

## ctools - Change request #2404

### csphagen output fits file missing OGIP standard headers

03/08/2018 04:02 PM - Moore Chris

<b>Status:</b>	Closed	<b>Start date:</b>	03/08/2018
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assigned To:</b>	Knödlseeder Jürgen	<b>% Done:</b>	80%
<b>Category:</b>		<b>Estimated time:</b>	0.00 hour
<b>Target version:</b>	1.6.0		

#### Description

I have recently tested the compatibility of ctools and CTA data with xspec using csphagen to create on, off, arf and rmf fits files.

However, I discovered that the files were missing several jey headers required to conform to OGIP standards, and so they did not work in xspec.

Manually inputting these headers allowed the data to work in xspec.

Missing headers for each file (with descriptions from the documentation and example inputs that worked for me):-

#### For the onoff\_on and onoff\_off files:

-The following must be added to the SPECTRUM index:

TELESCOP = 'CTA' / telescope (mission) name  
INSTRUME = 'CTA' / instrument name  
FILTER = 'NONE' / filter  
BACKFILE = 'none' / associated background filename  
CORRFILE = 'none' / associated correction filename  
CORRSCAL = 1 / correction file scaling factor  
RESPFILE = 'none' / associated redistribution matrix filename  
ANCRFILE = 'none' / associated ancillary response filename  
HDUCLASS = 'OGIP' / format conforms to OGIP standard  
HDUCLAS1 = 'SPECTRUM' / PHA dataset  
HDUVERS = '1.2.0' / version of the file format (I took a guess for this)  
POISSERR = T / poissonian errors to be assumed  
CHANTYPE = 'PI' / channel type (PHA, PI etc)  
DETCHANS = 120 / total number of possible channels

#### For the onoff\_arf file:

-The following must be added to the SPECRESP index:

TELESCOP = 'CTA' / telescope (mission) name  
INSTRUME = 'CTA' / instrument name  
FILTER = 'NONE' / filter  
HDUCLASS = 'OGIP' / format conforms to OGIP standard  
HDUCLAS1 = 'RESPONSE' / extension contains response data  
HDUCLAS2 = 'SPECRESP' / extension contains an arf  
HDUVERS = '1.2.0' / version of the file format (guess)

#### For the onoff\_rmf file:

- The following must be added to the EBOUNDS index:

TELESCOP = 'CTA' / telescope (mission) name  
INSTRUME = 'CTA' / instrument name  
FILTER = 'NONE' / filter  
CHANTYPE = 'PI' / channel type (PHA, PI etc)  
DETCHANS = 120 / total number of possible channels  
HDUCLASS = 'OGIP' / format conforms to OGIP standard  
HDUCLAS1 = 'RESPONSE' / extension contains response data  
HDUCLAS2 = 'EBOUNDS' / extension contains EBOUNDS  
HDUVERS = '1.2.0' / version of the file format (guess)

- The following must also be added to the MATRIX index:

TELESCOP = 'CTA' / telescope (mission) name  
INSTRUME = 'CTA' / instrument name  
FILTER = 'NONE' / filter  
CHANTYPE = 'PI' / channel type (PHA, PI etc)  
DETCHANS = 120 / total number of possible channels

HDUCLASS = 'OGIP' / format conforms to OGIP standard  
HDUCLAS1 = 'RESPONSE' / dataset relates to the spectral response  
HDUCLAS2 = 'RSP\_MATRIX' / dataset is a spectral response matrix  
HDUVERS = '1.2.0' / version of the file format (guess)  
TLMIN4 = 0 / the minimum value allowed in column 4 (number corresponds to the number of the F\_CHAN column)

The above are the minimum requirement for OGIP conformation, however there are other non-essential headers that may be of use. Full details of the above and non-essential headers can be found here for the PHA files:  
[https://heasarc.gsfc.nasa.gov/docs/heasarc/ofwg/docs/spectra/ogip\\_92\\_007/node6.html](https://heasarc.gsfc.nasa.gov/docs/heasarc/ofwg/docs/spectra/ogip_92_007/node6.html).

For the arf and rmf files, full details can be found here (page 8 and 14 for the rmf extensions and page 17 for the arf extensions):  
[ftp://legacy.gsfc.nasa.gov/caldb/docs/memos/cal\\_gen\\_92\\_002/cal\\_gen\\_92\\_002.pdf](ftp://legacy.gsfc.nasa.gov/caldb/docs/memos/cal_gen_92_002/cal_gen_92_002.pdf).

I hope this helps.

- Chris Moore

## History

---

### #1 - 06/12/2018 04:09 PM - Knödlseider Jürgen

- Status changed from *New* to *In Progress*
- Assigned To set to *Knödlseider Jürgen*
- Target version set to *1.6.0*
- % Done changed from *0* to *80*

I implemented the changes. It seems to me that the keywords for the EBOUNDS in the RMF file are not required for Xspec.

I installed Xspec and did some testing. Looks good. Results are similar to results obtained with ctlike.

I wrote a tutorial about how to do an Xspec analysis.

The merging of the code into the trunk is in progress.

### #2 - 06/12/2018 11:02 PM - Knödlseider Jürgen

- Status changed from *In Progress* to *Closed*

Here is a link to the tutorial: [http://cta.irap.omp.eu/ctools-devel/users/tutorials/howto/howto\\_xspec.html](http://cta.irap.omp.eu/ctools-devel/users/tutorials/howto/howto_xspec.html)

The code has been merged into devel.