omfastflat

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Abstract

Applies in-orbit flatfield and modulo-8 spatial fixed-pattern noise calibrations to an OM fast mode event list

1 Instruments/Modes

Instrument	Mode
OM	Fast

2 Use

pipeline processing	yes
interactive analysis	yes

3 Description

CCD Single Photon Counting Mode used at X-ray wavelengths is not applicable at optical wavelengths. At optical wavelengths, each detected event corresponds to a 'fractional' photon count, dependent on gain variations over the CCD and modulo-8 fixed pattern noise (due to the OM centroiding algorithm).

In order to produce photometrically calibrated light-curves the OM FAST mode event-list must be corrected for pixel-to-pixel gain variations and modulo-8 fixed pattern noise. This task applies these corrections using the OM in-orbit flatfield (as produced by OMFLATGEN) and the OM OSW modulo-8 map (produced by OMMODMAP).

This task then calculates a photon-count correction factor for each event in the input event-list, (based on the event RAWX,RAWY pixel co-ordinates), using the corresponding flatfield and modulo-8 image values. A new column containing this correction factor is added to the eventlist and is used when constructing photometrically accurate light-curves or images from the OM FAST mode event list. An image is also computed from the corrected eventlist, and a QUALITY array is attached. This image is suitable for OMMODMAP.

Note: Modulo-8 spatial fixed-pattern noise correction of the event list is currently not available and may require a new task. The flatfielded image produced is currently corrected using the existing Image Mode task OMMODMAP.

4 Parameters

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

Parameter	Mand	Type	Default	Constraints
set	yes	string		

OM ODF Fast Mode Event List filename

slewflatset	yes	string		

In-orbit flat field filename

fastimgset	yes	string		

Output Fast Mode Image filename

oswflatset	yes	string		

PPS OSW Flat field filename

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.

Wrong datamode for Event List *(fatal)*

6 Input Files

1. Intermediate OM fast mode event list (output of OMFASTSHIFT)
2. OM in-orbit flatfield (output of OMFLATGEN)

7 Output Files

1. Flatfield corrected intermediate OM fast-mode event list

2. Flatfielded fast-mode image suitable for input to OMMODMAP
3. OM OSW FITS Flatfield Data Product

8 Algorithm

```
subroutine omfastflat

 Get task parameters.
 Check data types of ODF input files
 Check if input is an Inorbit flatfield.

 Get a handle on the Inorbit flat field File.
 Get a handle on the ODF OM Fast Mode Event List File.
 Determine file type from file name in primary header.
 Determine if BPE binning is on/off

 if (dataMode == "FAST") then
   Get a handle on the tracking history data binary table extension.
   Get handles and pointers on the event list binary table extension columns.
   Get the number of rows in the event list binary table extension.
   Get window information from modes extension.
 else
   Incompatible file.
   call fatal("badFileMode","Value for keyword DATAMODE is incompatible")
 end if

 Open the CCF.
 Set the state of the cal.
 Get the bad pixel map.

 Add factor and bad pixel columns to event list file.
 Initialise pointer arrays to zero.

 If BPE binning off then need to rebin flatfield.

 Calculate factor and bad pixel flag.
 factorP(i) = (slewFlat(windowX0P(0) + rawXP(i), windowY0P(0) + rawYP(i)))**(-1.0)

 Release the cal memory.
 Release handles on data.

 Create flatfielded fast mode image file.
 Copy attributes.
 Get image handle and pointer.
 Get quality array handle and pointer.
 Build image and quality array.
 do i = 0 , nEvents - 1
      fastImgP(corrXP(i), corrYP(i)) = fastImgP(corrXP(i), corrYP(i)) + factorP(i)
      if badPixel then quality(corrXP(i), corrYP(i)) = 1
 end do
 Copy MODES extension
```

```
   Create OM OSW flat field data product.
   Copy Attributes
   Add HDU keywords
   Add Modes Extension

   Free up memory and pointers.

  end subroutine  omfastflat
```

9 Comments

10 Future developments

The image must also be corrected for modulo-8 noise. The modulo-8 tile is to be computed from an image mode OSW that encompasses the FAST mode region, taken during the same exposure. (see OMMODMAP)

References