

XMM-Newton Users Group Meeting #10

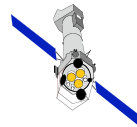
Instrument Operations / Data generation

ESAC, 6th May 2009

J.R. Muñoz, SRE-OAX

XMM-Newton

UGM#10, ESAC, 6-7 May 2009



Instrument Operations

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Overview

- **Instrument Operations**

- Instrument status
- Status of Instrument Operations
- Anomalies/Impact on science time.

- **Ground segment evolution**

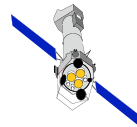
- New Operational scenario (no RT SOC monitoring).
- Man power evolution

- **Data generation and distribution**

- Status of data production
- SSC Processing
- Additional SOC products

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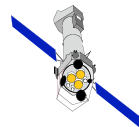
Instrument Status (1)

- **Instrument status:**
 - **general:** All instruments healthy and working fine
 - **NCR status:**
 - 116 NCR's raised on the Scientific Instruments since beginning of mission
 - Open: 1 (NCR-132, RGS-2 ADC-2 error from unused node, April 2008; it occurred 4 times)
 - **Recent anomalies (since last UGM): none**
- **NCR statistics (whole mission):**

| Unit | Issued | Unresolved | Open |
|----------------|------------|------------|-------------|
| EPIC-MOS 1 & 2 | 22 | 2 | 0 |
| EPIC-PN | 22 | 1 | 0 |
| RGS 1 & 2 | 18 | 0 | 1 (ncr-132) |
| OM | 51 | 1 | 0 |
| RM | 3 | 0 | 0 |
| Total | 116 | 4 | 1 |

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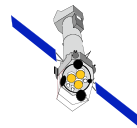
Instrument Status (2)

- **NCR-132:** RGS-2 is operated in Single Node Read-out since August 2007. Despite that in a few occasion an ADC Error was issued on the node that is OFF (i.e. in node D). This happened 4 times since 10/04/2008
 - **Outcomes of investigation:**
 - ◆ the instrument was properly configured for Single Node Readout Mode (node D was not supposed to be used)
 - ◆ only node C produced science telemetry after entering Spectroscopy
 - ◆ node C was reading the entire CCD (node D was totally passive)
 - **Reason:** still being investigated (in cooperation with the RGS experts at SRON); a **SEU** (i.e. spurious signal in the D-circuit) seems to be at the moment the most probable cause
 - **Impacts:** occurrence of this ADC error does not impact science

This NCR will be closed at the next MRB (use as is, no impact on science)

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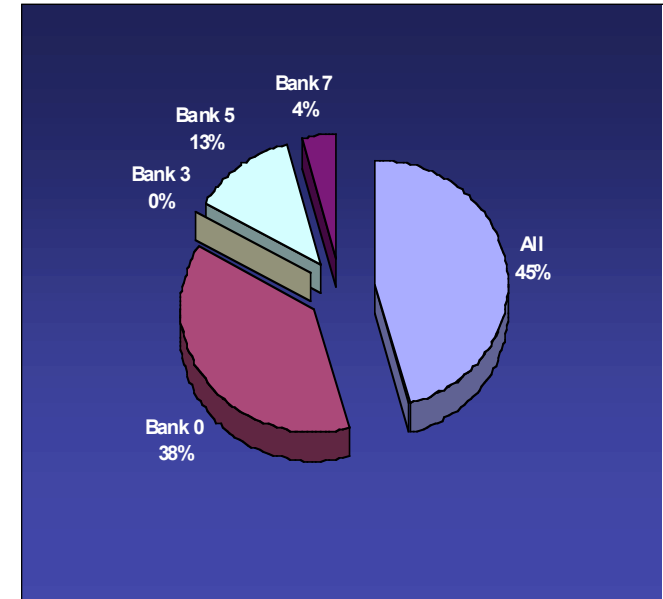
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Instrument Status (3)

Minor Instrument anomalies:

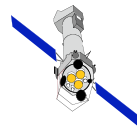
- MOS-2 EMCR SW crash on 23/02/09: smooth recovery, no science lost (occurred at perigee)
- OM DPU double bit memory errors: 28 occurrences since last UGM
- OM DPU reset: 2 occurrences
- OM ICU crash: 2 occasions (Rev-1534 & 1590)
- OM autonomous transition to Safe mode: one occurrence
- OM-A spurious switch-on (SEU on LCL) on 30/11/08; no impact on operations



OM DPU double bit errors statistics

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Instrument Status (4)

SVM anomalies:

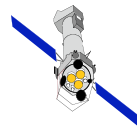
- **Transition to ESAM** on 06/10/08 while doing a RWL Biasing; caused by operational mistake after recovering CAE from an LCL SEU (forgot to re-initialize the CAE MACS bus interface).
- **Loss of contact** from 18/10/08 to 22/10/08 due to RF Switch malfunction

Remarks:

- ✓ In both cases the instrument integrity/safety was not affected (just a slight increase of the Focal Plane Temperature outside soft limits)
- ✓ The decision of not using the RF switch any longer (at least until next TX failure) has impacted the MP activities, while the instrument operations have remained totally unchanged.

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Instrument Operations highlights (1)

– Eclipses:

- Two regular eclipse seasons: 19 eclipses in total; maximum duration 1h 12 m
- Three lunar eclipses treated as full eclipses (the eclipse signal triggered only once)

– OM Earth & Moon limb tests:

Former constraints found to be too conservative:

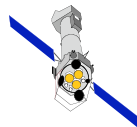
10 deg and 7 deg for slews near the Earth or the Moon respectively

- Up to 22 measures taken for analysis
- Reduction of the OM constraints in place as of 09/09/08 (Rev-1607); see table below
- Old values crossed eleven times so far

| OM constraint (slew) | previous | new |
|----------------------|------------|-----------|
| Earth | 10 degrees | 8 degrees |
| Moon | 7 degrees | 4 degrees |

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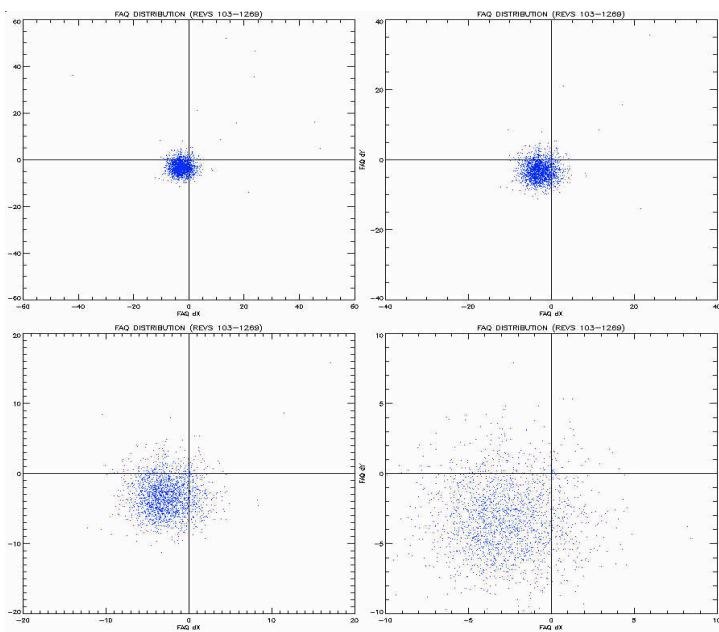
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Instrument Operations highlights (2)

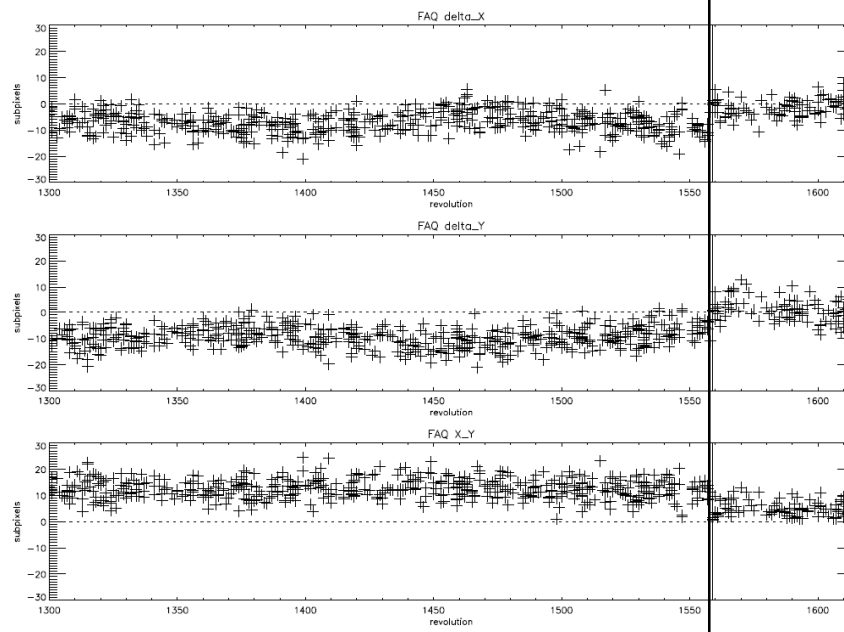
- OM bore-sight update:

- Progressive misalignment of OM with respect the platform reference frame along the years:
[X, Y] offset = [- 2.9", - 3.3"] +/- [2.1", 2.3"]; see picture
- New bore-sight implemented in rev 1559 (13/06/08). See A. Talavera's presentation.

update



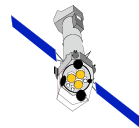
Before update



After update

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Instrument Operations highlights (4)

– Implementation of new Scientific modes

- **RGS Small window mode:**

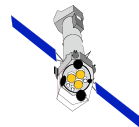
- Implementation required changes (in cooperation with MOC) to allow acquisition of up to 14 packets/sec (normally 6)
- Successfully tested on a bright extended source (Crab) in Rev-1687
- Test will be repeated on a bright point source (Cyg X-2) in May'09

- **MOSAIC mode:**

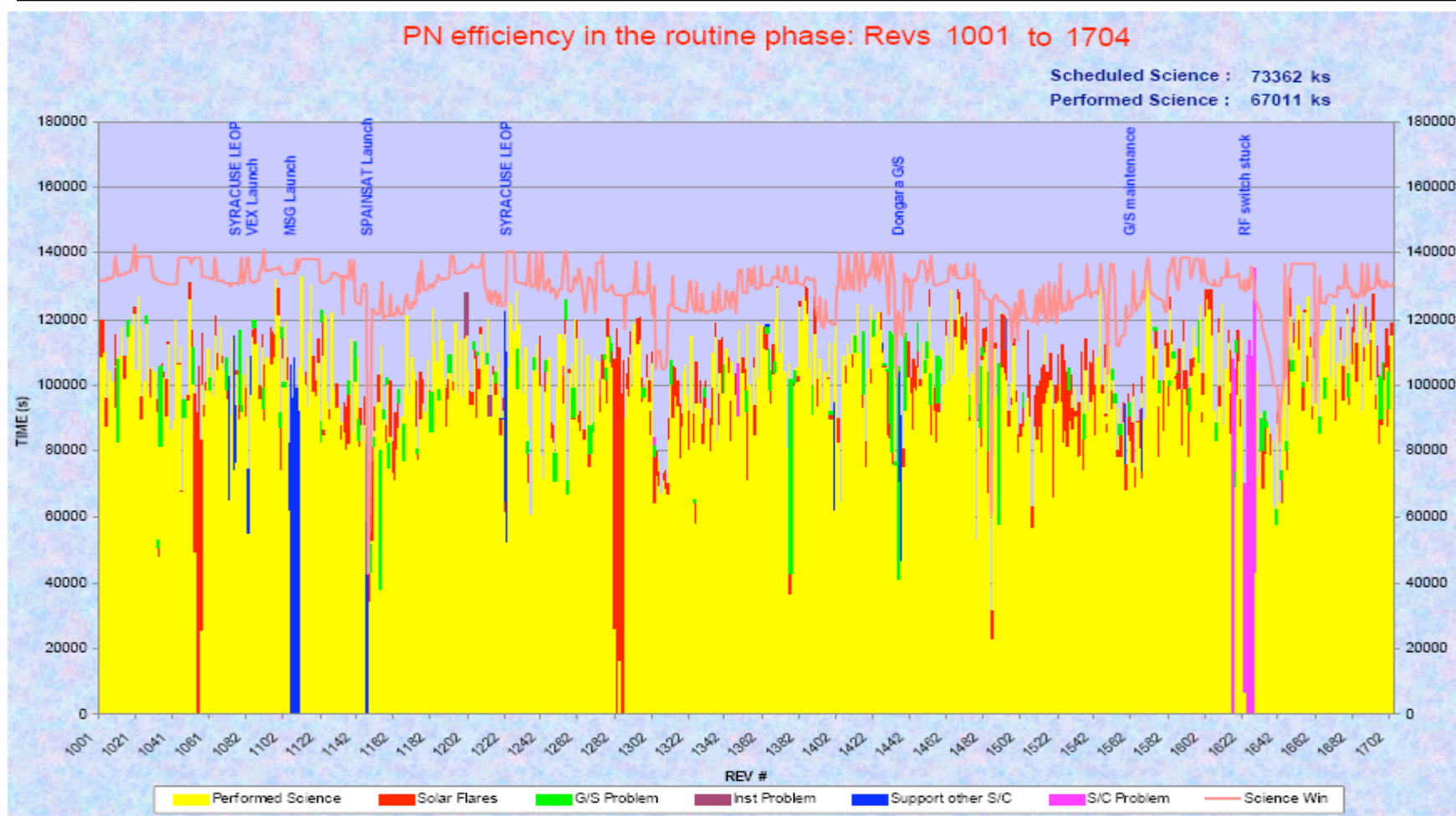
- New combined observing modality for PN and OM
- E2E test in Rev-1710: globally ok but OM commanding to be corrected (incorrect size of Memory windows)

- **RGS Multi-pointing:**

- Fully validated, already available in AO8. Still some manual tasks required for scheduling.

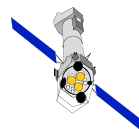


Time availability (PN)



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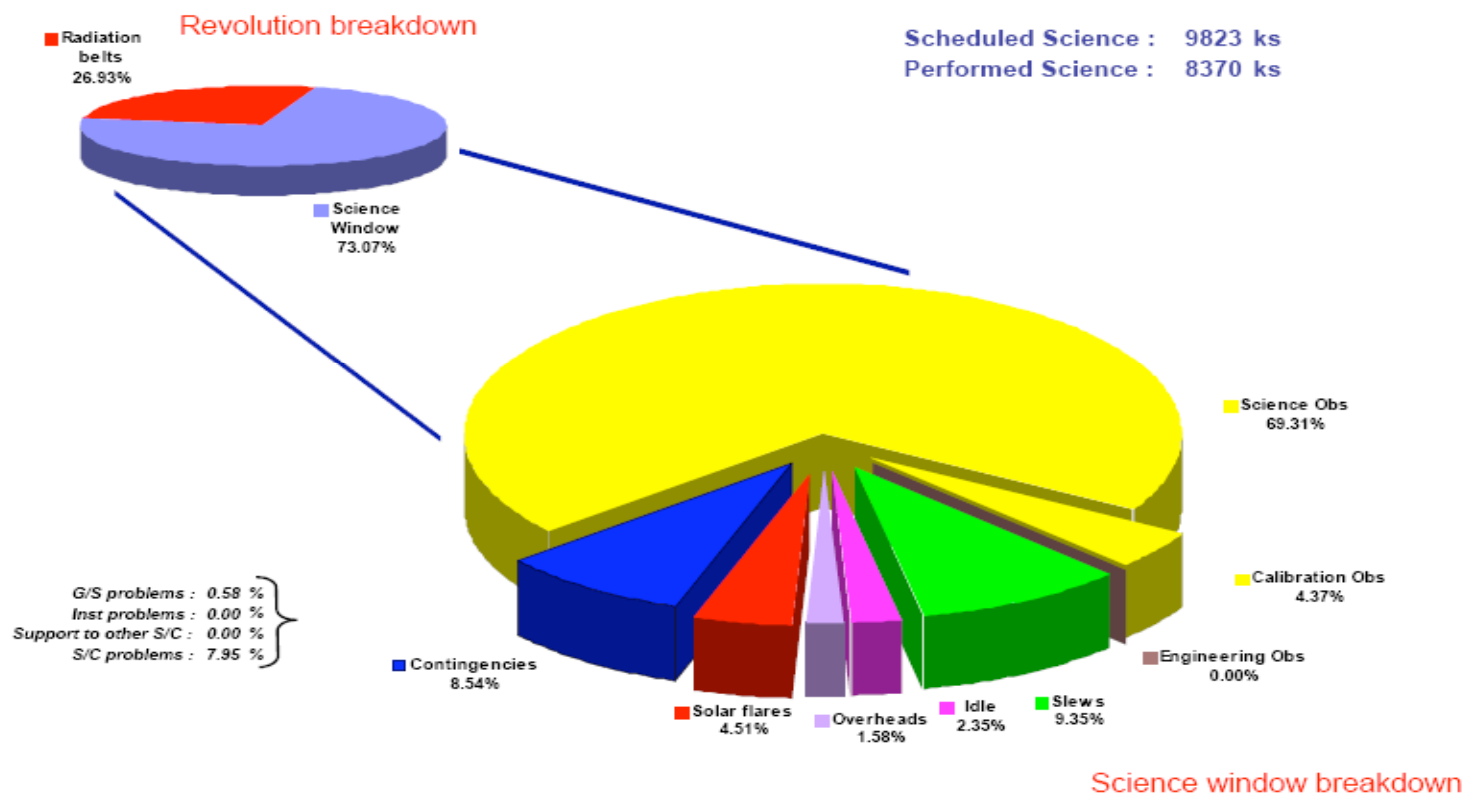


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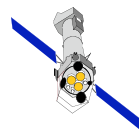
Time efficiency (MOS1)

MOS1 efficiency breakdown over the last 6 months (revs 1615 to 1704)



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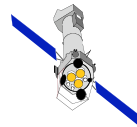
XMM-Newton Operations - general

Reminder of Real Time Scenario since January 2008:

- No Inscon; single Spacon controls XMM-Newton and Integral
- Pseudo on-call service established at the SOC for payload related contingencies; added to the already running on call support at MOC
- Priority on the simplicity of the operations rather than on the maximization of the science time / output
- Some initial problems were overtaken with supplement of Spacon training, optimization / simplification of procedures, additional alarms in Database, etc
- **Auto-commanding** in use since 14th of Oct 2008 (rev 1621)
 - Triggers on specific Out of Limits (either very critical or very frequent)
 - Puts the involved instrument in a safe status
 - No human intervention required
 - Mainly used for radiation alerts and some major instrument anomalies (not all cases can be covered)

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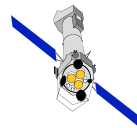
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XMM-Newton Operations - manpower

- As from 1st Mar 2008 one Data Aide 4 h per working day :
 - OLB and MOC events evaluation
- Real Time Telemetry to the SOC maintained and off-line Telemetry available via ftp every 12 hours (ready for ODF reprocessing if required or diagnostics).
- Last year 's evolution (2.5 ftes less):
 - One SW engineer (maintenance) less since 1st July 2008
 - One SW engineer (SCOS, CCB, ...) less since 1st Jan 2009
 - Half Team Leader (M. Casale), support to Planck as of 1st Jan 2009.
- Since 1st Jan 2009 the Instrument Operations and Systems Teams integrated in a single Team (6 ftes).
- In addition, 6 ftes in support areas (analysts, operators and XSA).

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Data generation (1)

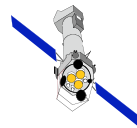
- Routine Phase statistics:

| | |
|------------------------------|------|
| – Scheduled (revs 103-1704): | 7516 |
| – Performed: | 7136 |
| – ODFs produced: | 6987 |
| – PPS products: | 6889 |

- Production of data is nominal, delay in ODF completion respect to data acquisition is ~9.0 days (delay in reconstructed orbit file generation).
- Use of predicted orbit helps decreasing delay to 6 – 7 days (already in).
- Slew data files (SDFs) are generated in parallel to the ODFs. Working on a fast access tool to the data for web availability.
- Required reprocessing for current data has increased (~5%) due to line problems, reaction to contingencies, data availability, ... (also manpower).

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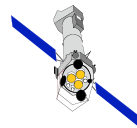


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Data generation (2)

- **SSC:**
 - New Pipeline (based on SAS 8.1). Products from this Pipeline started to be delivered from 15th Apr 2009.
 - New Products incorporate the Processing Report File, helping on the identification of Pipeline problems with the data.
 - Delay on deliveries mostly nominal. Only affected by tests of new Pipeline (both Pipelines could not run in parallel).
 - Failed Product Generation (FPG) raised in case of problems with ODF or with PIPE (available to SOC and SSC).
- Re-generation of Corrected Time Correlation (TCX)
 - Started by end of March 2009 with the rev range 1435 – 1575.
 - Other ranges until completion of entire mission in progress.
 - ODFs are updated and re-delivered (only) to XSA.
 - Correction based on the most updated and checked version of time delays (configuration control of SW and delays).
- Radiation Monitor: Data available for entire mission on a revolution basis. Once this data becomes time correlated it will be delivered to XSA.



Data generation (3)

- **XSA:**
 - New XSA version (XSA 5.0) released before AO8 opening (mid Aug 2008).
 - Future release (XSA 6.0) to be aligned with coming AO9.
 - No changes needed for Products coming from the new Pipeline Products (no format changes).
 - Incremental updates to 2XMM catalogue (2XMMi)
- **www:**
 - Migration to new webDB system completed

