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Disclaimer

A SMALL DRIFT SCAN SURVEY FOR GALAXIES IN THE NORTHERN SKY[1)]

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ABSTRACT

CCD photometry has been obtained for 1054 galaxies to a limiting magnitude $r_W = 18.0$ in a narrow strip of the sky 12′ wide by 60° long. The data are being used to calibrate photographic photometry as part of a parallel redshift survey, but can also be used to study the projected distribution of galaxies on large angular scales free from systematic effects that are present in photographic surveys. Fluctuations in the number density of order 20% are seen on angular scales of 5° and apparently correlate with the distribution of Abell Clusters that lie within 2° of the strip.

1. INTRODUCTION

The Century Survey (Geller *et al.* 1991) is a project to measure redshifts for approximately 2000 galaxies in a strip 1° wide by 100° long to a limiting magnitude $R_K = 16.4$ (where R_K is on the Kron-Cousins system). The strip is centered at $\delta = 29.5°$ and extends from $8^h\ 30^m$ to $16^h\ 45^m$ (epoch 1950). The purpose is to study the large scale distribution of galaxies in a two-dimensional slice in a manner analogous to that of de Lapparent, Geller, and Huchra (1986) but to approximately twice the distance. Galaxies are selected by scanning the Palomar Sky Survey E plates. The survey is currently in progress.

A key problem with this and any other galaxy surveys derived from photographic plates is getting an accurate magnitude calibration. Typically one obtains CCD photometry of several galaxies per plate to establish a zero-point. Since the internal r.m.s. error of phographic galaxy photometry is of order 15%, a dozen or more galaxies are needed. Still more are needed if it is desired to calibrate sensitivity and vignetting variations across a plate or nonlinearities in the magnitude scale. The Century Survey spans 14 Palomar Sky Survey plates, so about 200 objects would be needed for a proper calibration. The most efficient way to obtain the requisite data is with a CCD operating in drift-scan (TDI) mode.

This paper reports the results of a small CCD drift scan survey that passes down the center of the Century Survey strip. The purpose of the survey is two-fold. One is to provide an accurate calibration of the Century Survey photographic data. The other is to examine the fluctuations in galaxy density on angular scales of tens of degrees. The portion of the survey presented here covers a region 12′ in width (or 1/5 the width of the complete Century Survey strip) by 60° long. It is complete to a limiting magnitude of approximately $r_W = 18$ (and extends 1/2 mag fainter). Ultimately the survey will cover the entire length of the Century Survey strip. Since the remaining portion will use a different telescope and detector combination, it is appropriate to present the results of the first part separately here.

Studies of just the angular distribution of galaxies (without redshifts) also provide information on the clustering properties of galaxies. Heretofore virtually all studies of the angular distribution of galaxies on large scales have been done photographically (*e.g.*, Groth and Peebles 1977; Collins *et al.* 1988; Maddox *et al.* 1990). The two-point angular correlation function has now been measured several times on angular scales between 0.1° and 10°. All studies are in agreement that on small scales the correlation function is a power law with slope of ≈ -0.7 and that the correlation function shows a break on larger scales, but the position of this break and the angular correlation function on scales greater than about 10° to 20° are poorly known. Studies of the large scale angular galaxy distribution require that one calibrate photographic plate zero-points consistently to an accuracy of a few percent. Ideally one would like have accurate independent calibrations of each plate, but more commonly such calibrations are done by using plate overlap regions to adjust the zero-points of adjacent plates to a common value. Consequently any measurements of the fluctuation in galaxy density on the scale of plate-to-plate separations are suspect. CCD drift-scan data provide an alternative way to study the angular distribution of galaxies in a way that avoids the problems of photographic material.

2. OBSERVATIONS

The observations were carried out on the night of May 23, 1990. A Ford Aerospace 2048 × 2048 front-side illuminated CCD was used on the 61 cm telescope of the Whipple Observatory, located on Mt. Hopkins, AZ. The CCD was operated with on-chip binning, giving an effective format of 1024 × 1024 pixels with a scale of 0.72″ per pixel. In drift scan mode, the CCD columns are aligned in the east-west direction. The telescope tracking is stopped, and the CCD is clocked at the sidereal rate in synchronism with a star image as it trails across the CCD. The

CCD is read out continuously, building up an image of a strip of the sky. At a declination of 29.5°, the effective integration time for each pixel on the sky was 57 seconds.

The telescope focal ratio is quite slow, $f/13$, so in order to get the highest signal/noise ratio possible, the observations were made through a wide "W" filter that transmits $4000-9000$Å. Observations of Thuan & Gunn (1976) standard stars were used to calibrate the data. Although the W filter matches no standard bandpass, the effective wavelength for objects that have the color of galaxies closely matches that of the Thuan & Gunn (1976) r filter, and all magnitudes will be reduced to that system. It should be recognized that the photometry is not true r band photometry, and to indicate that fact we will label all magnitudes as r_W This is not crucial, however, because the purpose of the survey is more to maintain uniformity across the sky than to reach a well-known, absolute zero-point. For reference $R_K \approx r - 0.4$.

Due to the need to refocus periodically, the strip was broken into several overlapping segments. A computer crash caused the loss of data in the range $15^h45^m < \alpha < 16^h17^m$. Thus the data actually cover two contiguous strips, $11^h50^m < \alpha < 15^h45^m$ and $16^h17^m < \alpha < 16^h45^m$, which have angular extents of 51.0° and 6.4° respectively.

To check the reliability of our data, repeat observations in both pointed and drift scan mode were obtained in 1991 May and 1992 February using a different CCD and a 1.2 m telescope (that has now replaced the 0.61 m telescope). The new drift scans overlap the old in the regions of 11^h45^m and 16^h20^m for a total of about 15^m. Pointed observations were made of several fields spaced uniformly along the extent of the strip.

For reference the survey passed over 6 NGC galaxies, the centers of 2 Abell clusters (A1495 and A1878), and several fields with known radio galaxies, BL Lac objects, QSO's, etc. for which fragmentary bits of data have been published.

3. DATA REDUCTION AND ANALYSIS

Initial data processing followed standard methods with a couple of variations. Bias frames were replaced with "drift dark" frames where the CCD is operated in drift scan mode with the shutter closed. Flatfields were generated by forming a median average of data frames. Frames were combined typically in groups of 15. The CCD had no bad columns. The only cosmetic corrections made to the data were for occassional rows dropped by the computer and for some frames with shifted rows caused by loss of readout synchronization.

Astrometry was accomplished by using stars with known positions from the Guide Star Catalog (Lasker *et al.* 1990). All stars in a single segment of frames were used to determine the scale factors in right ascension and declination. The rms residuals in the fits were 0.5″ in right ascension and 0.9″ in declination. The larger error in declination was caused by a charge transfer problem that will be discussed next. The residuals in right ascension were correlated with right ascension in a fashion that reflects the boundaries of the plates that were used to construct the Guide Star Catalog catalog. Because each segment of CCD images covered more than one plate typically, these systematic errors in the guide star catalog ought to be partially removed. To be conservative, we will assume that the rms errors in the standard star fits apply to the galaxy positions as well.

The analysis was complicated greatly by a charge transfer problem discovered only after the CCD was installed at the telescope. This problem caused star images to be smeared into cometary shapes reminiscent of comatic abberation. Furthermore, the amount of smearing increased linearly with column number across the CCD. Figure 1 shows isophotal plots of two stars from different column positions on the CCD, illustrating the nature of the problem. This problem affected both the photometry and the star/galaxy separation. Several steps were taken to ameliorate the damage.

In spite of the charge smearing, the photometric quality of the data was still preserved. This was checked in two ways. First, the galaxy NGC 4278 fell in the strip, and surface photometry was compared with published R-band photometry of Peletier *et al.* (1990). No significant differences were found over a surface brightness range $17 < \mu_r < 23$ mag arcsec^{-2}. Second, the pointed observations obtained in 1991 and 1992 were used to randomly check the photometry of stars in several fields spaced along the strip. No significant problems were found as a function of magnitude or position on the CCD at the level of 0.05 mag.

Because of the variable charge smearing, traditional star/galaxy separation routines could not be used. However, we found that the FWHM of star profiles taken in the east-west direction (perpendicular to the smearing) were nearly constant everywhere on the CCD (Fig. 2). Consequently, we classified stars and galaxies solely on the basis of single-cut profile widths. This procedure worked reasonably well, although it failed to identify edge-on galaxies oriented north-south. The critical width separating stars and galaxies was set high so that we erred in the direction of missing compact galaxies rather than including stars erroneously. This is necessary to avoid any artifacts in the galaxy counts due to variations in star density with Galactic latitude. We still found it necessary to visually inspect all frames and throw out objects erroneously classified as galaxies arising from close pairs of stars, smearing from saturated images of bright stars, and uncorrected artifacts in the data. We estimate that our star/galaxy separation is reliable to $r_W = 18.0$. We have actually classified galaxies to a limit $r_W = 18.5$ (and then cut the list at 18.0 after the fact), although we are certainly incomplete at the fainter limit. We were able to check the reliability of our classifications by comparing them with the images from 1991 that had a much higher quality. Brighter than our completeness limit $r_W = 18.0$, we identified 40 galaxies in the 1990 survey; the 1991 data showed only 1 to be in error, and additionally 1 compact galaxy was missed. Fainter than our completeness limit, we identified 24 galaxies. Again, only 1 was in error, but 9 were missed. Hence the 18.0 mag limit for completeness appears to be reasonable.

Another measure of incompleteness due to the charge smearing problem is to compare the galaxy counts in the lower and upper halves of the CCD. Indeed, among the galaxies brighter than 18.0 we find more galaxies in the lower than the upper half by the ratio 569/479. The difference of 90 galaxies is considerably larger than the rms difference of 33 that one would expect for Poisson fluctuations. However, following an analysis given in the Appendix, we find that the expected rms difference in counts between the two half-strips is actually dominated by large scale structure in the galaxy distribution and not Poisson fluctuations; the expected rms difference in counts is in fact 50. Hence this test is not conclusive in showing whether or not incompleteness is a problem. Again, repeat images of the survey with the 1.2 meter telescope show no pattern of missing galaxies anywhere.

Finally, we need to estimate the fraction of galaxies lost to overlapping stars and/or other galaxies. Ideally, we would add artificial galaxies randomly to real images and determine the detection efficiency, but given the need to deal with a variable point-spread function, this would be a laborious procedure. Instead, we simply smoothed each image and computed the fractional area that had an intensity 10% or more above the sky background. Excluding those frames with very bright stars, this area ranges from 1% to 2%, depending primarily on galactic latitude. We conservatively estimate that any galaxy with a center within 3 pixels of such bright pixels is likely to be missed. The total fractional area so excluded is found to range from 4% to 7%. Given the tentative nature of this calculation, the number densities derived below will not be corrected for this incompleteness. However, the variation in incompleteness across the survey is expected to be only a few percent and will turn out to be unimportant.

As a practical convenience the raw data were divided into square frames and then reduced frame-by-frame. A constant sky value was derived for each frame and used in computing object magnitudes. This procedure is not technically correct because the the sky intensity varies continuous throughout the strip. However, the frame-to-frame variations in sky intensity show that the variation within a single frame is negligible.

Object magnitudes were computed iteratively. Given a preliminary estimate of an object's magnitude, an aperture was chosen such that the mean surface inside is approximately 23.5 mag arcsec^{-2}. For all except the very lowest surface brightness galaxies, we estimate that this aperture will include at least 98% of the total galaxy light. The one exception to this choice of aperture was that the minimum aperture allowed was 7.2$''$ in radius. The uncertainties in galaxy magnitude due to statistical noise were 15% at $r_W = 18.5$ and less at brighter magnitudes. Charge smearing causes some light to be missed. This was rectified by applying aperture corrections measured from several bright stars at different positions on the CCD. In all cases the aperture size is sufficiently large that the galaxies are essentially point sources as far as the aperture corrections are concerned. The largest correction was 0.15

mag. Figure 3 shows the corrections as a function aperture size for two y positions that span the CCD.

Because the survey region was scanned in several short, overlapping strips, a number of objects in the overlap regions were observed twice. Figure 4 shows the magnitude difference for all objects observed twice as a function of magnitude. The magnitudes of bright objects are quite repeatable, while the error increases rapidly fainter than $r_W = 17$. However, even at $r_W = 18$, the rms error is still only 0.06 mag. This error refers only to the repeatability of magnitudes measured in fixed apertures; the galaxy magnitudes will be somewhat worse due to the need to adjust the aperture size as a function of magnitude as well. A comparison of the galaxy magnitudes with those from the 1991 data shows an rms difference of 0.12 mag. We consider this to be a more realistic estimate of the true error at the survey limit.

Although the night was photometric to the eye, small variations in atmospheric transparency could not be ruled out. Therefore, as a final check on the magnitude zero-point, four fields spaced evenly along the survey were reobserved in rapid succession during May 1991. Aside from a small zero-point difference between the 1990 and 1991 observations (likely due to a change in the filter being used), the peak deviation among the four fields was only 0.02 mag. Hence we feel confident that the magnitude zero point is indeed uniform along the entire length of the strip.

The final list of galaxies is given in Table I. We include only objects with total magnitudes brighter than 18.0. A colon after a magnitude indicates that it may be uncertain due to the presence of a second object in or near the aperture.

4. DISCUSSION

The total survey (to $r_W = 18.5$) contains 1495 galaxies, and at the completeness limit of $r_W = 18.0$, there are 1054 galaxies. In the 51° contiguous region these numbers are 1392 and 978 respectively. The total area covered by the survey is 11.5 deg^2. The mean density of galaxies at our completeness limit of $r_W = 18$ is 92 gal deg^{-2}; at $r_W = 18.5$, the measured density is 130 gal deg^{-2}, but this figure is certainly low because of incompleteness. The first density can be compare with other galaxy surveys: the Zwicky (1961) catalog has as mean density of 3; the Lick Survey (Shane & Wirtanen 1967) reaches to a density of 54; the Edinburgh/COSMOS survey (Collins *et al.* 1988) goes to 279 and 449 in two different areas; and the Oxford/APM survey (Maddox *et al.* 1990) goes to 465.

The data of de Lapparent *et al.* (1986) show that the Zwicky Catalog detects galaxy clusters to a characteristic redshift of about $z = 0.03$. Since our survey goes approximately 3 times deeper, we should be sensitive to clusters out to a redshift of $z \approx 0.1$.

With only 1054 galaxies in the complete survey and 978 in the largest contiguous strip, the two-point angular correlation function cannot be measured to very high accuracy. Still, in Fig. 5 we show the two-point correlation function for those galaxies that lie in the 51° contiguous portion of our strip. The function was computed using the method outlined by Peebles (1980): we count the number pairs of galaxies with a given separation and divide by the number of pairs that one would get for a perfectly random distribution. The latter number was determined by a series of Monte Carlo simulations. The error bars show in Fig. 5 measure the scatter in the determination of the correlation function as derived from the simulations. The simulations also allow us to estimate the effects of observational selection biases on the measured correlation function. In particular, we find that the suspected bottom/top asymmetry in finding galaxies on the CCD as discussed in §3 is quite negligible.

Also shown in Fig. 5 is the power-law portion of the correlation function derived by Groth and Peebles (1977) based on the Lick Survey and scaled to our depth. We find virtually the same slope (≈ 0.7) for scales $\theta < 1°$ albeit with lower amplitude. We are unable to measure the location of any break in the correlation function on larger scales as was claimed to exist by Groth and Peebles.

Probably the most interesting result of our survey is the variation in number density in the contiguous 51° strip across the sky. It is on these scales that photographic surveys are the most unsure. What problems we had with the data are not expected to correlate with right ascension, so the variations we measure should be real. Figure 6 shows the galaxy density binned by every 5.1° in right ascension. The mean number of galaxies per bin is 98. Two features can be gleaned from the figure: first, there is no large scale gradient in the galaxy density, and second, the bin-to-bin fluctuations are much larger than expected from Poisson statistics. The former is reassuring; the latter is not unexpected, and it reflects the fact that galaxy positions are correlated. In fact, the expected rms can be estimated using the angular two-point correlation function $w(\theta)$. In the Appendix we show that the variance in the number of galaxies in randomly placed bins is $\sigma^2 = N[1 + N\langle w \rangle]$, where N is the mean number of galaxies per bin, and $\langle w \rangle$ is the correlation function averaged over the interior of a bin. To determine the mean of w, use the Lick correlation function $w(\theta) = .0684/\theta^{0.73}$ (Groth & Peebles 1977) and scale to our depth by assuming that we reach a factor 1.19 greater in distance: this scaled function is $w(\theta) = .051/\theta^{0.73}$. We have calculated σ under two different assumptions: first, that the power-law correlation function is valid to very large angular scales, and second, that the power-law is cut off at a finite radius (2.5° for the Lick survey or 2.1° for our CCD survey). For the two cases, we predict that $\sigma = 31$ and 21 respectively. The observed rms is 20 galaxies per bin, with an uncertainty of 5 if the bins are uncorrelated. The accuracy is not quite sufficient to distinguish between the two cases (although being in the direction of favoring a cutoff), but the rms is over twice that predicted by Poisson statistics. We can also estimate the contribution of uncertainties in limiting magnitude and foreground dust extinction to the fluctuations. Fluctuations in the limiting magnitude are apparently 0.02 mag at most and hence can be ignored. Also, from the *IRAS* map of high-latitude cirrus (Boulanger and Perault 1988), we estimate that the peak extinction over the survey is less than $A_V = 0.14$ mag. This corresponds to a peak-to-peak fluctuation in number counts of about 17% or approximately 5% rms. Hence neither contribution should be making a significant contribution to the observed galaxy count rms fluctuations.

It is also of interest to match Fig. 6 to the distribution of Abell clusters near the Century Survey strip. The survey is expected to be able to detect Abell clusters reaching out to distance classes 4 or 5. Figure 6 overlays the galaxy counts with a plot of the number of Abell clusters with distance classes 1 to 5 that lie within 2° of the strip. A fair degree of correlation appears to be present. Using Spearman's rank-order correlation test (Press *et al.* 1986), we find that the two distributions are correlated at the 90% confidence level, suggestive although not overwhelming. In contrast, Fig. 7 makes the same comparison with D=6 clusters; here, no correlation is seen, indicating that these clusters are too distant to influence the survey counts.

The significance of the correlation in Fig. 6 is somewhat subtle: only 2 Abell clusters actually have centers that lie in the strip, and they contribute only 2 galaxies total. Hence what we are seeing are fluctuations due to an enhancement in the density of galaxies in the neighborhood of clusters rather than the individual clusters directly. The enhanced density in the zone $15^h < \alpha < 16^h$, for example, may be caused by the Coronal Borealis supercluster (Postman *et al.* 1988). Galaxy redshifts, once available, will undoubtedly reveal the clustering properties more clearly.

It is interesting to note that because the bin-to-bin fluctuations are dominated by large scale structure rather than Poisson statistics, we would not have measured the rms fluctuations any better if we had simply, say, doubled the width of the survey. Rather, to do better, we would have to survey an independent portion of the sky. In fact, with a dozen or so CCD drift scan swaths, we could extract virtually as much information on the very large scale angular correlation function as one could derive from a filled photographic survey.

Our results can also be compared with those of Picard (1991). Using photographic plates, Picard measured the galaxy density for two fields separated by about 128°. Each field was approximately 15° on a side, and the total area surveyed was 386 deg^2. His survey reached to a limiting magnitude $r = 19.0$ and recorded a density of 400 gal deg^{-2}. He found a difference of 30% in number density between the two fields. Our survey provides only ≈ 3 independent samples on the scale of 15°, but we estimate that the rms fluctuations on this scale are only of order 12% or so to our shallower limiting magnitude; these fluctuations should be reduced further by a factor 2 or so in the deeper survey of Picard. Consequently, we would expect to find a much smaller variation between the two fields than he actually does. However, since our survey spans only half the angular scale of his, we could easily miss a large scale gradient in the galaxy density on that scale. Further observations would settle the issue.

5. CONCLUSIONS

We have conducted a drift-scan CCD survey over a 60° swath of sky (51° contiguous) and found 1495 galaxies total to $r_W = 18.5$ (1054 to $r_W = 18.0$ in a complete sample) in an area of 11.5 deg^2. The data are being used to calibrate a larger photographic survey (to be presented in a future paper) but also form a deeper galaxy survey in their own right. The principal result is that fluctuations in galaxy counts on the scale of 5° and greater can be measured and may be correlated with fluctuations in the number density of Abell clusters.

The present CCD survey covers a little more than half the range in right ascension of the full Century Survey. Data have now been obtained for the remaining right ascension range using a new 1.2 meter telescope and a Ford CCD with much better performance. Those data also will be presented in a future paper.

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APPENDIX

Here we give a more detailed derivation of the bin-to-bin galaxy count fluctuation computation, following Peebles (1980). We assume that a bin has width W and length L with $W << L$. For simplicity, we will perform only a 1-dimensional calculation. We let $w(\theta)$ be the two-point correlation function and λ be the (constant) mean density of galaxies per unit angle along the bin.

Break the bin up into K cells such that there are 0 or 1 galaxies per cell. Let $\epsilon = L/K$ be the size of one such cel. Let n_i be the number of galaxies in cell i. Then n_i is a discrete random variable with a probability distribution function $P(n_i)$ given by $P(0) = 1 - \lambda\epsilon$ and $P(1) = \lambda\epsilon$. The first and second moments are given by $\langle n_i \rangle = \lambda\epsilon$ and $\langle n_i^2 \rangle = \lambda\epsilon$ respectively. Given 2 cells separated by θ_{12} with densities n_1 and n_2, the correlation function $w(\theta_{12}) = w(|\theta_1 - \theta_2|)$ is defined so that $\langle n_1 n_2 \rangle = \langle n_1 \rangle \langle n_2 \rangle [1 + w(\theta_{12})]$.

The total number of objects in a bin is

$$N = \sum n_i,$$

and the second moment is

$$N^2 = \sum n_i^2 + \sum_{i \neq j} n_i n_j.$$

Then

$$\begin{aligned} \langle N \rangle &= K\lambda\epsilon = \lambda L, \\ \langle N^2 \rangle &= K\lambda\epsilon + K^2\lambda^2\epsilon^2 \left[1 + \langle w \rangle\right] \\ &= \langle N \rangle + \langle N \rangle^2 \left[1 + \langle w \rangle\right] \end{aligned}$$

where

$$\langle w \rangle = \frac{1}{L^2}\int_0^L d\theta \int_0^L w(|\theta - \theta'|)d\theta'$$
$$= \frac{2}{L^2}\int_0^L d\theta \int_0^\theta w(\theta - \theta')d\theta'.$$

Let $\theta' = \theta \sin\phi$. Then

$$\langle w \rangle = \frac{2}{L^2}\int_0^L \theta d\theta \int_0^{\pi/2} w[\theta(1-\sin\phi)]\cos\phi d\phi.$$

The variance is

$$\sigma^2 = \langle N^2 \rangle - \langle N \rangle^2 = \langle N \rangle [1 + \langle N \rangle \langle w \rangle]. \qquad (A1)$$

We take

$$w(\theta) = \frac{A}{\theta^\alpha}, \qquad \theta < \theta_c$$
$$w(\theta) = 0, \qquad \theta > \theta_c$$

Then

$$\langle w \rangle = \frac{2A}{L^2}\int_0^{\theta_c} \frac{\theta d\theta}{\theta^\alpha}\int_0^{\frac{\pi}{2}} \frac{\cos\phi d\phi}{(1-\sin\phi)^\alpha} + \frac{2A}{L^2}\int_{\theta_c}^L \frac{\theta d\theta}{\theta^\alpha}\int_0^{\sin^{-1}(1-\theta_c/\theta)} \frac{\cos\phi d\phi}{(1-\sin\phi)^\alpha}$$
$$= \frac{A}{L^\alpha}\left[\frac{2}{(1-\alpha)(2-\alpha)}\right]\left[1-(2-\alpha)\left(\frac{\theta_c}{L}\right)^{1-\alpha}\left(1-\frac{\theta_c}{L}\right)\right]. \qquad (A2)$$

Equations (A1) and (A2) are the desired results. If $\theta_c > L$, we drop the factor inside the right set of brackets in Eq. (A2).

A parallel analysis can be done to compute the rms difference in counts between two parallel strips separated by a distance s. Omitting the details, we find that

$$\sigma^2 = \langle (N_1 - N_2)^2 \rangle = N[1 + N\langle w'_{12} \rangle] \qquad (A3)$$

where

$$\langle w'_{12} \rangle = \frac{A\alpha}{(1-\alpha)s^\alpha}\left(\frac{s}{L}\right). \qquad (A4)$$

Here, N_1 and N_2 are the counts in each strip, $N = N_1 + N_2$, s is the separation of the strips and L is their length.

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FIGURE CAPTIONS

Fig. 1.–Isophotal contour plot of 2 star images, illustrating the variable amount of charge smearing. Column number increases vertically. The units are pixels (0.72″). The upper star was actually located around column number 800 on the CCD and has been shifted down for the figure.

Fig. 2.–Full width at half maximum (FWHM, in pixels) for bright objects as a function of column number. The FWHM is measured from east-west cuts that are perpendicular to the direction of the charge smearing. Note that in spite of the smearing, the width is nearly independent of column number. The line separating stars from galaxies is shown. All objects with widths greating than this were further inspected visually to eliminate double stars and other artifacts.

Fig. 3.–Correction to object magnitudes versus aperture radius for two y positions on the CCD.

Fig. 4.–Comparison of repeat magnitude measurements for stars and galaxies between two CCD frames.

Fig. 5.–Solid line: two-point angular correlation function for the complete sample of galaxies (to $r_W = 18.0$). Only galaxies in the contiguous 51° strip are used. The vertically-distributed points show the expected error in each bin used to com-

pute the correlation function. Dashed line: power-law portion of the correlation function given by Groth and Peebles (1977) scaled to the depth of the CCD survey.

Fig. 6.–Solid line: number galaxies in bins 11′ wide by 5.1° long as a function of right ascension. Dotted line: number of Abell clusters with distance class $D = 0 - 5$ that lie within ±2° of declination from the galaxy strip.

Fig. 7.–Same as Fig. 6 except that Abell clusters $D = 6$ are shown instead.

Table 1

Galaxy Catalog

ID	*R.A.*$_{(1950)}$	*Decl.*$_{(1950)}$	*Mag.*	*Rad.* (")	*ID*	*R.A.*$_{(1950)}$	*Decl.*$_{(1950)}$	*Mag.*	*Rad.* (")
1	11 48 30.13	29 33 57.6	16.56	15.4	46	12 0 39.43	29 32 53.9	17.50	9.2
2	11 48 36.12	29 36 52.8	17.77	8.8	47	12 0 46.42	29 31 3.7	16.38	16.6
3	11 48 36.73	29 39 2.1	17.78	8.8	48	12 0 46.93	29 41 38.0	16.02	18.2
4	11 48 42.78	29 40 56.1	17.47	5.8	49	12 0 55.59	29 32 3.6	17.78:	8.4
5	11 48 56.67	29 31 24.2	16.41	16.4	50	12 1 18.96	29 33 56.0	17.78	8.8
6	11 49 9.43	29 33 17.9	15.52	34.6	51	12 1 26.90	29 31 20.2	17.30	10.6
7	11 49 26.25	29 37 31.9	17.20	11.6	52	12 1 53.44	29 36 16.6	17.88	8.4
8	11 49 54.18	29 36 34.5	16.77:	13.2	53	12 1 55.77	29 36 33.4	17.37	10.4
9	11 50 8.06	29 35 40.5	17.03	12.4	54	12 2 6.76	29 34 11.1	17.94	8.0
10	11 50 12.28	29 36 25.0	13.44	63.4	55	12 2 8.87	29 33 20.9	17.22	11.2
11	11 50 13.76	29 37 2.5	17.29	5.8	56	12 2 31.41	29 31 14.6	17.94	8.0
12	11 50 32.82	29 36 14.3	17.81	8.6	57	12 3 46.59	29 33 32.5	17.24	11.2
13	11 51 8.91	29 31 46.7	15.45	28.8	58	12 3 50.92	29 32 5.3	17.72	8.6
14	11 51 38.62	29 32 42.0	17.82:	7.8	59	12 4 1.47	29 31 40.9	17.88	8.0
15	11 52 0.99	29 32 4.3	16.87	13.4	60	12 4 6.24	29 39 54.5	17.71	8.8
16	11 52 21.08	29 37 13.0	16.29	17.8	61	12 4 8.91	29 40 44.9	17.70	9.0
17	11 52 40.52	29 32 25.7	16.34	17.0	62	12 4 10.79	29 34 26.7	17.31	10.8
18	11 52 45.51	29 36 26.2	17.11	11.6	63	12 4 42.88	29 34 31.7	17.32	10.6
19	11 53 2.00	29 37 44.2	15.85	20.8	64	12 4 52.15	29 31 50.3	17.38:	9.8
20	11 53 4.62	29 29 46.7	17.41	10.2	65	12 5 9.20	29 30 44.2	17.54	9.6
21	11 53 11.44	29 33 0.1	16.90	13.0	66	12 5 14.03	29 30 15.1	17.55	9.2
22	11 54 6.13	29 37 41.1	16.49	16.2	67	12 5 15.75	29 32 1.4	16.95:	13.0
23	11 54 47.77	29 38 9.2	17.42	10.4	68	12 5 32.35	29 37 47.9	17.41	10.6
24	11 54 55.32	29 39 48.5	17.34	10.8	69	12 6 14.88	29 34 56.6	13.15	59.2
25	11 55 0.37	29 36 40.8	17.92	8.0	70	12 6 16.77	29 38 9.3	17.11	12.0
26	11 55 1.09	29 37 12.1	17.98	8.0	71	12 6 18.55	29 39 31.7	14.98	34.6
27	11 55 1.48	29 30 47.9	16.34	16.8	72	12 6 28.43	29 36 12.8	16.55:	14.2
28	11 56 35.86	29 41 7.3	17.43	10.6	73	12 6 29.04	29 31 38.3	13.88	37.4
29	11 56 53.08	29 40 20.2	17.99	8.0	74	12 6 29.32	29 36 19.0	17.65:	9.0
30	11 57 36.22	29 30 14.1	17.33	10.6	75	12 6 35.31	29 37 58.7	17.84	8.4
31	11 57 43.10	29 34 18.7	17.16	11.6	76	12 6 35.59	29 35 35.1	17.97	7.8
32	11 57 58.70	29 32 2.4	17.66	9.0	77	12 6 37.25	29 33 0.2	15.91	33.2
33	11 58 1.14	29 39 47.5	17.44	10.0	78	12 6 44.53	29 32 24.8	17.53	9.6
34	11 58 24.35	29 33 57.8	17.46	10.0	79	12 6 54.64	29 40 7.3	17.66	9.0
35	11 58 28.90	29 37 33.2	16.81	14.0	80	12 6 54.75	29 40 59.9	17.86	8.4
36	11 58 34.84	29 37 17.4	17.50	10.0	81	12 7 2.35	29 36 47.4	17.36	10.4
37	11 58 35.29	29 37 37.1	17.70	9.0	82	12 7 10.24	29 39 49.6	16.16	18.2
38	11 58 36.29	29 33 58.5	16.33	17.2	83	12 7 12.35	29 39 6.4	17.68	9.2
39	11 58 38.29	29 39 45.5	17.92	8.2	84	12 7 24.11	29 34 45.1	15.87	20.6
40	11 58 54.39	29 30 11.3	17.64	9.0	85	12 7 29.17	29 38 32.1	17.61	9.2
41	11 59 12.65	29 39 38.1	17.76	8.4	86	12 7 31.17	29 40 56.2	16.79	13.2
42	11 59 27.14	29 36 54.0	17.75	5.8	87	12 7 41.10	29 33 45.0	17.55	9.6
43	11 59 51.13	29 39 15.8	16.51	14.6	88	12 8 18.47	29 33 29.2	17.58:	9.6
44	11 59 58.62	29 31 10.9	17.17	10.0	89	12 8 30.13	29 41 11.9	17.96	8.0
45	12 0 12.67	29 39 38.7	16.45	16.0	90	12 8 41.56	29 32 9.5	17.54	9.4

ID	*R.A.*(1950)	*Decl.*(1950)	*Mag.*	*Rad.* (")
91	12 8 42.73	29 39 19.4	17.26	5.8
92	12 8 43.68	29 39 2.8	16.99:	12.6
93	12 9 3.88	29 33 59.2	17.81	8.6
94	12 9 12.60	29 36 8.0	17.77	8.6
95	12 9 20.98	29 30 37.0	16.86	13.2
96	12 9 21.48	29 35 36.6	16.48	15.8
97	12 9 31.65	29 41 39.0	16.44	16.4
98	12 9 33.87	29 39 39.8	17.87	8.4
99	12 9 48.19	29 41 2.7	17.80	8.8
100	12 9 48.68	29 30 36.7	17.83	8.4
101	12 9 51.07	29 30 57.0	17.90	8.0
102	12 9 51.35	29 31 17.7	17.26	11.0
103	12 10 10.46	29 41 6.9	15.98	20.0
104	12 10 33.04	29 32 31.4	17.94	7.8
105	12 10 40.71	29 39 5.9	17.60	9.4
106	12 10 41.60	29 37 57.8	17.79	8.4
107	12 10 47.93	29 40 30.9	17.03	12.4
108	12 10 54.97	29 32 9.8	16.12:	15.6
109	12 10 56.58	29 31 59.0	15.97	21.6
110	12 10 59.14	29 32 25.0	17.94	7.8
111	12 11 1.52	29 32 40.5	16.61:	14.8
112	12 11 4.19	29 31 29.6	17.97	7.4
113	12 11 4.30	29 34 31.2	17.47	9.6
114	12 11 10.85	29 29 45.8	17.04	12.0
115	12 11 11.35	29 31 29.3	17.91	8.0
116	12 11 12.13	29 32 49.3	17.93	8.0
117	12 11 12.18	29 30 21.0	17.61	9.2
118	12 11 15.35	29 31 14.4	17.63	9.0
119	12 11 23.68	29 36 51.9	17.69	9.0
120	12 12 1.88	29 37 31.6	17.96	8.0
121	12 12 2.88	29 38 11.2	17.42	10.2
122	12 12 8.82	29 33 54.2	16.19	24.6
123	12 12 13.93	29 35 29.3	16.23	18.0
124	12 12 14.31	29 32 31.1	17.22	11.2
125	12 12 44.74	29 31 39.6	16.25	16.8
126	12 13 1.28	29 36 3.1	17.87	8.2
127	12 13 3.72	29 33 13.2	17.92	8.0
128	12 13 19.22	29 40 10.3	17.86	8.4
129	12 14 3.02	29 32 24.3	17.84	8.0
130	12 14 5.01	29 30 0.7	17.88	8.0
131	12 14 27.45	29 34 52.2	17.14	11.4
132	12 14 57.65	29 35 53.2	17.32	10.8
133	12 15 0.82	29 34 52.5	17.87	8.2
134	12 15 3.82	29 36 57.2	17.81	8.6
135	12 15 31.92	29 41 16.8	17.01	12.6
136	12 15 33.86	29 40 21.6	16.66	14.8
137	12 15 41.28	29 31 37.2	15.98:	19.2
138	12 15 42.84	29 34 15.3	17.71	8.6
139	12 15 44.17	29 30 6.7	17.58	5.8
140	12 15 46.67	29 31 57.2	17.51:	9.0
141	12 15 48.45	29 31 46.1	14.79	43.2
142	12 15 49.33	29 31 18.3	16.98	12.0
143	12 15 50.29	29 39 7.5	17.98	8.0
144	12 16 13.66	29 39 23.0	16.69:	13.2
145	12 16 30.27	29 30 53.9	17.77	8.6
146	12 16 32.33	29 37 43.3	16.62	15.2
147	12 17 7.95	29 31 51.5	17.60	21.6
148	12 17 13.57	29 29 33.0	17.54	9.6
149	12 17 20.37	29 41 6.8	17.89	8.4
150	12 17 36.24	29 33 29.0	10.21	129.8

ID	*R.A.*(1950)	*Decl.*(1950)	*Mag.*	*Rad.* (")
151	12 17 50.23	29 35 16.7	12.14	57.6
152	12 17 56.40	29 41 10.0	17.96	8.0
153	12 18 5.28	29 34 33.4	16.68	14.6
154	12 18 11.67	29 37 20.9	13.53	63.4
155	12 18 44.81	29 36 6.6	16.67	14.0
156	12 19 15.19	29 40 30.6	17.23	11.4
157	12 19 20.30	29 40 6.6	16.90	13.0
158	12 19 25.84	29 32 26.9	16.79	13.6
159	12 19 26.52	29 38 49.5	17.44	10.2
160	12 19 44.22	29 30 18.4	17.74	8.8
161	12 20 39.70	29 37 33.7	14.76	50.4
162	12 20 55.75	29 39 10.6	17.95	8.2
163	12 21 37.90	29 41 22.1	17.25	11.4
164	12 21 43.88	29 36 5.4	17.96	8.0
165	12 21 45.28	29 38 37.7	17.81	8.4
166	12 21 46.28	29 41 33.0	16.47	16.2
167	12 22 10.87	29 35 52.2	17.55	9.8
168	12 22 25.25	29 36 14.8	17.67:	5.8
169	12 24 59.17	29 36 17.9	17.98	8.0
170	12 25 0.38	29 30 21.6	16.63	14.2
171	12 25 37.08	29 34 5.3	17.98	7.8
172	12 25 45.81	29 37 41.7	17.06	10.6
173	12 25 47.86	29 36 29.7	17.79	8.6
174	12 25 57.81	29 40 11.8	17.17	11.8
175	12 27 11.49	29 38 42.3	17.86	8.4
176	12 27 19.32	29 37 32.0	17.36:	10.2
177	12 27 49.56	29 31 37.0	17.22	10.6
178	12 27 52.79	29 35 36.5	17.39	10.4
179	12 28 44.88	29 37 41.6	17.97	7.8
180	12 29 14.41	29 32 44.3	17.85	8.0
181	12 29 51.67	29 33 27.8	16.31	17.2
182	12 29 53.24	29 41 12.3	16.58	15.6
183	12 30 7.99	29 32 43.1	17.52	9.6
184	12 30 12.67	29 39 32.2	17.15:	11.8
185	12 30 15.11	29 39 23.7	14.96	27.4
186	12 30 19.67	29 39 58.0	17.11:	10.6
187	12 30 37.53	29 34 25.0	17.21	11.0
188	12 31 14.96	29 34 47.7	17.88	8.4
189	12 31 56.49	29 34 7.5	17.87	8.0
190	12 32 16.85	29 30 31.7	16.28	17.2
191	12 33 5.46	29 38 55.7	17.97	8.0
192	12 33 19.11	29 35 7.1	17.79	8.8
193	12 33 20.06	29 37 37.7	17.16	11.6
194	12 33 58.58	29 33 5.6	17.73	8.4
195	12 34 13.52	29 34 39.7	17.53	9.8
196	12 35 54.93	29 40 2.7	17.72	8.4
197	12 38 9.17	29 32 24.3	17.42	10.0
198	12 38 44.02	29 34 49.5	17.47	10.0
199	12 38 48.03	29 38 26.3	17.47	10.0
200	12 39 2.87	29 39 55.2	16.39	15.0
201	12 39 29.58	29 36 48.5	17.70	9.0
202	12 39 48.56	29 29 38.6	17.48	9.8
203	12 41 15.77	29 39 13.9	17.81	8.4
204	12 41 28.72	29 38 33.4	17.30	11.0
205	12 42 4.13	29 30 15.9	16.63	14.6
206	12 42 40.10	29 34 20.1	17.50	10.0
207	12 42 50.95	29 39 19.8	17.93	8.2
208	12 42 59.18	29 40 19.1	17.22	11.6
209	12 43 7.66	29 37 6.0	17.06	12.0
210	12 43 11.27	29 34 43.5	16.33	17.2

ID	*R.A.*$_{(1950)}$	*Decl.*$_{(1950)}$	*Mag.*	*Rad.* (")
211	12 43 16.61	29 36 14.6	16.46	16.2
212	12 43 23.56	29 37 52.0	17.95	8.0
213	12 43 44.96	29 39 48.4	17.98	8.0
214	12 43 48.18	29 41 2.0	17.99	8.0
215	12 44 20.13	29 39 40.0	16.56	15.0
216	12 44 45.76	29 30 54.6	17.58	9.4
217	12 45 1.52	29 39 32.2	17.60	9.6
218	12 45 10.51	29 36 35.1	17.48	10.0
219	12 45 41.87	29 30 36.0	17.27	10.8
220	12 46 4.38	29 31 49.5	16.85:	12.6
221	12 46 16.77	29 30 31.5	16.22:	16.2
222	12 46 57.96	29 35 35.3	17.04	11.2
223	12 47 13.13	29 35 59.5	15.83	21.4
224	12 47 18.93	29 40 35.7	17.84	8.4
225	12 47 30.50	29 30 48.6	17.60	9.2
226	12 48 10.60	29 40 23.4	17.84	8.4
227	12 48 30.51	29 33 11.6	16.37:	14.4
228	12 48 50.60	29 41 5.4	17.86	8.0
229	12 48 59.43	29 40 9.1	17.22	11.4
230	12 48 59.74	29 33 17.6	17.67	8.6
231	12 49 4.74	29 33 21.5	17.91	8.2
232	12 49 39.63	29 33 29.5	17.34	10.2
233	12 49 43.87	29 36 54.8	17.49	10.0
234	12 49 59.80	29 34 48.0	17.33	10.0
235	12 50 19.21	29 38 56.0	17.18	11.0
236	12 50 27.78	29 29 34.3	16.67	14.2
237	12 50 40.10	29 37 37.4	17.70	9.0
238	12 50 40.66	29 39 58.7	15.75	13.0
239	12 50 42.39	29 40 17.6	17.35	10.8
240	12 50 56.63	29 32 48.9	17.35	10.6
241	12 51 31.45	29 40 42.7	17.97	8.0
242	12 51 40.45	29 40 43.2	17.75	9.0
243	12 51 41.24	29 30 40.5	16.46	15.0
244	12 51 49.49	29 36 10.4	17.53	9.8
245	12 53 36.97	29 31 19.4	15.54	27.4
246	12 53 37.19	29 31 55.7	16.87	12.6
247	12 53 41.87	29 33 19.5	17.81	8.4
248	12 53 55.54	29 34 10.4	15.19	41.8
249	12 54 26.57	29 38 52.1	15.32	43.2
250	12 55 39.56	29 37 2.1	17.60	9.6
251	12 55 50.42	29 30 36.5	17.67	9.0
252	12 57 13.55	29 32 43.5	17.98	7.6
253	12 57 21.92	29 29 28.1	16.92	12.4
254	12 57 39.08	29 38 40.2	17.65	9.2
255	12 57 57.07	29 36 18.8	15.46	26.0
256	12 58 6.79	29 36 33.7	17.65	9.2
257	12 58 17.83	29 33 17.5	17.32	10.8
258	12 58 29.77	29 31 50.5	17.39	5.8
259	12 58 48.89	29 33 53.4	17.75	8.4
260	12 58 51.53	29 38 18.3	16.37:	16.2
261	12 58 53.36	29 38 22.3	17.72:	9.0
262	12 58 58.13	29 36 27.9	16.62	14.6
263	12 59 0.09	29 38 45.3	16.96:	14.4
264	12 59 0.62	29 34 36.4	13.58:	14.4
265	12 59 1.40	29 34 53.7	14.92:	10.0
266	12 59 15.74	29 36 17.9	16.49	12.2
267	12 59 17.70	29 38 58.7	16.78	13.2
268	12 59 31.34	29 34 16.3	17.24	10.8
269	12 59 32.01	29 35 26.1	15.63	27.4
270	12 59 40.38	29 31 16.9	13.78	40.4
271	12 59 46.17	29 34 18.3	17.68	8.8
272	12 59 53.28	29 32 44.9	17.05	12.0
273	13 0 49.12	29 34 11.1	17.42	13.0
274	13 0 50.73	29 34 8.3	17.88	8.2
275	13 1 13.79	29 33 59.2	17.28:	10.6
276	13 1 17.06	29 32 23.4	17.40	10.2
277	13 1 32.15	29 38 11.0	17.76	8.8
278	13 1 59.99	29 39 2.6	16.21:	17.2
279	13 2 15.55	29 29 21.8	16.31	16.4
280	13 2 26.99	29 29 46.7	17.32	10.6
281	13 3 2.02	29 33 47.9	14.36	40.4
282	13 3 15.16	29 29 46.1	17.52	9.6
283	13 3 15.31	29 36 59.7	17.44:	9.0
284	13 3 28.13	29 33 23.7	17.60	9.4
285	13 3 36.46	29 32 42.8	14.18	46.2
286	13 4 3.90	29 32 11.7	17.90	7.8
287	13 4 9.99	29 37 55.4	16.19	16.8
288	13 4 21.99	29 38 16.4	16.29	17.0
289	13 4 22.42	29 36 9.3	16.71	13.4
290	13 4 31.03	29 35 29.1	17.98	7.8
291	13 4 31.67	29 31 12.6	17.43	26.0
292	13 5 0.11	29 40 3.1	16.75	13.8
293	13 5 10.14	29 35 37.3	17.46	10.0
294	13 5 19.30	29 32 46.9	17.73	8.4
295	13 5 39.56	29 29 44.1	17.62	9.0
296	13 5 58.89	29 29 29.6	16.05:	16.8
297	13 6 5.06	29 40 18.4	15.00	20.2
298	13 6 11.21	29 36 45.5	17.74	8.2
299	13 6 12.22	29 29 4.6	17.30	10.6
300	13 6 33.95	29 29 59.7	17.68	14.4
301	13 6 50.12	29 40 25.1	17.73	8.8
302	13 6 53.50	29 37 59.0	14.84	31.8
303	13 7 3.18	29 40 3.5	17.26	11.0
304	13 7 11.80	29 33 25.2	16.71	7.4
305	13 7 18.00	29 29 9.4	16.51	0.4
306	13 8 14.95	29 29 45.4	17.97	7.6
307	13 9 55.48	29 34 36.1	17.76	8.6
308	13 9 59.28	29 37 29.7	16.93	12.8
309	13 10 1.68	29 39 36.0	17.70	9.2
310	13 10 11.92	29 33 43.0	17.47	9.8
311	13 10 27.70	29 34 3.2	17.78	8.4
312	13 11 17.55	29 35 56.0	17.19	0.4
313	13 11 30.10	29 34 37.7	16.44	16.0
314	13 11 39.58	29 40 15.1	15.43	31.8
315	13 12 15.88	29 34 51.4	16.15:	46.2
316	13 13 4.71	29 34 40.8	17.92	8.0
317	13 13 19.49	29 35 32.5	15.57	33.2
318	13 13 24.20	29 40 57.2	17.67	9.2
319	13 13 28.49	29 35 2.6	17.75	8.6
320	13 13 37.03	29 32 31.7	16.14:	18.2
321	13 13 42.41	29 30 54.2	17.39	10.0
322	13 13 42.46	29 38 40.2	16.80	13.6
323	13 13 49.63	29 31 16.3	17.99	7.4
324	13 14 51.58	29 31 13.1	17.32	10.6
325	13 15 12.41	29 30 54.4	17.13	11.6
326	13 15 23.27	29 34 18.5	17.80	8.6
327	13 16 28.14	29 39 19.4	16.56	15.4
328	13 16 31.03	29 39 48.7	17.99	8.0
329	13 16 32.32	29 33 46.8	17.95	8.0
330	13 16 33.62	29 36 36.4	17.59	9.2

ID	R.A.(1950)	Decl.(1950)	Mag.	Rad. (")
331	13 16 51.29	29 30 16.8	17.03	31.8
332	13 16 54.95	29 36 40.5	17.69	9.0
333	13 16 54.97	29 31 5.0	17.86	8.0
334	13 17 39.17	29 35 57.4	16.90:	12.6
335	13 17 47.22	29 34 54.2	17.86	8.2
336	13 18 12.41	29 38 31.9	16.70	13.6
337	13 18 24.62	29 28 55.4	17.83	8.0
338	13 18 28.96	29 30 25.1	17.09:	10.6
339	13 18 29.29	29 30 8.8	17.75:	8.2
340	13 18 33.40	29 37 30.5	16.55:	15.6
341	13 18 34.41	29 30 17.8	17.78	8.4
342	13 18 35.86	29 31 0.1	17.42	10.0
343	13 18 41.51	29 29 27.3	17.99	7.6
344	13 18 45.01	29 37 32.8	15.66	21.6
345	13 18 48.71	29 33 37.0	17.99	7.8
346	13 18 56.27	29 33 59.6	16.96	12.4
347	13 19 5.77	29 34 34.5	16.74	13.8
348	13 19 8.14	29 39 59.4	17.65	8.2
349	13 19 8.38	29 34 26.6	17.54:	9.0
350	13 19 8.55	29 34 20.4	17.37:	10.0
351	13 19 22.40	29 29 12.0	16.83:	12.6
352	13 19 37.69	29 31 36.3	17.66	8.8
353	13 19 43.63	29 31 8.4	17.02	12.2
354	13 19 59.56	29 29 7.3	17.65	8.4
355	13 20 20.06	29 36 10.4	16.60	15.0
356	13 20 23.59	29 40 11.8	16.52	15.6
357	13 20 42.51	29 38 5.3	16.47	15.8
358	13 20 42.52	29 38 4.2	16.43	16.0
359	13 21 15.80	29 32 23.1	17.92	7.8
360	13 21 17.25	29 32 48.5	17.99	7.8
361	13 22 16.50	29 36 38.5	15.97:	14.0
362	13 22 36.97	29 40 7.9	17.47:	10.0
363	13 22 53.74	29 40 25.3	15.68	20.2
364	13 23 14.63	29 31 45.1	17.25	11.0
365	13 23 28.41	29 39 42.1	17.55	9.8
366	13 23 47.97	29 33 50.6	17.61:	9.4
367	13 23 53.84	29 38 36.0	17.77	8.4
368	13 23 56.01	29 39 2.4	17.65:	9.4
369	13 23 58.91	29 40 21.4	17.97:	8.0
370	13 24 33.52	29 33 11.2	17.59	9.6
371	13 25 2.24	29 39 15.3	17.78	8.6
372	13 25 32.10	29 36 16.8	17.37	10.6
373	13 26 2.46	29 39 29.6	16.40	1.6
374	13 28 58.28	29 37 29.7	14.51	54.8
375	13 29 26.97	29 39 27.2	17.87	8.4
376	13 29 47.12	29 37 50.1	17.90	8.2
377	13 29 54.06	29 38 10.3	17.24	11.2
378	13 29 57.55	29 28 49.6	17.80	8.4
379	13 30 0.77	29 28 49.0	17.81	8.4
380	13 30 2.25	29 33 30.3	17.59	9.6
381	13 30 2.77	29 35 44.6	17.96	8.0
382	13 30 24.70	29 34 19.6	17.99	8.0
383	13 30 32.10	29 36 7.7	17.21	11.6
384	13 31 16.33	29 36 24.9	16.78:	13.2
385	13 31 55.24	29 32 32.7	16.97	12.8
386	13 32 20.46	29 32 29.7	17.83	8.4
387	13 32 32.73	29 31 57.2	17.60	9.2
388	13 32 39.38	29 36 5.9	17.71	9.0
389	13 32 45.06	29 31 3.7	17.36	10.6
390	13 33 0.54	29 35 55.4	15.79	21.6
391	13 33 2.82	29 35 55.8	16.68	14.6
392	13 33 6.22	29 36 56.3	17.19	10.2
393	13 33 6.66	29 37 1.6	17.56	8.4
394	13 33 14.10	29 30 16.4	17.53	9.6
395	13 33 40.96	29 33 12.4	16.16	18.8
396	13 33 42.41	29 40 12.4	17.54	9.2
397	13 33 52.95	29 38 53.7	15.95	18.2
398	13 34 11.29	29 39 58.4	15.44	34.6
399	13 34 30.63	29 40 34.0	17.97	8.0
400	13 34 30.76	29 36 33.0	17.69	9.0
401	13 34 34.10	29 30 54.6	17.65	9.2
402	13 34 45.68	29 40 20.9	17.02	12.4
403	13 34 59.12	29 39 12.1	16.85	13.6
404	13 35 26.45	29 39 16.8	17.95	8.0
405	13 35 29.85	29 34 13.5	17.67	9.0
406	13 35 30.03	29 28 51.7	17.83	8.4
407	13 35 31.36	29 35 3.0	17.70	9.0
408	13 35 34.47	29 35 17.3	16.05	19.0
409	13 35 35.98	29 36 33.0	17.98	8.0
410	13 35 50.67	29 39 21.9	17.01	12.6
411	13 36 5.37	29 36 22.7	17.26	10.8
412	13 36 6.78	29 39 3.2	17.55	9.8
413	13 36 48.90	29 34 13.0	16.85	13.6
414	13 37 2.26	29 30 21.0	15.82:	13.6
415	13 37 2.42	29 30 13.1	16.53	14.4
416	13 37 11.70	29 36 42.8	16.30	15.6
417	13 37 13.59	29 36 37.0	14.60	28.8
418	13 37 22.65	29 37 32.7	17.40	10.4
419	13 37 23.70	29 30 19.5	17.49	9.8
420	13 37 23.88	29 38 26.0	15.50	39.0
421	13 37 27.69	29 29 1.0	17.19	11.6
422	13 37 32.35	29 34 45.1	17.26	1.6
423	13 37 34.60	29 37 49.3	16.56:	15.2
424	13 37 34.88	29 37 56.0	16.59:	15.2
425	13 37 36.48	29 30 25.5	17.72	8.8
426	13 37 37.59	29 36 41.5	15.75	23.0
427	13 37 41.25	29 36 17.5	17.57	9.6
428	13 37 52.66	29 32 11.4	17.67	9.0
429	13 37 58.44	29 39 29.5	17.73	9.0
430	13 38 3.27	29 32 26.7	17.75:	8.6
431	13 38 3.71	29 32 18.3	17.58:	34.6
432	13 38 6.22	29 38 44.0	17.36	10.6
433	13 38 15.89	29 32 45.1	17.78	8.6
434	13 38 24.45	29 40 4.3	15.85:	20.8
435	13 38 37.29	29 34 52.7	17.21	11.4
436	13 38 37.44	29 32 16.5	17.47	10.0
437	13 38 43.77	29 32 39.0	17.61	9.4
438	13 38 44.17	29 33 42.6	17.30:	10.8
439	13 38 44.78	29 39 52.1	17.81	8.4
440	13 38 45.68	29 34 47.0	17.18	11.6
441	13 38 46.88	29 31 54.0	17.98	7.6
442	13 38 49.82	29 31 37.4	16.93	12.6
443	13 38 55.16	29 38 49.5	16.22:	17.8
444	13 38 55.21	29 38 41.3	16.34:	14.0
445	13 39 20.70	29 31 0.2	17.25	14.4
446	13 40 7.36	29 36 53.8	16.97	12.6
447	13 40 19.11	29 34 31.9	15.57	23.0
448	13 40 24.61	29 34 33.2	17.97	8.0
449	13 40 32.34	29 35 1.9	16.60	14.8
450	13 40 38.95	29 34 35.5	17.95	8.2

ID	*R.A.*(1950)	*Decl.*(1950)	*Mag.*	*Rad.* (")
451	13 40 41.20	29 38 14.1	15.99	18.6
452	13 41 7.48	29 32 22.8	16.14	18.8
453	13 41 14.60	29 39 50.1	16.70:	12.4
454	13 41 14.88	29 40 2.4	16.84:	12.0
455	13 42 11.80	29 31 59.4	17.98	7.6
456	13 42 16.31	29 38 47.8	17.87	8.4
457	13 42 25.85	29 37 16.4	17.74	8.8
458	13 42 32.83	29 28 43.9	16.72:	14.0
459	13 43 24.79	29 30 40.8	17.85	8.2
460	13 43 26.11	29 30 12.4	15.91	20.6
461	13 43 49.44	29 35 35.3	17.83	8.2
462	13 44 5.98	29 33 53.8	17.15	11.2
463	13 44 21.47	29 32 44.4	16.83	12.8
464	13 44 25.56	29 36 53.8	14.97	34.6
465	13 44 33.15	29 28 44.3	17.67	8.6
466	13 44 45.76	29 34 22.2	17.91	8.2
467	13 44 47.75	29 40 7.0	17.35	10.2
468	13 45 19.89	29 30 38.0	17.46	9.8
469	13 45 43.88	29 35 59.0	17.89	8.2
470	13 46 2.76	29 35 13.3	17.95	8.0
471	13 46 10.35	29 33 25.3	17.72	9.0
472	13 46 36.77	29 36 59.4	16.67	14.8
473	13 46 59.22	29 37 16.5	17.65:	9.2
474	13 47 7.36	29 35 25.0	17.57:	9.2
475	13 47 7.67	29 32 46.2	16.72	14.2
476	13 47 35.19	29 34 40.7	17.87	8.4
477	13 47 50.95	29 39 7.6	16.32:	16.6
478	13 47 52.58	29 28 57.7	16.50	15.2
479	13 48 0.69	29 29 28.7	16.73:	13.6
480	13 48 9.32	29 31 4.8	17.33	10.6
481	13 48 11.76	29 31 21.0	16.41	16.0
482	13 48 15.69	29 29 47.5	17.21	11.0
483	13 48 18.15	29 37 9.5	14.46	40.4
484	13 48 19.60	29 32 9.9	16.94:	13.0
485	13 48 22.11	29 38 56.8	16.59	14.8
486	13 48 44.87	29 31 46.5	17.14	11.2
487	13 48 50.79	29 34 56.3	17.86	8.4
488	13 48 54.06	29 34 27.3	15.96	19.8
489	13 49 7.45	29 36 37.6	17.28	10.8
490	13 49 14.30	29 38 9.7	17.28	11.0
491	13 49 15.92	29 39 47.8	16.37:	15.6
492	13 49 17.09	29 39 47.3	17.20:	10.8
493	13 49 21.79	29 31 43.4	17.95	7.8
494	13 49 24.95	29 30 50.1	17.25	11.0
495	13 49 26.65	29 34 40.6	14.41	21.6
496	13 49 27.64	29 33 2.9	17.42	10.0
497	13 49 31.52	29 38 50.0	17.17	11.0
498	13 49 32.61	29 30 39.3	17.78	8.4
499	13 49 40.86	29 33 32.9	13.83:	21.6
500	13 50 4.23	29 37 45.8	17.91	8.2
501	13 50 11.40	29 31 44.8	17.67	8.8
502	13 50 12.56	29 31 7.3	17.68	9.0
503	13 50 13.34	29 31 39.2	16.86	13.4
504	13 50 17.61	29 36 30.8	17.97	5.8
505	13 50 19.93	29 34 54.3	17.68	9.2
506	13 50 31.97	29 39 31.7	17.60	9.4
507	13 50 44.13	29 38 49.3	17.03	12.4
508	13 50 53.89	29 37 0.9	17.39	10.4
509	13 50 56.12	29 38 21.4	17.85	8.4
510	13 51 10.89	29 31 20.9	17.18	11.0
511	13 51 23.94	29 37 42.1	17.74	9.0
512	13 51 25.90	29 39 4.0	17.80	8.6
513	13 51 56.31	29 35 10.4	17.19	11.6
514	13 52 50.81	29 33 20.0	17.86:	8.0
515	13 52 56.80	29 38 10.5	17.54	8.8
516	13 53 20.57	29 38 48.7	17.51	10.0
517	13 54 15.08	29 38 34.2	17.72	8.4
518	13 54 46.62	29 38 56.4	17.70	8.8
519	13 55 21.92	29 32 34.2	17.82	8.4
520	13 55 23.25	29 31 52.6	17.96	8.0
521	13 55 26.85	29 36 38.1	16.19:	17.4
522	13 56 20.99	29 37 52.5	16.52	15.4
523	13 56 21.13	29 35 51.8	17.79	8.0
524	13 56 28.99	29 32 57.0	16.13	18.8
525	13 56 33.65	29 33 9.0	17.70	9.0
526	13 56 58.32	29 28 59.0	17.32	10.6
527	13 57 3.66	29 30 2.3	15.85:	17.2
528	13 57 30.76	29 30 50.9	17.37	10.4
529	13 57 41.05	29 28 23.2	17.37	10.0
530	13 58 5.32	29 33 48.4	14.95	31.4
531	13 58 6.64	29 35 30.0	17.61	9.4
532	13 58 27.39	29 30 14.2	17.62	9.0
533	13 58 59.65	29 38 54.4	15.15	31.4
534	13 59 14.65	29 36 1.8	17.95	8.0
535	13 59 14.80	29 28 29.0	17.31:	10.4
536	13 59 27.51	29 35 0.7	17.76	9.0
537	13 59 33.65	29 38 48.5	17.15	11.6
538	14 0 1.96	29 34 20.6	17.48	9.4
539	14 0 15.57	29 36 32.8	15.14	23.0
540	14 0 21.32	29 29 13.5	17.65	9.0
541	14 0 35.43	29 36 41.1	16.82	13.0
542	14 0 53.70	29 33 21.8	17.42:	10.2
543	14 0 54.98	29 33 26.8	17.40:	10.0
544	14 1 1.03	29 28 24.0	17.13	11.2
545	14 1 12.32	29 31 0.4	17.60	9.2
546	14 1 29.28	29 35 4.5	15.32	34.6
547	14 1 30.62	29 36 4.3	15.25	30.2
548	14 1 33.72	29 35 24.5	16.69	14.4
549	14 1 36.85	29 37 29.3	16.73	14.2
550	14 1 49.19	29 34 38.3	15.71	27.4
551	14 1 54.42	29 31 23.5	17.51	9.6
552	14 2 38.60	29 32 59.4	17.03	11.6
553	14 2 58.75	29 39 20.8	15.01	34.6
554	14 3 1.08	29 39 45.7	15.04	18.8
555	14 3 2.98	29 35 25.5	15.74	23.0
556	14 3 15.74	29 35 40.2	17.27:	10.8
557	14 3 21.71	29 38 57.3	16.26	17.8
558	14 3 32.52	29 38 34.3	16.15	18.8
559	14 4 1.49	29 39 26.6	16.95	13.0
560	14 4 9.02	29 38 37.6	15.65:	26.0
561	14 4 9.24	29 38 28.2	15.61:	26.0
562	14 4 29.34	29 35 14.9	16.08:	19.0
563	14 4 29.56	29 29 50.8	17.60	8.8
564	14 4 45.40	29 32 1.9	17.73	8.6
565	14 5 7.74	29 31 6.2	17.94:	7.6
566	14 5 19.31	29 38 24.8	16.49:	15.4
567	14 5 22.23	29 31 26.2	16.61	14.6
568	14 5 30.03	29 29 59.3	16.74:	13.2
569	14 5 33.81	29 35 43.9	16.80	14.0
570	14 5 41.97	29 31 6.2	17.66:	8.8

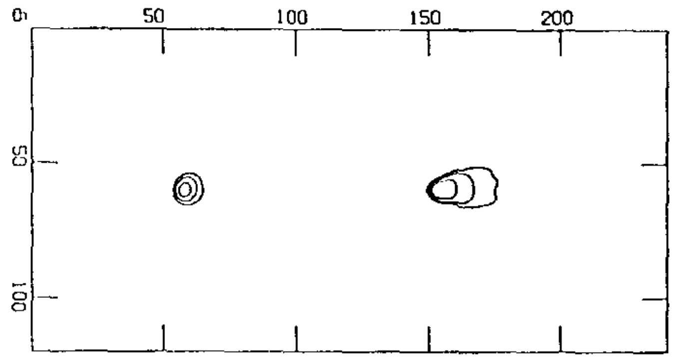
ID	R.A.$_{(1950)}$	Decl.$_{(1950)}$	Mag.	Rad. (")
571	14 6 1.03	29 29 15.9	17.66	8.8
572	14 6 56.07	29 34 53.5	17.86	8.4
573	14 7 14.89	29 31 47.0	17.75	8.8
574	14 7 17.91	29 28 56.1	17.79:	7.8
575	14 7 30.10	29 27 35.8	17.43	10.0
576	14 7 40.24	29 31 42.5	17.47	10.0
577	14 7 40.71	29 38 53.7	17.82	8.4
578	14 7 40.94	29 35 6.1	17.52	9.8
579	14 7 41.57	29 31 14.4	17.10	11.6
580	14 7 44.41	29 32 50.9	17.51	9.6
581	14 8 0.04	29 36 20.3	16.96	13.2
582	14 8 8.92	29 32 5.5	16.72	14.2
583	14 8 29.85	29 38 30.2	17.41	10.0
584	14 8 41.74	29 39 38.4	17.86	8.4
585	14 8 45.78	29 28 49.8	16.85:	12.8
586	14 8 47.56	29 29 20.3	17.41	9.6
587	14 8 47.56	29 34 44.9	17.10	11.8
588	14 8 53.24	29 36 23.1	17.21	11.6
589	14 8 57.00	29 30 34.7	15.03	37.4
590	14 9 2.67	29 32 1.2	17.38:	10.0
591	14 9 20.94	29 38 20.0	16.78	13.6
592	14 9 21.86	29 36 39.4	16.86	13.2
593	14 9 39.31	29 39 2.6	17.84	8.6
594	14 9 43.24	29 28 5.2	17.87	7.8
595	14 10 0.32	29 33 21.1	17.88	7.8
596	14 10 31.82	29 36 48.5	17.43	10.4
597	14 10 38.99	29 28 16.2	17.29	10.4
598	14 11 14.00	29 29 5.2	17.36	11.6
599	14 11 14.07	29 30 36.6	16.39	16.8
600	14 11 31.00	29 36 28.7	17.16	11.6
601	14 11 37.17	29 37 20.2	16.32	16.6
602	14 11 40.70	29 35 32.6	17.92	8.2
603	14 12 14.58	29 35 1.0	17.39	10.4
604	14 13 12.24	29 37 2.9	16.16	18.2
605	14 13 13.37	29 34 25.5	17.88	8.2
606	14 13 20.53	29 34 28.9	17.72	9.0
607	14 13 21.69	29 34 11.9	17.31	10.6
608	14 13 22.25	29 34 41.9	17.93	8.2
609	14 13 24.08	29 34 5.4	16.14	18.2
610	14 13 36.07	29 30 42.2	17.17	11.4
611	14 13 39.17	29 39 18.3	17.25	11.2
612	14 13 45.36	29 37 31.2	16.82	14.0
613	14 13 51.42	29 39 9.7	15.94:	19.2
614	14 13 57.19	29 34 4.0	17.59	9.6
615	14 14 14.07	29 35 51.1	17.89	8.4
616	14 14 32.55	29 31 20.6	17.61	9.4
617	14 14 39.65	29 36 39.9	17.02	12.6
618	14 14 42.63	29 30 0.5	15.60	30.2
619	14 14 42.81	29 31 11.6	17.29	11.0
620	14 14 45.49	29 37 31.7	17.26	11.0
621	14 15 3.27	29 30 17.8	17.59	9.0
622	14 15 21.62	29 34 28.8	17.40	10.4
623	14 15 21.96	29 35 21.3	17.88	8.0
624	14 15 41.78	29 27 27.0	15.33	26.0
625	14 15 58.05	29 37 54.3	17.22	11.6
626	14 16 42.60	29 29 37.7	17.56	8.4
627	14 16 47.29	29 32 0.3	16.95	13.0
628	14 16 53.17	29 32 14.1	16.12	18.4
629	14 17 24.86	29 38 14.4	17.32	11.0
630	14 17 46.58	29 35 43.7	17.42	10.4
631	14 17 52.10	29 33 49.2	17.53:	9.8
632	14 20 37.76	29 31 52.1	17.79	8.4
633	14 20 38.17	29 38 39.5	17.36	10.6
634	14 20 40.58	29 35 37.8	16.41	16.2
635	14 21 35.80	29 33 21.2	17.83	8.4
636	14 21 43.61	29 27 57.0	16.20	17.2
637	14 21 52.89	29 34 7.7	16.28	17.2
638	14 22 27.29	29 30 5.2	16.33	17.0
639	14 22 39.60	29 34 13.7	15.37	31.8
640	14 22 45.19	29 38 14.9	17.39	10.4
641	14 22 48.21	29 30 59.7	17.67:	9.0
642	14 22 48.52	29 34 4.6	17.19	11.6
643	14 22 48.54	29 30 31.1	15.22	26.0
644	14 22 53.71	29 36 5.1	17.29	11.0
645	14 23 2.09	29 31 54.4	16.69	14.4
646	14 23 3.80	29 36 0.9	15.64	24.6
647	14 23 23.32	29 35 25.8	17.66	9.2
648	14 23 30.23	29 33 51.1	17.18:	11.0
649	14 25 8.10	29 35 36.9	17.06	12.2
650	14 25 15.31	29 27 17.0	17.30	10.4
651	14 25 17.78	29 38 15.8	16.60:	14.6
652	14 25 28.64	29 37 2.9	17.53	10.0
653	14 25 35.84	29 36 34.5	17.12	12.0
654	14 25 49.29	29 38 50.5	16.18:	18.4
655	14 26 6.80	29 32 21.2	17.47:	10.0
656	14 26 8.12	29 32 2.3	15.58	26.0
657	14 26 9.38	29 34 53.4	15.67:	19.6
658	14 26 55.82	29 27 25.0	16.67	14.0
659	14 27 42.71	29 33 23.4	17.73	8.6
660	14 27 48.51	29 31 17.0	15.98	19.6
661	14 28 43.61	29 37 34.7	17.98	8.0
662	14 28 43.64	29 37 36.4	17.76	8.8
663	14 28 46.17	29 34 3.0	17.79	8.4
664	14 28 50.58	29 28 44.3	17.94	7.6
665	14 29 26.09	29 30 41.5	17.31	10.6
666	14 29 43.91	29 36 26.9	16.46	16.6
667	14 29 53.31	29 29 24.2	17.90	8.0
668	14 30 51.32	29 33 59.9	17.78	8.8
669	14 31 6.65	29 27 1.0	16.41	16.2
670	14 31 28.39	29 36 2.4	17.50	10.0
671	14 31 36.65	29 27 5.4	17.75	8.4
672	14 31 46.18	29 38 54.6	16.84	13.6
673	14 31 59.62	29 35 56.9	15.79:	19.2
674	14 32 6.60	29 26 49.8	16.23	17.6
675	14 32 11.95	29 33 13.8	17.09	12.0
676	14 32 24.26	29 37 47.1	15.03	34.6
677	14 32 49.99	29 33 29.7	17.82	8.0
678	14 32 59.25	29 28 46.8	17.13	11.6
679	14 33 8.63	29 33 12.6	17.86	8.2
680	14 35 3.27	29 29 36.0	16.24:	17.2
681	14 35 4.37	29 29 11.4	17.08:	11.6
682	14 35 21.14	29 34 57.5	16.37:	16.2
683	14 35 22.25	29 35 27.1	16.43:	15.6
684	14 35 43.22	29 35 44.7	16.01:	17.4
685	14 35 44.61	29 35 46.8	15.65:	19.8
686	14 36 33.66	29 29 24.7	17.98	7.6
687	14 36 44.65	29 34 13.7	17.78	9.0
688	14 37 11.69	29 36 52.6	16.75:	14.2
689	14 37 12.79	29 32 22.7	17.33	10.2
690	14 37 40.61	29 34 41.4	17.65	9.0

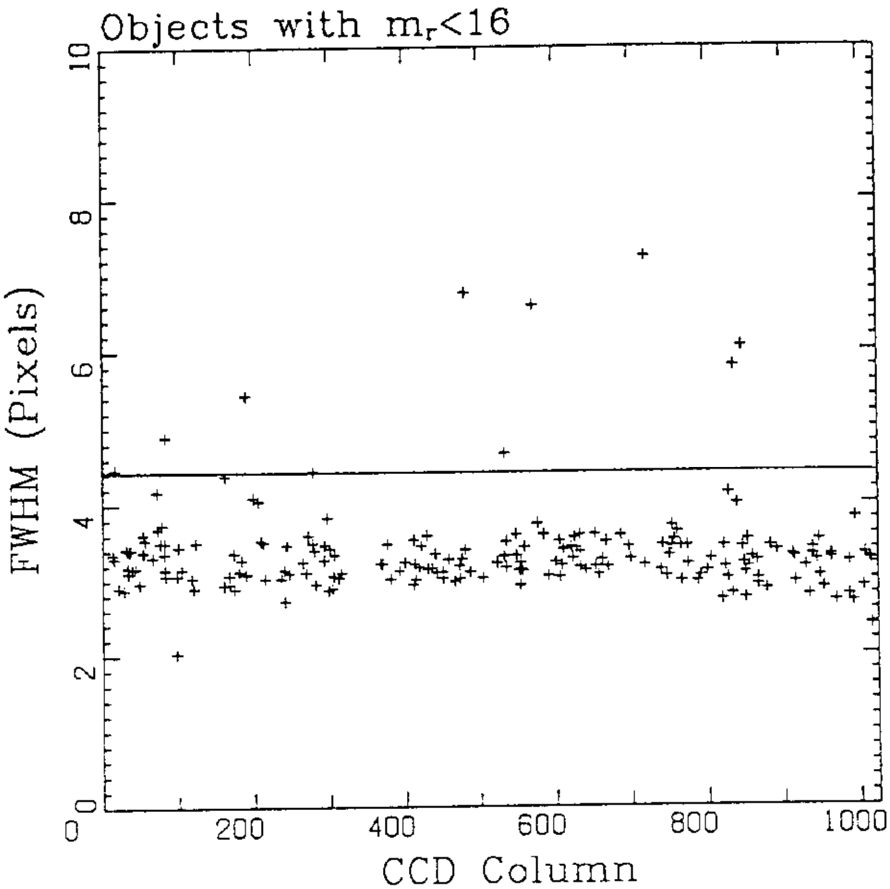
ID	*R.A.*(1950)	*Decl.*(1950)	*Mag.*	*Rad.* (")
691	14 37 48.06	29 36 34.0	17.02	12.4
692	14 37 52.30	29 29 58.2	17.75	8.4
693	14 38 2.83	29 33 10.6	16.89	13.2
694	14 38 4.14	29 32 5.7	17.65	9.2
695	14 38 29.39	29 37 28.5	15.75	37.4
696	14 38 59.99	29 32 37.8	17.22	11.2
697	14 39 11.66	29 33 51.9	16.76	13.6
698	14 39 15.95	29 35 33.1	17.93	8.0
699	14 39 27.78	29 28 48.3	16.00	19.0
700	14 39 47.49	29 30 35.3	16.61	14.4
701	14 40 10.04	29 28 43.5	17.78	8.0
702	14 40 19.81	29 38 11.8	16.42:	15.6
703	14 40 30.45	29 33 27.8	15.45	24.6
704	14 40 38.04	29 36 56.7	17.89	8.4
705	14 41 47.22	29 30 49.5	17.64:	9.0
706	14 41 47.96	29 31 51.9	17.90:	7.8
707	14 41 48.63	29 31 56.9	17.29:	9.6
708	14 41 50.91	29 28 25.5	16.22:	15.8
709	14 41 56.73	29 32 32.0	17.93	7.8
710	14 42 23.71	29 34 54.5	17.53	9.8
711	14 42 49.21	29 29 57.5	17.57	9.4
712	14 42 53.29	29 32 22.3	16.02:	18.2
713	14 43 3.57	29 38 6.4	16.29	16.8
714	14 43 10.52	29 31 21.6	17.32	10.8
715	14 43 18.72	29 34 55.0	16.13	18.0
716	14 43 50.46	29 31 51.4	17.47	9.8
717	14 43 50.67	29 27 13.7	17.40	10.2
718	14 44 19.98	29 29 27.6	17.73	8.8
719	14 44 29.31	29 34 22.4	17.75	8.8
720	14 44 39.56	29 37 46.7	17.13	11.6
721	14 44 48.44	29 30 19.1	17.90:	8.0
722	14 44 58.40	29 32 50.5	17.03:	12.6
723	14 44 58.56	29 32 30.2	17.68:	9.0
724	14 45 21.07	29 35 40.6	17.73	9.0
725	14 45 46.08	29 31 51.5	16.43:	15.0
726	14 45 49.01	29 35 34.3	17.64	9.4
727	14 45 52.36	29 32 45.5	17.31	10.6
728	14 46 7.89	29 37 20.1	17.86	8.4
729	14 46 50.21	29 33 34.0	17.47:	9.8
730	14 46 59.41	29 29 38.0	17.45	10.0
731	14 47 28.67	29 32 6.7	17.86:	8.0
732	14 47 39.87	29 35 43.8	17.95	8.0
733	14 47 40.24	29 30 43.2	17.55	9.6
734	14 47 42.54	29 32 42.1	17.94	8.0
735	14 48 23.18	29 32 22.7	14.36	18.8
736	14 50 2.46	29 36 22.9	15.89	15.8
737	14 50 14.97	29 31 4.1	17.00:	12.4
738	14 51 15.56	29 36 35.8	17.97	8.0
739	14 51 27.47	29 36 17.6	17.59:	9.6
740	14 51 28.50	29 34 35.4	17.30	10.8
741	14 51 33.16	29 26 49.7	17.31:	10.6
742	14 51 54.30	29 28 57.6	16.69:	15.8
743	14 51 56.30	29 29 19.4	17.62	9.2
744	14 51 57.72	29 35 27.1	17.75	8.6
745	14 52 2.71	29 27 59.7	17.40	10.0
746	14 52 24.98	29 34 58.0	17.25:	11.2
747	14 52 34.99	29 33 28.4	17.84	8.4
748	14 52 38.25	29 33 9.1	17.41	10.4
749	14 53 20.39	29 34 56.1	17.71	9.0
750	14 53 33.62	29 37 35.0	16.39:	16.2
751	14 53 35.49	29 32 24.6	16.50	15.8
752	14 53 43.99	29 34 19.8	16.04:	18.0
753	14 53 51.85	29 33 15.4	17.82	8.4
754	14 53 58.21	29 32 32.3	17.94:	8.0
755	14 54 16.92	29 35 18.7	17.45	10.4
756	14 54 22.91	29 35 37.6	15.64	33.2
757	14 55 29.28	29 26 40.8	16.51	15.2
758	14 56 1.81	29 30 29.0	17.45	9.6
759	14 56 51.64	29 27 23.7	17.04	12.0
760	14 56 52.63	29 26 49.2	17.08:	10.2
761	14 57 2.69	29 32 46.0	17.90	8.2
762	14 57 4.31	29 33 55.5	17.68	8.8
763	14 57 8.61	29 32 13.4	17.97	8.0
764	14 57 16.07	29 26 59.3	17.09	12.0
765	14 57 29.64	29 26 43.4	16.90	12.6
766	14 57 41.40	29 27 33.4	17.26	10.8
767	14 57 45.88	29 30 43.4	17.26	10.8
768	14 58 25.36	29 36 28.8	16.63	15.2
769	14 58 37.81	29 34 48.6	17.08	12.0
770	14 58 37.95	29 36 38.7	17.32	11.0
771	14 58 41.02	29 31 0.4	17.83	8.2
772	14 58 43.18	29 34 32.8	17.69:	9.2
773	14 58 44.03	29 28 16.8	17.71	8.6
774	14 58 45.06	29 26 31.4	16.77	13.2
775	14 58 53.38	29 34 26.5	17.36:	10.6
776	15 0 20.97	29 29 32.5	17.99	7.4
777	15 1 40.82	29 29 32.7	15.44	31.8
778	15 1 52.53	29 34 44.3	17.96	8.0
779	15 1 55.52	29 34 20.1	17.41	9.8
780	15 1 56.32	29 28 29.3	17.54	8.8
781	15 2 8.69	29 26 1.6	17.48	9.6
782	15 2 11.73	29 32 42.1	17.76	8.6
783	15 2 14.03	29 26 58.8	16.75	13.4
784	15 2 22.99	29 33 47.2	17.55	9.8
785	15 2 23.74	29 27 53.6	17.72	8.4
786	15 2 39.25	29 31 37.5	16.56	15.2
787	15 2 42.62	29 30 48.9	16.39:	15.2
788	15 2 59.98	29 28 20.0	17.55	9.2
789	15 3 6.24	29 27 47.3	17.35	10.4
790	15 3 26.17	29 34 21.6	17.49	10.0
791	15 3 27.18	29 27 33.4	15.54	26.0
792	15 3 52.99	29 26 51.2	16.51:	15.6
793	15 4 4.33	29 36 52.2	15.89	18.2
794	15 4 11.01	29 34 47.8	17.30	10.4
795	15 4 31.04	29 29 30.3	16.73:	14.0
796	15 4 34.95	29 27 53.9	17.56	9.0
797	15 4 41.19	29 33 53.0	16.94	13.0
798	15 5 11.75	29 32 9.2	17.20	11.4
799	15 5 16.08	29 28 30.7	17.81	8.4
800	15 6 6.59	29 27 19.0	17.47	9.6
801	15 6 8.08	29 26 36.1	17.37	10.0
802	15 6 22.76	29 34 1.6	17.36	10.6
803	15 6 25.97	29 37 27.4	17.09	12.0
804	15 6 27.51	29 28 51.7	16.43	16.0
805	15 6 34.29	29 30 16.7	17.68	9.0
806	15 6 39.16	29 37 17.1	17.42	10.0
807	15 6 40.83	29 26 38.1	17.99	7.6
808	15 6 42.03	29 36 20.2	17.91	8.2
809	15 6 43.40	29 35 47.3	17.91	8.2
810	15 6 45.00	29 31 18.3	17.85	8.4

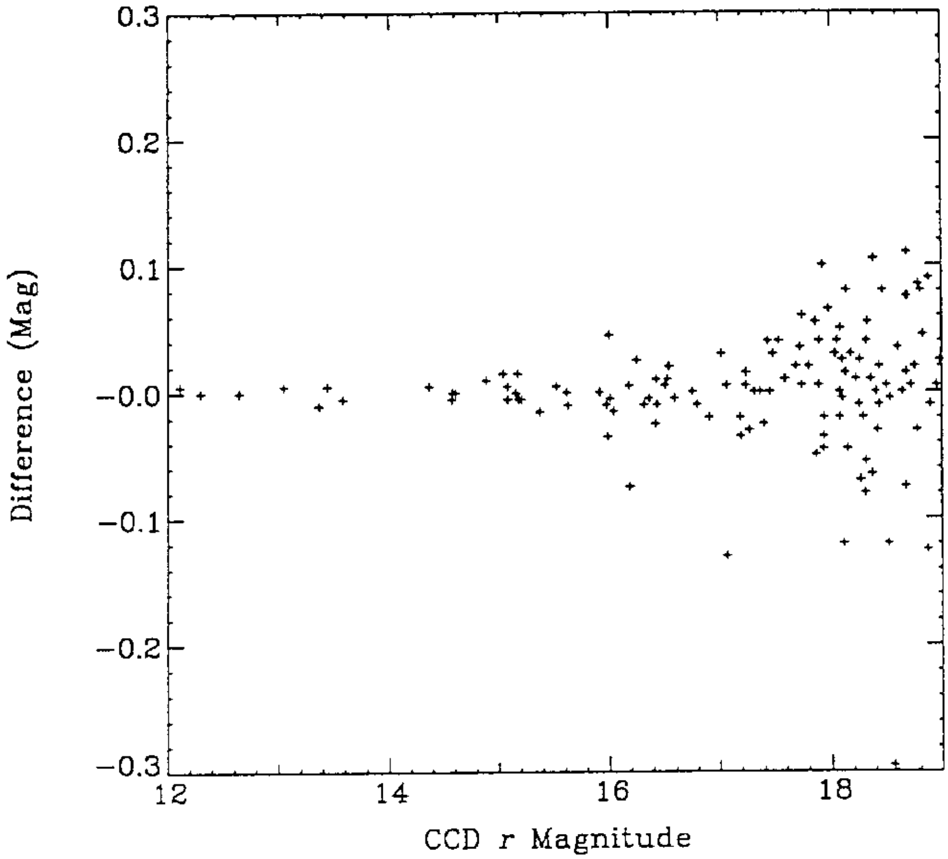
ID	R.A.(1950)	Decl.(1950)	Mag.	Rad. (")
811	15 7 1.30	29 28 16.5	17.85	8.0
812	15 7 8.28	29 33 41.5	17.21	11.2
813	15 7 12.10	29 36 50.7	17.42:	10.4
814	15 7 15.27	29 26 34.6	17.98	7.6
815	15 7 35.37	29 35 28.1	17.81	8.0
816	15 7 35.40	29 35 29.2	17.81	8.6
817	15 7 35.52	29 36 9.9	15.64	28.8
818	15 8 0.28	29 28 7.1	17.28	10.6
819	15 8 9.50	29 29 44.4	17.85	8.4
820	15 8 11.95	29 33 45.9	16.74	13.8
821	15 8 26.35	29 29 58.1	17.63	9.2
822	15 8 29.56	29 33 29.9	16.55	15.6
823	15 8 33.38	29 36 45.9	16.71	14.2
824	15 8 44.24	29 36 22.7	17.23	11.4
825	15 9 22.51	29 32 0.2	16.76	14.2
826	15 10 0.63	29 31 55.1	17.43	10.2
827	15 10 0.72	29 30 26.9	17.70	9.0
828	15 10 30.43	29 27 33.3	17.34	10.4
829	15 10 35.41	29 26 59.7	16.71	14.2
830	15 10 40.40	29 27 12.8	17.30	10.6
831	15 10 44.76	29 33 13.1	17.57	9.6
832	15 10 46.54	29 29 48.3	17.25	11.0
833	15 11 41.63	29 31 12.1	17.99	8.0
834	15 11 43.18	29 31 1.4	17.51	9.6
835	15 12 10.41	29 32 44.4	17.31	10.8
836	15 12 14.97	29 37 0.9	17.90	8.4
837	15 13 36.13	29 32 55.5	17.16	11.0
838	15 14 1.87	29 27 41.7	17.76	5.8
839	15 14 9.92	29 35 47.2	17.13	12.0
840	15 14 16.89	29 35 8.6	16.59	14.8
841	15 14 20.74	29 29 31.4	16.03:	20.4
842	15 14 36.36	29 29 2.1	16.19:	17.8
843	15 14 39.81	29 29 59.5	16.65	14.2
844	15 14 44.33	29 35 24.5	16.41:	16.6
845	15 14 46.77	29 36 3.2	17.13	5.8
846	15 14 46.89	29 36 13.3	15.41	26.0
847	15 14 48.27	29 36 20.2	17.01	12.6
848	15 14 49.11	29 32 51.1	17.63	9.4
849	15 15 5.98	29 31 19.2	17.38	10.6
850	15 15 12.79	29 34 42.5	16.27	44.8
851	15 15 56.15	29 25 46.0	17.20	11.0
852	15 16 11.07	29 34 5.1	17.98	8.0
853	15 16 11.85	29 33 55.3	17.42	10.4
854	15 16 11.90	29 33 30.5	17.54	9.8
855	15 17 9.81	29 31 10.3	16.08:	17.6
856	15 17 15.22	29 32 54.1	16.84	13.4
857	15 17 19.80	29 32 3.8	17.07	11.4
858	15 17 40.43	29 29 42.3	17.88	8.2
859	15 17 58.69	29 31 20.8	17.33	10.8
860	15 18 14.66	29 29 17.8	16.80	13.8
861	15 18 24.72	29 34 26.1	17.78	8.8
862	15 18 39.15	29 25 40.3	17.43:	8.2
863	15 18 43.47	29 29 13.8	17.62	9.4
864	15 18 54.94	29 32 26.1	16.82	13.6
865	15 18 59.03	29 28 34.1	16.34	16.8
866	15 19 0.43	29 36 8.1	15.24	37.4
867	15 19 8.18	29 35 34.5	17.60	9.6
868	15 19 17.78	29 25 59.7	17.74	8.4
869	15 19 19.22	29 26 31.1	17.97	7.6
870	15 19 23.95	29 27 29.4	15.94	19.4

ID	R.A.(1950)	Decl.(1950)	Mag.	Rad. (")
871	15 19 24.68	29 31 28.4	17.71	9.0
872	15 19 27.75	29 29 55.2	16.23:	17.0
873	15 19 32.32	29 34 58.0	17.82	8.6
874	15 19 34.65	29 34 46.7	17.37	10.6
875	15 19 36.67	29 25 51.5	17.58:	9.2
876	15 19 40.26	29 28 33.6	17.53	9.6
877	15 19 42.80	29 28 18.4	17.61	9.2
878	15 20 2.89	29 27 2.2	17.16	11.2
879	15 20 12.34	29 35 58.5	17.83:	8.4
880	15 20 12.62	29 32 27.4	17.80	8.2
881	15 20 15.40	29 29 43.0	17.76	8.6
882	15 20 38.55	29 28 55.4	17.89	8.0
883	15 20 41.93	29 25 50.4	17.39	10.2
884	15 20 44.87	29 36 19.1	17.43	10.0
885	15 20 54.83	29 28 24.4	16.09	19.0
886	15 21 5.55	29 26 56.9	17.94	7.8
887	15 21 6.49	29 26 47.4	17.63	9.0
888	15 21 11.18	29 35 30.5	17.90	8.2
889	15 21 11.52	29 25 39.3	17.75	8.0
890	15 21 43.73	29 27 12.4	16.80	13.2
891	15 21 45.22	29 33 44.6	17.78	8.6
892	15 22 3.87	29 35 31.1	17.27	11.0
893	15 22 28.99	29 26 59.4	17.55	9.2
894	15 22 36.47	29 30 10.6	17.87	8.0
895	15 22 39.16	29 35 50.5	17.67	9.2
896	15 22 39.34	29 26 4.6	17.68	8.8
897	15 22 45.73	29 30 31.2	17.27	10.8
898	15 22 49.23	29 34 42.7	17.57	9.6
899	15 22 53.40	29 31 57.8	16.21	17.8
900	15 23 1.65	29 24 55.7	17.88	8.0
901	15 23 18.06	29 35 58.4	16.24	17.8
902	15 24 3.93	29 35 26.2	16.79	13.6
903	15 24 5.78	29 26 25.1	17.23	11.0
904	15 24 7.49	29 36 17.8	17.10	11.8
905	15 24 16.53	29 26 44.0	16.92	12.6
906	15 24 23.11	29 32 53.7	16.47	16.0
907	15 24 30.72	29 30 49.0	16.14	30.2
908	15 24 37.70	29 33 45.8	15.05:	34.6
909	15 25 4.34	29 33 23.5	17.77	8.4
910	15 25 10.77	29 30 9.3	16.69	20.8
911	15 25 14.72	29 34 39.7	17.97	7.6
912	15 25 30.45	29 27 31.2	17.49	10.6
913	15 25 35.19	29 25 49.5	17.97	8.4
914	15 25 36.29	29 28 56.8	17.69	9.0
915	15 25 42.53	29 27 25.8	17.62	9.2
916	15 25 44.93	29 35 32.6	17.90	8.4
917	15 25 52.49	29 30 39.1	15.45	31.8
918	15 26 0.77	29 32 7.2	17.54	9.8
919	15 26 2.54	29 31 54.4	17.00	12.6
920	15 26 5.81	29 24 40.2	16.42	15.0
921	15 26 21.95	29 26 15.2	16.26	17.6
922	15 26 41.72	29 25 27.4	17.38	10.2
923	15 26 43.76	29 35 7.6	17.63	9.6
924	15 26 45.60	29 32 17.5	17.83	8.6
925	15 27 7.57	29 30 55.9	17.84	8.4
926	15 27 17.15	29 30 35.8	17.29	11.0
927	15 27 46.32	29 25 47.1	17.55	9.4
928	15 27 46.87	29 35 16.6	16.72	13.8
929	15 28 54.09	29 36 15.1	16.86	13.6
930	15 28 59.87	29 30 51.8	17.42	9.8

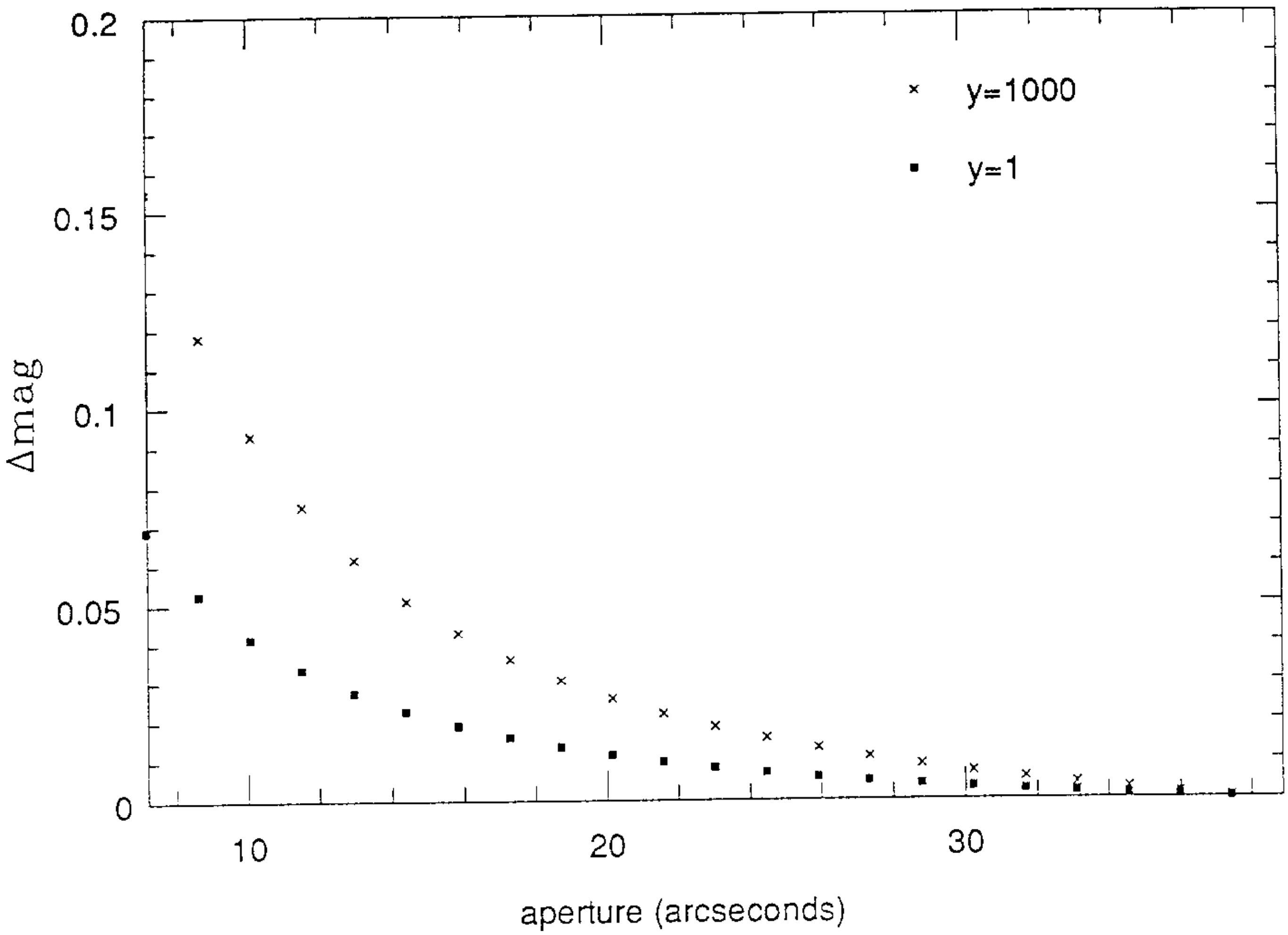
ID	*R.A.*$_{(1950)}$	*Decl.*$_{(1950)}$	*Mag.*	*Rad.* (")
931	15 29 2.93	29 31 46.8	17.91	8.2
932	15 29 27.67	29 29 54.5	15.87	20.8
933	15 29 30.82	29 29 23.8	17.19	11.6
934	15 29 42.78	29 29 34.0	16.55	15.0
935	15 29 54.22	29 31 5.1	17.89	8.2
936	15 29 55.40	29 31 49.1	17.01	12.6
937	15 30 8.51	29 27 33.2	17.79	8.4
938	15 30 15.92	29 32 59.2	16.71	14.2
939	15 30 22.59	29 28 10.1	17.55	9.2
940	15 30 26.90	29 30 39.6	17.36	10.6
941	15 30 30.65	29 29 10.5	13.37:	13.2
942	15 30 32.03	29 29 5.2	16.55:	13.6
943	15 30 38.22	29 34 41.5	16.50	16.0
944	15 31 17.51	29 35 27.3	15.48	27.4
945	15 31 22.81	29 24 39.5	17.72	8.4
946	15 31 25.06	29 26 12.6	17.75	8.4
947	15 31 39.23	29 32 27.0	17.06	12.0
948	15 31 40.80	29 30 29.3	16.28	17.6
949	15 31 41.05	29 31 45.9	16.44:	15.6
950	15 31 41.43	29 34 48.4	16.27	17.8
951	15 31 49.81	29 25 38.2	17.58	9.2
952	15 32 9.15	29 29 23.1	17.48	9.8
953	15 32 18.16	29 34 31.7	17.04:	12.0
954	15 32 30.11	29 33 52.0	17.54	9.6
955	15 32 32.52	29 28 39.7	17.09:	11.4
956	15 32 35.18	29 32 11.3	17.90	8.2
957	15 32 35.22	29 31 25.0	17.93	8.0
958	15 32 36.70	29 30 16.5	17.67	9.0
959	15 32 41.33	29 28 59.5	16.46	15.2
960	15 32 42.57	29 30 3.5	17.35	10.0
961	15 32 43.46	29 27 12.6	17.33	10.2
962	15 34 12.35	29 25 16.4	16.61	14.6
963	15 34 23.72	29 29 37.0	17.51	10.0
964	15 35 1.01	29 30 15.1	15.45:	36.0
965	15 35 2.29	29 30 0.6	15.13:	30.2
966	15 35 17.31	29 33 47.0	17.80	8.6
967	15 35 36.54	29 24 44.0	16.83	13.4
968	15 36 4.93	29 29 18.7	17.80	8.6
969	15 36 32.55	29 34 42.5	17.83	8.4
970	15 36 40.53	29 34 31.0	15.49	41.8
971	15 36 47.41	29 35 6.0	15.55	30.2
972	15 36 56.64	29 33 57.8	16.27	17.8
973	15 39 12.88	29 31 38.8	17.16	11.6
974	15 39 53.25	29 24 18.0	16.22	17.2
975	15 41 40.65	29 26 35.5	15.15:	20.8
976	15 41 42.46	29 35 8.8	15.16	28.8
977	15 42 2.52	29 32 35.0	17.72	8.8
978	15 42 45.00	29 25 22.0	15.05	27.4
979	16 15 41.36	29 28 40.4	17.61	9.4
980	16 15 47.46	29 28 57.7	17.69	9.0
981	16 16 24.65	29 27 56.2	17.25	10.6
982	16 16 44.42	29 33 34.4	17.98	8.0
983	16 16 47.93	29 22 42.6	17.92	7.8
984	16 17 11.83	29 30 16.7	17.69	9.0
985	16 17 42.33	29 29 45.9	17.91	8.2
986	16 17 47.44	29 30 20.8	17.49:	9.8
987	16 19 32.80	29 29 4.8	16.97:	12.2
988	16 19 35.03	29 24 1.6	17.10	11.6
989	16 19 56.67	29 29 3.5	16.57	15.0
990	16 20 19.11	29 29 56.6	17.25	11.2
991	16 20 45.33	29 31 20.8	17.83	8.4
992	16 21 53.85	29 32 19.4	15.76:	20.2
993	16 22 29.33	29 31 19.7	17.18	11.6
994	16 23 14.73	29 30 30.0	17.76	8.8
995	16 23 25.31	29 31 4.2	15.63	17.4
996	16 23 35.92	29 23 44.6	17.52:	9.6
997	16 23 38.34	29 28 52.7	17.93	8.0
998	16 23 50.03	29 26 20.2	17.93	8.0
999	16 24 31.54	29 22 20.2	17.61	9.0
1000	16 24 53.01	29 29 50.0	17.33	10.6
1001	16 25 11.84	29 30 3.0	17.45:	9.6
1002	16 25 19.26	29 29 57.2	17.38	10.2
1003	16 25 30.40	29 30 24.4	17.85	8.4
1004	16 26 51.40	29 29 41.3	16.37	16.6
1005	16 27 13.10	29 32 13.9	17.13:	11.8
1006	16 27 14.12	29 30 50.5	17.98	8.0
1007	16 27 19.75	29 32 29.8	17.46:	14.4
1008	16 27 38.25	29 29 53.6	17.46	10.0
1009	16 27 51.49	29 30 29.9	17.72	9.0
1010	16 28 50.69	29 30 23.1	15.00	28.8
1011	16 28 59.37	29 26 44.5	17.16	11.6
1012	16 32 3.00	29 33 13.2	16.29	17.4
1013	16 32 15.27	29 32 27.8	17.35	10.4
1014	16 32 43.81	29 24 41.9	17.86	8.0
1015	16 32 53.05	29 32 55.6	16.83	13.2
1016	16 33 12.86	29 23 56.1	17.63	9.0
1017	16 33 21.44	29 32 10.1	17.93	8.0
1018	16 33 54.89	29 32 28.4	16.49	15.8
1019	16 34 14.49	29 29 31.0	17.28	11.0
1020	16 34 15.45	29 22 2.9	16.37	16.8
1021	16 34 25.83	29 26 13.2	15.48	33.2
1022	16 34 27.49	29 26 10.3	15.83	21.2
1023	16 34 27.65	29 25 44.3	15.96:	17.8
1024	16 34 32.25	29 31 37.9	17.35:	10.6
1025	16 34 32.80	29 31 27.1	16.32	15.2
1026	16 34 33.71	29 24 1.6	17.87	7.8
1027	16 34 33.75	29 31 49.3	17.06	12.2
1028	16 34 34.40	29 25 34.6	17.97	7.8
1029	16 34 45.33	29 29 13.1	16.05:	13.2
1030	16 35 3.02	29 30 42.5	17.37	10.6
1031	16 35 3.60	29 29 15.3	16.23	17.8
1032	16 35 41.26	29 32 22.3	17.37	10.6
1033	16 35 41.56	29 22 25.3	17.58:	9.2
1034	16 35 42.73	29 28 17.8	16.36	16.8
1035	16 36 6.84	29 23 55.2	16.80	13.6
1036	16 36 10.33	29 24 0.1	16.71:	13.6
1037	16 36 11.28	29 24 18.9	17.13:	11.2
1038	16 36 13.71	29 24 5.9	17.56	9.6
1039	16 36 45.96	29 28 4.4	17.35	10.8
1040	16 36 47.23	29 25 19.5	17.47	9.8
1041	16 37 23.16	29 27 55.0	17.00	12.4
1042	16 37 24.20	29 30 5.4	17.35	10.8
1043	16 37 39.74	29 26 7.3	16.59	15.2
1044	16 39 11.55	29 32 15.7	17.38	10.6
1045	16 39 17.18	29 28 41.5	17.63	9.4
1046	16 39 40.89	29 26 10.8	17.68	9.0
1047	16 40 38.74	29 31 37.8	17.97	8.0
1048	16 41 1.42	29 27 40.9	16.91	13.2
1049	16 41 26.15	29 23 47.2	17.60	9.2
1050	16 41 29.76	29 24 24.8	17.56	9.0
1051	16 42 9.43	29 31 18.5	17.68	9.2
1052	16 42 11.88	29 23 29.0	17.81	8.4
1053	16 42 12.57	29 22 11.3	16.85	12.6
1054	16 42 20.10	29 30 35.9	17.02	12.6


0
50
100
150
200
50
100


Objects with m_r<16
FWHM (Pixels)
CCD Column
0
2
4
6
8
10
0
200
400
600
800
1000

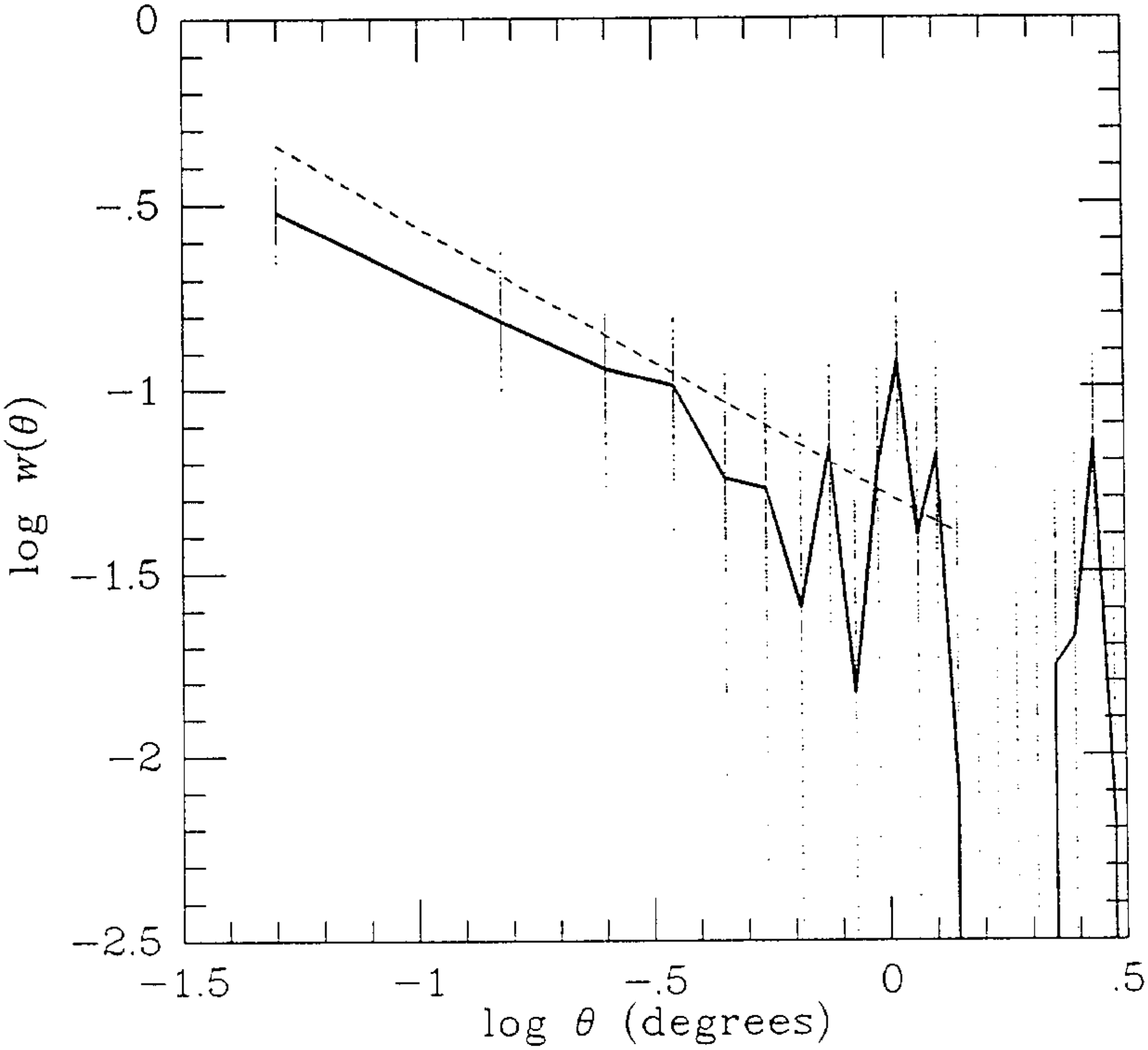


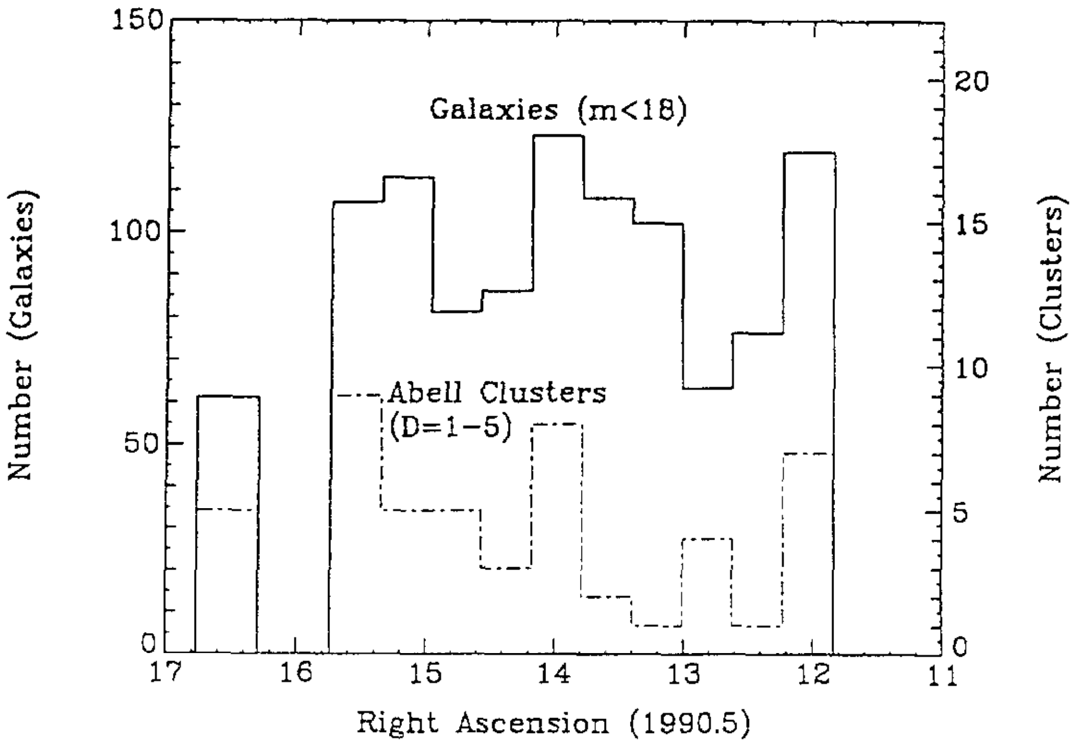
0.3
0.2
0.1
−0.0
−0.1
−0.2
−0.3
12
14
16
18
Difference (Mag)
CCD r Magnitude

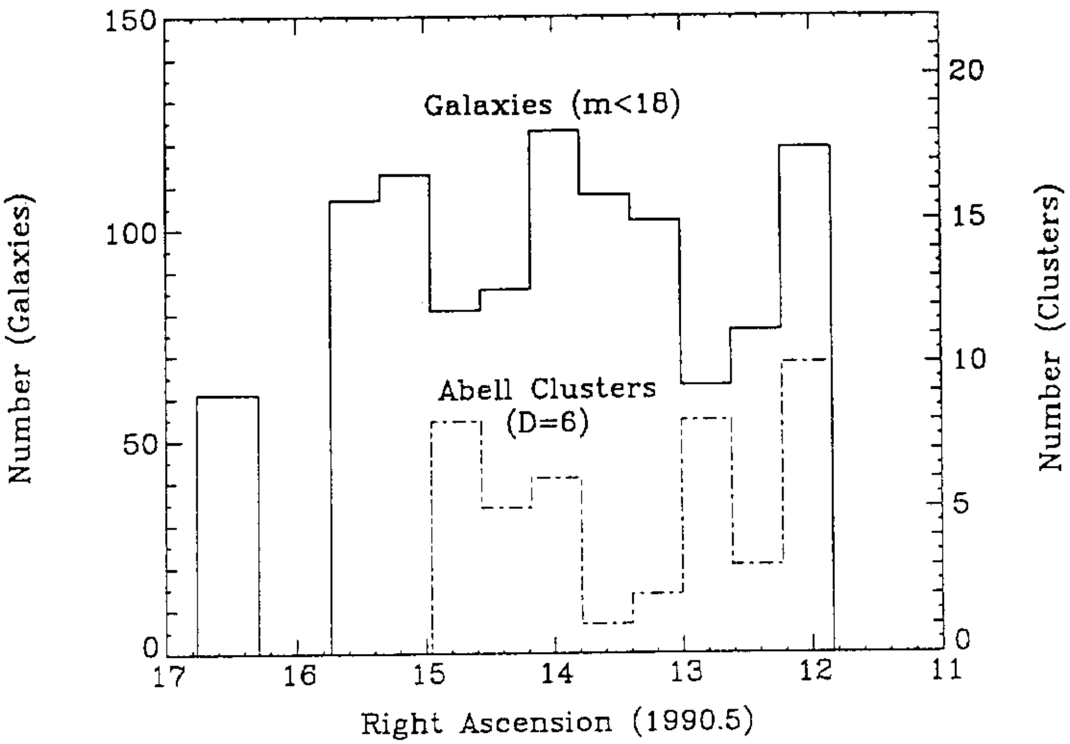


0.2
0.15
0.1
0.05
0
Δmag
y=1000
y=1
10
20
30
aperture (arcseconds)

Figure 5




Galaxies (m<18)
Abell Clusters
(D=1−5)
Number (Galaxies)
Number (Clusters)
Right Ascension (1990.5)
150
100
50
0
20
15
10
5
0
17
16
15
14
13
12
11


Galaxies (m<18)
Abell Clusters
(D=6)
Number (Galaxies)
Number (Clusters)
Right Ascension (1990.5)
150
100
50
0
20
15
10
5
0
17
16
15
14
13
12
11