EUROPEAN SPACE AGENCY
DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT
MISSION OPERATIONS DEPARTMENT

INTEGRAL
Mission Report

INT-MOC-SYS-RP-1001-OPS-OAI

No. 272
Week 49

10.12.07

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 01.12.07 until 07.12.07 (both dates inclusive) and covers the revolutions 627, 628 and 629.

2 Summary of Activities

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

The targets of these revolutions consisted of a raster dither of the North Ecliptic Pole (RA 18:00:00.00, DEC +66:33:39.0), and two 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.

The Thrusters calibration, in synch with the winter eclipse season, was successfully executed on 05/12/2007.

Five slews were missed from TL, during the observation period, due to problems on the antenna at Goldstone, MCS and S/T process.

The fuel consumption over the period between 01/12/2007 and 07/12/2007 was 0.1180 Kg. The remaining propellant is in the order of 143.4135 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.

On DoY 336 (2/12/2007) at 21.31z, the following parameters changed status from ON (1) to OFF (0):

- P3004 BCR1 ON/OFF STATUS
- P3005 BCR2 ON/OFF STATUS

At the same time the battery charge current fell from its nominal value of 0.1A to 0.0A. After checking the status of the EPS, the BCRs were switched back on. Following this the battery trickle charge current returned to its nominal value of 0.1A for each battery. There was no impact.

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.

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

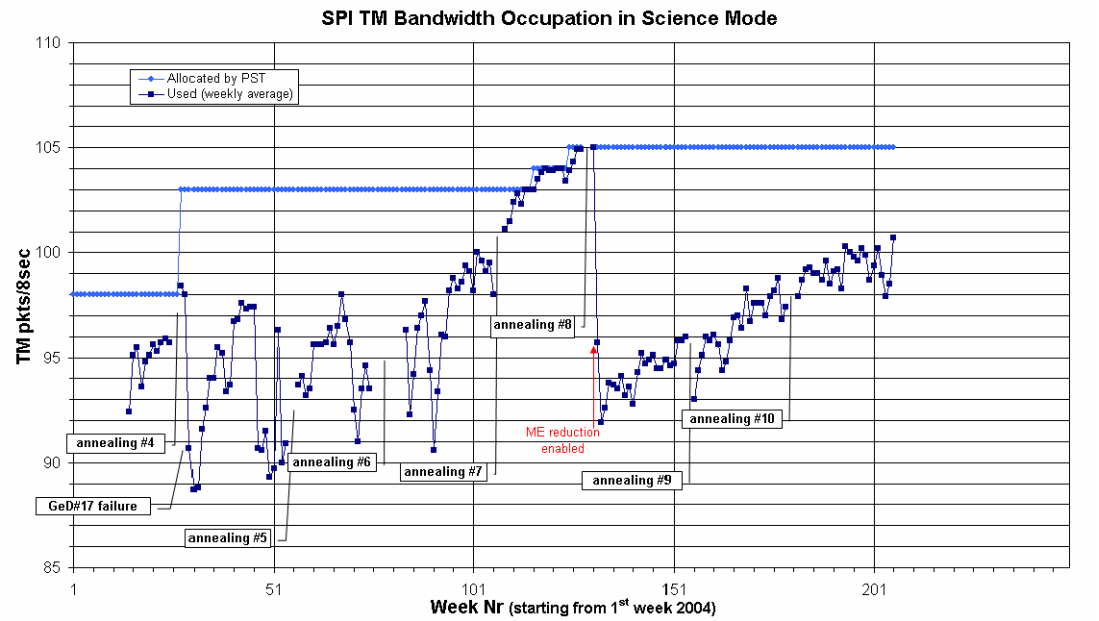
3.2.1 SPI

Following the 10th annealing, which ended on 17th June, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution 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 105 packets/cycle. The average telemetry occupation when the TM allocation was 105 packets/cycle was 100.7 packets/cycle.

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



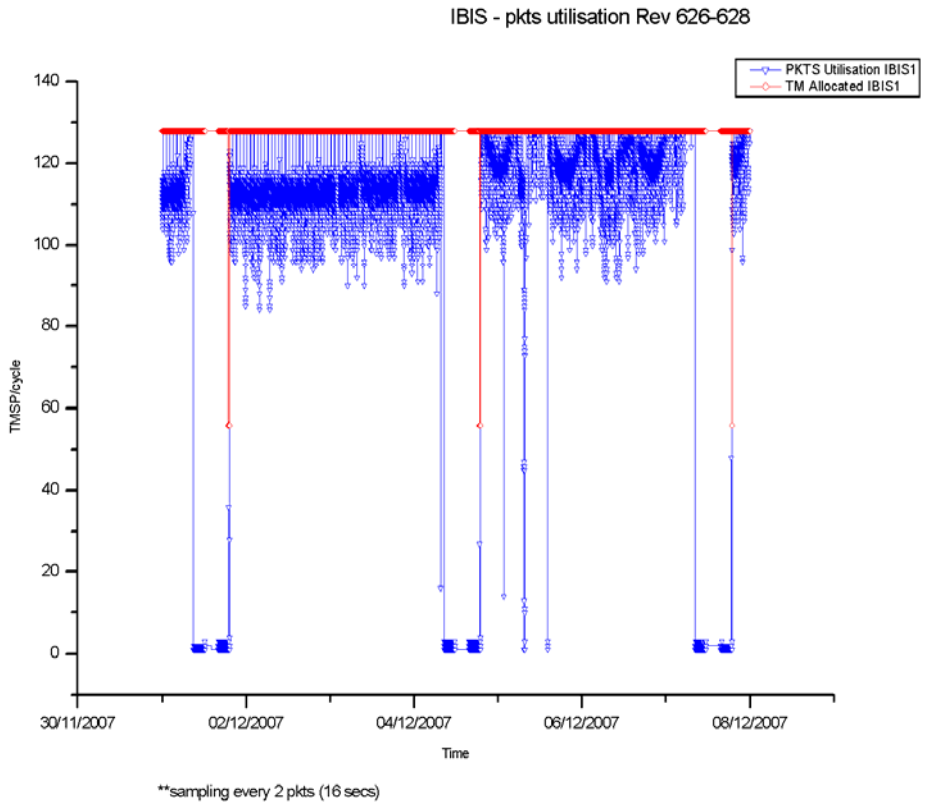
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

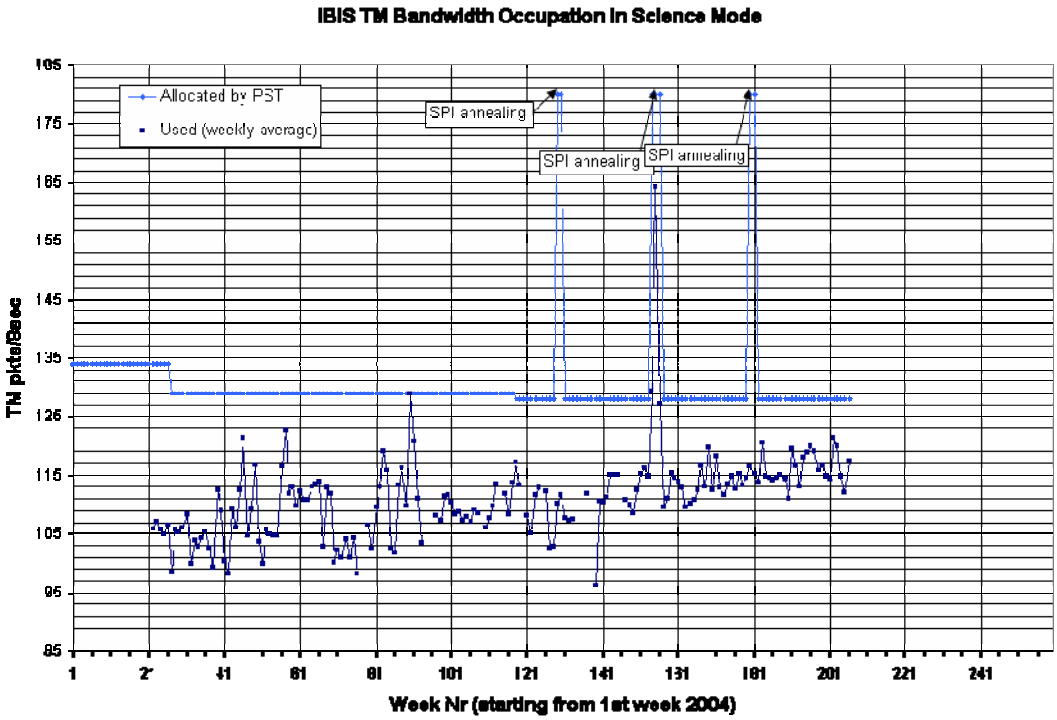
The overall status of the unit is nominal.

During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period (when IBIS was in Science mode) was 117.52 TMPS/cycle, up 5.48 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. JEM-X2 was dormant (DPE OFF) with no TM slots allocated.

Note: Some more information concerning the JEM-X operations is provided in the Appendix.

3.2.4 OMC

The status of OMC is nominal.

OMC operations were performed by the automatic Timeline. OMC was operated in Science Normal mode during science observations, with a TM allocation of 5 packets/cycle.

During this reporting period, 163 of the 166 planned science pointings for OMC were executed nominally, 1 was shortened and 2 were lost.

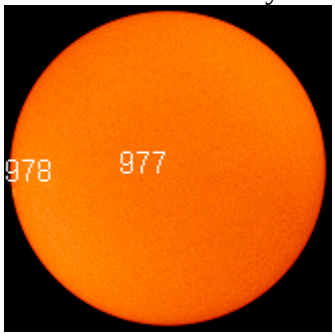
Note: Some more information concerning the OMC operations is provided in the Appendix.

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 and dissipated during the week, numbers 976, 977 & 978. None of these spots was large, and the risk of solar flares was very low.



Reference: www.spaceweather.com

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

4 Ground Facilities

The Operational ground facilities performance was very good this week. Two pointings were lost, and another shortened due to ground problems. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week. There were two occasions when the FD slew update after a Reaction Wheel Bias failed to arrive, these led to data loss. The overall performance was well over the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were, however, 1 occasion of a TM drop from Redu, 1 from DSS24 and an incident when DSS27 stopped tracking, which led to the loss of a pointing. The overall performance was well over the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSFs have been received for revolutions 634-637.

Revolutions 633-636 have been planned, but it was found that revolutions 634ff will need to be replanned. Due to a pending TOO the replanning was not done during the week.

The TSF for revolution 631 has been received.

2. Observation status

ECS for Revolutions 616-6618 have been received and processed.

3. ISOC Science Data Archive

No news.

4. ISOC system

V 16.2 was successfully tested for a planned release Monday, 10 December.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 10/12/2007:

- Latest Standard Analysis completed: observation 05200260001 (mid-latitude 1 region, Revolution 616-617) on 08/12/2007.

- Latest products archived: observation 05200260001 (mid-latitude 1 region, Revolution 616-617) on 08/12/2007.

- Latest observation products sent to the observer: observation 05200260001 (mid-latitude 1 region, Revolution 616-617) on 10/12/2007.

5 Special Events

6 Anomalies

The following problem was reported that impacted operations:

- On DoY 338, at 18:30, no FD slew update arrived for the first slew of the revolution. The Timeline was suspended, and a manual slew executed. There was no impact.
- On DoY 340, at 02:19, no FD slew update was received for pointing 06280042. The Timeline was suspended, and a recovery performed. The impact was a shortening of that pointing from a scheduled 2000 to 1440 seconds
- At 09:45, DSS-27 stopped tracking, although the carrier was not lost. A recovery was performed, the impact was the loss of pointing 06280054. Later a problem with a guide star led to the loss of pointing 06280056.

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

AR id	Date Created	Subject	Segment	Status
INT_SC-214	2007-12-03	BCR1 and 2 Spurious Switch-off	Platform	Pending
INT-2965	2007-12-06	ERT offset at VIL2, compared to other Integral stations.	ESA Stations	Pending
INT-2966	2007-12-04	ERT Offset at REDU when using TMTCS compared to TMP.	ESA Stations	Pending
INT-2967	2007-12-06	DSS27 stop tracking belt exit	NASA Station	Pending
INT-2968	2007-12-06	LOST TM & TC capability while DSS27 tracking	NASA Station	Pending
INT-2972	2007-12-04	FDS: missing update first slew rev 628	FDS	Pending

7 Future Milestones

The following activities are foreseen in the next few weeks.

- A SPI annealing activity is foreseen to be performed during revolution 641..

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 627

The observations in revolution 627 consisted entirely of a raster dither of the North Ecliptic Pole (RA 18:00:00.00, DEC +66:33:39.0), lasting ~58.0 hours.

Revolution 628

The observations in revolution 628 consisted entirely of a raster dither of the Cygnus Region (RA 20:35:53.00, DEC +40:39:49.0), lasting ~49.4 hours.

Revolution 629

The observations in revolution 629 consisted entirely of a raster dither of Cygnus Region (RA 20:35:53.00, DEC +40:39:49.0), lasting ~56.7 hours.

Throughout these observations, all instruments were in their nominal science modes, except JEM-X2, which is switched off. The TM allocation was IBIS 128; SPI 105; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

```
2007-11-16T17:41:14.000Z     143.7260    F   Automatic TM processing.
2007-11-18T03:20:37.000Z     143.7039    F   Automatic TM processing.
2007-11-19T17:38:49.000Z     143.6869    F   Automatic TM processing.
2007-11-20T02:44:42.000Z     143.6575    F   Automatic TM processing.
2007-11-22T17:28:02.000Z     143.6284    F   Automatic TM processing.
2007-11-24T02:35:18.000Z     143.6118    F   Automatic TM processing.
2007-11-25T17:02:42.000Z     143.5963    F   Automatic TM processing.
2007-11-27T02:20:37.000Z     143.5719    F   Automatic TM processing.
2007-11-28T17:01:14.000Z     143.5549    F   Automatic TM processing.
2007-11-30T02:19:09.000Z     143.5315    F   Automatic TM processing.
2007-12-01T16:37:29.000Z     143.5174    F   Automatic TM processing.
2007-12-03T02:26:05.000Z     143.5051    F   Automatic TM processing.
2007-12-05T08:28:03.000Z     143.4804    F   Automatic TM processing.
2007-12-05T13:00:00.000Z     143.4593    F   After thruster torque
calibration
2007-12-05T13:33:07.000Z     143.4298    F   Automatic TM processing.

This report was generated  Fri Dec 7 08:00:18 GMT 2007
```

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, 01/12/2007 – 07/12/2007

The AOCS operations were executed from the Automatic Timeline.

During this period, 47 Open Loop Slews, 126 Closed Loop Slews and 7 Momentum Biases were executed.

5 slews (4 CSL, 1 OSL) were missed from TL, during the observation period, due to a problem with the Antenna on DSS, IMCS and S/T process.

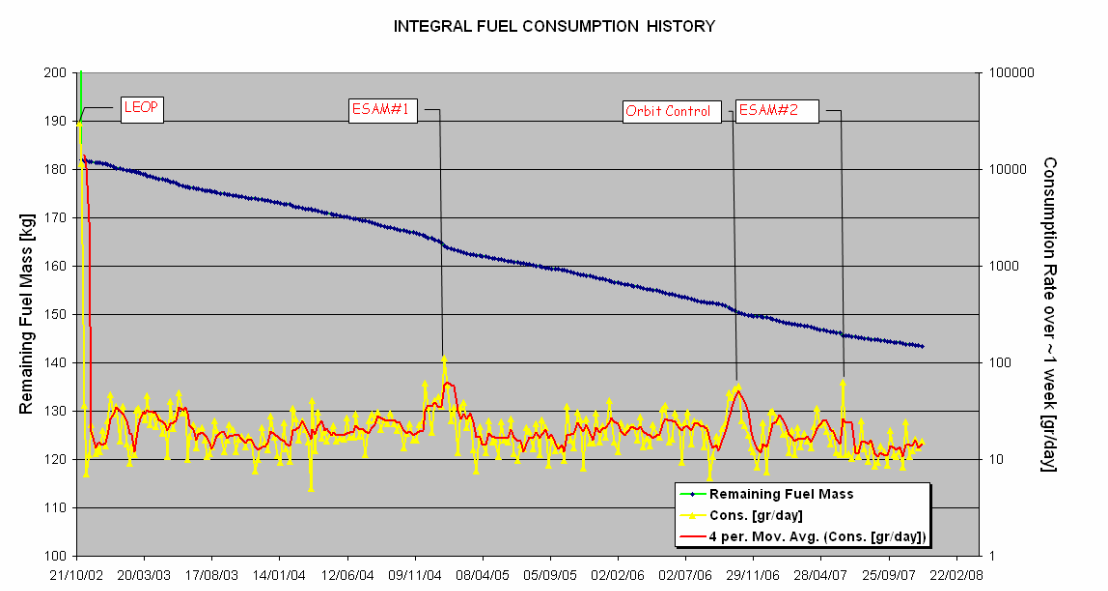
This is equivalent to ~ 2.8 % of the total number of slews planned (174).

Orbit Control

No update.

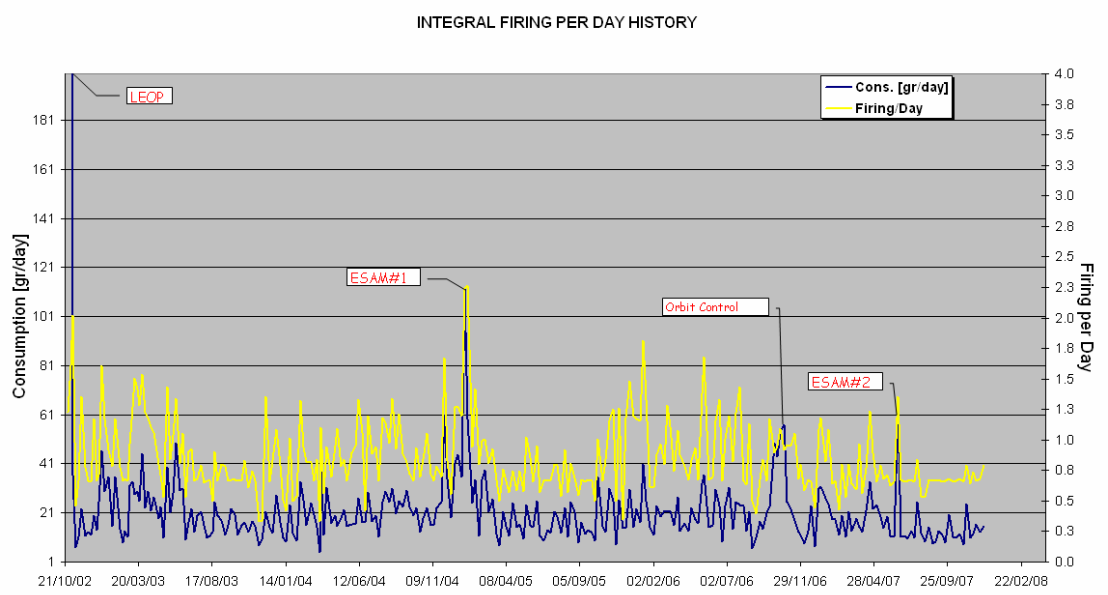
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 07/12/2007 is reported in the plot below.



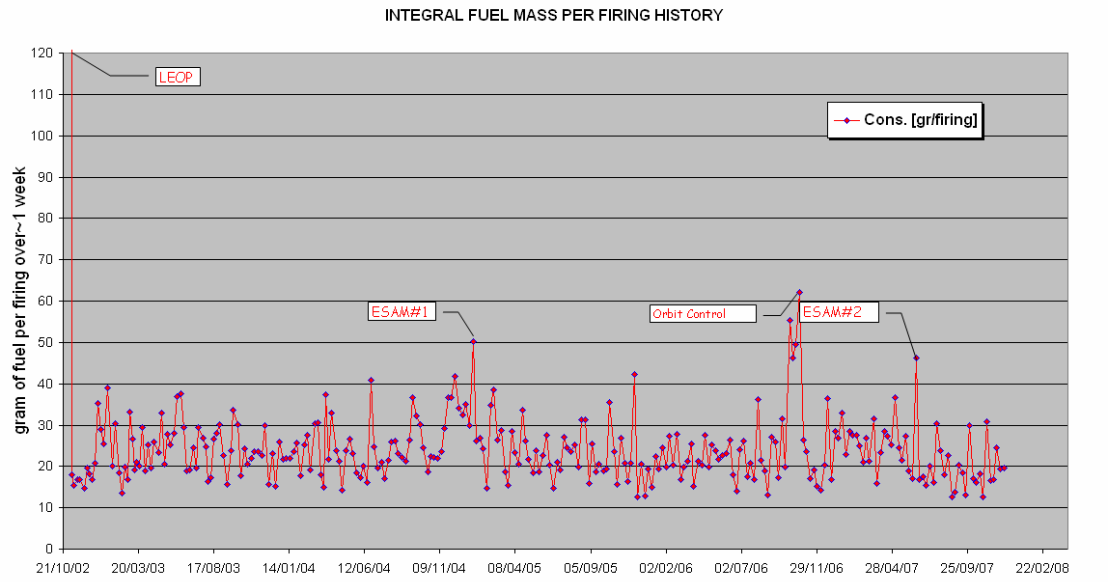
The plot above consider the ESAM fuel consumption spread over period of ~1 week.

The firing per day over the period between 01/11/2002 and 07/12/2007 is reported in the plot below.



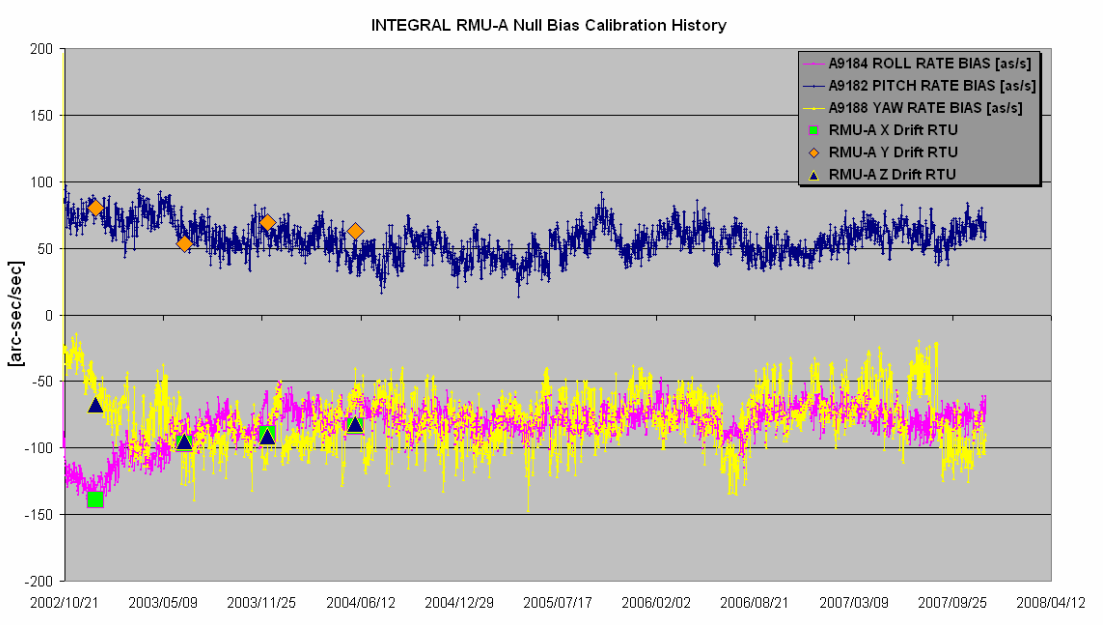
The plot above considers the ESAM fuel consumption spread over period of ~1 week.

The fuel per firing over the period between 01/11/2002 and 07/12/2007 is reported in the plot below.



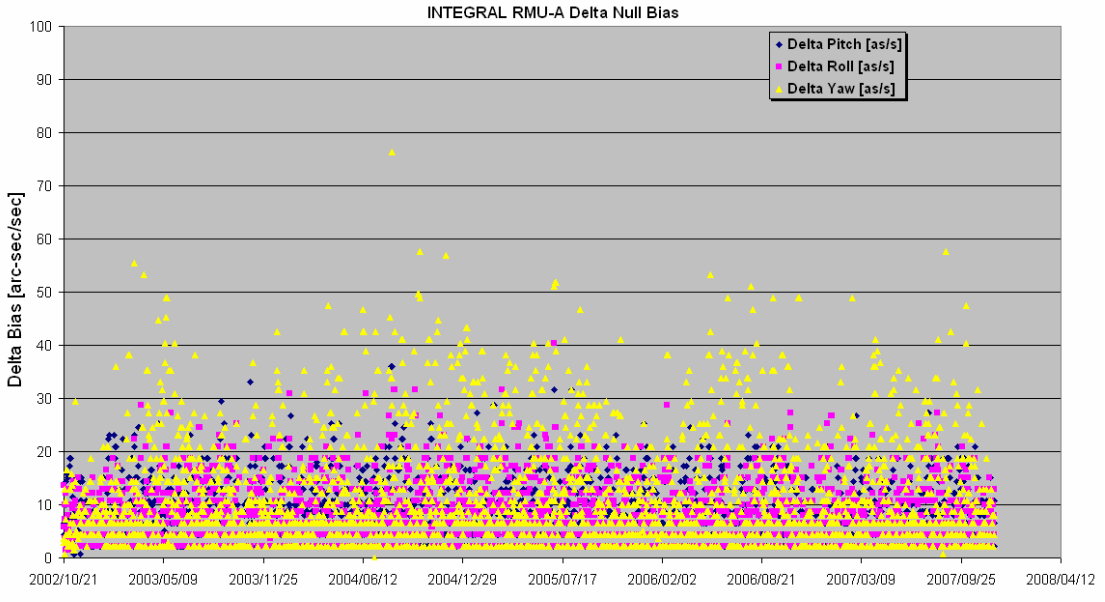
The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 30/11/2007 is reported in the plot below.



The evolution of the drift on yaw channel is under constant monitoring.

The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 30/11/2007 is reported in the plot below.



01/12/2007 (Day of Year 335, Revolution 626-627)

Nothing to report.

02/12/2007 (Day of Year 336, Revolution 627)

Nothing to report.

03/12/2007 (Day of Year 337, Revolution 627)

Nothing to report.

04/12/2007 (Day of Year 338, Revolution 627-628)

FDS missed update generation: at 18:30z the automatic update of the slew 06280001 was missed: this occurred right after the execution of the first RWB. No error on FDS reported and apparently no automatic job scheduled. Requested FD investigation (AR INT-2972)

The slew 06280001 was manually updated in TL.

No impact on TL.

05/12/2007 (Day of Year 339, Revolution 628)

Thrusters Torque Calibration: the Thrusters calibration was executed according to EPOS for revolution 628_05.The calibration was performed based on the following timeline:

Time	Event	Execution
2007-12-05 T08:16:59Z	Engineering Window Open	Timeline
	AOCS and FD engineers requested	
2007-12-05 T08:16:59Z	ED AECGS_00 Change of guide star before the execution of the RWB to meet the pointing requirements (FCP_AOC_0529)	Timeline
2007-12-05 T08:21:59Z	ED AERWB_00 Reaction Wheel Bias Manouvre to set the wheel speeds at RW2=+2000 rpm, RW3=+2000 rpm, RW4=-2000 rpm (RW1 not used)	Timeline
	Verify the automatic update of the next slew!	
2007-12-05 T08:47:40Z	ED AECSL_00 Corrective Closed Loop Slew (FCP_AOC_0520) Verify SSL enabled. IF lost of guide star, re-generate SSL	Timeline
2007-12-05 T08:53:48Z	ED AESAM_00 Mapping (FCP_AOC_0531)	Timeline
2007-12-05 T09:11:59Z	Verify that the CGS has not the same star picked after CSL. ED AECGS_00 Change of guide star before the execution of the Thruster Calibration to meet the pointing requirements (FCP_AOC_0529) PT1=6.75 bar PT2=6.97 bar PT3=14.86 bar ALPHA=0.01 deg BETA=-17.83 deg	Timeline

	RW1=NU RW2=+2010 RW3=+2017 RW4=-1967	
THRUSTER CALIBRATION Manual Thruster Calibration Operations Reference:INT-PR-MMB-0005, OO_017		
2007-12-05 T09:30:00Z	**Start of Manual Thruster Calibration Operations (FCP_AOC_1520)**	
09:30:00Z	Reset the TIMs accumulators (step 1-3.1 FCP_AOC_1520) **WAIT** 20 minutes of RW data collection to estimate the external torques. Inform ISDC to disable the IBAS system. Set FCV-A ON (step 3.2 FCP_AOC_1520)	
09:50:00Z	**First execution** of the RCS_A thruster calibration sequence (FCP_AOC_1520). On loading TC sequence AS0715, the input value for the formal parameter THR_TIME shall be **564** raw (equivalent to **137.616** msec, where the quoted figure is the output of FD estimates* rounded down to the nearest 244ms LSb.). **NOTE: Sequence shall be uplinked with INTERLOCK DISABLED** **NOTE: verify that the release time in the sequence is consistent with the procedure and <u>NO SET ASAP</u>** **NOTE: the IMCS will ask authorization before commanding having the TC_seq Hazardous TCs.** NOTE: possible occurrence of OEM APID 640 Class 0 ID 48<<ROLL ERR>>, ID 49<<PITCH ERR>>, ID 50<<YAW ERR>>. Due to an over generation of OEMs, potential OOL A5702 (Mod 4096 counter) →download on board OEMs (TC A1091 A1092) Execution duration is ~34 minutes. * on the basis of estimated fuel mass and tank temperature on the 29/11/2007	Manual

10:24:00Z	**WAIT** 20 minutes for IPS settling and RW data collection to determine the post-settling wheel speeds and external torques. Perform Manual Mapping, FCP_AOC_0531, and start Recovery Schedule Tool until attitude reconstruction process to generate the last ASF for ISDC. GUIDE STAR PT1=6.75 bar PT2=6.97 bar PT3=14.98 bar ALPHA=-0.02 deg BETA=-17.86 deg RW1=NU RW2=+2044 RW3=+2022 RW4=-2003	
10:44:00Z	**Second execution** of the RCS_A thruster calibration sequence (FCP_AOC_1520). On loading TC sequence AS0715, the input value for the formal parameter THR_TIME shall be **564** raw (equivalent to **137.616** msec, where the quoted figure is the output of FD estimates* rounded down to the nearest 244ms LSb). **NOTE: Sequence shall be uplinked with <u>INTERLOCK DISABLED</u>** **NOTE: verify that the release time in the sequence is consistent with the procedure** NOTE: possible occurrence of OEM APID 640 Class 0 ID 48<<ROLL ERR>>, ID 49<<PITCH ERR>>, ID 50<<YAW ERR>>. Execution duration is ~34 minutes.	Manual

11:18:00Z	**WAIT** 20 minutes for IPS settling and RW data collection to determine the post-settling wheel speeds and external torques. Perform Manual Mapping, FCP_AOC_0531, and start Recovery Schedule Tool until attitude reconstruction process to generate the last ASF for ISDC. GUIDE STAR PT1=6.75 bar PT2=6.97 bar PT3=14.74 bar ALPHA=-0.06 deg BETA=-17.88 deg RW1=NU RW2=+2078 RW3=+2024 RW4=-2040	
11:38:00Z	**Third execution** of the RCS_A thruster calibration sequence (FCP_AOC_1520). On loading TC sequence AS0715, the input value for the formal parameter THR_TIME shall be **564** raw (equivalent to **137.616** msec, where the quoted figure is the output of FD estimates* rounded down to the nearest 244ms LSb.). **NOTE: Sequence shall be uplinked with <u>INTERLOCK DISABLED</u>** **NOTE: verify that the release time in the sequence is consistent with the procedure** NOTE: possible occurrence of OEM APID 640 Class 0 ID 48<<ROLL ERR>>, ID 49<<PITCH ERR>>, ID 50<<YAW ERR>>. Execution duration is ~34 minutes.	Manual
12:12:00Z	**WAIT** 20 minutes for IPS settling and RW data collection to determine the post-settling wheel speeds and external torques. Perform Manual Mapping, FCP_AOC_0531, and start Recovery Schedule Tool until attitude reconstruction process to generate the last ASF for ISDC. GUIDE STAR PT1=6.75 bar PT2=6.97 bar PT3=14.50 bar ALPHA=-0.09 deg BETA=-17.90 deg RW1=NU RW2=+2104	

	RW3=+2026 RW4=-2072 Reset the TIMs accumulators Set FCV-A OFF	
2007-12-05T12:32:00Z	**End of Manual Thruster Calibration Operations**	
	Spare time Verify that the guide star is still suitable for the incoming RWB activity	
2007-12-05T13:26:59Z	ED AERWB_00 Reaction Wheel Bias Manouvre to set the wheel speeds at RW2=+3170 rpm, RW3=+1490 rpm, RW4=-2860 rpm (RW1 not used)	Timeline
	Verify the automatic update of the next slew	
2007-12-05T13:52:40Z	ED AECSL_00 Corrective Closed Loop Slew to the science attitude (FCP_AOC_0518)	Timeline
2007-12-05T13:58:48Z	ED AESAM_00 Mapping (FCP_AOC_0531)	Timeline
2007-12-05T14:16:59Z	Engineering Window close	Timeline

STR Search/Track process failed: at 13:54z the S/T process for the slew ID 06280023 failed (no star found) causing the slew to fail execution.

A manual recovery was performed from attitude of PID 06280022 to the attitude of PID 06280023 by generating the manoeuvre as a CSL (Close Loop Slew).

The next slew 06280023 was manually updated in TL.

At 14:37z the AOCS s/s was enabled in TL.

The following slew was missed in TL: 06280022(CSL)

06/12/2007 (Day of Year 340, Revolution 628)

FDS missed update generation: at 02:19z the automatic update of the slew 06280042 was missed: this occurred right after the execution of a RWB. No error on FDS reported and apparently no automatic job scheduled. Requested FD investigation (AR INT-2972)

A manual recovery was performed from attitude of PID 06280041 to the attitude of PID 06280042 by generating the manoeuvre as a CSL (Close Loop Slew).

The next slew 06280043 was manually updated in TL.

At 02:41z the AOCS s/s was enabled in TL.

The following slew was missed in TL: 06280042 (CSL)

Several problems affecting Antenna, IMCs and S/T process: at 09:45z the antenna at Goldstone stopped tracking causing the slew ID 06280054 to fail release.

A manual recovery was performed from attitude of PID 06280053 to the attitude of PID 06280055 but the slew uplink failed again due to a (known) problem on the IMCS Command Verifier task when same TC sequence is uplinked from the MANSTACK (to recover) and failing release at the same time (because AOCS s/s disabled) in AUTOSTACK.

A second recovery was attempted to the attitude of PID 06280055, this time successfully.

Later the slew ID 06280056 failed release again due to problem on the S/T process (star not found).

The slew was then manually recovered and the next slew ID 06280057 manually updated in TL.

At 11:21z the AOCS s/s was enabled in TL.

The following slews were missed in TL: 06280054(CSL)-55(OSL)-56(CSL)

Problems with guide star: at 13:57:53z a jump (~200 ccd units) in the pitch coordinates of the selected guide star occurred during the execution of PID 06280061, causing the OTF threshold in pitch axis to be exceeded.

The guide star was Mi 8.4 @ CCD [7614, -18806].

As foreseen by the IPS logic, the following OEM was generated:
<< ACC PITCH ERROR>> APID 640 ID 49 class EVENT (0)

The problem was generated by the guide star identified as ID 2676-1264. From the star catalogue resulted having two dim companions at few arcmins.

No impact on TL.

Problems with guide star: at 14:33:24z a jump (~170 ccd units) in the pitch coordinates of the selected guide star occurred during the execution of PID 06280062, causing the OTF threshold in pitch axis to be exceeded.

The guide star was Mi 8.4 @ CCD [15979, 12017].

As foreseen by the IPS logic, the following OEM was generated:
<< ACC PITCH ERROR>> APID 640 ID 49 class EVENT (0)

The problem was generated by the same guide star as for PID 06280061, identified as ID 2676-1264. From the star catalogue resulted having two dim companions at few arcmins.

No impact on TL.

Loss of guide star: at 17:46:05z a false event on the selected guide-star, occurred during the execution of PID 06280066 causing the loss of guide star. The guide star was Mi 7.8 @ CCD location [7924, 2987]. A jump to CCD location [8428, 3538] was reported shortly in TM.

As foreseen by the IPS logic, the ACC switched ON the IMU 1, a new automatic mapping was commanded and a new guide star picked.

As effect of the IMU 1 ON activation, was observed a jump in the speed for RW2 when the control passed from the STR to the IMU1. The change in the RW2 speed was on the order ~100 rpm.

The event occurred just before the starting of slew ID 06280067, preventing the stop of the slew commanding. The automatic mapping started after the IMU1 activation did find a new guide star Mi 7.8 @ CCD location [7512, 2434].

FD on-call verified the attitude after the slew execution.

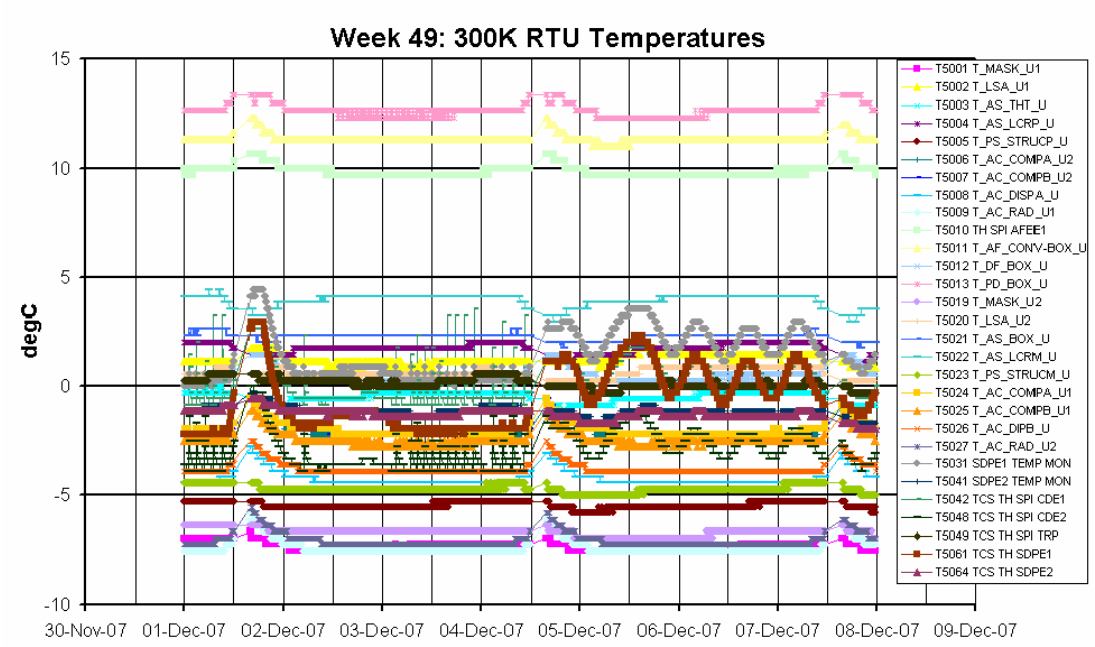
No impact on TL.

07/12/2007 (Day of Year 341, Revolution 628-629)

Nothing to report.

8.3.2 SPI Operations

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

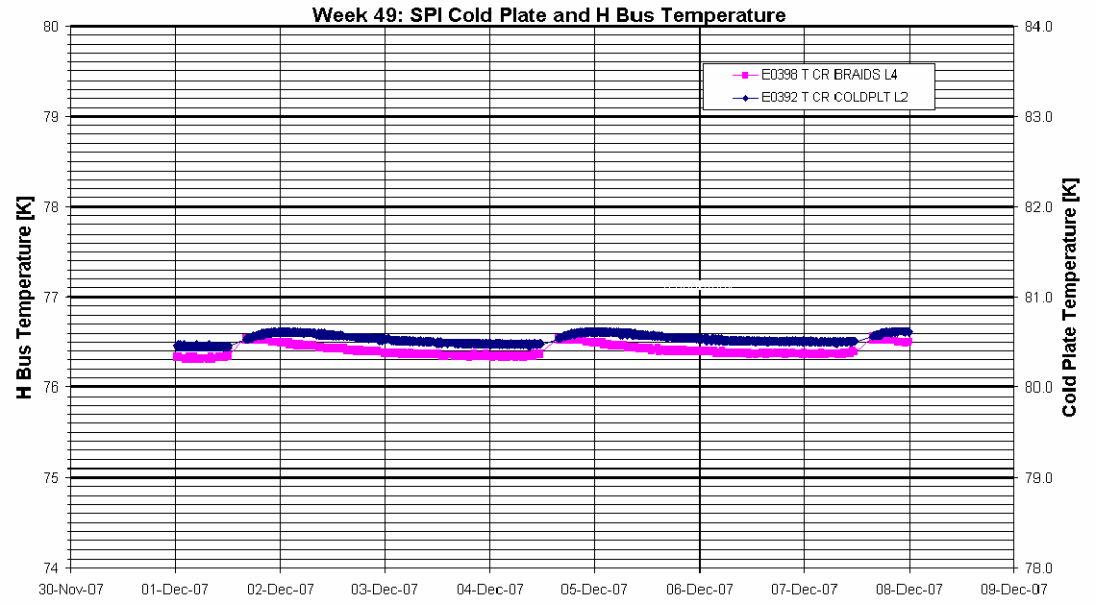


Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K.

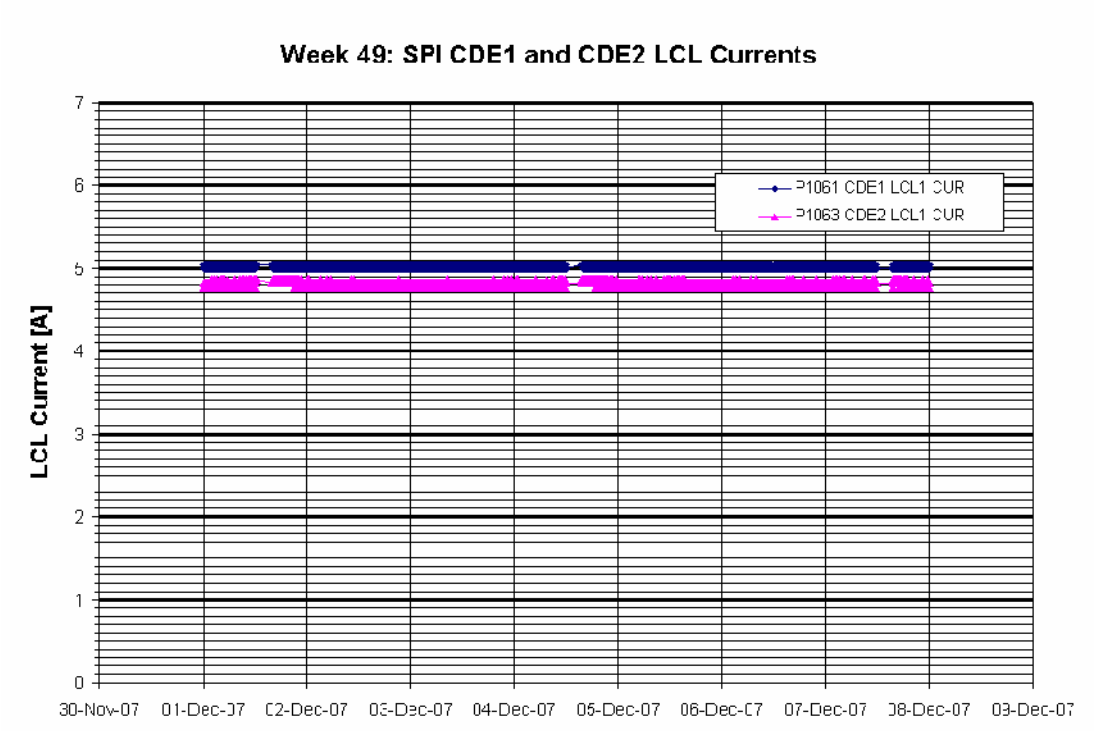
The stroke of all four compressors was set to 41 throughout the week. The average CDE LCL currents over the week were as follows:

- CDE1 LCL Current = 5.01A
- CDE2 LCL Current = 4.81A

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

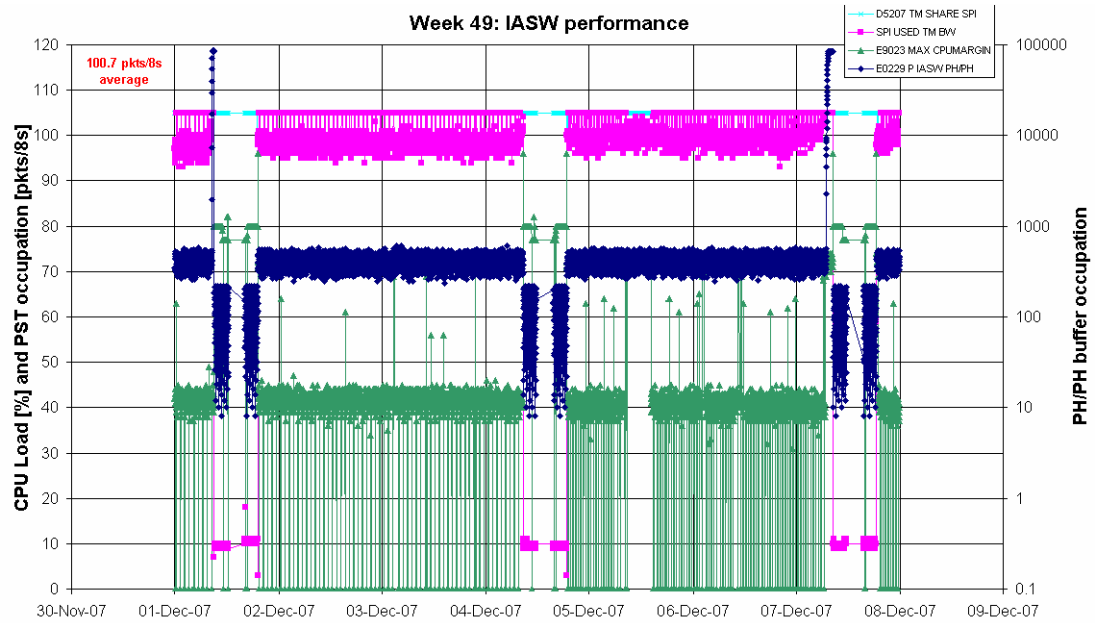


The following plot shows the evolution of the CDE currents during the reporting period.



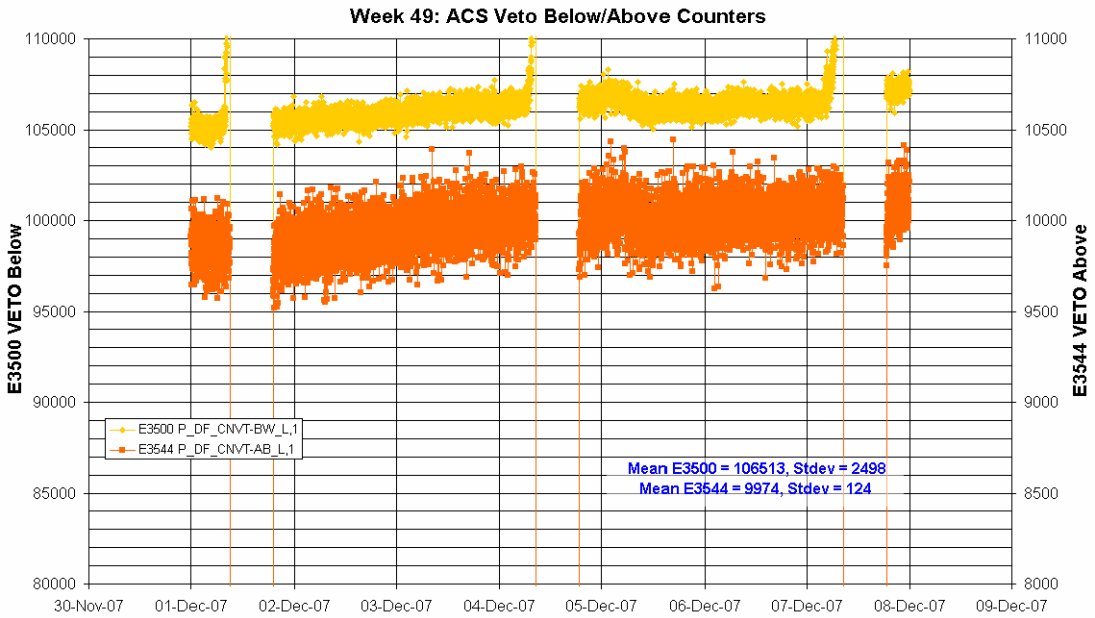
DPE & IASW: The DPE health and IASW performance is nominal. The IASW version installed is v433 patch #1 with the spectra scaling factor set to 8/19 SE. The average TM bandwidth occupation of SPI was 100.7 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

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



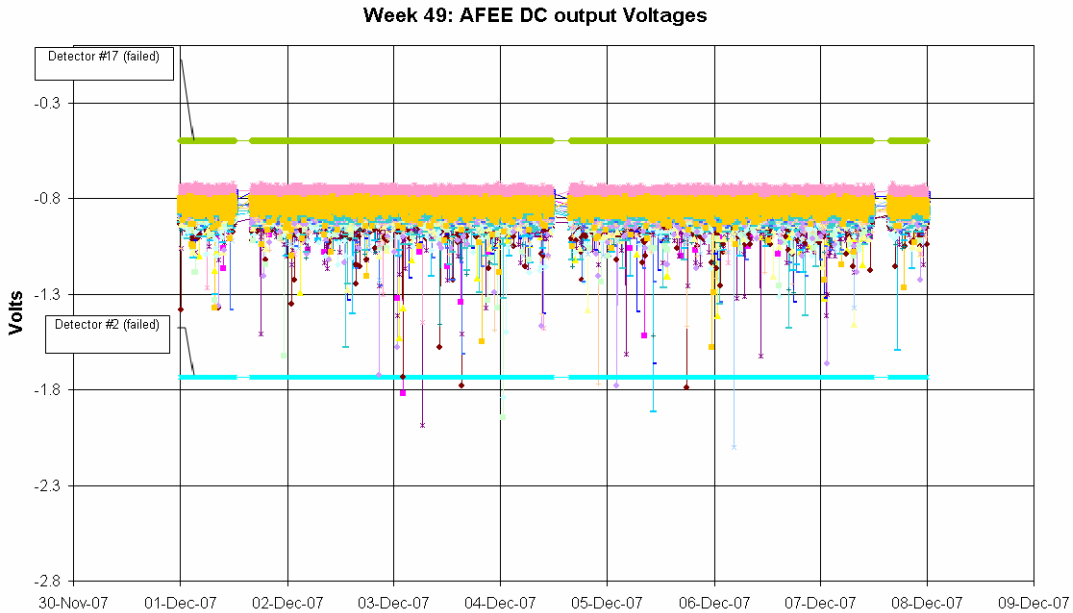
ACS: The performance of the ACS is nominal, except for FEE #81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

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

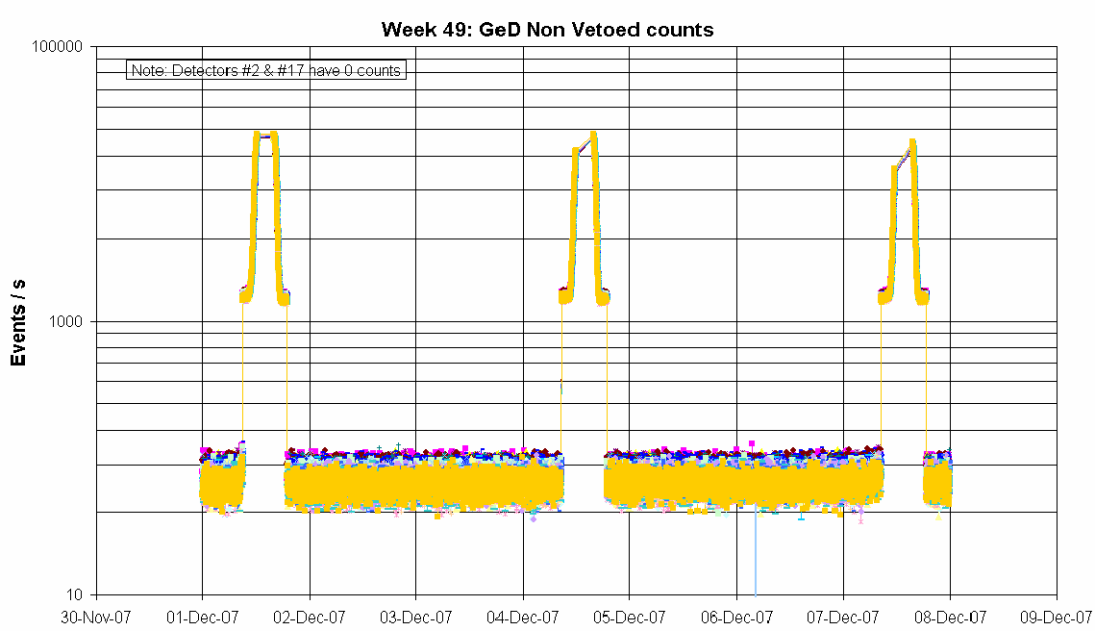


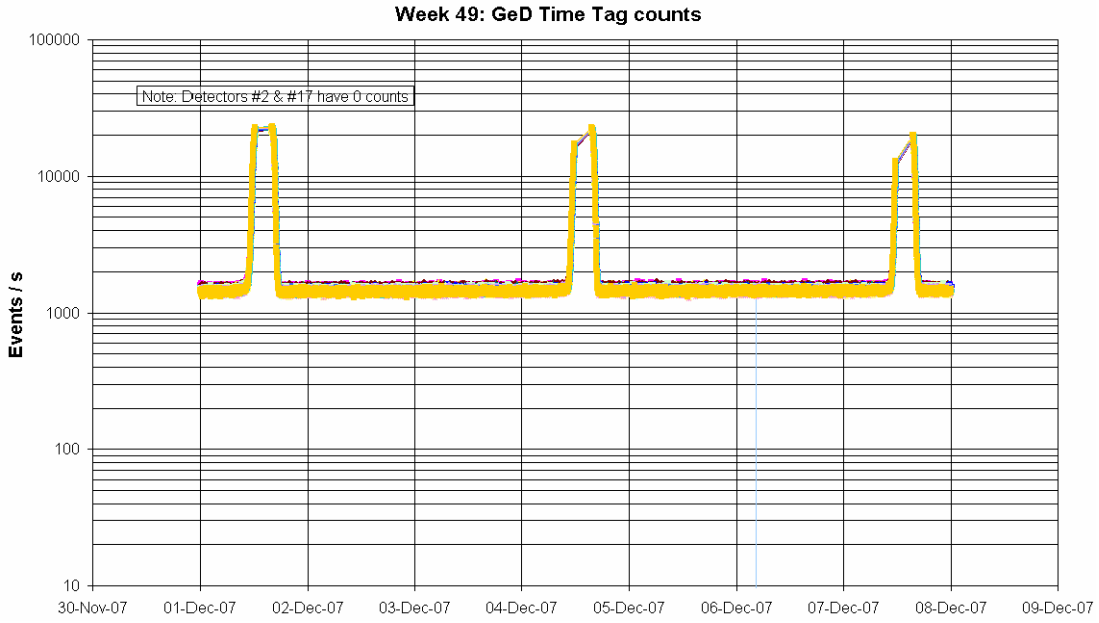
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

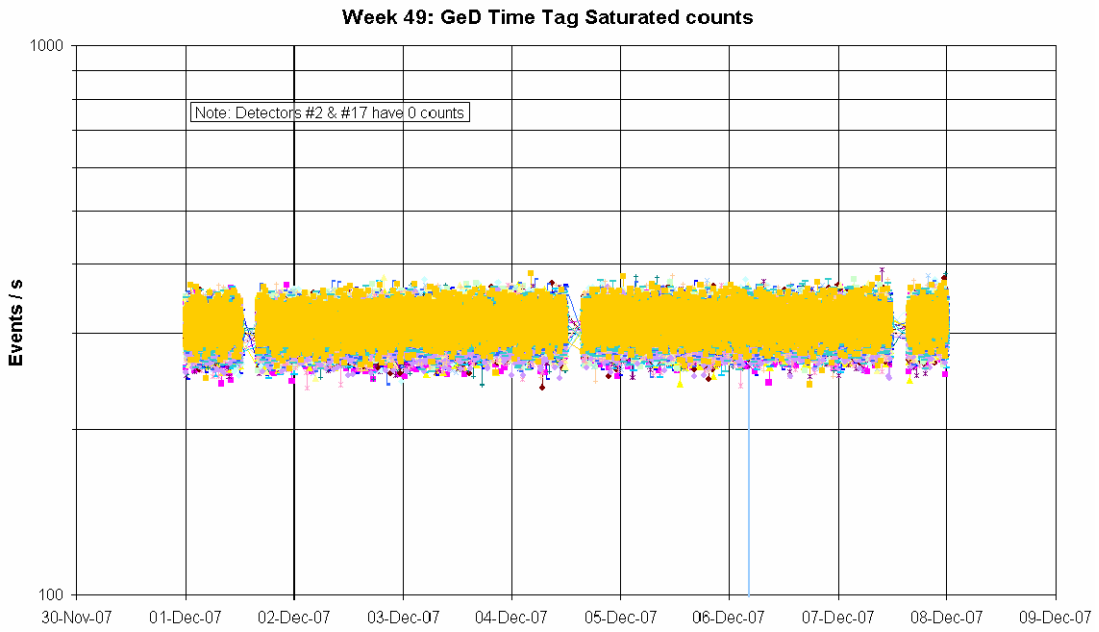
The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004.



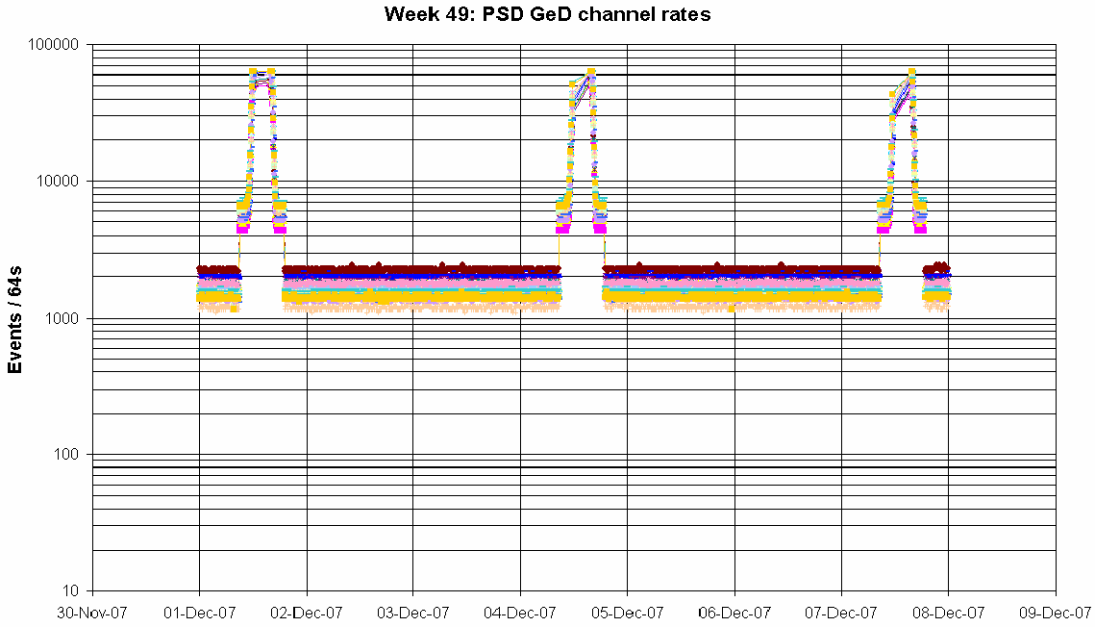
DFEE: The performance of the unit is nominal. The following plots show the Non Vetoed, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.


Week 49: GeD Non Vetoed counts
Note: Detectors #2 & #17 have 0 counts
Events / s
100000
1000
10
30-Nov-07
01-Dec-07
02-Dec-07
03-Dec-07
04-Dec-07
05-Dec-07
06-Dec-07
07-Dec-07
08-Dec-07
09-Dec-07


Week 49: GeD Time Tag counts
Note: Detectors #2 & #17 have 0 counts
Events / s
100000
10000
1000
100
10
30-Nov-07
01-Dec-07
02-Dec-07
03-Dec-07
04-Dec-07
05-Dec-07
06-Dec-07
07-Dec-07
08-Dec-07
09-Dec-07



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 during the reporting period:

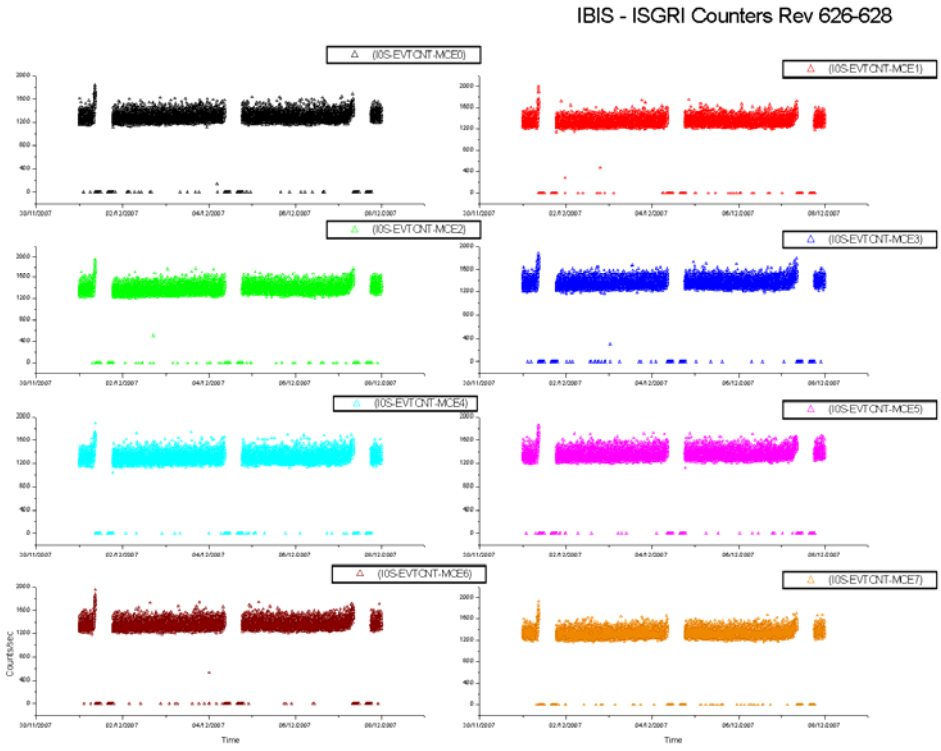
- 20 occurrences of OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED were received during the week. As they were all single occurrences, no action was taken.
- Due to high background radiation conditions before the expected radiation belt entry of revolution 626, on 2007-12-01 at 08:18:19Z TM parameter E3500 went OOL High, remaining OOL until radiation belt entry, at 08:56Z.
- Due to high background radiation conditions before the expected radiation belt entry of revolution 627, on 2007-12-04 at 08:12:44Z TM parameter E3500 went OOL High, remaining OOL until radiation belt entry, at 08:42Z.

- Due to high background radiation conditions before the expected radiation belt entry of revolution 628, on 2007-12-07 at 07:59:00Z TM parameter E3500 went OOL High, toggling OOL until radiation belt entry, at 08:30Z.

8.3.3 IBIS Operations

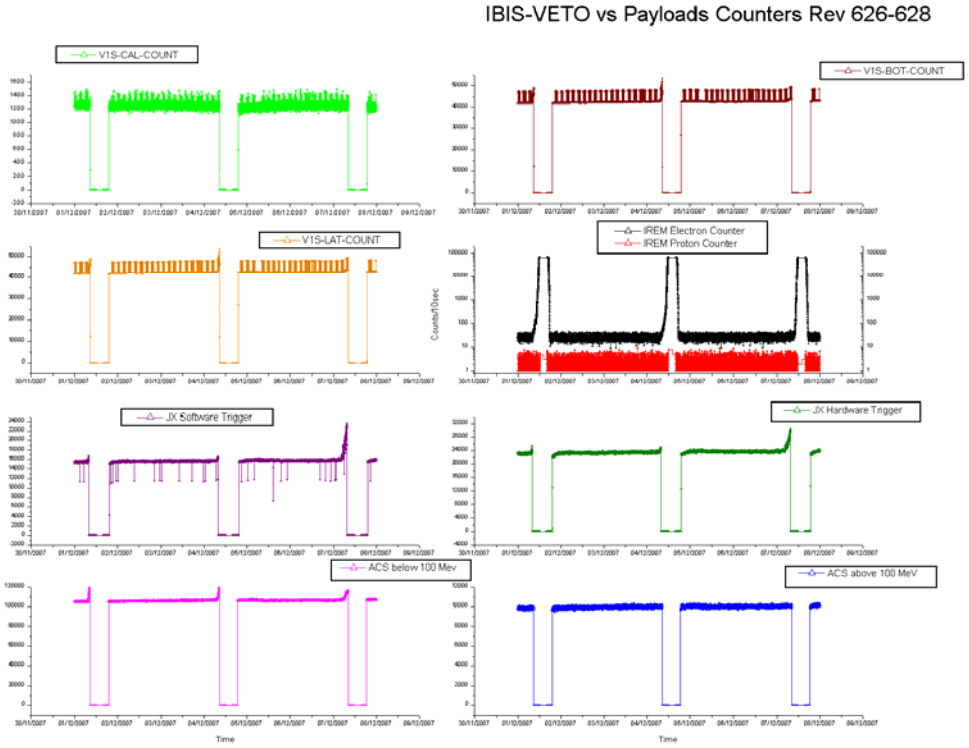
IBIS Event Counters Plots

ISGRI Counters:



**sampling every 4 pkts (32 secs)

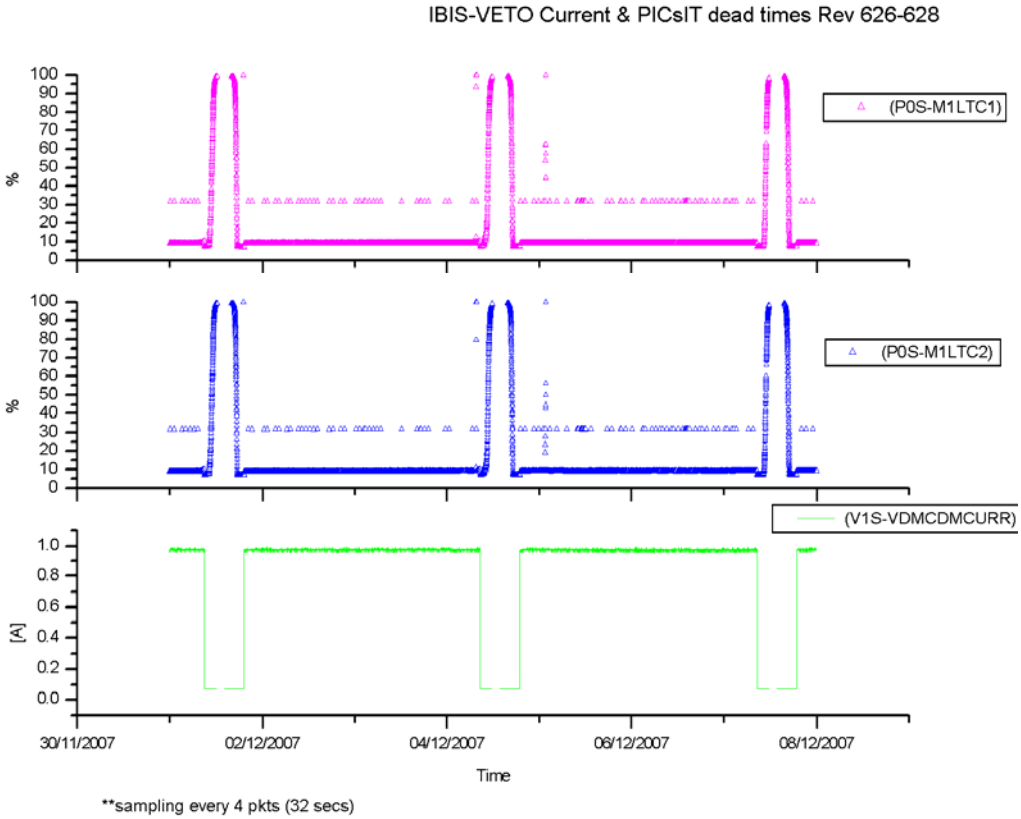
VETO vs Payloads Counters:



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

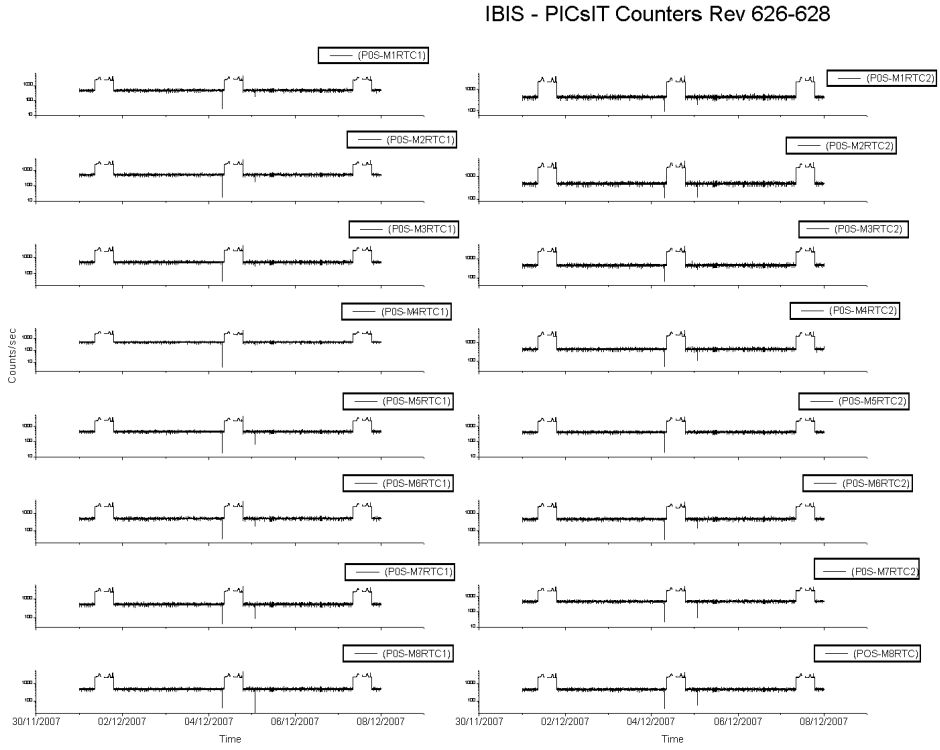
The week was characterised by low radiation as reported by the payload.

VETO Current:



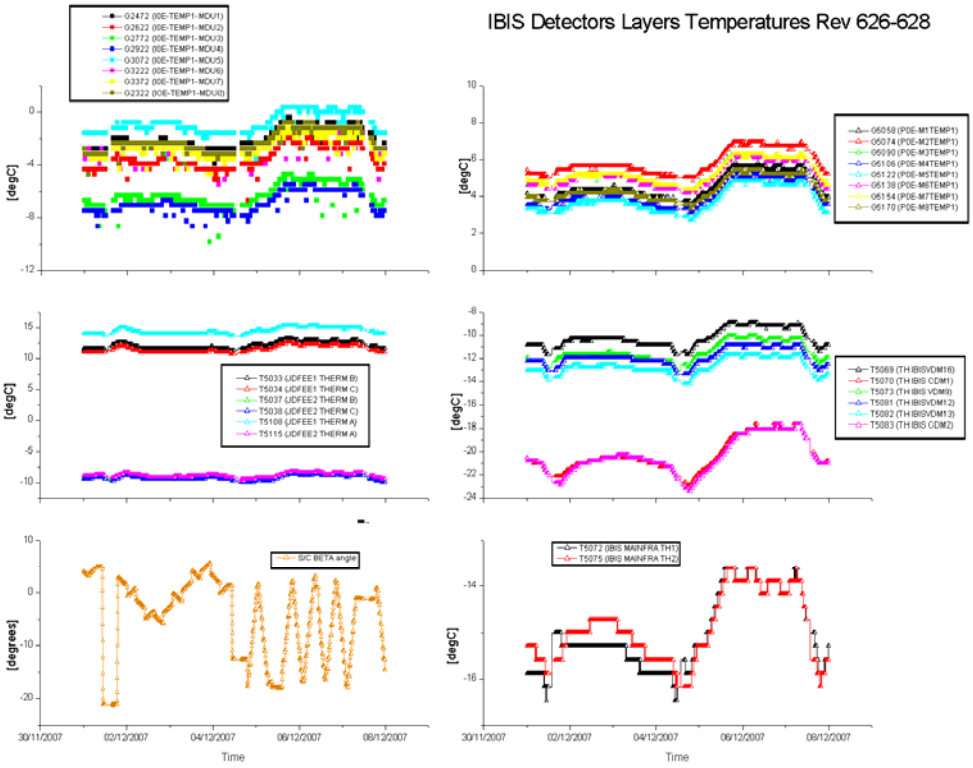
**sampling every 4 pkts (32 secs)

PICsIT Counters:



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:



**sampling every 8 pkts (64 secs)

IBIS daily report:

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

In addition, throughout the week, TM parameter G8080 went OOL Warning High several times. This is the valid event rate on HBRA. As at each occurrence it remained OOL for only 1 TM cycle, no action was taken. This indicates an overflow in the counters and affects only the quality of the scientific data but not the safety of the instrument.

2007-12-01 (DOY 335, Rev 626-627)

At 19:09:19Z, just after radiation belt exit of revolution 627, TM parameter G2111 went OOL Low (value = 0). This is the number of events triggering the MCE7 per second. As it returned within limits at 19:10:15Z, no action was taken.

2007-12-02 (DOY 336, Rev 627) to 2007-12-03 (DOY 337, Rev 627)

IBIS operations executed nominally.

2007-12-04 (DOY 338, Rev 627-628)

At 07:38:47Z, the TM parameters families G5002 and G5003 for the PDM semi-module counters went OOL (value = 0) and at 07:38:52Z the TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semi-module FIFO error flags. As these were followed at 07:42:02Z by OEM APID 1280 ID 132 EVENT IBIS1 IASW HEPI RESYNCHRONIZED, indicating that HEPI resynchronised autonomously, by which time all the above parameters had returned within limits, no action was taken.

At 18:38:31Z, during the execution of the ED GEISCL03 before radiation belt exit of revolution 628, TM parameter G2041 went OOL Low (value =0). This is the number of events triggering the MCE2 per second. As it returned within limits at 18:39:51Z, no action was taken.

2007-12-05 (DOY 339, Rev 628)

At 01:37:16Z the TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semi-module FIFO error flags. At 01:40:31Z, the TM parameters families G5002 and G5003 for the PDM semi-module counters also went OOL (value = 0). As these were followed at 01:43:55Z by OEM APID 1280 ID 132 EVENT IBIS1 IASW HEPI RESYNCHRONIZED, indicating that HEPI resynchronised autonomously, by which time all the above parameters had returned within limits, no action was taken.

At 06:42Z, following a ground station handover, TM parameter X7500 went OOL, indicating a problem with the histogram process. The following recovery procedure

was then executed to force the histogram accumulation and download process to resume:

- 07:35:48Z FCP_IBIS1_0312
- 07:46:52Z TC G0129 uplinked to return IBIS to Science Standard mode.

IBIS operations continued nominally.

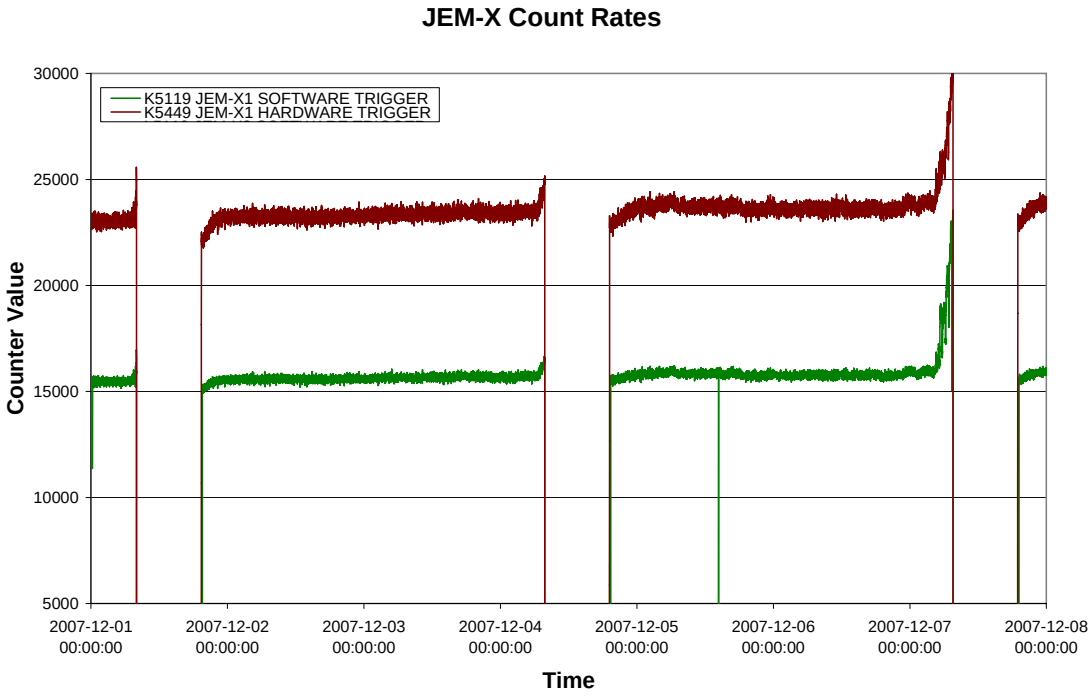
2007-12-06 (DOY 340, Rev 628) to 2007-12-07 (DOY 341, Rev 628-629)

IBIS operations executed nominally.

8.3.4 JEM-X Operations

JEM-X Count Rates

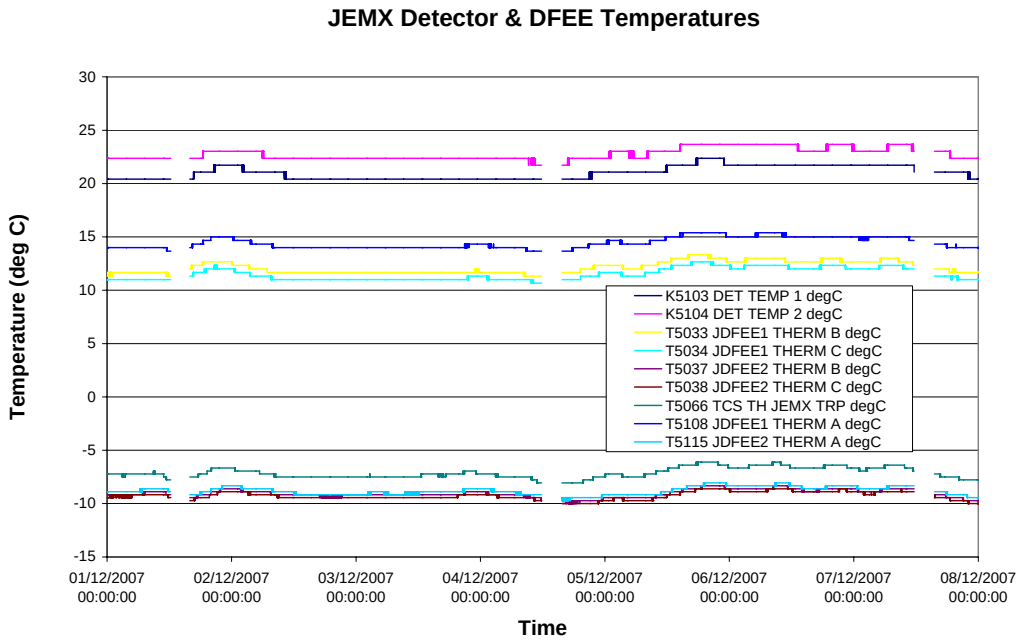
JEM-X count rates over the reporting period are displayed in the following graph[1].



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 graph[2].

[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

2007-12-01 (DoY 335, Rev 626-627) to 2007-12-06 (DoY 340, Rev 628)

JEM-X1 operations executed nominally

2007-12-07 (DoY 341, Rev 628-629)

From 07:26:03 to 07:35:23, in the run-up to the belt entry, there were repeated warnings about parameter K5449 being out of soft limit. No action was taken and there was no impact.

At around 13:45, and again at 14:11, there was the following group of alarms: K9037, K9200, K9201, K9202, K9203, K9207, K9208, K9210, K9211, K9215, K9216 & K9217 all went outside hard limits (on both occasions). No action was taken, and there were no impact.

8.3.5 OMC Operations

2007-12-01 (DoY 335, Rev 626-627) to 2007-12-04 (DoY 338, Rev 627-628)

Nothing to Report.

2007-12-05 (DoY 339, Rev 628)

At 09:58:28, TC M1329 Imaging-BX (CONFIGURE OMC FOR IMAGE PROCCESING- WINDOWS FOR TRIGGER SUB-MODE) was sent from ISDC. This command was rejected, as OMC was in Stand-by mode at the time. The following OEM was received.

```
2007.339.09.58.28.681   2007.339.09.58.37.738   1792   RealTime   131     TC REJECT
REJECTED TC1                                              0       0    65535   PR    N
E   E
```

There was no impact.

2007-12-06 (DoY 340, Rev 628)

At 02:19, a FDS problem forced the suspension of the Timeline. A recovery was performed, and the OMC commands manually upinked. The impact was a shortening of pointing 06280042, from a planned 2000 to 1440 seconds

At 09:45, an antenna problem caused the commanding to fail. At 09:54, the uplink was restored, and a recovery was performed. The impact was the loss of pointing 06280054. Pointing 06280055 initially also failed, but was manually uplinked, and executed in full.

At 10:19, due to an AOCS problem, the commands for slew 06280056 failed. A recovery was performed, and the Timeline rejoined at 11:21. The impact was the loss of pointing 06280056. It was around these times the following OEMs were received:

```
2007.340.10.23.37.233   2007.340.10.23.47.249   1792   RealTime   131     TC REJECT
REJECTED TC1                                          0       0    65535   PR    N
E   E
2007.340.10.23.43.483   2007.340.10.23.47.275   1792   RealTime   131     TC REJECT
REJECTED TC1                                          0       0    65535   PR    N
E   E
2007.340.10.58.53.234   2007.340.10.59.01.380   1792   RealTime   131     TC REJECT
REJECTED TC1                                          0       0    65535   PR    N
E   E
2007.340.10.58.59.484   2007.340.10.59.08.587   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 06280055 and 06280056.

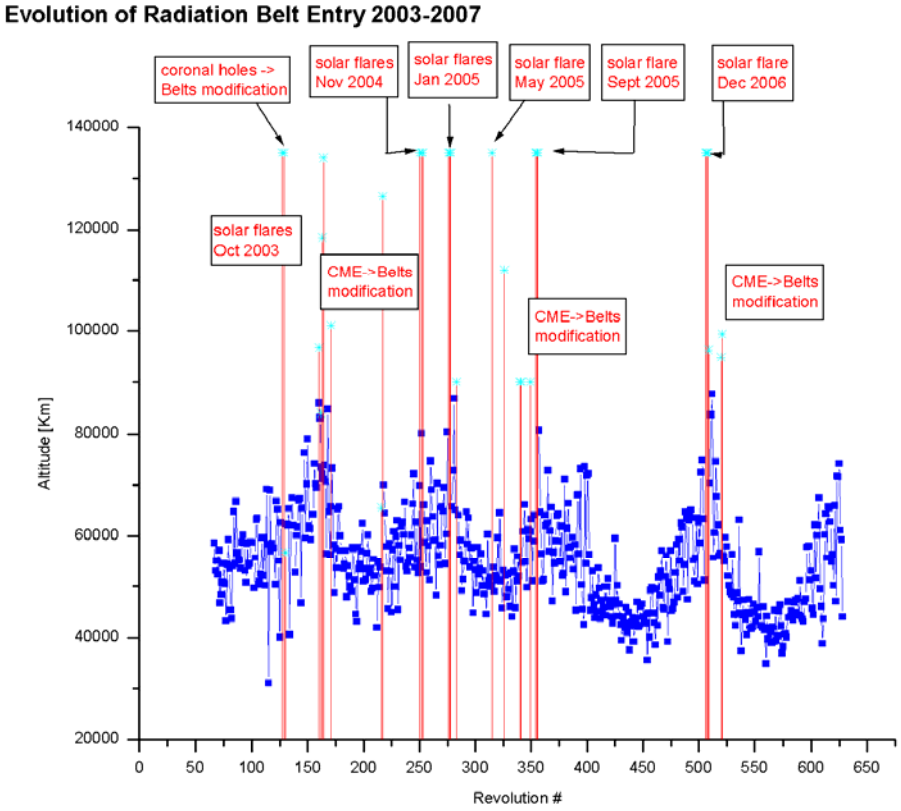
2007-12-07 (DoY 341, Rev 628-629)

Nothing to Report.

On DoY 335 at 08:56:09, DoY 338 at 08:42:33 and DoY 341 at 08:30:17 OMC went to SAFE mode nominally, at the radiation belt entry time as set in the Broadcast Packet.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

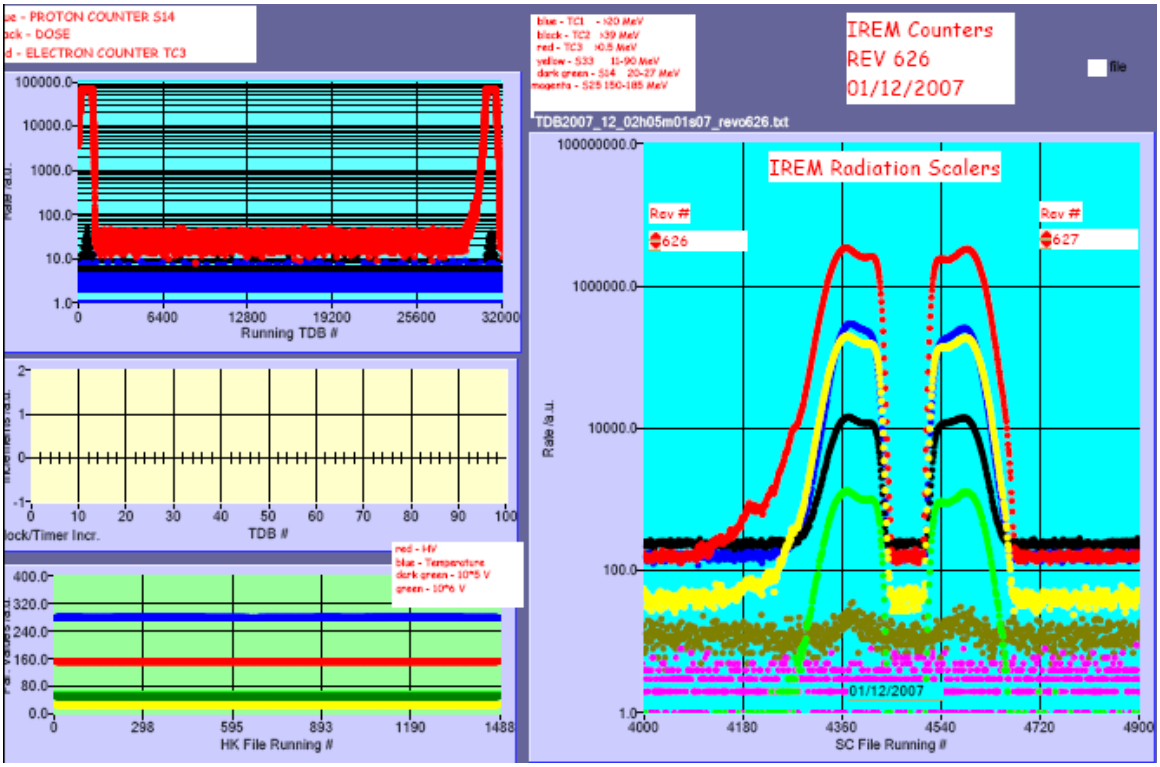
Nothing to report.

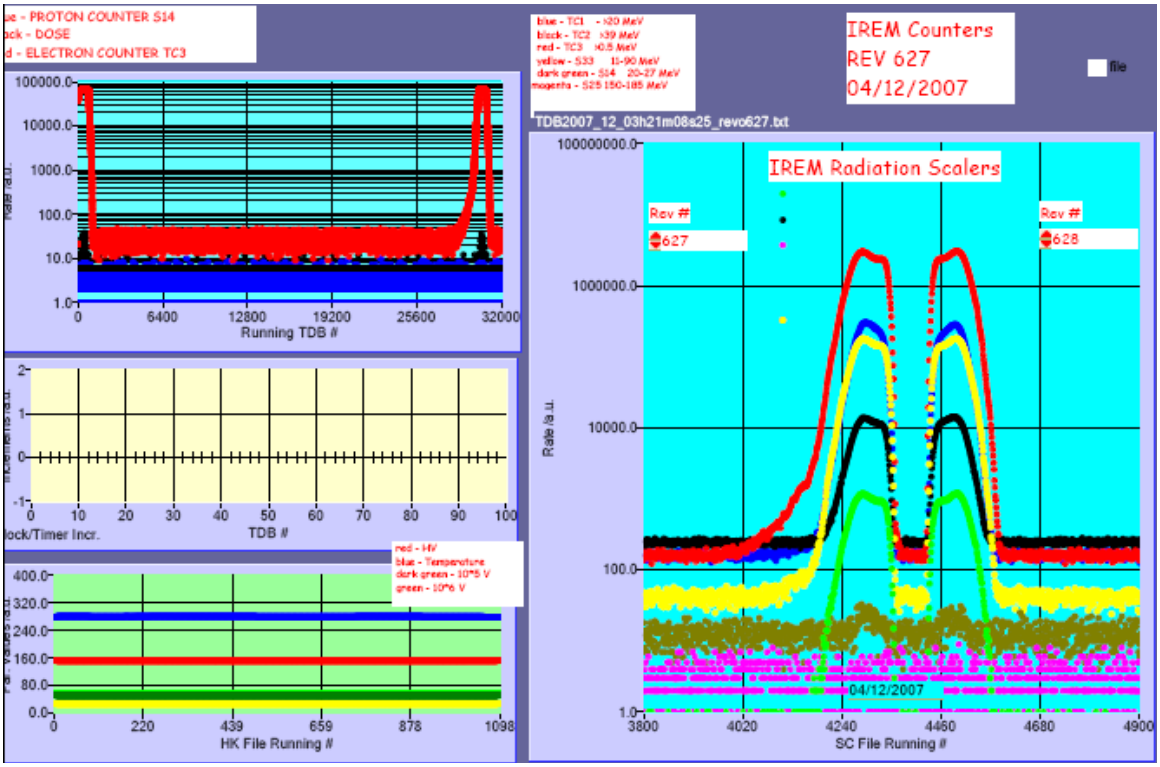
Electron Belts

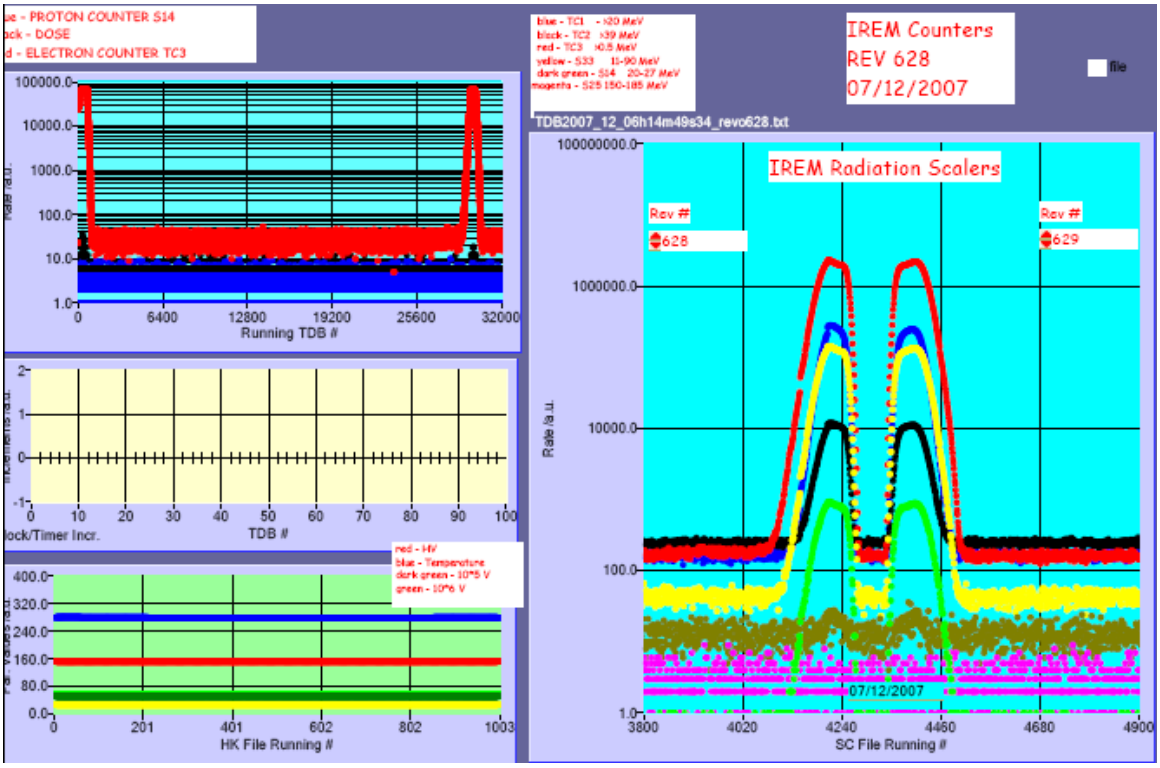
REV	S/C BCPKT (electron)	Electron CUT-OFF Observed Entry/Exit	Observed Entry/Exit Altitude [Km]	Electron CUT-OFF Predicted Entry/Exit	Predicted Entry/Exit Altitude [Km]
626	RAD_ENTR R 2007-12-01T08:56:01Z	01/12/2007 08:22:40	61239.5	01-Dec-2007 10:26:46	43814.89
627	RAD_EXIT R 2007-12-01T19:03:22Z	01/12/2007 17:30:08	>>33131.5	01-Dec-2007 18:06:46	44290.5
627	RAD_ENTR R 2007-12-04T08:42:29Z	04/12/2007 08:22:40	59271.7	04-Dec-2007 10:10:58	44412.77
628	RAD_EXIT R 2007-12-04T18:49:30Z	04/12/2007 17:16:08	>>33141.0	04-Dec-2007 18:00:58	45217.86
628	RAD_ENTR R 2007-12-07T08:30:13Z	07/12/2007 09:55:20	44074.5	07-Dec-2007 10:10:58	43103.52
629	RAD_EXIT R 2007-12-07T18:36:23Z	07/12/2007 17:05:20	>>33161.3	07-Dec-2007 17:50:58	45130.64

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)

IREM radiation counters:

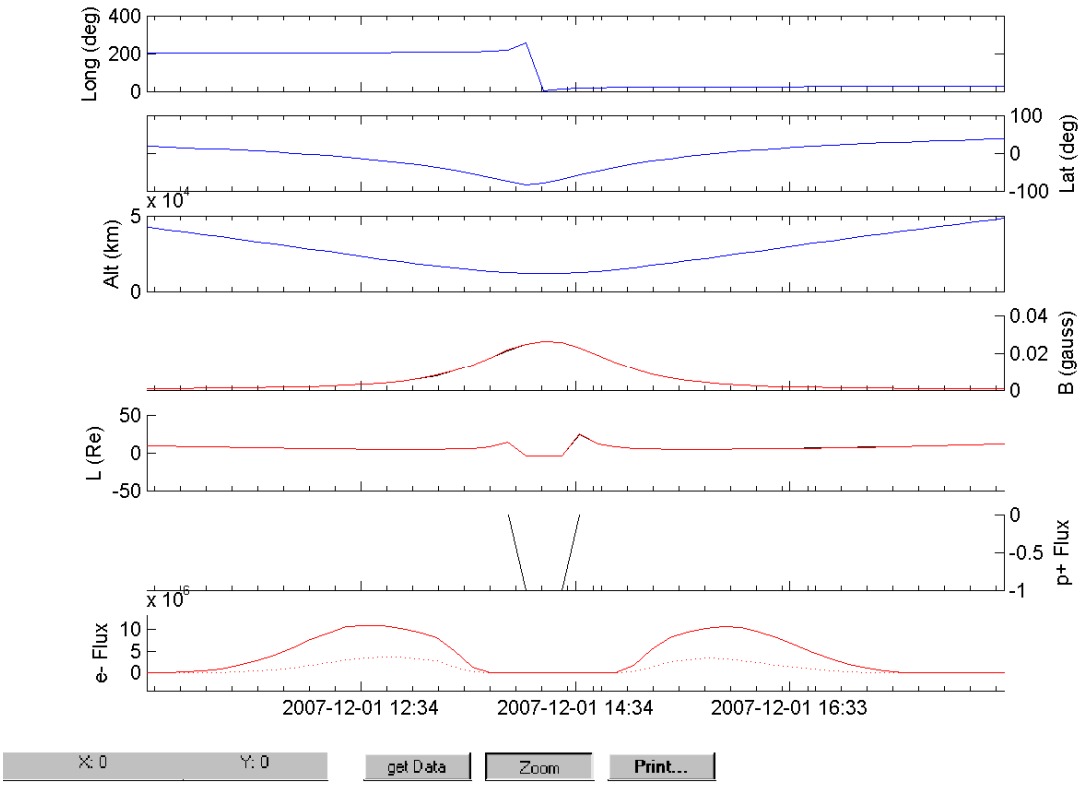




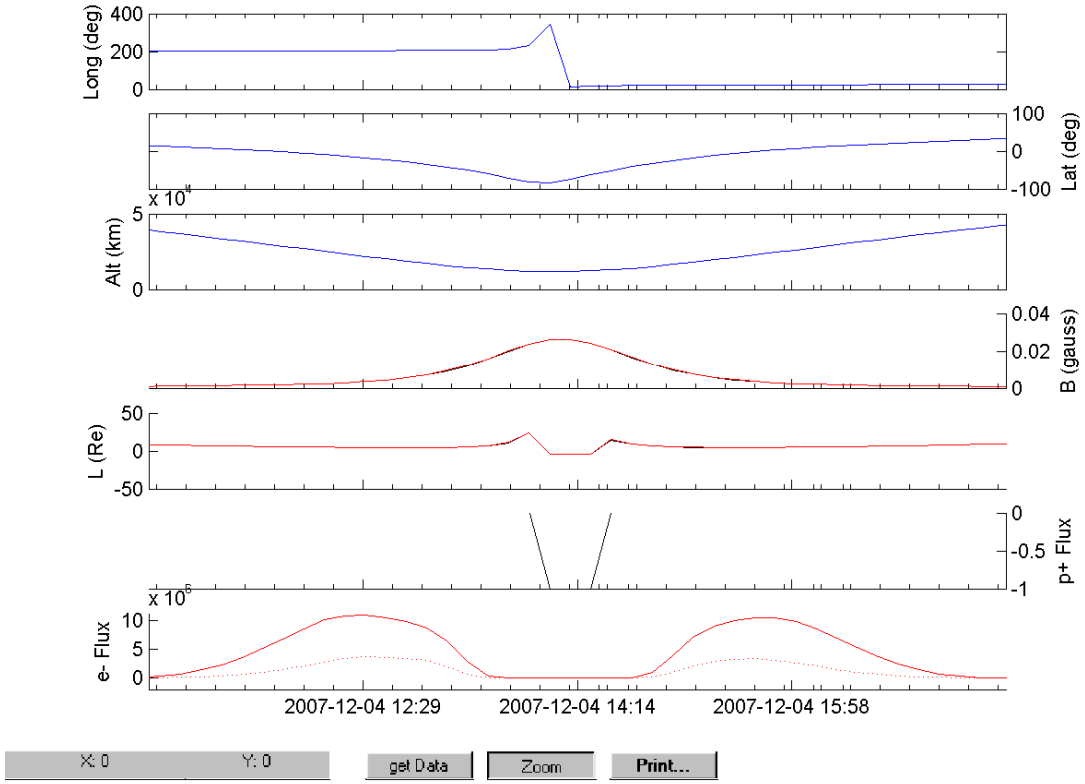


IREM Predicted Radiation Belt Passages

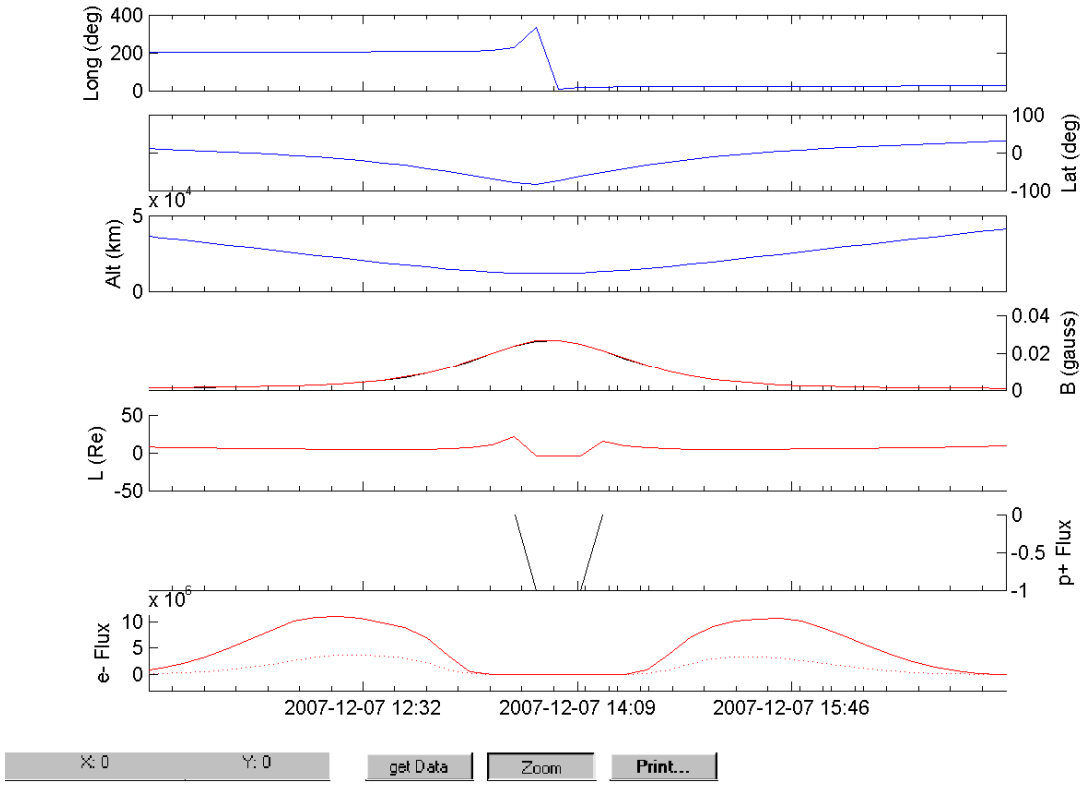
Rev 626



Rev 627



Rev 628



SEC-GOES Observed Particles Fluxes (using SEIS/RAT tool):

Due to a problem on the SEISOP server, no data are available this week. However, the week was very quiet and no radiation was reported.