

How to Create a Background Map for an HRC-I Observation

T. Isobe and M. Juda (SAO/CXC)

This poster shows that incorporation of a stowed background map into the background correction creates a better fluxed map. For example, a HRMA vignetting correction to the particle background often makes "ring" artifacts. Subtracting the stowed background from the observation before the exposure correction should eliminate this artifact.

When ACIS is selected as the observing instrument, the HRC is in a stowed position not viewing the sky. Often while in the stowed position the MCP HV will be at its operational level and observing the non-sky contribution to its background. We have accumulated these observations, and created a standardized stowed background event-list for each year. These data can be downloaded from our site.

The steps to create an appropriate background map for an observation are briefly described here.

1. Retrieve stowed background data from the year corresponding to that of the observation
2. Apply a status bit filter to the background event-list that matches observation filter
3. Assign fake times to stowed background events
4. Apply aspect to background events
5. Bin events into image
6. Using an appropriate weight, normalize the background

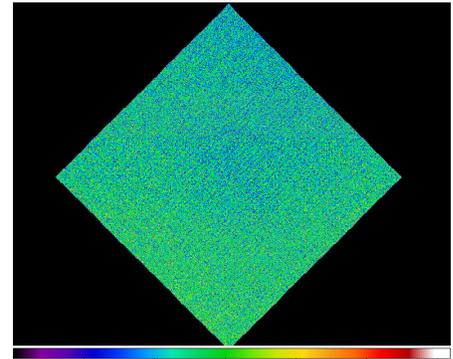


Figure 1: a stowed background map prepared for Obsid 144.

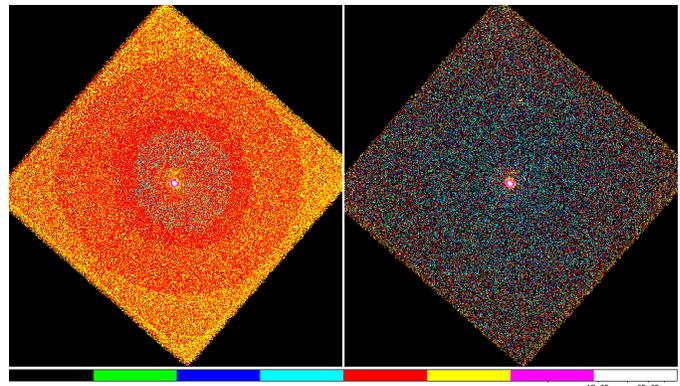


Figure 2: Fluxed images of G21.5-0.9, processed *without* the stowed background correction (left), and *with* the stowed background correction (right).

Using the year 2000 stowed background map (Figure 1), we corrected a fluxed image of an observation of G21.5-0.9 (OBSID 144); this is the observation used as an example in the CIAO science thread "HRC-I Exposure Map and Fluxed Image". The resulting fluxed image for the observation is shown in Figure 2. To show the "ring" artifact due to the HRMA vignetting correction, we set the upper threshold of the images to 3.0×10^{-5} (cnt/pix/sec). The left image is *without* the stowed background subtracted and the right one is *with* the stowed background subtracted. The "ring" artifact is clearly removed from the observation with the stowed background correction.

References:

High Resolution Camera Stowed Background Study

http://cxc.harvard.edu/contrib/cxchrc/Stowed_study/hrc_stowed_position_study.html

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http://cxc.harvard.edu/contrib/cxchrc/Stowed_study/hrci_image_correction.html

Contacts:

T. Isobe: isobe@head.cfa.harvard.edu

M. Juda: juda@head.cfa.harvard.edu