

Chandra Calibration Status



IACHEC Meeting April 28, 2009

Updated Calibration Products Since Last IACHEC Meeting

There have been 5 CALDB releases since the last IACHEC meeting

HRMA

- Updated HRMA effective area released in CALDB 4.1.1

ACIS

- New detector gains are computed and released every 3 months.

HETG

- Updated HEG and MEG efficiencies to maintain cross- calibration

Chandra Internal Cross-Calibration

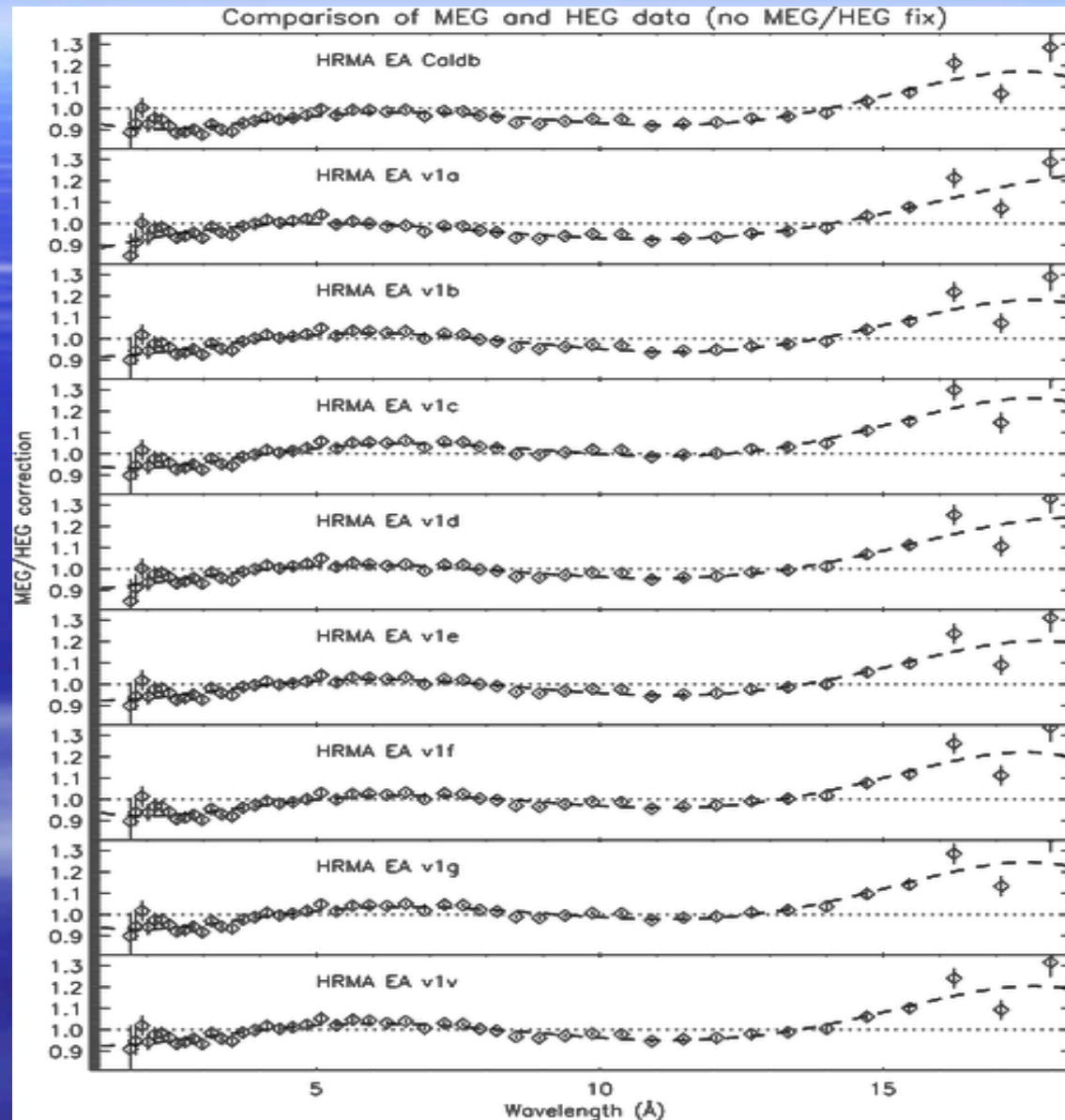
ACIS – No changes were required. The mirrors and ACIS had independent ground calibration.

HETG – the transmission efficiencies of the HEG and MEG were adjusted to produce consistent results.

HRC-I – No changes were required to maintain ACIS/HRC cross-calibration.

LETG/HRC-S – an adjustment to the HRC-S QE is required to maintain accurate cross-calibration between the HETG and LETG.

Revised HETG Efficiencies



[CALDB 4.1.1](#) →

HRC-I/ACIS Cross-Calibration with Updated HRMA Model

TABLE 1
CAS A ON ACIS-I3

	Old HRMA	New HRMA
N_H	1.53e22	1.50e22
Index	3.24	3.22
Norm	1.80e-3	1.90e-3

TABLE 2
G21.5-09 ON ACIS-S3

	Old HRMA	New HRMA
N_H	2.15e22	2.19e22
Index	1.73	1.83
Norm	1.63e-2	1.93e-2

TABLE 3
PKS 2155-304 ON ACIS-S/LETG

	Old HRMA	New HRMA
N_H	1.36e22 (frozen)	1.36e22 (frozen)
Index	2.74	2.74
Norm	1.85e-2	2.03e-2

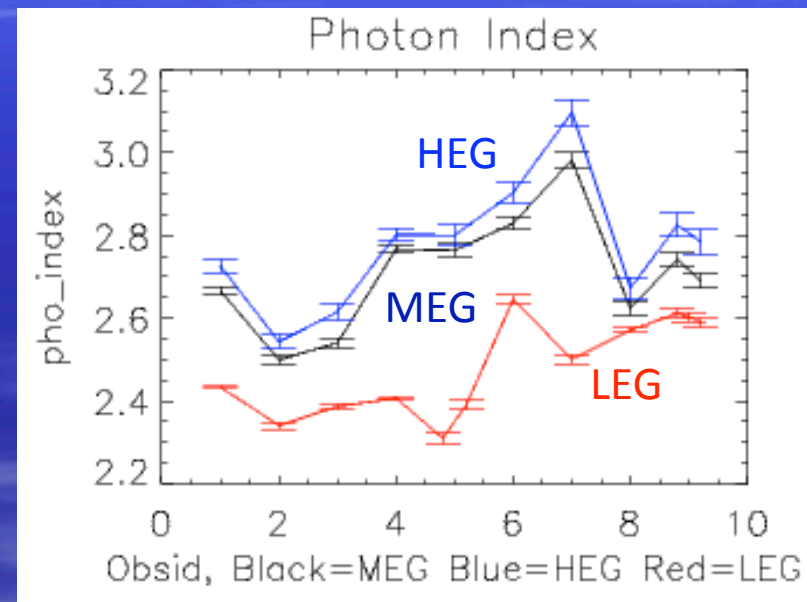
TABLE 4
PREDICTED HRC-I COUNT RATES

Source	Old HRMA	New HRMA
Cas A	0.032	0.032
G21.5-09	0.59	0.59
PKS2155-304	1.55	1.57

LETG/HETG Cross-calibration

- HRC-S 0.5-10keV QE calibrated and fine-tuned in-flight using LETG blazar continua
- HRMA EA revision requires QE re-calibration
- Account for:
 - HRMA EA changes
 - Accumulated in-flight data suggesting overly-hard power-law indices than HETG+ACIS by of order 5%
 - Will require relative QE correction between ~ 0.5 -5keV of $\sim 15\%$

Power law Fits to contemporaneous HETG and LETG observations of PK2155-304

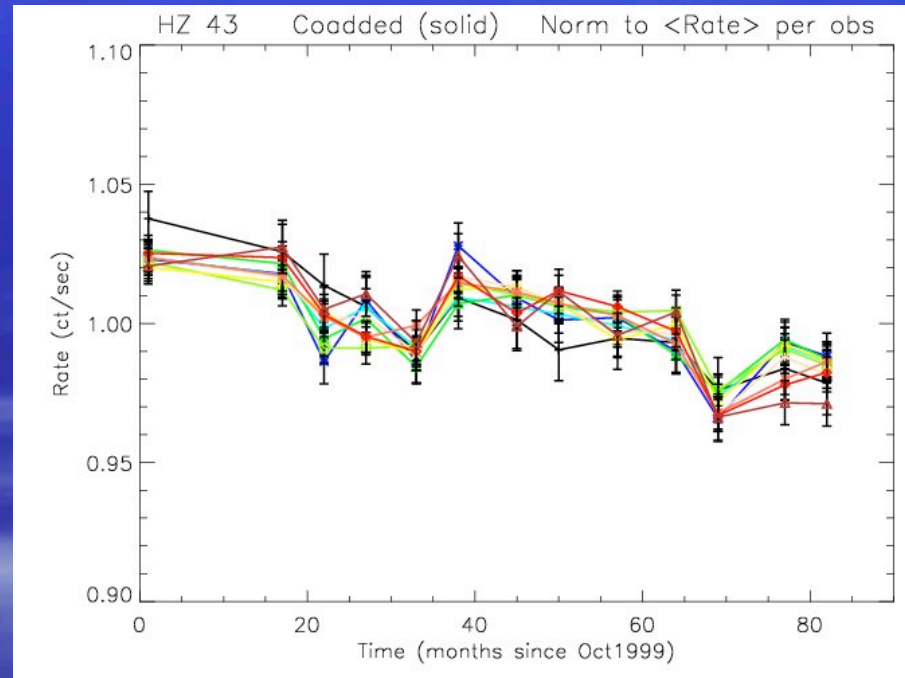
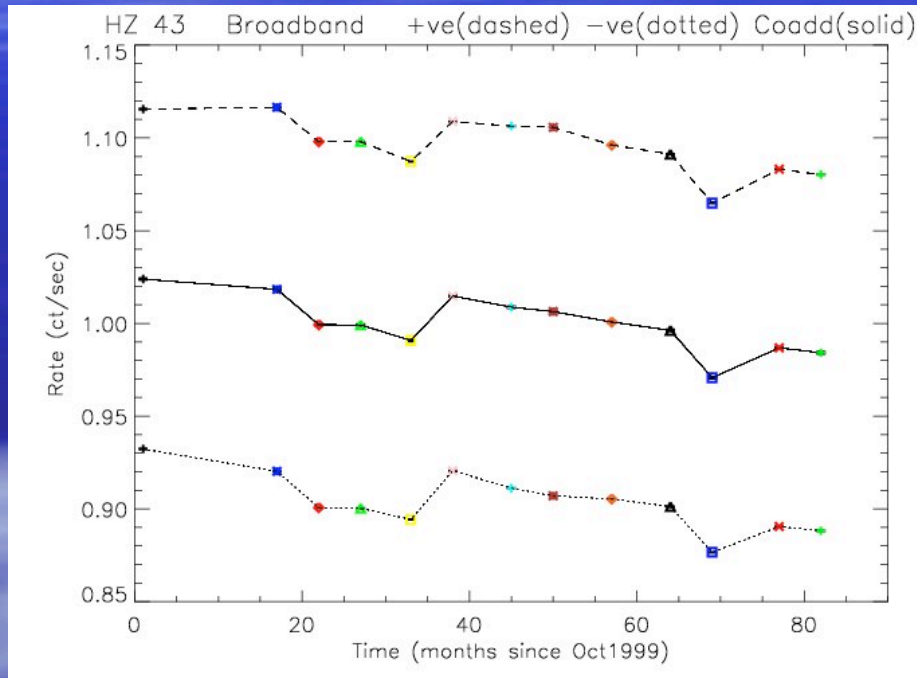


Complicated by:

- Spectral shape/intensity variability
- Parameter non-orthogonality
- Possible PL curvature

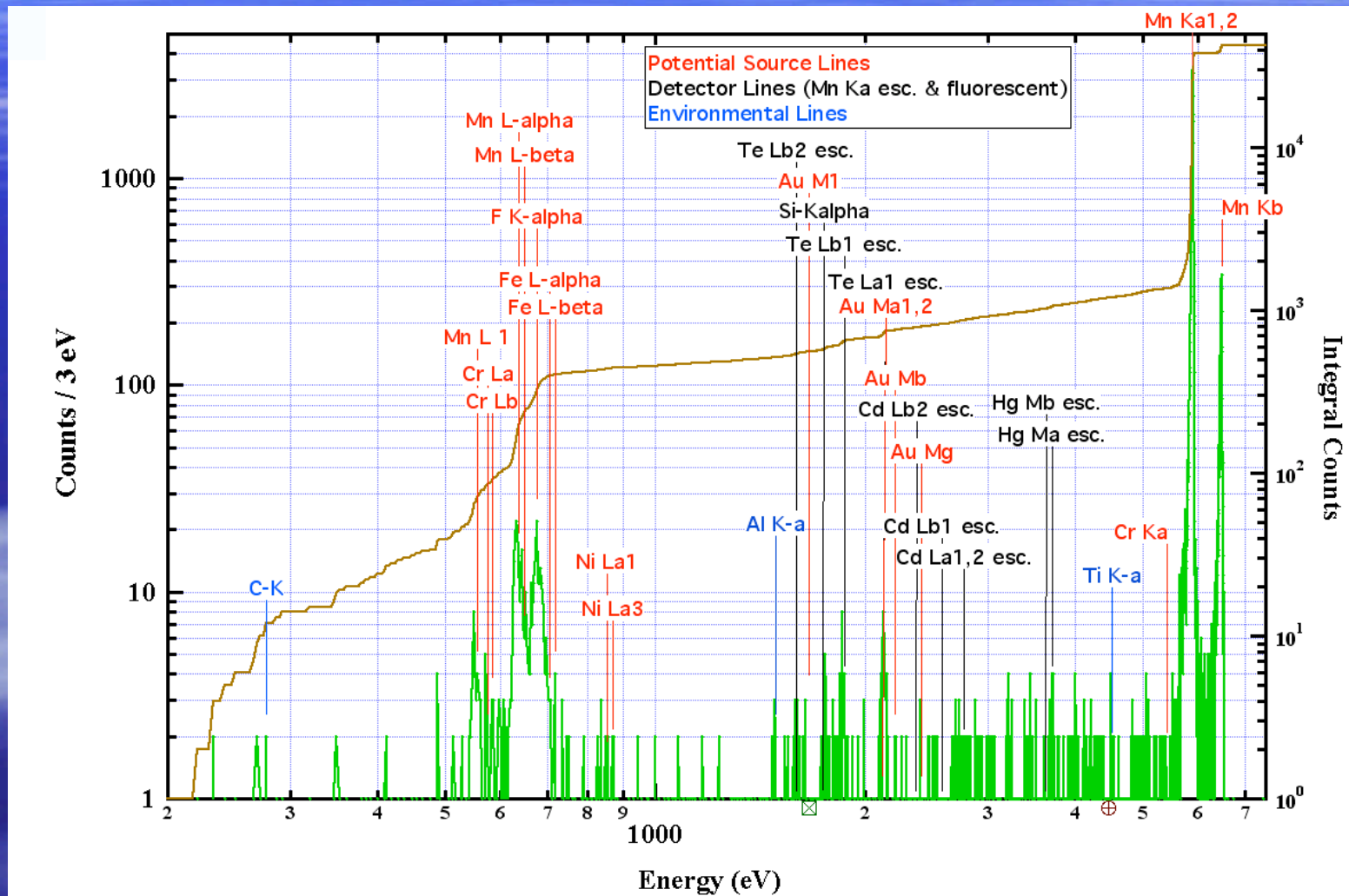
HRC-S QE Decline

Detector wide and energy independent

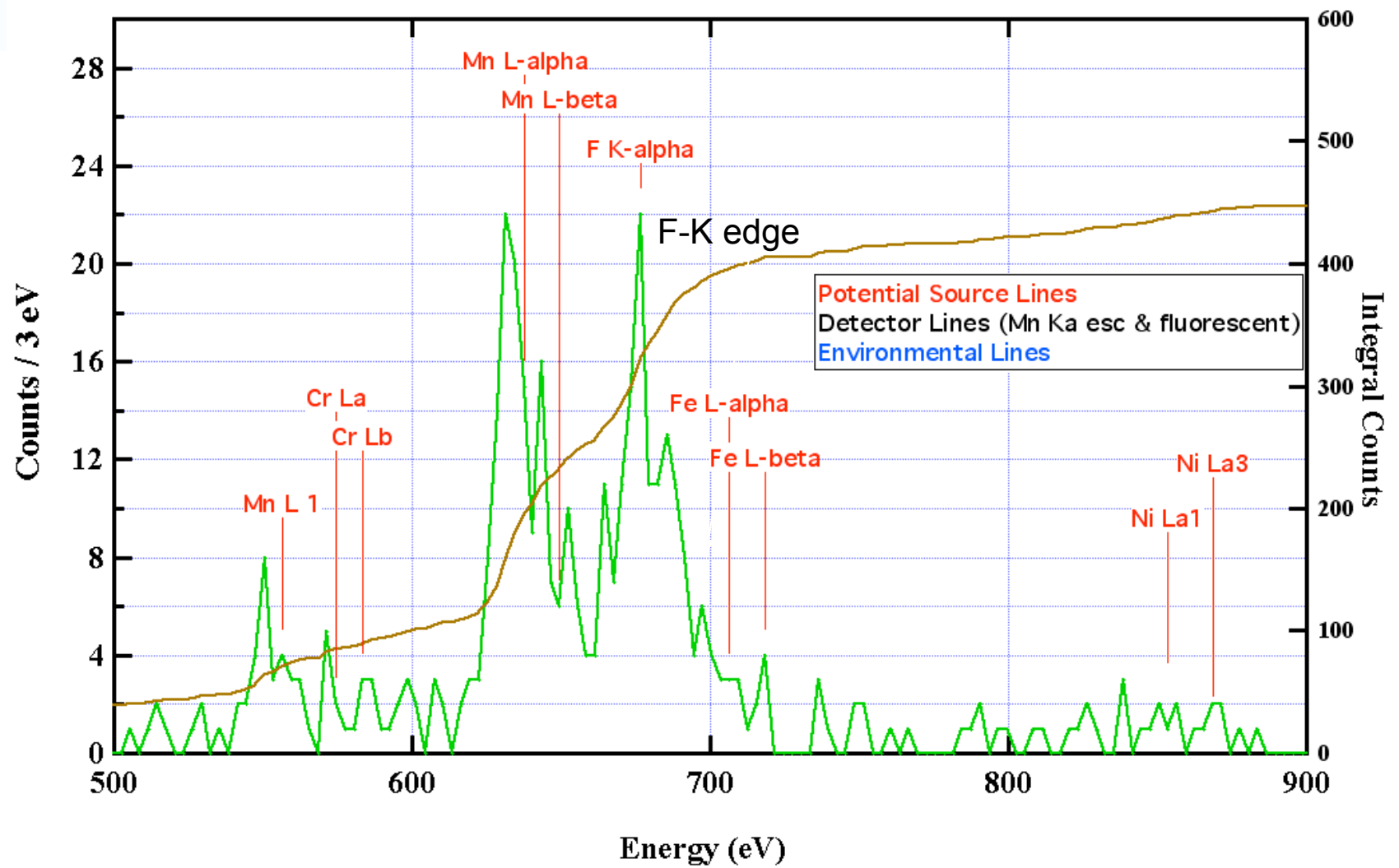


ACIS Filter Contamination Model

Update on the ACIS Contamination Model

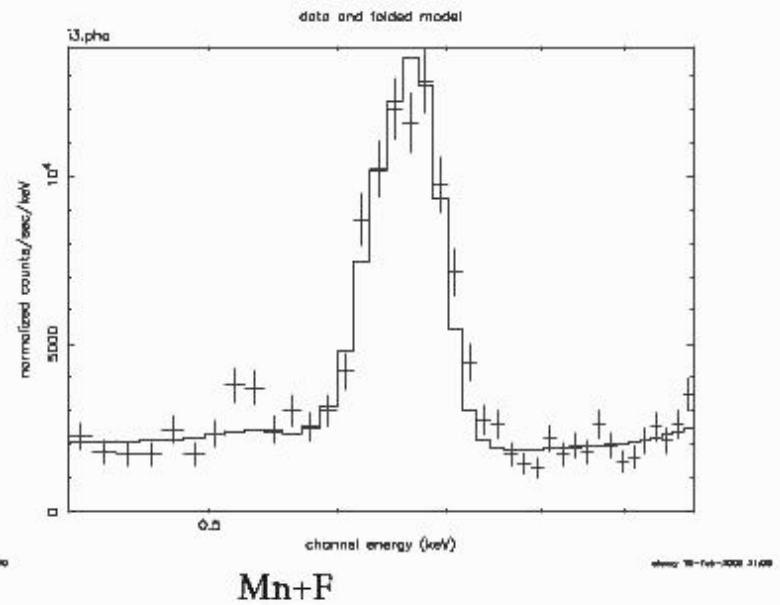
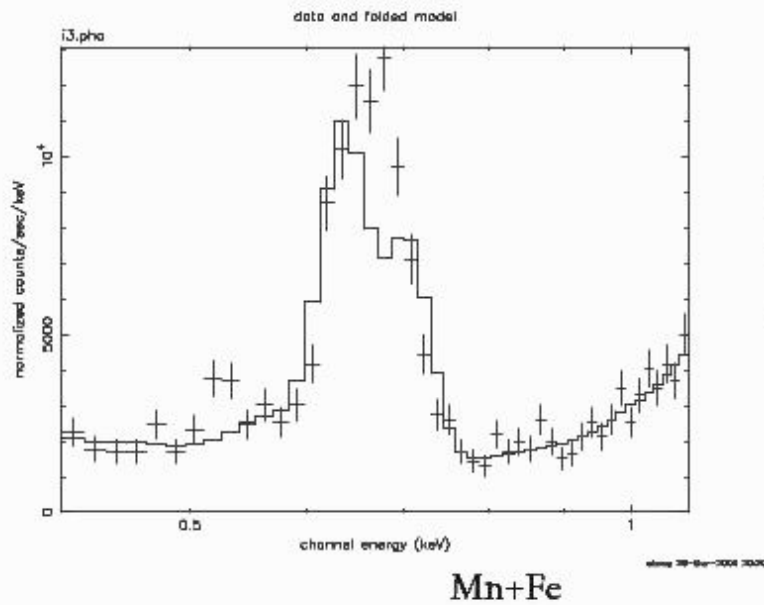


Spectrum of ECS L-Complex



ECS data fit with the old and new spectral model for the L-complex

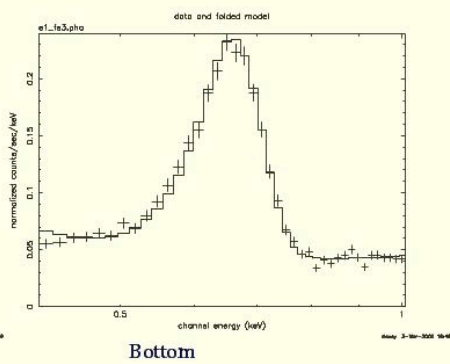
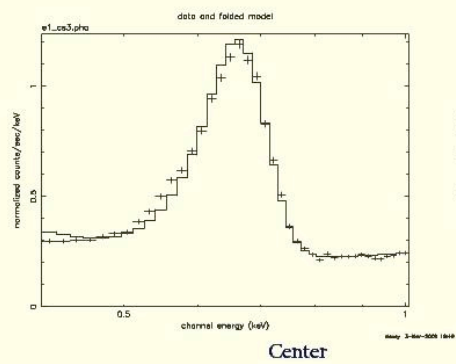
Mn+F vs Mn+Fe in Ball measurements



Decline in ECS Flux with Time

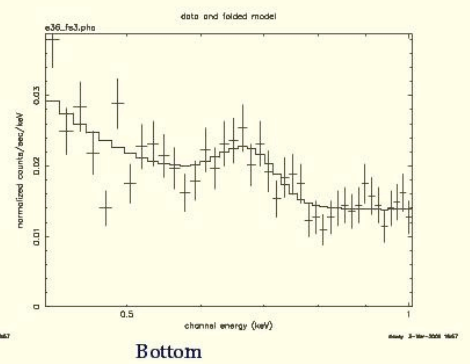
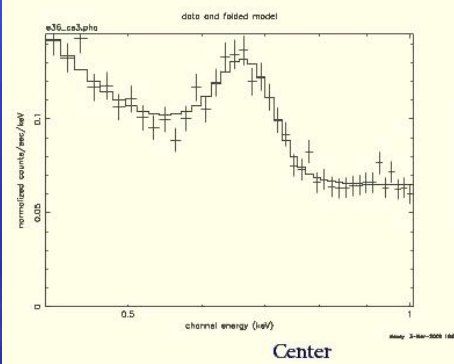
S3

Epoch 1



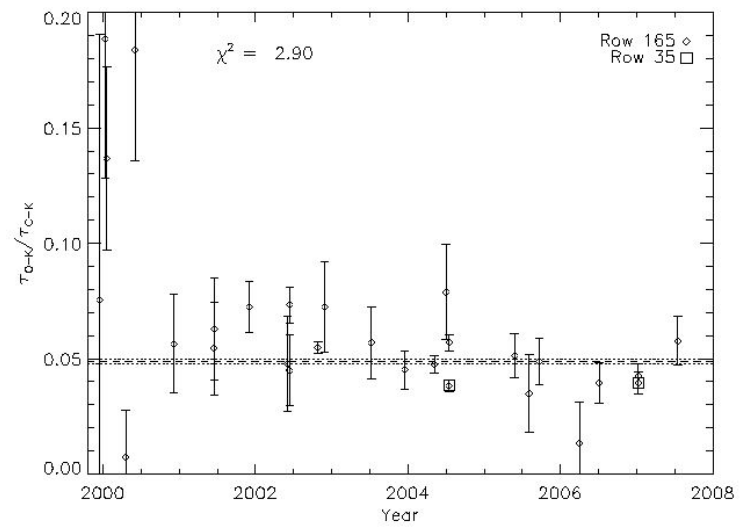
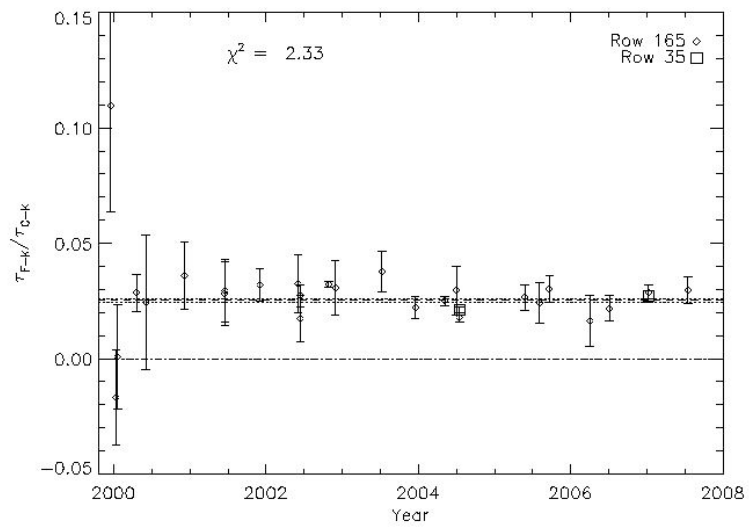
S3

Epoch 36



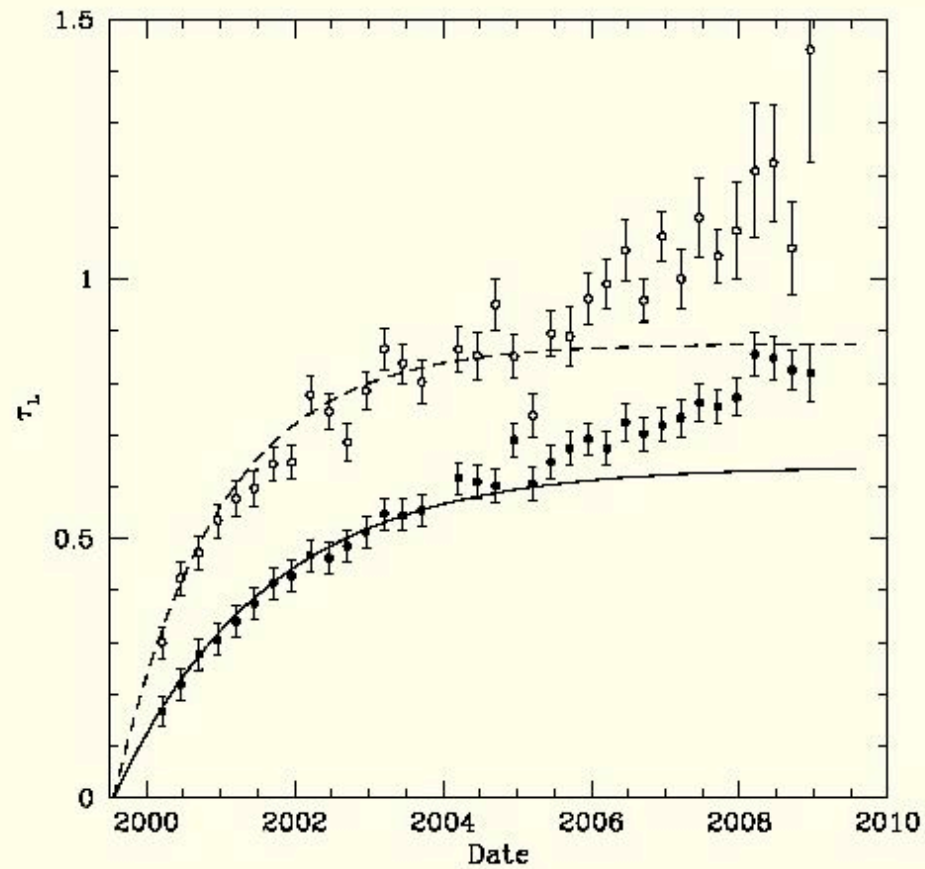
Contaminant on ACIS Filter

Chemical Composition



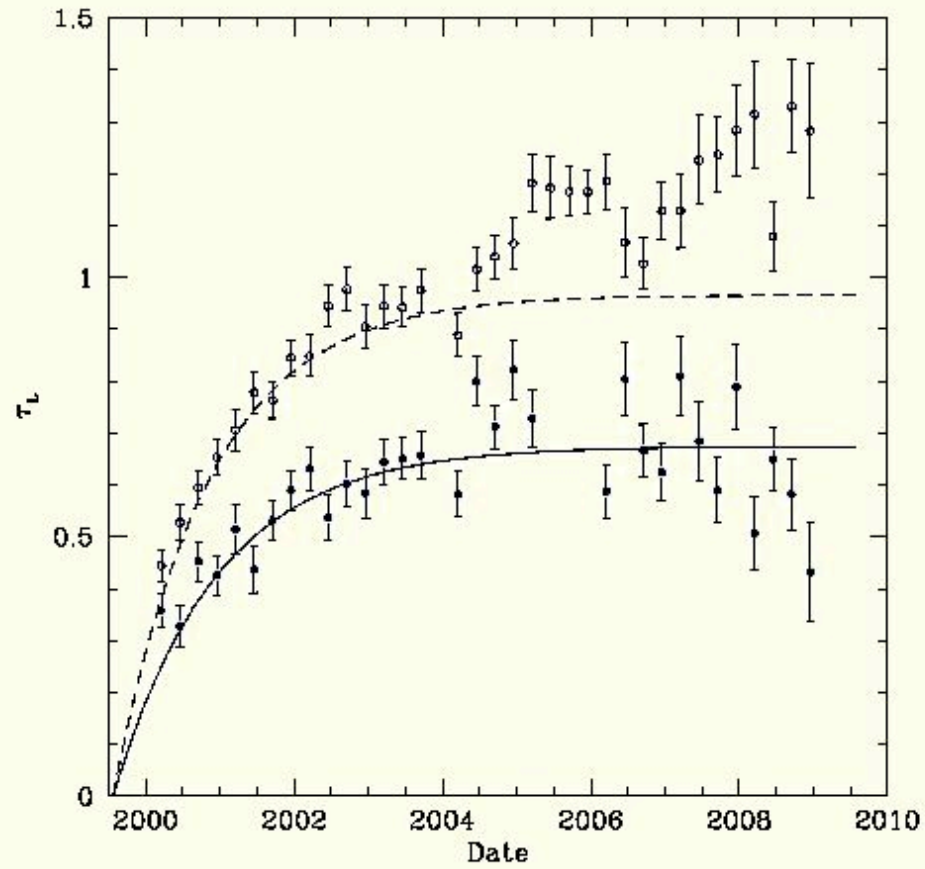
Optical depth of the contaminant at L-complex on ACIS-S

S3

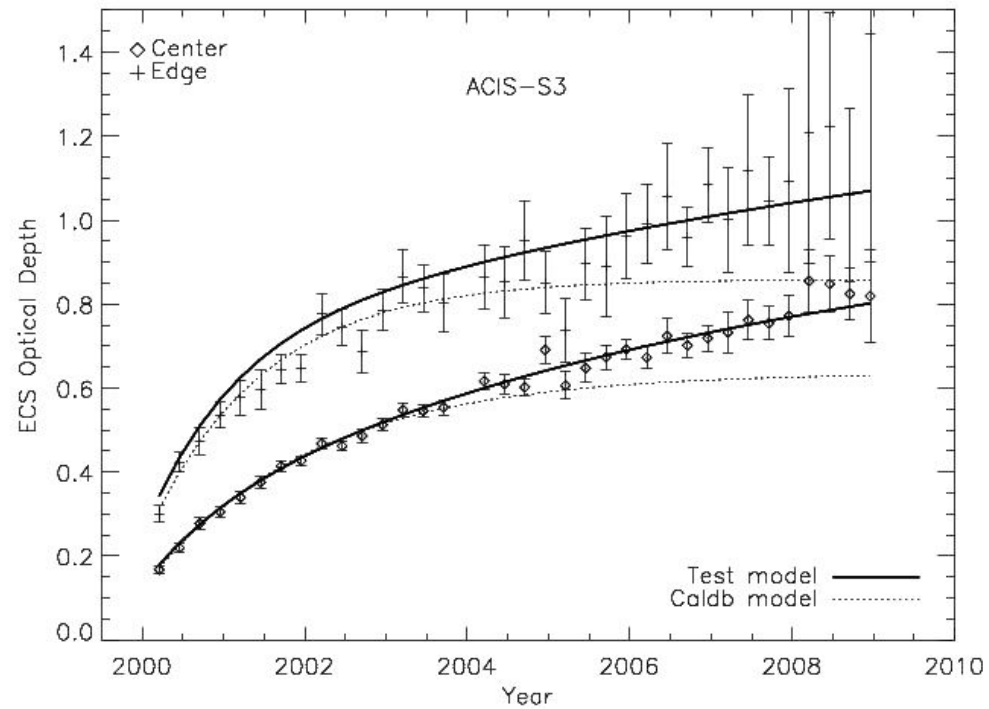


Optical depth of the contaminant at L-complex on ACIS-I

I

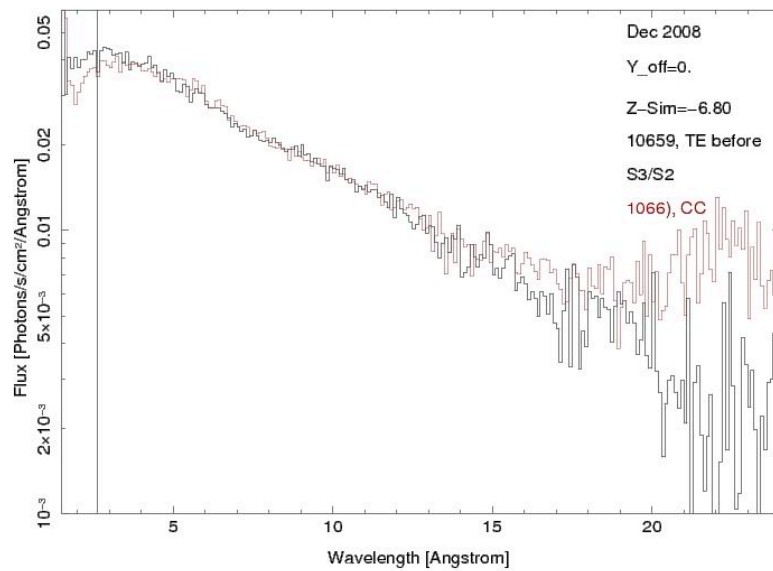


Test version of contamination model for ACIS-S

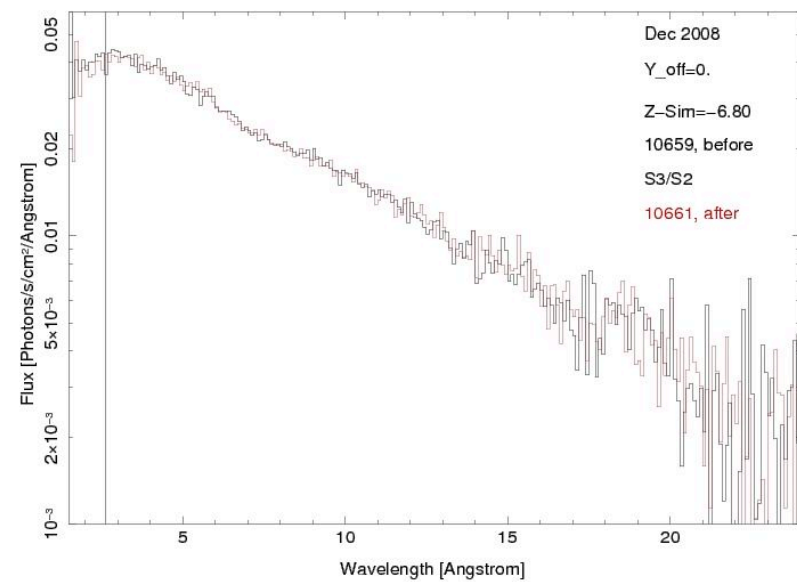


ACIS Continuous Clocking (CC) Mode Calibration

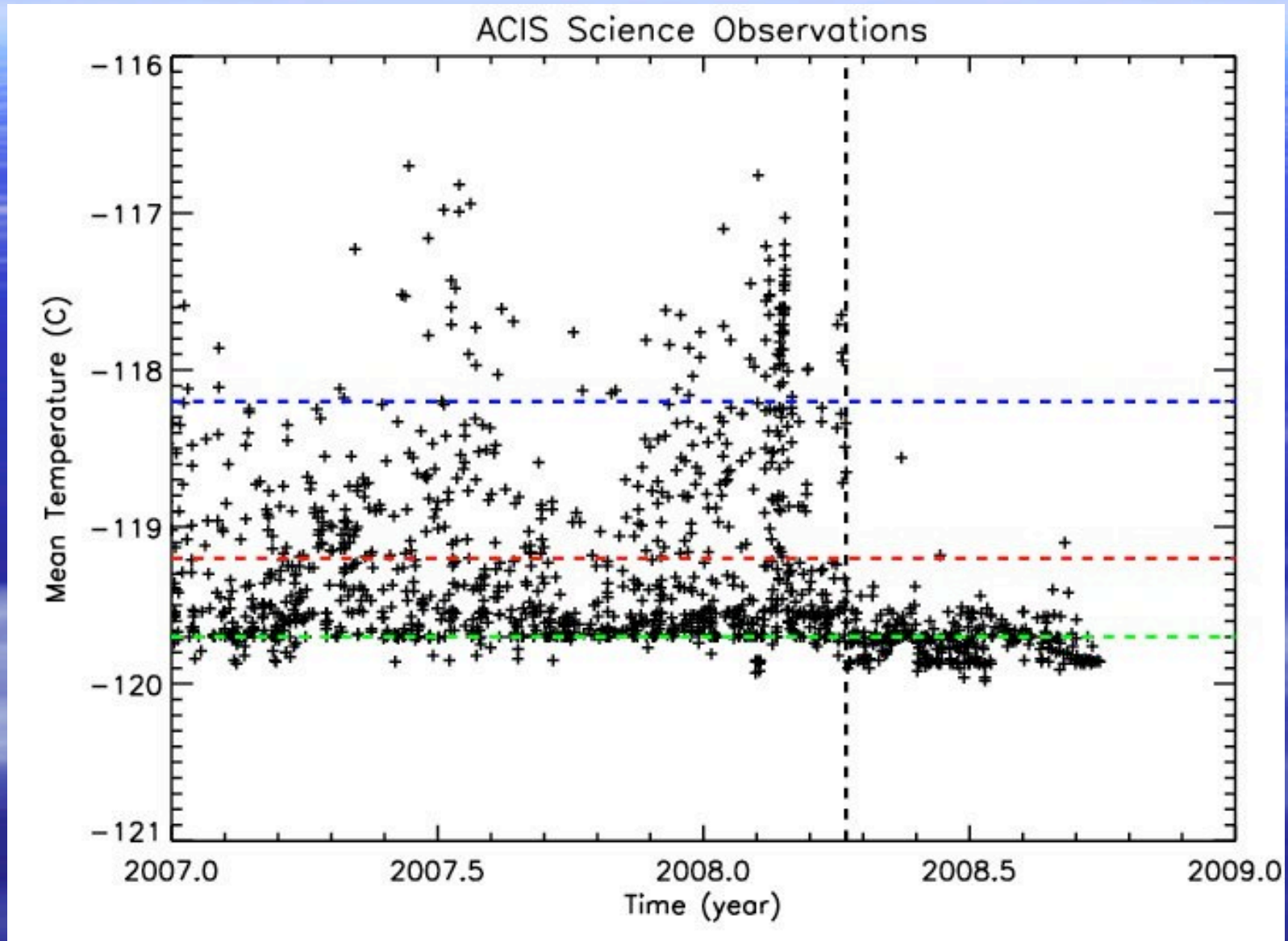
CC-mode HETG, MEG -1 TE compare before vs CC with CTI



CC-mode HETG, MEG -1 TE compare before vs after

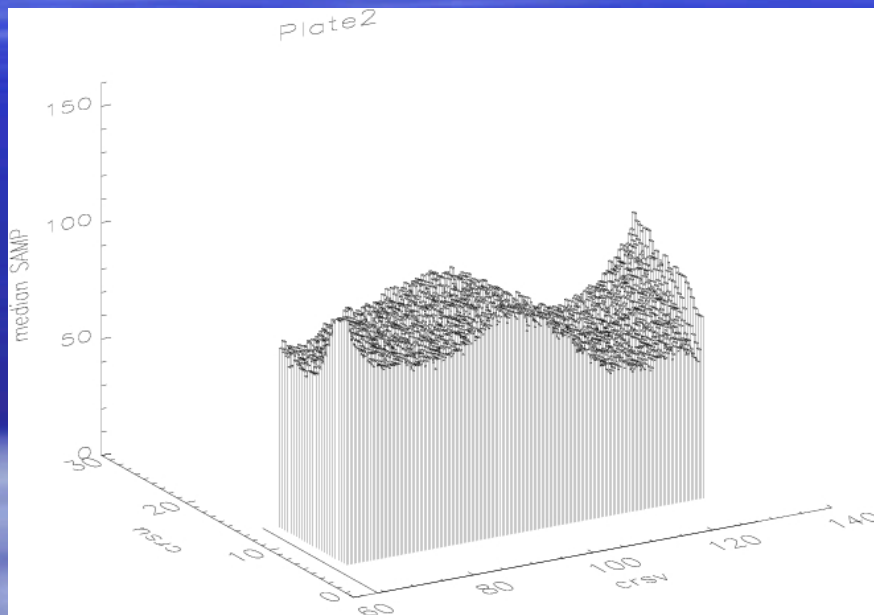


ACIS Operating Temperature

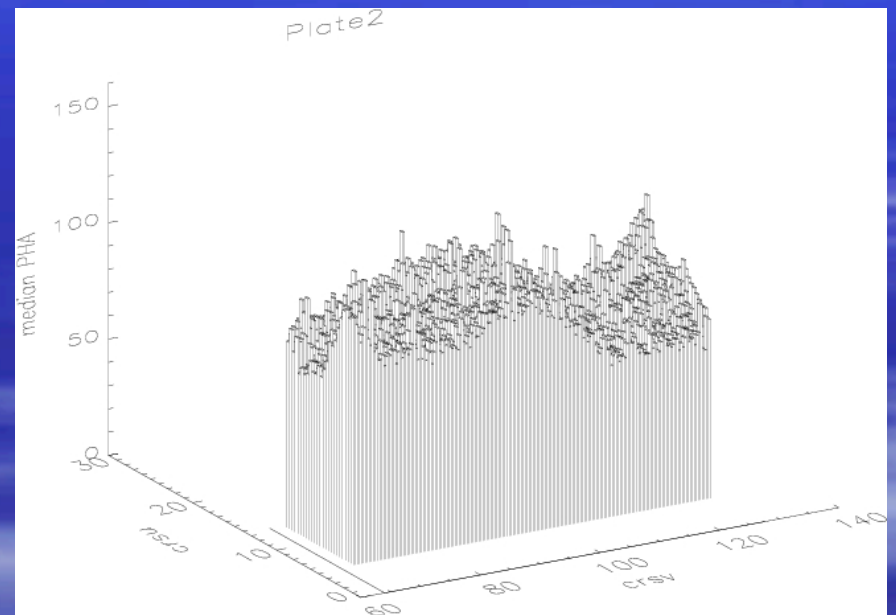


New HRC-S Gain Maps

New Method using SUMAPMS



Old Method using PHA



Better Background Subtraction with New HRC-S Gains

