om2pha

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Abstract

This task creates a multiple spectrum FITS file by extracting OM count rates and errors for a set of filters for a given source.

1   Instruments/Modes

Instrument	Mode
OM	Imaging

2   Use

|	
pipeline processing	yes
interactive analysis	yes

3   Description

om2pha works from an input XMM-Newton OM source list and an input celestial position. It finds the source list entry corresponding to the input position, within a certain tolerance, and extracts the filter count rates and errors into a single spectral file. This file may then be used in a spectral fitting program, such as XSPEC, possibly in conjunction with spectra from X-ray instruments to perform spectral fitting over the optical, UV and possibly X-ray bands.

The output is a single spectral file, known as an "OGIP TYPE:II" file that contains the spectrum for each filter on a separate row. Each row refers to the response matrix which should be used for this filter within the fitting program. The most recent response matrices, available from the XMM-Newton web site, should be copied into the current directory before starting the fitting process.

Each row of the multiple spectral file contains the columns: `SPEC_NUM` (scalar giving the reference number of the spectrum in the particular row), `CHANNEL` (specifying that we use channel 1), `RATE` (the count rate for this filter in counts/s), `STAT_ERR` (the statistical error on the count rate), `RESPFILE` (the response file to be used when interpreting the count rate in this filter), `ROWID` (the filter name).

The resulting multiple spectrum file can be read into XspecV.10 and higher, for example.
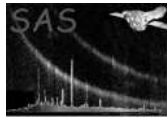
Example: to produce a multiple spectral file from the position RA=180.1 degrees, DEC=-45.1 degrees from the source list P0691100201OMCOMBOBSMLI0000.FIT and write the result into a file called omspecs.ds, use:

om2pha srclist=P0691100201OMCOMBOBSMLI0000.FIT ra=180.1 dec=-45.1 output=omspecs.ds

4 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints

srclist	yes	dataset		

The source list containing the count rates for the required filters

ra	yes	real		0-360.

The right ascencion of the source in decimal degrees

dec	yes	real		-90.0 - 90.0

The declination of the source in decimal degrees

tolerance	no	dataset	2.0	

The tolerance to use when checking for a source matching the input position in units of arcseconds.

output	no	dataset	OM_multispec.fits	

Name of output multiple spectrum set

5 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS documentation.

InvalidSrcList *(fatal)*
> The supplied source list has the wrong format

NoSourceFound *(fatal)*
> No sources were found in the source list within the tolerance distance from the supplied coordinates

MultipleSourcesFound *(warning)*
> More than one source was found in the source list within the tolerance distance from the supplied coordinates
> *corrective action:*

6 Input Files

- **srclist** An OM source list generated by the OM processing chain. The code expects this file to have a table SRCLIST which contains the columns RA_CORR, DEC_CORR, filtername_CORR_RATE and filtername_CORR_RATE_ERR.

  Typical files to use would be the COMBINED source list with a name like PoooooooooooOMCOM-BOBSMLI0000.FIT or the merged source list with name PoooooooooooOMCOMBOBSMER0000.FIT.

  where ooooooooo specifies the 10 digit observation ID.

7 Output Files

- **output** A multiple spectrum file, conforming to the OGIP standard (Arnaud, George & Tennant 2009).

  This file contains the data for each filter in a separate row of the table SPECTRUM. Columns in this table contain the count rate, the error on the count rate and a reference to the response file which should be used to interpret this count rate.

8 Algorithm

om2pha is a F90 module which does the following

```
module om2pha

Read input srclist

Validate the contents

Find the index of the source corresponding to the entered position

Extract rates and errors for each filter

Write results to the output file

end module  om2pha
```

9 Comments

- The response file names are currently hard-coded, meaning that the code will have to change if the responses are updated. This could be avoided by usinog generic names for the response files, rather than having the version number encoded in the name.

- The exposure time for each filter is not available in the source list and not recorded in the output file. A dummy exposure value of 1 second is stored as a header keyword.

10 Future developments

- Source coordinates should be stored in the file header.

11 References

Arnaud, K, George, I & Tennant, A. 2009, OGIP Memo OGIP/92-007 (HDUVERS 1.2.1)

References