

## Instrument Science Report ACS 2003-02

# NUV Earth Flats

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April 21, 2003

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### ABSTRACT

*While the bright Earth is a poor flat field source at optical wavelengths because of structure in the cloud cover, below ~4000Å the Earth is a uniform source of diffuse light due to the high optical depth above the cloud layer. Sixteen supported modes of the ACS HRC camera lie in this wavelength regime and now have flats created from observations of the bright Earth. Unfortunately, the red leaks in F220W and F250W are so large that the out-of-band light dominates, and the lab flats created with deuterium lamp illumination are superior to the observed earth flats for the 10 modes that include these two filters. A new dust mote appeared around 2002 Aug 13, so two flats for each of the 16 modes are required for HRC observations obtained before and after this date.*

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### 1. INTRODUCTION

When pointed directly at the Earth, the field of view (FOV) of HST sweeps out a swath that progresses across the ground at the orbital velocity of 7 km/sec. The width of the path perpendicular to the direction of motion is  $H \times \Theta$ , where  $H$  is the orbital altitude of ~500km and  $\Theta$  is the instrumental FOV, i.e. 25 arcsec for the HRC. Any object smaller than the FOV will cause a streak in the image, and considerable analysis is required to remove the effect of streaking on the flat fields (cf. Koekemoer, Biretta, & Mack 2002). Clouds or, possibly, whitecaps on the oceans are the source of these streaks. An example of an ACS WFC streak flat appears in Figure 1 for F502N. The Earth is too bright for observations in the broad WFC Filters. However, HRC modes that utilize the F220W, F250W, F330W, and F344N are immune to streaks because of the large optical depth down to the tropospheric cloud layers. The bright Earth provides a uniform flat field source for the complete OTA+HRC optical complement, and the required calibration flat,

which incorporates both the low frequency L-flat and the high frequency pixel-to-pixel P-flat response, can be produced with a minimum of processing. The individual Earth exposures are combined with an IDL cosmic-ray rejection algorithm, which also produces statistical uncertainty and data quality arrays. The clean, combined frame is normalized to unity in the standard central region per Bohlin, Hartig, & Martel (2001).

## 2. OBSERVATIONS

A signal of about 100,000 *electrons per pixel* is required for each flat field to avoid degrading the intrinsic pixel-to-pixel rms P-flat response of <1% for the ACS CCD detectors. A random part of the Earth is observed during occultation of primary astrophysical targets, so that the individual Earth flat frames often have a low signal from the dimly illuminated night side. In order to maximize the probability of attaining sufficient signal, routine observations were instituted and are summarized in Table 1 for HRC observations through 2003 Mar 31. The last column indicates the signal in *electrons per pixel*. Frames which are saturated or which have less than 10,000 *electrons per pixel* are not tabulated or used in construction of the flat field reference files.

## 3. RESULTS

A new dust mote appeared on the HRC CCD sometime in Aug 2002 between the 6th and the 21st, so the observations in Table 1 are divided into one group of LP-flats with a USEAFTER date of 1997 Jan 01 and a second group with a USEAFTER date of 2002 Aug 13. Table 2 summarizes the total electron signal recorded in each of the 32 UV flats. After Aug 13, more than the required goal of 100,000 *electrons* are present for all 16 flats, while six cases fall short of the goal before Aug 13. However, the 87,000 *electrons* recorded for F344N are sufficiently close to the goal. The other five cases before Aug 13 require a patch in the new dust mote region. For example, the “before” flat for F330W+Coronagraph is made from the high signal F330W+Coronagraph “after” flat by inserting the mote free region with a 13 pixel radius from the F250W+Coronagraph “before” flat using the IDL script FLTFIX02AUG.pro. The change in the P-flat structure from the “before” to the “after” set is 0.25%, so that the patched flats have slightly more pixel-to-pixel noise than indicated by the associated statistical uncertainty arrays.

A subset of 10 of these UV Earth flats were previously delivered for pipeline data reductions in Sep 2002.

**Table 2.** Total Electrons/1000 in HRC UV Earth Flats Before & After the New Dust Mote

MODE	Before 2002 Aug 13	After 2002 Aug 14
F220W	130	>100
F250W	256	>100
F330W	105	>100
F344N	87	>100
F220W+Coron	33	>100
F250W+Coron	253	>100
F330W+Coron	45	>100
F220W+Pol_0	0	>100
F220W+Pol_60	70	>100
F220W+Pol_120	0	>100
F250W+Pol_0	356	>100
F250W+Pol_60	314	>100
F250W+Pol_120	422	>100
F330W+Pol_0	136	>100
F330W+Pol_60	179	>100
F330W+Pol_120	108	>100

#### 4. ANOMALIES

The solar spectrum has a steep UV gradient below 3400Å, and UV extinction by ozone and other atmospheric constituents make the earthshine gradient even steeper. Cox et al. (1987) show the measured spectrum of the Earth, where the intensity drops by four dex from 3400 to 2500Å. This red spectrum causes artifacts in the shortest wavelength F220W and F250W filters.

When F220W is combined with a Pol\_UV filter, an apparent doughnut shaped bright patch appears and may be caused by the fact that F220W reflects the bulk of the spectral energy back toward the concave side of the polarizer, which then reflects a small fraction back toward the filter. Figure 2 illustrates this ghost image in an Earth flat for F220W+Pol0UV. The F220W+Pol120UV flat shows a similar effect with the ghost appearing lower and to the left, while F220W+Pol60UV exhibits a fainter double ring nearer to the field center. The Earth flat field is up to 2% too high in these doughnut regions, and stars have ghost images in these three F220W+PolUV filter modes.

Another curiosity is that numerous hot spots on the ten flats involving the two shortest wavelength F220W and F250W filters show as dark spots on the lab flats obtained with a deuterium lamp light source, as illustrated by the comparison of Figure 2 with the lab flat shown in Figure 3. More than 90% of the light transmitted by F220W and F250W comes from their redleaks longward of 3000Å, because the solar spectrum is so faint over the primary bandpass. These hotspots in the F220W and F250W Earth flats are more sensitive to the leaking long wavelength light, because F330W shows the same hotspots as illustrated in Figure 4 for the new F330W Earth flat field, which matches the lab deuterium lamp F330W flat.

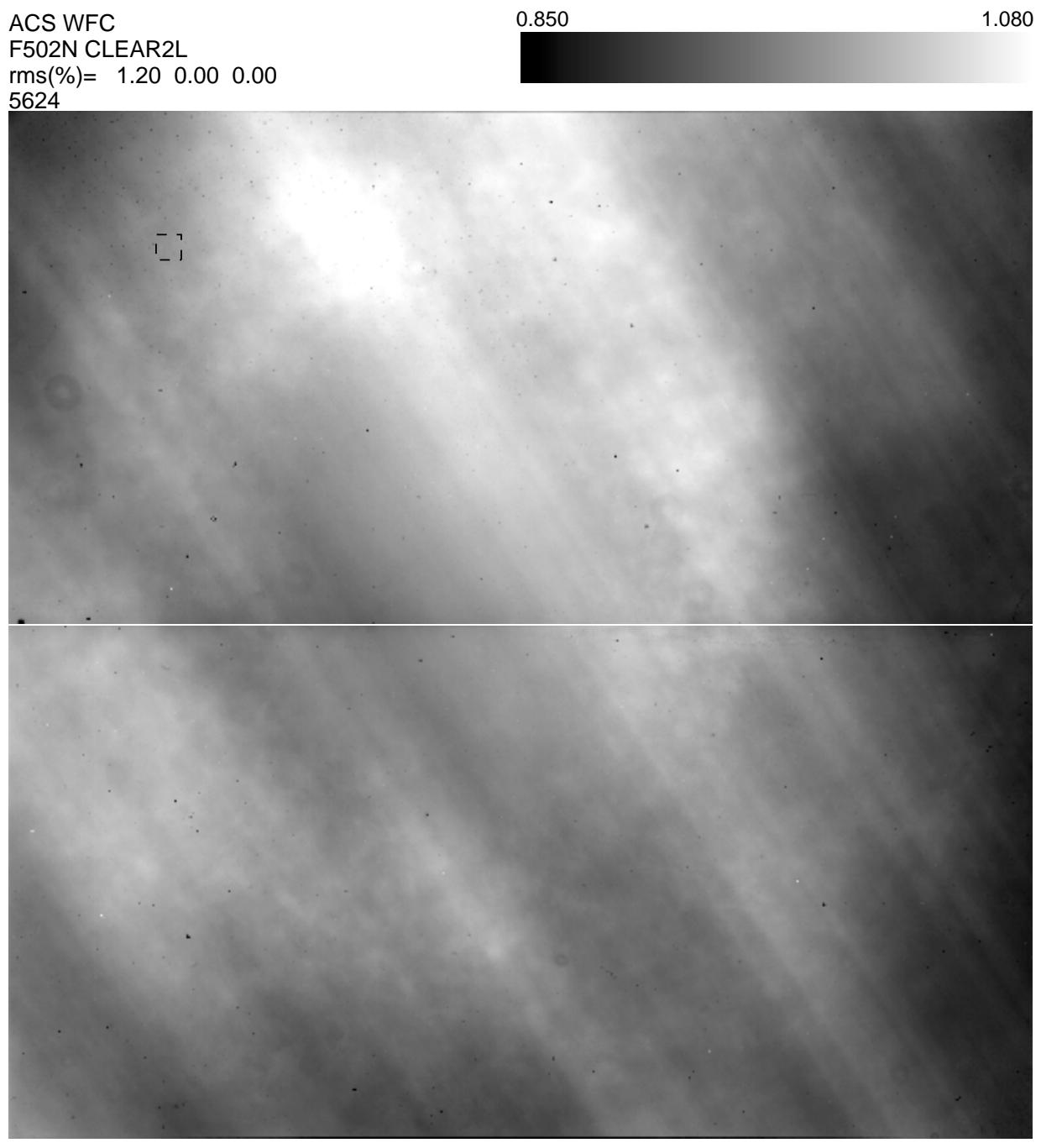
## 5. CONCLUSIONS

Because of the anomalies in F220W and F250W, the lab deuterium flats of Bohlin, Hartig, and Martel (2001) have been reprocessed and new versions of these modes will be delivered instead of the Earth flats. In order to derive the NUV HRC L-flats using the technique of Mack et al. (2002), higher signal stellar observations in F220W and F250W are required. Figure 5 shows the ratio of one of the worst Earth flats divided by the corresponding rehabilitated lab deuterium lamp flat. The new dust mote that appeared ~2002 Aug 13 is patched into these 10 flats to produce another set of 10 for the USEAF-TER=Aug 13, 2002. These sets of 10 lab flats are supplemented by the F344N+clear and the five F330W Earth flats to complete each set of 16 “before” and “after” flats for pipeline use.

## REFERENCES

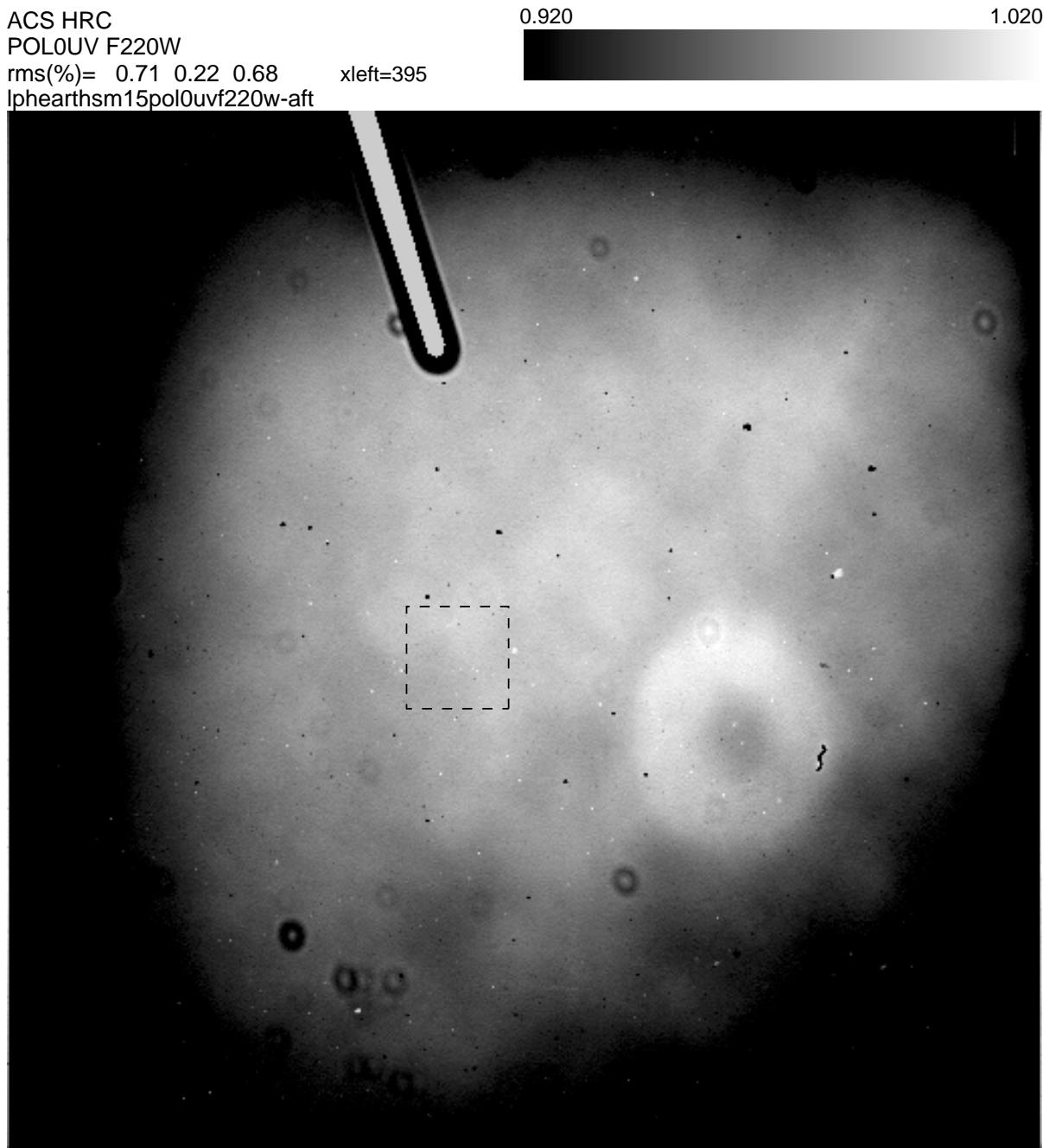
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- Bohlin, R. C., Hartig, G. & Martel, A. 2001, Instrument Science Report, ACS 01-11, (Baltimore:STScI)
- Cox, C., Bohlin, R. C., Griffiths, R. E., & Kelsall, T. 1987, “Standard Astronomical Sources for HST: 6. Spatially Flat Fields,” (Baltimore:STScI).
- Koekemoer, A., Biretta, J., & Mack, J. 2002, Instrument Science Report, WFPC2 2002-02, (Baltimore:STScI)
- Mack, J., Bohlin, R., Gilliland, R., Van der Marel, R., Blakeslee, J., & De Marchi, G. 2002, Instrument Science Report, ACS 02-08, (Baltimore:STScI)

**Figure 1:** WFC narrow band observation of the bright Earth in F502N, showing typical streaking at a stretch of 0.85 to 1.08 from black to white.



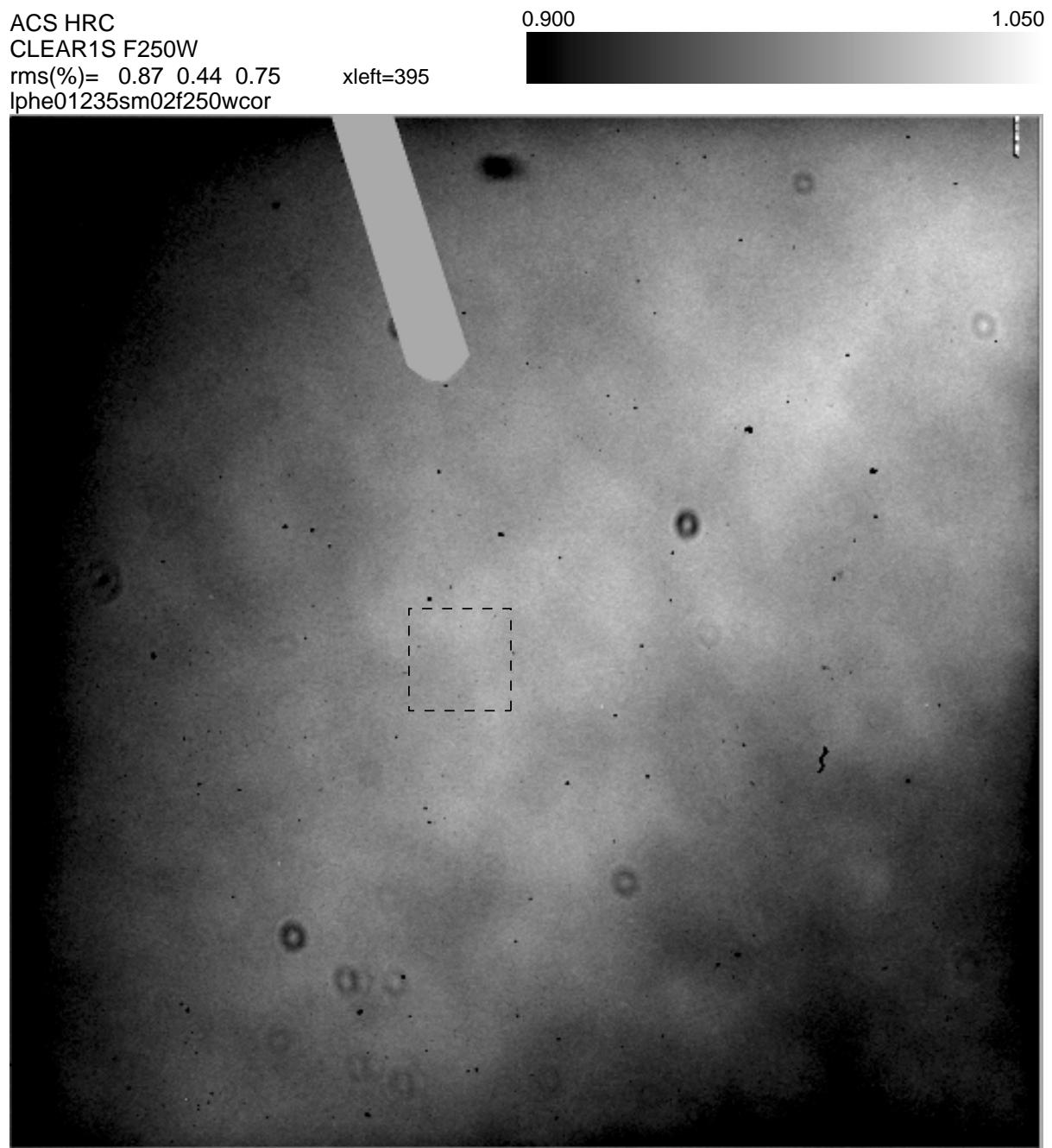
Bohlin: primg 17-Apr-2003 22:27

**Figure 2:** Flat field from observations of the bright earth for the HRC F220W+Pol0UV with a stretch from 0.92 to 1.02. Because of the extreme weakness of the solar continuum near 2200Å, virtually all of the incident light is reflected by F220W. The ghost doughnut shape centered at (720, 400) may be caused by multiple reflections between the surfaces of the two filter elements. The new dust mote in this post-Aug 13 flat is centered at (586, 888).



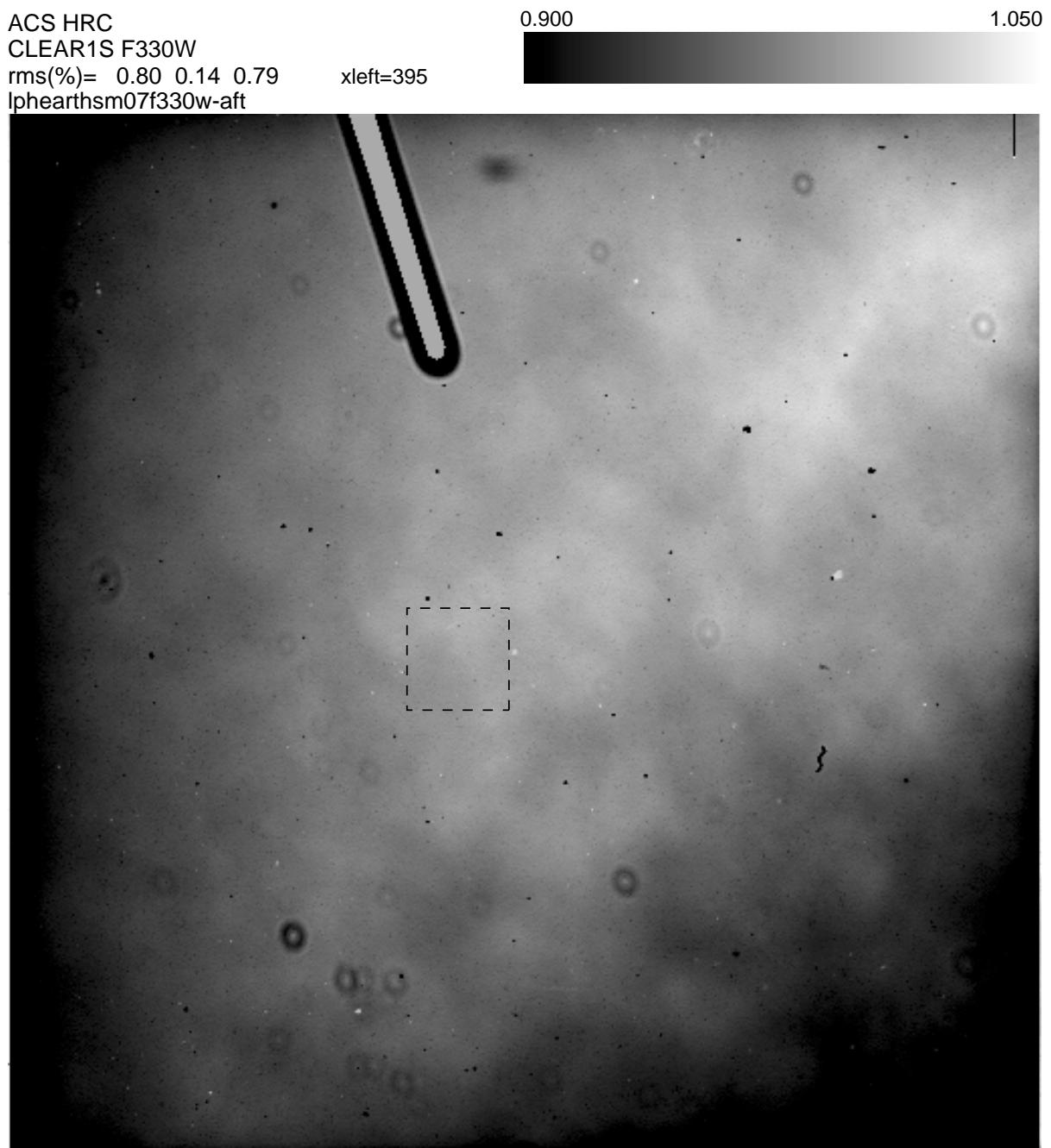
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**Figure 3:** Flat field for HRC F250W obtained in the laboratory with a deuterium light source. The brightest spots (>1) in Figure 2 are dark (<1) here.



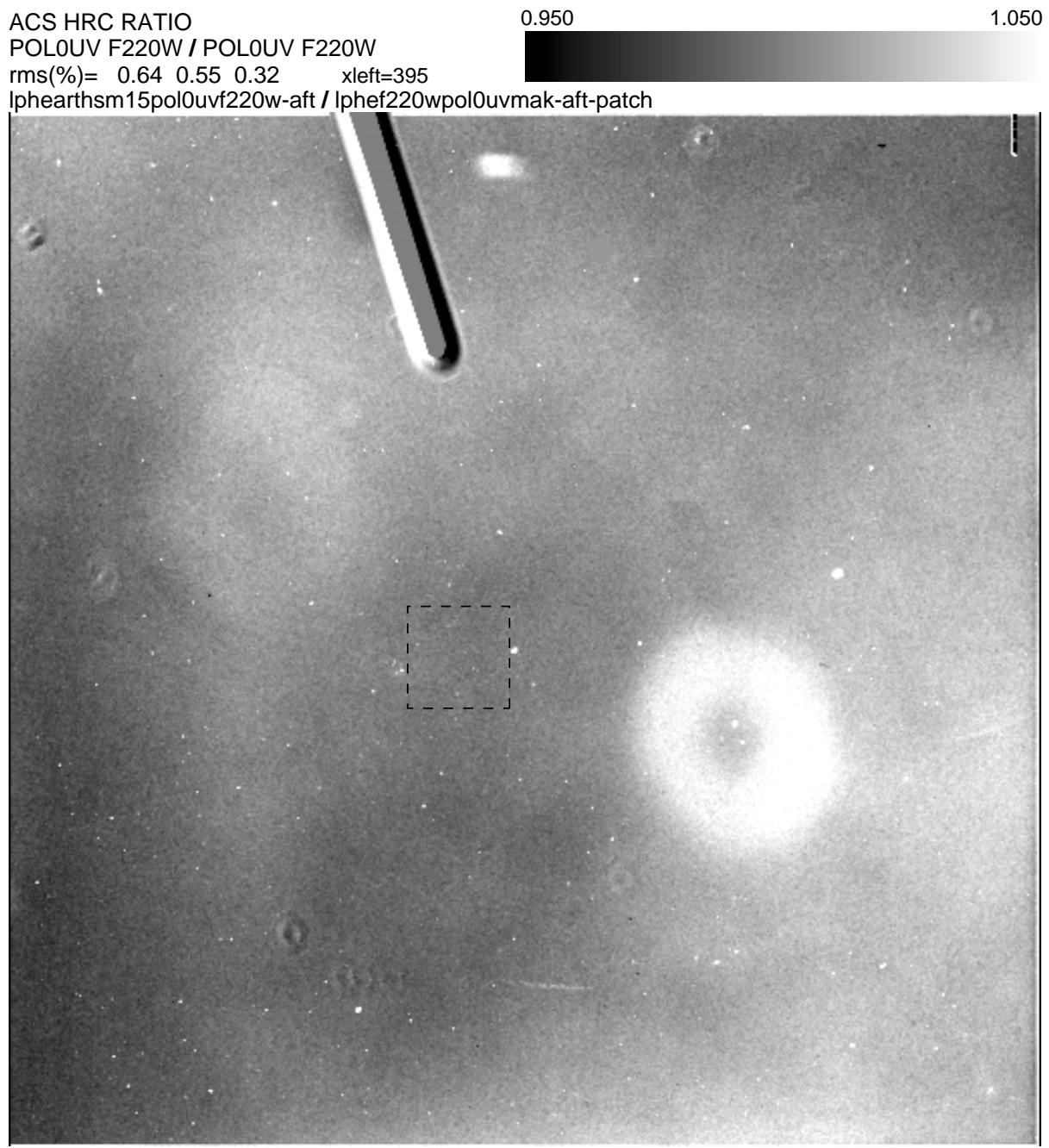
Bohlin: primg 10-Apr-2003 21:42

**Figure 4:** Flat field for HRC F330W from earth flats, which matches the lab F330W flat from a deuterium lamp with strong UV illumination. The hot spots appearing here are similar to those at longer wavelengths and at shorter wavelengths when solar illumination is used.



Bohlin: primg 15-Apr-2003 17:15

**Figure 5:** Ratio of the F220W+Pol0UV Earth flat from Figure 2 to the corresponding lab flat, illustrating the bright artifacts caused by the red Earthshine illumination. The ghost doughnut has an amplitude of 2%, while the smaller bright spots indicate errors of several percent in the Earth flat. For example, two pixels at (498:499, 490) in the hotspot just right of the dashed box have depths of (0.90, 0.79) in the lab flat and values of (1.03, 0.93) in the Earth flat of Figure 2, which cause (14%, 18%) errors in this ratio image.



**Table 1.** HRC UV Flat Field Observations of the Earth

ENTRY	ROOTNAME	DATE-OBS	TIME-OBS	EXPTIME	PROP	FILTER1	FILTER2	TYPE	GAIN	ELECTRONS
4548	j8em50uuq	2002-07-23	23:17:50	450.0	9564	CLEAR1S	F220W	CORON	4	18722
5415	j8ema4gwq	2002-09-12	22:36:48	450.0	9564	CLEAR1S	F220W	CORON	4	12984
5418	j8ema5xdq	2002-09-11	20:52:32	450.0	9564	CLEAR1S	F220W	CORON	4	13413
5574	j8kf04b3q	2002-12-23	03:02:44	380.0	9658	CLEAR1S	F220W	CORON	4	17705
5575	j8kf04b4q	2002-12-23	03:09:55	380.0	9658	CLEAR1S	F220W	CORON	4	24635
5718	j8kf17czq	2003-03-05	22:28:42	380.0	9658	CLEAR1S	F220W	CORON	4	15112
5719	j8kf17d0q	2003-03-05	22:35:53	380.0	9658	CLEAR1S	F220W	CORON	4	13604
5720	j8kf17d1q	2003-03-05	22:43:04	380.0	9658	CLEAR1S	F220W	CORON	4	11749
5781	j8kf30fuq	2003-03-17	12:55:59	380.0	9658	CLEAR1S	F220W	CORON	4	11920
5782	j8kf30fvq	2003-03-17	13:03:10	380.0	9658	CLEAR1S	F220W	CORON	4	14572
2240	j8em01eyq	2002-06-03	06:51:31	54.0	9564	CLEAR1S	F250W	CORON	2	45048
2262	j8em06baq	2002-06-05	01:59:10	54.0	9564	CLEAR1S	F250W	CORON	2	46352
4526	j8em11z5q	2002-07-07	23:13:47	54.0	9564	CLEAR1S	F250W	CORON	2	12536
4549	j8em50ovq	2002-07-23	23:26:29	86.0	9564	CLEAR1S	F250W	CORON	4	112827
5224	j8ema1x1q	2002-08-21	19:45:14	86.0	9564	CLEAR1S	F250W	CORON	4	53078
5413	j8ema3aaq	2002-08-29	15:16:18	86.0	9564	CLEAR1S	F250W	CORON	4	51506
5416	j8ema4gxq	2002-09-12	22:45:29	86.0	9564	CLEAR1S	F250W	CORON	4	25619
5419	j8ema5xeq	2002-09-11	21:01:12	86.0	9564	CLEAR1S	F250W	CORON	4	55260
4550	j8em50owq	2002-07-23	23:29:04	2.0	9564	CLEAR1S	F330W	CORON	4	38066
5225	j8ema1xj1q	2002-08-21	19:47:49	2.0	9564	CLEAR1S	F330W	CORON	4	58561
5414	j8ema3abq	2002-08-29	15:18:53	2.0	9564	CLEAR1S	F330W	CORON	4	33809
5417	j8ema4gyq	2002-09-12	22:48:04	2.0	9564	CLEAR1S	F330W	CORON	4	19725
5420	j8ema5xfq	2002-09-11	21:03:48	2.0	9564	CLEAR1S	F330W	CORON	4	46156
5579	j8kf05epq	2002-12-16	12:28:06	3.2	9658	CLEAR1S	F330W	CORON	4	26211
5611	j8kf18shq	2002-12-29	08:11:25	3.2	9658	CLEAR1S	F330W	CORON	4	88613
5665	j8kf31rwq	2003-02-18	11:18:10	3.2	9658	CLEAR1S	F330W	CORON	4	51974
5812	j8kfbadoq	2003-03-31	11:34:14	3.2	9658	CLEAR1S	F330W	CORON	4	40783
5813	j8kfbadpq	2003-03-31	11:35:09	3.2	9658	CLEAR1S	F330W	CORON	4	48488
2235	j8em01etq	2002-06-03	06:36:45	170.0	9564	CLEAR1S	F220W	IMAGE	2	13395
4521	j8em11z0q	2002-07-07	22:59:01	170.0	9564	CLEAR1S	F220W	IMAGE	2	19828
4546	j8em50osq	2002-07-23	21:54:45	500.0	9564	CLEAR1S	F220W	IMAGE	4	53229
4547	j8em50otq	2002-07-23	22:03:52	500.0	9564	CLEAR1S	F220W	IMAGE	4	44183

ENTRY	ROOTNAME	DATE-OBS	TIME-OBS	EXPTIME	PROP	FILTER1	FILTER2	TYPE	GAIN	ELECTRONS
5219	j8em16nlq	2002-08-24	02:39:57	500.0	9564	CLEAR1S	F220W	IMAGE	4	27512
5221	j8em21m5q	2002-08-23	20:01:20	500.0	9564	CLEAR1S	F220W	IMAGE	4	59858
5222	j8em21m6q	2002-08-23	20:10:27	500.0	9564	CLEAR1S	F220W	IMAGE	4	37944
5396	j8em31qpq	2002-09-06	20:31:58	500.0	9564	CLEAR1S	F220W	IMAGE	4	64495
5397	j8em31qqq	2002-09-06	20:41:05	500.0	9564	CLEAR1S	F220W	IMAGE	4	59801
5407	j8em36i4q	2002-09-17	00:12:00	500.0	9564	CLEAR1S	F220W	IMAGE	4	80422
5408	j8em36i5q	2002-09-17	00:21:08	500.0	9564	CLEAR1S	F220W	IMAGE	4	53655
2236	j8em01euq	2002-06-03	06:40:48	30.0	9564	CLEAR1S	F250W	IMAGE	2	46095
4522	j8em11z1q	2002-07-07	23:03:04	30.0	9564	CLEAR1S	F250W	IMAGE	2	55500
4534	j8em15leq	2002-08-06	01:57:18	60.0	9564	CLEAR1S	F250W	IMAGE	4	76156
4543	j8em20guq	2002-08-05	08:19:17	60.0	9564	CLEAR1S	F250W	IMAGE	4	77811
5379	j8em25vpq	2002-09-07	09:23:10	60.0	9564	CLEAR1S	F250W	IMAGE	4	96081
5393	j8em30xyq	2002-09-14	09:56:55	60.0	9564	CLEAR1S	F250W	IMAGE	4	86926
5404	j8em35ynq	2002-09-14	11:33:04	60.0	9564	CLEAR1S	F250W	IMAGE	4	91621
5608	j8kf18seq	2002-12-29	08:06:27	60.0	9658	CLEAR1S	F250W	IMAGE	4	111997
5662	j8kf31rtq	2003-02-18	11:13:12	60.0	9658	CLEAR1S	F250W	IMAGE	4	108589
4535	j8em15lfq	2002-08-06	01:59:27	1.5	9564	CLEAR1S	F330W	IMAGE	4	55012
4544	j8em20gvq	2002-08-05	08:21:26	1.5	9564	CLEAR1S	F330W	IMAGE	4	49832
5380	j8em25vqq	2002-09-07	09:25:19	1.5	9564	CLEAR1S	F330W	IMAGE	4	71589
5394	j8em30xzq	2002-09-14	09:59:04	1.5	9564	CLEAR1S	F330W	IMAGE	4	63895
5405	j8em35yoq	2002-09-14	11:35:13	1.5	9564	CLEAR1S	F330W	IMAGE	4	70620
5517	j8em40v8q	2002-10-06	20:15:35	1.5	9564	CLEAR1S	F330W	IMAGE	4	79189
5578	j8kf05eoq	2002-12-16	12:26:53	2.0	9658	CLEAR1S	F330W	IMAGE	4	16350
5610	j8kf18sgq	2002-12-29	08:10:12	2.0	9658	CLEAR1S	F330W	IMAGE	4	79916
5664	j8kf31rvq	2003-02-18	11:16:57	2.0	9658	CLEAR1S	F330W	IMAGE	4	99785
4536	j8em15lgq	2002-08-06	02:00:43	10.0	9564	CLEAR1S	F344N	IMAGE	4	47974
4545	j8em20gwq	2002-08-05	08:22:42	10.0	9564	CLEAR1S	F344N	IMAGE	4	38968
5381	j8em25vrq	2002-09-07	09:26:35	10.0	9564	CLEAR1S	F344N	IMAGE	4	63406
5395	j8em30y0q	2002-09-14	10:00:20	10.0	9564	CLEAR1S	F344N	IMAGE	4	50453
5406	j8em35ypq	2002-09-14	11:36:29	10.0	9564	CLEAR1S	F344N	IMAGE	4	60018
5518	j8em40v9q	2002-10-06	20:16:51	10.0	9564	CLEAR1S	F344N	IMAGE	4	66707
5609	j8kf18sfq	2002-12-29	08:08:37	20.0	9658	CLEAR1S	F344N	IMAGE	4	102992
5663	j8kf31ruq	2003-02-18	11:15:22	20.0	9658	CLEAR1S	F344N	IMAGE	4	119252
5364	j8em22hmq	2002-09-16	20:45:00	485.0	9564	POLUV	F220W	IMAGE	4	14256

ENTRY	ROOTNAME	DATE-OBS	TIME-OBS	EXPTIME	PROP	FILTER1	FILTER2	TYPE	GAIN	ELECTRONS
5365	j8em22hnq	2002-09-16	20:53:52	485.0	9564	POL0UV	F220W	IMAGE	4	14052
5366	j8em22hoq	2002-09-16	21:02:44	485.0	9564	POL0UV	F220W	IMAGE	4	14392
5384	j8em27f7q	2002-09-16	11:19:33	445.0	9564	POL0UV	F220W	IMAGE	4	22927
5385	j8em27f8q	2002-09-16	11:27:45	445.0	9564	POL0UV	F220W	IMAGE	4	13690
5386	j8em27f9q	2002-09-16	11:35:57	445.0	9564	POL0UV	F220W	IMAGE	4	12900
5435	j8em32qqq	2002-09-27	21:22:36	445.0	9564	POL0UV	F220W	IMAGE	4	17073
5436	j8em32qrq	2002-09-27	21:30:48	445.0	9564	POL0UV	F220W	IMAGE	4	11529
5437	j8em32qsq	2002-09-27	21:39:00	445.0	9564	POL0UV	F220W	IMAGE	4	12739
5504	j8em37skq	2002-10-02	10:26:16	445.0	9564	POL0UV	F220W	IMAGE	4	14128
5505	j8em37slq	2002-10-02	10:34:28	445.0	9564	POL0UV	F220W	IMAGE	4	10668
5565	j8kf01d7q	2002-12-13	17:20:23	385.0	9658	POL0UV	F220W	IMAGE	4	11065
5566	j8kf01d8q	2002-12-13	17:27:35	385.0	9658	POL0UV	F220W	IMAGE	4	11321
5653	j8kf14p6q	2003-02-15	17:13:31	385.0	9658	POL0UV	F220W	IMAGE	4	13375
5738	j8kf27g8q	2003-03-10	19:18:11	385.0	9658	POL0UV	F220W	IMAGE	4	13454
2251	j8em05fzq	2002-06-03	08:12:54	190.0	9564	POL0UV	F250W	IMAGE	2	80508
2273	j8em10h1q	2002-06-03	09:49:03	190.0	9564	POL0UV	F250W	IMAGE	2	82390
4528	j8em15l8q	2002-08-06	01:38:47	190.0	9564	POL0UV	F250W	IMAGE	4	93542
4537	j8em20fqq	2002-08-05	08:00:46	190.0	9564	POL0UV	F250W	IMAGE	4	98822
5398	j8em35yhq	2002-09-14	11:14:33	190.0	9564	POL0UV	F250W	IMAGE	4	131560
5510	j8em40v1q	2002-10-06	19:54:55	190.0	9564	POL0UV	F250W	IMAGE	4	127981
4529	j8em15l9q	2002-08-06	01:43:06	4.0	9564	POL0UV	F330W	IMAGE	4	60427
4538	j8em20frq	2002-08-05	08:05:05	4.0	9564	POL0UV	F330W	IMAGE	4	76069
5374	j8em25vkq	2002-09-07	09:08:58	4.0	9564	POL0UV	F330W	IMAGE	4	24239
5388	j8em30xtq	2002-09-14	09:42:43	4.0	9564	POL0UV	F330W	IMAGE	4	104776
5399	j8em35yiq	2002-09-14	11:18:52	4.0	9564	POL0UV	F330W	IMAGE	4	119898
5511	j8em40v2q	2002-10-06	19:59:13	4.0	9564	POL0UV	F330W	IMAGE	4	57910
5580	j8kf05eqq	2002-12-16	12:29:39	5.5	9658	POL0UV	F330W	IMAGE	4	55287
5612	j8kf18siq	2002-12-29	08:12:58	5.5	9658	POL0UV	F330W	IMAGE	4	87128
5666	j8kf31rxq	2003-02-18	11:19:43	5.5	9658	POL0UV	F330W	IMAGE	4	77278
5352	j8em14v7q	2002-09-01	12:09:08	485.0	9564	POL120UV	F220W	IMAGE	4	11007
5353	j8em14v8q	2002-09-01	12:18:00	485.0	9564	POL120UV	F220W	IMAGE	4	12054
5354	j8em14v9q	2002-09-01	12:26:52	485.0	9564	POL120UV	F220W	IMAGE	4	21321
5370	j8em24eiq	2002-09-16	09:43:24	445.0	9564	POL120UV	F220W	IMAGE	4	14566
5371	j8em24ejq	2002-09-16	09:51:36	445.0	9564	POL120UV	F220W	IMAGE	4	18099

ENTRY	ROOTNAME	DATE-OBS	TIME-OBS	EXPTIME	PROP	FILTER1	FILTER2	TYPE	GAIN	ELECTRONS
5372	j8em24ekq	2002-09-16	09:59:48	445.0	9564	POL120UV	F220W	IMAGE	4	14236
5441	j8em34roq	2002-09-28	00:35:29	445.0	9564	POL120UV	F220W	IMAGE	4	14070
5442	j8em34rpq	2002-09-28	00:43:41	445.0	9564	POL120UV	F220W	IMAGE	4	13740
5445	j8em39gzq	2002-09-30	18:06:24	445.0	9564	POL120UV	F220W	IMAGE	4	11791
5446	j8em39h0q	2002-09-30	18:14:36	445.0	9564	POL120UV	F220W	IMAGE	4	17617
5503	j8em29t7q	2002-10-16	18:44:59	445.0	9564	POL120UV	F220W	IMAGE	4	17454
5570	j8kf03liq	2002-12-28	03:09:38	385.0	9658	POL120UV	F220W	IMAGE	4	10634
5571	j8kf03ljq	2002-12-28	03:16:54	385.0	9658	POL120UV	F220W	IMAGE	4	15077
5572	j8kf03lkq	2002-12-28	03:24:10	385.0	9658	POL120UV	F220W	IMAGE	4	18308
5655	j8kf16phq	2003-02-15	18:42:20	385.0	9658	POL120UV	F220W	IMAGE	4	10179
5656	j8kf16piq	2003-02-15	18:49:36	385.0	9658	POL120UV	F220W	IMAGE	4	24229
5742	j8kf29pkq	2003-03-12	11:30:00	385.0	9658	POL120UV	F220W	IMAGE	4	15261
5743	j8kf29plq	2003-03-12	11:37:16	385.0	9658	POL120UV	F220W	IMAGE	4	14881
2253	j8em05g1q	2002-06-03	08:22:12	190.0	9564	POL120UV	F250W	IMAGE	2	100260
2275	j8em10h3q	2002-06-03	09:58:21	190.0	9564	POL120UV	F250W	IMAGE	2	93513
4532	j8em15lcq	2002-08-06	01:51:07	190.0	9564	POL120UV	F250W	IMAGE	4	111931
4541	j8em20gsq	2002-08-05	08:13:06	190.0	9564	POL120UV	F250W	IMAGE	4	115683
5377	j8em25vnq	2002-09-07	09:16:59	190.0	9564	POL120UV	F250W	IMAGE	4	79881
5391	j8em30xwq	2002-09-14	09:50:44	190.0	9564	POL120UV	F250W	IMAGE	4	148198
5402	j8em35ylq	2002-09-14	11:26:53	190.0	9564	POL120UV	F250W	IMAGE	4	128859
5514	j8em40v5q	2002-10-06	20:07:15	190.0	9564	POL120UV	F250W	IMAGE	4	119911
4533	j8em15ldq	2002-08-06	01:55:26	4.0	9564	POL120UV	F330W	IMAGE	4	52131
4542	j8em20gtq	2002-08-05	08:17:25	4.0	9564	POL120UV	F330W	IMAGE	4	55763
5378	j8em25voq	2002-09-07	09:21:18	4.0	9564	POL120UV	F330W	IMAGE	4	56706
5392	j8em30xxq	2002-09-14	09:55:03	4.0	9564	POL120UV	F330W	IMAGE	4	61227
5403	j8em35ymq	2002-09-14	11:31:12	4.0	9564	POL120UV	F330W	IMAGE	4	93773
5515	j8em40v6q	2002-10-06	20:11:33	4.0	9564	POL120UV	F330W	IMAGE	4	69033
5582	j8kf05esq	2002-12-16	12:32:09	5.5	9658	POL120UV	F330W	IMAGE	4	48576
5614	j8kf18skq	2002-12-29	08:15:28	5.5	9658	POL120UV	F330W	IMAGE	4	90629
5668	j8kf31s0q	2003-02-18	11:22:13	5.5	9658	POL120UV	F330W	IMAGE	4	43141
2245	j8em03j2q	2002-06-03	13:01:18	530.0	9564	POL60UV	F220W	IMAGE	2	24853
2246	j8em03j3q	2002-06-03	13:10:55	530.0	9564	POL60UV	F220W	IMAGE	2	19281
2247	j8em03j4q	2002-06-03	13:20:32	530.0	9564	POL60UV	F220W	IMAGE	2	26218
5367	j8em23dlq	2002-09-16	08:07:13	445.0	9564	POL60UV	F220W	IMAGE	4	23468

ENTRY	ROOTNAME	DATE-OBS	TIME-OBS	EXPTIME	PROP	FILTER1	FILTER2	TYPE	GAIN	ELECTRONS
5368	j8em23dmq	2002-09-16	08:15:25	445.0	9564	POL60UV	F220W	IMAGE	4	17825
5369	j8em23dnq	2002-09-16	08:23:37	445.0	9564	POL60UV	F220W	IMAGE	4	12177
5438	j8em33r5q	2002-09-27	22:58:41	445.0	9564	POL60UV	F220W	IMAGE	4	14939
5439	j8em33r6q	2002-09-27	23:06:53	445.0	9564	POL60UV	F220W	IMAGE	4	13120
5440	j8em33r7q	2002-09-27	23:15:05	445.0	9564	POL60UV	F220W	IMAGE	4	11949
5498	j8em28f6q	2002-10-10	20:15:11	445.0	9564	POL60UV	F220W	IMAGE	4	23080
5499	j8em28f7q	2002-10-10	20:23:23	445.0	9564	POL60UV	F220W	IMAGE	4	13379
5507	j8em38uoq	2002-10-06	16:40:13	445.0	9564	POL60UV	F220W	IMAGE	4	13732
5508	j8em38upq	2002-10-06	16:48:25	445.0	9564	POL60UV	F220W	IMAGE	4	17519
5509	j8em38uqq	2002-10-06	16:56:37	445.0	9564	POL60UV	F220W	IMAGE	4	29453
5567	j8kf02i1q	2002-12-16	23:54:45	385.0	9658	POL60UV	F220W	IMAGE	4	17081
5568	j8kf02i2q	2002-12-17	00:02:01	385.0	9658	POL60UV	F220W	IMAGE	4	10450
5569	j8kf02i3q	2002-12-17	00:09:17	385.0	9658	POL60UV	F220W	IMAGE	4	13184
5739	j8kf28pdq	2003-03-12	09:53:58	385.0	9658	POL60UV	F220W	IMAGE	4	18766
5740	j8kf28peq	2003-03-12	10:01:14	385.0	9658	POL60UV	F220W	IMAGE	4	12839
2252	j8em05g0q	2002-06-03	08:17:33	190.0	9564	POL60UV	F250W	IMAGE	2	93115
2274	j8em10h2q	2002-06-03	09:53:42	190.0	9564	POL60UV	F250W	IMAGE	2	103482
4530	j8em15laq	2002-08-06	01:44:57	190.0	9564	POL60UV	F250W	IMAGE	4	111795
4539	j8em20ftq	2002-08-05	08:06:56	190.0	9564	POL60UV	F250W	IMAGE	4	107504
5375	j8em25vlq	2002-09-07	09:10:49	190.0	9564	POL60UV	F250W	IMAGE	4	38569
5400	j8em35yjq	2002-09-14	11:20:44	190.0	9564	POL60UV	F250W	IMAGE	4	123414
5512	j8em40v3q	2002-10-06	20:01:04	190.0	9564	POL60UV	F250W	IMAGE	4	128394
4531	j8em15lbq	2002-08-06	01:49:16	4.0	9564	POL60UV	F330W	IMAGE	4	90009
4540	j8em20fuq	2002-08-05	08:11:15	4.0	9564	POL60UV	F330W	IMAGE	4	88777
5376	j8em25vmq	2002-09-07	09:15:08	4.0	9564	POL60UV	F330W	IMAGE	4	53388
5390	j8em30xvq	2002-09-14	09:48:52	4.0	9564	POL60UV	F330W	IMAGE	4	83558
5401	j8em35ykq	2002-09-14	11:25:03	4.0	9564	POL60UV	F330W	IMAGE	4	53200
5513	j8em40v4q	2002-10-06	20:05:24	4.0	9564	POL60UV	F330W	IMAGE	4	63954
5581	j8kf05erq	2002-12-16	12:30:54	5.5	9658	POL60UV	F330W	IMAGE	4	59953
5613	j8kf18sjq	2002-12-29	08:14:13	5.5	9658	POL60UV	F330W	IMAGE	4	83349
5667	j8kf31rzq	2003-02-18	11:20:58	5.5	9658	POL60UV	F330W	IMAGE	4	33613