
EUROPEAN SPACE AGENCY
DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT
MISSION OPERATIONS DEPARTMENT

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 142
Week 23
13.06.05
Routine Phase

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1 General

The Flight Control Team at MOC has compiled this report with some input provided by the Flight Dynamics Team, ISOC and ISDC.

It addresses the activities from 04.06.05 until 10.06.05 (both dates inclusive) and covers the revolutions 323 and 324.

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 Crux Arm (RA 11:57:7.00; DEC -59:12:12.0) and the Coma Cluster (RA 12:59:48.70; 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.

The Eclipse season completed with the 7th and 8th eclipse passages on 05/06/2005 and 08/06/2005, DOY 156-159. The eclipse passages were nominal from an AOCS point of view. After the end of the season the ACC/FDE/FCE Eclipse Timers were stopped.

3 slews (2 CSL, 1 OSL) were missed from the Timeline during this period, due to problem on the new release of the MCS and problem during DSS16 pass on rev 322.

The fuel consumption over the period between 04/06/2005 and 10/06/2005 was 0.1646 kg. The remaining propellant is in the order of 160.9529 Kg.

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

3.1.2 Power

The 7th and 8th eclipses of the current eclipse season occurred during the reference period.

On 5/6/2005 Integral passed through eclipse #7 of the summer eclipse season. Eclipse #7 had a total duration of 50 minutes. The batteries Depth of discharge was approximately 4.50Ah each and the battery recharge time was about 2 hours 44 minutes.

On 8/6/2005 Integral passed through eclipse #8, the last eclipse of the summer eclipse season. Eclipse #8 had a total duration of 32 minutes. The batteries Depth of discharge was approximately 2.50Ah each and the battery recharge time was about 1 hour 29 minutes.

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

On 10/6/2005 following the end of the eclipse season, the MRU end of charge Timer threshold was set to 0, and the circuit was left in enabled status.

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

On 10/6/2005 following the end of the eclipse season, the On-board monitoring table was reloaded with the entries to be used outside of the 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. A problem in the Mission Control System (MCS) Automatic Timeline (ASTACK) left the instrument configured with some ACS High Voltage switched on inside the belts in rev.322. This had no consequences.

The eclipse season ended on 8th June.

During the reporting period, the instrument has been kept in photon-by-photon mode, with spectra telemetry enabled, an assigned telemetry bandwidth in the science observation windows of 103 pkts/cycle and an actual average occupation of 93.5 pkts/cycle.

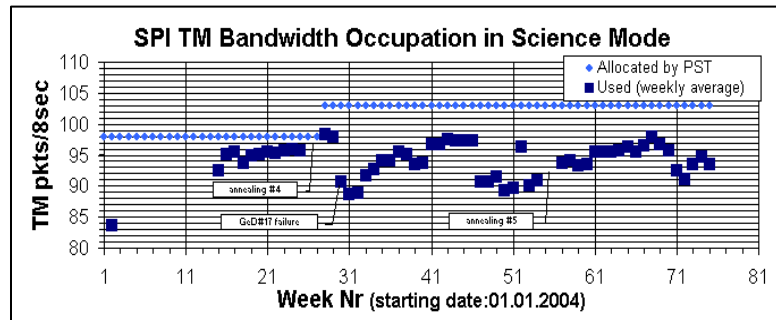
The Stirling compressors are working well, maintaining the detector cold-plate temperature within 85+/-1K.

One PSAC temperature is still out of range since the start of the eclipse season (18th May).

Testing of the software patch to fix both the TM leakage malfunction (AR INT_SC-107) and the missed belts entry ACS HV switch off malfunction (INT_SC-115) has been resumed, thanks to the DPE, lent by OMC to the SPI team.

The next annealing (6th) of the detectors is planned on 14th June. An annealing summary timeline is published in this report, under the future activities section.

The following plot shows the evolution of the allocated/occupied telemetry bandwidth, since beginning of 2004



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

3.2.2 IBIS

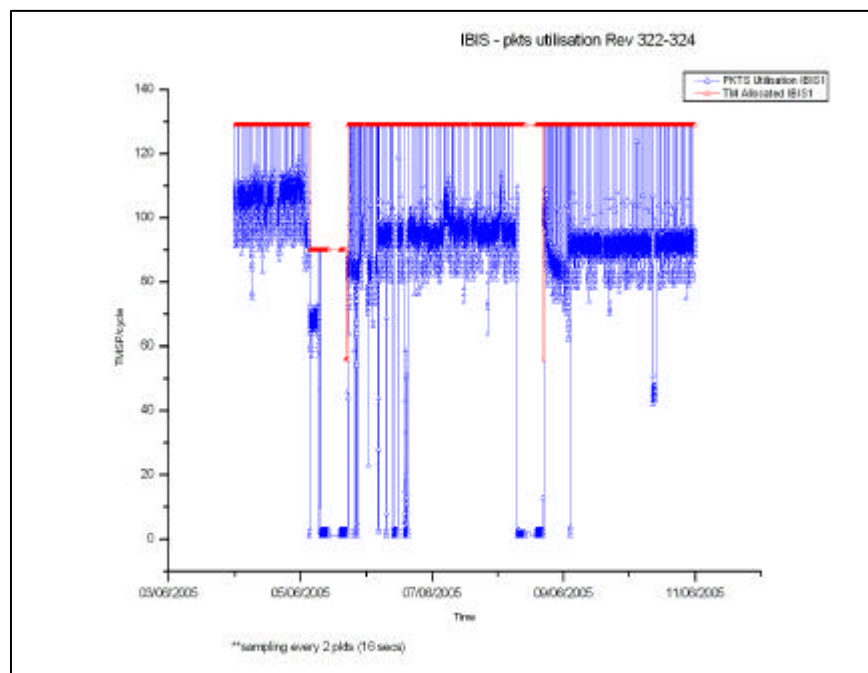
The Overall status of the unit is Nominal.

The week was characterised by low solar activity.

No anomalous or unexpected behaviour was reported during the eclipses of this week.

During the reporting period the PST allocation to IBIS was most of the time 129 TMPS/cycle, except on DoY 156 between 03:26Z and 16:38Z when it was 90 due to an OMC FF Calibration. The IBIS mean bandwidth utilisation during the observation period was 98.20 TMPS/cycle, down 5.93 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.

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 the period from 2005-06-05T03:26Z to 2005-06-05T07:28Z (radiation belt entry of revolution 322), OMC Flat Field and Dark Current calibrations were performed and therefore OMC was in FFCalibration followed by DCCalibration modes and had a TM allocation of 63 packets/cycle.

During this reporting period, 141 of the 145 planned science pointings for OMC were executed nominally. One pointing (PID 03220042) was lost in order to avoid a possible STR processor fault due a bright object. One pointing (PID 03220056) was missed due to dynamic PTV failure of the associated slew sequence. In addition, two pointings (PID 03230007 and 03230023) were cut short due to CCCF execution during the pointings.

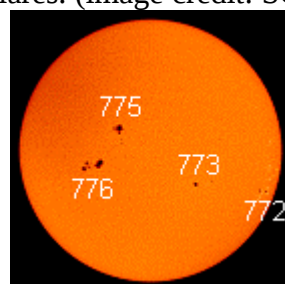
Note: Some more information concerning the OMC operations is provided in the Appendix Section 8.3.5.

3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity:

The observation period was characterised by low solar activity. At the end of the week, sunspots 775 and 776 had developed complex magnetic field and hence posed a threat for strong M-class solar flares. (image credit: 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, 155 slews were executed correctly, and 3 were lost due to ground station problem with DSS16 (1) and ground problem with the new system's release (2).

4.1 Mission Operations Centre

Since last week when operations were switched from the imcs-a running the IMCS 'Classic' S/W to imcs-c running the new 'Evolution' version, some problems have been reported. More details are provided in the next section. The performance of the MOC was good this week. 3 pointings were however lost due to MOC.

4.1.1 Upgrade of IMCS.

On 2nd June during perigee, the prime MCS used for operations was moved from IMCS-A to IMCS-C, following upgrade of IMCS-C with new IMCS software, IMCS version E1.3. Since this time IMCS-C has been used for all operations, IMCS-A is running as back up, connected to VC-0 TM stream only. Following the handover a number of problems were noted with new control System, the following problems were the most significant this week:

- It was observed that occasionally commands are not released from the MCS due to a timeout in communications between 2 internal processes. Unfortunately this timeout occurs before the command reaches the TC History and so no alarm is generated on the MCS and no failure is indicated. An emergency fix for this problem is in preparation.
- Apart from this some errors continued to be observed in the distribution of RT TM and auxiliary data files to ISDC and in the various TM archives.

Monitoring of the performance and stability of the IMCS-C is still on-going. The IMCS-A will be maintained in hot back up until all outstanding issues with the new IMCS have been resolved.

4.2 Ground Stations & Network

The performance of the ground stations and Network was very good this week. There were some minor drops in TM from Redu & DSS-16. And, a loss of TC link from Goldstone caused to miss a slew. The overall performance was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSF's for up to rev 333 have been received. It is agreed to start the SPI annealing in revolution 326. This is expected to last up and including 330. Therefore the planning of revolutions 327 up to 329 has a special telemetry allocation only giving the minimum to SPI. The rest has been reallocated to JEM+X and IBIS. Mission planning has been performed up to revolution 332 and the POS's sent to MOC. No ToO request has been received. TSF for rev 324 to 326 were received.

2. Observation status

ECS's for revolution 312 was received. The corresponding OCS's have been generated and sent to ISDC. No extra time was credited. ECS for revolution 301 and 311 are missing.

3. ISOC science data archive

An upgrade of the beta version of ISDA has been done to correct/ modify what was discovered during the internal beta testing. Critical item is the ingestion of data into the archive. This process could be resumed during the week but there is still a backlog. The process to copy data automatically from ISDC to ESAC is seriously hampered by very low network performance. This problem has been looked into during the week but no conclusion is available. A first test indicates that the problem is neither in ISDC nor in ESAC. This makes it much more difficult to track. Further investigation is ongoing.

4. ISOC system

The version 10.9.2 has been used most of this week. A problem detected when generating the very long observation covering most of the SPI annealing required the system to be patched to version 10.9.3

5. Problems

The network problem mentioned above is becoming critical for the ISDA schedule to make the ISDA publicly accessible.

4.3.2 ISDC

Status of ISDC observation processing on 13/06/2005:

- Latest Standard Analysis completed: observation 03201090019 (Gal. Bulge region, Revolution 306) on 28/05/2005
- Latest products archived: observation 03201090019 (Gal. Bulge region, Revolution 306) on 08/06/2005
- Latest observation products sent to the observer: observation 03201090009 (Gal. Bulge region, Revolution 295) on 06/06/2005

5 Special Events

6 Anomalies

There were a number of problems that impacted the operations:

- On DoY 155, at 00:02Z “Lost connection to TM RT cache” was reported in the Event logger.
- On DoY 156, at 00:55Z, TC A3084 failed release due to MCS problem (see section 4.1.1).
- On DoY 156, at 03:02Z, bad frames were received from REDU.
- On DoY 156 at 07:38Z, TC sequence EENTRY02 failed release due to MCS problem (see section 4.1.1).

- On DoY 156, at 08:39Z, TC link was unexpectedly lost from Goldstone. This caused the loss of slew ID 03220062.
- On DoY 156 at 09:26Z a resweep of DSS16 was needed. At 09:27Z bad frames were received from DSS16, a new resweep was done at 09:28Z. At 09:30Z DSS16 brought down the carrier and reswept it. TM link was reported lost and back at 09:32Z, TC link was back at 09:36Z. Problems on the Ground Station were apparently due to service instances not being updated to DSS16 for the complete pass.
- On DoY 156 at 18:26Z, "Link TM-DDS-VC7RT" was reported toggling between disconnected and connected in the Event logger. TMDS-RT on iddc was restarted at 18:38Z. This appeared to have cured the problem. However at 20:04Z the event was again reported in the event logger, and TMDS-RT was restarted in iddc at 20:16Z. Finally, a third occurrence of this event was reported at 20:24Z.
- On DoY 156 at 23:36Z CCC informed of crash and manual reboot of idda, this is possibly related to the previous problem. After the reboot of idda, the imca was showing red on Global MMI.
- On DoY 157 at 11:22Z, sun128 (Flight Dynamics machine) was showing red on Global MMI.
- Between DoY 157 at 21:11Z and DoY 158 at 00:26Z "Link TM-DSS-VC7RT" was reported 6 times toggling between disconnected and connected. On DoY 158 at 00:31Z TMDS-RT was restarted on iddc.
- On DoY 159 at 22:30Z the TM link with ISDC was showed disconnected on TM Spacon but no message in the event logger was reported. Network was requested to remove and re-apply TM links on INCTRA. At 22:34Z, the TM Spacon display was restarted and MADDS-ISDS connection showed "TM flow" while both ISDC and IFRD were reported disconnected. CCC was requested to stop and restart IFRD on ISDS-C. At 23:00Z MADDS-ISDS connection status showed "TM flow" and both ISDC and IFRD were reported connected this time. However the link ISDS -> ISDC was reported toggling between connected and disconnected in the Event logger. CCC was requested to stop, reboot and restart all applications running on ISDS-C. This was done later on and at 07:08Z the link MADDS-ISDS, ISDC and IFRD were all reconnected. At 07:18Z "error sending data to ISDS" was reported in the Event logger. Following the analyst's request, ISDC changed their link from ISDS-C to ISDS-A and back. At 07:53Z ISDC connected correctly to the C-chain and the problem was fixed.
- On DoY 161 ISDC were not receiving the OLF file. After software support intervention at 15:49Z ISDS-C was back on line and the OLF were correctly delivered to ISDC.

The following anomaly reports were entered into the ARTS system this week:

AR id	Date Created	Subject	Segment	Status
INT-2746	13/06/2005	E1.3: TMPQ Display of SPID 211001 Crashes TMPH	IMCS	Pending
INT-2747	13/06/2005	OLF sent twice	IMCS	Pending
INT-2748	13/06/2005	Timeline Commands Missed due to Incorrect Constants Table.	IMCS	Pending

INT-2749	13/06/2005	E1.3: TDRS Display of Time Parameters.	IMCS	Pending
INT-2750	13/06/2005	E1.3: TMPRINT Display of Time Parameters.	IMCS	Pending
INT_SC-120	07/06/2005	IBIS problem on the HBR-B I/F: stop of Histogram downloading.	Payload	Open

7 Future Milestones

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 has been delayed due to configuration problems encountered during testing, it will be made after completion of the IMCS upgrade.

Upgrade of the IMCS, to use S2K release 3.1. A major update of the MCS is currently in progress, see section 4.1.1.

Change of communication protocol to ESA Station from X25 to TCP IP, testing of this change will start once the IMCS-C is available again. 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 323

The observations in revolution 323 consisted of 13 pointings of a GPS lasting ~9 hours, followed by a raster dithering observation of the Crux Arm (RA 11:57:7.00; DEC -59:12:12.0), performed for the remaining ~50 hours of observation time.

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

Revolution 324

The observations in revolution 324 consisted of 11 pointings of a GPS lasting ~8 hours, followed by a raster dithering observation of the Coma Cluster (RA 12:59:48.70; DEC +27:58:50.0), performed for the remaining ~52 hours of observation time.

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

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2005-05-24T16:29:02.000Z	161.2658	F	Automatic TM processing.
2005-05-25T00:58:47.000Z	161.2526	F	Automatic TM processing.
2005-05-25T02:05:43.000Z	161.2250	F	Automatic TM processing.
2005-05-26T02:12:26.000Z	161.2043	F	Automatic TM processing.

2005-05-27T09:18:21.000Z	161.1850	F	Automatic TM processing.
2005-05-27T16:17:58.000Z	161.1506	F	Automatic TM processing.
2005-05-30T16:05:25.000Z	161.1317	F	Automatic TM processing.
2005-06-01T01:42:01.000Z	161.0998	F	Automatic TM processing.
2005-06-02T15:55:09.000Z	161.0905	F	Automatic TM processing.
2005-06-04T01:16:08.000Z	161.0309	F	Automatic TM processing.
2005-06-05T15:45:00.000Z	161.0175	F	Automatic TM processing.
2005-06-06T00:12:05.000Z	160.9965	F	Automatic TM processing.
2005-06-06T02:39:41.000Z	160.9714	F	Automatic TM processing.
2005-06-08T15:16:52.000Z	160.9580	F	Automatic TM processing.
2005-06-08T23:47:25.000Z	160.9259	F	Automatic TM processing.

This report was generated Fri Jun 10 08:00:23 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, 04/06/2005 – 10/06/2005

AOCS operations were executed from the Automatic Timeline.

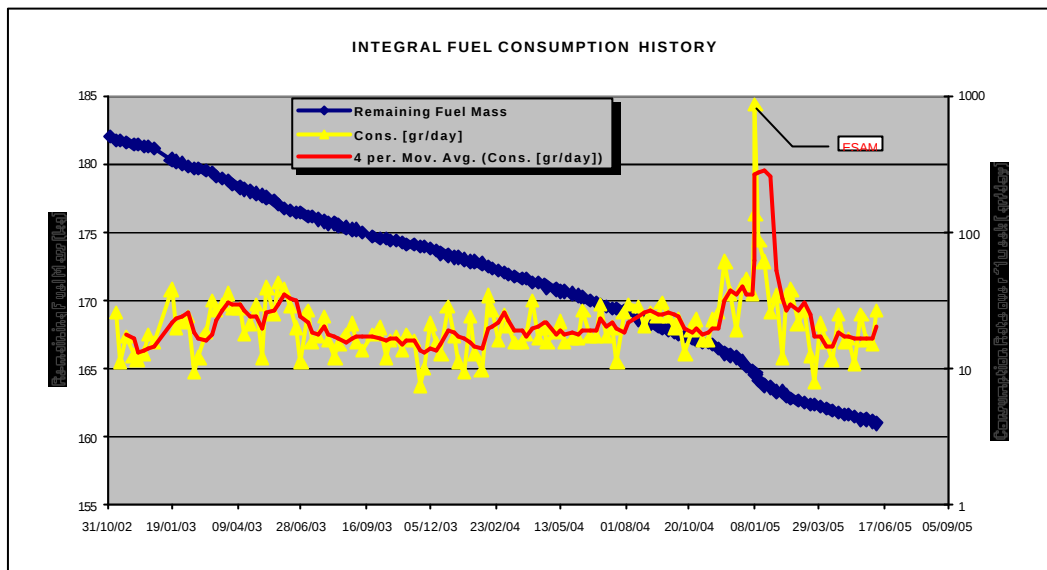
During this period, 55 Open Loop Slews, 103 Closed Loop Slews and 6 Momentum Bias were executed. 3 (2 CSL, 1 OSL) slews were missed due to problem on the new release of the MCS and problem during DSS16 pass on rev 322. This is equivalent to a $\sim 1.8\%$.

The AOCS eclipse operations were nominal. For the 7th and 8th eclipse passages, 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			11:59:31	12:06:40	12:11:17	12:16:25	0:23:01
2005-05-21	11:32:00	15:17:00	10:15:57	10:58:24	11:06:58	11:07:42	11:15:37	11:18:26	11:18:35	12:08:15	12:09:02	12:10:39	12:14:38	12:20:50	0:55:02
2005-05-24	11:18:00	15:03:00	09:59:13	10:41:54	10:50:33	10:51:17	10:58:53	11:01:15	11:01:15	12:03:23	12:04:04	12:05:11	12:09:57	12:15:34	1:06:18
2005-05-27	10:55:00	14:50:00	09:50:25	10:31:50	10:43:15	10:43:59	10:50:05	10:51:23	10:52:12	11:58:27	11:58:13	12:00:00	12:05:35	12:09:08	1:09:55
2005-05-30	10:55:00	14:39:00	09:45:47	10:26:52	10:38:26	10:39:10	10:45:27	10:46:24	10:47:28	11:52:10	11:51:44	11:53:41	11:59:18	12:02:30	1:08:14
2005-06-02	10:43:00	14:30:00	09:42:58	10:24:03	10:35:38	10:36:14	10:42:38	10:43:23	10:44:45	11:42:54	11:42:13	11:44:30	11:49:46	11:53:17	1:01:52
2005-06-05	10:30:00	14:17:00	09:41:21	10:22:10	10:33:47	10:34:31	10:41:01	10:41:38	10:43:25	11:29:47	11:28:55	11:31:43	11:37:03	11:40:14	0:50:42
2005-06-08	10:19:00	14:05:00	09:43:14	10:24:08	10:35:31	10:36:15	10:42:54	10:44:16	10:46:32	11:12:04	11:11:22	11:15:15	11:20:27	11:23:49	0:32:21

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
2005-05-21 08:05:31	2005-05-21 12:23:02	0.2124	0.2817	0.2901	4:17:31	7:56:31
2005-05-24 07:47:21	2005-05-24 12:17:47	0.2904	0.2772	0.2602	4:30:26	12:26:57
2005-05-27 07:37:09	2005-05-27 12:11:27	0.1852	0.1811	0.2119	4:34:18	17:01:15
2005-05-30 07:55:36	2005-05-30 12:04:47	0.2733	0.1595	0.1350	4:09:11	21:10:26
2005-06-02 07:33:06	2005-06-02 11:55:38	0.1569	0.2102	0.2370	4:22:32	25:32:58
2005-06-05 07:15:33	2005-06-05 11:42:28	0.1928	0.2982	0.4800	4:26:55	29:59:53
2005-06-08 07:38:35	2005-06-08 11:25:59	0.2129	0.1583	0.1370	3:47:24	33:47:17

The fuel consumption over the period between 01/11/2002 and 10/06/2005 is reported in the plot below.



04/06/05 (Day of Year 155, Revolution 322)

Preventive action on AOCS s/s due to bright object in FOV: due to the presence of a Bright Objects (ID 8979-03464) in the STR FOV that could have caused the premature abortion of the (manual and automatic) mapping and the failing of the attitude reconstruction process, a preventive actions was performed for slew ID 003220042, as per OR INT-208:

- at 10:34:00Z, i.e. 2 minutes before the starting of commanding for slew ID 42, the AOCS s/s was disabled in TL and the slew for ID 42 left failing the release in TL.
- Performed a manual recovery to attitude of PID 03220043 and manually update the TL for PID 03220043
- The AOCS s/s was re-enabled in TL at 11:24z. The slew ID 03220042 was missed.

STR 1750 processor fault: at 14:48:59z a STR 1750 processor fault occurred during the execution of the PID 03220046. The sequence of the events was:

14:47:25z Close Loop Slew End for PID 03220046
 14:48:24z Mapping start
 14:48:59z Mapping End prematurely (aborted)
 14:48:59z IMU 1 ON
 14:48:59z New automatic mapping commanded by the ACC.
 14:58:59z IMU 2 OFF

No impact reported on the TL execution except that the OTF for the PID 03220046 was not reached.

05/06/05 (Day of Year 156, Revolution 322-323)

Slew missed from the Timeline: Due to a problem on the new release of the MCS (Exception raised by the CMD Multiplexer task during commanding activity), the sequence for the slew ID 03220056 (CSL) failed release at 00:55z because one TC, A3086 (SSL INI), was unexpectedly not released by the Autostack. The sequence was stopped due to missing verification and furthermore the command was not reported in the TC History task.

The reason for failing release and reporting is unknown. From the on-board point of view all was right and the telemetry was correctly received and processed.

A manual recovery was then performed to the attitude of PID 03220056. The next slew (OSL) for PID 03220057 was manually updated and executed from the Timeline.

Slew missed from the Timeline: Due to a problem on DSS16 station (pass service instances not updated), the slew ID 03220062 (CSL) was not executed (TC link down) and the AOCS s/s disabled in TL at 8:40z. A manual recovery was then performed to the attitude of PID 03220062. The next slew (OSL) for PID 03220063 was manually updated and executed from the Timeline. The AOCS s/s was re-enabled in TL at 10:15z.

Guide star released by the STR SEU Filter: in three occurrences at 14:03:31z, 14:21:06 and 14:27:52z the SEU Filter threshold of the ACC was exceeded and the guide star released. A new guide star was picked in the first automatic mapping, which was kept afterwards.

06/06/05 (Day of Year 157, Revolution 323)

Nothing to report.

07/06/05 (Day of Year 158, Revolution 323)

Nothing to report

08/06/05 (Day of Year 159, Revolution 323-324)

Reconfiguration of the AOCS after the eclipse season: With the ending of the eclipse season the ACC, FDE and FCE Eclipse Timers were stopped. The manual operation started at 20:29z and the following steps were performed:

- freezing the FDE Eclipse Timer in the sunlight state (by loading zero and starting the Timer);
- Freezing the FCE Eclipse Timer in the sunlight state (by loading zero and starting the Timer);
- Stopping the ACC Eclipse Timer task.

09/06/05 (Day of Year 160, Revolution 324)

Nothing to report.

10/06/05 (Day of Year 161, Revolution 324)

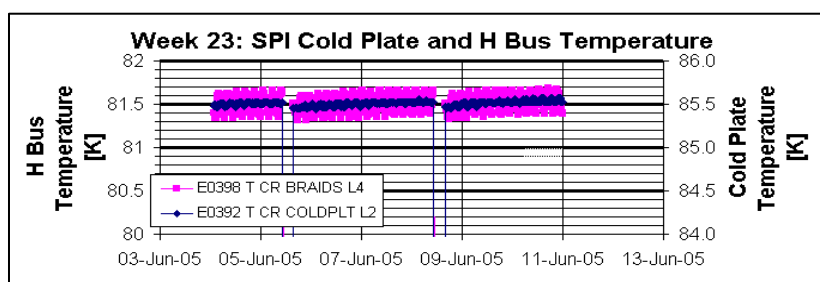
Nothing to report.

8.3.2 SPI Operations

Stirling compressors and Cryostat:

The performance of the compressors is nominal. The cold plate temperature was maintained at 85K $\pm$ 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.



DPE & IASW:

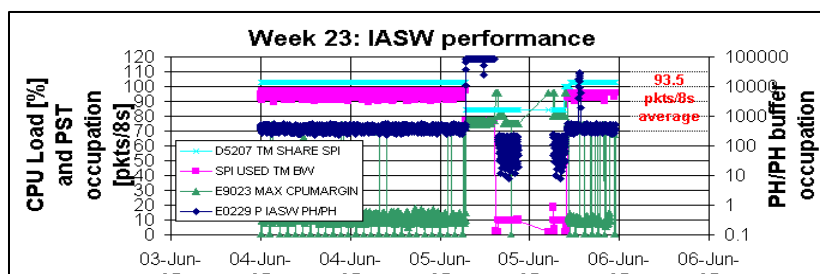
The IASW performance is nominal. The PST TM bandwidth allocation was 103 pkts/cycle in the science windows; During the OMC Flat Field observation OMC was in FFCalibration followed by DCCalibration mode and the TM allocation was IBIS 90; SPI 84; JEM-X1 8; JEM-X2 1; OMC 63.

The actual TM bandwidth usage is:

- 102-103 pkts/cycle peak (1 pkt/cycle is sometimes unused due to TM leakage anomaly);
- 93.5 pkts/cycle average in science mode, during observation periods.

The temporary workaround to the TM leakage anomaly (AR INT_SC-107) has been stopped since rev.322 due to a problem in the PST commands with the new MCS release.

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

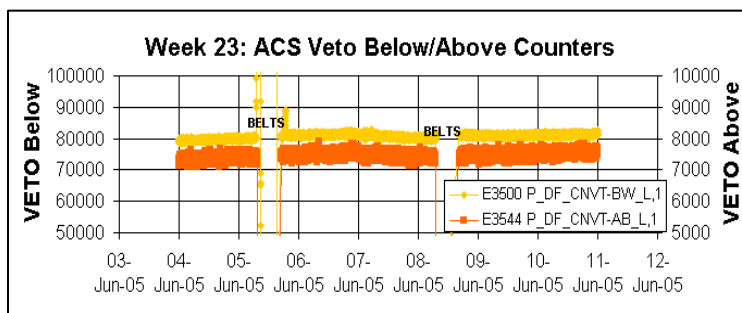


ACS:

The performance of the ACS is nominal except for the PSAC thermal environment. It is since the 2nd -3rd eclipse passage of this season that TM E2116 has exceeded the low hard alarm limit, without re-entering in range. The PI and the ACS experts have

been contacted: according to preliminary analysis it could be a failure of the sensor chain as all other temperature reading, close to E2116, show a nominal value. It has been decided to wait sometime after the end of the upcoming annealing cycle to see if the temperature returns in limit, before doing further investigations/drawing final conclusions.

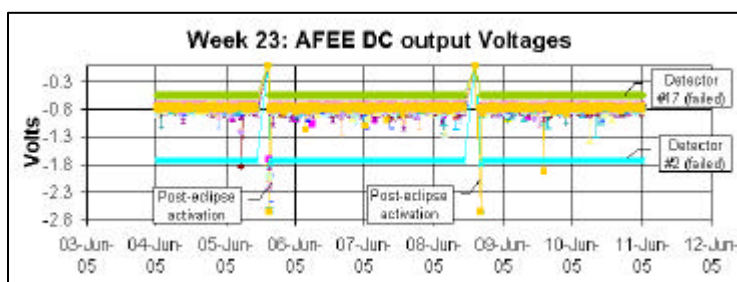
The following plot shows the ACS overall count rate evolution during the reporting period.



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.

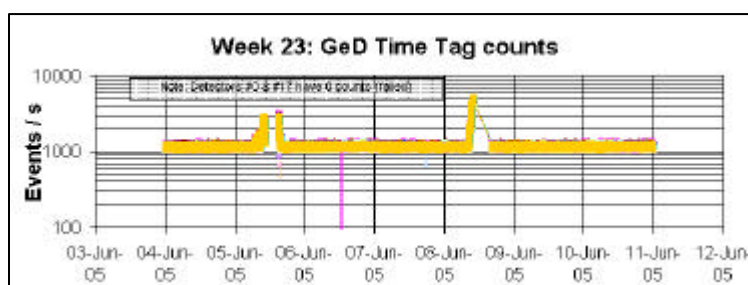
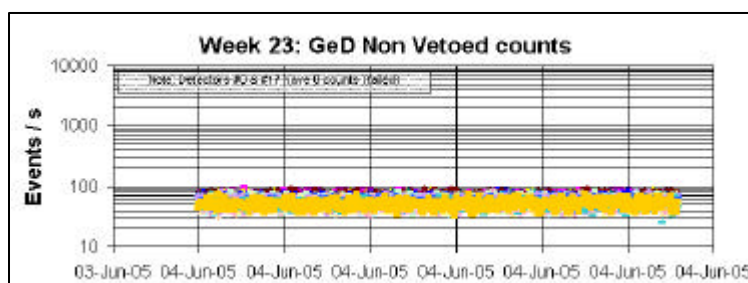
The following plot shows the AFEE dc output signals during the reporting period.

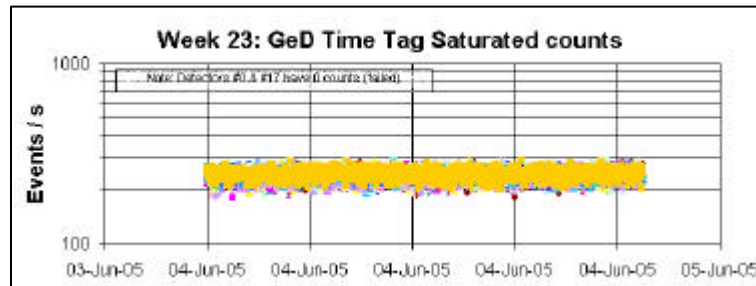


DFEE:

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 (due to problems in the TM retrieval tool, some plot could be affected by large gaps).





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.

SPI DAILY EVENTS

NOTE: The events log is extracted from the revolution pass summary.

DOY Time	Event
156 / 06:54	TM E3500 "P_DF_CNVT-BW_L,1" OOL alarm high at 100,655. / No action requested as specified in the OR-0198.
156 / 07:24	Seq. EENTRY02 failed release because of Dyn. PTV
156 / 07:27	Radiation Belt Entry.
156 / 07:28	Seq. EEORTM01 failed release because of Dyn. PTV
156 / 07:38	Seq. EENTRY02 failed release from the Manual Stack because of Dyn. PTV. / Dynamic Default was blocked. The time for release from the M/S was not the same as the Actual Time
156 / 08:01	Interlock for SPI subsystem reset on Autostack.
156 / 08:08	First investigation shows that the SPI TM onboard time is out of sync with the actual TM Time. / SPI Report packet properly generated but received outside the verification window. / All the attempt to uplink manually the SPI sequence failed for the same reason.
156 / 08:18	TM P2014 "LCL CUR ACS-A" OOL warning high at 1.45 A
156 / 08:36	TC D3712 "VER TIME SPI1" uplinked
156 / 16:50	TC E0253 (SEQ EEXIT-02) failed release due to dynamic PTV failure (at the same time, an EXCEPTION message was displayed in the Event logger concerning the CMDHmplx) / SEQ EEXIT-02 was resent.
159 / 07:11	TC EU0202D (SEQ EENTRY) failed release due to heavy load of the system. /EENTRY sent manually.

159 14:56-16:20	⇒ TC E0251 "TC-R AS SERV1"; TC E0252 "TC-R AS SERV2"; TC E0253 "TC-R AS SERV3" Failed release. ⇒ OEM: SPI1 LSL Error - ID 145. ⇒ SPI Reactivation after the eclipse failed. The SPI activation was manually performed by executing the following procedure: o CRP_SPI1_5140 o CRP_SPI1_0061 o CRP_SPI1_0043 (Step 3.10 P2014 = 1.258A) o CRP_SPI1_0080 o CRP_SPI1_0175 o CRP_SPI1_0160 ⇒ SPI1 was re-enabled on the A/S @ 16:20
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Future activities:

The 6th SPI annealing will start on 14th June (rev.325 belts entry) and will last until 29th June (rev 331 belts exit). The annealing schedule includes 125hours at 104degC, several calibration runs of the ACS and a special configuration of the AFEE to monitor the faulty Ge detectors during the warm phase.

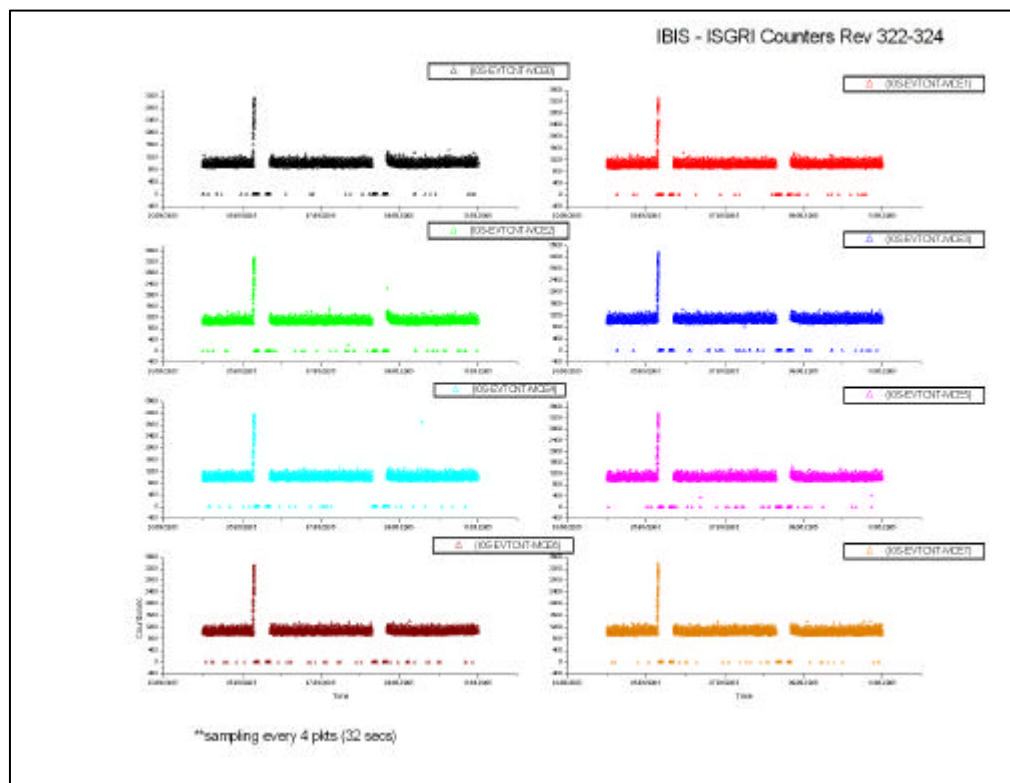
Here follows the summary view of the updated timeline:

6th SPI Annealing - revs 325-331																										
ID	Task Name	Duration	Start	Resource Nam	13 Jun '05							20 Jun '05							27 Jun '05							
					Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su
2	Start SPI Annealing	2.52 hrs	14 Jun 06:48	PST[20 pkts]	un 06:48																					
16	Warm up to Annealing Temperature	38.34 hrs	14 Jun 09:09	PST[20 pkts]	Jun 09:09																					
23	Annealing at 104degC	125 hrs	15 Jun 23:29	PST[20 pkts]	15 Jun 23:29																					
32	Stop SPI Annealing - Passive Cooling	67.02 hrs	21 Jun 04:29	PST[20 pkts]									21 Jun 04:29													
35	ACS Switch-on and Calibration	133.8 hrs	20 Jun 15:38	PST[20 pkts]									20 Jun 15:38													
50	Active Cooling	121.52 hrs	23 Jun 23:31	PST[20 pkts]										23 Jun 23:31												
65	Active Cooling Fine Tuning	72 hrs	29 Jun 01:02	PST[20 pkts]																29 Jun 01:02						
67	Camera Switch on & Performance Tests	35.28 hrs	27 Jun 18:32	PST[103 pkts]															27 Jun 18:32							
91	Resume SPI POS Observations	62 hrs	29 Jun 15:05	PST[103 pkts]																29 Jun 15:05						

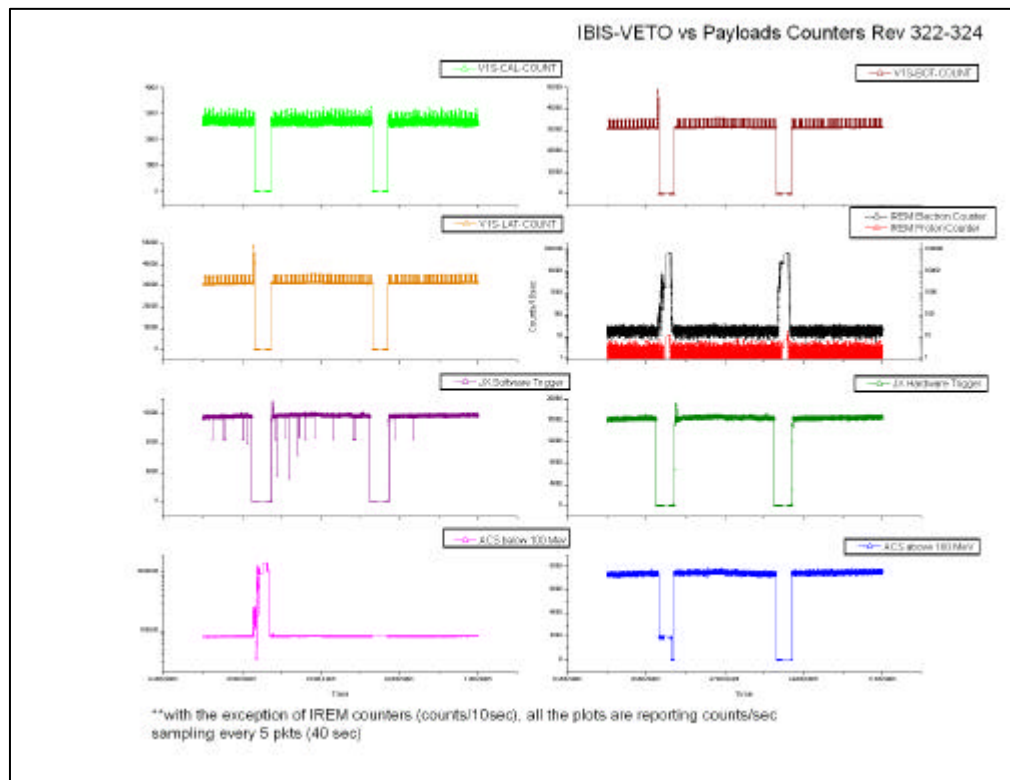
8.3.3 IBIS Operations

IBIS Events Counters Plots.

ISGRI Counters:

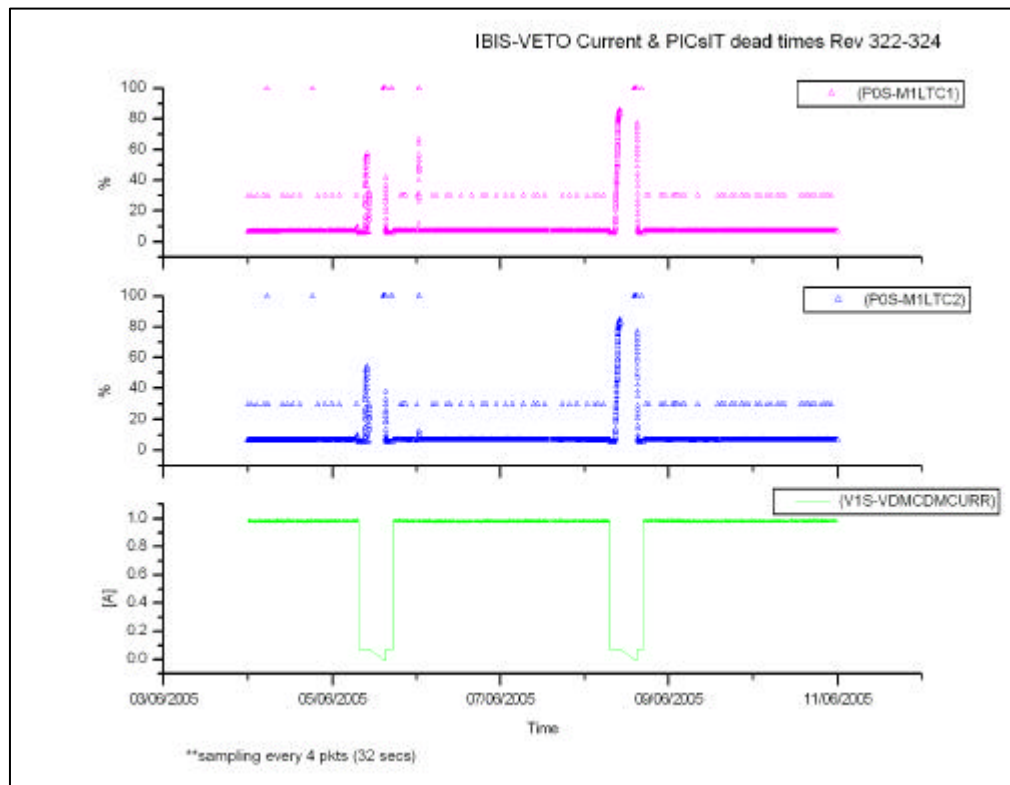


VETO vs Payloads Counters:

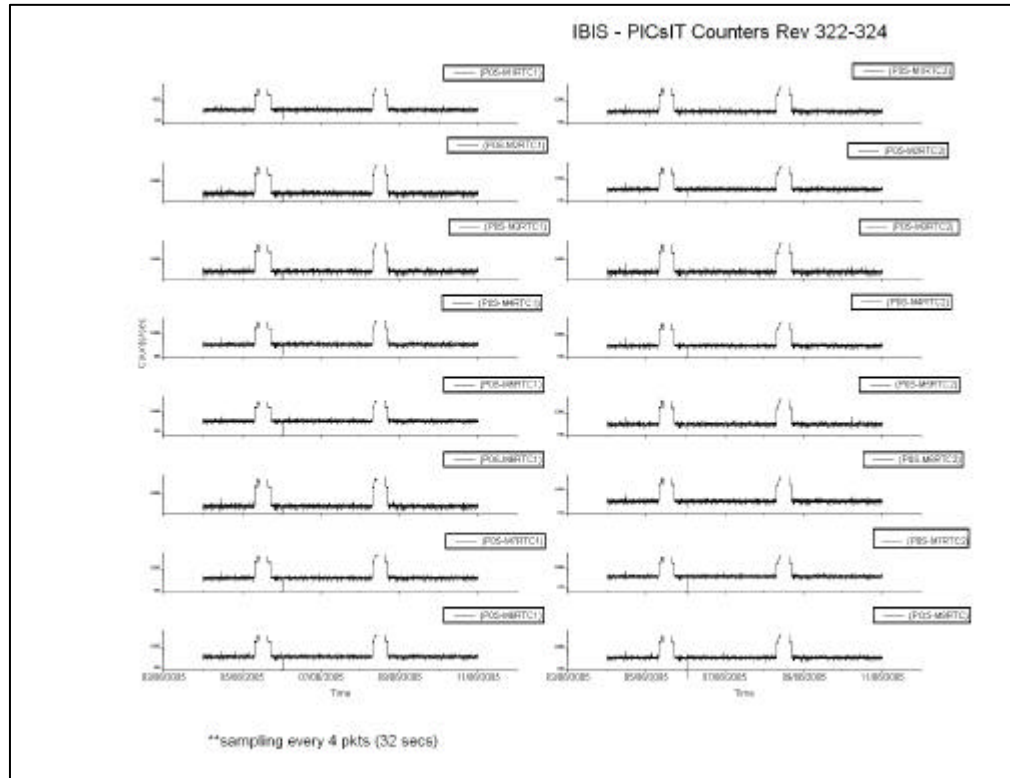


The week was characterised by low solar activity.

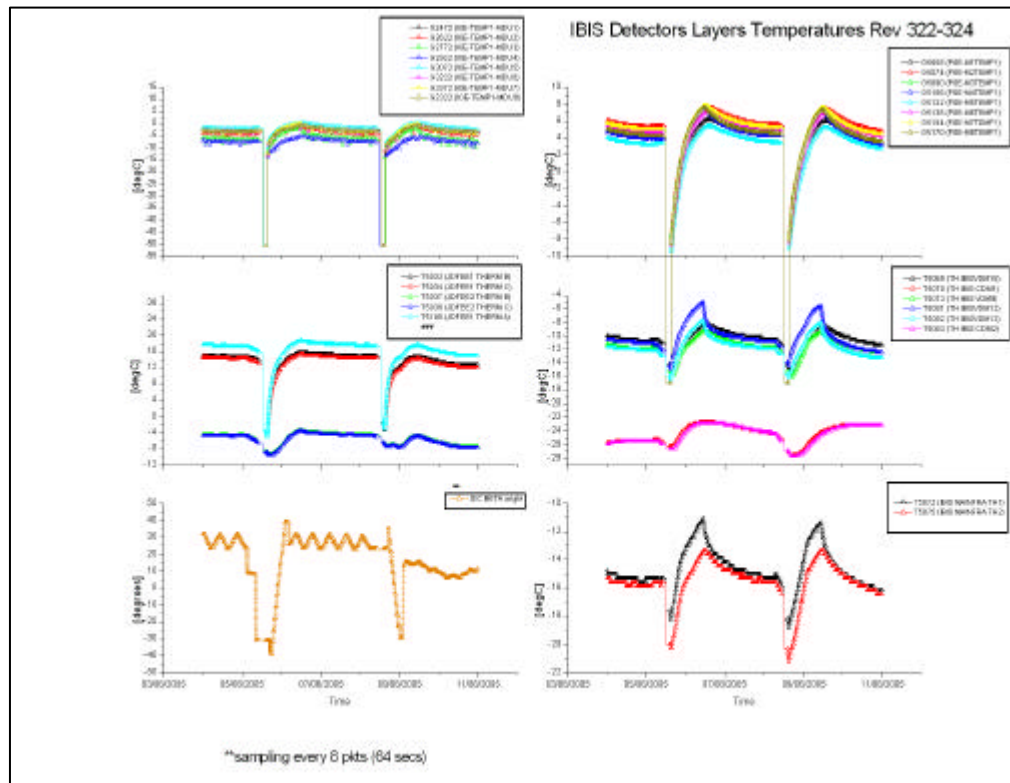
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report:

DoY 2005.156 (05/06/2005) and DoY 2005.157 (06/06/2005):

HBR B Anomaly (Details are reported in the Anomaly Report INT_SC-120)

At 01:58:11Z the 3 following OEMs (class 1 EXCEPTION) were reported:

APID 1280 ID 1 <<IBIS1 FIXED POINT OVERFLOW>>
 INTERRUPTED TASK ID=5= HISTOGRAM INTEGRATION
 STATUS WORD INT = 4097
 INSTR COUNT INT = 31150

APID 1280 ID 7 <<IBIS1 CONSTRAINT DPE CULPR>>
 IASW TASK ID =5
 OUT RANGE VALUE= 51374
 LOGICAL ADDRESS= 31153

APID 1280 ID 128 <<IBIS1 IASW EXCEPTION WAS RAISED>>
 EXCEPTION ID= HBRB TSK 1
 LOGICAL ADDRESS = 5457

The first OEM, ID 1, indicated an exception on the HBR B task (High Bit Rate Interface B: transmission of the PICsIT Calibration and Standard Histogram data) during the execution of the Histogram integration. OEM ID 7 featured an ADA exception raised in the DPE SW Culprit Identification. Finally the last OEM, ID 128, reported that an exception was raised by the IASW.

These exceptions were generated at the beginning of a new Histograms integration for PID 3220057.

Since 02:25Z, almost 1800sec after the start of Histogram integration (Histogram integration time = 1750 sec), the HBR I/F has reported no data rate, flagging a possible problem on the Histogram reading or Histogram integration functions. At the same time (02:30Z) TM parameter X7500 reported <<No Hist downloading>>. As the S/C was close to enter in Radiation Belts and as the 3 OEMs were observed only once, no immediate recovery action was taken as suggested by the Alenia UM (DPE section) and the FDIR. After Belt passage, several attempts to recover the Histogram downloading were performed following INT_OR_109, but no effect was noted.

On DoY 157 at 07:18Z IBIS was switched into Stand-by mode and the following recovery actions were performed:

- 1- Read all Histograms (INT_OR_109): no effect, HBR B still showed no data rate, and no Histogram was received by ISDC.
- 2- Discard all Histograms on –board (FCP_IBIS1_0314): integration, buffer full and reading Histogram flags were correctly reset to zero. However during the following transition to Standard Mode and integration, no Histogram downloading was observed.
- 3- Re-uplink and verification of the current scientific configuration by using the CCCF function in Timeline.
- 4- Verification of the IASW set-up relevant to PICsIT and HEPI units (FCP_IBIS1_0073, “IASW SET-UP”). No discrepancy was found with respect to the reference values.
- 5- In agreement with the IBIS PIs, at 14.00Z a dump and a comparison of the IASW and all CTX tables (HEPI, VETO, PICsIT, LUT1 and LUT2) except ISGRI, were started. No differences were found with respect to the reference images.

None of these actions has any effect. HBR B still showed no data rate and Histograms were still not downloaded.

On DoY 157 at 15:24Z IBIS was set back in Scientific Standard Mode. The scientific packets produced are S1-S2-S3-S4-S4.1-S8. ISDC confirmed that all IBIS scientific packets except S5 (Histograms Calibration) and S7 (Scientific Histograms) are correctly generated and received on ground.

Since then, investigations are on going on PIs side, and an attempt of recovery should be performed next week on DoY 165.

DoY 2005.156 (05/06/2005):

After Belt passage, at entry in revolution 0323, IBIS CTX Tables for revolution 0322 were not found in the new system directory. Instead, ISGRI CTX Tables from the previous revolution (0321) were uplinked.

This problem was fixed and did not appear on the next revolution entries.

At 06:55Z TM parameter G8080 (S1E-VS HBRA RT) went OOL High and back. As indicated in H-OVF-2, no action was taken.

At 07:01Z TM family G2013 (number of events triggering the MCEi per second) went OOL High and back at 07:28Z. According to ICNT-1 and as the parameters stayed OOL for less than half an hour no action was taken.

At 07:28Z TM parameter G8015 (S1E-A2 PMT V) went out of limit 'high'. It went back inside limit at 17:19Z (after belt exit). As this happened close to the radiation belts, according to V-VLT-1 no action was taken.

DoY 2005.157 (06/06/2005):

At 00:37Z, TM families G5068 and G5072 (POS-MiF #1 and #2 ERRF) failed SCC.

At 00:45Z, TM families G5002 and G5003 (POS-MiRTC #1 and #2) went OOL 'low-low'.

At 00:49Z, the OEM id 132 class 0 "IBIS1 IASW HEPI RESYNCHRONISED" was reported.

According to reaction P-CNT-1 that describes the coincidence of these 3 events outside Radiation Belts, no action was taken.

DoY 2005.158 (07/06/2005):

At 06:04Z TM parameter G2000 (Overflow of the noisy pixel address register in MCE1) failed SCC. As indicated in I-OVF-1, no action was taken.

DoY 2005.159 (08/06/2005):

At 07:15Z TM parameter G8015 (S1E-A2 PMT V) went out of limit 'high'. It went back inside limit at 16:51Z (after belt exit). As this happened close to the radiation belts, according to V-VLT-1 no action was taken.

At 09:59Z TM parameter G5033 (PDM7: counter semimodule #2) went OOL "High" and back at 14:08Z. According to P-CNT-1, as this happened in radiation belts, no action was taken.

At 16:15Z TM family G2004 (Watch dog status in MCEi) failed SCC. No action was taken, as per I-WDG-1.

DoY 2005.160 (09/06/2005):

At 13:37Z TM parameter G2056 (I0E-OVFWPXADD-M4) failed SCC. No action was taken.

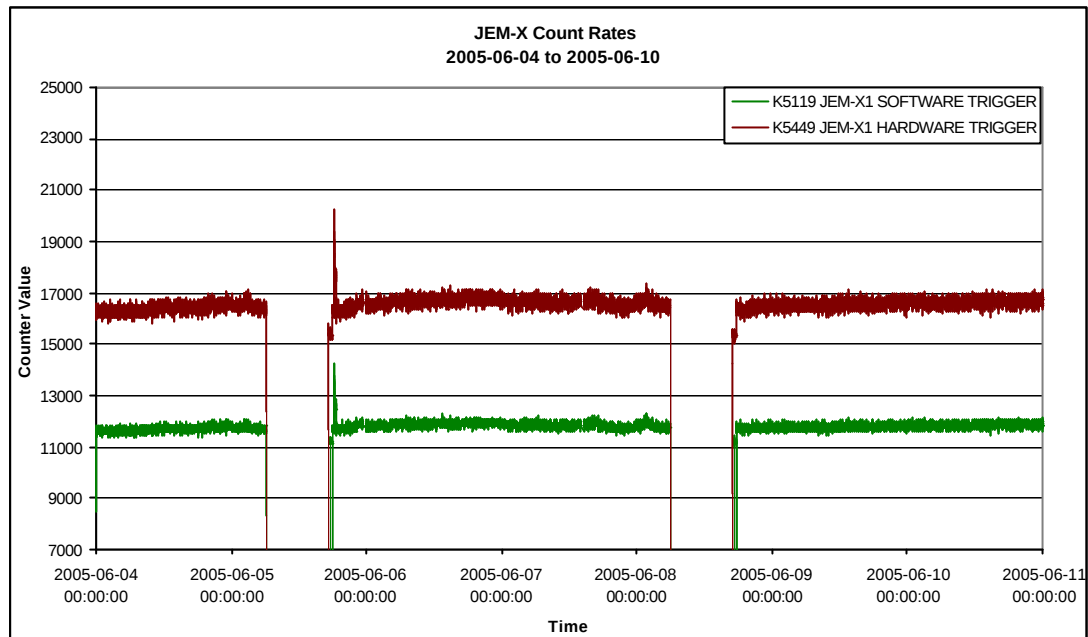
DoY 2005.161 (10/06/2005):

At 02:56 TM parameter G2056 (I0E-OVFWPXADD-M4) failed SCC. No action was taken.

8.3.4 JEM-X Operations

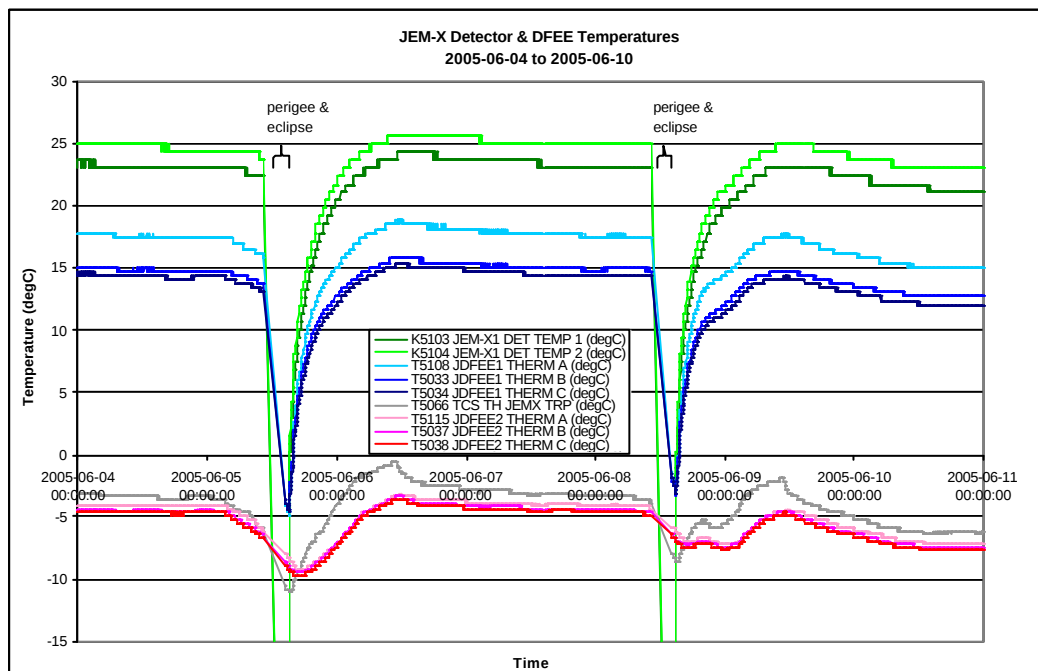
8.3.4.1 JEM-X Count Rates

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



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

2005-06-04 (DOY 155, Rev 322) to 2005-06-10 (DOY 161, Rev 324)

Nothing to report

8.3.5 OMC Operations

2005-06-04 (DOY 155, Rev 322)

In line with INT_OR_0208 (Possible STR processor faults due to bright objects), commanding to the AOCS subsystem was disabled from the Timeline at 10:34Z, such that the slew to Pointing ID 03220042 failed release from the Timeline. The OMC imaging ED MEIM-A01 scheduled at 10:42:11Z therefore failed acceptance on-board (as OMC was still in Science Normal mode), with two occurrences of the OEM 131 REJECTED TC1. At 11:08Z a manual slew from the attitude of PID 03220041 directly to PID 03220043 was started and OMC transitioned to Standby mode. The Timeline slew to Pointing 03220043 was then updated and commanding to the AOCS from the Timeline enabled at 11:24Z. Thus OMC operations continued nominally from PID 03220043.

2005-06-05 (DOY 156, Rev 322-323)

Due to a dynamic PTV failure, the slew to Pointing ID 3220056, scheduled to start at 00:57:25Z failed from the Timeline. The OMC imaging ED MEIM-A01 scheduled at 00:57:55Z therefore failed acceptance on-board (as OMC was still in Science Normal mode), with two occurrences of the OEM 131 REJECTED TC1. A manual recovery slew was started at 01:26:32Z, at which time OMC went to Standby mode. The Timeline slew to Pointing 03220057 was then updated and commanding to the AOCS from the Timeline was re-enabled. Thus OMC operations continued nominally from PID 03220057.

OMC Flat Field and Dark Current Calibrations were executed nominally as follows:

- 03:26Z to 06:54Z Flat Field Calibration
- 06:55Z to 07:28Z Dark Current Calibration

During pointing ID 03230007, as part of the recovery procedure for the IBIS histograms (see IBIS section), the CCCF block starting at 20:52:15Z was enabled in line with INT_OR_0109 (IBIS Stop of histograms downloading). As part of the CCCF, the PID was set to zero and the OTF was set low at 20:52Z, causing OMC to go to Standby mode. As the imaging EDs are not scheduled as part of this kind of CCCF, OMC remained in Standby after the execution of the CCCF (PID reset and transition of the OTF back to high). Therefore the majority of this pointing was lost. OMC operations continued nominally from PID 03230008.

2005-06-06 (DOY 157, Rev 323)

During pointing ID 03230023, during another attempt to recover the IBIS histograms (see IBIS section), the CCCF block starting at 09:45:25Z was enabled in line with INT_OR_0109. As part of the CCCF, the PID was set to zero and the OTF was set low at 09:46Z, causing OMC to go to Standby mode. As the imaging EDs are not

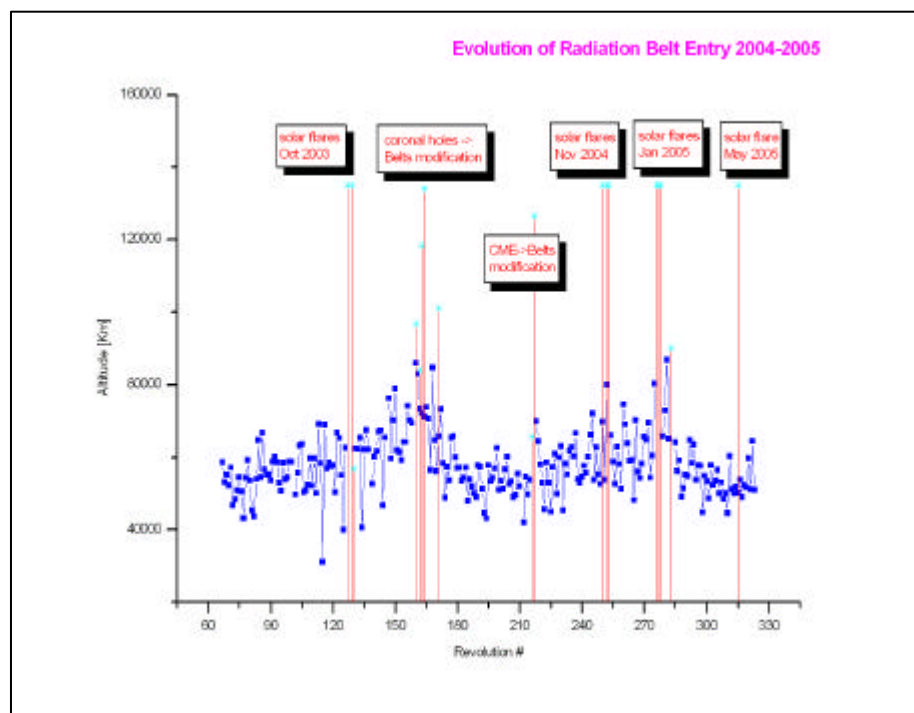
scheduled as part of this kind of CCCF, OMC remained in Standby after the execution of the CCCF. Therefore the majority of this pointing was lost. OMC operations continued nominally from PID 03230024.

2005-06-07 (DOY 158, Rev 323) to 2005-06-10 (DOY 161, Rev 324)

Nothing to report

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

Nothing to report.

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]
322	RAD_ENTR R 2005-06-05T07:27:55Z	2005-06-05 07:14:01	61554.4	2005-06-05 08:18:51	53415
323	RAD_EXIT R 2005-06-05T16:43:53Z	2005-06-05 15:35:37	29753.8	2005-06-05 15:38:51	29747
323	RAD_ENTR R 2005-06-08T07:14:51Z	2005-06-08 08:27:29	51005.6	2005-06-08 08:09:54	52794
324	RAD_EXIT R 2005-06-08T16:31:02Z	2005-06-08 15:30:09	29751.3	2005-06-08 15:29:54	30478

Reference

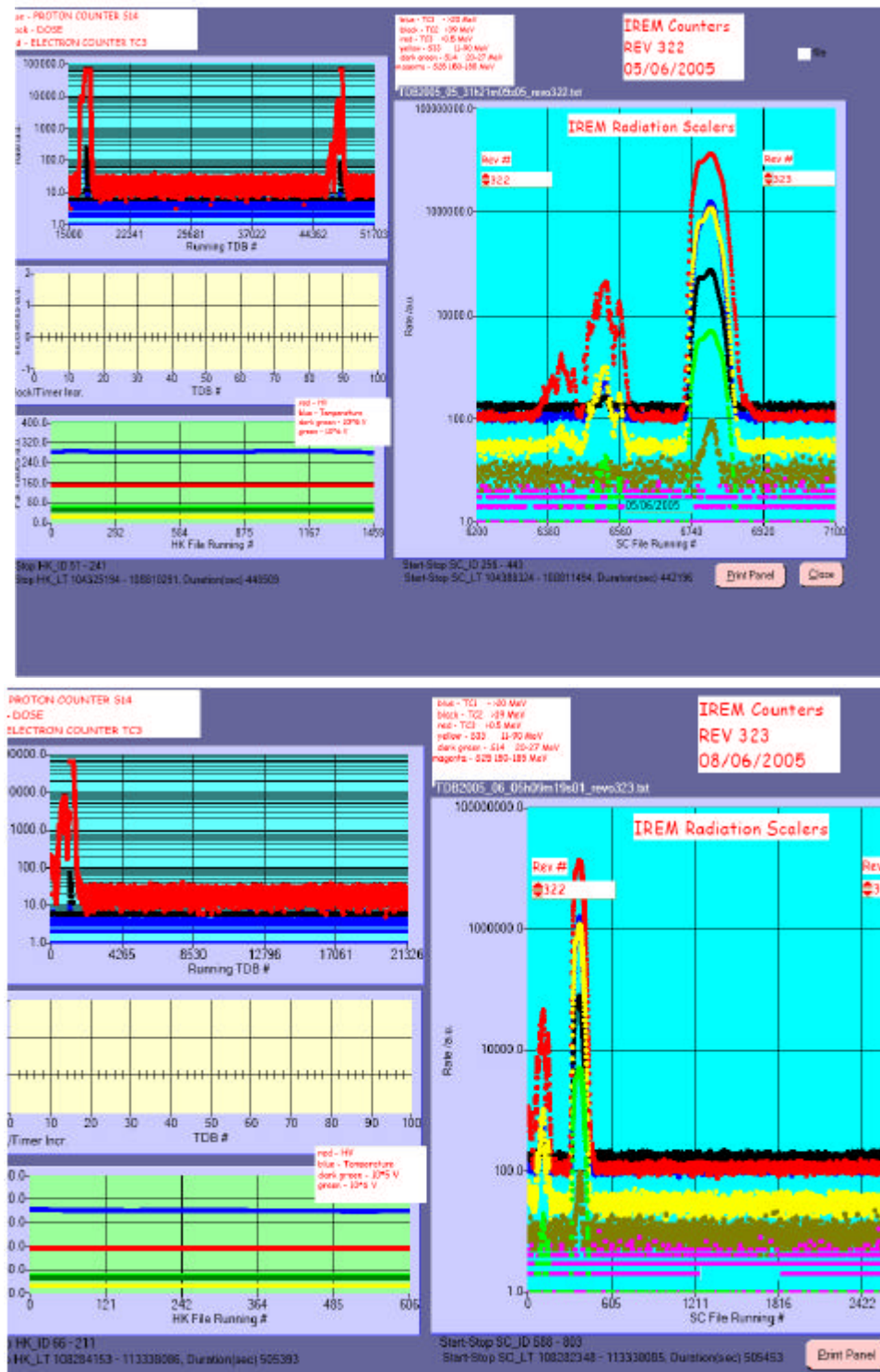
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

Radiation Spike

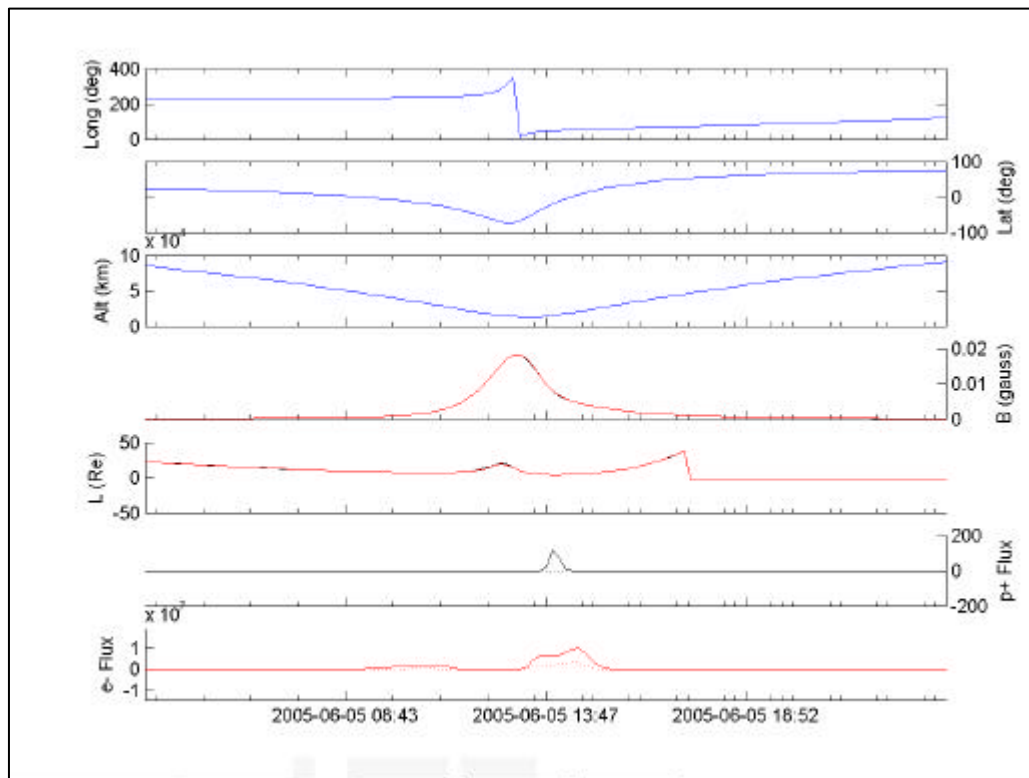
IREM radiation counters:



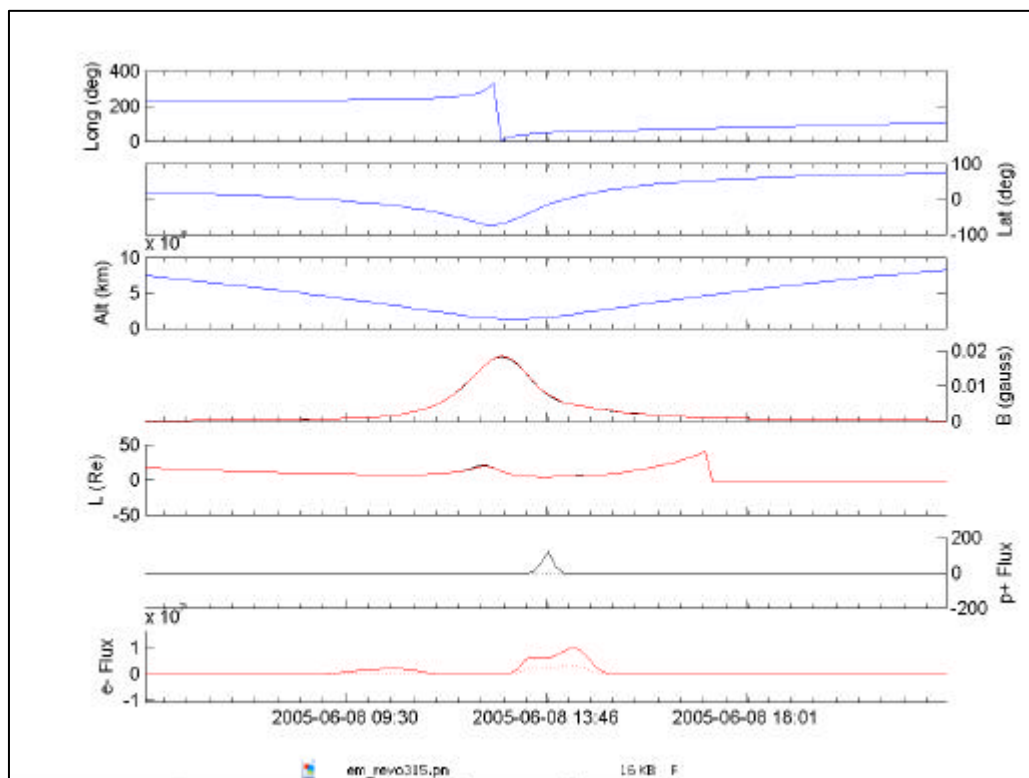
Due to upgrade of the MCS system, problems on the ECOE server occurred during revolution 323 and 324. Data are only partially available.

IREM Predicted Radiation Belt Passages:

Rev 322:



Rev 323:



SEC-GOES Observed Particles Fluxes:

