ACIS Update

Paul Plucinsky, Royce Buehler, Nancy Adams-Wolk, & Gregg Germain

The ACIS instrument continued to perform well over the past year with no anomalies or unexpected degradations. The charge-transfer inefficiency (CTI) of the FI and BI CCDs is increasing at the expected rate. The contamination layer continues to accumulate on the ACIS optical-blocking filter. Recent data indicate that the contaminant may be increasing in thickness faster than the current model predicts, especially around the edges of the filter which are colder than the center of the filter. The CXC calibration group is analyzing the data and may produce an updated contaminant model in the coming year.

The control of the ACIS focal plane (FP) temperature continues to be a major focus of the ACIS Operations Team. As the *Chandra* thermal environment continues to evolve over the mission, some of the components in the Science Instrument Module (SIM) close to ACIS have been reaching higher temperatures, making it more difficult to maintain the desired operating temperature of -119.7° C at the focal plane. In previous years, a heater on the ACIS Detector Housing (DH) and a heater on the SIM were turned off to provide more margin for the ACIS FP temperature. At this point in the mission, there are two effects that produce excursions in the FP temperature, both related to the attitude of the satellite. First the Earth can be in the FOV of the ACIS radiator (which provides cooling for the FP and DH). Second, for pitch angles larger than 130 degrees, the Sun illuminates the shade for the ACIS radiator and the rear surfaces of the SIM surrounding the ACIS DH. Reducing the number of operational CCDs reduces the power dissipation in the FP, thereby resulting in a lower FP temperature.

Starting in Cycle 13, GOs were encouraged to request 5 CCDs for their observations to keep the FP and the electronics cooler, if their science objectives could be met with 5 CCDs. Starting in Cycle 14, GOs will not be allowed to specify "Y" for 6 CCDs in the RPS forms when they submit their proposal. If a GO requires 6 CCDs for their observation, they are to specify 5 CCDs as "Y" and one CCD as "OPT1" at the time of proposal submission. If the proposal is selected, the GO may work with their User Uplink Support Scientist and change the "OPT1" to a "Y" if the sixth CCD is required. GOs should be aware that requesting 6 CCDs increases the likelihood of a warm FP temperature and/or may increase the complexity of scheduling the observation. GOs should review the updated material in the Proposers' Guide on selecting CCDs for their observations and on this web page: *http://cxc.cfa.harvard.edu/acis/optional_CCDs/optional_CCDs.html*

The control of the ACIS electronics temperatures has also been a concern for the ACIS Operations Team. ACIS has three main electronics boxes, the Power Supply and Mechanisms Controller (PSMC), the Digital Processing Assembly (DPA), and the Detector Electronics Assembly (DEA). The PSMC reaches its highest temperatures when the satellite is in a "forward Sun" configuration, pitch angles between 45–60 degrees (*Chandra* cannot point within 45 degrees of the Sun). Since 2006, the *Chandra* FOT has been using the optional CCDs information provided by GOs to turn off optional CCDs if thermal conditions require. As a result of the changing thermal environment, the DEA and DPA are reaching higher temperatures in tail-Sun orientations (pitch angles larger than 130 degrees). The recommendation in the previous paragraph to use only 5 CCDs if the science objectives can be met with 5 CCDs, will also reduce the temperature of the DEA and DPA in addition to the temperature of the FP. Starting in Cycle 14, the *Chandra* FOT will be using the optional CCDs information to turn off optional CCDs if either the DEA or DPA approach their temperature limits.