emproc

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Abstract

Process the EPIC MOS part of an Observation Data File.

1 Instruments/Modes

Instrument	Mode
EPIC MOS	IMAGING, TIMING, COMPRESSED IMAGING, COMPRESSED TIMING

2 Use

pipeline processing	no
interactive analysis	yes

3 Description

emproc is one of the two tasks in the SAS package **epicproc**. Please refer to the documentation in **epicproc** for information on most of the functionality available in **emproc**.

In the following we describe some of the MOS-specific task parameters. These can be found in the parameter dialog box labeled *Details*, but there are a few exceptions to this rule as noted below. The following subsections are titled as the panes in the parameter dialog.

The parameter dialog box is automatically displayed if the task is run from the SAS graphical user interface **sas**. On the command line one can achieve the same effect by typing `emproc -d`. (See also the documentation of package **taskmain**.)

3.1 Flow Chart

In the figure 1 there is a sketch of the pipeline with all the tasks that emproc execute. A default execution of **emproc** can be easily tracked, just simply following the red arrows.

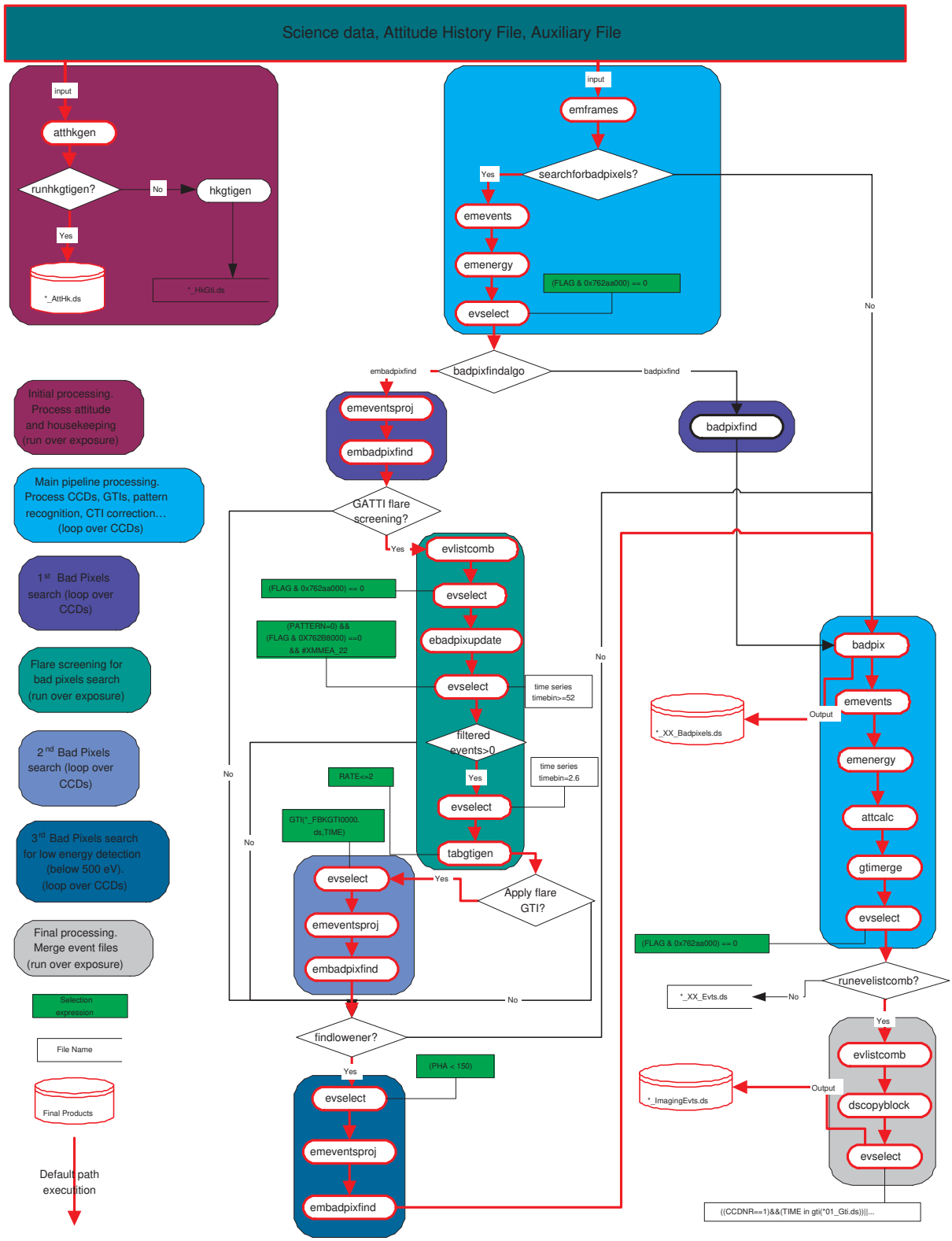

Figure 1: emproc pipeline.

3.2 Bad Pixels

emproc has a more sensitive algorithm for bad pixels detection which is **embadpixfind** (refer to this tash for further information). This task has been developed for finding bad pixels in an EPIC-MOS image in a completely automatic way.

If part of the exposure is affected by flares, this can seriously reduce the power of the bad pixels search (flares act as noise for the bad pixels and make detecting them more difficult). Therefore an intermediate flare screening is necessary (Fig 1). The bright pixels (which can perturb the flare screening) are flagged using **ebadpixupdate**. The resulting files are used to generate Good Time Intervals outside flares. Then the bad pixel search is run a second time on the data outside flares, in incremental mode.

Before applying this flare screening, we check the data quality inspecting the field of view value of each CCD (GATTI flare screening in Fig 1). If we obtain a value greater than 3 arcmin, we consider that the flare screening can be applied.

For `embadpixfind` the algorithm is called a third time (incrementally) on energies below 500 eV (and after flare screening), unless `findlowener`=N. This sometimes detects bad pixels more easily, because most appear at low energy.

Parts of the observation can be excluded from the search for bad pixels by giving **emproc** an additional GTI file via the parameters `withbadpixgti` and `badpixgti`.

For instance:

```
emproc --withbadpixgti=yes --badpixgti=mygti.ds
```

3.3 Details

In general there is no need to modify any of the parameters described in this section.

3.3.1 emframes

3.3.2 emevents

The following **emevents** parameters can be altered: `keepsifluor`, `randomizeposition`, `rejectrows`, `maxeventsperrow`, and `randomizetime`.

3.3.3 emenergy

The following **emenergy** parameters can be altered: `useccfdarkframe`, `randomizeenergy`, `correctcti` and `correctgain`.

3.4 Examples

- `emproc --selectinstruments=yes --emos1=yes`
  Process only the imaging exposures for EMOS1.

- `emproc --timing=yes --withsrccoords=yes --srcra=xxx --srcdec=xxx`

  Process also the timing exposures. The source coordinates should be given. (See also the task **emframes**.)

4 Parameters

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

Parameter	Mand	Type	Default	Constraints
selectinstruments	no	b	false	yes | no
Select one of the cameras?				
emos1	no	b	false	yes | no
Process EMOS1 data				
emos2	no	b	false	yes | no
Process EMOS2 data				
removetemporaries	no	b	true	yes | no
Remove temporary data sets?				
removeintermediategtis	no	b	true	yes | no
Remove intermediate GTI data sets?				
removeintermediateeventlists	no	b	true	yes | no
Remove the intermediate CCD/node-based event lists?				
withinstexpids	no	b	false	yes | no
Select exposures to process?				
instexpids	no	S	'M1S001 M2S001'	
List of exposures to process.				
selectccds	no	b	false	yes | no
Select the CCDs to process? false = process all CCDs.				
ccd1	no	b	false	yes | no
Process data for CCD 1?				
ccd2	no	b	false	yes | no
Process data for CCD 2?				
ccd3	no	b	false	yes | no
Process data for CCD 3?				
ccd4	no	b	false	yes | no
Process data for CCD 4?				
ccd5	no	b	false	yes | no
Process data for CCD 5?				
ccd6	no	b	false	yes | no

Process data for CCD 6?

ccd7	no	b	false	yes | no

Process data for CCD 7?

selectmodes	no	b	true	yes | no

Select the modes to process? false = process all modes.

imaging	no	b	true	yes | no

Process imaging mode exposure?

rimaging	no	b	true	yes | no

Process reduced imaging mode exposure?

timing	no	b	true	yes | no

Process timing mode exposures?

ctiming	no	b	false	yes | no

Process compressed timing mode exposures?

withgtiset	no	b	false	yes | no

Use an external GTI dataset to be used when filtering the data?

gtiset	no	e	gti.ds	

Name of the external GTI dataset to be used when filtering the data.

runhkgtigen	no	b	false	yes | no

Generate a GTI dataset based on housekeeping?

runatthkgen	no	b	true	yes | no

Pre-process attitude data through atthkgen?

referencepointing	no	s	object	nominal—object—mean—median—user

Coordinates of the reference poiting used for the calculation of the sky coordinates

ra	no	u	0.0	$\geq 0.0 - \leq 360.0$

User-specified right ascension of s/c attitude (deg)

dec	no	u	0.0	$\geq$ -90.0 – $\leq$ 90.0

User-specified declination of s/c attitude (deg)

posangle	no	u	0.0	$\geq$ -180.0 – $\leq$ 180.0

User-specified astronomical position angle of s/c attitude (deg)

filterevents	no	b	true	yes | no

Filter the event lists?

flagfilteredevents	no	b	false	yes | no

Flag the events that match the filter expression instead of removing them?

applygti	no	b	true	yes | no

Apply GTI filter to the event lists?

runevlistcomb	no	b	true	yes | no

Merge CCD-level event lists into exposure-level event lists (by mode)?

searchforbadpixels	no	b	yes	yes | no

Search for bad pixels?

badpixfindalgo	no	s	embadpixfind	emabadpixfind—badpixfind

Algorithm for bad pixels

searchforbadcolumns	no	b	true	yes | no

Look for bad columns?

withbadpixgti	no	b	false	yes | no

Search for bad pixels only in the given good time intervals?

badpixgti	no	e	bapixgti.ds	

Good time intervals to use while searching for bad pixels.

thresholdlabel	no	s	rate	peak—rate—counts

Thresholds choice - as percentage of PEAK, as count RATE or pure COUNTS [!badpixfind]

lothresh	no	r	0.0	≥ 0.0

Low threshold to search for dead pixels [badpixfind]

hithresh	no	r	0.005	≥ 0.0

High threshold to search for hot pixels [!badpixfind]

columnsearchlabel	no	s	median	median—total

Columnsearch thresholds choice - refer to TOTAL column value or MEDIAN column value [badpixfind]

locolthresh	no	r	0.0	≥ 0.0

Low threshold to search for dead columns [badpixfind]

hicolthresh	no	r	0.002	≥ 0.0

High threshold to search for hot columns [badpixfind]

flickertimesteps	no	i	1	≥ 1

Number of timesteps to search for flickering pixels [badpixfind]

flickerksthresh	no	r	0.55	$\geq 0 - \leq 1$

K-S threshold for low count flickering pixels [badpixfind]

flickerchisqthresh	no	r	15.0	≥ 0

Reduced Chi-sq threshold for high count flickering pixels [badpixfind]

backgroundrate	no	r	-1	none

Background rate (ct/s/pix) - if negative, mean over entire field assumed [!badpixfind]

narrowerthanpsf	no	r	3	≥ 0.0

PSF-pixel(s) comparison - 1:equal to PSF, ¿1:more compact [!badpixfind]

threshabovebackground	no	b	no	yes | no

High thresholds as values above background [badpixfind]

loenergythresh	no	r	0	$\geq 0 - \leq 30.0$

Low energy threshold for searching (keV) [badpixfind]

hienergythresh	no	r	30.0	$\geq 0 - \leq 30.0$

Hi energy threshold for searching (keV) [badpixfind]

useccfdarkframe	no	b	no	yes | no

Use dark frame in CCF [emenergy]

randomizeenergy	no	b	yes	yes | no

Randomize PHA within one ADU bin [emenergy]

keepsifluor	no	b	no	yes | no

Keep as one event diagonals with Si fluorescence [emevents]

randomizeposition	no	b	yes	yes | no

Randomize DETX/DETY within one pixel [emevents]

rejectrows	no	b	yes	yes | no

Throw away rows/frames with too many events [emevents]

maxeventsperrow	no	i	4	≥ 1

Maximum number of events per row/frame [emevents]

randomizetime	no	b	true	yes | no

Randomize TIME within one frame [!emevents]

withsrccoords	no	b	no	yes | no

Provide source coordinates (Timing only) [emframes]

srcra	no	u	0.	none

Source right ascension (J2000) [emframes]

srcdec	no	u	0.	none

Source declination (J2000) [emframes]

withparameters	no	b	false	yes | no

Specify explicit list of HK parameters? [hkgtigen]

parameters	no	S		

List of HK parameters to consider [hkgtigen]

except	no	b	false	yes | no

Consider all parameters except those specified [hkgtigen]

withoverrideparameters	no	b	false	yes | no

Specify list of additional parameters? [hkgtigen]

overrideparameters	no	S		

List of override/additional parameters [hkgtigen]

findlowener	no	b	yes	yes | no

Additional run of embadpixfind below 500 eV.

analyzingSciSimdata	no	S		

Set up the configuration to analyze SciSim data with emproc

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.

SubTaskError *(warning)*
emproc has detected an error from one of the sub-tasks.
corrective action: The processing of the current data set is abandoned.

NoEventListsToMerge *(warning)*
There are no event lists to merge into an exposure-level data set. This can be caused by errors in some of the tasks. Examine the output of **emproc**. See also the warning `SubTaskError`.
corrective action: none

IntermediateEventListsNotRemoved *(warning)*
The user set `runevlistcomb` and `removeintermediateeventlists` to `true`, and the event list combination stage failed. As a consequence **emproc** does not remove the intermediate event lists.
corrective action: The intermediate event lists are not removed.

References