XMM-Newton CCF Release Note

XMM-CCF-REL-334

RGS Bad Pixels - upload of extended segments

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1 CCF components

Name of CCF	VALDATE	EVALDATE	Blocks changed	XSCS flag
RGS1_BADPIX_0034	2016-05-11T23:00:00	—	BADPIX	NO

2 Changes

This release adresses an issue concerning bad segments, which has already been discussed in former CCF release notes (XMM-CCF-REL-226 and XMM-CCF-REL-239). Flagging of two areas with increased offsets ("hot spots"), on both upper part sides of CCD 1 in RGS1, so each one corresponding to a readout node became necessary. This was done first through a number of advisory hot segments masking the area of the spots, and then through uploaded hot segments of 8 pixels each in the most left and right 31 columns on each side in the upper areas of CCD 1, starting in revolution 1416, to avoid increased telemetry. In the last years the hot spot on the C side of the CCD has shown a growth, making advisable to extend the masked segments from 8 to 16. This table with the extended masking has been uploaded as of revolution 3008, starting on the late evening of May 11, 2016. RGS1_BADPIX_0034 contains these extended bad pixel masking, for correct handling of the data when processing including a correct calculation of the efficient areas.

3 Analysis

As part of the continuous monitoring of the RGS instruments, offset maps are produced, as the averages of the diagnostic images over three consecutive revolutions. They are then taken into the ODF data for the offset subtraction. The hot spot on the C side of the detector is clearly seen in

Fig. 1, left side, showing the averaged offset map corresponding to year 2015. The hot spots are attributed to stress produced in CCD1 at the bond places.

We perform also an analysis of all the hot stuff found by running the bad pixel/column finding software (SAS task `rgsbadpixfind`) over the science data, and construct bad pixel maps. On the right side of Fig. 1 we have such a map corresponding to RGS1 - CCD 1 - C readout side. The region suppressed in the telemetry, corresponding to the hot spot, is clearly seen, however, this is not covering the whole signal from the hot spot now, giving also rise to an increased number of hot columns found below the region. Since further expansion of this spot, not seen on the D side, could be compromising telemetry rates, provision has been taken to upload extended bad column segments (16 pixels instead of 8), masking fully off the spot area.

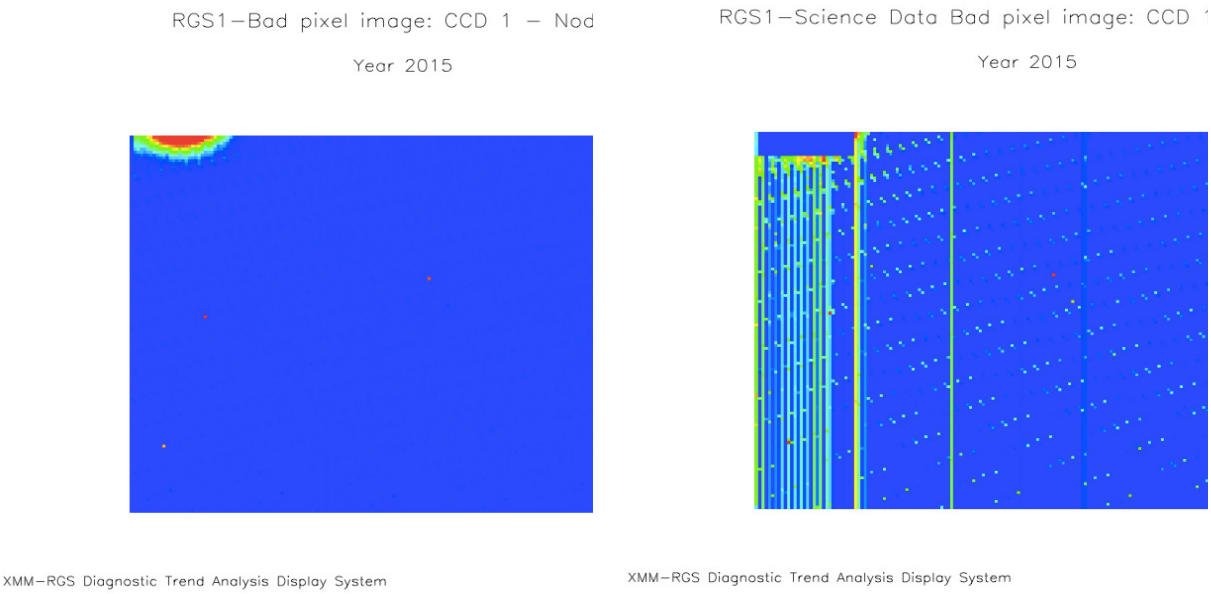

Figure 1: Left: RGS1 - CCD1 - C side offset map averaged over all data from year 2015, showing the "hot spot". Right: RGS1 - CCD1 - C side bad pixel map obtained with science data over the same time.

4 Scientific Impact of this Update

The start date of validity is set to the late evening of May 11 2016. when the new bad pixel tables, including the extended hot spot, started to be uploaded to the instrument. SAS will notice through this CCF the not telemetered masked regions.

5 Estimated Scientific Quality

The inclusion of the extended hot segment in this CCF will insure a proper calculation of effective areas.

6 Expected Updates

Further analysis of bad pixels with diagnostic and science data should lead to updates, although this is expected to happen very infrequently.

7 Test procedures

General checks:

- use fv (or another fits viewer) for file inspection. It should contain 2 binary extensions (BADPIX and BADPIX1)
- use the SAS task CALVIEW to see if the CAL digests and uses the new files.
- check that the differences between RGS1_BADPIX_0033 and _0034 is exclusively the extension of the uploaded ("h") segments corresponding to the hot spot in RGS1 CCD1 C readout side.

8 Summary of the test results

The fits viewer fv was used to inspect both CCF files, wrt their structure, validity dates and contents of the first extension (BADPIX). Everything OK.

The SAS task cifbuild was run several times using data corresponding to periods covered and not covered by this CCF in order to check the correct selections. Selections were correctly done.

The SAS task calview was used to prove that these calibration files are ingested correctly by the CAL, by pointing to the different Calibration Index Files and producing bad pixel plots.

Finally, fdiff (FTOOLS) has been used to check that the differences to the former valid bad pixel CCF file (RGS1_BADPIX_0033).