

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OF
No. 159
Week 40
10.10.05
Routine Phase

Prepared by: M. Walker (OPS-OFO)

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.....	3
3.1.3	Thermal.....	3
3.1.4	OBDH.....	3
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	4
3.2.3	JEM-X.....	5
3.2.4	OMC.....	6
3.2.5	IREM.....	6
4	Ground Facilities.....	6
4.1	Mission Operations Centre.....	7
4.2	Ground Stations & Network.....	7
4.3	Science Ground Segment.....	7
4.3.1	ISOC.....	7
4.3.2	ISDC.....	8
5	Special Events.....	8
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.....	11
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 01/10/2005 – 07/10/2005.....	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

DISTRIBUTION LIST

Addressees	Copy	Addressees	Copy
D/OPS		ESA HQ	
G. Winters D/OPS	1	D. Southwood D/SCI	1
W. Frank OPS-O	1		
A. Smith OPS-OF	1	ESTEC	
J. F. Kaufeler OPS-G	1	J. Louet SCI-P	1
N. Bobrinsky OPS-ON	1	A. Gimenez-Canete SCI-S	1
R. Münch OPS-GF	1		
		ESTEC / PG	
M. Schmidt	1	G. Sarri	1
R. Southworth	1		
F. Di Marco	1		
F. Cordero	1		
M. Walker	1		
P. Lippi	1	ESTEC/RSSD	
R. Lemme	1	M. Kessler SCI-SD	1
S. Fahmy	1	C. Winkler	1
SPACONs	1	A. Parmar	1
O. Bergogne	1	L. Hansson	1
I. Bayliss	1	E. Kuulkers	1
G. Di Girolamo	1		
F. Dreger	1		
G. Gienger	1	ESTEC/SCI-A	
S. Pallaschke	1	Nicola Rando	1
W. Hell	1		
K.J. Schulz	1	ISDC	
M.A. Larsen	1	T. Courvoisier	1
K. Capelle	1	R. Walter	1
M. Butkovic	1	N. Mowlavi	1
D. Heinzer	1	ISDC Shift Team	1
		D. Texier	1
Shift - Coord	1		
Scheduling Office	1	ALENIA	
T. Beck	1	M. Montagna	1
J. Wardill	1	F. Ravera	1
M. Unal	1		
P. Maldari	1	PI / Instrument Teams	
		J. P. Roques – SPI	1
Redu		G. La Rosa – IBIS	1
B. Demelenne	1	P. Ubertini – IBIS	1
		S. Brandt – JEM X	1
Vilspa		E. De Miguel - OMC	1
P. Kretschmar	1	W. Hajdas – IREM	1
		JPL / Goldstone	
		D. Holmes	1
		J. Valencia	1

1 General

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

It addresses the activities from 01.10.05 until 07.10.05 (both dates inclusive) and covers the revolutions 363 & 364.

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 Bulge region (RA 17:45:36.00; DEC -28:55:60.0); the Galactic Centre and the Scutum Arm. The activities consisted of hexagonal dithering and grid 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.

9 slews (7 CSL, 2 OSL) were not executed from the Timeline during this period, due to problem on stations (DSS16 and REDU) and FDS.

The fuel consumption over the period between 01/09/2005 and 06/10/2005 was 0.0578 kg. The remaining propellant is in the order of 159.1287 Kg.

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

3.1.2 Power

The EPS is working nominally, available power from the arrays is of the order of 2100W.

3.1.3 Thermal

The thermal control of the satellite is working well. The temperatures are currently all within the specified operational limits.

3.1.4 OBDH

The OBDH subsystem is working flawlessly. No on-board communications problem was identified.

3.1.5 RFS

The RF subsystem is working properly. The link margin is sufficient to ensure proper TM reception and execution of commands with the ranging channel enabled.

3.2 Payload

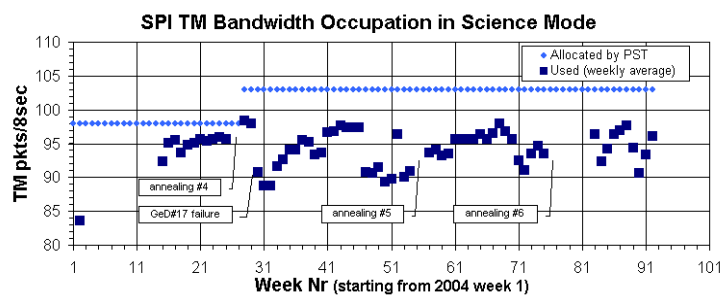
3.2.1 SPI

The overall status of the instrument is nominal.

During science operations, the instrument was 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 average occupation of 96.1 pkts/cycle.

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

The following plot shows the TM bandwidth occupation information.



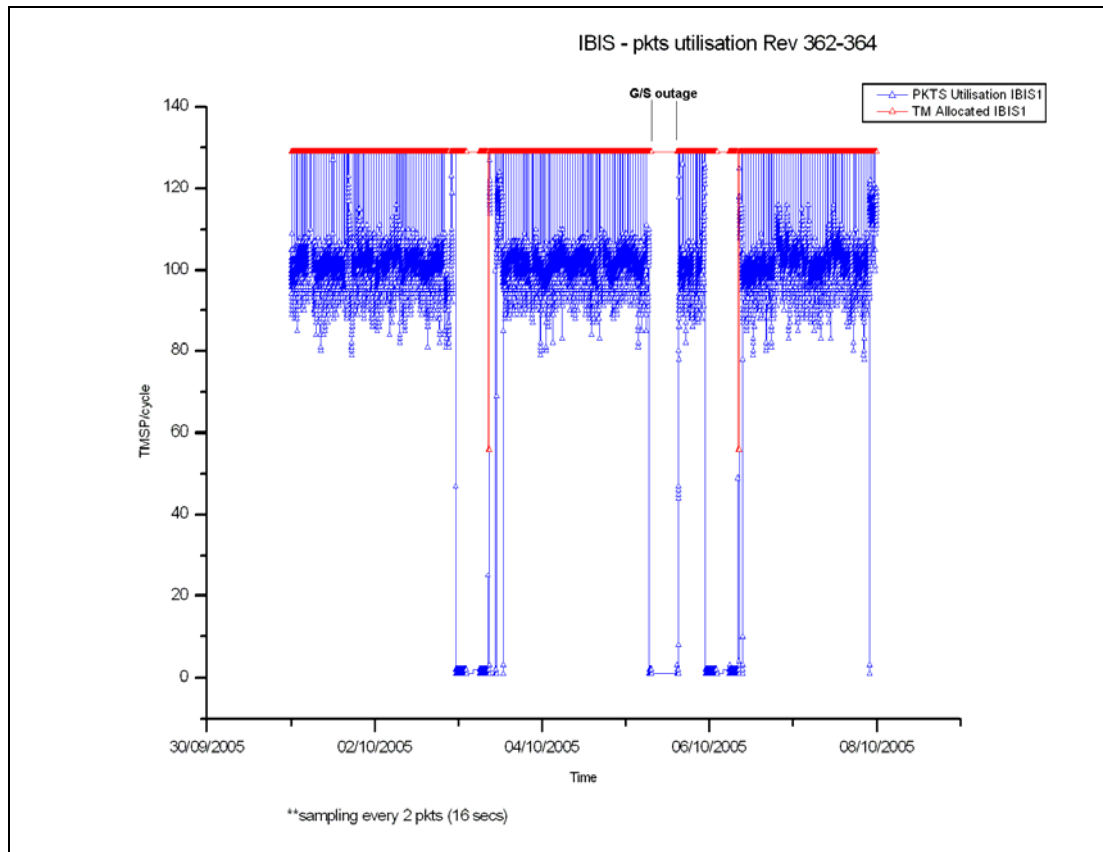
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

The Overall status of the unit is Nominal.

During the reporting period, the PST allocation to IBIS was most of the time 129 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period was 103.46 TMPS/cycle, down 7.62 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 with a TM allocation of 1 packet/cycle. The JEM-X2 DFEE was off until 2005-10-06 at 08:25:32Z, when the DFEE was switched on in preparation for the use of JEM-X2 during the upcoming Crab Calibration (revolution 365) and JEM-X2 then continued in Safe mode.

On 2005-10-02, due to ground station problems, JEM-X1 was commanded to Safe mode manually about 10 minutes later than planned in the Timeline before radiation belt entry of revolution 362.

On 2005-10-05, due to a ground station outage, JEM-X1 was commanded to Safe mode at 06:51:55Z and was returned to Data Taking mode at 15:38:38Z.

A few Out of Limits were received on the TM parameter K5136 BUFFER LOSS during the week.

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, 177 of the 183 planned science pointings for OMC were executed nominally, 5 were lost and 1 delayed.

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

3.2.5 IREM

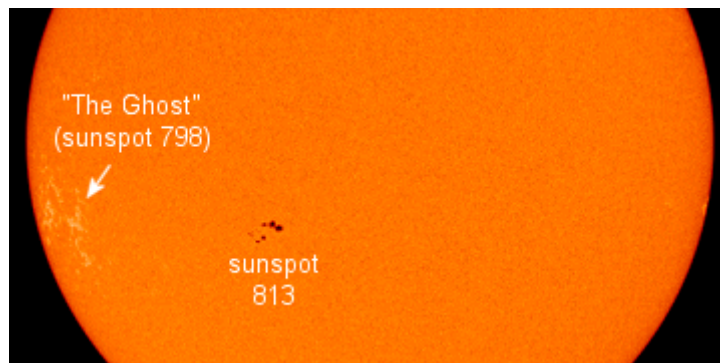
The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity.

The sun was very quiet during the observation period. Tiny sunspots appeared but posed no threat of a solar flare.

Sunspot 798 that hurled 9 solar Flares in September returned to the Earth facing side of the Sun. However it was very weak and had almost disappeared (cf. picture below taken on the 6th of October).



Reference: www.spaceweather.com

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 good this week, 193 slews were executed, 9 were lost or delayed. The problems were: An AOCS command was rejected, which led to the loss of a pointing, a problem at DSS-16 lost 2 more pointings, lack of time after the ground station outage to acquire the link before the scheduled time of the next observation lost a pointing. Another was lost to guide star

problems interrupting commanding. A TM drop from Redu delayed a pointing by about 18 minutes. The overall performance was well above the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was much better this week. No pointings were lost due to problems at the MOC. The overall performance was well above the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week although two pointings were lost when TCP problems caused a lack of bit-lock after handover to DSS-16, another pointing was delayed when the TM from Redu was interrupted. There were several other minor instances where the links dropped briefly, but none had any impact on science operations. The overall performance though was well above the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

New PSF's for revolution 368 to 370 were received. Planning has been performed of revolutions 367 to 369. No new ToO request was received. However a decision on the ToO request received last week is still pending. It is not yet confirmed that this source referred to is of the correct class. TSF for revolution 366 has been received.

2. Observation status

ECS's for revolutions 352, 353 and 355 were received this week. Revolutions 352 and 353 had no time lost and the corresponding OCS's has been returned to ISDC. Revolution 355 had the instruments off for most of the revolution due to high solar activities. Decision on crediting of extra time is pending.

3. ISOC science data archive

The ISDA has been demonstrated this week together with a poster in the ADASS conference in El Escorial. A problem with one of the new disk arrays currently prevents it from being used. No impact on the operational use yet. A draft plan for implementation of the 2nd ISGRI catalogue is internally circulated.

4. ISOC system

A version 11.1 patch 5 of the ISOC system is still used. No problems reported.

5 AO 4

The schedule for the AO 4 preparation was presented to the ISWT this week. The core program for this AO was discussed in this meeting. Good progress was made giving reasonable confidence this program will be agreed in due time as requested by ISOC.

5. Problems

The problem reported last week concerning discrepancy between the constraint checking in ISOC and MOC is still under investigation. The investigation has progressed this week with some interactions between MOC and ISOC.

4.3.2 ISDC

Status of ISDC observation processing on 10/10/2005:

- Latest Standard Analysis completed: observation 03200490001 (A 0535+26, Revolution 352) on 08/10/2005
- Latest products archived: observation 02297000020 (galactic disk l<0, Revolution 347) on 03/10/2005
- Latest observation products sent to the observer: observation 03201020003 (Crux Arm, Revolution 330) on 08/09/2005

5 Special Events

None

6 Anomalies

There were a number of problems that impacted the operations:

- On DoY 274, at 05:36, the FD tool failed to update the slew 03620035. It was successfully manually updated at 05:48, there was no impact.
- At 11:32, there were some missing source packets, with an apid of 1664 (Jemx-2), there was no impact.
- At 23:03, the TC A3189 (START GUIDE STAR) failed release, due to the guide star not being found (coincidentally there was a radiation spike observed on AND K0100). A manual recovery was performed, and the timeline rejoined at 12:25. The impact was the loss of pointing 03620042.
- On DoY 275, at 16:43, there was a 20 second drop in TM & TC links with Redu, there was no impact.
- At 20:22, after the handover from Redu to DSS-16, there was no bit-lock. 4 Re-sweeps, and 2 TCP swaps were performed, without success. At 21:55, the problem was resolved after resetting both TCPs. A manual recovery was performed to the perigee attitude. The corresponding DR# is G106124. The impact was the loss of pointings 03620086 & 03620087.
- On DoY 276, at 06:39, there was a short VC0 data gap. There was no impact.
- On DoY 277, at 11:09, the message: "Missing source packets, APID=1281" was seen in the event log (APID 1281 corresponds to IBIS). There was no impact.
- At 13:33, IDDA went red for a few seconds. The problem disappeared by the time the alarm was acknowledged. No event log messages were raised, and there was no impact.
- At 11:35, during the ground station outage, attempts were made to playback the recorded data. From Goldstone, the nctrs was blocking the playbacks, and at 11:43, from Redu, the data was shown as bad, the cause is unknown, there was no impact.
- At 14:48, pointing 03630066 was lost, as the scheduled time of the slew was only 1 minute after AOS TC Goldstone, there was insufficient time to establish the link

- At 15:44, the FD update for slew 03630067 failed, as there was no guide star present, after the recovery, the Timeline was rejoined at 16:40, the impact was the loss of pointing 03630068.
- At 15:56, the following messages were received in the event log: "TMDSmain, idda, Error, Software error sending data to ISDS", followed by: "Link MADDS-ISDS TM Flow". Also at this time the MCCM display disappeared, no further problems were reported, there was no impact.
- At 16:38, 7 Bad frames were received from DSS-16.
- At 17:57, the following event log messages were received: "TPKT, imca, Error, System, 1 missing transfer frame", then: "Error sending data to ISDS", then "Link MADDS-ISDS TM Flow", there was no impact.
- On DoY 279, at 21:41, there was a brief TM drop due to a hit on the line, there was no impact.
- On DoY 280, at 06:43, there was a brief data gap on VC0 onl.TIM from RED1_IP, this was followed by 15 bad TM frames, there was no further impact.
- At 07:18, there were several errors sending data to the ISDS, at 08:25, the ISDS & IFRD were restarted, TM flow was indicated in the event log, however the software had to be restarted a second time at 08:38, before ISDC could confirm data flow.
- At 17:18, the VC0 & VC7 TM from Redu were lost due to an MCP problem, this caused the TC A2541 (STR SRCH/TRCK) to fail release. A manual recovery was performed, the impact was an 18 minute delay in the start of pointing 03640046.

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

7 Future Milestones

A patch of the IMCS is planned for September/October, which should fix a couple of problems.

DSS-16 is to be decommissioned, and replaced by DSS-27, the testing of which started last week, and is on-going.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 363

The observations in revolution 363 consisted of a hexagonal dithering observation of the Galactic Bulge region (RA 17:45:36.00; DEC -28:55:60.0) lasting ~3.5 hours, followed by a Galactic Centre observation, performed for the remaining ~57.5 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 364

The observations in revolution 364 began with 1 pointing of a hexagonal dithering observation of the Galactic Bulge region (RA 17:45:36.00; DEC -28:55:60.0) lasting ~30 minutes, followed by a Galactic Centre observation lasting ~36 hours. The hexagonal dithering observation of the Galactic Bulge region (RA 17:45:36.00; DEC -28:55:60.0) was then resumed and performed for ~3 hours. A grid observation of the Scutum Arm was then performed for the remaining ~21 hours of observation time.

Throughout these observations all instruments were in their nominal science modes, except for JEM-X2 which was in Safe mode, 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

2005-09-12T08:17:59.000Z	159.4162	F	Automatic TM processing.
2005-09-15T08:38:31.000Z	159.3824	F	Automatic TM processing.
2005-09-18T02:43:27.000Z	159.3733	F	Automatic TM processing.
2005-09-18T07:53:51.000Z	159.3490	F	Automatic TM processing.
2005-09-21T02:29:58.000Z	159.3366	F	Automatic TM processing.
2005-09-21T07:44:15.000Z	159.3000	F	Automatic TM processing.
2005-09-24T02:27:26.000Z	159.2919	F	Automatic TM processing.
2005-09-24T07:27:34.000Z	159.2661	F	Automatic TM processing.
2005-09-27T02:04:37.000Z	159.2414	F	Automatic TM processing.
2005-09-27T07:14:14.000Z	159.2233	F	Automatic TM processing.
2005-09-30T02:03:41.000Z	159.2068	F	Automatic TM processing.
2005-09-30T07:02:37.000Z	159.1865	F	Automatic TM processing.
2005-10-03T06:45:57.000Z	159.1593	F	Automatic TM processing.
2005-10-06T01:37:15.000Z	159.1429	F	Automatic TM processing.
2005-10-06T06:31:40.000Z	159.1287	F	Automatic TM processing.

This report was generated Fri Oct 7 08:00:29 GMT 2005

8.3 Detailed Satellite Information

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

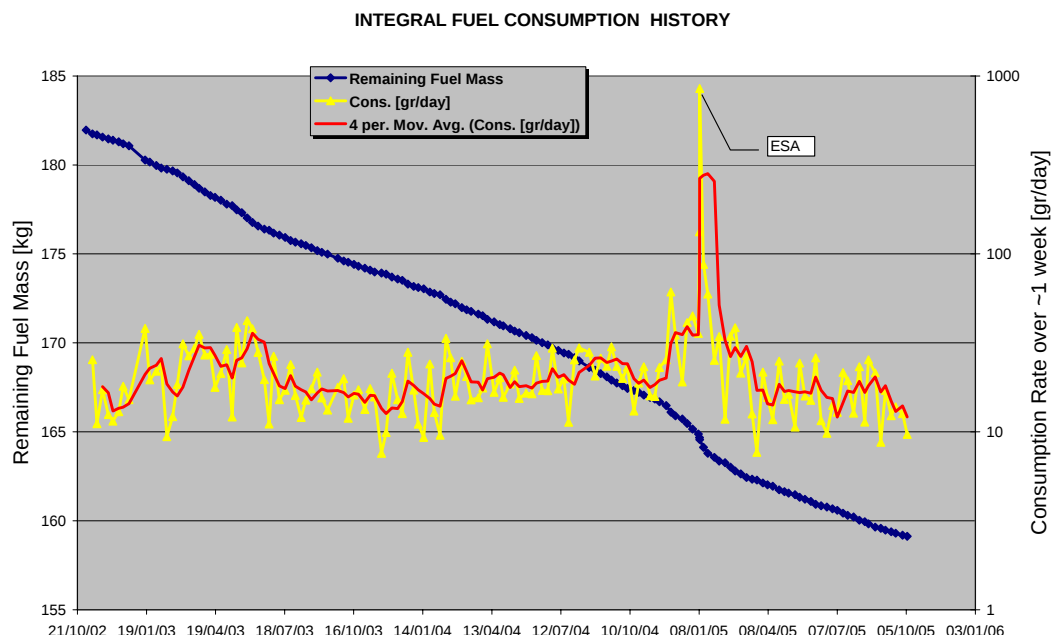
8.3.1 AOCS SUMMARY OPERATIONS REPORT, 01/10/2005 – 07/10/2005

AOCS operations were executed from the Automatic Timeline.

During this period, 112 Open Loop Slews, 81 Closed Loop Slews and 3 Momentum Bias were executed (TL + manual recovery). 9 slews (7 CSL, 2 OSL) were not executed from the Timeline during this period, due to problem on stations (DSS16 and REDU) and FDS.

This is equivalent to a ~4.6 % of the total number of slews planned (196).

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



01/10/05 (Day of Year 274, Revolution 362)

Slews missed from the Timeline: At 11:32z, due to a problem during the Search and Track process for slew ID 03620042, guide star to be tracked on slot# 2 not found, guide star ID 6847-2984 Mi 8.23 at CCD location [6730 , 20141], the TC A3189 (Start Guide Star) failed release due to static PTV failure. The problem on S\T process was originated likely by the magnitude of the guide star (8.23) set for the CSL sequence, too close to the S\T threshold (8.5), assuming an LSB of 0.25 magnitude.

The AOCS s/s was disabled in TL at 11:32z

A manual recovery was attempted from attitude of PID 03620041 to the attitude of PID 03620043. The next slew (OSL) for PID 03620044 was manually updated and executed from the Timeline.

The AOCS s/s was re-enabled in TL at 12:25z.

The following slews were not executed from TL while recovering the AOCS s/s: 03620042(CSL)-43(CSL).

ACC Yaw and Pitch Errors: reported at 23:00z, after the execution of slew ID 03620057 (OSL) several occurrences of OEMs APID 640 ID 50 <<ACC YAW ERR>> and ID 49 <<ACC PITCH ERR>>. Two independent stars,

ID 7370-366 Mi 8.04 at CCD location [-262, -9531]

ID 7370-823 Mi 8.06 at CCD location [-536, -9313]

as reported from the FDS star catalogue and attitude log file, were observed at the position of the picked STR guide star Mi 7.8 [-316, -9488] and likely this caused the generation of the OEMs. The STR could not determine the barycentre of the system, being the two stars separated by 1 arcmins (~1 pixels), with the expected accuracy and this caused the generation of the OEMs above and the flickering of the ACC pointing bit, not seen anyway at OTF level. As example, the inaccuracy in Y position resulted in <200 ccd units= 50 arcsec=1 pixel. The situation was cleared at the execution of the following OSL (ID 03620058). No impact on TL reported.

02/10/05 (Day of Year 275, Revolution 362)

Slews missed from the Timeline: Due to a tracking problem on DSS16 (antenna set in stow position and system rebooted), the slew ID 03620086(CSL) failed release and the AOCS s/s disabled in TL at 21:07z.

A manual recovery was then performed to the perigee safe attitude of PID 03620088 and a corrective close loop slew was manually executed to the same attitude. After having checked the validity of the current attitude (ID 03620088, valid until 2005-10-06T04:50:50Z), the validity of the wheels speeds through the perigee pass and that the current guide star, Mi 6.05 at CCD location [-4864, 15125] was the proper for the starting of the new revolution (363), the AOCS s/s was left disabled (in TL) and in safe status until the end of the revolution 362.

Nominal operations were resumed at the beginning of the revolution 363.

The following slews were not executed from TL while recovering the AOCS s/s: 03620086(CSL)-87(CSL)-88(OSL)-89(CSL).

03/10/05 (Day of Year 276, Revolution 362-363)

Nothing to report.

04/10/05 (Day of Year 277, Revolution 363)

Nothing to report.

05/10/05 (Day of Year 278, Revolution 363)

Slews missed from the Timeline: in order to accommodate the Cryosat Dress Rehearsal, the expected REDU pass in rev 363 from 07:32z to 14:45z was not performed. To cover part of this period and extended Goldstone support was scheduled from 14:45z to 02:22z and the TL prepared accordingly. For the outage period the attitude of the S/C was that for PID 03630065 (valid until 2005-10-09T00:28:14Z) and the wheels speeds checked to be valid through the entire period.

The AOCS s/s was disabled in TL at 10:50z in order to prepare the reconfiguration at the AOS Goldstone. The slew ID 03630066 failed release due to s/s disabled in TL.

At 15:08z a manual recovery was then performed to attitude of PID 03630066. The next slew (OSL) for PID 03630067 was manually updated and executed from the Timeline.

The AOCS s/s was re-enabled in TL at 15:22z.

At 15:44 the FDS failed to generate the update for slew ID 03630068 because no guide star was found in overlap: being the slew planned a CSL, no suitable guide star was found in order to perform the slew.

The AOCS s/s was disabled in TL at 15:55z.

At 16:22 a recovery was then performed to attitude of PID 03630068 by manual generating an OSL instead of the planned/suggested (by FD recovery tool) CSL. The next slew (CSL) for PID 03630069 was manually updated and executed from the Timeline.

The AOCS s/s was re-enabled in TL at 16:40z.

The following slews were not executed from TL while recovering the AOCS s/s: 03630066 (OSL)-68(CSL).

06/10/05 (Day of Year 279, Revolution 363-364)

Nothing to report.

07/10/05 (Day of Year 280, Revolution 364)

Slew missed from the Timeline: Due to a problem on REDU station (MCP transfer problem), the slew ID 03640046(CSL) failed release and the AOCS s/s disabled in TL at 17:19z.

A manual recovery was attempted from attitude of PID 03640045 to the attitude of PID 03640046. The next slew (CSL) for PID 03640047 was manually updated and executed from the Timeline.

The AOCS s/s was re-enabled in TL at 17:53z.

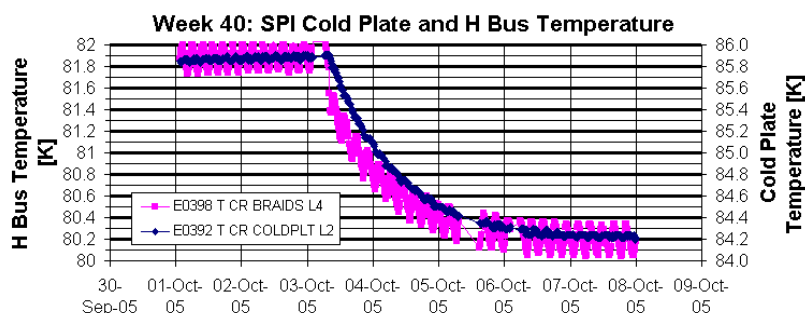
The following slew was not executed from TL while recovering the AOCS s/s: 03640046(CSL).

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 showing the usual positive drift with the expected slope. Due to the accumulated effects of the drift the stroke had to be increased from 4x37 to 4x38 on 3rd October 2005 (276) at 07:56z.

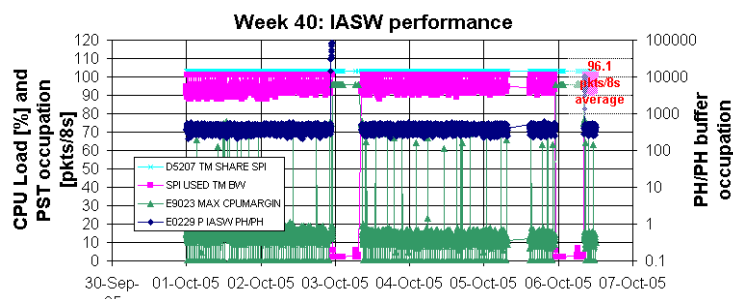
The following plot shows the evolution of the cold-plate and H bus temperatures during the reporting period.



DPE & IASW:

The IASW performance is nominal.

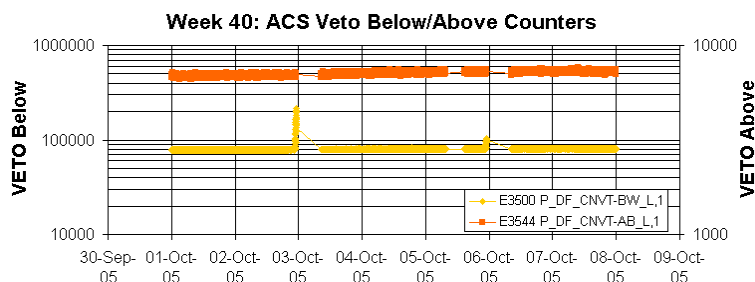
The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



ACS:

The performance of the ACS is nominal.

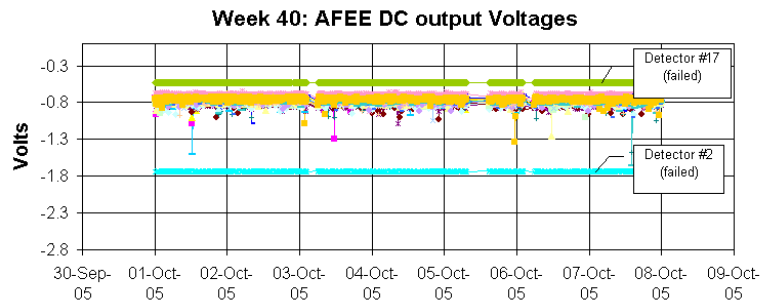
The following plot shows the ACS overall count rate evolution during the reporting period.



AFEE and Germanium Detectors:

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

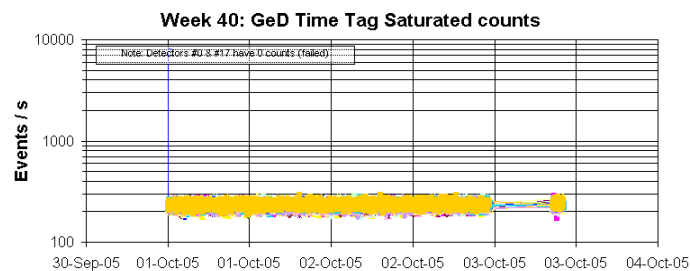
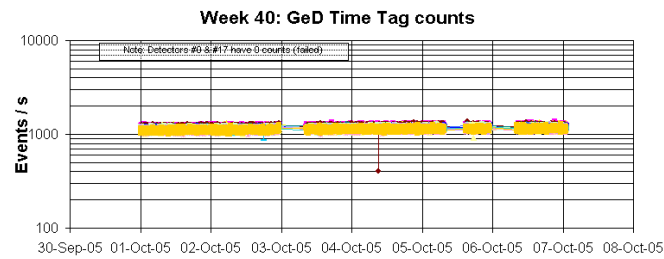
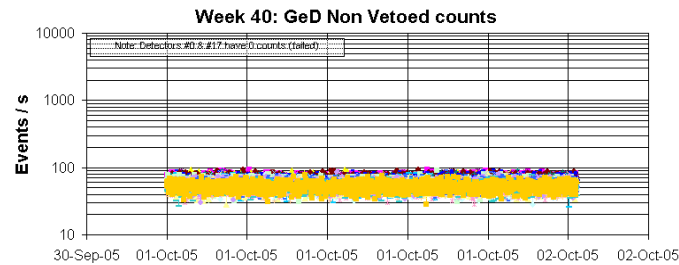
The following plot shows the dc voltage offset of the detector channels during the reporting period.



DFEE:

The performance of the unit is nominal.

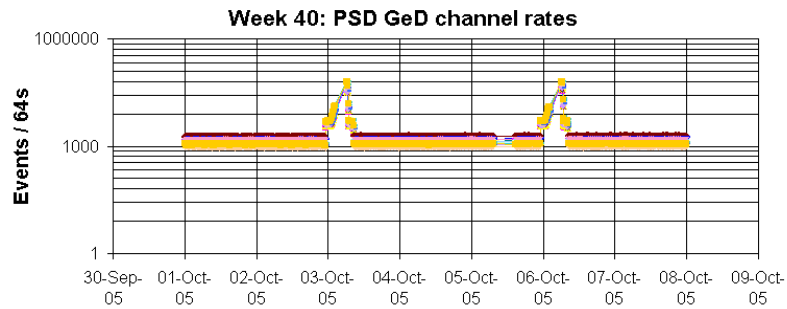
The following plots show the count rates of the detectors during the reporting period (due to problems in the data retrieval tool, some gaps could be present).



PSD:

The performance of the unit is nominal.

The following plots show the PSD channel rates during the reporting period.



SPI EVENTS LOG

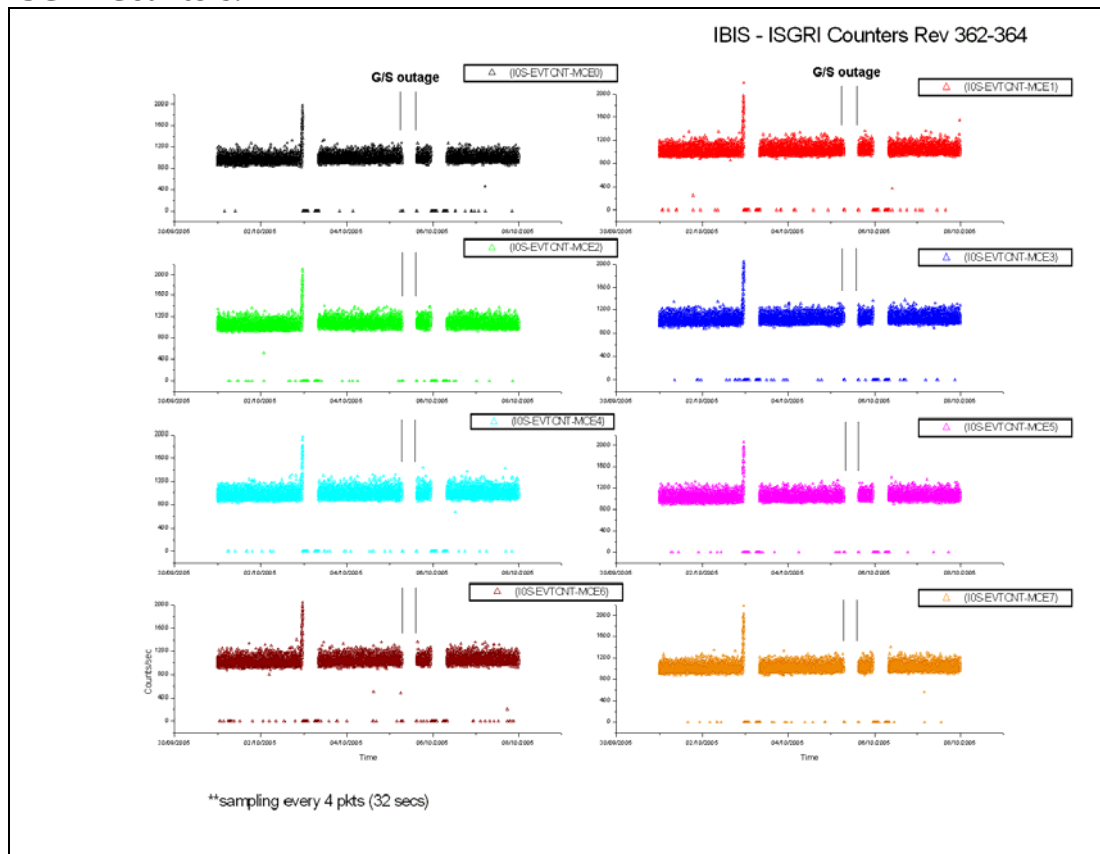
NOTE: The events log is extracted from the revolution pass summaries (courtesy of the Integral Analysts).

DOY Time	Event
275 - 18:55	TM E0392 OOL, back in limits @ 19:06
275 - 22:29	TM E0392 OOL, back in limits @ 22:40
275 - 22:38	TM E3500 OOL, back in limits @ 22:45
275 - 23:17	TM E0392 OOL, back in limits @ 23:21
276 - 00:04	TM E0392 OOL, back in limits @ 00:15
276 - 06:16	TM E2115, E2116, G8015 OOL
276 - 07:00	TM E0392 OOL, back in limits @ 08:04
276 - 14:37	TM E2115 OOL, back in limits @ 15:41 (DOY 277)
277 - 15:54	TM E2115 OOL
278 - 22:56	TM E3500 OOL
281 / 22:32	TM E3500 "P_DF_CNVT-BW_L,1" OOL Alarm High.
281 / 22:44	TM E3500 "P_DF_CNVT-BW_L,1", G6062 "V1S-BOT-COUNT", G6063 "V1S-LAT-COUNT" back into limits.

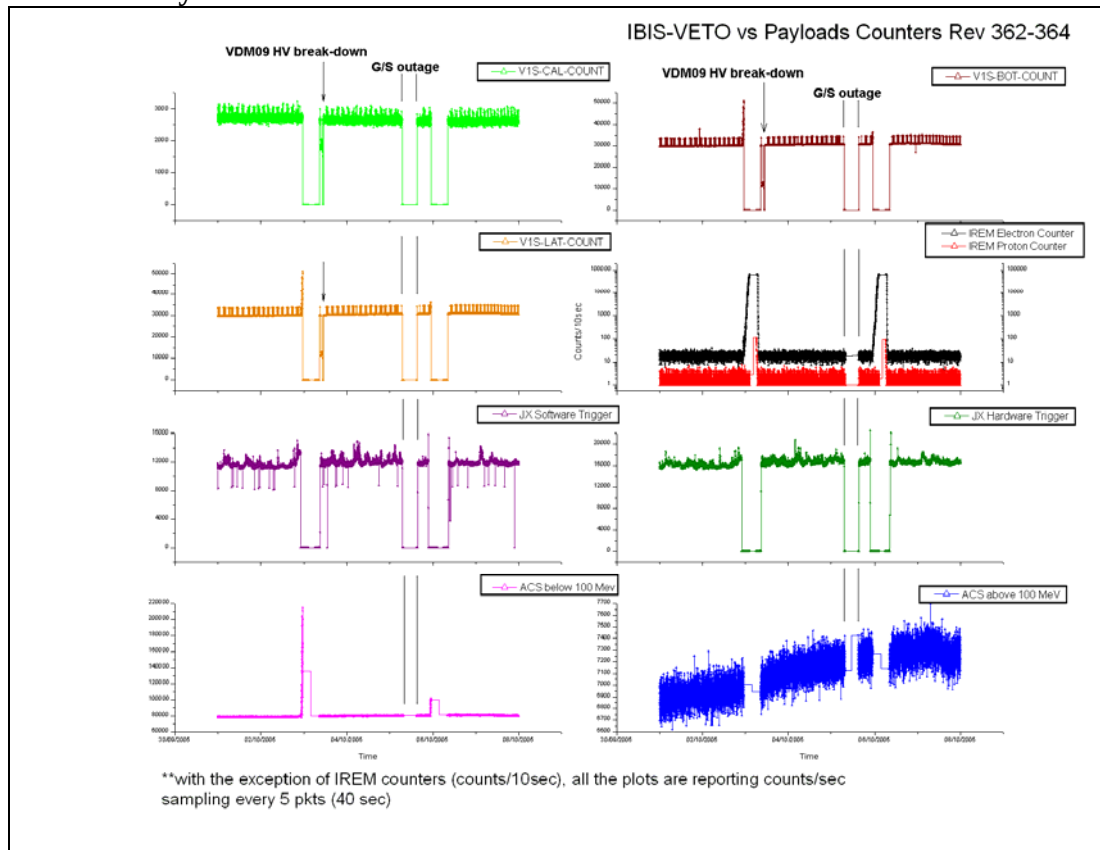
8.3.3 IBIS Operations

IBIS Event Counters Plots.

ISGRI Counters:

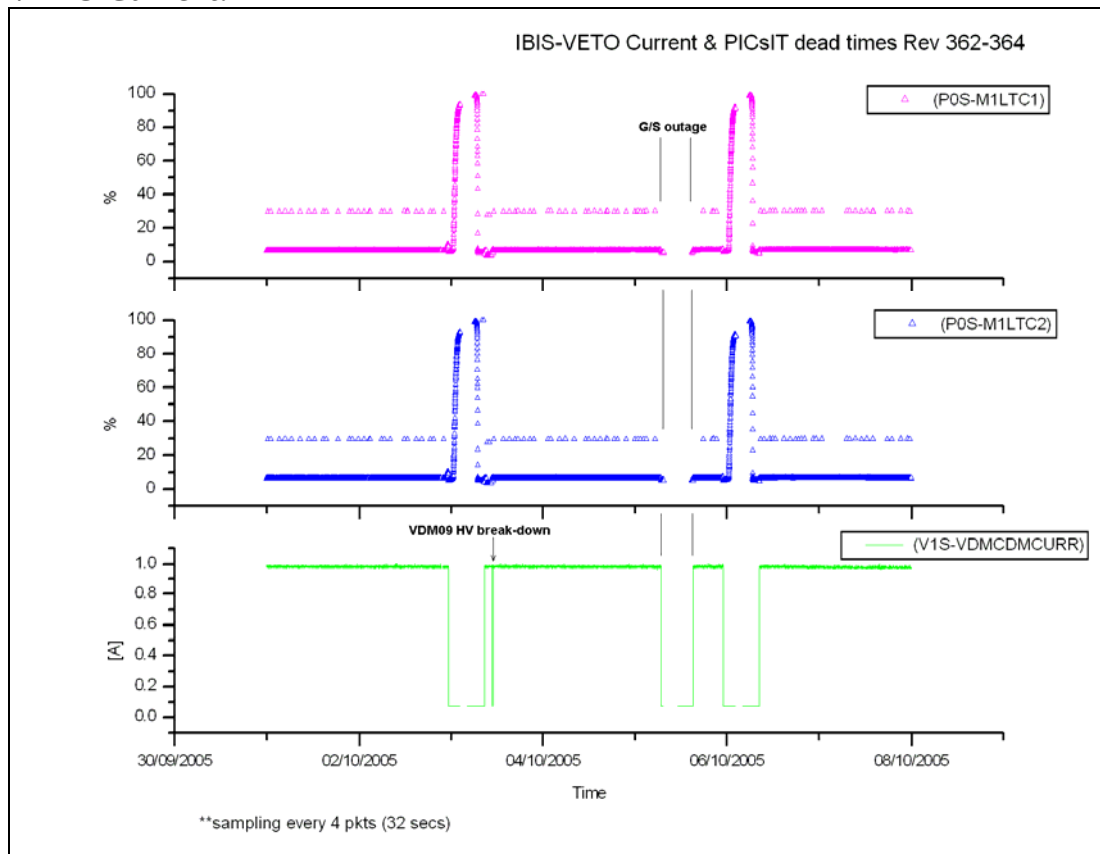


VETO vs Payloads Counters:

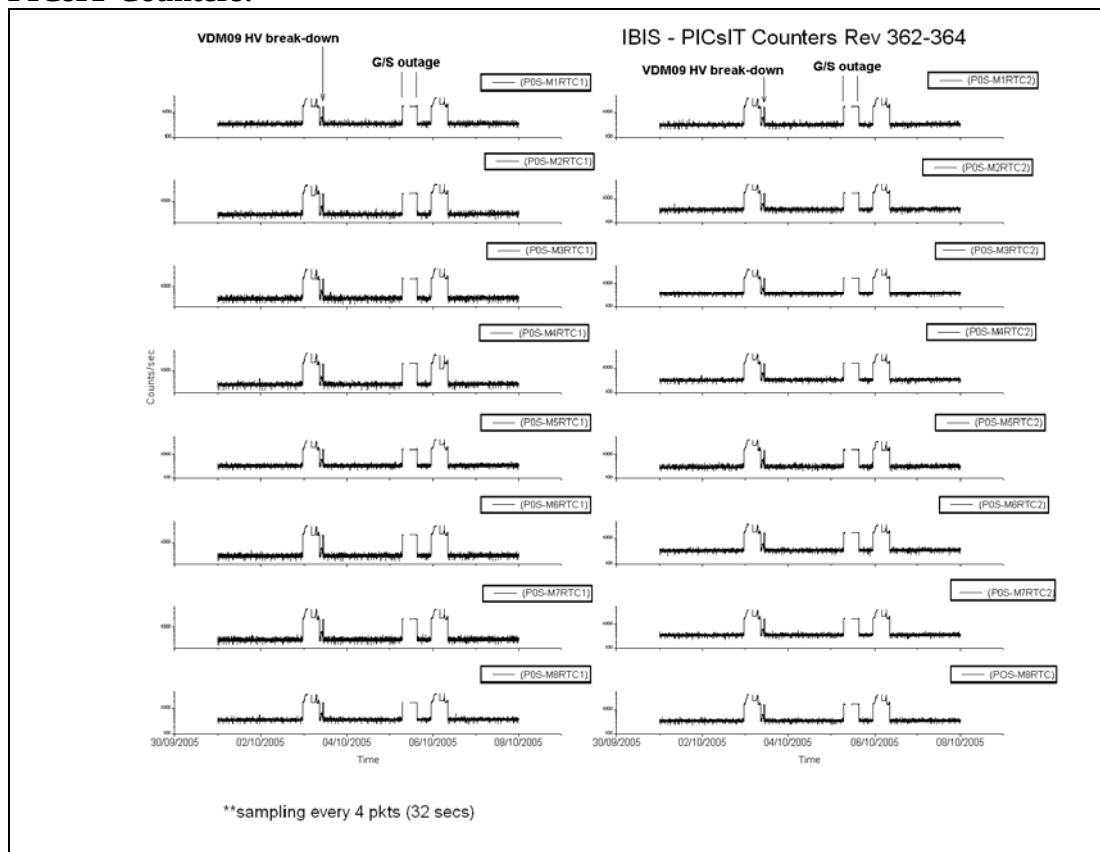


The week was characterised by low radiation.

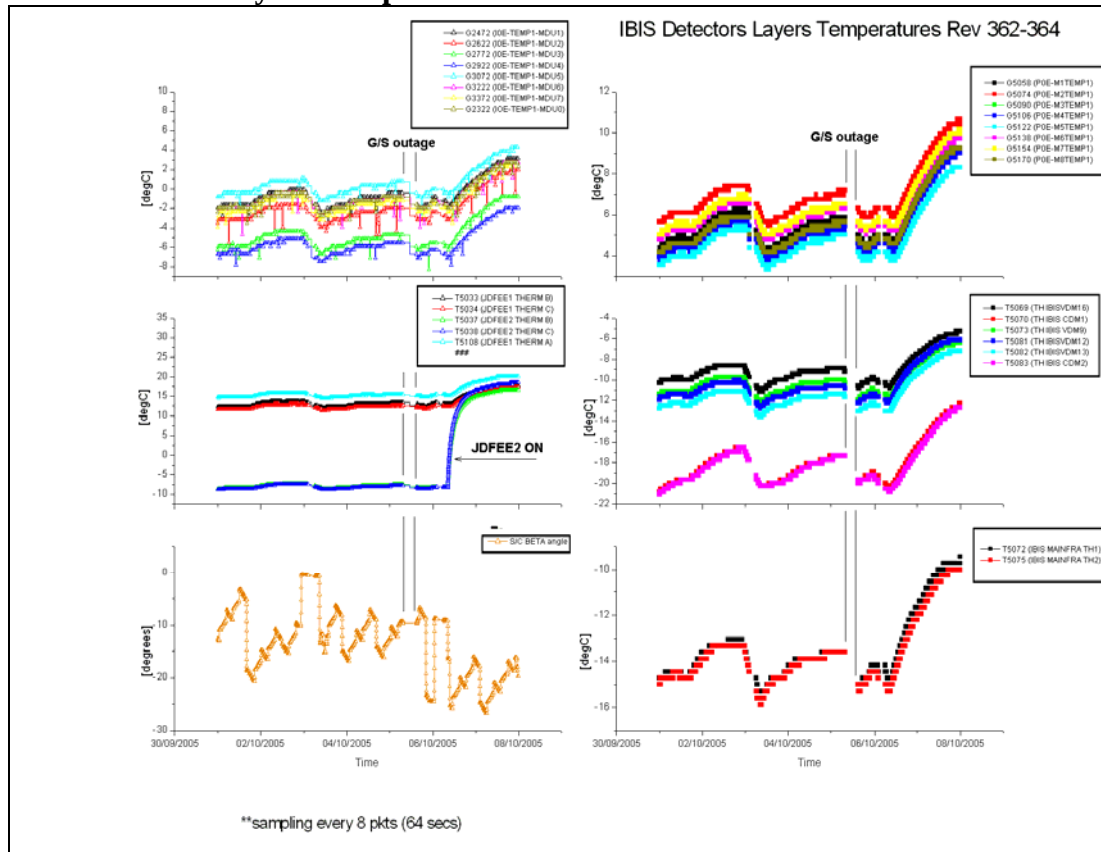
VETO Current:



PICsIT Counters:



IBIS Detectors Layers Temperatures:



IBIS daily report

DoY 2005.274 (01/10/2005)

At 05:34Z, TM families G5068 (P0S-Mi F1ERRF) and G5072 (P0S-Mi F2ERRF) failed SCC. As this happened only once, according to reaction P-FIF-1, no action was taken.

DoY 2005.275 (02/10/2005)

Between 23:00Z and 23:11Z, TM G6062 (V1S-LAT-COUNT) and G6063 (V1S-BOT-COUNT) were toggling OOL High. This happened while INTEGRAL was approaching the radiation belts; therefore, according to V-BOT1 and V-LAT1, no action was taken.

At 23:15Z, TM parameter G8015 (28V PMT set by IASW) went OOL High with the value 29.4V. It went back inside limits on DoY 276 at 08:42Z. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

DoY 2005.276 (03/10/2005) **VDM 09 High Voltage break-down (INT_SC-129)**

At 09:11Z, TM parameter G6043 (VDM 09 HV) was reported OOL Alarm low, the value was 549.42V (instead of 992.68 usually). This did not trigger an OEM (voltage

was not close to 0) so that the high voltage break down was first not recognized. It is the first breakdown of module 09; VDM 15, 11, 04, 12 and 08 already reported break down in the past.

At the time of the break-down, the VDM 09 temperatures were in limits and consistent with the others VDMs. The S/C altitude was going out of the radiation belts at 45733.6km. The VETO lateral and bottom count rates dropped from ~30000 cts/s to ~10000 cts/s. The calibration count rate also dropped from ~2600 cts/s to 1736 cts/s, triggering OOL Alarm low. The VETO current changed from 1.63A to 1.64A; the VDM/CDM current changed from 0.99A to 0.98A; and, the VEB current changed from 1.47A to 1.48A.

The value of HV for VDM09 came back by itself to nominal at 09:12Z. However VETO counters remained low.

Because VETO was “down” after this anomaly, TM G8080 (S1E-VS HBRA-RT) went OOL High and back at 09:29Z, 10:00Z and 10:32Z, flagging an overload of ISGRI events.

At 10:31Z following the OOL & OEM reaction (V-HV-1) in the Payloads Recovery Document, VETO was set in Stand-By mode switching off all HVs with:

- FCP_IBIS1_0313 IBIS transition to Stand-By (TC G0125)
- FCP_IBIS1_0203 VETO transition to Stand-by (TC G0601).

At 10:36Z, still following V-HV-1, VETO was set in Maintenance mode and was monitored until 11:00Z. Parameter TM G6061 (V1S-CAL-COUNT) went back inside limits as soon as VETO was restarted, and all VETO parameters were nominal during the monitoring period.

At 11:00Z, VETO was set back in Nominal mode and IBIS in Scientific Standard. The unit reported the following nominal values:

VDM 09 HV = 992.68V,
VETO counters both ~30000 cts/s.

DoY 2005.276 (03/10/2005)

From 01:20Z to 06:52Z, TM parameters G5038 (P0S-M8_RTC2), G5023 (P0S-M5_RTC2), G5033 (P0S-M7_RTC2), G5018 (P0S-M4_RTC2), and G5008 (P0S-M2_RTC1) were toggling OOL High. As this happened inside the radiation belts, according to P-CNT-1 no action was taken.

At 08:26Z, TM parameter G2098 (I0E-OVFWPXADD-7) failed SCC. According to reaction I-OVF-1, no action was taken.

At 10:34Z, TM parameter G8015 (28V PMT set by IASW) went OOL High as VETO was in Stand-By. It went back as soon as VETO was set into Maintenance mode.

Similarly, TM G8015 went OOL high at 11:00Z when VETO was switched from Maintenance to Stand-By. It went back inside limits as VETO went in Nominal mode.

DoY 2005.278 (05/10/2005)

At 06:47, following INT_OR_0221 (Loss of Redu due to CRYOSAT), IBIS was switched to Safe mode with FCP_IBIS1_0801. IBIS was disabled in the timeline at 07:02Z.

From 07:32Z to 14:45Z, no TM/ TC link was ON due to Cryosat rehearsal on REDU. At 15:05Z, IBIS was set back into Scientific Standard mode with FCP_IBIS1_0803 and with GESTAN02 at 15:17Z. IBIS was enabled in the timeline at 15:19Z. Consequently, TM G8015 was reported OOL high between 06:48Z and 15:13Z.

At 23:01Z, TM parameter G8015 (28V PMT set by IASW) went OOL High with the value 29.4V. It went back inside limits at 08:28Z on DoY 279. As this happened inside the radiation belts, according to V-VLT-1 no action was taken.

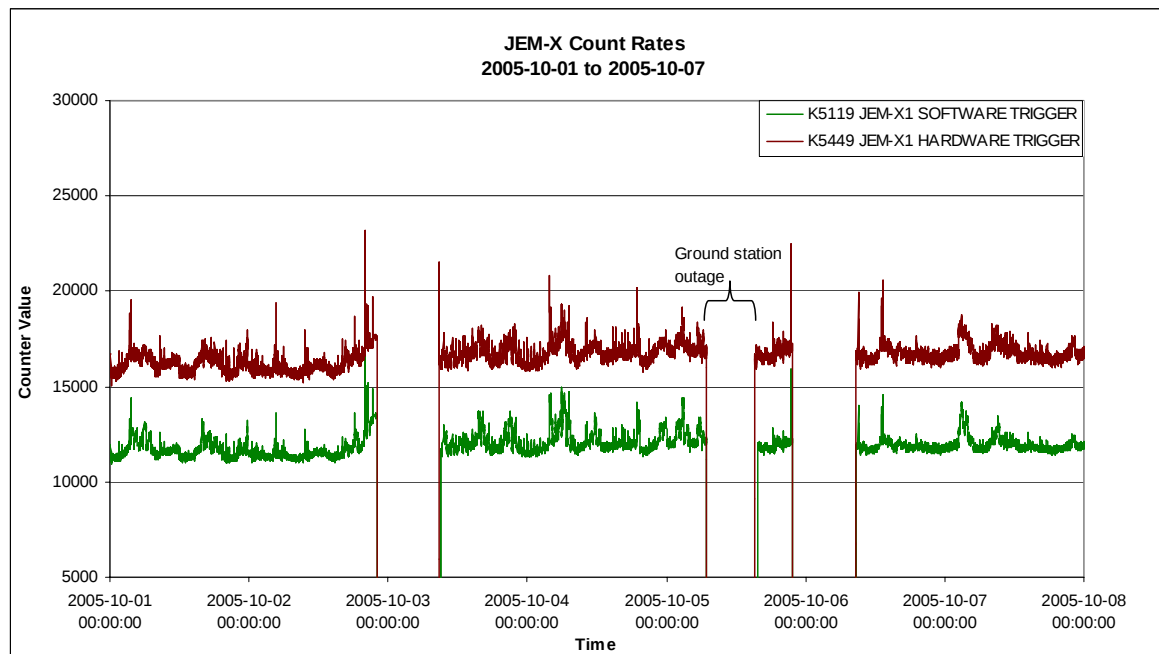
DoY 2005.279 (06/10/2005)

From 01:22Z to 06:42Z, TM parameters G5038 (P0S-M8_RTC2), G5022 (P0S-M5_RTC1), G5033 (P0S-M7_RTC2), G5013 (P0S-M3_RTC2), and G5008 (P0S-M2_RTC1) were toggling OOL High. As this happened inside the radiation belts, according to P-CNT-1 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.

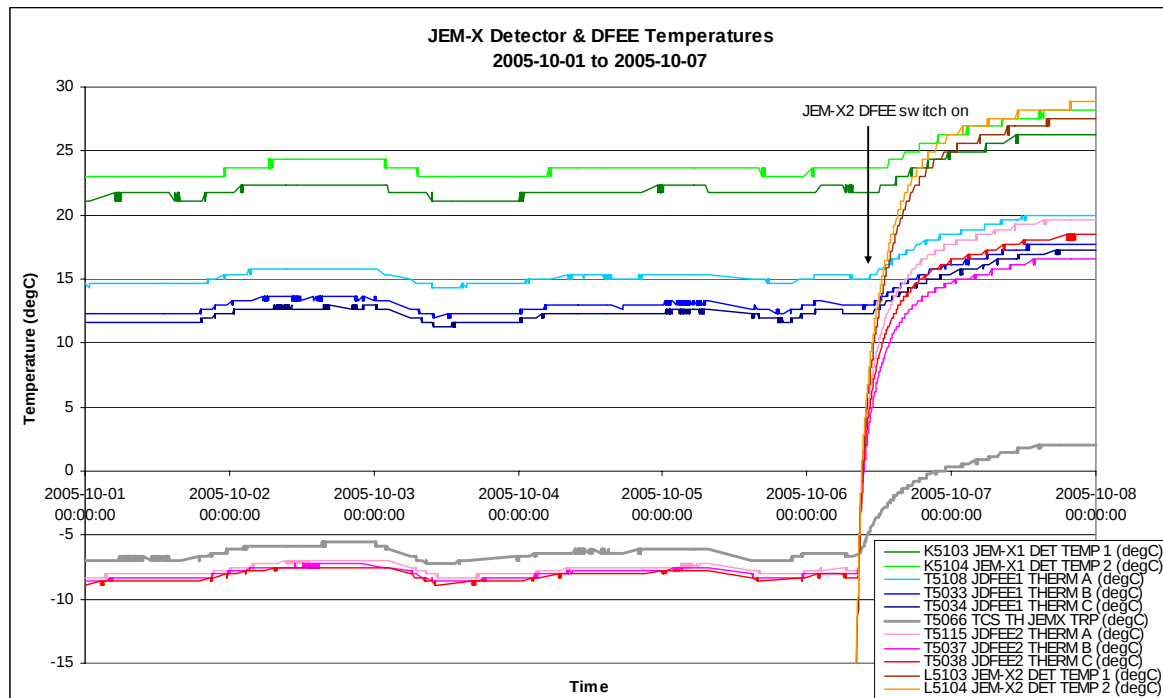


8.3.4.2 JEM-X Temperatures

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.

The effect of the switch-on of the JEM-X2 DFEE on 2005-10-06 is evident. The JEM-X1 temperatures increased by ~5 degC and those of JEM-X2 by ~25 degC.



8.3.4.3 JEM-X Daily Report

2005-10-01 (DOY 274, Rev 362)

Nothing to report

2005-10-02 (DOY 275, Rev 362)

Due to a problem with the ground station resulting in the loss of TM/TC links (see AR INT-2797), the ED KESAFE02 scheduled in the Timeline at 21:51:39Z failed release. Once TC capability was regained, the ED was resent at 22:00:02Z.

At 20:04:46Z, 20:12:06Z and 20:13:02Z the TM parameter K5136 BUFFER LOSS went Out of Limits High for 1 TM cycle on each occurrence.

2005-10-03 (DOY 276, Rev 362-363) to 2005-10-04 (DOY 277, Rev 363)

Nothing to report

2005-10-05 (DOY 278, Rev 363)

² Data sampled (1 frame in 8)

In line with INT_OR_0221, due to a ground station outage as a result of the CRYOSAT dress rehearsal, JEM-X1 was commanded to Safe mode via FCP_JEM1_0040 at 06:51:55Z and commanding to JEM-X1 was then disabled from the Timeline. Once coverage was regained, JEM-X1 was recovered to Data Taking mode as follows:

- 15:06:34Z FCP_JEM1_0041 JEMX1 TRANSITION TO SETUP
- 15:07:20Z FCP_JEM1_1010 JEMX1 CONFIGURATION SETTING FOR SCIENCE OPS
- 15:37:53Z ED KEDATA02 up-linked to put JEM-X1 in Data Taking mode with the planned observation parameters for the ongoing observation.

Commanding to JEM-X1 from the Timeline was then re-enabled and JEM-X1 operations continued nominally.

2005-10-06 (DOY 279, Rev 363-364)

In line with OCR 200 (Special JEM-X operations during the October 2005 Crab Calibration), the JEM-X2 DFEE was switched on at the start of revolution 364, after radiation belt exit. The activities were performed according to INT_OR_0222, as follows:

- 08:25:32Z FCP_JEM2_0021 JEMX2 DFEE ACTIVATION
- 08:45:46Z FCP_JEM2_0040 JEMX2 TRANSITION TO SAFE

As is usually the case when the DFEE is switched on after having been off for a considerable period of time, the JEM-X2 Detector Pressures went Out of Limits Low when the DFEE was switched on (TM parameter L5101 DET PRESSURE 1 = 132650Pa and L5102 DET PRESSURE 2 = 135200Pa). L5101 returned stably within limits (137000Pa) at 14:55:58Z and L5102 at 16:08:22Z.

At 13:23:34Z the TM parameter K5136 BUFFER LOSS went Out of Limits High for 1 TM cycle.

2005-10-07 (DOY 280, Rev 364)

Nothing to report

8.3.5 OMC Operations

2005-10-01 (DoY 274, Rev 362)

At 11:32, an AOCS command failed release, due to lack of a guide star. A manual recovery was performed, and the timeline rejoined at 12:25. The impact was the loss of pointing 03620042. It was at this time the following commands were rejected:

2005.274.11.35.10.061	2005.274.11.35.13.691	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535	PR N
E E						
2005.274.11.35.16.186	2005.274.11.35.21.568	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535	PR N
E E						

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

2005-10-02 (DoY 275, Rev 362)

At 20:22, a problem with achieving bit-lock from DSS-16 after the handover from Redu led to the suspension of the timeline until 22:13. The impact was the loss of pointings 03620086 and 03620087. It was at this time the following commands were rejected:

2005.275.22.00.48.006	2005.275.22.00.57.344	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535 PR	N
E E						
2005.275.22.00.54.256	2005.275.22.00.57.348	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535 PR	N
E E						

Which correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) for pointing 03620087.

2005-10-05 (DoY 278, Rev 363)

At 06:53:43, OMC was commanded from ground to SAFE mode owing to the upcoming planned ground station outage (Redu had been allocated for the Cryosat launch rehearsal). The first pointing after the outage: 03630066, was lost due to insufficient time between AOS and slew start to establish a link. OMC was recovered back to Stand-by at 14:57:21, and was again in Normal mode at 15:38:48.

At 15:44, the FD update for slew 03630067 failed, as no guide star was present, after the recovery, the Timeline was rejoined at 16:40, the impact was the loss of pointing 03630068.

It was at this time the following commands were rejected:

2005.278.16.22.35.139	2005.278.16.22.42.373	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535 PR	N
E E						
2005.278.16.22.41.389	2005.278.16.22.50.329	1792	RealTime	131	TC REJECT	
REJECTED TC1			0	0	65535 PR	N
E E						

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

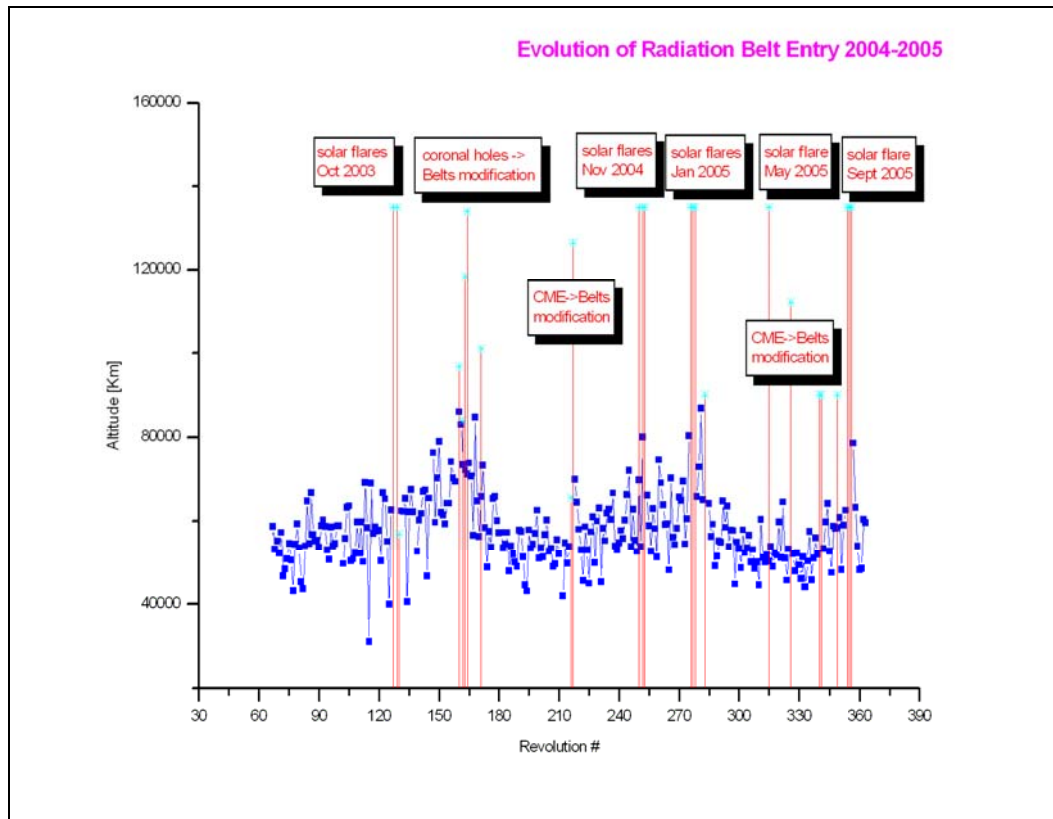
2005-10-07 (DoY 280, Rev 364)

At 17:18, the VC0 & VC7 TM from Redu were lost due to an MCP problem, this caused an AOCS command to fail release. A manual recovery was then performed. The impact was an 18 minute delay in the start of pointing 03640046

On DoY 275 at 23:15:20 and DoY 278 at 23:00:49 OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Radiation Belts Entry



IREM daily report

At 06:55Z, following INT_OR_0221 (Loss of Redu due to Cryosat), sequence UEGROF01 (IREM Ground Link Off) was sent so that during the antenna outage data would be stored in the on-board IREM buffer.

From 07:32Z to 14:45Z no TM/TC link was available due to the Cryosat rehearsal.

At 14:58Z sequence UEGRON01 (IREM Ground Link On) was sent, and the buffer started emptying the data to ground. This TC failed completion but was verified against the relevant TM parameter.

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]
362	RAD_ENTR R 2005-10-02T23:15:18Z	2005-10-02 23:00:08	>60356.1	2005-10-03 00:13:03	52143
363	RAD_EXIT R 2005-10-03T08:30:09Z	2005-10-03 07:21:52	>>24921.9	2005-10-03 07:23:03	29774
363	RAD_ENTR R 2005-10-05T23:00:48Z	2005-10-05 23:04:08	59538.9	2005-10-06 00:00:00	52238
364	RAD_EXIT R 2005-10-06T08:16:13Z	2005-10-06 07:10:00	>>24928.9	2005-10-06 07:10:00	29603

Reference

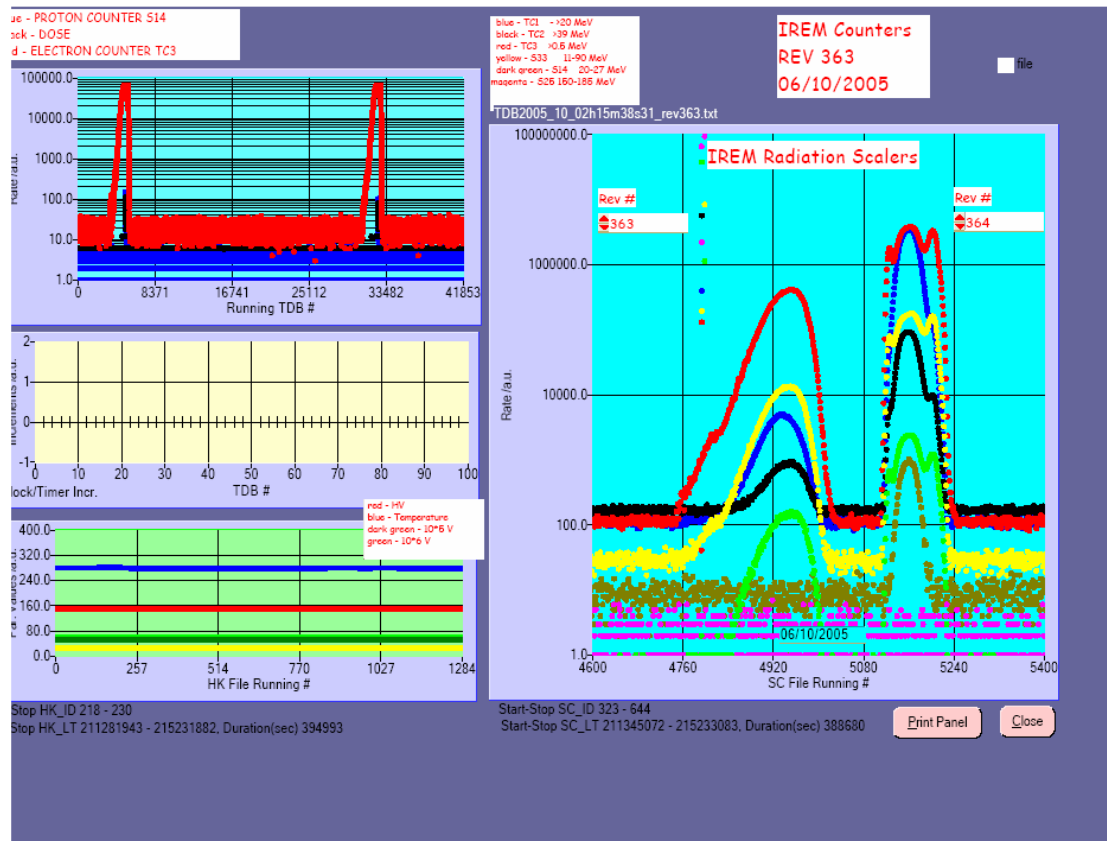
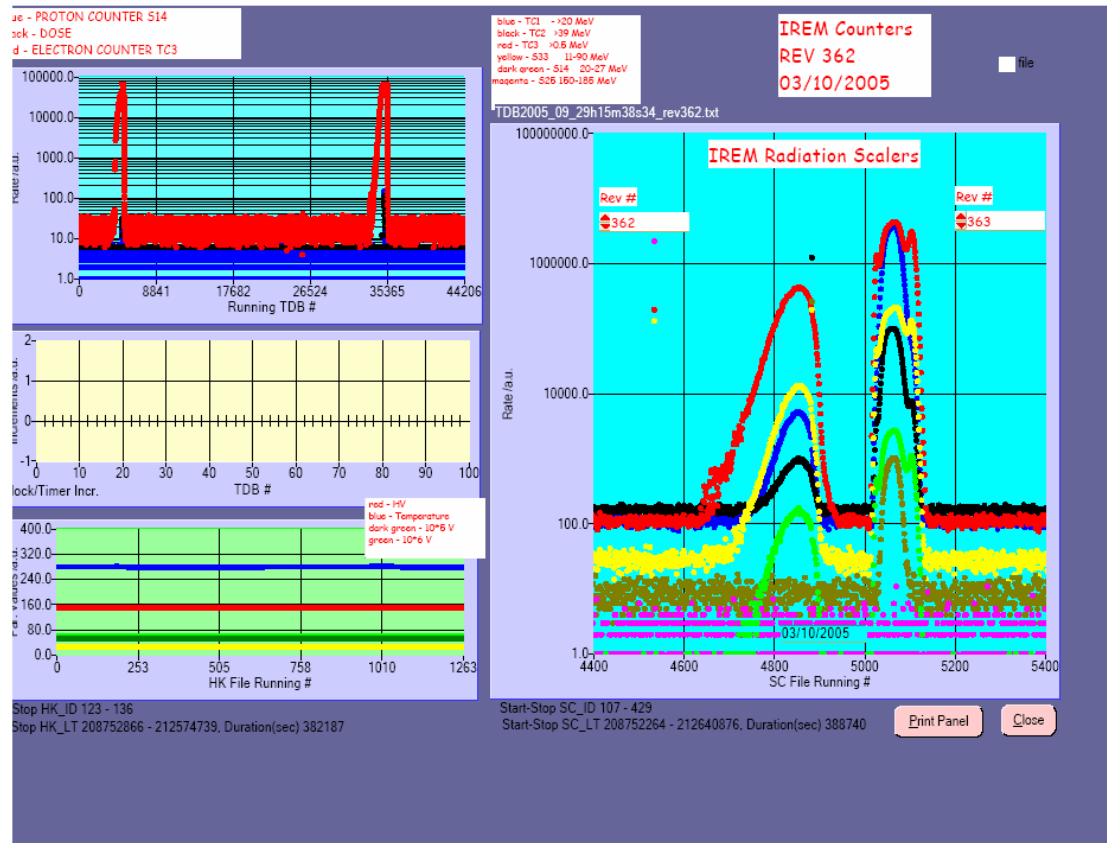
Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

Large error vs reference (more than 30 minutes)

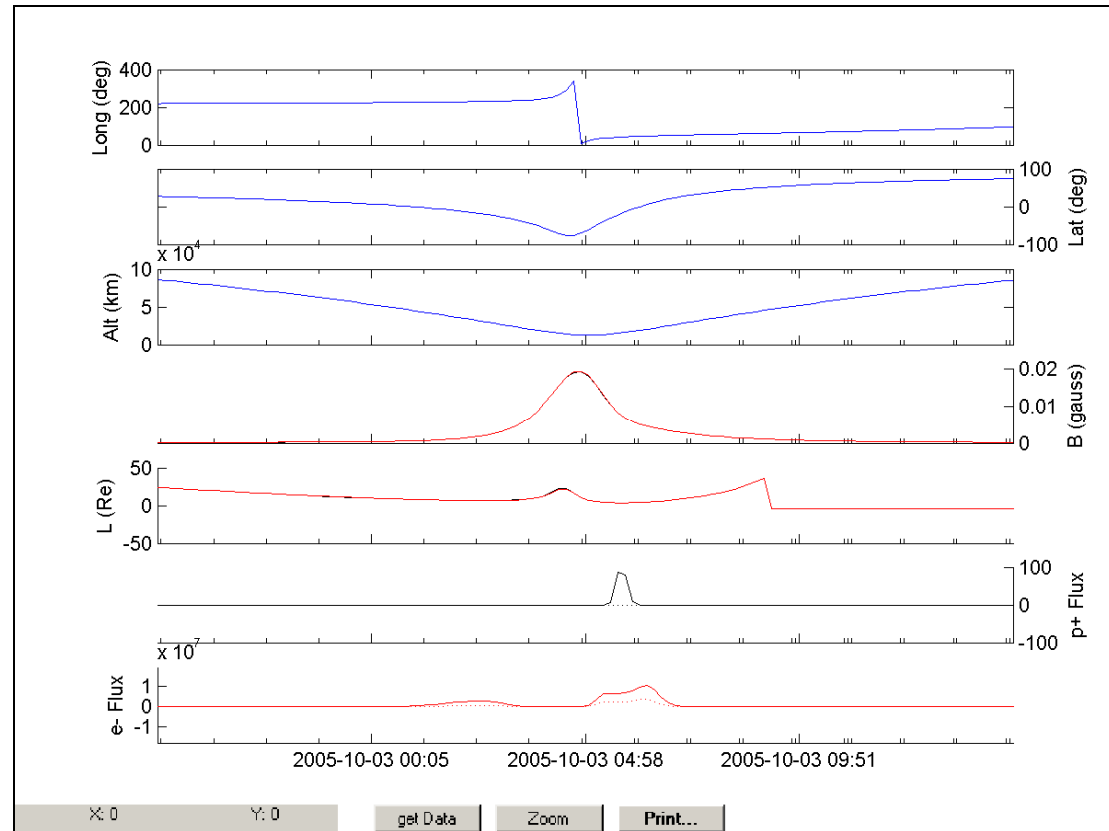
Radiation Spike

IREM radiation counters:

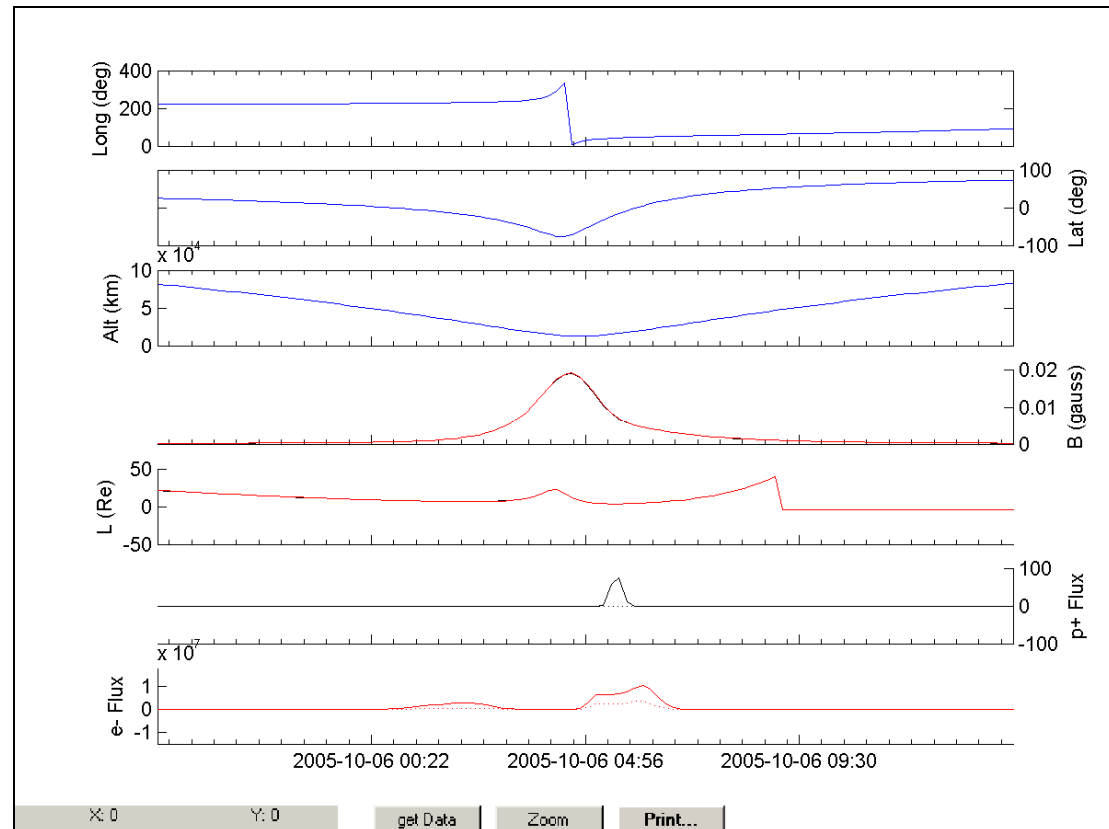


IREM Predicted Radiation Belt Passages:

Rev 362



Rev 363



SEC-GOES Observed Particles Fluxes:

