XMM-Newton CCF Release Note

XMM-CCF-REL-349

Extrapolation of the correction to the RGS Effective Area

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1 CCF components

Name of CCF	VALDATE	List of Blocks changed	XSCS flag
RGS1_EFFAREACORR_0012	2000-01-01T00:00:00	AREACORR_1	NO
		AREACORR_2	NO
RGS2_EFFAREACORR_0012	2000-01-01T00:00:00	AREACORR_1	NO
		AREACORR_2	NO

2 Changes

The time and wavelength dependent correction to the RGS effective area was first implemented at the beginning of 2017, in parallel with the release of SASv16.0.

Similar to the other extensions in the `EFFAREACORR` CCFs, this correction is tabulated at several epochs. The correction for a given date is derived by linear interpolation between the two closest entries in the CCF. The values of the last entry are used for any date after the last epoch included in the CCF, i.e. no extrapolation is made. In the first version of these CCFs the last epoch tabulated was 24th April 2015 (XMM-Newton revolution 2816).

These new CCFs have been created to make possible the extrapolation of the correction beyond April 2015 without requiring a change in the software.

3 Scientific Impact of this Update

The RGS effective area correction was derived using the results of the work by Kaastra et al. (2015). These authors have used a large sample of observations of bright blazars taken from the beginning

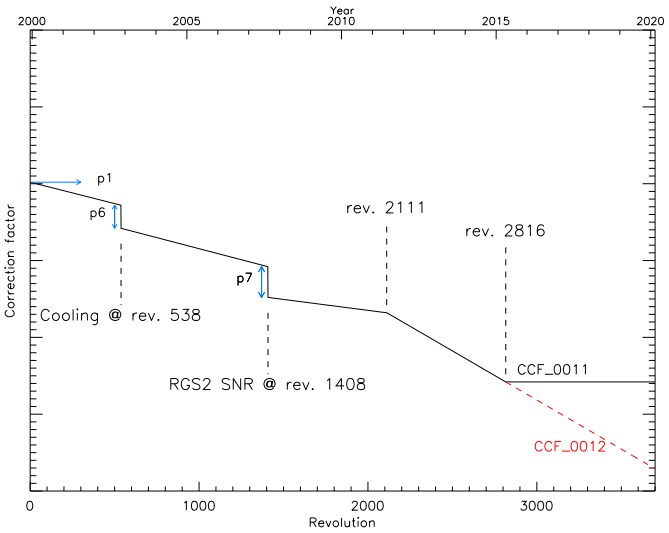

Figure 1: Scheme of the parametrisation used for the fit to the residuals. p_1 is the initial calibration mismatch; p_6 represents the potential discontinuity at the time of the instruments cooling (rev. 538), and p_7 at the time to the change of RGS2 to single node readout mode (rev. 1408, p_7=0 for RGS1). With this release of the CCFs, the correction is extrapolated for dates after rev. 2816, while with the previous one it was kept constant at the value corresponding to that date.

of the mission until October 2014. Each spectrum was fitted to an absorbed broken power-law, and the residuals (in bins of 0.05 Å) as a function of time were fitted according to the expression given in Kaastra et al. (2015) and González-Riestra (2016) and shown schematically in Fig.1.

Different parameters have been derived for four epochs: before revolution 538, between revolutions 538 and 1408, between revolutions 1408 and 2112 and between revolutions 2112 and 2816. As mentioned above, using the first release of these CCFs no extrapolation is made beyond the last date.

With these new CCFs the validity of the parametrisation of the last of the four epochs is extended until the end of 2019. This has been done by adding a new row in the CCF with date 31st December 2019 (XMM-Newton revolution 3674), whose values have been computed using the parametrisation corresponding to the revolution range 2111-2816.

4 Estimated Scientific Quality

With this new calibration files, the correction for observations taken after 24th April 2015 is extrapolated from that used in the period June 2011 to April 2015.

Until new data are analysed new parameters are derived, the extrapolation of the current correction is preferred to keeping it constant at the values of April 2015.

5 Test procedures & results

The new CCFs have been fully tested in SASv16.

- 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.

6 Expected Updates

This is the first update of this correction. More tests with different types of spectra need to be done, which may lead to improvements. The time evolution of the effective area should be closely monitored, and new records will be added (or the existing ones modified) to cope with potential changes.

7 References

[1] "Effective area calibration of the RGS", J. Kaastra, C. de Vries, J.W. den Herder, SRON-RGS Internal Report, August 2015

[2] "Correction to the RGS Effective Area", R. González-Riestra, XMM-CCF-REL-340, December 2016.