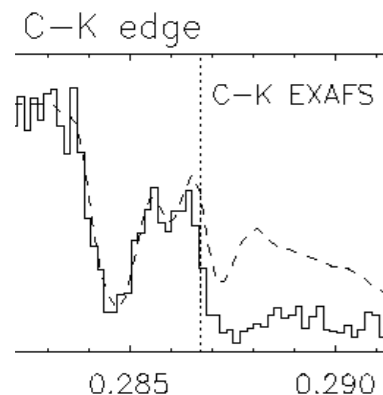


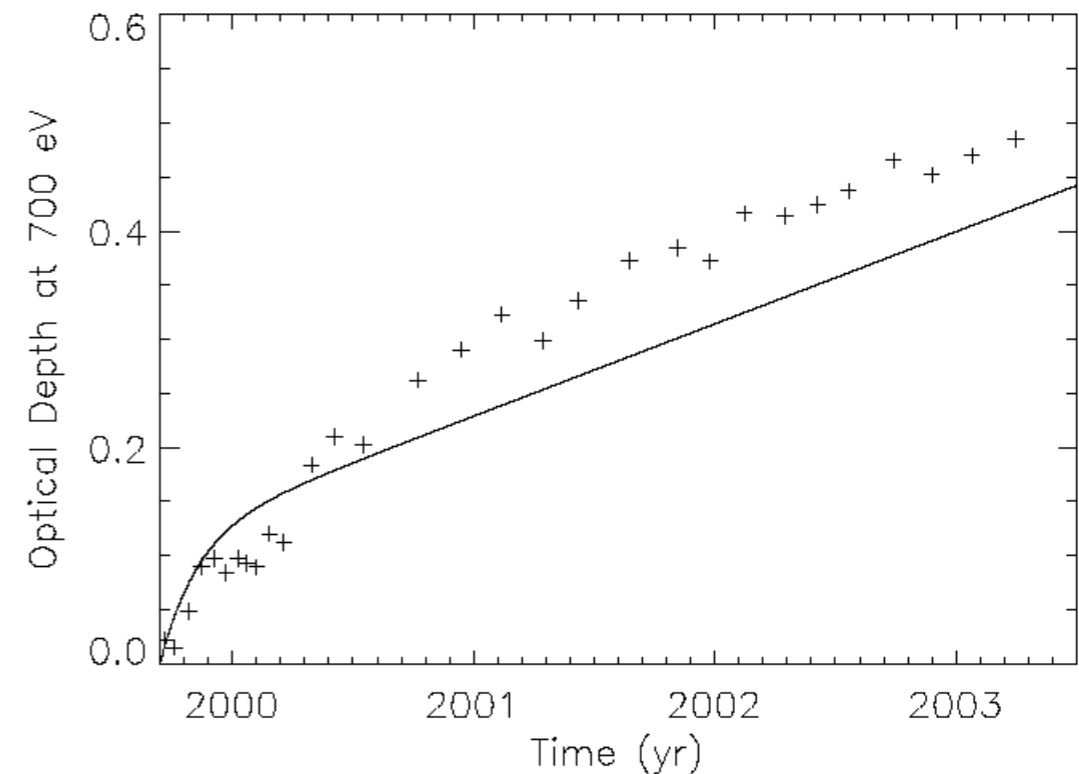
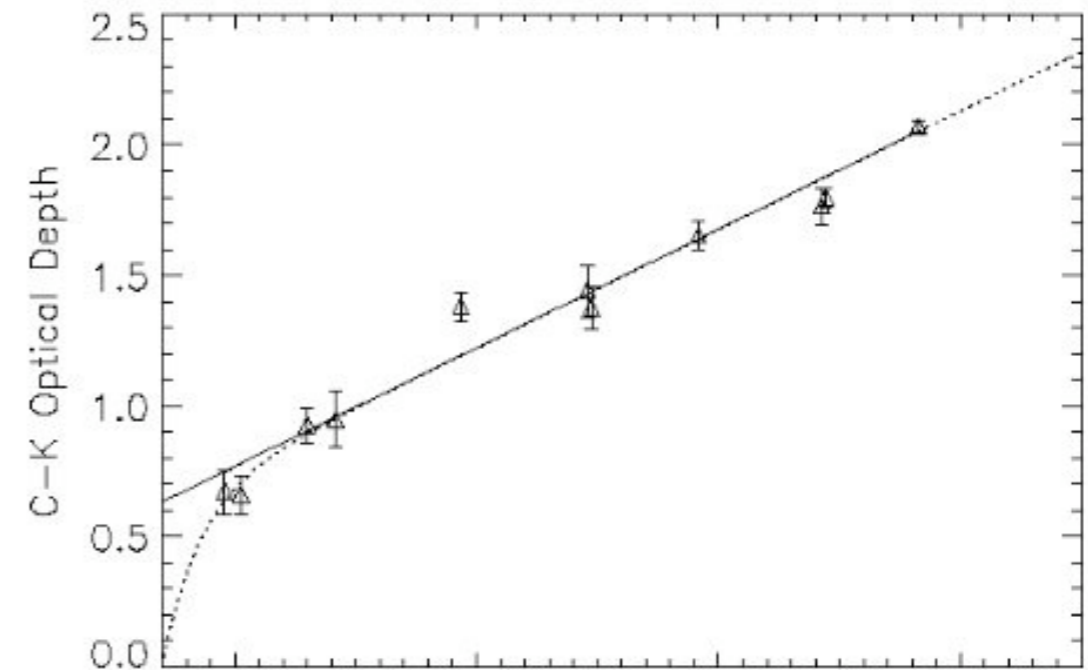
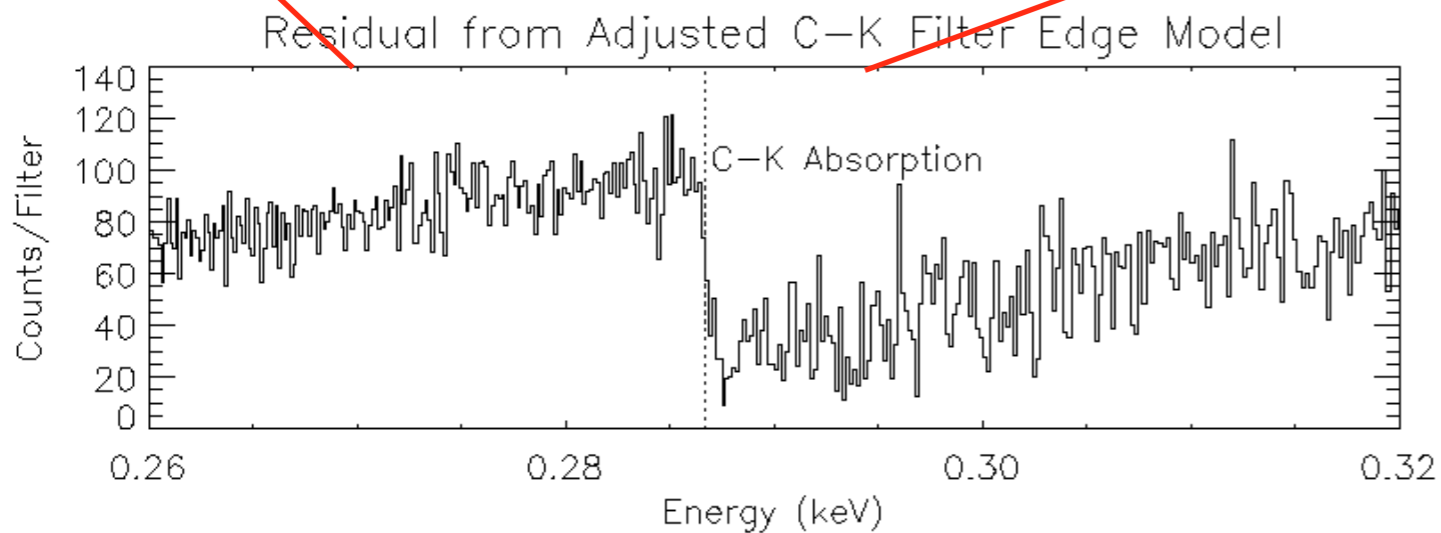
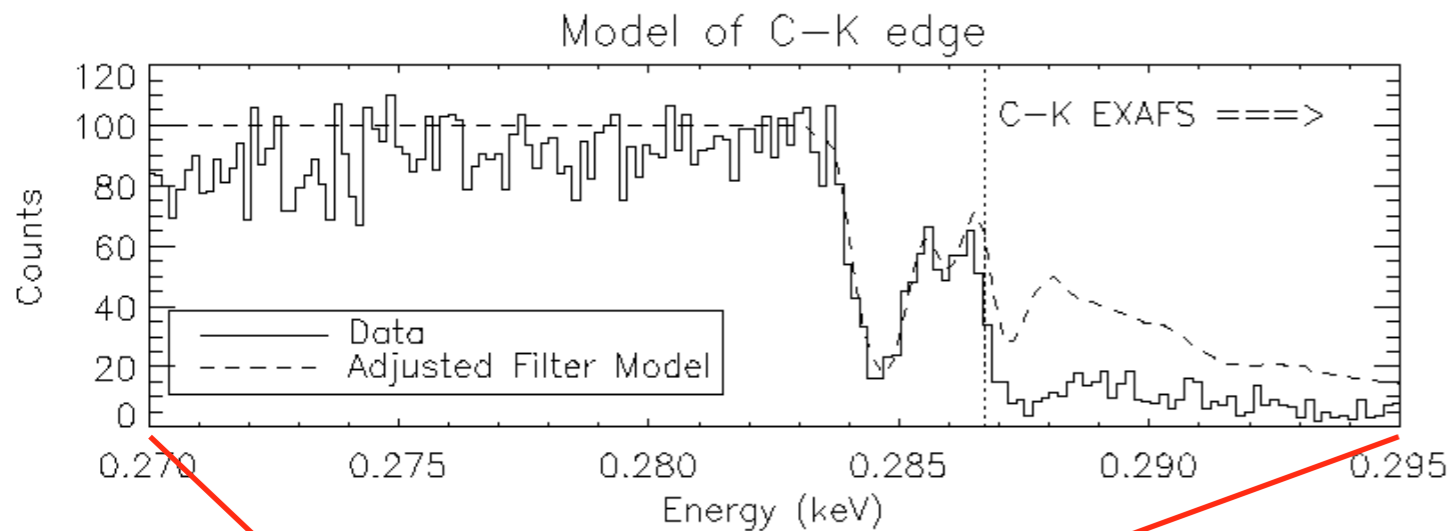
Diagnosing the ACIS Contaminant using Grating Observations

Herman L. Marshall (MIT)
Chandra X-ray Center



A Brief Review

- Filter dominates below .2867 keV, contaminant above
- Composition from edges: C:O:F:N ~ 55:5:4:<2
- ECS gives slower deepening than elemental model

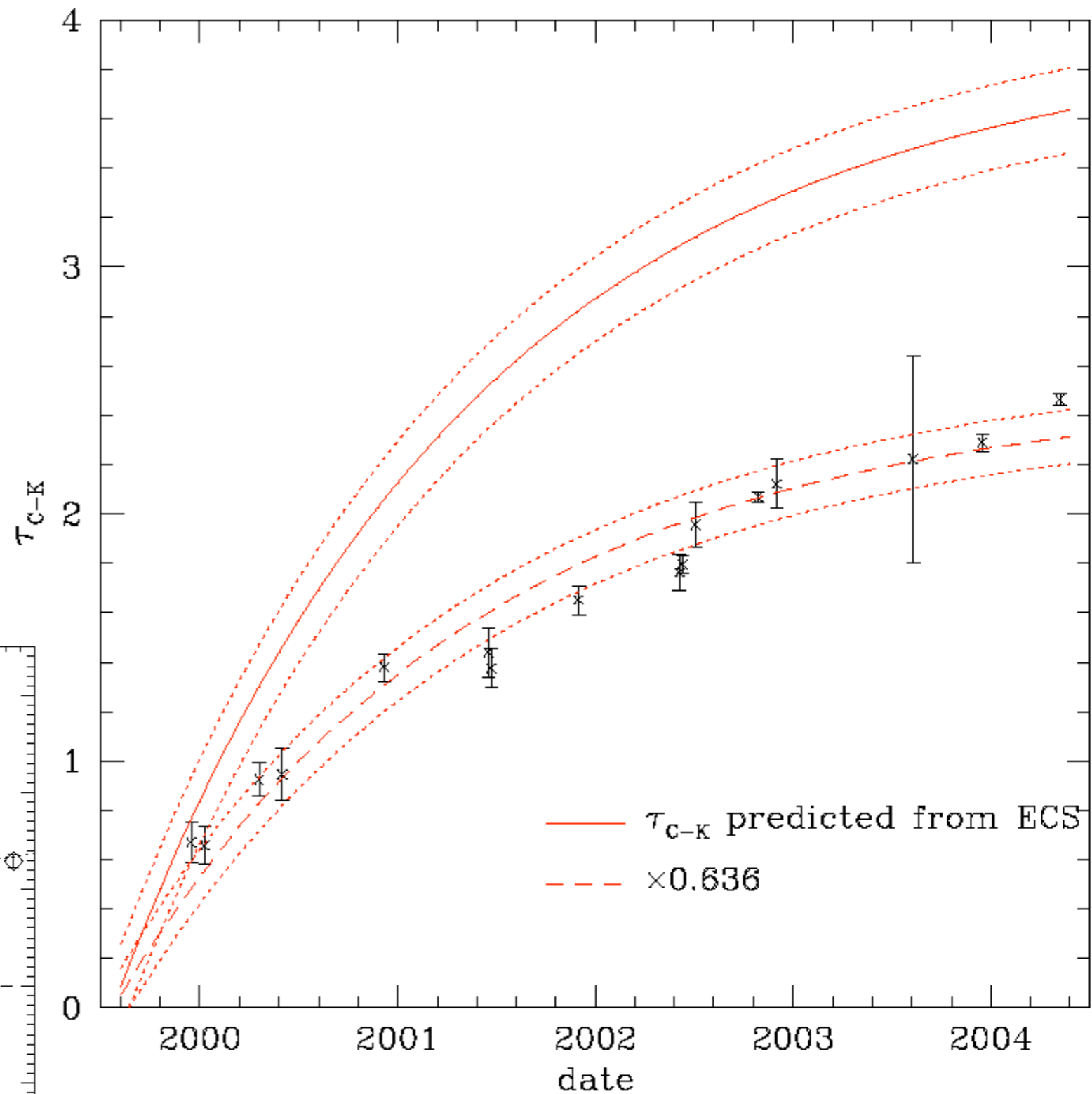
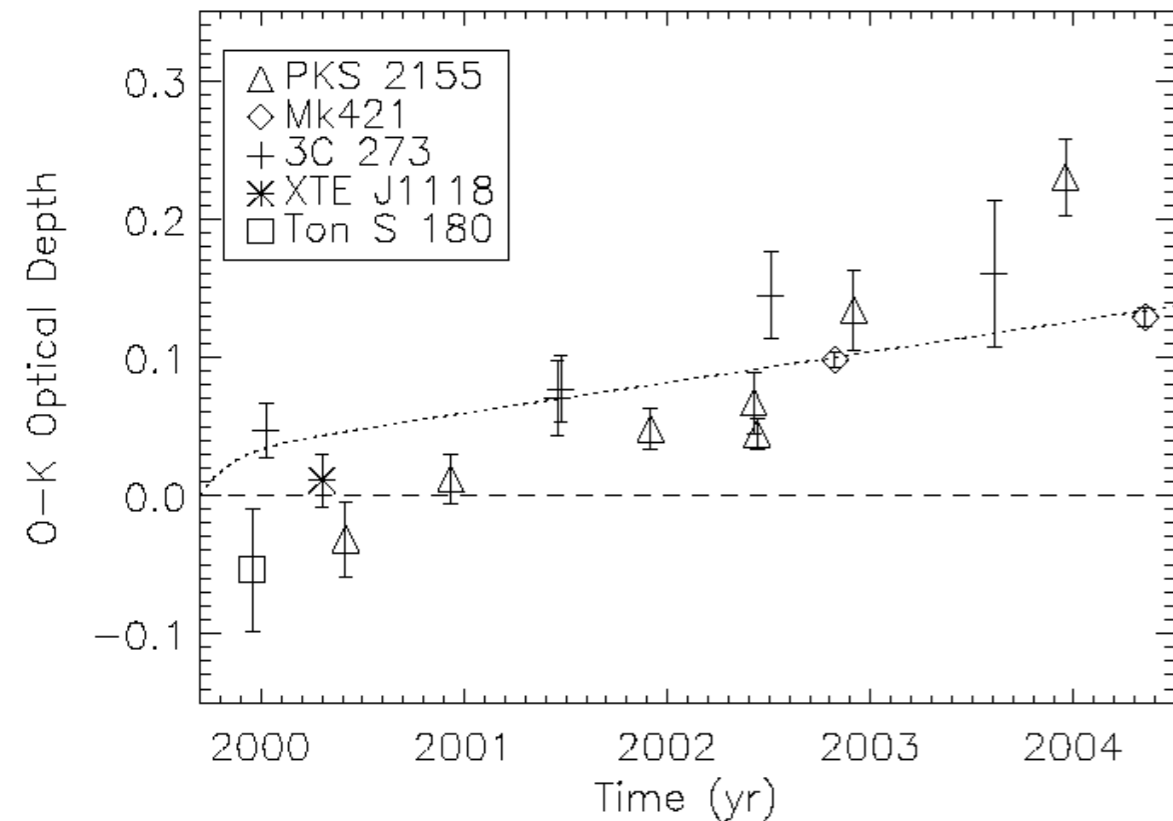


Reconciling ECS and ACIS/LETG Spectra

- Multiple optical depth (fluffy) material can have different edge depth dependences on thickness
- Model allows larger o.d. at high E, without affecting C-K
- Approximate model with “element” fluffium, a fake spectral component
- Time dependence is pegged to ECS results
- CIAO decontamination scripts use fluffium calibration files in caldb
- A.P. Hitchcock (McMaster U.): thickness variations should not be expected

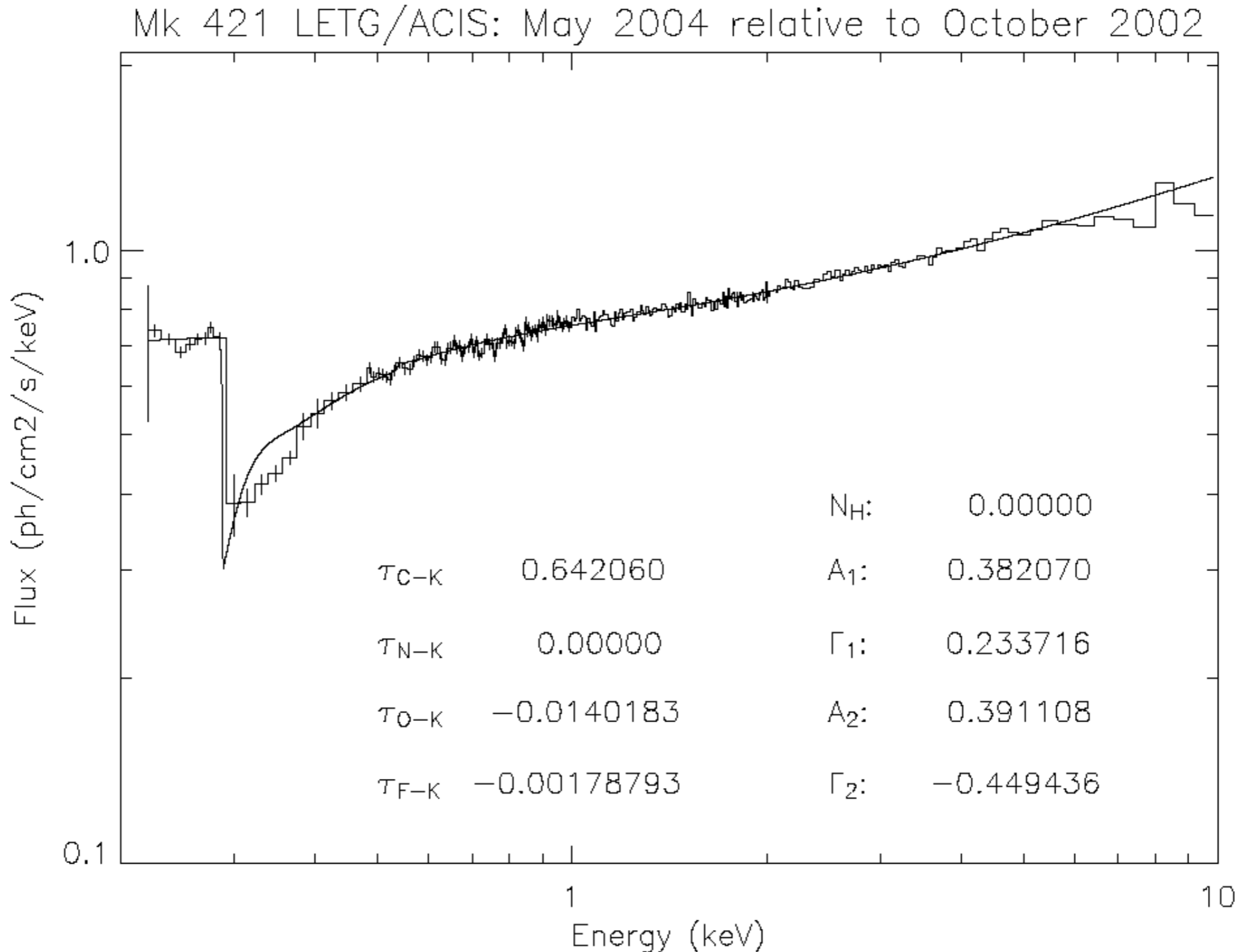
Time Dependence - I

- C-K depth continues to increase but may merely scale with ECS (from Alexey Vikhlinin)
- O-K increases with time, like C-K (but note large systematic uncertainties)



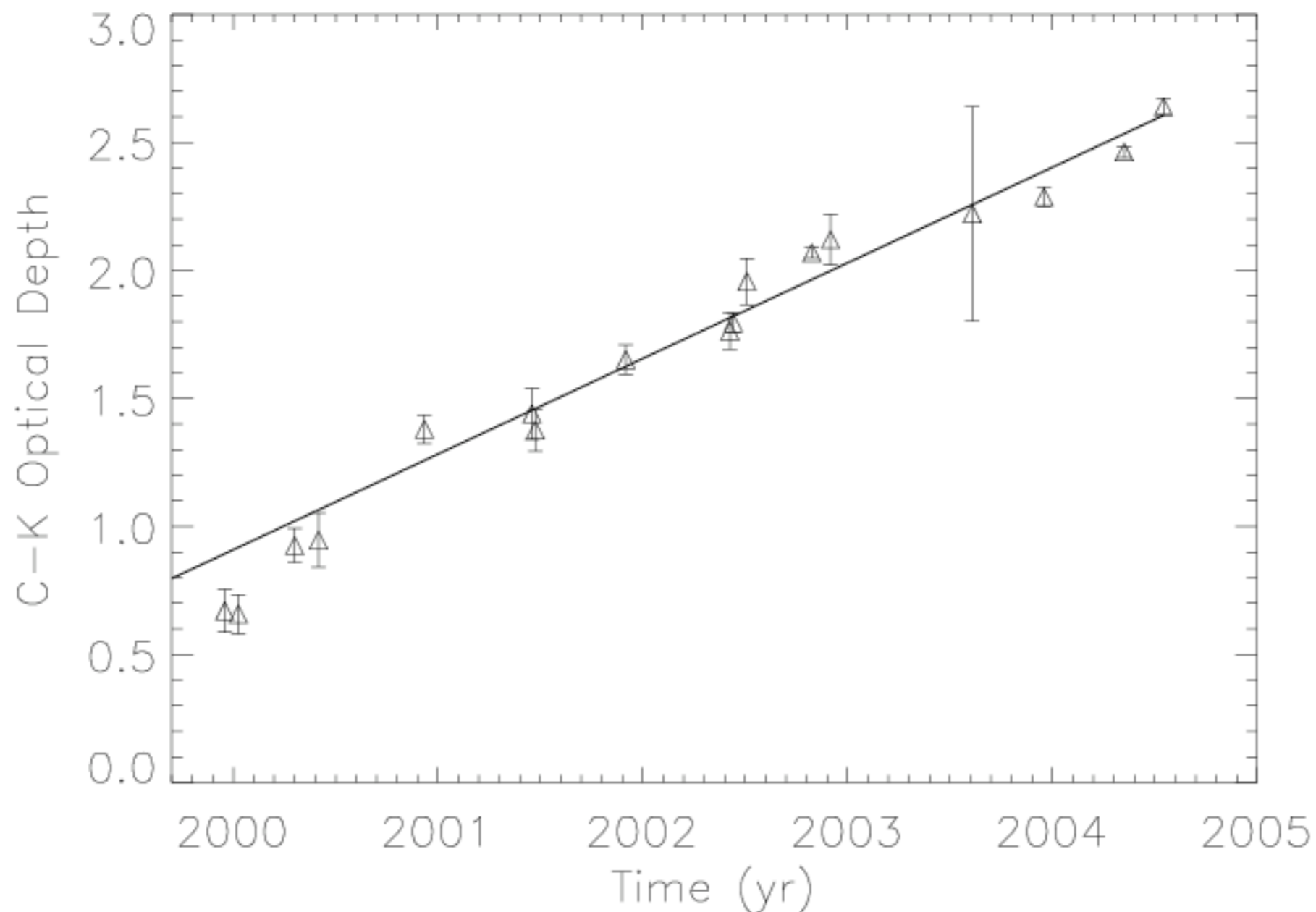
Time Dependence - 2

- Ratio of Mk 421 observations has low systematic errors but weak signal
- Hard to test for C:O or C:F changes with time in only 2 yr



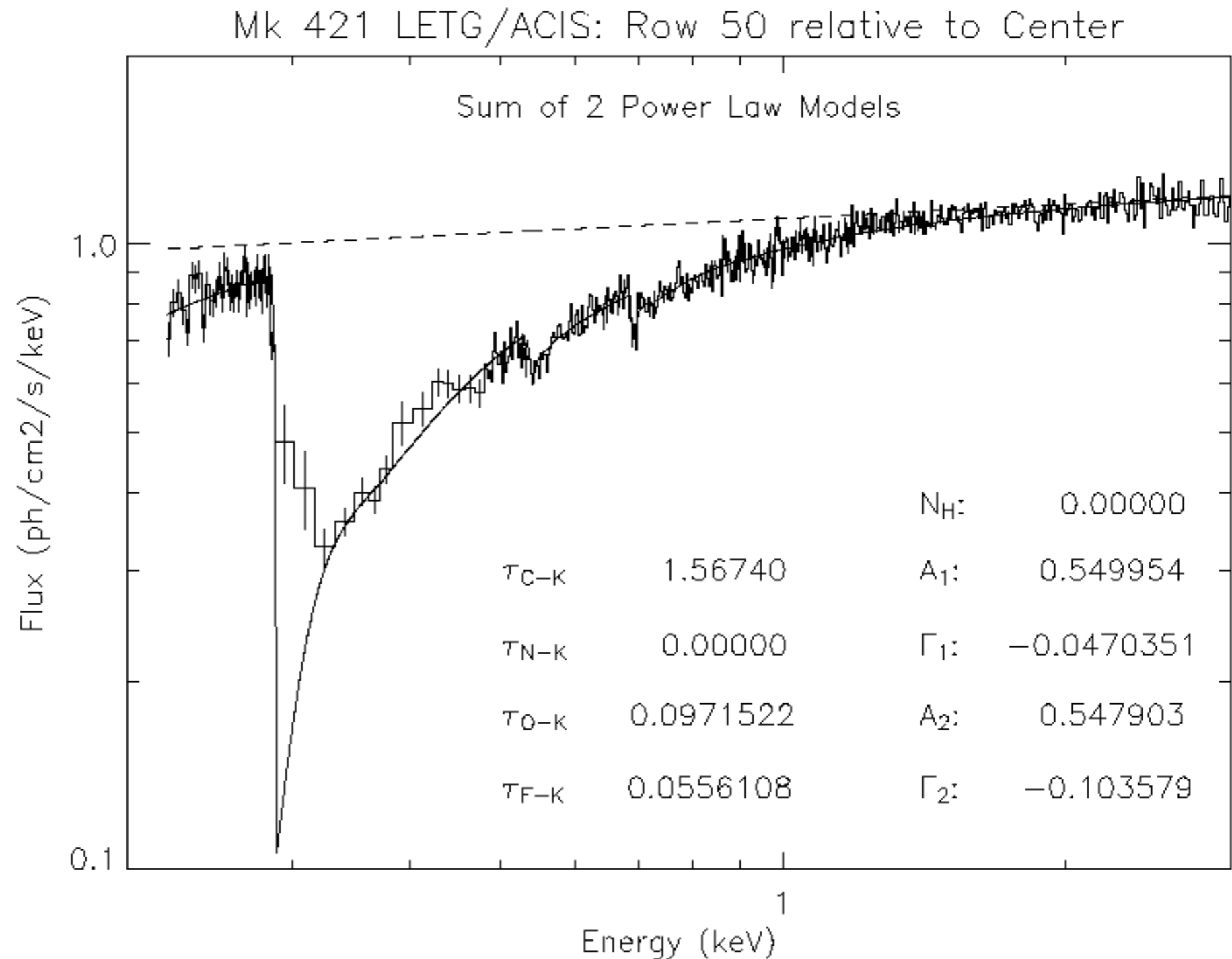
Time Dependence - 3

- New Mk 42I observations give deeper C-K
- C-K seems to continue increasing linearly — slower than 2000-3
- Systematic reanalysis in progress using all new BI QEs



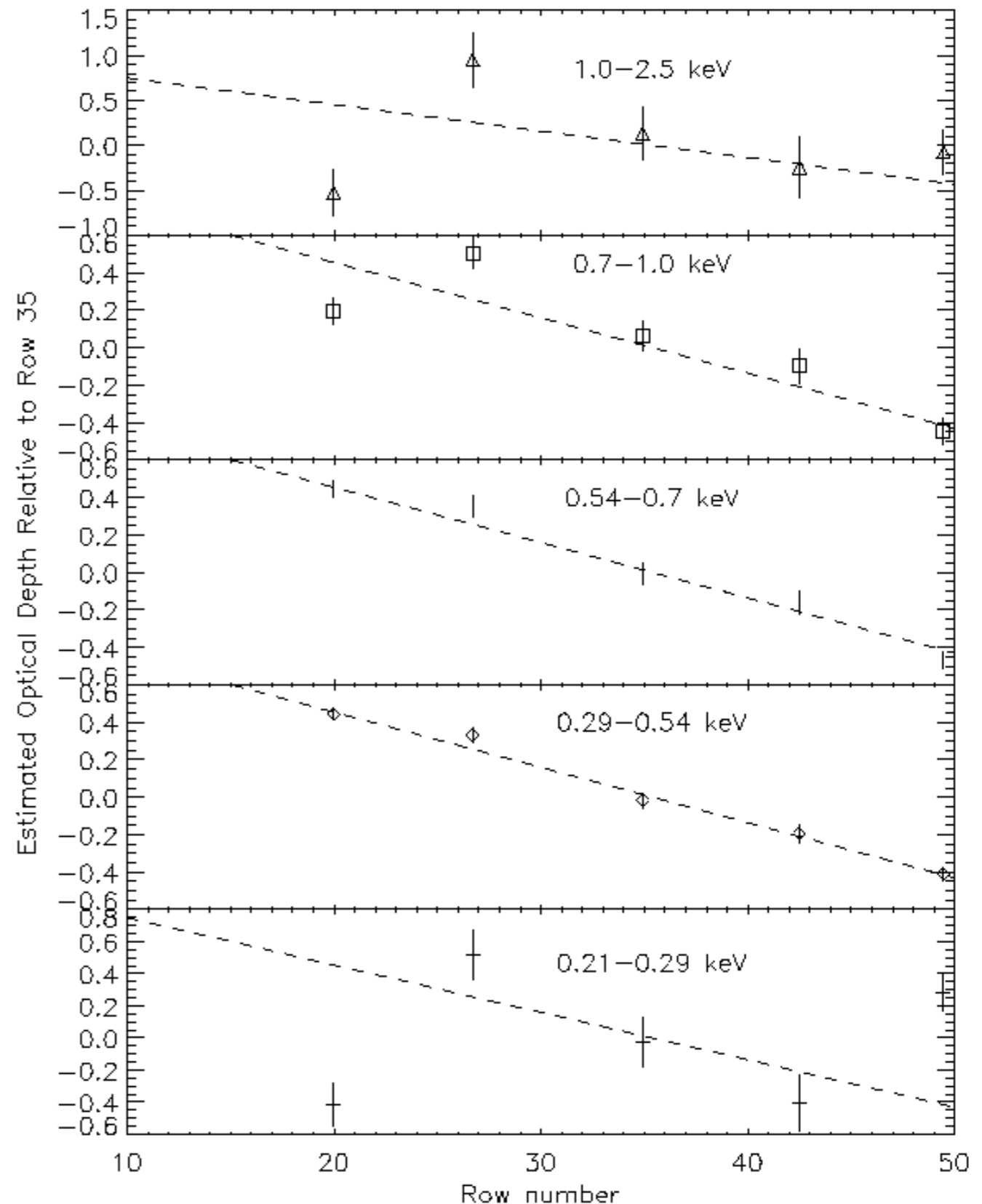
Spatial Variation - I

- New Mk 42 I show significant O-K and F-K
- Ratios of F and O to C are marginally higher in the excess near the edge than elsewhere
- The 700 eV depth is the same as the ECS
- The 285 eV C=C feature is stronger near the readout



Spatial Variation - 2

- Dithering around row 35 near readout samples various optical depths
- Compute optical depth gradients vs. energy
- Gradients are larger than expected but within uncertainties from ECS
- Gradients change with time as contaminant pattern varies
- Gradient is not responsible for varying optical depth of “fluffium”



Plans to Improve Contaminant Modeling

- Refit all LETG/ACIS data with improved QEs
 - Use consistent ISM models for each source
 - Fits may require repairing edges at Si-K, Ir-M, N-K
- Determine gradients for other observations and use to refine the spatial nonuniformity model
- Use global fits and comparison to LETG/HRC to test “fluffium” model
 - Fix contamination spectral model and fit I parameter
- Design new contaminant model with physical components