

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 139
Week 20
23.05.05
Routine Phase

Prepared by: M. Walker (OPS-OFO)

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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 14.05.05 until 20.05.05 (both dates inclusive) and covers the revolutions 316 & 317.

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 point source 3C 454.3 (RA +22:53:57.7; DEC +16:08:54.0), and the Coma Cluster (RA +12:59:48.7 ; DEC +27:58:50.0) The activities consisted of GPS, and raster dithering observations.

Note: Some further information concerning the activities is provided in the Appendix.

3 Satellite Status

3.1 Platform

The performance of the platform was good. No new unexpected behaviour / malfunction was identified.

3.1.1 AOCS

The AOCS operations were performed from the timeline during this period.

As part of the AOCS preparation for the summer eclipse season, the onboard AMD thresholds were set to their eclipse season values on 15/05/2005.

The Eclipse season started with the first eclipse passage on 18/05/2005, DOY 138. The eclipse passage was nominal from an AOCS point of view.

1 slew (OSL) was missed from the Timeline during this period, due to a problem on REDU station.

The fuel consumption over the period between 13/05/2005 and 19/05/2005 was 0.1424 kg. The remaining propellant is in the order of 161.3161 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.

Preparation for the next eclipse season was carried out on 17/5/2005, this consisted of:

FCP_EPS_1271 Select full Charge Rate (C/13), BCR1.
FCP_EPS_1272 Select full Charge Rate (C/13), BCR2.
FCP_EPS_1260 Battery EOC Timer - Change Time.

The EOC Timer will also need to be updated periodically during the eclipse season as the eclipse duration changes.

On 18/5/2005 Integral passed through eclipse #1 of the summer eclipse season. Eclipse #1 had a duration of just 23 minutes of Penumbra only. The batteries Depth of discharge was 0.77Ah each and the battery recharge time was 23 minutes.

As the eclipse took place entirely outside ground station coverage, no direct monitoring of batteries behaviour during eclipse was possible. However all indications from on-board stored data (ECD and OBM) are that the behaviour was nominal.

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.

The preparation for the next eclipse season was carried out on 17/5/2005, this consisted of executing the procedure:

FCP_DHS_1232 Load OBM Entries for Eclipse Season.

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.

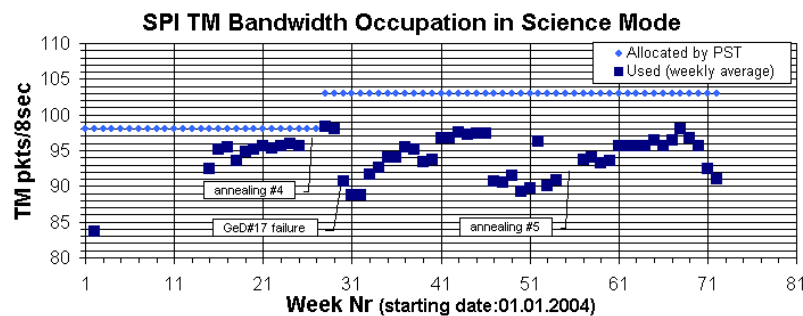
3.2 Payload

3.2.1 SPI

The overall status of the instrument in this week is nominal.

During the reporting period, the instrument has been kept in photon-by-photon mode, with spectra TM enabled, an assigned TM bandwidth in the science observation windows of 103 pkts/cycle and an actual occupation of 91 pkts/cycle average. The workaround to the TM leakage anomaly (INT_SC-107) has been resumed, since 11th April.

The Stirling compressors are working well, maintaining the detector cold-plate temperature within 85+/-1K.



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

3.2.2 IBIS

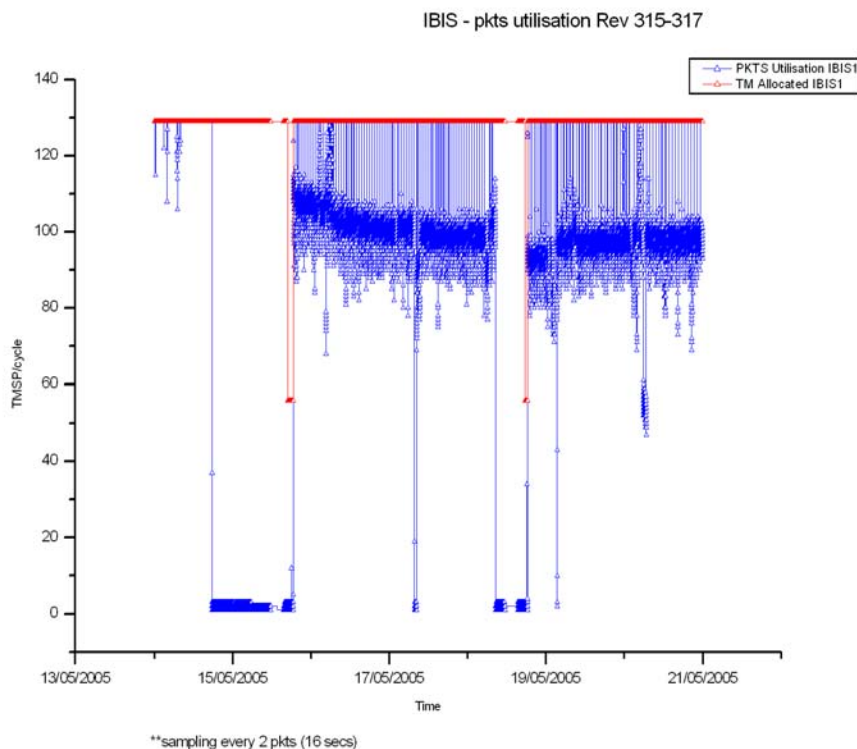
The Overall status of the unit is Nominal.

The week was characterised by moderate to high solar activity.

On DoY 138 (18/05/2005) the summer eclipse season started, no anomalous or unexpected behaviour was reported.

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 103.99 TMPS/cycle, up 3.05 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 and JEM-X2 was dormant (DFEE OFF) with a TM allocation of 1 packet/cycle.

On DoY 138 (18/05/2005) the summer eclipse season started, a failure of the JEMX-1 DFEE during the post eclipse reconfiguration necessitated a cold restart of the unit.

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.

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

During this reporting period, 134 pointings were executed nominally, 1 was truncated and 26 were lost due to high background radiation.

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

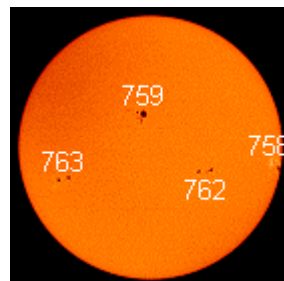
3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by moderate to high solar activity.

On the 13th of May, sunspot 759 unleashed a M8 solar flare, which reached Earth on the 14th (image: SOHO/MDI).



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 excellent this week, 177 slews were executed correctly, 1 was lost due to ground problems.

4.1 Mission Operations Centre

The performance of the MOC was excellent this week, with no pointings lost. There were minor problems with swap space, an error sending data to the consolidator, and connectivity problems around the ISDS, none of which impacted operations.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were minor problems with the links to Redu and DSS-16, and one problem with bitlock with Redu, which caused a pointing to be lost (it would have been ruined by high radiation anyway). The overall performance was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's for rev 325 has been received. Mission planning for revolutions 324 and 325 generated and sent to MOC. No ToO request was received. Revolution 325 is subject to iteration between MOC and ISOC since it includes an AOCS calibration that needs further optimisation. It will be finalised early next week. Revolution 324 was also resubmitted once due to change of the dither pattern change. The 5x5 dither pattern now is oriented to the instrument z-axes with inclination of 11.3 degrees. TSF for rev 317 (replanned) to 319 were received.

2. Observation status

ECS's for revolutions 300 up to 307 were received except rev 301. Corresponding OCS's were sent to ISDC. No extra time was credited.

3. ISOC science data archive

The development of ISDA version 2 is progressing according to plan. This was confirmed in an internal progress meeting. A planning for beta testing has been agreed. This will start on 23 May. A reassessment of the data volumes shows a significant increase due to the size of the revision 2 data. Therefore purchase of more disk memory is initiated.

4. ISOC system

The version 10.9.0 was installed this week. The main new features are a rewrite of the STARMAP tool in JAVA. There is also a change of the calls to the Flight Dynamics routines provided by MOC resulting in an improved performance and a better maintainability. An urgent SPR was also fixed resulting in a second release of Version 10.9.

5. Problems

none

4.3.2 ISDC

Status of ISDC observation processing on 23/05/2005:

- Latest Standard Analysis completed: observation 03200450032 (GRO J1655-40, Revolution 304) on 20/05/2005
- Latest products archived: observation 03200650012 (GRO J1655-40, Revolution 289) on 09/05/2005
- Latest observation products sent to the observer: observation 02297000013 (CAS A, Revolution 261-269) on 24/03/2005

5 Special Events

6 Anomalies

There were a number of problems that impacted the operations:

- On DoY 134, at 00:58, there were Reed-Solomon alarms, followed by 10 bad frames from Redu. There was no impact.
- At 06:01, an AOCS command failed release owing to a lack of bitlock from Redu. Subsequently at 06:05, difficulty was experienced acquiring AD mode using VC7. The Timeline was re-enabled at 06:39. The impact was the loss of pointing 03150043.
- At 23:38, the link ISDS-ISDC briefly disconnected, no action was taken, and there was no impact.
- On DoY 135, at 07:31, the TC K0008, JEMX-1 State SAFE failed release, as the unit was already in SAFE mode.
- On DoY 137, at 07:51, the IREM unit experienced another SEU. This caused OMC and IBIS to switch to SAFE mode. The OMC was recovered at 08:12, the IBIS at 08:35. The impact was the truncation of pointing 03160051.
- On DoY 138, at 06:03, the link MADDS-ISDS toggled between connected and TM flow, there was no impact.
- At 10:21, there was drop in VC7 TM from Redu, for a few seconds, there was no impact.
- At 10:22, there was an error sending data to the consolidator on VC7, no action was taken and there was no impact.
- From 10:56, to 10:58, the VC0 & VC7 links from DSS24 dropped, there was no impact.
- At 16:30, the JEMX-1 subsystem was disabled in the Autostack, as it was observed that the DFEE had crashed. See JEM-X section for details.
- On DoY 140, at 05:20, both imca application launchers had to be restarted owing to low swap space.

The following anomaly report was entered into the ARTS system.

AR id	Date Created	Subject	Segment	Status
INT_SC-118	17/05/2005	IREM Anomaly: Reset of IREM_CSCI S/W #23, 17/05/2005	Payload	Open
INT_SC-119	19/05/2005	JEM-X1 DFEE CRC anomaly during post-	Payload	Open

		eclipse reconfiguration		
INT-2734	17/05/2005	Disk failure on IMCB	IMCS	Closed

7 Future Milestones

The current Eclipse season started on 18th May.

Upgrade of the NCTRS (Network Controller and Telemetry Router System) for Integral to release 9.1.4. This will cure some known problems with the current release and is also compatible with TCP IP communications to ESA Stations as well as X25. The upgrade is currently planned to take place in May.

Upgrade of the IMCS, to use S2K release 3.1, a major update of the MCS is currently undergoing acceptance testing. A date for installation on the operational machines has not yet been decided.

Change of communication protocol to ESA Station from X25 to TCP IP, testing of this change will start in April. It will be used operationally only once testing is complete and the operational machines have been upgraded with the latest versions of the NCTRS and MCS.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 316

The observations in revolution 316 consisted of raster dithering observations of the point source 3C 454.3 (RA +22:53:57.7; DEC +16:08:54.0) lasting ~ 57.8.

Throughout these observations all instruments were in their nominal science modes, except JEM-X2, for which the DFEE was off, and on the day 17/05/05 when an IREM SEU forced IBIS and OMC in safe condition at the following times:

OMC in Safe Mode from 07:50z until 08:12z;
IBIS in Safe condition from 07:50z until 08:35z.

TM allocation was IBIS 129; SPI 103; JEM-X1 8; JEM-X2 1; OMC 5.

Revolution 317

The observations in revolution 317 started with a GPS lasting ~6.7 hours and ended with raster dithering observations of the Coma Cluster (RA +12:59:48.7 ; DEC +27:58:50.0) lasting ~50 hours.

Throughout these observations all instruments were in their nominal science modes, except JEM-X1 that, due to DFEE CRC anomaly occurred during the post-eclipse reconfiguration, requested to perform a DFEE power cycle in order to reconfigure correctly the unit. The re-configuration of the unit lasted from 16:21z until 20:09z. JEM-X2 DFEE remained off along the entire 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

2005-04-30T17:20:08.000Z	161.6165	F	Automatic TM processing.
2005-05-01T02:16:49.000Z	161.5859	F	Automatic TM processing.
2005-05-03T17:10:09.000Z	161.5719	F	Automatic TM processing.
2005-05-04T12:40:03.000Z	161.5507	F	Automatic TM processing.
2005-05-08T03:44:36.000Z	161.5369	F	Automatic TM processing.
2005-05-09T16:50:00.000Z	161.5324	F	Automatic TM processing.
2005-05-10T06:58:17.000Z	161.4991	F	Automatic TM processing.
2005-05-12T16:35:59.000Z	161.4919	F	Automatic TM processing.
2005-05-13T04:51:13.000Z	161.4585	F	Automatic TM processing.
2005-05-13T12:33:45.000Z	161.4293	F	Automatic TM processing.
2005-05-15T16:36:23.000Z	161.4119	F	Automatic TM processing.
2005-05-17T02:33:14.000Z	161.3856	F	Automatic TM processing.
2005-05-18T10:13:17.000Z	161.3663	F	Automatic TM processing.
2005-05-18T16:53:58.000Z	161.3551	F	Automatic TM processing.
2005-05-19T01:23:35.000Z	161.3161	F	Automatic TM processing.

This report was generated Fri May 20 08:00:28 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, 14/05/2005 - 20/05/2005

AOCS operations were executed from the Automatic Timeline.

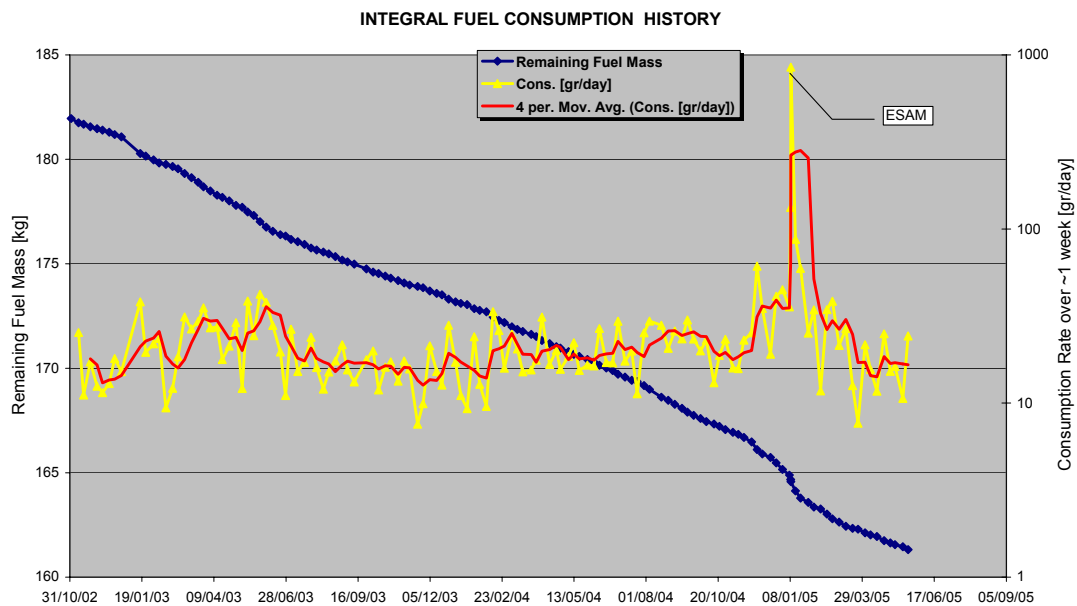
During this period, 65 Open Loop Slews, 112 Closed Loop Slews and 5 Momentum Bias were executed. 1 slew was missed due to a problem with REDU station. This is equivalent to a ~0.5 %.

The AOCS eclipse operations were nominal. For the first eclipse passage, 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														Summer 2005	
Date	LOS	AOS	ACC Eclipse Imminent	Eclipse Start						Eclipse End				Eclipse Duration	
				ACC	FDE	FCE	Penumbra	FSS Sun Out	Umbra	Umbra	FSS Sun In	Penumbra	FDE/FCE		ACC
2005-05-18	11:36:00	15:29:00	10:43:59	11:26:02	11:35:53	11:36:37	11:43:39	11:51:24	11:43:39	12:06:40	11:59:31	12:06:40	12:11:17	12:16:25	0:23:01

IMU Usage during Eclipse Season					Summer 2005	
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]		
2005-05-18 08:39:40	2005-05-18 12:18:40	0.1997	0.1579	0.1430	3:39:00	3:39:00

The fuel consumption over the period between 01/11/2002 and 19/05/2005 is reported in the plot below.



14/05/05 (Day of Year 134, Revolution 315)

Slew missed from the Timeline: Due to a problem on REDU station (no on-board bit lock), the slew ID 03150043(OSL) was not executed and the AOCS s/s disabled in TL at 06:01z. A manual recovery was then performed to the attitude of PID 03150043. The next slew (CSL) for PID 03150044 was manually updated and executed from the Timeline. The AOCS s/s was re-enabled in TL at 06:39z.

15/05/05 (Day of Year 135, Revolution 315-316)

Loading of the Eclipse Season AMD thresholds: In preparation of the summer eclipse season (according to FCP_AOC_0524) and with the start of the first eclipse revolution of the season, the on-board AMD thresholds were set to their eclipse season values:

Thresholds from INT-MA-AI-0001, 5.3.2.4.2.2, and INT-PR-MMB-0005 page 5-9, modified as per new AMD Threshold agreement for the eclipse season.

01- Update of thresholds after uplink of new RW Inertias on 22/01/2004. 0155_0001_M.RWI

Wheel Inertia:

RW#1:	0.096000	Kgm**2
RW#2:	0.097650	Kgm**2
RW#3:	0.097272	Kgm**2
RW#4:	0.097649	Kgm**2

Eclipse Season:

	Subset 1		Subset 2	
WSMAX	39.5	Nms	35.9	Nms
WSMIN	1.2	Nms	4.8	Nms

WSMAX	To Uplink:		In rpm:			
	X1	X2	X1	X2		
RW#1:	411.458333	rd/s	373.958333	rd/s	3929	3571
RW#2:	404.507960	rd/s	367.641411	rd/s	3863	3511
RW#3:	406.078637	rd/s	369.068939	rd/s	3878	3524
RW#4:	404.508374	rd/s	367.641788	rd/s	3863	3511

WSMIN	To Uplink:		In rpm:			
	X1	X2	X1	X2		
RW#1:	12.500000	rd/s	50.000000	rd/s	119	477
RW#2:	12.288849	rd/s	49.155398	rd/s	117	469
RW#3:	12.336566	rd/s	49.346265	rd/s	118	471
RW#4:	12.288862	rd/s	49.155448	rd/s	117	469

The uplink was performed at 11:12z.

In the same time frame were verified the AMD dead band value, the IMU timers, the load of the TT sequence to re-enable the IMU Auto Switch-Off function in the ACC and the Eclipse ACC\FDE\FCE timers.

16/05/05 (Day of Year 136, Revolution 316)

Nothing to report.

17/05/05 (Day of Year 137, Revolution 316)

Nothing to report.

18/05/05 (Day of Year 138, Revolution 316-317)

Guide star released by the STR SEU Filter: At 15:56:14z, the SEU Filter threshold of the ACC was exceeded and the guide star released. The magnitude 5.5 guide star was located at CCD coordinates [9367, 17219]. A new guide star was found in the first automatic mapping, which was kept afterwards.

19/05/05 (Day of Year 139, Revolution 317)

Nothing to report.

20/05/05 (Day of Year 140, Revolution 317)

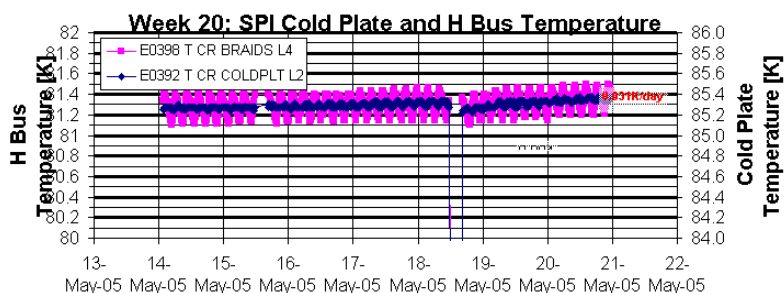
Nothing to report.

8.3.2 SPI Operations

Stirling compressors and Cryostat:

The performance of the compressors is nominal. The cold plate temperature was maintained at 85K+/-1K over the reporting period, showing the expected positive drift.

The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period (due to problems in the TM retrieval tool, the plot is affected by large gaps).



DPE & IASW:

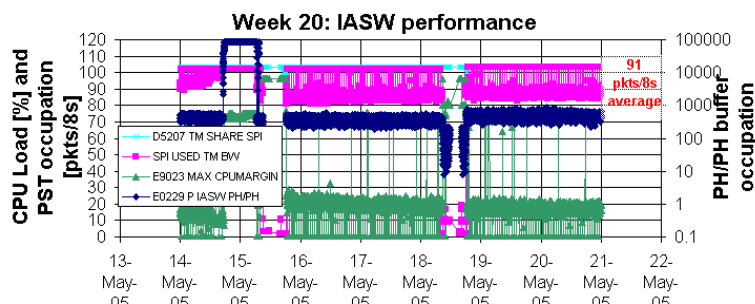
The IASW performance is nominal. The PST TM bandwidth allocation was 103 pkts/cycle in the science windows; the actual TM bandwidth usage is: 102-103 pkts/cycle peak (1 pkt/cycle is sometimes unused due to TM leakage problem, see after);

91 pkts/cycle average in science mode.

The temporary workaround to the TM leakage anomaly (AR INT_SC-107), applied at every revolution, has been resumed since 11th April.

A software patch to fix both the TM leakage malfunction and the missed belts entry ACS HV switch off malfunction (INT_SC-115) is ready: however due to an anomaly in the DPE used for ground testing, validation of the patch is on-hold.

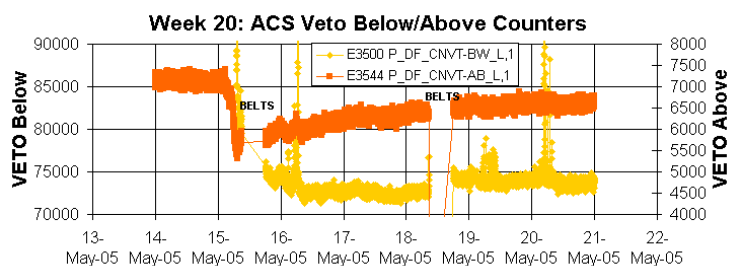
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS:

The performance of the ACS is nominal.

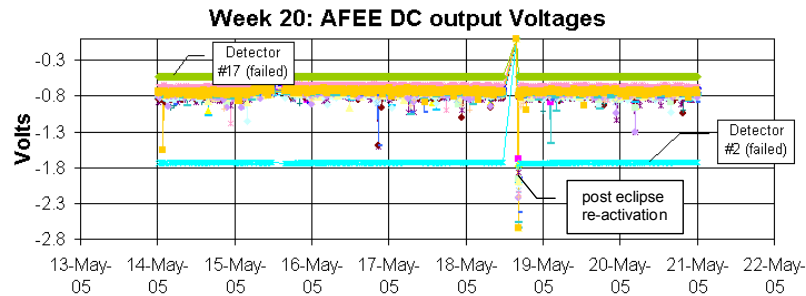
The following plot shows the ACS overall count rate evolution during the reporting period.



AFEE and Germanium Detectors:

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.

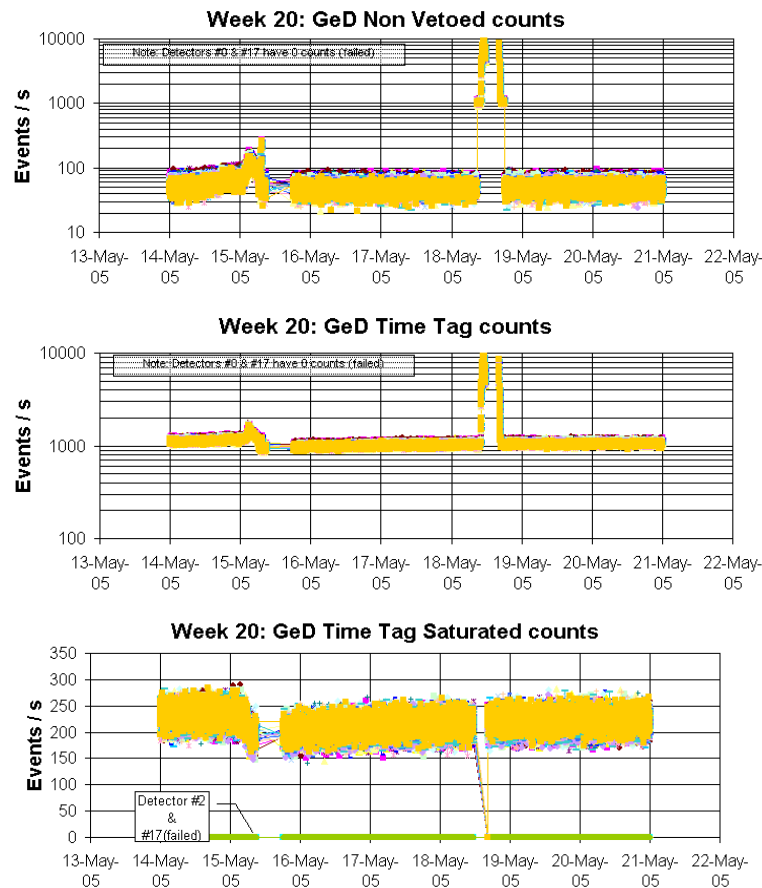
The following plot shows the AFEE dc output signals during the reporting period (due to problems in the TM retrieval tool, the plot is affected by large gaps).



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.

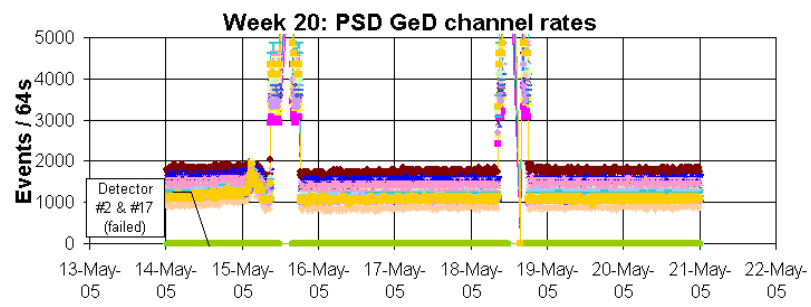


PSD:

The performance of the unit is nominal.

Following the execution of OCR#191 (PSD input channels #2 and #17 disable), the channel rates blocking malfunction did not appear again. It was therefore decided to keep this setting.

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



8.3.3 IBIS Operations

IBIS Events Counters Plots.

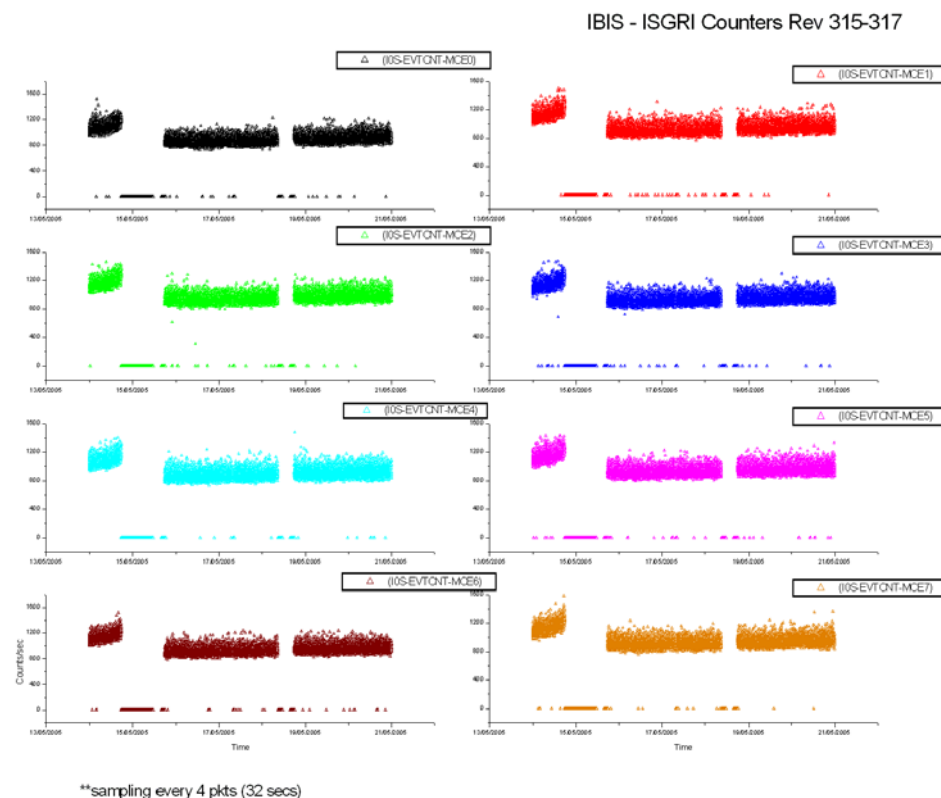
The week was characterised by moderate to high solar activity.

On the 14th and 15th of May, the radiation environment was high due to an M8-solar flare. Consequently, both ISGRI and VETO reported high radiations until they switched to Safe configuration because the high radiation automatism was triggered when IBIS/IREM thresholds were crossed. PICsIT reported high radiation during the whole solar flare since it is not affected by the IREM reaction automatism. In addition it reported a spike of activity on the 15th of May revealing a spike of radiation.

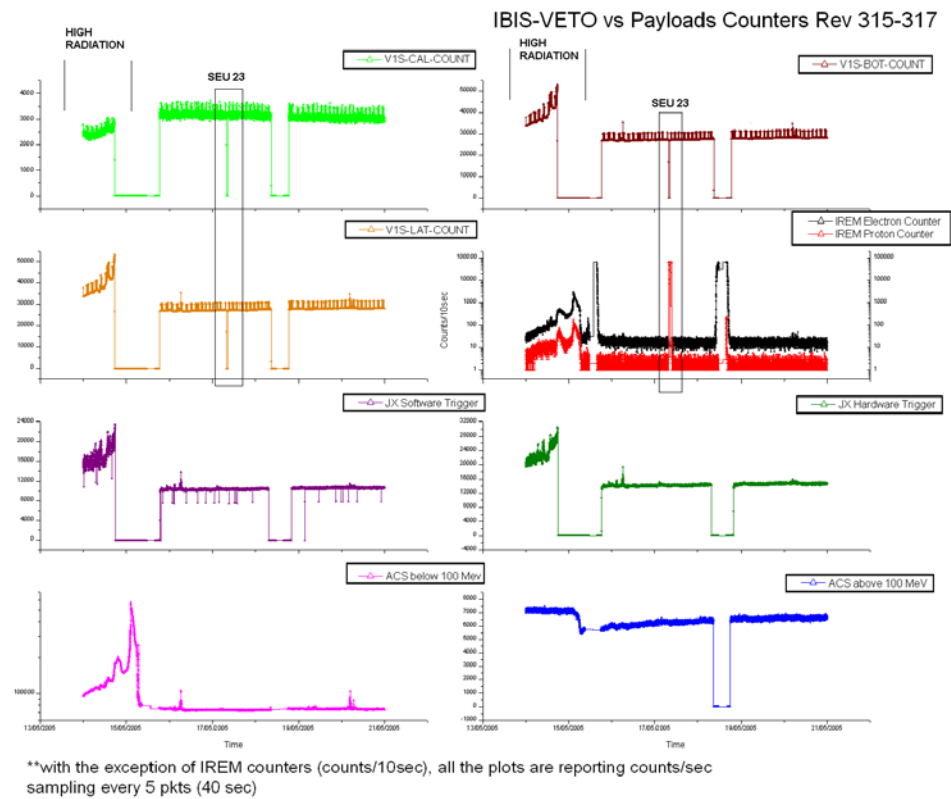
On DoY 2005.137 (17/05/2005) at 07:50Z, IREM S/W reset (SEU #23) occurred. Consequently IBIS radiation automatism was triggered and while VETO counters turned to 0, PICsIT reported a high radiation spike.

During belts passage from revolution 315 to 316, on the 18th of May, the first eclipse of the summer eclipse season occurred.

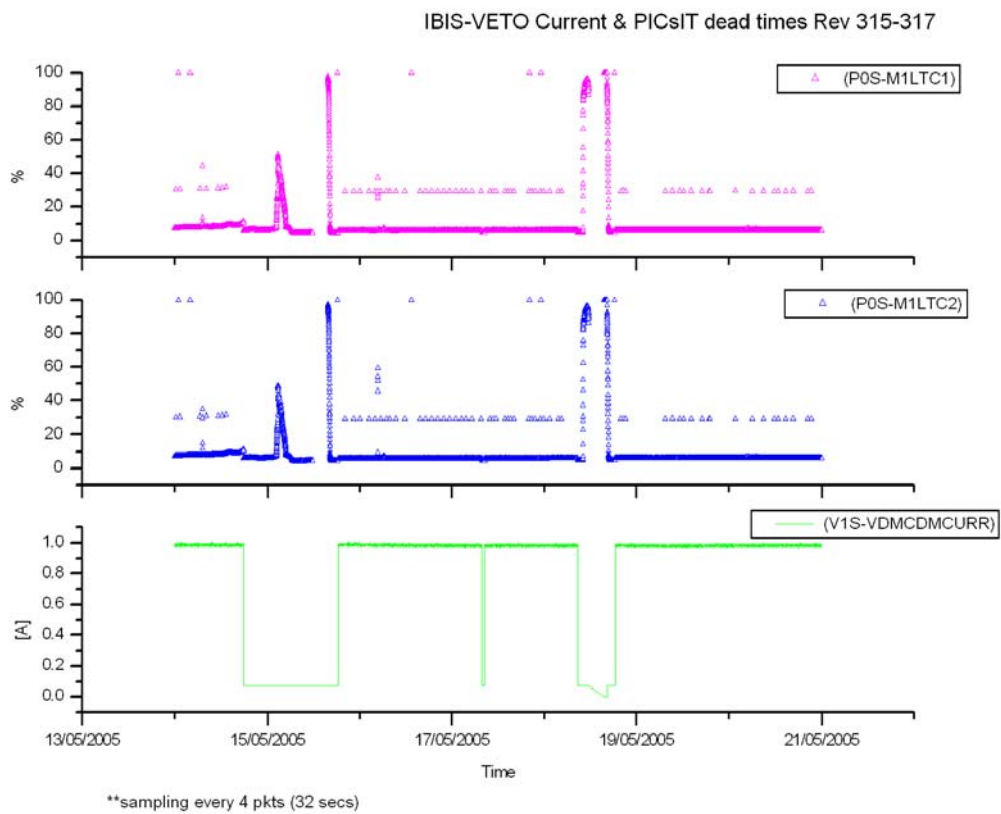
ISGRI Counters:



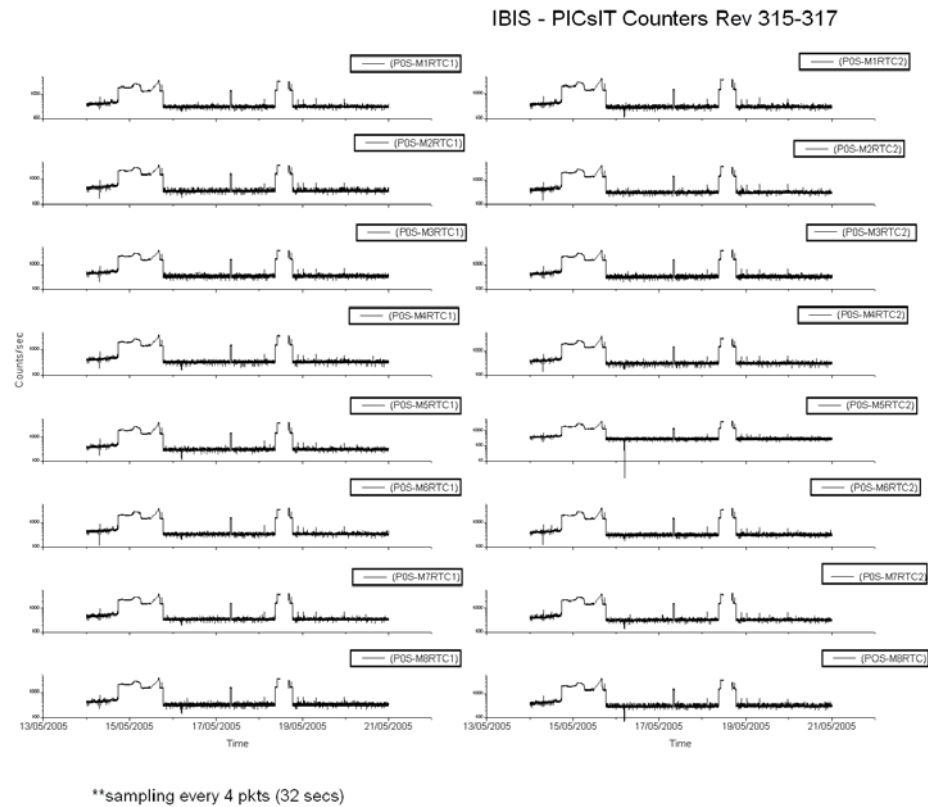
VETO vs Payloads Counters:



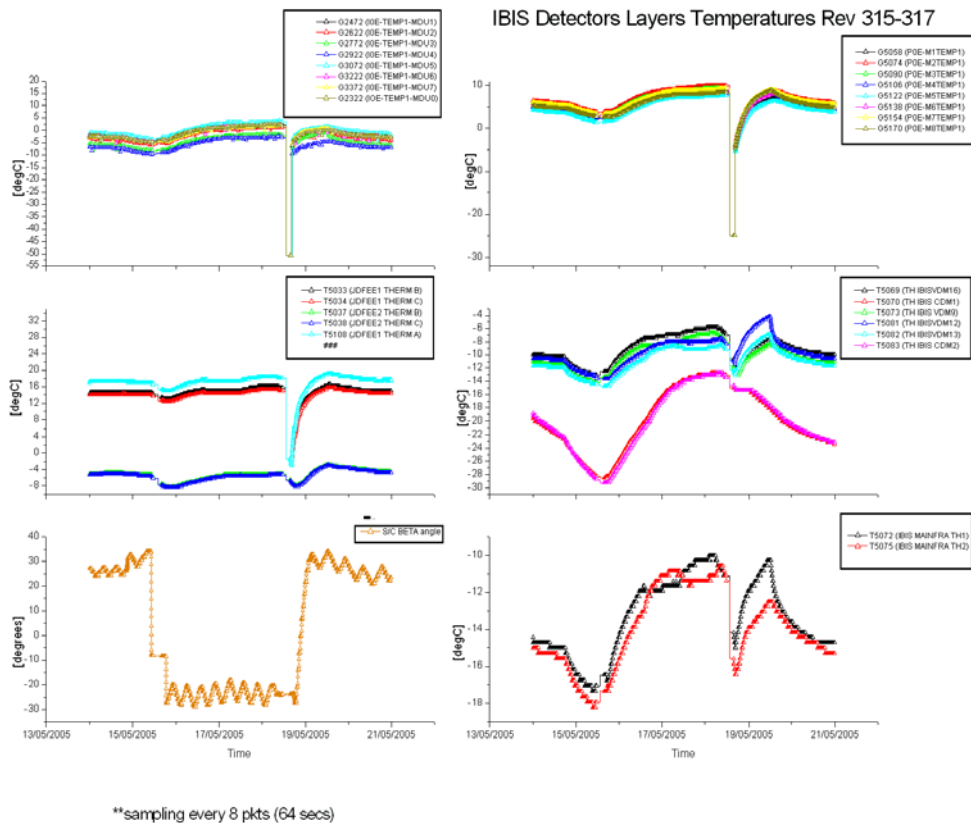
Veto Current:



Picsit Counters:



IBIS Detectors Layer Temperatures:



IBIS daily report

DoY 2005.134 (14/05/2005)

As reported in previous weekly report, from 2005.133.21.57Z, TM G6061 ("VIS-CAL-COUNT": VETO calibration counter) has been reported Out of Limit "low-low". The radiation background was high (M8-solar flare) but the IBIS/IREM thresholds not yet exceeded. The reason of this OOL is due to a known problem of the VETO CDM01 FEE not able to follow high count-rates.

G6061 was hence monitored until IBIS entered Safe mode automatically when IREM thresholds were crossed on 2005.134.17.48Z.

Because of the solar flare, G6062 and G6063 (VIS-BOT-COUNT and VIS-LAT-COUNT) were reported OOL "high" at 17:34Z just before IBIS switched to Stand-By automatically when IREM thresholds were crossed at 17:48Z.

At 07:06Z TM parameters of G5068 and G5072 families were reported out of limit for only one cycle. Following reaction P-FIF-1, no action was taken.

Starting at 13:15Z, every hour TM G8080 (S1E_VS HBRA_RT) was reported OOL for 5 times. This happened during the solar flare, and following reaction H-OVF-2, no action was taken.

At 17:43Z TM parameter G8015 (S1E-A2 PMT V) went out of limit 'high' with the value of 29.4V (limit value). It went back inside limit at 18:22Z the next day. As this happened in high radiation background (close to the radiation belts and during the solar flare), according to V-VLT-1 no action was taken.

DoY 2005.135 (15/05/2005)

IBIS stayed into Safe configuration (due to Solar flare) until the belt passage from revolution 315 to 316. It was reconfigured nominally after the belt exit on 2005.135. Starting at 15:50Z and for about half an hour. TM parameters G5008, G5018, G5033, G5038 (P0S-MiRTC2, i=2, 4, 7 and 8) and TM G5022 (P0S-M5RTC1) toggled OOL "High". According to P-CNT-1, as this happened in Radiation Belts, no action was taken.

DoY 2005.136 (16/05/2005)

At 04:43Z, TM family G5068 and G5072 failed SCC. According to P-FIF-1, no action was taken.

At 04:44Z TM G5023 went OOL "low-low". As this OOL lasted only for one cycle, according to P-CNT-1, no action was taken.

DoY 2005.137 (17/05/2005)

At 07:51Z an IREM SW failure (SEU #23) forced IBIS to Stand-by mode. Following procedure FCP_IBIS1_0803, IBIS exited this Safe configuration and went back to Scientific Standard mode at 08:35Z.

At 07:51Z TM parameter G8015 (S1E-A2 PMT V) went out of limit 'high' with the value of 29.4V (limit value). It went back inside limit at 08:28Z. As this happened in “fake” high radiation background (due to IREM S/W reset), no action was taken.

DoY 2005.138 (18/05/2005)

At 08:42Z TM parameter G8015 (S1E-A2 PMT V) went out of limit 'high' with the value of 29.4V (limit value). It went back inside limit at 15:29Z (AOS_TM after eclipse). It then went back OOL again after IBIS reconfiguration (from ED GECLEX02) and until the belt exit time (18:28Z).

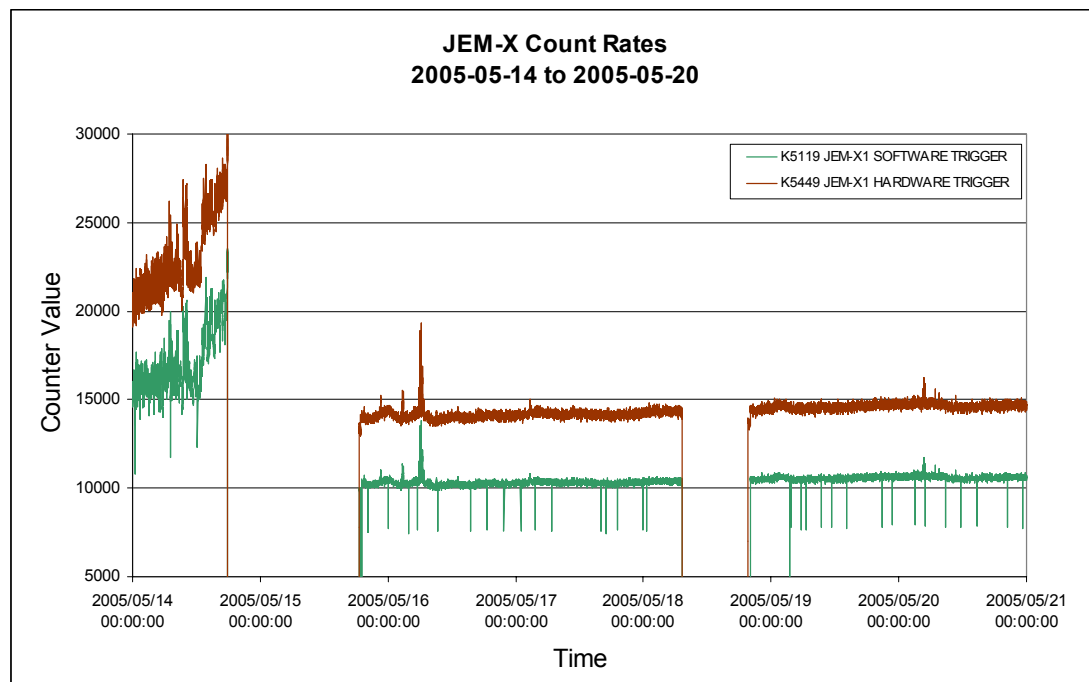
As this happened close to the radiation belts, according to V-VLT-1 no action was taken.

The first eclipse of the summer season 2005 started on this day, the peripheral context tables were correctly saved by the on-board automatism and the reconfiguration of the unit post-eclipse was nominal. The temperatures of the peripherals after Eclipse did not show any anomalous or unexpected behaviour. The uplink of the VETO patch was executed via ED GEVESP01 at 16:27Z.

8.3.4 JEM-X Operations

8.3.4.1 JEM-X Count Rates

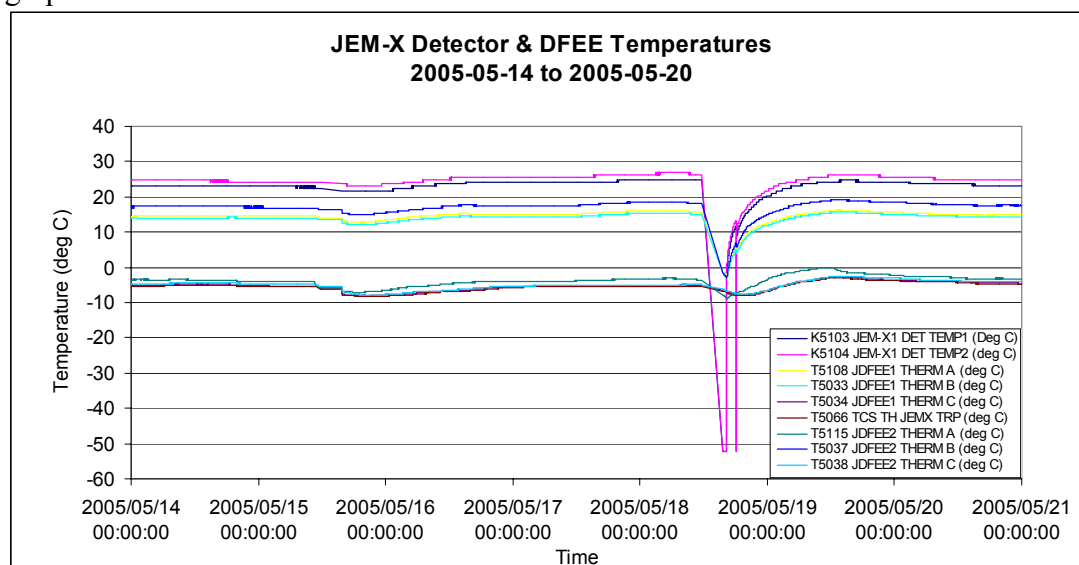
JEM-X count rates over the reporting period are displayed in the following graph¹.



8.3.4.2 JEM-X Temperatures

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

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

2005-05-14 (DoY 134, Rev 315)

Due to a solar flare the following out of limits were observed:

At 06:29, K5317 (RAD MONITOR 3) went OOL High High

At 10:04, K5119 (Software Trigger) went OOL High, about every 30 seconds

At 11:03, K5317 (RAD MONITOR 3) went OOL High High '85'

At 11:31, K5315 (RAD MONITOR 1) went OOL High High '23'

At 13:41, K5119 (Software Trigger) went OOL High High '20303'

At 17:56, the OEM JEMX-1 Prob DFEE 9 (to Safe) was received. The procedure CRP-JEM1_0002 was executed to set the unit to SAFE mode.

2005-05-15 (DoY 135, Rev 315)

At 07:31, the TC K0008, State SAFE fails release, as the unit was already in SAFE mode.

2005-05-16 (DoY 136, Rev 316)

At 06:21 to 06:22, the TM parameter K5317 Rad Monitor 3, went OOL High High with a value of 67.

2005-05-18 (DoY 138, Rev 317)

A DFEE anomaly similar to that seen on the 08/12/2004 was observed. A summary follows:

The following OEMs were received at 16:21:24z

191 JEM-X1 PROB DFEE 11

--> unsuccessful load of the Context due to CRC failure

² Data sampled (1 frame in 8)

234 JEM-X1 AUTO EVENT 4 --> failure of the automatic recovery from shutdown level Eclipse to Rad Belts

Following the post eclipse reactivation the JEM-X1 DFEE status remained in MEMORY, instead of SAFE, the active shutdown level remained ECLIPSE, instead of RAD BELTS and the DFEE CPU speed remained at 8 MHZ, instead reaching the nominal value of 16 MHZ.

As foreseen by the recovery procedure the following actions were taken:

- 1) DFEE memory dump (start address=9000 Hex; length of mem= 4C00 Hex) FCP_JEM1_0051 at 17:21z
- 2) DFEE deactivation FCP_JEM1_9010 at 18:06z
- 3) DFEE activation FCP_JEM1_0021 at 18:15z
- 4) Anode Calibration FCP_JEM1_1010 at 19:12z
- 5) Configuration for Science Operations FCP_JEM1_1010, taking into account the new reduced value for the HV (as per OR 204) at 19:34z
- 6) Transition to Data Taking at 20:09z
- 7) JEMX1 enabled in timeline at 20:15z

8.3.5 OMC Operations

2005-05-14 (DoY 134, Rev 315)

At 06:01, a commanding problem would have caused the loss of pointing 03150043, but it was lost anyway due to the following....

At 06:23:56, due to high background radiation OMC was switched to SAFE mode, which stayed high for the remained of the revolution. The unit was switched back into Stand-by manually at the nominal time for the start of the next revolution on DoY 135 at 18:18:20, and was again in Science mode at 18:40:19. The impact was the loss of pointings 03150043 through to 03150068

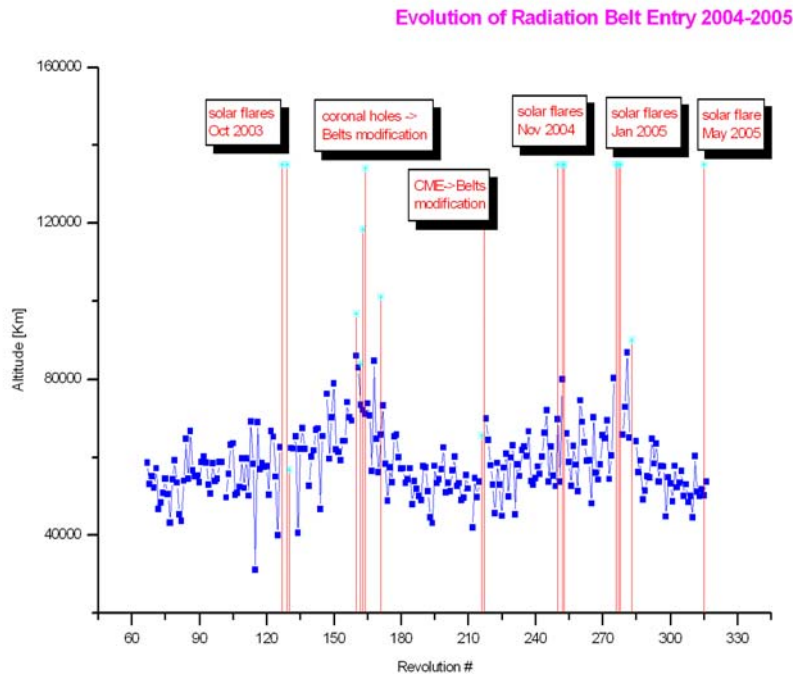
2005-05-17 (DoY 137, Rev 316)

At 07:51:09, there was an IREM SEU (No. 23). This caused OMC to switch immediately to SAFE mode during pointing 03160051. The unit was recovered to Stand-by at 08:10:20, and was again in SCIENCE mode at 08:20:29. The impact was pointing 03160051 was cut short from a planned duration of 2667 to 1025 seconds.

On DoY 138 at 08:42:23, OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

DoY 2005.137 (17/05/05)

Reported at 07:50Z the local reset of the IREM CSCI S/W (SEU #23): as in the past (see anomalies on 16/12/02, 01/01/03, 03/06/03, 11/07/03, 19/07/03, 05/08/03, 24/08/03, 26/12/03, 13/05/04, 16/05/04, 09/06/04, 12/06/04, 10/09/04, 14/09/04, 28/10/04, 06/11/04, 01/12/04, 11/12/04, 30/01/05, 11/02/05, 04/03/05, 11/05/05) the status of the unit, before the occurrence of the anomaly, was nominal, here is the summary:

- 1) temperatures nominal
- 2) LCL current nominal
- 3) last HK before the anomaly HV, 5V and 6V voltages inside limits
- 4) the anomaly occurred at 2005.137.07.50.54Z at 147832.0 km and the unit performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex); just before the anomaly, radiation counters reported nominal values considering the position of the S/C along the orbit
- 5) the recovery of the unit started at 07:54Z using procedure CRP_SYS_2570. The first dump of the status word after the anomaly shown a value of BCC0 HEX = 48320 DEC = 1011110011000000, ie. still the unit was reporting the status as if it was in Integral mode with counting ON, accumulation ON and checksum failure flag ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.

6) dumping all registers bank give a status word BC80 HEX = 48256 DEC = 1011110010000000, ie. the unit is still reporting the status as if it was in Integral mode but the checksum failure flag is now OFF and the checksum counter in the register number 3 incremented of 1 unit.

7) The patch was performed successfully with the correct re-starting of the S/W. The operation was completed at 10:06Z.

The IREM automatic transition to Standard Mode did affect the instruments since it forced them to automatically enter Safe configuration, except for SPI and JEM-X whose automatism are disabled according to PIs request.

The recovery of the payloads was performed as follows:

IBIS re-enabled at 08:35Z

OMC re-enabled at 08:12Z

The cause of this S/W reset is still under investigation, but it is apparently due to the unit's memory device that is sensitive to ionising radiation.

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]
315	RAD_ENTR R 2005-05-15T08:54:41Z	2005-05-15 10:08:32	50253.5	2005-05-15 09:43:25	53571
316	RAD_EXIT R 2005-05-15T18:09:30Z	2005-05-15 16:37:28	>24920.8	2005-05-15 17:03:25	29718
316	RAD_ENTR R 2005-05-18T08:42:05Z	2005-05-18 09:29:44	53750.2	2005-05-18 09:35:42	52900
317	RAD_EXIT R 2005-05-18T17:56:58Z	2005-05-18 17:04:24	>31372.1	2005-05-18 16:45:42	28901

Reference

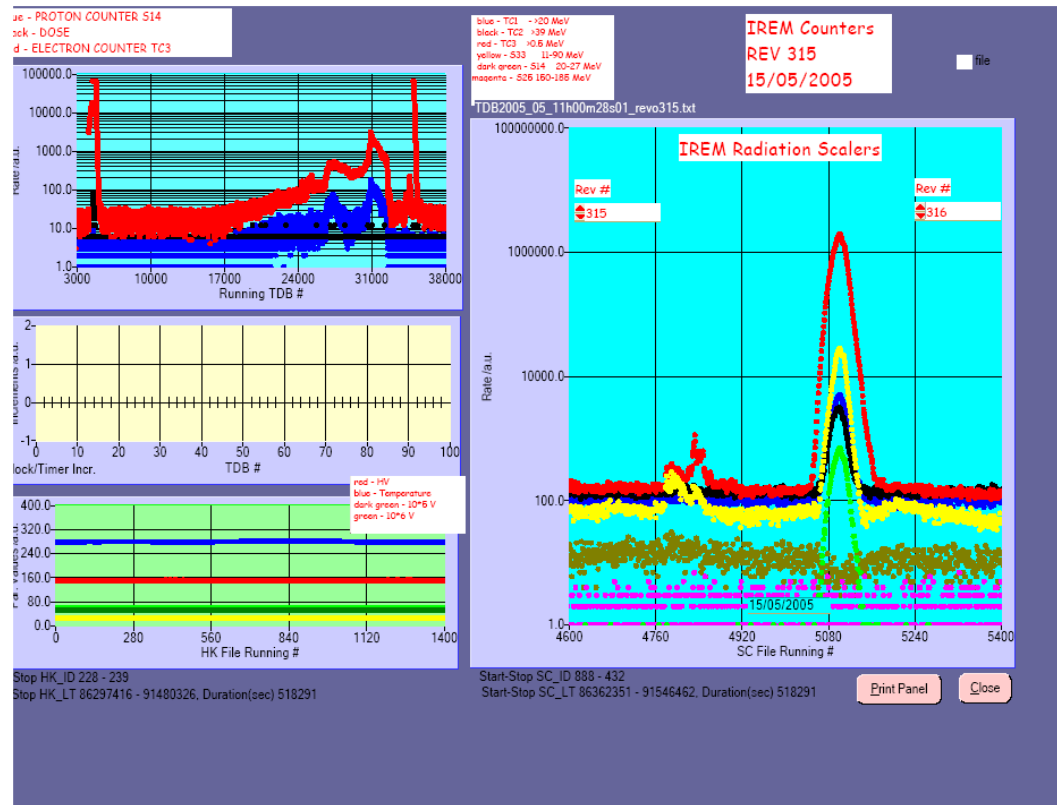
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

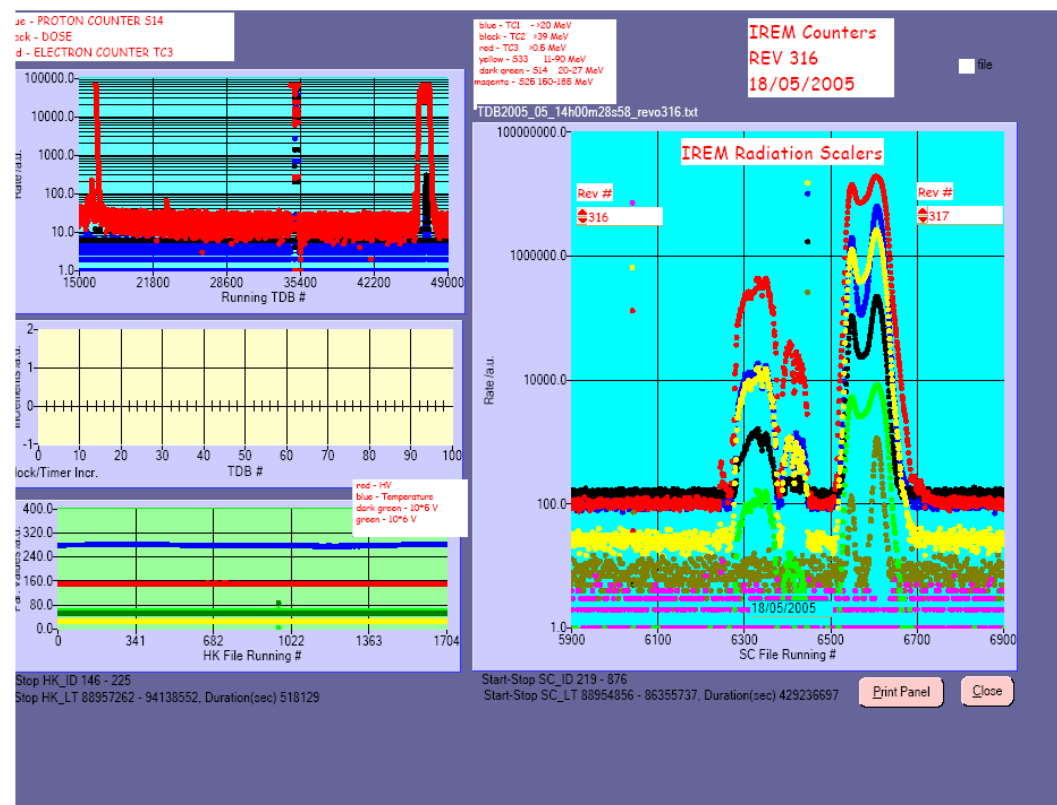
Large error vs reference (more than 30 minutes)

Radiation Spike

IREM radiation counters:

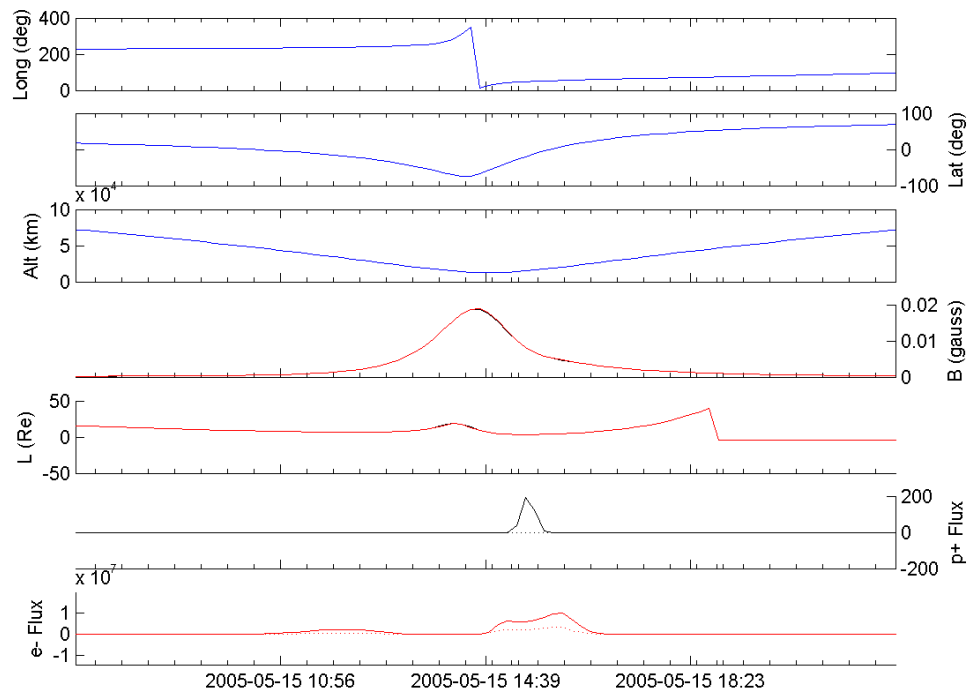


During revolution 315, an M8-solar flare occurred that affected the shape of the radiation belts.



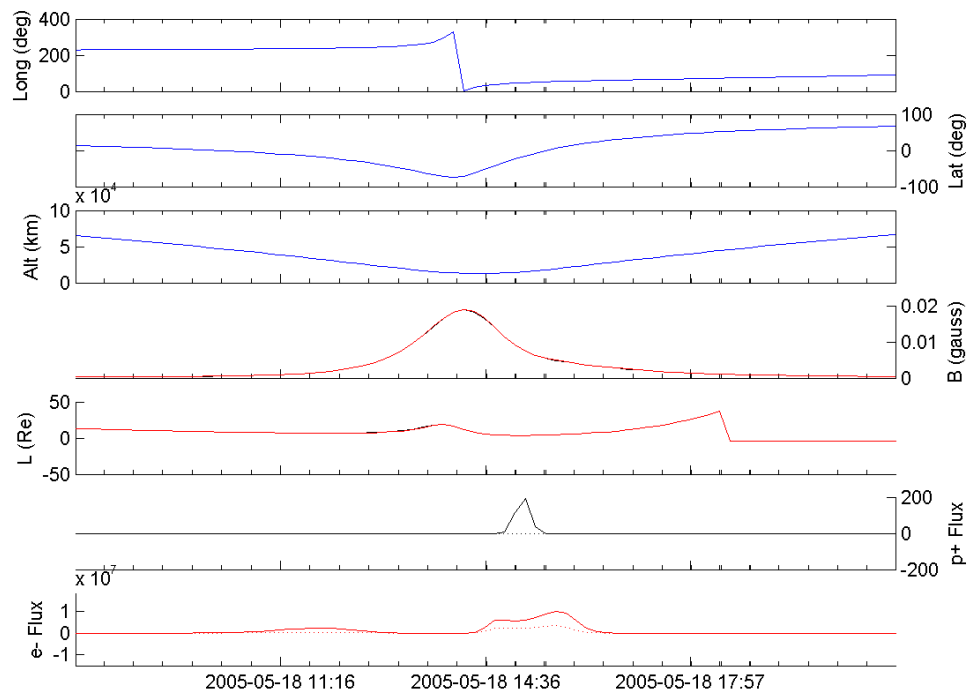
Due to the high radiation during the previous revolution, the radiation belts shape has been modified. During revolution 316, SEU # 23 is reported by IREM counters.

IREM Predicted Radiation Belt Passages:
Rev 315

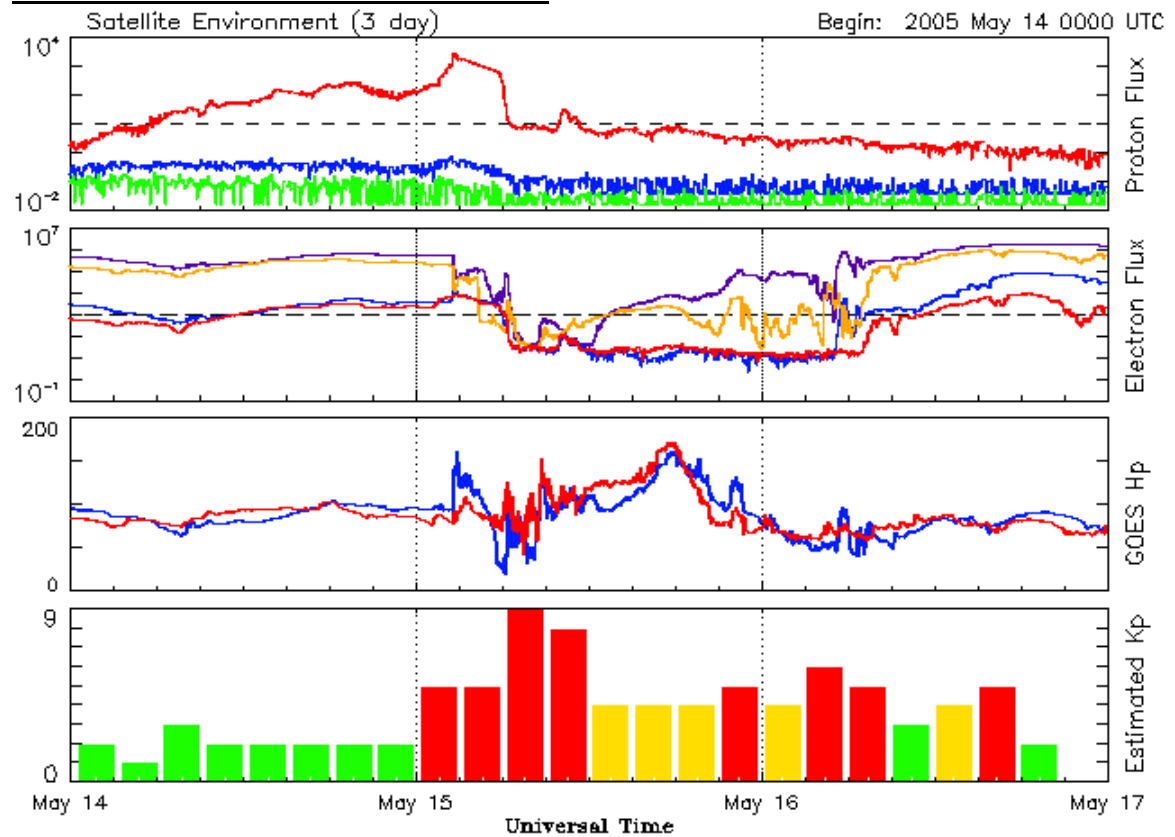


432.dll 156 KB

Rev 316

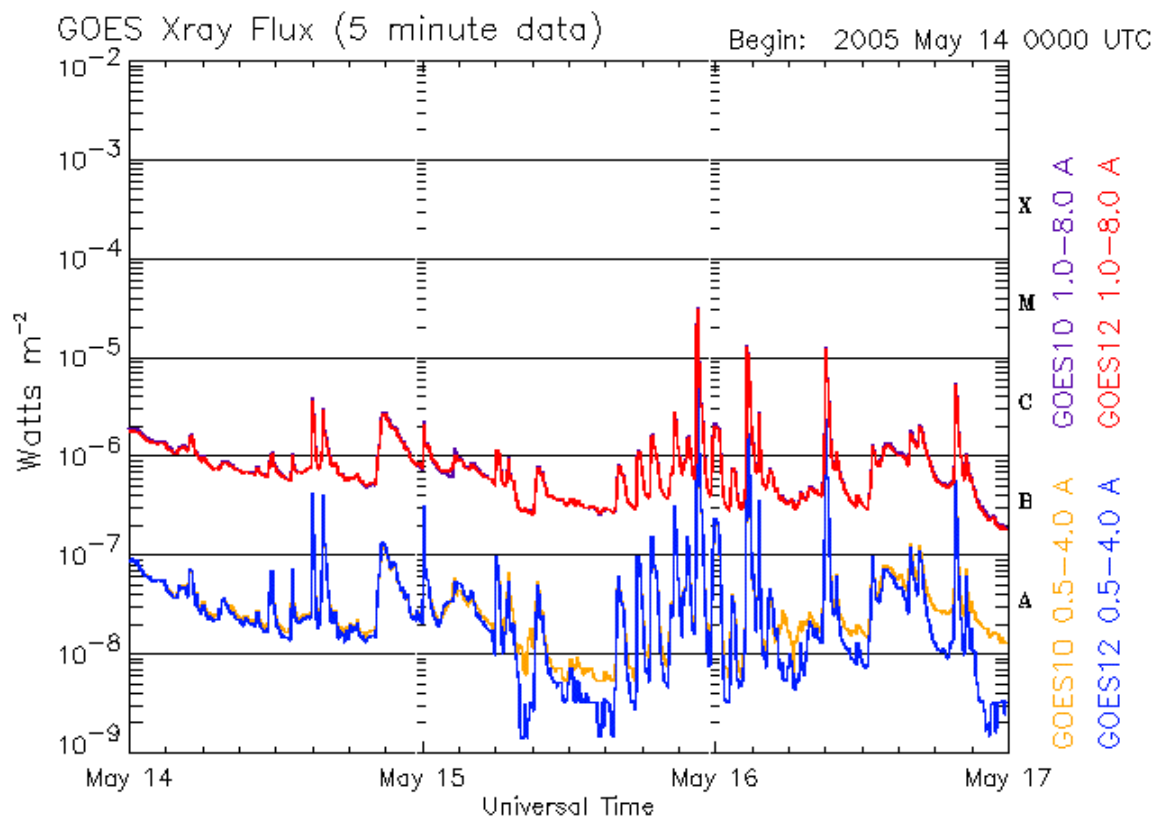


SEC-GOES Observed Particles Fluxes:



Updated 2005 May 16 23:56:12 UTC

NOAA/SEC Boulder, CO USA



Updated 2005 May 16 23:56:03 UTC

NOAA/SEC Boulder, CO USA

