

## 6. Contamination Worms

**Description:** Weak, irregular lines in images of bright extended targets (e.g. planets) with high count rates.

**Cause:** Contaminant particles slowly collect on cold CCD windows (field flatteners) in a quasi-uniform layer. For reasons which are not entirely clear, the contaminants avoid linear regions on the windows, thus giving rise to reduced scattering and higher counts in these areas at visible wavelengths. In the far UV these linear features have low transmission, suggesting the presence of some permanent contaminant which repels new material. Approximately once per month the CCDs are warmed and the contaminants are boiled off; this “decontamination” temporarily eliminates the worm pattern until the contaminant layer reforms.

**Example:** Ratio of F439W internal VISFLATs taken before and after a decontamination for CCD WF2. The ratio is roughly 0.988 over most of the image due to light scattering from contaminant layer in pre-decon. VISFLAT. Ratio is 1.002 in the “worm” features, indicating an absence of contaminants.

**Impact:** Contributes false structure to extended targets. Since it is a weak effect (1-2%), it will only be visible at high count levels.

**Correction:** In principle, the internal VISFLATs which are taken weekly can be used to estimate and remove the pattern. One must also consider that the flat field reference files used for calibration will also contain the worm pattern to some degree, and will partially correct the worm pattern in science images. Eventually “deltaflats” may be made available to allow easy correction of contaminant structures.

**Prevention:** In critical situations, one might request that the observations be scheduled just after one of the monthly decontaminations. This request can be made in the RPS2 Phase II Visit Level Comments, and by contacting the STScI Program Coordinator for your program.

Figure 6.1. Ratio of F439W internal VISFLATs taken before and after a decontamination for CCD WF2. The image taken before the decontamination has linear regions (worms) where the counts are about 1% larger (darker in this display) than the surrounding regions.

