

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 116
Week 50
13.12.04
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 04.12.04 until 10.12.04 (both dates inclusive) and covers the revolutions 262 & 263.

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 Plane; Cassiopeia A (RA 23:51:39.60; DEC +61:41:40.5); an OMC Flat Field target (RA 23:48:0.00; DEC +14:30:00.0) and the Target of Opportunity IGR J00291+5934 (RA 00:29:6.00; DEC +59:33:60.0). The activities consisted of GPS, staring and raster dithering observations. In addition, OMC Flat Field and Dark Current Calibrations and a JEM-X1 gas purity engineering session were performed.

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 Eclipse season continued with the 5th and 6th eclipse passages. The eclipses were nominal from an AOCS point of view.

4 slews (CSL) were missed from the Timeline during this period:

- three slew (3 CSL) were missed in revolution 262 due to a problem on the selection of the guide star;
- One slew (CSL) was missed in revolution 262 due to problem (Decoder 2 in LOCKOUT status) during the handover from REDU to DSS-16.

The fuel consumption over the period between 02/12/2004 and 08/12/2004 was 0.2095 kg. The remaining propellant is in the order of 165.8968 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.

During the reporting period Integral passed through eclipses 5 and 6 of the current eclipse season. Both eclipse passages were nominal from an EPS point of view, the batteries Depth of discharge and recharge duration were in line with predictions in both cases. The MRU EOC Timer did not require update for either of these 2 eclipses.

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.

On 7/12/2004 at 17.01z following problems establishing uplink at HANOVER from REDU to DSS16, Decoder 2 (VC-7) entered Lockout Status. As this was the first time this had occurred since the start of the mission, the problem took some time to understand and correct. The AD mode tele-command uplink was eventually restored at 17.58z.

The reasons for this happening are as follows:

During the HANOVER window the SETVR BC directives to reset the On-board AD mode TC counters failed due to the commanding problems at DSS16, this meant that the ground counters were reset, but not the on-board counters. After the uplink problem had been solved a test command was up-linked in AD mode, due to the inconsistency (greater than the FARM-1 Sliding Window tolerance) in the 2 counters the command was rejected and Decoder Lockout mode was set.

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.

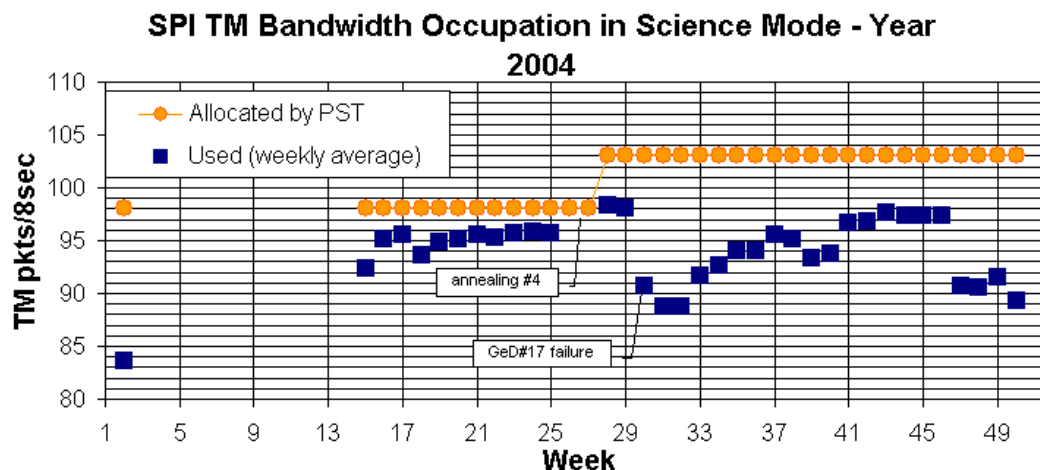
3.2 Payload

3.2.1 SPI

The overall status of the instrument in this week is nominal, though the PSD (Pulse Shape Discriminator) still continues to randomly reproduce the malfunction of channels blocking.

The SPIASW 431 installation is under preparation and is scheduled on 11th December: After the patch, the Out-Of-Limit, currently defined on the PSD channel rates, can be deleted, thus removing the false alarms associated to the malfunction.

The instrument was however kept in photon-by-photon mode for the whole period, with spectra TM enabled, an assigned TM bandwidth in the science observation windows of 103 pkts/cycle and an actual occupation of 89.3 pkts/cycle average. The following plot shows the evolution of the occupied bandwidth, since beginning of 2004.



The cryocooler 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

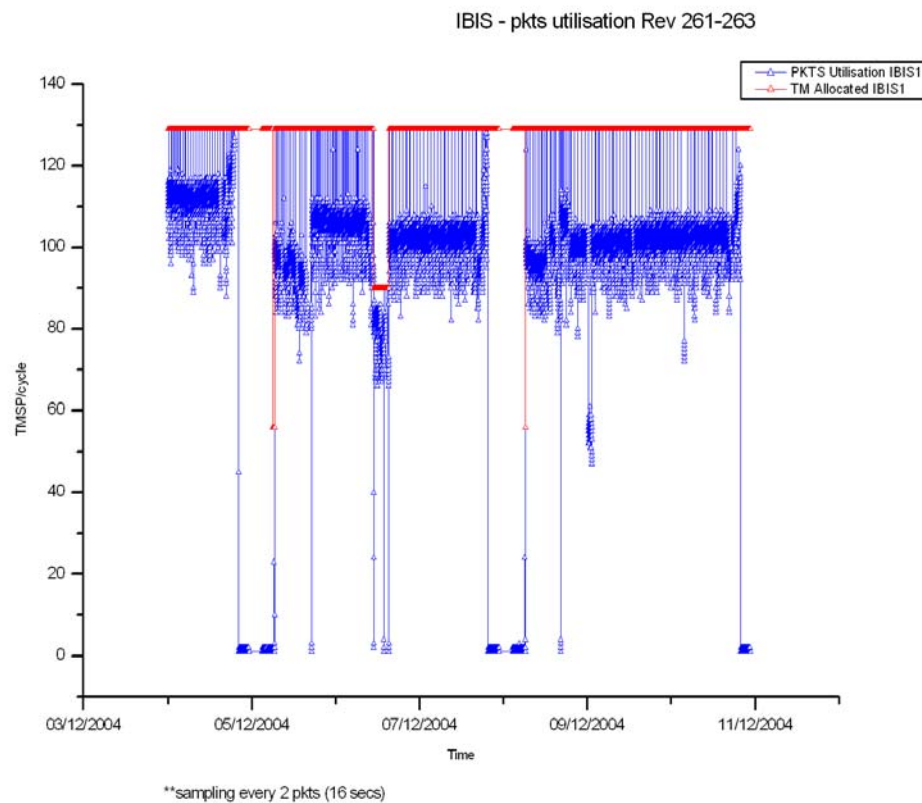
The Overall status of the unit is Nominal.

The week was characterised by low to moderate solar activity.

During the execution of a VETO patch, a dump tele-command was rejected. This was followed by an 'autonomous restore' of the Context table contained in the VETO PROM, referring to the launch setting. The recovery of the unit was performed by re-uplinking the patch and restoring the Context table saved in the DPE. An anomaly report has been generated since the first occurrence (AR INT_SC-102) accordingly. Investigations are on-going at MOC and PIs side. A modification of the patch execution time (a delay of 3 minutes) has been implemented in the timeline for the following eclipses passages, to fix this problem.

During the reporting period the PST allocation to IBIS was 129 TMPS/cycle, except during the OMC Flat Field calibration, when the allocation was 90 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 103.6 TMPS/cycle, down 13.2 on last week.

A plot of the IBIS TM utilisation during the observation period is shown below:



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

3.2.3 JEM-X

The status of both JEM-X units is nominal.

JEM-X operations were performed by the automatic Timeline.

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

On 2004-12-06 in line with OCR-184, a JEM-X1 gas gain engineering session was performed. This was executed during the OMC Flat Field Calibration observation in revolution 262, from 2004-12-06T10:24Z to 2004-12-06T14:27Z. The activities were performed according to INT_OR_0185.

On 2004-12-08 at 04:17Z, during the post-eclipse reconfiguration of JEM-X1 following the 6th eclipse of this season, another DFEE anomaly occurred like that observed on 2004-06-20 and 2004-06-23 (following the 6th and 7th eclipses of the last eclipse season, ref: Anomaly Report INT_SC-84). The anomaly consisted of a CRC failure at the stage of switching on the DFEE and loading the DFEE context from the DPE to the DFEE. This anomaly is recorded in AR INT_SC-104. JEM-X1 was recovered by 2004-12-08T07:26Z.

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, except during the Flat Field and Dark Current calibrations from 10:57:59 to 15:20:19, when the TM allocation was 63 packets/cycle.

There were 158 OMC pointings executed nominally, 3 were lost and 1 was delayed by 23 minutes.

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

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterized by low solar activity.

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 very good this week, well above the system performance requirements, 3 pointings were lost due guide star problems, and another delayed due to an onboard decoder lockup.

4.1 Mission Operations Centre

The performance of the MOC was in general good in the reporting period, although there were problems communicating with ISDC on two occasions.

4.2 Ground Stations & Network

The performance of the ground stations and Network was in general good this week. There were several TM gaps from Redu, though none of them had any mission impact. A communications problem with DSS-16, caused a delay of 23 minutes in one pointing. The overall performance was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. General

This week has concentrated on the Time Allocation Committee (TAC) meetings to establish the open time program for the AO 3 period.

1. Mission planning

PSF's up to revolution 272.

All revolutions up to 270 have been planned; revolution 262 was also re-planned once more together with 263 due to a ToO.

TSF complete up to revolution 264.

2. Observation status

ECS for revolutions 252 has been received, ingested, and used to create corresponding OCS files for ISDC.

3. ISOC science data archive

The extended disk arrays from SUN were finally installed. The archive hardware is now being prepared for shipment to ESAC next week. No data ingestion has taken place.

4. ISOC system

Version 10.6.3 has been introduced. It includes a patch to the data-base to resolve an urgent SPR.

5. ISOC move to Spain

This week the last part of the functional testing of the ISOC system at ESAC have been successfully performed. This was to ensure that ISOC at ESAC could send the various files produced to the MOC and ISDC. This means the system in Spain is now functioning fully. What remains is a period of parallel operations both from ESTEC and ESAC. This is to build up the maximum confidence in the ISOC system at ESAC before the operations are actually switched over early February. This activity is planned to start in January and the procedures have been successfully tried out.

Shipment of some office computers to ESAC together with the archive system is initiated. This will allow the ISOC staff arriving in Spain to have access to the standard office facilities from the start.

6. Problems

When replanning the revolution 262 there were some commands missing in the part of the schedule that was not changed. This was detected by MOC and the problem could be overcome by selecting the switch over time from the running POS to the new RPOS. The problem is investigated in ISOC.

4.3.2 ISDC

Status of ISDC observation processing on 13/12/2004:

- Latest Standard Analysis completed: observation 02200940001 (X0115+63, Revolution 238) on 29/11/2004

- Latest products archived: observation 02200940001 (X0115+63, Revolution 238) on 01/12/2004

- Latest observation products sent to the observer: observation 02297000016 (IGR J16320-4751, Revolutions 226) on 08/12/2004

5 Special Events

6 Anomalies

There were a number of problems that impacted the operations:

- On DoY 340, at 21:59, an AOCS command failed uplink causing the loss of pointing 02620025. The same problem also caused the loss of pointings 02620026 and 02620027.
- On DoY 341, at 10:36, a hit on the line to Redu knocked out the TM and TC connection, the TM returned at 10:37, and the TC at 10:43, there was no impact.
- At 15:43, there was an error sending data to ISDC.
- On DoY 342, at 05:27, there was a drop in VC7 TM from Redu, the on-line-passes were restated at 05:28, there was no impact.
- At 06:28, there was a hit on the line with Redu knocking out TM & TC, at 06:30 the TM returned, and at 06:33 the TC link was restored. There was no impact.
- At 16:57, after a handover from Redu to DSS-16, it was not possible to command the spacecraft as the AD mode could not be initialised. See OBDH section for details. At 17:55, the unlock command was sent, and at 17:56, the test command was successful. The impact was that pointing 02620077 was delayed by 23 minutes.
- At 20:52, 20 TM frames from DSS-16 were dropped, there was no impact.
- On DoY 343, at 10:02, there was a VC0 TM data gap from Redu. There was no impact.
- At 16:40, there was a 1 minute data drop during the TM playback, there was no impact.
- On DoY 344, from 14:00 to 14:05, there was a TM data drop from Redu. There was no impact.
- At 19:54, there was an error sending data to the isds, at 19:55, data was flowing once again without intervention or impact.

The following new anomaly reports were entered into the ARTS system.

AR id	Date Created	Subject	Segment	Status
INT_SC-104	08/12/2004	JEM-X1 DFEE CRC anomaly following eclipse on 2004-12-08	Payload	Open
INT-2680	07/12/2004	TMP Stop and Restart at REDU Missed, VC-7 TM Lost.	ESA Stations	Pending
INT-2681	07/12/2004	IMCA disc error	IMCS	Closed
INT-2682	07/12/2004	TCE1 reboot in REDU, monitoring link lost	ESA Stations	Pending
INT-2683	07/12/2004	Hit on the line to REDU	ESA Stations	Pending

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INT-2684	08/12/2004	Communications Problems to DSS16	NASA Stations	Pending
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7 Future Milestones

The Current eclipse season started on the 23rd November 2004, and continues until the 17th December 2004. There will be a total of 9 eclipses, with a maximum duration of 57 minutes 41 seconds on 8th December 2004.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 262

The observations in revolution 262 consisted of the following:

- 13 pointings of a GPS lasting ~9 hours.
- Amalgamated raster dithering observation of Cassiopeia A (RA 23:51:39.60; DEC +61:41:40.5) lasting ~16.5 hours.
- Staring observation at an OMC Flat Field target (RA 23:48:0.00; DEC +14:30:00.0) lasting ~3.5 hours. During this observation OMC Flat Field and Dark Current Calibrations were performed as well as a JEM-X1 gas purity engineering session.
- Raster dithering observation of the Target of Opportunity IGR J00291+5934 (RA 00:29:6.00; DEC +59:33:60.0), performed for the remaining ~28.5 hours of observation time.

Throughout these observations, SPI and IBIS were in their nominal science modes and the JEM-X2 DFEE remained off. During the OMC Flat Field observation, OMC was in FFCalibration followed by DCCalibration modes and JEM-X1 was in Data Taking mode but with a series of non-nominal values for the detector cathode voltage (Vc). In this observation the TM allocation was IBIS 90; SPI 84; JEM-X1 8; JEM-X2 1; OMC 63. For the other observations, JEM-X1 and OMC were also in their nominal science modes and the TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

Revolution 263

The observations in revolution 263 began with 13 pointings of a GPS lasting ~9 hours, followed by an amalgamated raster dithering observation of Cassiopeia A (RA 23:51:39.60; DEC +61:41:40.5) lasting ~2.5 hours. A raster dithering observation of the Target of Opportunity IGR J00291+5934 (RA 00:29:6.00; DEC +59:33:60.0) was then performed for the remaining ~48 hours of observation time.

Throughout these observations all instruments were in their nominal science modes, except JEM-X2 for which the DFEE remained off, and the TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2004-11-26T13:50:58.000Z	166.4546	F	Automatic TM processing.
2004-11-27T14:41:08.000Z	166.4214	F	Automatic TM processing.
2004-11-27T17:37:08.000Z	166.3828	F	Automatic TM processing.
2004-11-28T21:26:40.000Z	166.3329	F	Automatic TM processing.
2004-11-28T23:01:37.000Z	166.2726	F	Automatic TM processing.
2004-11-29T05:12:09.000Z	166.2568	F	Automatic TM processing.
2004-11-29T13:37:06.000Z	166.2018	F	Automatic TM processing.
2004-11-30T14:19:09.000Z	166.1798	F	Automatic TM processing.

2004-12-01T20:46:00.000Z 166.1414 F Automatic TM processing.
 2004-12-02T05:07:53.000Z 166.1063 F Automatic TM processing.
 2004-12-04T15:10:15.000Z 166.0740 F Automatic TM processing.
 2004-12-05T05:02:40.000Z 166.0124 F Automatic TM processing.
 2004-12-05T15:49:21.000Z 165.9742 F Automatic TM processing.
 2004-12-06T14:30:20.000Z 165.9618 F Automatic TM processing.
 2004-12-08T04:52:32.000Z 165.8968 F Automatic TM processing.

This report was generated Fri Dec 10 08:00:30 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 Summary Operations Report 04/12/2004-10/12/2004

AOCS operations were executed from the Automatic Timeline.

During this period, 58 Open Loop Slews, 118 Closed Loop Slews and 5 Momentum Bias were scheduled. 4 slews were missed. This is equivalent to a ~2.2%.

The AOCS eclipse operations were completely nominal. For each revolution, the Eclipse Timers and the Time-Tagged sequence to re-enable the IMU Auto Switch-Off function of the ACC were loaded from the Timeline and the pre-eclipse IMU health checks were performed at the planned times. Some information regarding the eclipse times and IMU usage up to this stage of the eclipse season are provided below:

AOCS Eclipse Times														Winter 2004	
Date	LOS	AOS	ACC Eclipse Imminent	ACC	FDE	FCE	Penumbra	FSS Sun Out	Umbra	Umbra	FSS Sun In	Penumbra	FDE/FCE	ACC	Eclipse Duration
2004-11-23	23:46:27	03:45:40	03:06:49	03:48:50	03:58:42	03:59:26	04:06:29	04:09:59	04:12:20	04:14:57	04:17:09	04:21:06	04:26:02	04:30:49	0:14:37
2004-11-26	23:44:00	03:34:05	02:50:42	03:32:42	03:42:24	03:43:08	03:50:22	03:51:55	03:51:57	04:22:01	04:22:35	04:23:56	04:28:48	04:33:38	0:33:34
2004-11-29	23:30:12	03:21:00	02:37:29	03:19:29	03:28:56	03:29:40	03:37:09	03:38:31	03:38:23	04:19:38	04:20:11	04:21:13	04:25:36	04:30:55	0:44:04
2004-12-02	23:18:00	03:09:00	02:24:38	03:06:33	03:15:54	03:16:38	03:24:18	03:25:38	03:25:24	04:14:07	04:14:46	04:15:32	04:19:54	04:25:08	0:51:14
2004-12-05	23:18:00	02:56:00	02:13:52	02:55:54	03:05:20	03:06:04	03:13:32	03:14:22	03:14:37	04:07:58	04:08:02	04:09:21	04:13:44	04:19:05	0:55:49
2004-12-08	22:54:00	02:45:00	02:04:35	02:46:31	02:57:05	02:57:49	03:04:15	03:04:58	03:05:19	04:00:31	04:00:34	04:01:56	04:07:41	04:11:33	0:57:41

IMU Usage during Eclipse Season						Winter 2004
IMU On	IMU Off	From Health Check		From Auto Calibration	On Time	Accumulated On Time
		Noise Roll [as/s]	Drift Roll [as/s]	Drift Roll [as/s]		
2004-11-22 20:56:00	2004-11-23 04:33:06	0.2117	0.1986	0.2548	7:37:06	7:37:06
2004-11-25 21:08:31	2004-11-26 04:42:27	0.2808	0.1480	0.1334	7:33:56	15:11:02
2004-11-28 20:21:18	2004-11-29 04:33:34	0.1839	0.2401	aborted (lost of guide star	8:12:16	23:23:18
2004-12-01 20:14:00	2004-12-02 04:27:32	0.3523	0.2516	aborted (lost of guide star	8:13:32	31:36:50
2004-12-04 19:47:45	2004-12-05 04:21:36	0.1867	0.1332	aborted (lost of guide star)	8:33:51	40:10:41
2004-12-07 20:01:43	2004-12-08 04:13:55	0.1830	0.2500	0.2949	8:12:12	48:22:53

04/12/04 (Day of Year 339, Revolution 261)

Nothing to report.

05/12/04 (Day of Year 340, Revolution 261-262)

Guide star released by the STR SEU Filter: At 08:50:00z, the SEU Filter threshold of the ACC was exceeded and the guide star released. The magnitude 8.4 guide star was located at [-22746, 3691]. A new guide star was found in the first automatic mapping, which was kept afterwards: [-9524, 357] 8.3 Mi.

Slews missed from the Timeline: At 21:59Z the sequence for the closed loop slew 02620025 was interrupted when the STR failed to track the commanded guide star in the search and track process. The commanded star was 4284-822 with instrumental magnitude 7.7. The Timeline recovery tool was used to perform a manual close loop slew from attitude of PID 02620024 to the attitude of PID 02620026 but failed to track the commanded guide star because the selected star was again 4284-822. The Timeline recovery tool was then used to perform a manual close loop slew to the attitude of PID 02620026 but failed again to track the commanded guide star because the selected star was still 4284-822. The Timeline recovery tool was then used to perform a manual open loop slew to the attitude of PID 0262027. The next slew (02620028) was manually updated and executed from the Timeline.

Star 4284-822 has two dim neighbours:

at ~2.1 arc-minutes, star 4284-852 with magnitude 9.3;

at ~3.5 arc-minutes, star 4284-832 with magnitude 9.6.

Which probably caused the release of the selected guide star for slew 02620025.

06/12/04 (Day of Year 341, Revolution 262)

Nothing to report.

07/12/04 (Day of Year 342, Revolution 262)

Slew missed from the Timeline: Due to a problem (see OBDH detailed part), still to be clarified, during the station handover REDU to Goldstone (DSS16), some of the TCs, performing the BC directive re-Set V(r) for VC0/7, did not reach the satellite. As the difference between V(r) (on board counter) and N(s) (on ground AD counter) was greater than that allowed by the FOP Sliding Window, the Decoder 2 entered Lockout status causing the stop of the timeline uplink and the lost of slew 02620077. A manual close loop slew was then performed to the attitude of PID 02620077 and the pointing partially recovered (lost 15 minutes). The next slew for PID 02620078 was manually updated and executed from the Timeline.

08/12/04 (Day of Year 343, Revolution 262-263)

Pitch and Yaw error during the eclipse passage: At 02:28z an undetected false event on the star tracker caused a jump in the position of the CCD image of the guide star. The error in pitch and yaw was more than the OTF thresholds for these axes. The magnitude 6.6 star was selected as guide star, at CCD location [7682, -16683], for the perigee passage.

09/12/04 (Day of Year 344, Revolution 263)

Nothing to report.

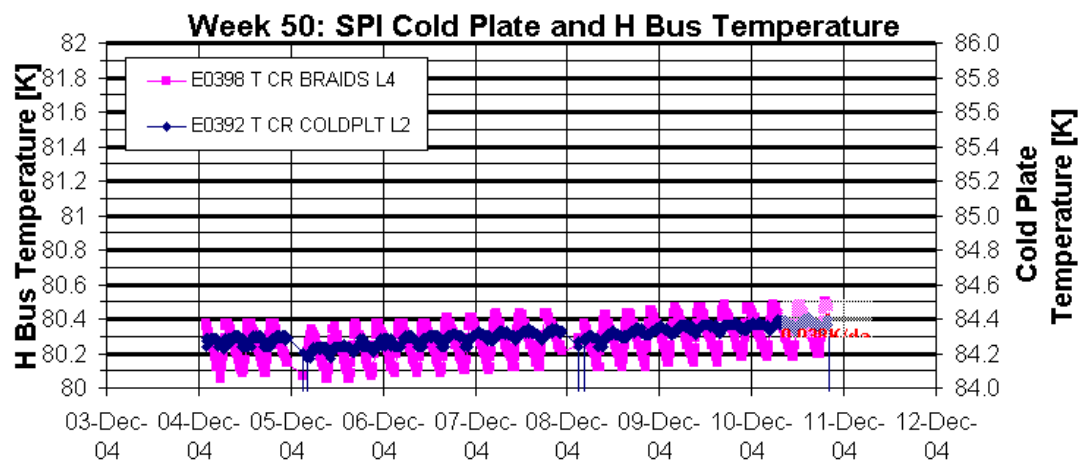
10/12/04 (Day of Year 345, Revolution 263)

Nothing to report.

8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

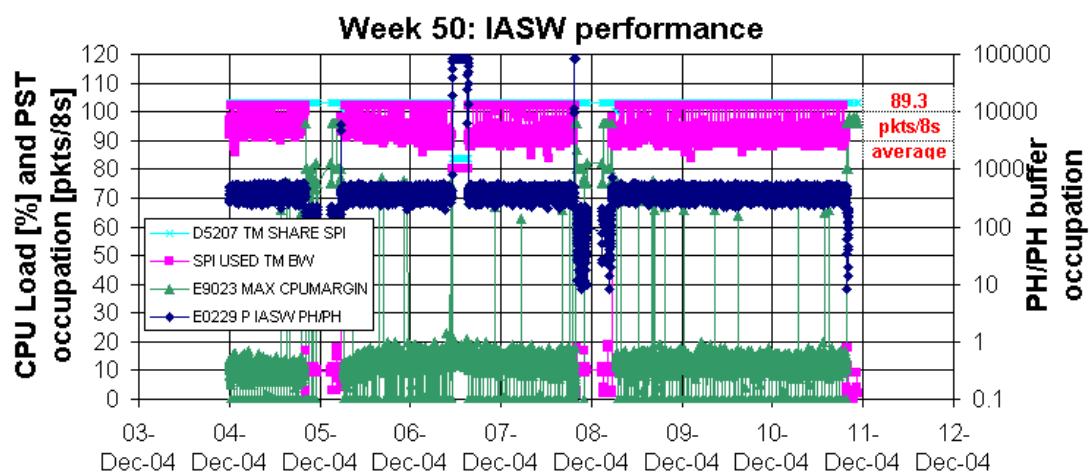
The performance of the cryo-cooler is nominal. The cold plate temperature was maintained at 85K $\pm$ 1K over the reporting period, showing the expected small positive drift. The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



IASW/DPE:

The performance of the IASW/DPE is nominal.

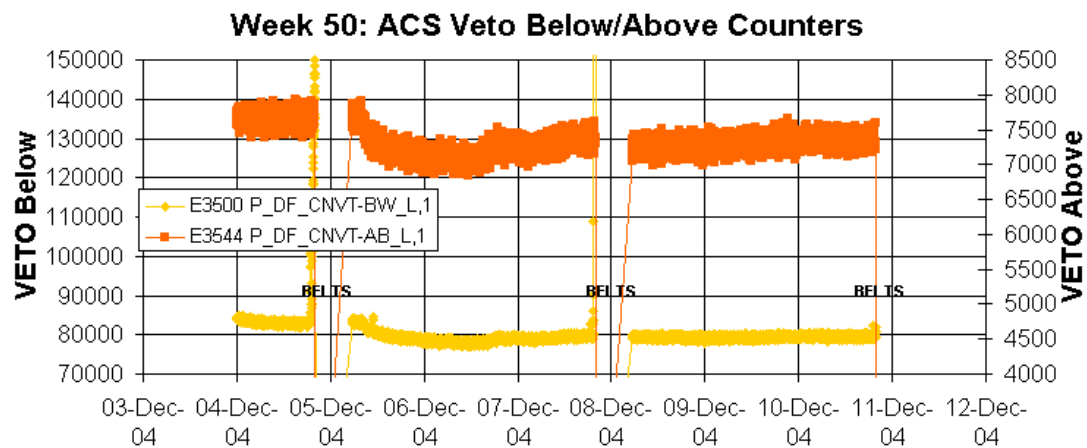
The following diagram shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS:

The performance of the ACS is nominal.

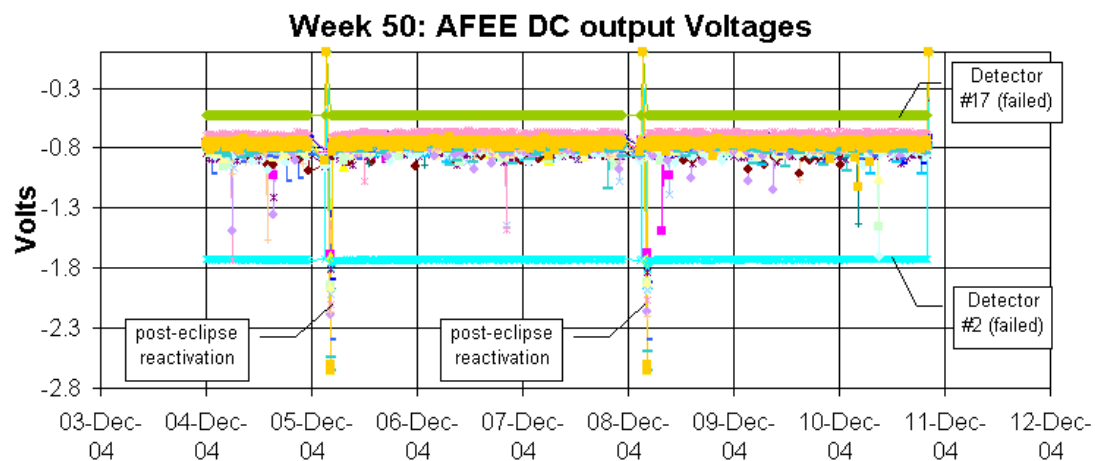
The following plot shows the ACS overall count rate evolution during the reporting period.



AFEE:

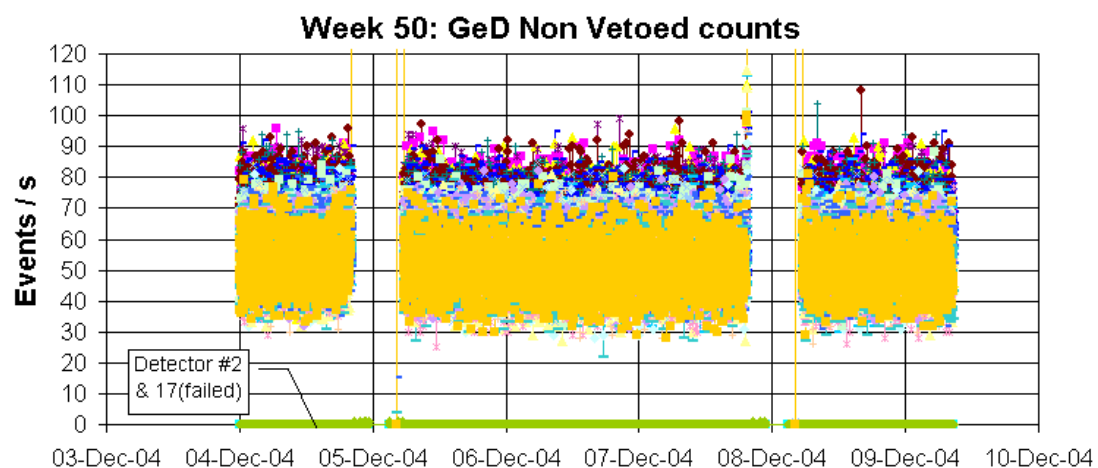
The performance of the detectors is nominal except for the detector #2, failed since 06.12.2003, and detector #17, failed since 17.07.2004.

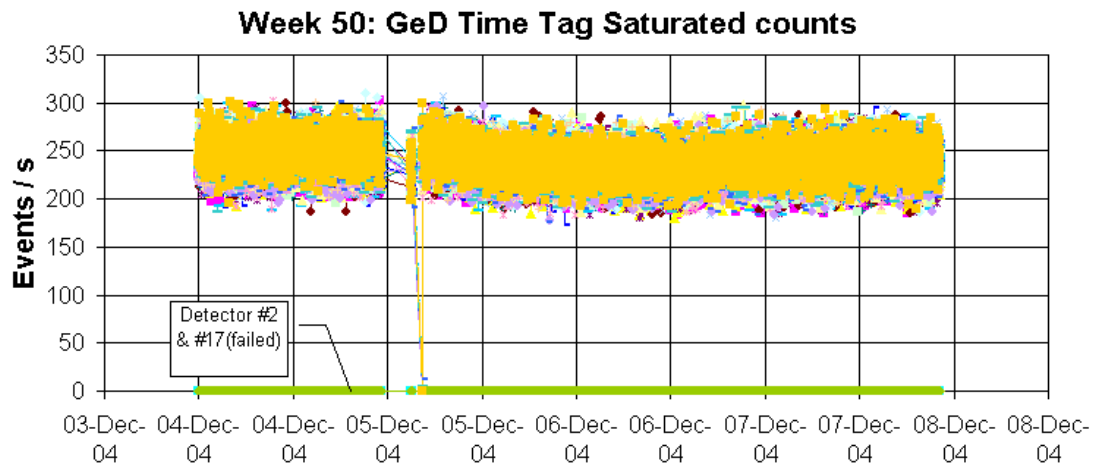
The following plot shows the AFEE dc output signals during the reporting period.



DFEE:

The performance of the unit is nominal. The following plot shows the Non Vetoed event rates, processed by the DFEE during the reporting period. The count rate of each detector is within the expected range, except for the failed detector #2 and #17.



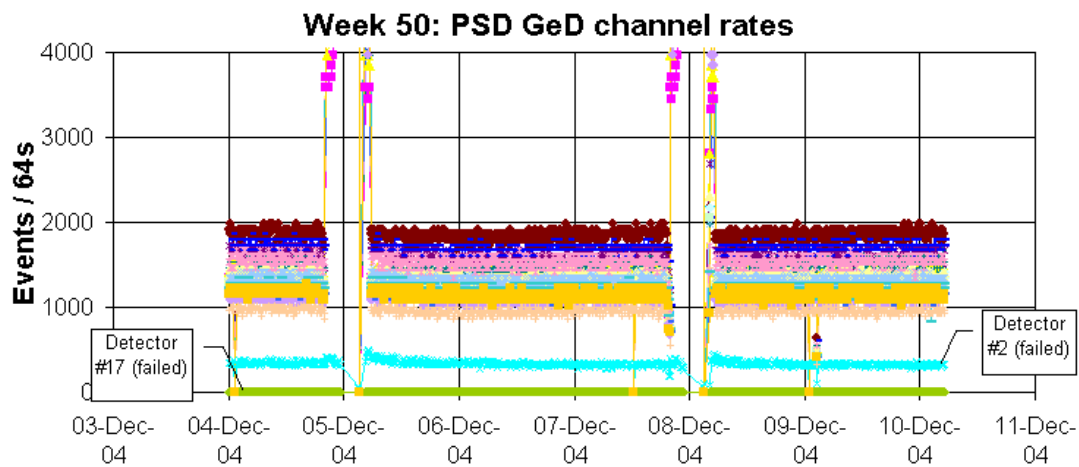


PSD:

The performance of the unit is nominal, though the malfunction of the channel rates blanking reproduced itself also this week (see AR INT_SC-90 for a detailed description of the anomaly).

After the SPIASW 431 installation on-board foreseen in the forthcoming week, to enable the Sci HK TM downlink inside the radiation belts, the Out-Of-Limit currently defined for the PSD channel rates can be deleted, thus removing the false alarms associated to the malfunction.

The following plot shows the PSD channel rates during the reporting period.

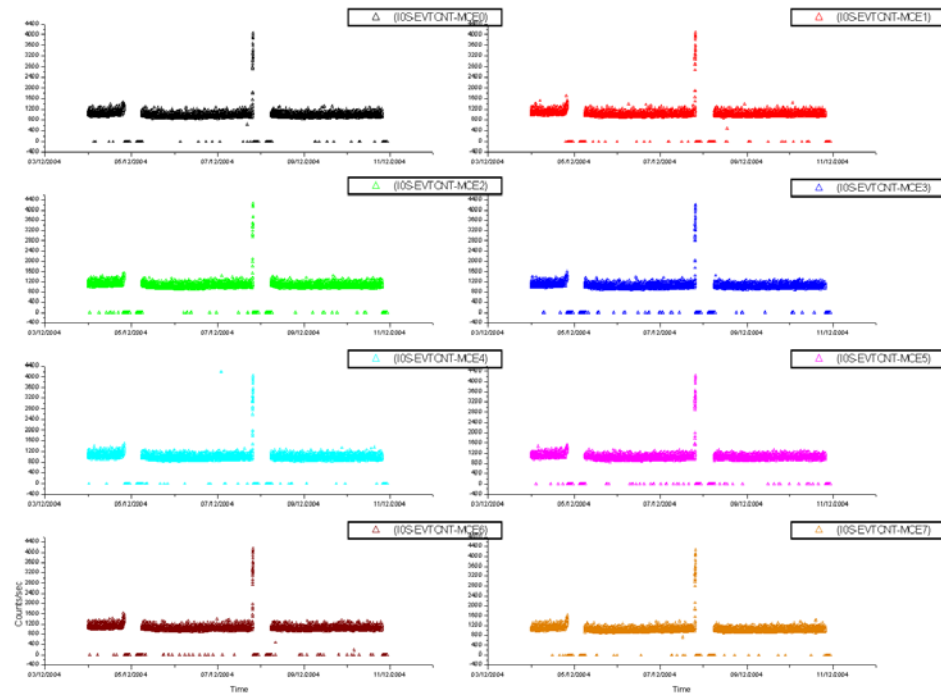


8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

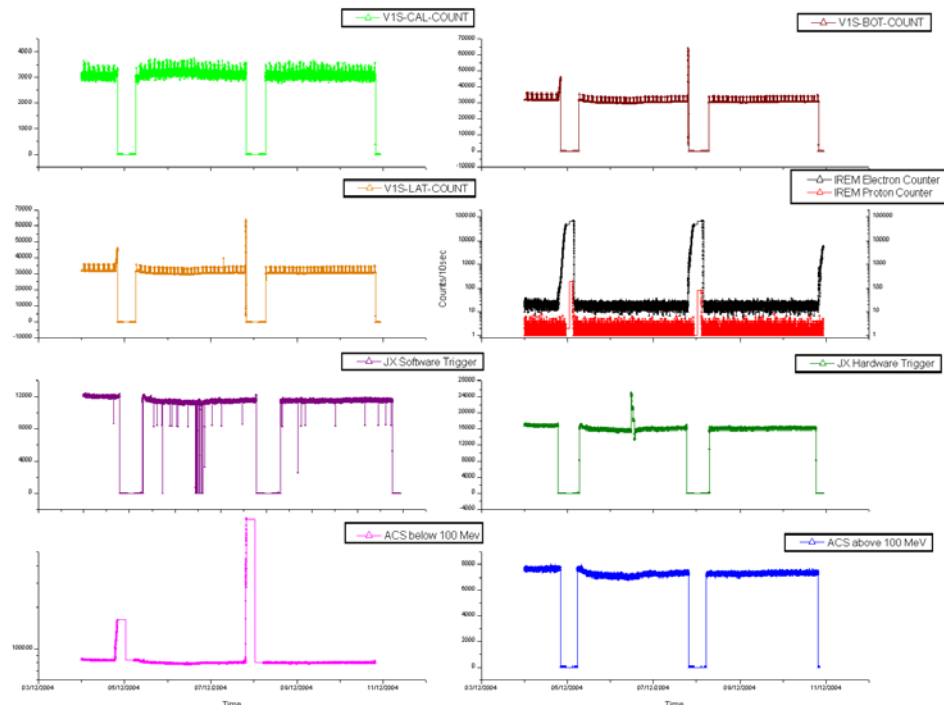
IBIS - ISGRI Counters Rev 261-263



**sampling every 4 pkts (32 secs)

VETO vs Payloads Counters

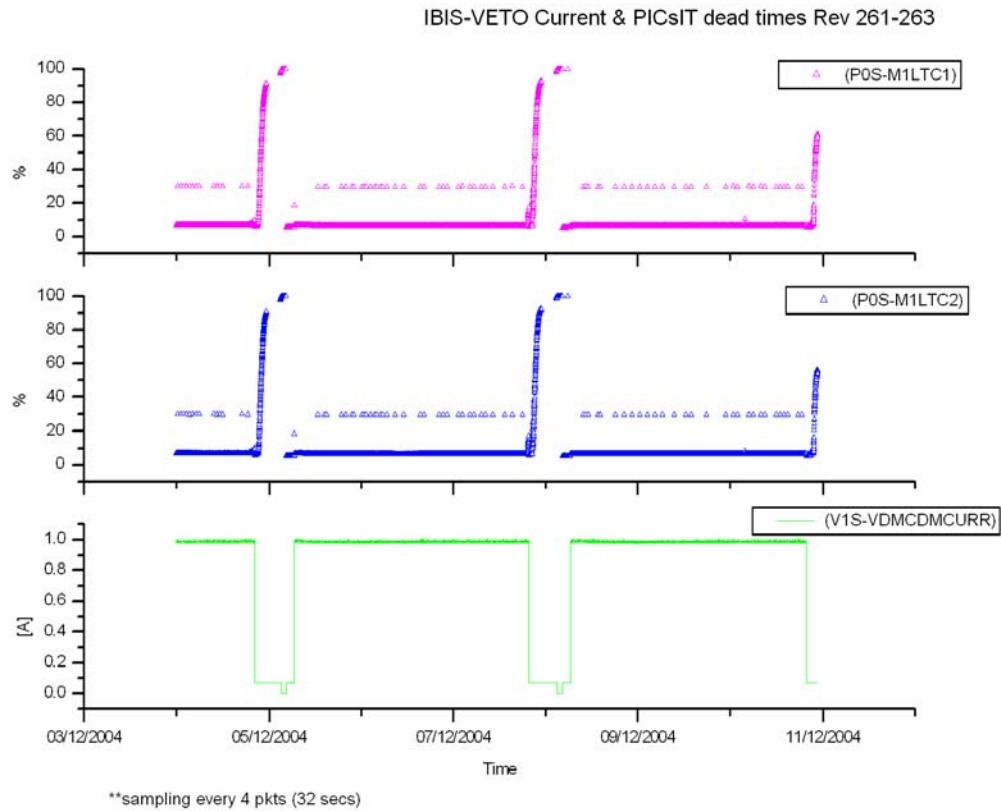
IBIS-VETO vs Payloads Counters Rev 261-263



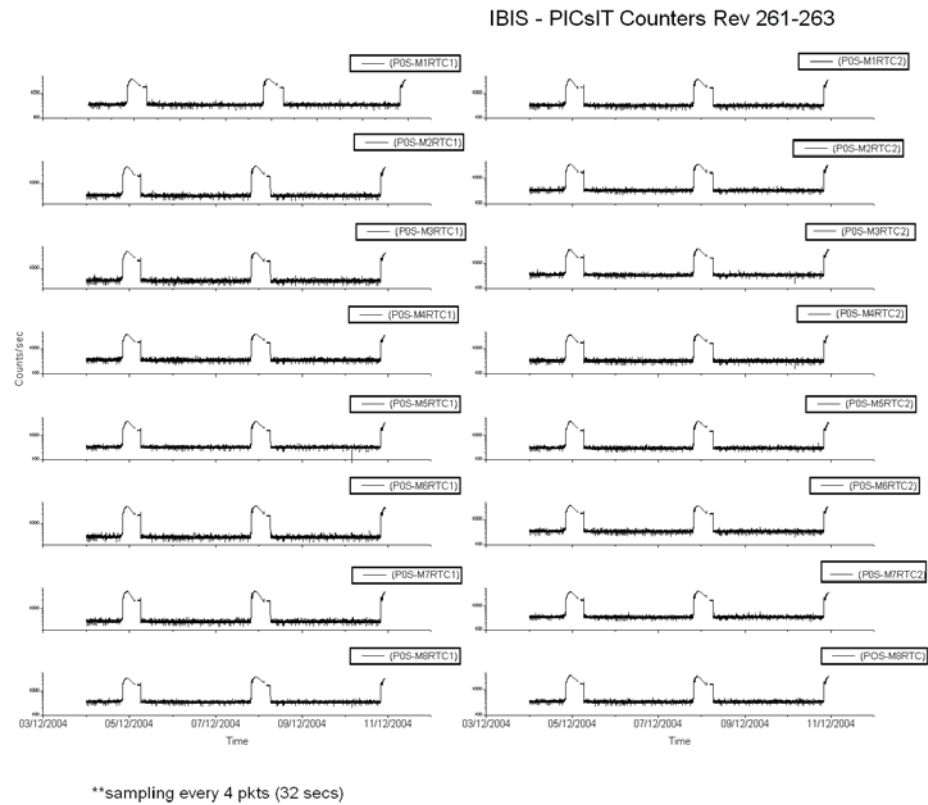
**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec sampling every 5 pkts (40 sec)

The week was characterised by low to moderate solar activity.

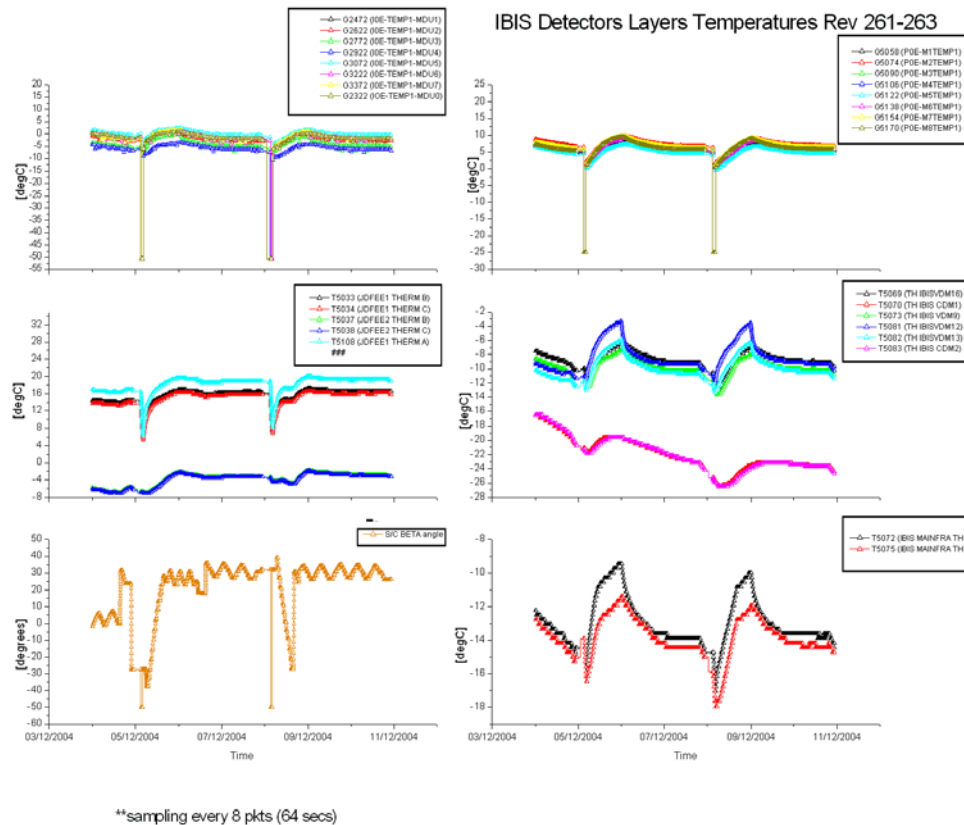
Veto Current:



Picsit Counters:



IBIS Detectors Layers Temperatures



IBIS daily report DoY 2004.339 (4/12/2004)

Nothing to report.

DoY 2004.340 (5/12/2004)

At 04:35z the uplink of the VETO patch 3.2 (ED GEVESPO1) was executed in automatic from the MANSTACK under the guidance of the IBIS s/s SOE. No problems were reported and the unit reconfigured nominally at Belts Exit.

DoY 2004.341 (6/12/2004)

Nothing to report.

DoY 2004.342 (7/12/2004)

At 01:48Z the TM parameter G2056 (ISGRI Overflow of the noisy pixel address buffer in MCE4) was reported OOL (SCC FAIL). No action was taken according to the Payload FDIR document.

At 19:41z the unit reported Radiation Belts entry. This was earlier than expected (19:58z) and probably due to the modification of the Belts structure by the solar activity.

DoY 2004.343 (8/12/2004)

After eclipse (6th eclipse of the winter season), at 04:22z, during the uplink of the VETO patch 3.2, the following OEMs were reported in coincidence with the rejection of the dump tele-command GU613TC:

```
OEM APID 1280 ID 129 CLASS 2 <<IASW TIME-OUT LSL DATA>>  
OEM APID 1280 ID 134 CLASS 3 <<IASW EXTERNAL TC REJECTED COULD NOT  
BE EXECUTED>>  
OEM APID 1280 ID 129 CLASS 2 <<IASW TIME-OUT LSL DATA>>
```

This happened during the execution of the ED GEVESP01, used during the Eclipse season to uplink the patches (anomalous OEM generation and counters rescaling factor). The OEM flagged an on-board problem during the execution of the patch TC just before the mentioned dump, with a temporary interruption of the LSL (low speed line, TC/HK) communication between the DPE and the peripheral (VETO).

Under the guidance of the s/s SOE the following recovery was performed:

- 1) re-uplink of the VETO patch(ED GEVESP01);
- 2) restore of VETO CTX from DPE.

At VETO transition to Nominal (after Belts Exit), all the HVs reported correct values and the CDM02 was set OFF as per nominal configuration.

Investigations are on-going at MOC and PIs side. A modification of the GEVESP01 execution time (a delay of 3 minutes with respect to the end of the post eclipse reconfiguration GECLEX02) has been implemented in the timeline for the following eclipses passages, to fix this problem.

DoY 2004.344 (9/12/2004)

Nothing to report.

DoY 2004.345 (10/12/2004)

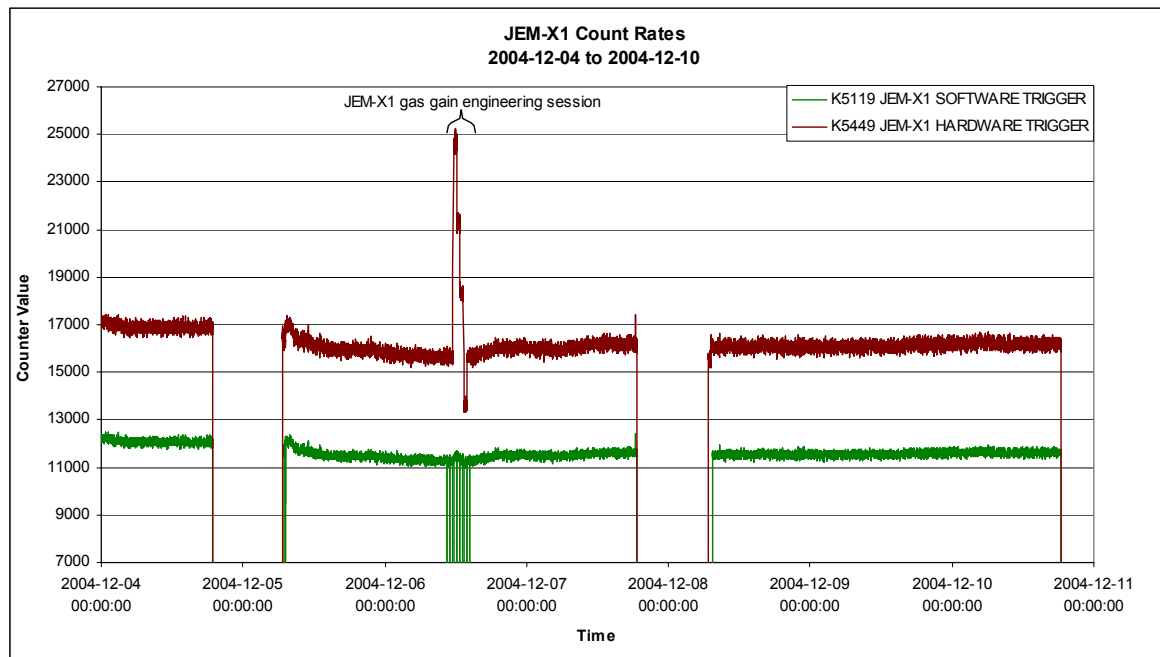
At 03:53z the TM parameters G5068-5072-5084-5088-5100-5120-5164-5184 (PDM X: Semimod Y FIFO Error Flag) went OOL (SCC fail) for about 2min. Following the reaction P_FIF_1 reported in the Payload Recovery doc, no action was taken.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

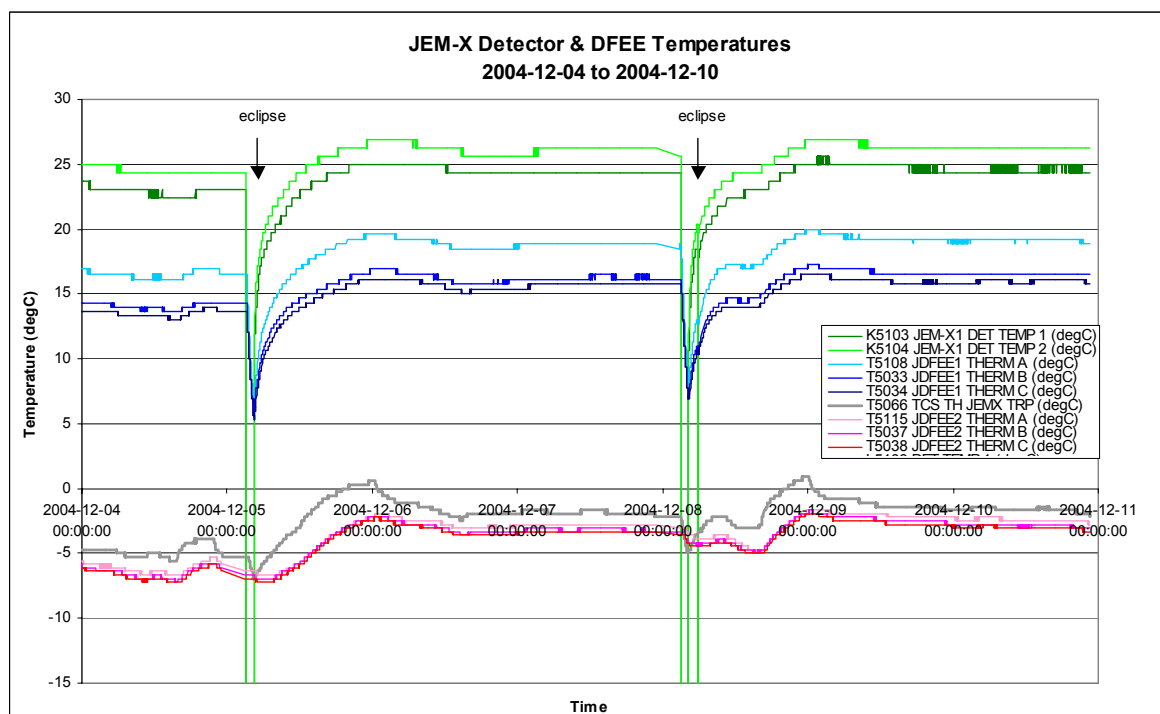
JEM-X count rates over the reporting period are displayed in the following graph¹.

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



8.3.4.2 JEM-X Temperatures

JEM-X Detector and DFEE temperatures, along with the temperature on the detector bench between the two units, over the reporting period are displayed in the following graph².



8.3.4.3 JEM-X Daily Report

² Data sampled (1 frame in 8)

2004-12-04 (DoY 339, Rev 261) to 2004-12-05 (DoY 340, Rev 261-262)

Nothing to report

2004-12-06 (DoY 341, Rev 262)

In line with OCR-184, a JEM-X1 gas gain engineering session was performed in revolution 262. This was executed during the OMC Flat Field Calibration observation in order not to disturb nominal science observations. The activities were performed according to INT_OR_0185, with the main stages in the activities as follows:

10:24Z Timeline commanding to JEM-X1 was disabled.

10:26Z FCP_JEM1_0041 was executed to put JEM-X1 in Setup mode

10:31Z FCP_JEM1_0070 executed to enter the JEM-X1 calibration source engineering configuration. The parameters of the TC K0014 were set as follows:

TC parameter K0013 (PARAM INT POS) = 64 RAW, DEC

TC parameter K0014 (PARAM INT VALUE) = 1023 RAW, DEC

10:33Z FCP_JEM1_0044 executed to put JEM-X1 in Data Taking

Starting at 11:00Z, a series of observations were then performed with different settings of the detector cathode voltage (Vc). In each case, the procedures executed were:

- FCP_JEM1_0041 to put JEM-X1 in Setup mode
- FCP_JEM1_0031 to set new Vc value (value for the parameter of TC K0004)
- Wait 2 minutes to let Vc ramp to the desired value
- FCP_JEM1_0044 to put JEM-X1 in Data Taking (with default parameters)
- Allow 1800 seconds (30 minutes) for data collection

For these observations, the times during which JEM-X1 was in Data Taking mode with the various Vc values are reported in the following table:

Cathode voltage (Vc)	Start Time (Data Taking)	End Time (back to Setup)
Nominal Vc value: 1120 V (112 RAW)	11:04Z	11:34Z
640 V (64 RAW)	11:37Z	12:08Z
800 V (80 RAW)	12:11Z	12:42Z
960 V (96 RAW)	12:45Z	13:16Z
1280 V (128 RAW)	13:19Z	13:51Z
Nominal Vc value: 1120 V (112 RAW)	13:54Z	14:24Z

During the time when the Cathode voltage was set to 1280V, i.e. from 13:17Z to 13:53Z, an out of limit (alarm high) was received on the TM parameter K5002 HVCATHODE 12 bit, as the high limit set in the IODB is 1180V (i.e. taking into account the nominal value set for the cathode voltage). After confirmation from the

JEM-X PI that this out of limit was not a problem (the maximum allowable value for the Vc is 1600V), this OOL was disregarded.

At 14:24Z FCP_JEM1_0041 was executed to put JEM-X1 in Setup mode

At 14:25Z FCP_JEM1_0070 was executed to return to the nominal JEM-X1 calibration source configuration. The parameters of the TC K0014 were set as follows:

TC parameter K0013 (PARAM INT POS) = 64 RAW, DEC

TC parameter K0014 (PARAM INT VALUE) = 760 RAW, DEC

At 14:26Z FCP_JEM1_0044 was executed to return JEM-X1 to Data Taking.

Commanding to JEM-X1 from the automatic Timeline was re-enabled at 14:27Z.

2004-12-07 (DoY 342, Rev 262)

Nothing to report

2004-12-08 (DoY 343, Rev 262-263)

During the post-eclipse reconfiguration of JEM-X1 following the 6th eclipse of this season, another DFEE anomaly occurred like that observed on 2004-06-20 and 2004-06-23 (following the 6th and 7th eclipses of the last eclipse season, ref: Anomaly Report INT_SC-84). As before, the anomaly occurred at the stage of switching on the DFEE and loading the DFEE context from the DPE to the DFEE. This anomaly is recorded in AR INT_SC-104.

The symptoms were as follows:

1) The following OEMs were received after the JEM-X1 DFEE was switched on by the ED KECLEX01 in the Timeline (uplinked at 2004-12-08T04:16:14Z):

2004.343.04.17.00.506 1536 Real Time Event 191 JEM-X1 PROB
DFEE 11 FIX6=11 K9079=0 K9080=191 FIX16=8 FIX16=0

>> Indicating that the operation "Load DFEE context" was unsuccessful due to CRC failure for code area B000 to CFFF

2004.343.04.17.00.506 1536 Real Time Event 234 JEM-X1
AUTO EVENT 4 FIX6=4 K9079=0 K9080=234 K5419=64,ECLIPSE K5420=48,RAD.
BELTS

>> Indicating failure of the automatic recovery from shutdown level ECLIPSE to shutdown level RAD BELTS

These OEMs generated Out of Limits on the parameters K9104 EM #1 IDENTIFIER (value = 191) and K9110 EM #2 IDENTIFIER (value = 234).

2) Following the KECLEX01 ED, the JEM-X1 DFEE state (TM parameter K5022) remained MEMORY, instead of SAFE, and the Active Shutdown Level (TM parameter K5381) remained ECLIPSE, instead of RAD. BELTS. This remained the case after the broadcast packet radiation belt exit time of 2004-12-08T05:13:03Z.

The fact that the Active and Wanted Shutdown Levels were not equal was highlighted by an out of limit (unexpected false), received on the parameter KD5380D EQ SHTDWN

LEV at 04:17Z (returning within limits at 05:39Z as a result of the recovery operations).

3) The DFEE CPU speed, TM parameter K5583 CPU MODE, remained at a value of 8MHz WAIT (as at startup) rather than the nominal value of 16MHz.

In response to this, the following operations were performed:

At 04:57Z Timeline commanding to JEM-X1 was disabled.

1) For the purpose of later analysis, a dump of the DFEE memory was executed: 05.34.20Z FCP_JEM1_0051 JEMX1 DFEE MEMORY DUMP, with the following values for the parameters of TC K0018:

K0017 START ADDR = 9000 (hex)
K0018 LENGTH OF MEM = 4C00 (hex)

2) In order to recover JEM-X1, a DFEE power cycle was then performed:

05.39.04Z FCP_JEM1_9010 JEMX1 DFEE SWITCH OFF

05.47.17Z FCP_JEM1_0021 JEMX1 DFEE ACTIVATION

3) Followed by further activation of JEM-X1 for science operations:

06.17.58Z Sequence KEACAL01JEMX1 ANODE CALIBRATION AT PERIGEE EXIT re-uplinked

06.41.30Z FCP_JEM1_1010 JEMX1 CONFIGURATION SETTING FOR SCIENCE OPS, with the microstrip gas gain voltage parameter values edited from the database defaults to the current operational values (final nominal dV = 79 RAW).

07.25.53Z FCP_JEM1_0044 JEMX1 DATA TAKING

Commanding to JEM-X1 from the automatic Timeline was re-enabled at 07:29Z and JEM-X1 operations then continued nominally.

2004-12-09 (DoY 344, Rev 263) to 2004-12-10 (DoY 345, Rev 263)

Nothing to report

8.3.5 OMC Operations

At 21:59, an AOCS command failed uplink, causing pointing 02620025 to fail. The same problem also caused pointings 02620026 and 02620027 to fail as well, it was at this time that the 3 following pairs of commands were rejected:

```
2004.340.22.03.00.290 2004.340.22.02.52.109 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=725
2004.340.22.03.08.061 2004.340.22.02.58.609 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=726
2004.340.22.35.07.753 2004.340.22.34.58.236 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=727
2004.340.22.35.15.952 2004.340.22.35.04.361 1792 Real Time Rejection 131
REJECTED TC1
```

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```
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=60,IM A M9068=1 FIX2=0 M9069=728
2004.340.23.07.16.535 2004.340.23.07.04.862 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=729
2004.340.23.07.23.549 2004.340.23.07.12.362 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=730
```

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

On DoY 341 from 10:58:12 to 13:46:35 a Flat Field calibration was performed. This was followed by a Dark Current calibration from 13:50:44 to 14:06:44. Both appear to have been successfully executed

At 16:57, an on-board decoder lockout prevented commanding, the impact was pointing 02620077 was delayed by about 23 minutes, it was at this time that the following pair of commands were rejected:

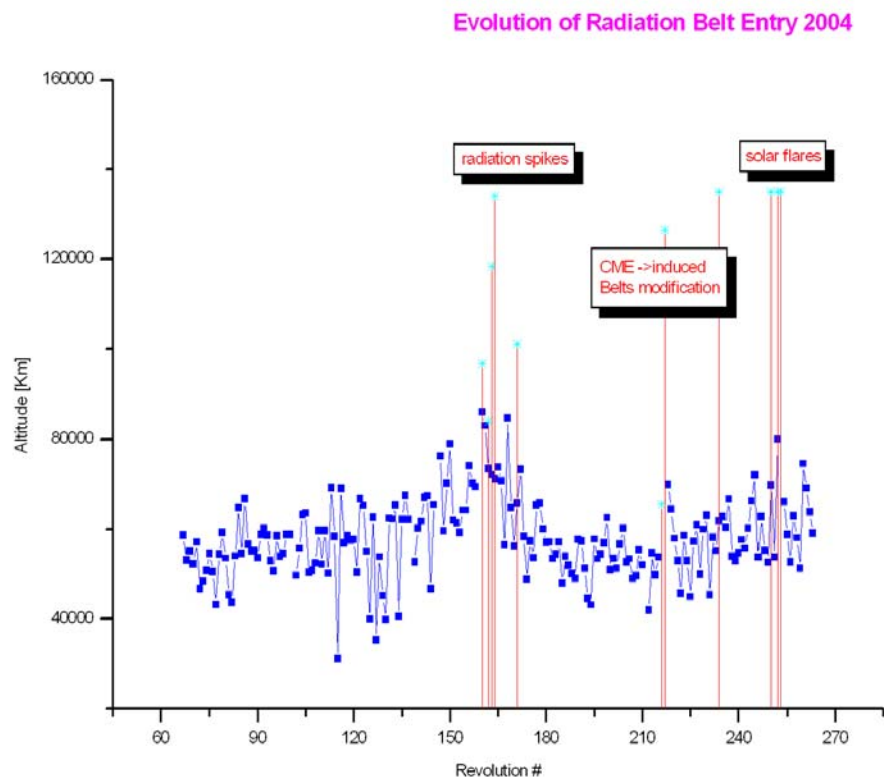
```
2004.342.17.58.51.931 2004.342.17.58.45.218 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=130,RESET IM M9068=1 FIX2=0
M9069=983
2004.342.17.59.00.941 2004.342.17.58.51.593 1792 Real Time Rejection 131
REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=60,IM A M9068=1 FIX2=0 M9069=984
```

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

On DoY 339 at 20:13:47 DoY 342 at 20:01:25 and DoY 345 at 19:47:16, OMC was switched by the Timeline to SAFE mode, at the nominal times.

8.3.6 IREM Operations

Radiation Belts Entry



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]
261	RAD_ENTR R 2004-12-04T20:13:33Z	2004-12-04 18:54:00	>69113.3	2004-12-04 20:58:43	54081.32
262	RAD_EXIT R 2004-12-05T05:25:06Z	2004-12-05 03:57:52	<26528.3	2004-12-05 04:08:43	27815.77
262	RAD_ENTR R 2004-12-07T20:00:56Z	2004-12-07 19:25:52	>63829.0	2004-12-07 20:44:53	54142.12
263	RAD_EXIT R 2004-12-08T05:12:52Z	2004-12-08 03:42:40	24888.0	2004-12-08 04:04:53	29309.2
263	RAD_ENTR R 2004-12-10T19:47:01Z	2004-12-10 19:54:32	59107.8	2004-12-10 20:34:53	53523.65

Reference

Very small error vs reference (less than 10 minutes)
 Small error vs reference (between 10 and 30 minutes)
 Large error vs reference (more than 30 minutes)
 Radiation Spike

Proton Belts

REV	Proton CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
261	PROTON_RAD_ENT	Not available in RadMon
262	PROTON_RAD_EXT	Not available in RadMon
262	PROTON_RAD_ENT	Not available in RadMon
263	PROTON_RAD_EXT	Not available in RadMon

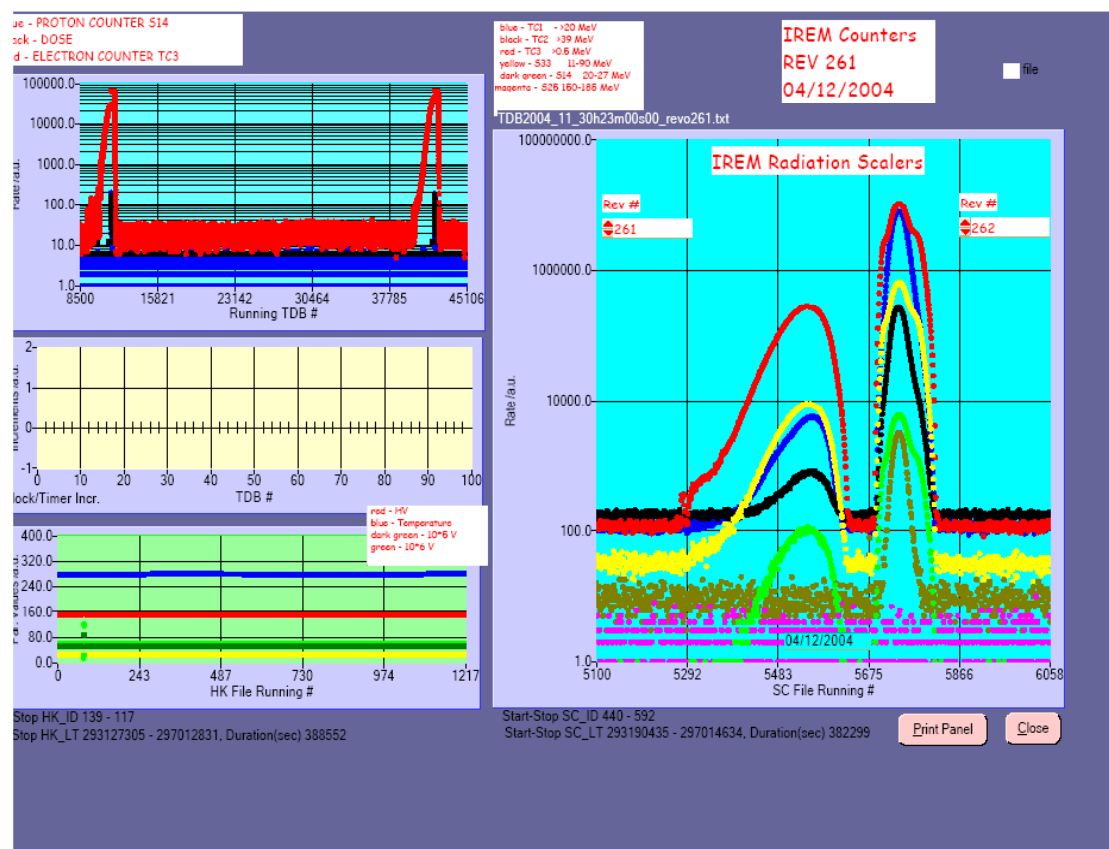
The flux of protons >8MEV computed by RadMon, did not exceed the threshold. Therefore, no predicted proton cut-off is provided for this week.

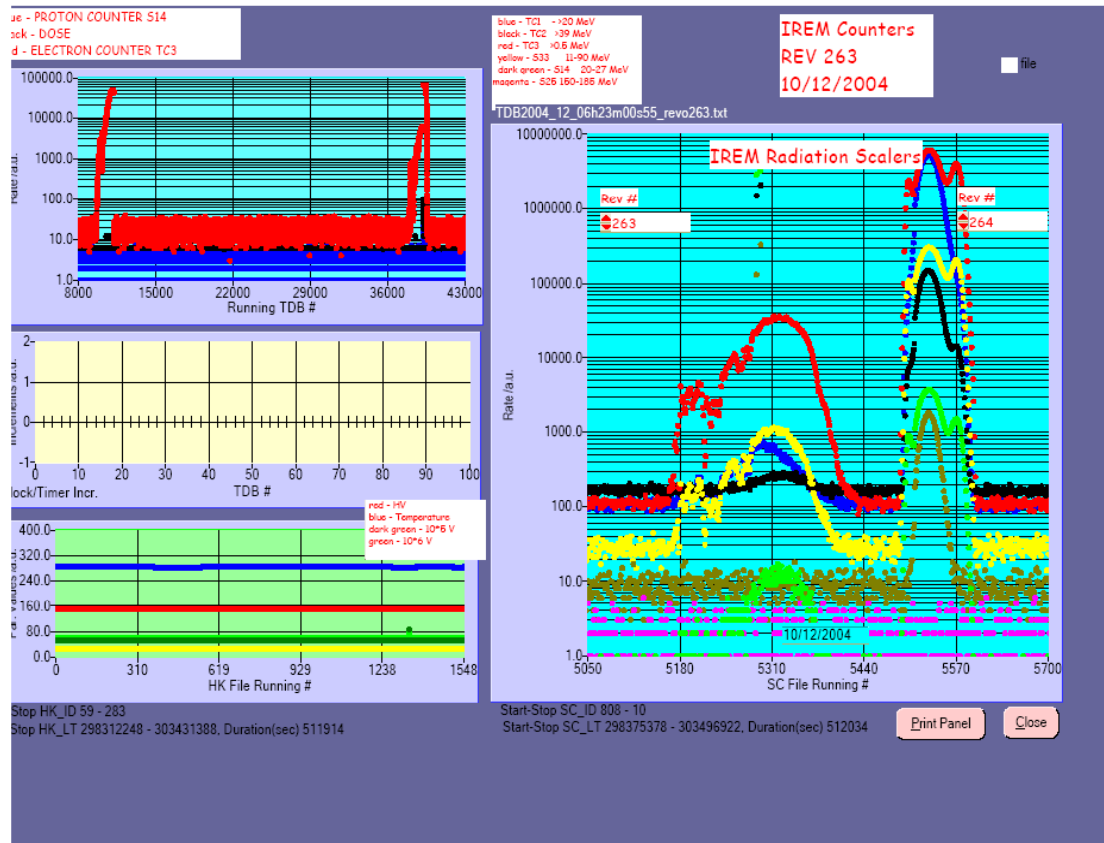
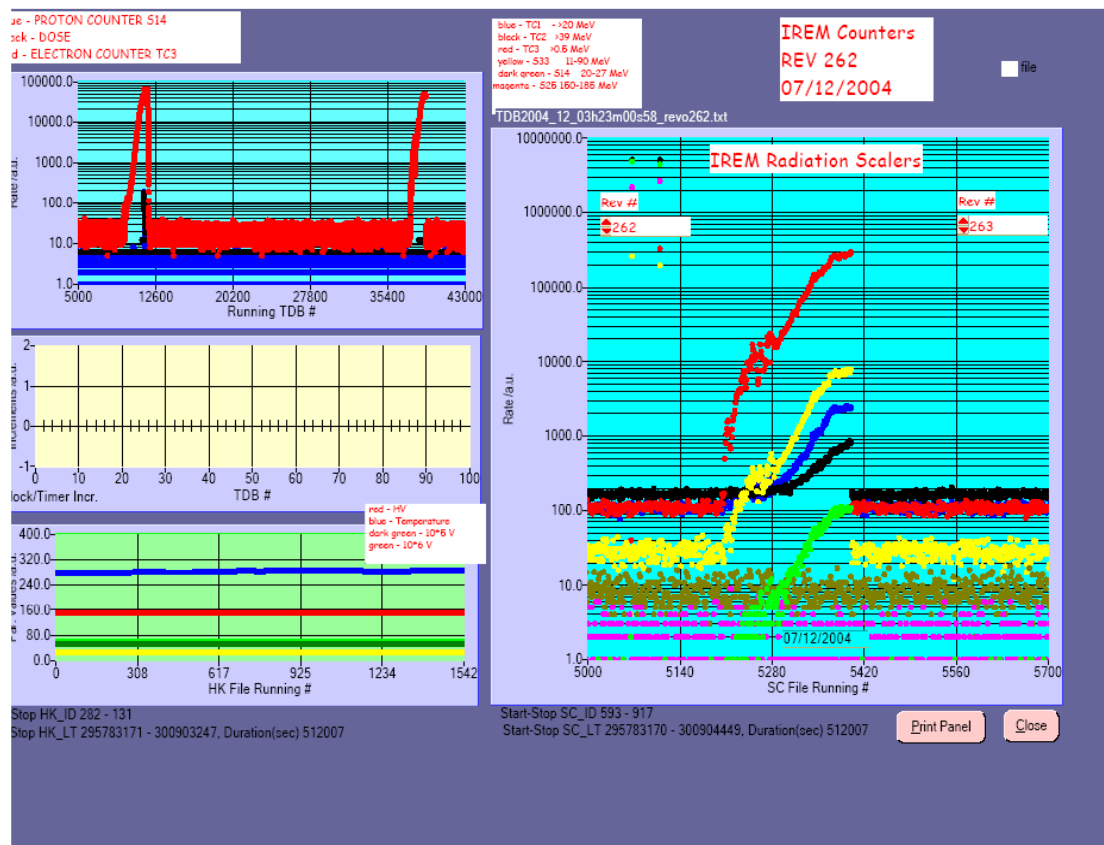
IREM daily report

DoY 2004.343 (08/12/2004):

At 03:16Z the CEV (Command Execution Verification) for the TC U4920 (INT GND LINK ON) failed. The execution of the TC was verified against the relevant TM parameter using the monitoring task and no further action was taken.

IREM radiation counters





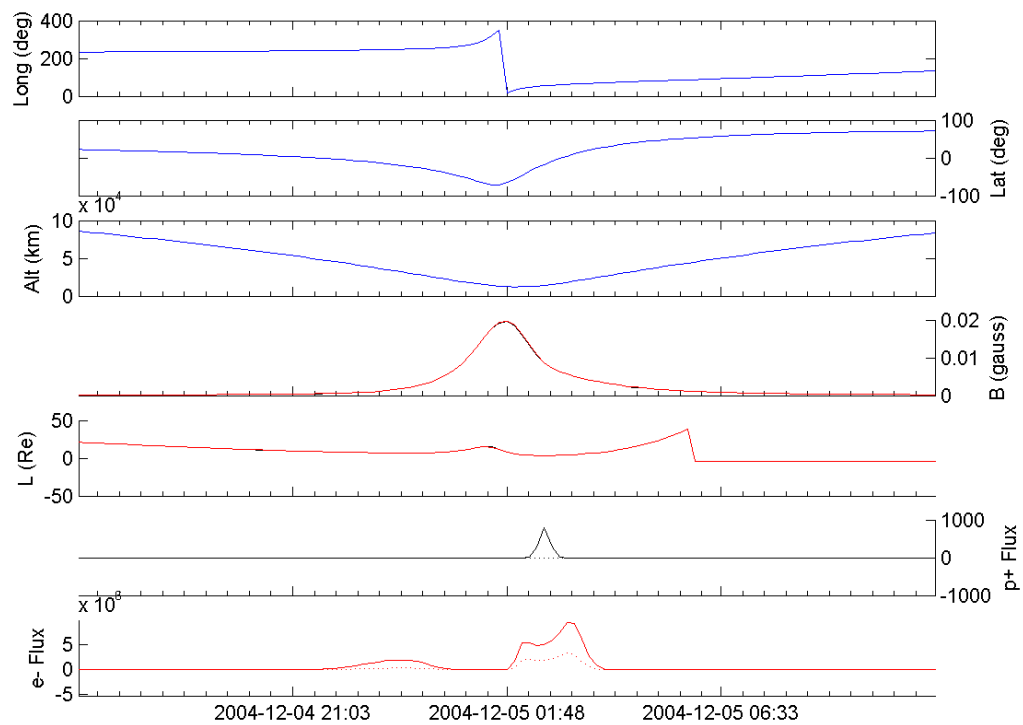
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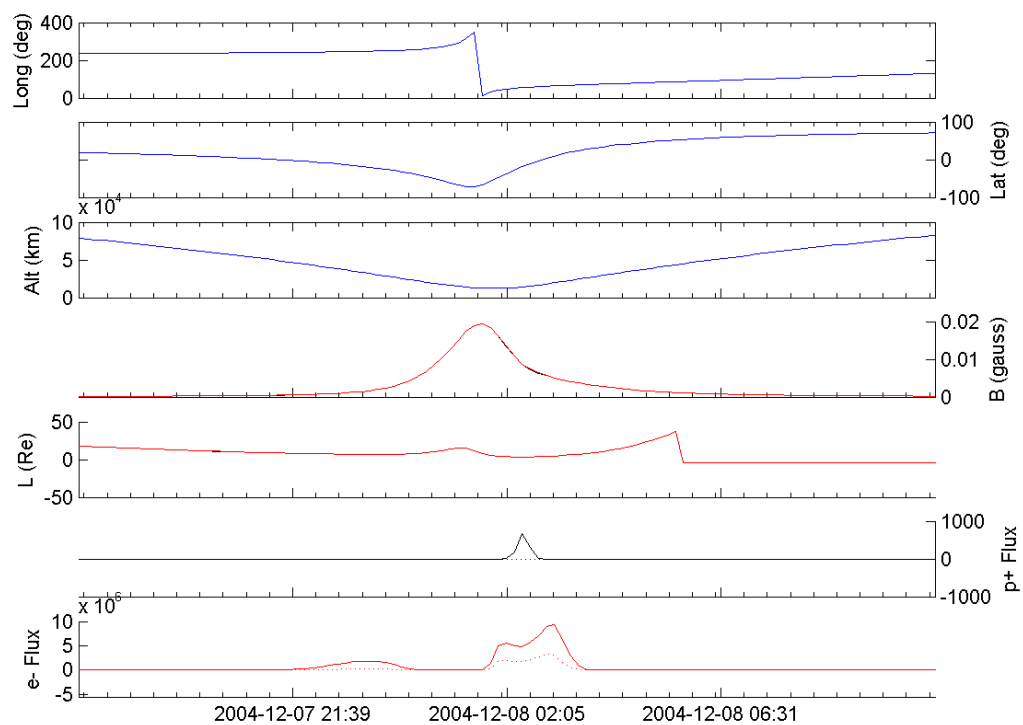
Due to problems on the TM distributor machine, IREM radiation counters data, acquired by IREM ECOE, are not completely available for the perigee passages of revolutions 262.

IREM Predicted Radiation Belt Passages.

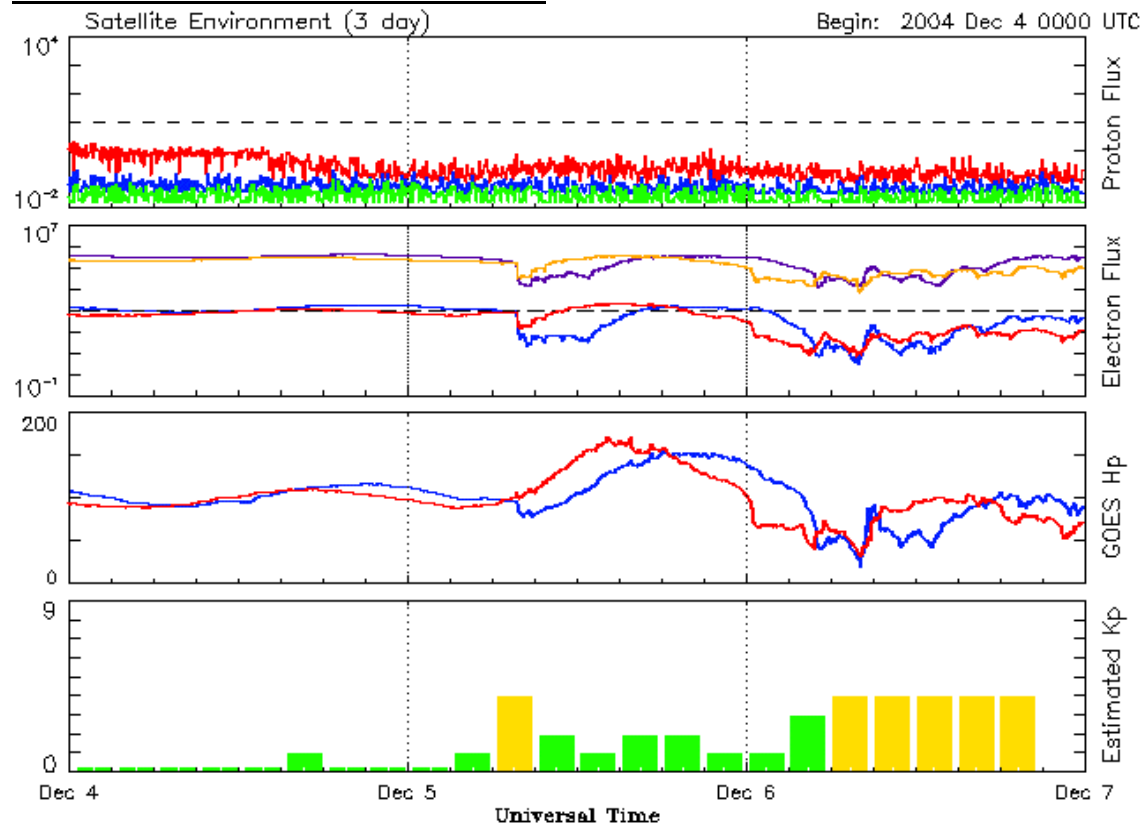
Rev 261



Rev 262

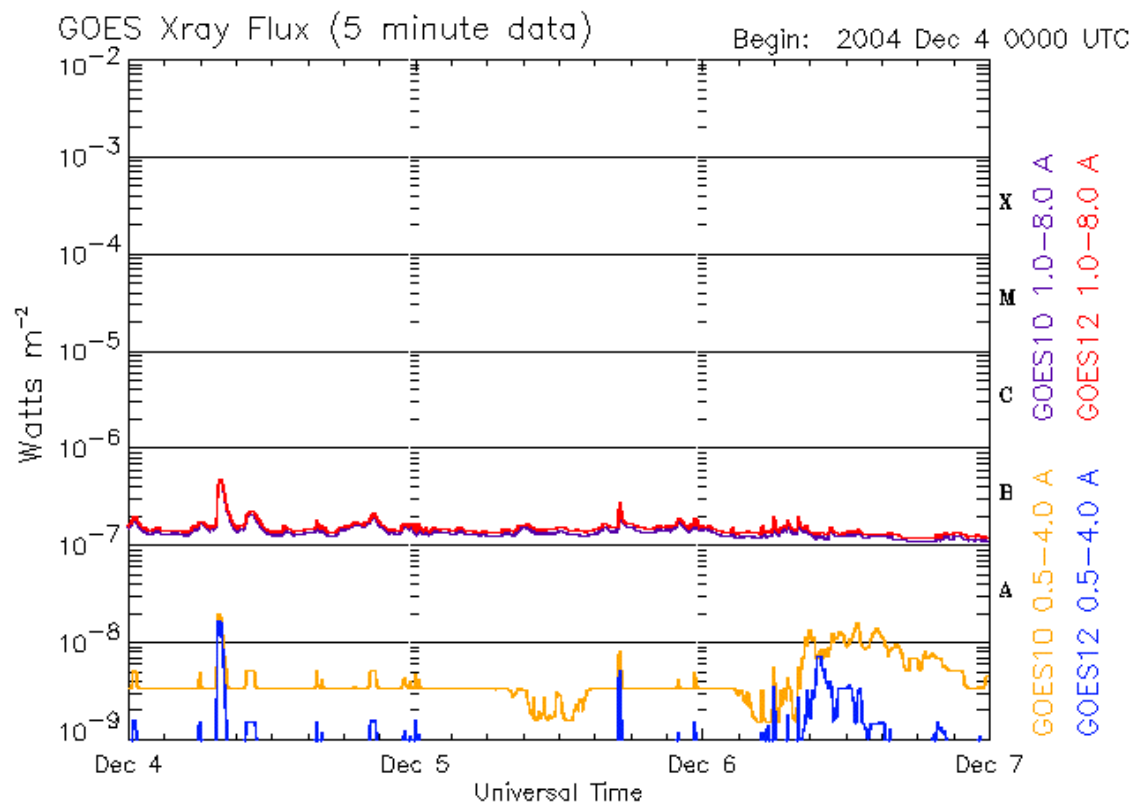


SEC-GOES Observed Particles Fluxes.



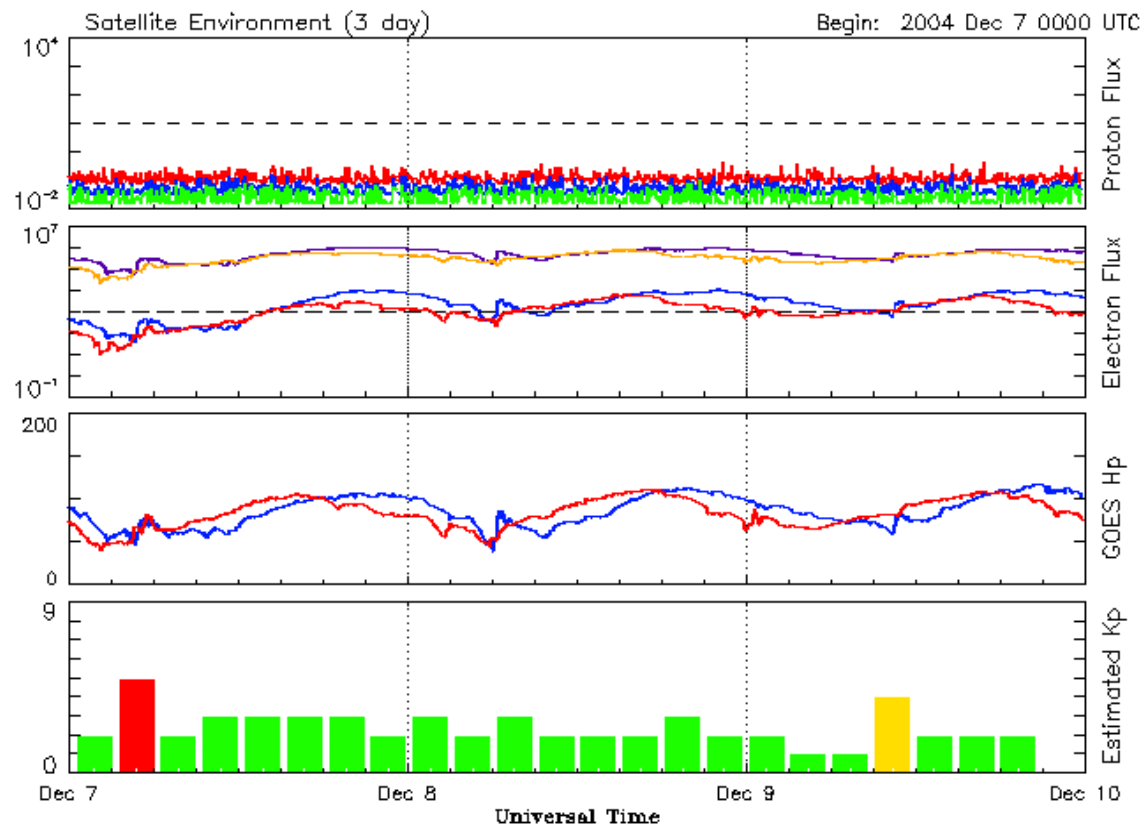
Updated 2004 Dec 6 23:56:09 UTC

NOAA/SEC Boulder, CO USA



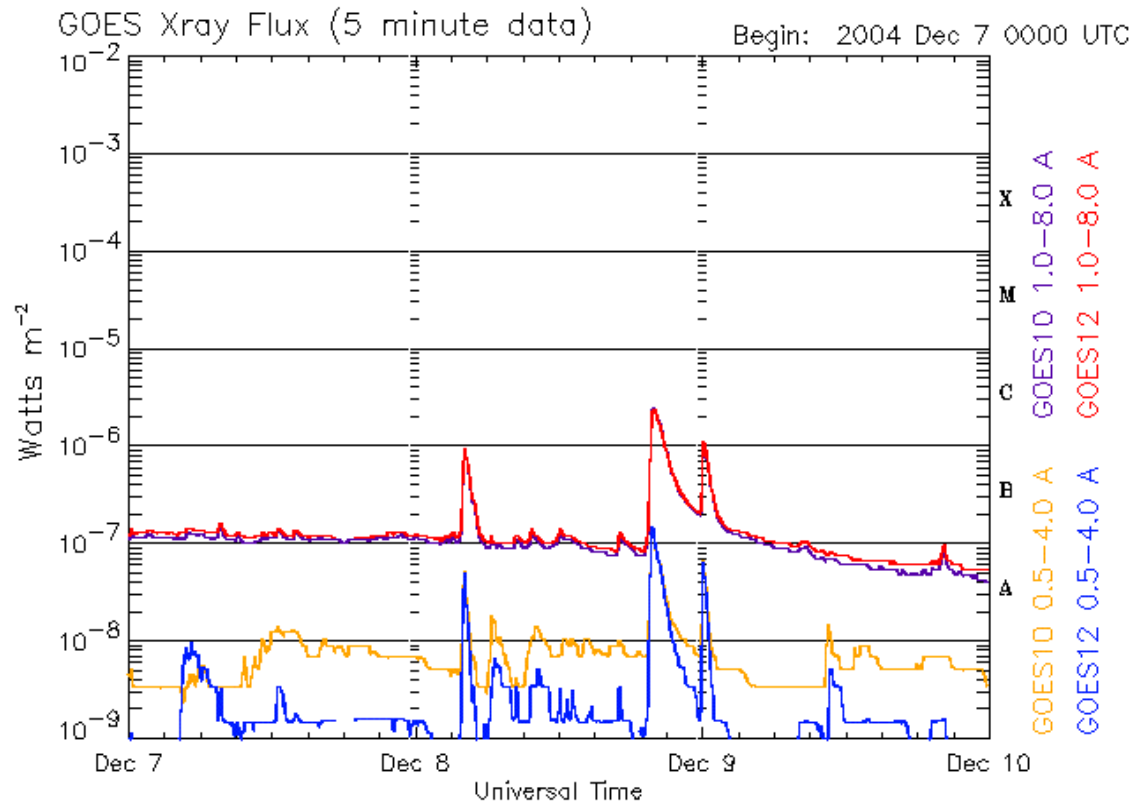
Updated 2004 Dec 6 23:56:04 UTC

NOAA/SEC Boulder, CO USA



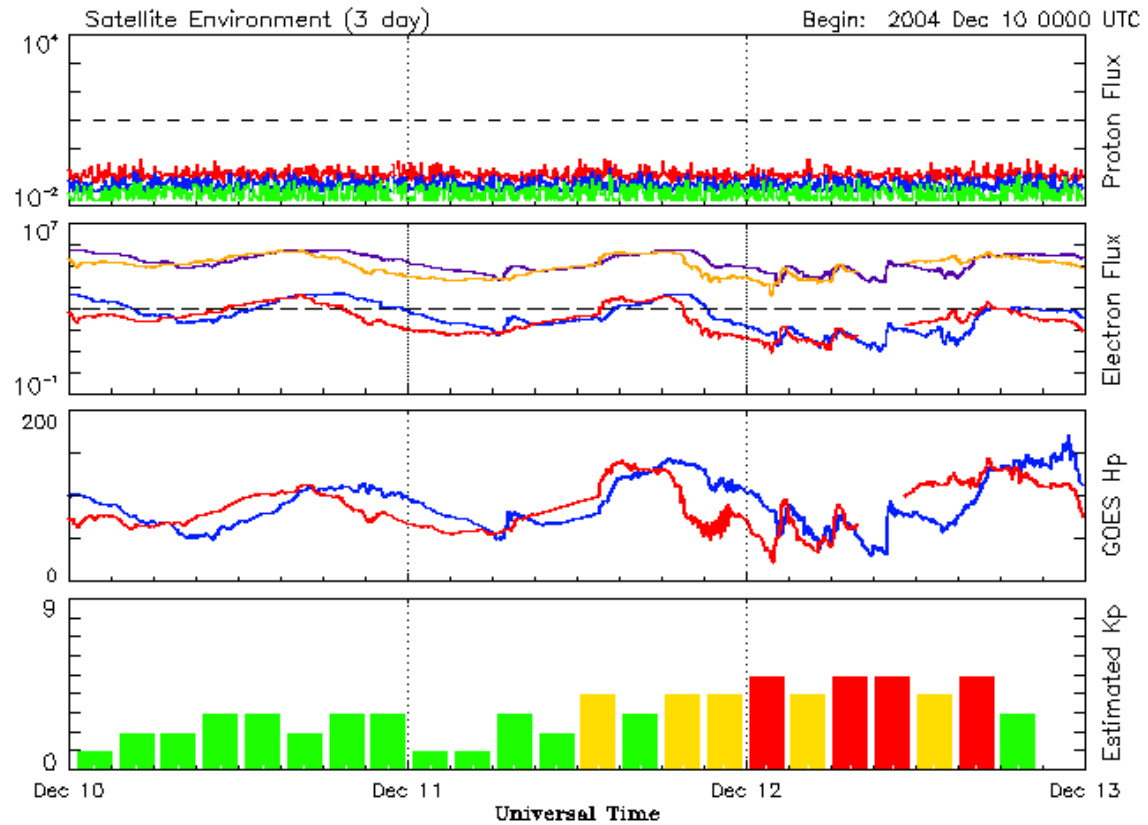
Updated 2004 Dec 9 23:56:09 UTC

NOAA/SEC Boulder, CO USA



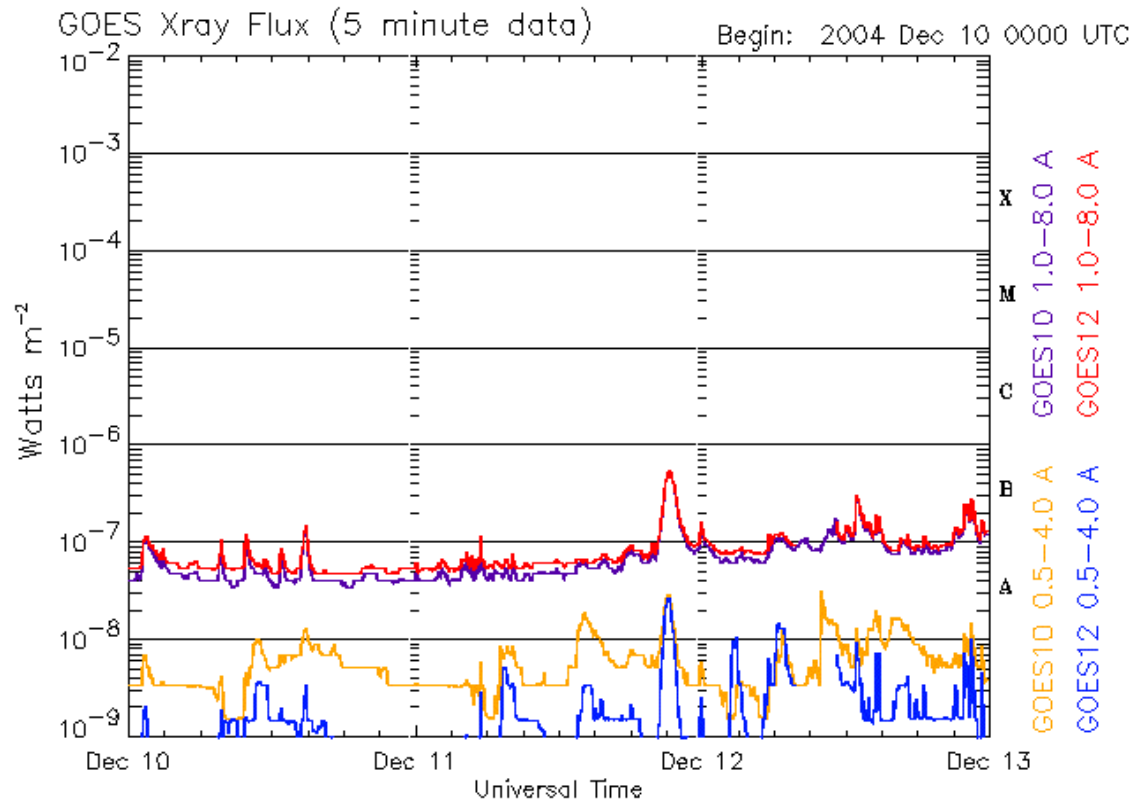
Updated 2004 Dec 9 23:56:03 UTC

NOAA/SEC Boulder, CO USA



Updated 2004 Dec 12 23:56:10 UTC

NOAA/SEC Boulder, CO USA



Updated 2004 Dec 12 23:56:05 UTC

NOAA/SEC Boulder, CO USA