Pipeline Status

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26/06/2024

Outline

- Daily production
- Bulk Reprocessing for 5XMM
- Improvements and challenges

Daily processing

Smooth but

- Ground stations issues (TM drops / TC failures / incorrect values in TCX)
- Ground segment issues (instrument processors / NIS)

result in

- Errors in ODF generation
- crash in SAS tasks or pipeline scripts
- “wrong” products identified in manual screening

and extra actions required:

- Raw telemetry reprocessing to generate new ODFs (logged in ODS system)
- “Manual” edition of ODF constituents (logged in Qcheck system)
- Ignore exposures in pipeline processing (logged in PPS system)

Remote screening tool is now operational

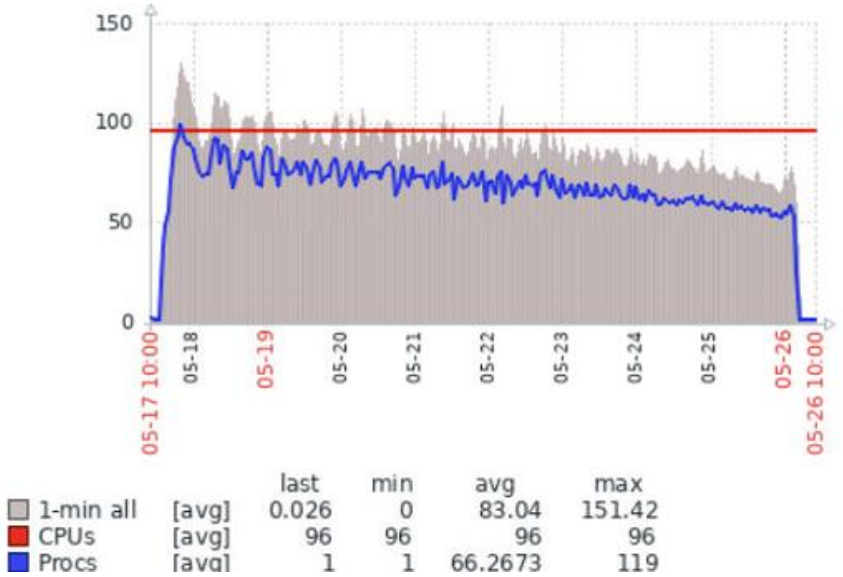
670 new pointed obs in XSA since last UG

154 new slew obs in XSA since last UG

Reprocessing: execution

- Use ESAC in-house facilities (faster CPUs but less nodes wrt 2019)
- All observations processed within 2 weeks (+25% observations wrt 2019)

Requirements

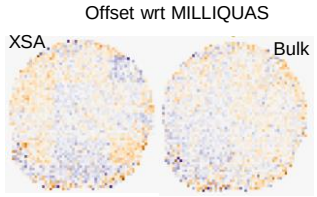


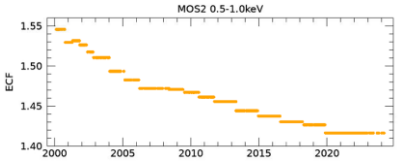
- Re-analysis of processing capabilities
- Request changes to default configuration
- Re-assessment of processing strategy

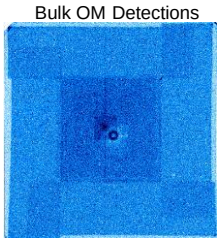
All observations processed in 8.5 days

Reprocessing: highlights

- Latest corrections to EPIC/RGS effective area
  - MOS-to-pn empirical correction
  - RGS-to-pn empirical correction
  - Empirical correction >3.0keV to reconcile EPIC-NuSTAR spectral fits
- Update CCDs layout in MOS cameras (LINCOORD CCF)
- Time evolution of Energy Conversion Factors (MOS ECFs)
- EPIC spectra for sources with more than 50cts
- Merging all OM modes in mosaicking detection
  - one OM mosaic image per observation and filter (new product)
- OM sources from mosaicking detection only from overlapping regions
- New method for source detection in EPIC cameras (emldetect_esc)





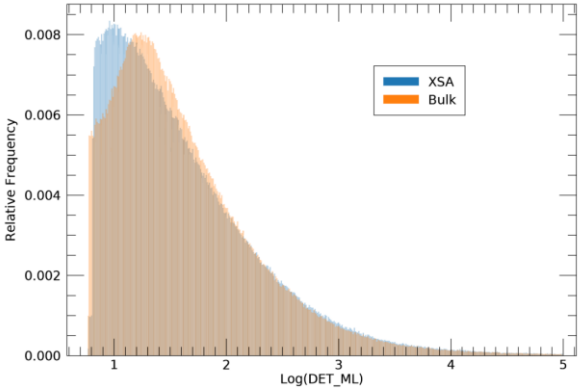


Reprocessing: flux-coupled source detection

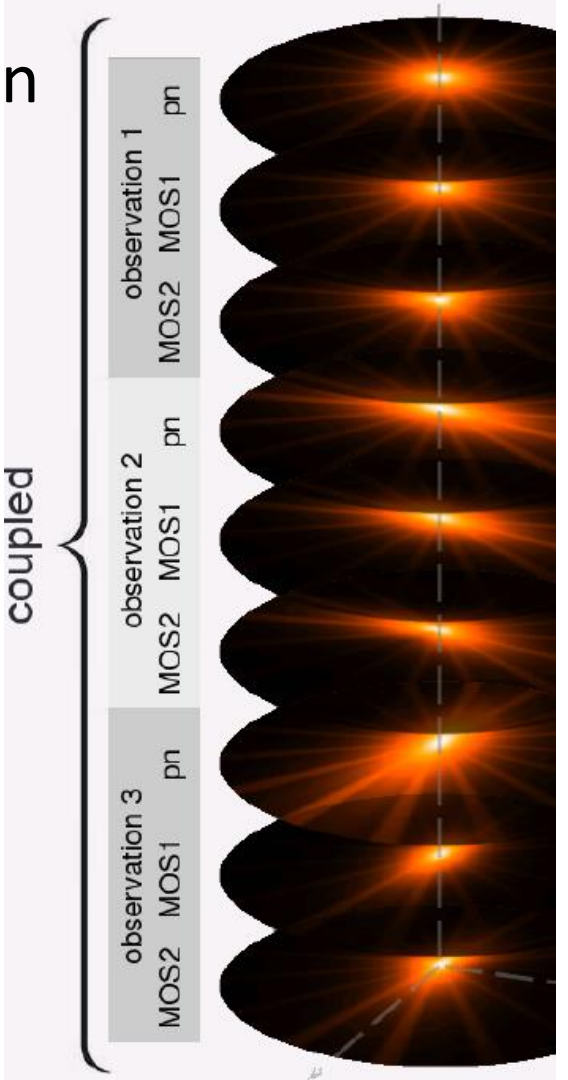
Flux-coupled source detection

- ✶ fit position, extent, common flux, spectral parameters
- ✶ integrate the ECF interface in spectral fitting
- ✶ *adjust the maximum likelihood routine*
- ✶ *determine detection likelihood and parameter errors*
- ✶ determine final source parameters and variability info

from subsequent PSF photometry

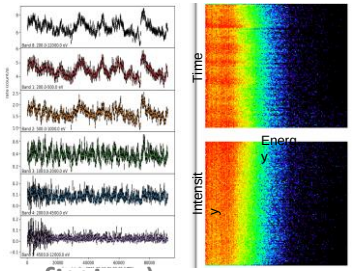


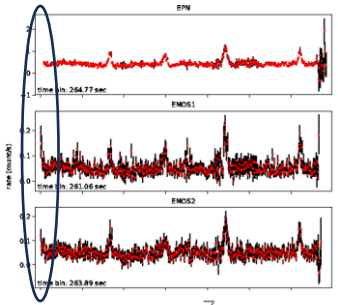
Iris Traulsen et al.
The XMM-Newton survey legacy for Athena and beyond
February 26-29, 2024

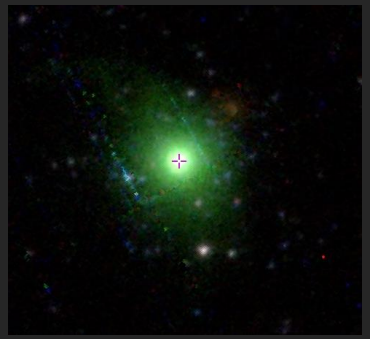


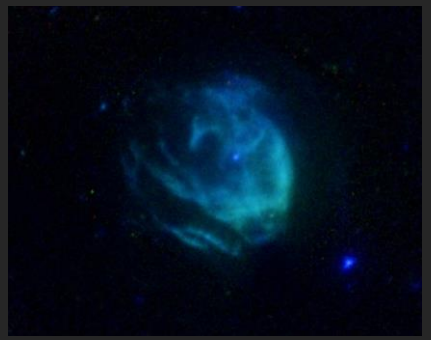
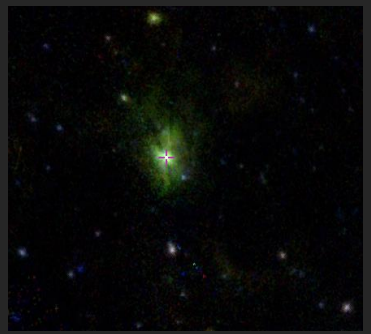
Improvements and challenges

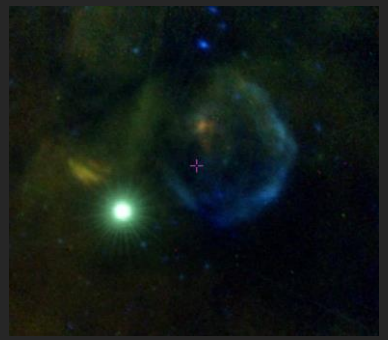
- Point-like sources
  - Rate to flux conversion (spectral fitting, different bands, rmf inversion)
  - Astrometry (CCDs layout, camera to Star Tracker alignment)
  - Detection (improve for fainter sources and reduce spurious detections)
  - Variability (amplitude, timescale)
- Bright point-like sources
  - Spectral variability (spectra for different intensity levels/time intervals)
  - Common GTI for spectra from different instruments (for simultaneous fitting)
- Extended sources
  - Detection (actively search for them)
  - Spatial properties (location, geometry)
  - Spectral properties (images in ad hoc energy bands, tessellation)
  - Mosaicking (sources extending beyond FoV)









Summary

- Smooth daily processing (screening, some manual fixes)
- Data for 5XMM reprocessed (will not be public before 5XMM release)
- Room for improvement in current products (calibration, processing parameters)
- Challenges for Legacy Products (new techniques, new products)