

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 089
Week 23
07.06.04
Routine Phase

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LIST OF CONTENTS

1	General.....	3
2	Summary of Activities.....	3
3	Satellite Status.....	3
3.1	Platform	3
3.1.1	AOCS	3
3.1.2	Power	4
3.1.3	Thermal.....	4
3.1.4	OBDH.....	4
3.1.5	RFS	4
3.2	Payload	4
3.2.1	SPI	4
3.2.2	IBIS	5
3.2.3	JEM-X	5
3.2.4	OMC.....	5
3.2.5	IREM	6
4	Ground Facilities.....	6
4.1	Mission Operations Centre.....	6
4.2	Ground Stations & Network.....	6
4.3	Science Ground Segment.....	6
4.3.1	ISOC	6
4.3.2	ISDC.....	7
5	Special Events.....	7
6	Anomalies.....	8
7	Future Milestones	9
8	Appendix.....	10
8.1	Overview of Revolutions	10
8.2	Consumables	10
8.2.1	Detailed Fuel Book-keeping.....	10
8.3	Detailed Satellite Information	10
8.3.1	AOCS Operations	11
8.3.2	SPI Operations.....	14
8.3.3	IBIS Operations.....	16
8.3.4	JEM-X Operations.....	21
8.3.5	OMC Operations	23
8.3.6	IREM Operations	24

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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 29.05.04 until 04.06.04 (both dates inclusive) and covers the revolutions 198 & 199.

2 Summary of Activities

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

The target of these revolutions was Carina (RA 10:36:31.39; DEC -58:21:54.7). The activities consisted of 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 periodic AOCS calibrations and in preparation for the eclipse season, a calibration and health check of all four IMUs was performed on 01/06/2004, along with the health check of RMU-B. The ACC IMU drift corrections were uplinked on 02/06/2004. Moreover, the onboard AMD thresholds were set to their eclipse season values on 03/06/2004, during the first eclipse revolution of the season.

A few slews were missed from the Timeline during this period:

- Two slews were missed in revolution 198 due to problems with establishing the links after station handover to Goldstone.
- One more slew was missed in revolution 199 due to problems with establishing the links after station handover to Goldstone.
- One slew was missed in revolution 200 probably due to a communication problem between the TMP and TCE at Redu.

The fuel consumption over the period between 28/05/2004 and 04/06/2004 was 0.121 kg. The remaining propellant is in the order of 170.299 Kg on the 4th of June.

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

3.1.2 Power

The power subsystem is working as specified. The available power from the arrays is in the order of **2100W**.

Preparation for the next eclipse season was carried out on 4/6/2004, 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.

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.

Preparation for the next eclipse season was carried out on 4/6/2004, this consisted of:

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 is nominal.

During the reporting period the instrument was in photon-by-photon mode with spectra TM enabled, an assigned TM bandwidth in the science windows of 98

pkts/cycle and an actual average occupation of 95.7 pkts/cycle (+0.4 pkts w.r.t. previous week).

The 4th annealing of the Germanium detectors has been decided to start on 17th June at rev. 204 critical altitude descending crossing. A summary timeline is published in this report, under the future activities section.

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.

During the reporting period the PST Allocation to IBIS was 134TMSP / Cycle
The mean IBIS BW usage was 107.08 TMSP / Cycle (previous week was 105.96).

Reported on DoY 154.09.59.39 Z a major failure on the IDPE1 (halt of the IASW) that caused the lost of control of the peripherals just entering inside the radiation Belts. The hazardous condition was recovered by the direct power off of the IBIS peripherals. The recovery of the unit was successfully performed in the following day (155).

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 was dormant with a TM allocation of 1 packet/cycle.

Further information on the JEM-X operations can be found in the Appendix Section 8.3.4.

3.2.4 OMC

The status of OMC is nominal.

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

There were 139 OMC pointings executed nominally, 1 was partially and 3 totally lost.

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

3.2.5 IREM

The overall status of the unit is Nominal.

The observation period was characterised by low solar activity.

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

4 Ground Facilities

The performance of the Operational ground facilities was in general good this week, well above the system performance requirements.

4.1 Mission Operations Centre

The performance of the MOC was in general good in the reporting period, there were a few minor problems: communication problems with the isds and low swap space effects that were easily resolved.

4.2 Ground Stations & Network

The performance of the ground stations and Network was in general good this week with 3 exceptions: Poor communications with DSS-16 on two occasions caused the loss of a total of 3 pointings, and a problem at Redu caused the loss of one more. The performance though was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's: Received up to rev. 209

POS and POD generated: up to rev 206 (no change)

TSF's: Received up to rev 202

No ToO request received and no replanning performed

2. Observation status

ECS for revolution up to 185 received except 168 which is still pending.

3. ISOC science archive

Nothing to report this week

4. ISOC system

The ISOC system version 10.4.1 is still operational. No problems encountered.

5. Problems

The Vacancy Notices regarding replacement scientists are still not published.

6. Telemetry allocation

The telemetry packet rate for SPI is increasing and is slowly reaching the current allocation. In a meeting with the Instrument PI's it was therefore agreed to give five more packets to SPI from IBIS. This will be implemented in ISOC as soon as the necessary modifications to the IBIS settings are defined by the PI. This change will reduce the IBIS/Picsit timing integration time and thereby release some telemetry.

7. Dither pattern modifications

In the last Integral Science Working team meeting (ISWT) IBIS indicated that a "randomisation" of the pointings of an observation would remove some systematic effects and improve the sensitivity. ISOC will therefore implement modifications to the raster (5 x 5) pattern to avoid pointing to the same point in the sky with the same attitude. No change to staring and hexagonal dither pattern is planned. Also the second cycle of the GCDE will be slightly offset with respect to the first cycle.

4.3.2 ISDC

On 07/06/2004, the status of ISDC observation processing is:

- Latest Standard Analysis completed: observation 02201120002 (IC443, Revolution 184) on 04/06/2004
- Latest products archived: observation 02201120002 (IC443, Revolution 184) on 07/06/2004
- Latest observation products sent to the observer: observation 02201120001 (IC443, Revolution 182) on 02/06/2004

5 Special Events

None.

6 Anomalies

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

- On DoY 150 at 10:27, the TM links from DSS-16 dropped out, the links returned at 10:30, without impact. There were 22 bad frames received at the time. The corresponding DR# is G104448.
- On DoY 151, at 00:01, there was an error sending data to the ISDS.
- Later at 05:59, after the handover from Redu to DSS-16, the test command failed, causing the Timeline to be stopped. At 06:19, the first successful test command was sent. The Timeline was eventually fully rejoined at 07:27. The impact was pointings 01980057 and 01980058 were lost. The corresponding DR# is G104450.
- On DoY 152, at 07:33, there was an error sending data to the isds. The error message was Commdata Exchange send Error. Comm_cannot.sending. Unix error II. After investigation, at 07:38, the problem seems to have cleared itself without any intervention.
- On DoY 153, at 11:08, 11:48, and 12:06, a total of 104 bad frames were received from DSS-16.
- Later at 15:05, the imca was showing yellow in the global monitor, with low swap space available. The imca application launcher was stopped and restarted curing the problem.
- On DoY 154, at 05:53, after the station handover from Redu to DSS-16, there was initially no bit-lock, then a ghost link necessitated an NCTRS reboot, the links were finally installed at 06:01. The impact was pointing 01990057 was lost. The corresponding DR# is G104455.
- At 09:59, at belt entry, there was a crash of the IBIS DPE, see the IBIS report for details.
- On DoY 156, at 14:19, an AOCS command failed, causing the partial loss of pointing 02000042.
- At 19:41, idda lost communication with the NCTRS, the connection was restored, possibly interrupting VBC7 for a few seconds.
- At 20:54, there was an idda error sending data to the ISDS, together with an ISDS-IFRD connection error: IDDA Commdataexchange send error. Comm_cannot_sendmsg. Unix error II. As before on DoY 152, investigation revealed nothing, and the problem cleared itself. IDDA MMI on sun129 indicated green, but the disk space usage was up to 97%.

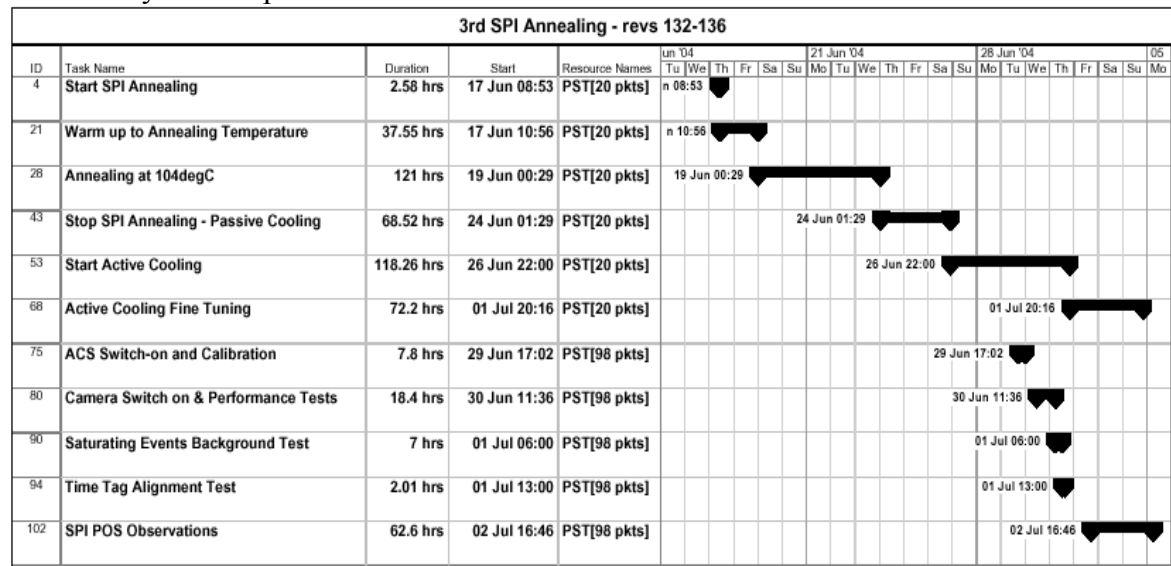
The following new anomaly reports relevant to some of the above problems were entered into the ART system.

AR id	Date Occurrence	Subject	Segment	Status
INT_SC-79	02/06/2004	IBIS IDPE1 Failure	Payload	Open
INT-2605	04/06/2004	CLCW Response not received from TCE, despite Successful Uplink.	ESA Station	Pending

7 Future Milestones

The 4th SPI annealing will start on 17th June and will last until 2nd July (revs 204 to 209). The annealing timeline includes 121hours annealing time at 104degC, a few additional tests to calibrate the ACS, investigate the background of the camera saturating events, align the ACS veto pulse with the camera time tag events. During the warm phase, the instrument will also be maintained in photon by photon to catch any signal from GeD#2 channel - faulty since 06.12.2003 - triggered by thermal noise.

A summary of the updated timeline is shown below:



The next eclipse season will start on 5th June, the dates and times of eclipses are as follows:

Date	Penumbra Entry	Umbra Entry	Umbra Exit	Penumbra Exit
2004/06/05	12:38:59	12:43:24	13:13:44	13:17:31
2004/06/08	12:17:46	12:20:23	13:15:23	13:17:24
2004/06/11	12:03:58	12:06:09	13:10:29	13:12:08
2004/06/14	11:52:50	11:54:52	13:01:25	13:02:54
2004/06/17	11:43:28	11:45:28	12:49:17	12:50:44
2004/06/20	11:36:14	11:38:19	12:35:16	12:36:49
2004/06/23	11:32:15	11:34:34	12:19:52	12:21:41
2004/06/26	11:32:46	11:36:24	11:59:55	12:03:04

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 199

In revolution 199 an amalgamated raster dithering observation of Carina (RA 10:36:31.39; DEC -58:21:54.7) was performed throughout the available observation time (~62 hours).

Revolution 200

In revolution 200 an amalgamated raster dithering observation of Carina (RA 10:36:31.39; DEC -58:21:54.7) was performed throughout the available observation time (~61 hours).

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

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2004-05-21T18:38:04.000Z	170.5566	F	Automatic TM processing.
2004-05-23T04:29:52.000Z	170.5357	F	Automatic TM processing.
2004-05-24T12:28:27.000Z	170.4700	F	Automatic TM processing.
2004-05-24T18:23:00.000Z	170.4637	F	Automatic TM processing.
2004-05-25T01:51:25.000Z	170.4514	F	Automatic TM processing.
2004-05-26T04:49:04.000Z	170.4431	F	Automatic TM processing.
2004-05-27T12:11:31.000Z	170.4313	F	Automatic TM processing.
2004-05-27T18:07:56.000Z	170.4201	F	Automatic TM processing.
2004-05-29T03:58:55.000Z	170.3991	F	Automatic TM processing.
2004-05-30T11:56:35.000Z	170.3778	F	Automatic TM processing.
2004-05-30T17:49:16.000Z	170.3594	F	Automatic TM processing.
2004-06-01T04:39:04.000Z	170.3404	F	Automatic TM processing.
2004-06-02T11:46:03.000Z	170.3224	F	Automatic TM processing.
2004-06-02T17:49:40.000Z	170.3135	F	Automatic TM processing.
2004-06-04T03:26:47.000Z	170.2993	F	Automatic TM processing.

This report was generated Fri Jun 4 08:00:15 GMT 2004

8.3 Detailed Satellite Information

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

8.3.1 AOCS Operations

AOCS operations were executed from the Automatic Timeline.

During this period, 14 Open Loop Slews, 130 Closed Loop Slews and 7 Momentum Bias were executed. 4 slews were missed or executed manually. This is equivalent to a 2.8%.

29/05/04 (Day of Year 150, Revolution 198)

Nothing to report.

30/05/04 (Day of Year 151, Revolution 198-199)

Slews missed due problem at the ground station (Goldstone, DSS-16): After station handover to DSS-16, the TC link could not be established on time (DR#: G104450). The Timeline was stopped at 06:04 and slew 01980057 was missed from the Timeline. After establishment of the TC link at 06:19, the Timeline was rejoined by performing a manual Open Loop Slew to the attitude of PID 01980058, followed by a corrective Close Loop Slew to the same attitude. Slew 01980059 was manually updated and was executed from the Timeline. PIDs 57 and 58 were affected.

31/05/04 (Day of Year 152, Revolution 199)

Nothing to report.

01/06/04 (Day of Year 153, Revolution 199)

Complete IMU calibration/health-check and RMU-B health-check: In preparation for the summer eclipse season and as part of the periodic AOCS calibrations, a complete calibration and health-check of all the four IMU units was performed. In parallel, RMU-B was switched on and its overall status was checked. The checks showed that all IMUs as well as the redundant RMU are healthy. The timeline of this operation as well as the obtained drift and noise levels of the selected IMU channels are presented in the following table:

Time z	Complete IMU Health-Check / Calibration and RMU-B Health Check 01/06/2004 (DoY 153), Revolution 199	
06:10:00	Disable ACC Autonomous IMU Switch OFF, FCP-AOC-1051	
06:15:00	IMU1 Switch On, FCP-AOC-1600	
06:25:00	IMU3 Switch On, FCP-AOC-1604	
06:35:00	RMU-B switch On, FCP-AOC-1902	
	Allow minimum 30 minutes warm-up time	
07:05:00	Set IMU Selection	
07:15:00	ACC: IMU1 on Roll, IMU1 on Yaw, FCP-AOC-1050 FDE: IMU1-X on Roll, IMU3-Y on Pitch, IMU3-Z on Yaw, FCP-AOC-1218	
07:16:18	Reset IAAD Accumulators, FCP-AOC-1210	
07:18:03	Reset FCE RMU Integrators, FCP-AOC-1254 Perform IMU-1 Drift and Noise evaluation, FCP-AOC-1623	

07:16:18 to 07:59:02	42 minutes of data collection From noise and drift evaluation: IMU1 Noise Roll = 0.1931 as/s IMU1 Drift Roll = 0.1400 as/s IMU1 Noise Yaw = 0.0589 as/s IMU1 Drift Yaw = 0.1083 as/s	Drifts calculated by FD: => 0.1477 as/s => 0.1086 as/s	Stable Pointing: PID 01990036 Start of slew 01990037: 07:59:02
08:10:00 08:20:00	Set IMU Selection ACC: IMU1 on Roll, IMU3 on Yaw, FCP-AOC-1050 FDE: IMU1-X on Roll, IMU3-Y on Pitch, IMU1-Z on Yaw, FCP-AOC-1218		
	Station Handover, Redu to Goldstone		
08:48:29 08:49:46	Reset IAAD Accumulators, FCP-AOC-1210 Reset FCE RMU Integrators, FCP-AOC-1254 Perform IMU-3 Drift and Noise evaluation, FCP-AOC-1623		
08:48:29 to 09:45:17	56 minutes of data collection. From noise and drift evaluation: IMU1 Noise Roll = 0.2045 as/s IMU1 Drift Roll = 0.1383 as/s IMU3 Noise Yaw = 0.0476 as/s IMU3 Drift Yaw = 0.0600 as/s	Drifts calculated by FD: => 0.1301 as/s => 0.0657 as/s	Stable Pointing: PID 01990037 Start of slew 01990038: 09:45:17
09:50:00	Deselect IMU1 and IMU3 from ACC Word B, FCP-AOC-1050		
09:55:00	Deselect IMU1 and IMU3 from FDE, FCP-AOC-1218		
10:00:00	Switch Off IMU1, FCP-AOC-1601		
10:10:00	Switch Off IMU3, FCP-AOC-1605		
10:20:00	Re-enable ACC Autonomous IMU Switch Off, FCP-AOC-0526		
10:30:00	RMU-B switch Off, FCP-AOC-1903		
	Wait min. 2 hours for thermal stabilisation after IMU1 Switch Off		
11:55:00	Disable ACC Autonomous IMU Switch Off, FCP-AOC-1051		
12:00:00	IMU2 Switch On, FCP-AOC-1602		
12:10:00	IMU4 Switch On, FCP-AOC-1606		
12:20:00 12:25:00	Set IMU Selection ACC: IMU2 on Roll, IMU2 on Yaw, FCP-AOC-1050 FDE: IMU2-X on Roll, IMU4-Y on Pitch, IMU2-Z on Yaw, FCP-AOC-1218		
	Station Handover, Goldstone to Redu		
	Allow Min. 30 minutes IMU warm-up time		
12:42:21	Reset IAAD Accumulators, FCP-AOC-1210 Perform IMU-2 Drift and Noise evaluation, FCP-AOC-1623		
12:42:21 to 13:38:13	55 minutes of data collection. From noise and drift evaluation: IMU2 Noise Roll = 0.1707 as/s IMU2 Drift Roll = 0.2500 as/s IMU2 Noise Yaw = 0.0453 as/s IMU2 Drift Yaw = 0.0243 as/s	Drifts calculated by FD: => 0.2477 as/s => 0.0394 as/s	Stable Pointing: PID 01990040 Start of slew 01990041: 13:38:13
13:50:00 13:55:00	Set IMU Selection ACC: IMU4 on Roll, IMU2 on Yaw, FCP-AOC-1050 FDE: IMU4-X on Roll, IMU4-Y on Pitch, IMU2-Z on Yaw, FCP-AOC-1218		
13:53:08	Reset IAAD Accumulators, FCP-AOC-1210 Perform IMU-4 Drift and Noise evaluation, FCP-AOC-1623		
13:53:08 to 14:38:04	44 minutes of data collection. From noise and drift evaluation: IMU4 Noise Roll = 0.1954 as/s IMU4 Drift Roll = -0.0519 as/s IMU2 Noise Yaw = 0.039 as/s IMU2 Drift Yaw = 0.0583 as/s	Drifts calculated by FD: => - 0.0647 as/s => 0.0539 as/s	Stable Pointing: PID 01990041 Start of slew 01990042: 14:38:04
14:50:00	Deselect IMU2 and IMU4 from ACC, FCP-AOC-1050		
14:55:00	Deselect IMU2 and IMU4 from FDE, FCP-AOC-1218		
15:00:00	Switch Off IMU2, FCP-AOC-1603		
15:10:00	Switch Off IMU4, FCP-AOC-1607		
15:20:00	Re-enable ACC Autonomous IMU Switch Off, FCP-AOC-0526		

02/06/04 (Day of Year 154, Revolution 199-200)

Slew missed due to ground station problem (Goldstone, DSS-16): After station handover to DSS-16 at 05:44, the TM/TC links could not be established on time (DR#: G104455) and slew 01990057 could not be executed from the Timeline. After the links were established at 06:01, the Timeline was rejoined by performing a manual Close Loop Slew to the attitude of PID 01990057. The next slew was executed from the Timeline after being manually updated.

Update of the ACC IMU drift corrections: Starting at 09:17, the on-board ACC IMU drift corrections were updated with the results of the IMU calibration, which was performed on 01/06/2004. The uplinked values are shown below:

```
AEDRA_00 S
      M F 12
2004-06-02T11:00:00Z
2004-06-02T11:00:00Z
AAAA1
IMU1_R_1 R 0.6309026E-06      r/s D IMU 1 roll 1
IMU1_R_2 R 0.6309026E-06      r/s D IMU 1 roll 2
IMU1_Y_1 R 0.5264786E-06      r/s D IMU 1 yaw 1
IMU1_Y_2 R 0.5264786E-06      r/s D IMU 1 yaw 2
IMU2_R_1 R 0.1200651E-05      r/s D IMU 2 roll 1
IMU2_R_2 R 0.1200651E-05      r/s D IMU 2 roll 2
IMU2_Y_1 R 0.2614746E-06      r/s D IMU 2 yaw 1
IMU2_Y_2 R 0.2614746E-06      r/s D IMU 2 yaw 2
IMU3_Y_1 R 0.3186729E-06      r/s D IMU 3 yaw 1
IMU3_Y_2 R 0.3186729E-06      r/s D IMU 3 yaw
IMU4_R_1 R -0.3137714E-06      r/s D IMU 4 roll 1
IMU4_R_2 R -0.3137714E-06      r/s D IMU 4 roll 2
```

03/06/04 (Day of Year 155, Revolution 200)

Loading the Eclipse Season AMD thresholds: In preparation of the eclipse season 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.							
1) 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:							
	X1		X2		In rpm:		
					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:							
	X1		X2		In rpm:		
					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 completed at 09:57.

04/06/04 (Day of Year 156, Revolution 200)

Slew missed because the CLCW response of an AOCS command was not received (REDU): At 14:19:30 the command to load the IMU timers was released from the control system and was received on-board. However, the CLCW response of this command was not received from the TCE and the command was flagged as failed on the IMCS, interrupting the execution of the Timeline. The problem is probably caused by the loss of connection between the TCE and TMP at Redu. For more detail refer to INTEGRAL ARTS entry INT-2605. The effect was that execution of slew 02000042 failed. After reestablishment of the AD service, the Timeline was rejoined by performing a manual Close Loop Slew to the attitude of PID 02000042. PID 42 was affected.

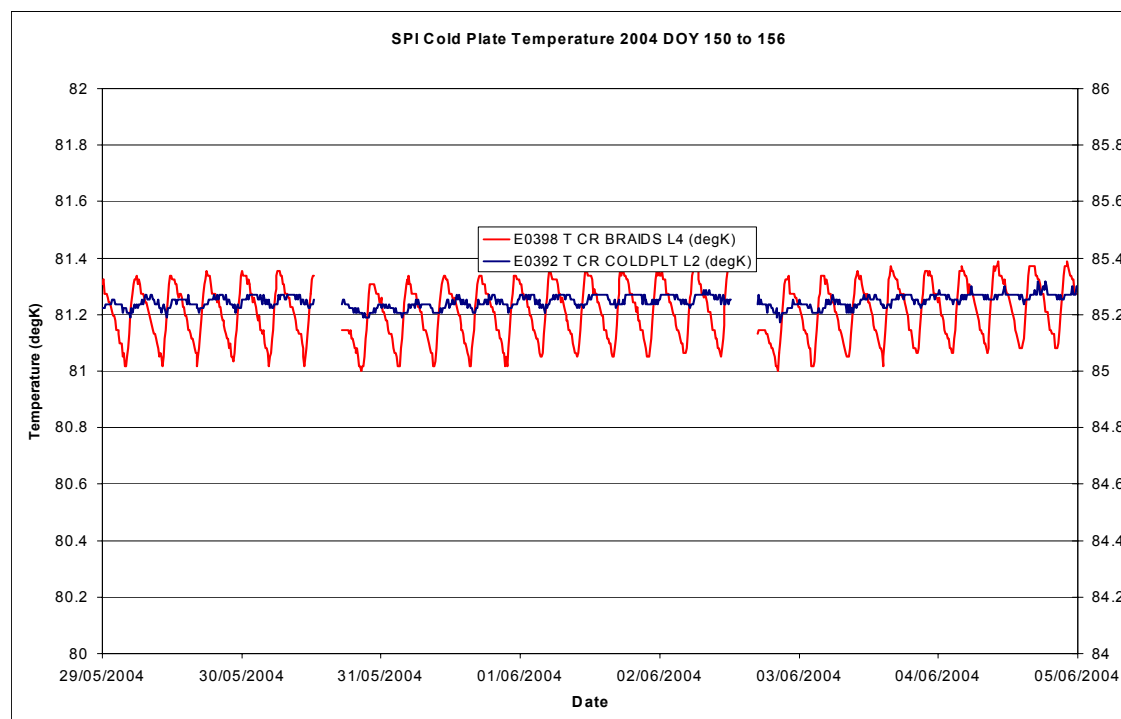
8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

The performance of the cryo-cooler is nominal.

The cold plate temperature is leveled off at around 85.15K with a drift over the whole week of +0.009K/day, which is well within the expected range.

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



IASW/DPE:

The performance of the IASW/DPE is nominal. The average TM bandwidth occupation was 95.7 pkts/cycle in the science windows (+0.4 pkts w.r.t. previous week).

As the occupation is approaching the maximum allocated bandwidth (98 pkts/cycle), the disabling of the PSD pulse shape sample downlink is being considered as a recovery step to gain (reduce) about one pkt/cycle.

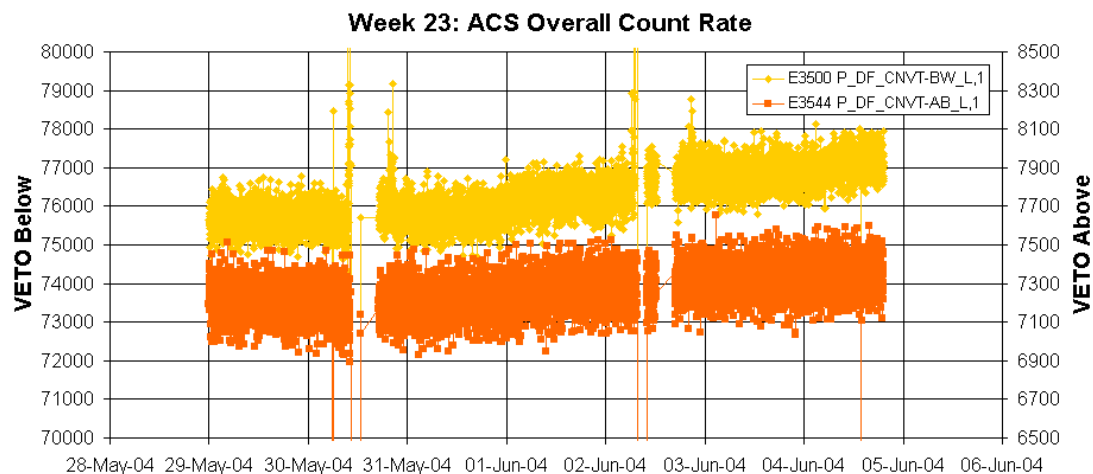
The following diagram shows the IASW performance in terms of TM bandwidth and event buffer occupation during the reporting period.



ACS:

The performance of the ACS is nominal.

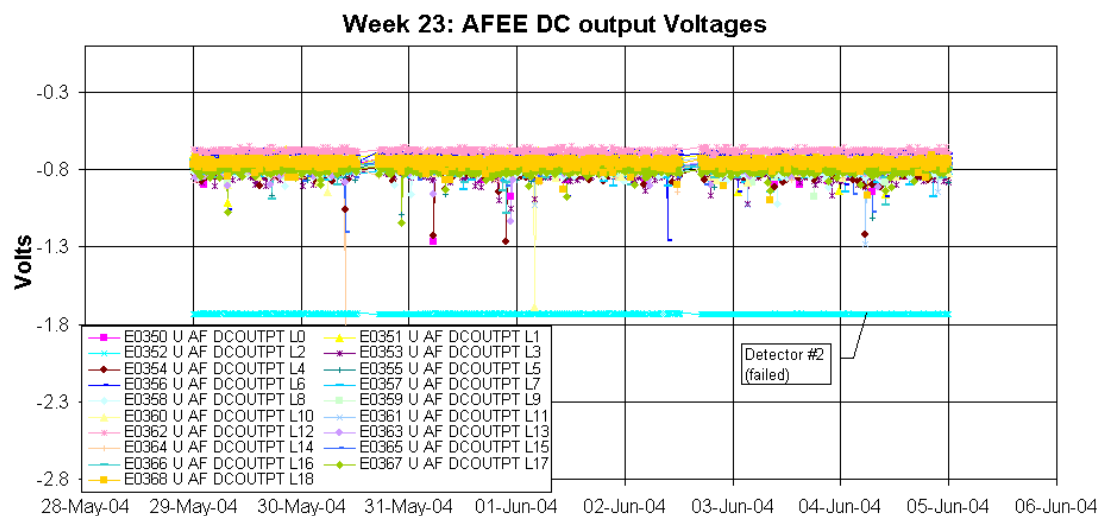
The following plot shows the ACS overall counts and IREM counters evolution during the reporting period.



AFEE:

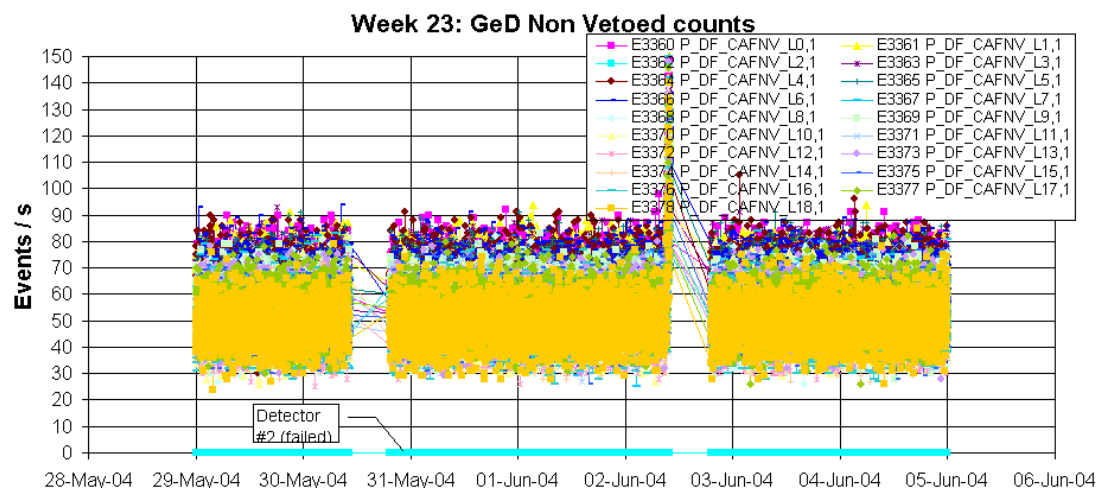
The performance of the detectors is nominal except for the detector #2 failed since 06.12.2003 (see anomaly report INT_SC-72).

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



DFEE:

The following plot shows the GeD 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.



PSD:

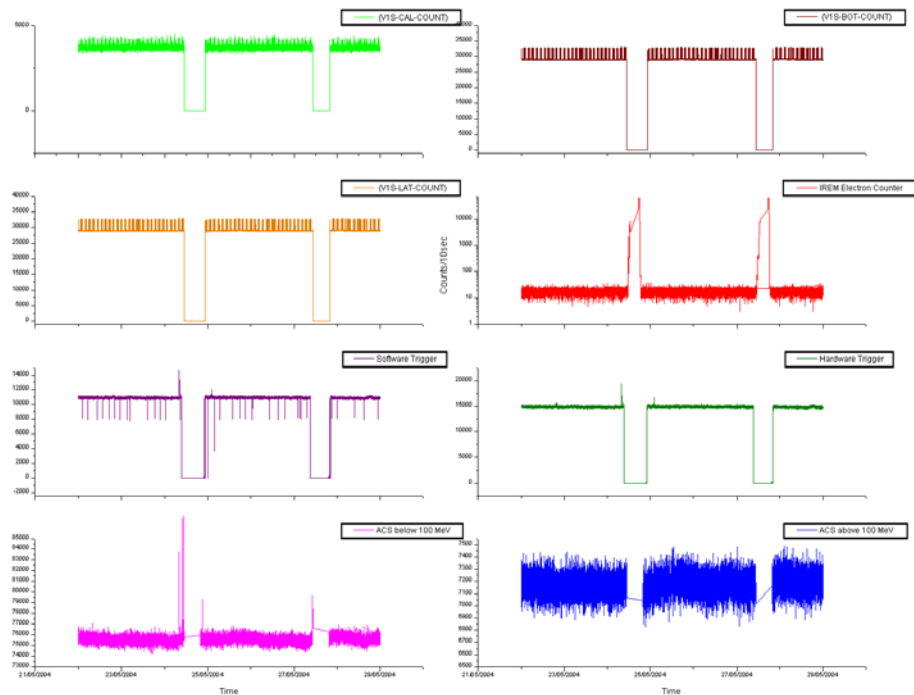
The performance of the unit is nominal.
 Nothing to report.

8.3.3 IBIS Operations

IBIS event counters plot

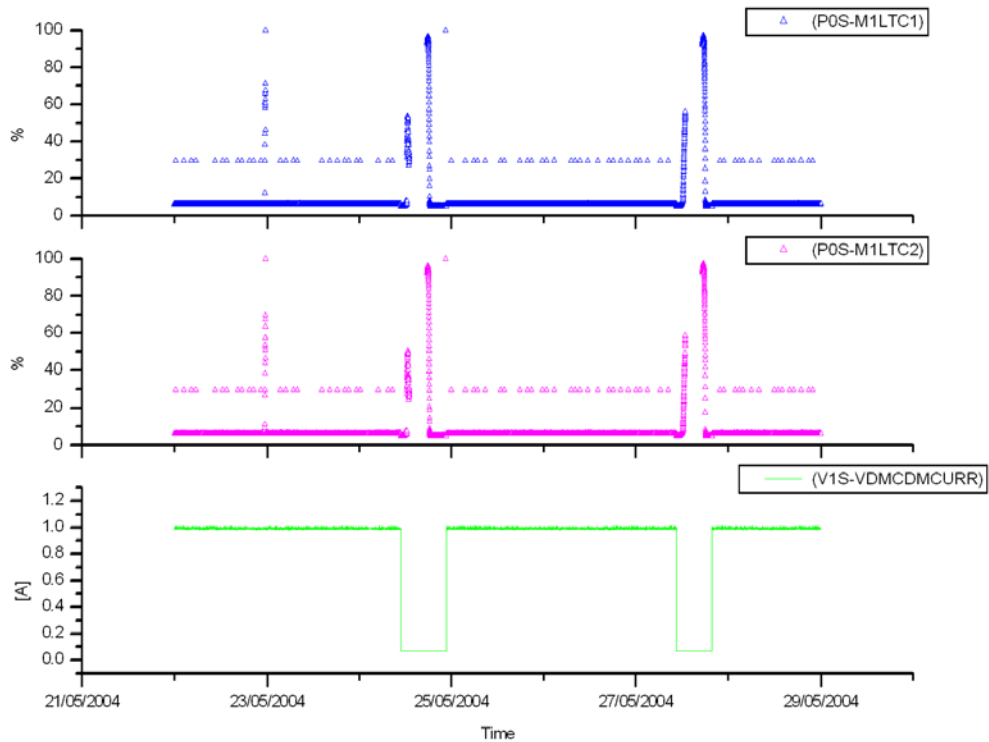
Plots Rev 195-197

IBIS-VETO Counters vs Payloads Counters Rev 195-197



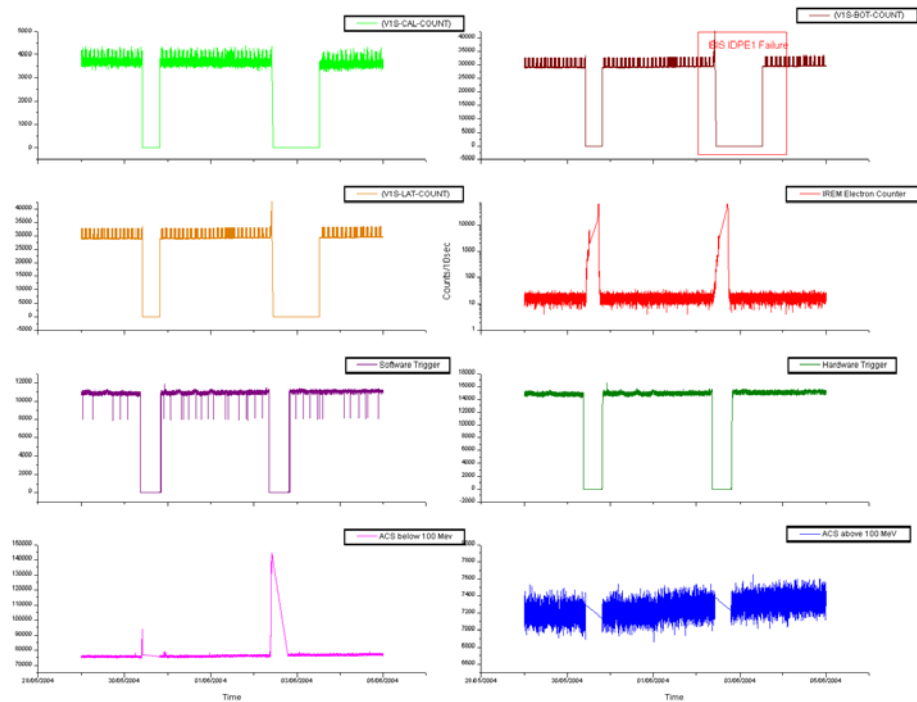
**with the exception of IREM counters, all the values reported are in counts/sec

IBIS-VETO Current & PICsIT dead times Rev 195-197



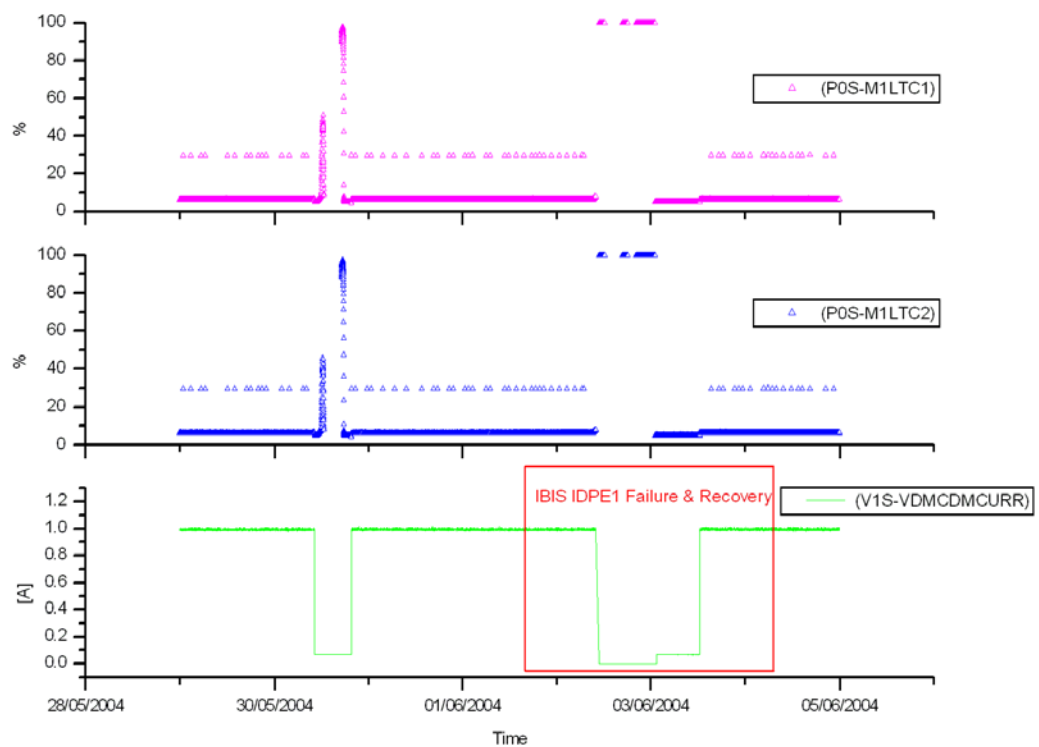
Plots Rev 198-200

IBIS-VETO vs Payloads Counters Rev 198-200



**with the exception of IREM counters, all the plots are reporting counts/sec

IBIS-VETO Current & PICsIT dead times Rev 198-200



IBIS daily report

DOY 2004.150 (29/05/04)

Nothing to report

DOY 2004.151 (30/05/04)

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

At 19:08Z the parameter G2014 (Overflow of the noisy pixel address buffer in MCE1) failed the SSC. The parameter returned within limits after few TM cycle and no further action was taken.

DOY 2004.152 (31/05/04)

Nothing to report.

DOY 2004.153 (01/06/04)

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

DOY 2004.027 (27/01/04)

At 03:35 Z the following OEMs were reported:

```
OEM APID 1280 ID 133 CLASS 2 << IBIS1 IASW LSL TRANSFER FAILED (LOW LEVEL)>>  
OEM APID 1280 ID 131 CLASS 2 <<IBIS1 IASW LSL TRANSFER FAIL REPORT FOR HIGH-LEVEL  
MODULE RESET>>
```

These two OEMs were followed after few seconds by:

```
OEM APID 1280 ID 222 CLASS 3 << IBIS1 MCE3 TIME OUT>>.
```

This anomaly is similar to that which occurred in MCE3 on DoY 2004.017 and MCE5 on DOY 2004.27. IBIS incurred a timing problem on the LSL that affected the communication with the peripherals. At this time a request for HK1 was sent to the MCE3 without response, due to the black out in communication between the peripheral and DPE. The IASW flagged the non-generation of HK1 from the MCE3 as an on-board rejection (time out) of the internal TC identified in the OEM above by the CID. At this time no valid HK was collected from MCE3, what was reported in the HK1 was simply the IASW default (i.e. all 000000...). This was confirmed by the reading of some TM_paras as the biases, operating modes and MDUs temperatures all reporting as value 0 raw. After few TM cycles the unit solved autonomously the

internal conflict on the LSL and reported the valid HK1 for MCE3. As suggested by the Payload FDIR doc no action was requested, just a monitoring of the unit. The detailed description of the previous anomaly, for the MCE3, has been reported in WR #69.

DOY 2004.154 (02/06/04)

At 09.59.39Z a failure in the IBIS DPE1. The anomaly occurred at the entry of the Belts (time distributed by BCPKT 09.59.39Z), the following ALARM conditions were reported:

- At 09.59.39Z OEM ID 82 APID 129 'EX OBIH TM ST11 WRONG RBI STATUS' the CDMU did not get any response from the DPE
- at 09.59.42Z OEM ID 91 APID 129 'EX OBIH TC ST9 WRONG RBI STATUS' reporting a problem in the distribution of the BCPKT from the CDMU to the IDPE1,
- at 09.59.50 the parameter D6703 (IBIS 1 IBIS1 RBI Status Word: Running State) failed the SCC reporting the status 'NOT RUNNING' indicating a problem with the on-board S/W
- HK1-HK3-HK4 were not received since 09.59.25Z

the STATUS of the unit at the time of the anomaly was:

IASW = STANDARD MODE

PICSIT=NOMINAL

ISGRI=NOMINAL+NP/LTH

VETO=NOMINAL

with all the HVs and Biases switched ON

The altitude of the spacecraft was around 60 Tkm (Belts Entry) and was reported moderated radiation activity.

The following First Actions were performed

- at 10.05Z command IBIS and peripherals in Stand-By, failed (TCs not executed by IASW);
- command IBIS in SAFE Mode by ED GEBENT01(Time-tagged TCs already loaded on-board from the previous belt exit) failed as well the execution;
- being already inside the Belts with all the peripherals ON and considered the non reaction of the IASW to any command , at 10:09Z was decided to proceed for the IBIS 1 fast deactivation by using procedure FCP_IBIS1_0901 and powering OFF ISGRI PICSIT and VETO modules. The power OFF of the peripherals of the unit was performed successfully.
- in order to recover the IASW was performed a cold reset by applying the CRP_IBIS1_5140 (IDPE1 FAILURE). The reset was successfully executed and the IDPE went back in 'RUNNING' status.

The Recovery of the complete unit started the evening after perigee passage at 18:04 Z as for FCP_IBIS1_0005 (IBIS1 Nominal Activation), and the following activities were performed:

- verification of the thermal configuration
- load and verification of the IASW patch 1.9
- activation of the IASW
- uplink and verification of the on-board CTX s(new HEPI, LUT1, LUT2, VETO, PICSIT)
- uplink and verification of the last ISGRI CTX processed by ISDC (from rev 199)
- set-up of the IASW
- activation and reconfiguration of the ISGRI MDUs

DOY 2004.155 (03/06/04)

The Recovery of the unit continued at 00.01Z as for FCP_IBIS1_0005 (IBIS1 Nominal Activation), and the following activities were performed:

- activation and reconfiguration of the PICsIT PDMs
- activation and configuration of the VETO VDMs+CDM
- ISGRI calibration
- VETO patch 3.1+3.2 , division factor included)
- VETO High Voltages activation
- reconfiguration to Standard Mode
- verification of the thermal configuration

IBIS was reconfigured and re-joined to the automatic scheduling system at 13:44Z. An anomaly report has been generated (AR#79).

An investigation is on-going at MOC side, more details will be reported in the next issue of the WR.

DOY 2004.156 (04/06/04)

The unit was under monitoring and started at PIs and in ISDC side the verification of the scientific configuration.

DOY 2004.157 (05/06/04)

The following Radiation Belts entry for rev 200 (09:43Z) evidenced no anomaly/misbehaviour of the instrument, confirming the healthy status of the unit.

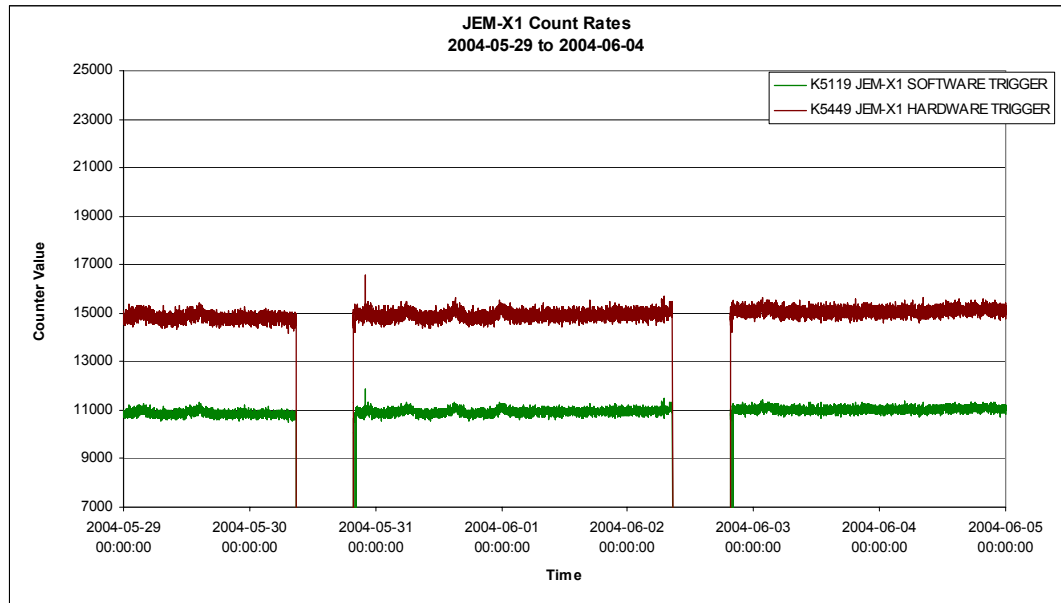
8.3.4 JEM-X Operations

2004-05-29 (DOY 150, Rev 198) to 2004-06-04 (DOY 156, Rev 200)

Nothing to report

8.3.4.1 JEM-X Count Rates

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



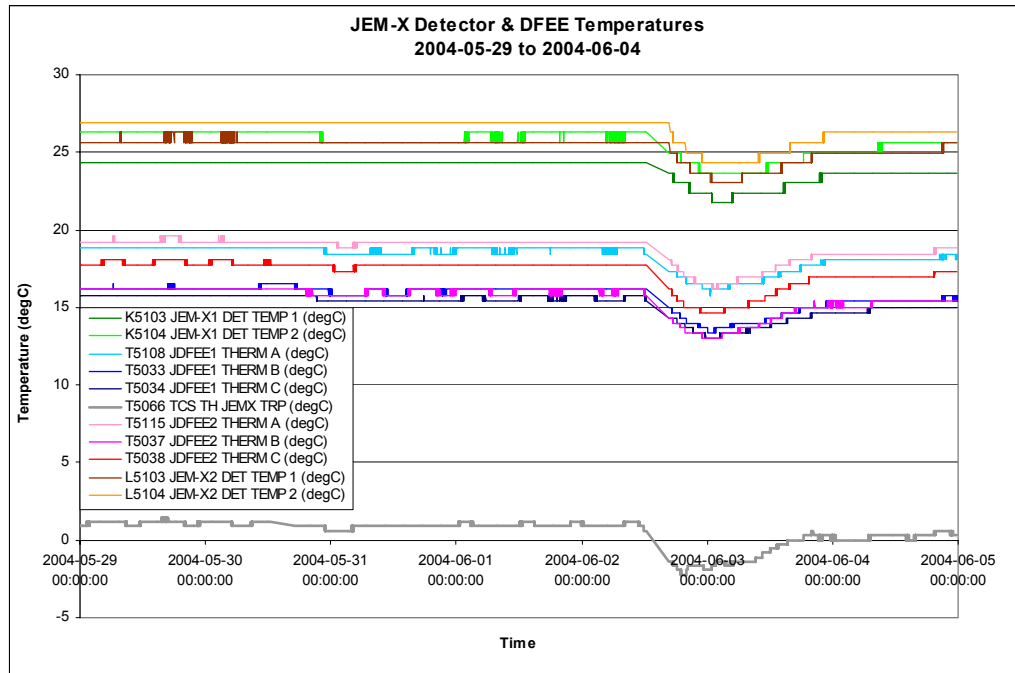
8.3.4.2 JEM-X Temperatures

The JEM-X1 and JEM-X2 detector temperatures over the reporting period are displayed in the following graph, along with the temperatures at a selection of DFEE locations and on the detector bench between the two units².

The dip in the temperatures during the period 2004-06-02T12:00Z to 2004-06-03T20:00Z (perigee passage of revolution 199-200 and the start of revolution 200) could be related to the IBIS DPE1 anomaly and subsequent recovery actions which occurred during this period (see IBIS section of this report for further details).

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)



8.3.5 OMC Operations

On DoY 151, at 07:08:42, due to communications problems with DSS-16 pointings 01980057 and 01980058 were lost. The commands for 01980058 were later sent, and subsequently rejected:

```
2004.151.07.08.42.329 2004.151.07.08.31.006 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=850
2004.151.07.08.34.301 2004.151.07.08.24.256 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=849
```

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

On DoY 154 at 05:53, due to station communication problems, there was a late start after a handover to DSS-16. The impact was pointing 01990057 was lost.

On DoY 156, at 14:26:11, after problems with the TC link to Redu, pointing 02000042 was lost. The commands for that pointing were later sent, and rejected:

```
2004.156.14.26.11.810 2004.156.14.26.01.779 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=467
2004.156.14.26.02.305 2004.156.14.25.55.154 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=466
```

These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing. These commands were subsequently manually resent at 14:55, partially recovering the pointing.

On DoY 151 at 10:16:50 and DoY 154 at 09:59:55, OMC was switched by the Timeline to SAFE mode, at the nominal times.

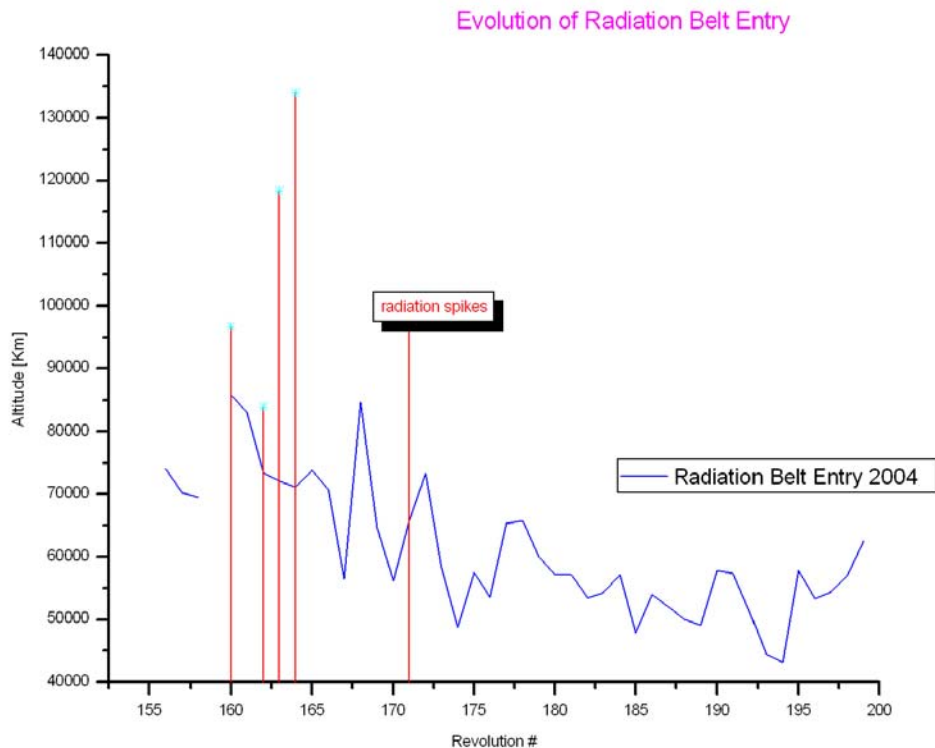
8.3.6 IREM Operations

IREM daily report

Nothing to report.

Radiation Belt Entry Analysis

The evolution of the Radiation Belt Entry in 2004, since rev 156 is reported in the following plot (the plot has been reviewed respect to the last issue, the radiation spikes are now displayed as independent event).



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

The reported Electron Belts Entry/Exit for revs 193-->195, as defined by a cut-off flux of 3.76×10^2 e/cm²/sec ($E > 0.5$ MeV) and the predicted Proton Belts Entry/Exit, as defined by a cut-off flux of 1.25×10^3 p/cm²/sec ($E > 8$ MeV) are shown below:

Electron Belts

REV	S/C BCPKT (electron)	Electron CUT-OFF Observed Entry/Exit	Observed Entry/Exit Altitude [Km]	Electron CUT-OFF Predicted Entry/Exit	Predicted Entry/Exit Altitude [Km]
196	RAD_ENTR R 2004-05-24T10:47	24/05/2004 11:36	53383	24-May-2004 11:25	54359
197	RAD_EXIT R 2004-05-24T19:53	24/05/2004 18:32	26539	24-May-2004 18:25	26356
197	RAD_ENTR R 2004-05-27T10:31	27/05/2004 11:11	54413	27-May-2004 11:10	54764
198	RAD_EXIT R 2004-05-27T19:37	27/05/2004 18:17	26451	27-May-2004 18:20	27587
198	RAD_ENTR R 2004-05-30T10:16	30/05/2004 10:43	56983	30-May-2004 10:58	54244
199	RAD_EXIT R 2004-05-30T19:22	30/05/2004 18:08	26539	30-May-2004 17:58	26494
199	RAD_ENTR R 2004-06-02T09:59	02/06/2004 09:44	62536	02-Jun-2004 10:38	54957
200	RAD_EXIT R 2004-06-02T19:06	02/06/2004 17:45	26534	02-Jun-2004 17:48	27175

Reference

Small error vs reference

Large error vs reference

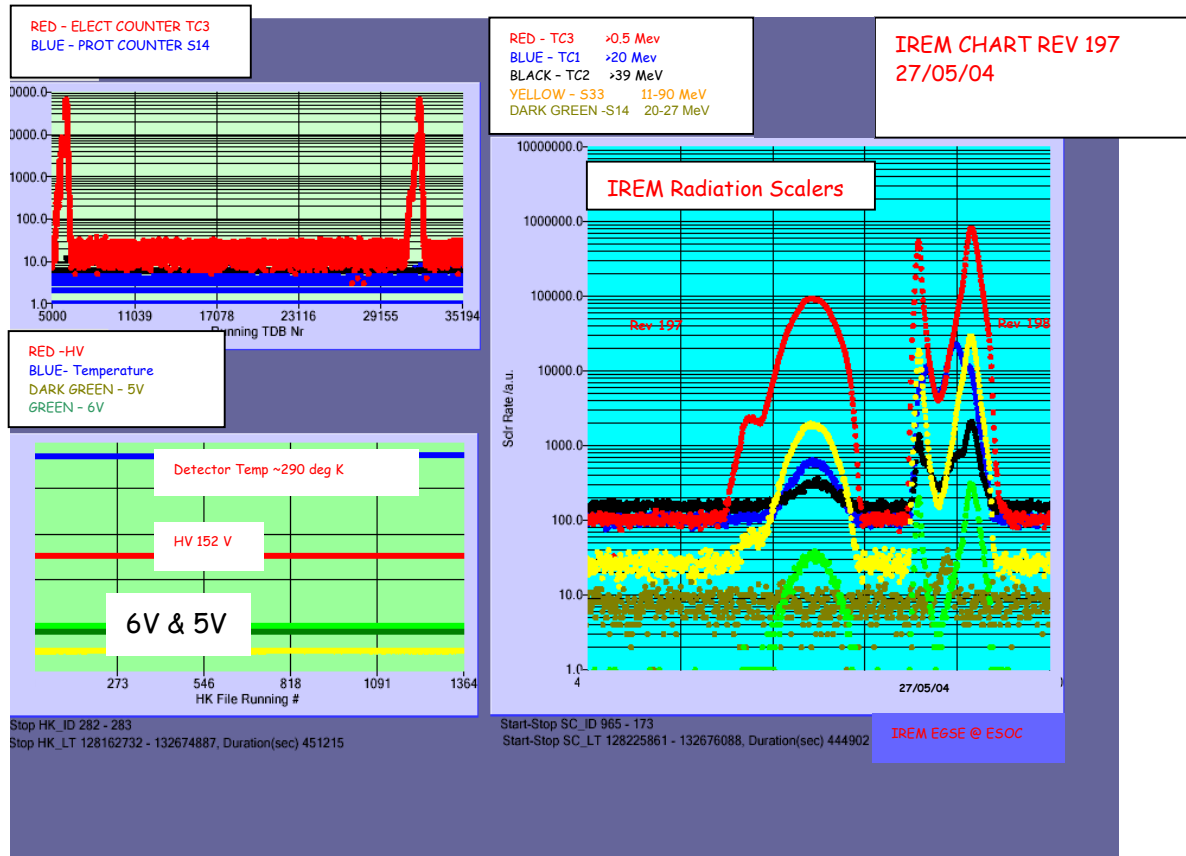
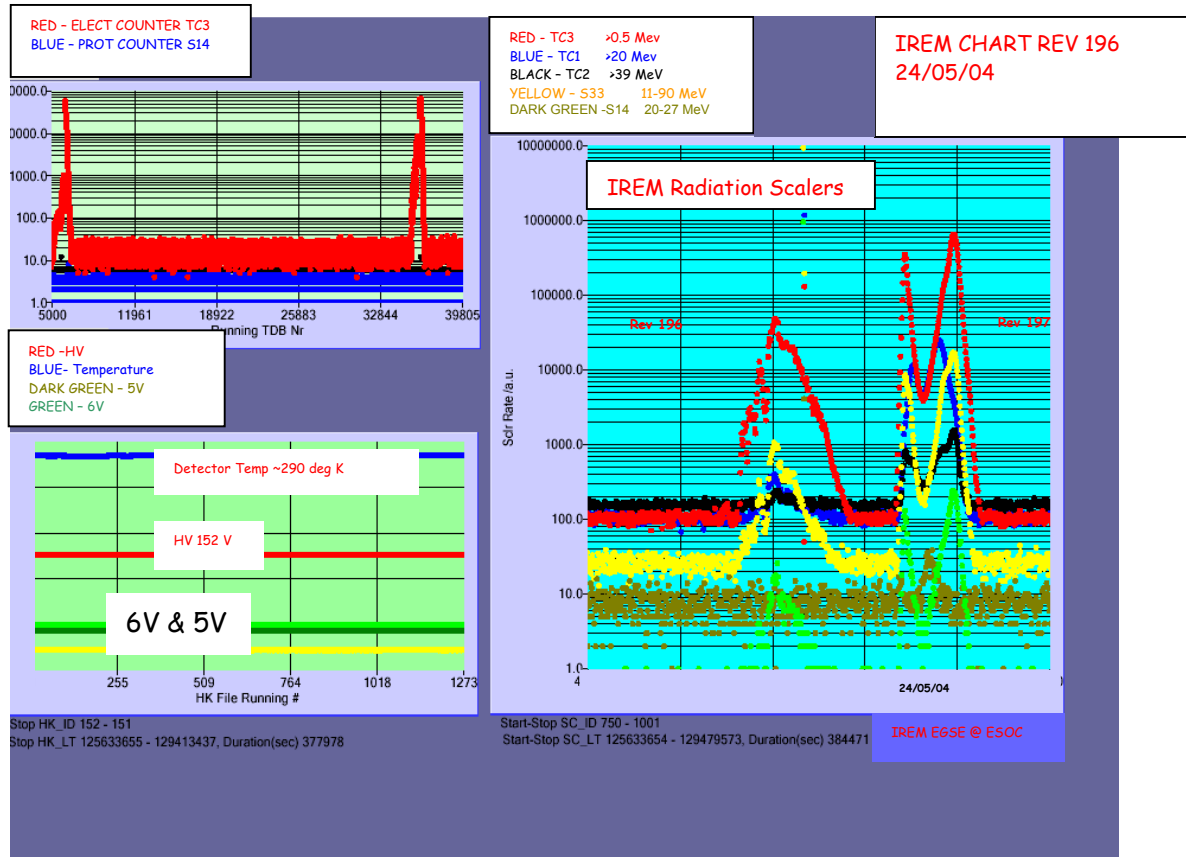
Radiation Spike

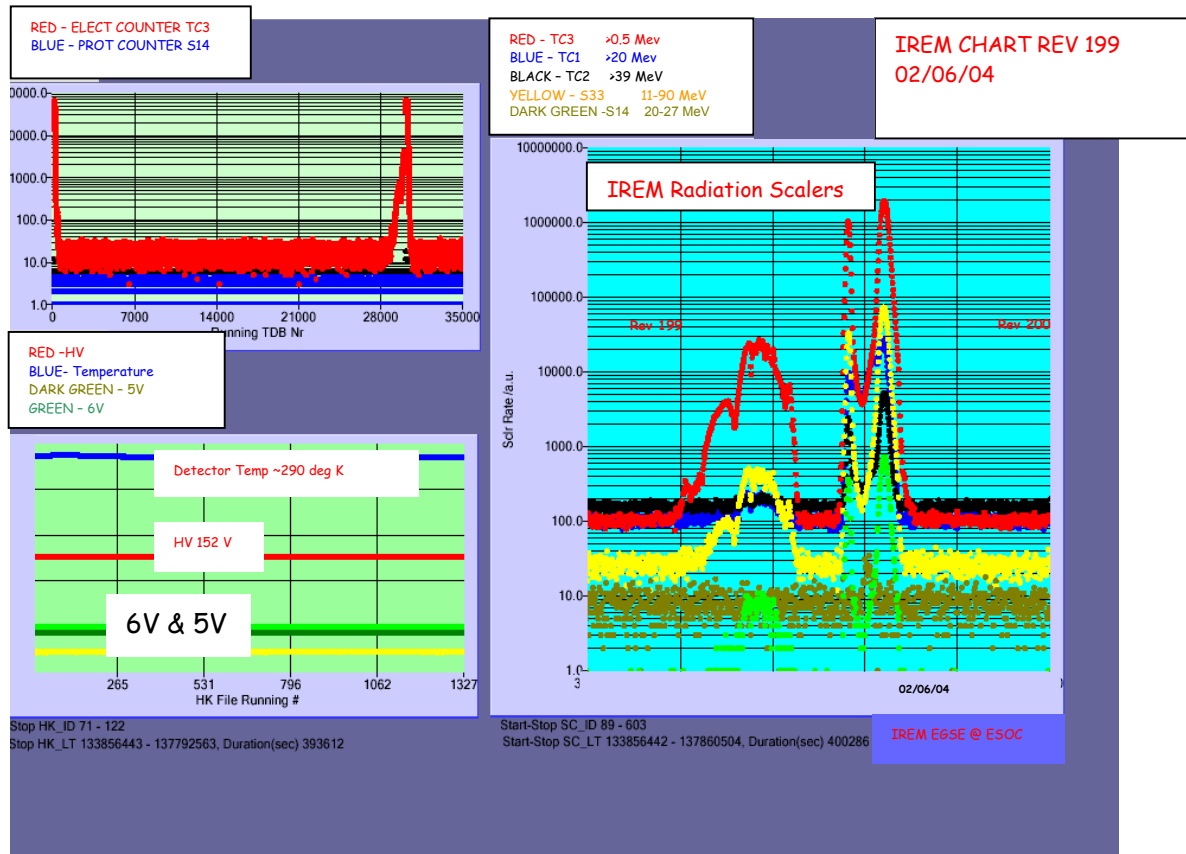
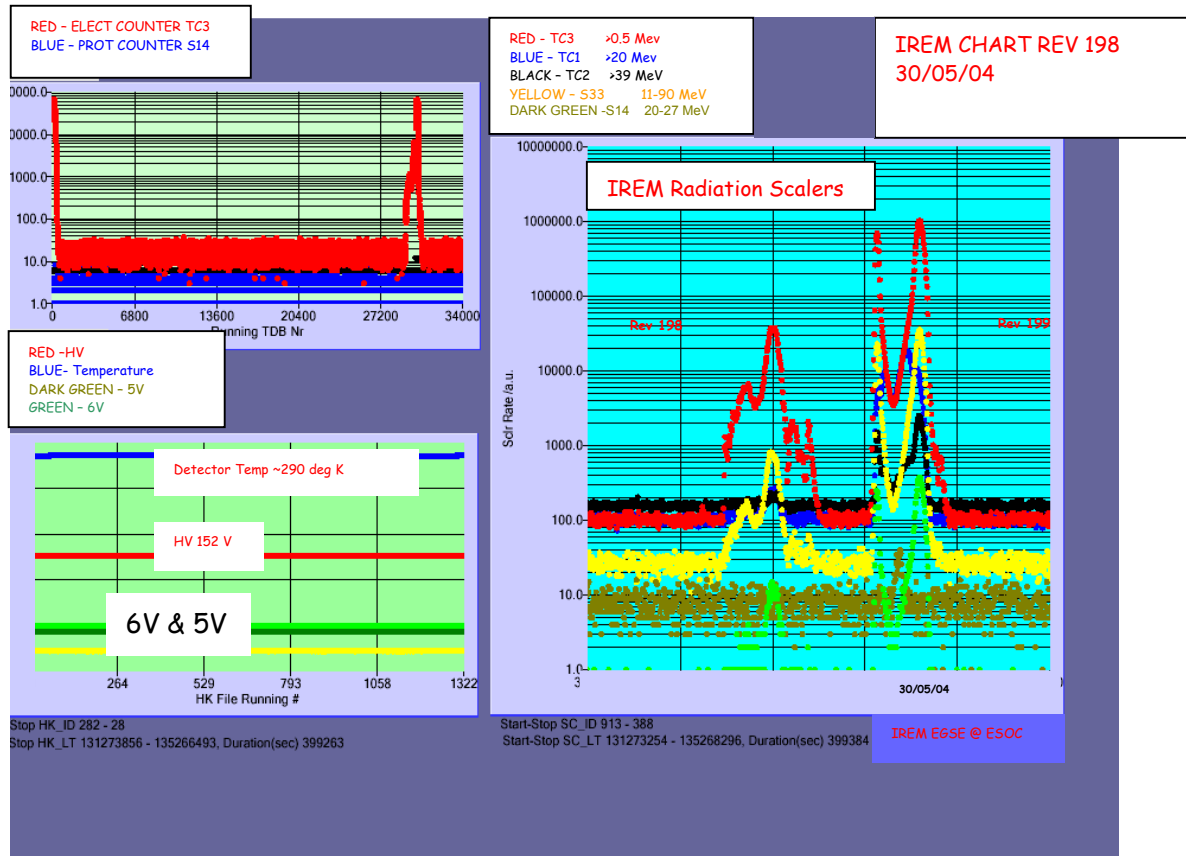
Proton Belts

REV	S/C BCPKT (proton)	Proton CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
196	PROTON_RAD_ENTR	24-May-2004 16:55	12814
196	PROTON_RAD_EXIT	24-May-2004 17:15	15132
197	PROTON_RAD_ENTR	27-May-2004 16:40	12523
197	PROTON_RAD_EXIT	27-May-2004 17:00	14737
198	PROTON_RAD_ENTR	30-May-2004 16:28	12894
198	PROTON_RAD_EXIT	30-May-2004 16:48	15244
199	PROTON_RAD_ENTR	02-Jun-2004 16:08	12521
199	PROTON_RAD_EXIT	02-Jun-2004 16:28	14581

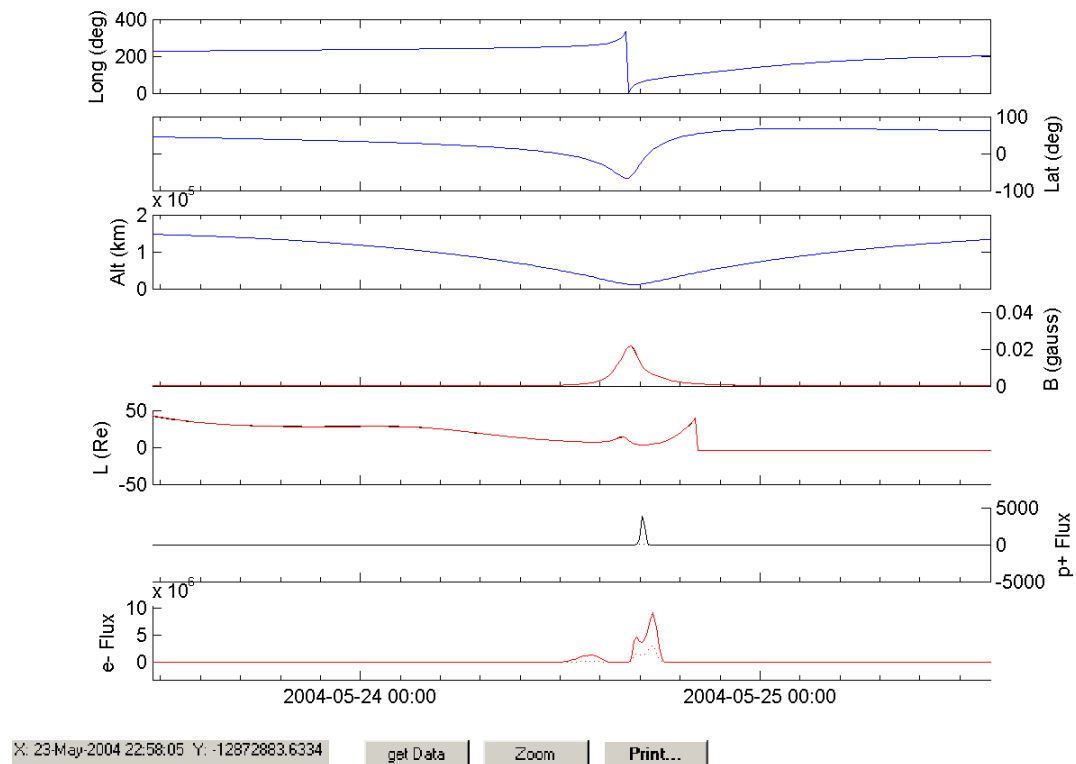
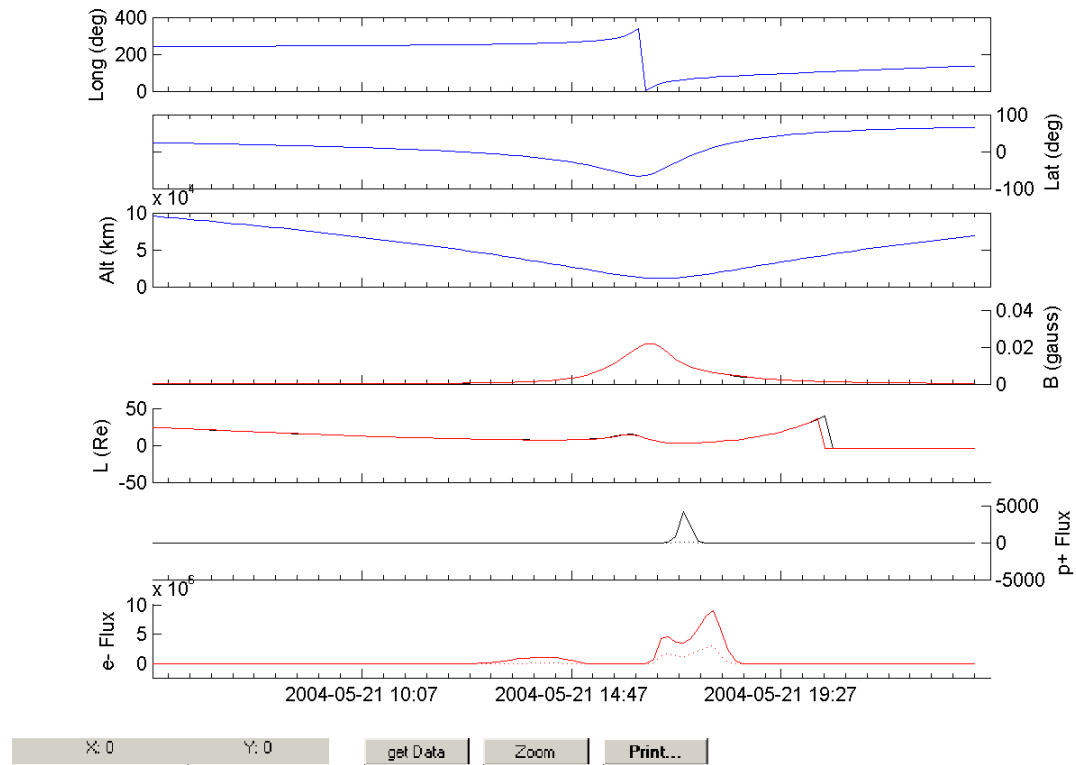
IREM radiation counters plots

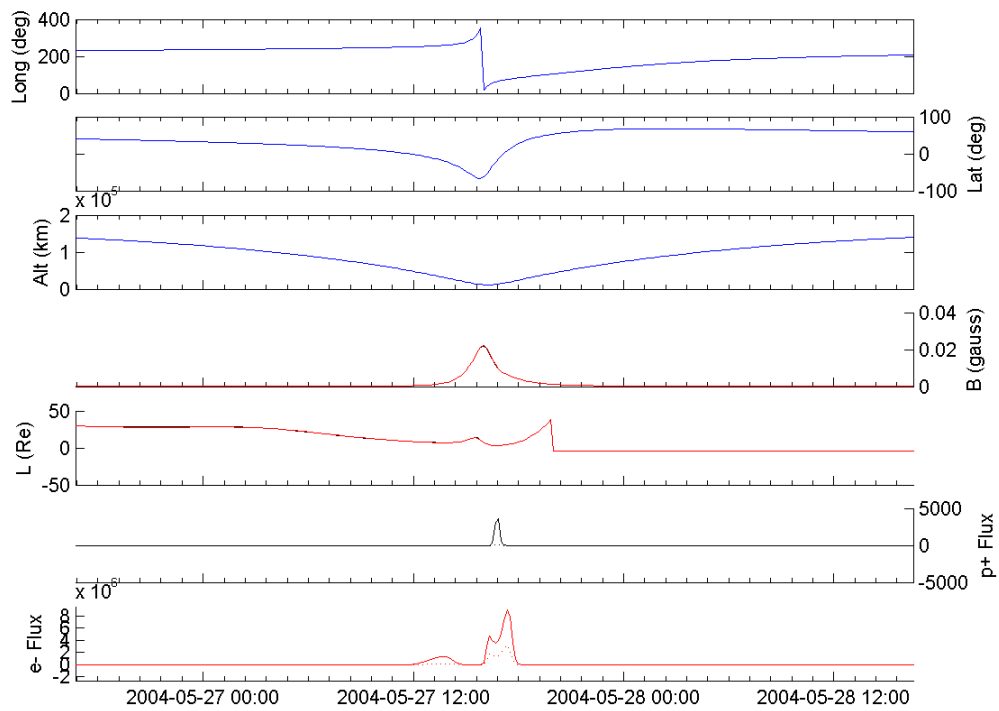
As these plots were missing from last weeks report, plots for the last 4 revolutions are included this week.





IREM predicted radiation counters



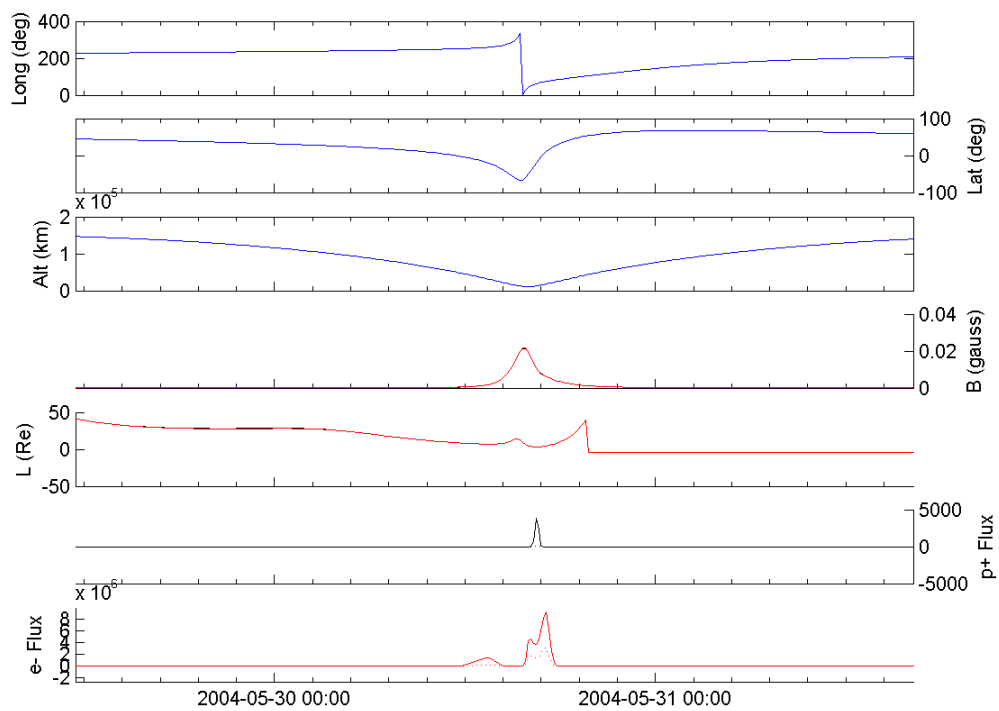


X: 23-May-2004 22:58:05 Y: -12872883.6334

get Data

Zoom

Print...

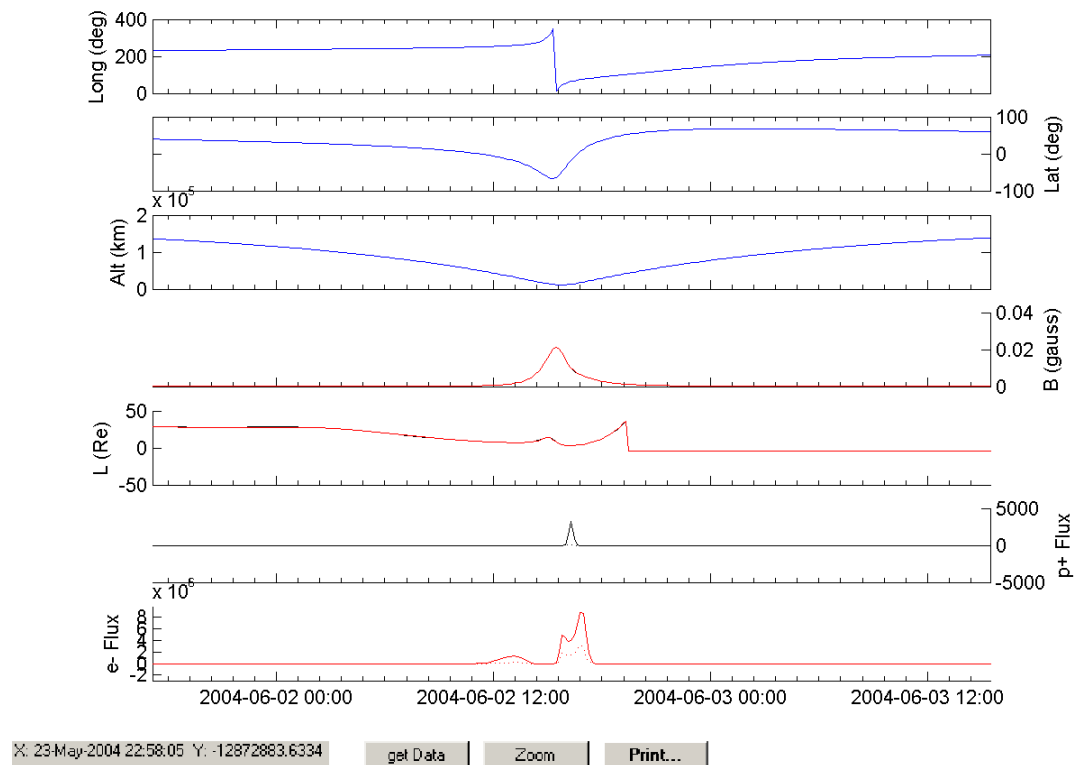


X: 23-May-2004 22:58:05 Y: -12872883.6334

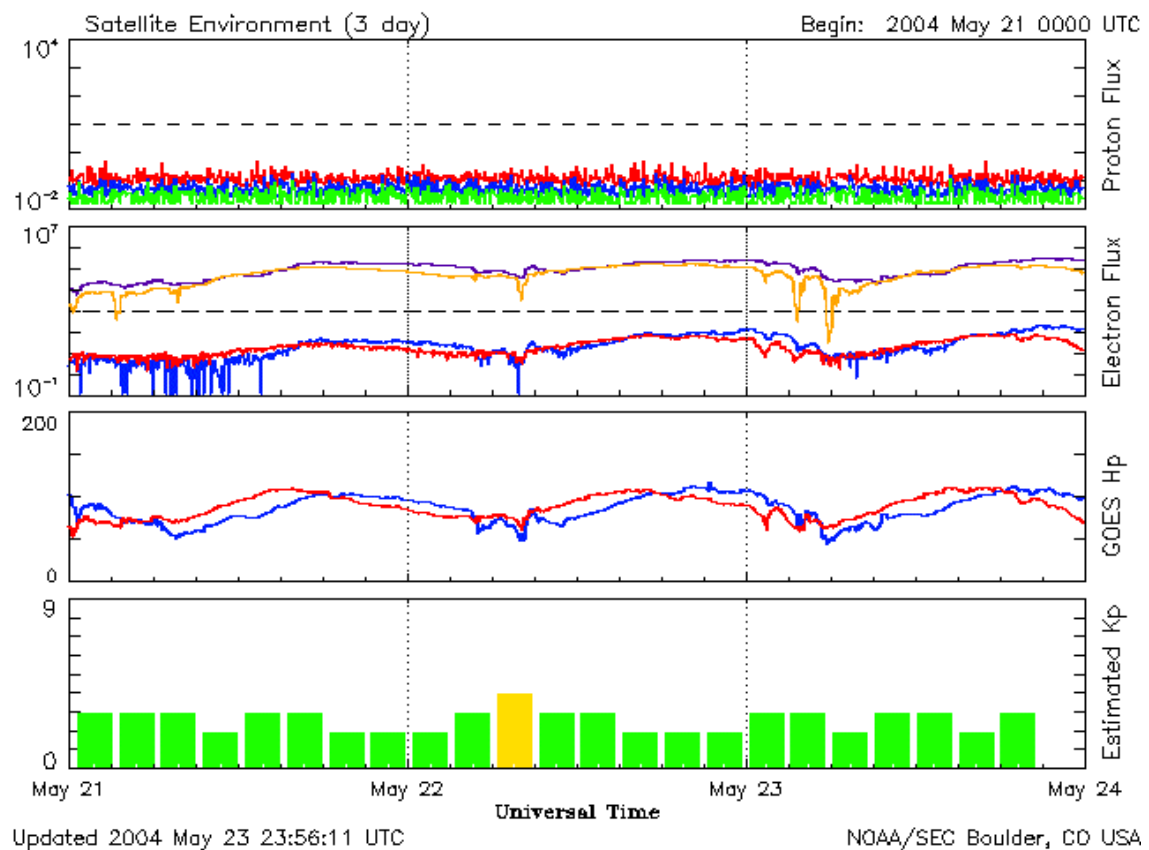
get Data

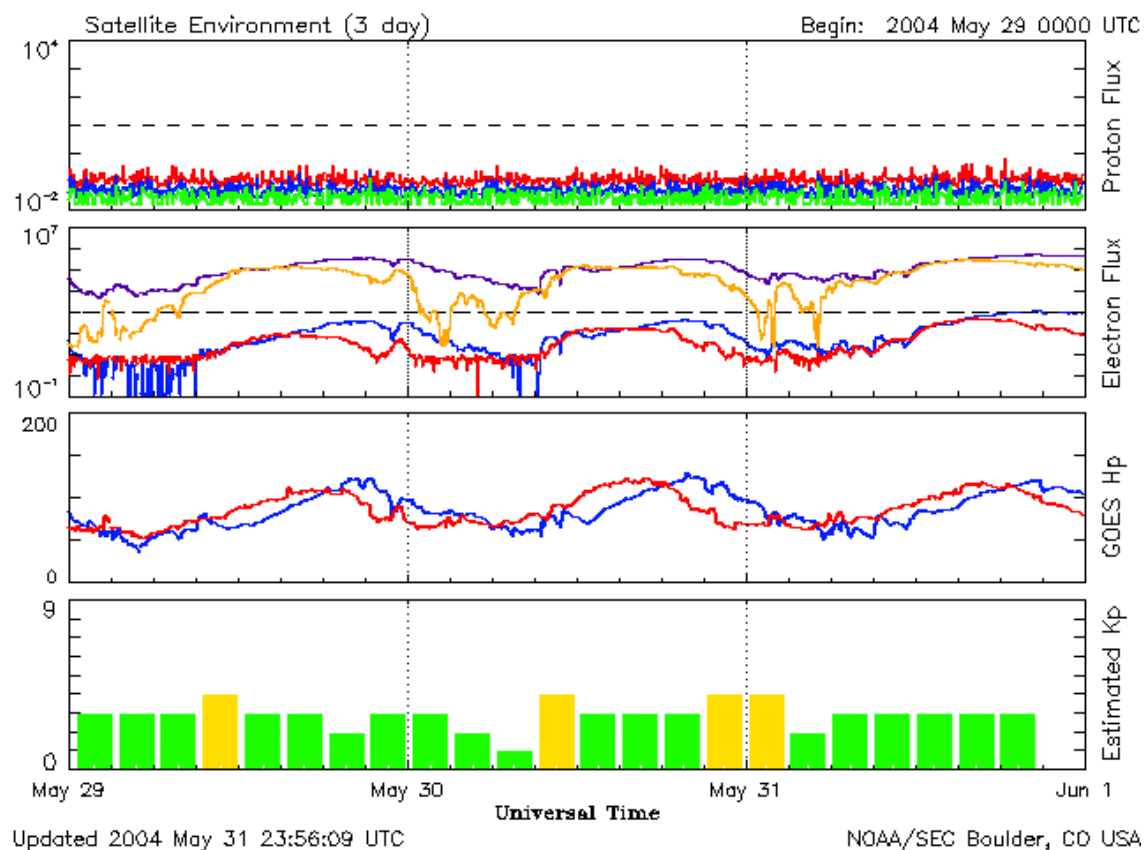
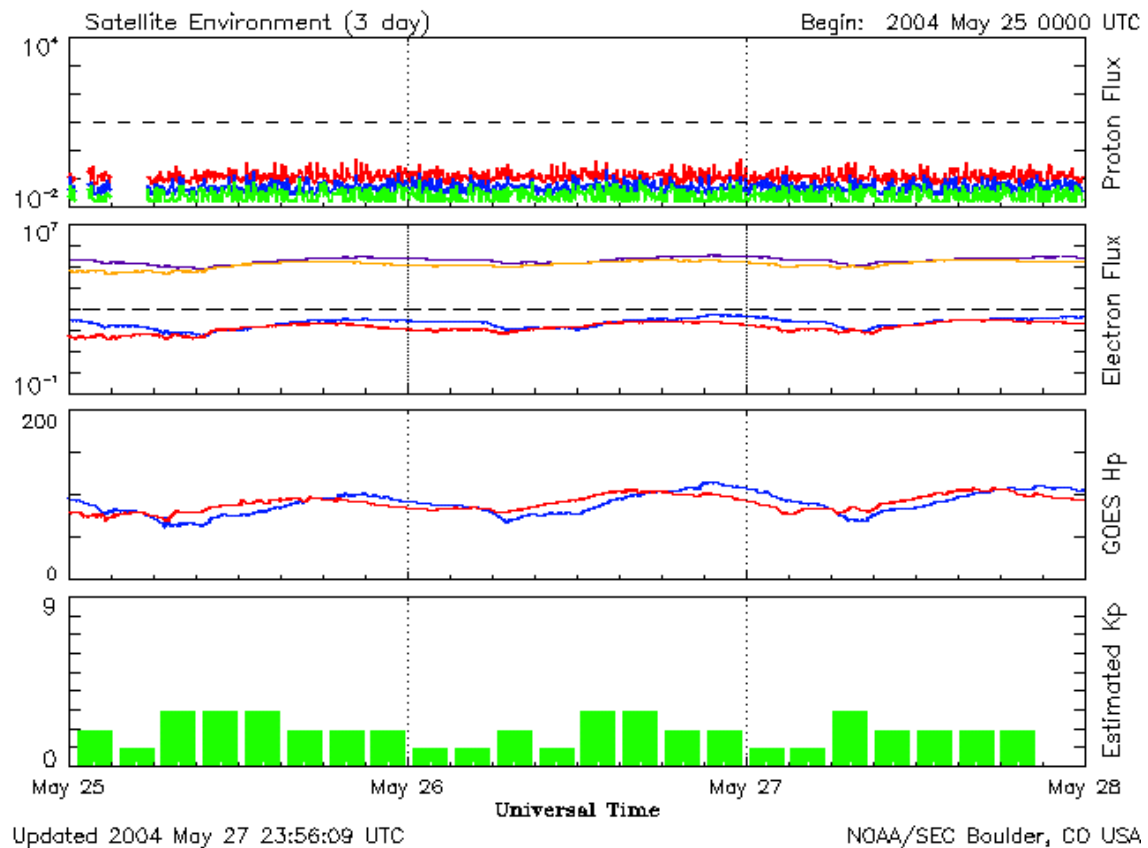
Zoom

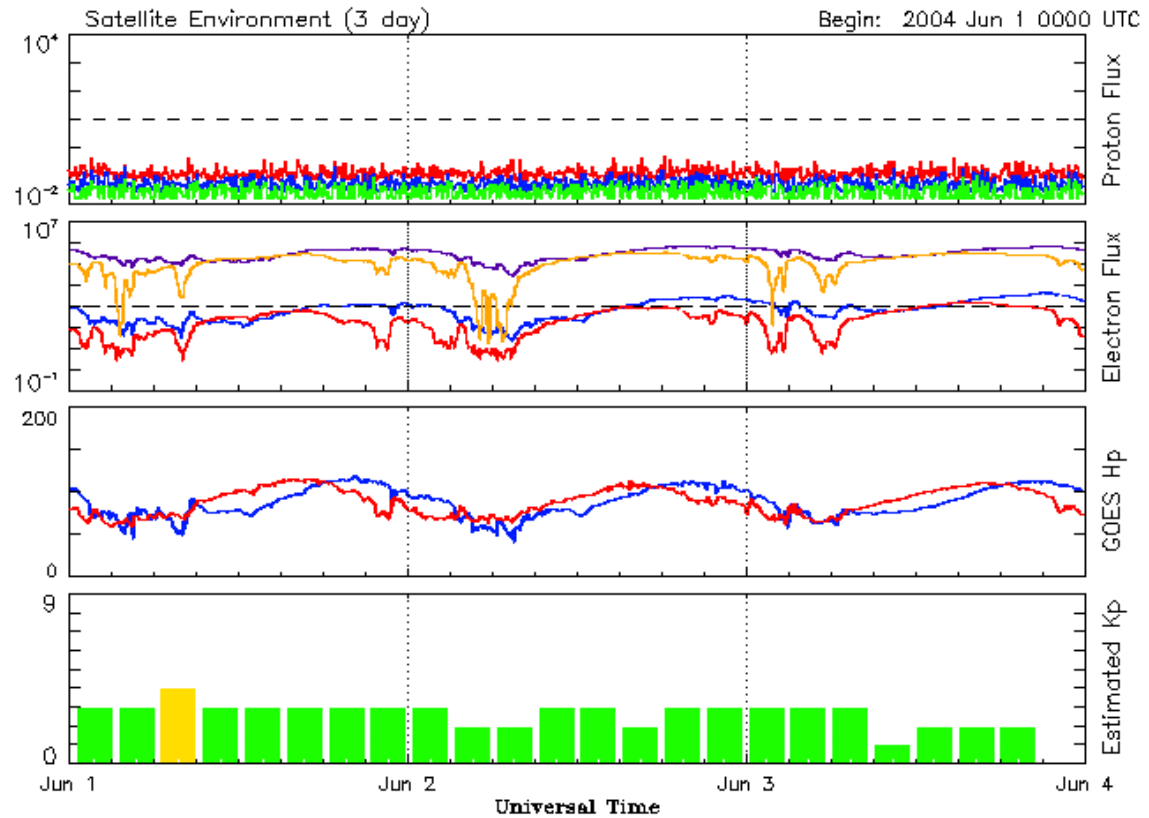
Print...



SEC-GOES observed particles fluxes







Updated 2004 Jun 3 23:56:09 UTC

NOAA/SEC Boulder, CO USA