ACIS Memo # 185
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To: ACIS Team
From: Catherine Grant
Subject: Analysis of Squeegee Mode Test with Corner-Pixel Bias Correction
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This is a follow-up to ACIS Memo #183, which detailed the decaying bias level during the squeegee test of 15 April. In order to reduce the effects of the erroneous bias subtraction from data analysis, I have used the mean value of the corner pixels for each event to correct the bias-subtraction for the entire event island. Corner pixels above the split threshold (13 ADU) were not included in the mean. Figure 1 shows that the time-dependence of the corner pixel values seen in the original event list has been reduced from many ADU to less than one ADU. Some variability remains, most likely because of signal charge below the split threshold being included in the mean calculation.
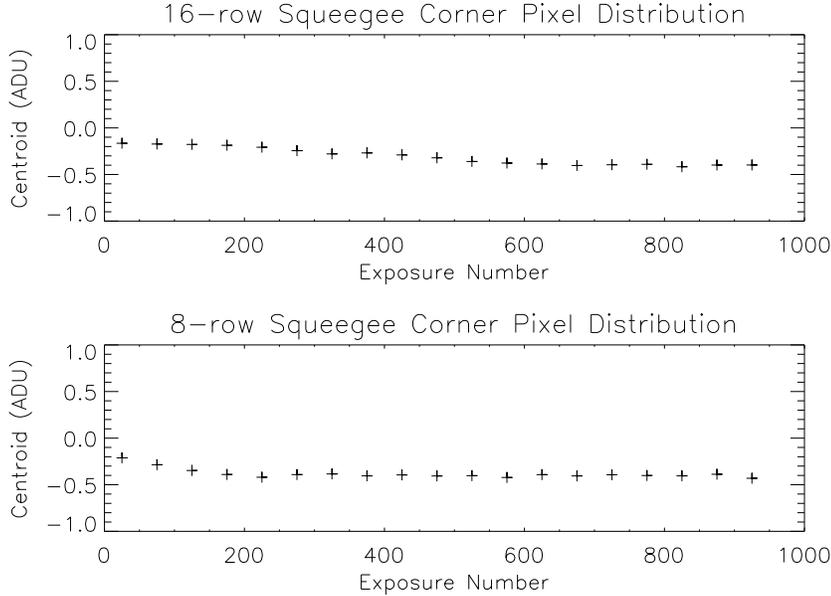

Figure 1: Time-dependence of the centroid of the corner pixel distribution for both the 16-row and 8-row squeegee tests after correcting each event with the mean of its corner pixels.

After correcting the bias level of the events, a change in CTI is still apparent for both the 16-row and 8-row squeegee tests as seen in Figure 2. This change occurs at the same time for both the Mn-Kα and Al-K spectral lines so is energy-independent. For the 16-row squeegee, the CTI initially drops by 30% and then appears to stabilize around 18% less than standard readout. The

fractional change at Al-K is slightly larger than that of Mn-Kα. The final values of CTI for the 8-row squeegee are approximately 12% lower than for standard readout. While the initial state of the squeegee mode seems to give better performance, it is unclear if this state can be stable over any useful length of time. The final state appears to be stable, at least over the time period of these observations.
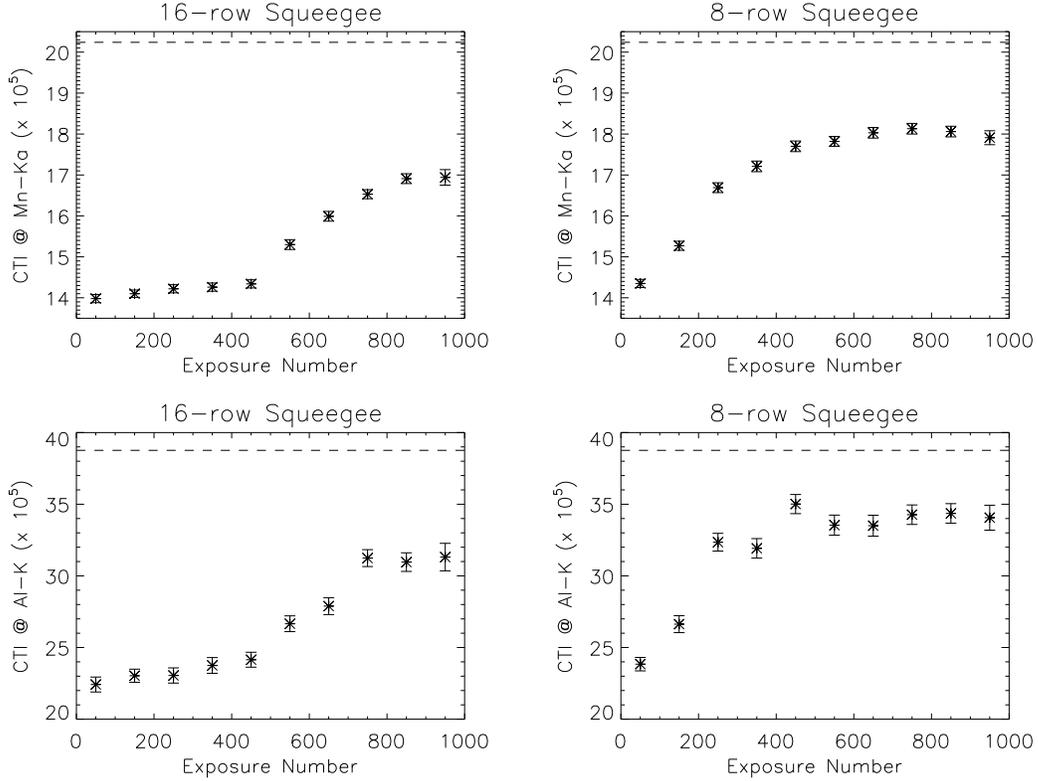

Figure 2: The change in CTI during the squeegee run for the 16-row squeegee (left) and the 8-row squeegee (right) at 5.9 keV (top) and 1.5 keV (bottom). The dashed line indicates the CTI measured with standard readout and no squeegee.

Mode	CTI @ Mn-K (x 10^{-5})	CTI @ Al-K (x 10^{-5})	Mn-K FWHM @ Row 928 (eV)				Al-K FWHM @ Row 928 (eV)			
16-row squeegee	15.28 ± 0.03	26.18 ± 0.16	360	413	422	426	197	229	286	260
8-row squeegee	17.32 ± 0.03	32.39 ± 0.17	478	551	547	512	255	306	283	275
standard readout	20.24 ± 0.05	38.76 ± 0.23	547	591	598	599	272	...	271	252
16-row squeegee										
frame < 400	14.07 ± 0.04	22.74 ± 0.21	317	309	340	323	150	154	150	143
frame > 650	16.52 ± 0.05	30.83 ± 0.29	375	460	496	364	230	256	227	199
8-row squeegee										
frame > 400	17.98 ± 0.04	33.69 ± 0.21	431	515	528	467	195	229	216	216