Chandra X-ray Center

URL: http://cxc.harvard.edu/ciao3.4/bugs/dm.html
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Bugs: Data Model

A list of bugs fixed in CIAO 3.4 is included at the end of this document.

Caveats

1. ***The Data Model does not support writing to gzip'ed files.***

   The Data Model does not support writing to gzip'ed files, *even if* the CIAO installation was configured with gzip support. General write support for gzip'ed files will not be added anytime in the near future, so users should gunzip their files first if it is necessary to modify them.

Bugs

General

1. ***The `BLANK` header keyword that an older version of some FTOOLs (e.g. `chimgtyp`) write to the FITS file header causes problems for `dmcopy`.***

   Workarounds:

   1. Use a CIAO tool in place of the FTOOL that created the `BLANK` keyword, e.g. instead of `chimgtyp`, try

      ```
      unix% dmcopy input.fits"[opt type=i4,null=-9999]" output.fits
      ```

      changing the `opt type` as appropriate.
   2. Delete the `BLANK` keyword before passing the file to `dmcopy` or any other CIAO tool.
2. ***If you use "`[opt null=nan]`" on an integer image, the BLANK keyword is set to 0, since nan isn't a valid integer.***

   Users should specify "`[opt null=-999]`", or some other number that is not likely to be a valid pixel value.
3. ***You may get a seg fault if you try to create a very large image. What constitutes "very large" depends on the data type, but for long and float images, 8192x8192 pixels seems to be the threshold.***

   (The image doesn't have to be square; it just needs to have 8192^2 pixels.)

   This condition may be met when the "`update=no`" option is used. Normally, when you filter a dataset, the data subspace (which describes the boundaries of each column's data and therefore is the intersection of the initial minima and maxima with any subsequent filters) gets updated to reflect the filtering. However, when you give the "update=no" option, you instruct the DM not to update the subspace to reflect the current filter. Therefore, the full ranges for x and y are used in the binning, and you get a 8192x8192 image (and a seg fault, for the reason described above).
4. ***# DMCOPY (CIAO 3.4): Bad data type in filter string formatting***

Prior to CIAO 3.4, this error message was written as:

```
# DMCOPY (CIAO 3.3): Filter data type mismatch for DOUBLE
```

If an unsigned byte column exists in the file, the DM will generate this warning. The output is unaffected by this bug.

5. ***The DM does not complain when given a component in a FITS region file that doesn't exist (e.g. "`file.fits[component=99]`" when there's no component numbered 99).***

   Since no rows in the file match that filter, you get an output file with no rows.
6. ***No more than nine subspace components are allowed.*** ***(01 Dec 2006)***

   The Data Model doesn't allow a file to have more than nine subspace components. If the input file has more than that number, only the first nine are copied to the output file.
7. ***Block names containing blank spaces are treated as bad syntax***

   If the extension in the input file name has a space in it, the CIAO tools will fail, e.g.

   ```
   unix% rmfimg "conx−ea−101106−b10.rsp[SPECRESP MATRIX]" rsp.img
   #   (CIAO 4.0): Failed to open conx−ea−101106−b10.rsp[SPECRESP MATRIX]:
   Must have RMF file
   ```

   Workaround:

   For most tools, refering to the block by number instead of name will allow the tool to run, e.g. "`conx−ea−101106−b10.rsp[3]`".

Filtering Data

1. ***Multi−valued string filters don't work***

   "`col=foo`" is okay, but "`col=foo,bar`" isn't.

   Workaround:

   Use "`col=foo,col=bar`" instead.
2. ***Creating a vector on−the−fly when region filtering***

   When region−filtering images, you can create a vector on the fly from any two axes by using a filter like "`(#1,#3)=circle(...)`". Although the image is filtered correctly with a temporary vector, the region filter isn't recorded in the subspace. Hence, tools that use the filtered file don't know that pixels outside the filter region are invalid. As a result, `dmstat` reports no nulls in the filtered image (unless you explicitly tell the DM to set pixels outside the filter to null by using "`opt null=...`").
3. ***Applying a bit−filter expression to an integer column does not work, nor does it cause an error.***
4. ***Using incorrect syntax with the rectangle shape does not fail when filtering.***

   For example, setting `xmax` > `xmin` and/or `ymax` > `ymin`. Instead it appears that the Data Model simply swaps the min and max values.
5. ***Filtering an image on logical coordinates causes problems when the short cut of omitting a number (i.e. to indicate the default value) is used.***

   The exit status of dmcopy is also incorrectly set to 0 (success):

   ```
   unix% dmcopy "image.fits[#1=1:20,#2=:]" delme.fits
   # DMCOPY (CIAO 3.4): [ftColRead]: FITS error 308 bad first element number in
   dataset image.fits Block 1 PRIMARY
   ```

```
unix% echo $status
0
```

Workarounds:

1. Omit the "`#2=:`" from the filter
2. Specify a range for both elements: `[#1=1:20,#2=1:20]`

6. ***Trying to exclude a region filter with `update=no` will cause the image to be filtered by the region's bounding box.***

   For example:

```
unix% dmcopy "acis_fimg3.fits[exclude sky=region(src.fits)][opt full,update=no]" remove.fi
```

   The regions are correctly excluded; however, the image is also clipped at the bounding box around all the excluded shapes, so the corners of a few chips are removed.

   Workaround:

   Remove `update=no`. In this case, the Data Model internally inverts all exclude filters to be an inclusive filter, and correctly filters the image.

   Be aware that this process is much slower if the region is large. In that case, it will also add a large region keyword to the file's header, noticeably slowing down any operation on that file.

7. ***There is a bug in region and range filters.***

   This command:

```
unix% dmcopy "input.fits[sky=circle(4096,4096,100),y=4020:4100,4250,4350]" \
      output.fits
```

   fails to do the y filter altogether. This bug also applies to exclude filters.

8. ***Using "!=" with string filtering causes dmlist to fail.*** ***(05 Mar 2007)***

   For example, the following commands both fail:

```
unix% dmlist "region.fits[shape!=Annulus]" data

unix% dmlist catalog.fits"[COMMENT!='weak'][cols COMMENT]" data
```

Rebinning Images

1. ***Rebinning an image with different values for the two axes causes the coordinate information to be lost***

   For example:

```
unix% dmcopy acis.img"[bin x=::5,y=::6]" acis5x6.img
```

   Using the same value for both axes works correctly:

```
unix% dmcopy acis.img"[bin (x,y)=::5]" acis5.img
```

Bugs fixed in CIAO 3.4

The following is a list of bugs that were fixed in the CIAO 3.4 software release.

1. ***Regions off the image: if one region shape is partly off the edge of the image, the DM does not exclude all the regions in the file correctly.***

   For example:

   ```
   unix%  dmcopy "expmap.fits[exclude sky=region(holes.reg)]" expmap_holes.fits

   unix% cat holes.reg
   -circle(4713.138184,3794.545410,11.654875)
   -circle(4382.204590,4670.012207,10.183500)
   -circle(4136.358887,4525.479492,6.161741)
   ..etc..
   ```

   Workarounds:

   1. Modify the region file to make it legal by adding the line

      ```
      field()
      ```

      at the beginning, so it reads

      ```
      field()
      -circle(4713.138184,3794.545410,11.654875)
      -circle(4382.204590,4670.012207,10.183500)
      -circle(4136.358887,4525.479492,6.161741)
      ..etc..
      ```

      then invert the filter to be an include instead:

      ```
      unix%  dmcopy "expmap.fits[sky=region(holes.reg)]" expmap_holes.fits
      ```
   2. Omit that shape from the region file
2. ***Problems occur when you wish to combine the filtering stored in an external file with additional filters.***

   Workaround:

   Split the filtering up into two steps: the first using the "@" file and the second the additional filters:

   ```
   unix% dmcopy "evt2.fits[@src.gti]" tmp.fits
   unix% dmcopy "tmp.fits[time=a:b]" evt2.src.fits
   ```
3. ***Due to a DM bug, `dmkeypar` should not be used to read data from array columns that are part of a vector.*** ***(01 Jun 2006)***

   `dmkeypar` will access the first X value correctly, but not the first Y value in the vector array column (when the length of the array is > 1).

   Examples of such a column are the "x", "y", and "pos" columns below:

   ```
   -----------------------------------------------------------------
   Columns for Table Block REGION
   -----------------------------------------------------------------

   ColNo  Name                 Unit        Type             Range
      1   POS(X,Y)[11]         pixel        Real8(11)      -Inf:+Inf
      2   SHAPE                             String[16]
   ```

```
   3   R[2]                 pixel        Real8(2)       −Inf:+Inf
   4   ROTANG[2]            pixel        Real8(2)       −Inf:+Inf
   5   COMPONENT                         Int2           −
```

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