# XMM SAS source detection tasks

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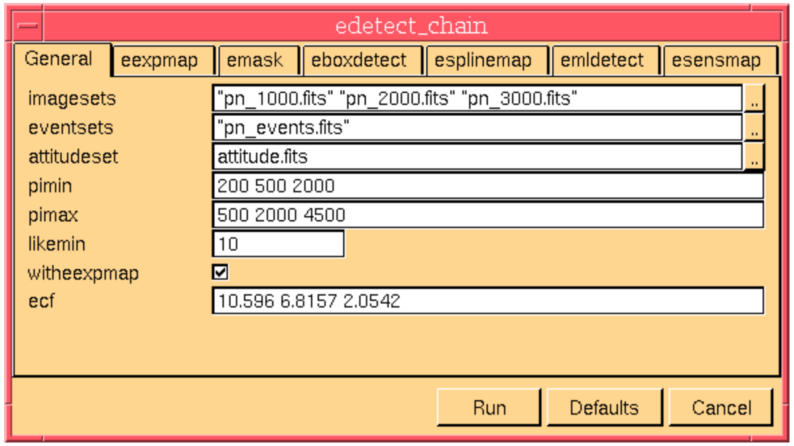
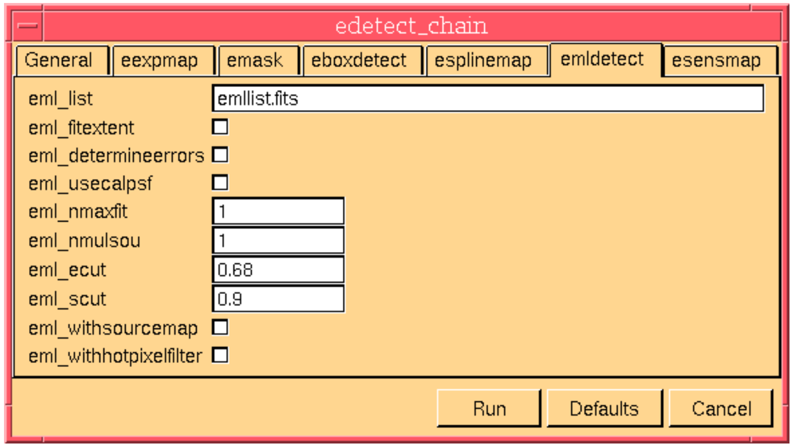
- Two packages using different algorithms:
  1. edetect_chain package
  2. ewavelet task

# edetect_chain package

| Task | Purpose |
|---|---|
| 1. eexpmap | create exposure maps |
| 2. emask | create detection masks |
| 3. eboxdetect (local mode) | sliding box detection |
| 4. esplinemap | create background maps |
| 5. eboxdetect (map mode) | box detection using background map |
| 6. emldetect | maximum likelihood fitting |
| 7. esensmap | create sensitivity maps |
| 8. edetect_chain | Chain script invoking 1.-7. |

# Using edetect_chain v2.0




- Command line or GUI use
- Able to control all relevant task parameters
- But: only small set of mandatory parameters

# Example: Point source detection, 5 energy bands

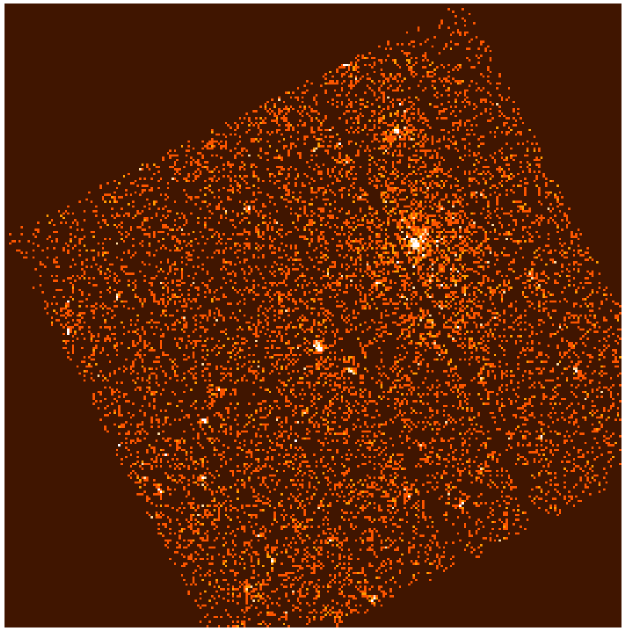
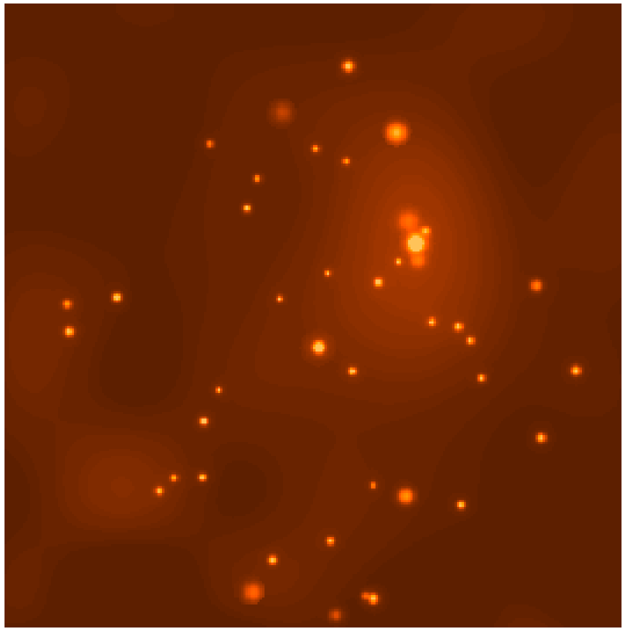
```
edetect_chain   attitudeset=P0126511201OBX000ATTTSR0000.FIT
                eventsets=P0126511201M1S002MIEVLI0000.FIT
                eml_list=M1_emllist.fits
                esp_nsplinenodes=16
                ecf=”10.596 6.8157 2.0542 0.99483 0.25933”
                pimin=”200 500 2000 4500 7500”
                pimax=”500 2000 4500 7500 12000”
                imagesets=”P0126511201M1S002IMAGE_1000.FIT
                           P0126511201M1S002IMAGE_2000.FIT
                           P0126511201M1S002IMAGE_3000.FIT
                           P0126511201M1S002IMAGE_4000.FIT
                           P0126511201M1S002IMAGE_5000.FIT”

srcdisplay      imageset=P0126511201M1S002IMAGE_8000.FIT boxlistset=M1_emllist.fits
```

## Example: Extended source search, 2 energy bands

```
edetect_chain   imagesets="P0110970101PNS001IMAGE_2000.FIT
                           P0110970101PNS001IMAGE_3000.FIT"
                eventsets=P0110970101PNS001PIEVLI0000.FIT
                attitudeset=P0110970101OBX000ATTTSR0000.FIT
                pimin="500 2000" pimax="2000 4500"
                esp_nsplinenodes=12
                eml_determineerrors=yes
                eml_fitextent=yes
                eml_fitextent=yes
                eml_ecut=0.95
```

## edetect_chain source map

## ewavelet

- Stand alone detection tasks
- Based on mexican hat wavelet algorithm
- Uses exposure maps from task eexpmap

++ Fast, easy to use, efficient for extended sources

– Source parameters less reliable than those from edetect_chain

## ewavelet example

```
ewavelet   expmapset=P0126511201M2S003EXPMAP8000.FIT
           imageset=P0126511201M2S003IMAGE_8000.FIT
           minscale=1.4   maxscale=16.  threshold=4.
           makerecon=yes   recimageset=m2_reconstructed.fits
           savebkgrnd=yes   bkgrndset=m2_ewave_bkg.fits
           srclistset=ewavelist.fits
```

## ewavelet products