- Evolution of the ACIS response function:
  - Line shape function mostly unchanged, but...
  - Evolving in center few columns of FI chips
  - New model of soft pulse-height tails for BI chips (see Gregory Prigozhin, next session)
- A good look at the energy scale (See Norbert Schulz and Joe DePasquale, later)

And a few coming attractions (*i.e.* longer term projects):

- QE glitch near the Si K edge; additional .04 μm Si dead layer? (see Herman Marshall, later)
- -110C CTI corrector: needs response files and testing
- -120C S3 CTI corrector: software fixes; possible -110 and S1 to follow
- Gain deviations at Al for middling values of chipy on FI chips: research project
- Research into CC-mode calibration

New stuff Coming Soon to a CALDB Near You:

- Second epoch CTI files (trap maps)
- Response (p2_resp inputs for mkacisrmf) and gain files to match
- quarterly TGAIN time-dependent gain files
- revision to the badpix list

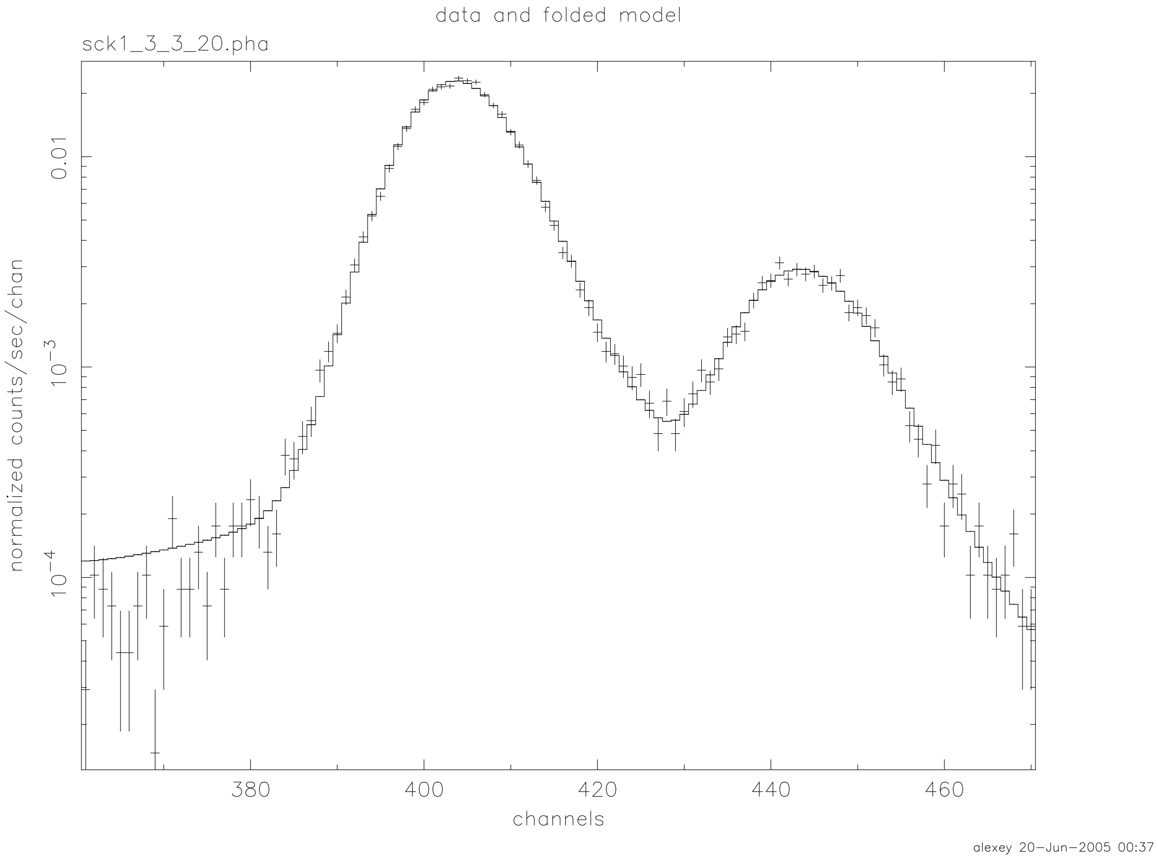

Figure 1: Mn line on I3c3, epoch 1. Line is fit to Epoch 1. TGAIN adjustment alone produces a good fit on some quadrants.

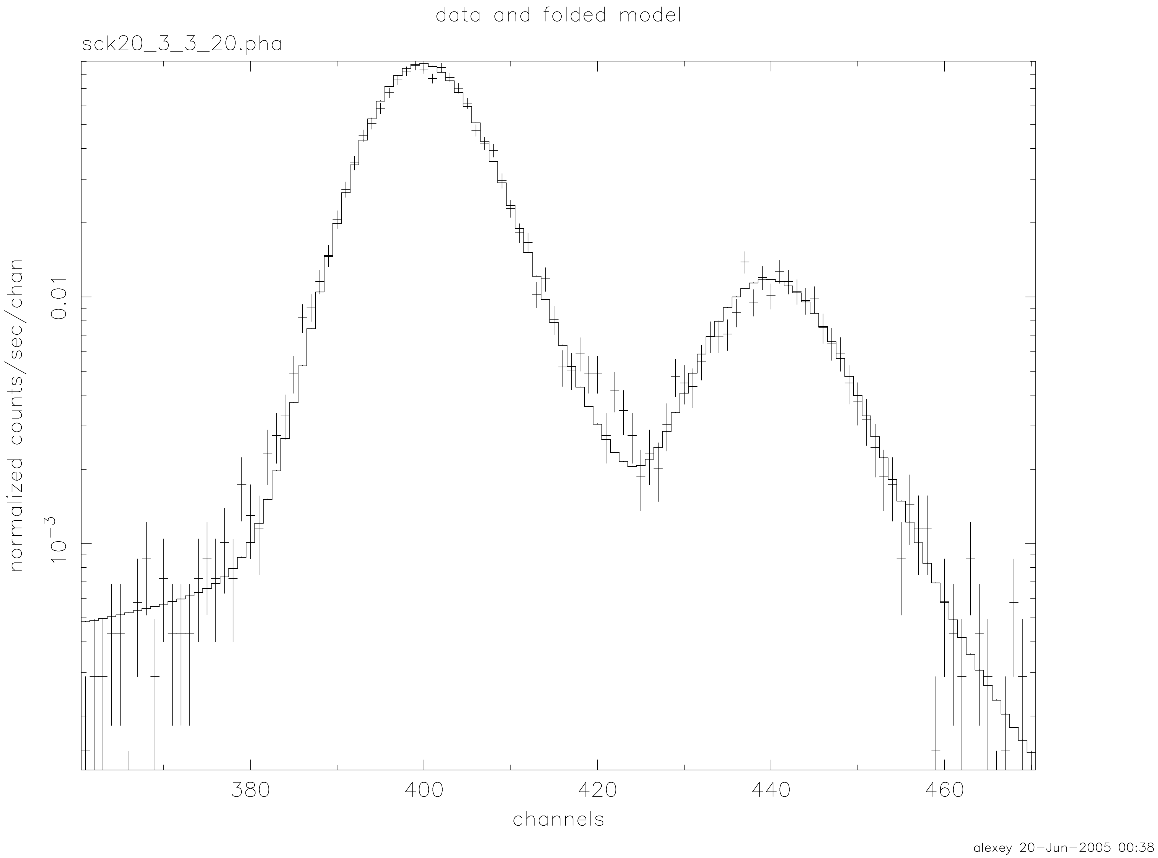

Figure 2: Mn line on I3c3, epoch 20. Line is fit to Epoch 1. TGAIN adjustment alone produces a good fit on some quadrants.

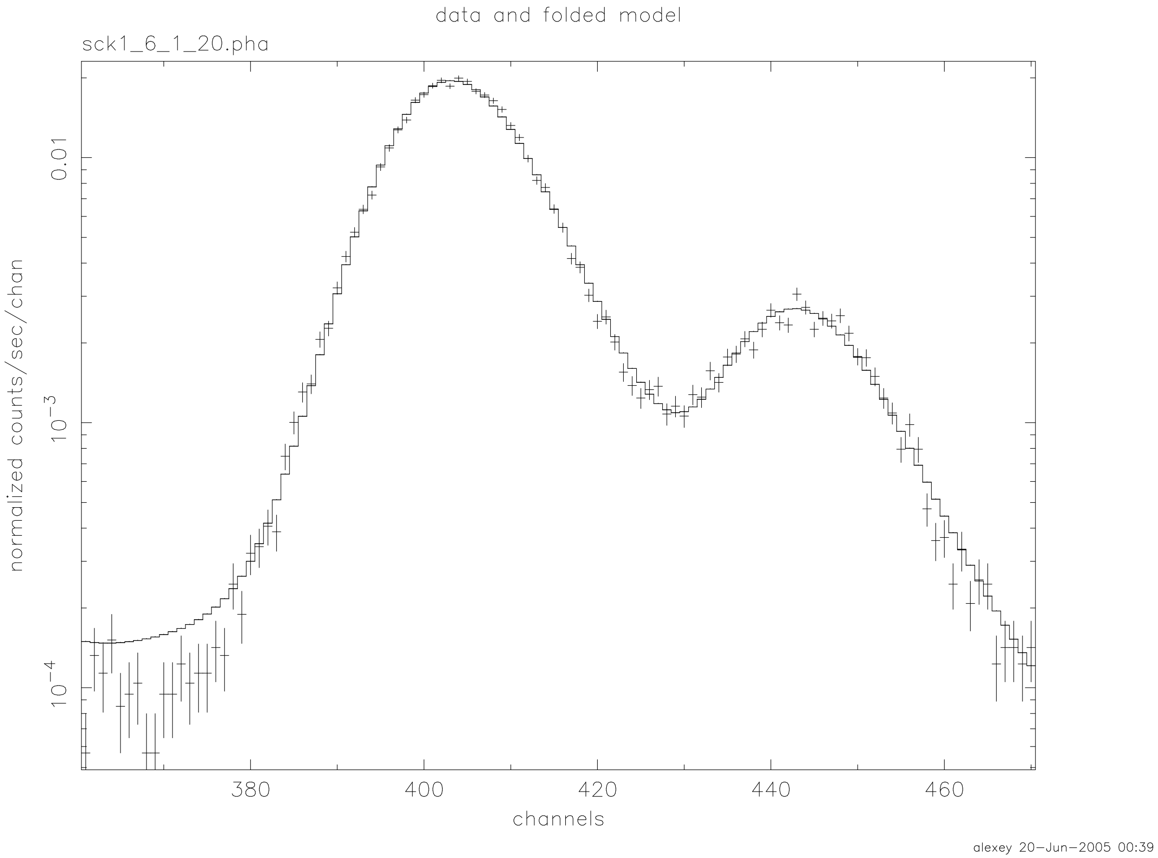

Figure 3: Mn line on S2c1, epoch 1. Line is fit to Epoch 1. TGAIN adjustment alone produces a bad fit on some other quadrants.

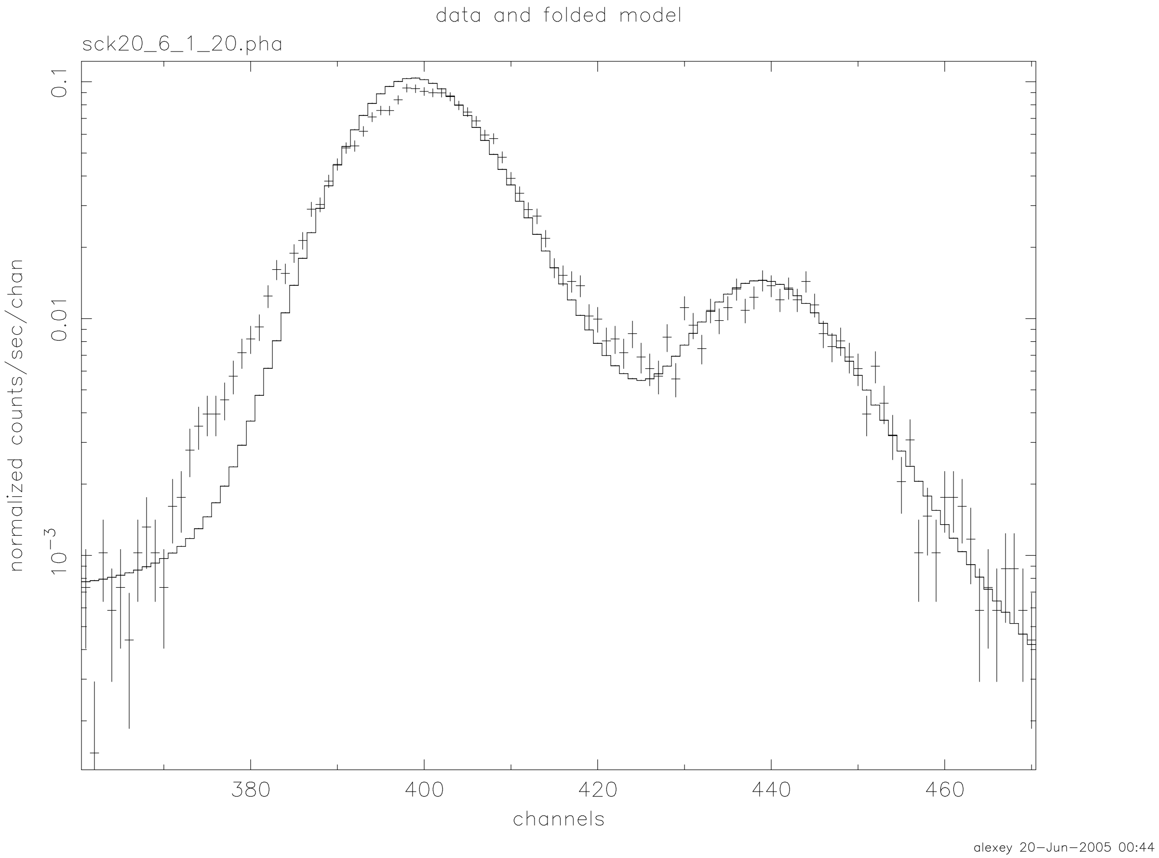

Figure 4: Mn line on S2c1, epoch 20. Line is fit to Epoch 1. TGAIN adjustment alone produces a bad fit on some other quadrants.

In order to adjust to the changing line shape function, we re-derived the CTI files (trap maps) for epoch 18-21, the year starting August, 2004.

This proved unnecessary, though an incremental ($\sim 2\%$) improvement in CTI-corrected energy resolution is seen after about Epoch 11 (November 2002)

What's really happening: gain droop in the few central columns.

- Known electrical effect (see Gregory Prigozhin memo of 2000)
- Seems to be getting stronger with time
- Looks like added CTI for roughly 30 columns near chip center (column 512)

We implemented a finer grid for TGAIN files to model this effect.
FI chips had 256 column $\times$ 32 row regions (i.e. 32 rows, whole quadrant wide).
Now replaced by 32×32 pixel regions.

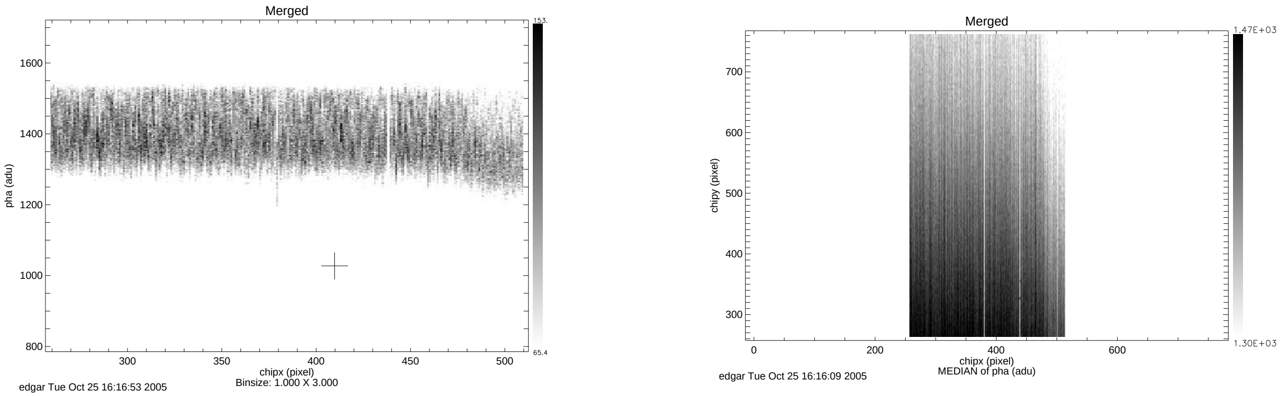

Figure 5: Mn line on S2c1, epochs 18-21. Left: scatter plot of PHA vs CHIPX. Right: Greyscale of mean PHA vs CHIPX and CHIPY.

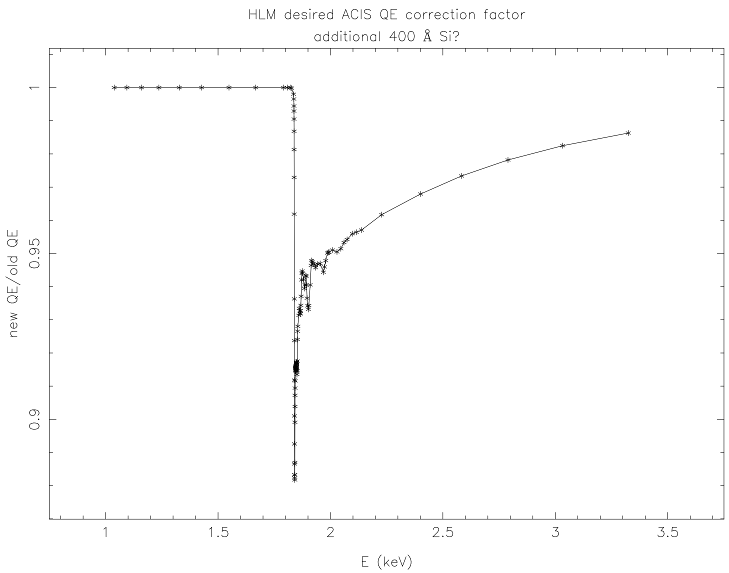

Figure 6: Proposed QE correction factor. Equivalent to $\sim$ 400 ÅSi. We're looking to see what consequences occur elsewhere.

Odd things found while making trap maps:

- Some columns have step-functions in PHA vs. chipy for a given spectral line.
- Some of these step-functions have vanished between 2001 and 2003
- Some are stable
- At least one has appeared between 2001 and 2003.
- Total number: roughly a dozen columns on 8 front side chips.

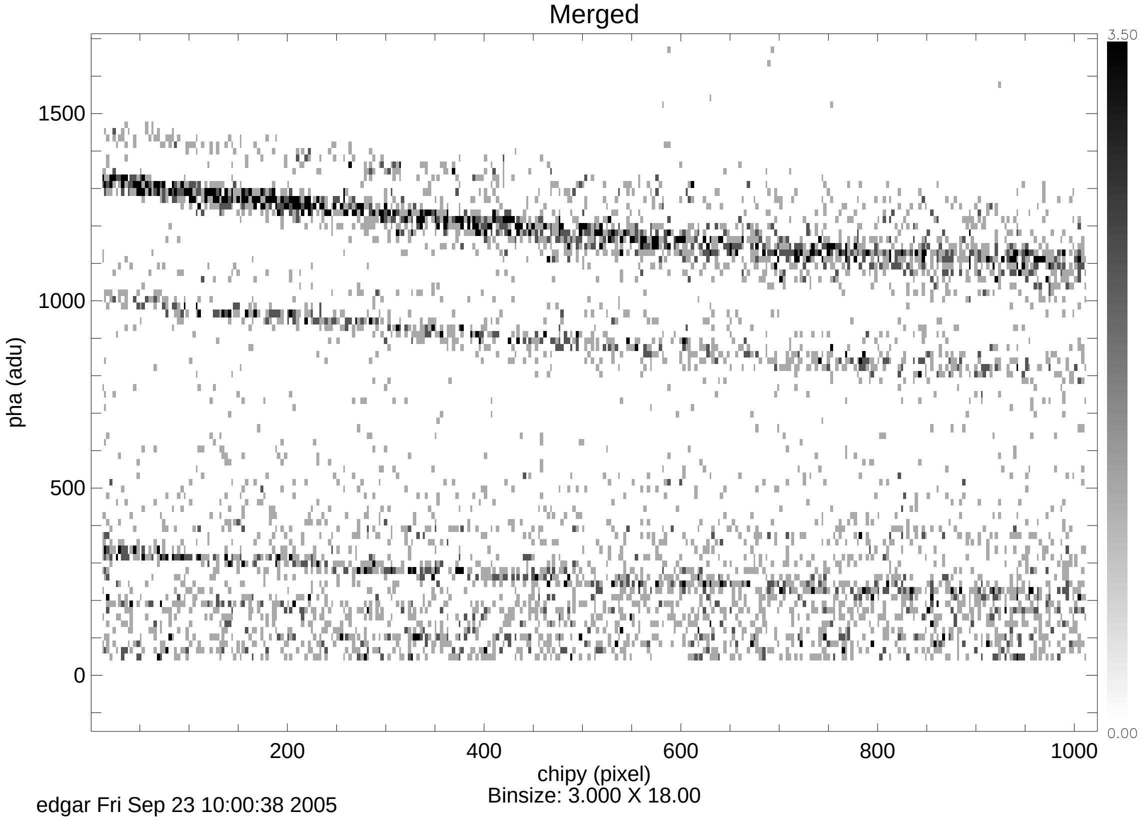

Figure 7: Normal column PHA vs. chipy plot: S4, col 487 Epochs18-21

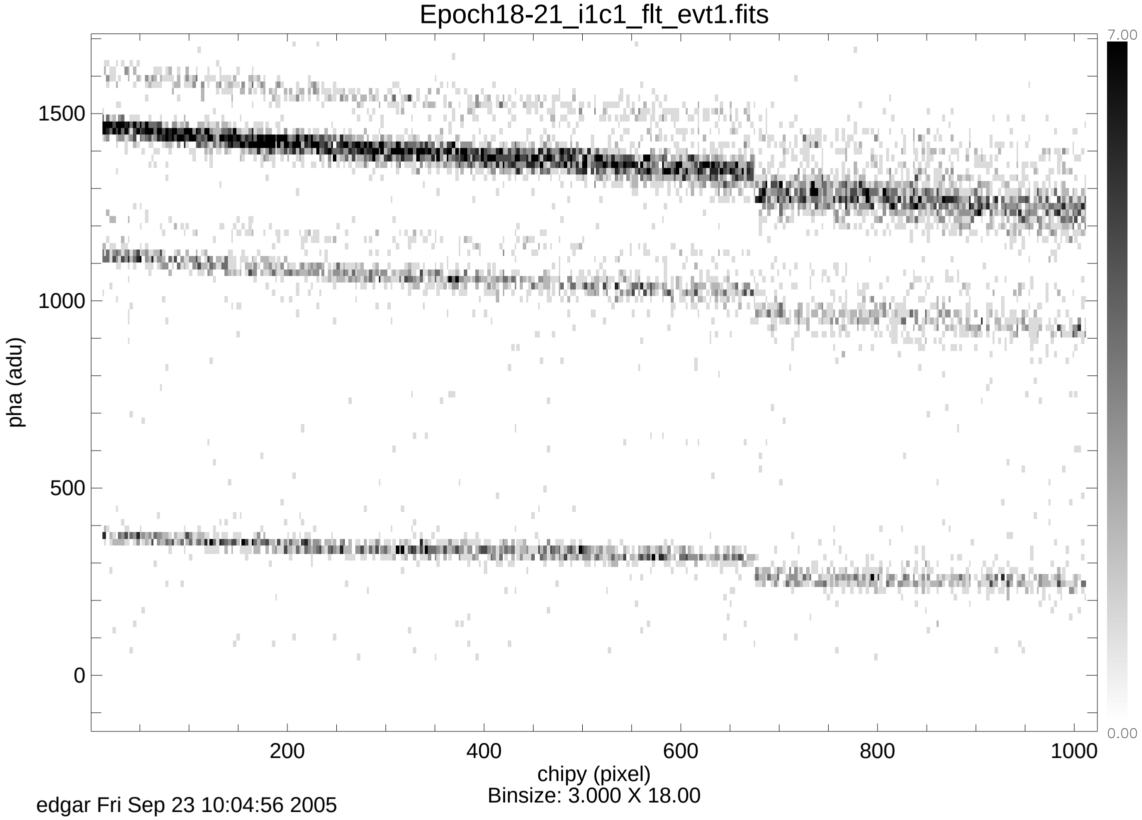

Figure 8: Small step function column PHA vs. chipy plot: S4, col 487 Epochs18-21

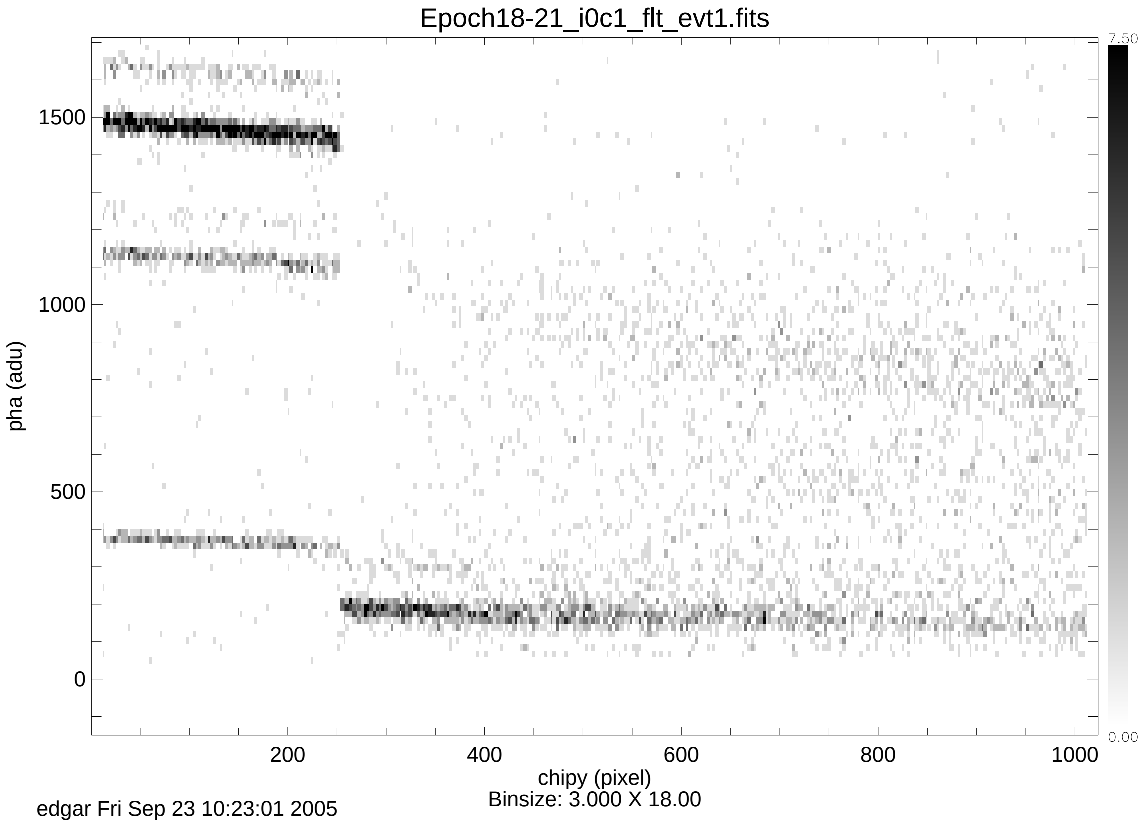

Figure 9: Very large step-function column PHA vs. chipy plot: I0, col 303 Epochs18-21

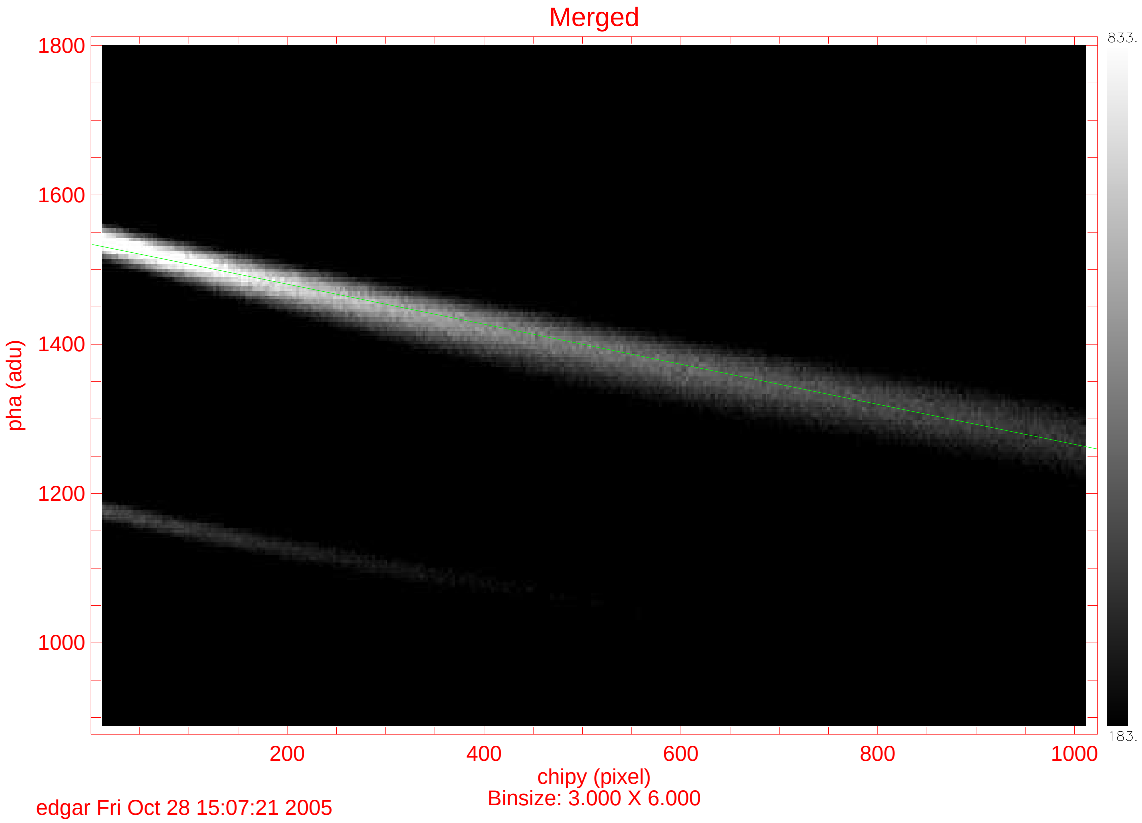

Figure 10: Linear fit to whole quadrant S2c1, Epoch18-21. Note the droop of the data below the linear trend for middle row numbers. We need to verify this effect is being modelled accurately.

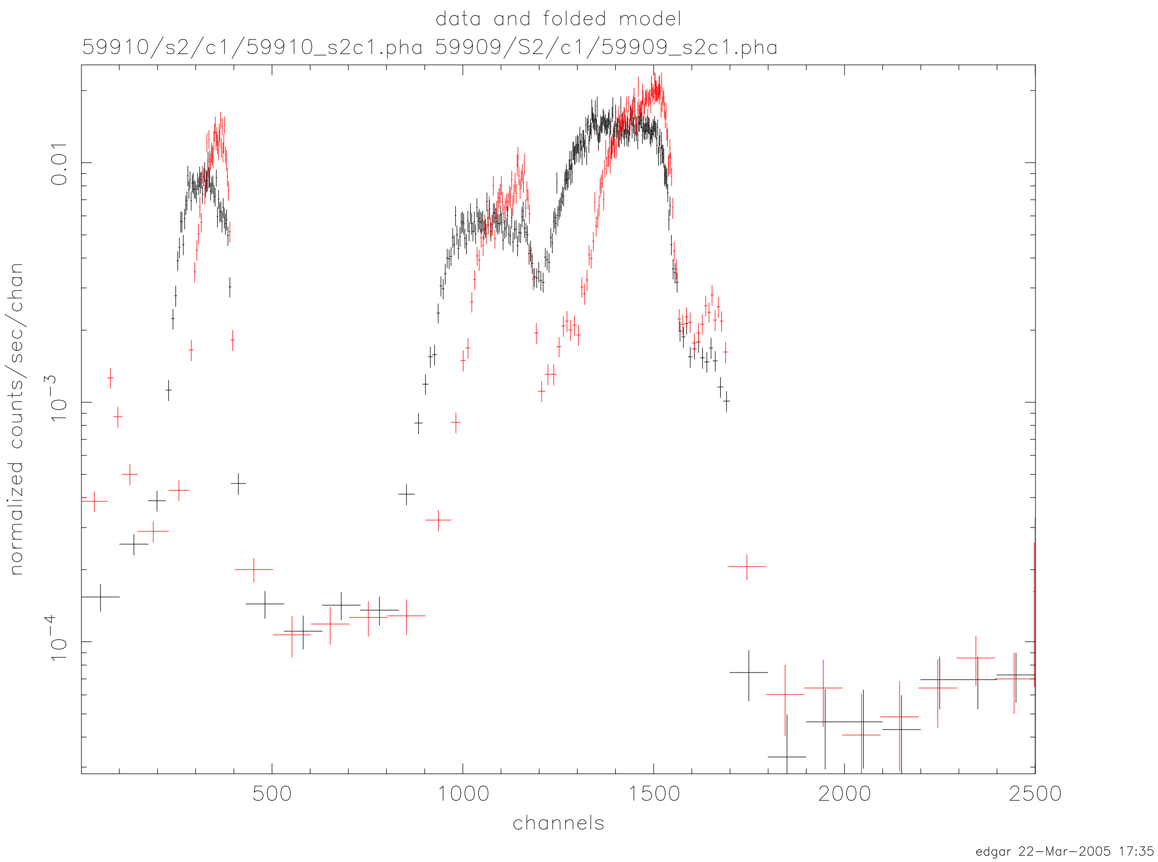

Figure 11: TE (black) vs. CC (red) uncorrected spectra of the ECS. Note sloped top of CC-mode lines, indicating QE loss with PHA loss and, presumably, chipy.

Conclusions:
A few coming attractions:

- QE glitch near the Si K edge; additional .04 μm Si dead layer? (see Herman Marshall, later)
- -110C CTI corrector: needs response files and testing
- -120C S3 CTI corrector: software fixes; possible -110 and S1 to follow
- Gain deviations at Al for middling values of chipy on FI chips: research project
- Research into CC-mode calibration: QE, CTI, response function ...
- look into step-function traps: population, properties, calibration

More immediate:
New stuff Coming Soon to a CALDB Near You:

- Second epoch CTI files (trap maps)
- Response (p2_resp inputs for mkacisrmf) and gain files to match
- quarterly TGAIN time-dependent gain files
- revision to the badpix list