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Screening and validation of EXTrAS data products

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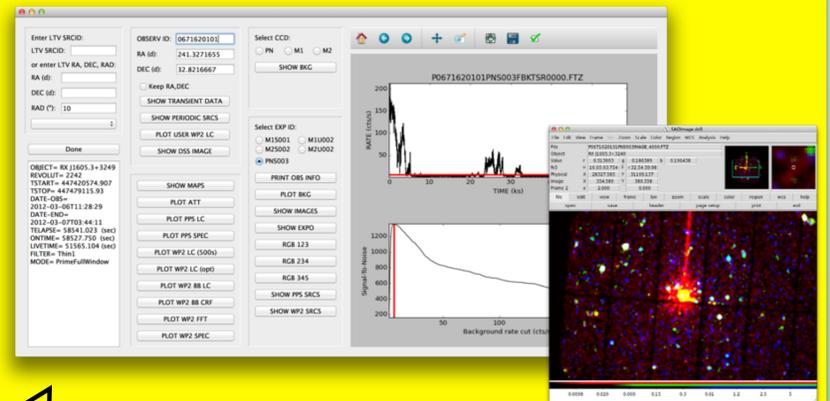
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Abstract

The EXTrAS project (Exploring the X-ray Transient and variable Sky) is aimed at fully exploring the serendipitous content of the XMM-Newton EPIC database in the time domain. The project is funded within the EU/FP7-Cooperation Space framework and is carried out by a collaboration including INAF (Italy), IUSS (Italy), CNR/IMATI (Italy), University of Leicester (UK), MPE (Germany) and ECAP (Germany). The several tasks consist in characterise aperiodic variability for all 3XMM sources, search for short-term periodic variability on hundreds of thousands sources, detect new transient sources that are missed by standard source detection and hence not belonging to the 3XMM catalogue, search for long term variability by measuring fluxes or upper limits for both pointed and slew observations, and finally perform multiwavelength characterisation and classification. Screening and validation of the different products is essential in order to reject flawed results, generated by the automatic pipelines. We present here the screening tool we developed in the form of a Graphical User Interface and our plans for a systematic screening of the different catalogues.

Visualisation of PPS products

The GUI displays images like background, exposure maps but also scientific images in one or several bands (including RGB images), plots of the background light curve, changes in the attitude, light curves and spectra of brightest sources, and prints information about the observation.

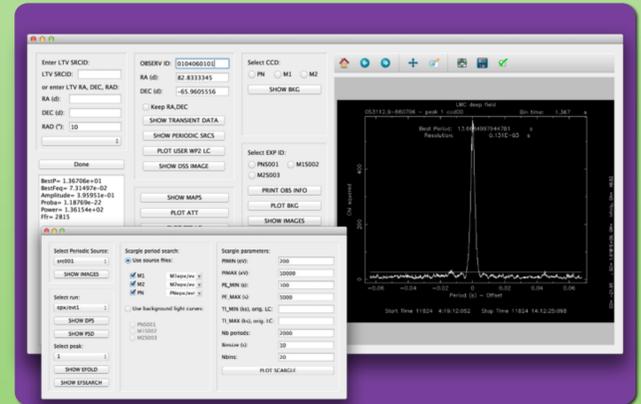


Visualisation of the WP2 products (aperiodic variability)

The GUI displays light curves (with different binning times), Bayesian Block light curves, Cumulative Rate Functions, Fast Fourier Transforms and Energy spectra. It also allows the user to produce its own light curves using different settings.

Description of the GUI

The GUI allows a quick visualisation of the XMM-Newton PPS files, EXTrAS data products and optical dss image of the FOV. Written in Python, it has a plot/graphic window and an interface to ds9 for image display.



Visualisation of WP4 products (transient sources)

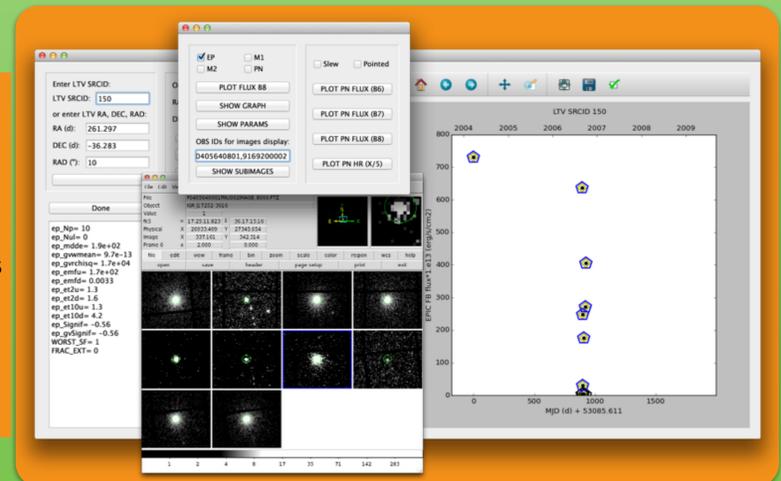
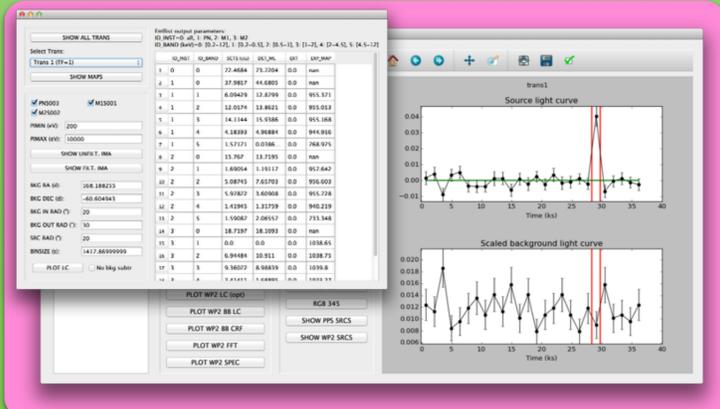
The GUI displays images of the transient candidates in the relevant time interval, with exposure and background maps, prints the detection parameters and allows the user to produce its own light curve using different settings.

Visualisation of WP3 products (periodic variability)

The GUI displays graphs of the Discrete Period Search, Power Spectra Density, folded light curve and Epoch Folding search around period. The user can also perform its own period search via Lomb Scargle Periodograms, using different settings.

Visualisation of WP5 products (long term variability)

The GUI displays long term light curves using the WP5 catalogue which contains fluxes and upper limits from pointed observations and slew surveys. It prints variability parameters and shows images of the sources in the different observations.



Plans for systematic screening of the different catalogues

For each WP it is planned to look for the most variable sources according to selected criteria and filtering. The GUI will then be used to check if the variability is real or spurious (because of bad data quality or imperfections in the automatic pipelines). After a careful analysis, feedback will be given to the different WPs to improve the algorithm and/or data products quality.