

*Suzaku* XIS  
Charge Leakage  
vs.  
Power Cycling

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11th IACHEC, IUCAA

# Problem

micro-meteoroid impacts (as evidenced by CCD  
charge leakage, OBF holes)

+

UVC shutdowns and power cycling

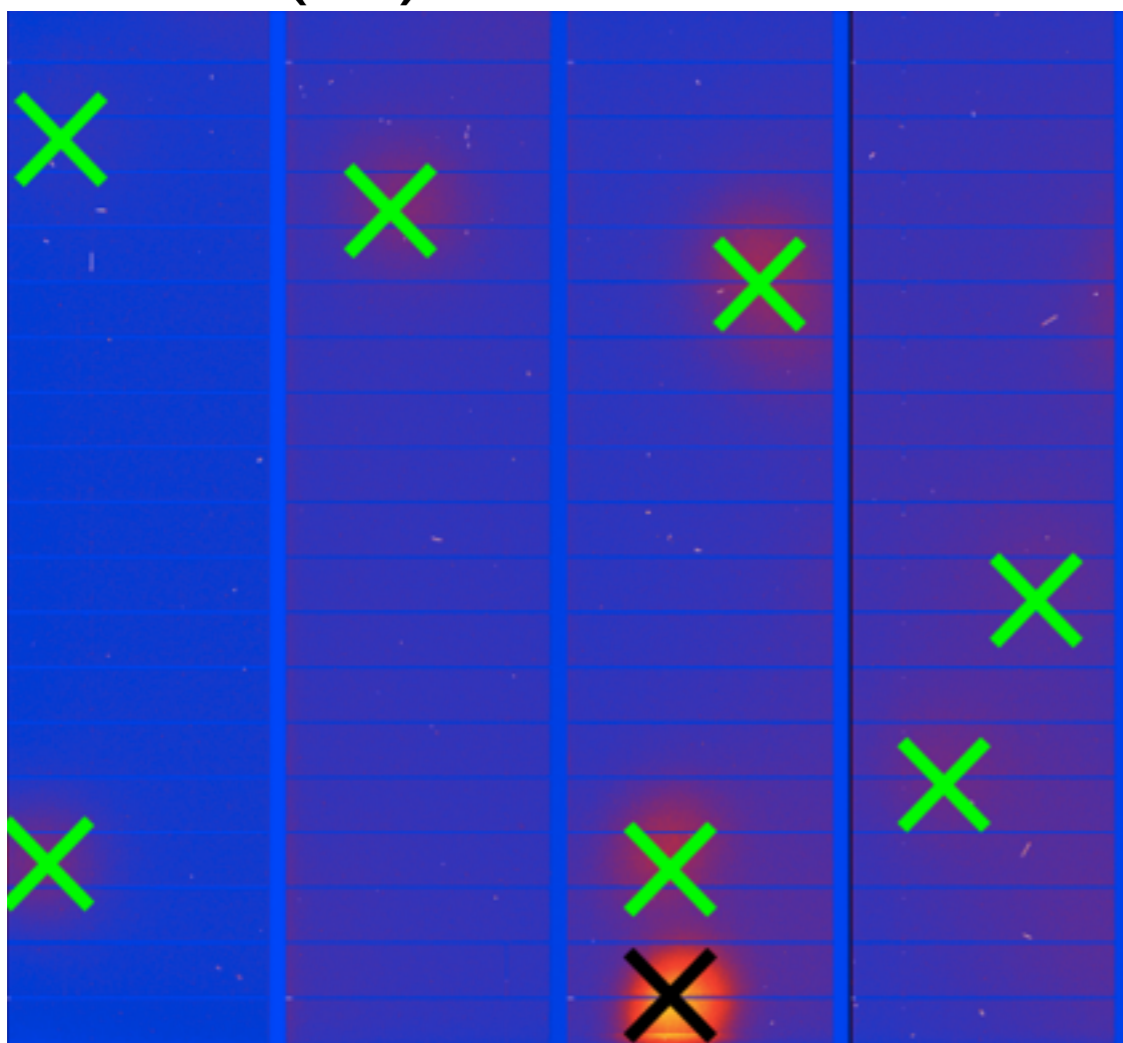
=

bad (apparently)

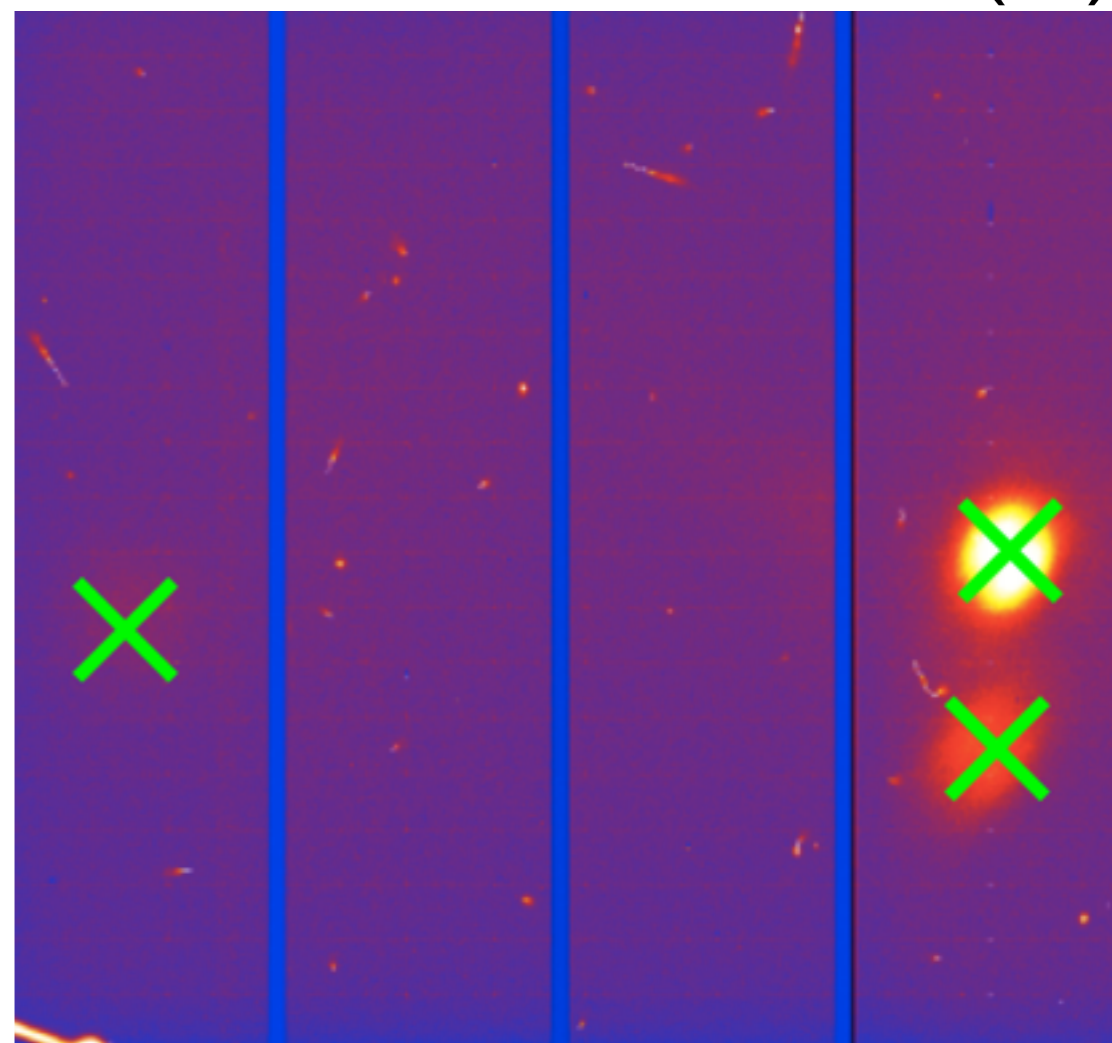
# OBF Holes

bright Earth raw frames (images)  
from July 2013

XISI (BI)



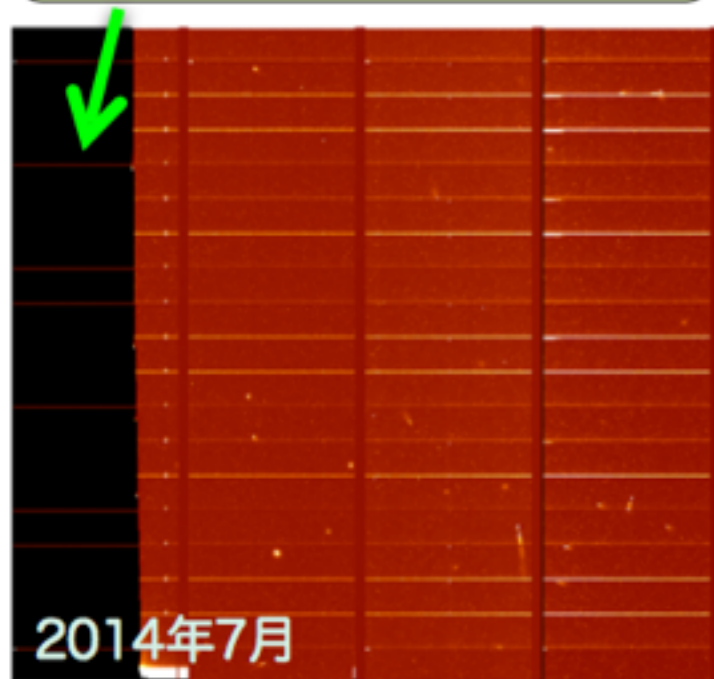
XIS 3 (FI)



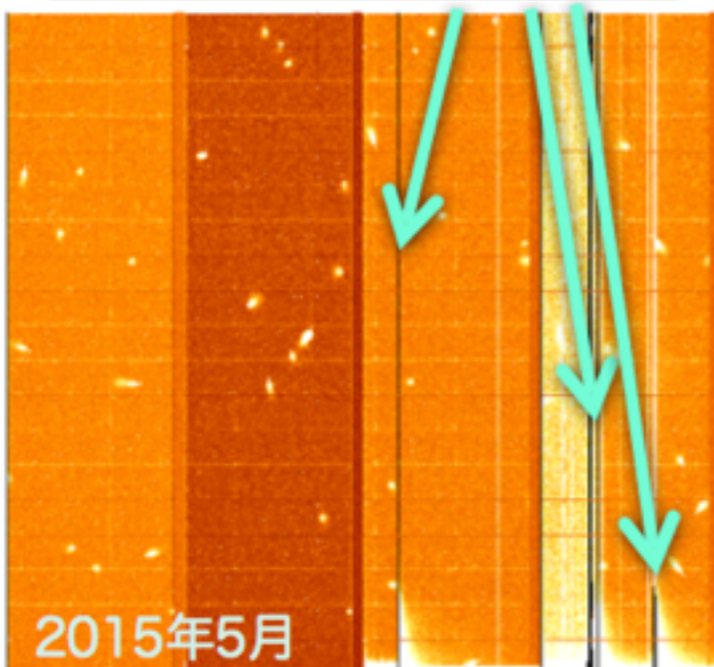
Dec 2009

# CCDs vs. Power Cycles

2014年4月に欠損拡大

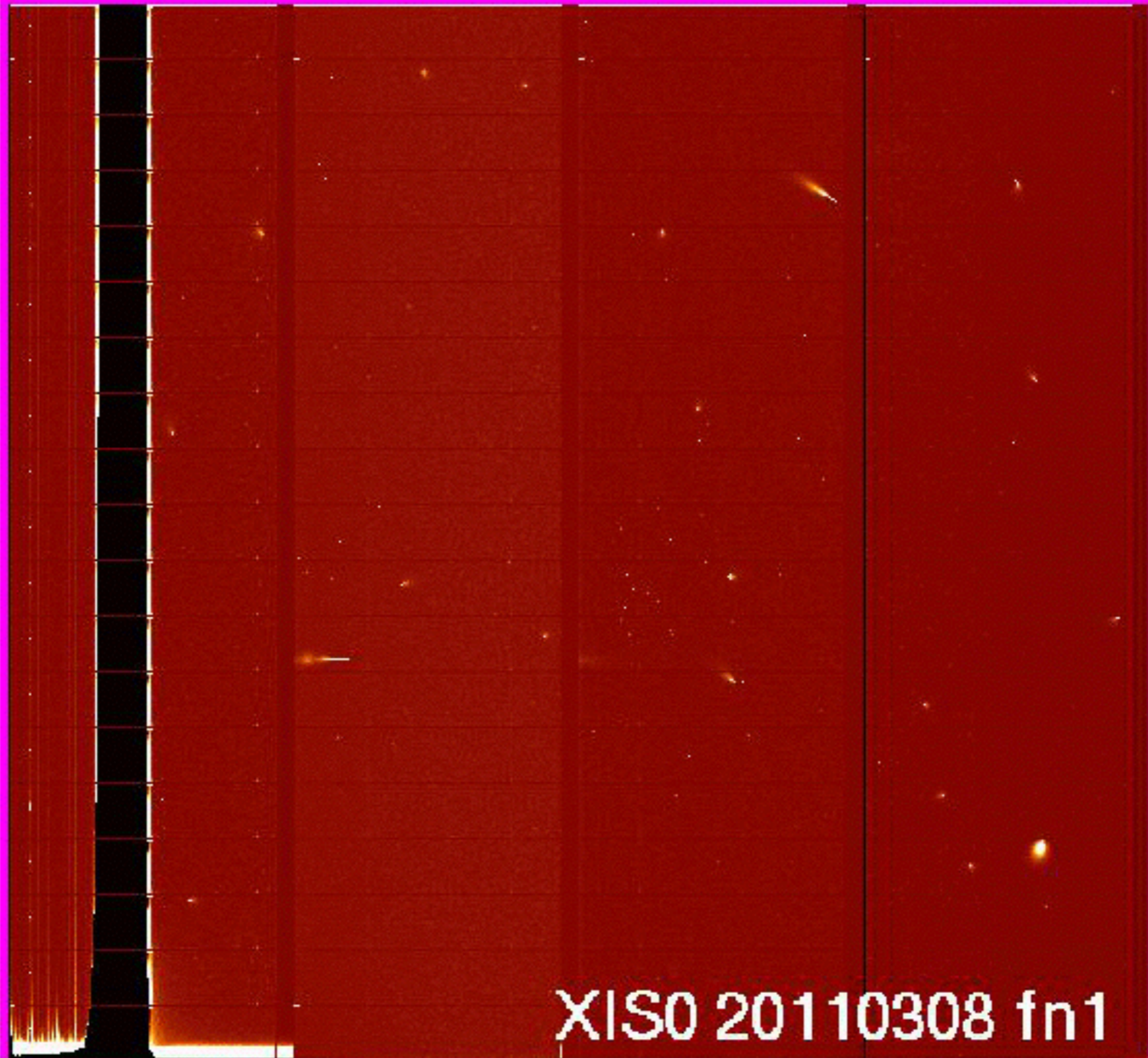


2015年5月に欠損



- dead region on XIS0, produced by micrometeoroid impact in 2009, has increased from 1/8 to 1/4 of CCD
- increase of noise behind CI rows
- CI register exacerbates leakage
- new dead/noisy regions on XIS3
- both occurred after extended power-offs for battery failure

# XIS FI Raw Frames



100

199

300

400

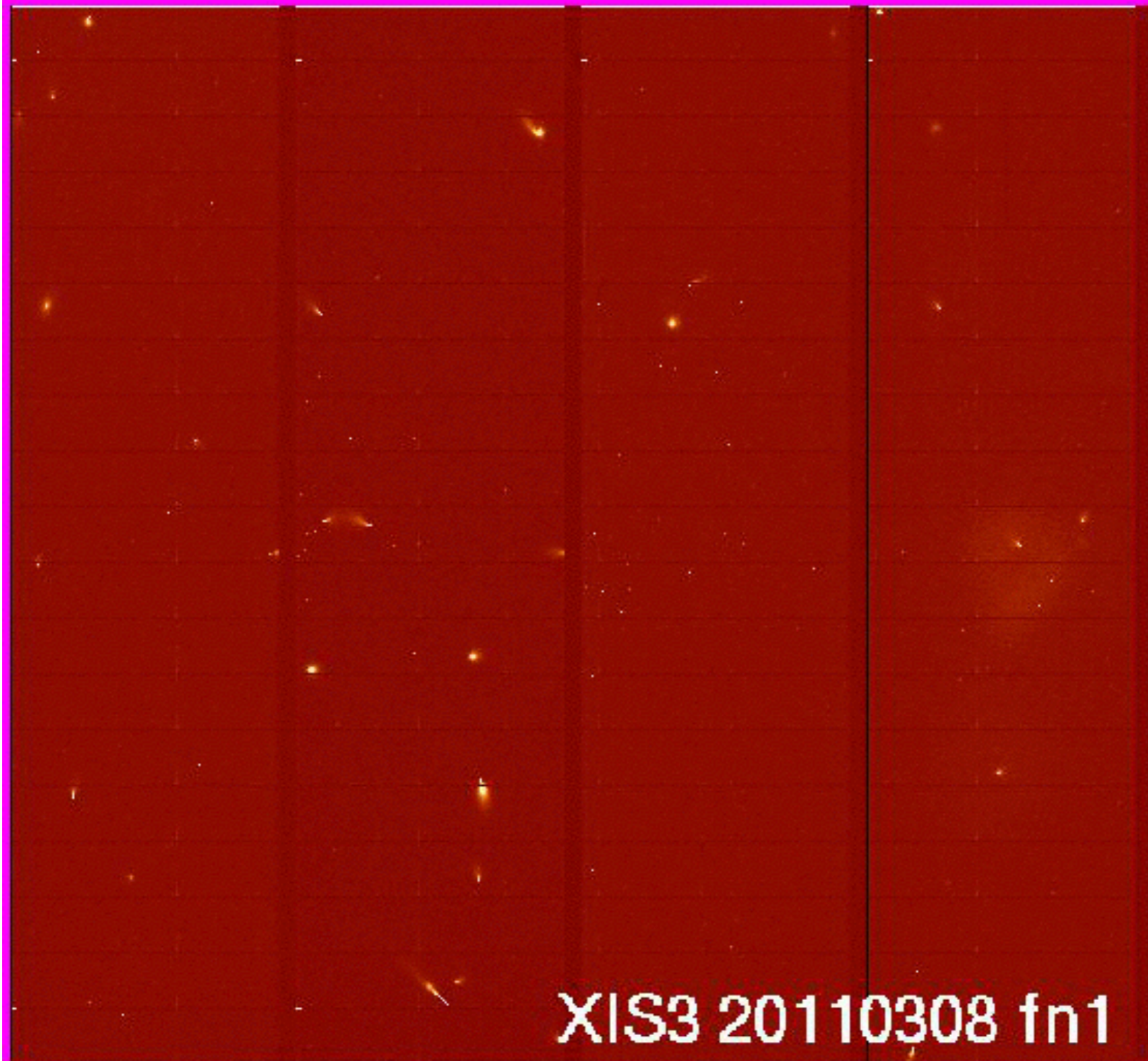
500

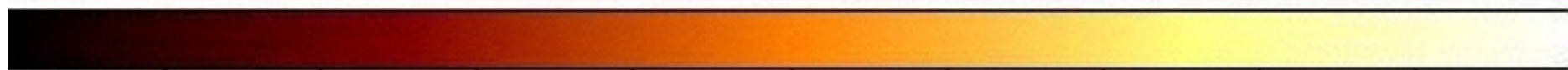
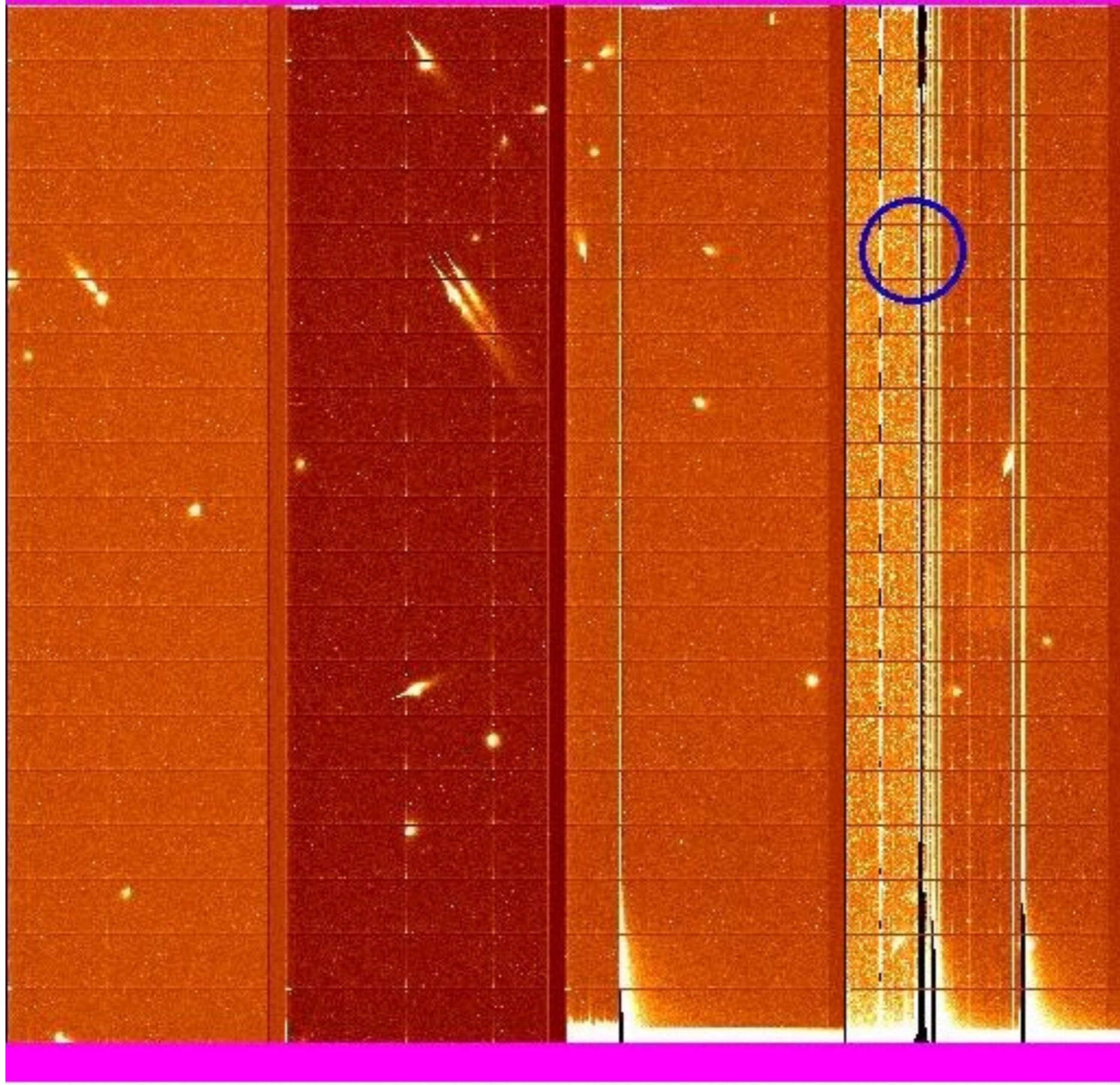
600

700

801

900





2.5e+02

2.7e+02

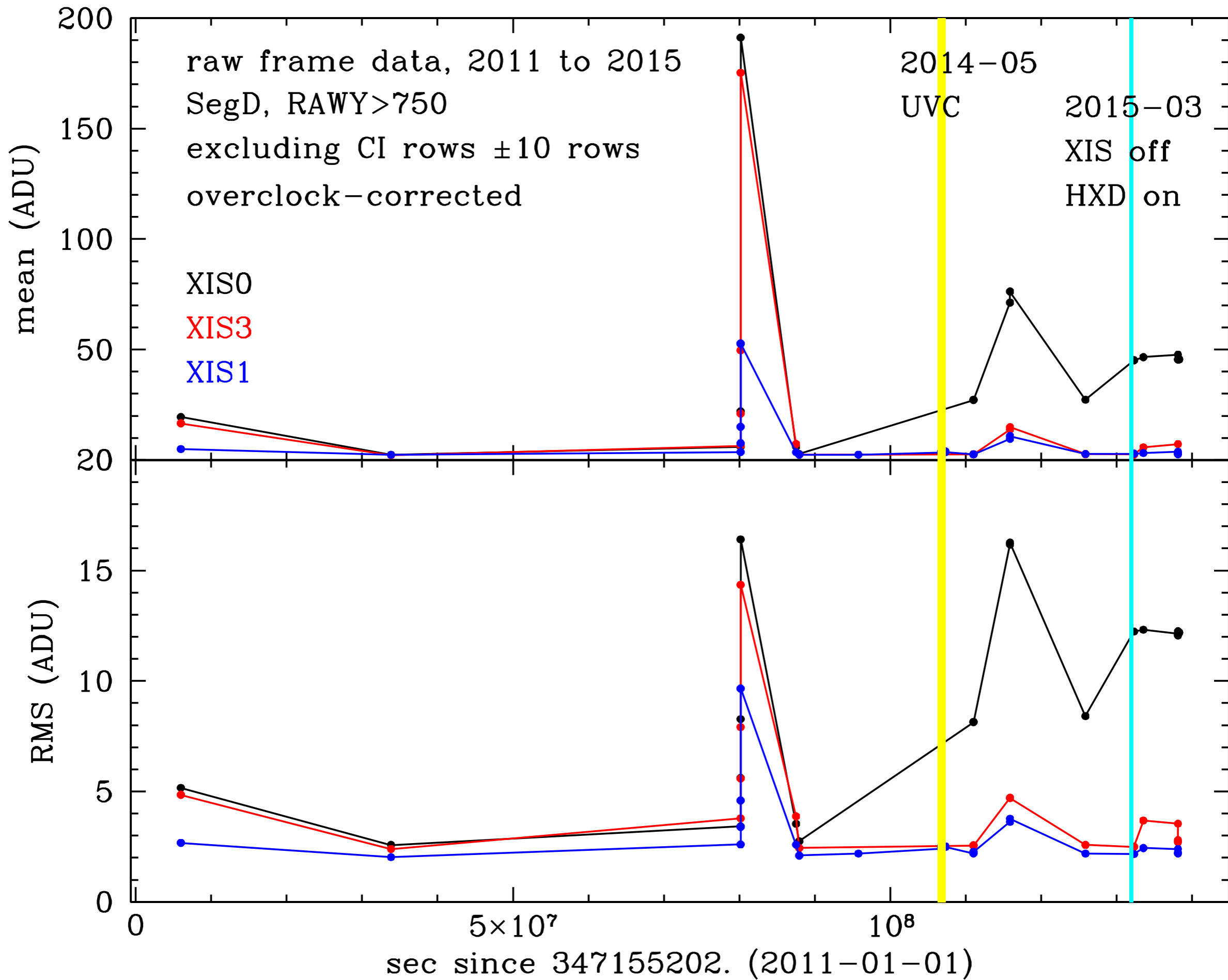
3e+02

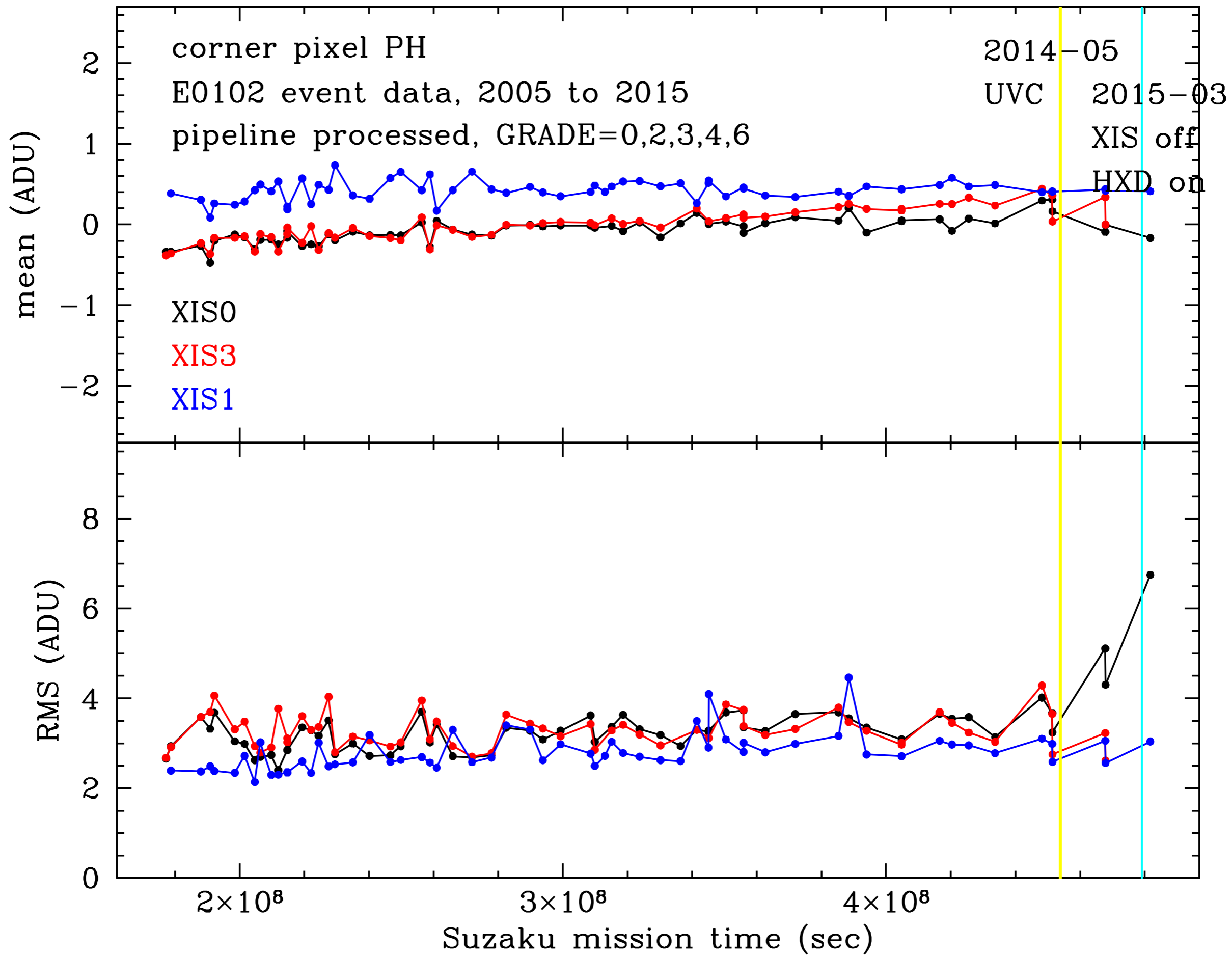
3.3e+02

3.6e+02



XIS FI Noise

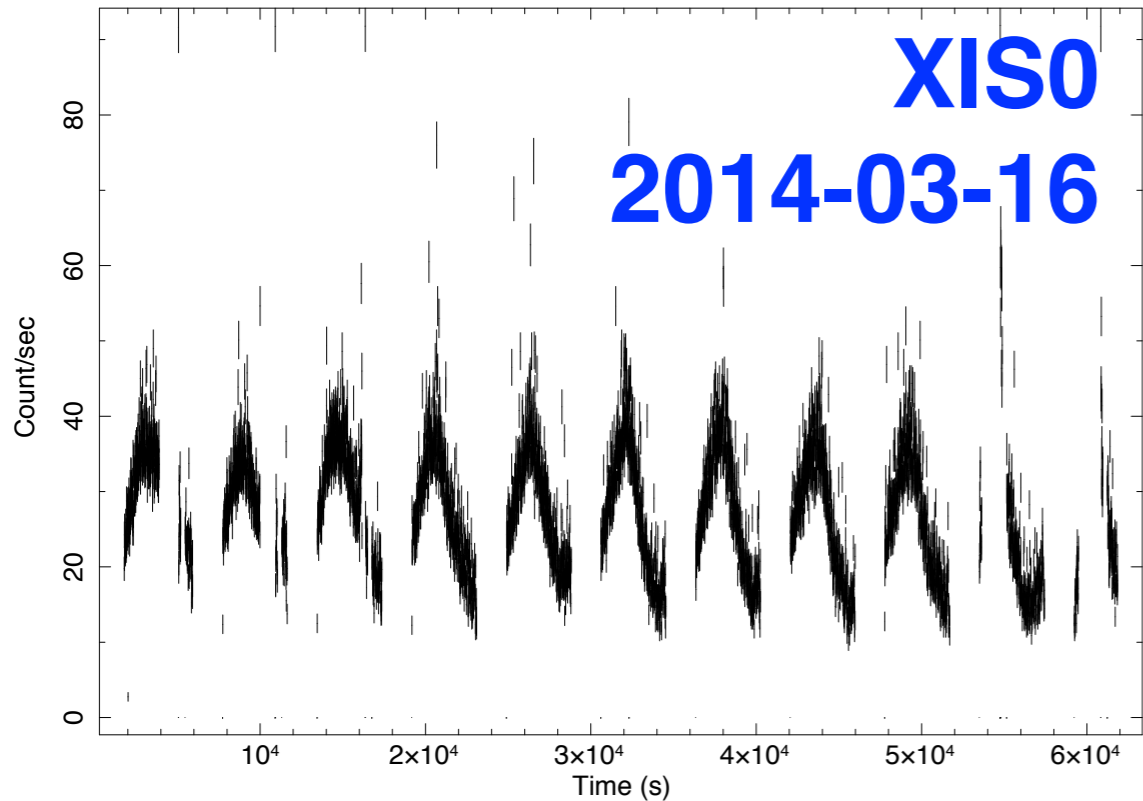




# XIS FI Telemetry Saturation

E0102-72

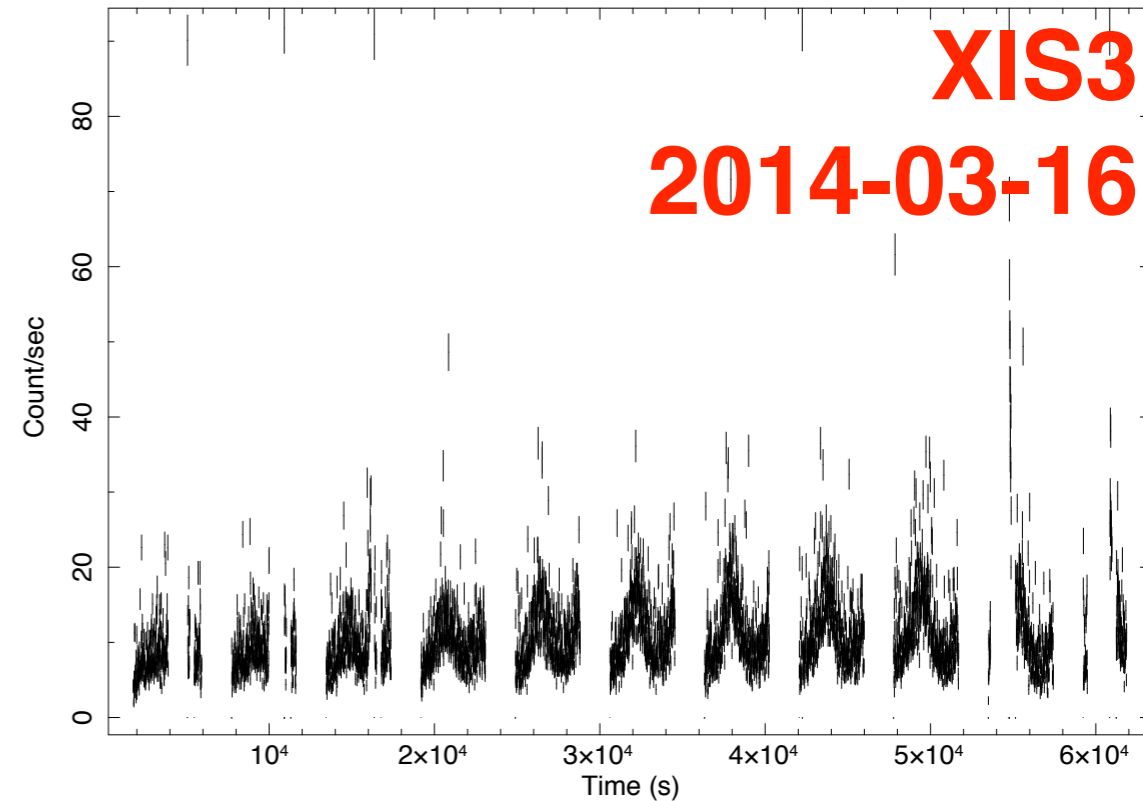
Bin time: 8.000 s



Start Time 16731 16:29:42:479 Stop Time 16732 9:10:54:479

E0102-72

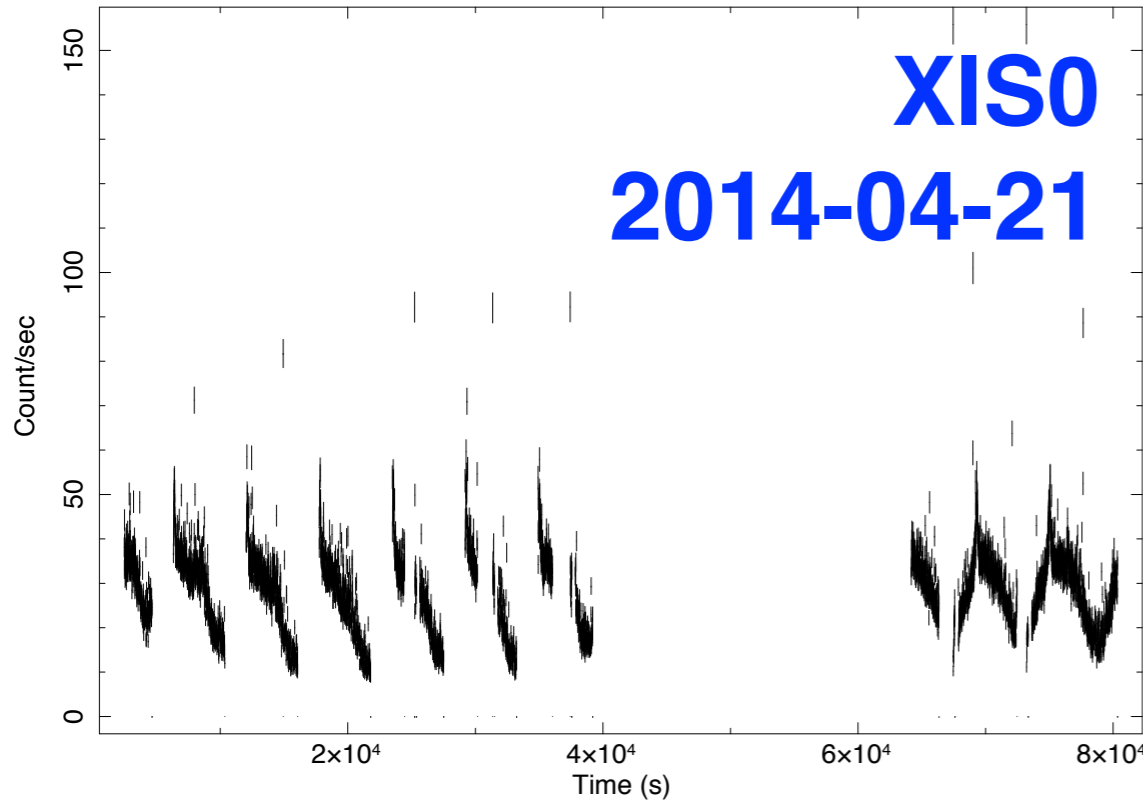
Bin time: 8.000 s



Start Time 16731 16:29:42:479 Stop Time 16732 9:11:02:479

E0102-72

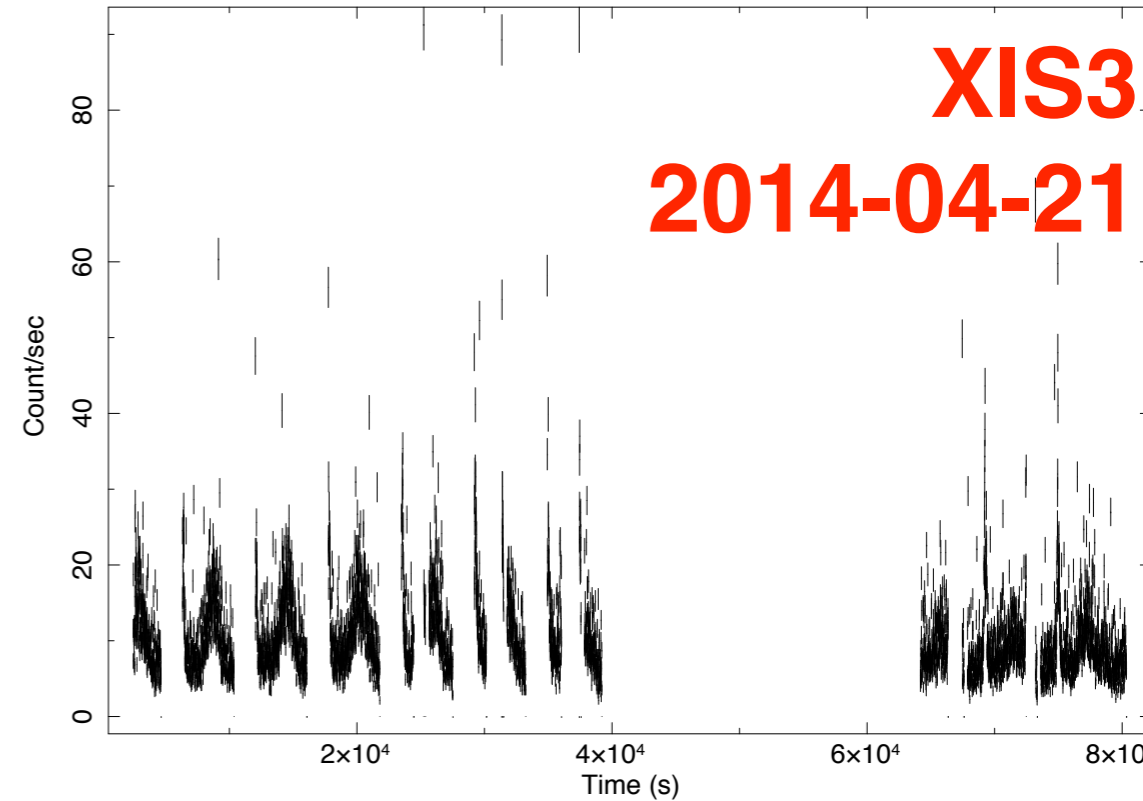
Bin time: 8.000 s



Start Time 16768 5:41:09:655 Stop Time 16769 3:19:09:655

E0102-72

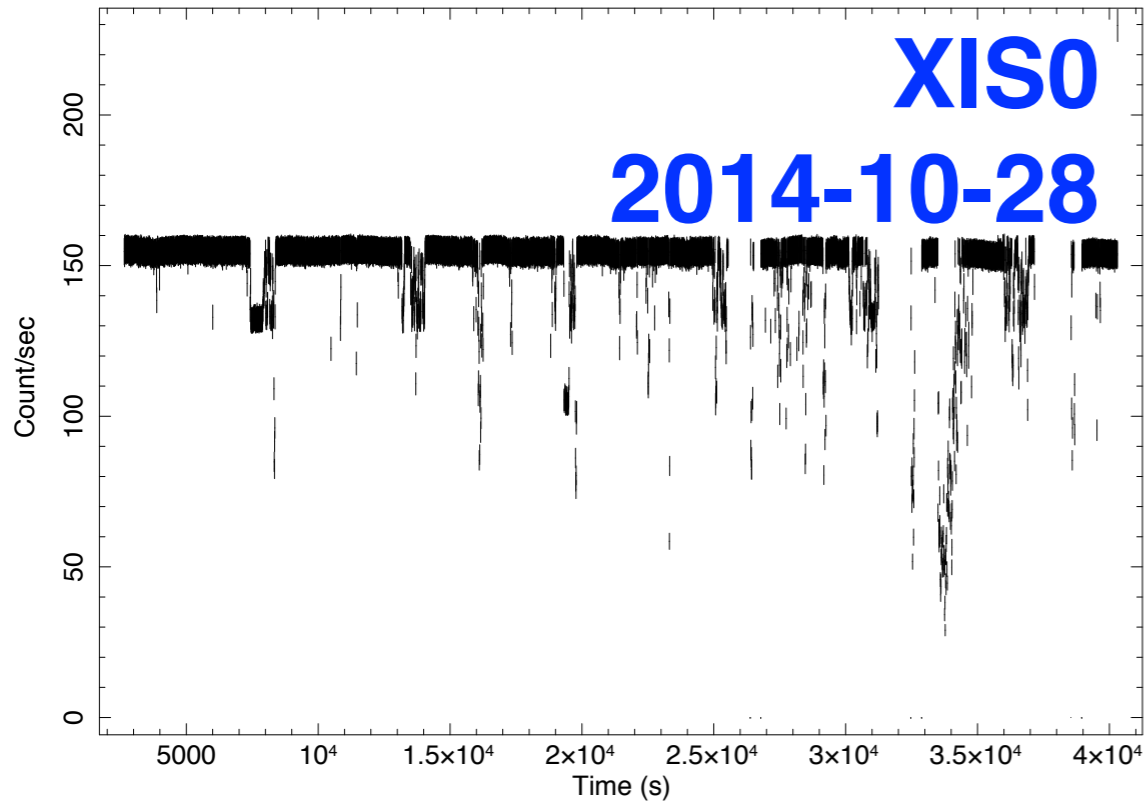
Bin time: 8.000 s



Start Time 16768 5:41:01:655 Stop Time 16769 3:19:09:655

E0102-72

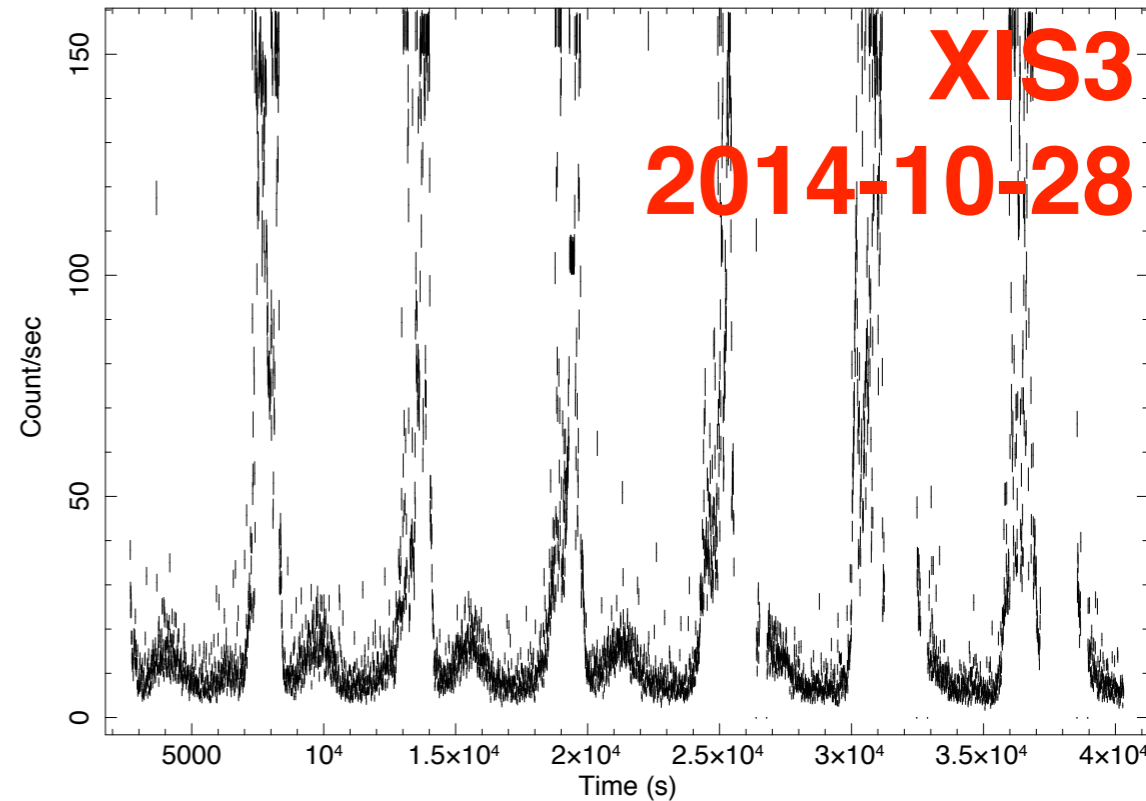
Bin time: 8.000 s



Start Time 16958 7:44:06:322 Stop Time 16958 18:11:50:321

E0102-72

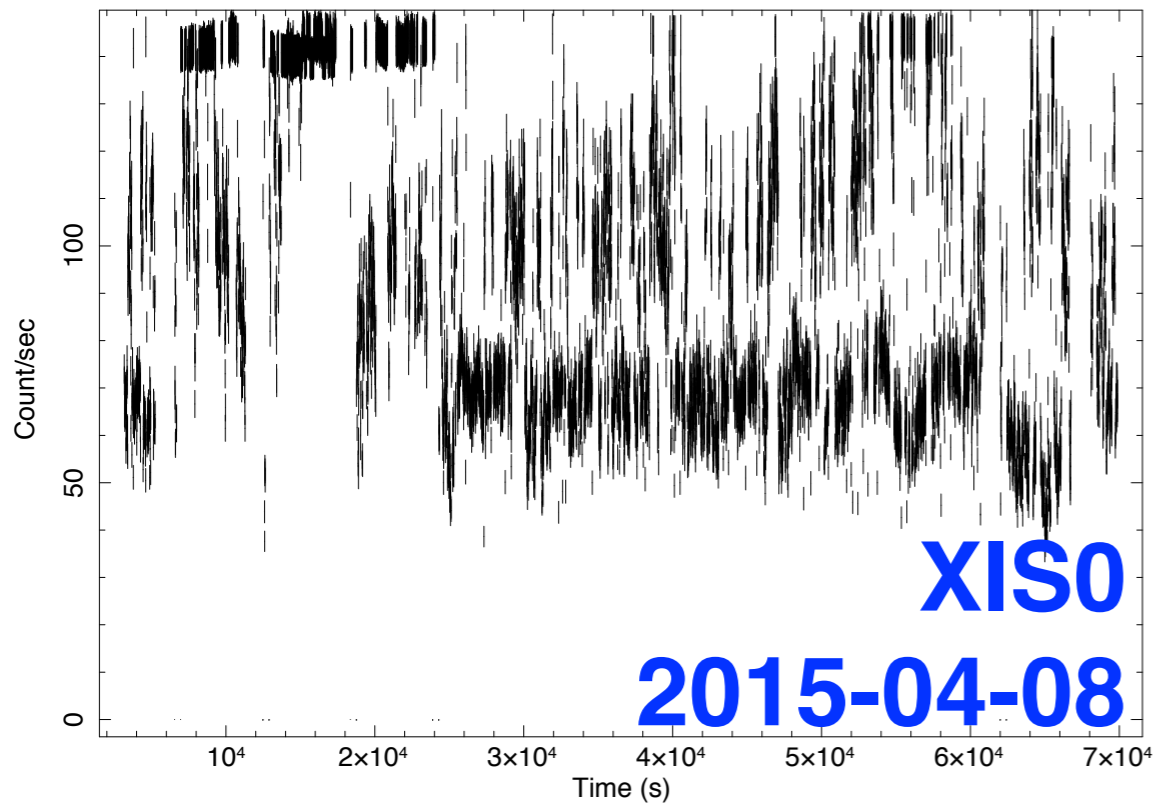
Bin time: 8.000 s



Start Time 16958 7:44:30:322 Stop Time 16958 18:11:50:321

E0102-72\_PSUM

Bin time: 8.000 s



Start Time 17119 14:52:49:352 Stop Time 17120 9:24:41:352

(in P-Sum mode)

XIS3  
2015-04-08

# Summary

- micrometeoroids have produced:
  - several OBF holes (5–10 per CCD?)
  - obvious damage to 2 (maybe 3) CCDs
- CI register provides a pathway for charge leakage
- power cycling or unstable power supply (UVCs) has exacerbated the charge leakage
- BI is robust to damage due to shielded gate structure (?)