

*AHELP for CIAO 3.4*

acis_find_hotpix

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Synopsis

Identify pixels that have an unusually large (or small) number of events.

Syntax

```
acis_find_hotpix infile outfile badpixfile maskfile [probthresh]
[regwidth] [clobber] [verbose]
```

Description

acis_find_hotpix is one of the tools used to find hot pixels and cosmic-ray afterglows (see acis_run_hotpix). The properties of the pixels that have an unusually large (or small) number of events are written to the output file. These pixels may be "hot" or may have been affected by a cosmic-ray afterglows. The tool acis_classify_hotpix, which should be run after acis_find_hotpix, is used to distinguish between these two cases. Pixels that are already known to be bad or that are inactive are excluded from the search.

Since astrophysical sources can produce an unusually large number of events in a pixel, some care is used to try to avoid misidentifying these events as hot-pixel or afterglow events. Unlike afterglows or hot-pixel events, events from astrophysical sources are dithered. Therefore, if the number of events on the pixels surrounding a suspicious pixel is large compared to the mean number of events per pixel (see probthresh), the events on the pixel are most likely associated with an astrophysical source. Such pixels are not identified as bad and are not written to the output file. Of course, this means that the tool may not find hot pixels or afterglows if they are in the dither pattern of an astrophysical source.

Example

```
acis_find_hotpix acisf00732_000N002_evt1.fits suspicious_pixels.fits
badpixfile="tmp1_bpix1.fits" maskfile="acisf00732_000N002_msk1.fits"
```

This example shows the default use of the tool. The file acisf00732_000N002_evt1.fits is read and searched for pixels on which there is an unusually large (or small) number of events. Pixels that are already identified as bad in the file tmp1_bpix1.fits, which was produced by acis_build_badpix, or that are marked as inactive in the file acisf00732_000N002_msk1.fits are excluded from the search. Information about each suspicious pixel is written to the file suspicious_pixels.fits. This file should be used as input to acis_classify_hotpix.

Parameters

name	type	ftype	def	min	max	reqd	stacks
<u>infile</u>	file	input				yes	yes
<u>outfile</u>	file	output				yes	
<u>badpixfile</u>	file	input	NONE			yes	
<u>maskfile</u>	file	input	NONE			yes	
<u>probthresh</u>	real		1e-3	1e-10	0.1	no	
<u>regwidth</u>	integer		7	3	255	no	
<u>clobber</u>	boolean		no			no	
<u>verbose</u>	integer		0	0	5	no	

Detailed Parameter Descriptions

Parameter=**infile** (file required filetype=input stacks=yes)

The name(s) of the input event data file(s). `acis_find_hotpix` can read Level 0, Level 1 and Level 2 files, but users are urged to use Level 1 files because these files contain all of the events. Some of the events are excluded from Level 2 files.

Parameter=**outfile** (file required filetype=output)

The name of the output file. This file contains information about each suspicious pixel, including the values of `CCD_ID`, `CHIPX`, `CHIPY`, the number of events on the pixel (S), the expected number of events on the pixel (R), the number of pixels used to compute R (N), the probability of obtaining S events for an expected number R (P), the mean number of events per pixel on the node (M) and the probability of obtaining R events for an expected number M (P_EXP). The output file is used as input to the tool `acis_classify_hotpix`.

Parameter=**badpixfile** (file required filetype=input default=NONE)

The name of the input bad-pixel file. Known bad pixels are not included in the search for new bad pixels.

Parameter=**maskfile** (file required filetype=input default=NONE)

The name of the mask file that defines the "active" region(s) of the CCD(s) used for the observation. Typically only the outer edge of a CCD is inactive. If a pixel is inactive, it is excluded from the search for hot pixels.

Parameter=**probthresh** (real not required default=1e-3 min=1e-10 max=0.1)

This parameter specifies the minimum significance of suspicious pixels. For example, if P is the probability of obtaining S events on a pixel for an expected number of events R , then the pixel is identified as suspicious if $P < (\text{probthresh} / T)$, where T is the total number of pixels examined. A pixel is also suspicious if $P > 1 - (\text{probthresh} / T)$. The default value of 0.001 corresponds to 3.09 sigma for a normal distribution. The one, two and three sigma confidence values are 0.159, 0.0228 and 0.00135, respectively. The default value of this parameter should be adequate in most cases. Be cautious about using some other value.

Parameter=regwidth (integer not required default=7 min=3 max=255)

This parameter specifies the size of the reference region used to determine the expected number of events for a pixel. The default value of seven means that the forty-eight pixels in a 7 pixel x 7 pixel region surrounding a pixel are used. The actual number of pixels used is smaller than forty-eight if the region contains pixels known to be bad, contains inactive pixels or overlaps the edge of a node. If no events are in the reference region, then the mean number of events per pixel for the node is used as the expected number of events. The default value of regwidth should be adequate in most cases. Be cautious about using some other value.

Parameter=clobber (boolean not required default=no)

If clobber=yes and a file exists that has the same name as the name of the output file, then the existing file is overwritten. If clobber=no and a file exists that has the same name as the name of the output file, then an output file is not created.

Parameter=verbose (integer not required default=0 min=0 max=5)

This parameter determines the amount of messages that is generated by acis_find_hotpix. If verbose=0, very few messages are reported. If verbose=5, the largest amount of messages is produced.

Bugs

See the [bugs page](#) on the CIAO website for an up-to-date listing of known bugs.

See Also

tools

[acis build badpix](#), [acis classify hotpix](#), [acis detect afterglow](#), [acis process events](#),
[acis run hotpix](#), [acisreadcorr](#), [destreak](#), [dmcopy](#), [lightcurve](#)

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URL:
http://cxc.harvard.edu/ciao3.4/acis_find_hotpix.html
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