XMM-Newton CCF Release Note

XMM-CCF-REL-0383

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_0040	2021-06-01T12:00:00	BADPIX	NO

2 Changes

This release addresses the upload of the HotStuff table v16 at the start of revolution 3934 (01/06/2021) and the update of the advisory hot columns.

The extension of the hot spot in RGS1 CCD1 flagged as "advisory" in the previous release is now marked as "uploaded" (see XMM-CCF-REL-381). These regions cover an area of 48 px × 24 px.

Two new columns are identified as hot in this CCF and flagged as "advisory": CCD1_nodeD_139 and CCD6_nodeC_088, both in RGS1. They have been hot more than 95% of the observations in the last three years.

On the other hand, column CCD1_nodeC_146 in RGS1 has been removed from the "advisory" list since it has been hot for 88% of the observations in 2020, being therefore below the 95% threshold.

No changes affect RGS2.

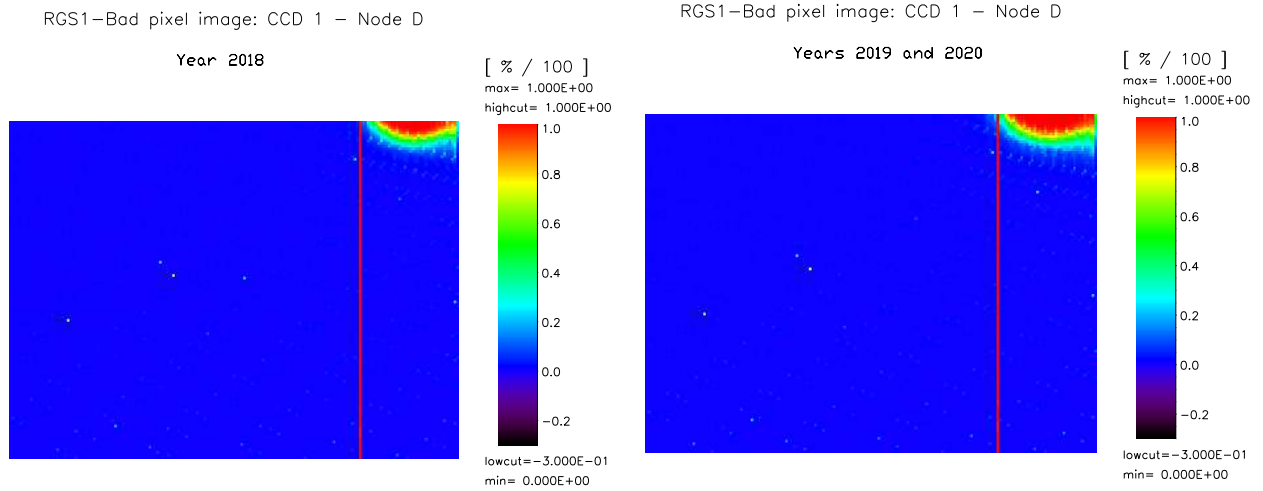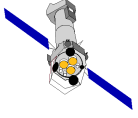This CCF will be applicable as of the 01-06-2021T12:00:00

Figure 1: Badpixel map for RGS1 - CCD 1 - node D. Left: Data corresponding to 2018. Right: Data averaged over year 2019 and 2020. The "hot spot" can be seen in the upper right corner in both images, increasing along both axes in the most recent data. The known hot column in $X_{CCF} = 38$ is also evident in both images and serves as a good marker of the expansion of these areas.

3   Analysis

As described in XMM-CCF-REL-381, the hot spot in the upper left corner of CCD1/RGS1 was clearly seen in the offset maps produced from the diagnostic data collected along 2019 and 2020 (see Fig. 1). This evolution of the hot spots, growing slowly both in vertical as in horizontal direction motivated the extension of the area considered hot by 8 columns to the right and 8 rows to the bottom. This expansion was first included as "advisory" in RGS1_BADPIX_0039. A new version of the uploaded Hot Stuff table is operational on board as of the 1st of June, 2021 and the new CCF RGS1_BADPIX_0040 now reflects this fact.

On the other hand, the analysis of both the Diagnostics and Science data collected in 2020 has shown that two new columns have been hot for more than 95% of the observations along the last year, and therefore they need to be included in this CCF as "advisory". The new hot columns are CCD1_nodeD_139 and CCD6_nodeC_088, both in RGS1. Column CCD1_nodeC_146, also in RGS1, has been hot for less than 95% of the observations in the same period (specifically only 88% of the cases). It has been removed from the CCF "advisory" list.

4   Scientific Impact of this Update

As of the date of validity of this CCF, the on board masking of the upper left corner of CCD1 of RGS1 has been extended to cover an area of 48 px × 24 px. No data from this spot will be telemetered.
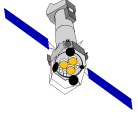
RGS1 columns CCD1_nodeD_139 and CCD6_nodeC_088 will be discarded during science data processing when the `rgsproc` keyword `withadvisory` is set to `yes`. Column CCD1_nodeC_146, also in RGS1, will now be included in the science processing.

5   Test procedures & results

General checks:

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

- Use the SAS task CALVIEW to see if the CAL digests and uses the new files.

- Check that the differences between RGS1 BADPIX 0039 and 0040 are:
    - The change of the extensions of the advisory segments corresponding to the hot spots in RGS1 CCD1 C and D readout side from "H" to "h".
    - The appearece on these new columns marked as "H": CCD1_nodeD_139 and CCD6_nodeC_088
    - Removal of CCD1_nodeC_146 from the "advisory" list.

Results:

- After processing an RGS1 observation with the new CCF, the binary tables in the extensions BADPIX01 and BADPIX11 were successfully produced for each CCD.

- The SAS task calview could successfully use the new CCF (RGS1_BADPIX_0040.CCF).

- The comparison of the BADPIX tables produced when processing the same RGS1 observation with RGS1_BADPIX_0039.CCF and RGS1_BADPIX_0040.CCF showed the patch in the upper left corner of CCD1 correctly marked.

- The new added hot columns and the removed one in RGS1 were correctly processed.

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

6   Expected Updates

The status of the bad pixels in the RGS detectors will be reassesed at the beginning of 2022. No update of this CCF is foreseen until then.