eslewsearch

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Abstract

The task **eslewsearch** runs a source detect chain on subimages of an EPIC slew, which have been previously created by **eslewchain**. It creates individual source lists in the soft, hard and total energy bands and an extra combined list.

1 Instruments/Modes

Instrument	Mode
EPIC PN	IMAGING

2 Use

|	
pipeline processing	yes
interactive analysis	yes

3 Description

3.1 General

The aim of **eslewsearch** is to produce lists of sources detected in an XMM-Newton slew. It is designed to work with data from the EPIC-pn camera.

eslewsearch takes as input a set of slew images and exposure maps which have been previously created by the task **eslewchain**. It runs the following sequence of SAS tasks separately on the soft band (0.2–2 keV), hard band (2–12 keV) and total band (0.2–12 keV) subimages.

1. **emask** expimageset=EXPMAP

2. **eboxdetect** usemap=no (local mode)

3. **esplinemap** (make the background map)

4. **eboxdetect** usemap=yes (map mode)
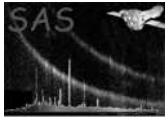
5. **emldetect**

The individual source lists are combined using the ftools, `ftlist, fcreate, fsort into a single file`.

3.2 How to use

The task should be run from a directory containing the output from a run of eslewchain. The task has no parameters and should be run by simply typing:

`> eslewsearch`

4 Parameters

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

Parameter	Mand	Type	Default	Constraints

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.

NoExpmap *(error)*
> The current directory does not contain any total band exposure maps

NoList *(error)*
> The processing failed to make any source lists

NoMerge *(error)*
> The processing failed to merge source lists

NoClean *(error)*
> Temporary files could not be removed

NoMask *(error)*
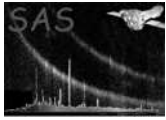> Failure during production of mask

BoxlFail *(error)*
> eboxdetect failed in local mode

BckgndFail *(error)*
> Failed to make a background file

BoxmFail *(error)*
> eboxdetect failed in map mode

emlFail *(error)*
          Error occurred in emldetect

NoTempCols *(error)*
          Failure in fcreate while making temporary columns file

NoCols *(error)*
          Failed to add extra columns onto source list

NoDump *(error)*
          Failed to dump values from source list

NoSort *(error)*
          Failed to sort final merged list

6   Input Files

The input files are the images and exposure maps produced by eslewchain.

7   Output Files

The task produces four output files:

- P"obsid"PNS003OMSRLI6000.FIT (soft band - 0.2--2 keV source list)

- P"obsid"PNS003OMSRLI7000.FIT (hard band - 2--12 keV source list)

- P"obsid"PNS003OMSRLI8000.FIT (total band - 0.2--12 keV source list)

- P"obsid"PNS003OMSSLI0000.FIT (combined source list)

The first three of these are source lists produced directly by the task emldetect. The
OMSSLI0000 file contains detections in all bands ordered by Right Ascension combined to
give one detection per band per row.

Count rates are converted to fluxes using hard-coded factors based upon a power-law spectrum
of slope 1.7, absorbed by a Galactic column of 3×10^{20} cm^{-2}. These values are 1 c/s = $1.436\times$
10^{-12}, 9.144×10^{-12}, 3.159×10^{-12} ergs s^{-1} cm^{-2} for the soft, hard and total bands respectively.

8   Algorithm

```
   for i = 0 to Number_subimages

     Loop over bands: soft, hard, total

        emask expimageset=expmap detmaskset=detmask.fits threshold1=1e-5
             threshold2=0.5
```
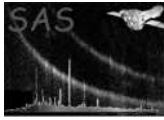
```
      eboxdetect expimageset=expmap boxsize=5 imagesets=image likemin=8
            nruns=3 pimin=1499 pimax=1501 usemap=no boxlistset=boxlist_l.ds

      esplinemap boxlistset=boxlist_l.ds detmaskset=detmask.fits
            excesssigma=3 imageset=image mlmin=1 nfitrun=3
            nsplinenodes=10 scut=0.005 bkgimageset=splinemap.ds

      eboxdetect bkgimagesets=plinemap.ds boxlistset=boxlist_m.ds boxsize=5
            expimageset=expmap imagesets=image likemin=10 nruns=3
            pimin=1499 pimax=1501 detmasksets=detmask.fits obsmode='slew'

      emldetect bkgimagesets=splinemap.ds boxlistset=boxlist_m.ds
            dmlextmin=2 ecut=36 expimageset=expmap imagesets=image
            fitextent=yes mlmin=8 pimin=1499 pimax=1501 scut=0.9
            psfmodel='slew' mllistset=mlist

   End of Loop over bands

 End of loop over subimages

 Merge soft band source lists together
 Merge hard band source lists together
 Merge total  band source lists together

 Create single source list from the individual band lists
```

9 Comments

- The PSF is used at 1.5 keV in all bands. This is thought to be more accurate than taking the central energy of each band.

- Subimages overlap by several arcminutes and a good fraction of the sources will be "detected" twice.

- The detection likelihoods have been set to a compromise between excluding real sources and including too many statistical fluctuations.

10 Future developments

It may be interesting in the future to simultaneously source search the soft and hard band images.

References