

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-TOS-OF
No. 082
Week 16
19.04.04
Routine Phase

Prepared by: M. Walker (TOS-OFI)

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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 10.03.04 until 16.04.04 (both dates inclusive) and covers the revolutions 183 & 184.

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 the Galactic Center and IC443 (RA 06:24:4.00; DEC +22:27:28.0). The activities consisted of GCDE and staring 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.

In revolution 182 the planned attitude with RA = 06:25:56.17, DEC = +21:23:41.7 and POS = 272:52:11.3 was visited 8 times with Pointing IDs 4, 11, 18, 25, 32, 39, 46 and 55. In all the cases the attitude was reached by a Close Loop Slew and using star 01879-02030 for the slew. At the end of these slews, the Guide Star was located in Elementary Search Window 20, which also contained Saturn. In three cases, namely after slews 01820018, 01820025 and 01820046, the 1750 Processor Fault occurred during the mapping after the slew. The mappings were aborted while processing ESW 20. All the 8 mappings were analyzed in detail, but no relation could be found between the occurrence of the fault and the CCD positions of the Guide Star and the bright object, relative to each other and/or relative to the edges of the ESW. The effect was that the OTF dropped and remained low during the affected Pointings.

Close Loop Slew 01820021 was lost because the STR could not pick the commanded star for the slew. The star, which was not reported by the STR even during the mapping, is the same star that caused the loss of Close Loop Slew 01790033. The reason for the STR failing to pick this 7.83 Mi star could be a dim neighboring star with 9.8 Mi, which is located at a distance of 1.7 arc-minutes. This combination can cause the failure of the clustering process in the search cycle of the Search-and-Track sequence. FD is looking into this case. If it is also concluded by them that the STR does not pick this star because of its dim neighbor, then the star will be excluded in the FDS to prevent its selection as Guide Star.

There were two cases of flickering of the OTF due to Pitch and Yaw errors. None of them were seen at BCP level.

The Guide Star was released during the perigee passage at the start of revolution 184, caused by False Events on the STR.

The fuel consumption over the period between 09/04/2004 and 16/04/2004 was 0.143 kg. The remaining propellant is in the order of 171.180 Kg on the 9th of April.

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, an assigned TM bandwidth in the science windows of 98 pkts/cycle and an actual average occupation of 92.4 pkts/cycle.

The cryo-cooler is working well maintaining the 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.

After the High Voltage break-down on VETO VDM # 15 (occurred on 4/4/2004), the unit was under constant monitoring but no new anomalies were observed.

An X-ray flare was observed on the 11th of April by the VETO system (see plots in the IBIS & IREM detailed part). The flare was characterised by a moderate proton component (>10 Mev), which did not impact on the instrument activity.

The TM bandwidth assigned to IBIS during the observation period was 134 pkts/cycle.

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 from the automatic Timeline.

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

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 170 OMC pointings executed nominally, XX 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 characterised by low solar activity with one high proton event observed.

A detailed analysis regarding the evolution of the Radiation Belt entry is provided in the Appendix.

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 in general good this week, well above the system performance requirements.

4.1 Mission Operations Centre

The performance of the MOC was good in the reporting period, there were however, problems with swap space on several different machines.

4.2 Ground Stations & Network

The performance of the ground stations and Network was in general good this week. There were minor problems related to the ground stations and their impact was limited.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's: Received up to rev. 192

POS and POD generated: up to rev 192

TSF's: Received up to rev 186

This week has been quiet with no re-planning or ToO requests

2. Observation status

ECS for revolution 169 received. Then ECS's up to revolution 170 except 168 are available. Corresponding OCS's sent to ISDC. This is no change since last week.

3. ISOC science archive

No new data tape received. The data transfer from ISDC to ISOC using Internet is now set up and is running. During this week substantial amount of data has been transferred. The ingest procedure on ISOC side as well as a method of checking the synchronisation between the ISDC archive and the ISOC one has been implemented and tested successfully.

4. ISOC system

The ISOC system version 10.3 has been in use this week. No modifications introduced.

5. Problems

No problems have occurred this week. The investigation of the problem of last week with wrong JEM-X configuration is not yet concluded.

4.3.2 ISDC

On 19/04/2004, the status of ISDC observation processing is:

- Latest Standard Analysis completed: observation 01200360001 (GRO J0332-87, Revolution 152-154) on 12/04/2004
- Latest products archived: observation 01200470001 (NGC 4945, Revolution 149-150) on 12/03/2004
- Latest observation products sent to the observer: observation 01201250002 (Cassiopeia A, Revolution 144-148) on 19/03/2004

5 Special Events

None

6 Anomalies

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

- On DoY 101, at 16:07, and again at 23:18, there were two Star TRacker 1750 faults, the impact were small attitude errors, no pointings were lost.
- On DoY 102, at 04:58, there was an error sending data to the isds, the flow resumed at 05:06, but was interrupted again at 05:15. CCC reported the firewall was hanging, this was restarted, and at 05:28, nominal service was restored, there was no impact.
- Later, at 15:30, the nctrs-a was indicating a low swap space of 42MB, this was stopped and restarted at 15:56, and was initially green, but by 19:00, was again indicating a low swap space of 49MB, at 19:19, operations were swapped to nctrs-b, and the nctrs-a again rebooted.
- At 22:16, another Star TRacker 1750 fault occurred, no apparent impact.
- On DoY 103, at 12:02:08 until 12:02:58, there was a TM drop from DSS-24, the impact was an AOCS command failed release, causing the loss of pointing 01820059. The manoeuvre and OMC commands sent manually, the impact was 14 minute delay in the start of the pointing.
- On DoY 103, after the end of the revolution it was noted that the free swap space on sun128, was again low (this was later shown to be caused by ghost processes left over from previous aborts, which were then cleared).
- On DoY 104, at 09:46, an AOCS command failed release, as the intended guide star was not seen, during the recovery, the guide star was again not seen, the impact was pointings 01830021 and 01830022 were lost.
- At 12:58, there were Reed-Solomon errors from Redu, leading to an AOCS command having an unverified completion.
- At 14:14 the HFAretTM on idda, died, and was restarted.

There were no new anomalies entered into the ARTS system this week.

7 Future Milestones

The Battery Reconditioning will begin on 21/04/2004, with an estimated duration of 11 days. This activity should have no impact on payload operations.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 183

In revolution 183 a GDCE was performed throughout the available observation time (~62 hours).

Revolution 184

In revolution 184 a staring observation of the supernova remnant IC443 (RA 06:24:4.00; DEC +22:27:28.0) was performed throughout the available observation time (~62 hours).

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

2004-03-28T16:29:15.000Z	171.5737	F	Automatic TM processing.
2004-03-28T22:58:36.000Z	171.5479	F	Automatic TM processing.
2004-03-31T22:46:52.000Z	171.5211	F	Automatic TM processing.
2004-04-03T13:45:39.000Z	171.5063	F	Automatic TM processing.
2004-04-03T22:25:24.000Z	171.4710	F	Automatic TM processing.
2004-04-05T08:12:07.000Z	171.4565	F	Automatic TM processing.
2004-04-06T13:19:14.000Z	171.4222	F	Automatic TM processing.
2004-04-06T22:14:43.000Z	171.3640	F	Automatic TM processing.
2004-04-07T07:00:44.000Z	171.3230	F	Automatic TM processing.
2004-04-09T11:35:05.000Z	171.3037	F	Automatic TM processing.
2004-04-09T15:24:10.000Z	171.2811	F	Automatic TM processing.
2004-04-09T21:58:03.000Z	171.2720	F	Automatic TM processing.
2004-04-11T08:35:50.000Z	171.2373	F	Automatic TM processing.
2004-04-12T21:36:50.000Z	171.2235	F	Automatic TM processing.
2004-04-15T21:28:41.000Z	171.1796	F	Automatic TM processing.

This report was generated Fri Apr 16 08:00:22 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, 87 Open Loop Slews, 92 Closed Loop Slews and 3 Momentum Bias were executed. 2 slews were missed or executed manually. This is equivalent to a 1.1%.

10/04/04 (Day of Year 101, Revolution 182)

Star Tracker 1750 Processor Fault, caused by Saturn being in the STR Field of View: A STR 1750 Processor Fault happened during the mapping after Close Loop Slew 01820018 to the planned attitude: RA = 06:25:56.17, DEC = +21:23:41.7 and POS = 272:52:11.3. The fault was caused by the presence of Saturn in the STR FoV and in the same Elementary Search Window of the Guide Star, ESW 20. No indication of the fault was reported in telemetry (the occurrence of the fault was not in synch with the TM cycle), but from the mapping data it is clear that it happened while processing ESW 20. The last processed ESW was ESW 19. The sequence of events at the time of the fault are listed below:

- 16:05:53 - End of Close Loop Slew 01820018.
- 16:06:52.668 - Start of STR Mapping.
- 16:07:24.270 - 1750 Fault and interruption of the mapping. The 7.4 Mi Guide Star was located at CCD [14126, -17643] in ESW 20. The catalogue number of this star is 01879-02030. The expected CCD location of Saturn was [18087, -21694] (also in ESW 20), with an expected instrumental magnitude of 0.1.
- 16:07:24.281 - Start of new ACC commanded mapping, during which a new Guide Star was found in ESW 1: [6562, -6568], 8.45Mi.

The effect was the drop of the OTF after the fault and throughout the pointing.

Flickering of the Pointing-Bit due to Pitch error: At 17:52:14, an undetected False Event on the STR caused a jump of +49.24 arc-seconds and -26.46 arc-seconds in the Y and Z positions of the Guide Star, respectively. The error in Y was more than the OTF threshold for Pitch and resulted in the flickering of the OTF. This was, however, not seen at the BCP level. The 8.4 Mi star was picked by the ACC after an Open Loop Slew and was located at [3177, -1651]. The altitude was about 135000 km.

Star Tracker 1750 Processor Fault, caused by Saturn being in the STR Field of View: A STR 1750 Processor Fault happened again during the mapping after Close Loop Slew 01820025 to the planned attitude: RA = 06:25:56.17, DEC = +21:23:41.7 and POS = 272:52:11.3. Like the previous case, the fault was caused by the presence of Saturn in the STR FoV and in the same Elementary Search Window of the Guide Star, ESW 20. No indication of the fault was reported in telemetry (the occurrence of the fault was not in synch with the TM cycle), but from the mapping data it is clear that it happened while processing ESW 20. The last processed ESW was ESW 19. The sequence of events at the time of the fault are listed below:

- 23:16:31 - End of Close Loop Slew 01820025.
- 23:17:30.213 - Start of STR Mapping.
- 23:18:03.510 - 1750 Fault and interruption of the mapping. The 7.4 Mi Guide Star was located at CCD [14130, -17644] in ESW 20. The catalogue number of this star is 01879-02030. The expected CCD location of Saturn was [18351, -21699] (also in ESW 20), with an expected instrumental magnitude of 0.1.
- 23:18:03.522 - Start of new ACC commanded mapping, during which a new Guide Star was found in ESW 1: [1941, -3340], 8.45Mi.

The effect was the drop of the OTF after the fault and throughout the pointing.

11/04/04 (Day of Year 102, Revolution 182)

Star Tracker 1750 Processor Fault, caused by Saturn being in the STR Field of View: A STR 1750 Processor Fault happened for the third time during the mapping after Close Loop Slew 01820046 to the planned attitude: RA = 06:25:56.17, DEC = +21:23:41.7 and POS = 272:52:11.3. Like the two previous cases, the fault was caused by the presence of Saturn in the STR FoV and in the same Elementary Search Window of the Guide Star, ESW 20. No indication of the fault was reported in telemetry (the occurrence of the fault was not in synch with the TM cycle), but from the mapping data it is clear that it happened while processing ESW 20. The last processed ESW was ESW 19. The sequence of events at the time of the fault are listed below:

- 22:14:30 - End of Close Loop Slew 01820046.
- 22:15:30.464 - Start of STR Mapping.
- 22:16:03.367 - 1750 Fault and interruption of the mapping. The 7.4 Mi Guide Star was located at CCD [14125, -17631] in ESW 20. The catalogue number of this star is 01879-02030. The expected CCD location of Saturn was [19205, -21731] (also in ESW 20), with an expected instrumental magnitude of 0.1.
- 22:16:03.378 - Start of new ACC commanded mapping, during which a new Guide Star was found in ESW 1: [6551, -6562], 8.45Mi.

The effect was the drop of the OTF after the fault and throughout the pointing.

12/04/04 (Day of Year 103, Revolution 182-183)

Slew lost due to a short drop in TM (Goldstone, DSS-24): A short drop in TM from Goldstone (DSS-24) interrupted the uplink of the slew sequence for Close Loop Slew 01820059. After TM was re-established, a manual Close Loop Slew was performed to the attitude of PID 01820059 (the missed slew was performed manually). The attitude was reached at 12:23:07, which was about 16 minutes later than the planned time in the Timeline. PID 01820059 was affected.

13/04/04 (Day of Year 104, Revolution 183)

Close Loop Slew missed because the STR did not pick the commanded Guide Star during the Search-and-Track process: The FDS selected the star with

catalogue number 6846-00066 for Close loop Slew 01820021. The expected CCD position of this 7.83 Mi star was [18294, -11232], prior to the slew. The STR did not report this star either in “Full Accuracy” or in “Reduced Accuracy” during the mapping, based on which the star was selected for the slew (the FDS extracts and selects stars for slews based on the determined attitude and not based on the stars reported by the STR in TM). The star could not be picked also during the STR Search-and-Track process of the slew sequence, which resulted in the interruption of the sequence and failure of the slew execution. The Timeline recovery tool was then used to generate a manual slew to the attitude of PID 01820021. The FDS generated a Close Loop Slew with the same star as before. This time as well, the star was not reported in the mapping process and could not be picked also during the Search-and-Track process. The manual slew failed execution. Having had missed a part of the pointing by this time, it was decided to perform a recovery slew to the attitude of PID 01820022. This time the Timeline recovery tool generated a manual Open Loop Slew, which was successfully executed. The effect was that PID 01820021 was lost.

The magnitude of the selected star is well above the specified lower value of the STR magnitude range and the spectral type is B2. One reason that this star was not reported by the STR during the mapping and was not picked during the Search-and-Track could be the presence of a close by dim star. This dim neighbor star, 6846-00213, has a magnitude of 9.8 and is located at a distance of 1.7 arc-minutes. From past experience, it seems that dim neighboring stars (even with magnitudes below the specified lower value of the STR magnitude range) could cause the failure of the clustering process of the search cycle and release of the star in the first cycle. Therefore the star is not reported in TM even as “Reduced Accuracy”. FD is looking into this case. If it is also concluded by them that the STR does not pick this star because of its dim neighbor, then the star will be excluded in the FDS to prevent its selection as Guide Star. It should be noted that the same problem with the same star also caused the failure of Close Loop Slew 01790033.

14/04/04 (Day of Year 105, Revolution 183)

Nothing to report.

15/04/04 (Day of Year 106, Revolution 183-184)

Flickering of the Pointing-Bit due to Pitch and Yaw errors: At 04:45:48, there was a jump of -163 arc-seconds and -55 arc-seconds in the Y and Z positions of the Guide Star, respectively. The errors were more than the OTF threshold for Pitch and Yaw and resulted in the flickering of the OTF. This was not seen at the BCP level. The 8.5 Mi Guide Star was picked by the ACC after an Open Loop Slew and was located at CCD location [-7221, 18552]. INTEGRAL was at an altitude of about 112000 km at this time.

Release of Guide Star by the STR SEU Filter of the ACC, during the perigee passage: At 20:34:25, the Guide Star was released by the STR SEU Filter of the ACC when the number of detected False Events on the STR exceeded the filter threshold. At LOS the 7.15 Guide Star was located at CCD location [-1973, -16188]. At AOS the new Guide Star was located at [-4332, 377] with a magnitude of 7.15.

16/04/04 (Day of Year 107, Revolution 184)

Nothing to report.

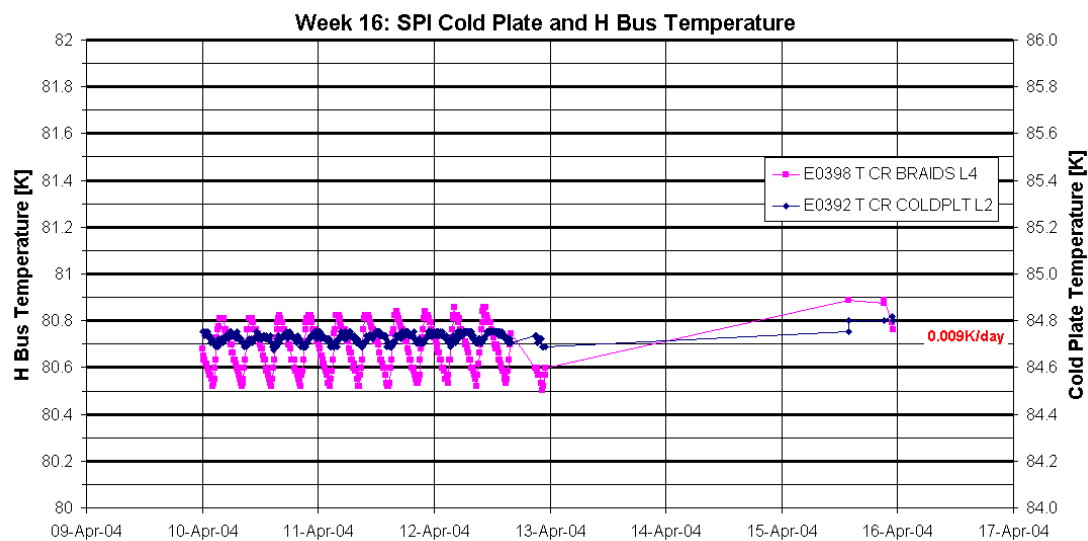
8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

The performance of the cryo-cooler is nominal.

The cold plate temperature is leveled off at around 80.7K with a small positive drift of 0.009K/day, which is within the expected range.

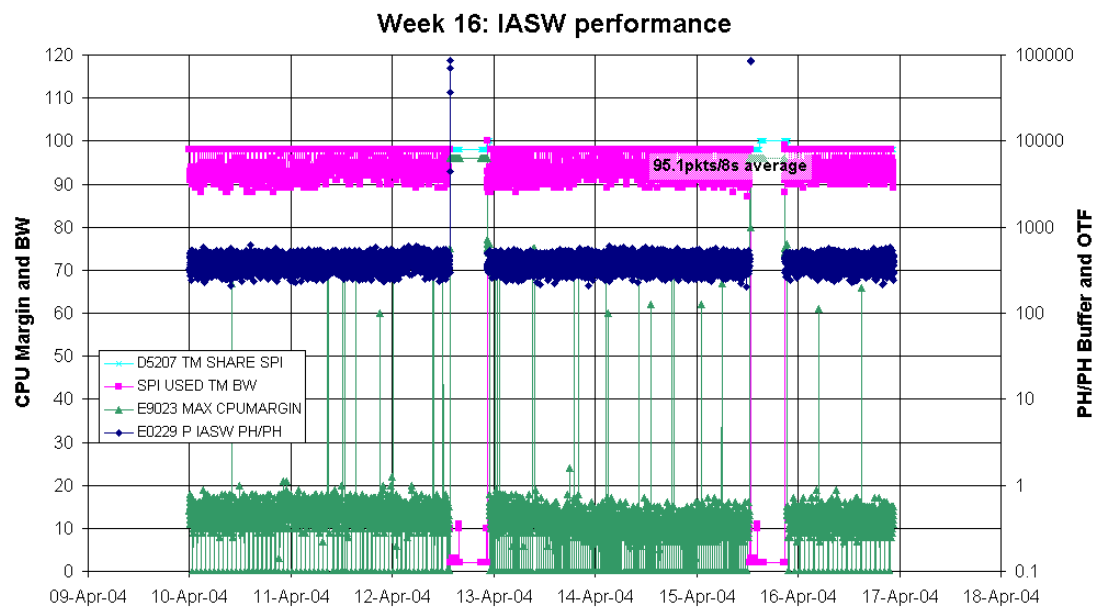
The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



IASW/DPE:

The performance of the IASW/DPE is nominal. The average TM bandwidth occupation was 95.1 pkts/cycle in the science windows.

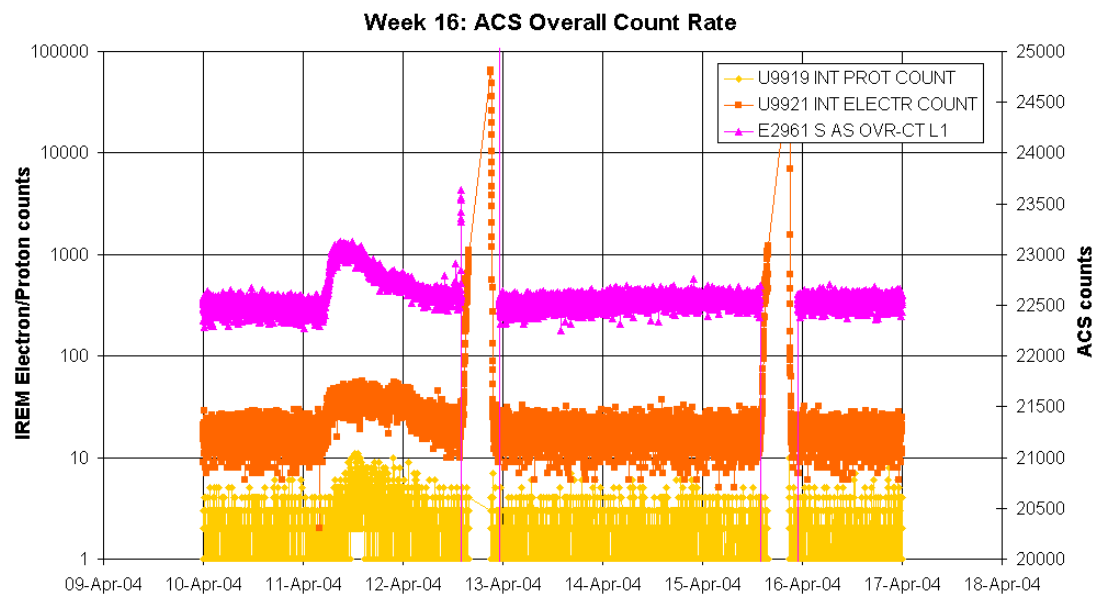
The following diagram shows the IASW performance in terms of TM bandwidth and event buffer occupation during the reporting period:



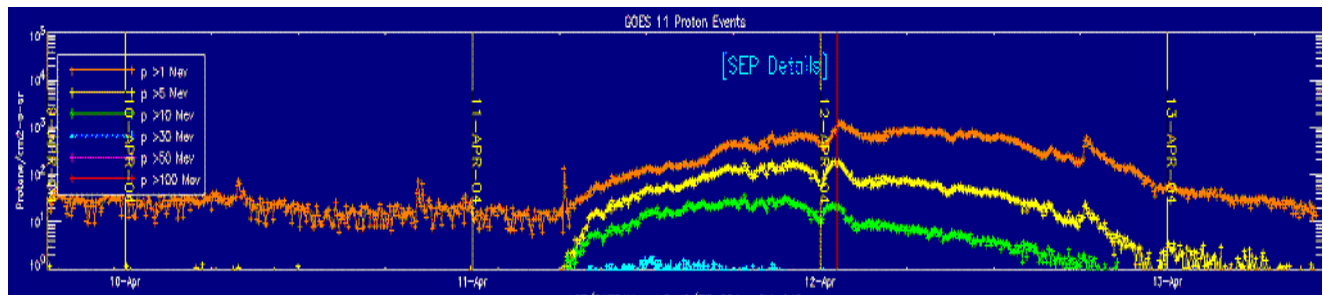
ACS:

The performance of the ACS is nominal.

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



Starting from 11th April at around 07:00z, a solar flare increased the background until the end of the revolution. Though no special warning was received for this flare, the ACS data shows a very good correlation with IREM proton counters and GOES proton flux measurements here after published (from Lockheed Martin).



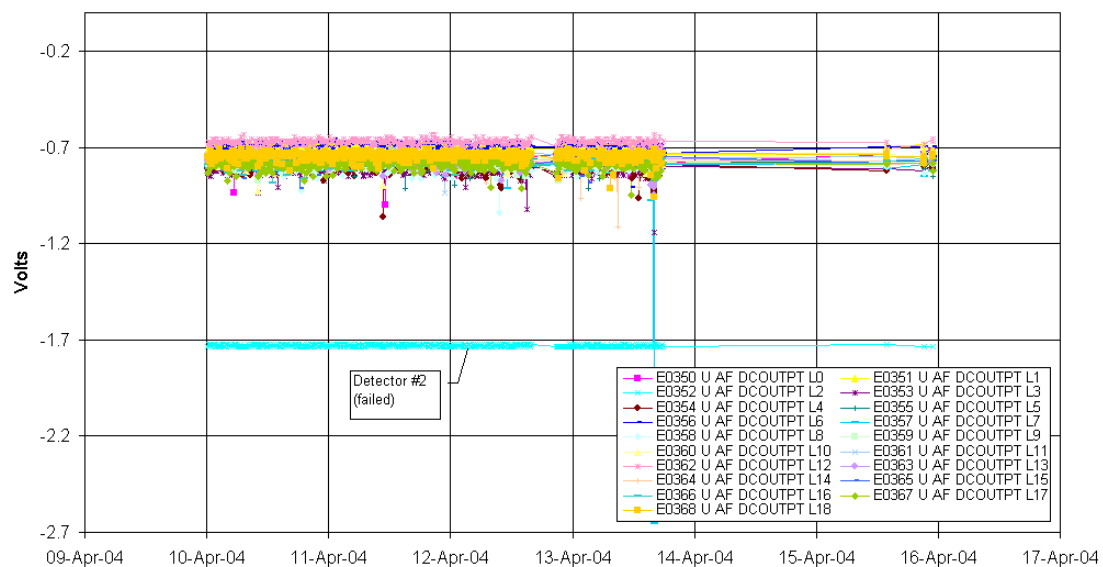
AFEE:

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.

Week 16: AFEE DC output Voltages



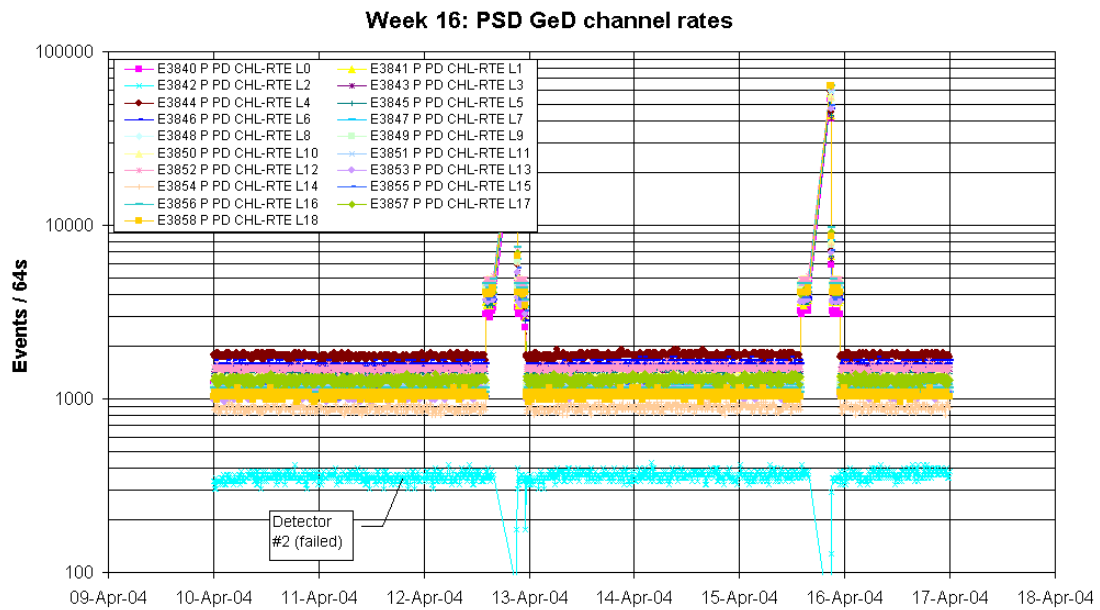
DFEE:

The performance of the unit is nominal.

Nothing to report.

PSD:

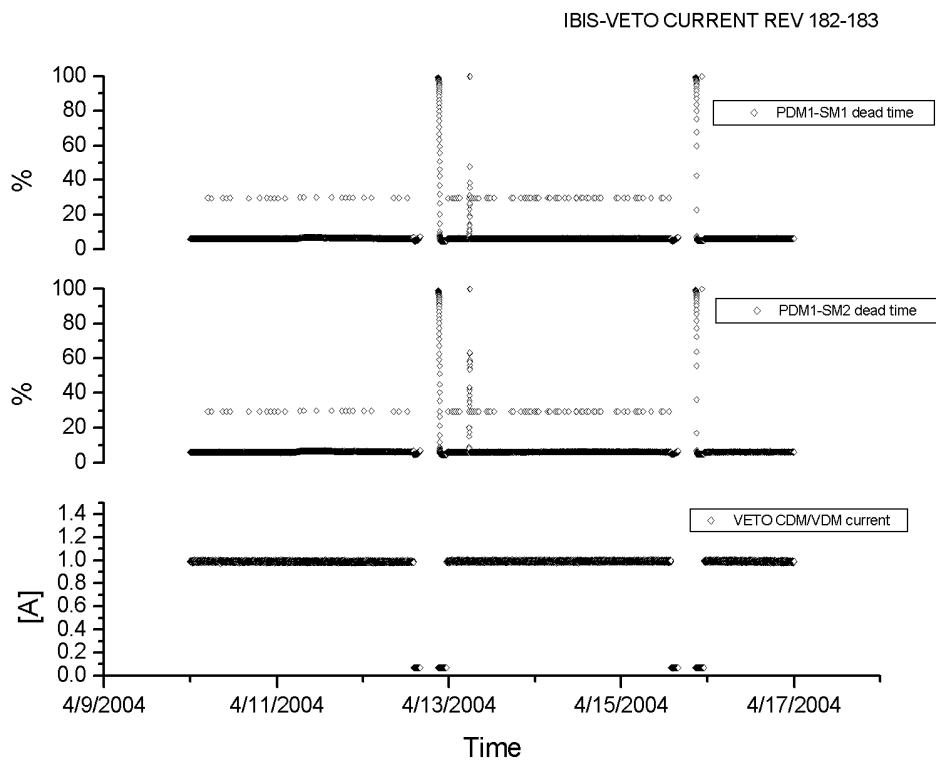
The following plot shows the GeD channel rates detected by the PSD during the reporting period. The count rate of each detector is within the expected range, except for the failed detector #2, whose residual counts are triggered by noise.



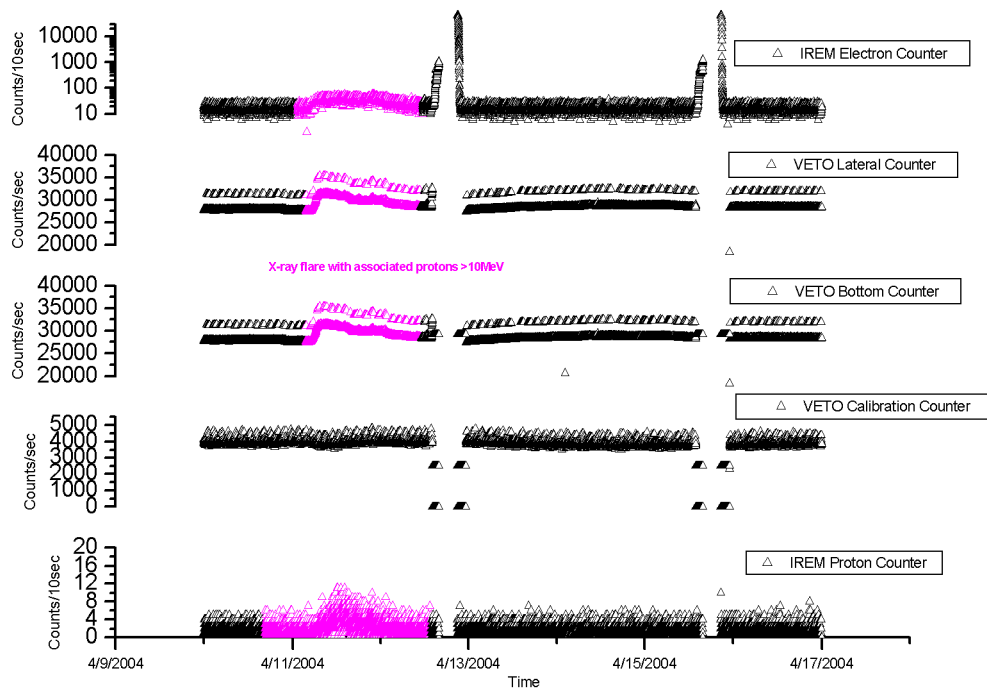
8.3.3 IBIS Operations

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:

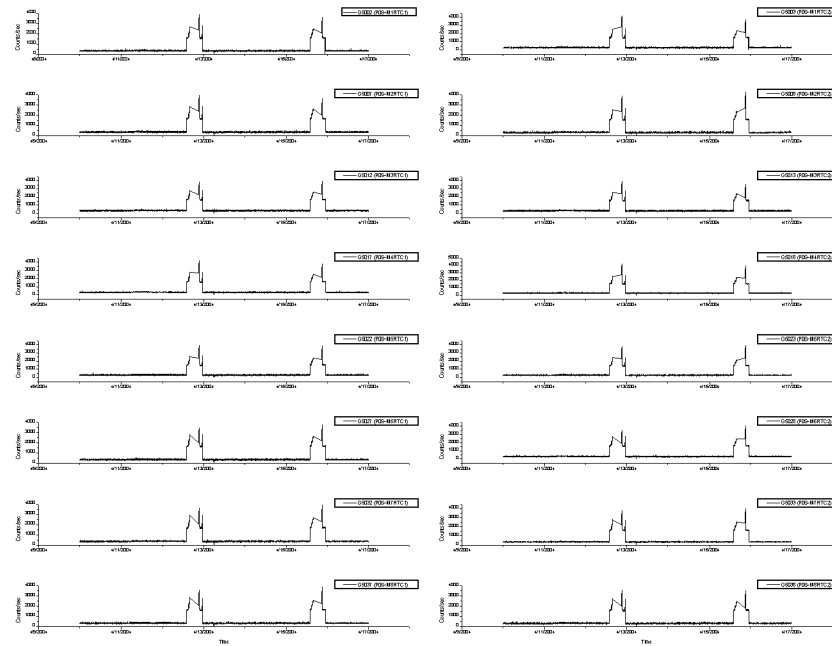


IBIS-VETO COUNTERS REV 182-183

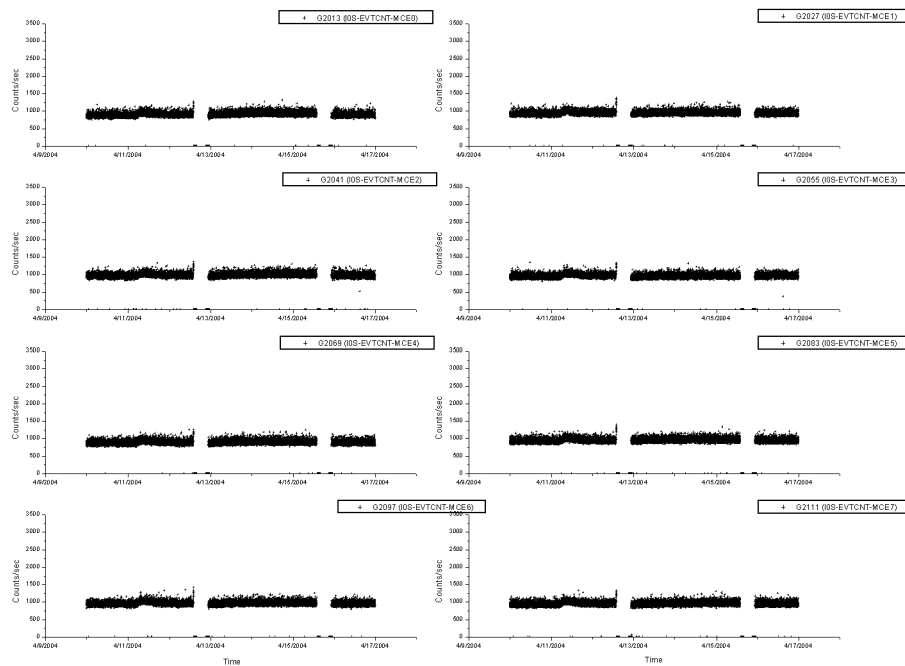


Plots of the ISGRI and PICsIT counters, during the observation period, are shown below:

IBIS-PICsIT COUNTERS REV 182-183



IBIS-ISGRI COUNTERS REV 182-183



IBIS daily report

DOY 2004.101 (10/04/04)

Nothing to report.

DOY 2004.102 (11/04/04)

Nothing to report

DOY 2004.103 (12/04/04)

There were a few reports during the Belt passage of the OEM APID 1280 ID 167 Class 2 <<IBIS1 PICsIT NOISY SEMIMODULE SIGNALLING>> due to the PICsIT detectors being ON without the VETO anticoincidence system, as required by the PIs.

DOY 2004.104 (13/04/04)

Reported

- at 05:36Z, the parameters family G5072(PDMi: semimodule #1and 2 FIFO error) failed SCC;
- at 05:47, the parameters family G5008 went in and out of limit HARD LOW (values =0 cts/s);
- at 05:51, the OEM APID 1280 ID 132 Class 0 <<HEPI RESYNCH>>

Following the Payload Contingencies Recovery document the behaviour described above is expected when present a problem in communication between the HEPI and the PFDM (PICsIT FIFO Data Manager). The unit as reported in the document is most of the time able to self-solve this conflict in around 15 minutes performing a re-synchronization of the HEPI-PICSIT interface. No action was then required.

DOY 2004.105 (14/04/04)

Nothing to report.

DOY 2004.106 (15/04/04)

At 13:04Z, the TM parameter G2000(IOE-OVFWPXADD-M0) failed SCC: the reason was the overflow in the number of the noisy pixel detected for ISGRI detector module 0. The condition was cleared after few seconds and no action was taken.

There were a few reports during the Belt passage of the OEM APID 1280 ID 167 Class 2 <<IBIS1 PICsIT NOISY SEMIMODULE SIGNALLING>> due to the PICsIT detectors being ON without the VETO anticoincidence system, as required by the PIs.

DOY 2004.107 (16/04/04)

Nothing to report.

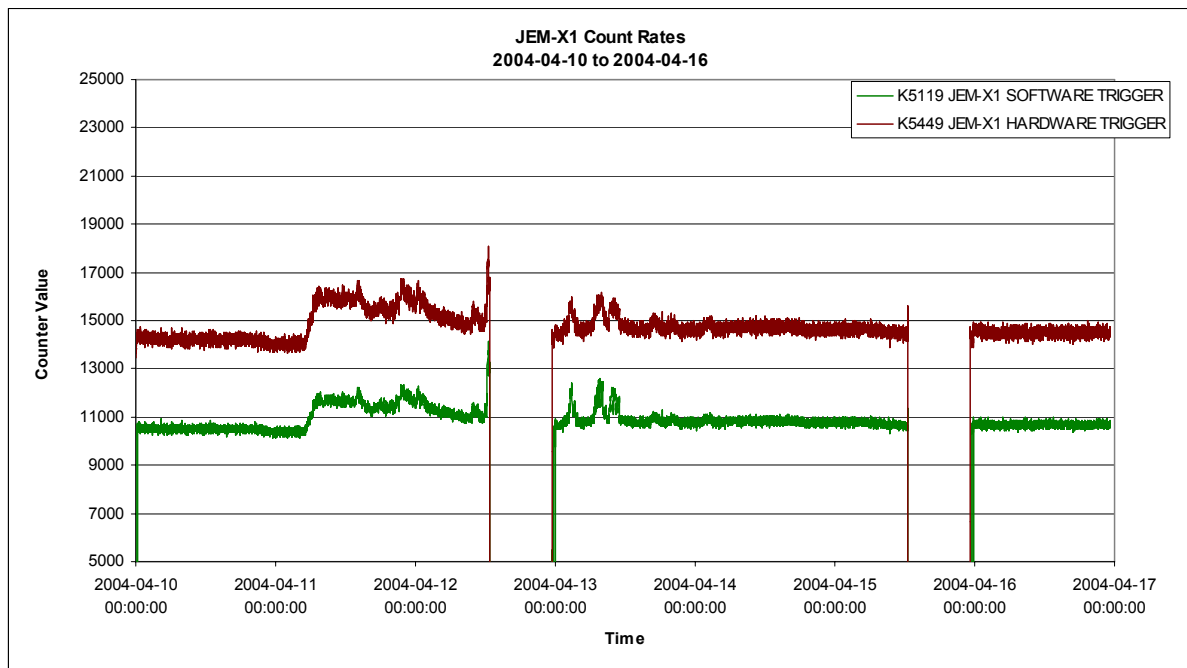
8.3.4 JEM-X Operations

2004-04-10 (DOY 101, Rev 182) to 2004-04-16 (DOY 107, Rev 184)

Nothing to report.

8.3.4.1 JEM-X Count Rates

JEM-X1 count rates over the reporting period are displayed in the following graph¹.



8.3.5 OMC Operations

On DoY 103, at 12:02, a TM drop prevented the uplink of an AOCS command, stopping the slew to pointing 01820059. The manoeuvre and OMC commands were conducted manually, the impact was 14 minute delay in the start of the pointing.

On DoY 104, at 09:46, an AOCS command failed release, as the intended guide star was not seen, during the recovery, the guide star was again not seen, the impact was pointings 01830021 and 01830022 were lost, it was at this time that the following pairs of commands were rejected:

```
2004.104.09.50.25.625 2004.104.09.50.19.401 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=447
2004.104.09.50.25.500 2004.104.09.50.12.901 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=446
```

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

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These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for pointing 01830021.

```
2004.104.10.22.40.446 2004.104.10.22.30.402 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=449
2004.104.10.22.32.185 2004.104.10.22.24.402 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=448
```

These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for pointing 01830022.

On DoY 104, at 20:37:12, while executing pointing 01830041, the following exception OEMs were raised:

```
2004.104.20.37.12.303 2004.104.20.37.04.925 1792 Real Time Anomaly 5 OMC
CSSW INT ER
      FIX6=0 M9079=2 M9080=5 M9074=4 M9067=5531
2004.104.20.37.12.206 2004.104.20.37.04.925 1792 Real Time Exception 7 OMC
CONSTRAINT D
      M9073=4,IASW TASK 4 M9079=1 M9080=7 M9076=55 M9067=20216
```

This is a known problem triggered when the unit is observing a crowded region of the sky. The attitude at this time was: R.A.: 18:14:07.04 (hh:mm:ss), dec: -32:30:06.1 (dd:mm:ss).

On DoY 103 at 14:06:32 and DoY 106 at 13:53:03, OMC was switched by the Timeline to SAFE mode, at the nominal times.

8.3.6 IREM Operations

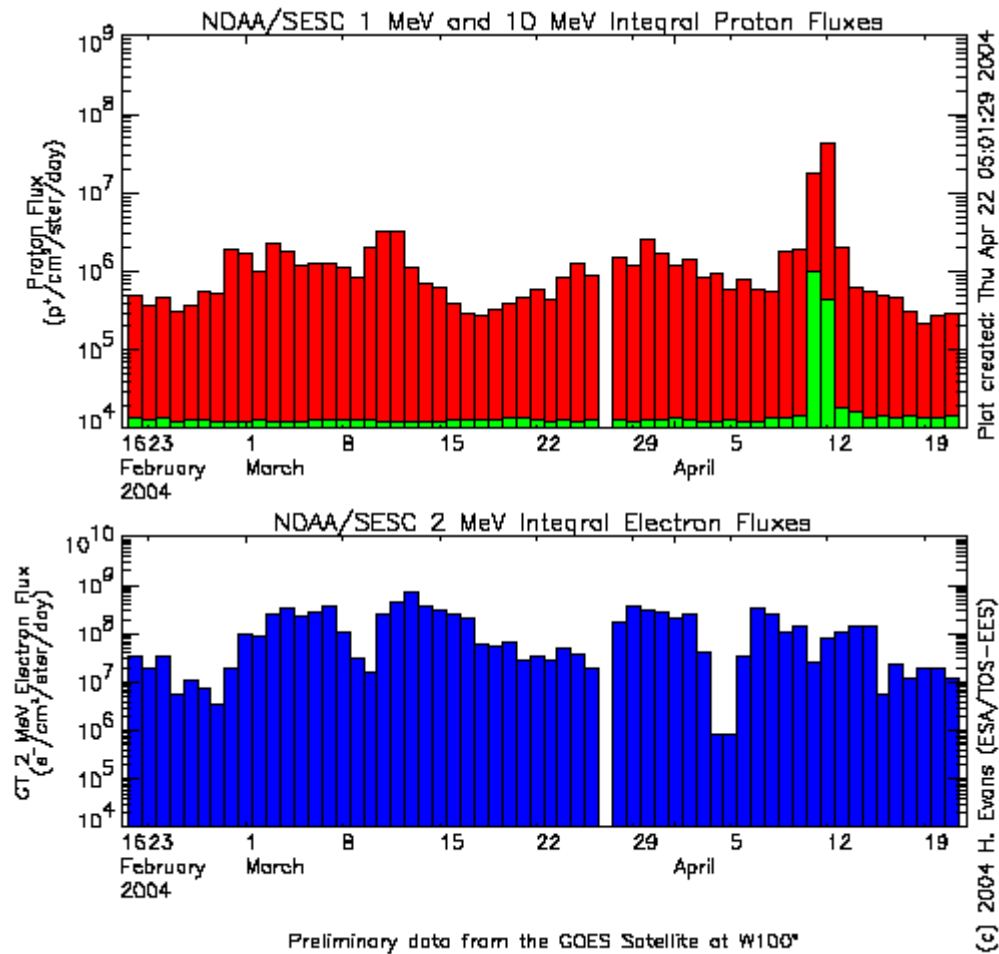
IREM daily report

Nothing to report.

Solar Activity

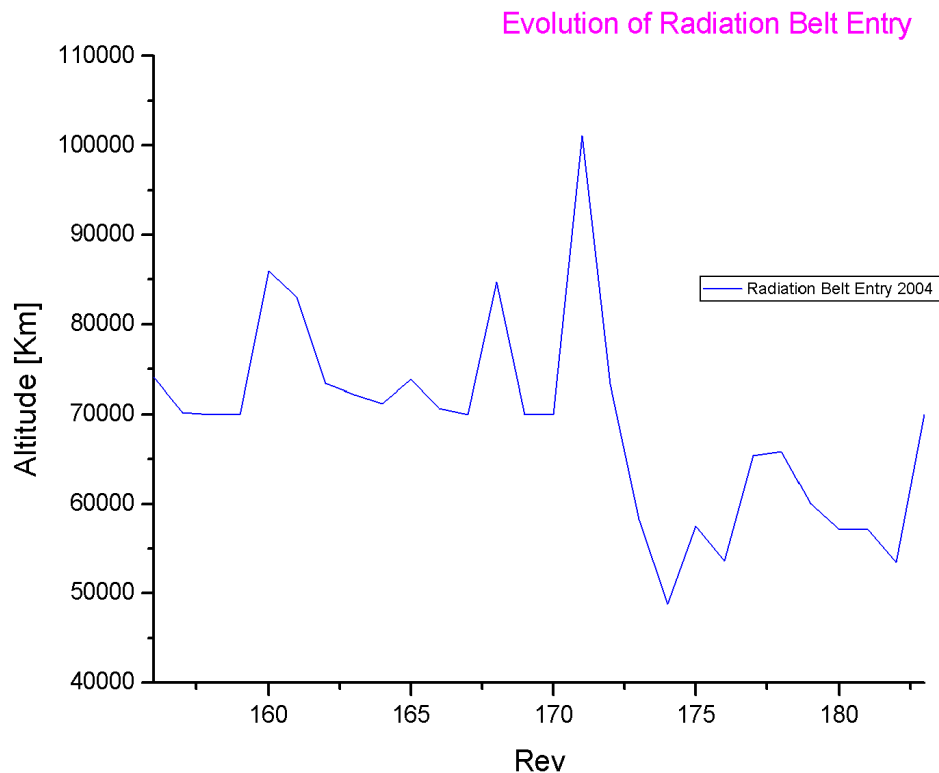
The observation period was characterised by moderate solar activity culminating with an X-ray flare Class C9 observed in the morning of 11/04/2004.

The x-ray flare had an associated proton flux, in the energy $10 \text{ MeV} < E < 50 \text{ MeV}$ that has been observed by large part of the on-board VETO systems. A graph showing the latest solar activity (proton and electron Fluxes during the past two months) with evidence of the proton event of the 11th of April (courtesy H.Evans).



Radiation Belt Entry Analysis

The evolution of the Radiation Belt Entry in 2004, since rev 156 is reported in the following plot 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 182-->183, as defined by a cut-off flux of $3.76\text{E}+02$ e/cm²/sec ($E>0.5$ MeV) and the predicted Proton Belts Entry/Exit, as defined by a cut-off flux of $1.25\text{E}+03$ 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
182	RAD_ENTR R 2004-04-12T14:06	12-Apr-2004 14:57	12-Apr-2004 14:44	55005
182	RAD_EXIT R 2004-04-12T23:07	12-Apr-2004 21:35	12-Apr-2004 21:44	26084
183	RAD_ENTR R 2004-04-15T13:52	15-Apr-2004 14:35	No data available	
183	RAD_EXIT R 2004-04-15T22:53	15-Apr-2004 21:14	No data available	

Reference

Small error vs reference

Large error vs reference

Radiation Spike

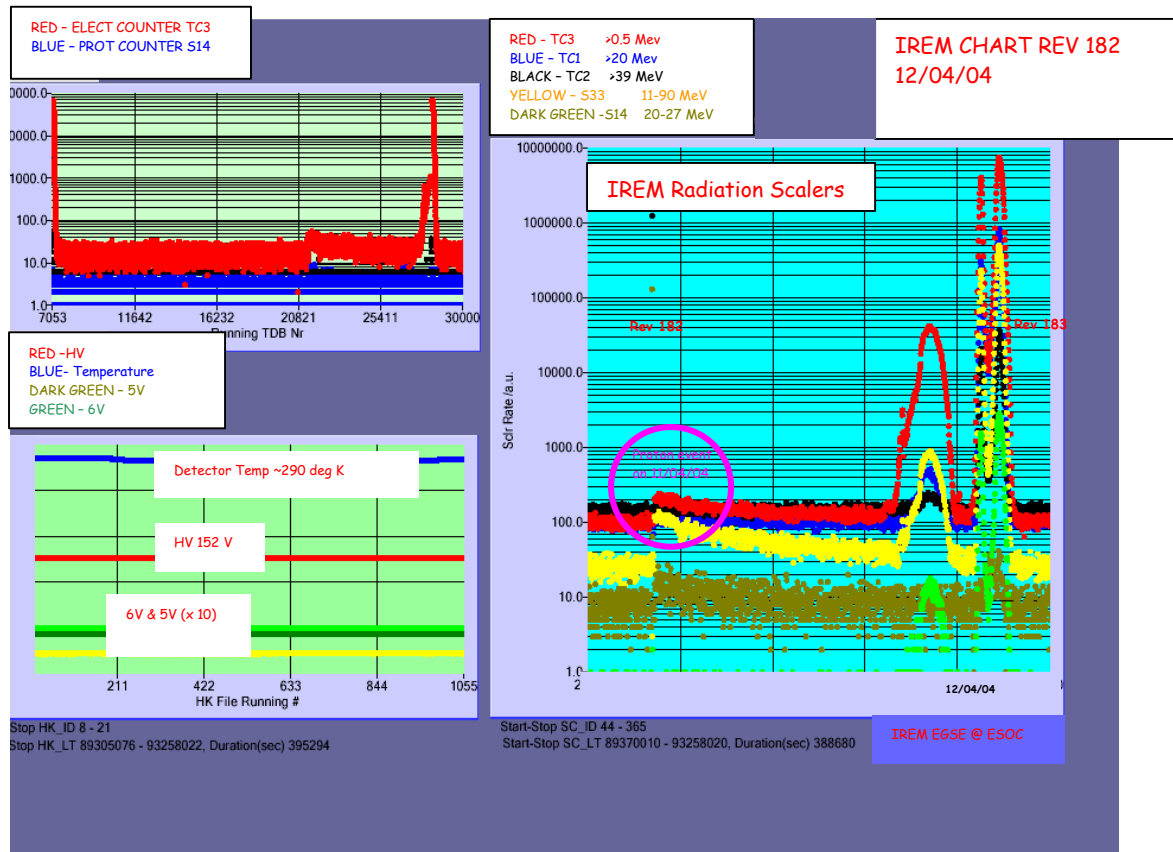
Proton Belts

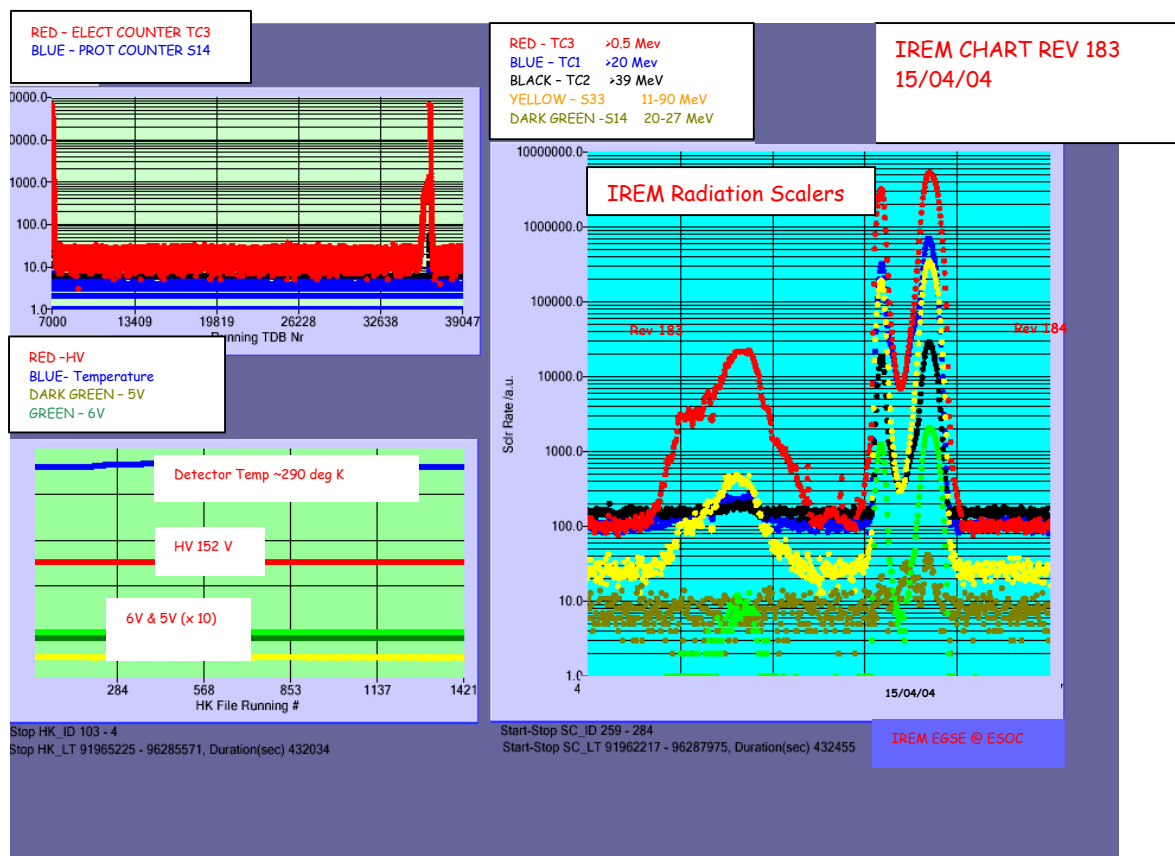
REV	S/C BCPKT (proton)	Proton CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
181	PROTON_RAD_ENTR	09-Apr-2004 20:26	11965

181	PROTON_RAD_EXIT	09-Apr-2004 20:46	14243
182	PROTON_RAD_ENTR	12-Apr-2004 20:04	11279
182	PROTON_RAD_EXIT	12-Apr-2004 20:34	14487
183	PROTON_RAD_ENTR	15-Apr-2004 18:28	11782
183	PROTON_RAD_EXIT	15-Apr-2004 18:58	15471

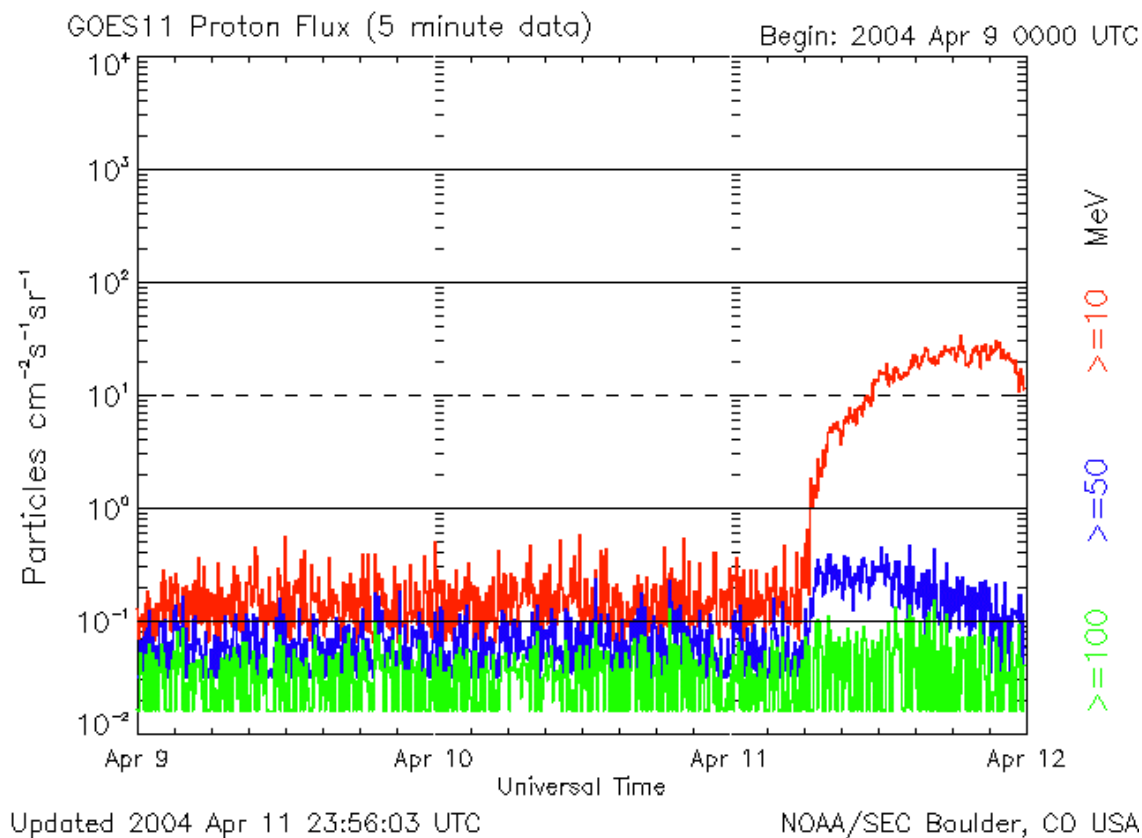
IREM radiation counters plot

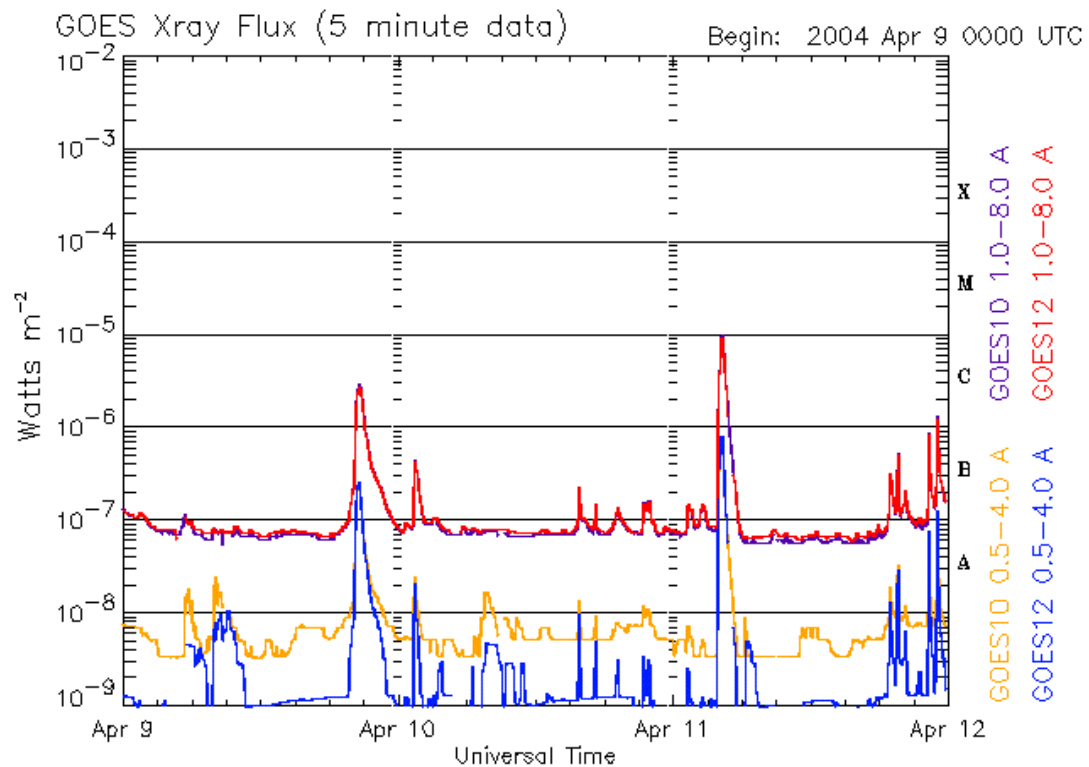
Plots of the evolution of the IREM counters from revs 182 & 183 are shown below:





the observed proton and X-ray Fluxes for the event on the 11th of April, as reported from GOES satellites are shown below:





Updated 2004 Apr 11 23:56:05 UTC

NOAA/SEC Boulder, CO USA

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

