XMM-Newton CCF Release Note

XMM-CCF-REL-416

RGS CTI: Change of Validity Dates

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1 CCF components

Name of CCF	VALDATE	List of Blocks changed	XSCS flag
RGS1_CTI_0019	2024-04-08T01:31:37		NO
RGS2_CTI_0020	2024-03-11T22:19:32		NO

2 Changes

The only change in this revision is in the validity date of the CCFs. Otherwise, the content is the same as in the previous versions, RGS1_CTI_0018 and RGS1_CTI_0019, see [1].

3 Scientific Impact of this Update

A sudden decrease of 1-2% in the CCDs Charge Transfer Efficiency (CTE), as measured from the energy of the internal Calibration Lamps, was observed in Spring 2024 in both RGSs. After a few months, in late December 2024, the CTE went back to its original level, following the steep decrease that started around revolution 4000 (see Fig.1).

The reason for the drop of the CTE was an increase in the temperature of the instruments, from its nominal value of -109.84 C to -108.25 C. This departure from the nominal temperature was not high enough to trigger an alarm, but had an impact in the CTE, and also made the number of hot pixels to increase slightly during this period. The effect in the effective area is estimated to be 1-2% at most.

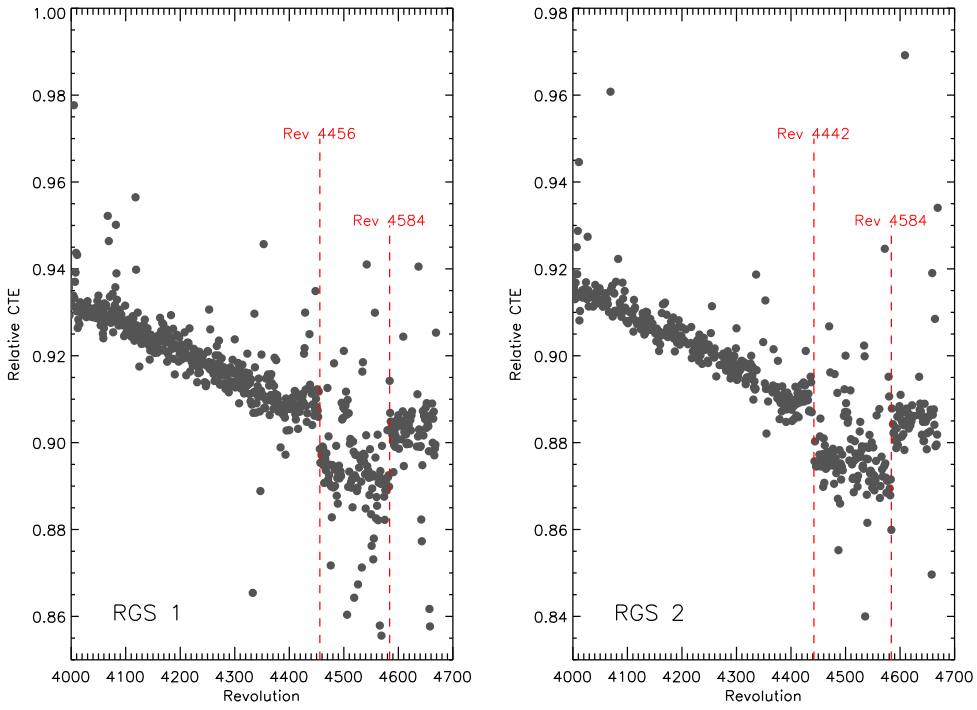

Figure 1: Evolution of the RGS CTE, marking the period of the drop associated to the increase in temperature.

The root cause of the wrong temperature was an incorrect recovery of the instruments after an electronic failure. It must be noted that the problem in both RGS was unrelated, and only by chance ocurred close in time.

With the start of the eclipse season at the end of 2024, in revolution 4584 (when the instruments are fully reset at the beginning of every revolution), temperatures were back to the nominal values.

The calibration observations of Mkn 421 off-axis that were the basis of the current CTI CCFs (#18 for RGS1, #19 for RGS2) were taken in May 2024, during the problem period and are therefore applicable to observations taken at the high temperature. The validity date of these CCFs was initially set to May 1st 2024, but it is more correct to use the exact times of the change of the temperatures, in revolutions 4456 and 4442 for RGS1 and RGS2, respectively.

4 Test procedures & results

- The fits viewer `fv` has been used to inspect the new CCFs, their structure, validity dates and contents.
- The SAS task `cifbuild` has been run to confirm that the right CCFs version is selected.

5 Expected Updates

At the time of writing, work on new CCFs covering the period after the start of the eclipse season in December 2024 is in progress.

6 References

[1] "Evolution of the RGS CTI (2024b)", R. González-Riestra and J. de Plaa, XMM-CCF-REL-412, October 2024
(https://xmmweb.esac.esa.int/docs/documents/CAL-SRN-0412-1-1.pdf