Chandra Calibration Status

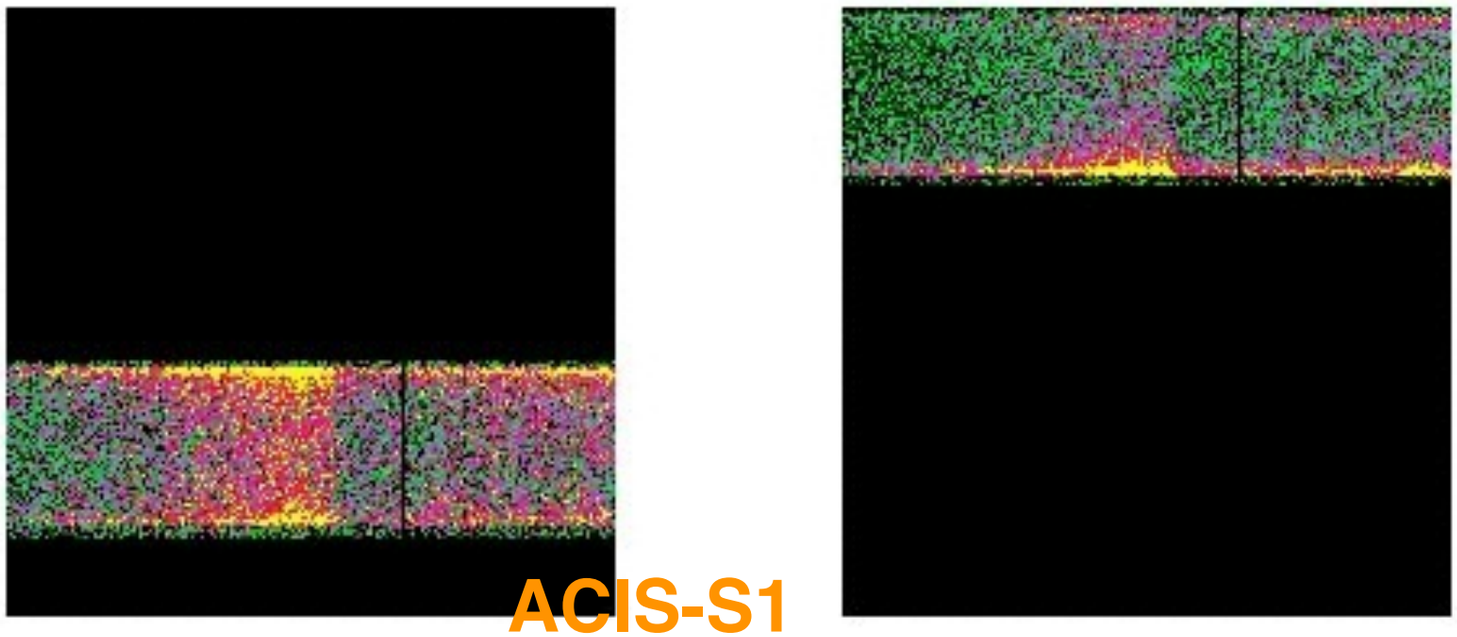
IACHEC April 20, 2015

Chandra Calibration Status

- Current calibration studies
- Internal cross-calibration results
- Calibration plans for the upcoming year

Contamination Build-Up on the ACIS filters

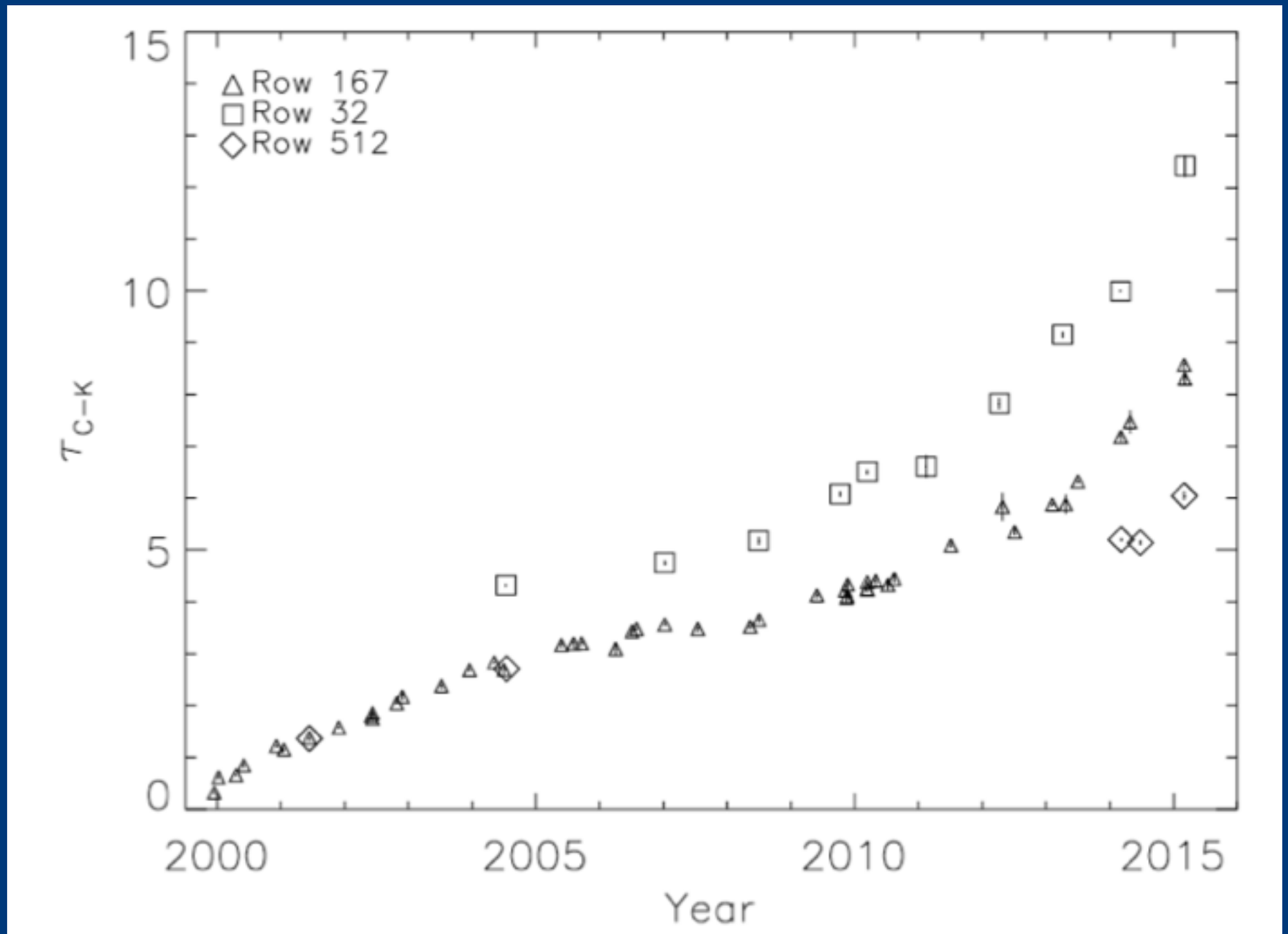
LETG/ACIS-S “Big Dither” Observations of Mkn 421 (2015)



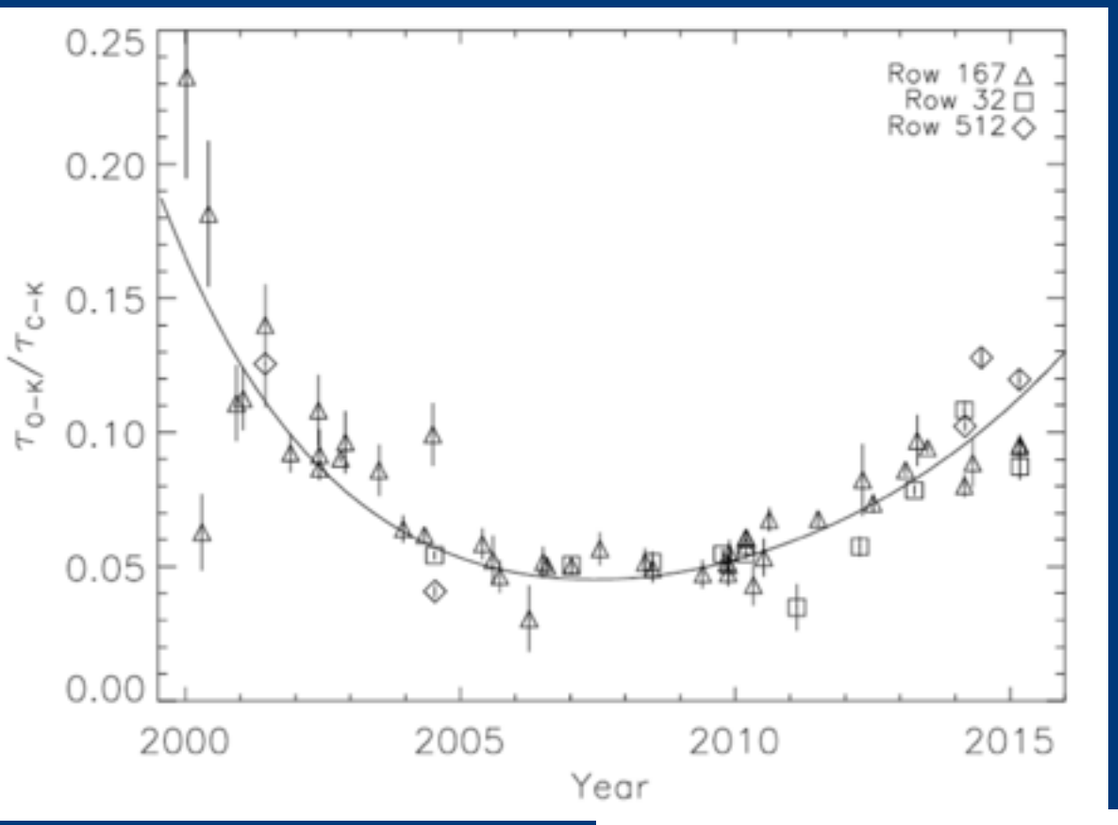
ACIS-S1

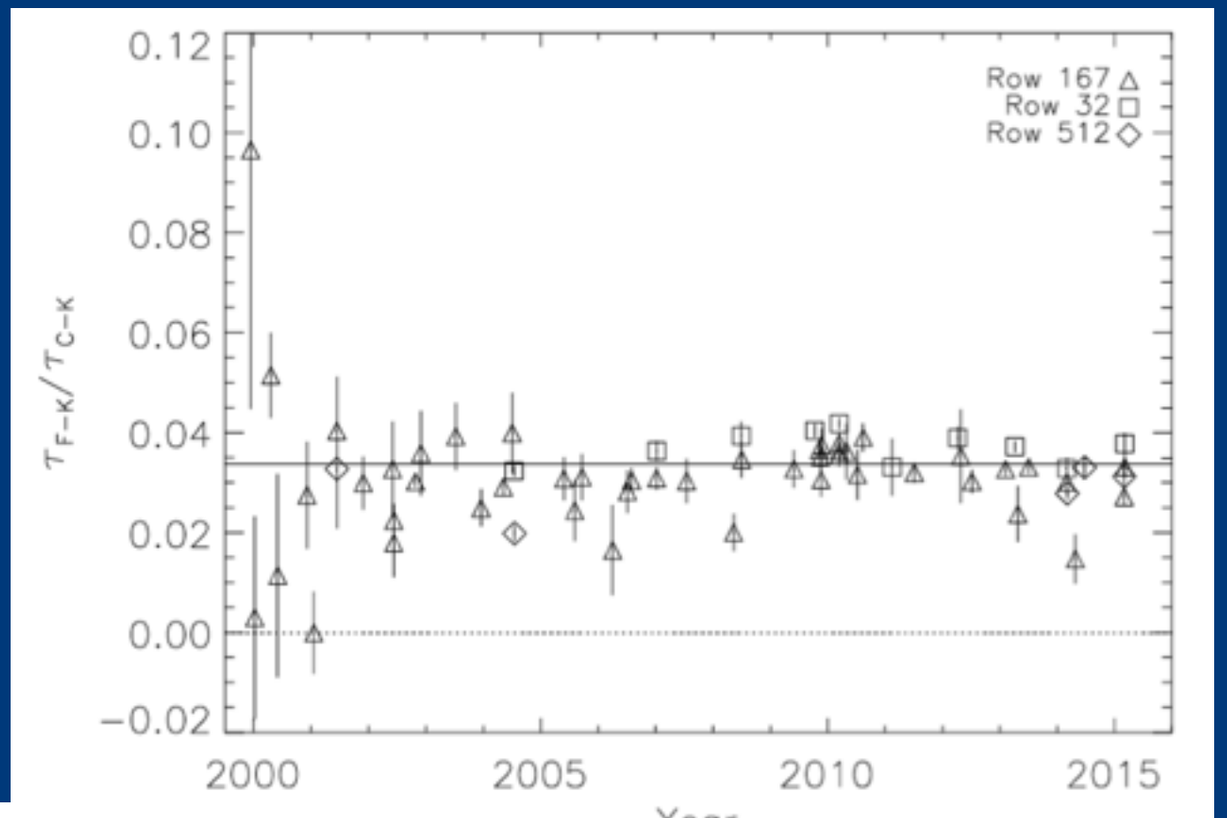
Contamination on the ACIS filters

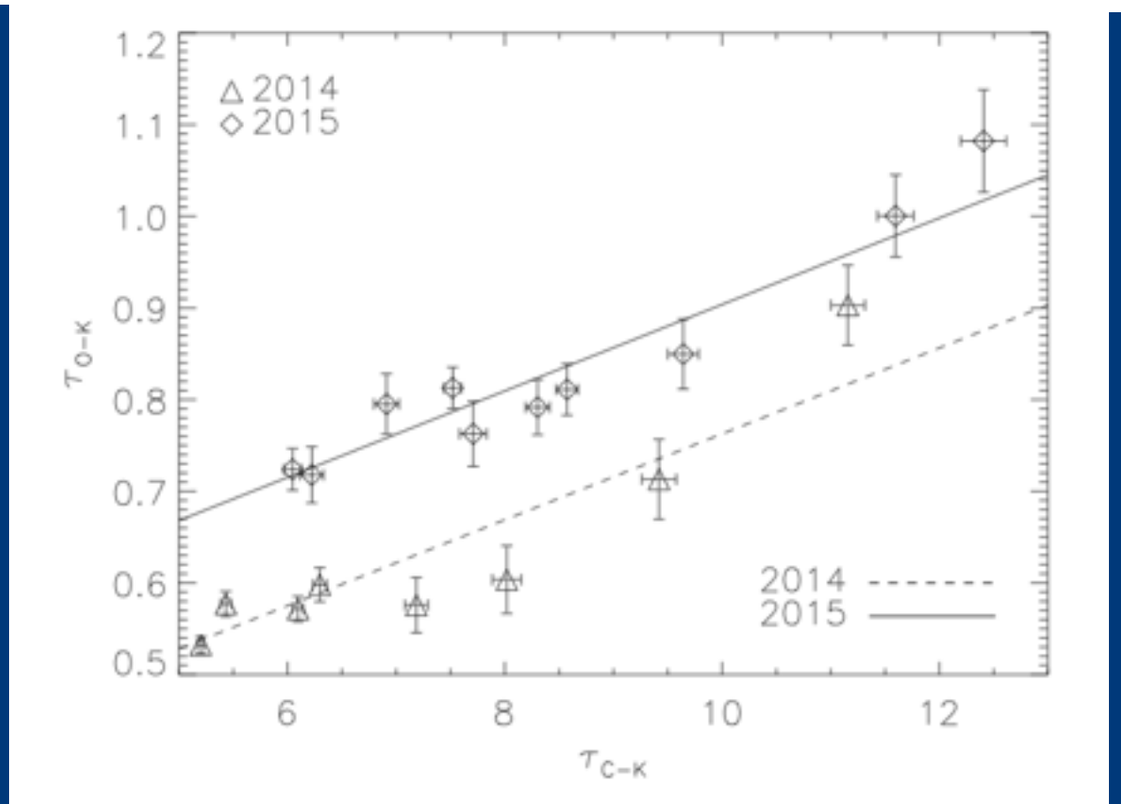
LETG/ACIS-S observations of blazars



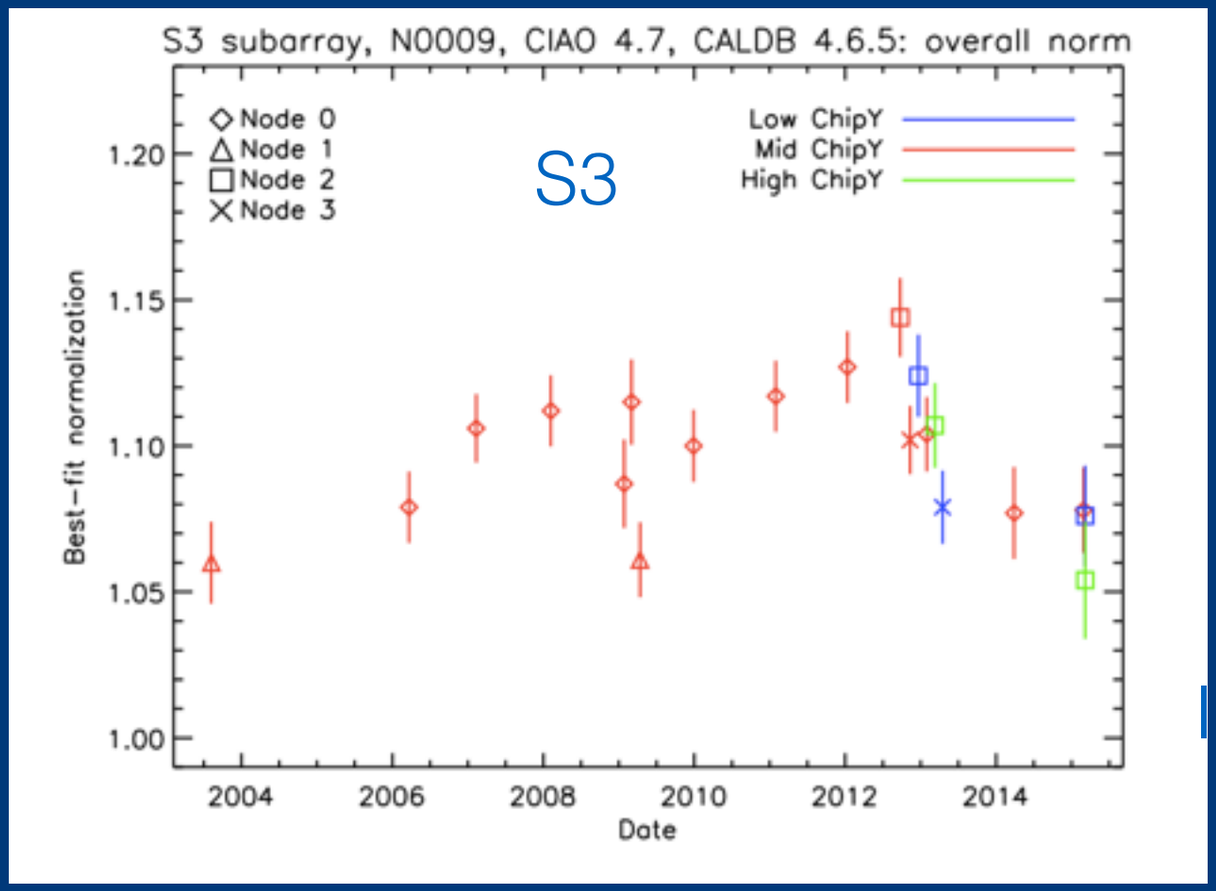
Contamination Build-Up on the ACIS filters





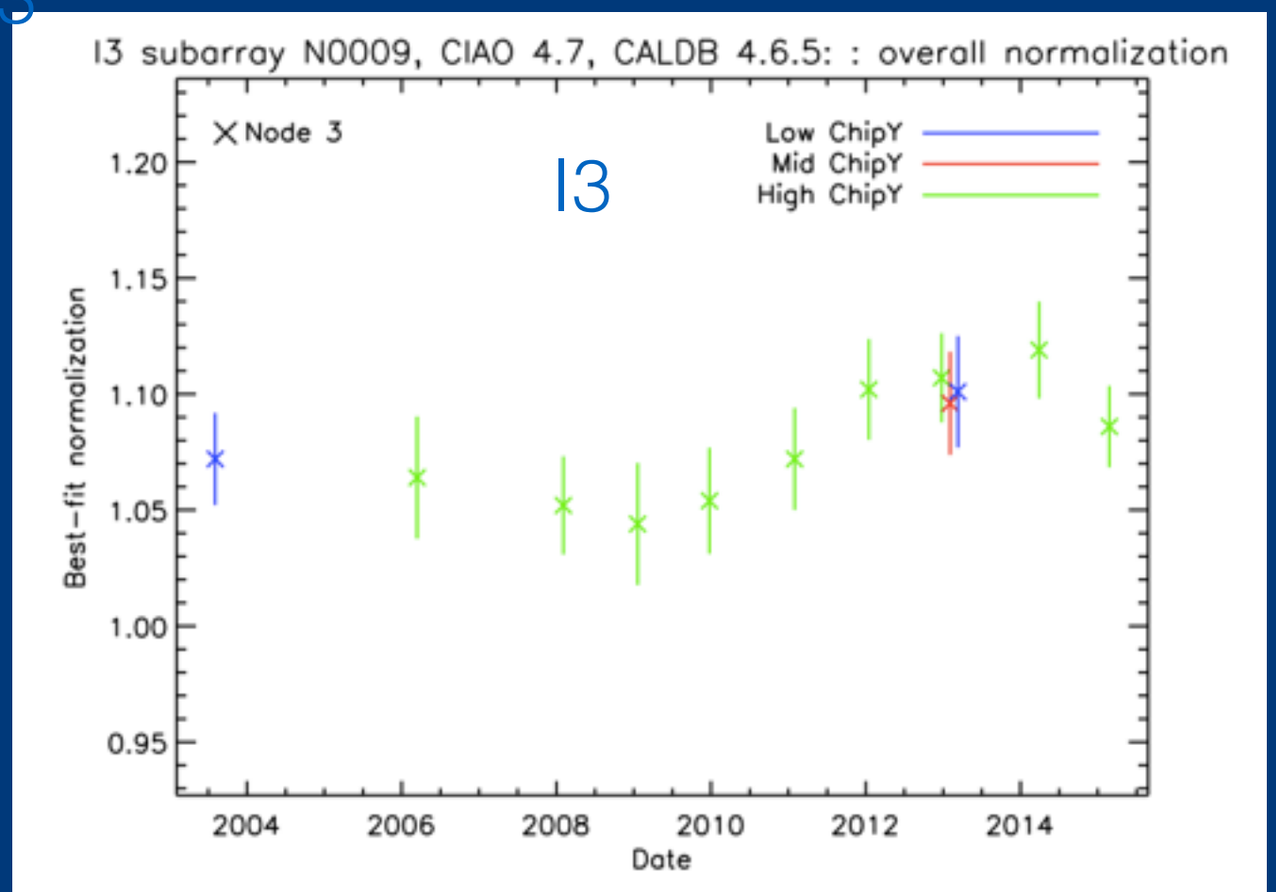


Contamination on the ACIS filters

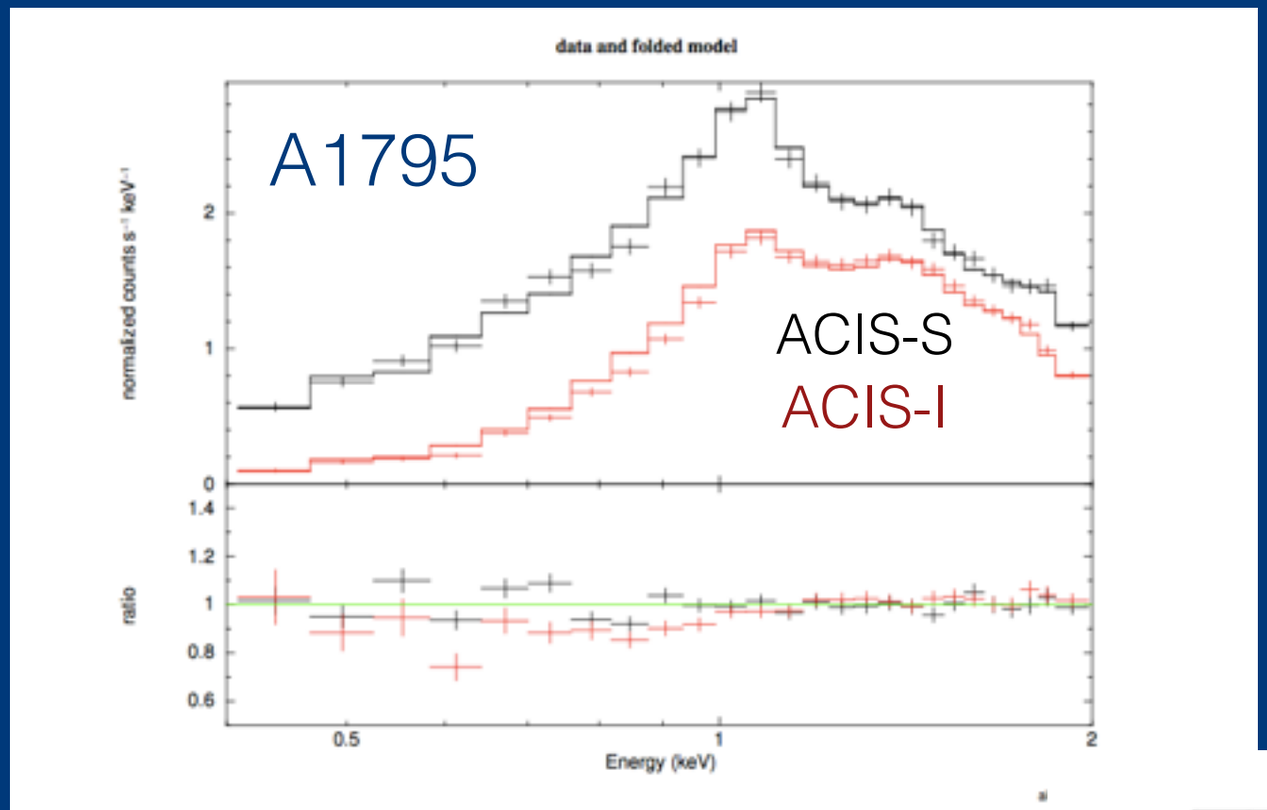


E0102-72 ACIS data fit with ACIS contamination model N0009.

I3



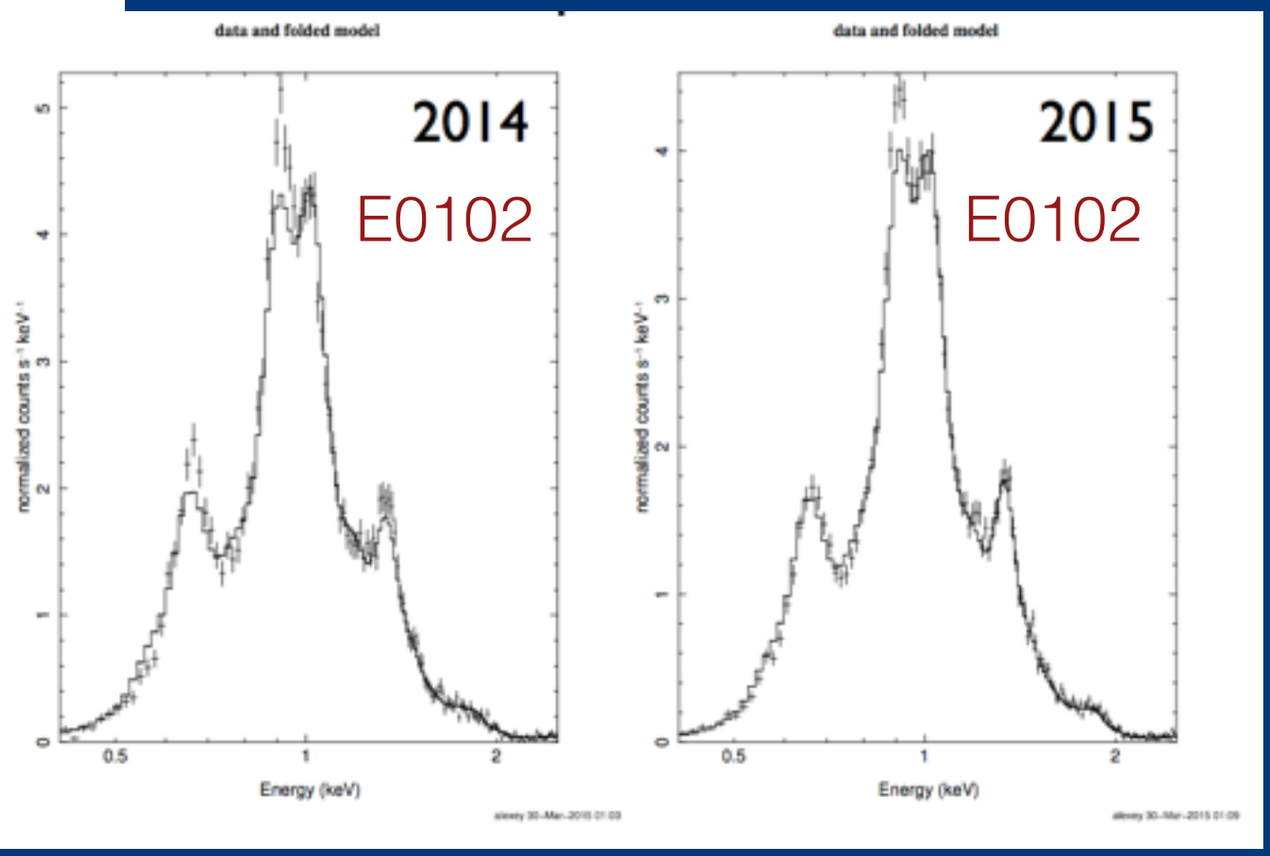
Contamination on the ACIS filters (ACIS-I vs. ACIS-S)



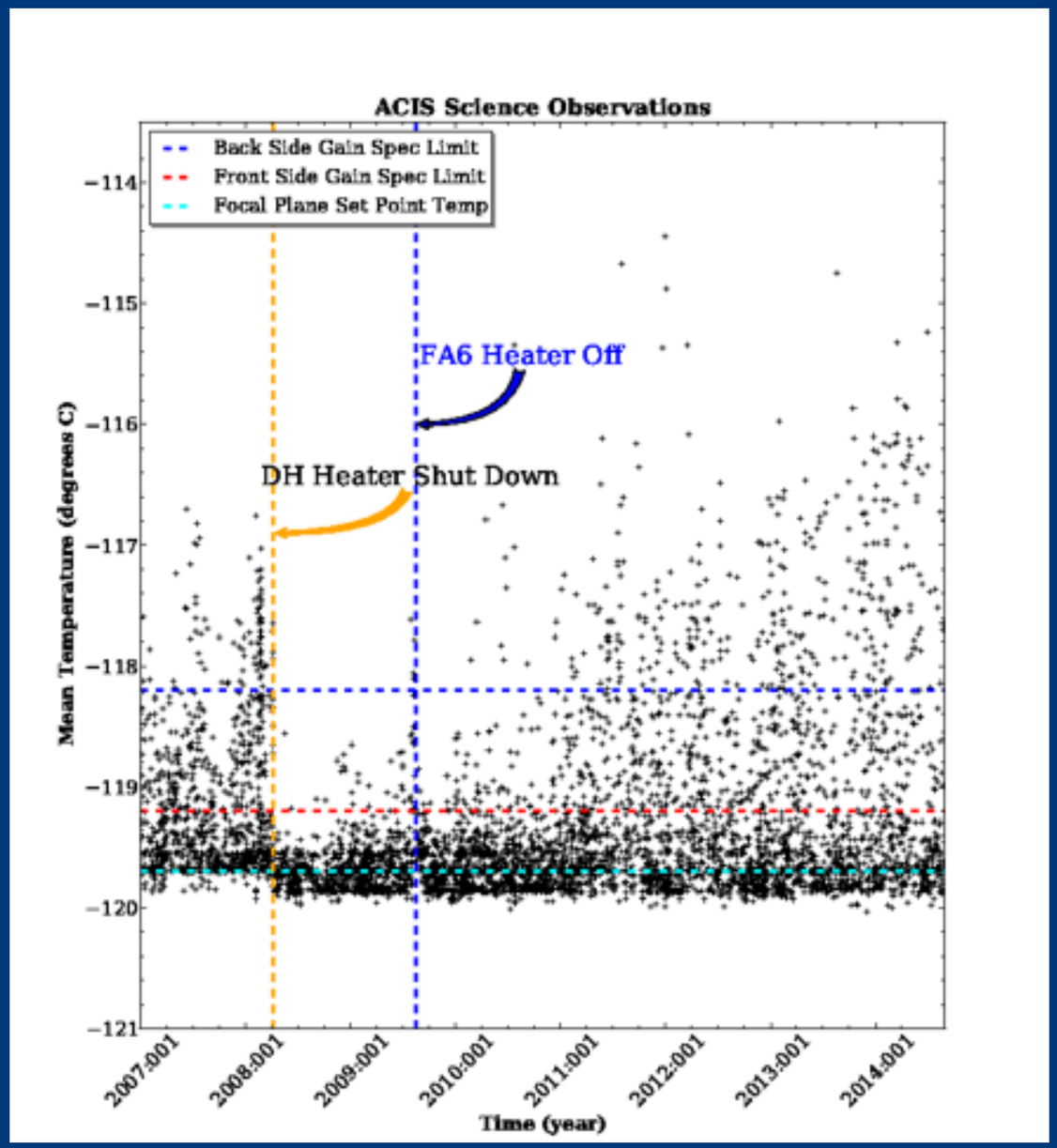
Best fit to ACIS-S data shown with the ACIS-I data

A1795 - More contaminant on ACIS-I compared to ACIS-S.

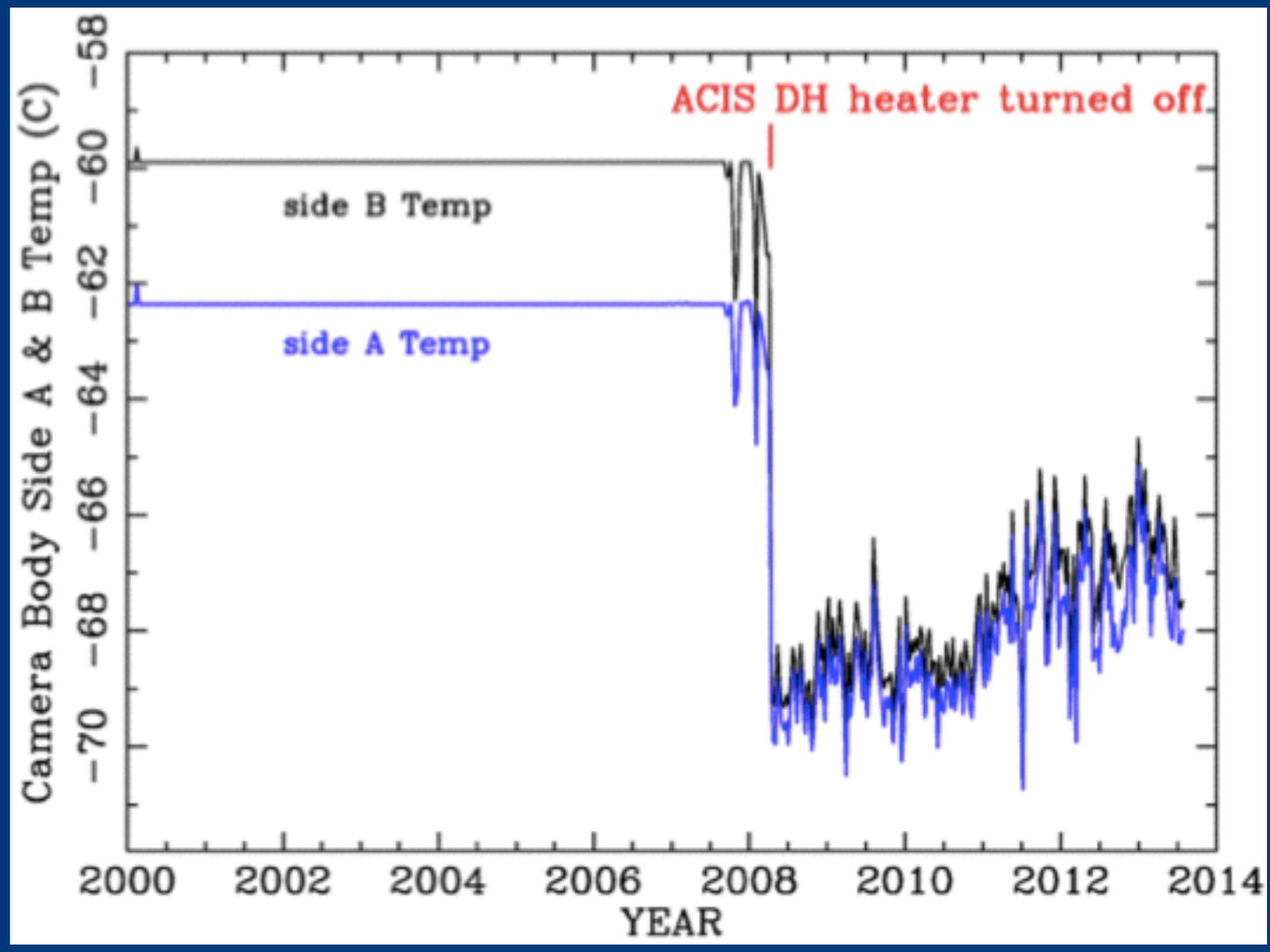
E0102 - Less contaminant on ACIS-I compared to ACIS-S



ACIS Temperatures

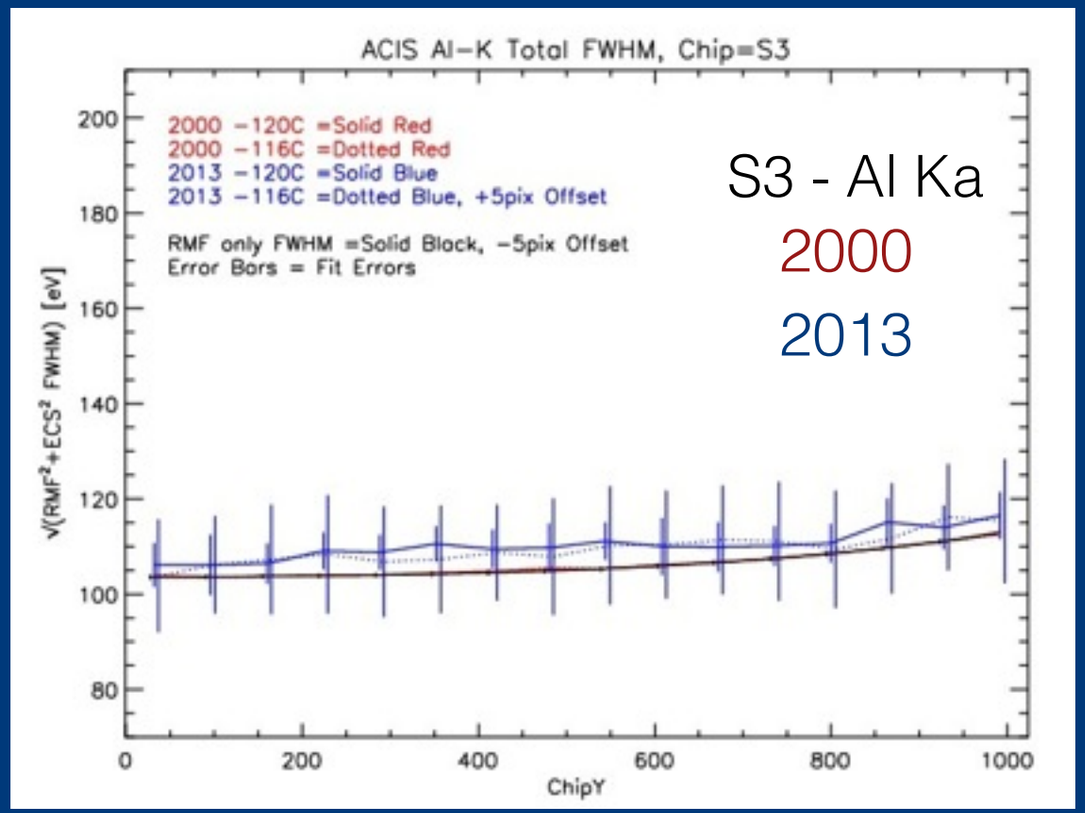


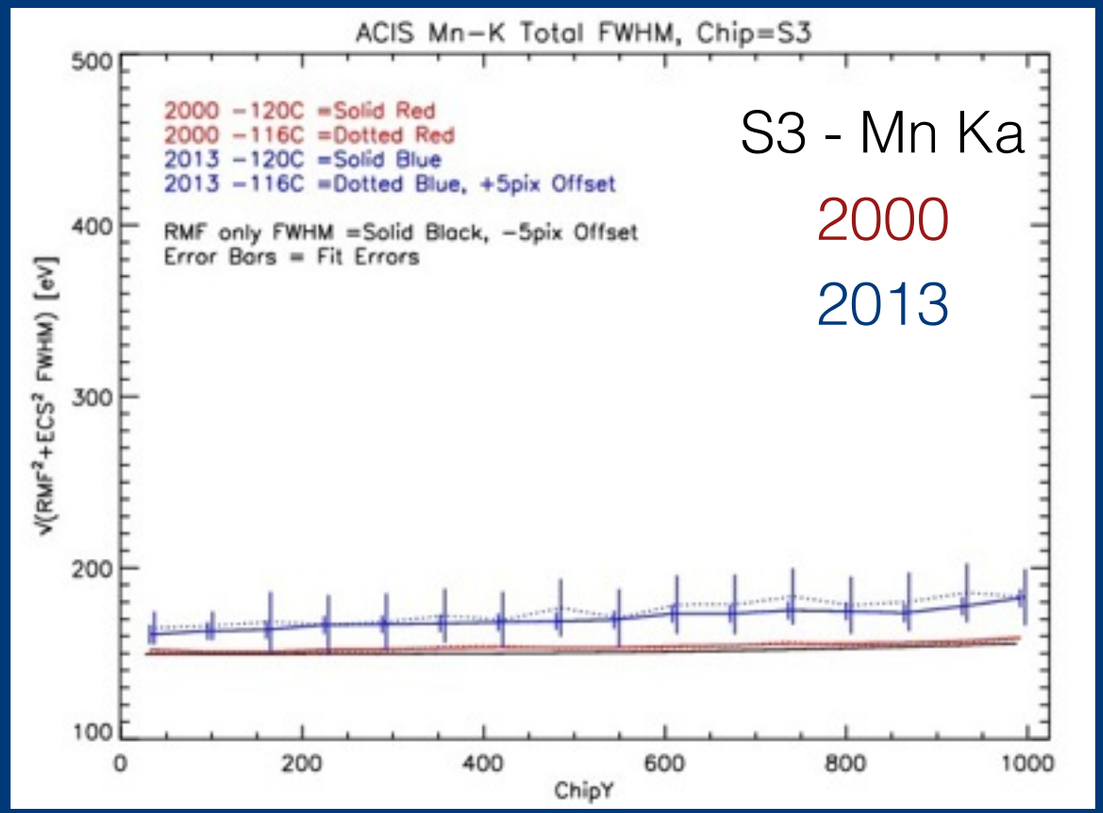
Focal Plane

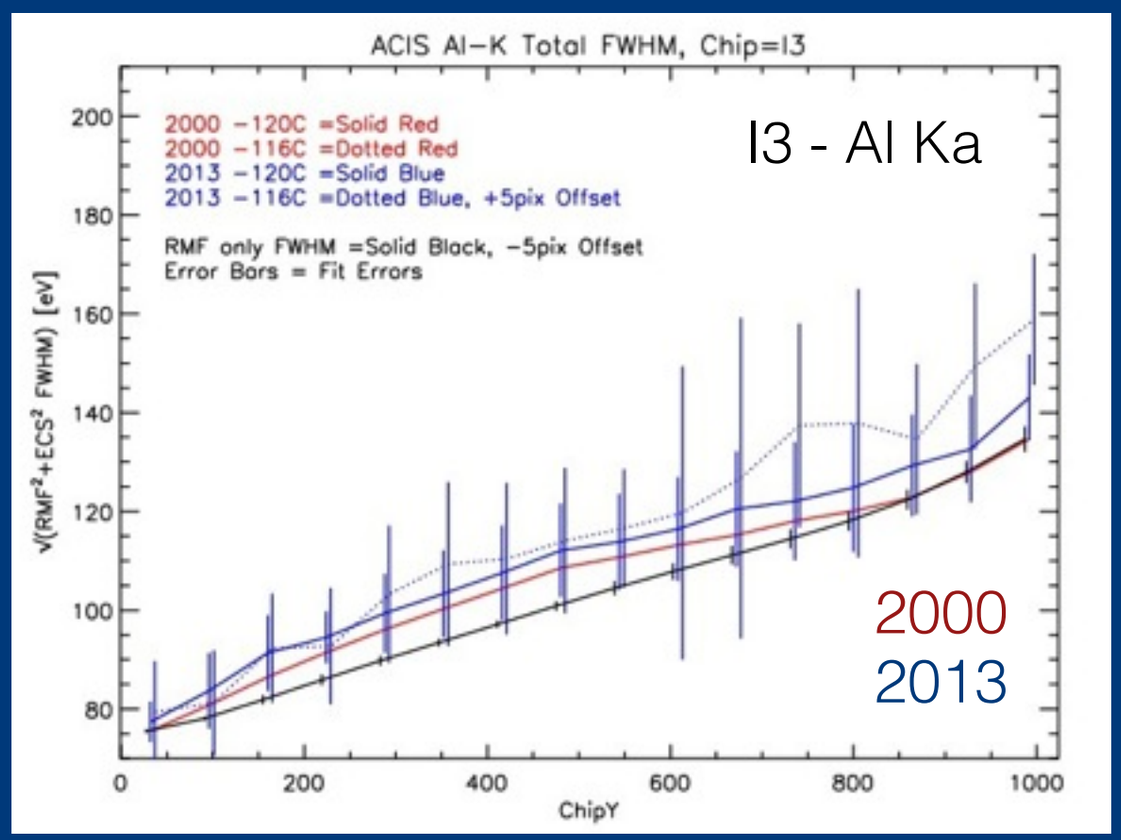


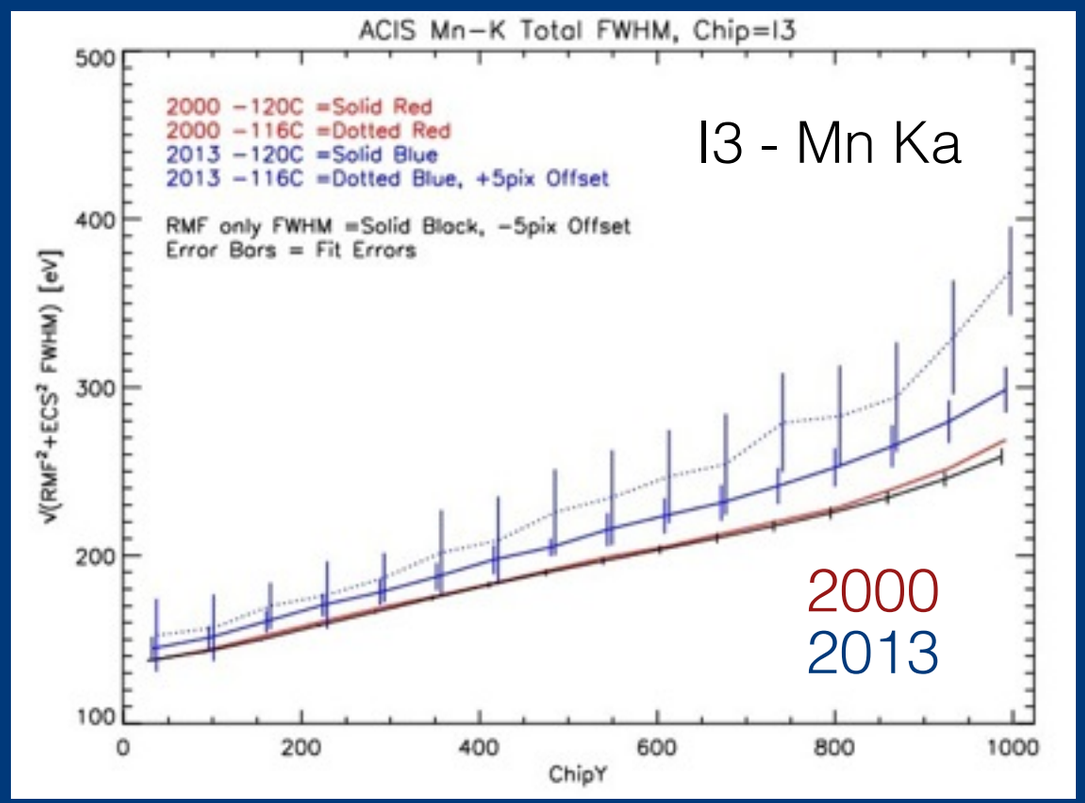
Camera Body

ACIS Spectral Resolution (ECS data)

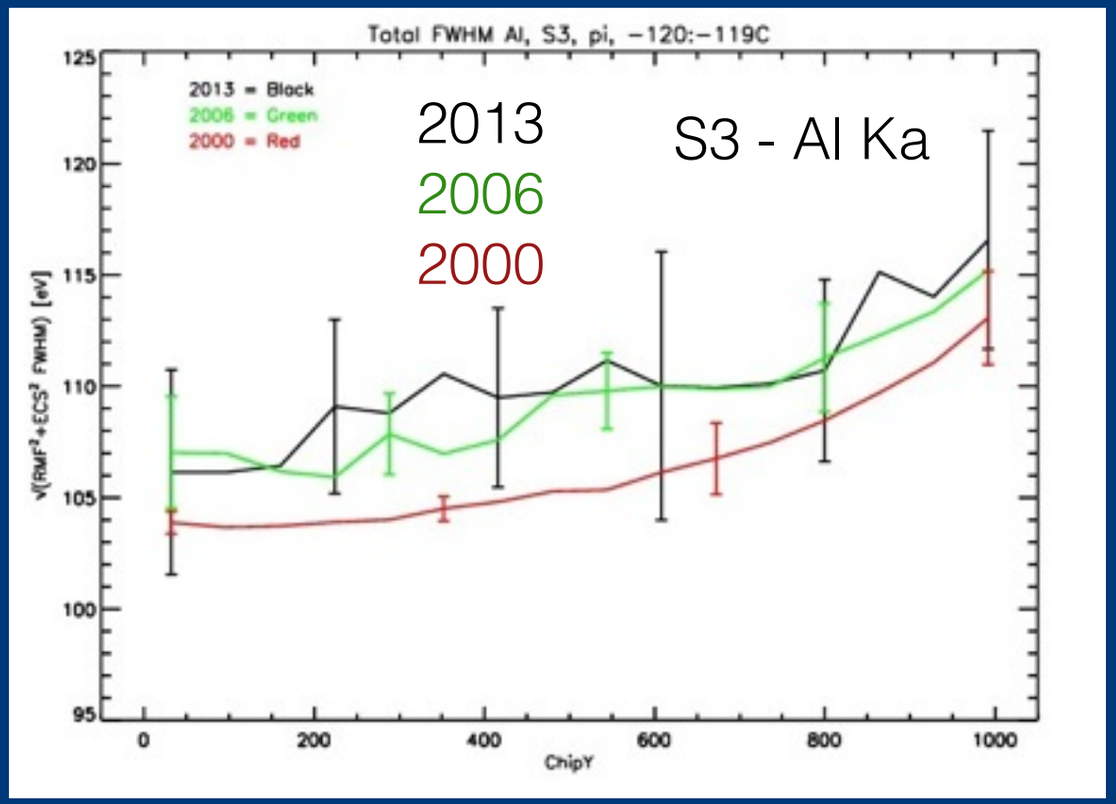


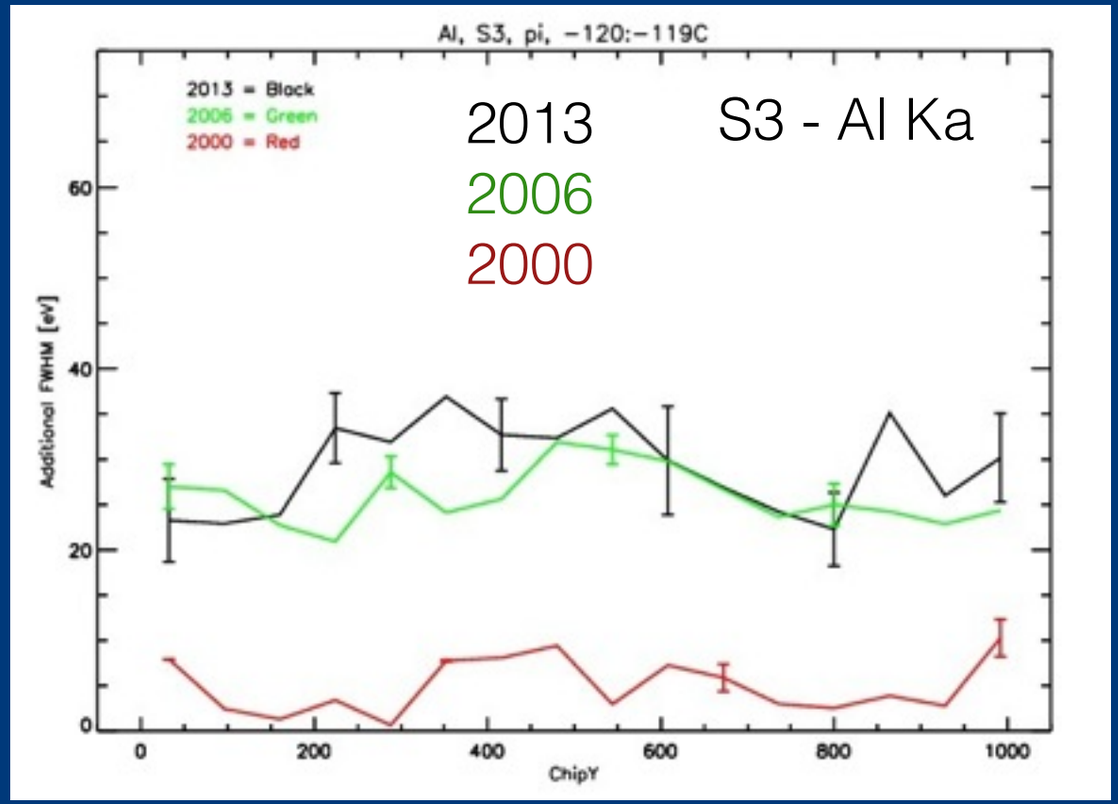


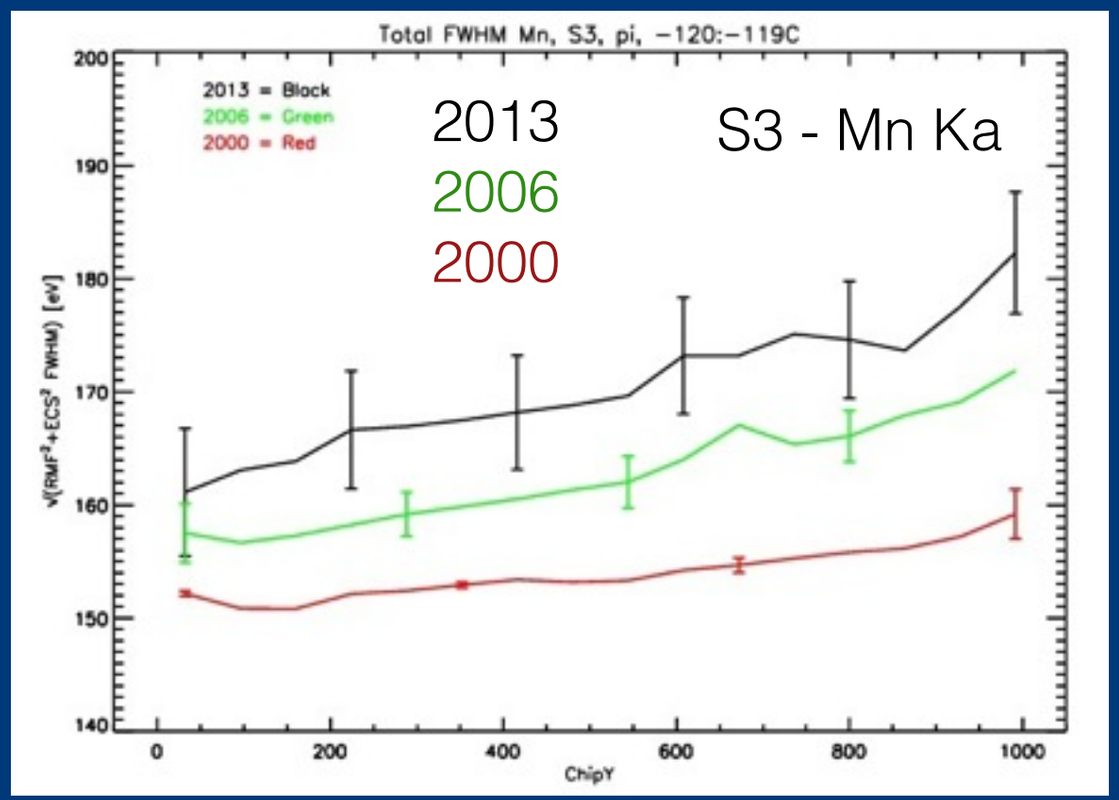


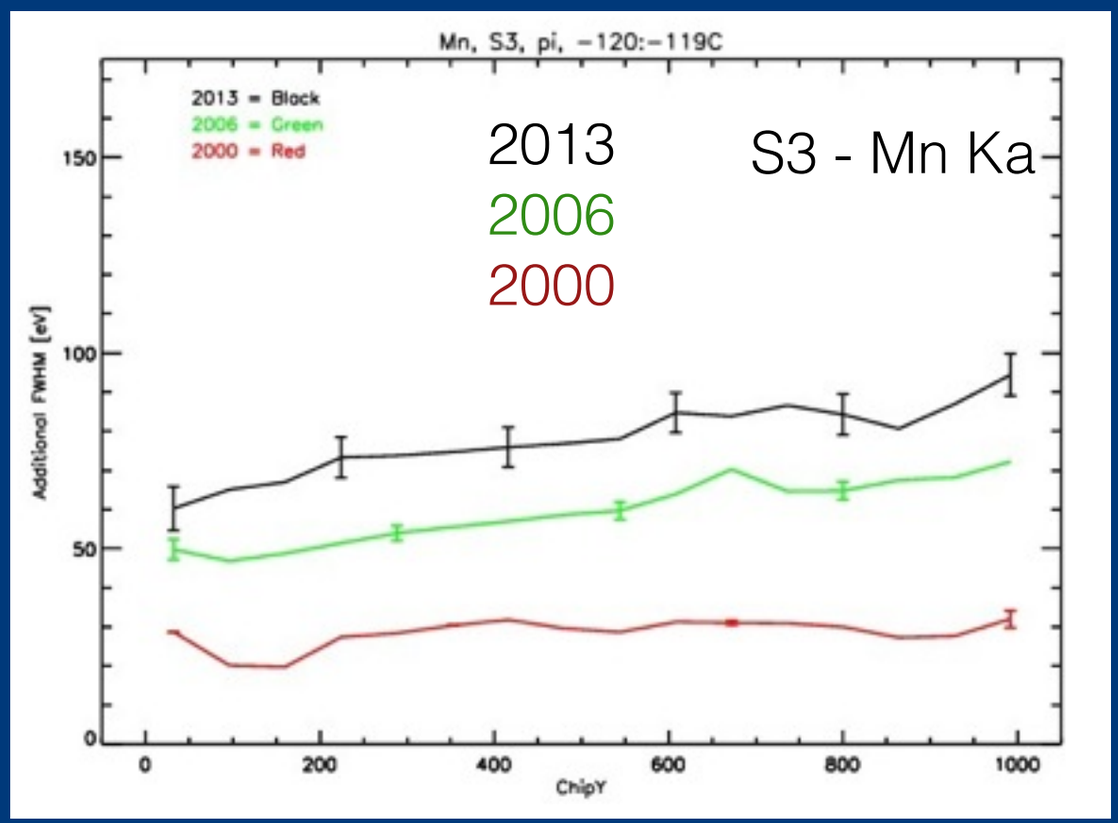


ACIS Spectral Resolution (S3)

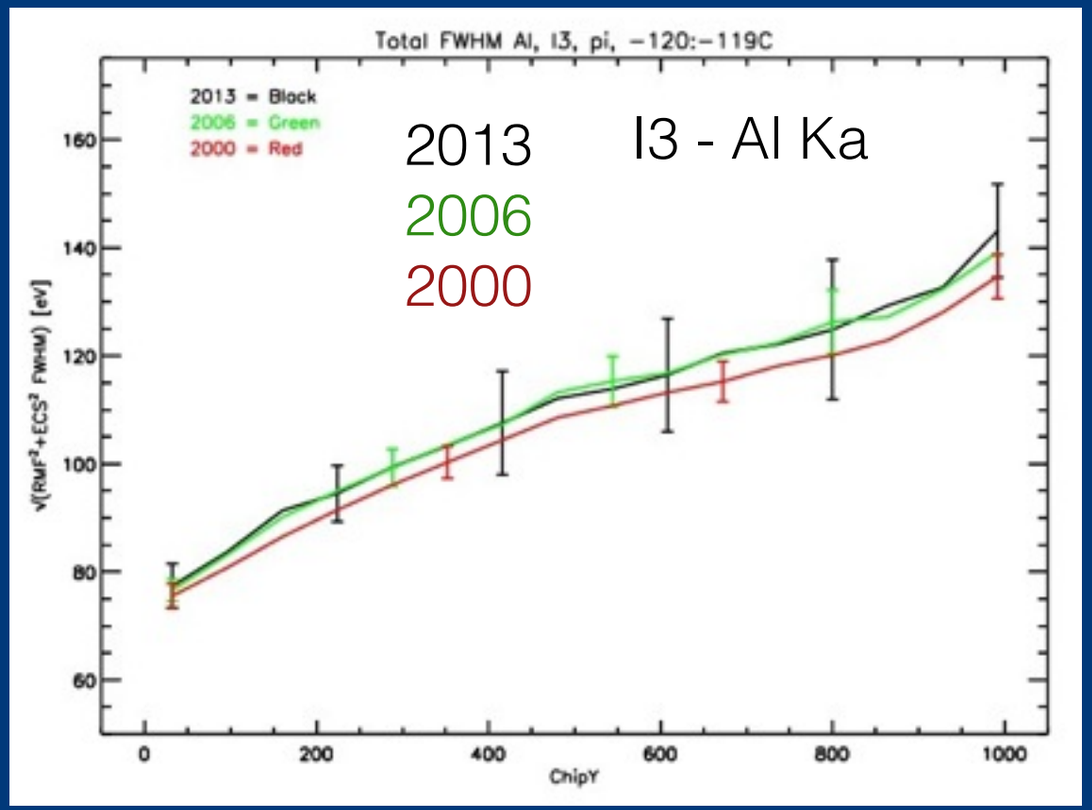


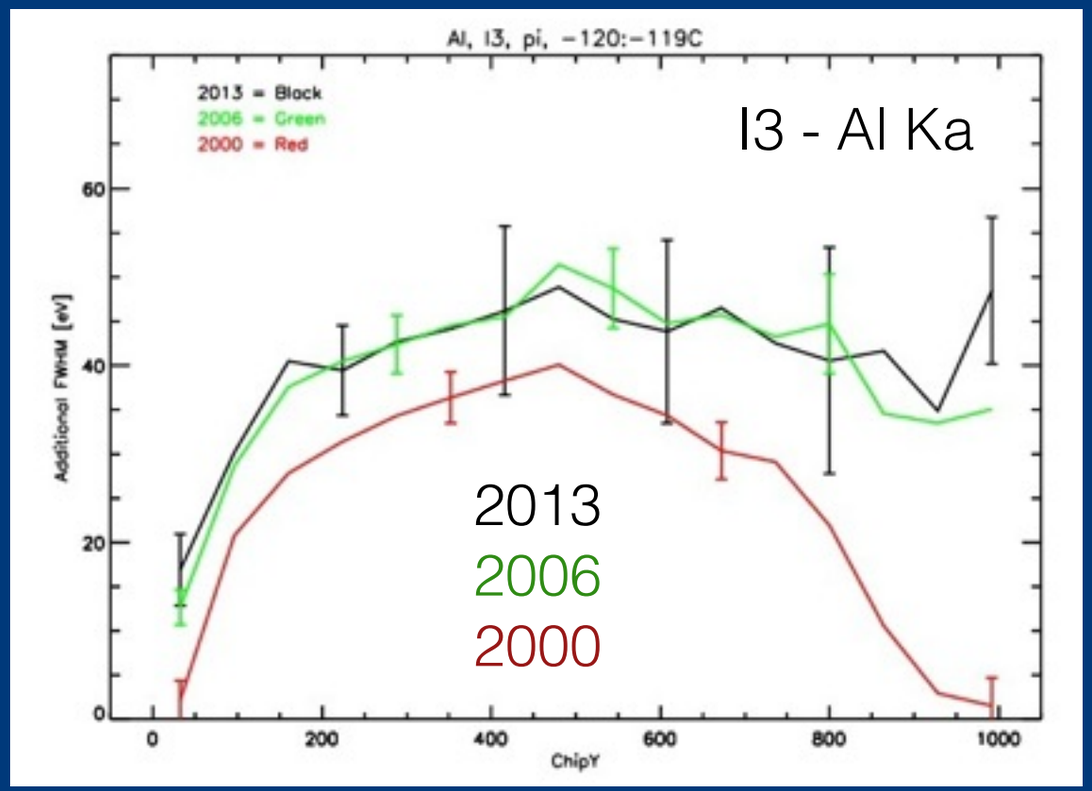


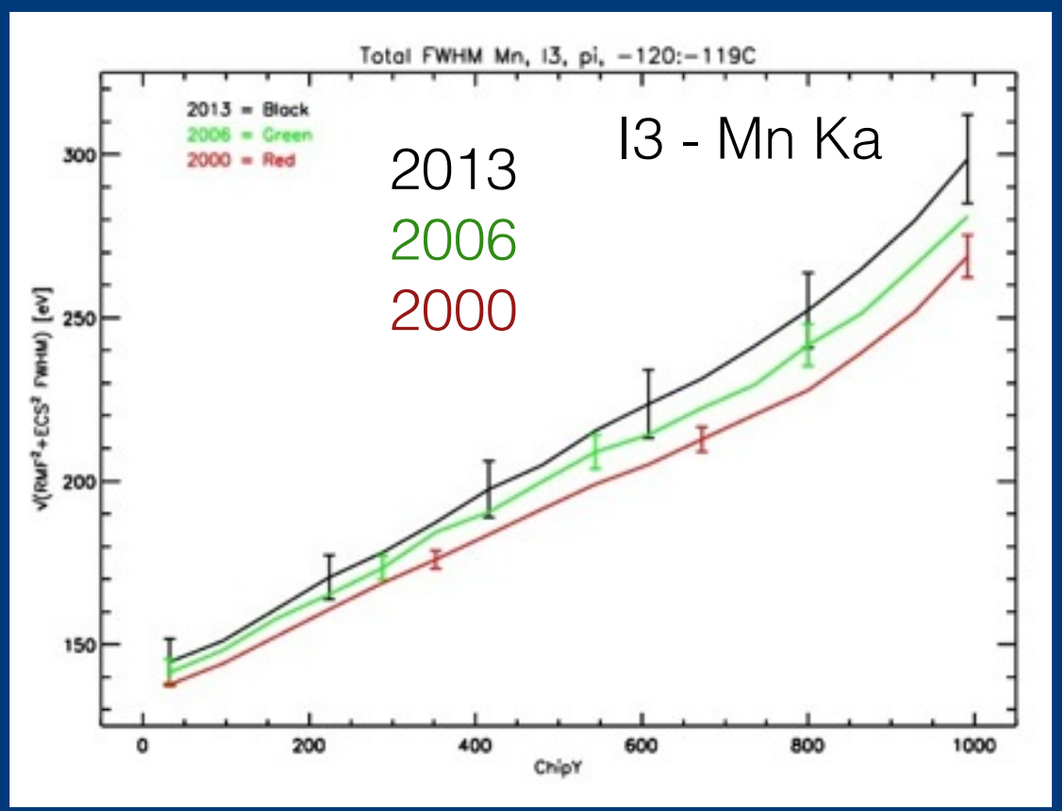


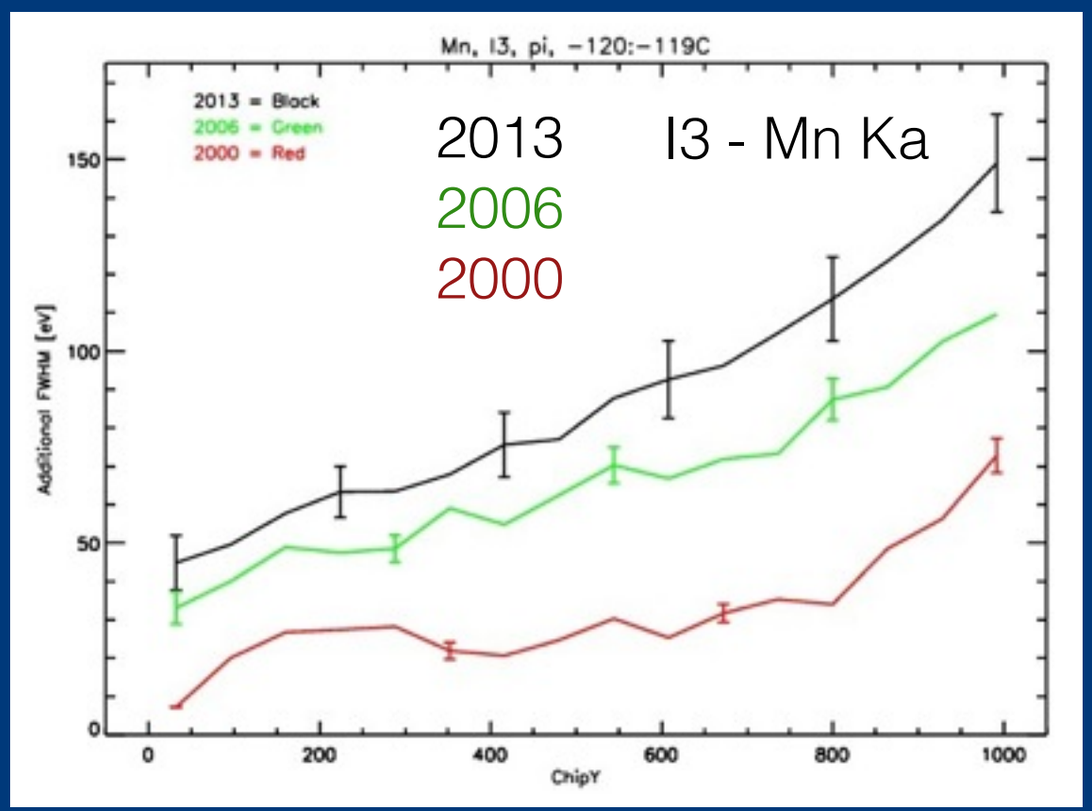


ACIS Spectral Resolution (I3)

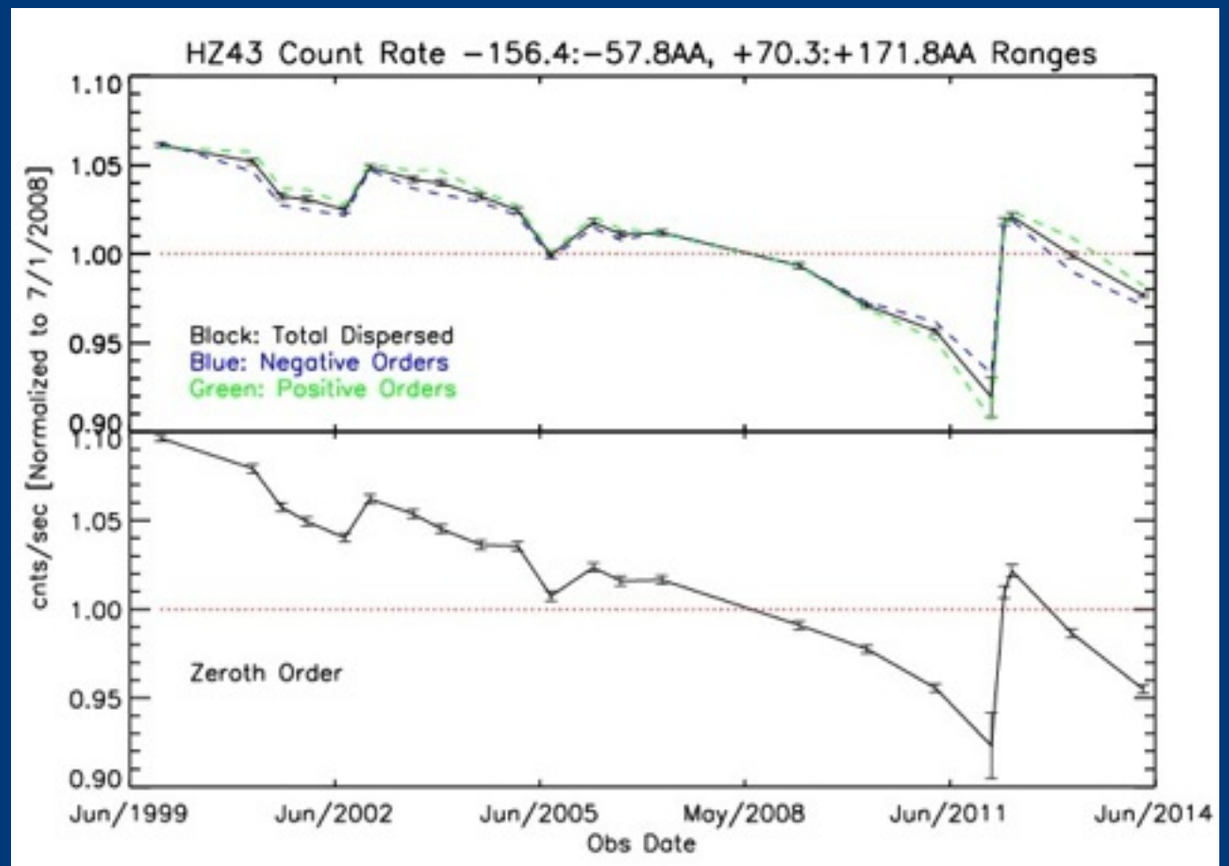








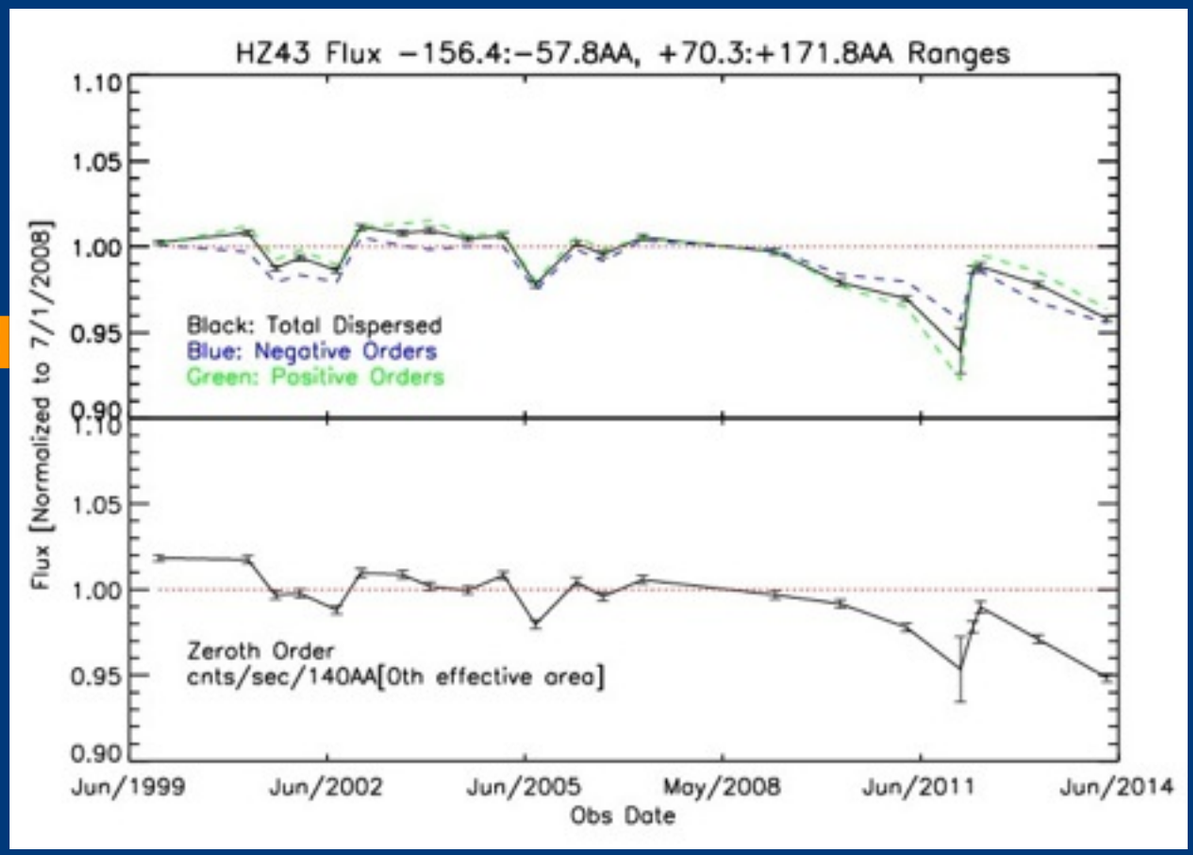
LETG/HRC-S Effective Area



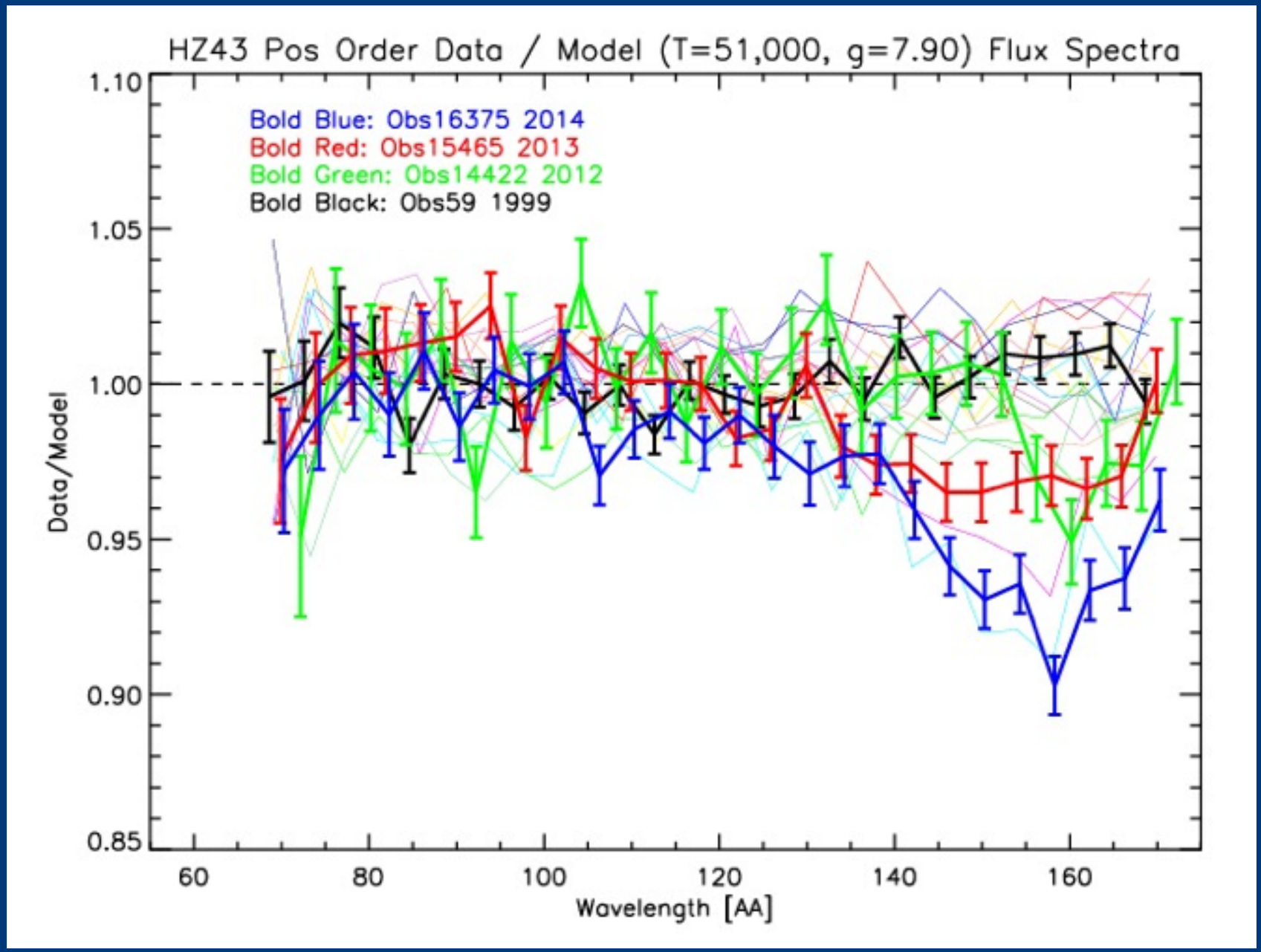
LETG/HRC-S observations of HZ43

Essentially a linear decline in broad band count rate

Fluxes are derived using the set of HRC-S QE maps in CALDB 4.6.3



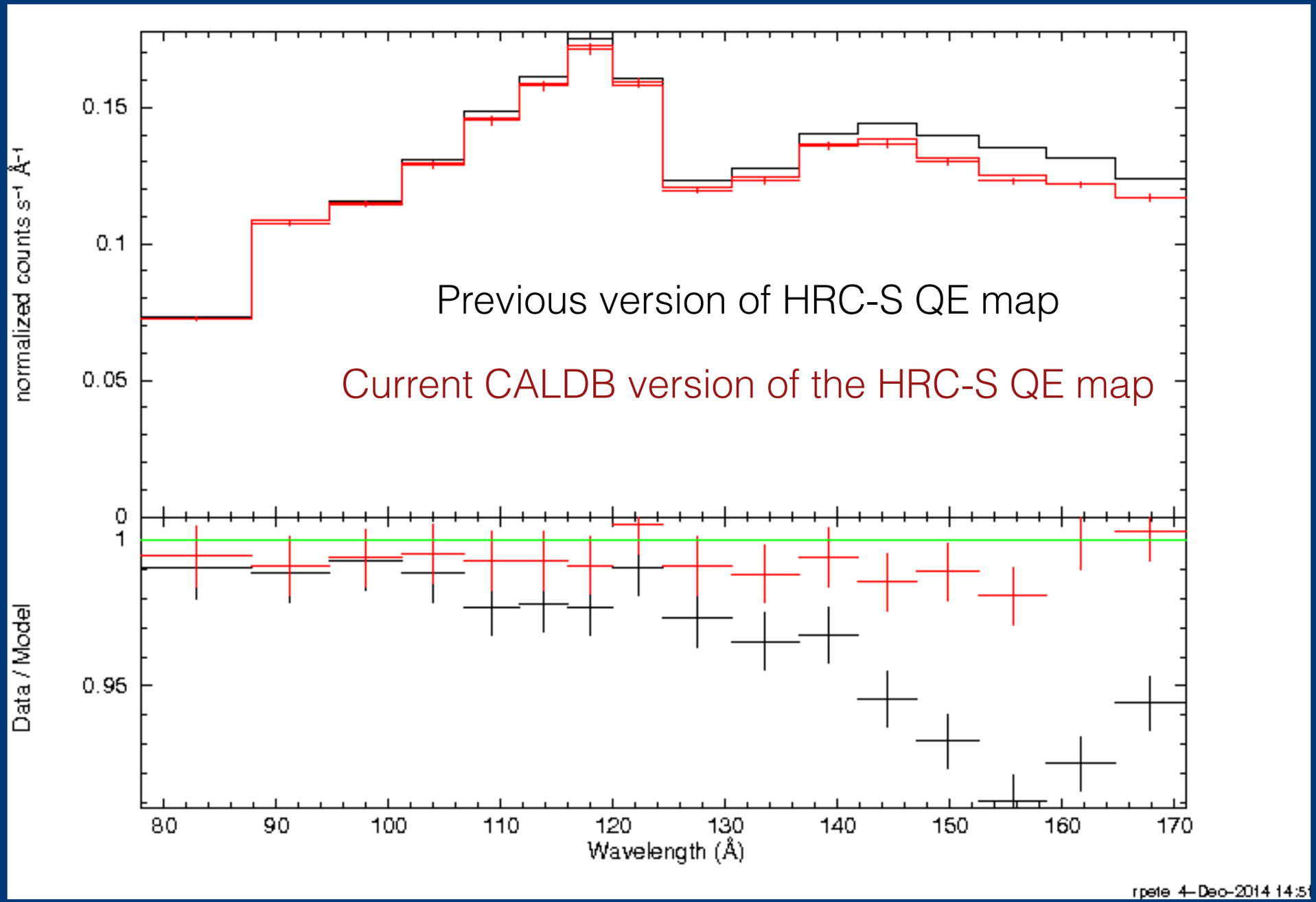
LETG/HRC-S Effective Area



The rate of QE decline varies with order, but is nearly wavelength-independent for wavelengths longer than 140A.

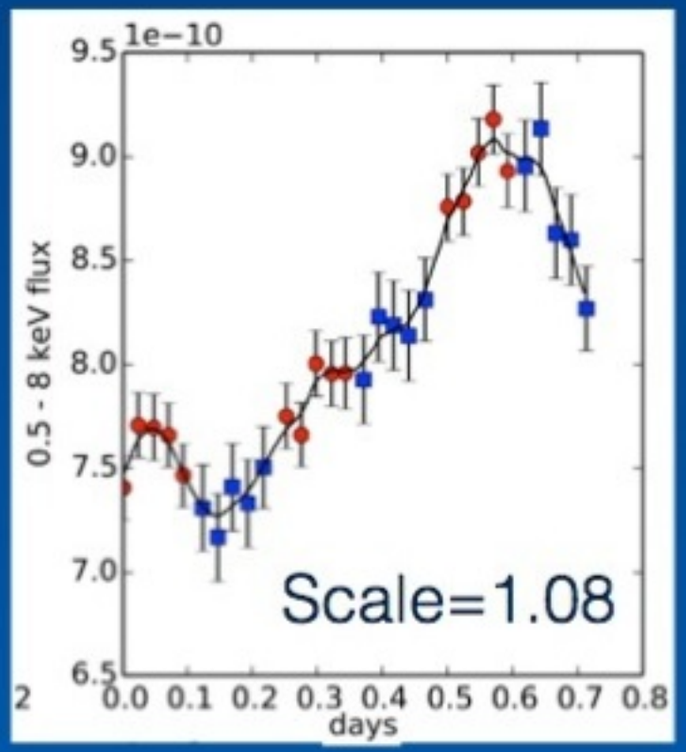
LETG/HRC-S Effective Area

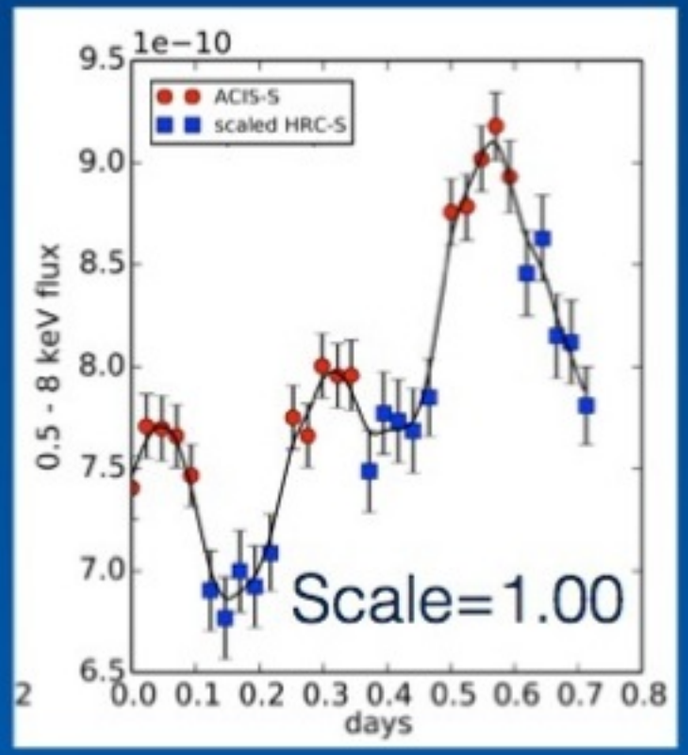
2014 LETG/HRC-S observation of HZ43

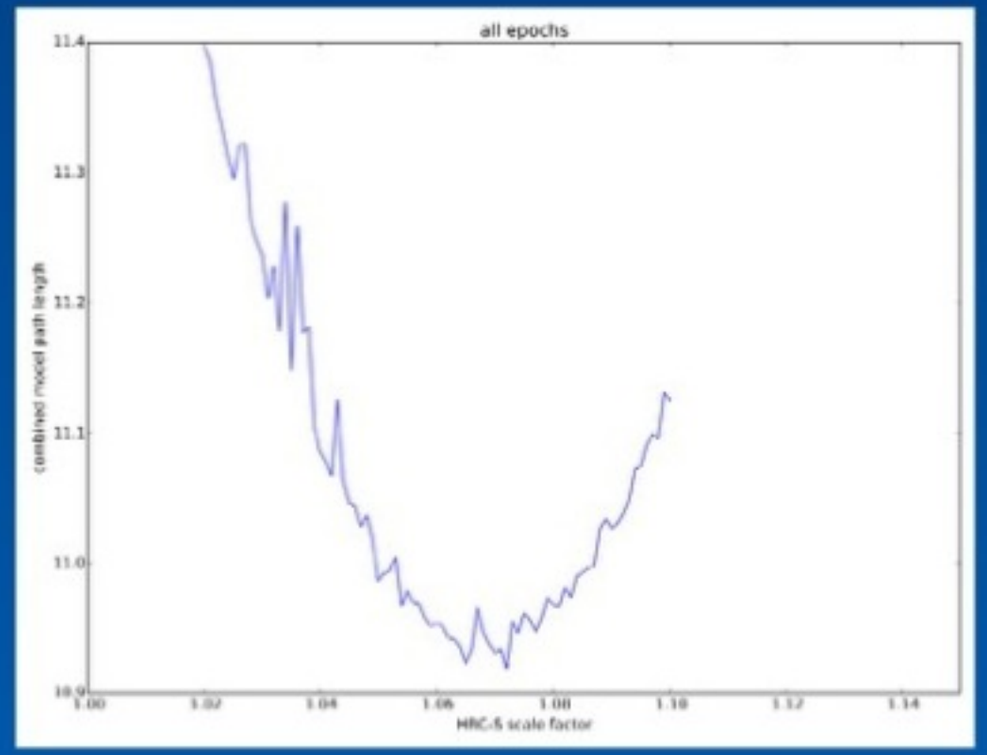


HRC-S - ACIS-S Cross-calibration

- Interleaved LETG+(ACIS-S,HRC-S) observations of blazar Mkn 421

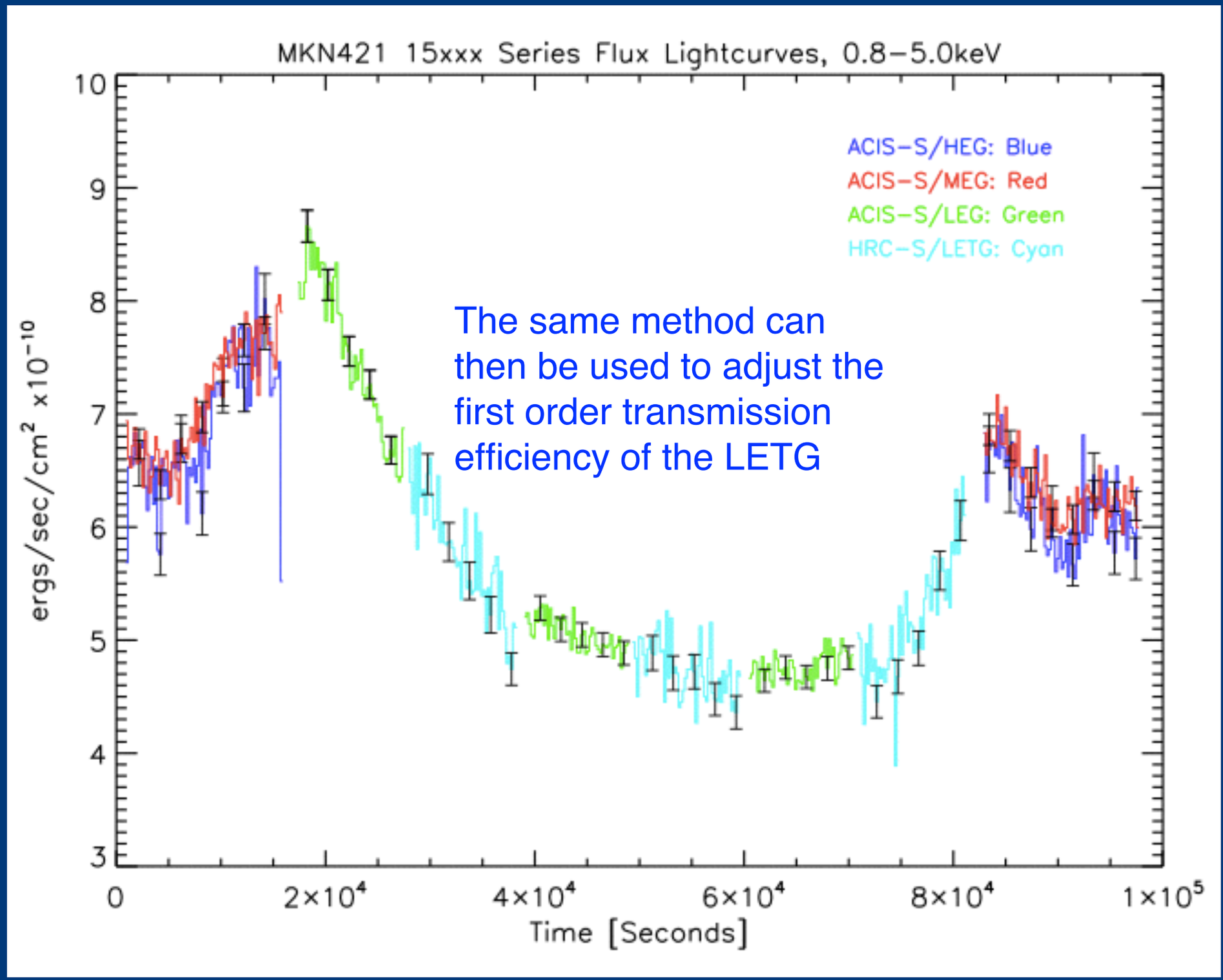






- Scale HRC-S flux to achieve minimum light curve “length”
- Five series of interleaved data combined ==> HRC-S QE needs downward revision of 7+/-1.5%

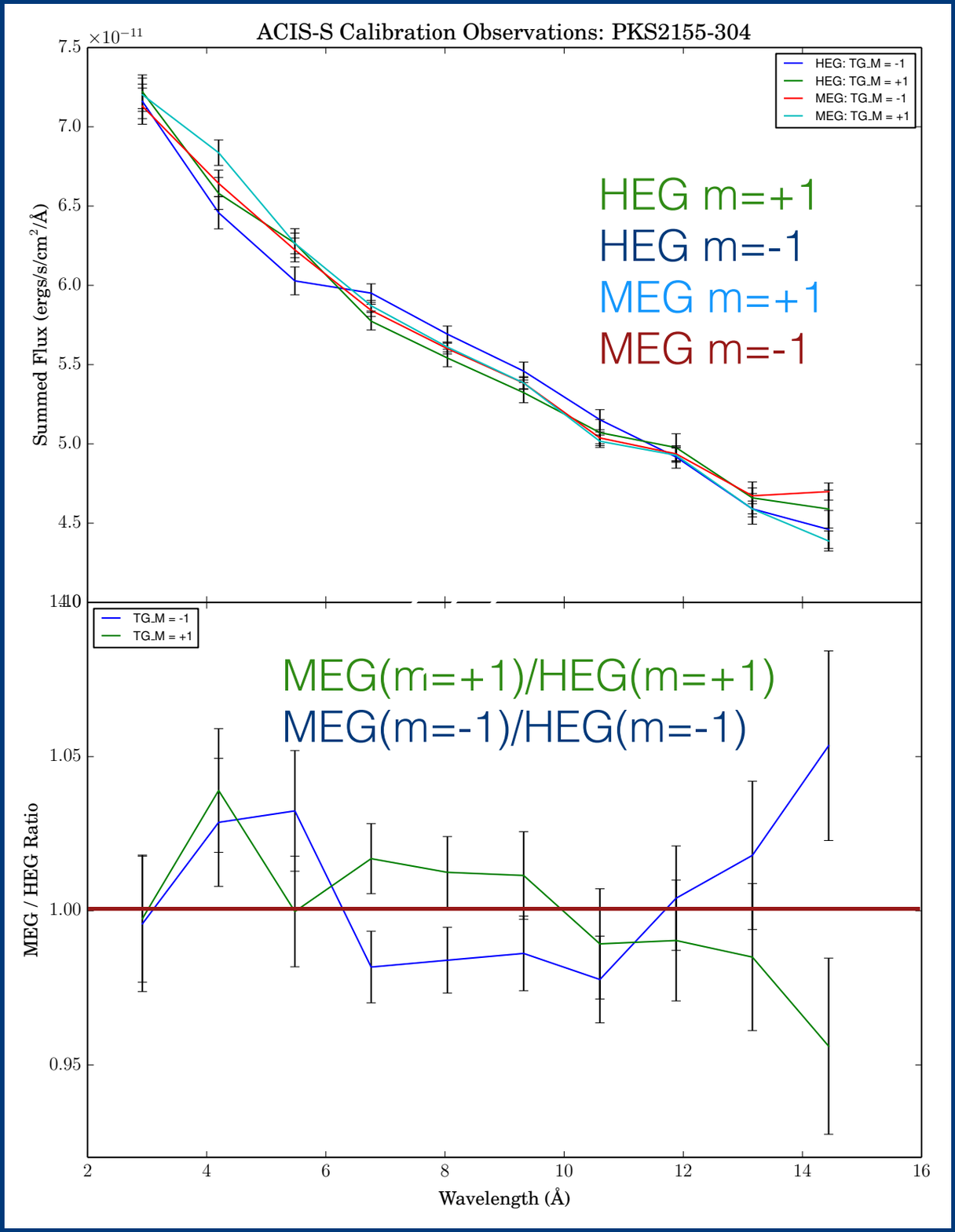
Internal cross-calibration



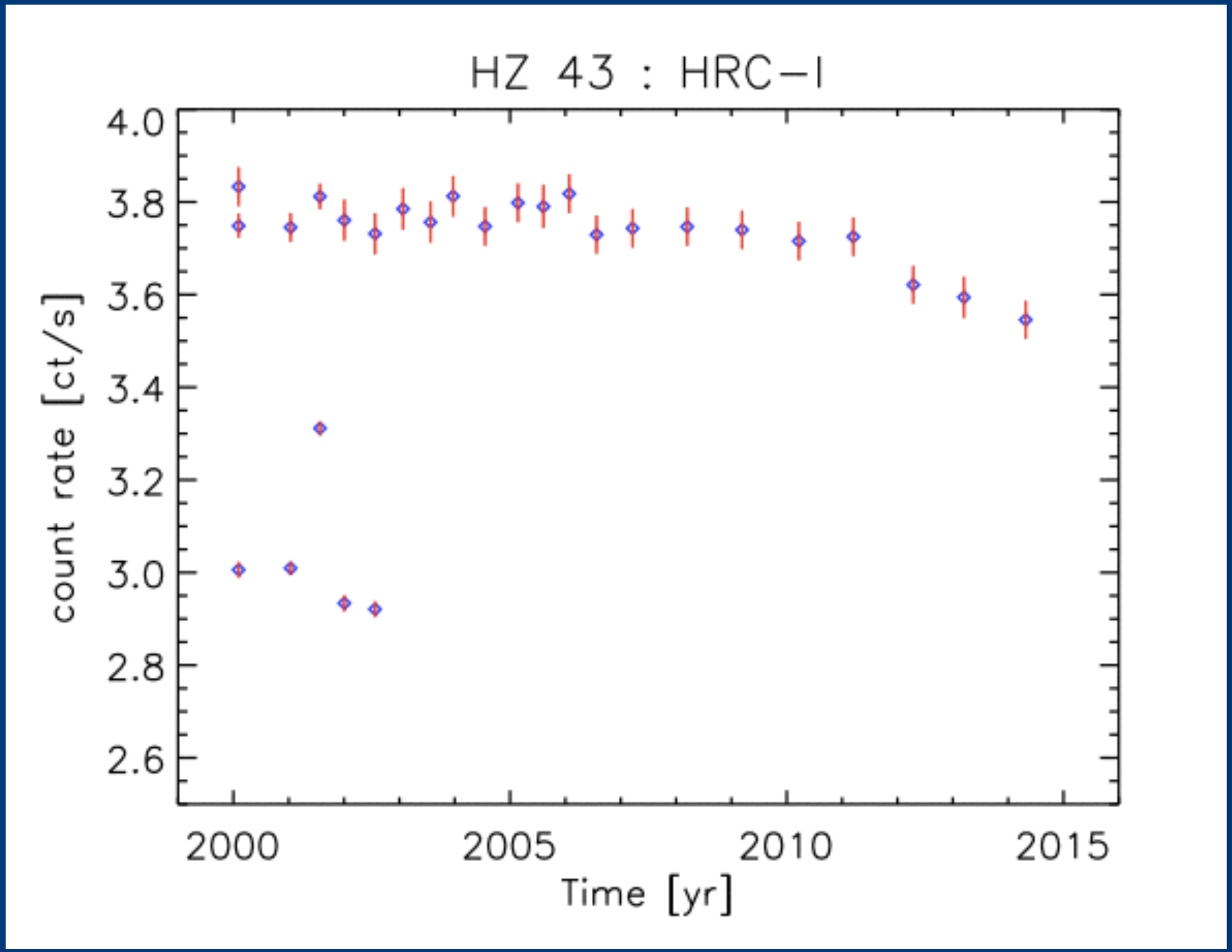
The same method can then be used to adjust the first order transmission efficiency of the LETG

HEG/MEG Cross-CalibrationS2155 data

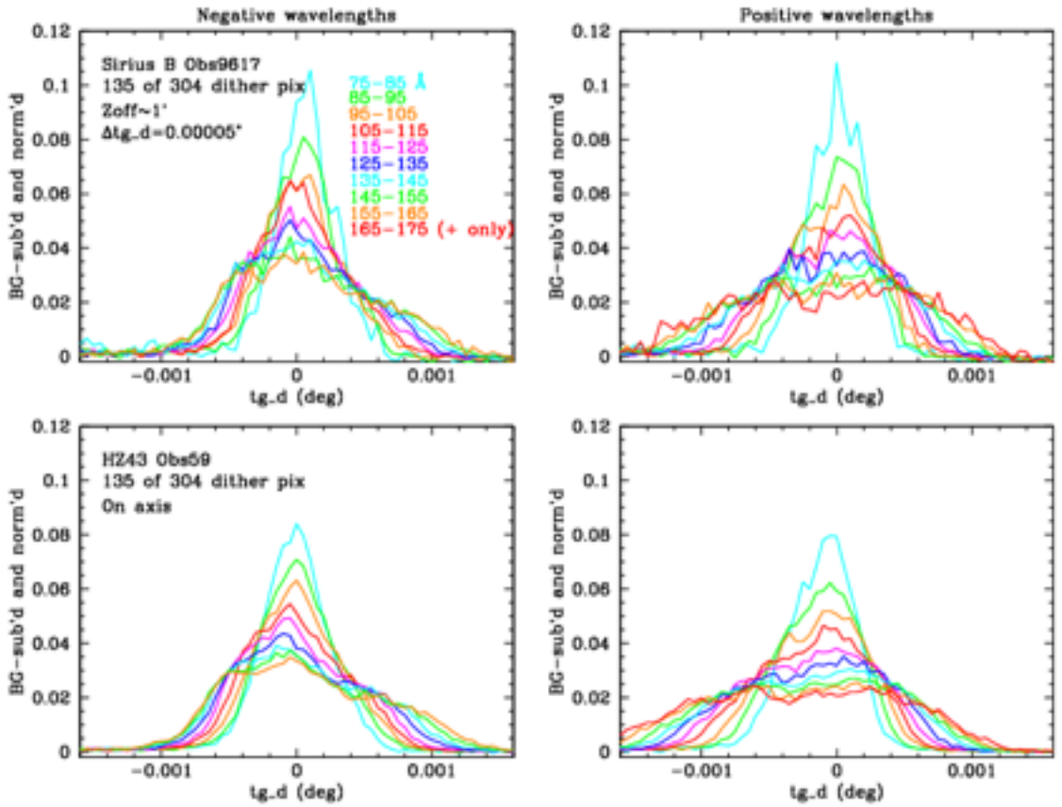
Co-added HETG/ACIS-S PK2155 data



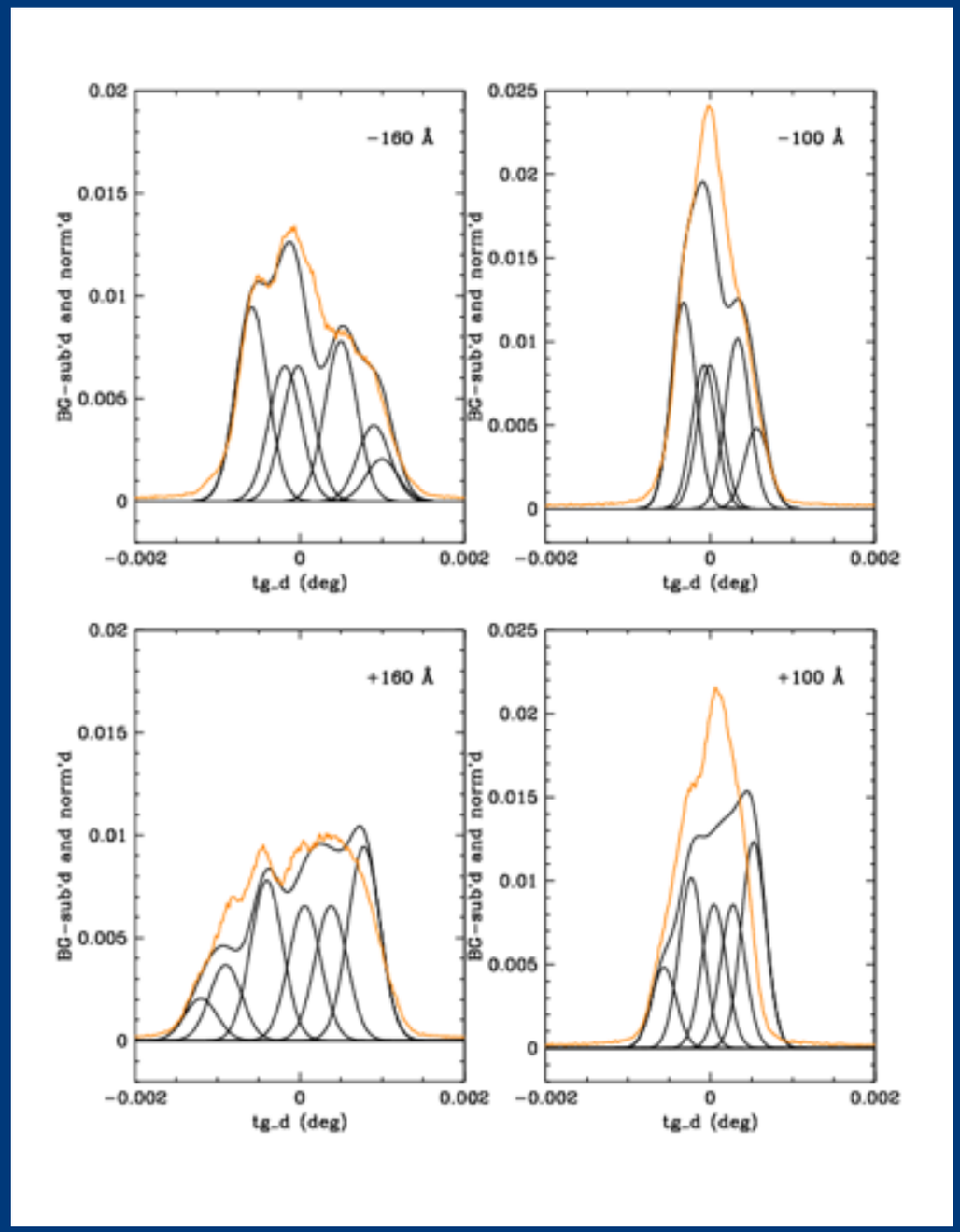
HRC-I Effective Area



LETG/HRC-S LSF Asymetry



Simulations show that the LSF asymmetry is probably due to misaligned facets.



Calibration Schedule

- Release revised ACIS contamination model with updated elemental ratios (C,O and F), spatial distribution and time-dependence.
- Release updated gain tables for the BI chips with improved gains at low energies (E < 500 eV).
- Release updated OSIP for LETG/ACIS-S data consistent with the updated gain table.
- Investigate methods for improving ACIS gain a warmer temperatures.
- Investigate methods for improving the modeling of the ACIS spectral response.
- Determine if an adjustment to the first order transmission efficiency of the LETG is required.
- Investigate the small decline in HRC-I QE.