Catalogue of the XMM-Newton Pipeline products Present and Future

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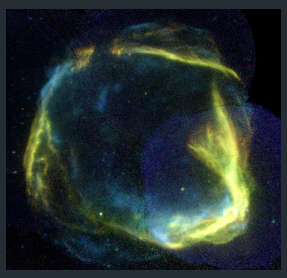
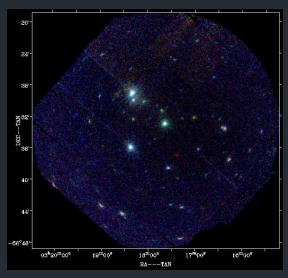
The aim of the XMM-Newton Pipeline Processing System (PPS) is to provide a set of data products which are of immediate value for the XMM-Newton observer as well as for the XMM-Newton Science Archive (XSA), where they are also stored for public release. The dedicated pipeline reduces data from each of the EPIC, RGS and OM science instruments on XMM-Newton.

The resulting pipeline products are a mixture of files that are useful as inputs to further scientific analysis by the user and files that provide a first cursory view of the data. The products include calibrated cleaned event lists for all X-ray cameras, sky images, source lists, cross-correlations with archival catalogues and spectra and time series of sufficiently bright individual sources.

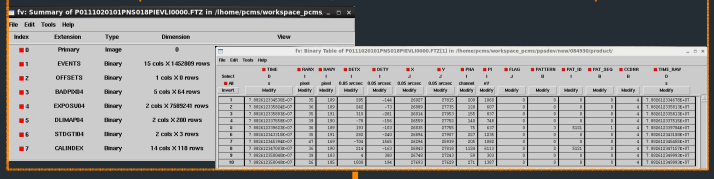
This poster is an overview of the current data products obtained by the XMM-Newton Pipeline and the plans to improve the quality of the data and the visualization of that resulting data.



Observation Data File
ODF
(raw data)



Event lists per instrument: EPIC-PN, EPIC-MOS1/2 an RGS1/2 + OM products



Source lists

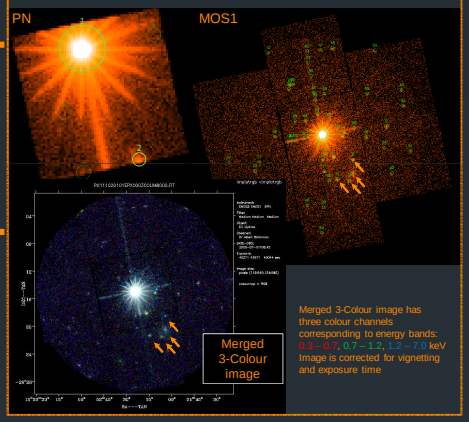
Source detection

Cross-correlation with EPIC, Optical OM and external catalogues sources

Source Products

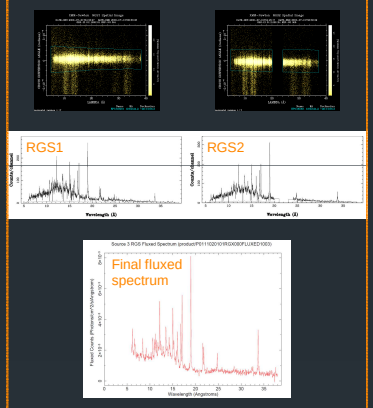
Source spectrum, Time Series, etc for sources with maximum likelihood detection and cross-correlation between EPIC, Optical OM and external catalogues

EPIC filtered images

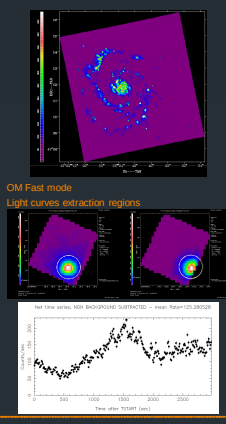


Merged 3-Colour image has three colour channels corresponding to energy bands: 0.3 – 0.7, 0.7 – 1.2, 1.2 – 7.0 keV
Image is corrected for vignetting and exposure time

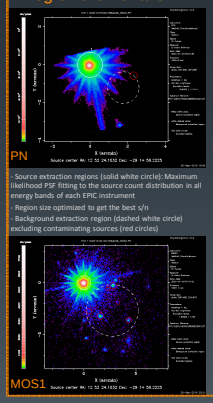
RGS spectroscopy



Optical Monitor (OM)

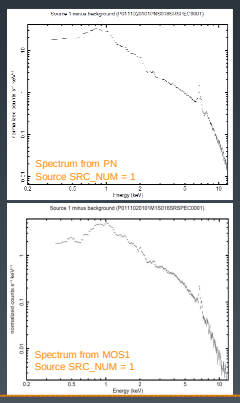


EPIC extraction region thumbnails

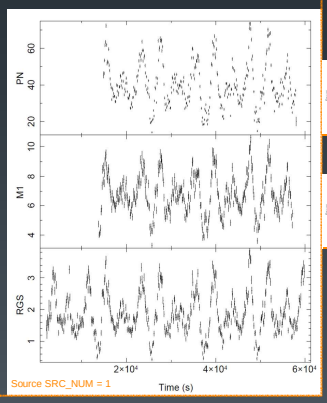


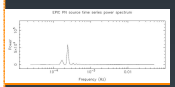
- Source extraction regions (solid white circle): Maximum likelihood PSF fitting to the source count distribution in all energy bands of each EPIC instrument
- Region size optimized to get the best s/n
- Background extraction region (dashed white circle) excluding contaminating sources (red circles)

EPIC spectra

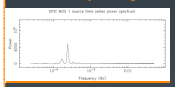


Time Series (Light Curves)

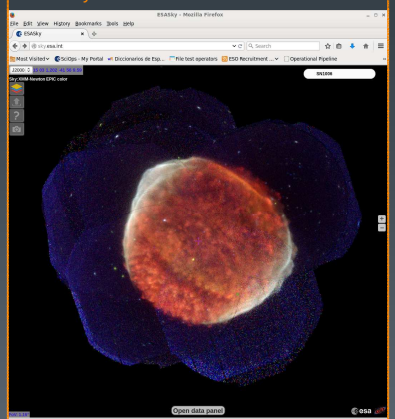




FFT time series power spectrum for variability checking



ESASky



Stacked EPIC 3-Colour images as are seen in ESASky visualization tool

In addition to improving the source products quality, better instrumental background estimate will also improve the presentation of overlapping images in any visualization tool (e.g., ESA Sky tool)

Last Improvements on results visualization

- Thumbnail images to visualize the exact regions of the source products (source, background and excluded sources)
- Spectral images (3-Colour images)

Future Plans

Products Quality:

- Improve source products quality by a better background estimate (instrumental background and flaring background filtering optimized per source)
- Increase sensitivity for source detection by stacking images and a better background estimate

Improve visualization:

- Provide net fluxed images, i.e. background subtracted, exposure corrected and energy correction factors applied
- ESASky images by stacking 3-Colour images: http://sky.esa.int (stacked images by ESA Sky team)
- Spectral variability (hardness ratios evolution). Spectral profile variability, "wavelength vs time"

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