

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 122
Week 03
24.01.05
Routine Phase

Prepared by: M. Walker (OPS-OFO)

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		JPL / Goldstone	
		D. Holmes	1
		J. Valencia	1

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 15.01.05 until 21.01.05 (both dates inclusive) and covers the revolutions 276 & 277.

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; the Coma Cluster (RA 12:59:48.70; DEC +27:58:50.0) and the Target of Opportunity V0332+53 (RA 03:35:0.00; DEC +53:10:22.8). The activities consisted of GPS and both hexagonal and raster dithering observations. However, due to high background radiation conditions, the instruments spent a considerable part of these revolutions in their safe modes. In addition, SPI annealing activities began during this reporting period.

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 partially performed from the timeline during this period. Due to the exceptional solar activity, the S/C was maintained in hibernation (valid attitude and bright guide star) for large part of rev 277 and the TML stopped.

An update of the RCS-A Thruster Torque Reciprocals, PWM look-up table, AMD Thruster On Times and the TIM Thresholds was made by FD following the RCS-A Thruster Calibration performed during revolution 275 (14/01/05). The results of this calibration were up-linked on 21/01/2005.

39 slews (22 CSL, 17 OSL) were missed from the Timeline during this period due to the high solar activity.

The fuel consumption over the period between 13/01/2005 and 19/01/2005 was 0.34 kg. The remaining propellant is in the order of 163.8 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.

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

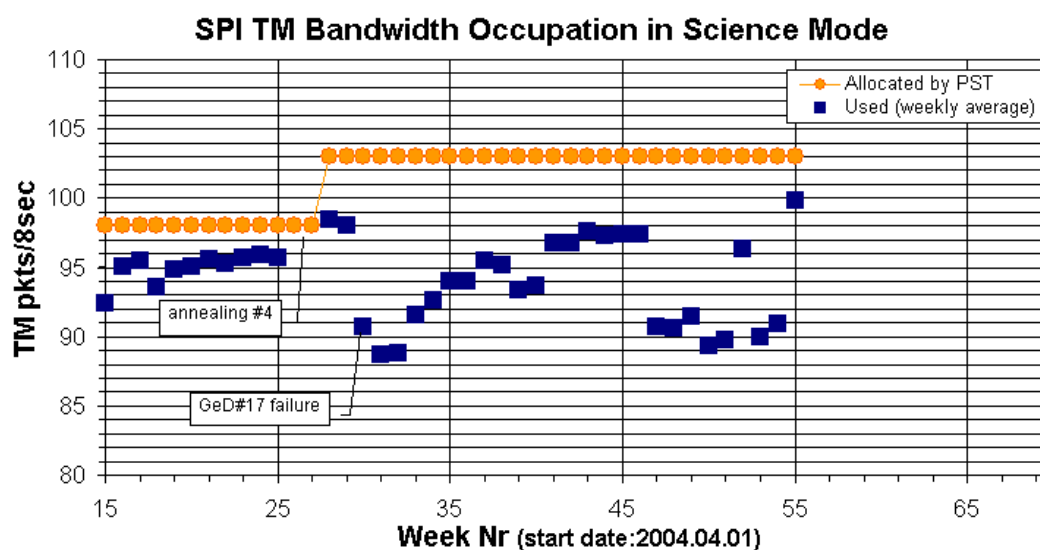
3.2.1 SPI

The high radiation environment affected the operations of the instrument in this week. The instrument had to be put in safe configuration twice, the first time by switching off the Anti-coincidence system high voltages; the second time, on 20th January, due to harder radiation, also the Germanium detector high voltages had to be reduced.

Due to the solar storm preventing any science observation, it was decided to start the detectors annealing two days earlier than scheduled, on Thursday 20th January at 13:00z.

Before annealing start, the instrument was kept in photon-by-photon mode for the whole period, including the time when it was in safe configuration, with spectra TM enabled, an assigned TM bandwidth in the science observation windows of 103 pkts/cycle. The actual bandwidth occupation was 99.8 pkts/cycle average, during the useful science acquisition periods.

The following plot shows the evolution of the occupied bandwidth, since April 2004.



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.

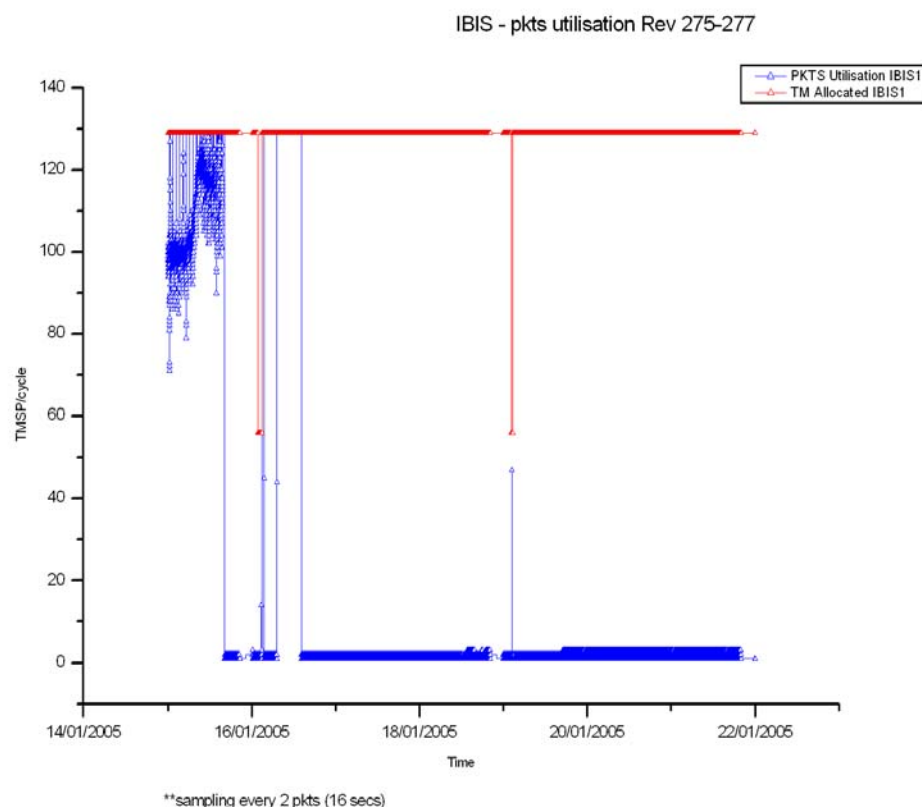
3.2.2 IBIS

The Overall status of the unit is Nominal.

The week was characterised by exceptional solar activity. The giant sunspot 720 erupted on 20/01 at 07:00z, unleashing an X7-class solar flare. The blast hurled a coronal mass ejection (CME), forcing the unit in Safe configuration for a large part of rev 276-277.

During the reporting period the PST allocation to IBIS was most of the time 129 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 116.4 TMPS/cycle, up 11.8 on last week. However due to high radiation background, IBIS packets utilisation was very low during most of the 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.

INT_OR_0189 was executed at the start of each revolution to reset the JEM-X1 Broadcast Packet override flags for IREM to DISABLED following the anode calibration ED KEACAL01 in the Timeline.

Due to high background radiation conditions as a result of solar flares, JEM-X1 spent most of the reporting period in Safe mode.

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.

For the majority of the week, the OMC was in SAFE mode due to the high radiation experienced by the satellite. There were 17 OMC pointings executed nominally, 134 were lost due to high radiation.

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

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by high solar activity. Giant sunspot 720 unleashed several solar flares from the 15th to the 20th of January. The strongest was a X7-flare reported at 06:53Z on the 20th. High radiation was first reported by the IREM counters on the 16th at 02:54Z. Following the request of the On-call SOE, the instruments were put in Safe-mode and remained in this configuration until the 23rd of January when the solar activity had died down.

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 much better this week, well above the system performance requirements, no pointings were lost to ground problems.

4.1 Mission Operations Centre

The performance of the MOC was good this week, there were only minor events reported, including an occasion when the link to ISDC was disrupted.

4.2 Ground Stations & Network

The performance of the ground stations and Network was in general good this week. No Slews were lost to ground station problems although there were instances of bad TM, probably due to RFI. The overall performance was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's received up to rev 291 including redelivery of 283 and 288 to 291 (was discarded last week). TSF received up to 278.

Rev. 277 was re-planned due to the ToO observation introduced last week was partially wiped out due to high solar activities. This week up to rev 285 have been planned in ESTEC. In ESAC up to rev 281 have been performed. Hence up to this revolution has been sent to MOC.

2. Observation status

ECS's up to rev 267 have been received. Corresponding OCS's sent. No extra time allocated

3. ISOC science data archive

This is still in a transitional phase. Real progress is only expected in early February. Some problem to get the hardware up and running has been reported. This may slightly delay when the ISOC science data archive is operational and will be made open to the public.

4. ISOC system

Version 10.7 is still used both in ESTEC and ESAC

5. AO 3

All AO 3 observations are now entered in the data-base. Before doing amalgamation there are some observations where there is proposed to change the observation mode. This is communicated to the PI's for approval. Amalgamation investigations have been performed off-line.

6. ISOC move to ESAC

The parallel mission planning has successfully continued this week. A major effort was performed to ensure the ESTEC and the ESAC data bases are kept in sync despite the many re-plannings performed.

7. Problems

A couple of the AO 3 observations gave some problem when entering the TAC results. Investigation is ongoing. This problem does not cause any delay in the remaining amalgamation process.

4.3.2 ISDC

Status of ISDC observation processing on 24/01/2005:

- Latest Standard Analysis completed: observation 02201050001 (Cygnus X-1, Revolution 255) on 16/01/2005
- Latest products archived: observation 02200280002 (GRS 1915+105, Revolution 255) on 24/01/2005
- Latest observation products sent to the observer: observation 02201120003 (IC443, Revolutions 247-248) on 24/01/2005

5 Special Events

Due to the high radiation encountered this week, it was decided to perform a hibernation until the solar activity had subsided. This consisted of from 20/01/2005 at 11:09 to 23/01/2005 at 16:32 manoeuvring to a safe attitude, with a bright star available to the star tracker, see section 8.3.1 for details.

6 Anomalies

There were a number of problems that impacted the operations:

- On DoY 016, at 13:00, ISDC reported they were not receiving the attitude history files, these were routinely sent the following day at the end of the revolution.
- On DoY 017, at 04:38, and again at 04:45, the TC link from Redu toggled in and out of bit-lock, the problem did not reoccur.
- On DoY 018, at 15:53, the TM from DSS-16 dropped, at 16:58, the TM was back, but no TC. This was connected again at 16:03. DSS-16 reported a problem with the x-axis control of the antenna, there was no impact.
- At 16:09, the FDS failed to update the guide star. There was no impact.
- At 17:52, 38 bad frames were received, and at 18:19, 25 more bad frames were received from DSS-16, there was no impact. At 18:27, RFI was reported at DSS-16.
- At 18:54, 3 bad frames were received from DSSS-16, who report that it is probably due to RFI.

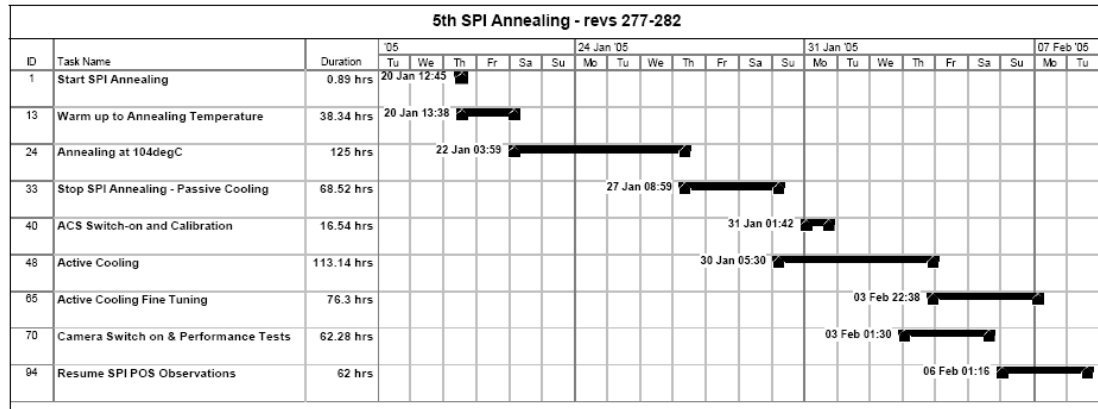
There were no new anomaly reports entered into the ARTS system this week.

7 Future Milestones

The 5th annealing of the SPI Germanium detectors has started on 20th January and will continue until 6th February according to the following schedule:

Doc. Title : INTEGRAL Mission Report #122
 Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
 Date : 24/01/05

Issue : 1
 Rev. : 0
 Page : 9



8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 276

The activities in revolution 276 began with 14 pointings of a GPS lasting ~10 hours. A raster dithering observation of the Coma Cluster (RA 12:59:48.70; DEC +27:58:50.0) was then performed for the remaining ~50 hours of observation time.

During these observations all instruments were planned to be in their nominal science modes, except JEM-X2 for which the DFEE remained off. However, all instruments spent a considerable part of this revolution in their safe modes due to high background radiation conditions as a result of a solar flare. The TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

Revolution 277

The planned activities in revolution 277 consisted of 13 pointings of a GPS lasting ~9 hours, followed by various hexagonal dithering observations of the Target of Opportunity V0332+53 (RA 03:35:0.00; DEC +53:10:22.8) lasting in total ~29 hours. A raster dithering observation of the Coma Cluster (RA 12:59:48.70; DEC +27:58:50.0) was then planned for the remaining ~20.5 hours of observation time.

During these observations all instruments were planned to be in their nominal science modes, except JEM-X2 for which the DFEE remained off. However all instruments spent most of this revolution in their safe modes due to high background radiation conditions as a result of solar flares. Also due to this, SPI annealing activities were brought forward and started during this revolution. 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

2005-01-13T10:37:32.000Z	164.1732	F	Automatic TM processing.
2005-01-13T18:07:08.000Z	164.1277	F	Automatic TM processing.
2005-01-14T08:02:46.000Z	164.1082	F	Automatic TM processing.
2005-01-14T12:00:00.000Z	164.0878	F	After thruster torque calibration
2005-01-14T13:07:42.000Z	164.0758	F	Automatic TM processing.
2005-01-15T18:31:38.000Z	164.0228	F	Automatic TM processing.
2005-01-15T19:51:14.000Z	163.9928	F	Automatic TM processing.
2005-01-16T00:58:58.000Z	163.9574	F	Automatic TM processing.
2005-01-16T09:43:15.000Z	163.9366	F	Automatic TM processing.
2005-01-16T12:49:32.000Z	163.9058	F	Automatic TM processing.
2005-01-18T18:12:57.000Z	163.8867	F	Automatic TM processing.
2005-01-18T19:34:18.000Z	163.8634	F	Automatic TM processing.
2005-01-19T00:47:22.000Z	163.8549	F	Automatic TM processing.
2005-01-19T09:28:27.000Z	163.8444	F	Automatic TM processing.
2005-01-19T11:57:23.000Z	163.7863	F	Automatic TM processing.

This report was generated Fri Jan 21 08:00:21 GMT 2005

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 15/01/2005-21/01/2005

AOCS operations were executed from the Automatic Timeline.

During this period, 71 Open Loop Slews, 61 Closed Loop Slews and 12 Momentum Bias were executed. 39 slews were missed due to the high solar activity. This is equivalent to a ~ 23 % loss.

15/01/05 (Day of Year 015, Revolution 275)

Nothing to report.

16/01/05 (Day of Year 016, Revolution 276)

Nothing to report.

17/01/05 (Day of Year 017, Revolution 276)

Nothing to report.

18/01/05 (Day of Year 018, Revolution 276)

Nothing to report.

19/01/05 (Day of Year 019, Revolution 277)

Nothing to report.

20/01/05 (Day of Year 020, Revolution 277)

Lost of guide star due to high solar activity: Due to the high solar activity (the giant sunspot 720 erupted at 0700 z, unleashing a [X7-class](#) solar flare) the magnitude 8.0 guide star at CCD location [6447, -9929] was released several times (see table below) during the morning, due to the STR SEU threshold exceeded.

2005.020.08.02.12.977z	ACC STR THR EX
2005.020.07.55.01.965z	ACC STR THR EX
2005.020.07.44.17.445z	ACC STR THR EX
2005.020.07.44.13.445z	ACC STR THR EX
2005.020.07.44.09.445z	ACC STR THR EX
2005.020.07.44.05.445z	ACC STR THR EX
2005.020.07.44.01.445z	ACC STR THR EX
2005.020.07.40.04.437z	ACC STR THR EX

2005.020.07.39.31.437z ACC STR THR EX
2005.020.07.39.26.933z ACC STR THR EX
2005.020.07.39.05.933z ACC STR THR EX
2005.020.07.00.23.861z ACC STR THR EX

As precaution, at 07:09z the AOCS s/s was disabled from the TML and the S/C slewed to attitude of PID 02770050 (RA 03:44:13:38, DEC +55:09:29.7). The magnitude 6.5 star (ID 3721-38) at CCD location [5598, -11871] was picked as guide star. This attitude remained valid until 21/01 at 21:05z.

At 12:27 the magnitude 6.5 guide star ID 3721-38 was released again few times due to the increasing of radiation environment

2005.020.13.39.53.100 ACC STR THR EX
2005.020.12.51.29.012 ACC STR THR EX
2005.020.12.27.44.968 ACC STR THR EX

It was then decided, as precaution and considering that the rate of false event was still low, to slew to an attitude with brighter guide star. The attitude selected (RA 03:04:08:02, DEC +53:24:03.9) was around the magnitude 3.0 bright star Gamma Persei, which was then picked as guide star at CCD location [1451, -1418]. This attitude remained safe until 21/01 21:18:14z.

21/01/05 (Day of Year 021, Revolution 277)

Update of TIM Thresholds, RCS-A Thruster Torque Reciprocals and AMD On Times: An update of the RCS-A Thruster Torque Reciprocals, AMD Thruster On Times and TIM Thresholds was made with the results of the RCS-A Thruster Calibration, performed on 14/01/2005, and from the estimations of the thrust level (9.72006 N) and remaining fuel mass (164.0852 Kg at tank temperature 25.7 C):

1. Update of the RTIM, PTIM, YTIM and TTIM thresholds, completed at 13:05z
2. Update of the RCS-A Thruster Torque Reciprocals along with the ESAM PWM look-up table (the PWM value did not change), completed at 11:43z
3. Update of the AMD On Times of RCS-A, completed at 12:09z

S/C hibernation due to exceptional solar activity: Due to the persisting high solar activity and the incoming perigee passage, it was decided to set the S/C in hibernation at the safe attitude (RA 01:37:41.6, DEC +48:31:06.9) around the magnitude 3.5 bright star 51 Andromeda, which was picked as guide star at CCD location [1255, -1249]. This attitude remained safe until 24/01 22:41:07z allowing the S/C to pass the high radiation period in safe condition. A magnitude 6.5 star was also selected in slot #2 at CCD location [13645, 4278] and monitored, for false events rates, together with the guide star, along all the duration of the radiation event.

All the slews in rev 277 from PID 02770038 onwards were not executed.

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, until annealing start, showing the expected small positive drift.

The plot showing the evolution of the cold-plate and H bus temperatures during the reporting period is not available.

IASW/DPE:

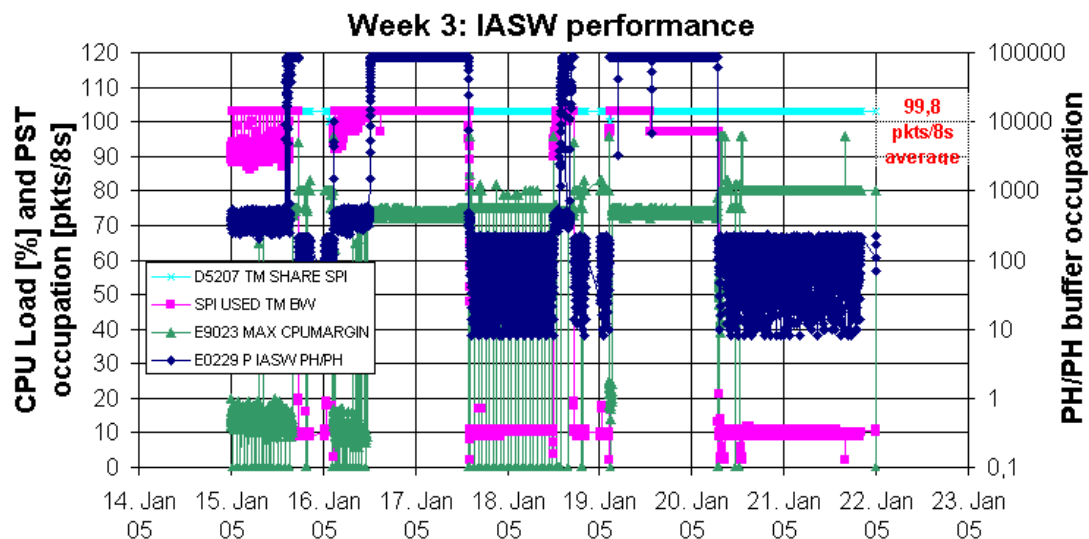
The IASW performances are nominal. The PST TM bandwidth allocation is 103 pkts/cycle in the science windows; the actual TM bandwidth usage is :

103 pkts/cycle peak;

99.8 pkts/cycle average during science acquisition periods.

A re-arrangement of the SPI TM slots in the PST, up-linked manually by the SPACON at every revolution, is temporarily used as workaround to the TM leakage anomaly INT_SC-107. The SPI team is currently working on the IASW, to find a permanent solution

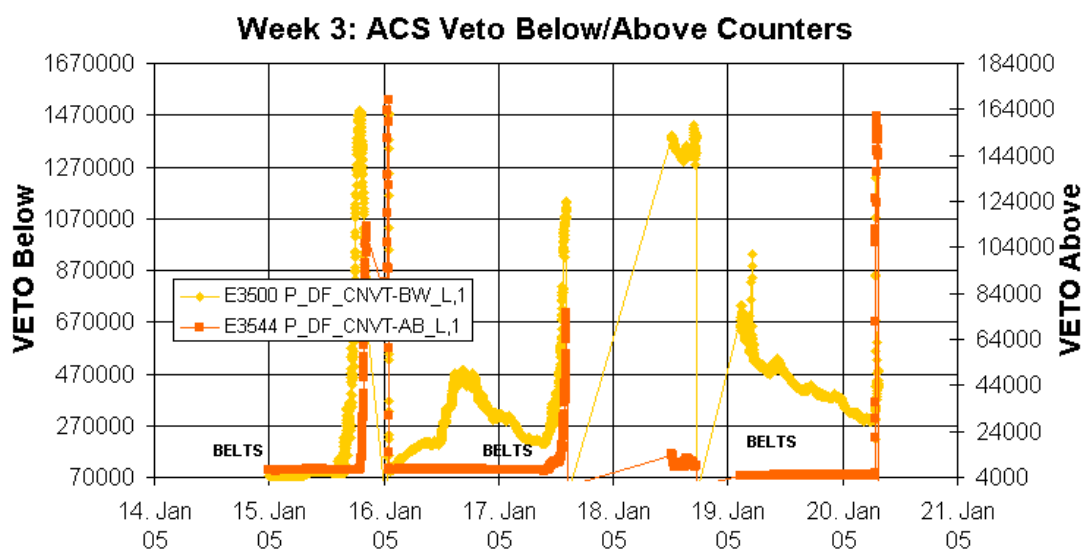
The following diagram shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS:

The performance of the ACS is nominal.

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



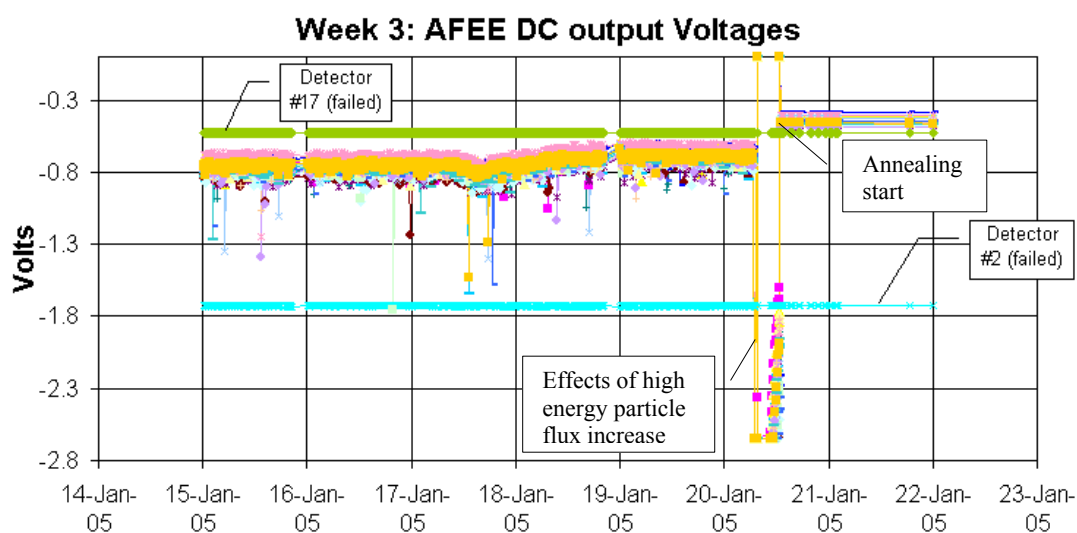
AFEE:

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.

On 20th January an unexpected solar eruption of high energy particle flux (>100MeV), increasing four orders of magnitude in less than half an hour, caused the increase of the detector bias currents such that the dc output voltage measurements went out-of-scale (<-2.7V).

Following this event, in agreement with the PI, the Ge high voltages were temporarily decreased from 4kV to 0.5kV.

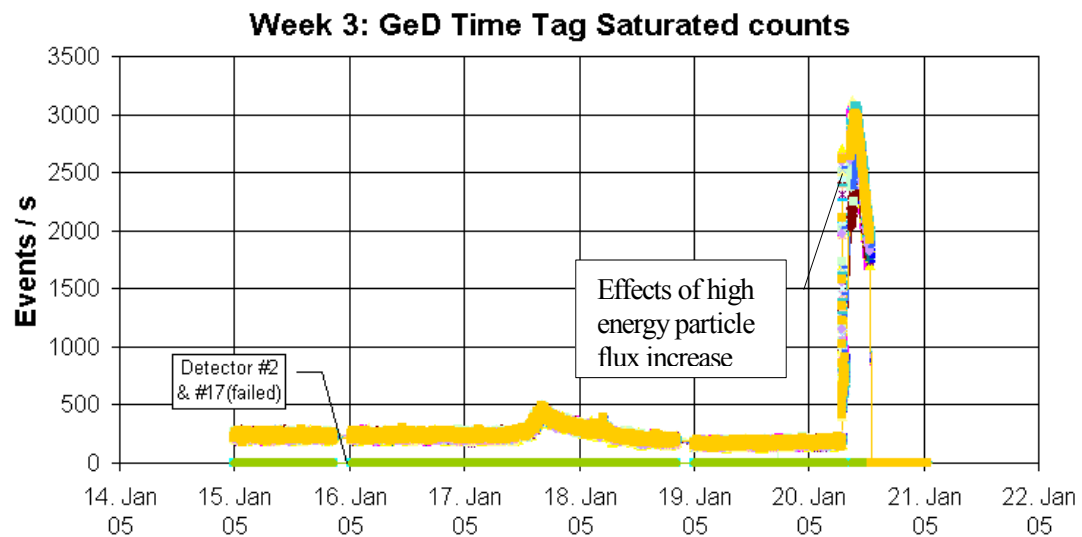
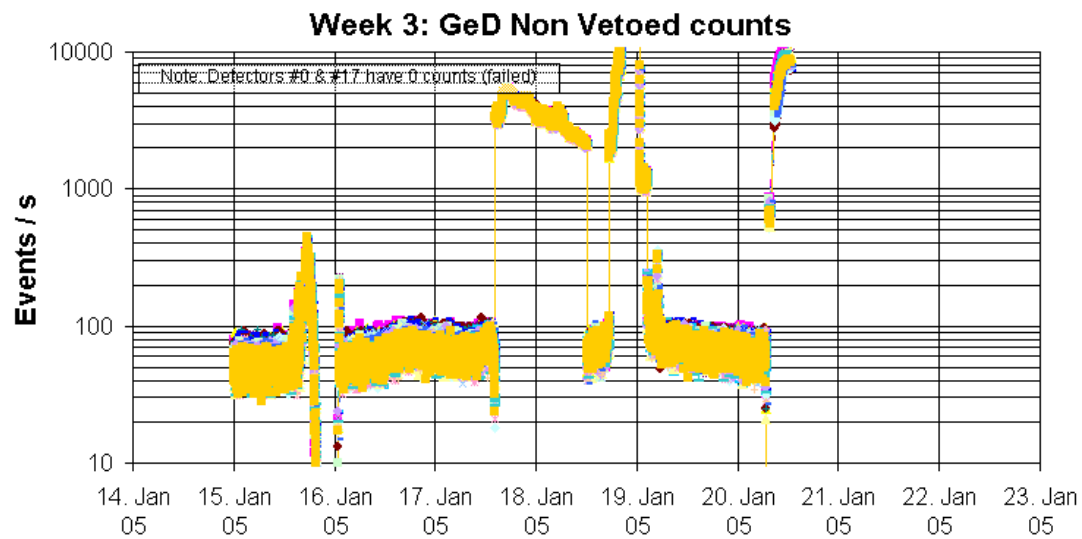
The following plot shows the AFEE dc output signals during the reporting period.



DFEE:

The performance of the unit is nominal.

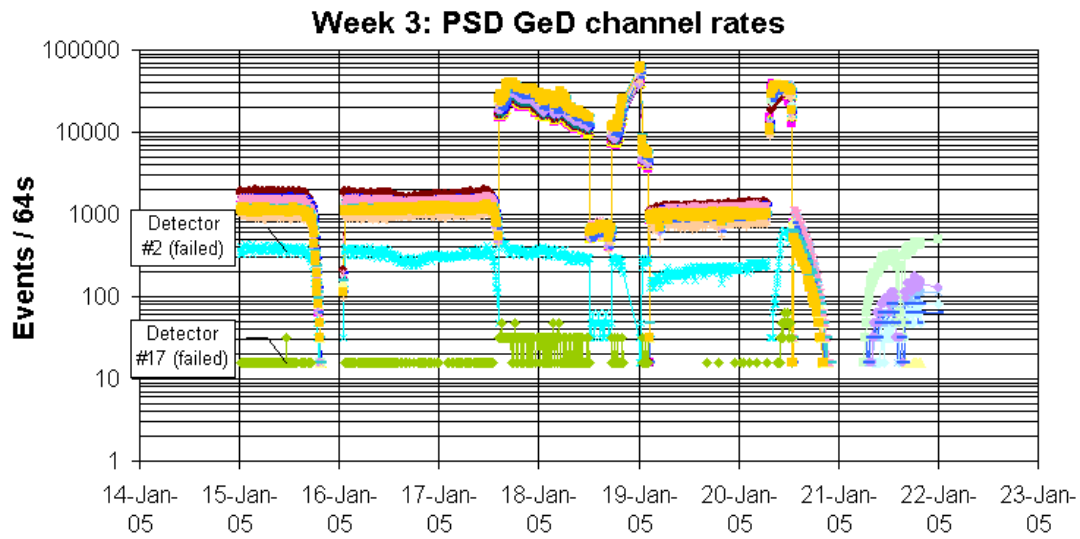
The following plot shows the Non Vetoed event rates, processed by the DFEE during the reporting period. The count rate of each detector is not nominal due to the solar storm.



PSD:

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

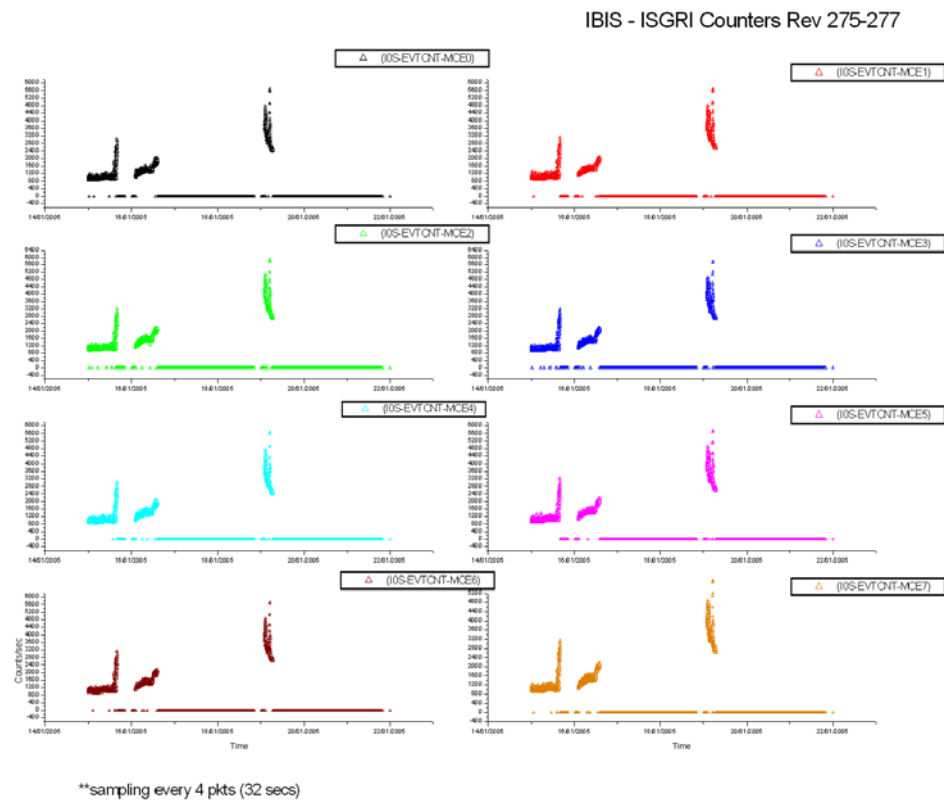
The following plot shows the PSD channel rates during the reporting period.



8.3.3 IBIS Operations

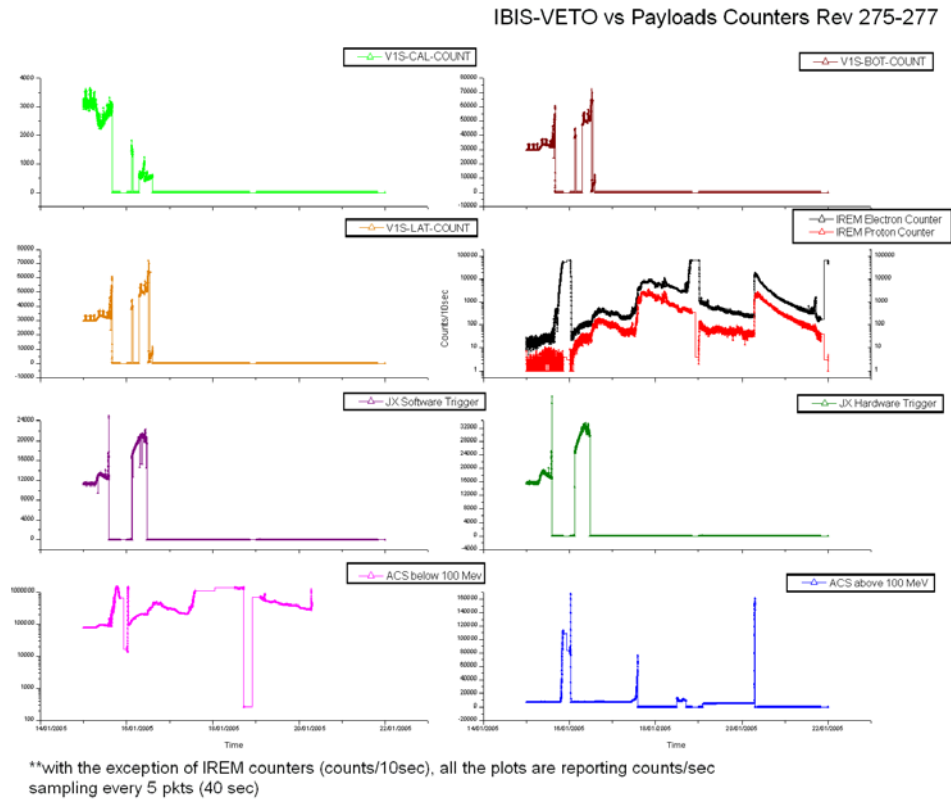
IBIS Event Counters Plots.

ISGRI Counters:



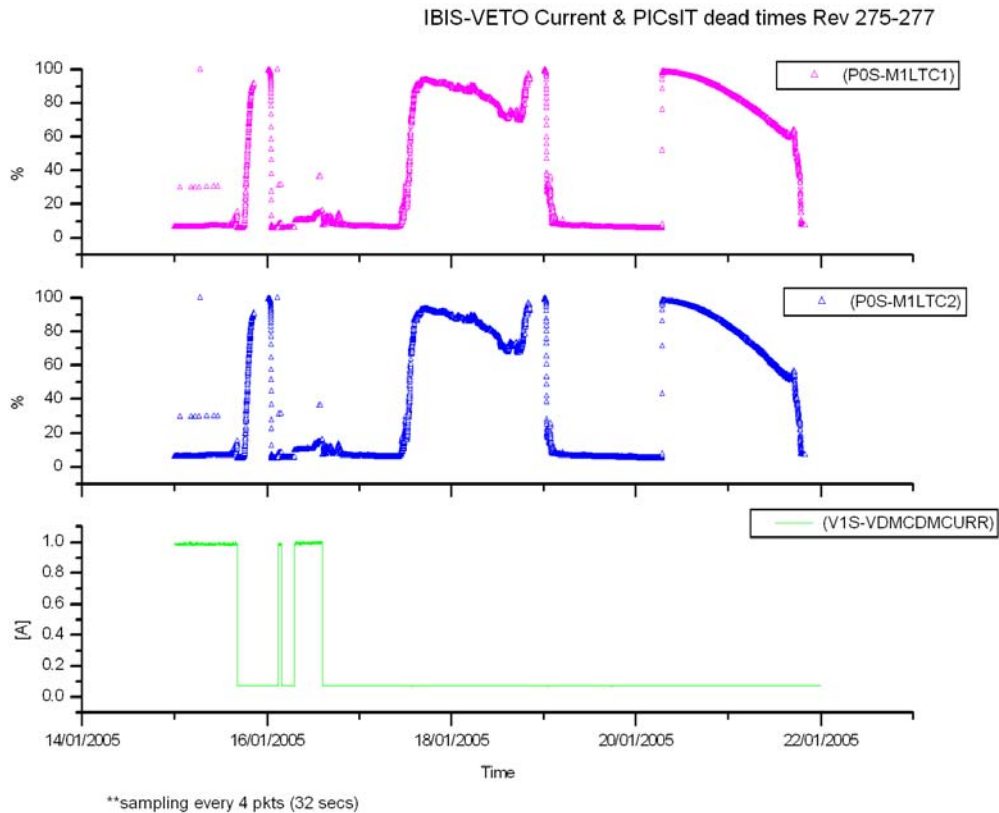
Due to high radiation background, ISGRI was switched OFF most of the week. However after belt passage from revolution 276 to 277, ISGRI was ON for several hours and the counters reported high values.

VETO vs Payloads Counters



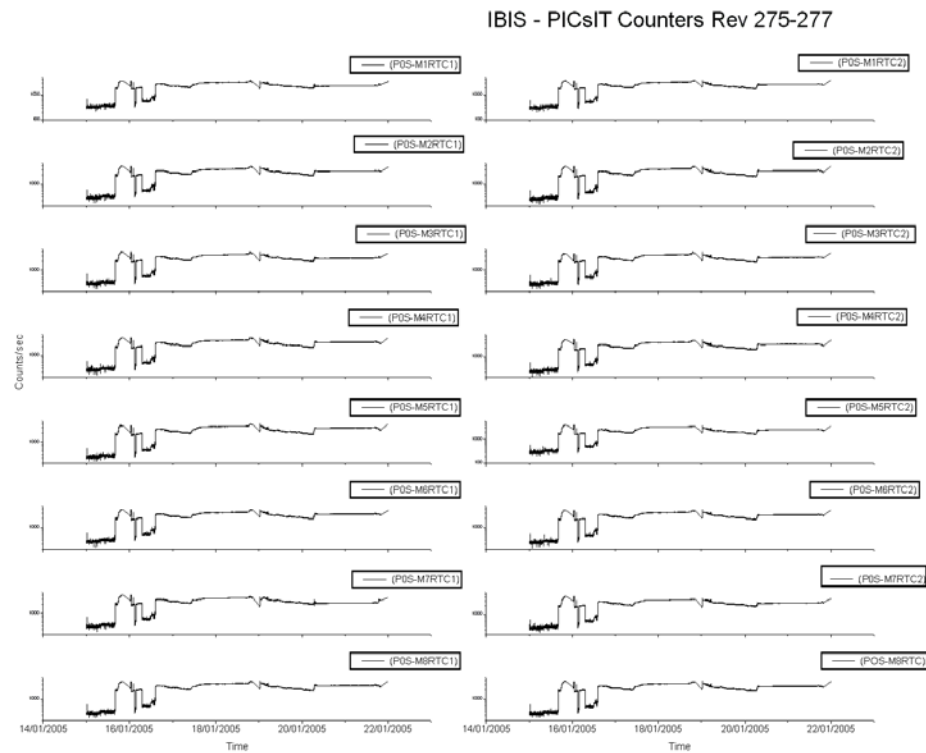
The week was characterized by exceptional solar activity. The giant sunspot 720 erupted 20/01 at 07:00z, unleashing an X7-class solar flare. The blast hurled a coronal mass ejection (CME) into space, forcing all the payloads to safe configuration.

Veto Current:



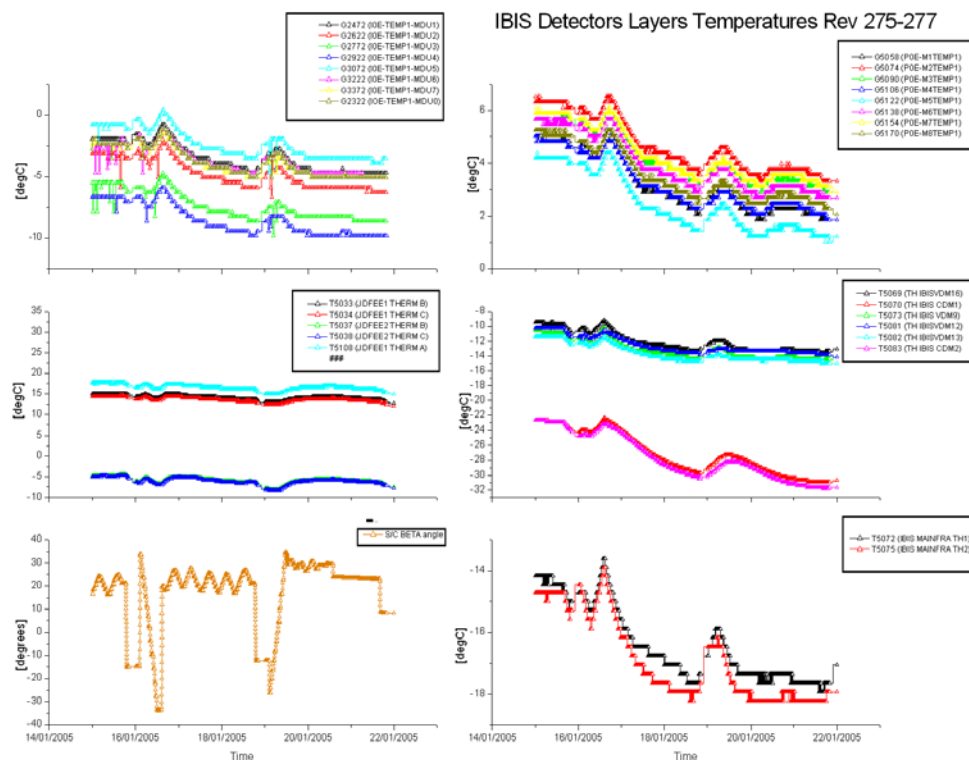
PICsIT dead time revealed the high radiation background that caused IBIS to be set OFF most of the time, as shown also by the VETO current. PICsIT counters reported high values during most of the week due to high radiation background.

Picsit Counters:



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures



**sampling every 8 pkts (64 secs)

IBIS daily report

DoY 2005.015 (15/01/2005)

From 08:09Z to 08:41Z, TM G6061 ("V1S-CAL-COUNT": VETO calibration counter) has been reported Out of Limit "low-low". At 08:41Z the limit threshold for "low-low" was temporary modified from 2500 to 2200 in order to cope with the reduced count-rate reported by the unit. The reason of this action is due to a known problem of the VETO CDM01 FEE not able to follow higher count-rates.

At 16:12Z IBIS entered Stand-by mode due to the Radiation belts in ahead of the BCPKT time (17:32Z).

DoY 2005.016 (16/01/2005)

At 02:54Z TM G6061 (V1S-CAL-COUNT) went Out of Limit "low-low". Being the radiation background high but the IBIS\IREM thresholds not yet exceeded, the reaction V-CAL-1 was applied. At 03:37Z, on-request of the on-call SOE, IBIS was put into Stand-by mode (FCP_IBIS1_0313) and at 03:41Z VETO was set into Stand-by mode as well (FCP_IBIS1_0203).

After wait time, VETO was set back into Nominal mode at 07:06Z (FCP_IBIS1_0201), and IBIS back in Scientific Standard mode at 07:15Z (FCP_IBIS1_0301). This verification did not cure the problem on the OOL of TM G6061 that appeared one more time at 07:06Z. No more action was taken since the count was low but not harmful and due to a known problem of the VETO CDM01 FEE not able to follow higher count-rates.

At 14:20Z due to high radiations reported by IREM counters, the OEM APID 1280 ID 131 CLASS 0 "IBIS1 IASW emergency Switch off" was received. At 14:30Z IBIS was disabled in Timeline, and remained in Safe configuration until the end of the revolution 276.

DoY 2005.019 (19/01/2005)

At the beginning of revolution 277, at 01.00Z ISGRI Context Tables were up-linked to the spacecraft. At 02:30Z, at belt exit, IBIS TCs were disabled from timeline because of the high radiation background. IBIS was hence left in Stand-by with PICsIT in nominal, ISGRI in nominal and VETO off.

Despite the high radiation environment, the IBIS switch-off automatism was not triggered since the IREM thresholds were not crossed (constant values above thresholds since before belt passage) and the automatism reacts only to the transition from low to high values. Hence, ISGRI was not set into Stand-by with biases to 0V, as expected. This situation was recognized, unfortunately few hours late, by the OOLs (warning high ~4000 cts/s) reported by the 8 ISGRI modules. The Recovery was the immediate transition of the ISGRI modules to Stand-By and set the biases to -0.56 V, executed at 6:44z.

After this, the unit was in the right Safe configuration and apparently the impact of the few hours' exposure on ISGRI was negligible.

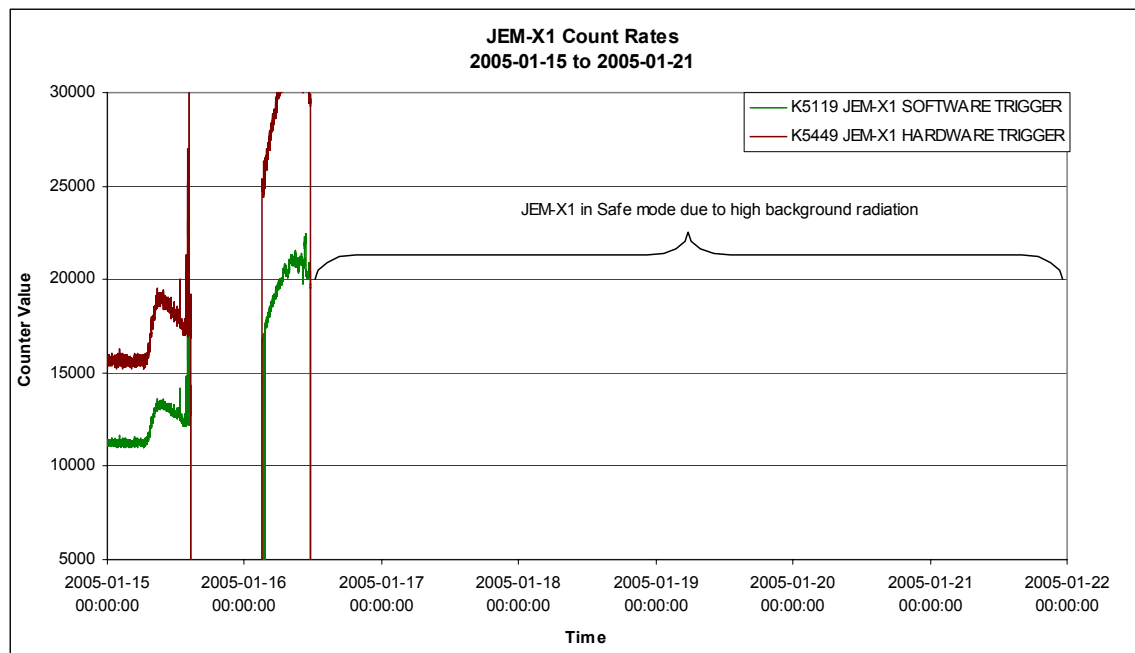
DoY 2005.020 (20/01/2005)

At 10.06Z, TM G5079 (POE-M2ASICLINE) went Out of Limit "high" and back. Similarly at 23:09Z G5079 went Out of Limit and back. Both times, according to P-VLT-2 no action was taken.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

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

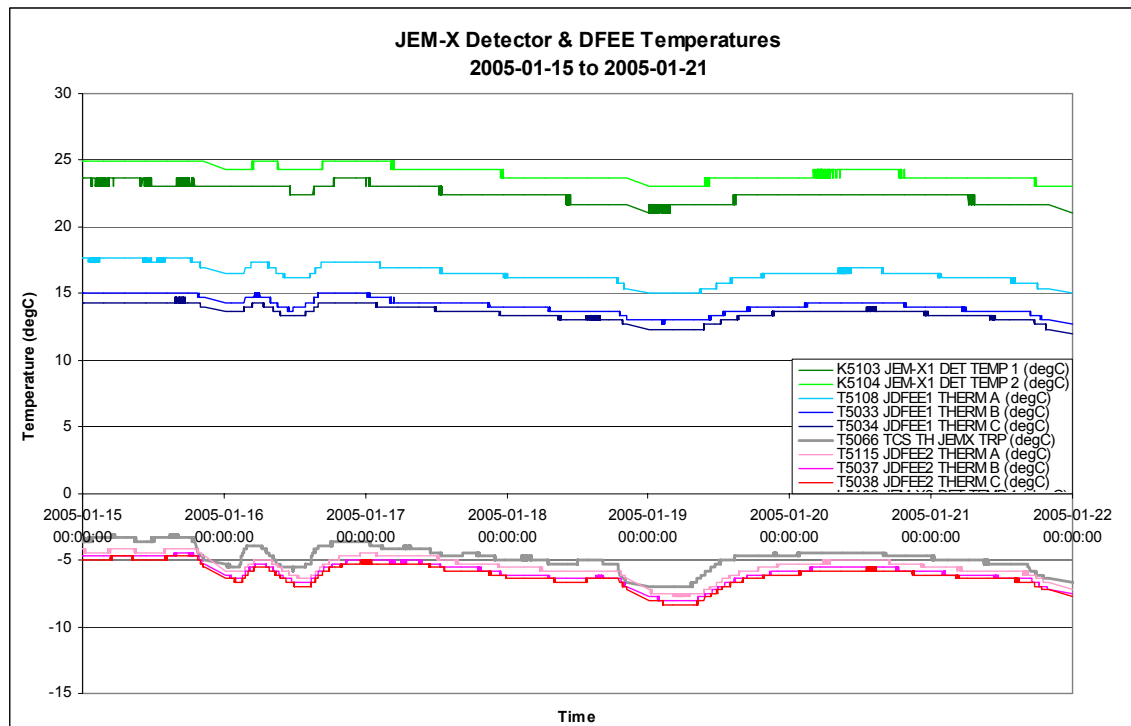


8.3.4.2 JEM-X Temperatures

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

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

² Data sampled (1 frame in 8)



8.3.4.3 JEM-X Daily Report

2005-01-15 (DOY 015, Rev 275-276)

At 14:21Z the parameter K5119 SOFTWARE TRIGGER exceeded its soft limit for a couple of TM cycles and at 14:31:53Z it exceeded the JEM-X1 Safe threshold of 25000, causing JEM-X1 to perform an autonomous transition to Safe mode (TM parameter K5022 DFEE STATUS = 1). However, as the parameter K5462 DFEE STATE IASW transitioned to Setup (value = 5) at this time, there was an occurrence of the OEM189 JEM-X1 PROB DFEE 9.

At 16.09.37Z the ED KESAFE01 was executed from the Timeline to command JEM-X1 to Safe mode, thereby setting the DFEE State IASW to Safe mode as well and the OEM 254 ERROR OFF was received.

2005-01-16 (DOY 016, Rev 276)

At the start of revolution 276, at 02.36.07Z, FCP_JEM1_0120 was executed to disable the JEM-X1 reactions to the IREM count rates in the Broadcast Packet as per INT_OR_0189.

Due to high background radiation conditions as a result of a solar flare, out of limits were received on the IREM radiation monitoring parameters K5315 RAD MONITOR 1 (value = 21) at 02:51:13Z and K5317 RAD MONITOR 3 (value = 66) at 02:53:05Z, after JEM-X1 transitioned out of Safe mode following radiation belt exit of revolution 276. These parameters then fluctuated in and out of limits, but with the periods spent out of limits and the out of limit values gradually increasing. At 06:11:37Z, the

parameter K5119 SOFTWARE TRIGGER also went out of limits Warning High (value = 20054) for 1 TM cycle, and then began fluctuating in and out of its soft limit.

At 11.31.44Z, after consultation with the JEM-X PI, JEM-X1 was manually commanded to Safe mode via FCP_JEM1_0040 (by this time the value of K5315 RAD MONITOR 1 was ~ 30; K5317 RAD MONITOR 3 was ~115 and K5119 SOFTWARE TRIGGER was ~205000). At 11:33Z commanding to JEM-X1 was disabled from the Timeline.

JEM-X1 remained in Safe mode (with commanding from the Timeline disabled) for the remainder of the day.

2005-01-17 (DOY 017, Rev 276) to 2005-01-18 (DOY 018, Rev 276-277)

Due to continuing high background radiation conditions, JEM-X1 remained in Safe mode (with commanding from the Timeline disabled) throughout this period.

2005-01-19 (DOY 019, Rev 277)

At the start of revolution 277, the automatic Timeline was started with commanding to JEM-X1 enabled. Thus, the ED KEACAL01 for the JEM-X1 anode calibration inside the radiation belts was executed nominally. After this, at 02.23.12Z, FCP_JEM1_0120 was executed to disable the JEM-X1 reactions to the IREM count rates in the Broadcast Packet as per INT_OR_0189.

As the background radiation levels were still high ($\sim 70 < K5315 < \sim 100$ and $K5317 = \sim 850$) commanding to JEM-X1 from the automatic Timeline was disabled at 02:24Z to prevent the activation of JEM-X1.

As the JEM-X1 reactions to the IREM count rates had been disabled, JEM-X1 made the nominal autonomous transition to Setup mode (with HV off) at Broadcast Packet radiation belt exit time (02.32.56Z), issuing OEM 233 JEM-X1 AUTO EVENT 3. Thus, the IREM radiation monitoring parameters began to show out of limits and JEM-X1 was later commanded back to Safe mode at 03.28.31Z by procedure FCP_JEM1_0040.

2005-01-20 (DOY 020, Rev 277) to 2005-01-21 (DOY 021, Rev 277-278)

Due to continuing high background radiation conditions, JEM-X1 remained in Safe mode (with commanding from the Timeline disabled) throughout this period.

8.3.5 OMC Operations

On DoY 016, at 02:52, the Reset ROE command failed uplink due to OMC being still being in SAFE mode. The reason for this was that the unit was still in SAFE due to the high radiation environment. At 03:50, an attempt was made to get back into normal mode, however the radiation again put the unit back to SAFE. It was at this time that the following command was rejected:

Doc. Title : INTEGRAL Mission Report #122
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OF
Date : 24/01/05

Issue : 1
Rev. : 0
Page : 24

2005.016.03.52.31.872 2005.016.03.52.22.628 1792 Real Time Rejection 131
REJECTED TC1

Which corresponded to the Reset ROE command rejected as the unit had returned to SAFE mode.

On DoY 017, at 06:43, another attempt was made to switch to Normal mode, however the radiation levels were mis-read, and again the unit switched back to SAFE immediately.

OMC remained in SAFE mode for the rest of the week. All the OMC pointings for revolutions 0276 (65) and 0277 (69) were lost.

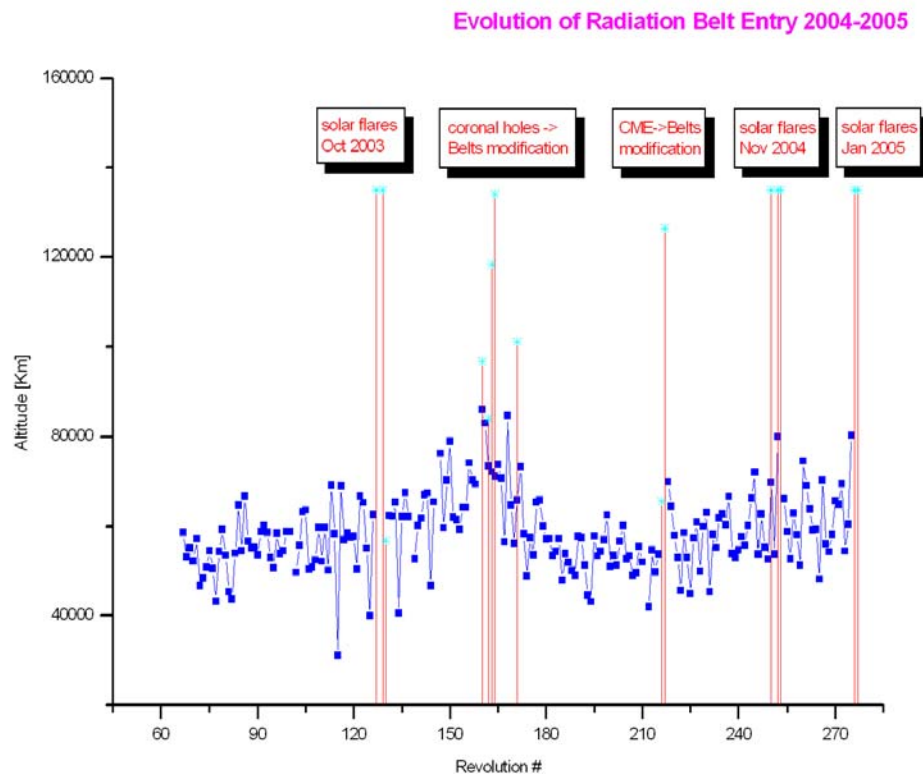
On DoY 015 at 17:32:48, OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

IREM daily report

On DoY 2005.021 at 19:32Z, as the timeline was stopped because of high radiation environment, U4921 (INT GND LINK OFF) was sent manually to prepare Belt entry.

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]
275	RAD ENTR R 2005-01-15T17:32:33Z	2005-01-15 14:32:34	80327.4	2005-01-15 18:16:59	54009.56
276	RAD EXIT R 2005-01-16T02:43:25Z	2005-01-16	-	2005-01-16 01:26:59	27971.17
276	RAD ENTR R 2005-01-18T17:21:39Z	2005-01-18	-	2005-01-18 18:06:57	53873.94
277	RAD EXIT R 2005-01-19T02:32:54Z	2005-01-19	-	2005-01-19 01:16:57	28066.66
277	RAD ENTR R 2005-01-21T17:07:37Z	2005-01-21	-	2005-01-21 17:56:57	53873.94

Reference

Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

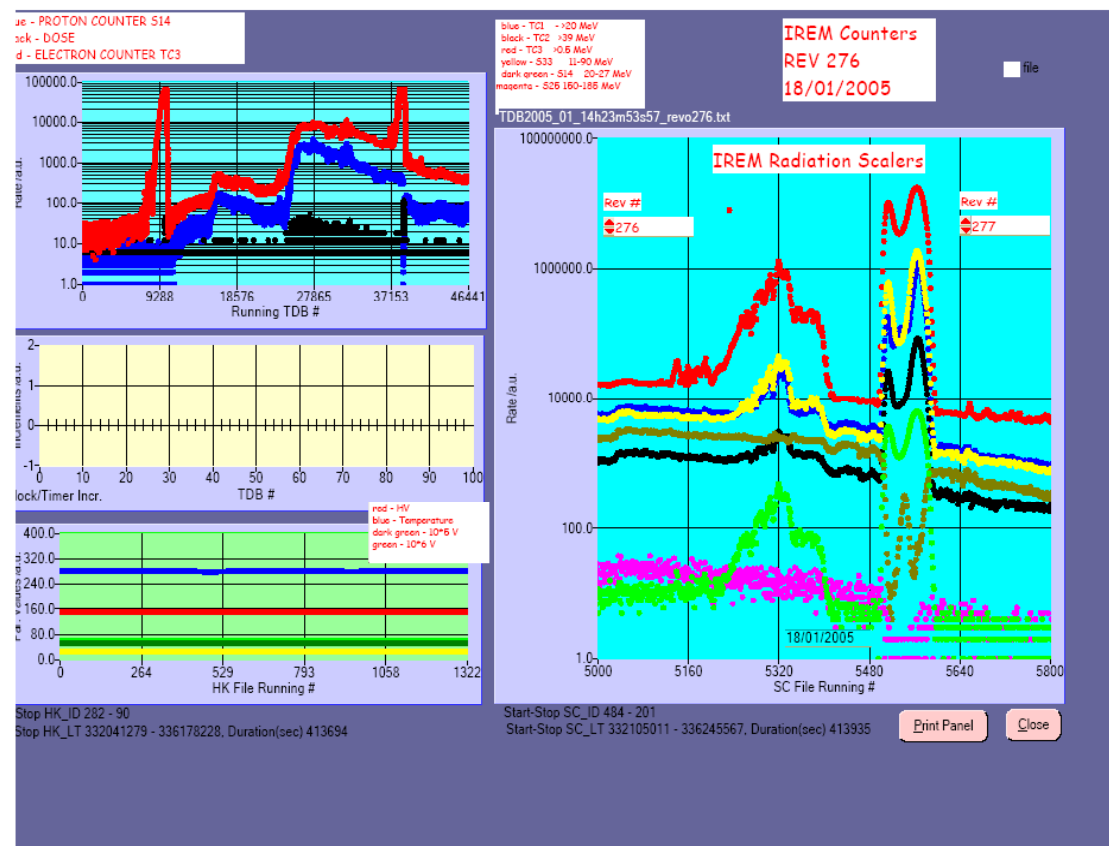
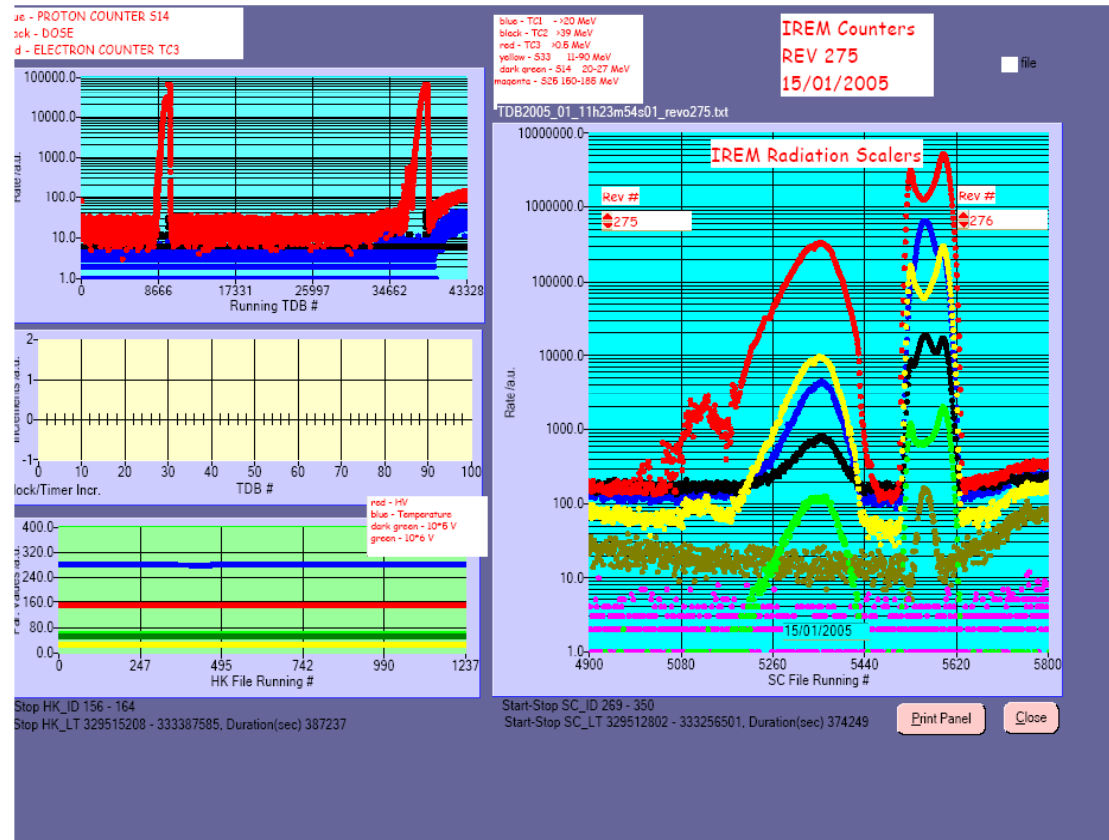
Large error vs reference (more than 30 minutes)

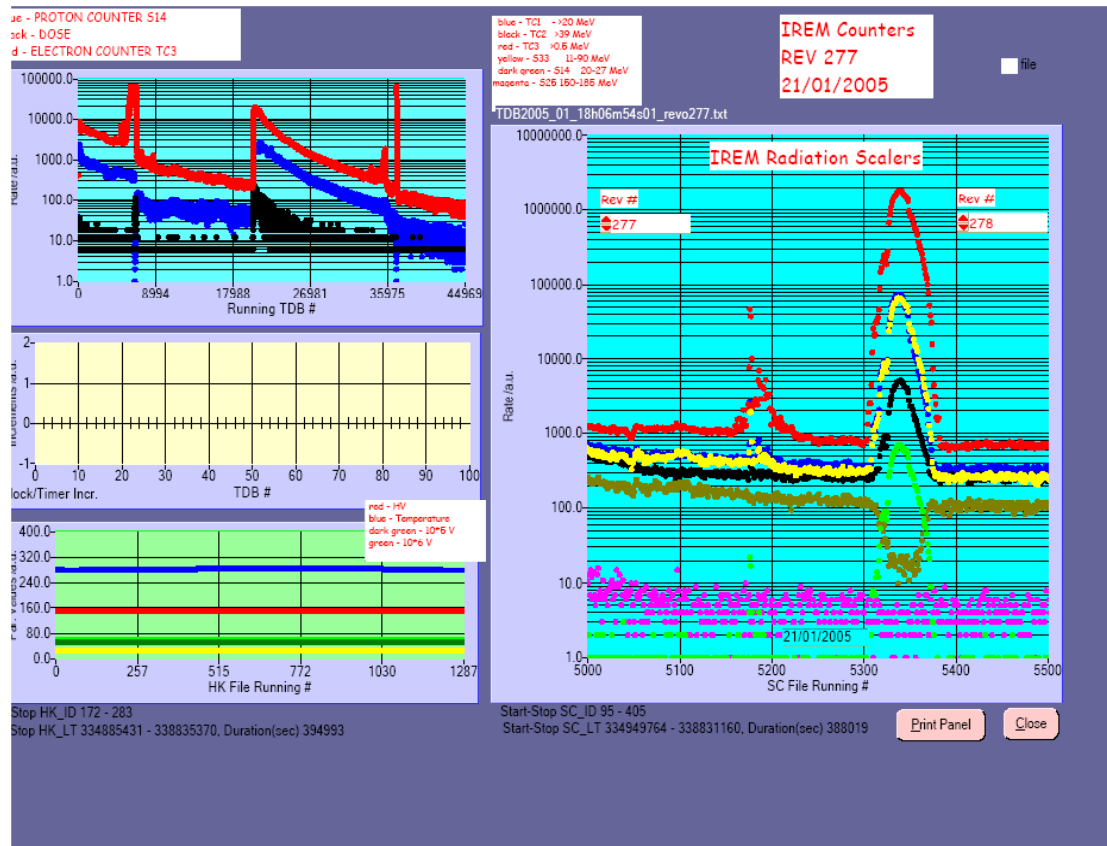
Radiation Spike

Proton Belts

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

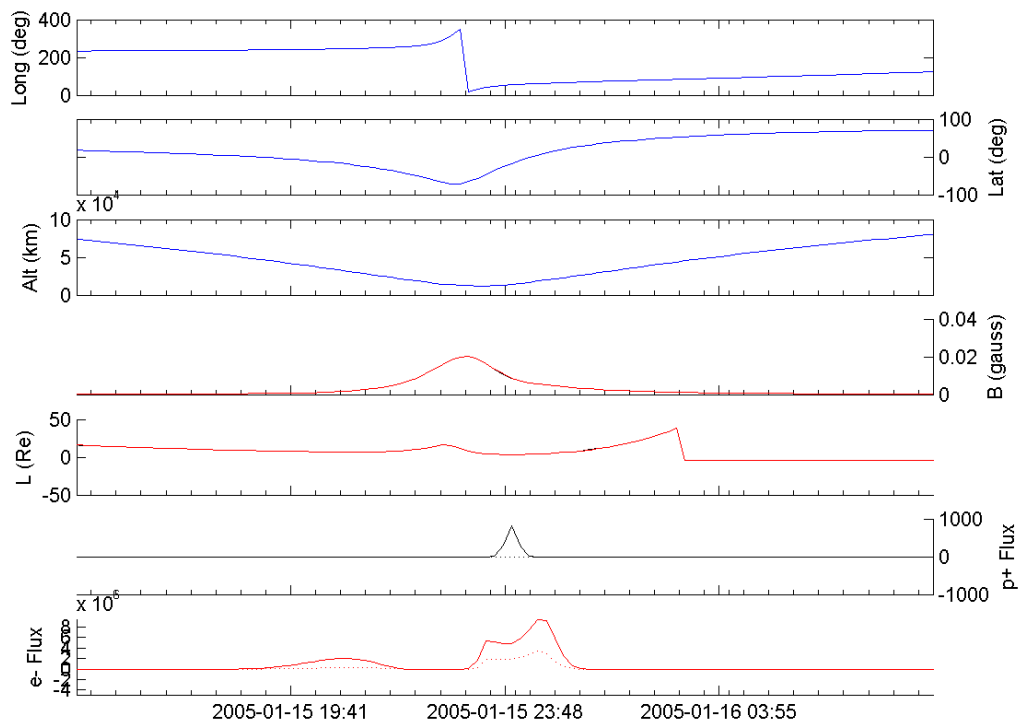
IREM radiation counters

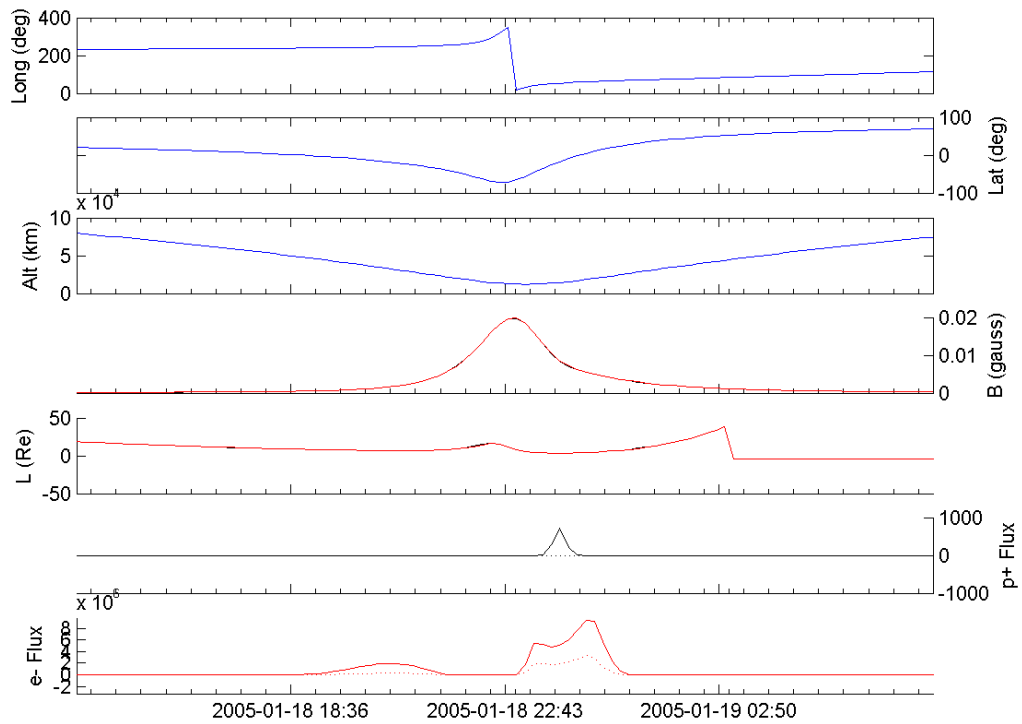




IREM Predicted Radiation Belt Passages.

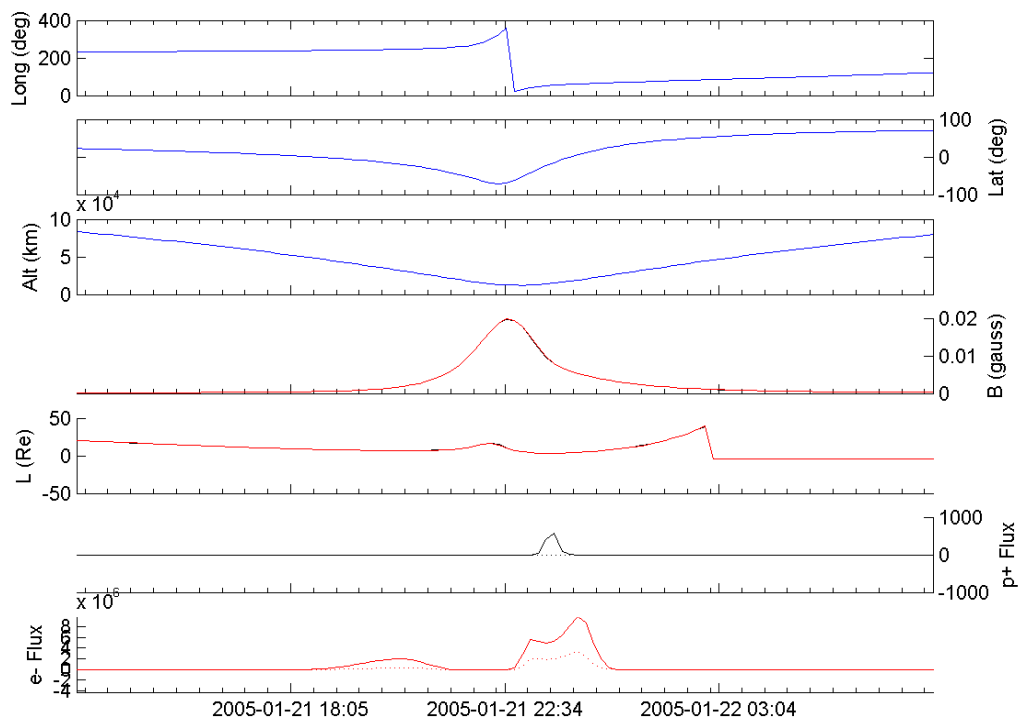
Rev 275





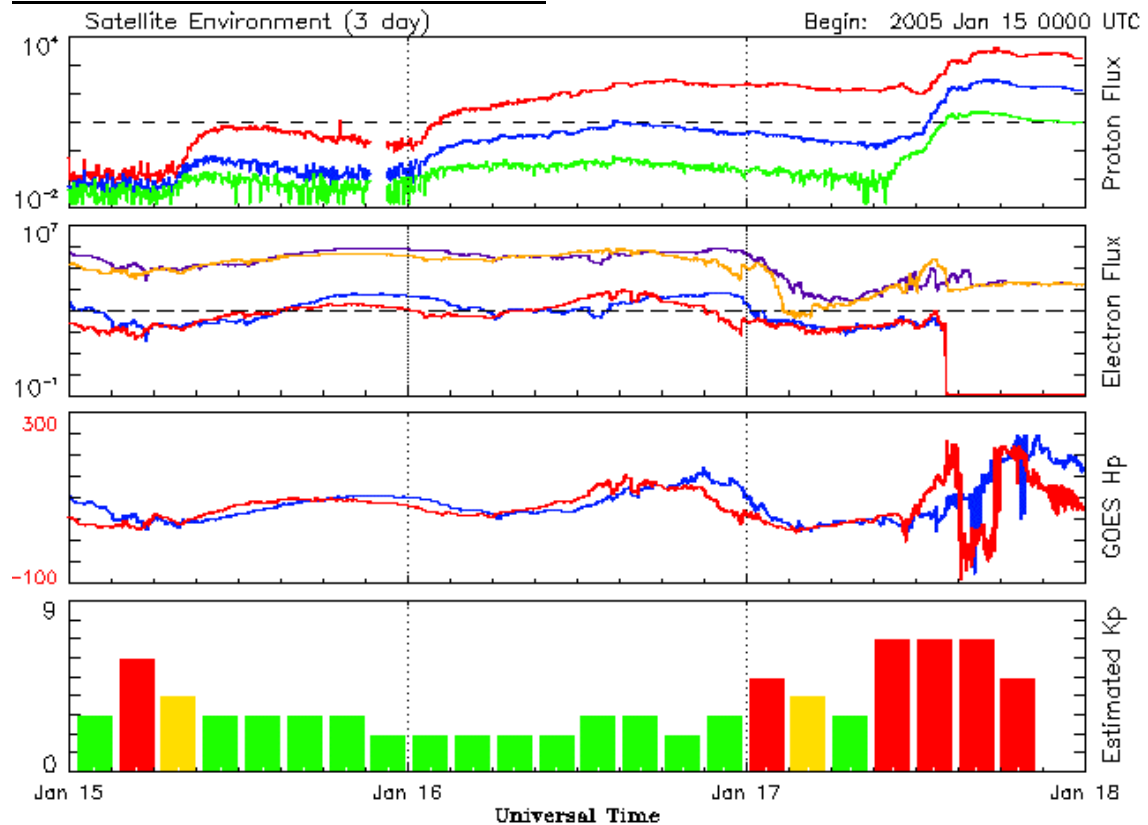
X: 0 Y: 0 get Data Zoom Print...

Rev 277



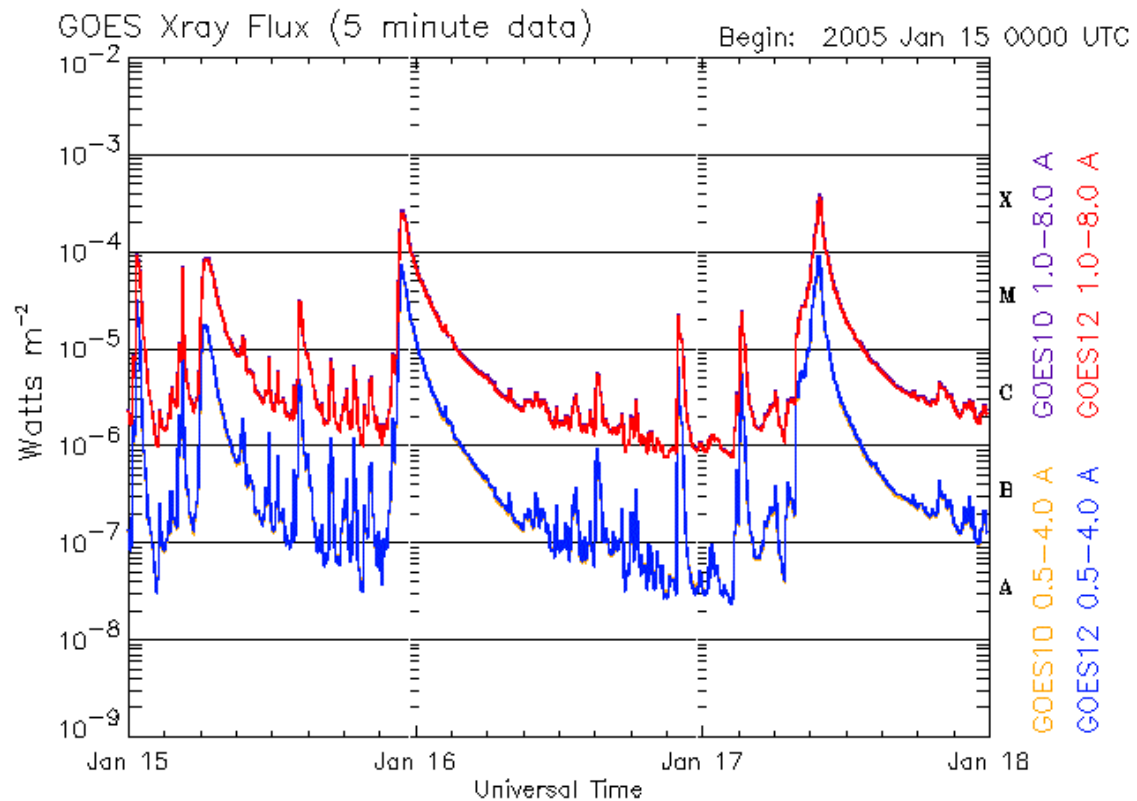
X: 0 Y: 0 get Data Zoom Print...

SEC-GOES Observed Particles Fluxes.



Updated 2005 Jan 17 23:56:11 UTC

NOAA/SEC Boulder, CO USA



Updated 2005 Jan 17 23:56:04 UTC

NOAA/SEC Boulder, CO USA

