

XMM-Newton CCF Release Note

XMM-CCF-REL-215

RGS individual CCD sensitivities and 2nd and 3rd order grating efficiencies

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1 CCF components

Name of CCF	VALDATE	List of Blocks changed	XSCS flag
RGS1_QUANTUMEF_0015	1998-01-01T00:00:00	CCD_DESC	NO
		RGA_EFFCORR	NO
RGS2_QUANTUMEF_0016	1998-01-01T00:00:00	CCD_DESC	NO
		RGA_EFFCORR	NO

2 Changes

The sensitivity of individual CCDs has been checked by inspection of the nearly 1 million seconds of raw data accumulated on Mkn421 throughout the mission as shown in Fig. 1. In the past, the small differences between CCDs have been parameterised as equivalent thicknesses of SiO₂. In this release, they are coded more directly as individual CCD sensitivities in 5 new columns CCD_DESC(SENS_M[1-5]), one for each order, with any non-zero thicknesses of SiO₂ reset to zero. Adjustments were required for CCD2 only in both instruments. In RGS1 this amounts to 3.5% in 1st order and progressively less for higher orders. In RGS2 the 1st order correction is 11.4%.

Following the derivation of new 1st order spectra with the revised effective-area calibration described in XMM-CCF-REL-216 that incorporates, among other things, these new individual CCD sensitivities, it was also necessary to recalculate the 2nd and 3rd order corrections held in the RGA_EFFCORR extension. The results are shown in Fig. 2. The agreement between the three independent sets of data is good. There are differences of the order of 10% in comparison with the previous values.

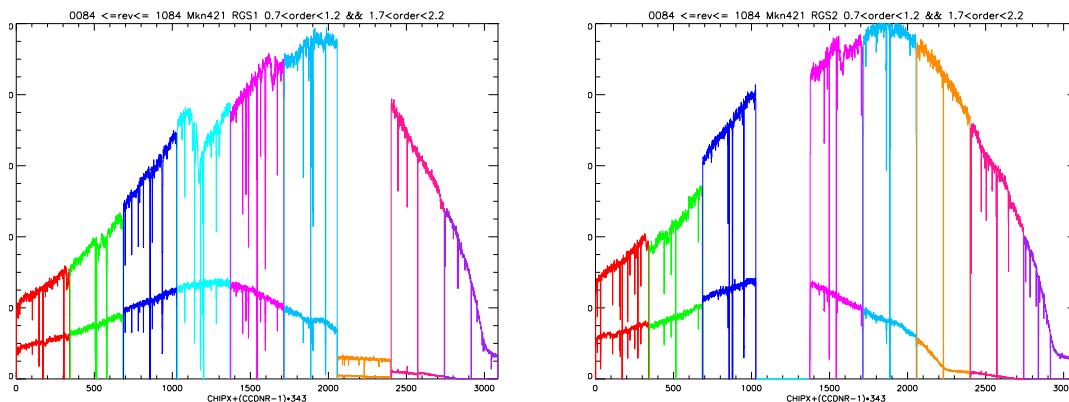
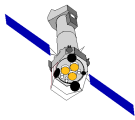


Figure 1: Data accumulated throughout the mission on Mkn421 plotted in detector coordinates. RGS1 on the right and RGS2 on the left. Sensitivity corrections were required for CCD2 in both RGS instruments.

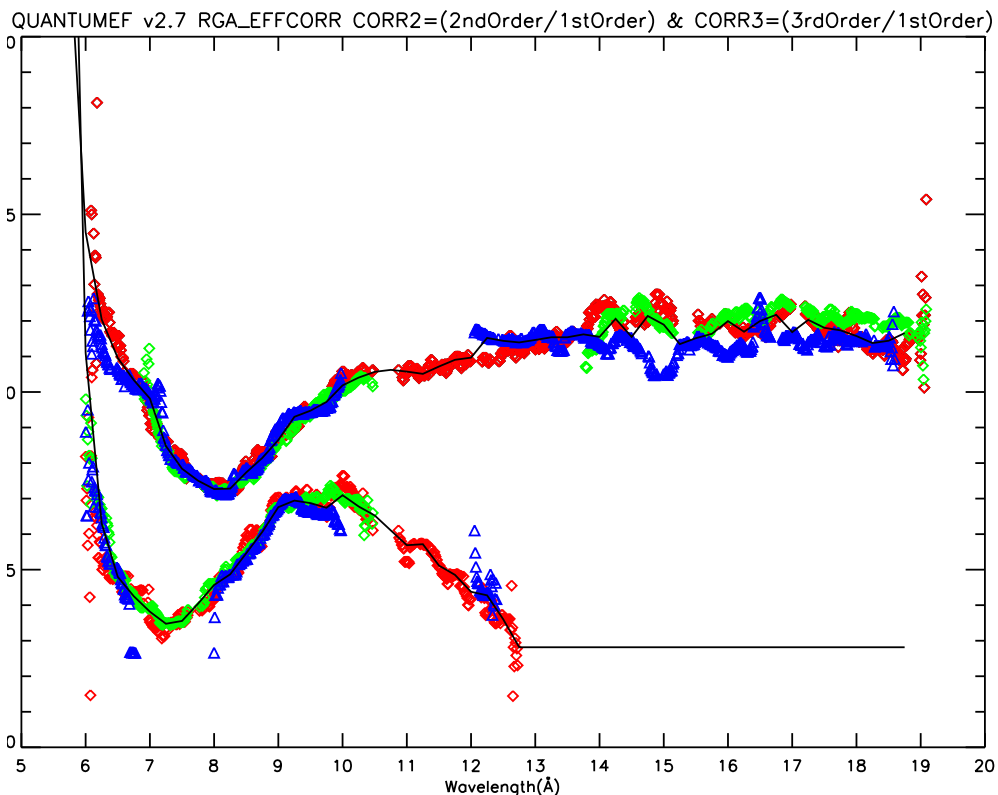
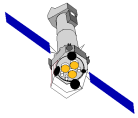


Figure 2: New 2nd and 3rd order corrections for the RGS instruments using the accumulated data of Mkn421 throughout the mission. RGS1 data are shown in red before the loss of the CCD7 electronics in rev 0135 and in green after. RGS2 from the whole mission are in blue. The early RGS1 data were supplemented by two observations of PKS2155-304 from rev 0087. The upper branch is the 2nd order, the lower 3rd order. The solid lines show the tabulation in the new CCF release.



3 Scientific Impact of this Update

Unknown.

4 Estimated Scientific Quality

Improved consistency between the long wavelengths sampled by CCD2 in RGS1 and RGS2 and the rest of the spectrum. Because the 2nd and 3rd order corrections are empirical, the improved consistency ensured by this calibration update will allow observers to be more confident in their use of especially 2nd order spectra in analysis. The use of the SAS task `rgsfluxer` is recommended in this respect and should be encouraged in order to compensate in part with second order for the loss of data from RGS2 CCD7.

5 Test procedures & results

This CCF is part of the overall calibration effort whose final results are described in the new RGS effective area model described in XMM-SOC-CAL-SRN-0216.

6 Expected Updates

None expected.