e[mp]proc

Presentation for
XMM-Newton SAS Workshop

(only slightly modified by M.Guainazzi on the basis of a presentation by)

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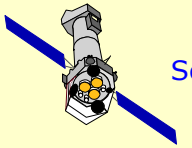
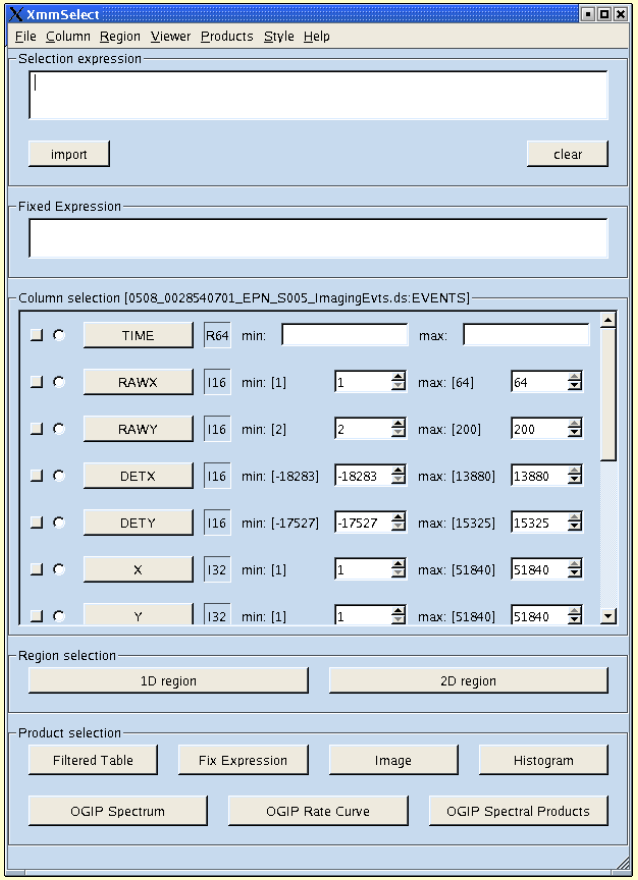
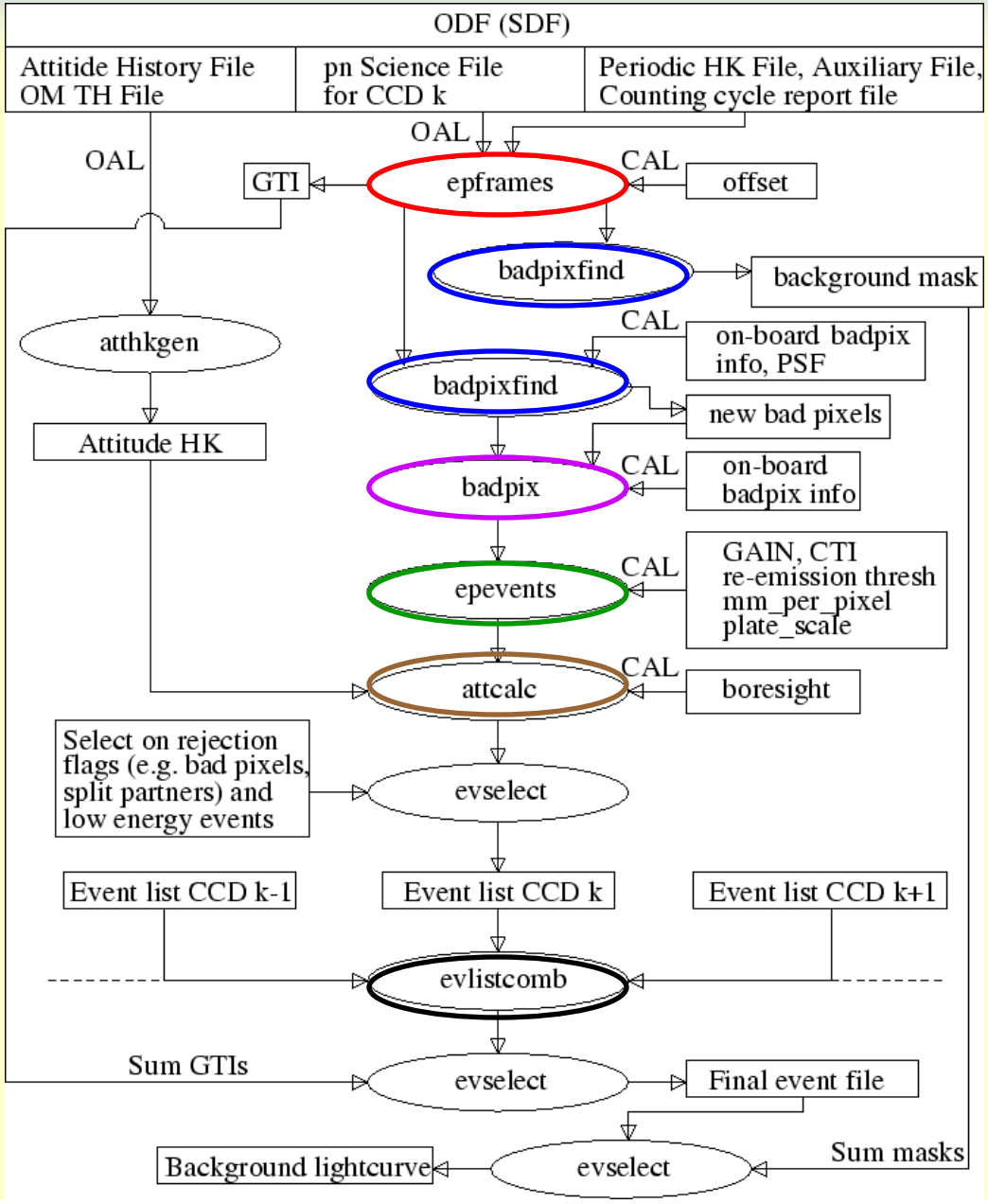


e[mp]proc

- Meta task to process MOS or pn data
- It generates calibrated, possibly filtered event lists
- User remains in control of GTI and filter expressions



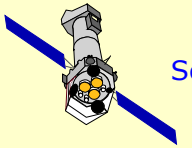
Example: epproc



- **epframes** to process a CCD, exposure and datamode specific ODF file, creating the output raw event list and GTI data set
- **badpixfind** to find new bad pixels
- **badpix** to process the raw event list, adding the BADPIX extension
- **epevents** to process the event list file, flagging trailing events, performing split events pattern recognition CTI and gain correction to create the calibrated event list
- **attcalc** to calculate the X and Y sky coordinates.
- **evlistcomb**, the CCD specific data sets are merged into a single event list.

Event lists

- In the EPIC pn imaging mode, the EVENTS table of the calibrated event list files contain 14 columns *i.e.*:
  - TIME → when did my photon arrive
  - RAWX RAWY → where on the CCD
  - DETX DETY → where on the detector
  - X Y → where from the sky
  - PHA PI → which energy did my photon have
  - FLAG → photon hit the detector at a critical place
  - PATTERN → photon was a true X-ray or not
  - CCDNR → CCD, that the photon hit



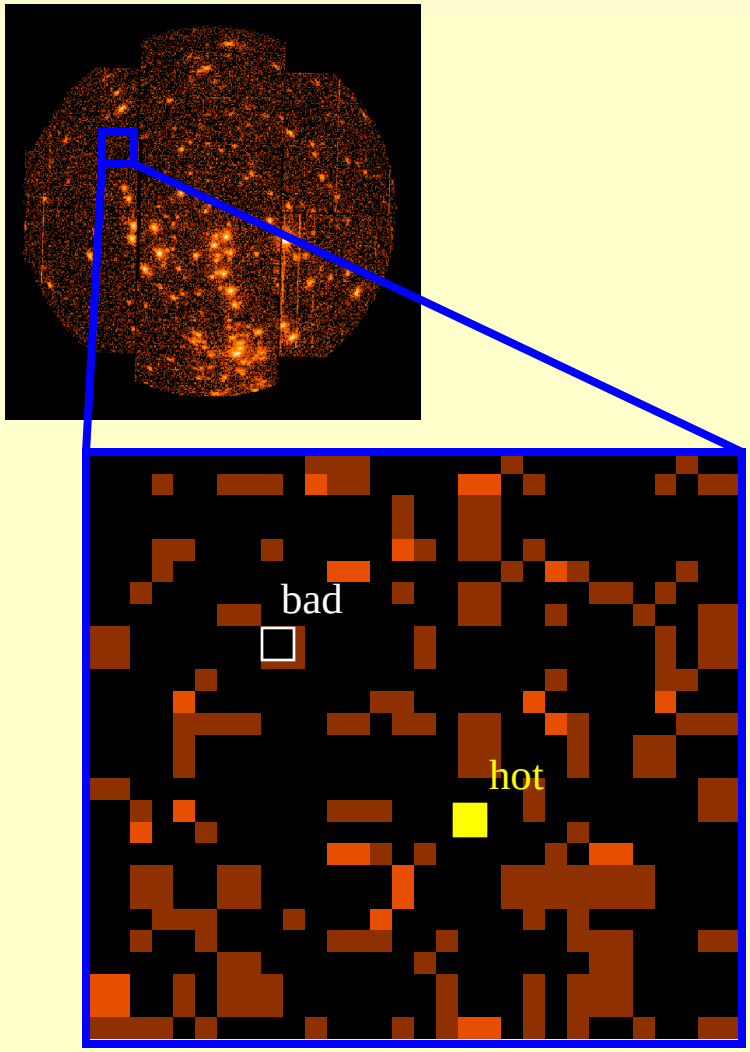
Default or not default?

- Exposure selection
  - by default all imaging and timing exposures are processed
  - selection of data modes to be processed
    - imaging
    - timing
    - burst → `epproc burst=YES`
  - exposures to process can be selected individually via strings:

    `epproc withinstexpids=yes instexpids='PNS001'`

- Attitude and housekeeping, GTI
  - `atthkgen` is run by the `procs`
    - it produces a FITS file containing the entire attitude information for a complete observation)
  - `hkgtigen` is run by the `procs`
    - an external GTI can be loaded as well

Bad pixels



- Dead pixel: no events are detected
- Hot pixel: pixel "produces" ghost events very often
- By default the `procs` will try to detect bad pixels for any imaging exposure.
- The new bad pixels are then used in the data reduction together with any others known (via the calibration files) bad pixels

Data filtering

- By default the event lists are filtered, and the filtered events are removed
- The filter expression can be controlled by the user
  - `flagfilteredevents == true`:
    In this case all events are retained, and a flag column will be set to indicate what events would have been removed.