URL: http://cxc.harvard.edu/ciao3.4/why/destreak.html
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Destreaking ACIS Data

Return to: Why Index

Introduction

There is a flaw in the serial readout of the ACIS chips, causing a significant amount of charge to be randomly deposited along pixel rows as they are read out. Although not much coincidence is expected for low−rate/low−exposure sources, ACIS−S4 (ccd_id=8) is significantly affected by this problem. The `destreak` tool detects coincidence of events in adjacent pixels along a row (i.e. the serial read), flags probable streak events, and (optionally) removes them.

The `destreak` tool became part of standard data processing (SDP) at software version DS 7.3.0. It is applied by default to the S4 chip for all ACIS observations. In SDP, the tool is run such that events are only tagged in L1 and filtered in L2; the L1 products in the archive, therefore, still contain the streak events, so users can retrieve that information if desired.

Background Information

On account of the serial readout problem, the event file shows a variable pattern of linear streaks. For the purpose of this tool, a "streak" is defined as any CHIPY row which contains more than M events in a single frame time in a single CCD node. By default, M=1, which is to say that any row containing 2 or more events on a single node in a single frame time is identified as a streak. This default should be fine for low−rate data; more details are given in the destreak memo.

The tool should always be used with caution because it removes counts from any source sufficiently bright to generate multiple events in a single row of one CCD node within a single frame time. ***Bright point sources are certain to be affected.*** The Destreak the ACIS−S4 Chip thread, which has an example of running `destreak` on timed exposure (TE) mode data, explains how to determine if significant source counts were removed.

Applying `destreak` to the ACIS−S4 chip is justified when the source count rate per row is small compared to the streak event rate. It is generally most applicable to grating observations of faint point sources and imaging observations of extended, low−surface brightness objects.

Continuous Clocking Mode

In continuous clocking (CC) mode, all `CHIPY` information is lost, so the streaks off the spectral trace will contaminate the spectrum. Therefore, there is contribution from a much larger area. In real CC−mode data, streaks have been known to cause heavy corruption; running `destreak` with the default parameters cleaned up the data quite a bit.

Although the `destreak` parameters have not been optimised, the tool is able to produce diagnostic information for a specific source. One should be able to estimate the expected coincidence given an approximate source spectrum and the value of the `EXPTIME` keyword (***not*** `EXPOSURE`); `EXPTIME` is the

frame time in TE mode or row transfer time in CC mode.

The `destreak` help file contains information about the statistics files which can be written out (see "`ahelp destreak`"):

```
Three statistics files can, optionally, be generated as
additional output. The first of the three files, defined
by the countfile parameter, holds the observed and predicted
data for the number of counts per row and the number of
occurrences. The countfile also holds the equation and
parameters that were used to fit the observed event data.

The second file, defined by the fracfile parameter, contains
the cumulative event contamination based on the observed and
predicted counts.

The third file, defined by the timefile parameter, holds the
amount of lost observation time due to streak events for each
row of each node. The user should note that generating statistics
files can significantly increase program execution time.
```

These files can be used to see if you are on the Poisson source counts region or on the noise tail. The destreak memo has detailed information on how to determine the allowable contamination limit for a particular observation; also see the `max` parameter in the help file.

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