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

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-TOS-OF
No. 077
Week 11
15.03.04
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 06.03.04 until 12.03.04 (both dates inclusive) and covers the revolutions 171 & 172.

2 Summary of Activities

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

The target of these revolutions was the Galactic Centre. The activities consisted of GCDE and raster dithering observations.

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.

A considerable number of slews were missed during this time due to bad TM link from the ground stations (refer to the related section of this report for more detail). During one of the Goldstone (DSS-16) passes, which was the last pass of the revolution, the situation was such that continuation of the Timeline was not possible and an early RWB/Slew to the perigee passage attitude was performed by manual operations.

There was a case of OTF flickering after an Open Loop Slew, due to Pitch and Yaw errors. The reason was that the STR picked the CCD image of two nearby stars as the Guide Star, which resulted in an unstable star position while this Guide Star was being tracked.

Near the apogee of revolution 171, the STR SEU Filter of the ACC released the guide Star after the number of detected False Events on the STR exceeded the filter threshold.

The fuel consumption over the period between 05/03/2004 and 12/03/2004 was 0.122 kg. The remaining propellant is in the order of 171.856 Kg on the 12th of March.

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

3.1.2 Power

The power subsystem is working as specified. The available power from the arrays is in the order of **2200W**.

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

The overall status of the instrument is nominal.

During the reporting period the instrument was in photon-by-photon mode with spectra TM enabled and an assigned TM bandwidth in the science windows of 98 pkts/cycle.

The cryocooler is working well, keeping the Ge detector cold plate temperature within 85+/-1K.

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

3.2.2 IBIS

The status of the unit is Nominal.

The TM bandwidth assigned to IBIS during the observation period is reported in the table below:

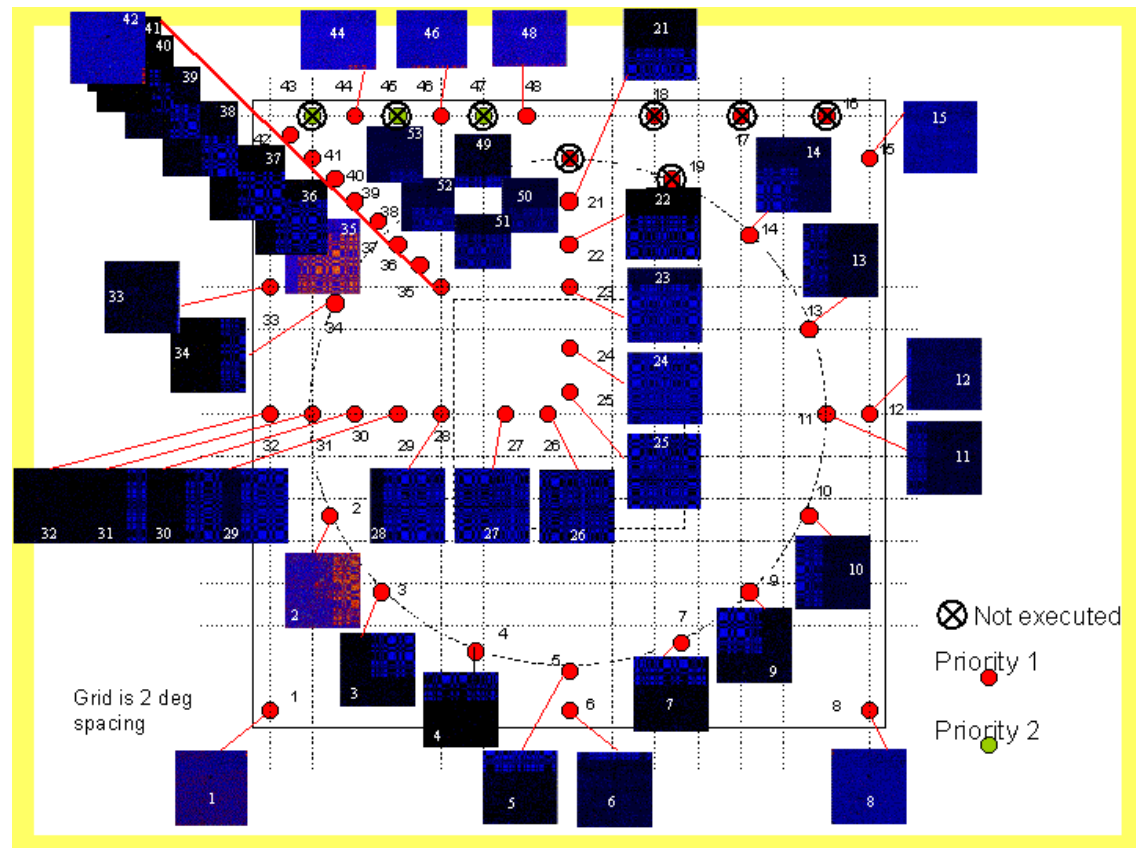
From	To	IBIS TM allocation pkts/cycle
2004-03-05T02:12:27Z	2004-03-06T14:29:11Z	134
2004-03-06T14:29:11Z	2004-03-07T05:55:58Z	125
2004-03-07T05:55:58Z	end of revolution	172

No occurrence of anomalous OEM generation (ID 183-184-179-180, Class 2) reported.

Since DoY 064 the unit is working with the updated PICsIT binning table (HEPI table).

Reported many occurrences of the count-rate of the calibration Unit #1 in Hard low limit (in/out limit for few TM cycles). This is probably due to the decaying of the on-board radioactive (0.4 mCi of Na²², half life=2.58 years) calibration source.

On DoY 067 the third Crab Calibration was completed. The mosaic image resulting from the merger of the complex structure for the off-axis pointings plus the resulting coded masks processed by IBIS Team at MOC (A. Bazzano\MOC) 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.

During the remainder of revolution 170 (2004-03-06 and 2004-03-07), JEM-X1 had a TM allocation of 4 packets/cycle and JEM-X2 had a TM allocation of 5 packets/cycle, except for the period 2004-03-06T14:30Z - 2004-03-07T05:39Z, during which they both had a TM allocation of 9 packets/cycle.

From revolution 171 onwards, JEM-X1 was operated in Data Taking mode during science observations, with a TM allocation of 8 packets/cycle, while JEM-X2 was dormant with a TM allocation of 1 packet/cycle.

JEM-X1 made an autonomous transitions to Safe mode, triggered by the unit's S/W Ratemeter, about 5 hours before it was planned to be put in Safe mode by the Timeline before radiation belt entry of revolution 171. Once the background radiation levels had returned stably within the Safe thresholds for JEM-X1, a recovery was attempted. However, this could not be completed due to a lack of stable TM and TC

from the ground station and JEM-X1 remained in Safe mode for the rest of this revolution.

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.

During the reporting period OMC operations were performed by the automatic timeline, with the TM allocation to OMC of 5 packets/cycle during normal science operations.

There were 242 OMC pointings executed nominally, 14 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.

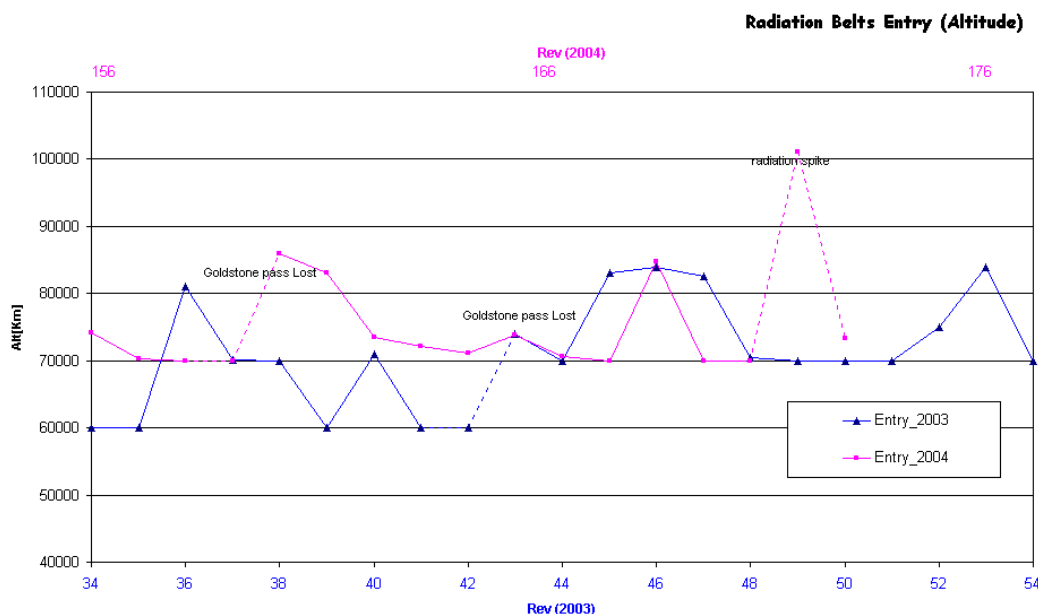
The observation period was characterized by low solar activity with a few occurrences of single electron (<0.5 MeV) spikes that in three cases

- 2004.061.13.25Z (rev 168) [errata from Weekly report #10]
- 2004.070.09.50Z (rev 171)
- 2004.073.14.26Z (rev 172)

triggered the transition of JEM-X to Safe Mode.

The Outer Radiation Belts, as observed in the last few weeks, reported modifications affecting the determination of the entry altitude.

A comparison between the Radiation Belt Entries in 2003 and 2004, along the same observation period winter->spring is shown below:



The Radiation Belts Entry is determined by the electron cut-off threshold (see definition below) based on JEM-X on-board radiation automatism.

The reported Electron Belts Entry/Exit for revs 165-->171, as defined by a cut-off flux of 3.76×10^2 e/cm²/sec ($E > 0.5$ MeV) and the predicted Proton Belts Entry/Exit, as defined by a cut-off flux of 1.25×10^3 p/cm²/sec ($E > 8$ MeV) are shown below:

Electron Belts

REV	S/C BCPKT (electron)	Electron CUT-OFF Observed Entry/Exit	Electron CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
165	RAD_ENTR R 2004-02-21T17:37Z	Sat 21 Feb 04, 15:42Z	No data available	
166	RAD_EXIT R 2004-02-22T02:37Z	Sun 22 Feb 04, 00:50Z	No data available	
166	RAD_ENTR R 2004-02-24T17:28Z	Tue 24 Feb 04, 15:08Z Tue 24 Feb 04, 16:00Z	24-Feb-2004 18:05Z	54834
167	RAD_EXIT R 2004-02-25T02:28Z	Wed 25 Feb 04, 00:47Z	25-Feb-2004 01:05Z	26371
167	RAD_ENTR R 2004-02-27T17:18Z	Fri 27 Feb 04, 17:45Z	No data available	55085
168	RAD_EXIT R 2004-02-28T02:18Z	Sat 28 Feb 04, 00:33Z	28-Feb-2004 00:53Z	25978
168	RAD_ENTR R 2004-03-01T17:06Z	Mon 01 Mar 04, 13:24Z	01-Mar-2004 17:39Z	55530
169	RAD_EXIT R 2004-03-02T02:07Z	Tue 02 Mar 04, 00:29Z	02-Mar-2004 00:49Z	27111
169	RAD_ENTR R 2004-03-04T16:54Z	Thu 04 Mar 04, 16:12Z	04-Mar-2004 17:29Z	55275
170	RAD_EXIT R 2004-03-05T01:55Z	Fri 05 Mar 04, 00:24Z	05-Mar-2004 00:29Z	25734
170	RAD_ENTR R 2004-03-07T16:42Z	Sun 07 Mar 04, 17:12:02	07-Mar-2004 17:17	54902
171	RAD_EXIT R 2004-03-08T01:42Z	Mon 08 Mar 04, 00:04:34	08-Mar-2004 00:17	26321
171	RAD_ENTR R 2004-03-10T16:28Z	Wed 10 Mar 04, 09:50:50 Wed 10 Mar 04, 15:43:30	10-Mar-2004 17:05	55035
172	RAD_EXIT R 2004-03-11T01:29Z	Wed 10 Mar 04, 23:37:30	11-Mar-2004 00:05	26088

Reference

Small error vs reference

Large error vs reference Radiation Spike

Proton Belts

REV	S/C BCPKT (proton)	Proton CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
166	PROTON_RAD_ENTR	24-Feb-2004 23:25Z	11321
166	PROTON_RAD_EXIT	24-Feb-2004 23:55Z	14673
167	PROTON_RAD_ENTR	27-Feb-2004 23:13Z	11257
167	PROTON_RAD_EXIT	27-Feb-2004 23:43Z	14412
168	PROTON_RAD_ENTR	01-Mar-2004 23:09Z	11774
168	PROTON_RAD_EXIT	01-Mar-2004 23:39Z	15376
169	PROTON_RAD_ENTR	04-Mar-2004 22:59Z	11920
169	PROTON_RAD_EXIT	04-Mar-2004 23:19Z	14223
170	PROTON_RAD_ENTR	07-Mar-2004 22:37	11261
170	PROTON_RAD_EXIT	07-Mar-2004 23:07	14605
171	PROTON_RAD_ENTR	10-Mar-2004 22:25	11248
171	PROTON_RAD_EXIT	10-Mar-2004 22:55	14467

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

4 Ground Facilities

The performance of the Operational ground facilities was impaired during the reporting period by RFI and Reed-Solomon errors. The main problems this week, are briefly described below.

4.1 Mission Operations Centre

The performance of the MOC was good in the reporting period.

4.2 Ground Stations & Network

There were repeated instances this week of severe RFI and Reed-Solomon errors. In addition there was a failure of some equipment at the Goldstone DSS-16 antenna (probably down converter). These problems impacted the mission execution and led to the loss of 14 pointings.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's: Received up to rev. 182

POS and POD generated: up to rev 178

TSF's: Received up to rev 174

The only replanning performed this week was initiated from ISOC to correct for the OMC mode selection. See problems below
One TOO request was rejected and one is accepted.

2. Observation status

No change from last week. This is becoming a subject of concern.

3. ISOC science archive

No new data received from ISDC.

4. ISOC system

The ISOC system version 10.2 was patched to correct for OMC mode selection problem. See below. The new release is expected next week.

5. Problems

During the CRAB calibration in revolution 170 it was discovered that the OMC was using Fast mode instead of the expected Normal mode. The cause of the problem was determined and the ISOC software was patched. The problem caused Fast mode to be always selected. This problem had been there since December last year. An investigation is started to see why it was not detected earlier.

4.3.2 ISDC

On 15/03/2004, the status of ISDC observation processing is:

- Latest Standard Analysis completed: observation 01200470001 (NGC 4945, Revolution 149-150) on 07/03/2004
- Latest products archived: observation 01200470001 (NGC 4945, Revolution 149-150) on 12/03/2004
- Latest observation products sent to the observer: observation 01297000009 (0716+714, Revolution 131-133) on 11/03/2004

5 Special Events

Three subsequent passes with the Goldstone DSS-16 antenna were impacted by RFI and faulty station equipment. JPL / Goldstone moved the operations on a short notice from the non-reliable DSS-16 antenna to the DSS-24 antenna. The DSS-16 antenna was repaired in parallel.

The MOC is preparing the system upgrades to accommodate the change request from the SPI team to move some packets from the VC 7 (science) data stream to the VC 0 (housekeeping) data stream. This will allow the MOC a better monitoring of the SPI functions.

6 Anomalies

There were a number of problems related to the ground segment that impacted the operations:

- On DoY 066, at 09:24, there was a drop in the bad frame link from Redu, no impact.
- On DoY 066, at 09:24, 09:33, 09:38, 09:47, 09:50, 09:54 and 09:56, there were drops in TM from Redu, due to Reed-Solomon errors. The last drop caused the slew to attitude 01700061 to be aborted. The impact was the loss of pointings 01700061 and 01700062. The timeline was rejoined at 10:49.
- On DoY 066, at 16:55, there was a brief drop in VC7 TM from DSS-16, possibly due to RFI, no impact.
- On DoY 068, at 10:45, the application launcher on sun122 crashed, the workstation was rebooted without impact.
- On DoY 068, at 15:35 and 16:20, there were drops in the bad frame TM link from Redu, no impact.
- On DoY 069 at 14:57, an ACC command failed completion owing to bad frames from DSS-16, this caused the loss of pointing 01710071. At 16:34, again, bad frames were received, and at 16:36 there was a TM drop, which caused the loss of pointing 01710074. The bad frames and TM drop were probably caused by RFI. The corresponding DR # is G-104133.
- On DoY 069, at 23:47, 23:48, 23:49, 23:57 and 00:03 on DoY 070, there were drops in the bad frame link from Redu, no impact. The last bad frame drop occurred at 01:21. During this period there were repeated Reed-Solomon alarms, and a total of 249 bad frames were received.
- The bad frame problem continued, and by 11:54 on DoY 070, after Redu handed over to DSS-16, a total of 620 bad frames were received. The impact was slew 01710109 was missed.
- During the recovery, from 12:05 to the EOT at 18:25, there were repeated TM drops from DSS-16, which caused the loss of pointings 01710109 to 01710116. Slews 01710117 & 01710118 were executed manually to bring the spacecraft to the nominal perigee attitude.
- On DoY 071 from 20:12 to 21:27, there were a total of 184 bad frames received from Redu, no impact.
- On DoY 072 at 07:56, 08:17 & 08:41, bad frames were received, coupled with Reed Solomon alarms in Redu, no impact.
- At 13:37, the handover from Redu to DSS-16 was delayed to 14:06, as good TM was not being received, the handover proceeded smoothly at the later time.
- At 14:48, the bad frame total was 200, by 15:24, this had reached 6448, which caused slew 01720071 to be missed, pointing 01720072 was also lost.
- At 16:40 DSS-16 handed over to DSS-24, there were no further bad frames until the handover to Redu at 18:31.
- At 21:25 there were 4 bad frames from Redu, no impact.

The following new anomaly reports have been entered into the Anomaly Reporting and Tracking System. Repeats of existing anomalies are not shown in this table.

AR id	Date Occurrence	Subject	Segment	Status
INT-2563	10/03/2004	NCTRS Problem in executing Station H/O	NCTRS	Pending
INT-2562	10/03/2004	TC and/or TM lost at Goldstone station	NASA station	Pending
INT-2561	10/03/2004	Connectivity problems at Goldstone station (incl. G/S handover)	NASA station	Pending
INT-2560	10/03/2004	RFI at Goldstone station	NASA station	Pending

7 Future Milestones

The planned date for the JEMX2 DFEE patch has been postponed until after revolution 172.

It is foreseen that the modification of the SPI data flow (move of packets from VC 7 to VC 0) can be used operationally from revolution 183, i.e. 13 April, onwards.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 171

In revolution 171 a GCDE observation was performed throughout the available observation time (~61 hours).

Revolution 172

The observations in revolution 172 consisted of a GCDE performed for ~41 hours, followed by a raster dithering observation of the Galactic Centre (RA 17:45:40.00; DEC -29:00:28.0) lasting ~13 hours, after which a GCDE was then performed for the remaining ~7 hours of observation time.

Throughout these revolutions all instruments were in their nominal science modes, except for JEM-X2, which was in Safe mode, and the TM allocation was IBIS 134; SPI 98; JEM-X1 8; JEM-X2 1; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2004-02-22T01:04:26.000Z	172.2656	F	Automatic TM processing.
2004-02-24T17:30:48.000Z	172.2463	F	Automatic TM processing.
2004-02-25T00:58:49.000Z	172.2159	F	Automatic TM processing.
2004-02-25T11:23:06.000Z	172.1911	F	Automatic TM processing.
2004-02-27T18:31:20.000Z	172.1843	F	Automatic TM processing.
2004-02-28T00:53:53.000Z	172.1020	F	Automatic TM processing.
2004-03-01T00:15:42.000Z	172.0833	F	Automatic TM processing.
2004-03-01T16:45:11.000Z	172.0666	F	Automatic TM processing.
2004-03-02T00:43:04.000Z	172.0205	F	Automatic TM processing.
2004-03-04T16:46:15.000Z	171.9986	F	Automatic TM processing.
2004-03-05T00:30:47.000Z	171.9782	F	Automatic TM processing.
2004-03-06T10:44:27.000Z	171.9542	F	Automatic TM processing.
2004-03-08T00:20:39.000Z	171.9219	F	Automatic TM processing.
2004-03-10T13:19:18.000Z	171.9008	F	Automatic TM processing.
2004-03-11T00:13:11.000Z	171.8557	F	Automatic TM processing.

This report was generated Fri Mar 12 08:00:16 GMT 2004

8.3 Detailed Satellite Information

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

8.3.1 AOCS Operations

AOCS operations were executed from the Automatic Timeline.

During this period, 150 Open Loop Slews, 108 Closed Loop Slews and 4 Momentum Bias were executed. 16 slews were missed or executed manually. This is equivalent to a 6.2%.

06/03/04 (Day of Year 066, Revolution 170)

Slews lost due to drop of Telemetry link (Reed Solomon errors, Redu): The execution of slew 01700061 from the Timeline was interrupted at 09:57 due to drops in TM. Slews 01700061, 01700062 and the Reaction Wheel Bias in between them were missed. After re-establishment of the TM link, the Timeline was rejoined by performing an Open Loop Slew to the attitude of Pointing 01700062, performing a manual RWB and then updating the parameters of slew 01700063. Slew 63 was executed from the Timeline.

07/03/04 (Day of Year 067, Revolution 170-171)

Pitch and yaw error after Open Loop Slew 01700112: At the end of Open Loop Slew 01700112, the ACC picked the barycenter of the CCD images of two nearby stars, as the Guide Star. The reported magnitude and CCD location of the Guide Star were 8.4 and [5319, -21702], respectively. The two stars have catalogue numbers 7695-02774 and 7695-01317 with 8.6 and 8.83 magnitudes, respectively and are 1.43 arc-minutes apart. After being taken by the ACC, the Guide Star location was constantly moving between the CCD images of the two stars and causing continuous generation of Pitch errors and occasional generation of Yaw errors. This continued until around 17:26, when the Guide Star was changed by the CGS sequence of the next Close Loop slew. This was not during science observation window.

08/03/04 (Day of Year 068, Revolution 171)

Nothing to report.

09/03/04 (Day of Year 069, Revolution 171)

Guide star released by the STR SEU Filter of the ACC: During Open Loop slew 01710047, the 7.6 Mi Guide Star left the STR FoV and the ACC picked a new Guide Star of 8.35 magnitude. With the selection of this dim star at 01:30:28, the STR

started continuous reporting of False Events. The situation continued like this and the SEU Filter threshold exceeded 17 times until one minute after the slew end, at 01:31:31, when the star was released and a new Guide Star was picked: [-2353, -976], 7.4 Mi. The OTF remained low during Pointing 01710047. The altitude was about 145600 km.

Slews/Pointings lost due to bad frames received from the station (Goldstone, DSS-16): At 14:57, an AOCS command from the Open Loop Slew sequence failed execution verification due to bad TM frames being received at this time. The AOCS commanding from the Autostack was stopped and slew/pointing 01710071 was missed. To rejoin the Timeline, a manual Close loop Slew was performed to the attitude of PID 01710072.

Again at 16:34, the execution of Open Loop Slew 01710074 was interrupted due to the bad TM frames. The AOCS commanding was disabled once again and a manual Open Loop Slew was performed to the attitude of PID 01740075. Pointing 75 was not affected and the next slew was executed from the Timeline.

10/03/04 (Day of Year 070, Revolution 171-172)

Loss of Slews/Pointings near the end of the revolution due to many bad frames and interrupting TM link (Goldstone, DSS-16): After station handover from Redu to Goldstone (Dss-16), many bad frames were being received. At 11:26 an AOCS command from slew 01710109 failed verification because of the bad TM link and the AOCS commanding from the Timeline was stopped. An attempt to rejoin the Timeline by a manual slew failed due to the bad frames and the situation got worse, such that the Timeline was stopped. This was the last pass of the revolution and the attitude was not safe (due to Earth Blinding) for perigee passage. Moreover, there was no evidence that the TM link would be re-established in a stable condition. It was therefore decided to abort the remaining observations and slew to the perigee passage attitude (last attitude in the Timeline). This was done by a Reaction Wheel Bias, an Open Loop slew and a corrective Close Loop Slew. To avoid the interruption of the slew sequences, the commands were sent in manual mode, one by one, while respecting the necessary timing in the sequence. The attitude of the last pointing in the Timeline, 01710117, was reached around 14:30. Slews/Pointings 01710109 to 01710116 were missed.

11/03/04 (Day of Year 071, Revolution 172)

Nothing to report.

12/03/04 (Day of Year 072, Revolution 172)

Slews/Pointings missed due to bad TM frames (Goldstone, DSS-16): At 15:26, the AOCS sequence for execution of slew 01720071 was interrupted because of the bad TM link from the station. AOCS commanding was stopped. To rejoin the Timeline, manual Open Loop Slew was performed to the attitude of PID 01720073. Pointings 71 and 72 were affected.

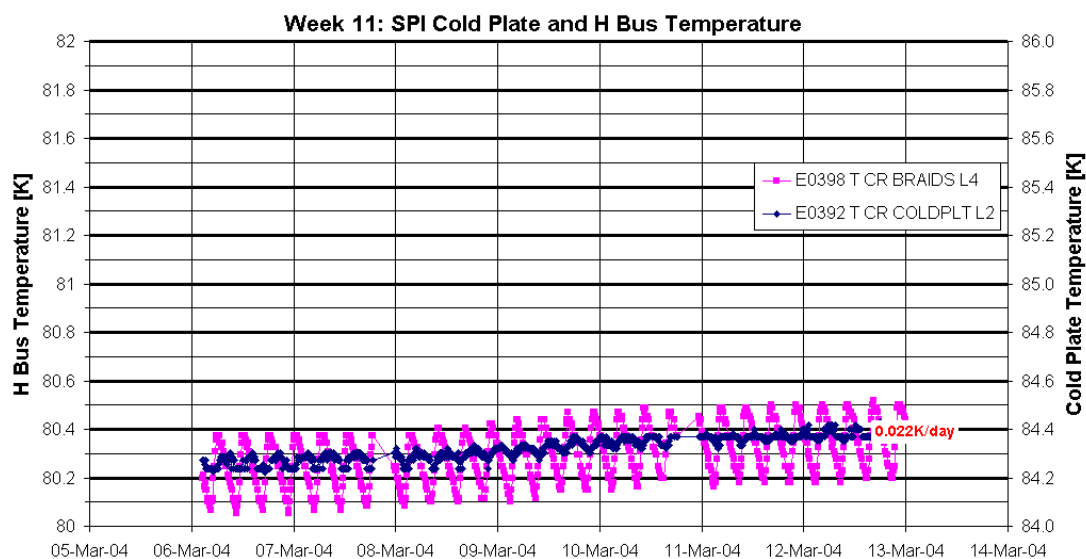
8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

The performance of the cryo-cooler is nominal.

The four compressor stroke amplitudes were increased by one lsb, on 28th February at 21:25z. As expected, the temperature decreased by almost 2 K, leveled off and started again. The drift is about 0.022K/day which is within the expected range.

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



IASW/DPE:

The performance of the IASW/DPE is nominal

The CR to change the APID of the 5 science housekeeping packets in order to transmit them through VC0 instead of VC7 has been submitted and processed. The EGSE database import into the ODB is on-going. The new commands and sequences to deal with the change are being created. The implementation timeline has been decided in agreement with SPI, ISOC, ISDC.

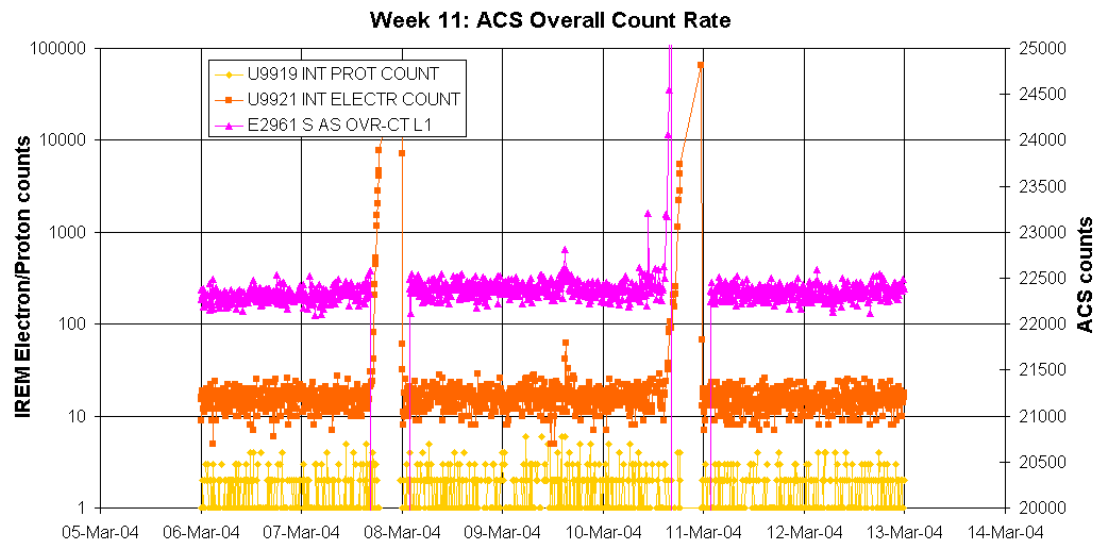
The following diagram shows the IASW performance in terms of TM bandwidth and event buffer occupation:



ACS:

The performance of the ACS is nominal.

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

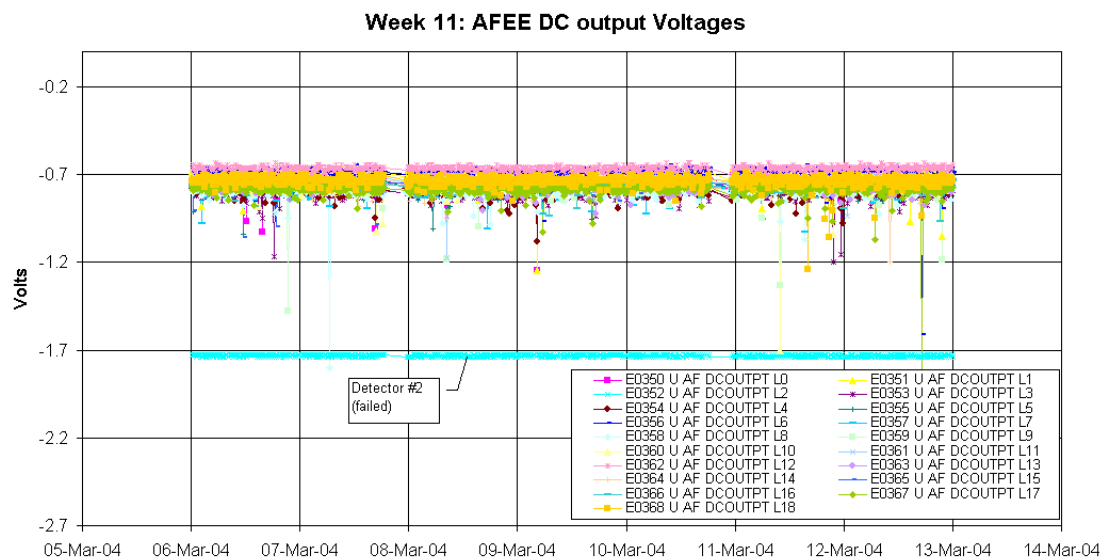


AFEE:

The performance of the detectors is nominal except for the detector #2 failed since 06.12.2003 (see anomaly report INT_SC-72).

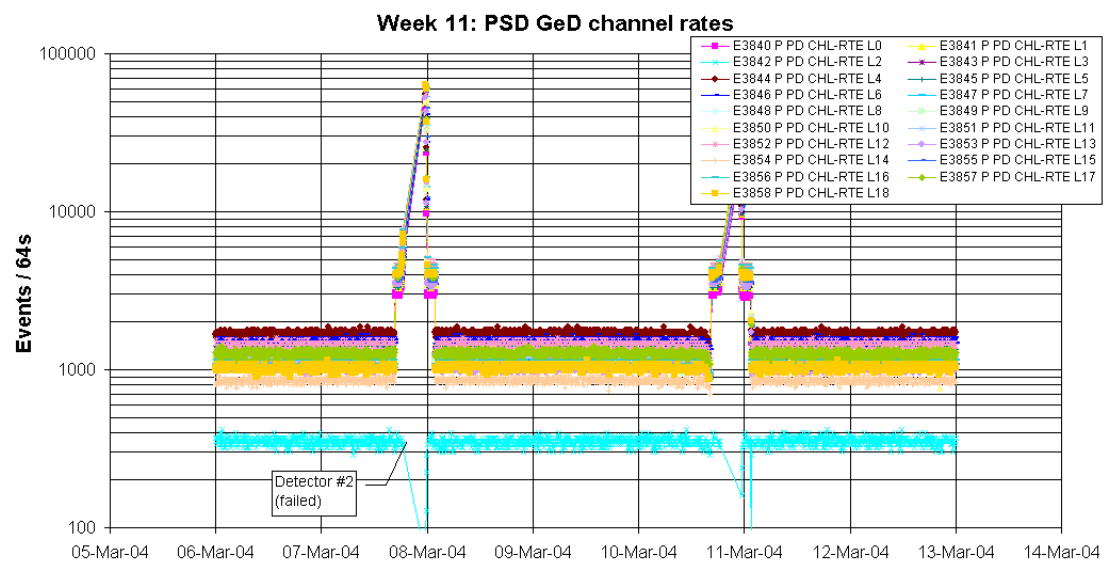
The AFEE dc output signals are here after plotted during the reporting period.

These signals represent the DC component of the current flowing through the Ge detector crystals polarised at 4kV; they provide a measure of the health status of both the detectors and the HV section.



DFEE:
 Nothing to report.

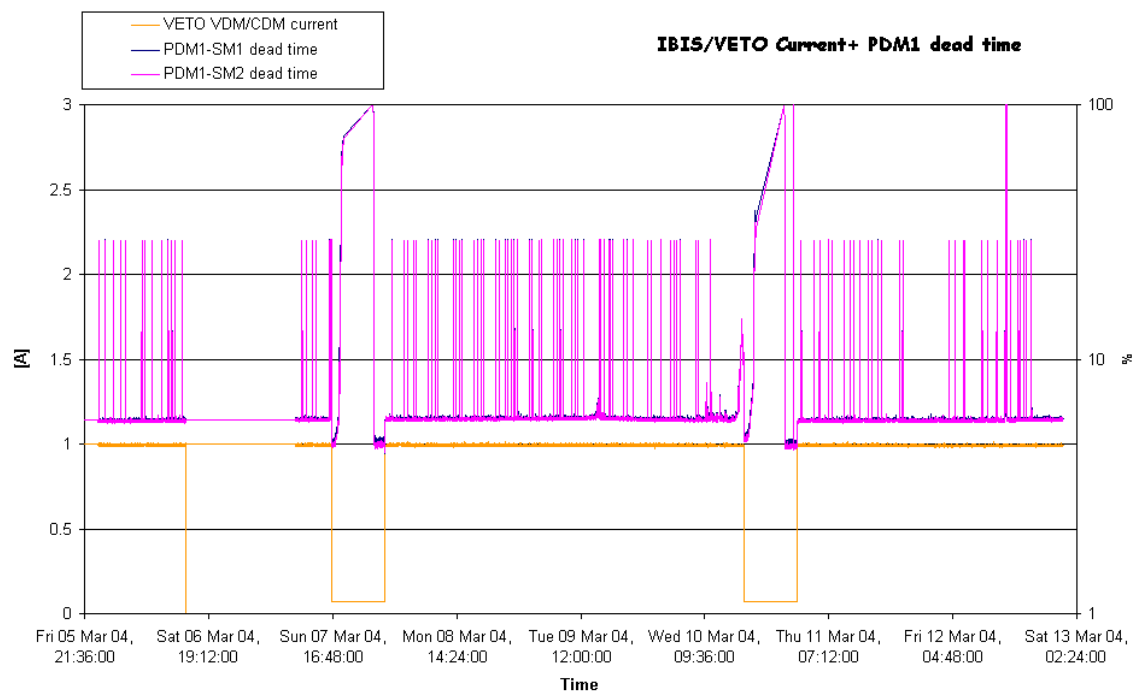
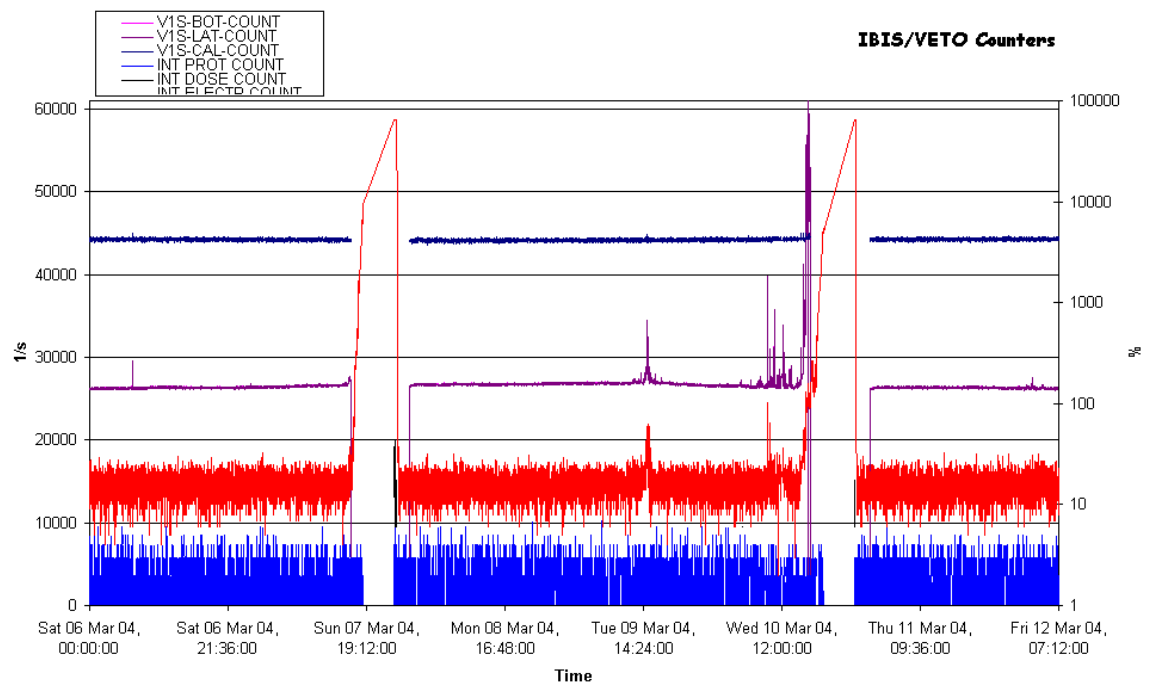
PSD:
 The following plot shows the GeD channel rates detected by the PSD during the reporting period. The count rate of each detector is within the expected range, except for the failed detector #2, whose residual counts are triggered by noise.



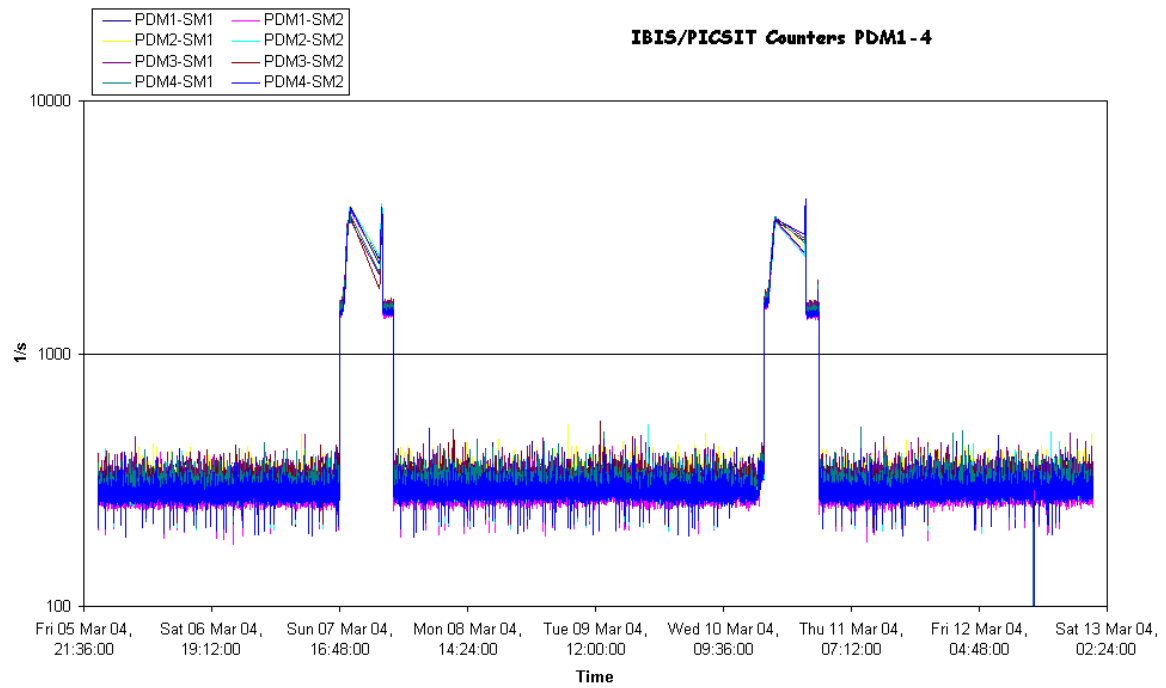
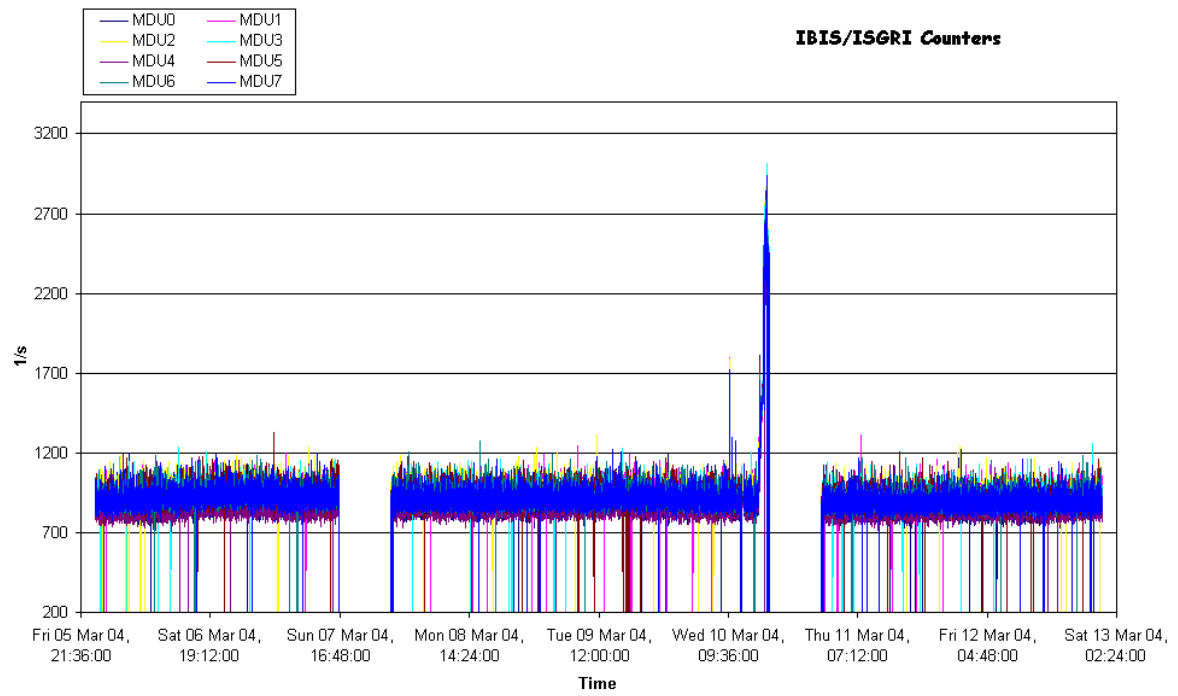
8.3.3 IBIS Operations

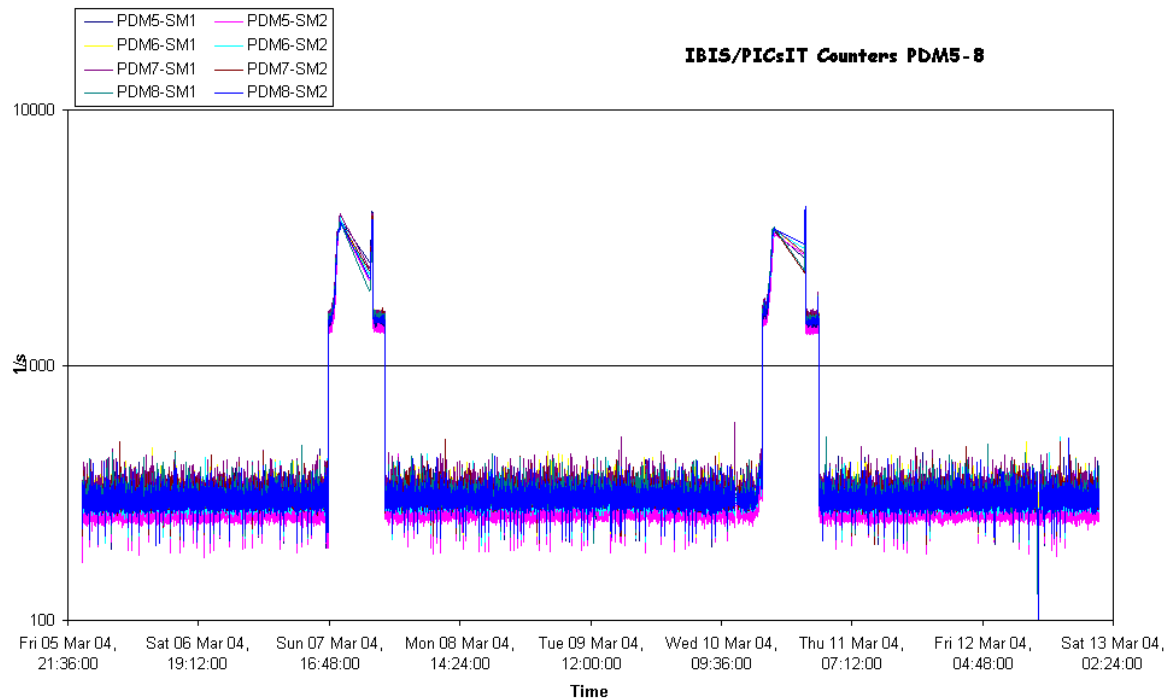
IBIS event counters plot

Plots of the reported VETO VDM/CDM current, the VETO bottom-lateral-calibration counters, the PICsIT PDM#1 SM1-2 dead times are shown below:



Plots of the ISGRI and PICsIT counters, during the observation period, are shown below:





IBIS daily report

DoY 2004.066 (06/03/04)

During the day, there were two occurrences when the parameter G6061(VIS-CAL-COUNT) Went outside the Hard low limit (for a few TM cycles). This parameter is reporting the count-rate of the calibration Unit #1 and this low limit is probably due to the decaying of the on-board radioactive the source (0.4 mCi of Na²²). No further action was taken but it requests an update of the parameter limits in agreement with the reduced source activity.

DoY 2004.067 (07/03/04)

Nothing to report

DoY 2004.068 (08/03/04)

There were three occurrences when the parameter G6061(VIS-CAL-COUNT) went outside the Hard low limit (again, for a few TM cycles).

DoY 2004.069 (09/03/04)

Three more occurrences of the parameter G6061(VIS-CAL-COUNT) outside Hard low limit.

DoY 2004.070 (10/03/04)

Nothing to report

DoY 2004.071 (11/03/04)

Nothing to report

DoY 2004.072 (12/03/04)

At 13.55Z, a problem with PICsIT detector modules was observed. The sequence of the events was:

- 1) at 13.55Z SCC failed for the TM_para family G5068 (semi-modules FIFO error flag)
- 2) after 5 minutes the SCC went back in limits, at the same time the PICsIT Real Time counters slowly went to zero counts and the Live Time Counters (dead time) increased progressively until 100%;
- 3) at 14.06Z all the PICsIT Real Time counters went out of limits (0 cts/sec);
- 4) at 14.09 the OEM APID 1280 ID 132 CLASS 0 <<IBIS IASW HEPI RESYNCH>> flagging an HEPI resynchronization was received.
- 5) after the generation of the OEM above the PICsIT Real Time went back in limits.

This behaviour, observed previously, is likely to be due to a loss of synchronization between the HEPI and the PICsIT modules and cleared autonomously by the unit. No action was taken as suggested by the recovery action P-FIF-1 reported in the Payloads Contingency Recovery Document.

8.3.4 JEM-X Operations

2004-03-06 (DoY 066, Rev 170)

Nothing to report

2004-03-07 (DoY 067, Rev 170-171)

No special operations or anomalies to report. JEM-X1 and JEM-X2 were both commanded to Safe mode at the end of revolution 170 as planned by the Timeline.

2004-03-08 (DoY 068, Rev 171)

Nothing to report

2004-03-09 (DoY 069, Rev 171)

Nothing to report

2004-03-10 (DoY 070, Rev 171-172)

At 09:50:18Z the TM parameter K5136 BUFFER LOSS went out of limits (value = 1007), reaching a value of 7338 in the following TM cycle and then returning within limits.

Following this, at 09:50:26Z, the parameter K5119 SOFTWARE TRIGGER went out of limits (value = 25013), causing JEM-X1 to perform an autonomous transition to Safe mode. This was about 5 hours before it was planned to put JEM-X1 into Safe mode before radiation belt entry of revolution 171. OEM189 JEM-X1 PROB DFEE 9 was then received, as the parameter K5462 DFEE STATE IASW was reporting state Setup.

At 09:51Z the IREM electron counter parameters K/L5317 RAD MONITOR 3 also went out of limits (value = 103) and the parameter K5462 DFEE STATE IASW began to report state Safe. The following OEMs were then issued:

OEM 231 JEM-X1 AUTO EVENT 1
OEM 254 ERROR OFF

At 10:01Z JEM-X1 performed an autonomous recovery to Setup mode (OEM 233 JEM-X1 AUTO EVENT 3) after the IREM RMCR values had remained below the JEM-X1 thresholds for exiting from Safe mode for more than 10 minutes.

At 10:13Z there was another spike on the parameters K/L5317 RAD MONITOR 3, however this did not cause JEM-X1 to transition to Safe mode again as these parameters only remained out of limits (value = 79) for 1 TM cycle.

At 11:24Z the recovery of JEM-X1 was started by executing procedure FCP_JEM1_0040 to command JEM-X1 back to Safe mode, followed by FCP_JEM1_0041 to return JEM-X1 to Setup mode. At 11:50Z procedure FCP_JEM1_1010 (JEM-X1 Configuration Setting for Science Ops) was then started. However, during the execution of the sequence KS1010, telemetry was lost from the ground station. This resulted in the failure of this sequence at TC KU0003A (SET dV NOM-3LSB), scheduled at 11:56:16Z, which failed release. At 11:58Z the automatic Timeline was stopped. During this period, commanding capability was also briefly lost. As soon as commanding capability was re-obtained, JEM-X1 was commanded back to Safe mode via procedure FCP_JEM1_0040 at 12:02Z.

No further recovery of JEM-X1 was attempted for the remainder of the revolution as ground station support continued to be unstable and thus JEM-X1 remained in Safe mode for the remainder of this revolution.

2004-03-11 (DoY 071, Rev 172)

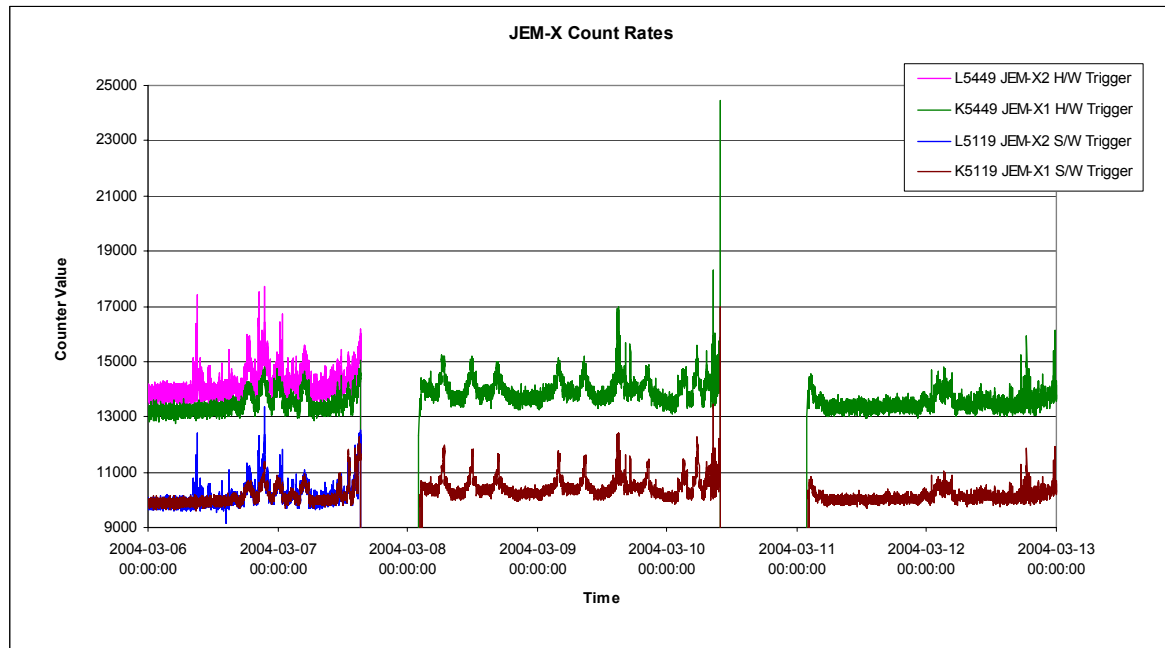
Nothing to report

2004-03-12 (DoY 072, Rev 172)

Nothing to report

8.3.4.1 JEM-X Count Rates

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



8.3.5 OMC Operations

On DoY 066, at 09:56, Reed-Solomon errors from Redu, led to a drop in TM causing the slew to attitude 01700061 to be aborted. The following commands corresponding to the M1130 (RESET IM) and MU1310 (IMAGING-A) were rejected:

```
2004.066.09.57.10.811 2004.066.09.57.03.701 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=7,FAST M M9079=3 M9080=131 M5001=60,IM A M9068=1 FIX2=0 M9069=365
2004.066.09.57.03.410 2004.066.09.56.57.826 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=7,FAST M M9079=3 M9080=131 M5001=130,RESET IM M9068=1 FIX2=0
M9069=364
```

Pointing 01700062 was subsequently also lost, the timeline was rejoined at 10:49.

On DoY 069 at 01:30, due to false events, the OTF remained low after the slew to attitude 01710047, but this didn't affect the OMC, which switched to science as scheduled.

On DoY 069 at 14:57, an ACC command failed completion owing to bad TM frames, this caused the loss of pointing 01710071. The following commands corresponding to the M1130 (RESET IM) and MU1310 (IMAGING-A) were rejected:

```
2004.069.14.59.49.901 2004.069.14.59.43.984 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=60,IM A M9068=1 FIX2=0 M9069=905
```

¹ Data smoothed to remove spikes in S/W Trigger due to flushing of buffer during slews. JEM-X1 data sampled (1 frame in 4).

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```
2004.069.14.59.41.673 2004.069.14.59.37.484 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=130,RESET IM M9068=1 FIX2=0
M9069=904
```

At 16:34, again, bad frames were received, and at 16:36 there was a TM drop, which caused the loss of pointing 01710074. The following command corresponding to the M1130 (RESET IM) was rejected:

```
2004.069.16.35.38.117 2004.069.16.35.25.737 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=130,RESET IM M9068=1 FIX2=0
M9069=916
```

Bad TM frames received between 11:54 and 18:05 on DoY 070, caused the loss of pointings 01710109 through to 01710116.

On DoY 072, at 15:26, bad frames caused the slew to pointing 01720071 to fail. The following commands corresponding to the M1130 (RESET IM) and MU1310 (IMAGING-A) were rejected:

```
2004.072.15.29.25.271 2004.072.15.29.20.625 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=60,IM A M9068=1 FIX2=0
M9069=1416
2004.072.15.29.25.193 2004.072.15.29.15.125 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=130,RESET IM M9068=1 FIX2=0
M9069=1415
```

pointing 01720072 was subsequently also lost before the Timeline was recovered at 16:08.

On DoY 067 at 16:42:58, OMC was switched by the Timeline to SAFE mode, at the nominal time, the switchover on DoY 070 was not observed due to the bad frame problem on DoY 070.

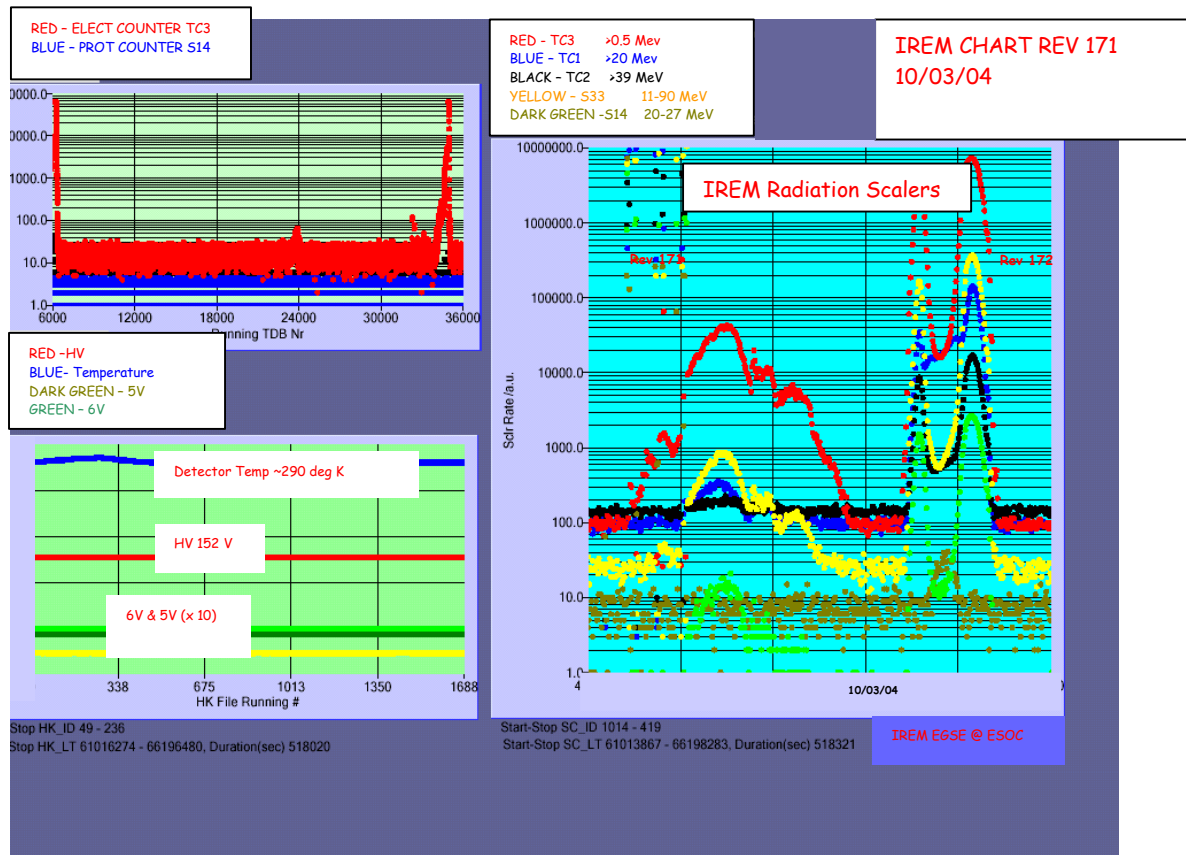
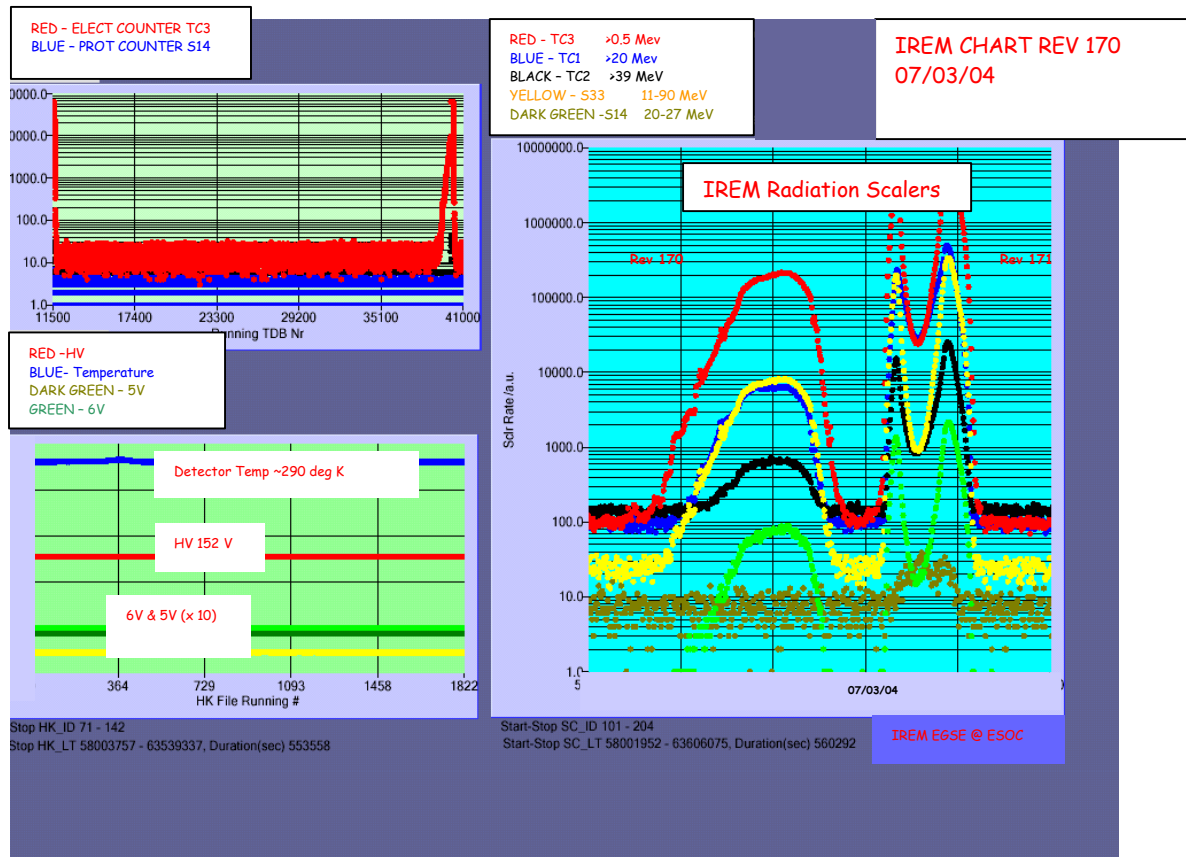
8.3.6 IREM Operations

IREM daily report

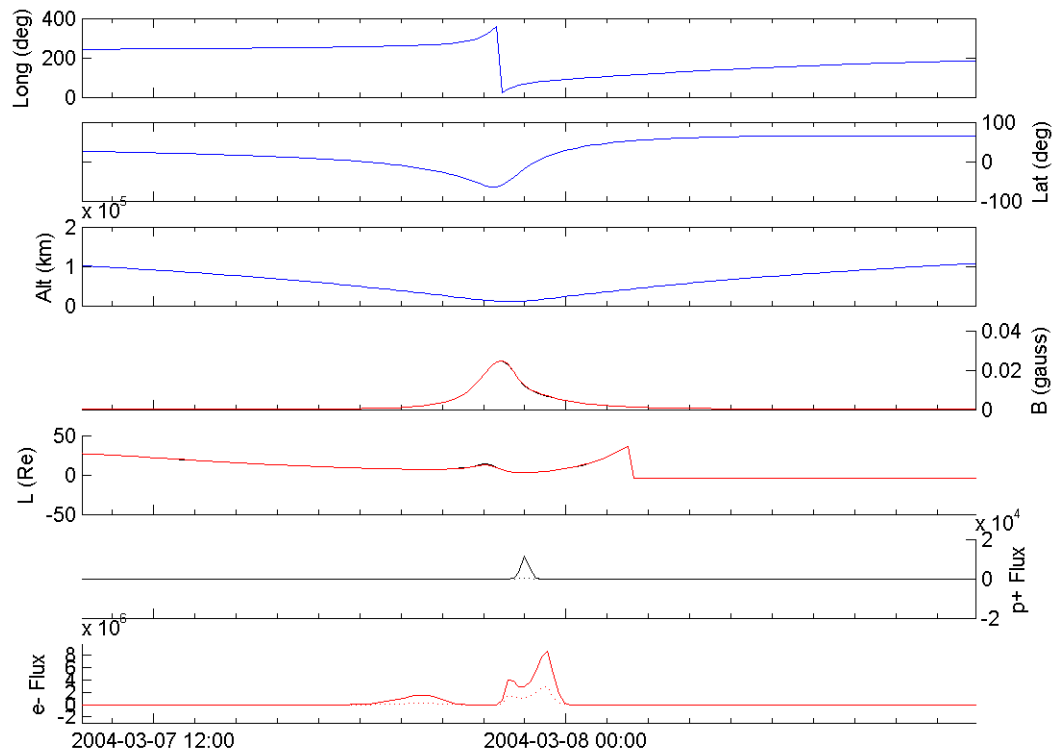
Nothing to report.

IREM radiation counters plot

Plots of the evolution of the IREM counters from rev 170-171 are shown below:



The corresponding predictions for the Belts passages (as calculated with AP8Max and AE8Max models by using the RADMON tool) are:

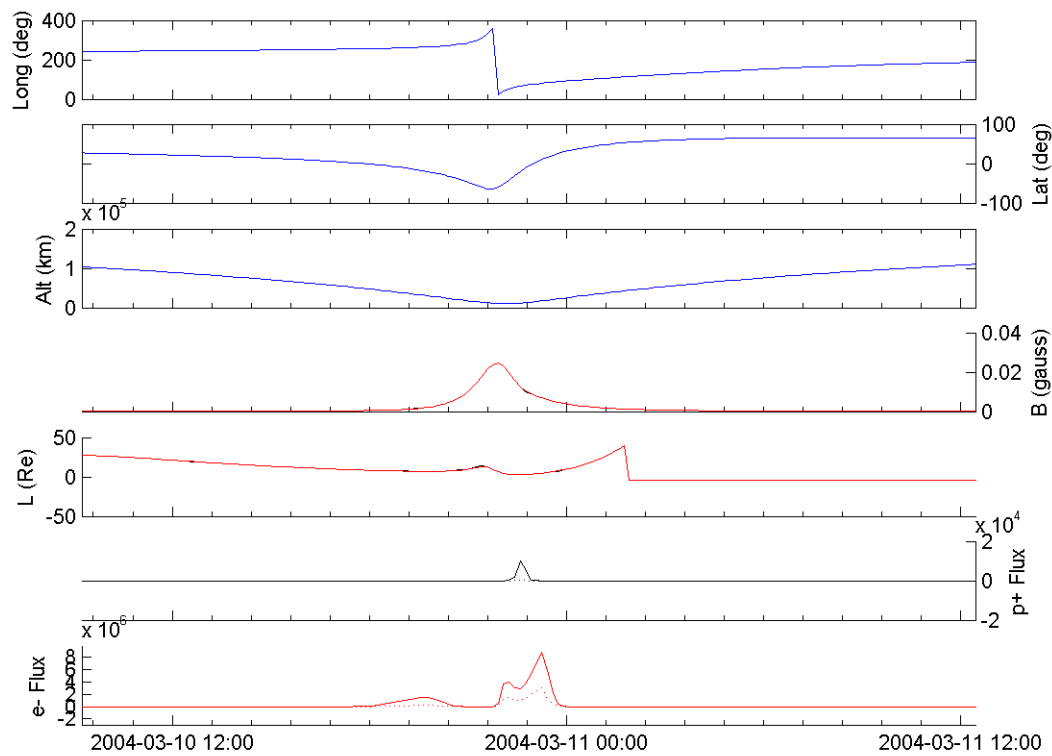


07-Mar-2004 14:46:34 Y: -8086535.8775

get Data

Zoom

Print...



07-Mar-2004 14:46:34 Y: -8086535.8775

get Data

Zoom

Print...