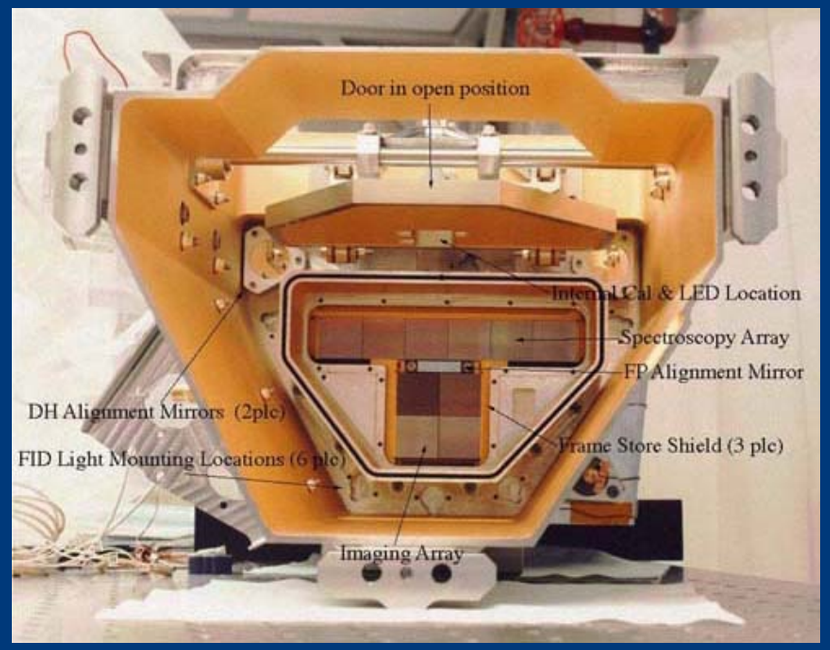
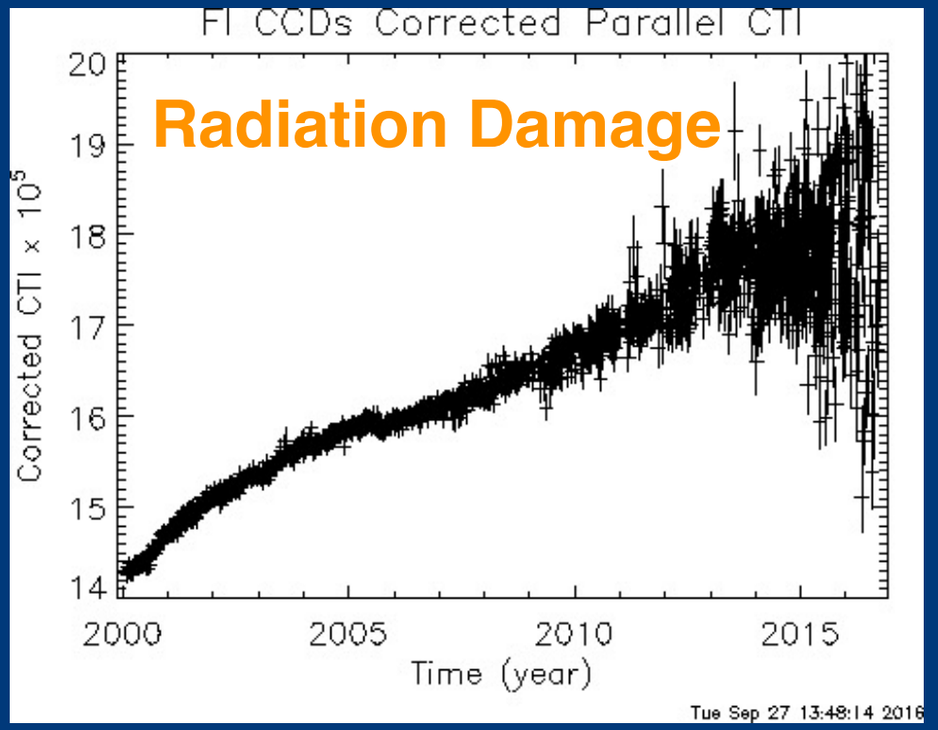
Chandra Calibration Status

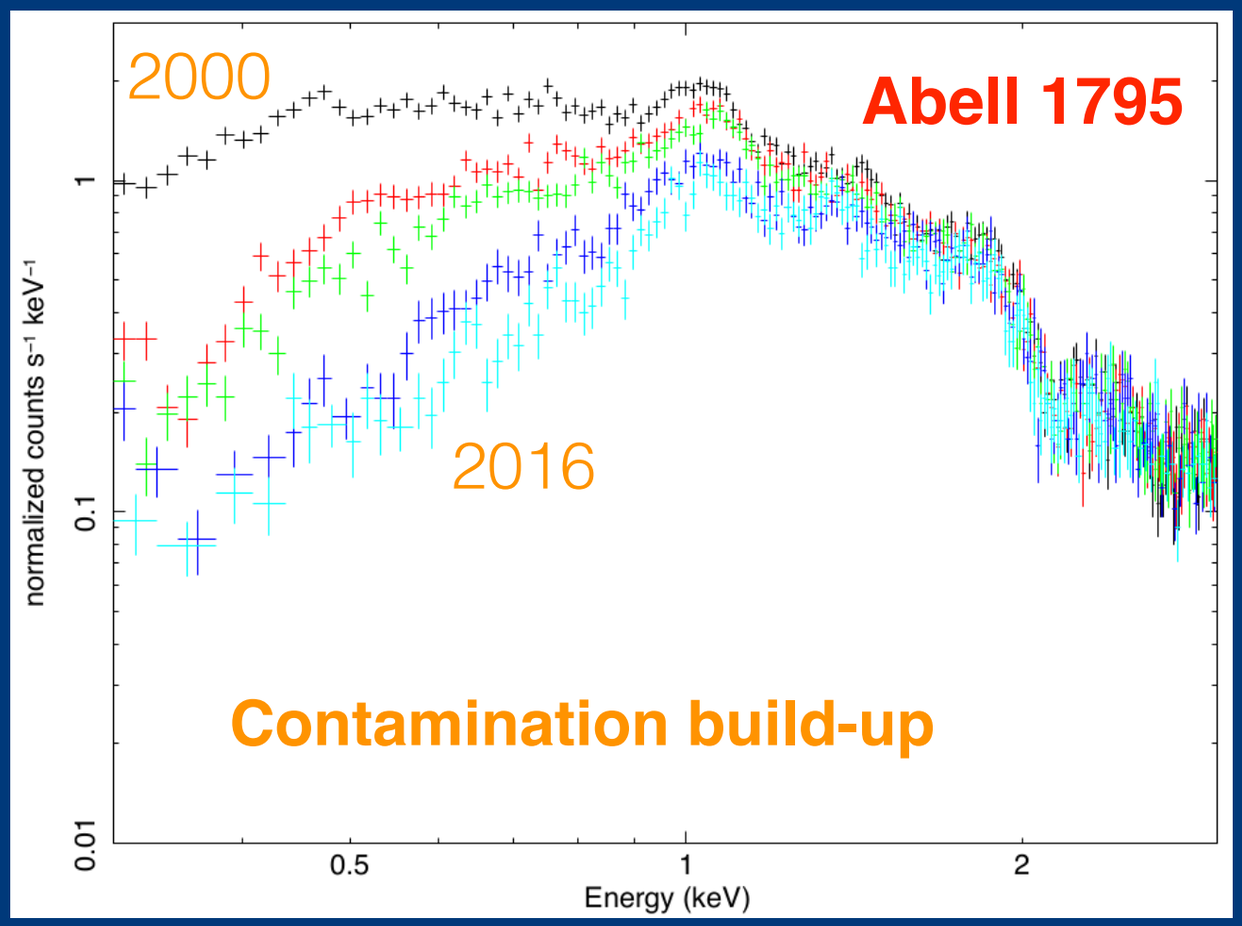
IACHEC Meeting - March 27, 2017

ACIS - Three Main Culprits Affecting Calibration

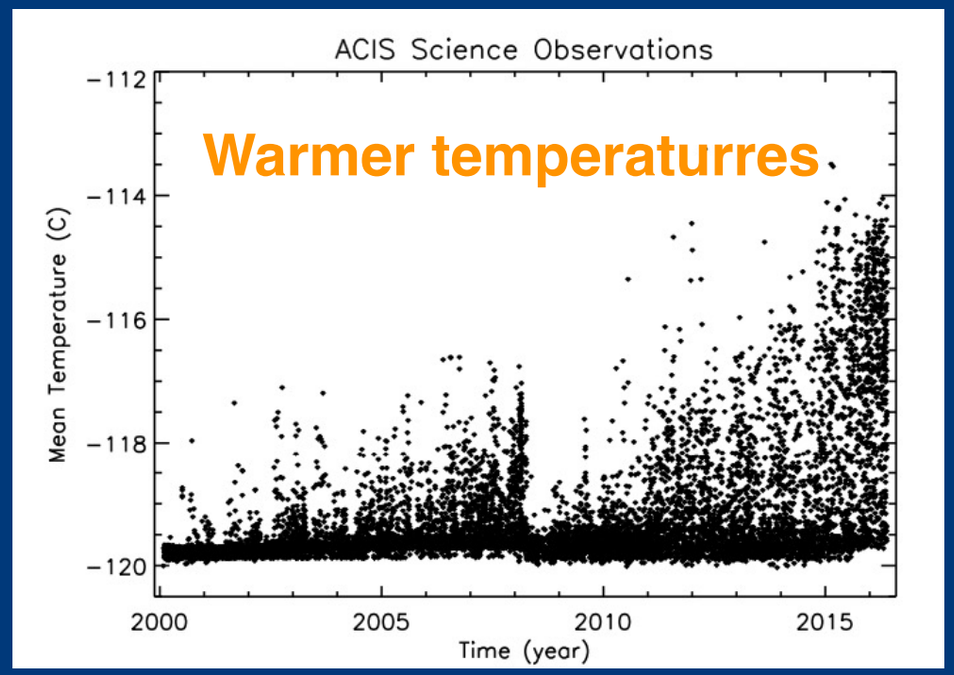




Gain and Spectral Resolution

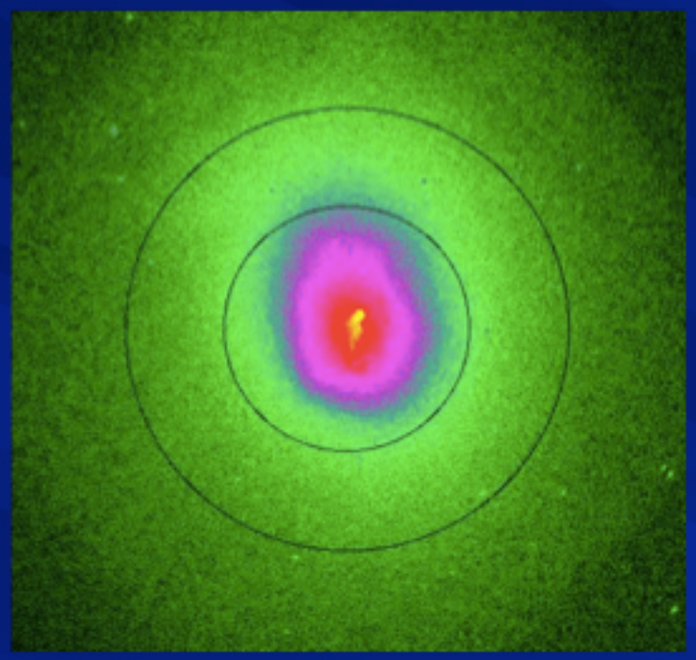


Effective Area



ACIS Effective Area - Monitoring the Contamination

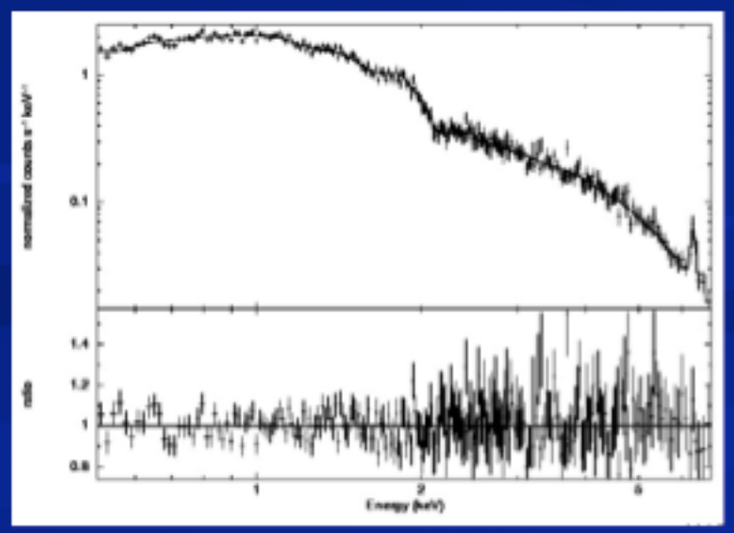
Abell 1795

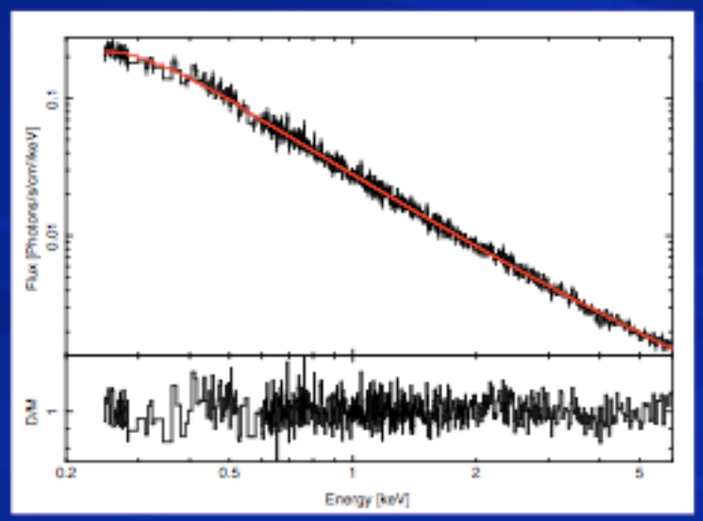


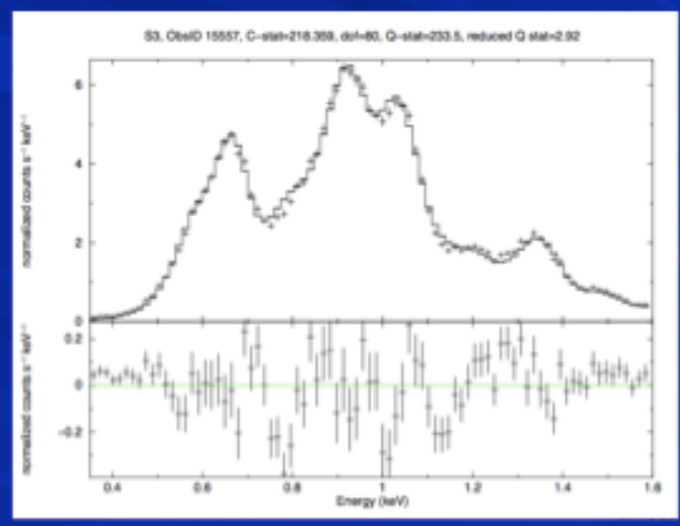
Blazars

Mkn 421
PKS 2111-304

E0102-72

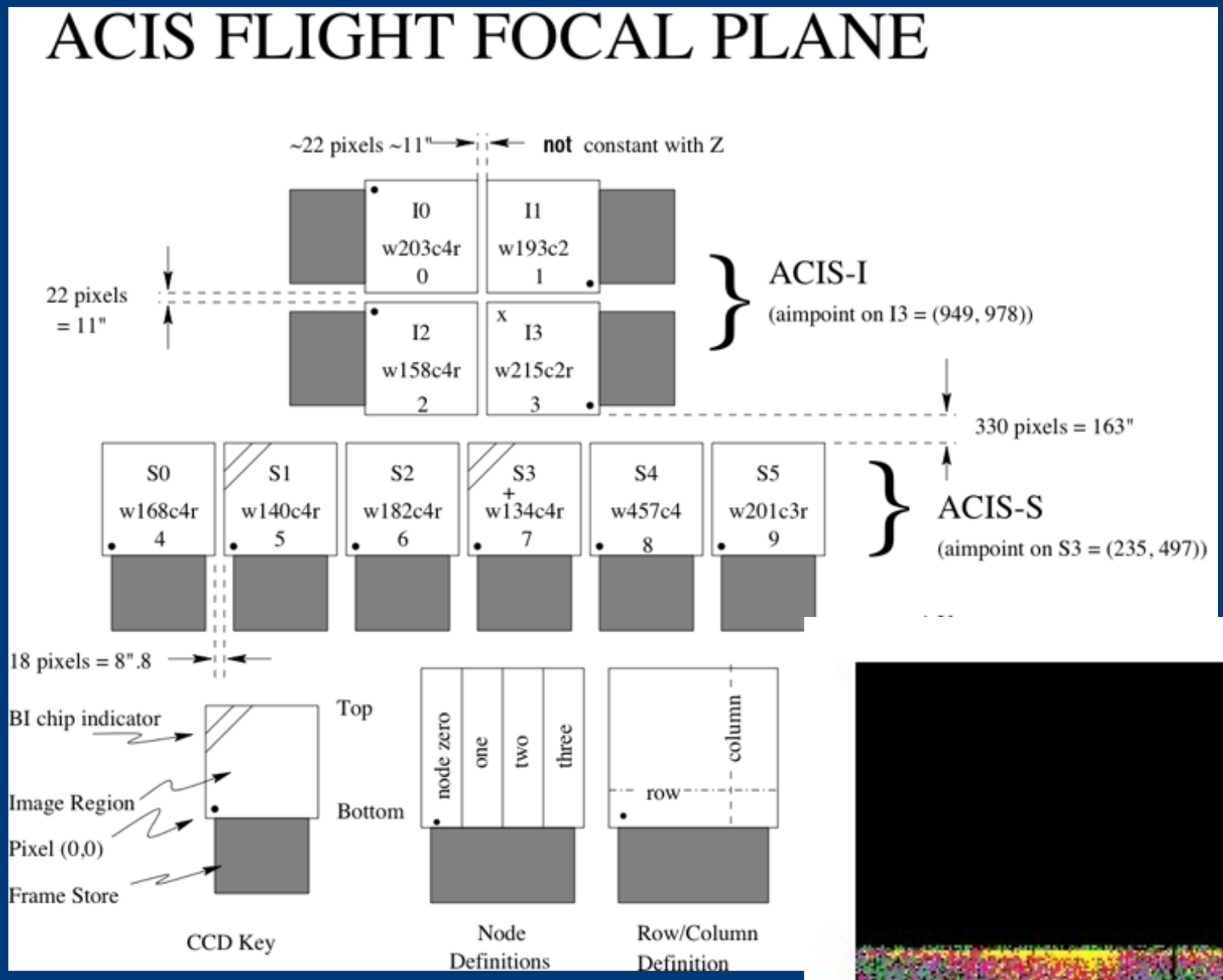






ACIS Effective Area - Monitoring the Contamination

Big Dither LETG/ACIS-S Observations of Mkn 421



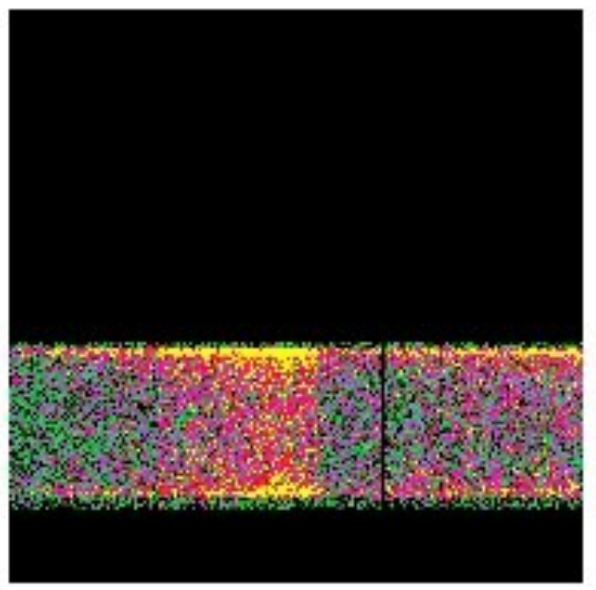
Recent Observations

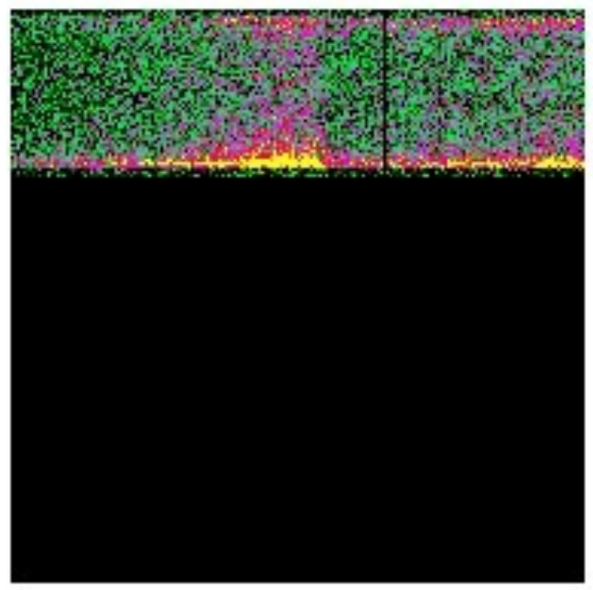
Dec. 2015

Jul. 2016

Jan. 2017

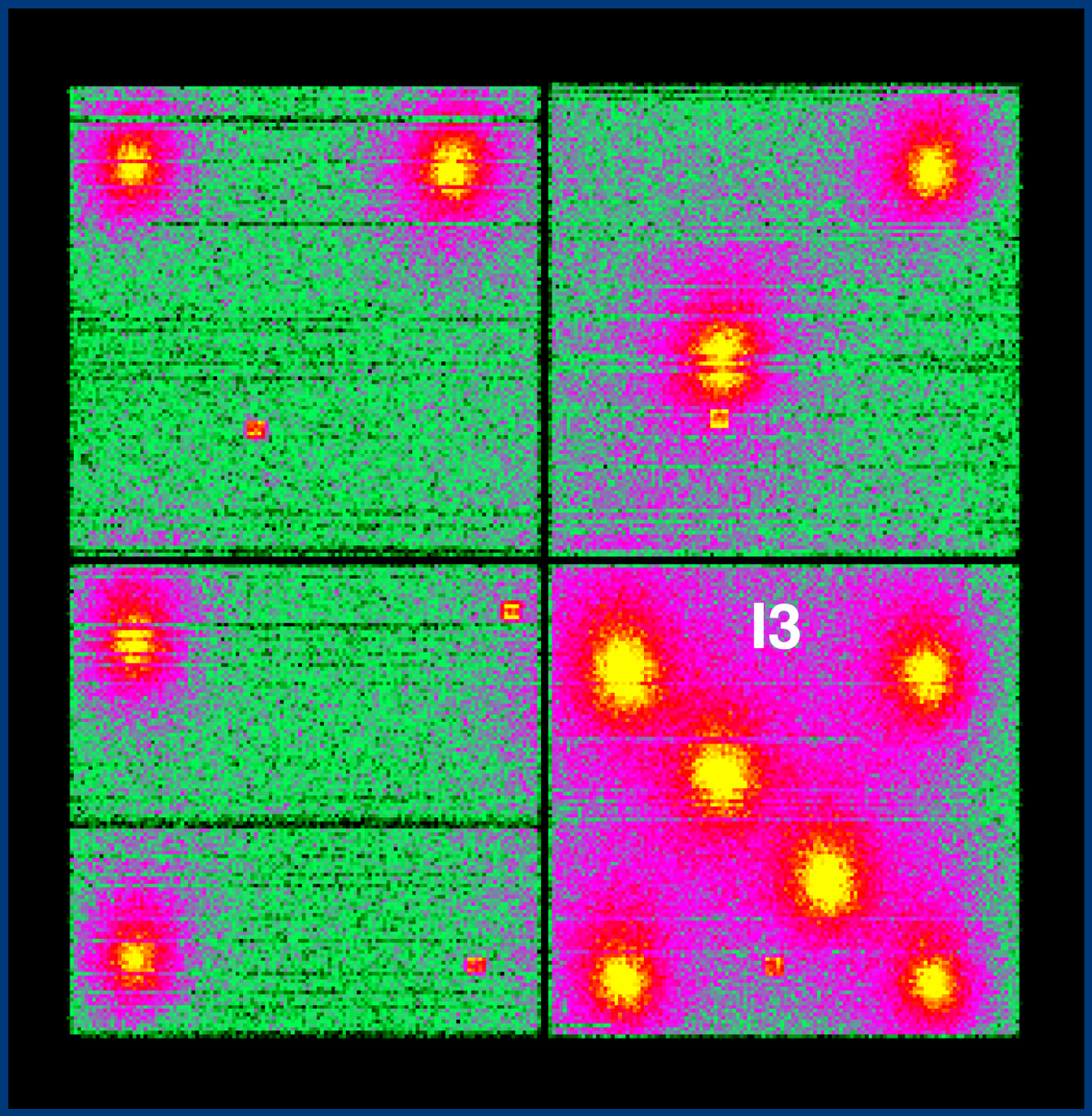
ACIS-S1





ACIS Effective Area - Monitoring the Contamination

Raster Scan of Abell 1795 on ACIS-I



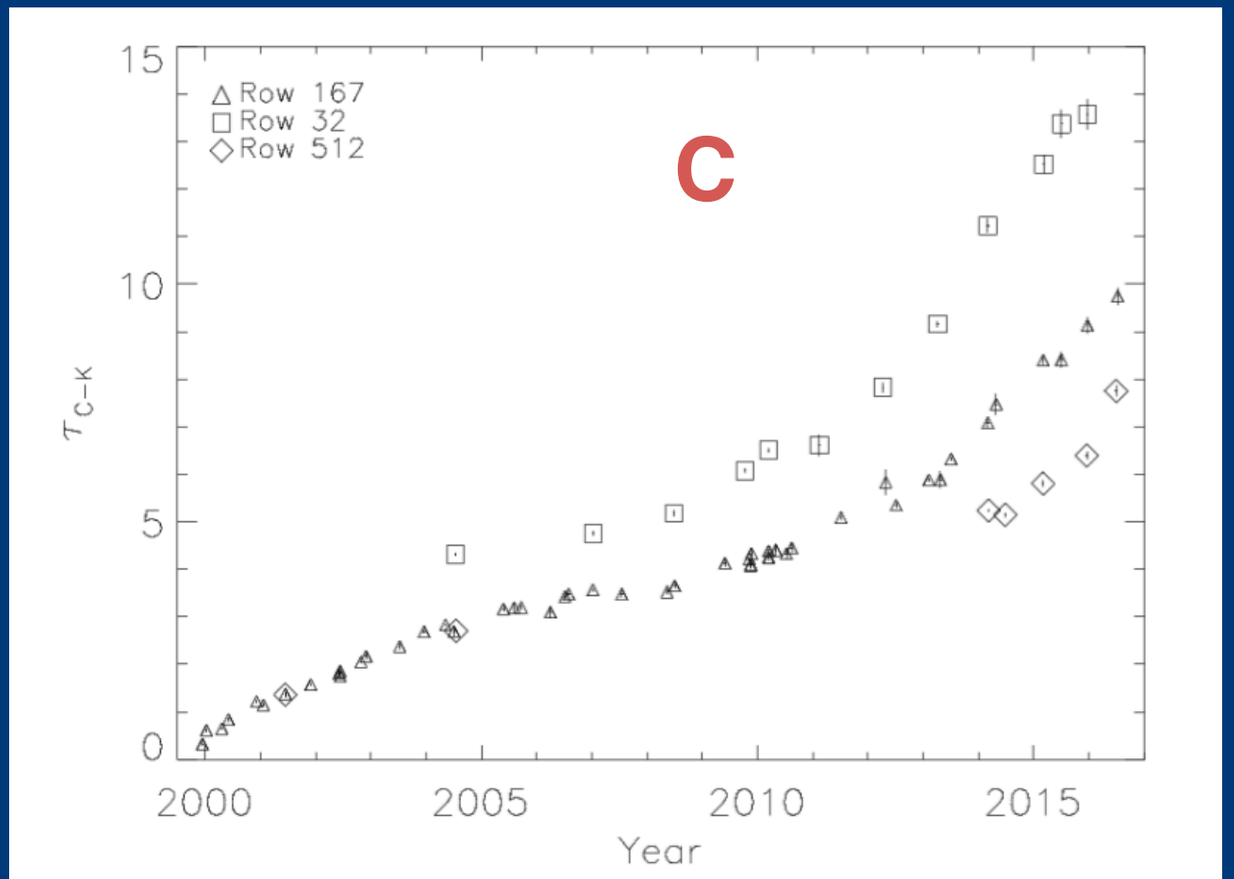
April 2016 data

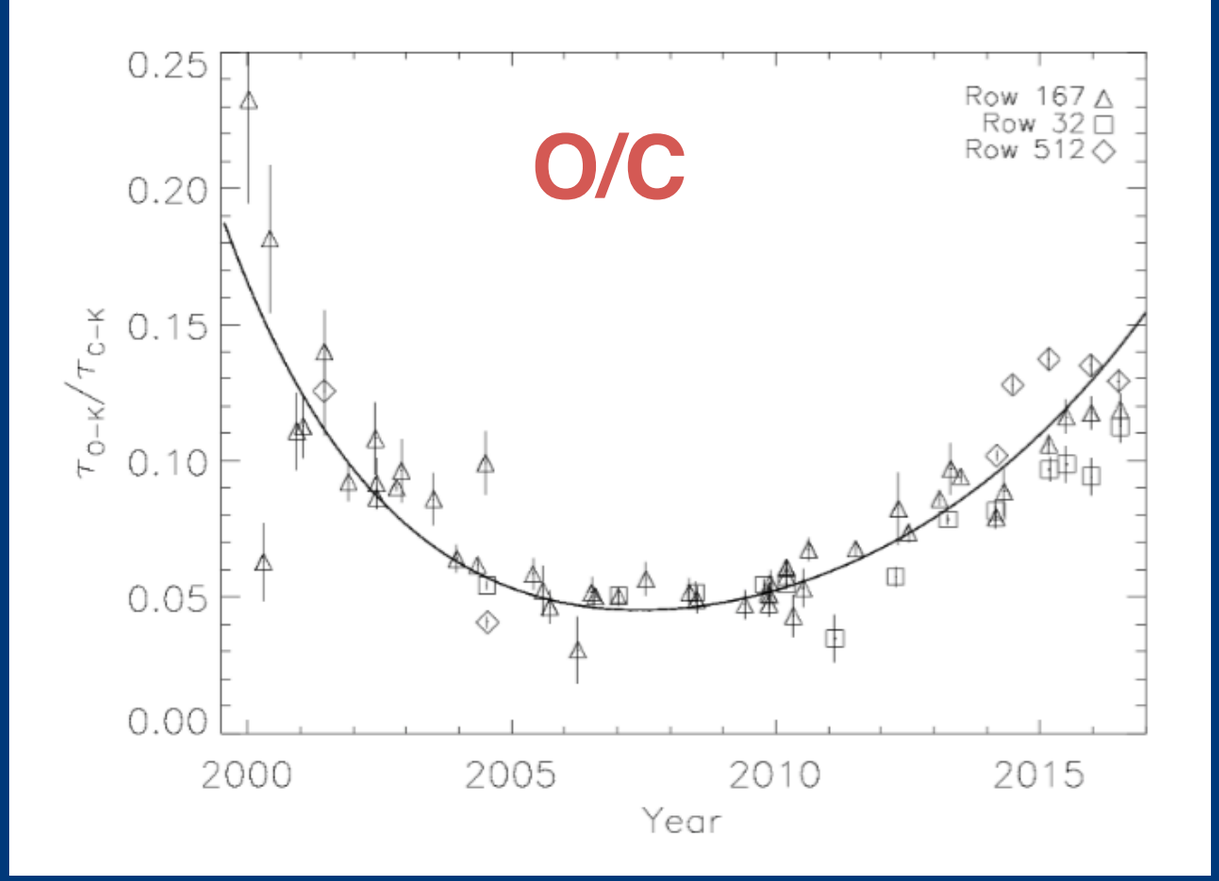
ACIS Effective Area - Monitoring the Contamination

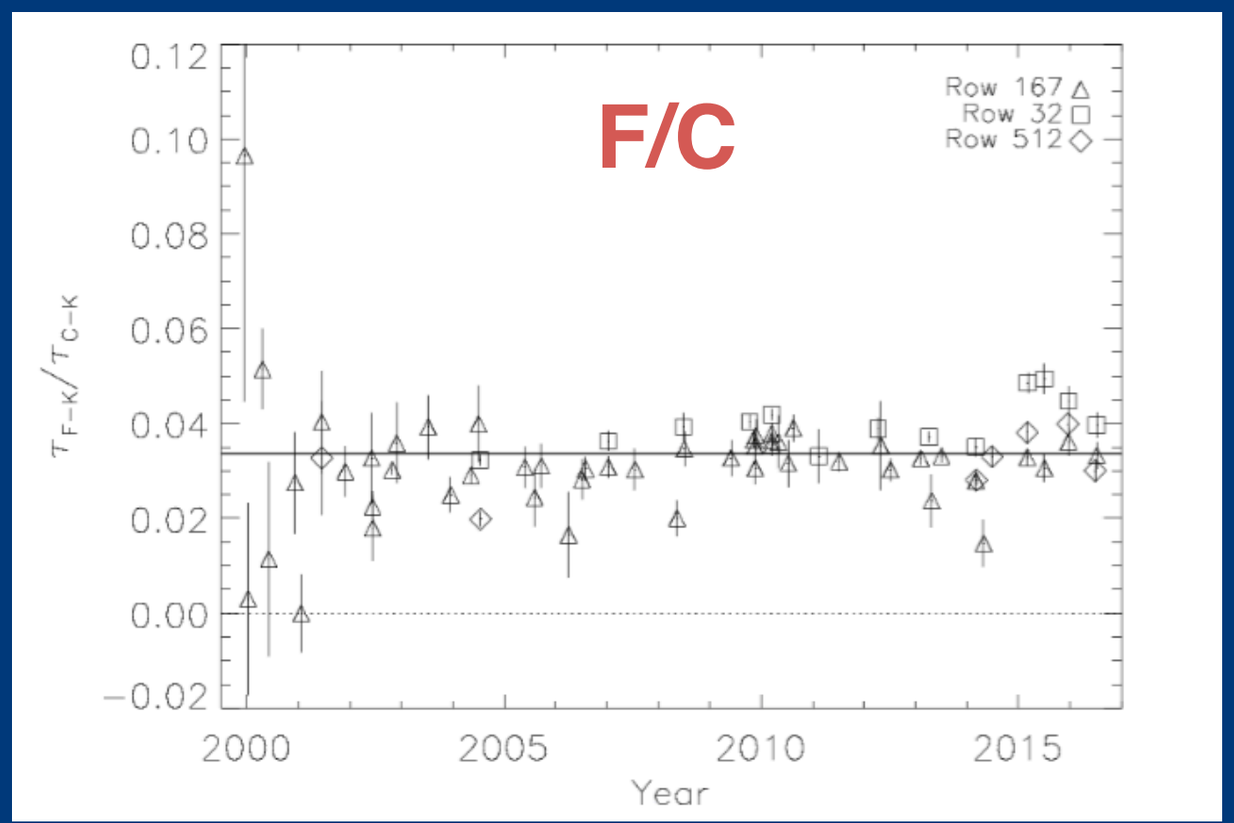
Three components to ACIS Contamination Model:

- **Composition (C, O, and F)**
- **Time-dependence**
- **Spatial-dependence**

Composition and Time-dependence



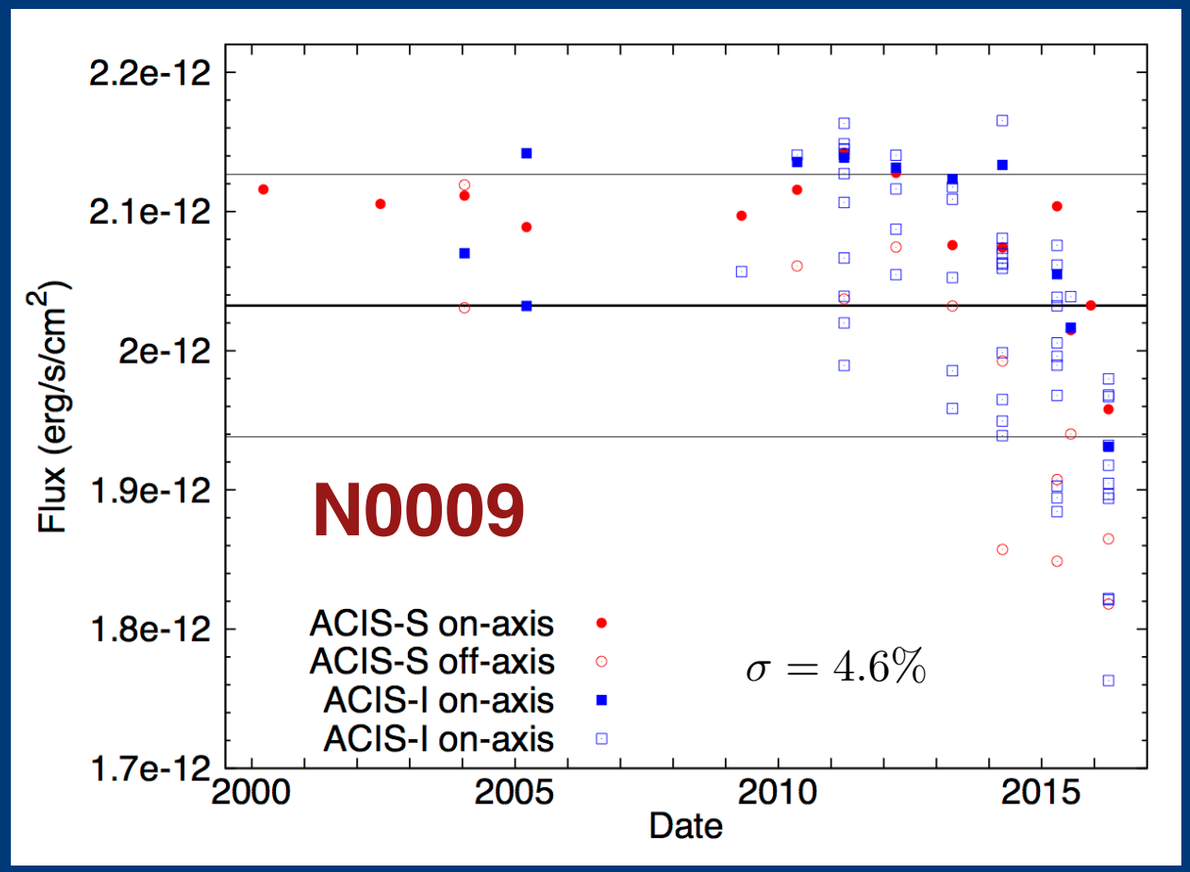


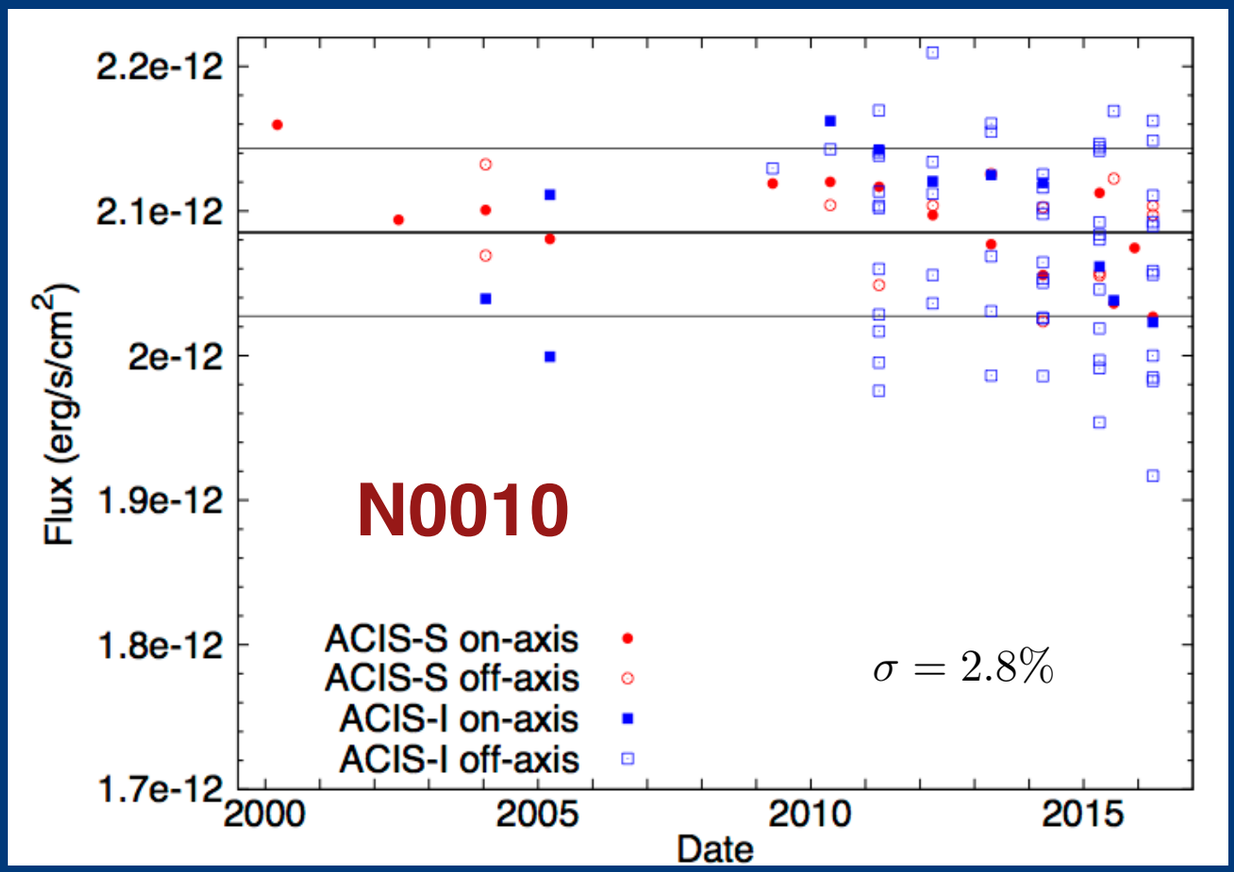


ACIS Effective Area - Monitoring the Contamination

Comparison of present ACIS contamination mode (CALDB N0009) with the new and improved model (v9968 or soon to be CALDB 0010)

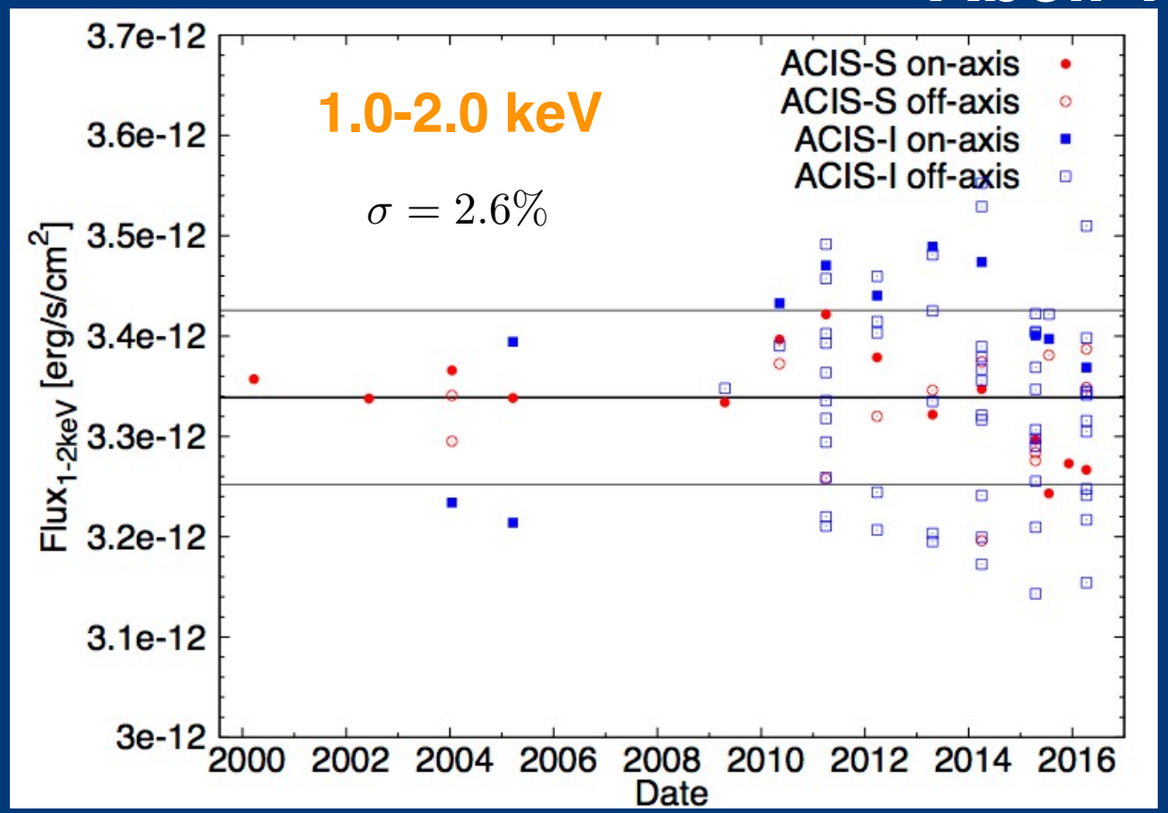
Abell 1795 (0.5-1.0 keV)

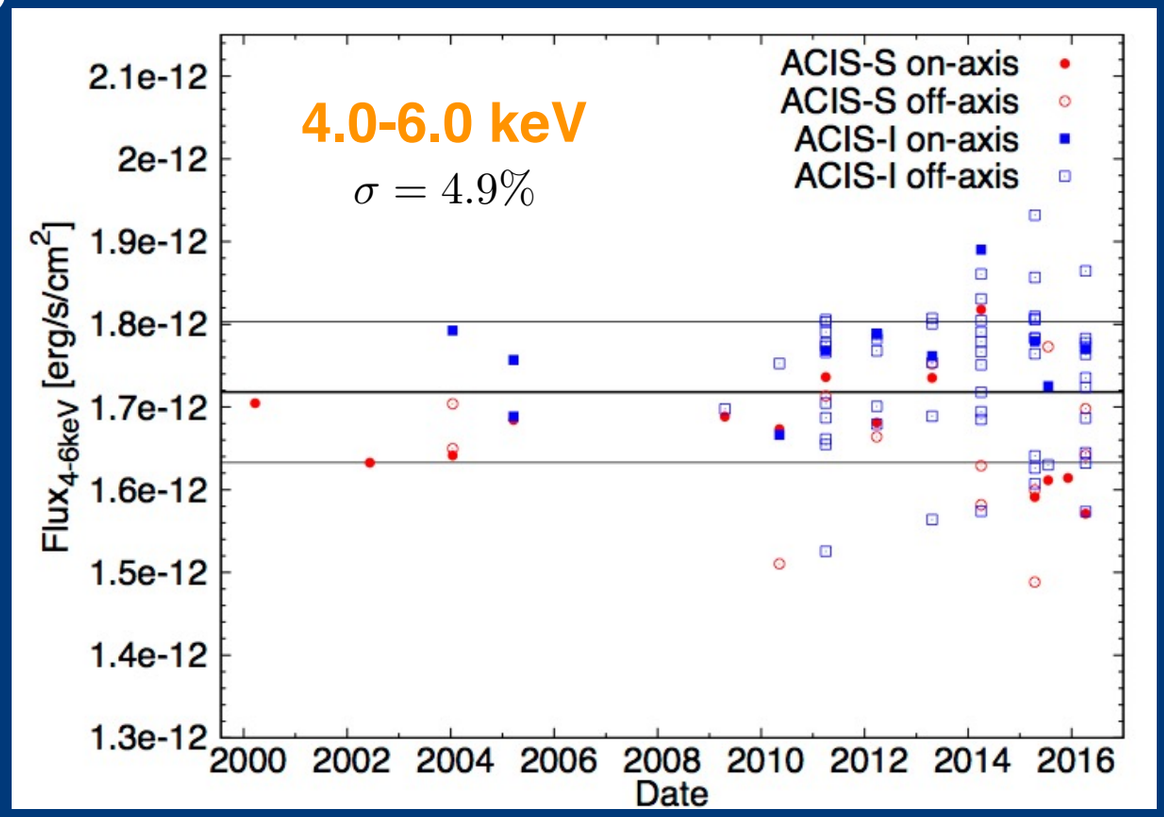


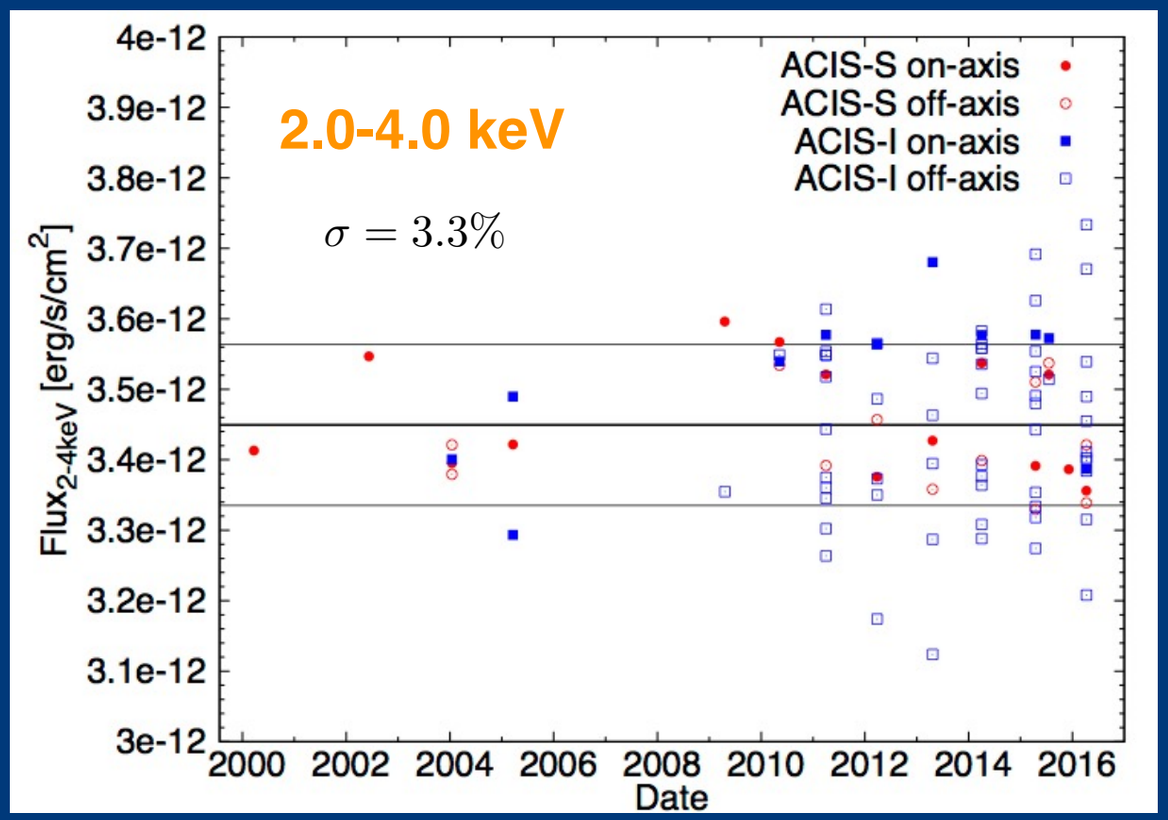


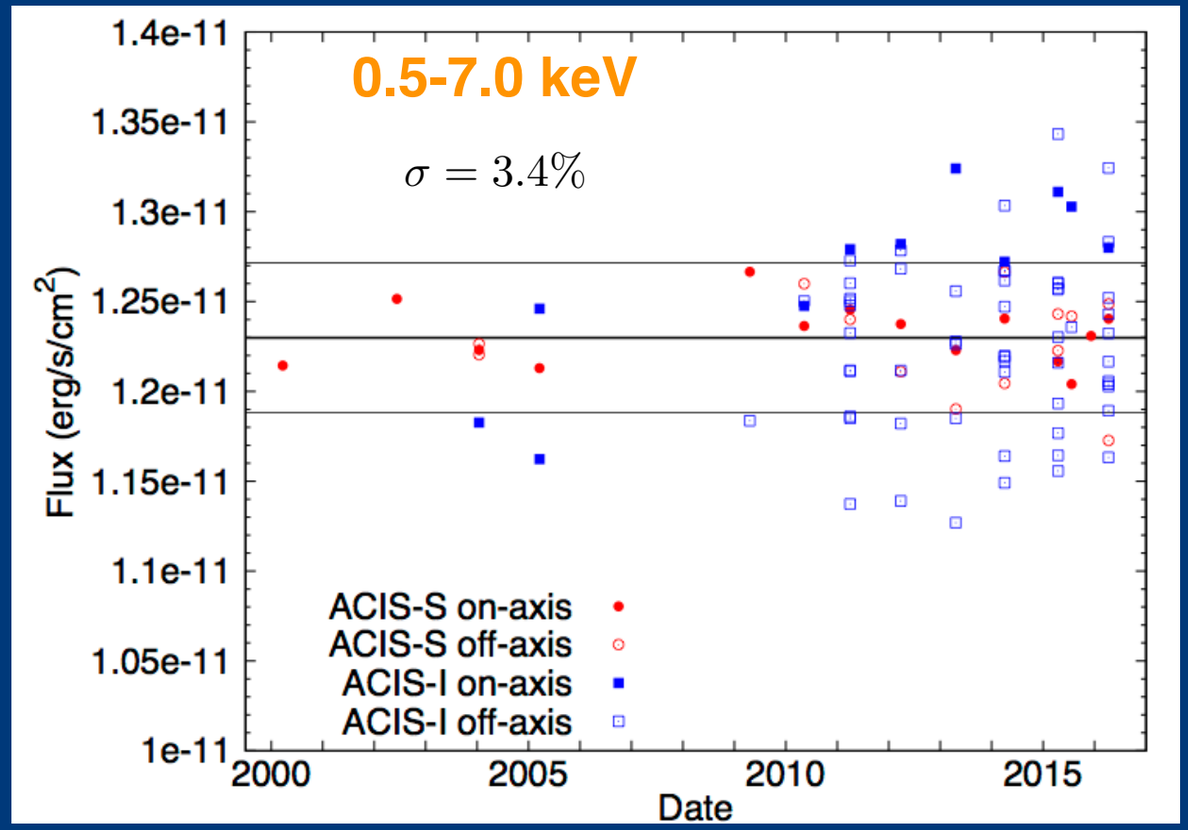
ACIS Effective Area

Abell 1795

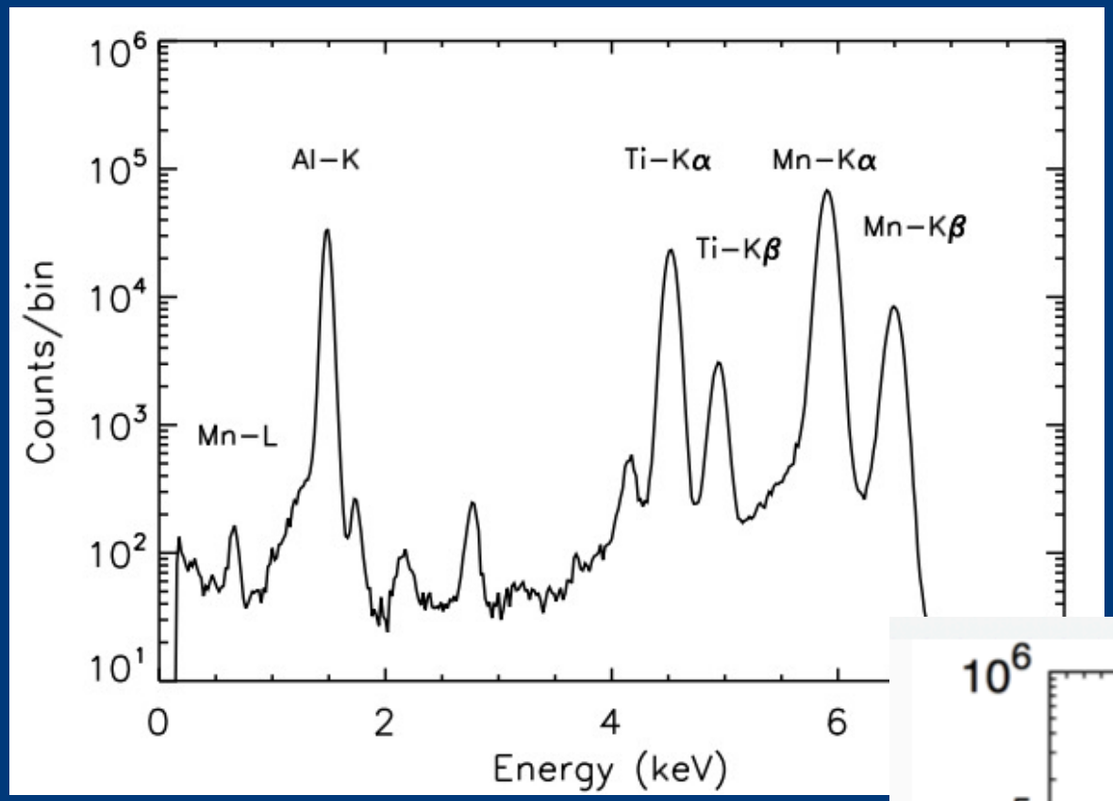






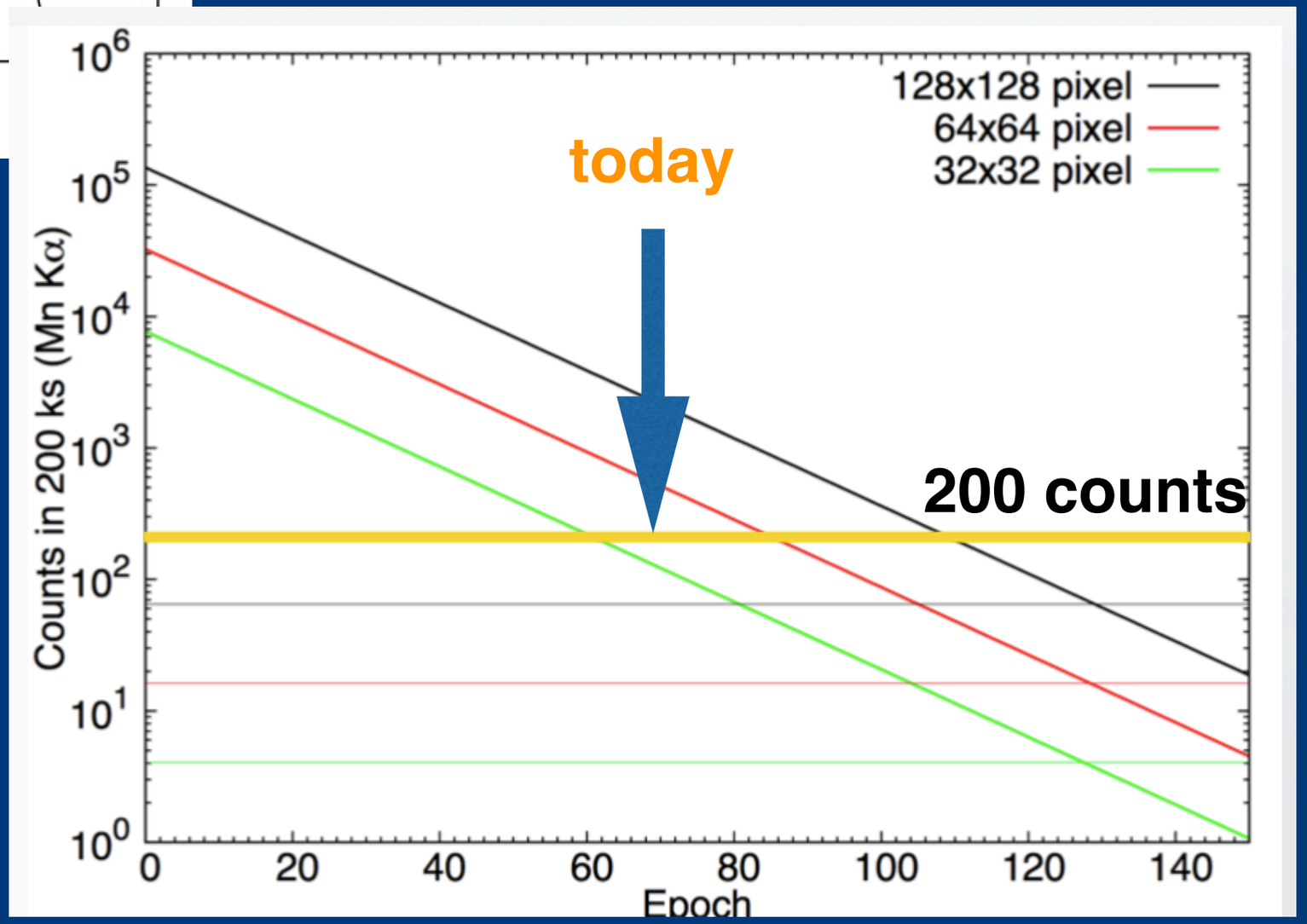


External Calibration Source (ECS)



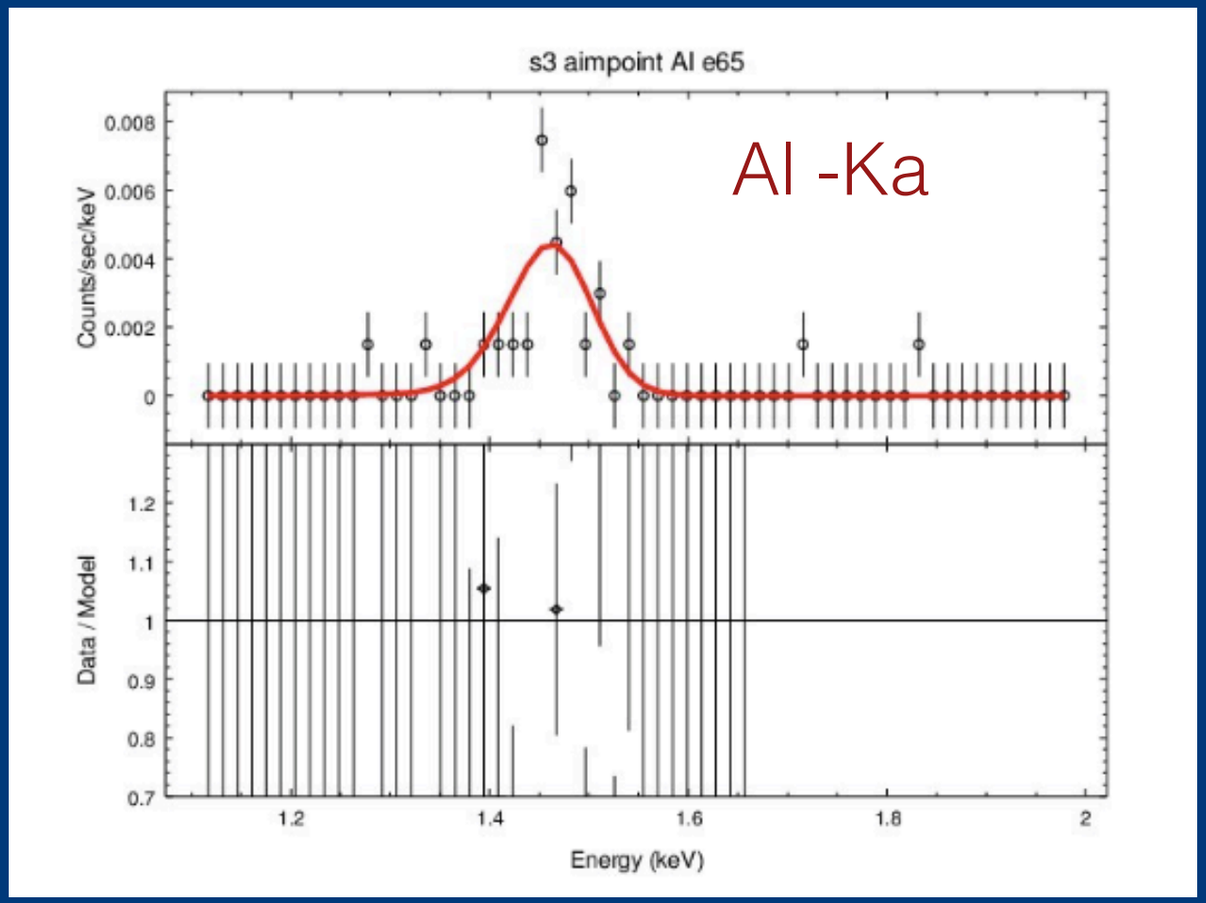
^{55}Fe half-life = 2.7 yr

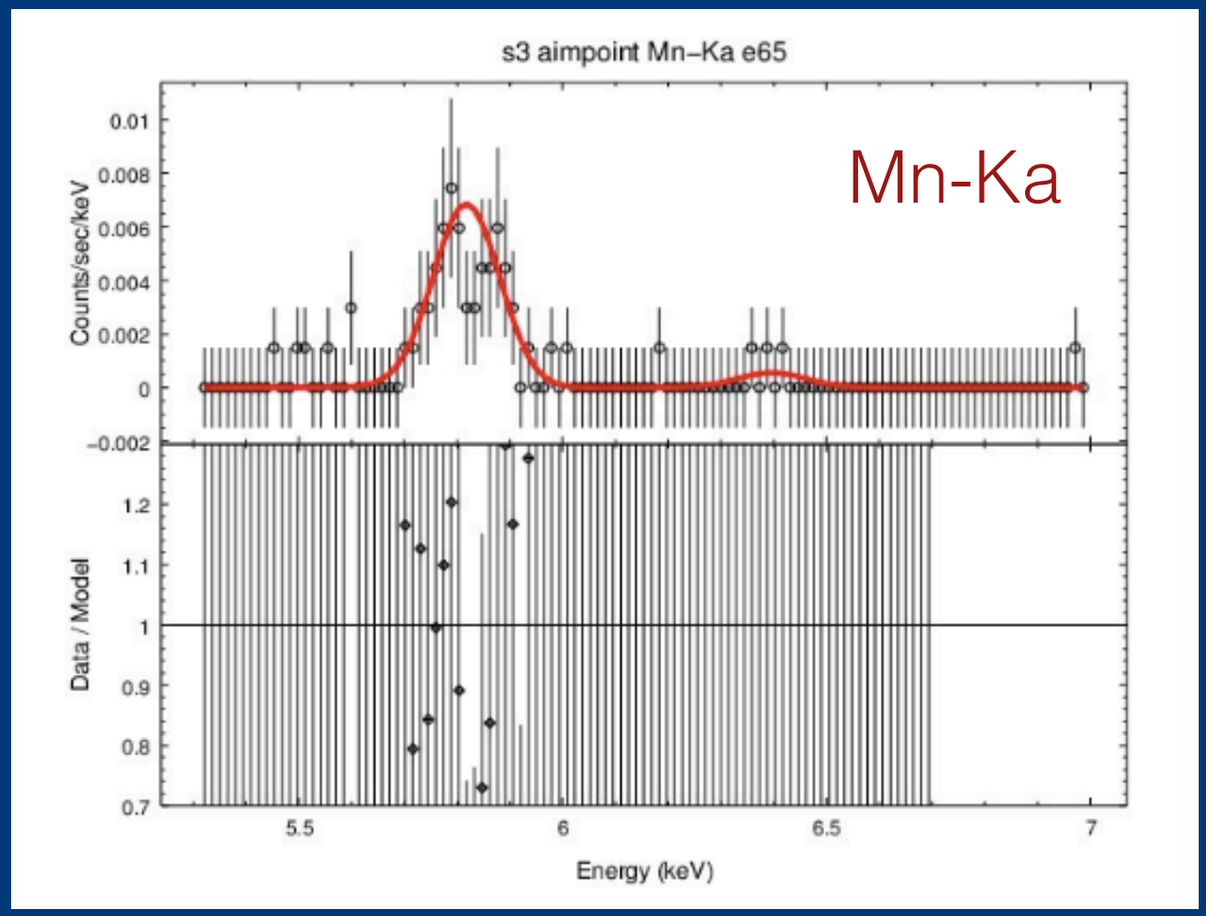
Epoch = 3 months



ACIS Gain - Time-Dependent Corrections

2016 ECS data - ACIS-S3 aim-point





Old tgain files:

- 32 by 32 pixel regions
- every 3 months

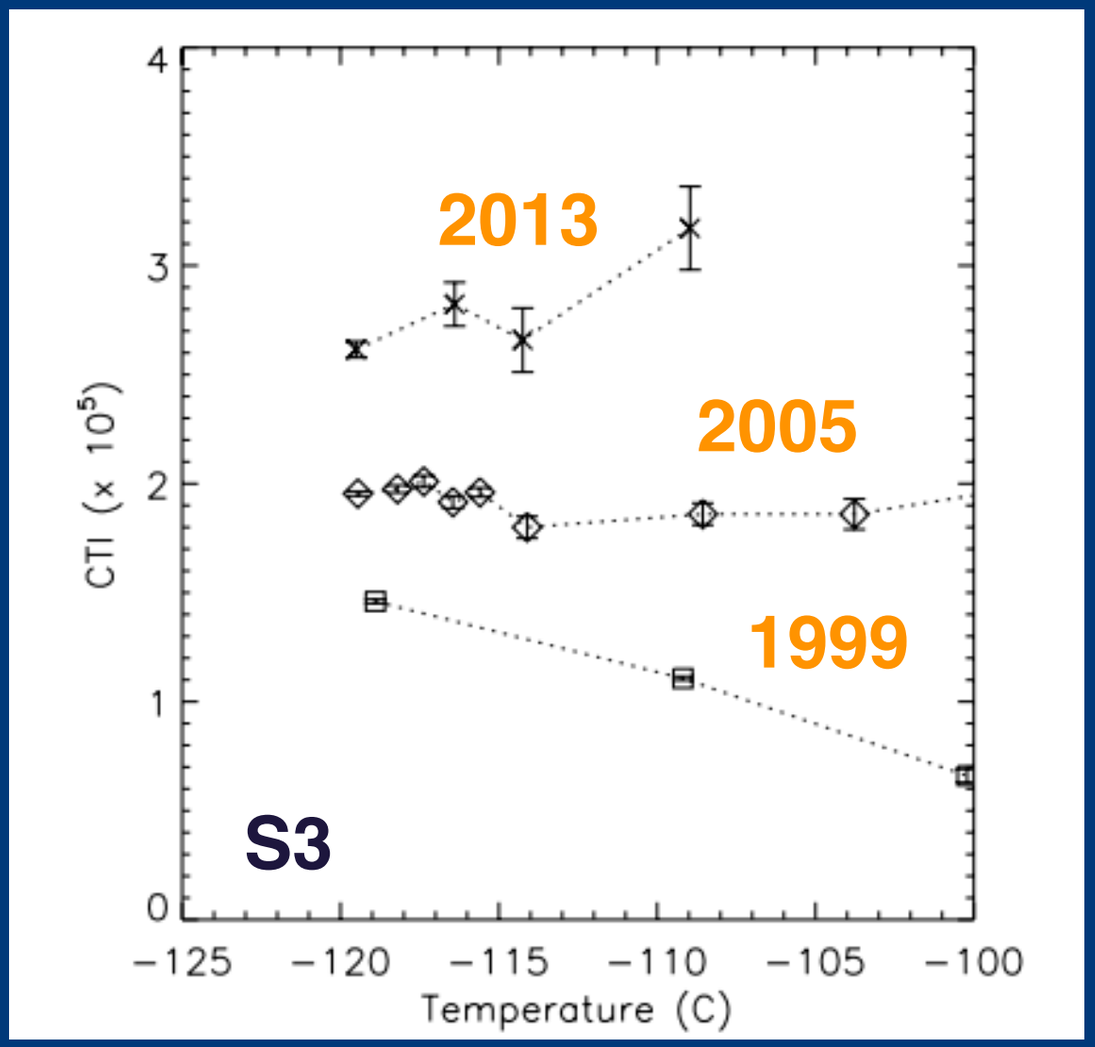
New tgain files (effective Sep., 2016):

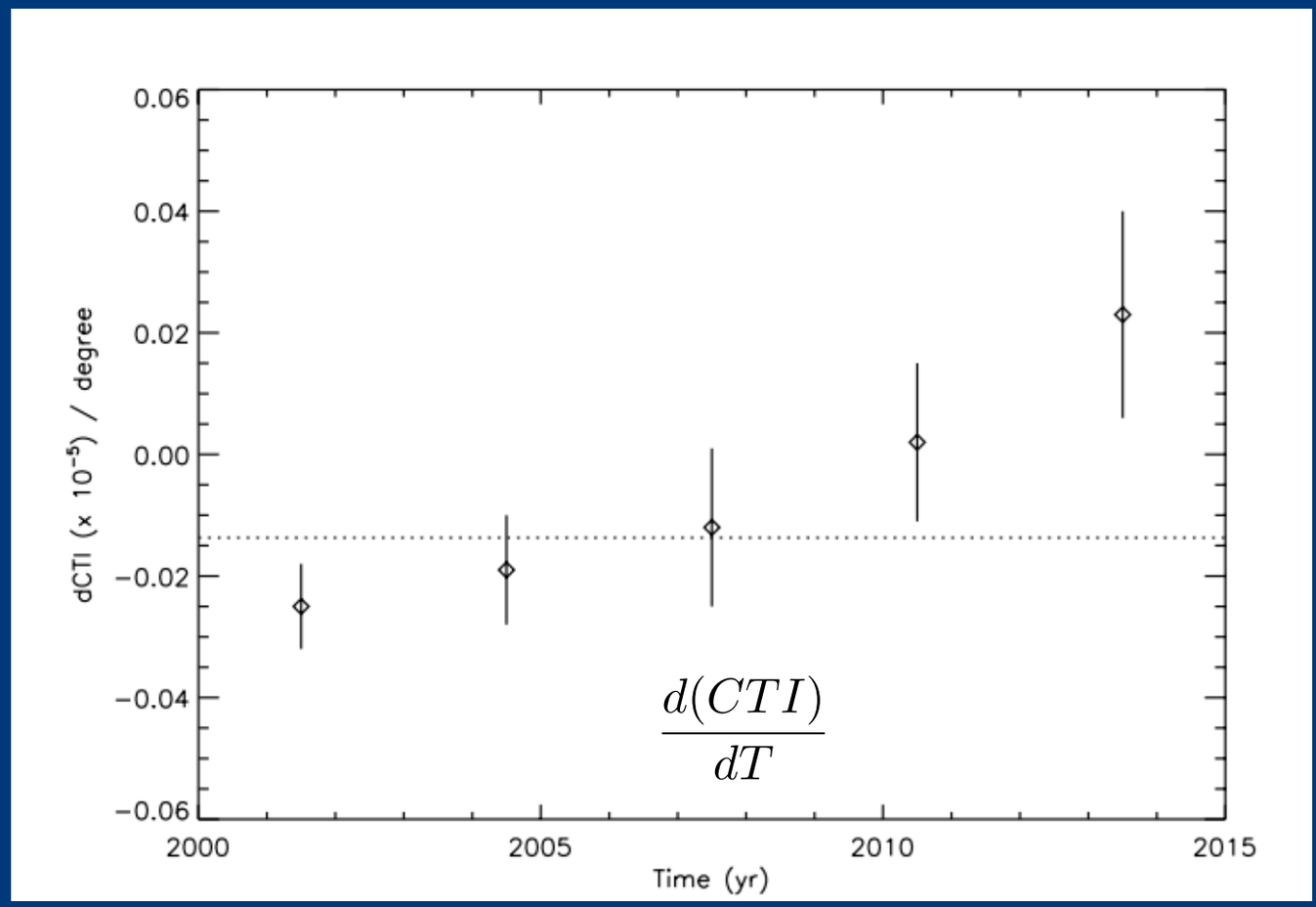
- 32 by 32 pixel regions
- Every 6 months

ACIS Gain - Temperature-Dependent CTI Correction

Two gain corrections are applied to ACIS data:

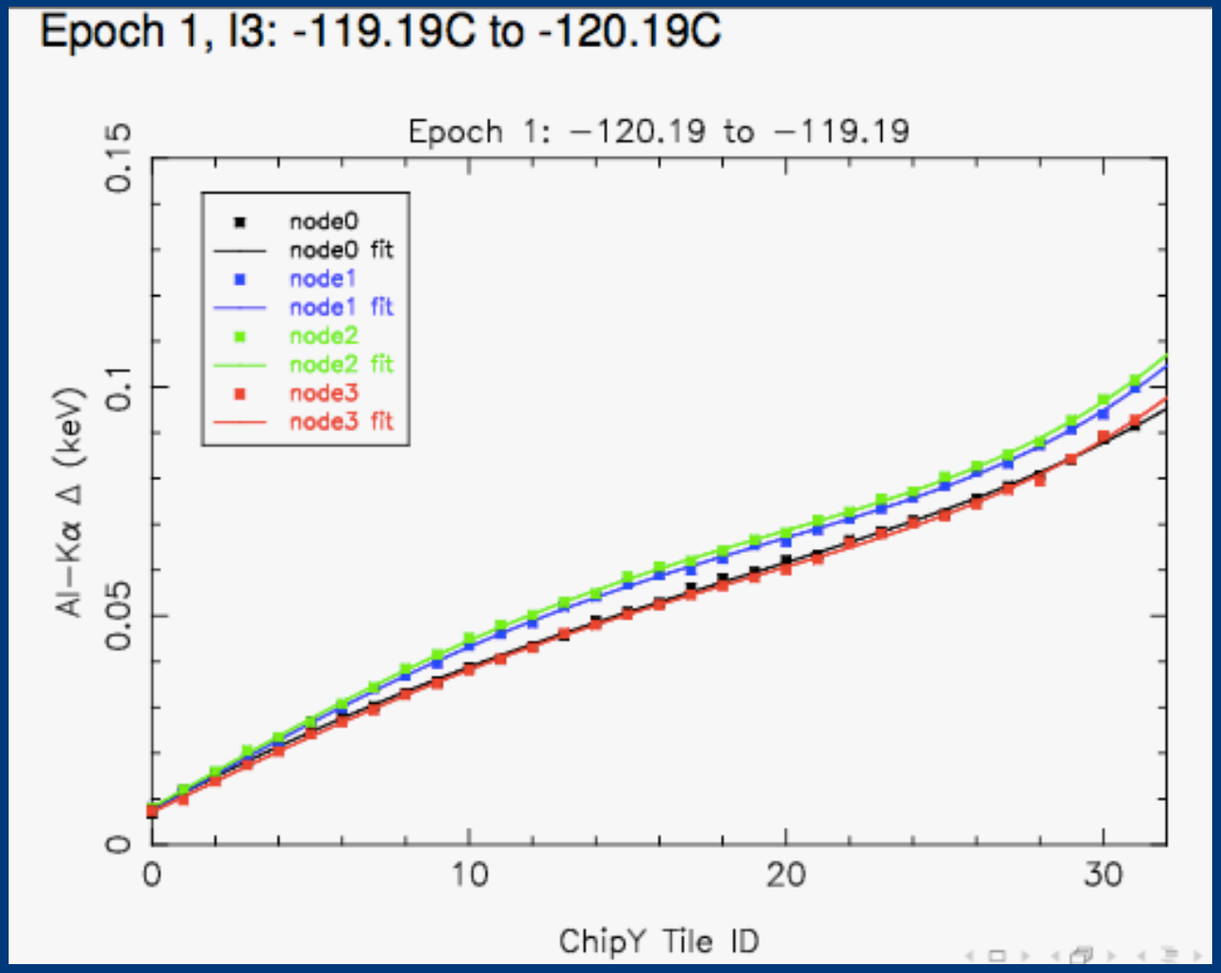
- **Temperature-dependent CTI correction**
- **Time-dependent gain correction.**

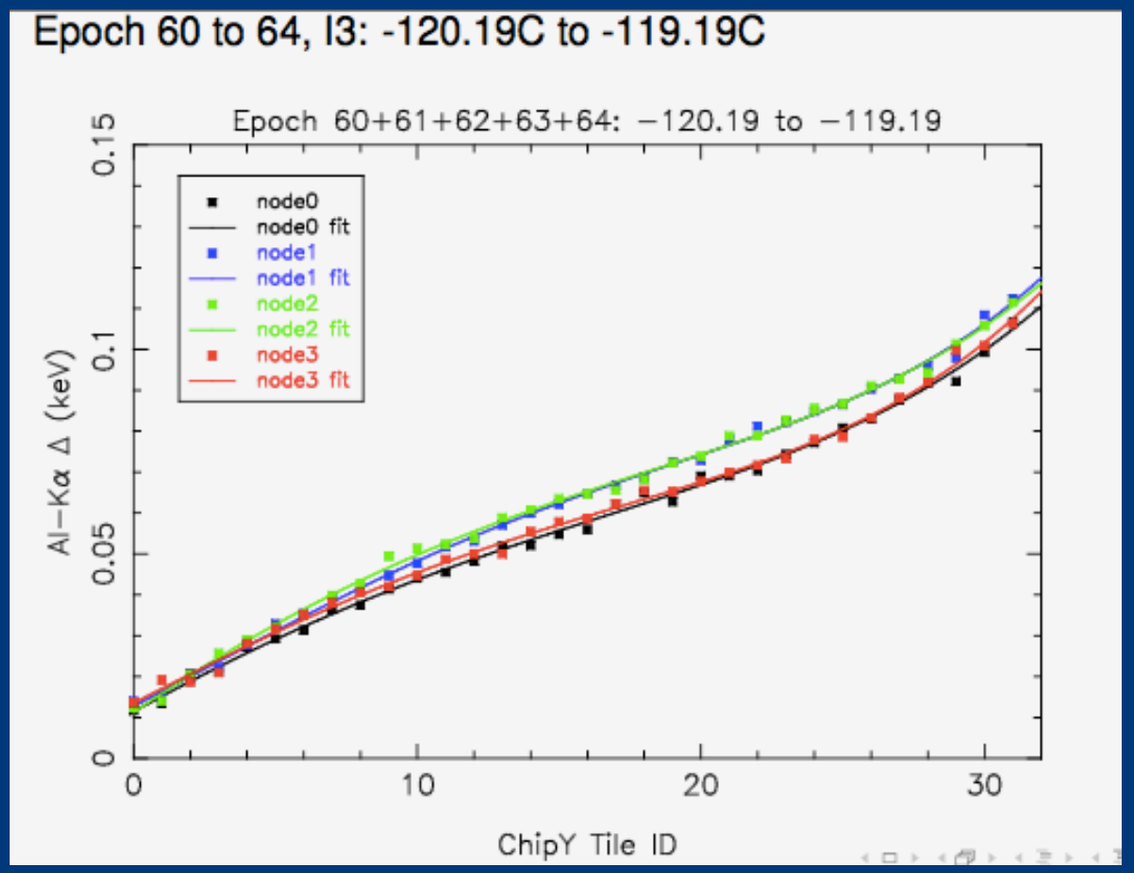


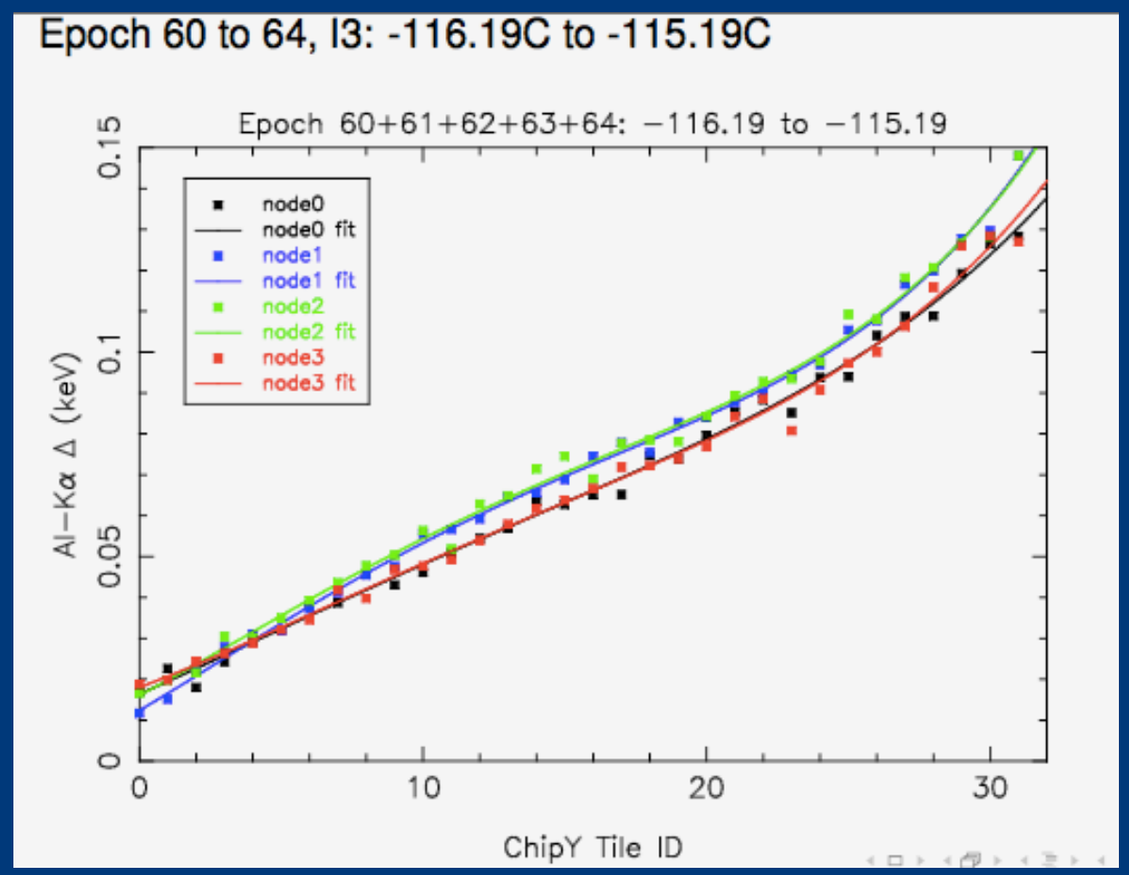


ACIS Spectral Resolution

ACIS-I3



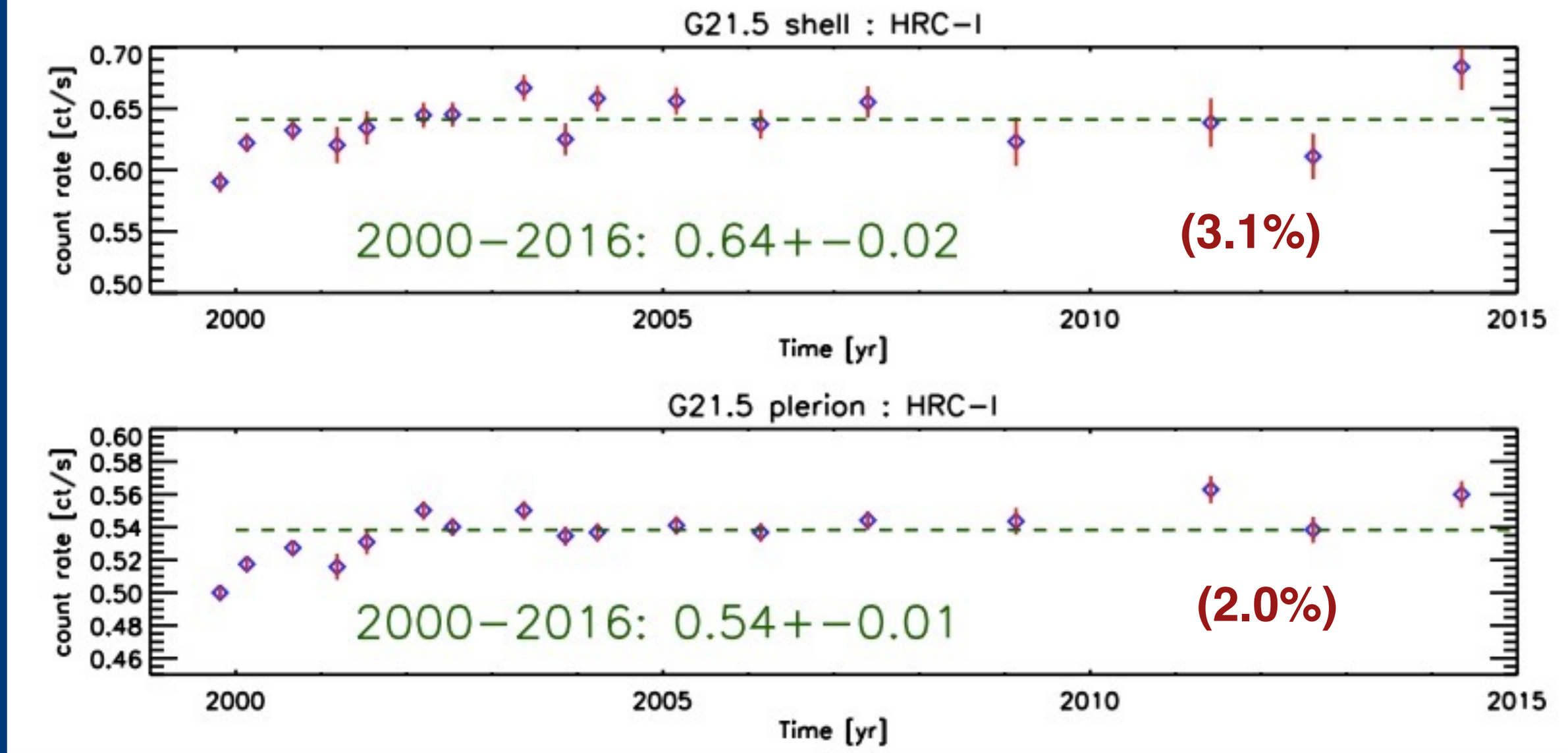




The cal team is in the process of fitting ECS data taken over the course of mission with the goal of generating a set of time- and temperature-dependent scatter matrices.

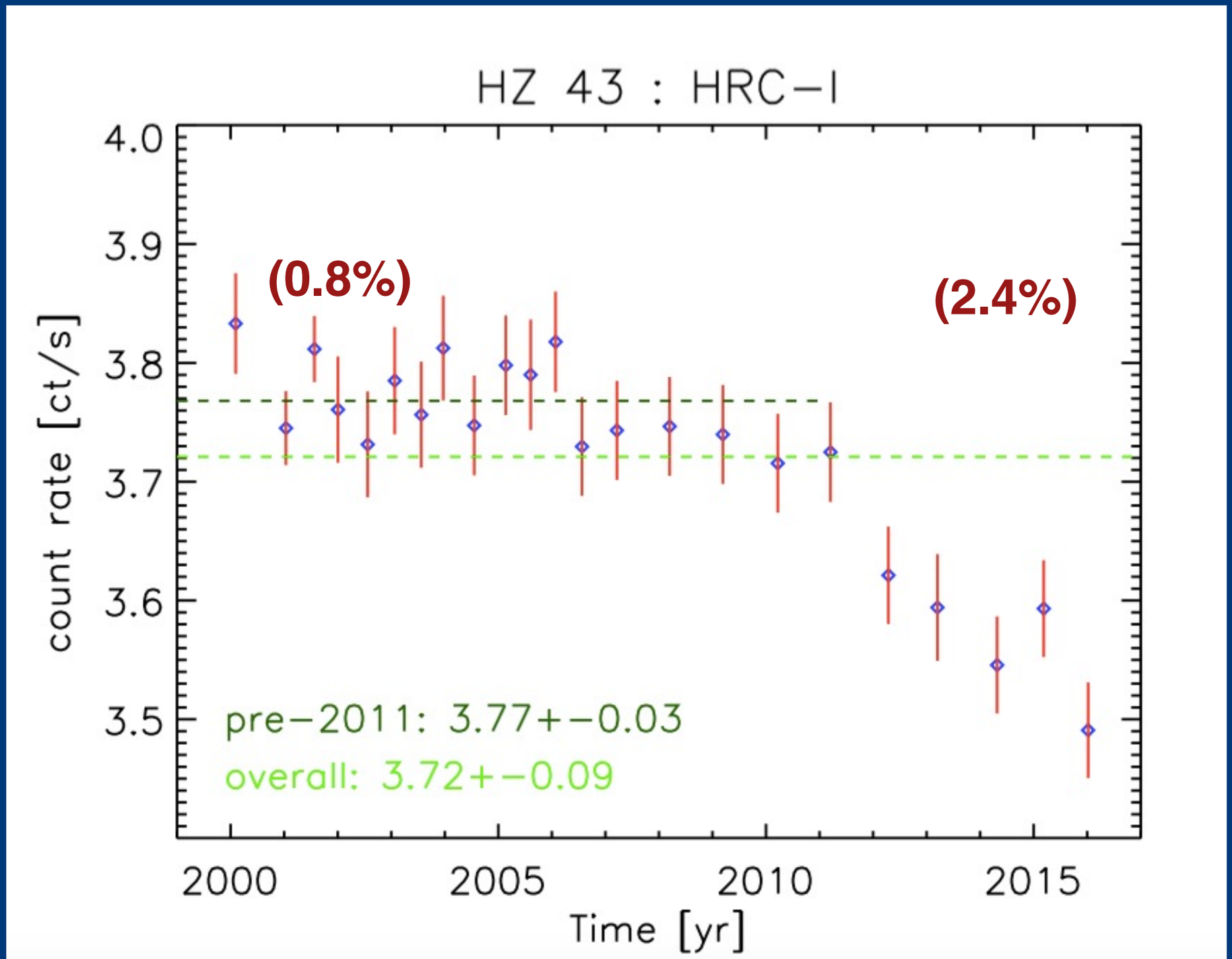
HRC-I Calibration Status

Hard X-ray source - G21.5-09

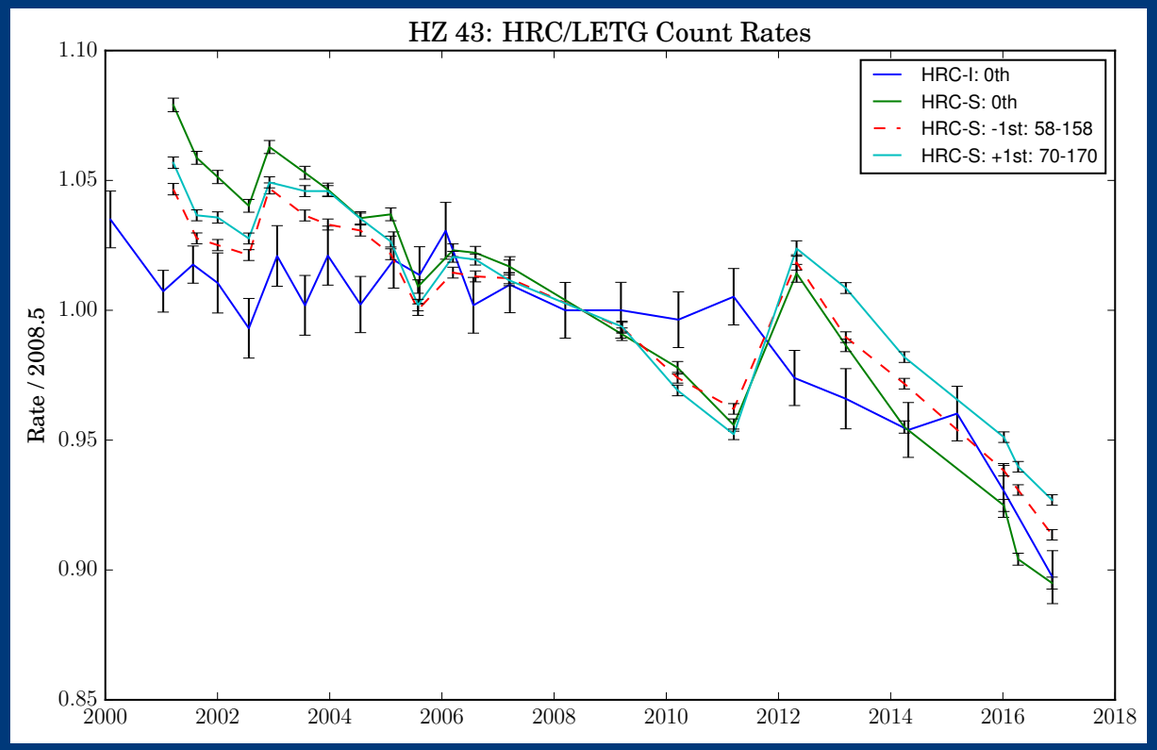


HRC-I Calibration Status

Soft X-ray source - HZ43

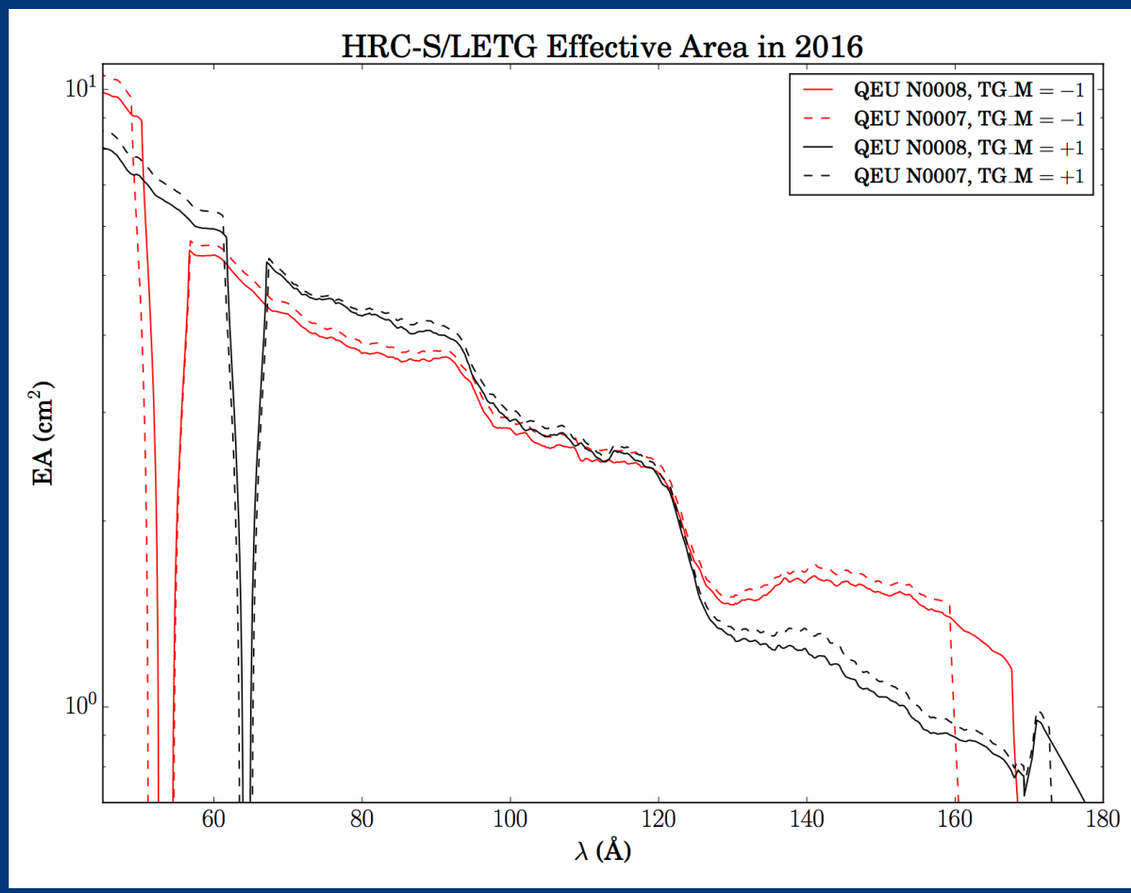


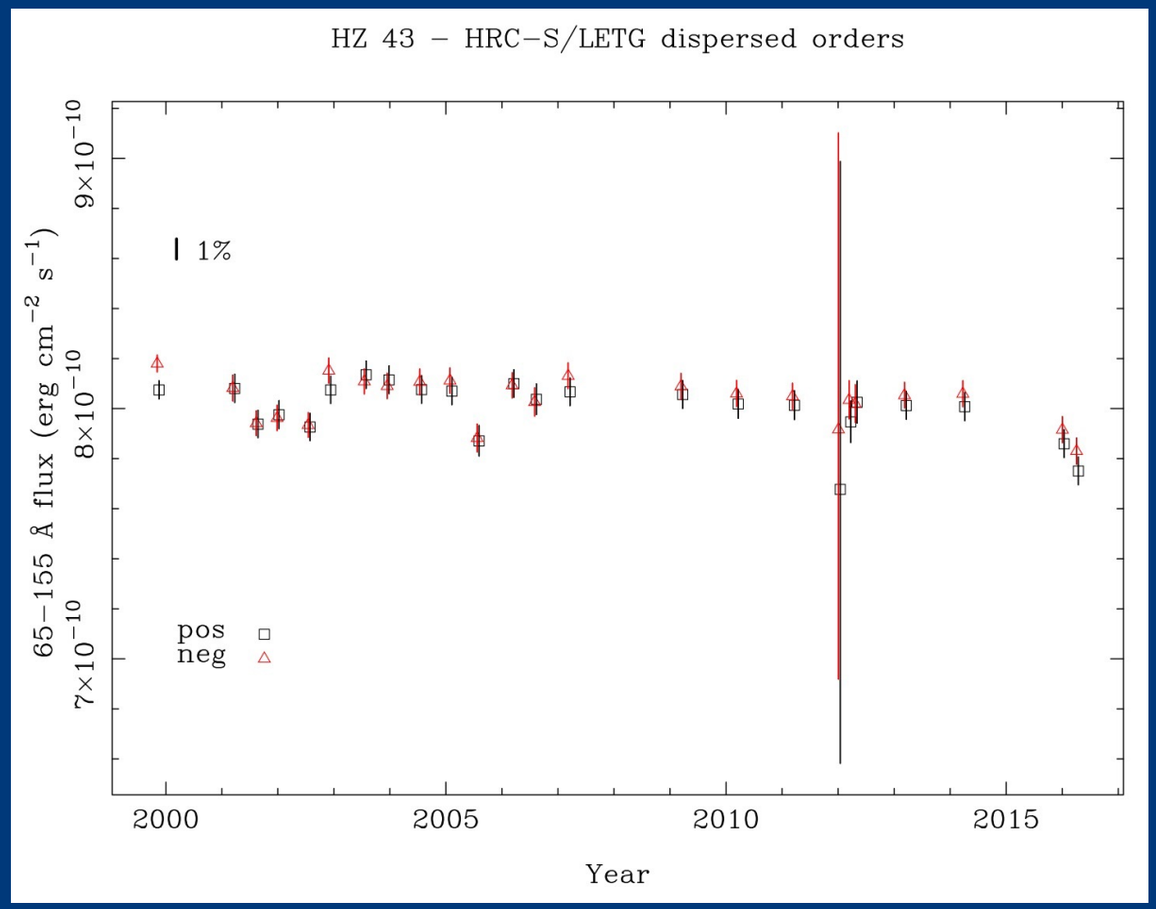
LETG/HRC-S Calibration



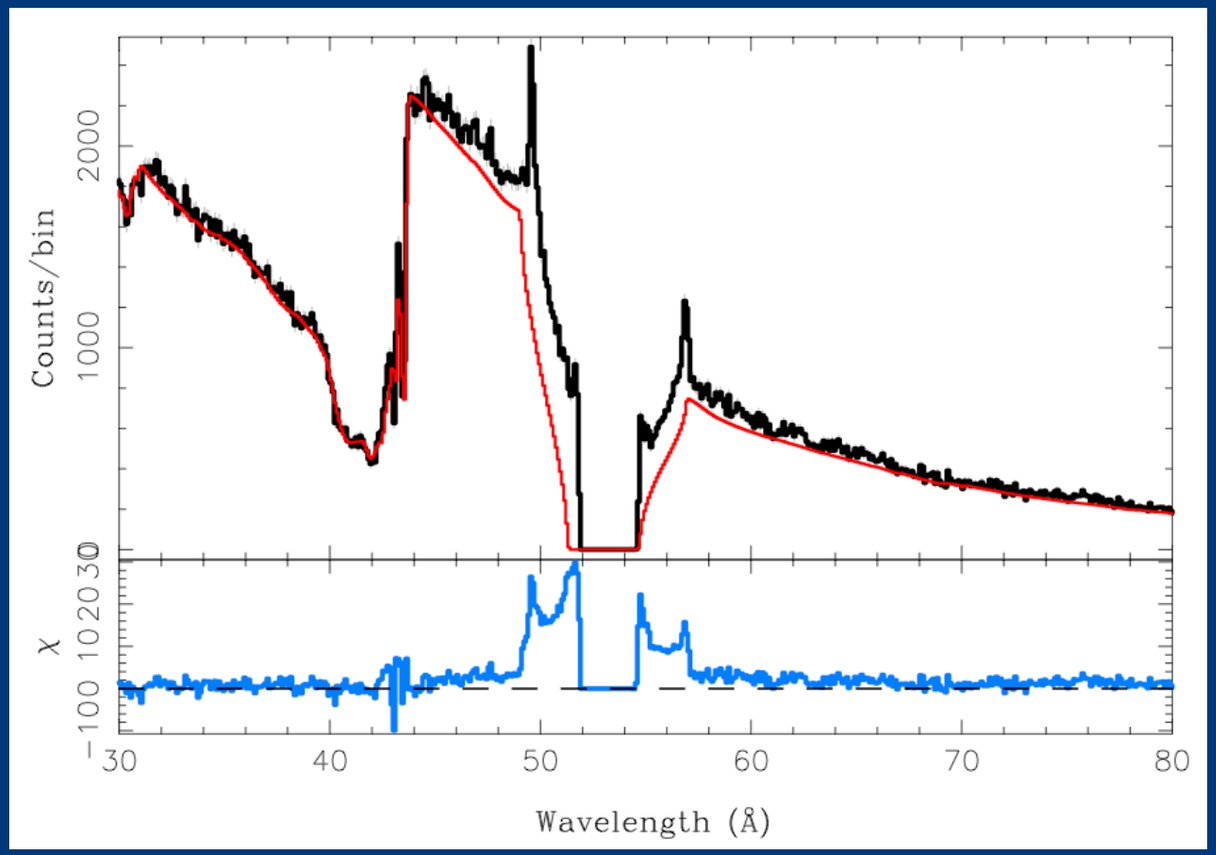
The HRC-S QE is declining by 2-3% per year. This is corrected with annual additions to the set of time-dependent HRC-S QE maps.

The HRC-S QE map for 2016 will be released in the next CALDB.

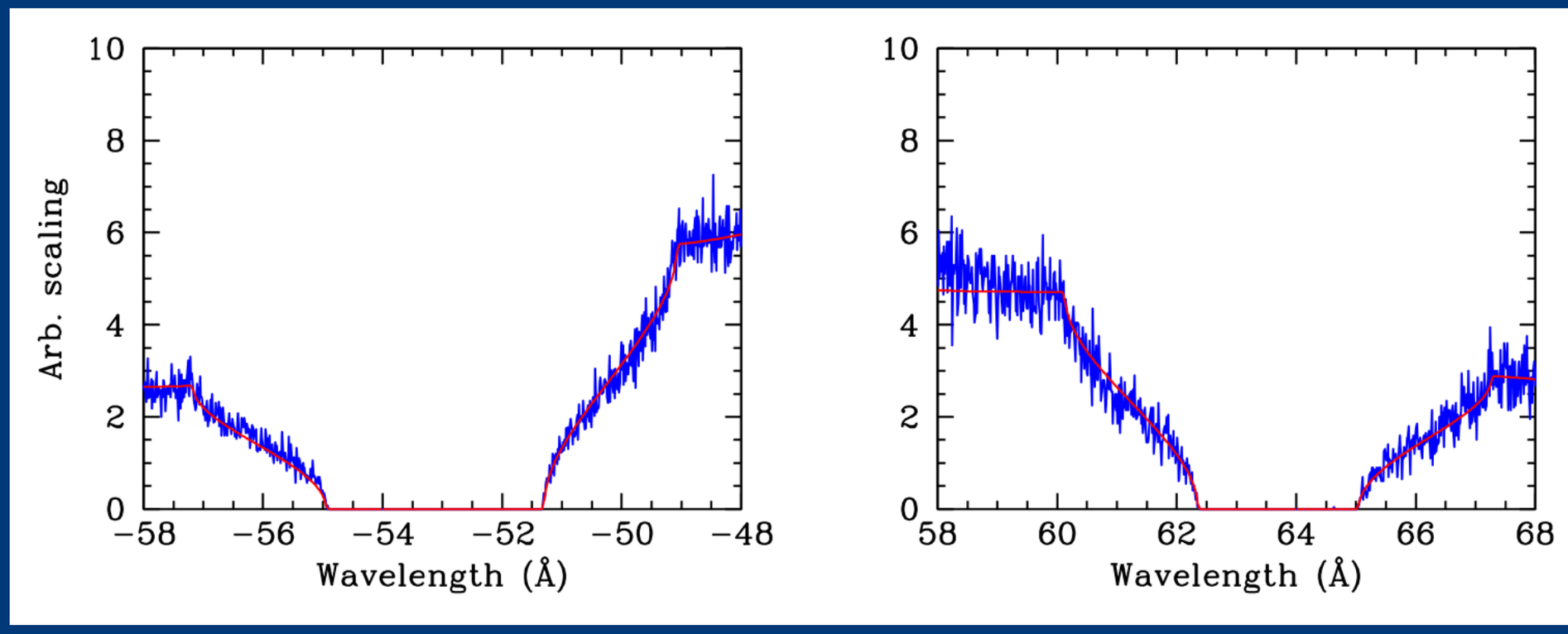




LETG/HRC-S Calibration

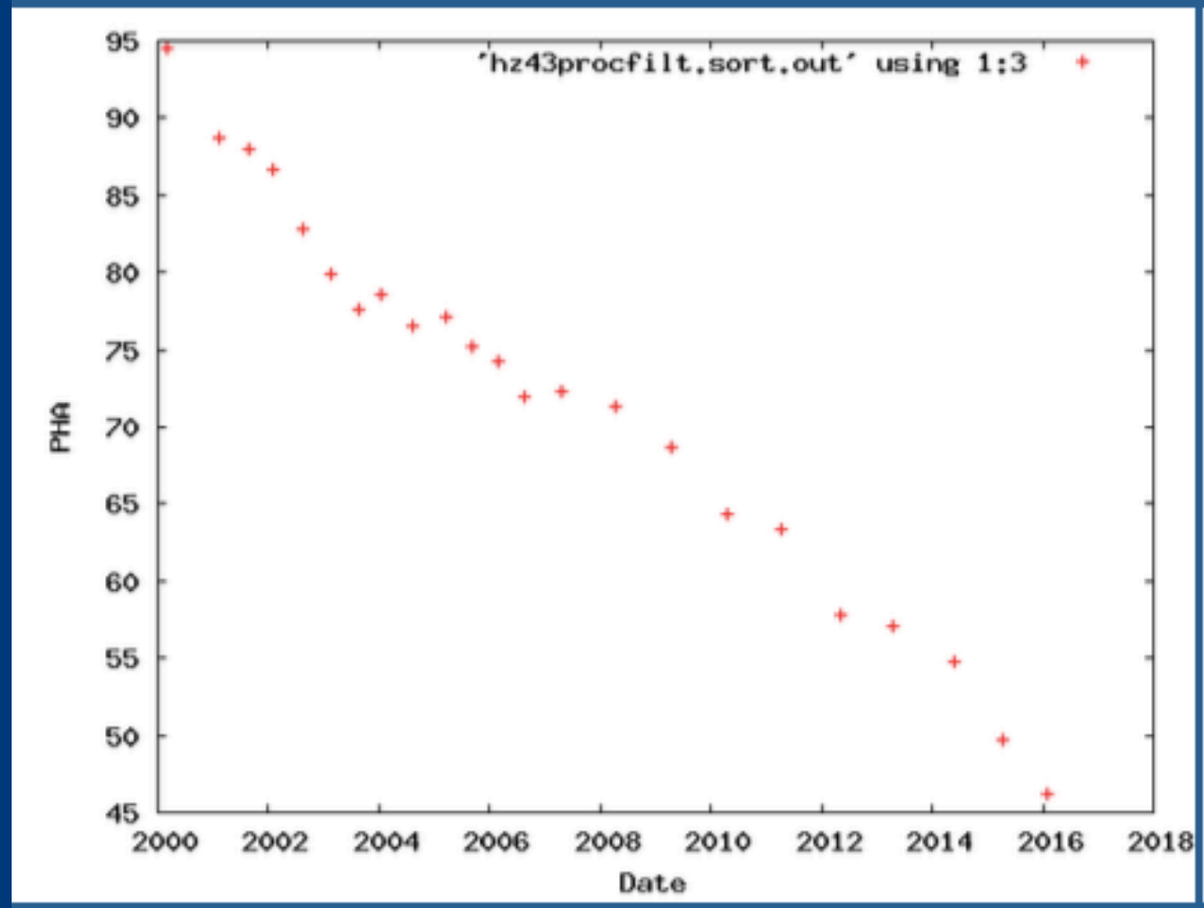


There was a mis-match between the CIAO generated garf file for LETG/HRC-S data and the actual wavelength coverage of the data near the HRC-S plate edges. This will be corrected in the next CALDB release.

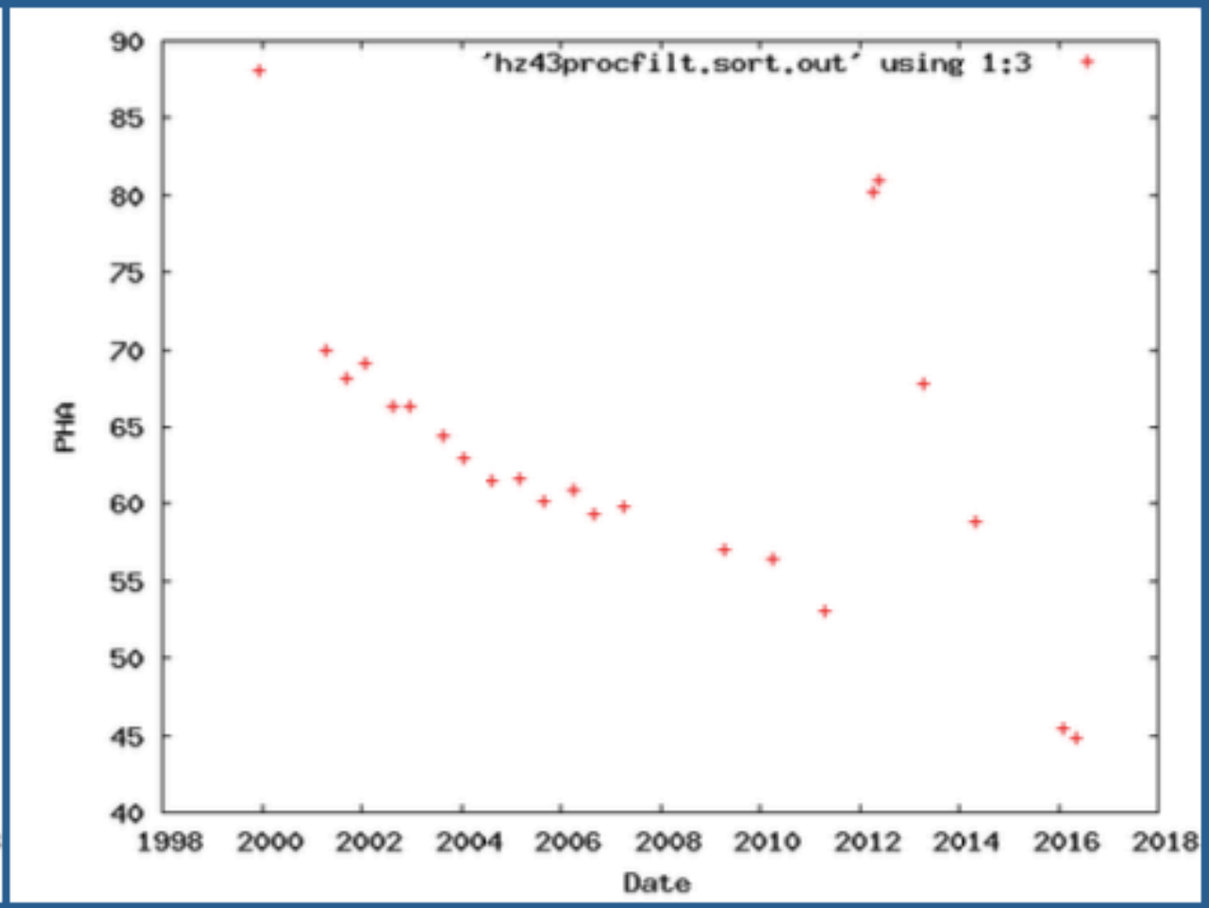


HRC Gain Calibration

HRC gain (HZ 43 calibration observations – zeroth order)



HRC-I

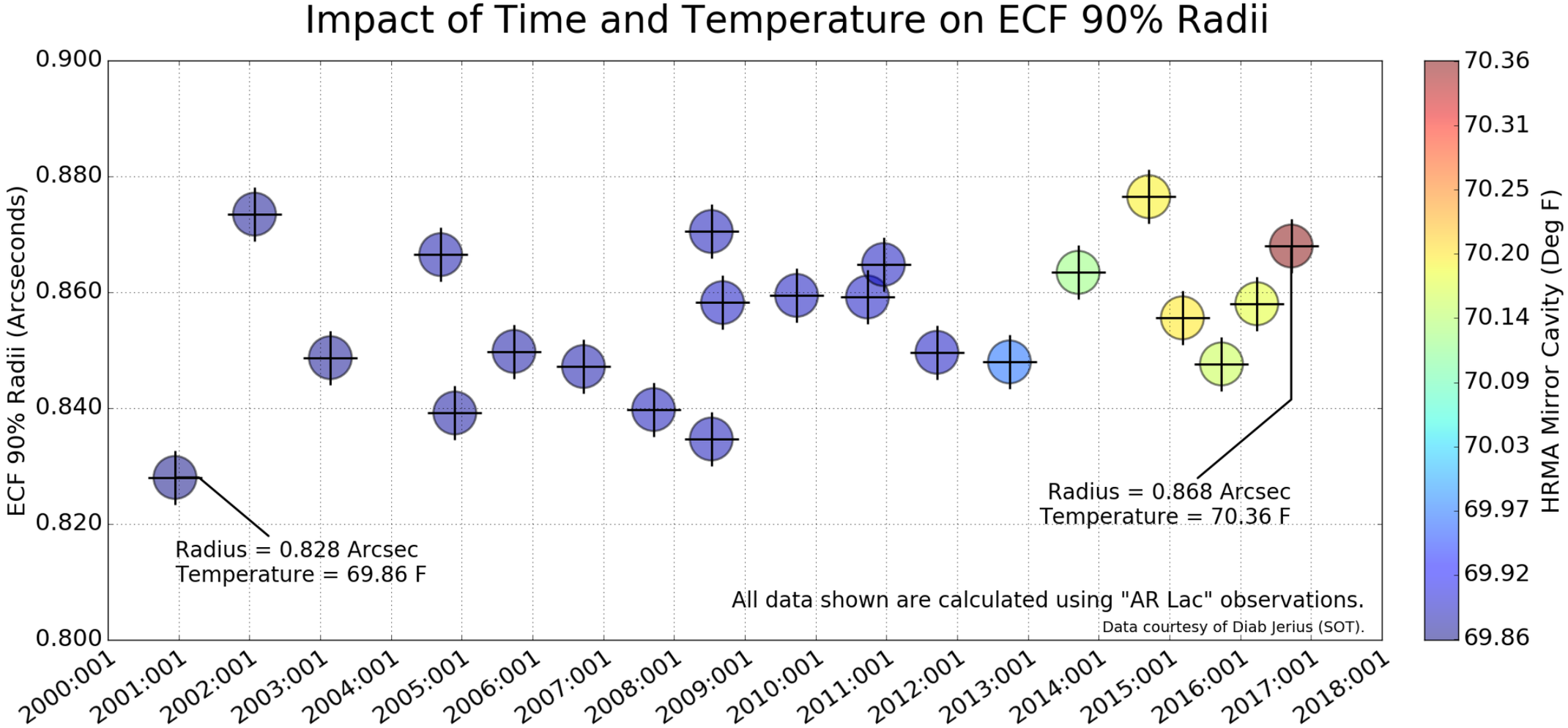


HRC-S

~10% gain loss per year

HRMA Calibration

Stability of Chandra Imaging



Matt Dahmer / Northrup Grumman

Present Calibration Work

ACIS

- Monitor contamination and release updates as required.
- Develop grid of time- and temperature-dependent rmfs.
- Investigate new gain calibration methods.

HRC-I

- Monitor QE and gain loss.
- Update HRC-I QE to maintain cross-calibration with HRC-S.
- Update the HRC-I QE map.

HETG

- Determine if the transmission efficiencies of the m ≠ 1 orders need to be adjusted.

LETG/HRC-S

- Release improvements to the wavelength coverage in the GARF files.
- Revise HRC-S de-gap map - correct slight off-set between plus/minus orders.
- Revise HRC-S gain map post HV change (2012).