XMM-Newton CCF Release Note

XMM-CCF-REL-381

RGS Bad Pixels - advisory extended segments

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1 CCF components

Name of CCF	VALDATE	List of Blocks changed	XSCS flag
RGS1_BADPIX_0039	2020-01-01T00:00:00	BADPIX	NO

2 Changes

This release addresses an issue concerning bad segments, motivated by the RGS Diagnostic Trend Analysis Report - 2019 (XMM-CAL-TN-0226).

The two areas with higher offsets ("hot spots") on both upper part sides of CCD 1 in RGS1 have increased their size by 8 rows and 8 columns. These regions are now 48 px × 24 px.

These new affected pixels are flagged as advisory hot segments with this CCF release. The previous two regions of 40 px × 16 px (one at each readout node) remain flagged as hot on board (uploaded hot segments).

An update of the onboard hot stuff table adding the new area will come in the next weeks/months. Once this update is done a new CCF will be released.

This CCF will be applicable as of the 01-01-2020T00:00:00

3 Analysis

The hot spot in the upper left corner of CCD1/RGS1 can be clearly seen in the offset maps produced from the diagnostic data collected along 2019 and 2020 (see Fig. 1). Its increase in size with respect

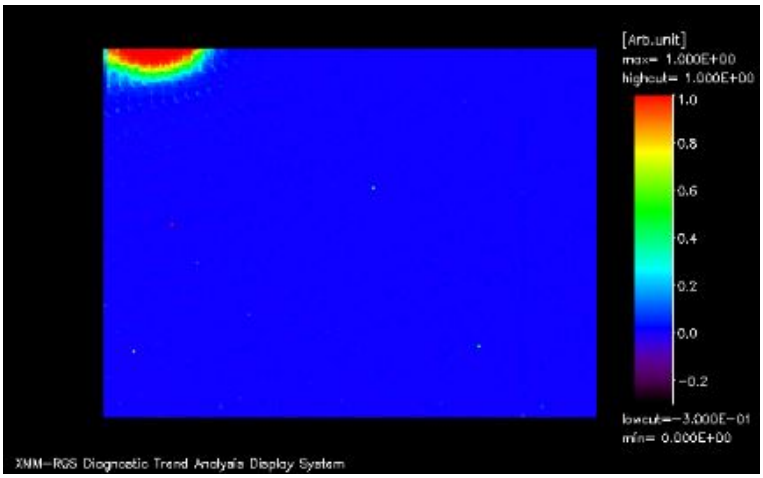

Figure 1: Offset map for RGS1 - CCD1 - node C averaged over data from year 2019 and 2020. The "hot spot" can be seen in the upper left corner.

to the area detected in 2017 has an effect on the science data, even when the advisory hot stuff is taken into account during data processing. This effect can be noticed as a series of leaks or pixels misidentified as bad in the area below the patched corner in both nodes, as well as a larger number of columns affected. When running the bad pixel/column finding software (SAS task `rgsbadpixfind`) over the science data, the resulting bad pixel map clearly trace the expansion of the patches in the area inmediately adjacent to it (see Fig. 2). It is clearly seen that, while the masking produced the desired effect of avoiding fake hot columns below the spot, there are now some not masked columns to the right of the spot giving rise to some columns being misidentied as hot. The evolution of the hot spots, growing slowly both in vertical as in horizontal direction, is the reason for extending now this spot further 8 columns to the right and 8 rows to the bottom, and so masking fully o the spot area.

4 Scientific Impact of this Update

As of the date of validity of this CCF, the masking of the upper left corner of CCD1 of RGS1 will be extended to cover an area of 48 px × 24 px when the `rgsproc` keyword `withadvisory` is set to `no`.

5 Test procedures & results

General checks:

- use fv (or another fits viewer) for file inspection. It should contain 2 binary extensions (BADPIX01 and BADPIX11)

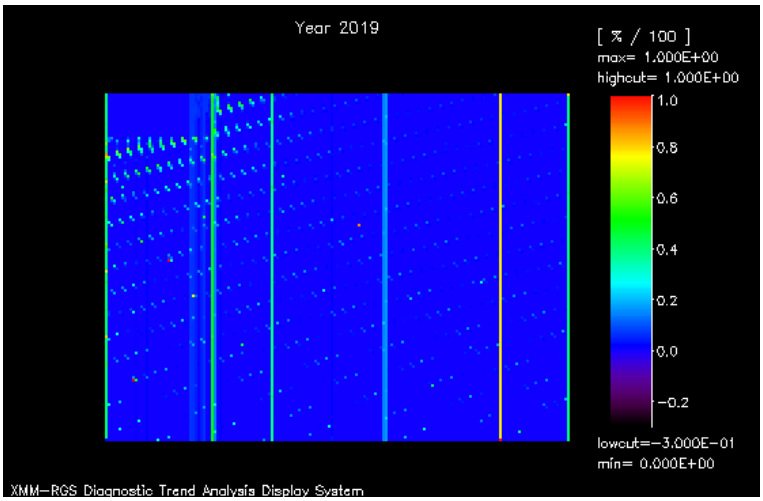

Figure 2: RGS1 - CCD1 - node C bad pixel map obtained from the science data taken with the latest on board hot stuff table (v15) along 2019.

- use the SAS task CALVIEW to see if the CAL digests and uses the new files.
- check that the differences between RGS1 BADPIX 0034 and 0039 are exclusively the extensions of the advisory ("H") segments corresponding to the hot spots in RGS1 CCD1 C and D readout side.

Results:

- After processing an RGS1 observation with the new CCF, the binary tables in the extensions BADPIX01 and BADPIX11 were successfully produced.
- The SAS task calview could successfully use the new CCF (RGS1_BADPIX_0039.CCF).
- The comparison of the BADPIX tables produced when processing the same RGS1 observation with RGS1_BADPIX_0038.CCF and RGS1_BADPIX_0039.CCF showed the different size of the patch in the upper left corner of CCD1.

With these results the validation and testing of the new CCF was declared as satisfactory

6 Expected Updates

Once the new version of the hot stuff table is uploaded on board, the segments flagged now as 'advisory' will be flagged as 'uploaded' in a new CCF.