XMM-Newton Technical Note

XMM-CCF-REL-261

RGS Background Spectra Templates in Wavelength space

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1 CCF components

Name of CCF	VALDATE	EVALDATE	Blocks changed	XSCS flag
RGS1_TEMPLATEBCKGND_0006	2001-01-01T00:00:00	–	X100_P090_1_0.00_LB... X100_P095_2_8.00_LB	NO
RGS2_TEMPLATEBCKGND_0007	2001-01-01T00:00:00	2007-08-17T00:00:00	X100_P090_1_0.00_LB... X100_P095_2_8.00_LB	NO
RGS2_TEMPLATEBCKGND_0008	2007-08-17T00:00:00	–	X100_P090_1_0.00_LB... X100_P095_2_8.00_LB	NO

2 Changes

This release of the RGS TEMPLATEBCKGND CCFs includes the background templates used by the SAS task `rgsbkgmodel` binned both in *beta* and in *wavelength* space. It applies to RGS1 and RGS2 and, for the latter, to double- and single-node readout modes (RGS2_TEMPLATEBCKGND_0007 and RGS2_TEMPLATEBCKGND_0008, respectively). These CCFs supersede previous versions. They are compatible only with `rgsbkgmodel` version 1.3.3 and higher.

The spectra used to derive the background templates have been extracted with version 2.7 of the SAS task `rgsspectrum`. The procedure followed is detailed in [1] and in the release notes of previous versions ([2], [3] and [4]).

The structure of the calibration file has changed with respect to previous releases: each file has now 128 extensions, 64 in *beta* space, and 64 in *wavelength* space. Within each group, 32 extensions correspond to first-order and 32 to second-order background spectra. There are different extensions for extraction regions of 90% and 95% in PI. Names of the extensions are coded as follows:
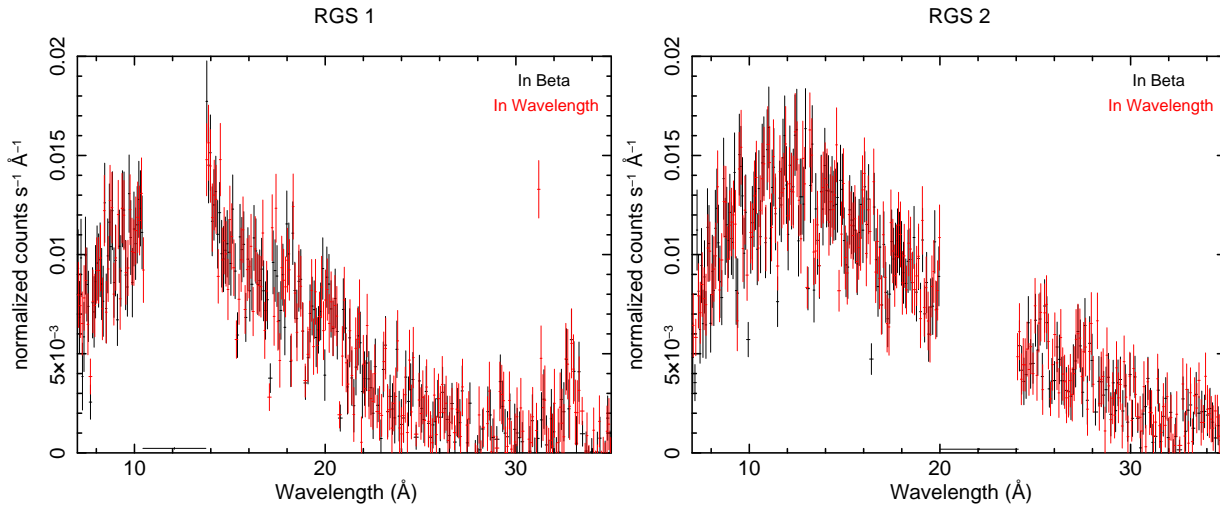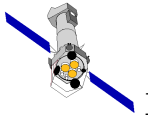
`Xsss_Pppp_o_r.rr_q`

Figure 1: Comparison of the results of using the background templates binned in *beta* and in *wavelength*. The figures show RGS first order background-subtracted spectra of the galaxy cluster Abell 1413 (RGS 1 on the left and RGS 2 on the right). Spectra binned in *beta* are shown in black, and spectra binned in *wavelength* in red.

with *sss* being the size of the extraction region in the cross-dispersion direction (always 100%), *ppp* the size of the extraction region in PI (090 or 095), *o* the order (1 or 2), *r.rr* the level (from 0.00 to 8.00), and *q* representing the binning space: 'B' for *beta* or 'L' for *wavelength*. For instance, X100_P095_1_0.20_B is the extension containing the first order template background spectrum for an extraction region of 95% in PI, and a level of 0.20 cts/sec, binned in beta space. X100_P095_1_0.20_L is the same template, but in wavelength space.

3   Scientific Impact of this Update

Starting in SAS 10.0, spectra generated with rgsspectrum and rgsproc will be binned in wavelength space by default. With these new CCFs, the user will be able to apply the background templates in all cases, independently of the spectral binning chosen.

4   Expected Updates

Further updates might be made in the future to improve the signal-to-noise ratio of the templates by adding more blank fields and/or to cope with software updates.
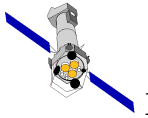
5   Test Procedures and Results

The new templates have been used to generate the model background for a sample of observations that included different levels of background, first and second orders, and 90 and 95% PI extraction regions. The results were satisfactory in all cases. The model background spectra binned in *wavelength* have been used in XSPEC v12 without any problem.

Formal checks:

- The fits viewer `fv` was used to inspect the CCF file, their structure and validity dates. Everything was OK: It contains 128 binary extensions, each with five columns: `CHANNEL, RATE, QUALITY, BACKSCAL` and `AREASCAL`.

- The SAS task `cifbuild` was run successfully in order to check the ingestion of the files into the calibration index file.

References

[1] "Templates for the RGS Background", R. González-Riestra, XMM-SOC-CAL-TN-0058, October 2004

[2] "RGS Background Spectra Templates", R. González-Riestra, XMM-CCF-REL-217, June 2006

[3] "RGS Background Spectra Templates", R. González-Riestra, XMM-CCF-REL-229, June 2007

[4] "RGS Background Spectra Templates", R. González-Riestra, XMM-CCF-REL-250, March 2009