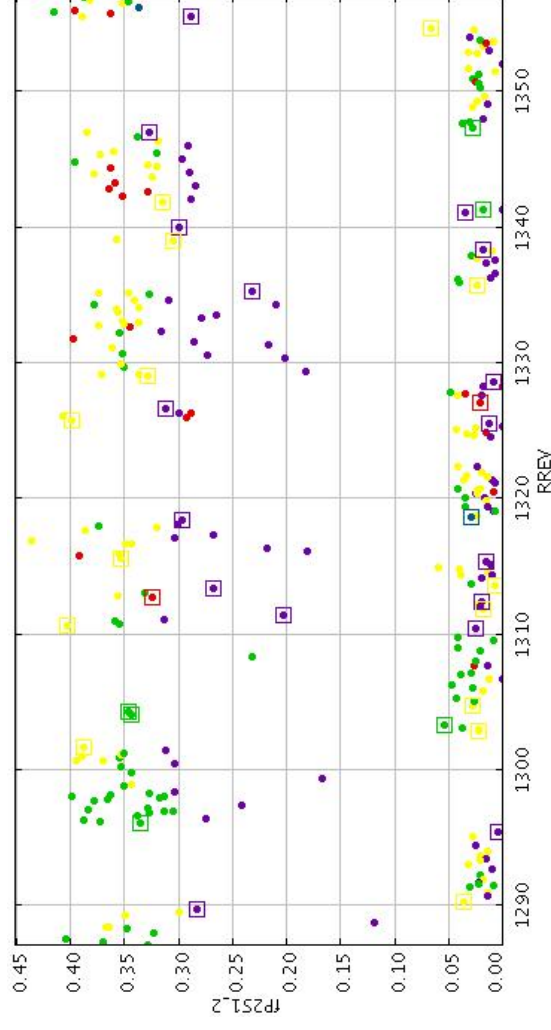
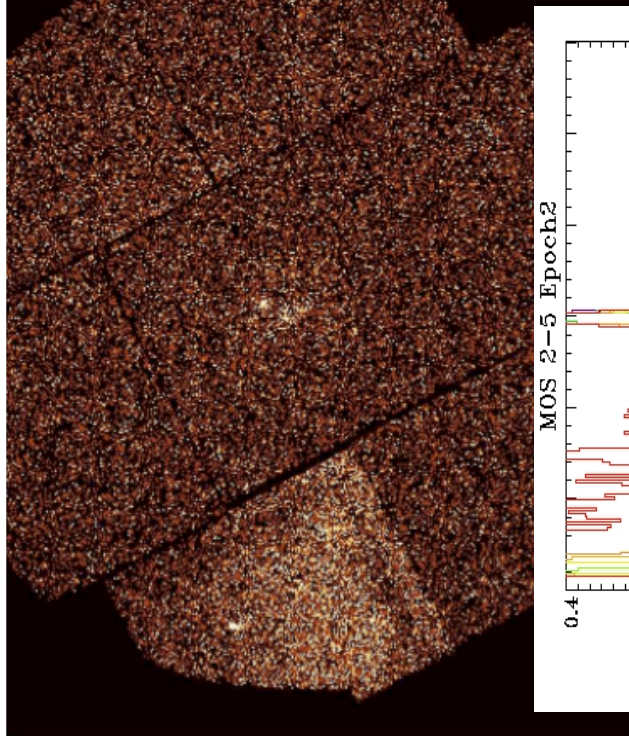


MOS CCD Noise

- Low energy plateau (<1keV)
- Multiple CCDs, both MOS, notable M1C4, M2C5
- Varying intensities
- No on/off within an observation
- No correlation with any HK
- Excess of patterns 2 & 4
- ‘Switchpoints’ between noise states occur predominantly at times of high radiation
- All tests to ‘switch’ CCD noise state (sequencer restarts, high-radiation) failed
- Technical Note written



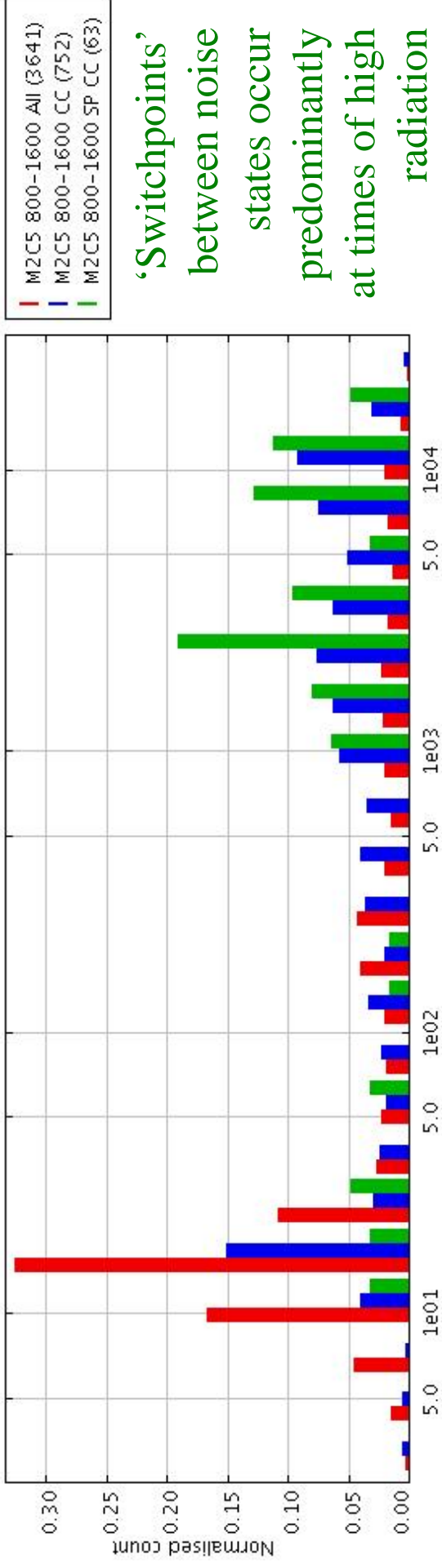
XMM-Newton Technical Note

XMM-CCF-TN-000

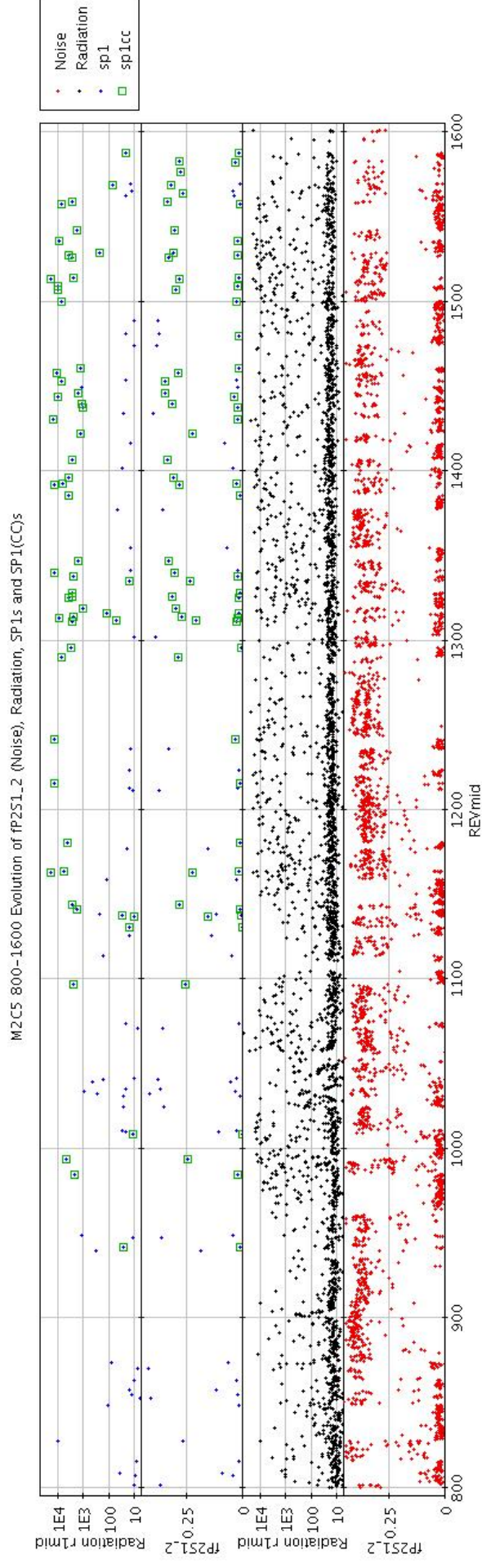
The EPIC-MOS Low-Energy CCD Noise – What are its characteristics and when does it occur?

A.M. Read (EPIC, Leicester University, UK)

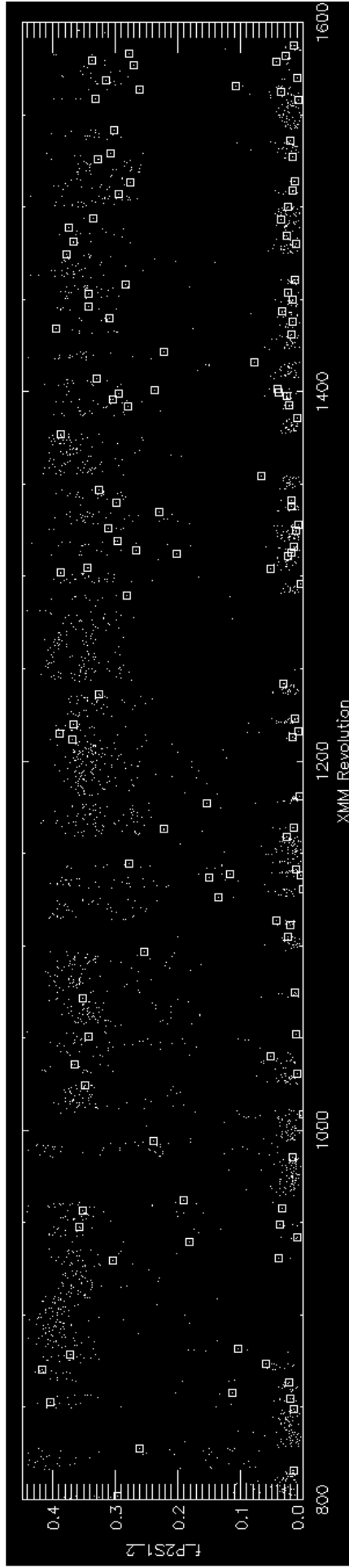
MOS CCD Noise



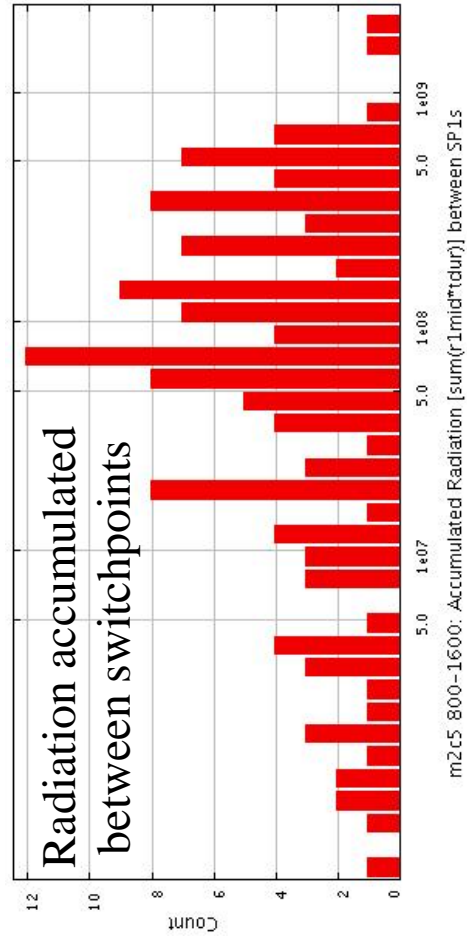
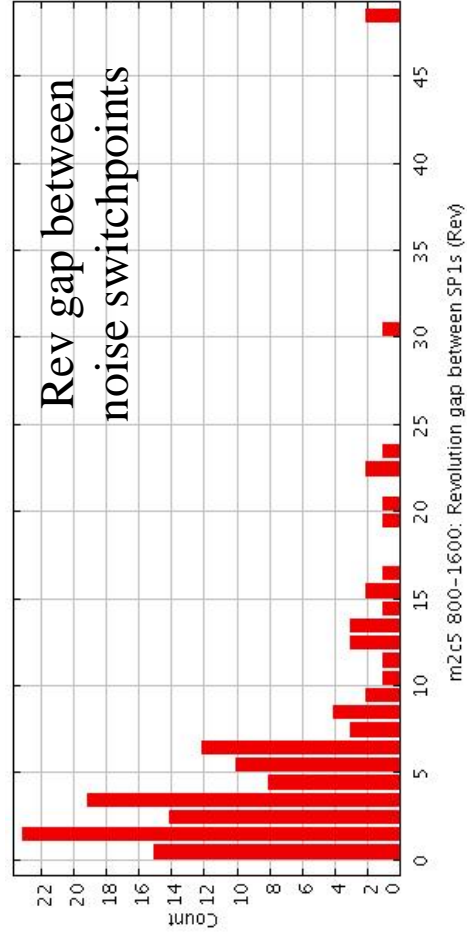
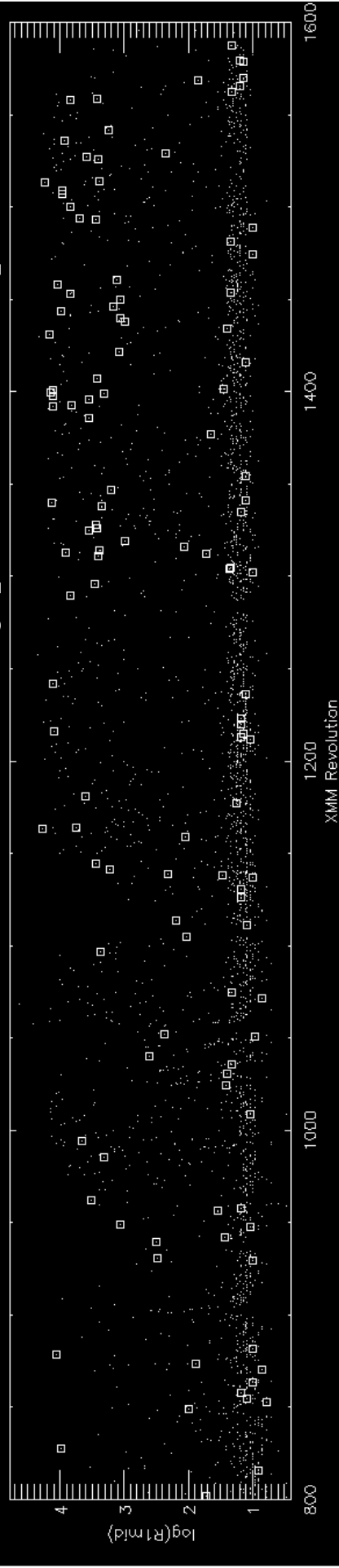
‘Switchpoints’
 between noise
 states occur
 predominantly
 at times of high
 radiation



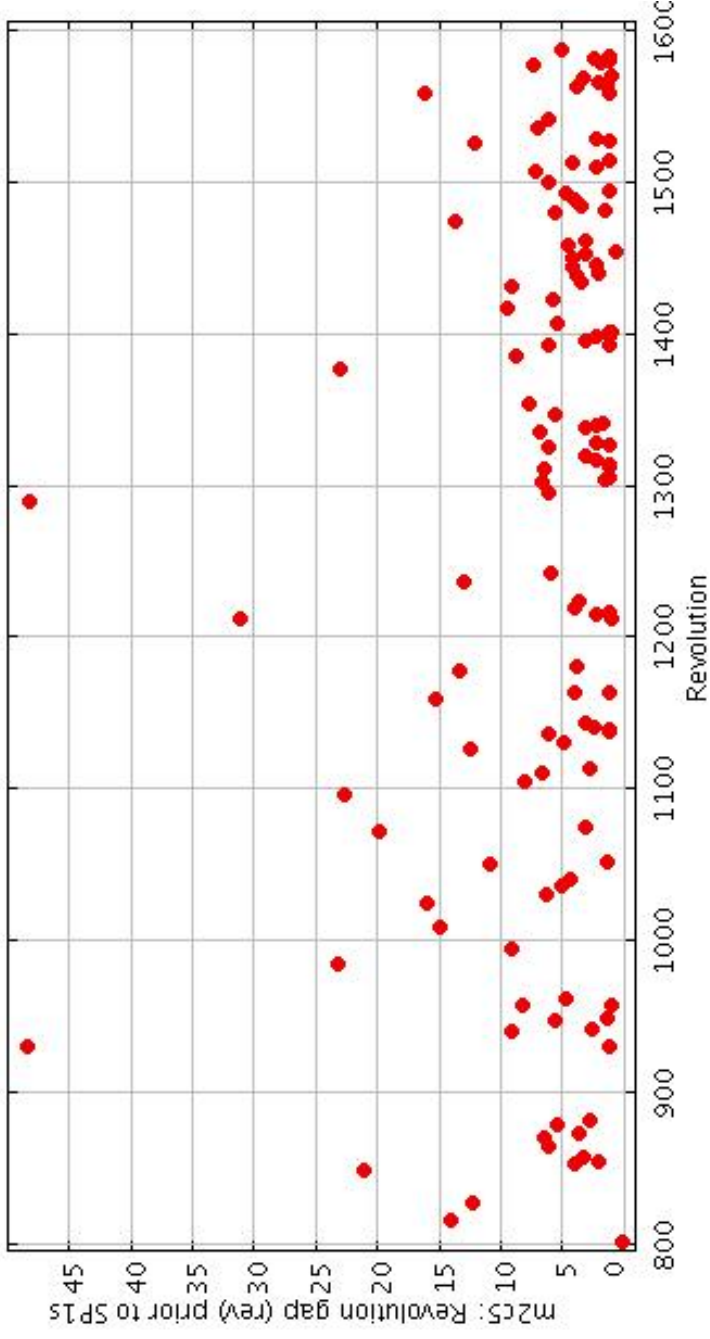
Why only particular times of high-radiation? Why the long gaps?



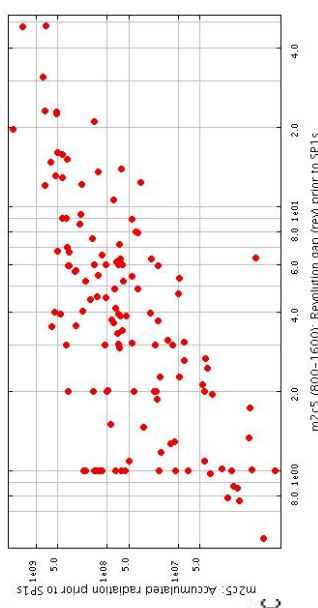
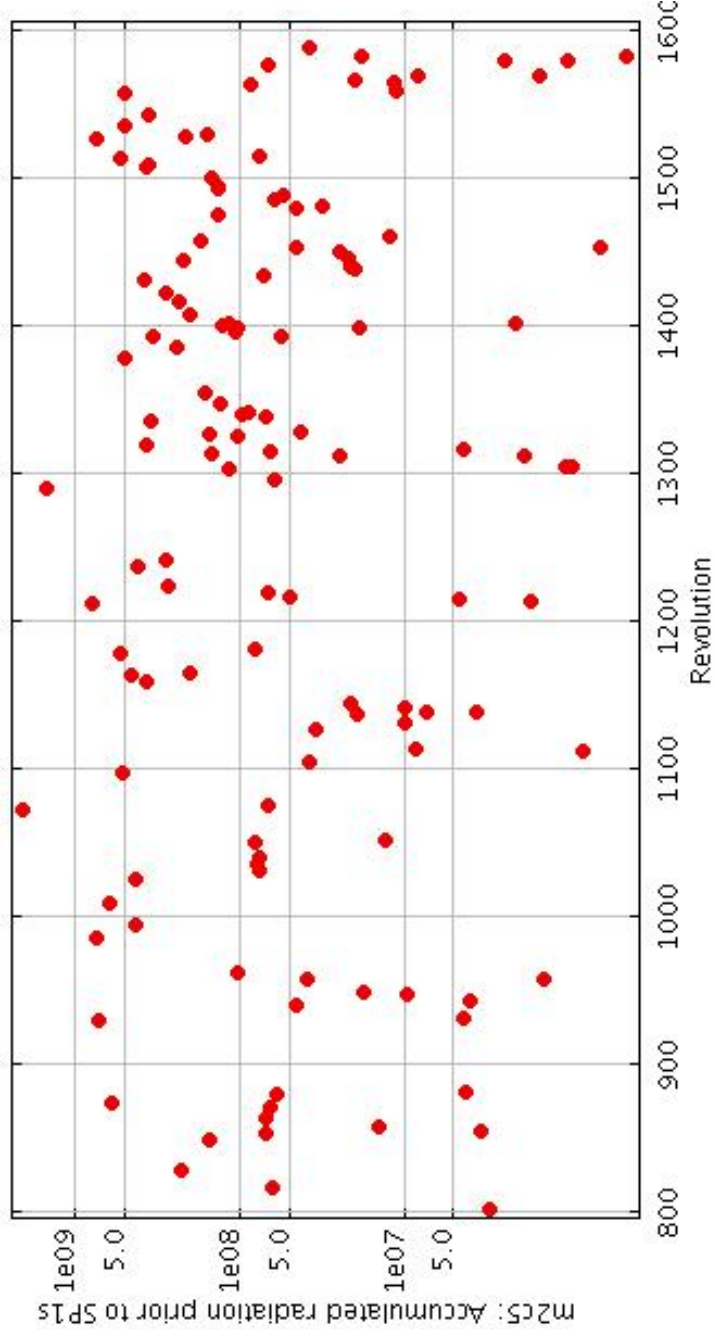
Look at accumulated radiation dose in the gaps between switchpoints



Evolution of Rev gap between SP1s



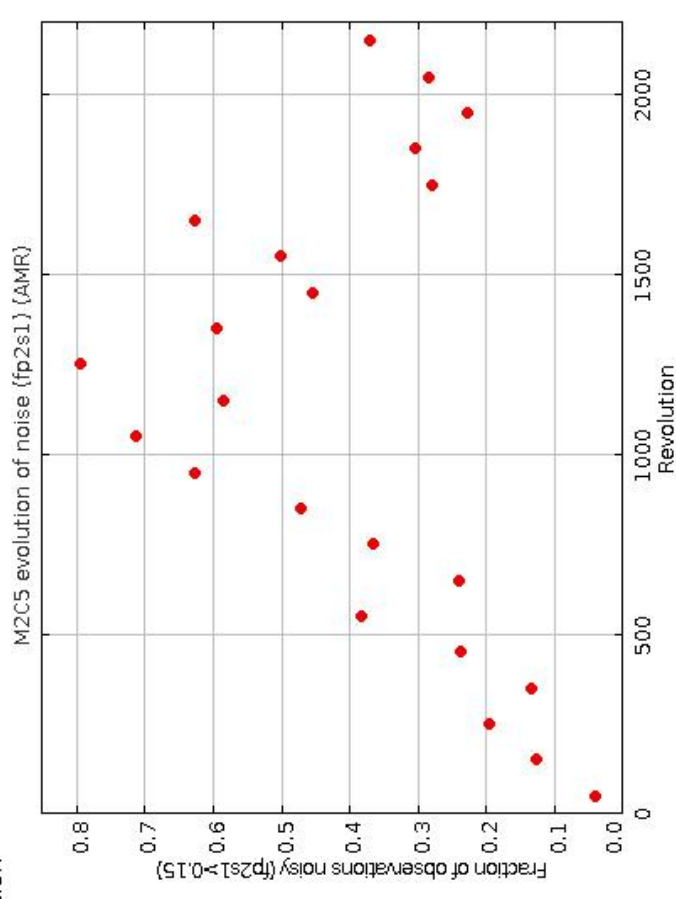
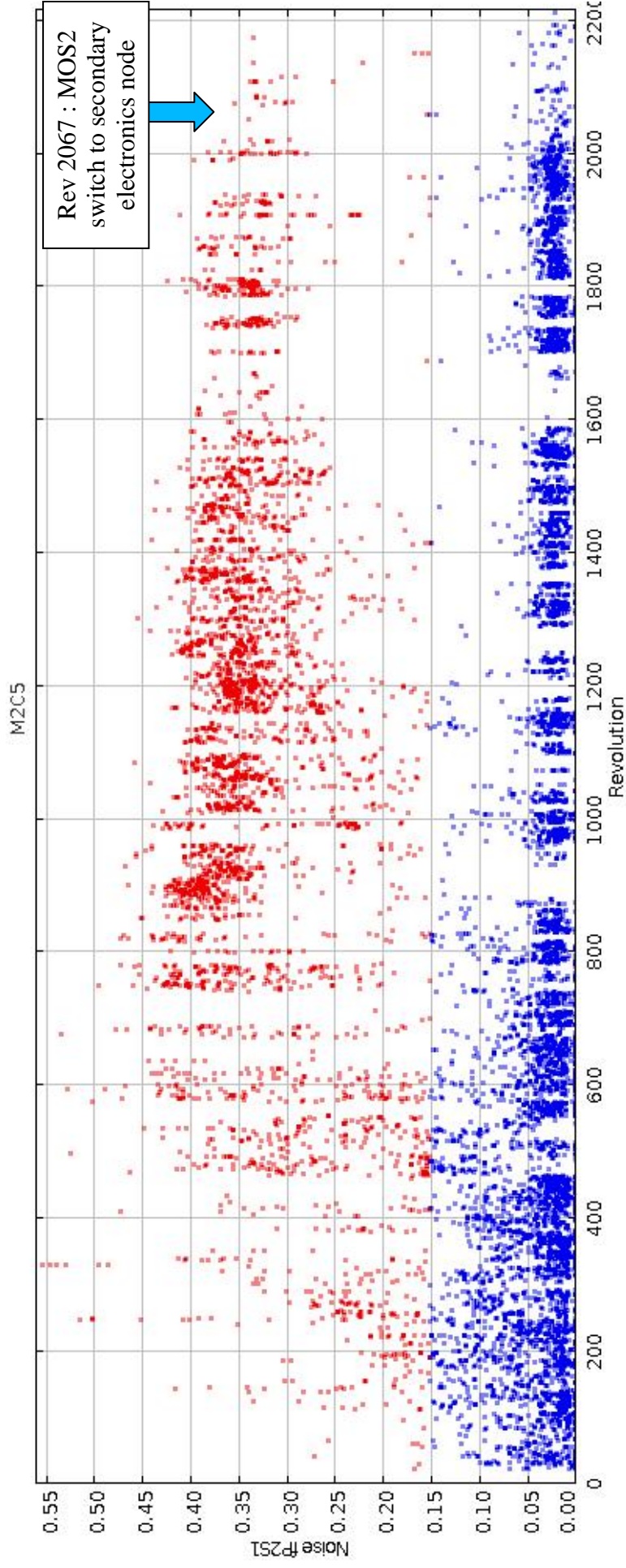
Evolution of accumulated radiation between SP1s



MOS CCD Noise

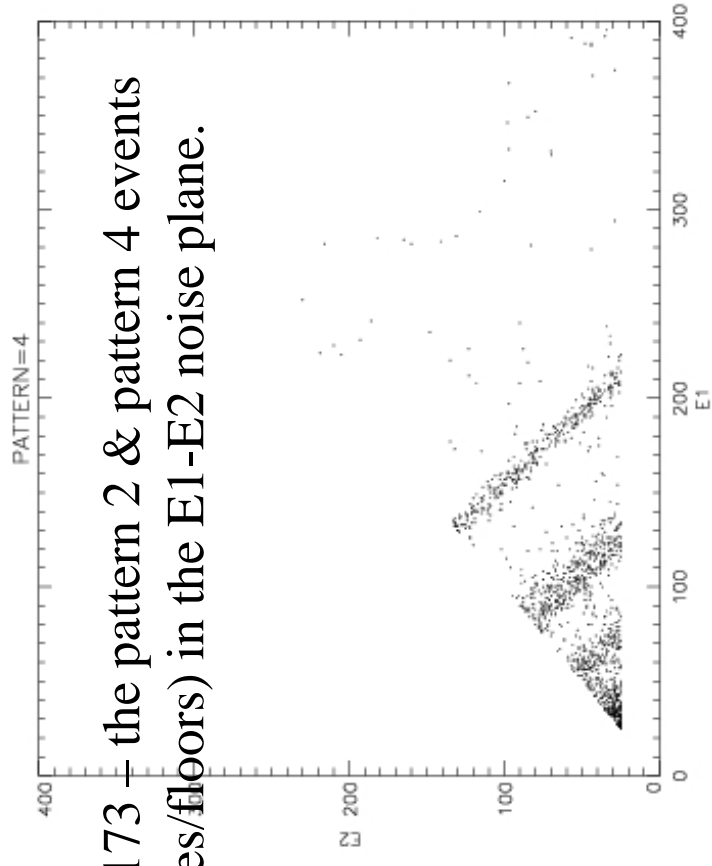
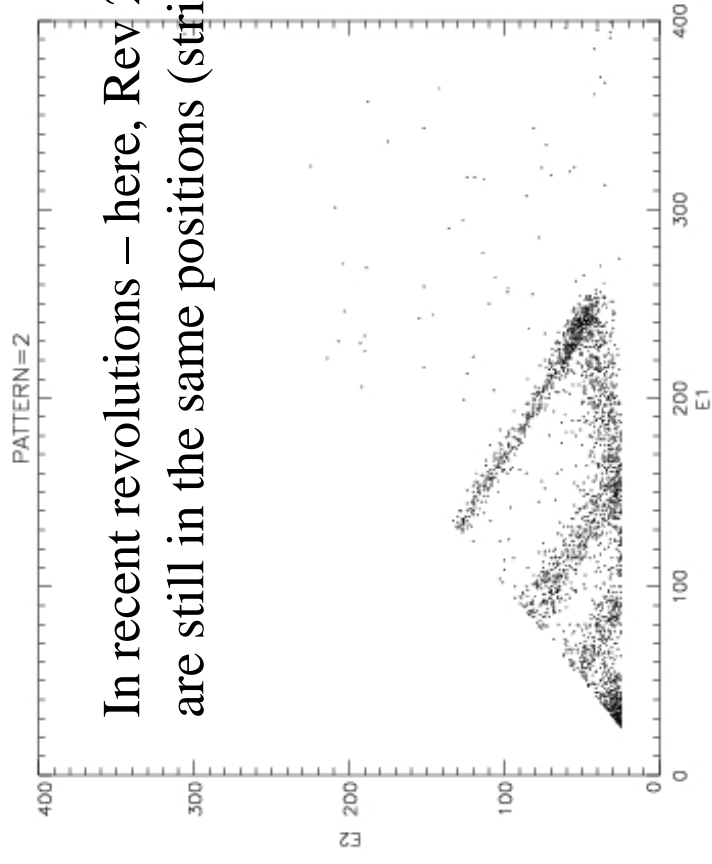
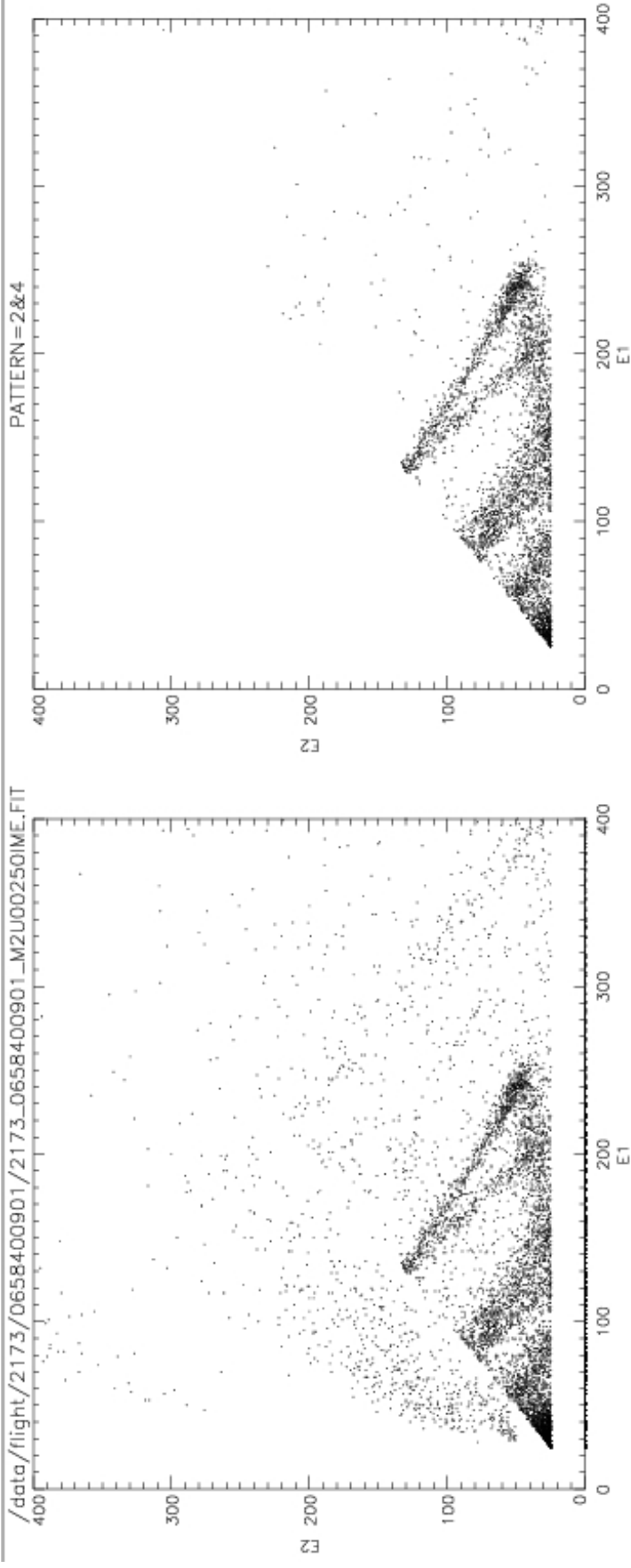
Running SAS task emtaglenoise on entire archive :

	MOS1	MOS2
Archive (SAS 11)	8576	8455
(successful)	8084 (94%)	8066 (95%)
CCD 2	0.0 %	9.2 %
CCD 3	0.0 %	0.0 %
CCD 4	29.8 %	0.0 %
CCD 5	0.9 %	14.3 %
CCD 6	0.0 %	0.0 %
CCD 7	0.0 %	0.0 %



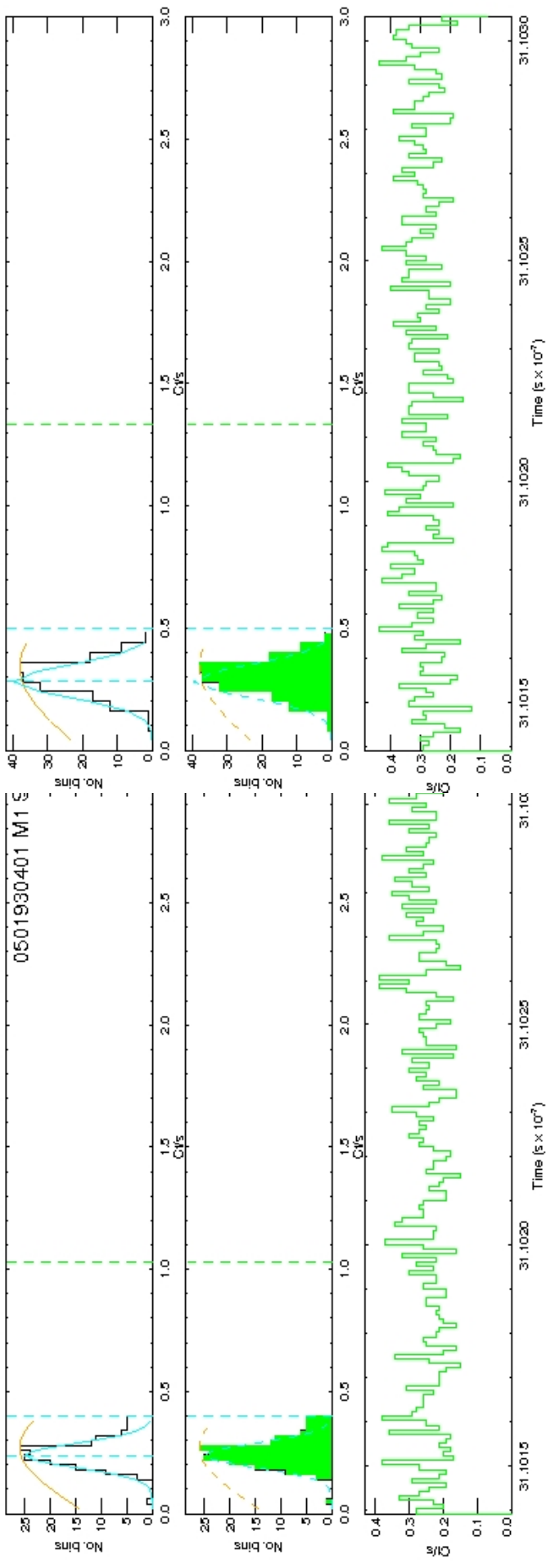
- MOS2 CCD5 still showing noisy/clean states, even after switch to secondary electronics mode
- But, this particular chip appears to be improving (noisy less often) – other chips different

/data/flight/2173/0658400901/2173_0658400901_M2U00250IME.FIT



In recent revolutions – here, Rev 2173 – the pattern 2 & pattern 4 events are still in the same positions (stripes/floors) in the E1-E2 noise plane.

Unusual BG features

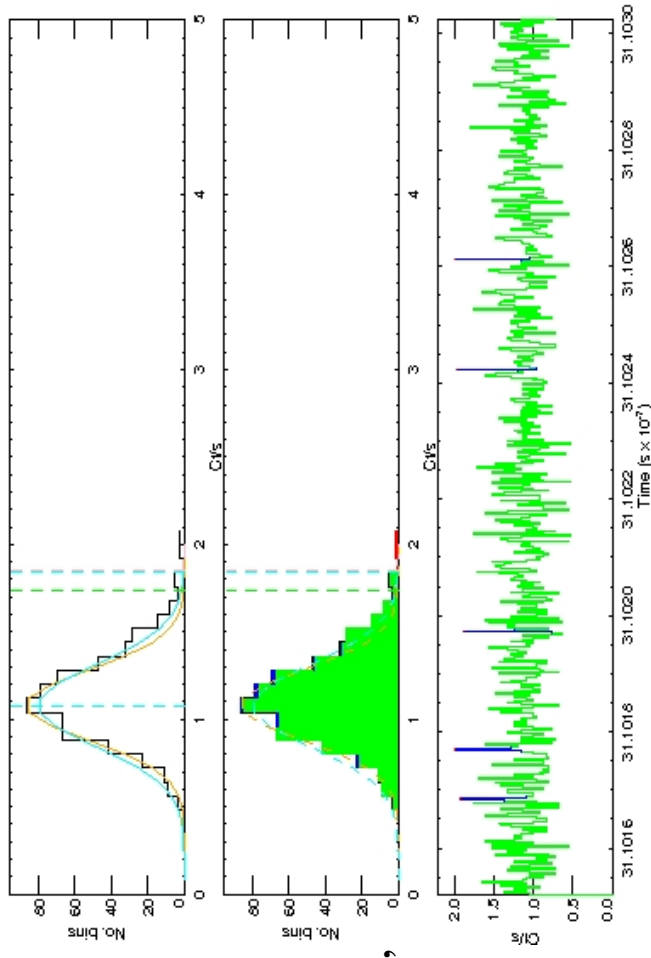


M1, M2

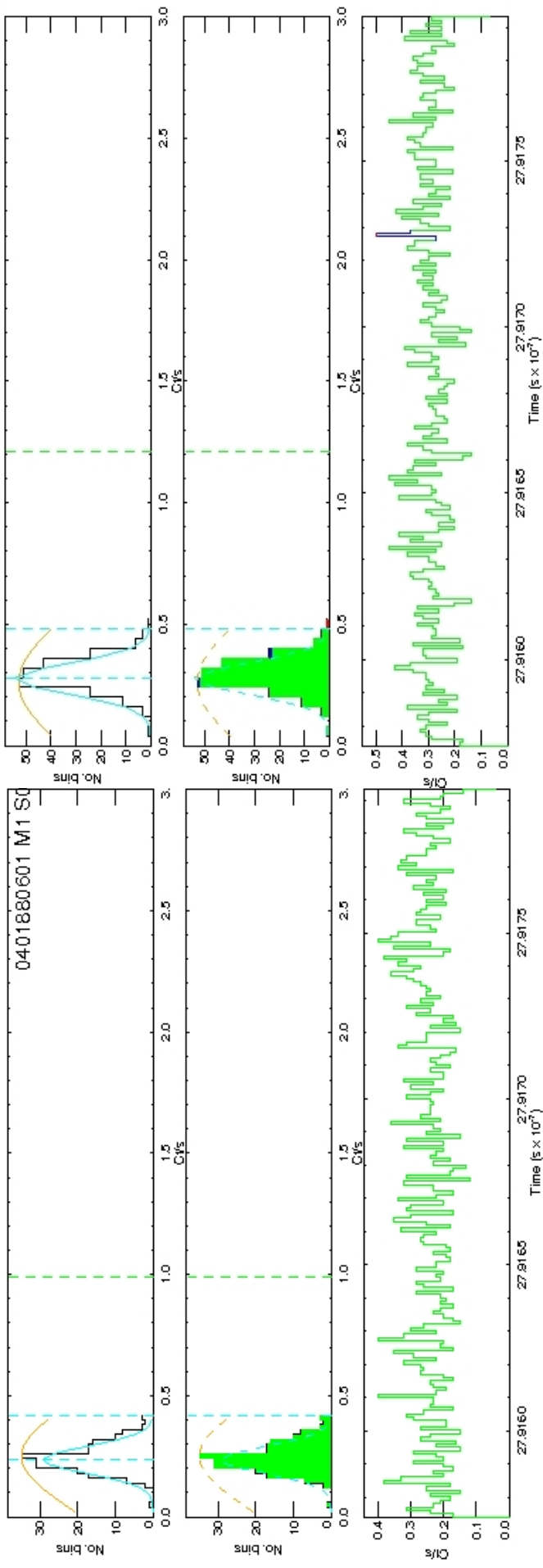
pn

Same OBSID, same pointing, source-free, screened, clean BS dataset, post flare-cleaning, low FinFout

InFOV ($r=3000-12000$) lightcurve (100s MOS, 25s pn), 2-12keV, PATTERN=0 (same effect with FLAG=0)



Unusual BG features

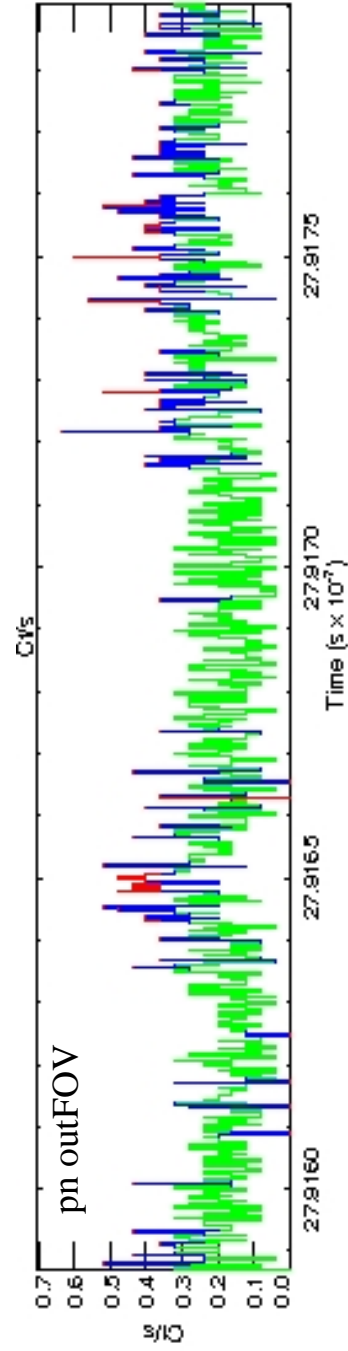
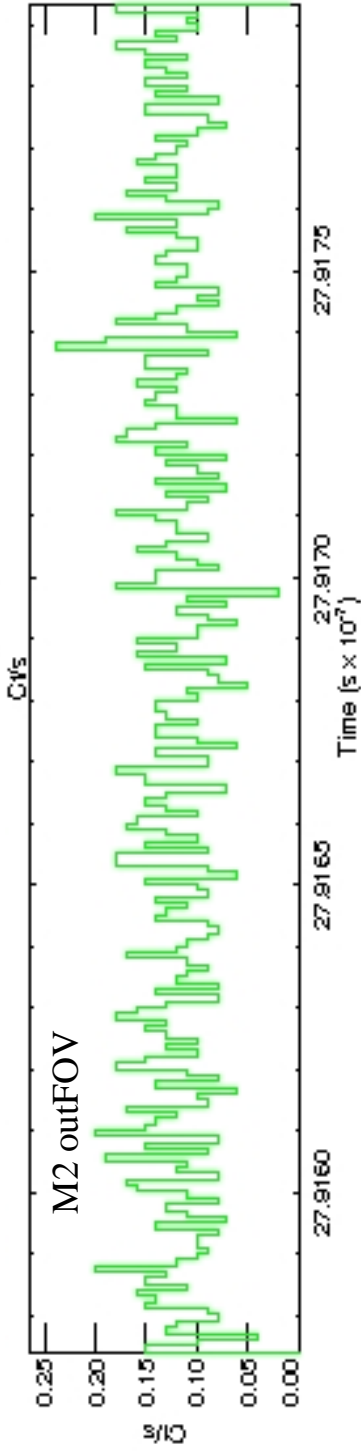
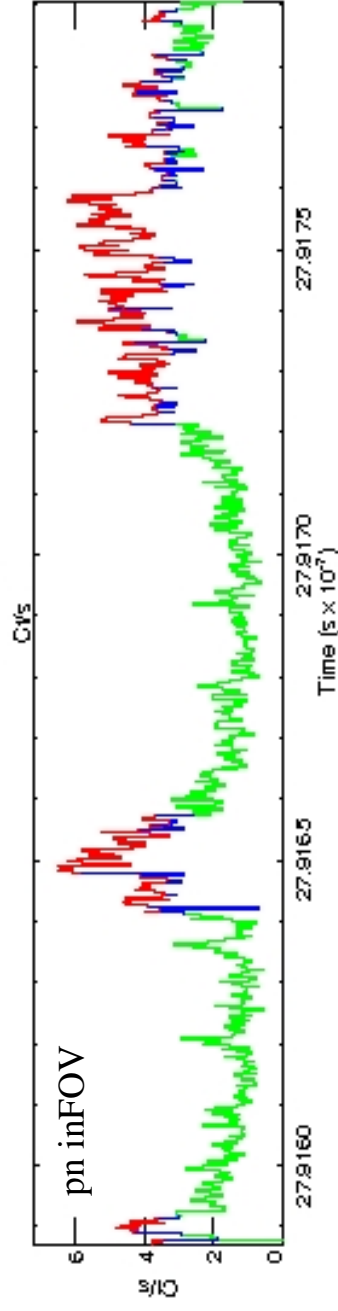
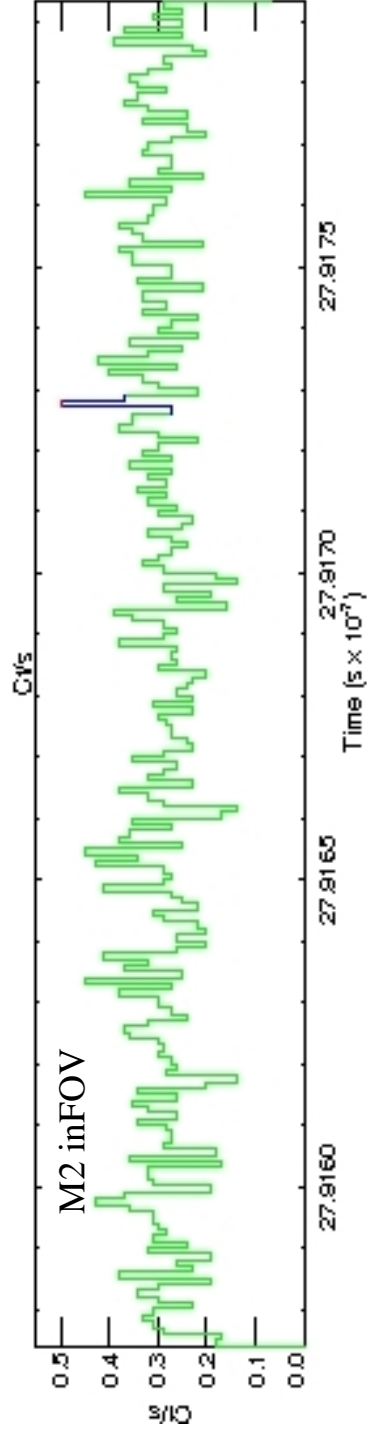


M1, M2

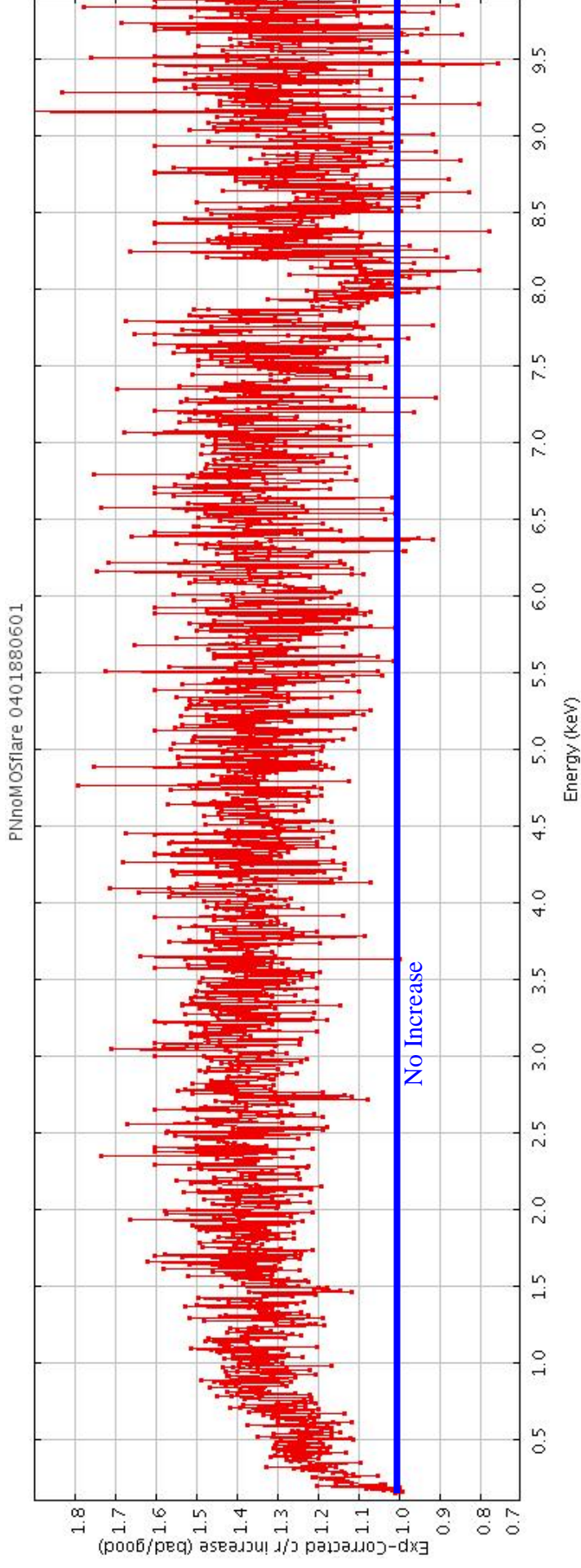
pn

Same OBSID, same pointing, source-free,
screened, clean BS dataset, post flare-
cleaning, low FinFout

InFOV (r=3000-12000) lightcurve (100s MOS
25s pn), 2-12keV, PATTERN=0 (same effect
with FLAG=0)



Unusual BG features



‘Noisy’ time is brighter than the ‘clean’ time across ~all the spectrum, **except** for at ~8keV
– the Cu(+Ni/Zn) instrumental lines (effect also at Al [1.5keV]).

Spatial analysis shows no areas of the detector that are affected significantly differently in noisy/clean times

Additional emission appears spectrally flat and featureless, and over whole of FOV – i.e. like SPs (but appearing **only in pn** and not in MOS)