

# XMM-Newton CCF Release Note

XMM-CCF-REL-402

## EPIC MOS Fixed Offset Tables

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### 1 CCF Components

Name of CCF	VALDATE	EVALDATE	Blocks Changed	XSCS Flag
EMOS1_DARKFRAME_0038.CCF	2023-08-08T07:52:54		OFFSET_CCD1 OFFSET_CCD4	NO
EMOS2_DARKFRAME_0034.CCF	2023-08-08T07:52:54		OFFSET_CCD1 OFFSET_CCD2 OFFSET_CCD3 OFFSET_CCD5 OFFSET_CCD6	NO

### 2 Changes

The OFFSET blocks in the DARKFRAME CCFs reflect the on-board MOS fixed offset tables. Periodically, the MOS offset table values are adjusted in order to bring them in line with the respective CCD background maps.

The MOS background maps are obtained from regularly performed CalClosed observations, and are derived from the mean ENERGYE4 values in the 5x5 pixel island surrounding mono and bi-pixel events. Per CCD, the median background values are then computed. Over the course of the mission, a long-term tendency to decreasing background values is seen, with differing trends per CCD (see Fig. 1). The column offset values of the MOS on-board offset tables are regularly adjusted (in integer ADU) to obtain background values close to zero.

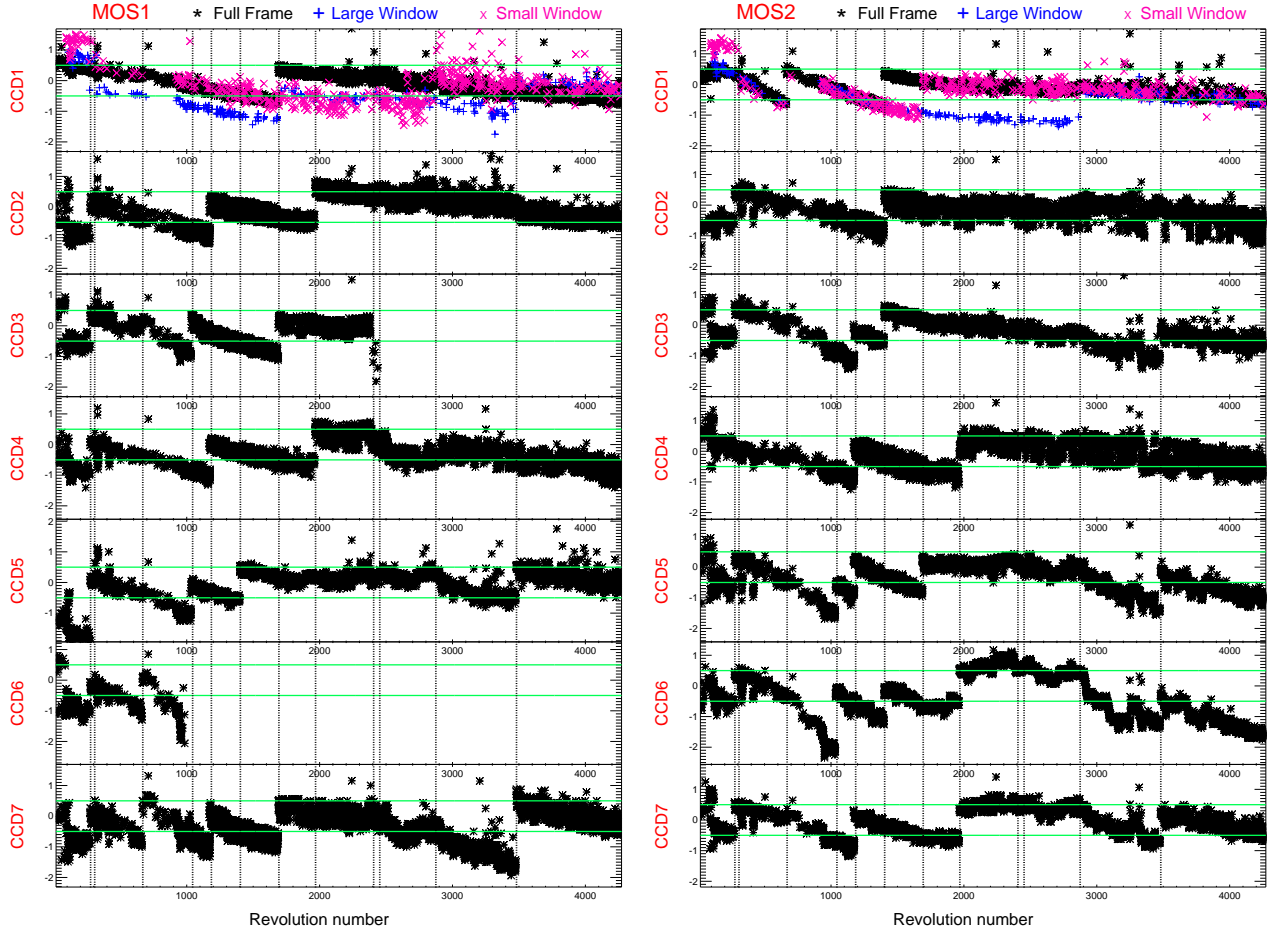


Figure 1: Per-CCD median MOS background values (in ADC) versus revolution number. MOS1 and MOS2 CCDs are shown in the left and right panels, respectively. CCDs are shown top to bottom. CCD1 values are coded according to read-out mode as per the legend. The horizontal green lines denote the  $\pm 0.5$  ADU range around 0. Vertical lines denote revolutions associated with changes to the on-board offset tables.

In this update, the on-board column offsets were changed as follows:

MOS	CCD	Mode	Offset Change (ADU)
1	1	FF	-1
1	4	FF	-1
2	1	FF	-1
2	2	FF	-1
2	3	FF	-1
2	5	FF	-2
2	6	FF	-1

This set of CCFs reflects these modifications to the uploaded MOS fixed offset tables, which were implemented as of revolution 4334.

### 3 Scientific Impact and Estimated Quality

The changes made to the overall offset level will restore the fixed offsets to measured CCD offsets. Too high offsets would result in the loss of events (or partial event charge) below threshold, whereas too low offsets would increase noise above threshold, potentially creating false events or adding charge to real events.

Note that the values in the OFFSET extensions of the DARKFRAME CCFs are not used to determine the E1 event energies; this is already done on board in the EDU. The main reason for reflecting the on-board offset values in the DARKFRAME CCFs is correctly to determine the reconstructed event energies, for which knowledge of the contemporaneous on-board offsets is required.

### 4 Expected Updates

The CCD background levels continue to develop over time and will need to be compensated through changes of the fixed offsets. These changes will be reflected in future updates of the OFFSET extensions of the DARKFRAME CCFs.

### 5 Test Procedures and Results

Correct functionality tested with `cifbuild` and `emproc` (SAS version 21). Reducing data with mismatched uploaded fixed offsets and DARKFRAME CCF issue may result in SAS warnings

**\*\* emevents: (spGatti11), reconstructed energy larger than 4095.**

As expected, use of the CCFs in this release result in correct reconstructed energies and no such warnings are issued.