



The above figure shows the pointing offset, exclusively in the Y-direction in the BCD frame as a function of campaign number. The variation is due to an intra-campaign wobble in the scan-mirror, i.e., its on-board position does not repeat in the manner expected from a ground-test model. The pointing offsets are relative to campaign number 17. Offline analysis has shown that this campaign has very good absolute pointing, so that correcting the BCDs in any other campaign using the appropriate offset will get you to within an absolute pointing accuracy determined more-or-less by the quoted offset uncertainty.

The above offsets were computed by centroiding on a characteristic dark “spot” caused by debris on a pick-off mirror. The position of the spot changes in the Y-direction as the mirror rotates about its axis. The measurements were performed on stacks of 24μm photometry mode BCD frames binned as a function of scan-mirror angle. The relative Y-positions of this spot (relative to our best-absolute pointing campaign; here number 17) were derived by performing a weighted average over all available mirror-angles for the campaign of interest. The associated uncertainty is purely due to spot centroiding error (typically one-tenth of a 24μm pixel). More specifically, the mean spot position offset for a campaign  $i$ , relative to a campaign  $A$  with best absolute pointing known a-priori, is given by

$$\langle \Delta Y \rangle_i = S_y \frac{\sum_j^{N_j} \frac{1}{\sigma_{i,j}^2 + \sigma_{A,j}^2} [Y_{i,j} - Y_{A,j}]}{\sum_j^{N_j} \frac{1}{\sigma_{i,j}^2 + \sigma_{A,j}^2}},$$

with uncertainty

$$\sigma_{\Delta Y} = S_y \left[ \sum_j^{N_j} \frac{1}{\sigma_{i,j}^2 + \sigma_{A,j}^2} \right]^{-1/2},$$

where  $j$  is an index over mirror-position, the  $\sigma_{ij}$  are centroiding errors,  $S_y$  is the (24μm) Y-axis *pixel-scale*, and the sums are over the  $N_j$  mirror positions for which measurements for campaigns  $i$  and  $A$  are available

These corrections are such that if you had a BCD whose position angle was exactly zero, i.e., whose Y-axis was aligned along the declination axis, you simply add the above offset to that BCD’s declination. For non-zero position angles, a correction to both RA and Dec is needed and it comes down to a spherical trig. problem. No doubt the latter will always apply. But don’t despair, the offset corrections in the above plot will be applied to all SSC data products, for all MIPS modes, in subsequent campaign reprocessing with the S13.0 pipeline version.