ACIS Memo #174
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To: ACIS Team
From: Catherine Grant
Subject: Variation of CTI across the ACIS focal plane
Date: 13 October 1999

This is an attempt to show the spatial variation of CTI across the focal plane and was originally posted on the CXC CTI web page on 27 September 1999. CTI @ Mn-Ka for ObsID 1313 (I-array) and 1312 (S-array) were used, however all CTI results show the same structure. Figure 1 shows three cuts through the focal plane, one through the S-array, two thru the I-array and either S2 or S3. The spatial coordinate is not a real distance.

The reason for presenting this is to show that there does appear to be some variation in the amount of damage. S0 has the worst CTI with some improvement going from S0 to S4. S4 and S5 have similar CTI, although S5 is marginally worse. The bottom of the imaging array (I2, I3) is better than S2 and similar to S4 and S5. The top of the imaging array (I0, I1) has the best CTI of all the FI CCDs.

The increase in CTI seen in the central two quadrants of each FI CCD is a result of the deterioration of charge transfer in the center of the FI CCDs reported by Gregory Prigozhin in ACIS Memo #172. That part of the structure is therefore not a result of any spatial variation in the damaging particles but rather is a result of delayed clocking signals.

CTI is a function of counting rate, with higher counting rates yielding better (lower) CTI. The intensity of the external calibration source at Mn-Kα across the focal plane is shown in the ACIS Calibration Report (p. 251-252), and is generally uniform within $\pm$ 5%. The variations in intensity are actually in the wrong direction to account for the CTI variation, i.e. S2 sees a higher intensity and has larger CTI than S5 which sees a smaller intensity and has smaller CTI.

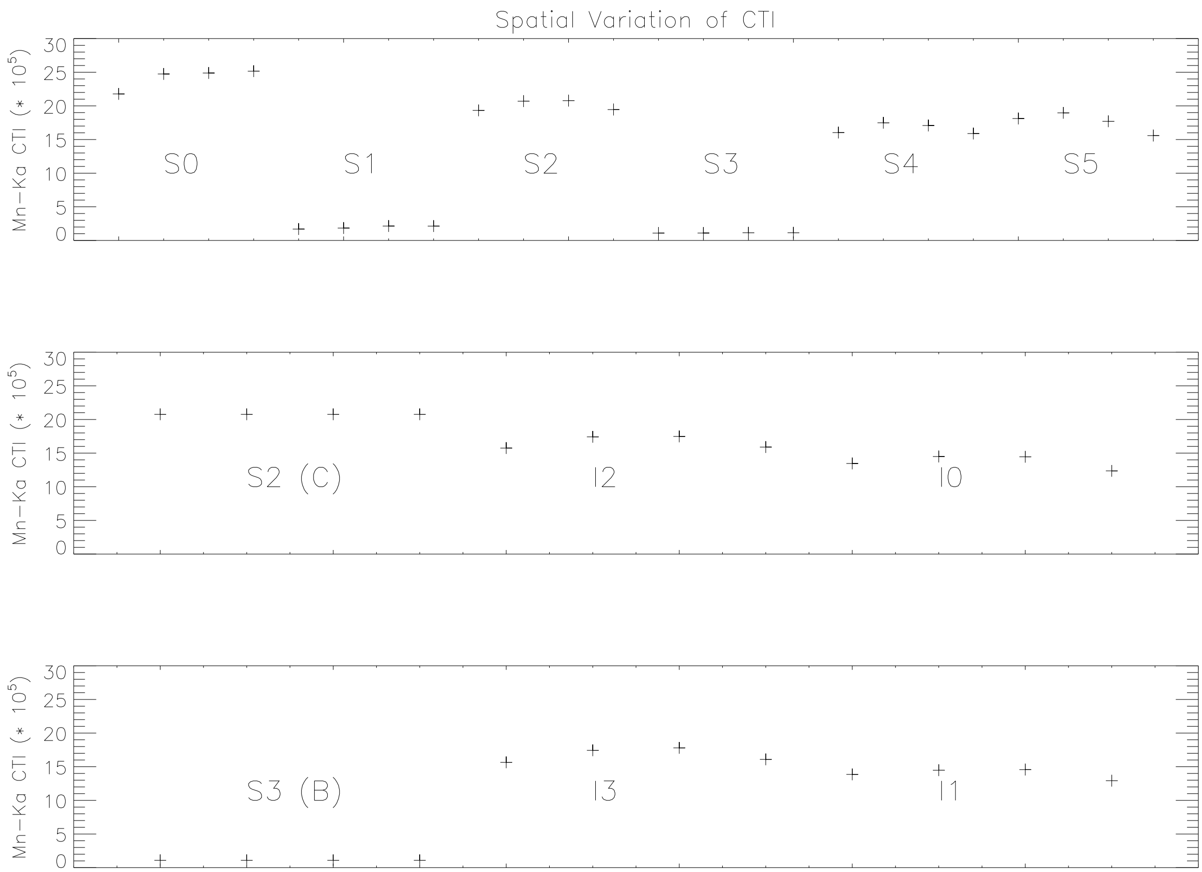

Figure 1: CTI variability for three cuts through the ACIS focal plane. The position coordinate is not a real distance measurement. The 'humped' structure seen for all the FI CCDs is not a result of non-uniformity in detector damage.