comb

January 12, 2017

Abstract

This task combines the various EPIC exposure images from a single observation, as well as images from multiple exposures into single count, exposure, model particle background, soft proton background, and SWCX images.

1 Instruments/Modes

Instrument	Mode
EPIC	Imaging

2 Use

pipeline processing	no
interactive analysis	yes

3 Description

comb combines the various EPIC exposure images from a single observation (ObsID), including images from multiple exposures, into single count, exposure, model particle background, soft proton background, and model solar wind charge exchange background images.

comb compensates for the inclusion of observations with different filters in the mosaic. It uses the results of PIMMS with the assumption of a power-law spectrum with photon indecies (alpha) of 2.4, 1.7, and 1.0, and absorption of $N_H = 2{\times}10^{20}$ H I cm^{-2}. The user enters a vlaue for alpha between 1.0 and 2.4 where 1.0 will select the hard spectrum, 1.7 selects the medium spectrum, and 2.4 selects the soft spectrum. Intermediate values will produce a linear scaling between the two nearest spectra. The exposure image is then scaled by the ratio of the model count rates for the MOS2 medium filter versus the thin or thick, making the resultant image appropriate for the MOS2 medium filter.

Warning and requirements: *comb* is part of the *esas* package which has been integrated into SAS. However, it is limited to work within the *esas* data reduction scheme. This is specially true wrt to the names and structures of the input files. In particular, *comb* assumes that another tasks from the package, *mos-spectra*, *pn-spectra*, *mos_back*, *mos_back*, *rot-im-det-sky*, and possibly *proton* and *swcx* have been successfully run for the exposures to be used.

4 Parameters

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

Parameter	Mand	Type	Default	Constraints
caldb	yes	string		

Directory containing all the ESAS specific calibration files

withpartcontrol	yes	boolean	true	

Particle background flag, 'true' to include it.

withsoftcontrol	yes	boolean	true	

Soft proton background flag, 'true' to include it.

withswcxcontrol	yes	boolean	true	

SWCX background flag, 'true' to include it.

alpha	yes	real	1.7	

Assumed spectral index for the filter correction scaling.

elowlist	yes	int	400 750	

Energy low limit(s) (in eV) for the different bands.

ehighlist	yes	int	750 1250	

Energy high limit(s) (in eV) for the different bands.

mask	yes	int	0	

Masking control. *0*: No additional masking, *1*: uses the mask produced by the `cheese` task, *2*: uses the normal mask images produced by `eexpmap`, and *3*: uses the normal mask images produced by `eexpmap` modified by `make-mask`.

prefixlist	yes	string	1S001 2S002 S003	

Exposure identifiers (eg. "1S001 2S002 S003") for the exposures (in the example MOS1 S001, MOS2 2S002, and PN S003) to be processed.

clobber	no	boolean	yes	T/F

Clobber existing files?

5 Input Files

For the full treatment images (products) from running *mos-spectra* and *pn-spectra*, *mos_back* and *pn_back*, *proton*, *swcx*, and *rot-im-det-sky* are needed. However, the combining of model particle background and soft proton images can be turned off by the `withpartcontrol` and `withsoftcontrol` parameters.

6 Output Files

- `comb-obj-im-`*elow-ehigh*`.fits` – The combined count image for the *prefix* exposure, selected energy band (`elow` and `ehigh`), and the selected region in sky coordinates.
- `comb-exp-im`*elow-ehigh*`.fits` – The combined exposure image for the *prefix* exposure, selected energy band (`elow` and `ehigh`), and the selected region in sky coordinates.
- `comb-back-im-sky-`*elow-ehigh*`.fits` – The combined model particle background image for the *prefix* exposure, selected energy band (`elow` and `ehigh`), and the selected region in sky coordinates.
- `comb-prot-im-sky-`*elow-ehigh*`.fits` – The combined model soft proton background image for the *prefix* exposure, selected energy band (`elow` and `ehigh`), and the selected region in sky coordinates.

7 Algorithm

8 Comments

References