epproc

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Abstract

Process the EPIC PN part of an Observation Data File.

1 Instruments/Modes

Instrument	Mode
EPIC PN	IMAGING, TIMING, BURST

2 Use

pipeline processing	no
interactive analysis	yes

3 Description

epproc 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 **epproc**.

In the following we describe some of the PN-specific task parameters. These can be found in the parameter dialog box labeled *Details*. 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 `epproc -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 epproc execute. A default execution of **epproc** for imaging mode can be easily tracked, just simply following the red arrows.

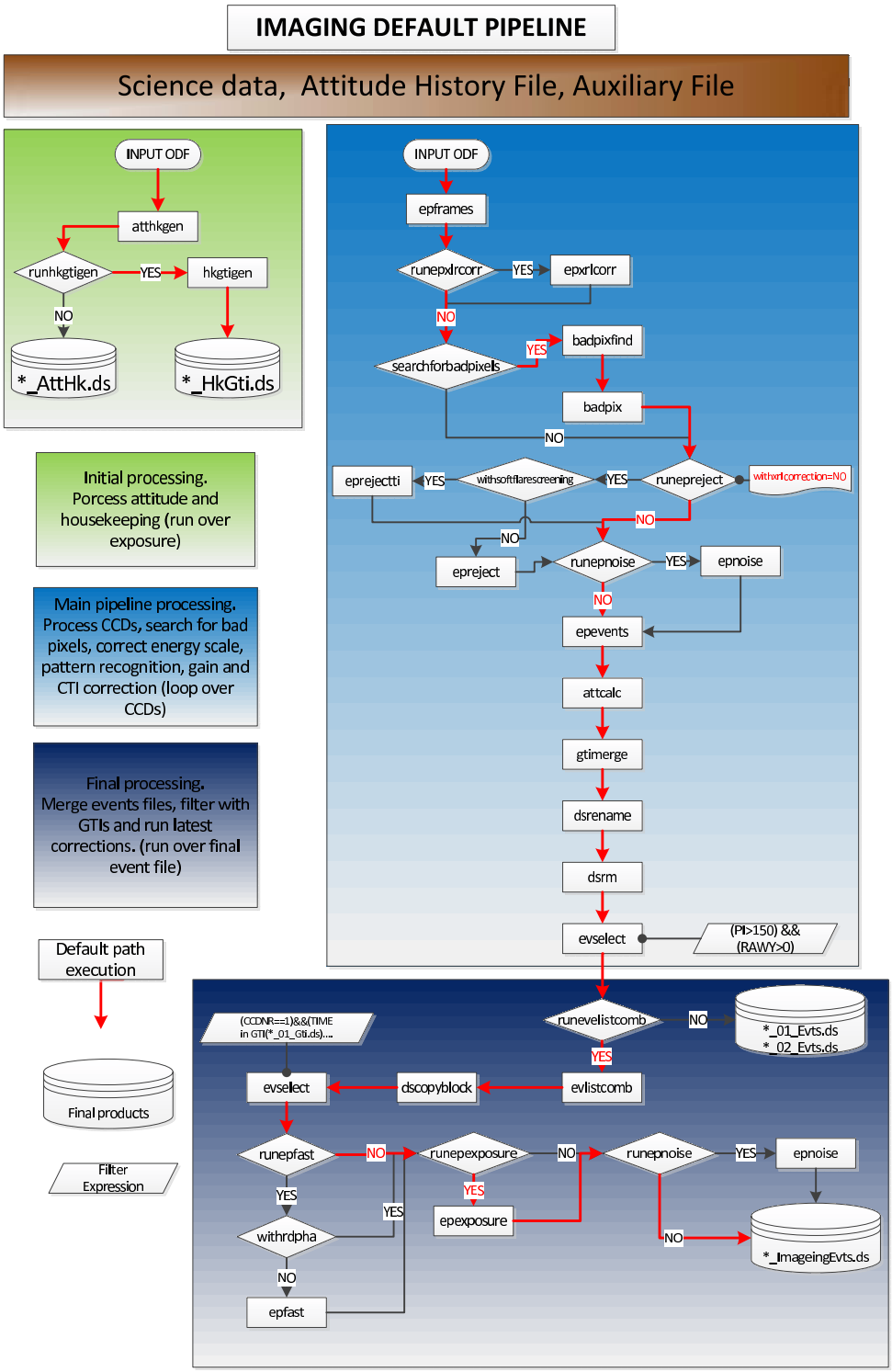

Figure 1: epproc imaging pipeline.

In the figure 2 there is a sketch of the pipeline with all the tasks that epproc execute for timing mode. The only different with respect to the imaging mode pipeline, is the execution of **epreject**. The red

arrows mark the default execution path.

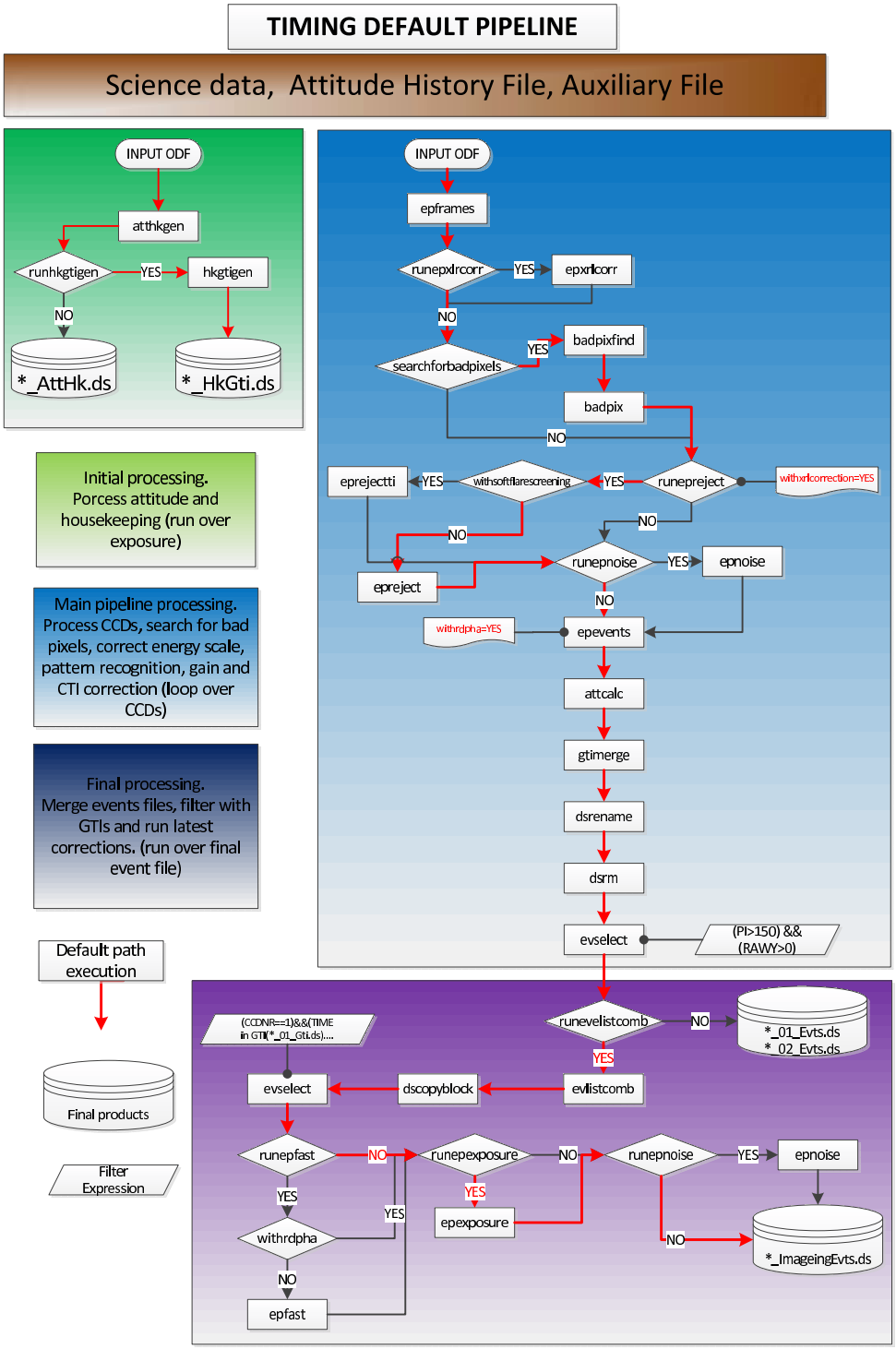

Figure 2: epproc timing pipeline.

In the figure 3 there is a sketch of the pipeline with all the tasks that epproc execute for burst mode.

In this case, the difference with respect to the imaging mode pipeline, is the execution of **epreject** and **epfast**. The red arrows show the default execution path.

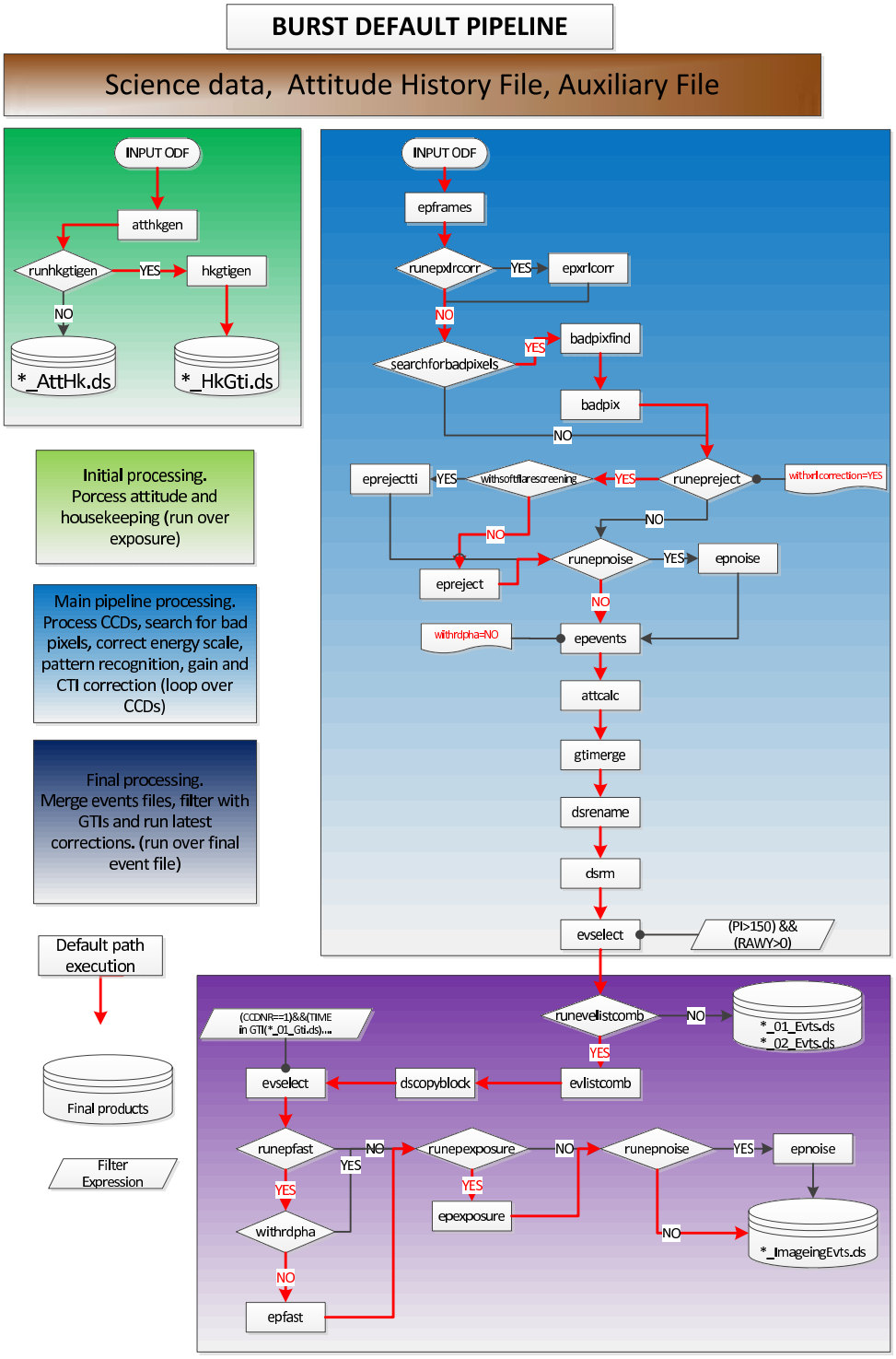

Figure 3: epproc burst pipeline.

To help the user, we have introduced the parameter `withdefaultcal`. This parameter enable or disable automatically the different tasks that have to be executed for the different PN modes.

3.2 Details

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

3.2.1 epframes

The following **epframes** parameters can be altered: `wrongpixlimit`, `mipthreshold`, `mipmethod`, `mipdist`, `mipdiscard`.

3.2.2 epevents

The following **epevents** parameters can be altered: `randomizeposition`, `randomizeenergy`, `testenergywidth`, `gainctiaccuracy`, `reemissionthresh`, `withoutoftime`, and `mappatterntype`.

4 Parameters

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

Parameter	Mand	Type	Default	Constraints
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?				
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?

ccd8	no	b	false	yes | no

Process data for CCD 8?

ccd9	no	b	false	yes | no

Process data for CCD 9?

ccd10	no	b	false	yes | no

Process data for CCD 10?

ccd11	no	b	false	yes | no

Process data for CCD 11?

ccd12	no	b	false	yes | no

Process data for CCD 12?

selectmodes	no	b	true	yes | no

Select the modes to process? false = process only imaging.

imaging	no	b	true	yes | no

Process imaging mode exposure?

timing	no	b	true	yes | no

Process timing mode exposures?

burst	no	b	false	yes | no

process burst mode exposures?

timingsrcposition	no	i	190	$\geq 1 - \leq 200$

Source position for TIMING and BURST modes in RAWY pixel coordinates. [Used in epframes.]

withinstexpids	no	b	false	yes | no

Select exposures to process?

instexpids	no	S		

List of exposures (ie, PNU002)

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	median	nominal—object—mean—median—user

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

ra	no	u	0.0	≥ 0.0 – ≤ 360.0

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

dec	no	u	0.0	≥ -90.0 – ≤ 90.0

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

posangle	no	u	0.0	≥ -180.0 – ≤ 180.0

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

filterevents	no	b	true	yes | no

Filter the event lists?

filterexpression	no	s		

Bad events selection expression.

flagfilteredevents	no	b	false	yes | no

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

rungtimerge	no	b	no	yes | no

Merge GTIs from each CCD

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)?

deleteexposurecolumns	no	b	true	yes | no

searchforbadpixels	no	b	yes	yes | no

Search for bad pixels?

searchforbadcolumns	no	b	yes	yes | no

Look for bad columns?

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	0.0045	≥ 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	0.00105	≥ 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	0.0001	none

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

narrowerthanpsf	no	r	1.5	≥ 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	0.14	$\geq 0 - \leq 30.0$

Low energy threshold for searching (keV) [!badpixfind]

hienergythresh	no	r	10	$\geq 0 - \leq 30.0$

Hi energy threshold for searching (keV) [!badpixfind]

randomizeposition	no	b	yes	yes | no

Randomize DETX/DETY within one CCD pixel [epevents]

randomizeenergy	no	b	yes	yes | no

Randomize PHA within one ADU bin [epevents]

testenergywidth	no	b	yes	yes | no

Use an energy width of 1eV [epevents]

gainctiaccuracy	no	i	2	$\geq 0 - \leq 2$

Accuracy of gain/cti correction [epevents]

reemissionthresh	no	i	0	none

Re-emission trigger threshold [epevents]

withoutoftime	no	b	no	yes | no

Perform out-of-time events analysis instead (Y/N) [epevents]

mappatterntype	no	s	sssd	

pattern types of the bands for photon maps [!epevents]

patternanalysis	no	boolean	Y	Y/N

no, if pattern recognition has been done already (future development)[!epevents]

withframecti	no	boolean	N	Y/N

yes, if TIME-derived frame numbers should be used in CTI correction for non-imaging modes (TI, BU) instead of the ODF frame numbers. For FF, eFF, LW, SW modes internally always the TIME-derived frame numbers instead of the dummy ODF numbers are used (should not be changed). [!epevents]

withpatternoffset	no	boolean	Y	Y/N

epevents: yes, if pattern energy offset corrections should be applied

withbackgroundgain	no	boolean	Y	Y/N

epevents: yes, if background gain corrections should be applied

ctilongtermsoft	no	boolean	Y	Y/N

epevents: special soft energy function

withrdpha	no	boolean	Y	Y/N

yes, if a correction for rate-dependent PHA effects for TI and BU modes should be applied. The logical keyword `PHA_RDCO` indicates whether this correction has been applied or not. If applied, then the keyword `PHA_RDCB` gives the scaling factor `B` used in the correction, derived from block `RDPHA_DERIV` in the `CTI.CCF`. [!epevents]

rdphatimebinsize	no	boolean	100	

time-bin size for rate-dependent PHA correction for TI and BU modes [s] [!epevents]

checksasmip	no	boolean	N	Y/N

yes, if the MIP rejection information obtained by task **epframes** shall be printed (only meaningful if on-board rejection is switched off, i.e. for SW, TI, BU modes).[!epevents]

wrongpixlimit	no	i	20	$\geq 0 - \leq 100$

Allowed percentage of wrong pixels without producing a warning [!epframes]

withsrccoords	no	b	no	yes | no

Use user-supplied RA,DEC coordinates for TIMING and BURST mode ? [epframes]

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

User-supplied source position RA [deg] [epframes]

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

User-supplied source position DEC [deg] [epframes]

mipthreshold	no	i	3000	$\geq 0 - \leq 4095$

maximum PHA for non-MIPs [epframes]

mipmethod	no	s	onboard	none—onboard—com—sas

method to reject MIPs [epframes]

mipdist	no	b	no	yes | no

Create MIPDIST columns and MIPHIST extension in output (yes/no) ? [epframes]

mipdiscard	no	b	yes	yes | no

discard MIPs from event list (yes/no) ? [epframes]

setupbpx	no	string	nom6	cal4/nom0/nom1/ nom2/nom3/nom4/ nom5/nom6/none

setup for badpix/offset correction vector (used only if ccfok=N) [epframes]

lowerthreshold	no	integer	20	0-4095

disregard low-energy events (with amplitudes < lowerthreshold [adu]) already at this stage, default `lowerthreshold`=0 preserves recommended (old) behavior. This may be useful when comparing early mission data with recent observations as the setup was different (`lowertreshold`=23 instead of 20 now)[epframes]

guessdeltap	no	boolean	N	Y,N

whether to estimate the shift of the PN oscillator frequency due to temperature and ageing effects from HK data, could be used to estimate `SAS_JUMP_TOLERANCE` (divide by 6).[epframes]

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]

runepnoise	no	b	no	yes | no

Run epnoise task

sigmacut	no	real	3.0	

Sigma cut for bright sources

noisecut	no	int	2	>0

Noise cut (maximum allowed number of soft events in frame)

savemasks	no	boolean	no	yes—no

Save CCDs mask to a file

runepreject	no	b	no	yes | no

Run epreject task.

badcolumnset	no	dataset	badcolumns.tab	

Name of optional ascii file containing pairs of ¡ccd nr.¿ ¡bad column nr.¿ (one per line), to be omitted from the offset correction [epreject]

sigma	no	real	4.0	

Sigma threshold for offset correction [epreject]

withnoisehandling	no	boolean	no	

enables noise flagging scheme [epreject]

noiseparameters	no	real	0.98 12 × 1.0	

Noise fraction parameters (cutoff parameter and 12 chip specific correction factors; only for expert use) [epreject]

withoffsetmap	no	boolean	yes	

enables use of offset map to calculate energy shifts [epreject]

withxrlcorrection	no	boolean	no	

turns on X-ray loading correction code for TI+BU modes, only meaningful if offset maps are availbale in the ODF and use of offset map is not switched off. [epreject]

withsoftflarescreening	no	boolean	no	

enables soft flare screening (TI mode) [epreject]

softflarethreshold1	no	real	10.0	

threshold for flare screening in units of counts/0.1 s [epreject]

softflarethreshold2	no	real	1.0	

threshold for flare screening [epreject]

softflaresmooth	no	string	BOX	

smoothing method for flare screening [epreject]

softflareenergyrange	no	list of int	40 50	

energy range for flare screening (in ADU units) [epreject]

softflaresmoothparams	no	list of real	2 1 1	

smoothing parameters [epreject]

runepexposure	no	b	yes	yes | no

Run epreject task

runepxlrcorr	no	b	no	yes | no

Run epxrlcorr task

runepfast	no	b	no	yes | no

Run epfast task

analyzingSciSimdata	no	S		

Set up the configuration to analyze SciSim data with epproc

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)*
epproc 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 **epproc**. 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