EPIC MOS Monitoring

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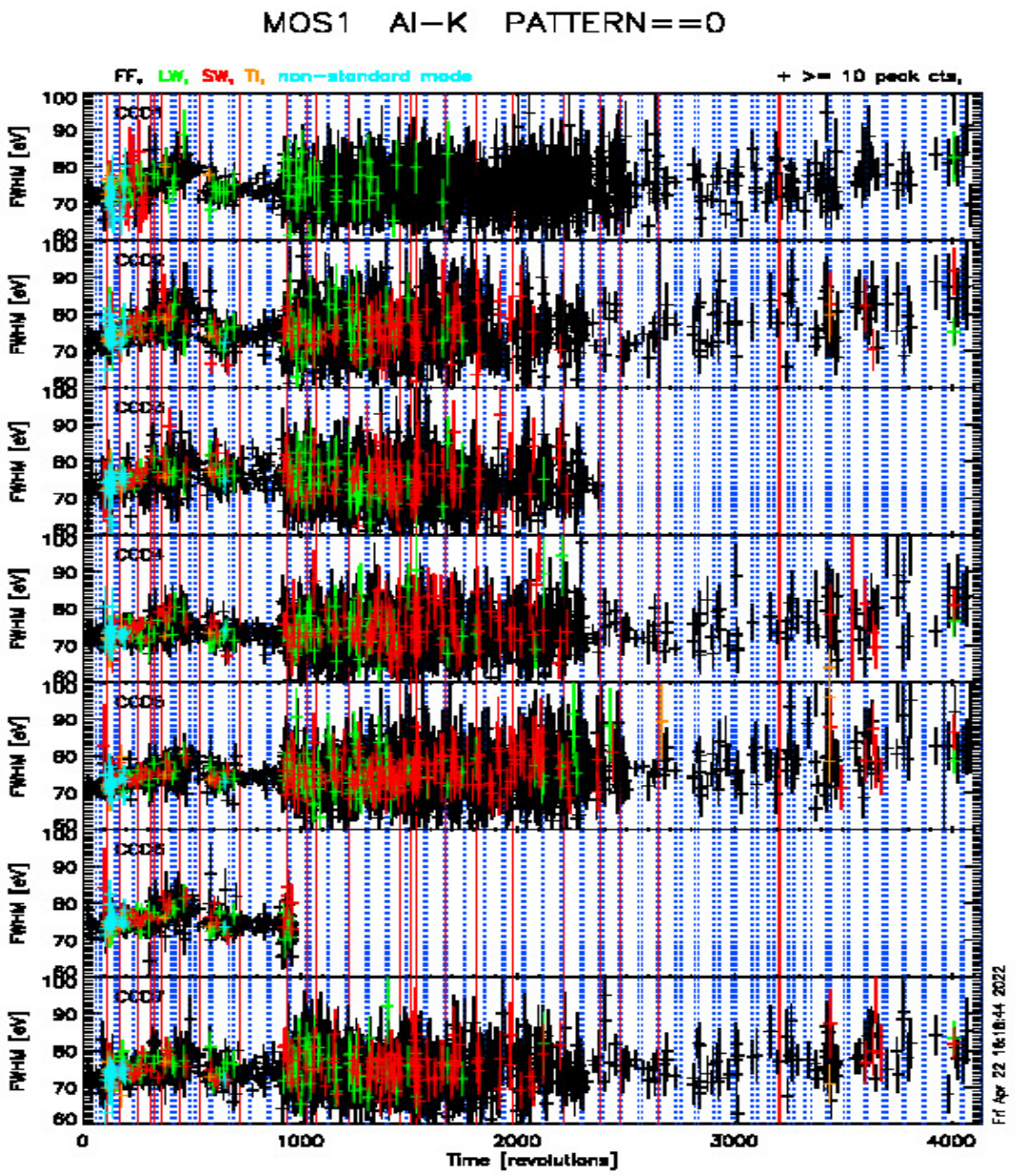
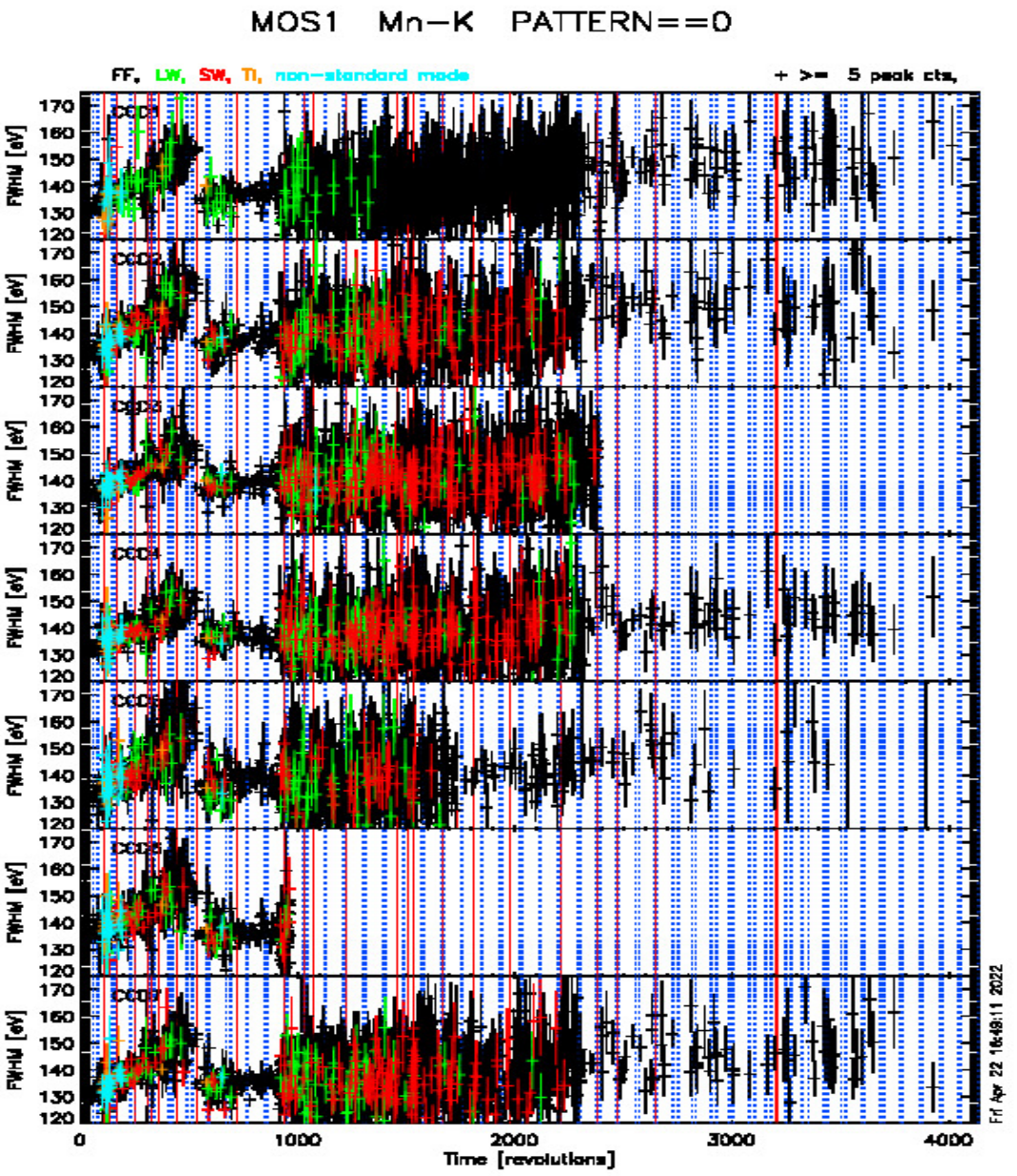
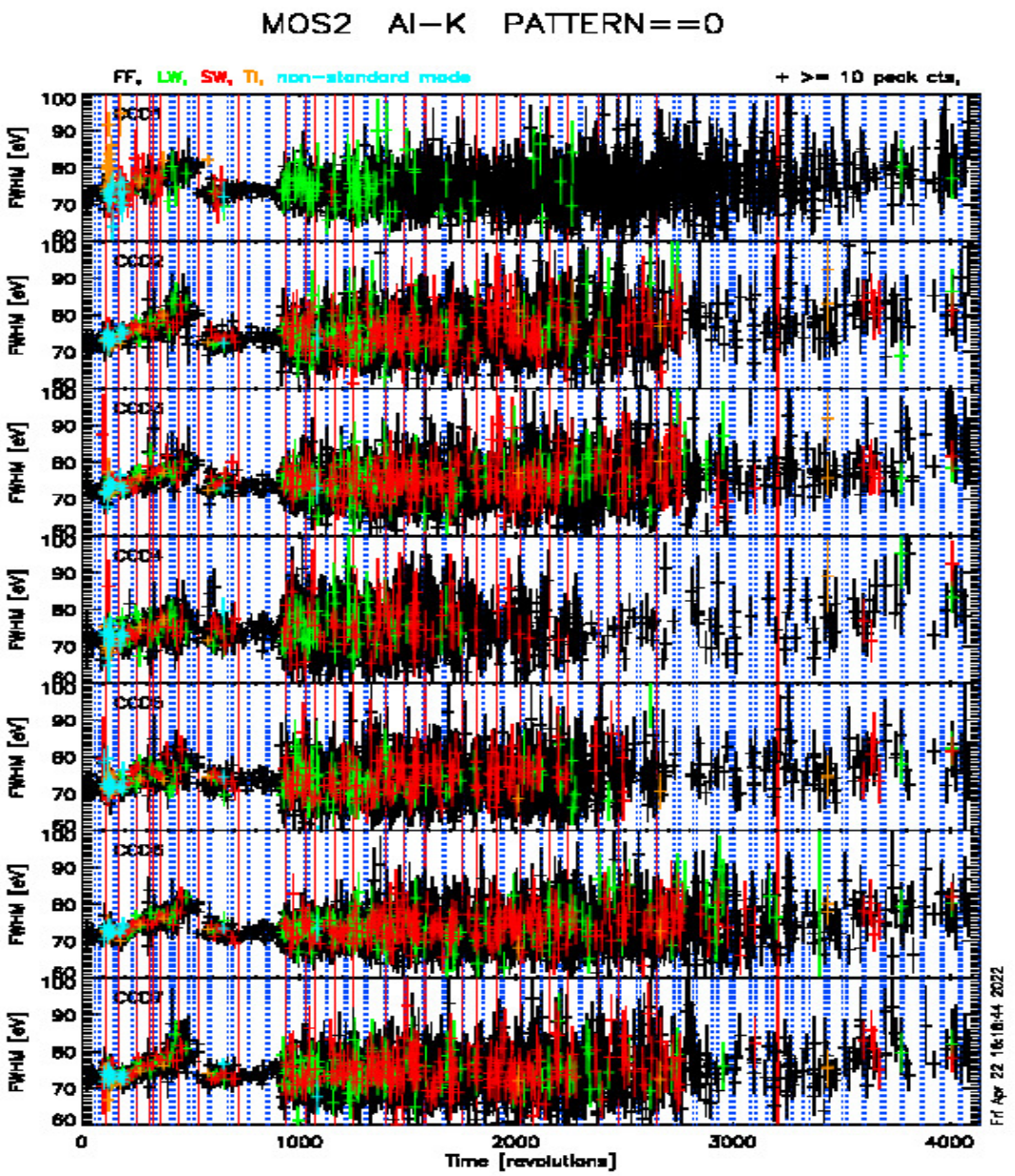
EPIC CAL Meeting
Everywhere, 25.04.2022

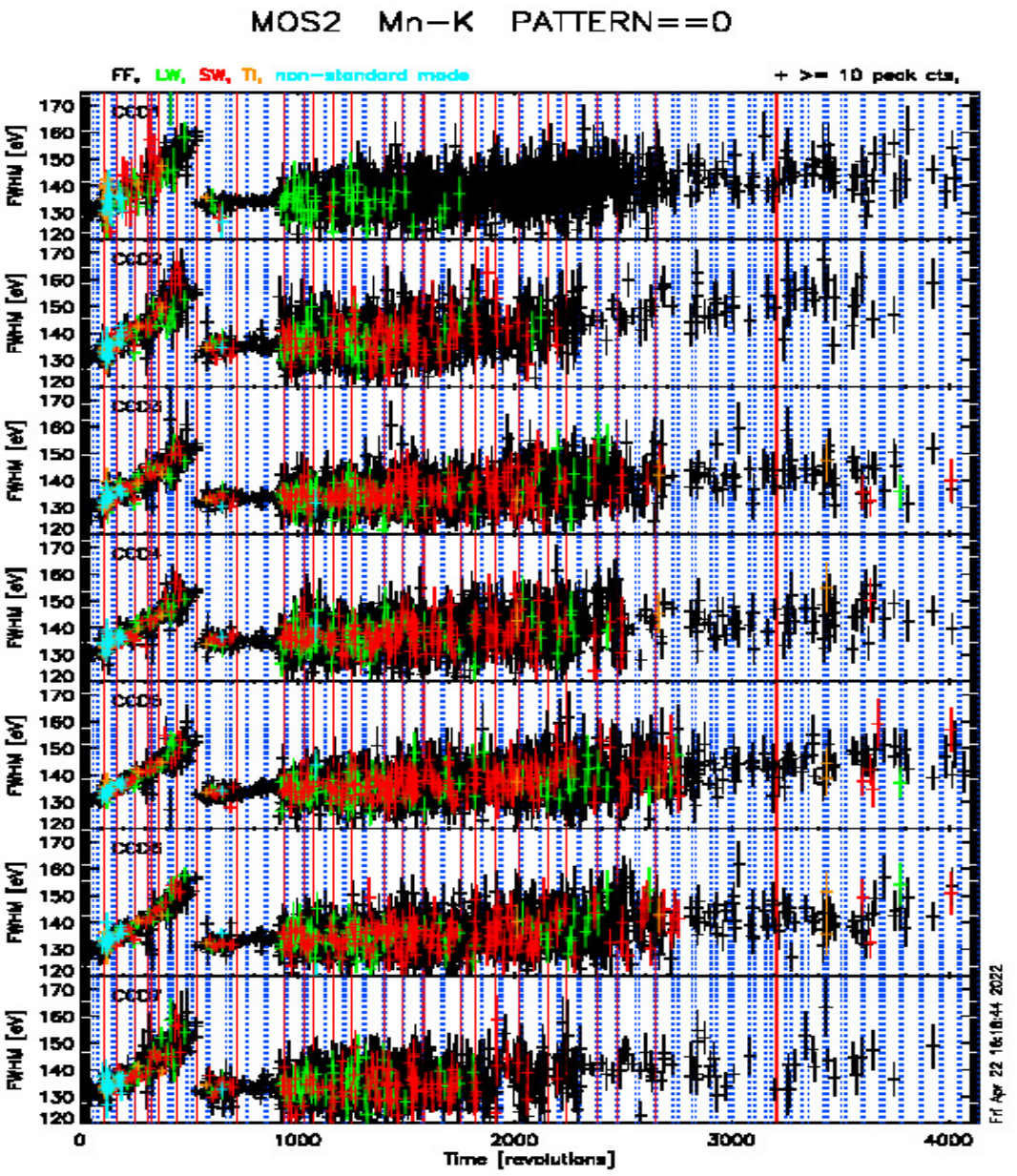
Line monitoring: MOS1 line widths



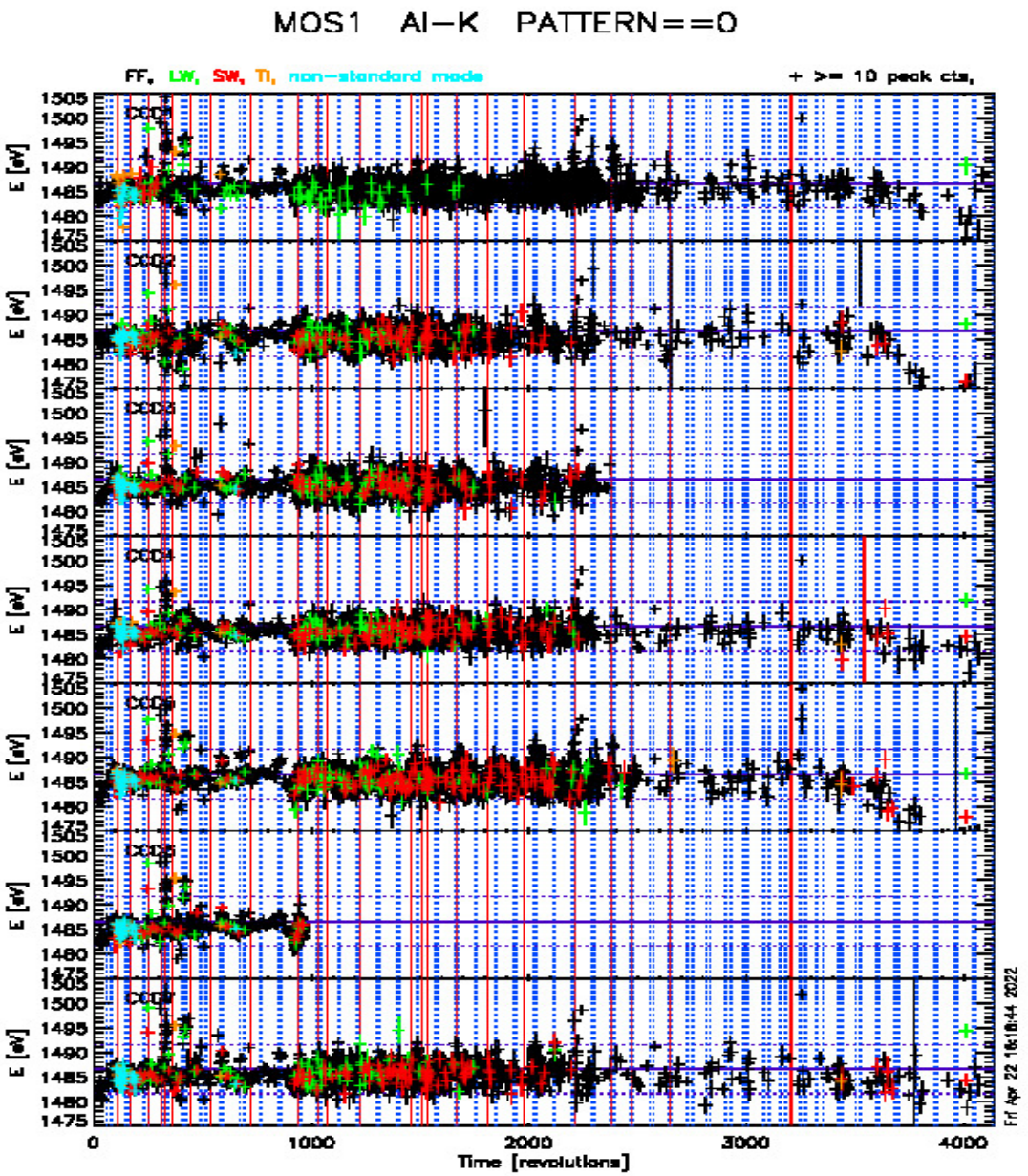


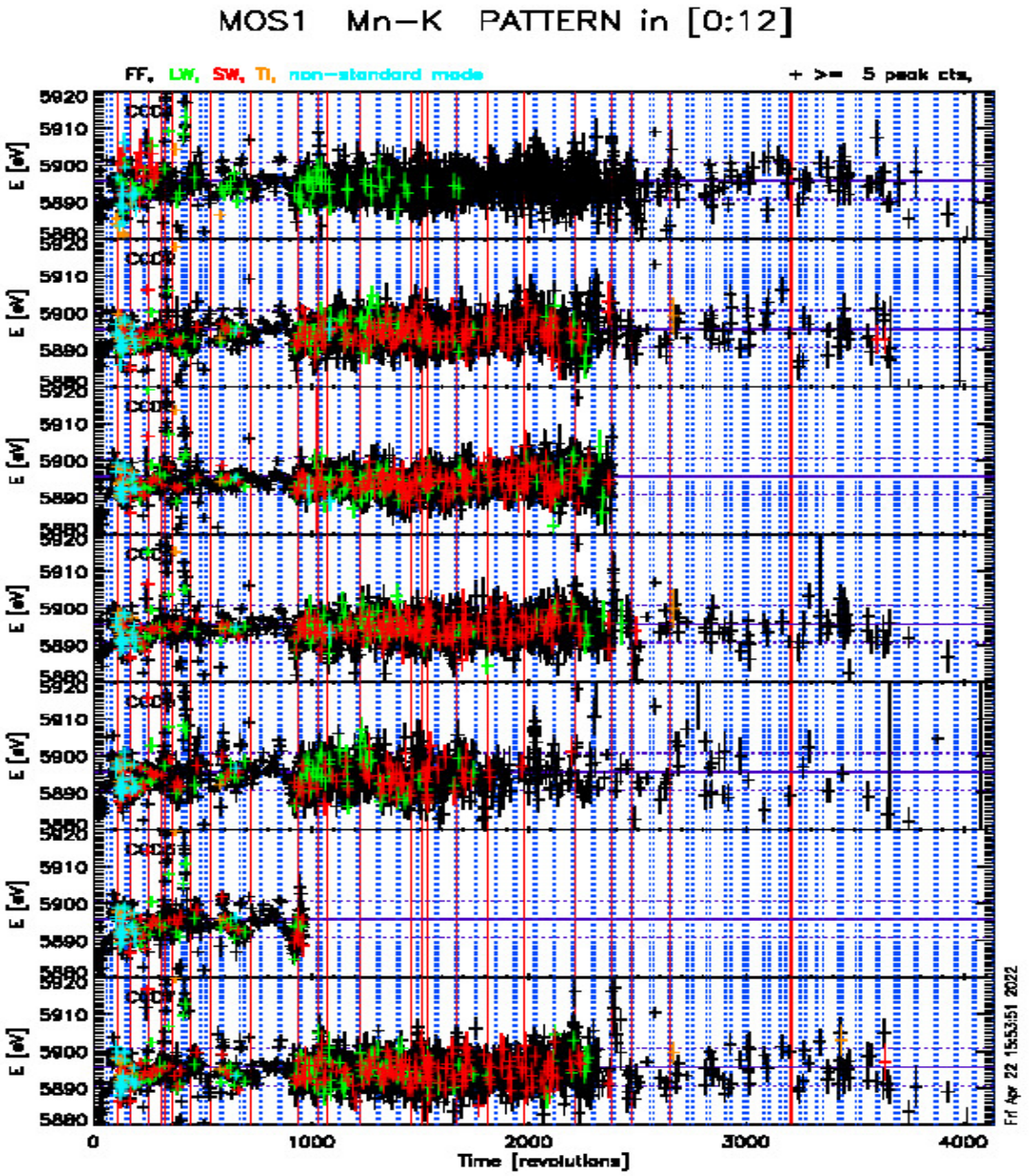
Line monitoring: MOS2 line widths



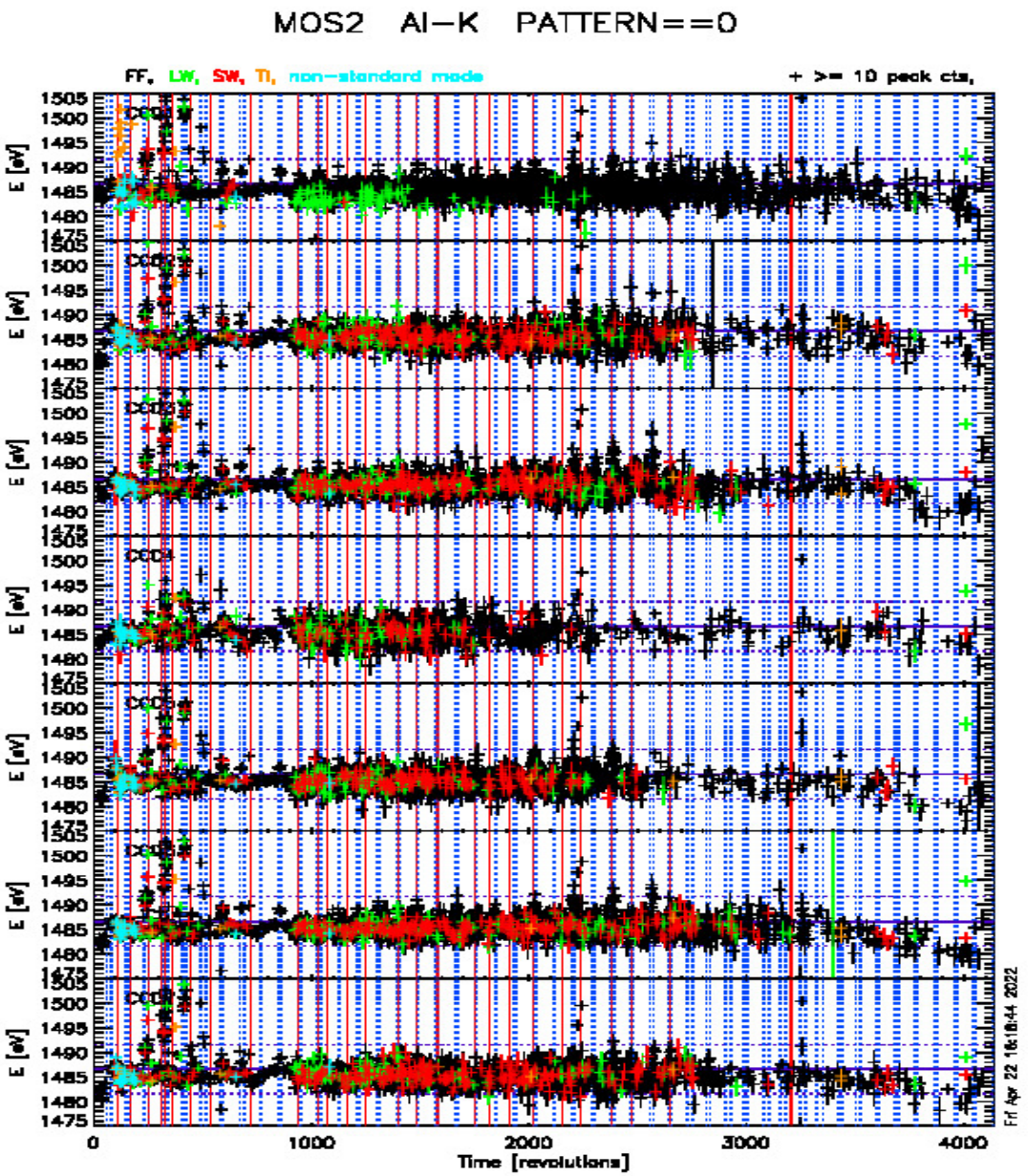


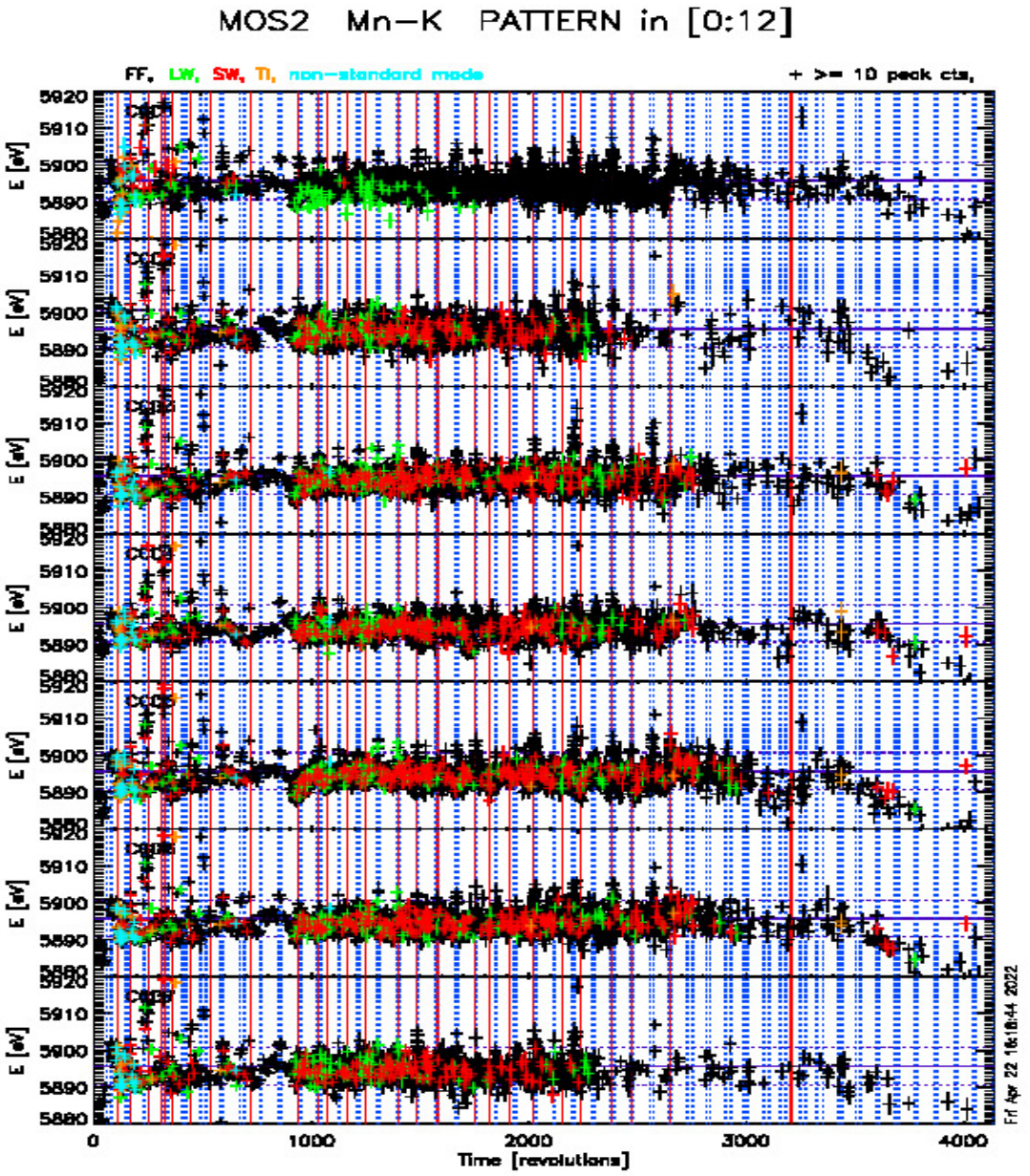
Line monitoring: MOS1 line energies





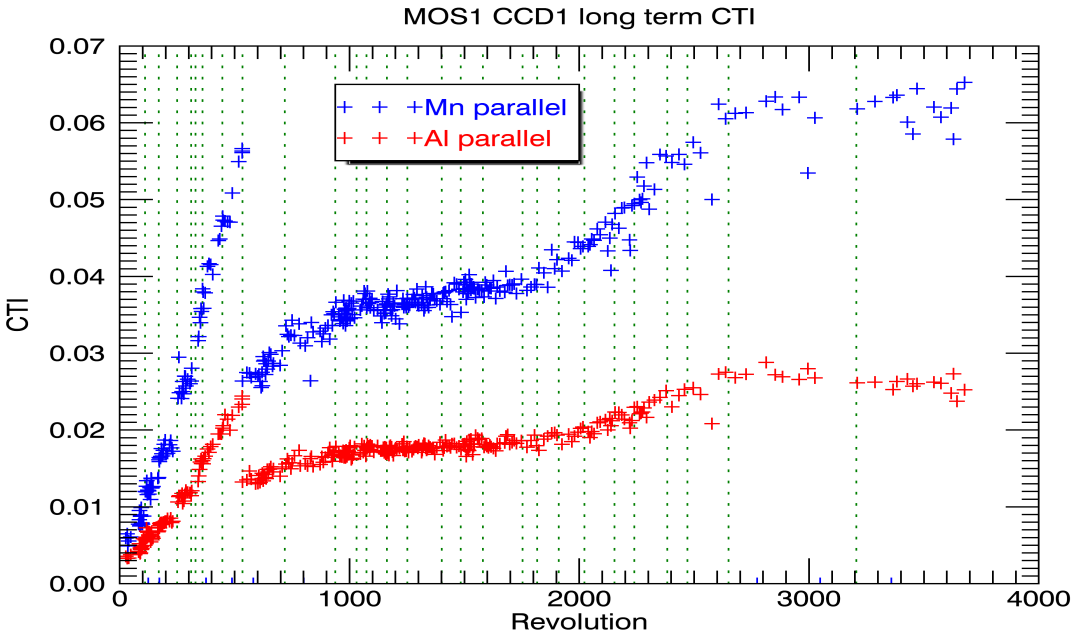
Line monitoring: MOS2 line energies

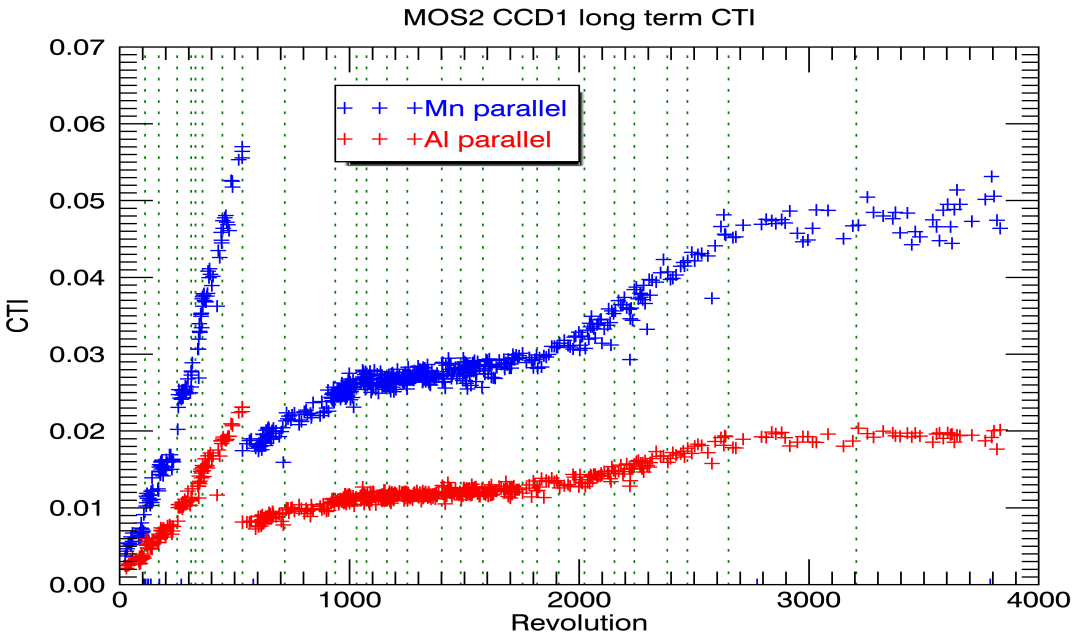




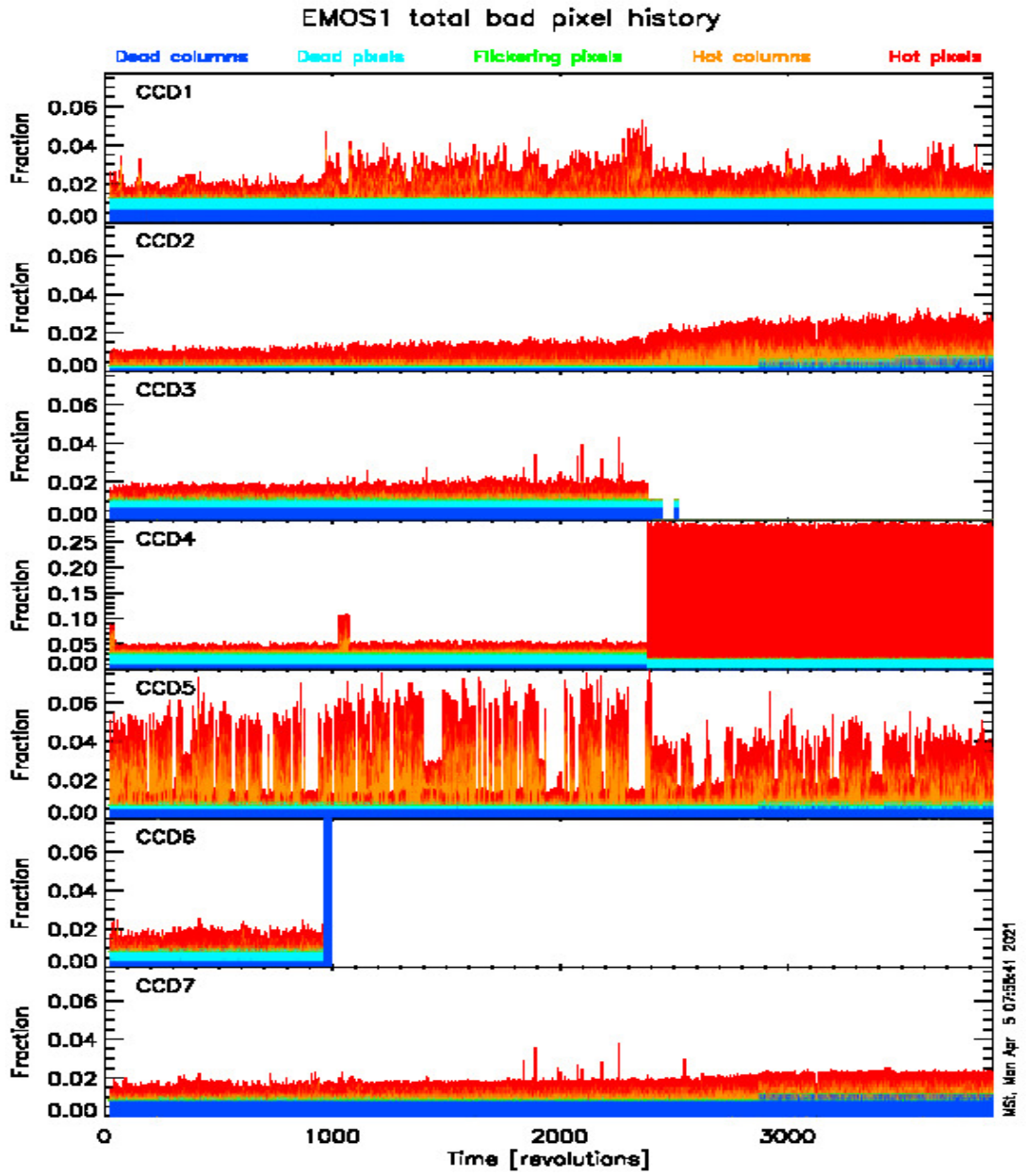
CTI monitoring

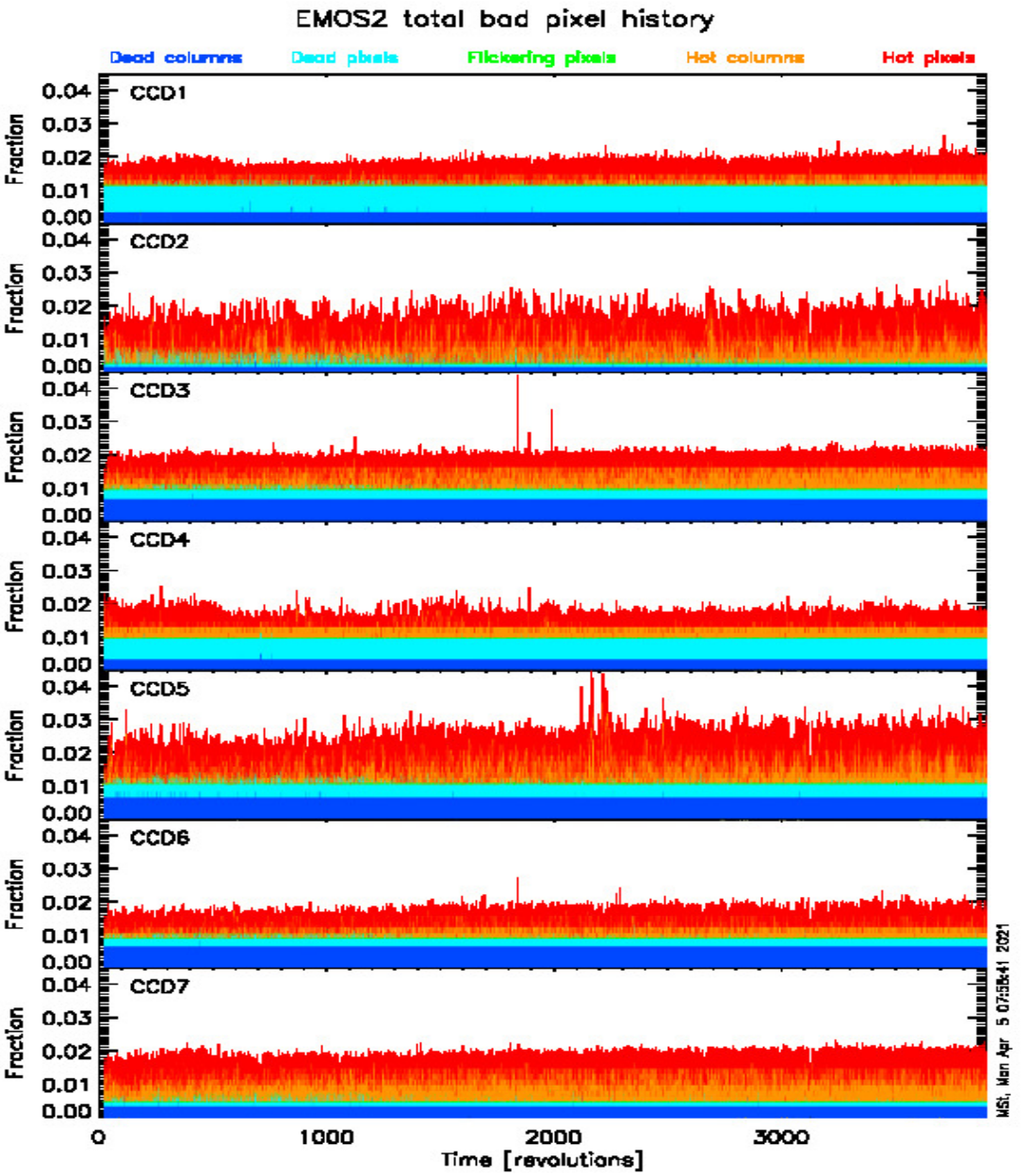
- Update of CTI/ADUCONV CCFs required to correct the energy scale for current epoch.
- MOS1 calibration source at statistical limit: the lines are not sufficiently detectable any more for CTI determination in single recent epoch.
- Work around: use information on long term CTI evolution for a “good guess” in current epoch.
- Move to astrophysical target for CTI determination required: analysis of calthin Vela SNR observations ongoing.





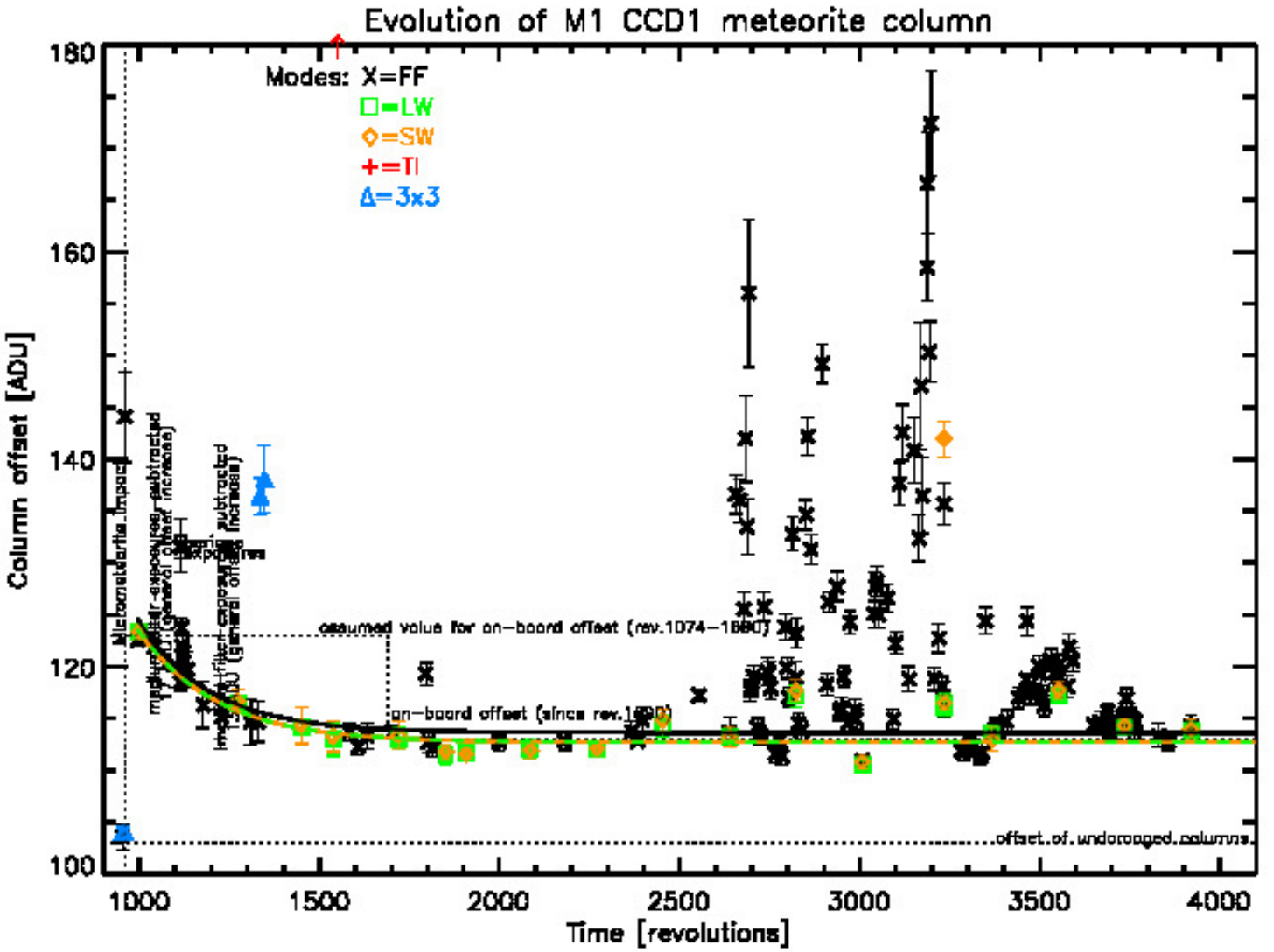
MOS bad pixel tables: event list files





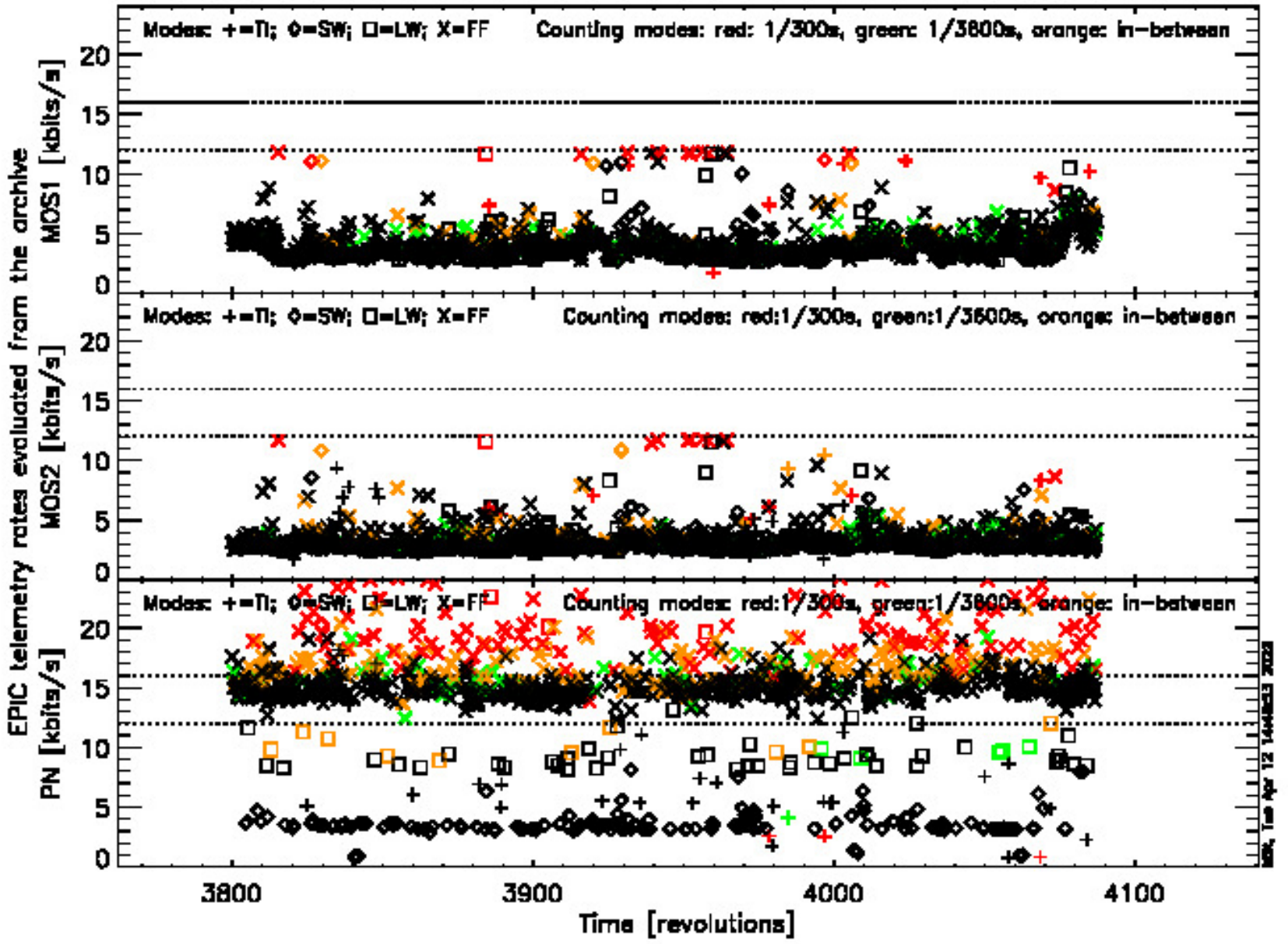
MOS1 meteorite column monitoring

- More frequent monitoring with additional diagnostic exposures stopped.
- Nominal calibration plan includes two series of diagnostic exposures per year.
- Last series of diagnostic FF exposures (rev.4011, ObsID 0810243201) suffered from a data file generation error for central CCD1:
  MOS1 raw pixel array size 622 x 590
  MOS2 raw pixel array size 610 x 590
- Column offset calibration correct in case column is at quite state.
- Recently column shows up as hot in most scientific exposures.



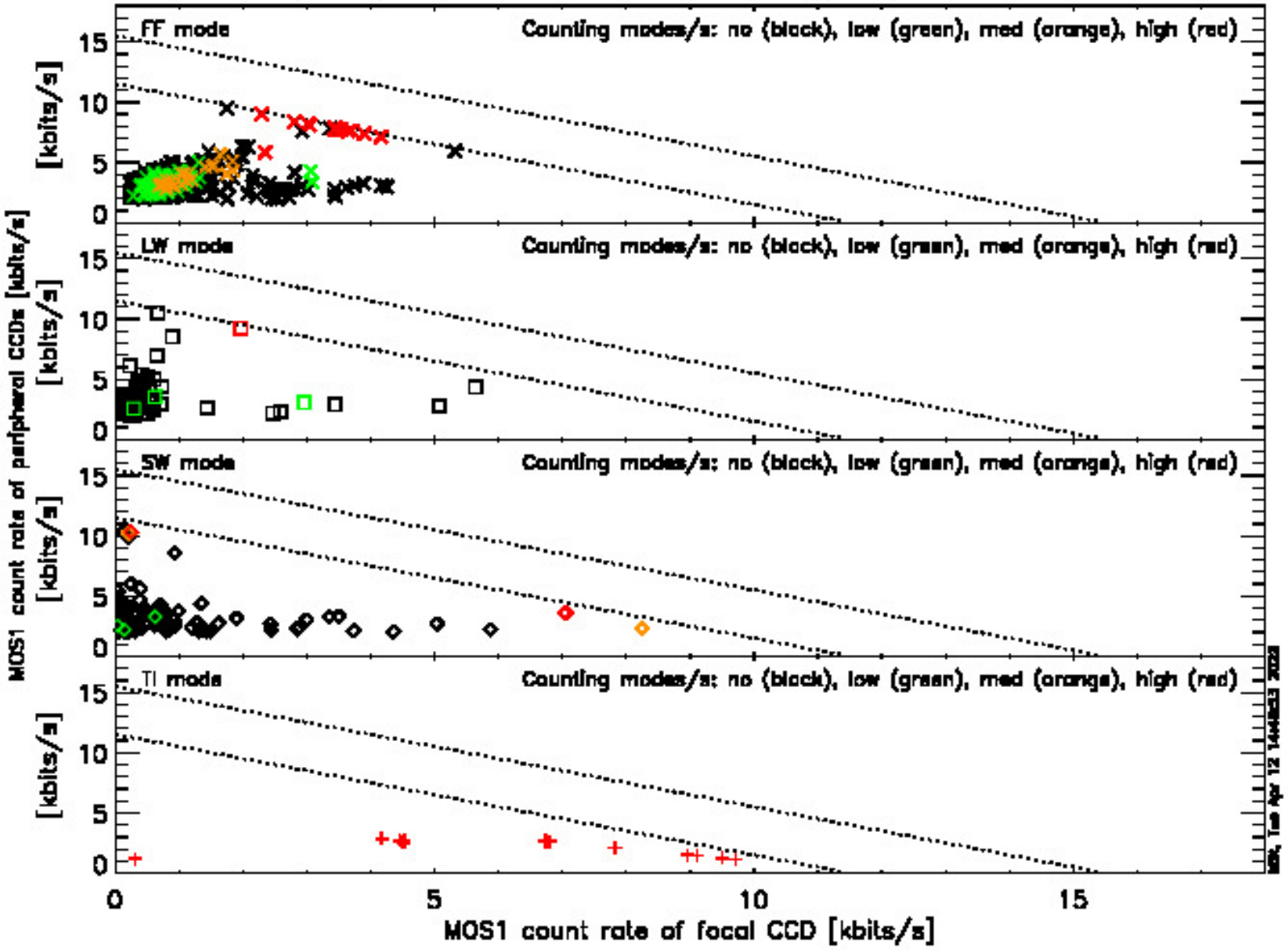
EPIC telemetry monitoring: revs. 3800-4086

- Telemetry of EPIC instruments nominal.
- MOS1 telemetry shows recent increase due to more active CCD1 meteorite column.



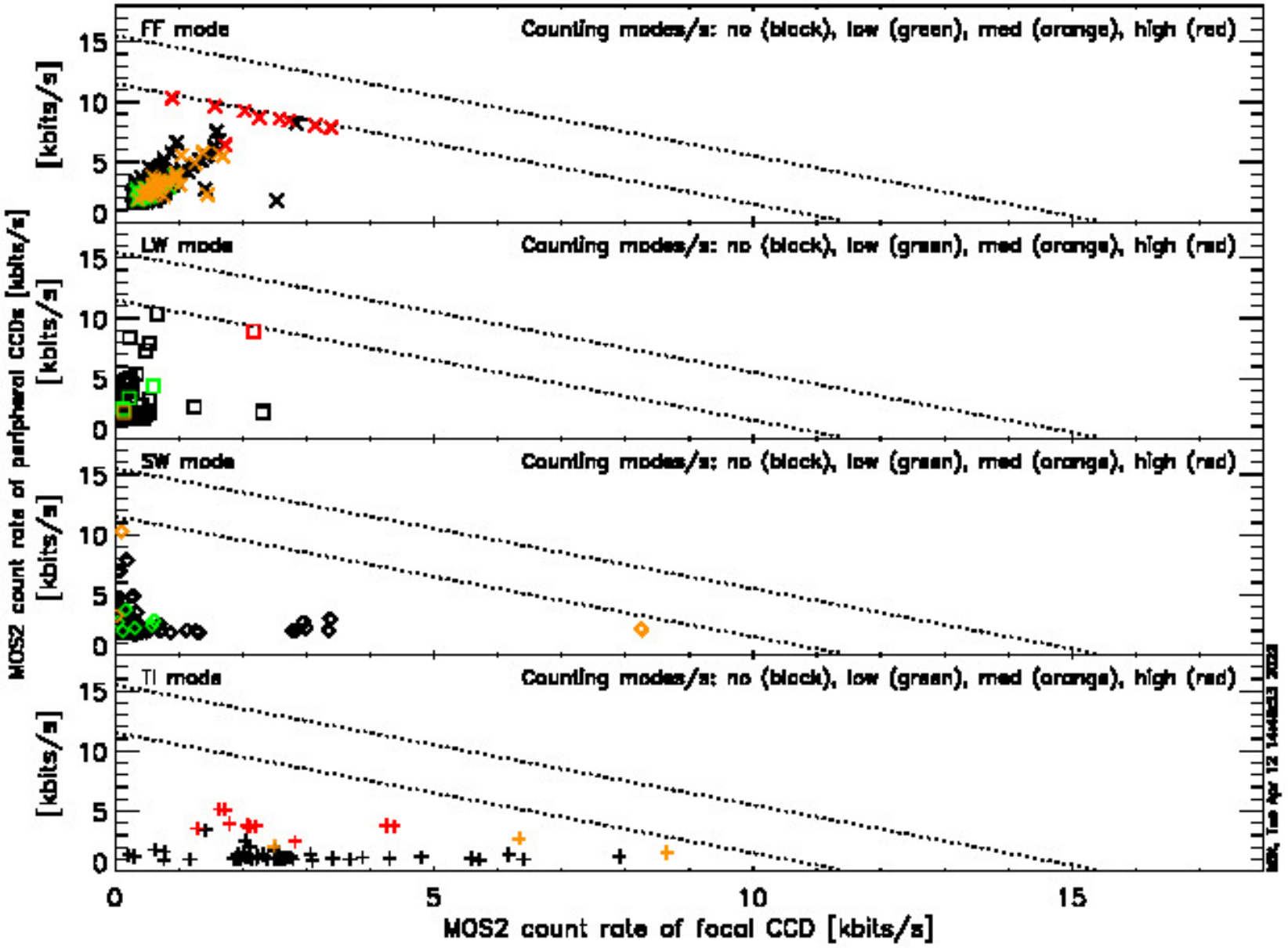
MOS1 telemetry

- MOS1 telemetry shows recent increase due to more active CCD1 meteorite column, especially in FF mode.
- Quiescent background of peripheral CCDs require about 1-3 kbits/s.
- Brightest FF mode exposure without counting mode was PSOJ231.6-20.8 rev. 3963 and affected by radiation.
- Brightest LW mode esposure was ToO rev. 4077.



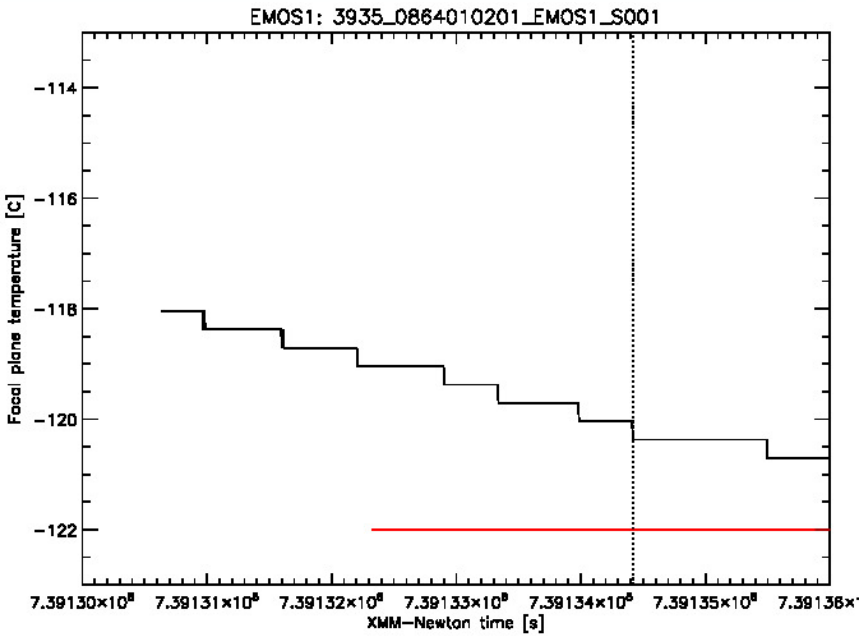
MOS2 telemetry

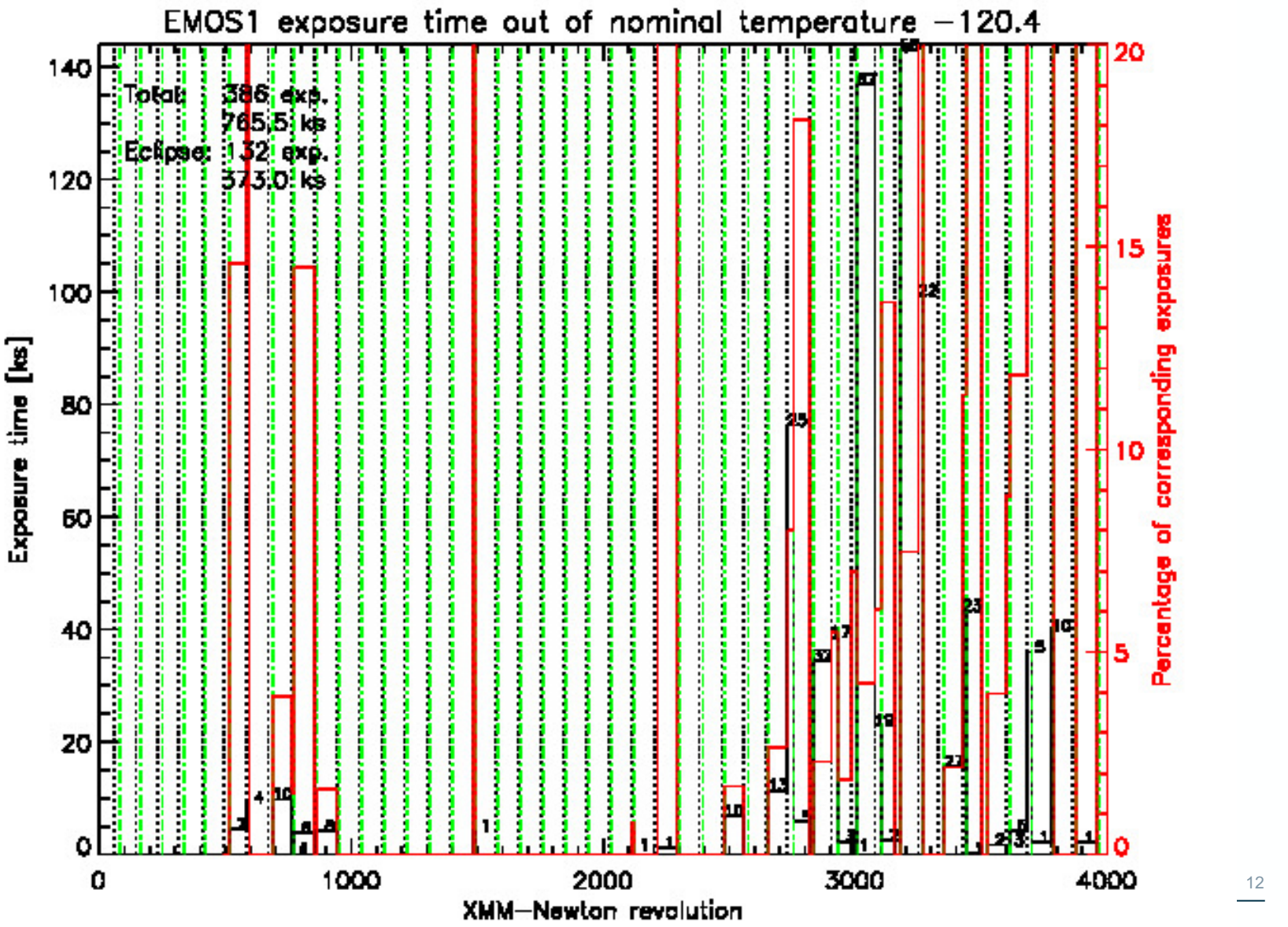
- Business as usual.
- Single high telemetry FF mode exposure without counting modes (11.59 kbits/s) was PSOJ231.6-20.8 rev. 3963 and affected by radiation.
- Bright SW mode exposure was Mkn 421 rev. 3829.



Exposure time out of nominal focal plane temperature

- Just one exposure during non-eclipse phase affected since last year.
- First exposure after perige in rev. 3935 (calclosed).





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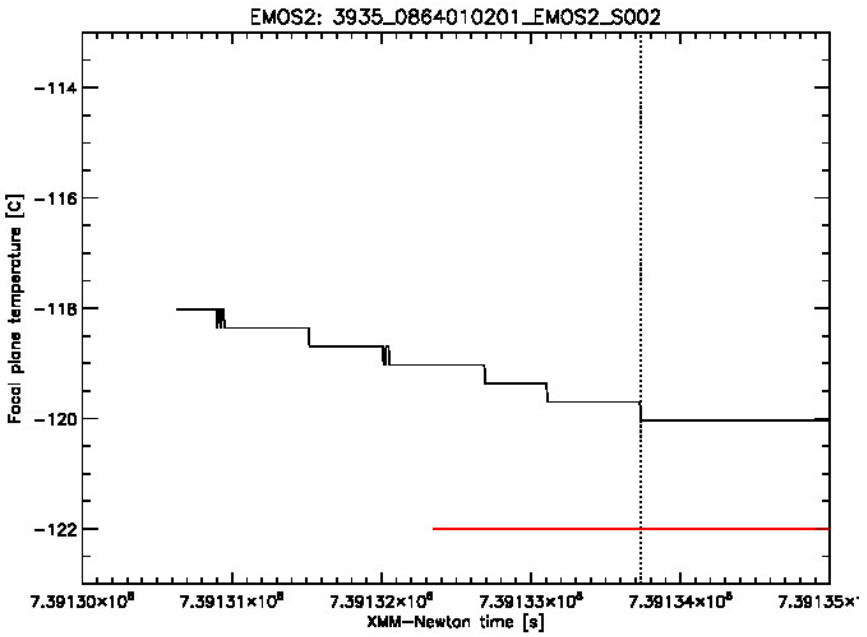
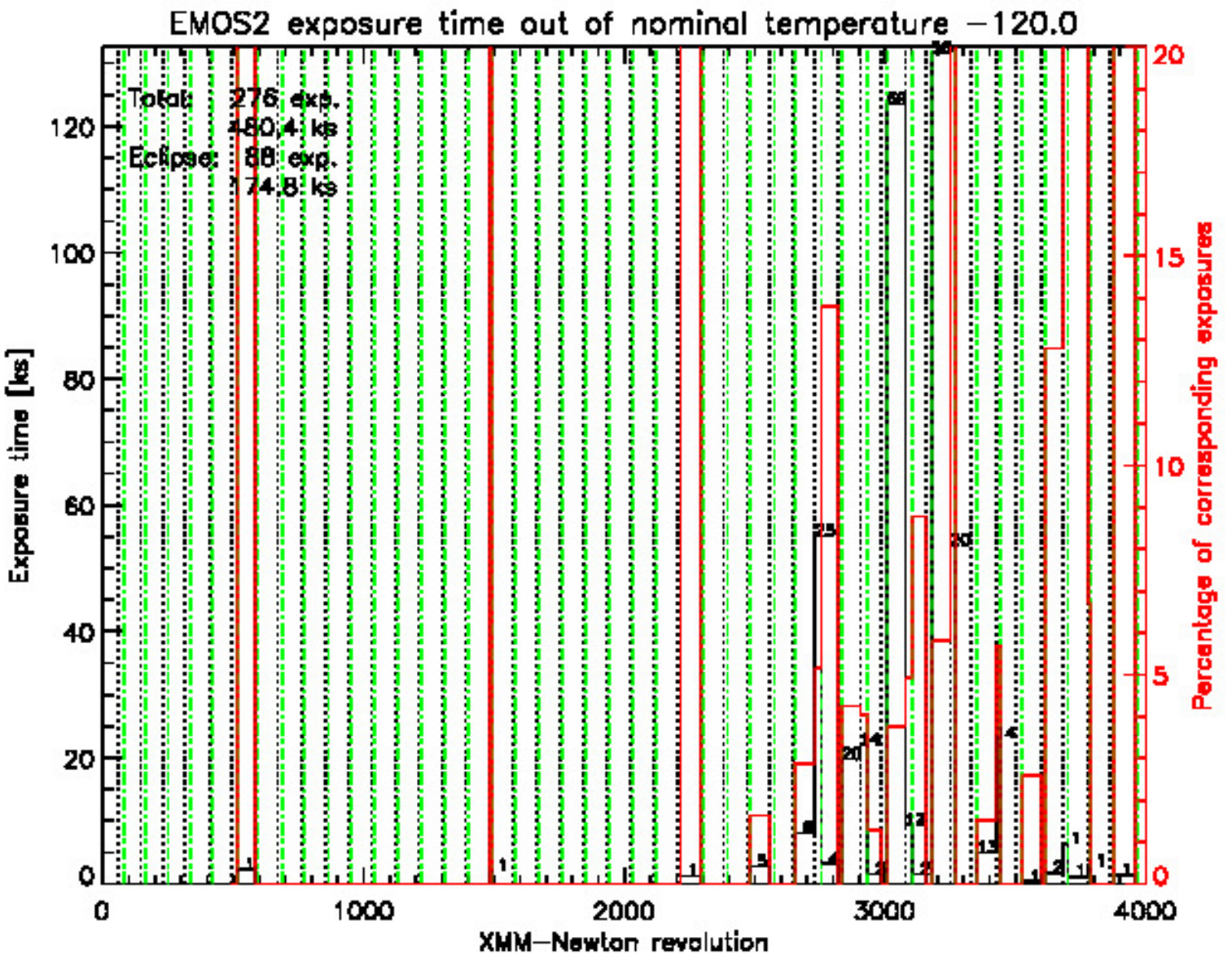
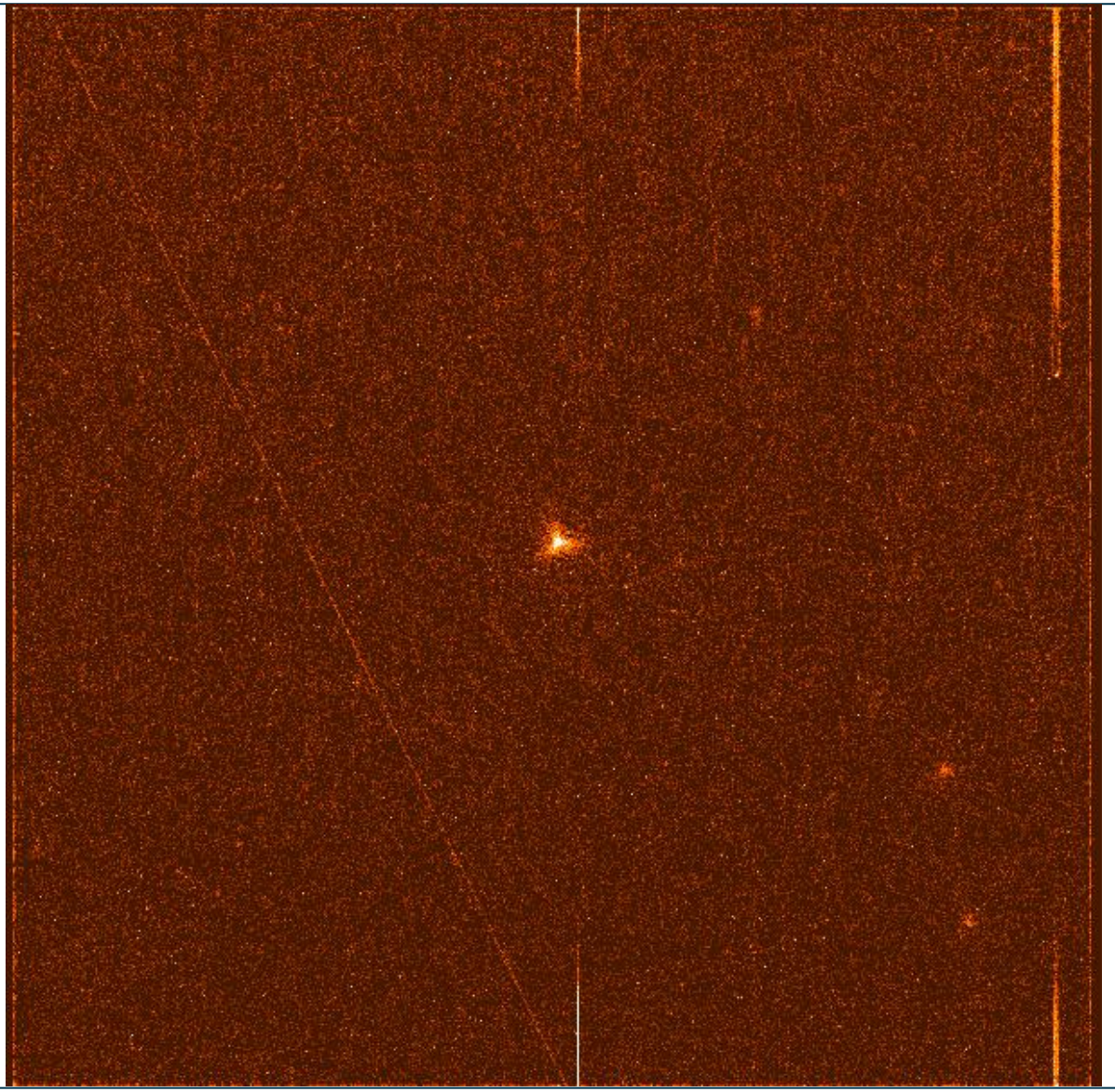




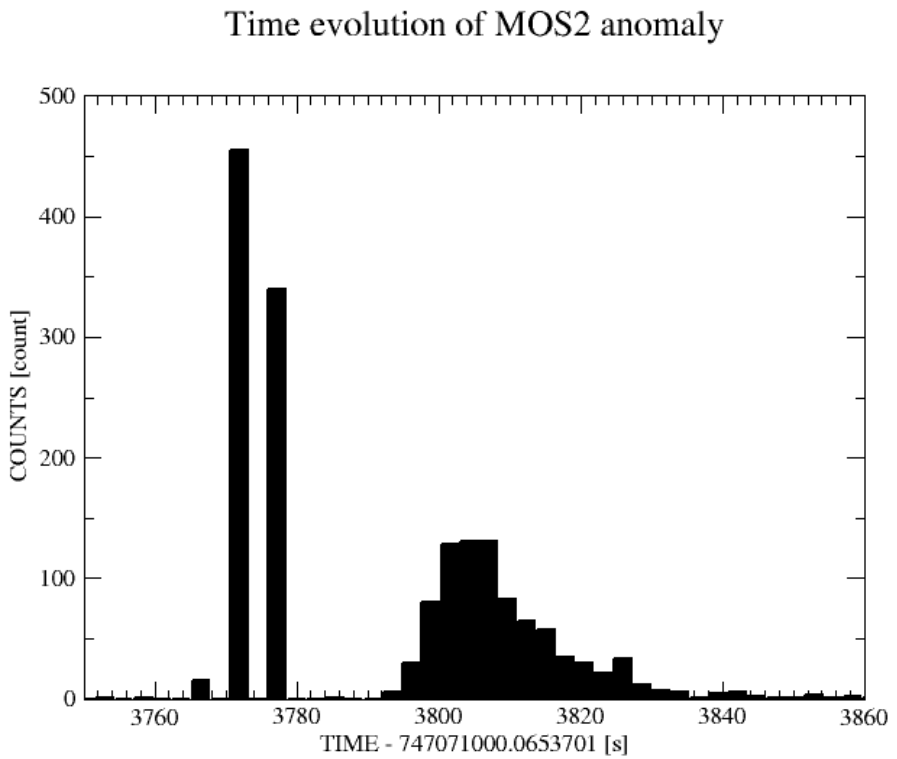
MOS2 anomaly ObsID 3981_0882061001

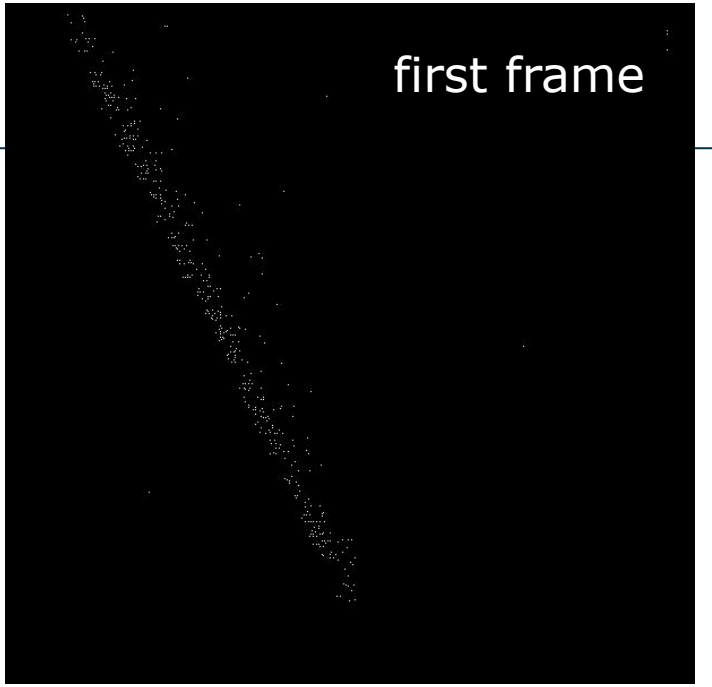
- Note from Blanca Juarez checking exposures using the QLA about an object having moved over CCD1 FOV on 06. Sep. 2021.
- Indeed CCD1 image looks like a slew over a bright target, but no pointing instability during exposure.
- Very first thought of a SpaceX Starlink photobomb immeadiately excluded.
- Diagonal seems to be connected to bright column section at readout side.
- Low energy noise PI< 200 eV, no effect on science.

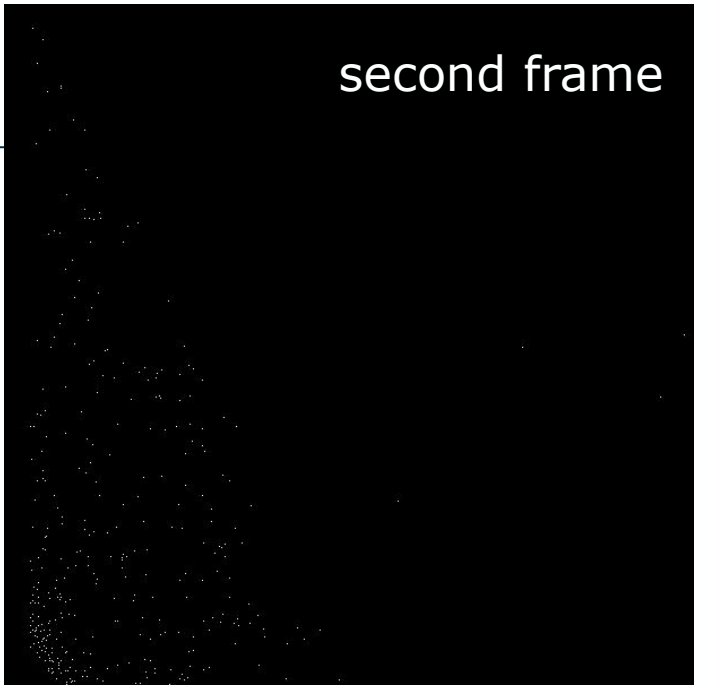


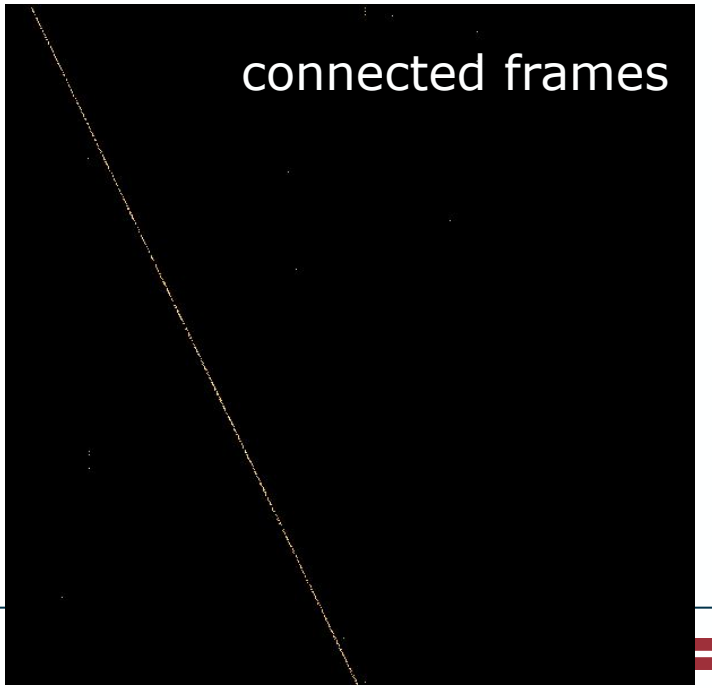
MOS2 anomaly

- Anomaly built up by 3 different characteristics.
- Two single flaring frames and a 17 frame continuous period.









Summary

- Recent MOS line energy reconstruction shifted to lower energies for about 5 eV@Al and 10 eV@Mn for focal CCDs, but can reach about 15 eV@Al and 30 eV@Mn for worst peripheral CCDs.

- CTI/ADUCONV CCF update required! Calibration source strength/statistics insufficient for CTI measurement at least for MOS1.

- Bad pixel level still low for active CCDs: MOS1 3-6% (except CCD4), MOS2 up to 3%.
- MOS1 meteorite column offset calibration is fine with quiescent state, the column currently is showing up as hot column in most science observations.

- No telemetry issues present for EPIC-MOS due to 12 kbits/s limit.

- Mission operation/planning successfully prevents science observations at non-nominal focal plane temperatures. Last occurrence rev. 3785 ObsID 0870910101 due to internal MOS2 power drop (SEU).