XMM-Newton CCF Release Note

XMM-CCF-REL-138

EPIC MOS quantum efficiency

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11 December 2002

1 CCF components

Name of CCF	VALDATE	Blocks changed	XSCS flag
EMOS1_QUANTUMEF_0013.CCF	2000-01-01	FRACTION_ENERGY, CHBINS_FRACTION	NO
EMOS2_QUANTUMEF_0013.CCF	2000-01-01	FRACTION_ENERGY, CHBINS_FRACTION	NO

2 Changes

Support for Timing and Burst mode Energy pattern fractions have been added in this release. In Timing mode pixels are binned together in the Y direction. This leads to Timing mode single pixel events being comprised of imaging mode pattern 0, 1 and 3 events. Similarly, double pixel events are actually comprised of imaging mode patterns 2,4 and 5 to 12. This is handled within the CCF structure by setting the FRAC_S column, of the FRACTION_ENERGY extension, for Timing mode data equal to the sum of the fractions of imaging mode pattern 0, 1 and 3 events and FRAC_D to the sum of the fractions for patterns 2, 4 and 5 to 12.

Burst mode (known as Timing Compressed) data contains no pattern information. This means that the standard data selection will contain events with imaging mode patterns 0-12. This is handled by making the FRAC_S column equal to the sum of the fractions of patterns 0-12 for Burst mode.

An additional extension, CHBINS_FRACTION, has been added to quantify the PI channels over which the FRACTION_CHANNEL arrays are defined. This extension has the column PI_CHAN.

3 Scientific Impact of this Update

This change allows the effective area file (ARF) to be calculated correctly for timing and burst mode data, taking into account any user pattern selection.

4 Estimated Scientific Quality

If the Timing mode is well calibrated it should return the same spectrum during spectral fitting as the imaging modes. To test this, the observation 290/0089960301 of the AGN NGC 5548 has been analysed. In this observation the source was simultaneously observed with MOS-1 in timing mode and MOS-2 in small window mode. In small window mode the source was piled-up and the inner 10 arcseconds of the core have had to be excised when extracting the spectrum. Despite this complication, a simultaneous fit of the two spectra, using ARFs produced by *arfgen* with these CCFs and RMFs produced by *rmfgen*, shows that the two spectra agree to within $\sim 10\%$ from 0.3 to 9 keV (Fig. 1). The spectrum is complex and has been fitted here with a model of an absorbed power-law, two black-bodies and nineteen spectral lines; giving $\chi^2_r = 1.3$ for the combined fit.

5 Expected Updates

The pattern fractions in channel space for timing mode have been set to be the same as for full frame mode. They will need to be measured from in-flight data and updated in a future release of these CCF files.

6 Test procedures and results

There are no standard matrices to check this release against. The analysis in Section 4 shows that the calibration is good to 10%, relative to the calibration of the imaging modes at all but the highest energies.

References

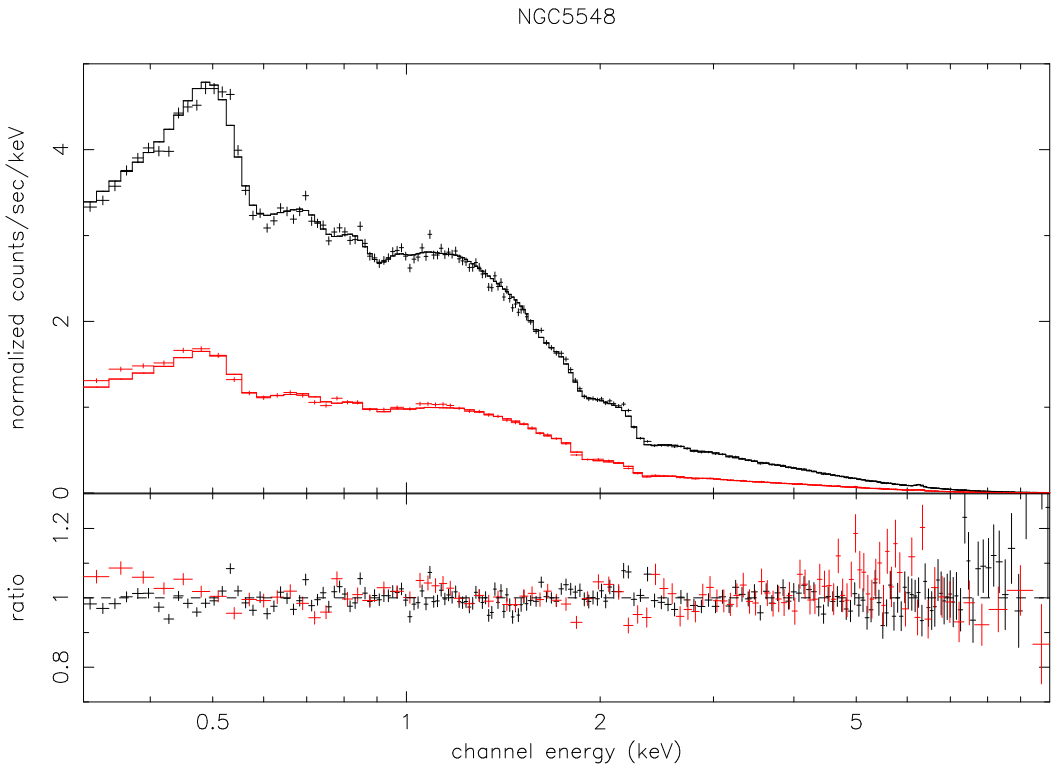

Figure 1: A combined fit of a MOS-1 timing mode (black) and MOS-2 small window mode observation (red) of NGC5548.