

# XMM-Newton CCF Release Note

XMM-CCF-REL-170

## MOS Filter Transmission

M.J.S. Smith

June 14, 2004

### 1 CCF components

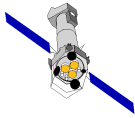
Name of CCF	VALDATE	EVALDATE	Blocks Changed	CAL Version	XSCS Flag
EMOS1_ FILTERTRANSX_0012	1998-01-01T00:00:00	–	FILTER-THIN1, -THIN2, -MEDIUM, -THICK, -OPEN, EBINS		NO
EMOS2_ FILTERTRANSX_0012	1998-01-01T00:00:00	–	FILTER-THIN1, -THIN2, -MEDIUM, -THICK, -OPEN, EBINS		NO

### 2 Changes

These CCFs basically combine the Thin and Medium filter transmissions of issue 0010 with the Thick filter transmission of issue 0011.

Although the detailed history of the CCF filter transmission changes may be found in their respective release notes, some relevant recent changes are summarised here.

Issue 0011 was a slightly modified re-release of an earlier issue (0006) which resulted in a significantly improved cross filter consistency with respect to issue 0010. This improvement was almost wholly due to the changes in the Thick filter transmission data (which, in issue 0011, reverted to the BESY ground calibration data). Issue 0011 also resulted in slightly changed Thin and Medium filter transmissions and the energy binning as compared to issue 0010.



However, it is assumed that the Thin and Medium filters are identical for each of the EPIC instruments. Therefore, in this new issue 0012, the MOS Thin and Medium filter transmission values are brought back into line with the respectively identical PN Thin and Medium filter transmissions of EPN\_FILTERTRANSX\_0013.CCF by using the issue 0010 values.

The MOS Thick filter transmission data of issue 0011 do however provide the most consistent results between filters (as described in its release note), and are therefore maintained. Owing to the required common energy bin structure, the Thick filter transmission values of issue 0012 were obtained by linearly interpolating the generally sparser issue 0011 Thick filter data to fit Thin and Medium filter energy binning. See Figures 1 and 2 for comparisons of old and new transmission values.

### 3 Scientific Impact of this Update

The results of an analysis of a PKS2155-304 observation (obsid 0124930301) in which the MOS2 was observing with Medium filter and the MOS1 was cycled through filters is presented in Figure 3. These plots show the data to model ratios of the simultaneous best fits for the various combinations of data sets. Use of the new CCF results in a slightly better cross filter consistency for the Medium versus Thick filters which is evidenced by the tighter data to model ratio below 0.35 keV, whereas the two other filter combinations (Medium-Thin and Medium-Medium) show no significant difference with respect to the previous CCF issue.

Owing to the slightly higher transmission in the  $\sim 0.8$ – $1.0$  keV band for the Medium and especially the Thin filter one may expect a corresponding increase in flux of a few percent.

### 4 Estimated Scientific Quality

The filter transmission values for MOS1, MOS2 and PN (Thin and Medium) are currently the same, although the filters are not identical. Moreover, the spatial variations around the C edge of the Thick filter is not handled in the CCF.

### 5 Expected Updates

As more calibration data is analysed there may be improvements in the transmission curves. Spatial region expressions may be introduced to handle the spatial variation of the Thick filter transmission in particular.

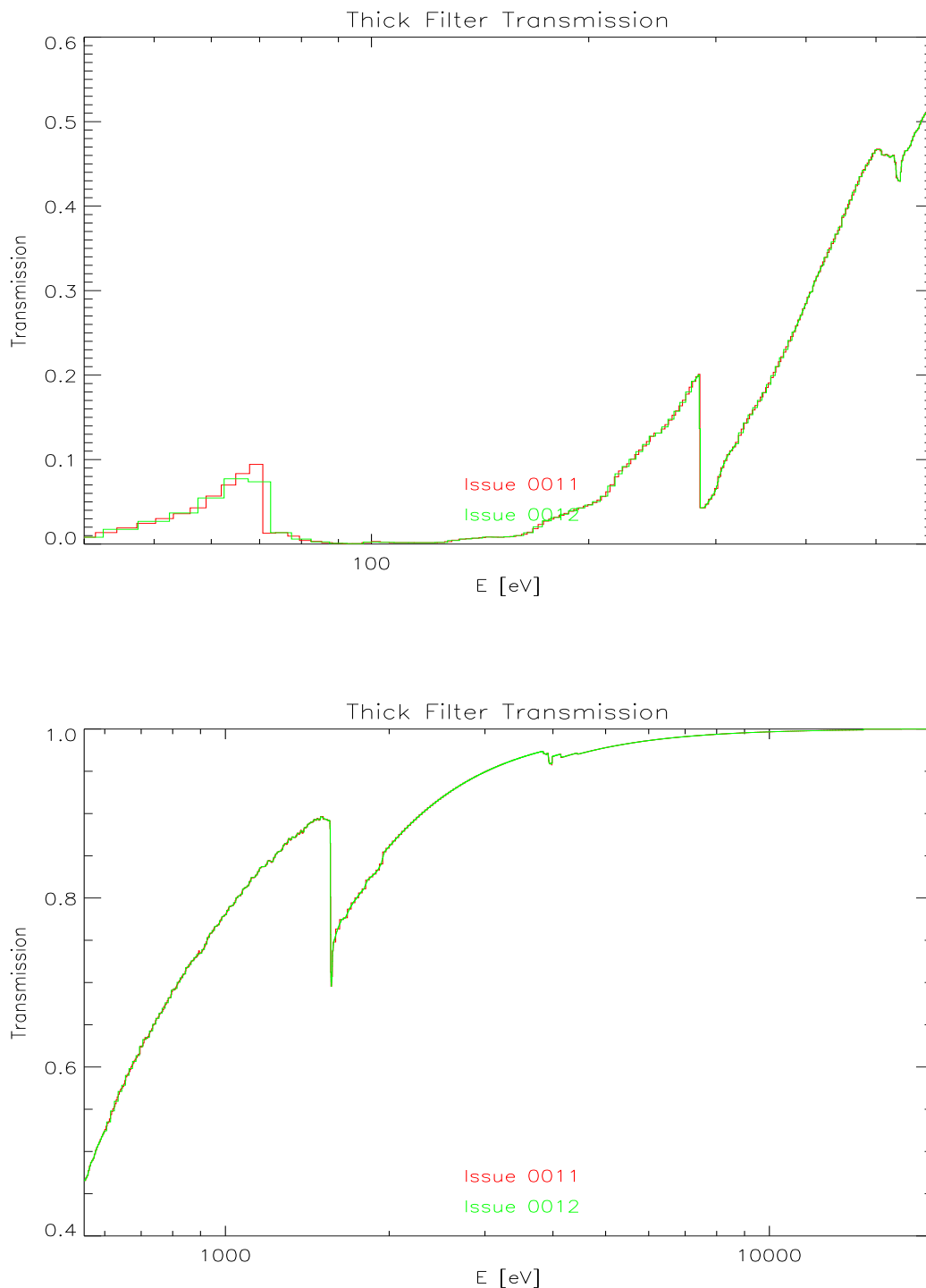
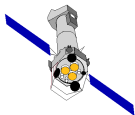


Figure 1: Comparison of the MOS Thick filter transmissions of the previous (red) and new (green) CCF issues, in the bands 0.04 – 0.6 keV (top) and 0.6 – 20 keV (bottom). The new values are derived from the previous values interpolated to fit the generally finer energy binning. The resulting differences are very small, especially above 100 eV where the transmission values are practically identical.

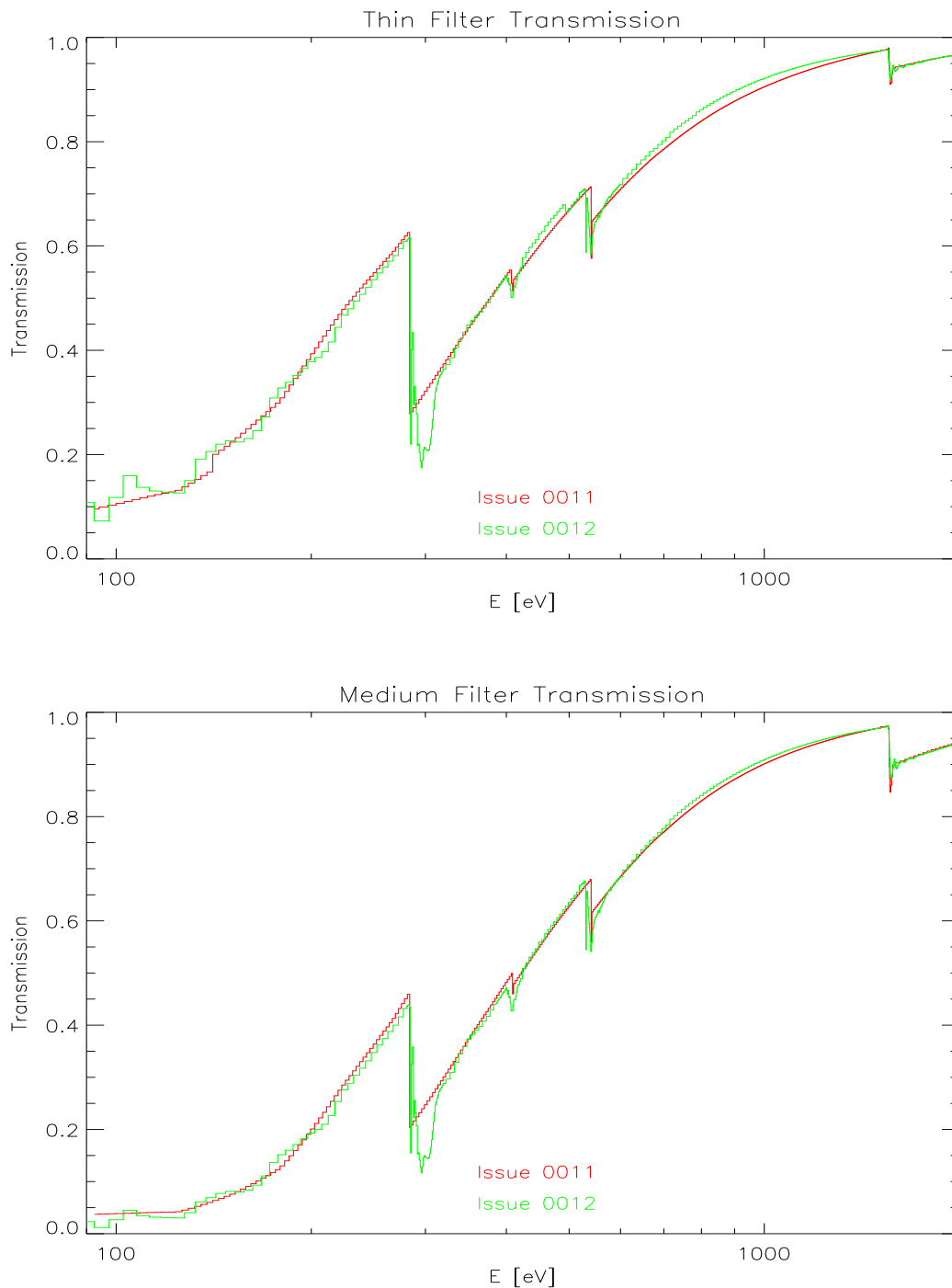
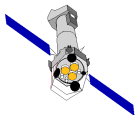


Figure 2: Comparison of the MOS Thin (top) and Medium (bottom) filter transmissions of the previous (red) and new (green) CCF issues. The differences in transmission are mainly at the C-edge and at  $\sim 0.8\text{--}1.0$  keV (where the transmission is approximately up to 3% higher the new CCF issue). The differences between the issue 0011 and issue 0012 transmissions at the C-edge are the same as those between the issues 0006 and 0010 and are described in XMM-CCF-REL-47; they are mainly due to the original model (based on Orsay ground calibration combined with the Henke coefficients) being modified by an edge structure extracted from ACIS blocking filter measurements.

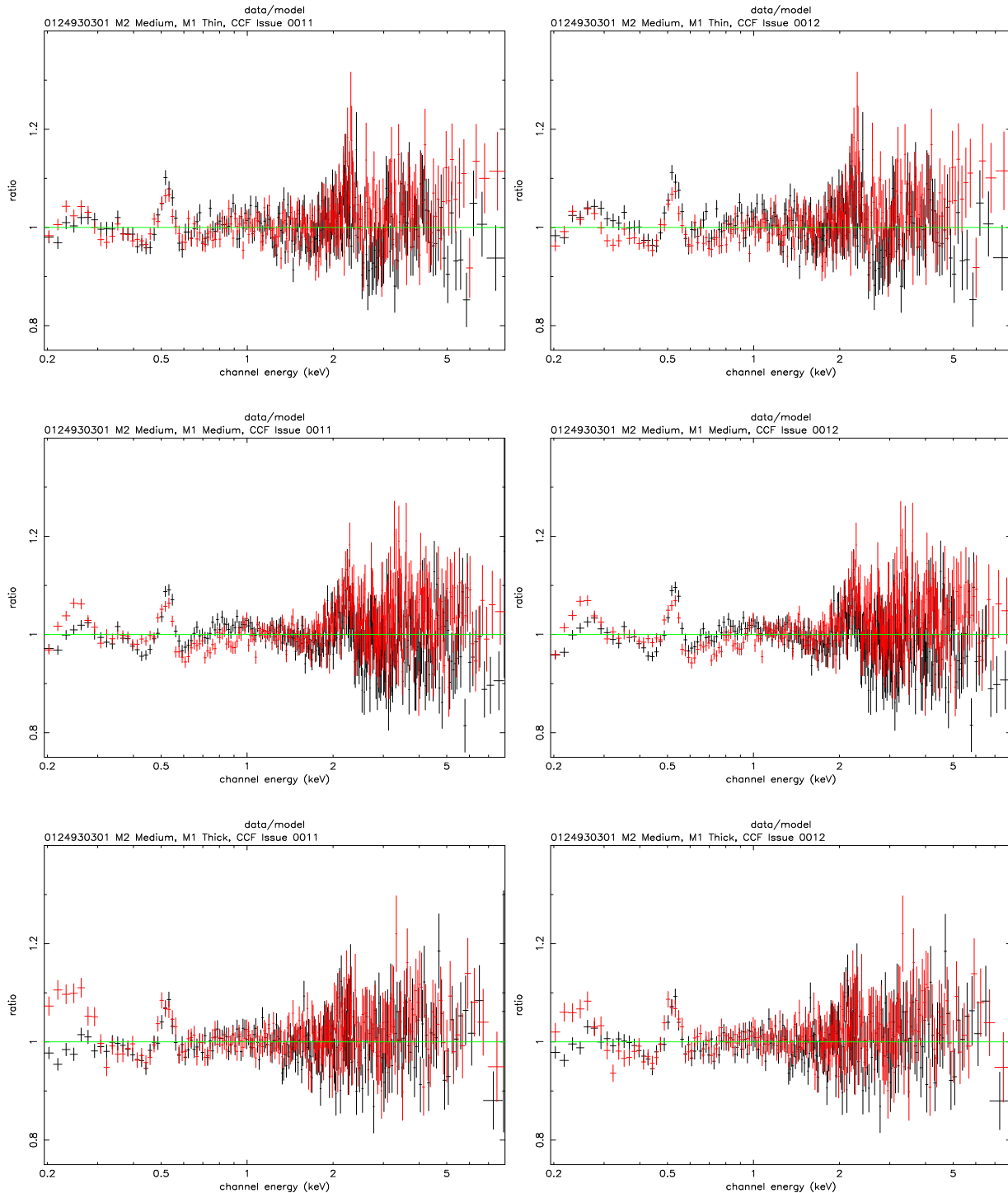
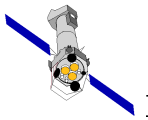
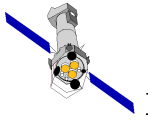


Figure 3: Comparison of data to model ratio of simultaneous observations of PKS 2155-304. At left the results for the previous CCF issue, at right those for the the new issue. Black: MOS2 Medium filter, Red: MOS1 Thin (top), Medium (middle) and Thick (bottom). The ratios were obtained from the respective best simultaneous fits to absorbed broken powerlaw models.



## 6 Test procedures

Functional testing with *calview* and *arfgen*. Comparison with previous transmission values using *calview*.

## 7 Summary of the test results

See Section 3