



implotregions

January 27, 2025

Abstract

Thumbnails of EPIC images around the Source and Background regions

1 Instruments/Modes

Instrument	Mode
EPIC PN	IMAGING
EPIC MOS	IMAGING

2 Use

pipeline processing	yes
interactive analysis	yes

3 Description

The task **implotregions** produces a thumbnail image (PNG) from an EPIC image, but only showing the part of the image surrounding the Source and Background regions. Those regions have to be included as input region files at the command line.

The task was thought to show the exact positions of the extraction regions of the source and the background in the usual process of getting the spectrum and the light curve of any EPIC source. Thus the best candidate region files for this task are the spectra FITS files produced by SAS because they include the regions as an extra extension in the file.

3.1 Input

3.1.1 Image

An EPIC image is one of the mandatory input files for this task. For the time being that image has to be in sky (X/Y) coordinates (0.05 arcsec). The task expects to find mandatory WCS keywords (CTYPEn,



CRVALn, CRPIXn and CDELTn) in the FITS file header and will exit with an error if the keywords are not found. In addition the task checks that the keyword DATAMODE is equals to IMAGING. Standard images produced by evselect and xmmselect and the pipeline will process ok.

3.1.2 Region files

The region files are also mandatory input files for this task. Any FITS file containing an extension REGION will be a valid region file. However the best candidate for region file is the spectrum file produced by SAS. Those spectra FITS file contain an extra extension with the REGION used to extract such a spectrum. The REGION extension has to be a table with the following 4 columns: SHAPE, X, Y, R, where SHAPE is the region shape (CIRCLE for sources and CIRCLE or ANNULUS for background) and X, Y is the position of the region in Sky X/Y coordinates. R is the radius of the region in arcsec.

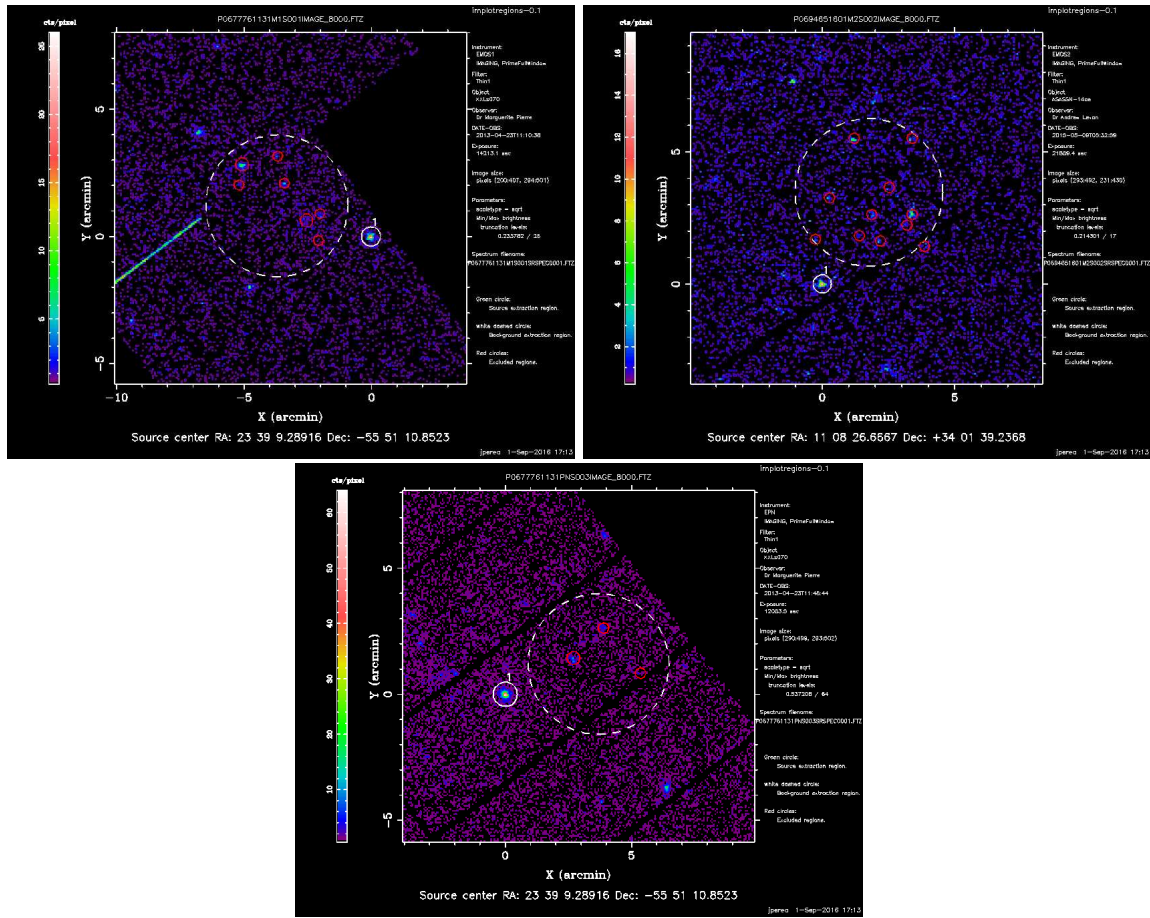
In order to draw the extraction region of the source and the selection background, two region files have to be included at the command line. One for the source (**srcregfile**) and the other one for the background (**bkgregfile**). Besides the background region, the background region file usually contains the contaminating sources which were excluded in the background estimate.

The extraction regions will appear in the resulting thumbnail image as follows:

- Source: white solid line
- Background: white dashed line
- Background contaminating sources: solid red lines

3.2 Output

The task **implotregions** produces a thumbnail image (PNG) from an EPIC image, but only showing the part of the image surrounding the Source and Background regions selected from the input region files. The image box axis are centered in the source and the source is labeled with the source number id (SRCNUM).



4 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints
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imageset	yes	string	image.ds	
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Input image FITS file (eg., P0123456789PNS003IMAGE_8000.FIT/FTZ).

srcregfile	yes	string	srcregfile.fits	
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Name of source region file. The source spectrum is the best candidate.

bkgregfile	yes	string	bkgregfile.fits	
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Name of background region file. The background spectrum is the best candidate.



outputfile	yes	string	thumb_output.png	
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Output PNG file name.

withxyclick	no	boolean	true	
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Whether to clip the image per each source+background regions pair.

separationmargin	no	real	1.0	
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Separation between the display box and the extraction regions as a fraction of the regions separation.

5 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS documentation.

invalidImageType (*error*)

Input image not valid. Mandatory WCS keywords not found (CTYPEn, CRVALn, CRPIXn, etc)

WrongRegionFile (*error*)

No REGION extension in the Region file. REGION extension does not contain valid column names (or the correct order): SHAPE, X, Y, R. Regions in the Source and Background region files have to be in the same coord. type.

WrongSourceNumbers (*error*)

Source number of the Source and Background spectra differ.

badPlotDevice (*error*)

Plot device was not created for some reason.

WcsTransform (*error*)

Cannot transform wcs coordinates to pixel coordinates. 'wcsfwd' error.

badWcsType (*error*)

At present the task only deals with MTYPE1 = "pos", CTYPE = "X/Y".

WrongPixelSizeWorld (*error*)

X world pixel size and Y world pixel size differ.

invalidWCS (*warning*)

corrective action: The input image array does not contain any WCS information. The displayed source positions may therefore be incorrect.



6 Input Files

1. An EPIC image produced by `evselect` or `xmmselect` or the pipeline.
2. A region file for the source.
3. A region file for the background selection.

7 Output Files

1. A PNG output thumbnail image.

8 Algorithm

References