XMM-Newton CCF Release Note

XMM-CCF-REL-173

RGS DARKFRAME normalisation

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1   CCF components

Name of CCF	VALDATE	List of Blocks changed	XSCS flag
RGS1_DARKFRAME_0005	1999-01-01T00:00:00	DARKFRAME	NO
RGS2_DARKFRAME_0006	1999-01-01T00:00:00	DARKFRAME	NO

2   Changes

The RGS DARKFRAME CCFs contain parameterisations of response non-uniformities across CCD node surfaces. Two changes were necessary: RGS2_DARKFRAME_0004 did not contain the proper CCD NODE_ID designations C(0) and D(1) as all values were set to zero; and both the RGS1 and RGS2 CCFs did not have proper normalisation values a_3 and b_3 that should make the average correction over the node zero. The dark frame is described with the equation

$$f = a_0 \times e^{a_1 (\text{rawX} - 1)} + a_2 \times (\text{rawX} - 1) + (a_3 + b_3)/2 + b_0 \times e^{b_1 (\text{rawY} - 1)} + b_2 \times (\text{rawY} - 1)$$

In all DARKFRAME releases so far, both a_3 and b_3 have been incorrectly set to zero. Now, proper values have been calculated per node to give $\bar{f} = 0$ over $1 \leq \text{rawX} \leq 171$, $1 \leq \text{rawY} \leq 128$.

3   Scientific Impact of this Update

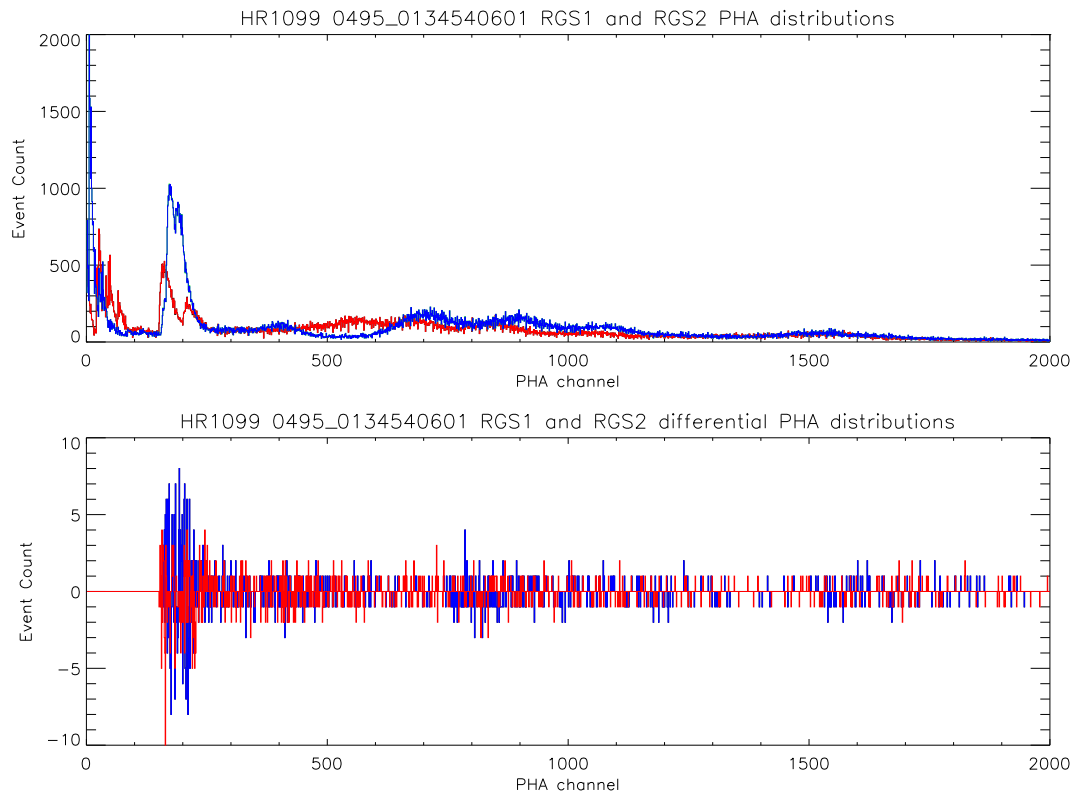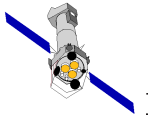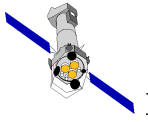Though rigour has demanded these changes, there is very little effect on the processed data.

Figure 1: The upper panel shows the PHA distributions of RGS1 before (black) and after (red) and RGS2 before (blue) and after(green) application of the new DARKFRAME CCFs. They are almost identical. The small differences between the two are shown in the lower panel for RGS1 (red) and RGS2 (blue).

4   Estimated Scientific Quality

Effectively unchanged.

5   Test procedures & results

An example observation of HR1099 in 0495_0134540601 has been processed with `rgsproc` with and without the new DARKFRAME CCFs. As expected, the changes are small. The upper part of Fig. 1 shows the PHA distributions of the RGS1 and RGS2 cleaned events files before and after application of the CCF revision. They are almost identical as emphasised by differences plotted beneath.

6   Expected Updates

None.