WFC3 Low-Frequency Flat Field Corrections

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Abstract.

Multiple dithered observations of the globular cluster Omega Centauri (NGC 5139) have been used to measure inflight corrections to the WFC3 UVIS and IR ground flat fields for a subset of key filters. To obtain an adequate characterization of the flat field over the detector field of view (FOV), 9 pointings were obtained for each filter using a 3x3 box dither pattern with steps of approximately 25% of the FOV. By measuring relative changes in the brightness of a star over different portions of the detector, low-frequency spatial variations in the detector response (L-flats) have been used to correct the flat fields obtained during ground testing. The broad wavelength range covered by these observations allow an interpolation of the L-flat correction for the remaining wide, medium and narrow-band filters, assuming a simple linear dependence with pivot wavelength. Initial results indicate that the required L-flat corrections are ±1.5% (standard deviation) in the IR and ±1.0% in the UVIS, and that the photometric response for a given star after applying the L-flat correction is now stable to better than 1% for any position in the field of view. Followup observations of the same field at multiple orientations will be used to verify the accuracy of the L-flat solutions and to quantify any temporal changes in the detector response while in orbit.