Chandra Calibration Status

Calibration Updates Since Last CUC Meeting

ACIS

1. New tgain files were released for epochs 23 and 24 (May 2005 – Nov 2005) in CALDB 3.2.2 on May 5, 2006. The new tgain files are based on a standard set of GTIs for the cti data based on the time-dependent focal plane temperature during the observations. Earlier screening of the cti data used the average focal plane temperature during the observation.
1. A revised HRC-I de-gap corrections table was released in CALDB 3.2.3 on Aug. 9, 2006. The revised de-gap is based on a raster scan (twenty 5 ksec pointings) of Capella on the central regions of the HRC-I in AO7. A similar raster scan will occur in AO8 to improve the de-gap corrections on the outer regions of the HRC-I.

2. A revised HRC-I gain map was also released in CALDB 3.2.3 correcting a problem with an earlier version of the gain map. This map only affects the computation of the PIs in HRC-I data taken during the first two months of the mission.

3. Quenched an ugly rumour that the HRC-S timing was broken by detecting the pulse in the 3 ms pulsar PSR B1821-24.
HRC-I encircled Energy

ObsID 1385 – AR Lac

Encircled Counts Fraction

Radius [arcsec]

Current Degap

Updated Degap
Present Status

Effective Area

Calibration Goals Met:

1. ACIS effective area:
   Between rows 100 and 900 on ACIS-S and within 6' of the aim point on ACIS-I the present uncertainties are 5%.
   
   Beyond these regions the uncertainties are 10%.

2. HRC-I effective area – present uncertainties are 7% 

3. HETG/ACIS-S 1st order effective area – present uncertainties are 8%
Effective Area

Goals Not Met:

1. LETG/HRC-S first order – present uncertainties are 15% - the goal is 10%

2. LETG/HRC-S higher orders – present uncertainties are 20% - the goal is 15%

3. HETG/ACIS-S higher orders – present uncertainties are 20% - the goal is 15%
Absolute Energies

Calibration Goals Met:

1. ACIS – rms deviations in the gains are 0.3%
2. LETG/HRC-S - present uncertainties are 0.010A
3. HETG/ACIS-S – present uncertainties are 3%

Energy Resolution (FWHM)

Calibration Goals Met:

1. HETG/ACIS-S present uncertainties are 3%
2. ACIS – present uncertainties are 20 eV

Goals Not Met:

1. LETG/HRC-S Present uncertainties are 20% - goal is 10%
Astrometry

Calibration Goals Met:

1. HRC/ACIS absolute positions – uncertainties are 0.6 arcsec

2. ACIS relative astrometry – uncertainties are 0.1 arcsec

Goals not met

1. HRC-I relative astrometry – uncertainties are 0.3 arcsec – goal is 0.1 arcsec

Timing – relative and absolute timing goals have been achieved.
Present and Future Calibration Activities

ACIS

1. CTI-corrected calibration products for the BI chips at T= -120 C. These products are scheduled for release in Dec. 2006 and will include new trap maps, cti-corrected gain files, response file, and QEU file.
2. A revised ACIS QE file with corrections near the Si-K edge is scheduled for release in Dec. 2006.
3. CTI-corrected calibration products for all 10 chips at T= -110C. There will only be one gain file (i.e., no time-dependence).
4. Improve CC mode calibration
5. The gain in 2.5% greater in the transfer streak in S3 and 7% greater in the transfer streak in the FI chips. This is under investigation.
Epoch 21 ChiSq FITTED ENERGY s3 CTICOR [Node=0 xreg=0] — Al Ka

% Difference

Row

Epoch 21 ChiSq FITTED ENERGY s3 CTICOR [Node=0 xreg=0] — Ti Ka

% Difference

Row

Epoch 21 ChiSq FITTED ENERGY s3 CTICOR [Node=0 xreg=0] — Mn Ka

% Difference

Row
HRC

1. Update the HRC-S degap correction coefficients table to include empirical corrections from both line and continuum sources observed by the LETG/HRC-S. This is scheduled for release in Dec. 2006.

2. A rmf for the HRC-S is scheduled for release in Dec. 2006. This will help with the generation of hardness ratio images.

3. Update the HRC-I degap correction coefficients table using the AO8 raster scan of Capella on the outer portions of the HRC-I.

4. Develop time-dependent gain correction tables for the HRC-I and HRC-S.

5. The HZ43 data show a slow drop of 5% in the QE at wavelengths longer than 50Å since launch. Superimposed on the monotonic 5% drop are 1 to 2% fluctuations. This is under investigation.
HRMA

1. Most of the optics team's time over the past 6 months has been spent porting the SAOsac raytrace package to Linux for installation into CIAO Level III processing.

2. Finish a memo on the drift of the optical-axis. This should be posted by Nov.

3. Release the ECFs derived from elliptical rather than circular apertures

4. Post a memo on the unpiled-up ACIS PSF based on the analysis of stacked faint sources

5. Finish analysis of the ACIS-S piled-up observations and post a report.

6. Investigate a potential problem with the tilt of shell 6 due to residuals in the LSF of HEG spectra.
LETG

1. Update the HRC-S QE file – the new product will include a better treatment of the QE near the O-K edge. This is complicated due to the inability of separating the OI and OII edges in the ISM and the molecular oxygen O edge in the HRC-S filter. The new QE will also include updates on the theoretical flux predictions of the white dwarf models for HZ43 and Sirius B.

2. Incorporate the spatial non-linearities in the LETG/HRC-S dispersion relation in the LRFs.

HETG

1. Use the HETG data taken in CC mode to improve the CC mode calibration.

2. Improve HETG higher order efficiencies

3. Examine the effects of pile-up in grating spectra