XMM-Newton CCF Release Note

XMM-CCF-REL-252

OM bad pixels: Update

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1 CCF components

Name of CCF	VALDATE	EVALDATE	List of Blocks changed	XSCS flag
OM_BADPIX_0005	2000-01-01T00:00:00	—	BADPIX	NO

2 Changes

The list of OM bad pixels has been updated.

The characteristics of bad pixels are defined in detail in the CAL handbook. In summary there are four regions, one at each corner of the detector where the so called "edge emission" affects all pixels, and small areas in the rest of the detector, corresponding to physical pixels with reduced sensitivity (including some dead pixels), a couple of hot pixels (permanent) and a few areas with more than one adjacent physical pixels with reduced sensitivity. (Remember that in OM each physical pixel is sampled into 8 x 8 sub-pixels by an event centroiding algorithm).

The identification of these bad pixels has been made by looking into composite super-flat images (obtained by adding several flat field images) spanning from revolution 400 up to 1400. The bad pixels appear in all super-flat fields, indicating that its number is stable with time. The final characterization has been made in a super-flat built up with all flat field images with a total exposure time of 830 ks.

Some images of extended objects, mainly comets and M 31 have been used as well to look for low sensitivity patches (due to several adjacent pixels). Five of these areas have been found. It is unknown whether these patches are produced in the photocathode, in the MIC, in the phosphor screen or in the CCD.

Although the structure of the CCF allows us to define each "bad" pixel (or area) by its position

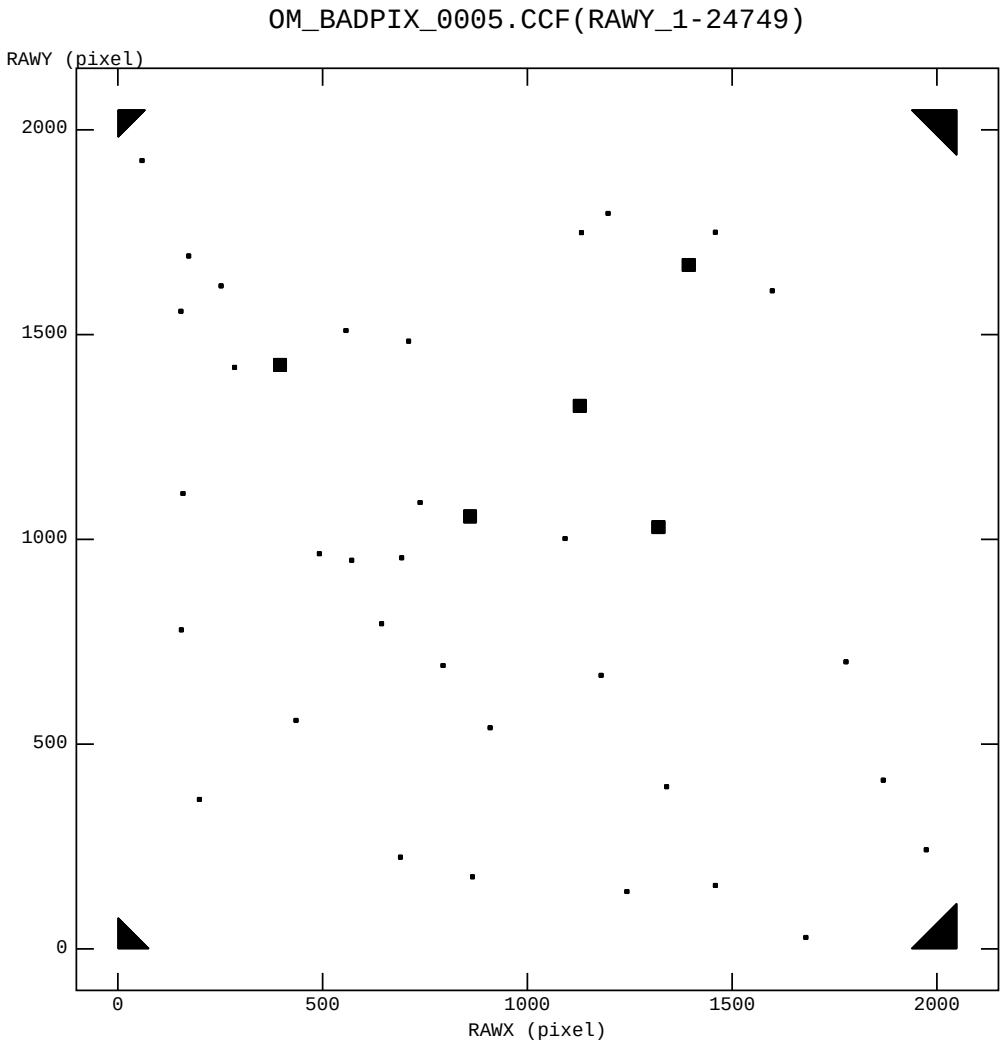

Figure 1: Distribution of bad pixels and low sensitivity patches in the new OM_BADPIX_0005.CCF

and extent in X and Y axis, we have preferred to list X and Y of all affected sub-pixels (with extent unity).

The distribution of the bad pixels is shown in Figure 1

Table 1 gives the centre (sub-pixel) of the bad pixels, excluding the triangular edge emission regions extending for as much as 100 pixels from the corners of the detector. The size of the bad pixel has been defined slightly larger than a physical one as a conservative approach accounting for the fact that a sub-pixel comes from interpolation into more than one physical pixel.

Table 1: OM Bad Pixels

X	Y	Description	Size (sub-pixel)
396	1426	low sensitivity patch	31 x 31
860	1056		
1128	1326		
1320	1030		
1394	1670		
159	1112	dead pixel	9 x 9
199	365		
866	176		
1680	28		
1869	412		
909	540	hot pixel	9 x 9
1180	668		
1340	396		
1459	155		
59	1925	low sensitivity pixel	9 x 9
154	1557		
155	779		
173	1692		
252	1619		
285	1420		
435	558		
492	965		
557	1510		
571	949		
644	794		
690	224		
693	955		
710	1484		
738	1090		
794	692		
1092.	1002		
1132	1749		
1197	1796		
1243	140		
1459	1750		
1598	1607		
1974	242		
1778	701		

3 Scientific Impact of this Update

The bad pixels list is used by the SAS to flag the quality of the count rate measurement of a detected source containing one or more of them. The flagging mechanism is carried on through all processing steps till the final combined source list.

The new table provides a more accurate characterization of the bad pixels. It contains a few more entries not listed before. Therefore the flagging of detected sources will be more reliable.

4 Estimated Scientific Quality

The level of decreased sensitivity is defined "by eye" in the flat field image. It is not used to correct the measured count rate. Instead, the flagging triggered by the bad pixels table indicates that a source measurement may be less accurate due to the presence of a bad pixel. Having more entries in the new table will increase the reliability of the results.

5 Expected Updates

The appearance of new bad pixels is monitored through the obtention and inspection of flat fields. Although, as we said before, there seems not to have new ones in the last 1000 revolutions, the aging of the detector may require the table to be updated in the future.

6 Test procedures

The new CCF has been verified with calview.

In addition, observations of BPM 16274, SA 92-45 and EXO 0748-676 have been processed with SAS 8 and the new CCF. The processing runs smoothly. Differences in the results are easily seen in the case of EXO 0748-676, a dense field where more sources are affected by the new, more abundant bad pixels definition and therefore they are flagged.

References