

## XMM-Newton CCF Release Note

XMM-CCF-REL-267

**EPIC MOS response**

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**1 CCF components**

Name of CCF	VALDATE	EVALDATE	Blocks changed	XSCS flag
EMOS1_REDIST_0075.CCF	2004-01-01	2020-01-01	PRIMARY	NO
EMOS2_REDIST_0075.CCF	2004-01-01	2020-01-01	PRIMARY	NO

**2 Changes**

In the previous set of EPIC MOS redistribution files, released in December 2005, the end validity date for the last epoch (`EMOS1/2_REDIST_0074.CCF`) was set to the beginning of 2010. This is clearly incompatible with observations made during or after 2010. Analysis of these observations with the current CCF has incorrectly used a much earlier version of the redistribution files (`EMOS1/2_REDIST_0042.CCF`; issued in August 2004) which contain an outdated parametrisation of the MOS photon redistribution.

In this release, the end date (keyword `EVALDATE`) for the final epoch has been increased to the beginning of the year 2020 for both MOS-1 and MOS-2. This will ensure that new observations use the latest epoch CCF element for the expected lifetime of the mission.

**3 Scientific Impact of this Update**

Only observations performed since the 1st of January 2010 are affected.

Examples of the impact yielded by the aforementioned error are shown in Fig. 1, where we compare the quality of the spectral fitting on two calibration observations performed in 2010: the thermal SuperNova Remnant (SNR) 1E0102-72 (Obs.#0412981001; Rev.#1898) and the blazar PKS2155-304 (Obs.#0411780501; Rev.#1902). The spectra of the 1E0102-72 were reduced and analysed following the prescriptions in Plucinsky et al. (2008). The source spectra of PKS2155-304 were reduced using standard procedures, and extracted

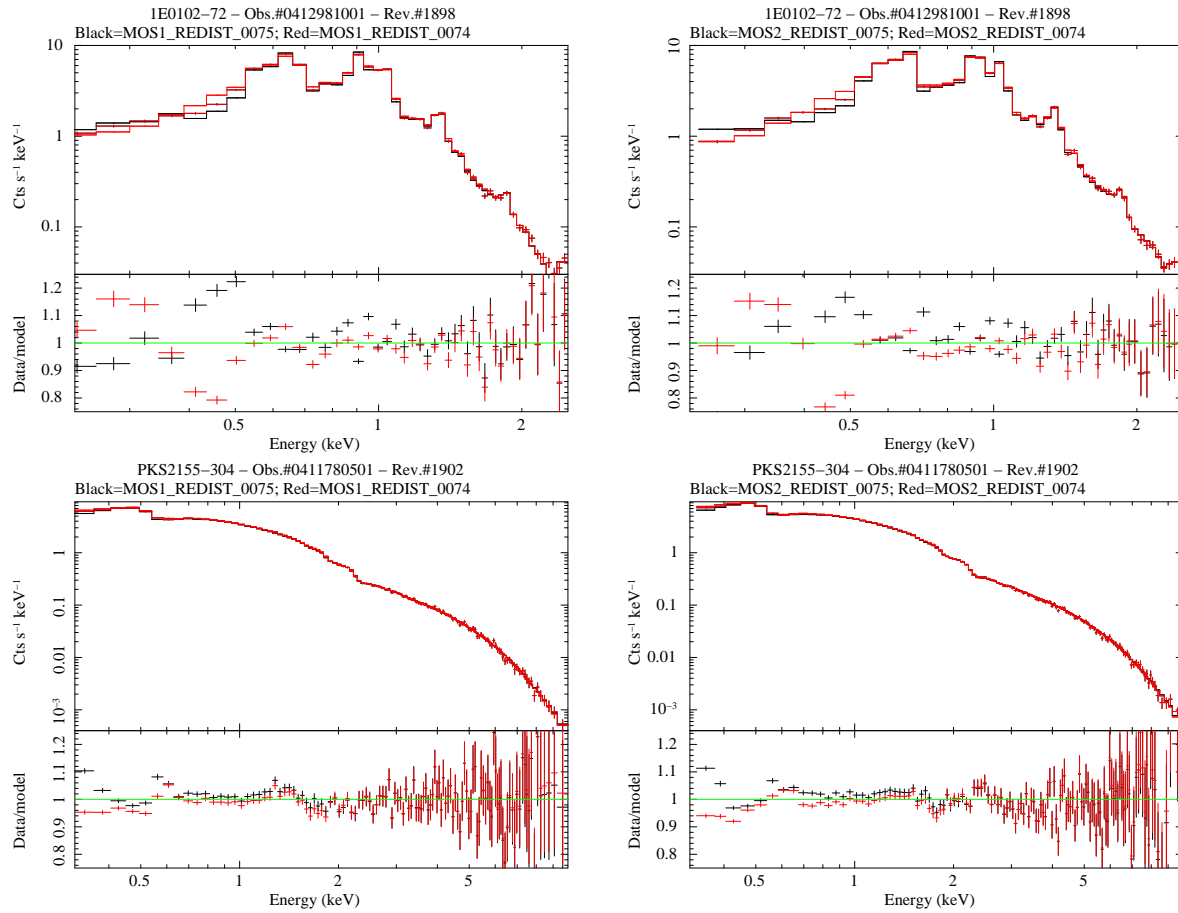
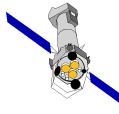
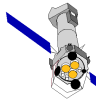


Figure 1: Spectra (*upper panels*) and residuals (*lower panels*) in units of data/model ratio when *the same model with the same parameters* is applied to the MOS1 (*left*) and MOS2 (*right*) spectra of 1E0102-72 (*top*) and PKS2155-304 (*bottom*).



from a circular region of  $40''$  around the X-ray centroid, after excising a  $1.5''$  PSF core due to marginal residual level of pile-up. background spectra were extracted from source-free regions on nearby chips. The PKS2155-304 spectra were analysed with a photoelectrically absorbed broken power-model.

In each panel of Fig. 1 we show (twice) the same spectrum (*upper panels*) and the residuals against *the same spectral model with the same parameters* but when redistribution matrices generated with different MOS redistribution CCF constituents are used. In all plots the *black curves* represent spectra and residuals obtained when the updated `EMOS1/2_REDIST_0075.CCF` is used; the *red curves* represent the residuals obtained when `EMOS1/2_REDIST_0042.CCF` is used, *i.e.* the redistribution CCF constituent wrongly picked-up by `cifbuild` instead of `EMOS1/2_REDIST_0074.CCF`. The difference is significant, due to the out-of-date calibration enshrined in `EMOS1/2_REDIST_0042.CCF`. In terms of data/model ratio against *the same spectral model with the same parameters*, the **relative difference** is  $\leq 5\%$  above  $\simeq 0.5$  keV, and can be as high as 10-20% at lower energy.

## 4 Estimated Scientific Quality

This update is meant to ensure that nominal spectral quality calibration accuracy is obtained for MOS spectra of sources after January 1, 2010.

Users are warmly recommended to update their CCF repository with `EMOS1/2_REDIST_0075.CCF`, regenerate their Calibration Index Files (CIF) via `cifbuild`, and then the MOS redistribution matrix via `rmfgen`.

This error does not affect the “canned” MOS redistribution matrices available from the XMM-Newton SOC calibration portal:

[http://xmm2.esac.esa.int/external/xmm\\_sw\\_cal/calib/epic\\_files.shtml](http://xmm2.esac.esa.int/external/xmm_sw_cal/calib/epic_files.shtml).

## 5 Test procedures and results

CIFs were generated via `cifbuild` using `EMOS1/2_REDIST_0075.CCF` for several XMM-Newton observations performed after January 1, 2010. In all cases, the CIF points to the latest MOS redistribution CCF constituents, as expected.

## 6 References

Plucinsky P., et al., 2008, SPIE, 7011, 68