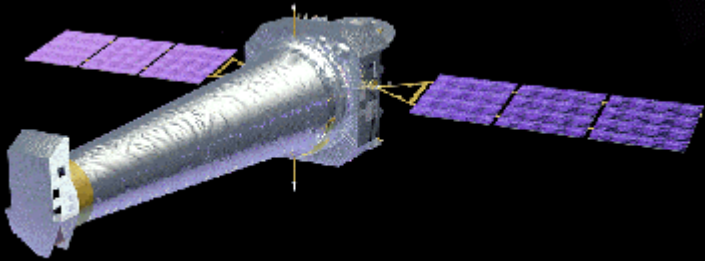
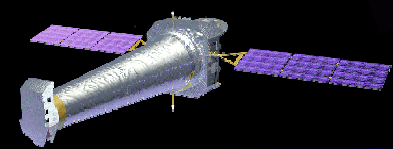


Spacecraft Stability

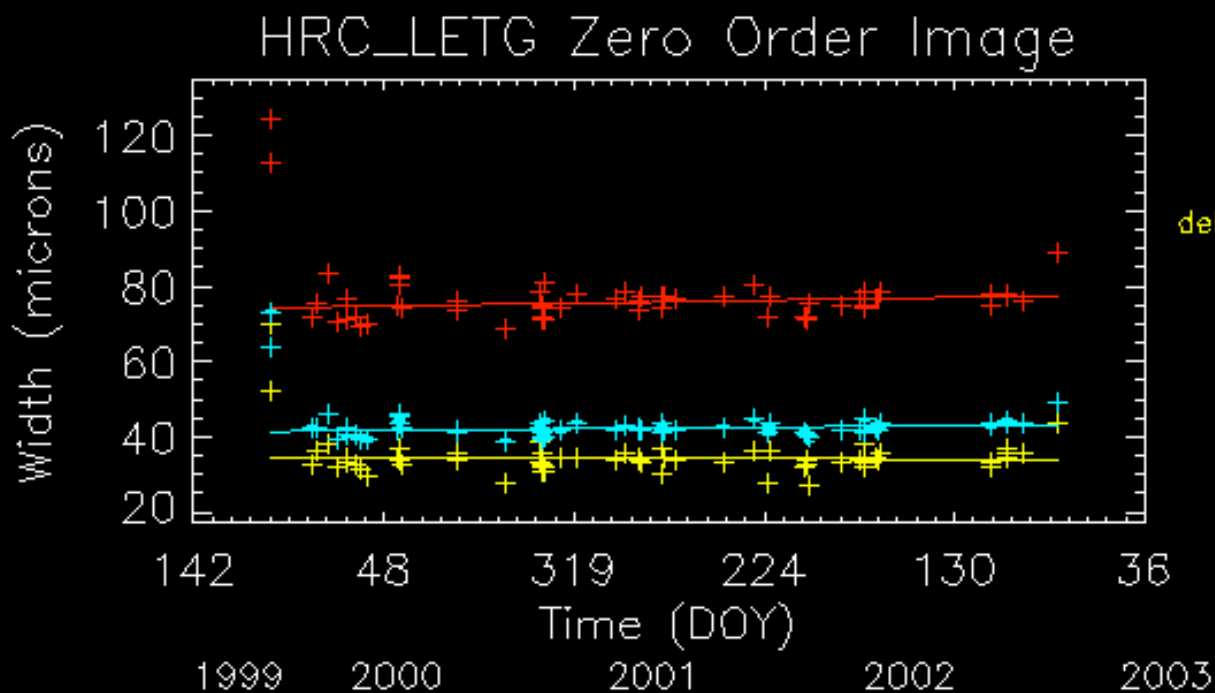
Scott Wolk
(CXC/M&TA)





The Spacecraft

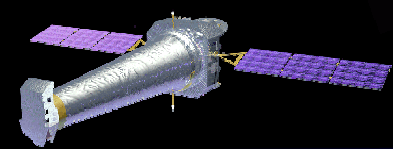
- ACIS
- HRC
- EPHIN
- PCAD
- SIM
- Chandra end to end
 - ✓ Focus
 - ✓ Spectral Resolution



AX LRF at 10% of peak
delta 1.00323 microns/yr

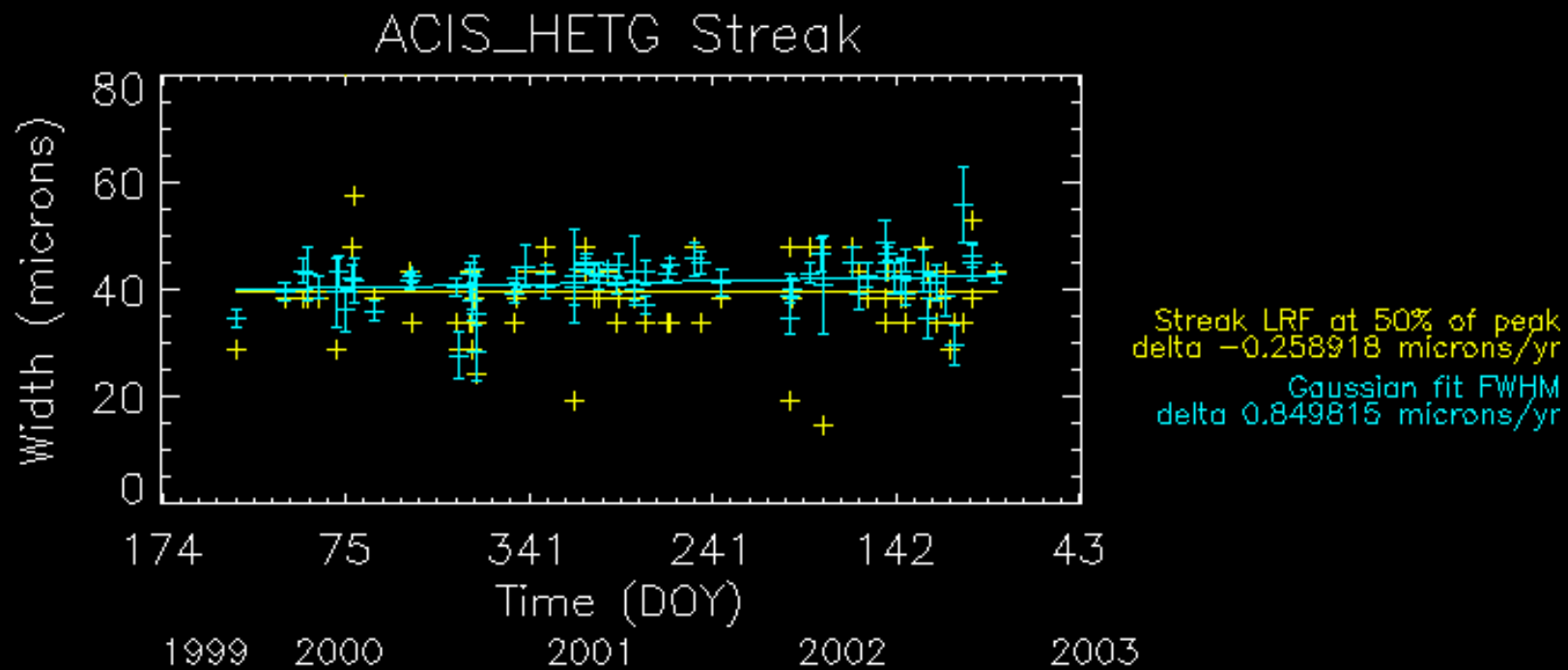
AX LRF at 50% of peak
delta -0.0797791 microns/yr

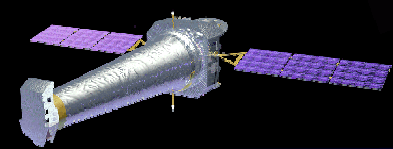
Gaussian fit FWHM
delta 0.595837 microns/yr



The Spacecraft

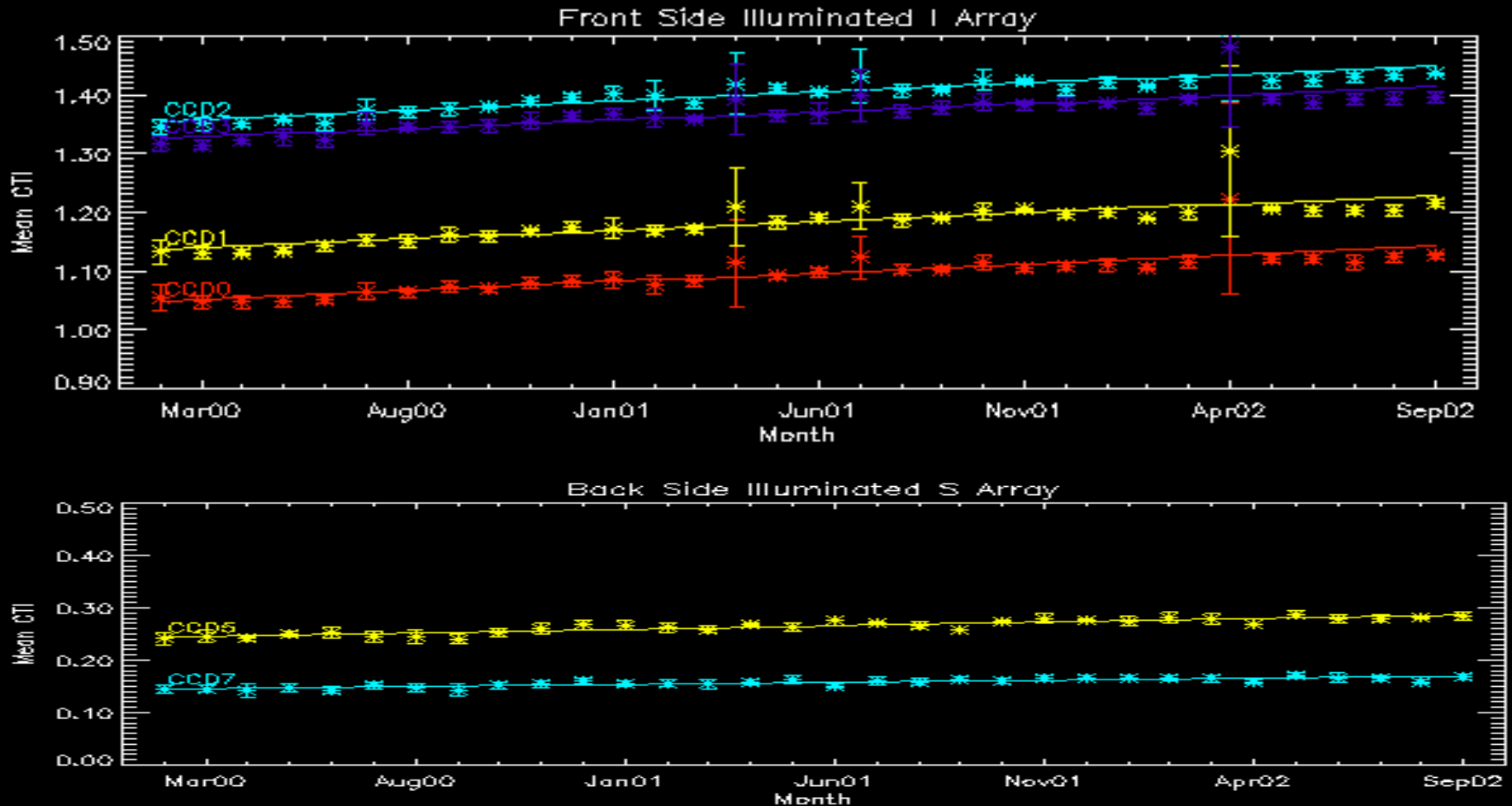
- ACIS
- HRC
- EPHIN
- PCAD
- SIM
- Chandra end to end
 - ✓ Focus
 - ✓ Spectral Resolution

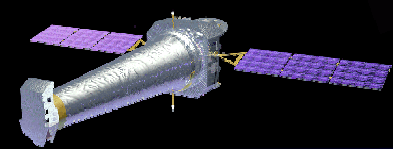




ACIS

- Low Energy QE (Plucinsky)
- CTI
 - ✓ increasing at a rate of 2-3%/yr.

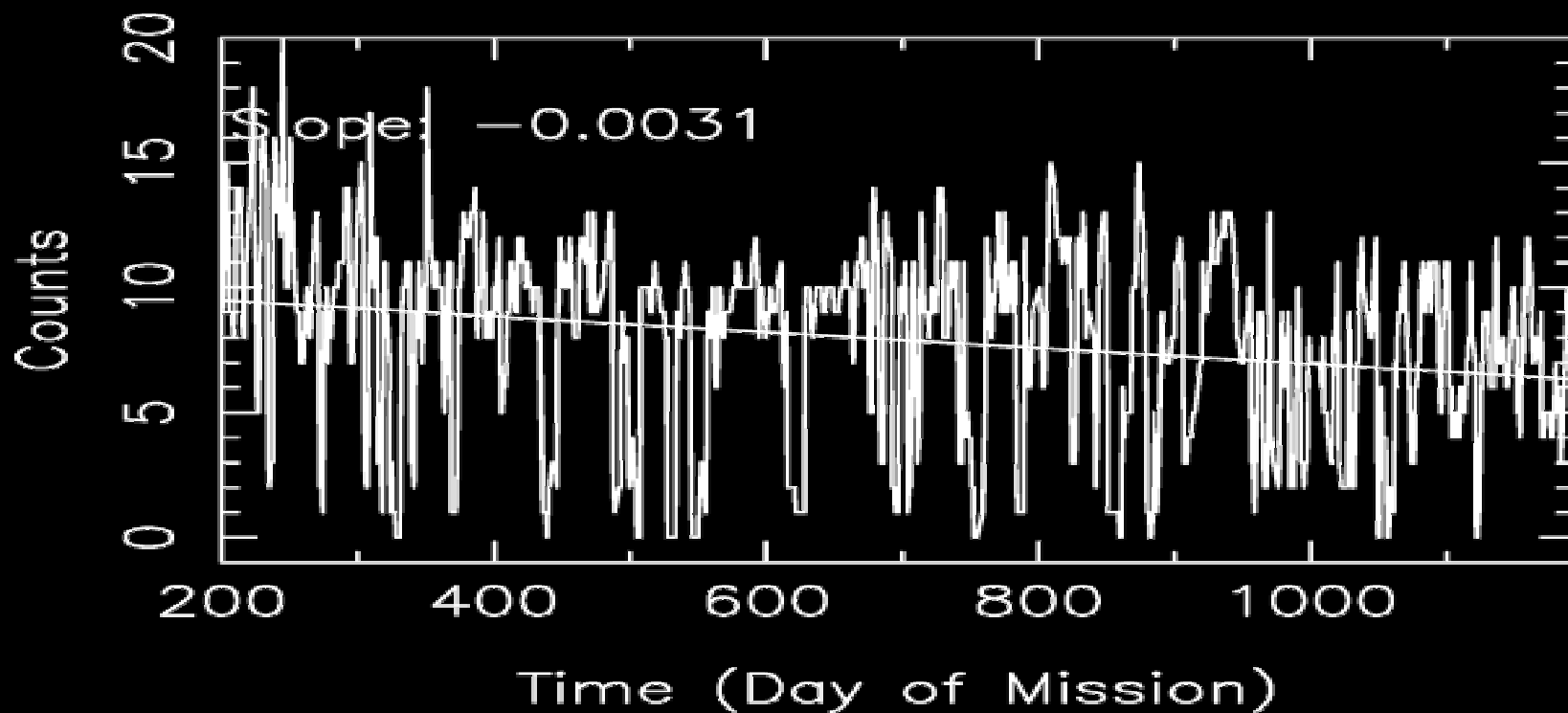


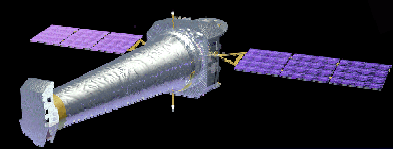


ACIS

- Low Energy QE (Plucinsky)
- CTI
 - ✓ increasing at a rate of 2-3%/yr.
- Questionable Pixels
 - ✓ <100 out of 10,000,000 in 3 years

Numbers of New Warm Pixels: Front Side CCDs

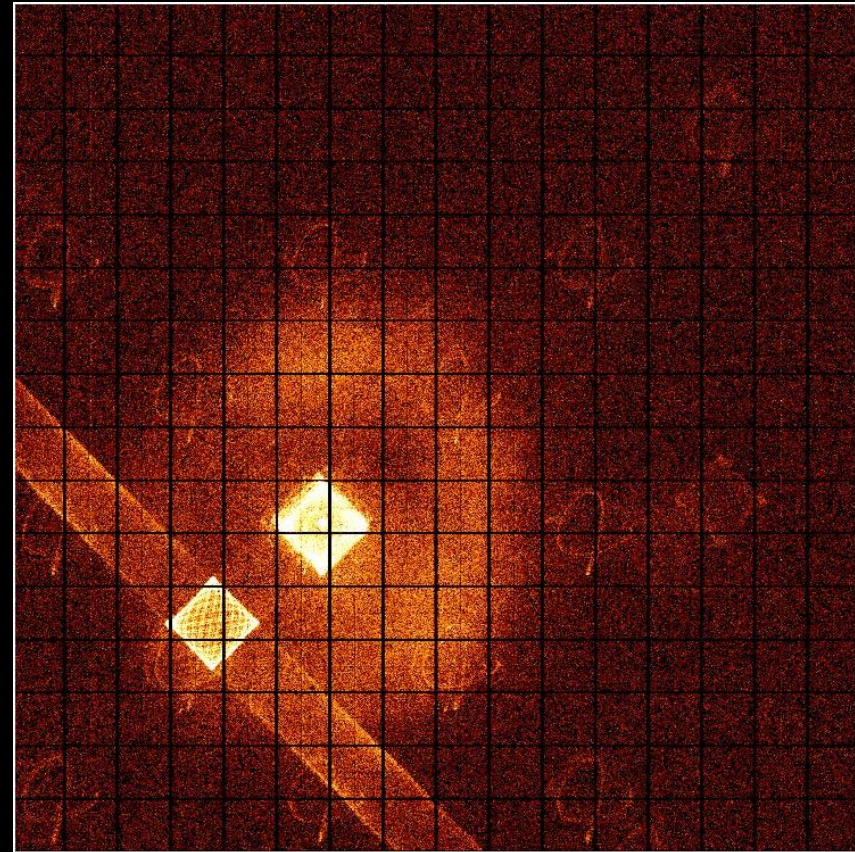
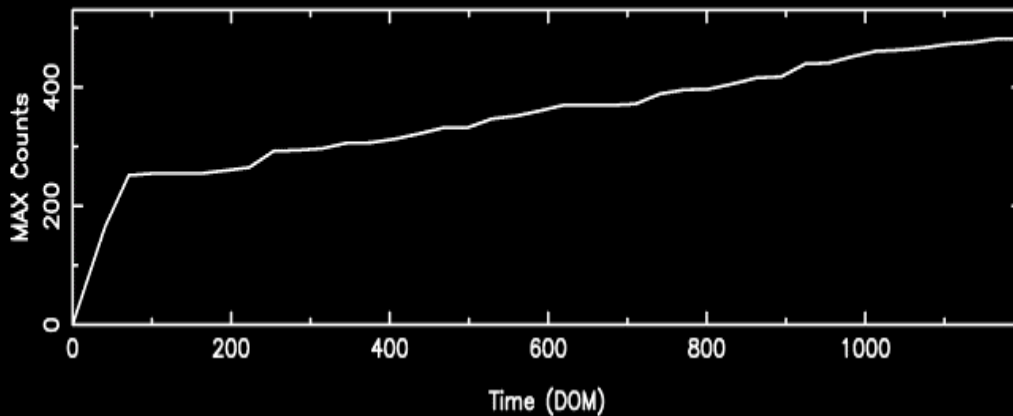


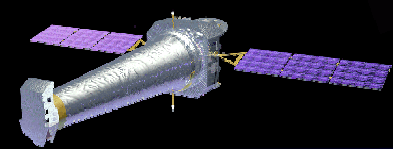


HRC

- Main concern is “dose”. After ~ 1000 photons in a single pore gain will drop by 10%.
 - ✓ 0 pores on HRC-I have cleared this threshold.

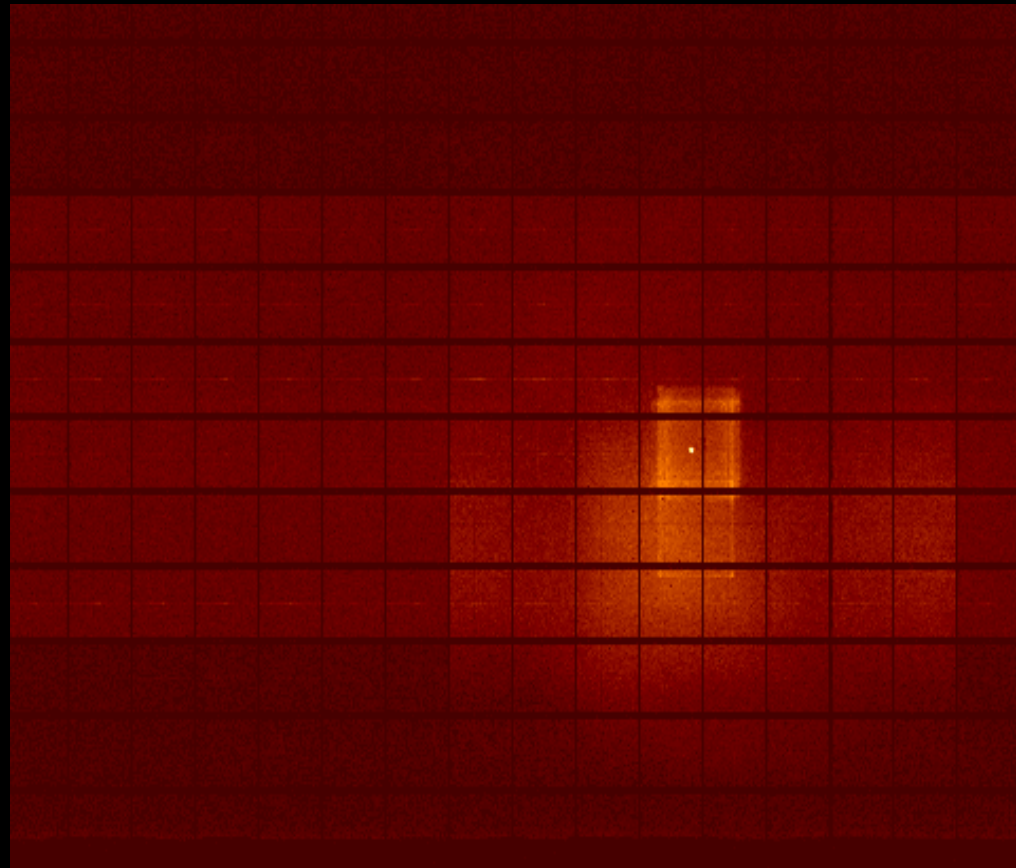
HRC-I

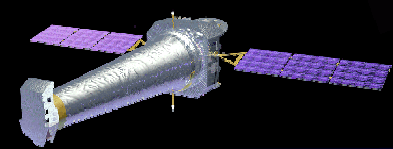




HRC

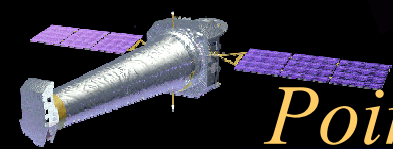
- Main concern is “dose”. After ~ 1000 photons in a single pore gain will drop by 10%.
 - ✓ 0 pores on HRC-I have cleared this threshold.
 - ✓ Less than 0.00001 of the pores in the HRC-S center array have exceeded this threshold.





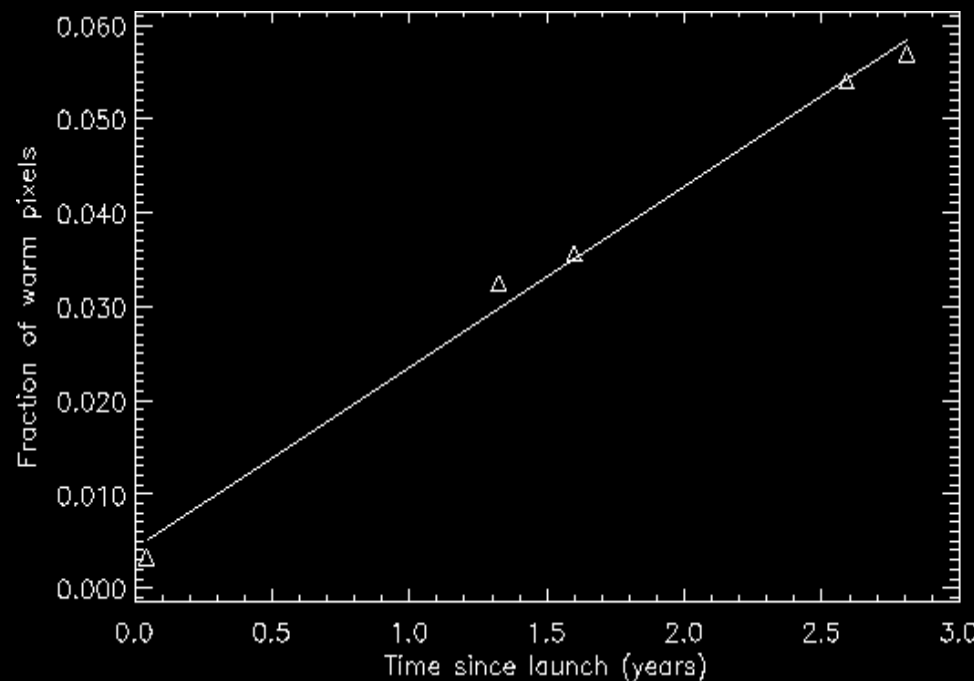
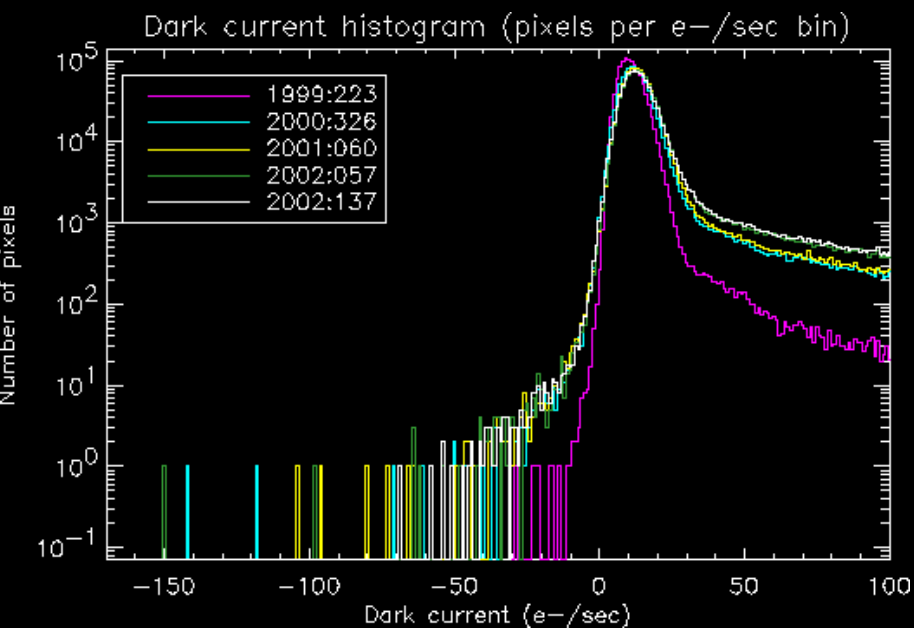
EPHIN & SIM

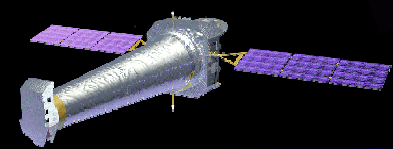
- EPHIN - Monitors radiation environment.
 - ? Slow long-term warming
 - ✓ No effect on radiation count rates
- SIM - Moves the instruments back and forth.
 - ✓ Move duration and location unchanged.
 - ? Very slow long-term warming.



Pointing Control & Attitude Determination

- Celestial Location Monitoring (Aldcroft)
 - ✓ Gyros (very occasional bias glitches)
- Warm Pixels
 - ⇔ Increasing at a rate of 2-3% per year.





Long Term Prospects

- Chandra
 - ✓ Focus
 - ✓ Resolving Power
- ACIS
 - ⇔ Low Energy QE
 - ✓ CTI
 - ✓ Bad Pixels
- HRC
 - ✓ Dose
- EPHIN
 - ⇔ Thermal
- SIM
 - ✓ Motions
 - ⇔ Thermal
- PCAD
 - ✓ ACA
 - ⇔ dark current
 - ✓ offsets
 - ✓ Gyros

While we may need to change our approach in how we operate the spacecraft, there are currently no issues which indicate that the fundamental capabilities of *Chandra* will change within the next 5 years.