



CIAO 1.1.5 Release Notes

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CIAO ACIS FILTERING BUG

We regret to announce that a serious bug has been found in the filtering code used in `dmcopy` and `dmmerge`. The effect of this bug is that compound filters, such as separate good time intervals for each CCD chip on ACIS, are not handled correctly.

In most cases, the good time intervals for the separate ACIS chips are not very different, and only a few events are incorrectly filtered. However, if complicated filters have been applied by the user the bug may cause large errors in the number of events allowed through.

The code works correctly in the case of a single good time intervals list. Unfortunately you can't filter the `flt1.fits` file to get a GTI file for a single chip, but you can filter the `evt2.fits` file on `CCD_ID` to get the time filters for a single chip; the filtered `evt2.fits` file can be used in place of the `flt1.fits` file, since its subspace now contains the GTIs for a single chip

Example:

```

Make new evt1.fits file, e.g.

  acis_process_events old_evt1.fits new_evt1.fits (parameters...)

Make single-chip event file with desired good time intervals

  dmmerge "old_evt2.fits[ccd_id=7]" outfile=old_evt2_ccd7.fits

Verify good time intervals made correctly

  dmlist old_evt2_ccd7.fits subspace

Filter new event file using single-chip time filter (will pass only ccd_id=7 events)

  dmmerge "new_evt1.fits[@old_evt2_ccd7.fits]" new_evt2_ccd7.fits

Inspect number of events in result

  dmlist new_evt2_ccd7.fits blocks
  
```

As a temporary fix, a beta version of the new CIAO 2.0 `dmcopy` tool, which does not have this bug, has been released in the CIAO1.1.5 patch.

CIAO 1.1.5 upgrade

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These enhancements apply to `dmcopy`, `dmmerge` and `dmlist` only in CIAO1.1.5. They will be extended to the remaining CIAO tools in the CIAO2.0 release.

Major bug fix: The filter

```
dmcopy "acis_evt1.fits[@flt1.fits]" ...  
or  
dmmerge "acis_evt1.fits[@flt1.fits]" ...
```

did not correctly handle the different good time intervals for different chips in earlier CIAO versions. This bug is now fixed.

Also, the `ONTIME` and `LIVETIME` and `EXPOSURE` keywords were not updated after a time filter by the earlier versions of `dmcopy`, which meant that you had to use `dmmerge` even when filtering a single file on the filter file. This is now fixed, so that `dmcopy` will now update the time intervals.

A number of minor bugs have also been fixed.

Extra functionality:

Support for filtering on table columns of bit and string datatype has been added. The bit filtering is useful for filtering on the `STATUS` column in event files. The syntax is

```
dmcopy "acis_evt1.fits[status=1x01x0]" ...  
dmcopy "acis_evt1.fits[status!=1x01x0]" ...
```

where the bit pattern `1x01x0` matches the rightmost 6 bits in the status variable with values

```
100100  
110100  
100110  
110110
```

(in other words, the `x` is a wild card matching 0 or 1); all leftward bits must be zero. To filter requiring the leftmost two bits of a 16-bit status word to be zero, the string `status=00xxxxxxxxxxxxxxxx` would be needed. Only the operators `=` and `!=` are supported.

Changed functionality:

`dmcopy` binning on a table which is filtered on the binning axes now shrinks the image to surround the filtered region. `dmcopy evt.fits[sky=circle(4300,4200,100)][bin sky]` will make a 100x100 image. The command `[binf sky]` will make the full image replicating the older behaviour.

Experimental functionality:

As part of the CIAO 2.0 development process, we've added some extra experimental features in CIAO 1.1.5. These features are not guaranteed to work, but you may wish to try them out and give us feedback.

- compound filters:

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The filter `[(ccd_id=0,chipx=257,513,769,fltgrade=16) || (ccd_id=1:9,chipx=512,fltgrade=104)]` is now supported. The `||` indicates a logical OR of the two component filters, corresponding to the union of two separate subsets of parameter space.

The filter `[exclude pha=5:10]` is now supported; with the `exclude` syntax, only rows in the table NOT passing the filter are copied. However, in CIAO1.1.5 there are known problems with the resulting good time intervals and data subspace, so experiment with caution.

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