XMM-Newton CCF Release Note

XMM-CCF-REL-47

EPIC Filter Transmission

D Lumb

November 16, 2000

1 CCF components

Name of CCF	VALDATE	List of Blocks changed	CAL VERSION	XSCS flag
EMOS1_FILTRANSX_0007	2000_01_01T00:00:00	FILTER-THICK, THIN ,MEDIUM, EBINS		NO
EMOS2_FILTRANSX_0007	2000_01_01T00:00:00	FILTER-THICK ,THIN ,MEDIUM, EBINS		NO
EPN_FILTRANSX_0010	2000_01_01T00:00:00	FILTER-THICK ,THIN ,MEDIUM, EBINS		NO

2 Changes

2.1 THICK Filter

The previously submitted data set was determined to have come from the flight spare PN thick filter. The Flight Model unit data sets measured at HASY laboratory have been identified, and these used to populate the CCF. The tranmission is somewhat lower than for the previous set.

However the HASY data have an incorrect Al K absorption edge energy, and the apparent EXAFS structure in transmission does not match well that seen at BESY and with other filters. Therefore I splice in the BESY data for the Flight Spare (suitably scaled) close the the 1550eV absorption features.

Furthermore there were no HASY data for higher energies, whilst there ARE data for the

Sn absorption feature around 4keV from the BESY measurements. Hence, taking a model for the polypropylene/Sn/Al layers that best matches the HASY data, we extrapolate to energies $\geq$2keV,and scale the BESY data to that

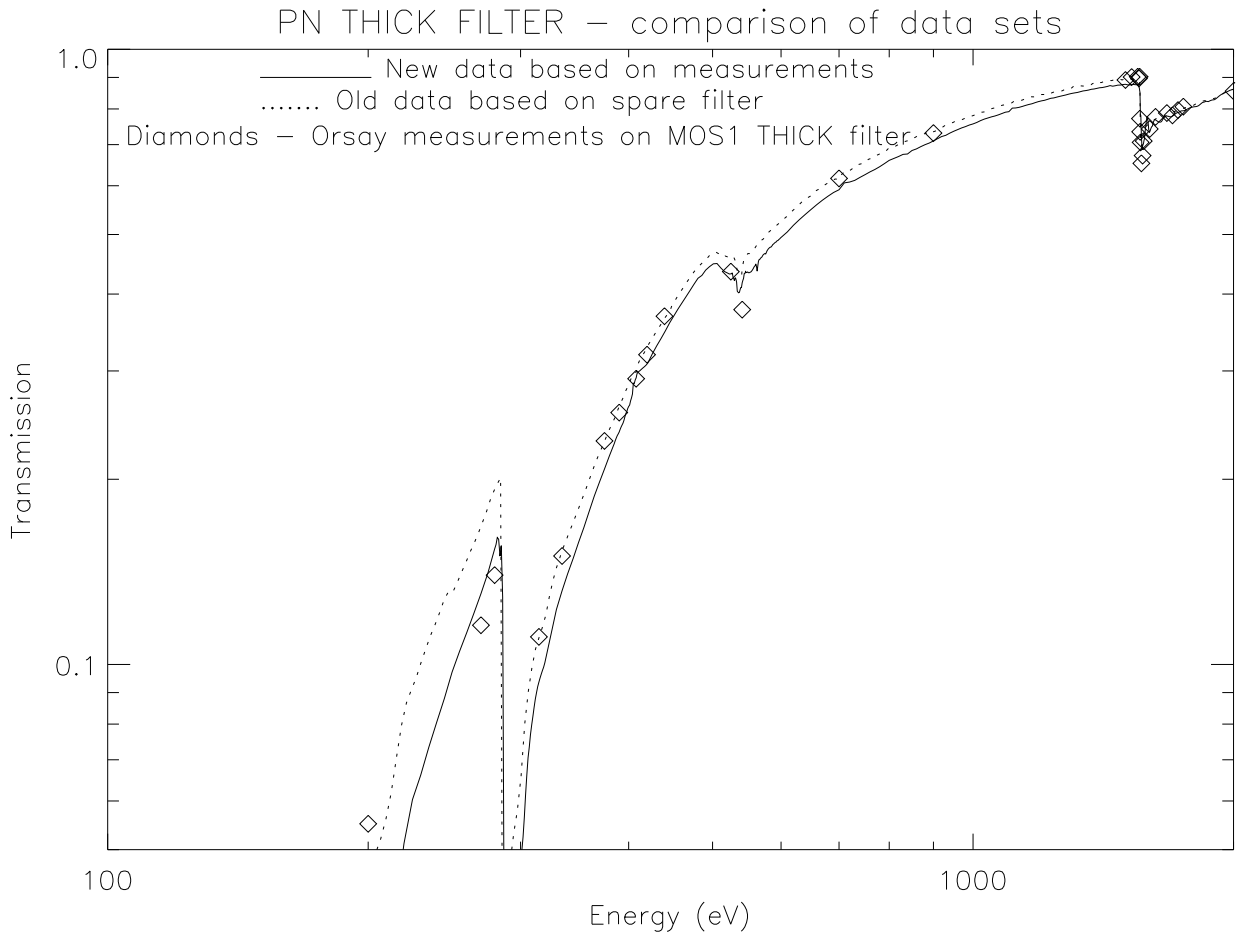

Figure 1:

2.2 MEDIUM and THICK Filters

EPIC measurements for the MEDIUM and THICK filters were made at Orsay synchrotron for a limited set of energies. In addition the manufacturer (MOXTEK) has estimates of the polyimide and Aluminium thicknesses based on point measurements, which indicate very close matched data for all filters. A model based on the Henke coefficients has been taken and reconciled with the few Orsay data points. In order to provide a better match at the critical absorption edges, however, the inferred attenuation coefficients were extracted from the measurements made on the similar ACIS blocking filters, and an edge structure spliced into the EPIC data sets.

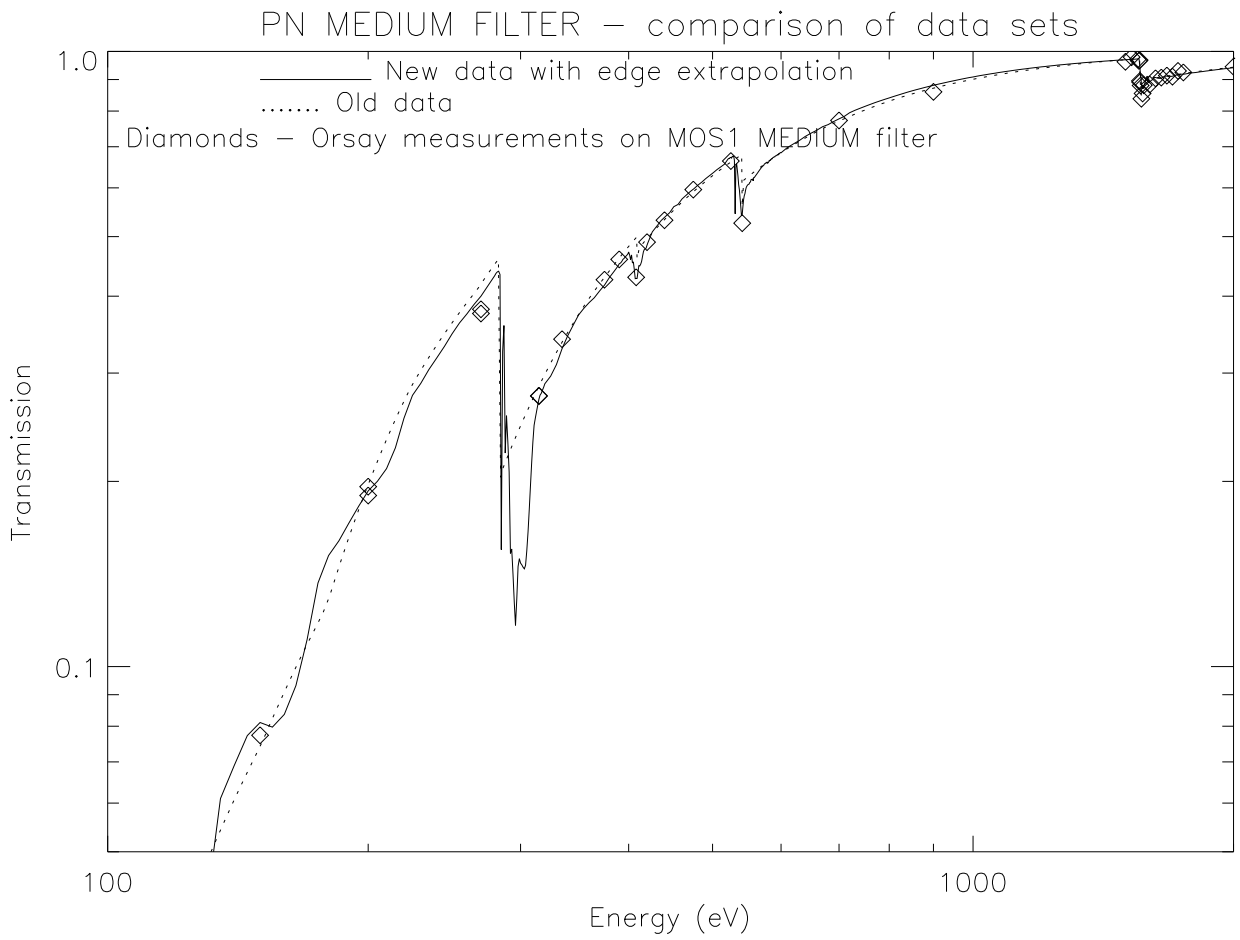

Figure 2:

2.3 Energy points

The format of the filter files requires a common energy bin structure, so the above data sets were then interpolated with a Hermite polynomial technique.

3 Scientific Impact of this Update

Better low energy spectral fitting should result. However we note that some of the mirror and CCD efficiency data has already been inferred with in-flight measurements, *ASSUMING* previous filter transmission data. Therefore some re-iteration on all 3 data sets will be necssary.

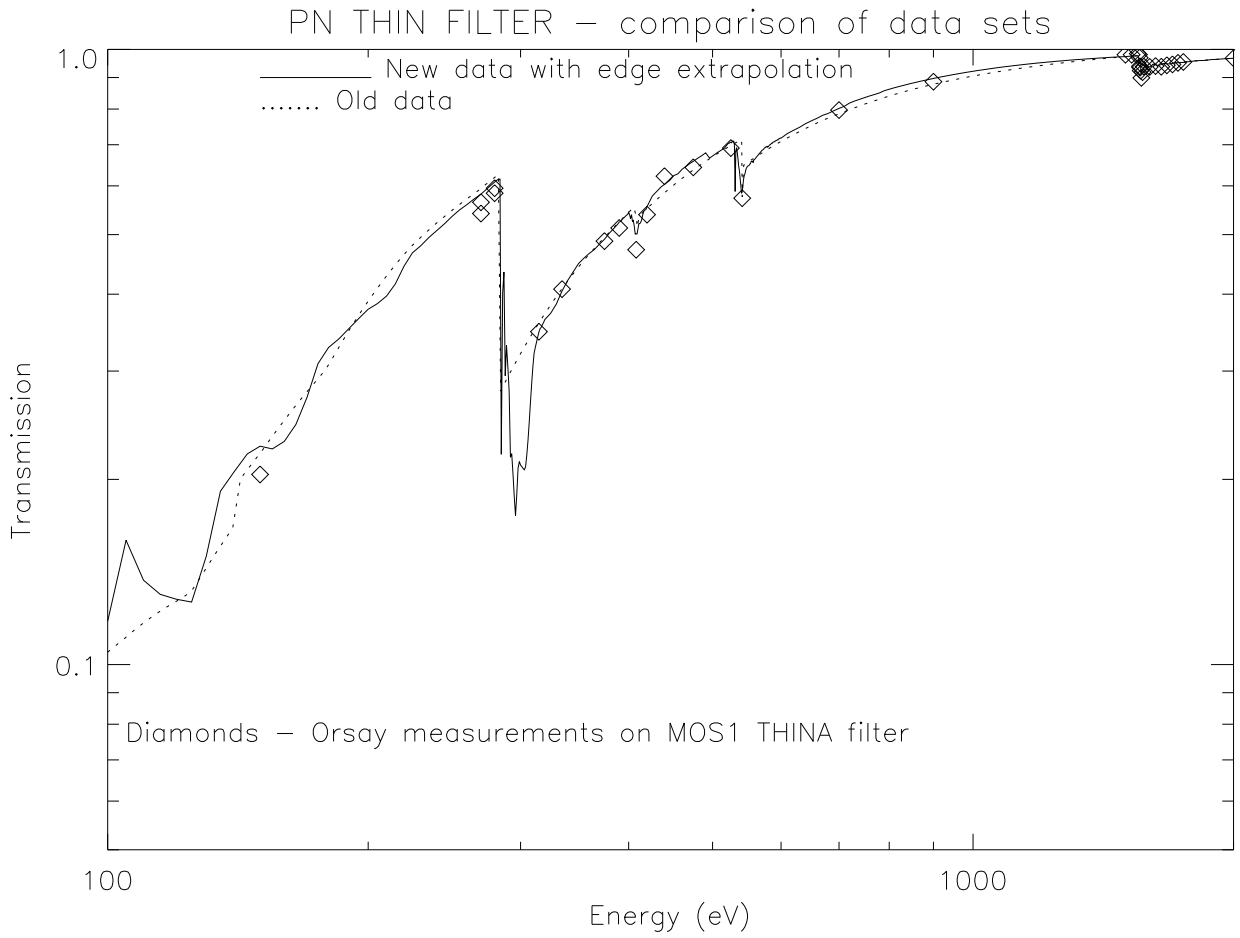

Figure 3:

4 Estimated Scientific Quality

We are still lacking the knowledge of which THICK filter was flown on the MOS cameras and given these filters varied significantly there could be 10% (energy dependent) discrepancies for the MOS THICK filters.

There are known spatial variations around the C edge of THICK filter, and that not all filters are identical. These features will have to be updated, and a spatial dependence in the TELCO-ORD co-ordinate system established, with suitable defocusing accounted for. The figures compare measurements with the previous CCF contents, and the new data sets.

5 Expected Updates

- Revised data when improved in-orbit filter measurements are made (RXJ0720 for exasmple)

- Spatial variation of THICK filter transmission
- Revised MOS THICK filter data when the piece numbers are identified.