ABSTRACT

PHOTOMETRIC STUDY OF THE GALACTIC OPEN CLUSTER M11

By Dan M. Piehl

The open cluster M11 (NGC 6705, Mel 213, Cr 391, OCl 76) is a concentrated, populous stellar system projected on the rich background of the Scutum star-forming field, towards the central part of the Galactic disk.[1] Sometimes mistaken for a loose globular cluster, M11 is one of the richest and most compact of the known open clusters in the Milky Way. At the same time, the cluster is young, resembling the young globular clusters in the Magellanic Clouds. The cluster is situated in a clear area characterized by a relatively low interstellar extinction. It is important for its contribution to the understanding of evolution of massive and intermediate mass stars.

In this study, the M11 cluster is investigated using Strömgren-Crawford *uvbyβ* photometry.[2] This is the first *uvbyβ* photometry obtained for this cluster. This work involves analysis of photometric data obtained with the 0.9-m WIYN telescope at Kitt Peak National Observatory (KPNO) during two observing runs in 2007 and 2008. The primary goal of this work is to convert the raw observations to a standard photometric system. A software package called IRAF has been utilized for the reduction of this data. In the process, various techniques of stellar photometry are applied and discussed.

The reduced photometry is used to classify the observed stars into spectral types, and to provide new estimates of the distance to the cluster and the extinction of stellar light.

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by

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Chapter 1 – Introduction

Scope of Research

The open cluster M11 (NGC 6705, Mel 213, Cr 391, OCl 76) is a concentrated, populous stellar system projected on the rich background of the Scutum star-forming field, towards the central part of the Galactic disk.[1] The cluster is situated in a clear area characterized by a relatively low interstellar extinction near the Sagittarius arm. For several reasons, M11 has captured attention over the years. This cluster is important for its contribution to the understanding of chemical and dynamical Galactic evolution.

This study investigates the cluster using Strömgren-Crawford *uvbyβ* photometry.[2] Stellar photometry involves measuring the brightness of stars in various wavelengths. This study includes analysis of the M11 photometric data from 2007 and 2008 observations obtained at Kitt Peak National Observatory (KPNO).

The data has been obtained with the 0.9-m KPNO telescope using a CCD (charge-coupled device). A software package called IRAF, designed for astronomy purposes, has been utilized for the reduction of this data. I used the PSF (point spread function) method[3] and the method of aperture photometry to remove the instrumental signature due to sky background noise and electronic noise and convert the measurements to a standard system.

The reduced photometry will be used to find the stellar physical parameters of all stars included in the survey. This will allow separation of the members of the cluster from the background stars, obtain a new, precise distance to the cluster, and estimate the extinction of stellar light in this direction. Use of the WEBDA database and M11 catalog stars[4,5,6,7] will be included for purpose of star matching, and there will be discussion of coordinate transformations and matching algorithms.

To begin this discussion, I will describe some of the features of IRAF software, such as how to remove instrumental signatures. The IRAF commands will be shown in *lowercase italics* as a reminder that these are commands entered into the terminal session associated with the IRAF command line. The processing was done in a VMware environment running Ubuntu and the Linux version of IRAF.

For information on how to do CCD photometry in IRAF, Massey and Davis[8] provide a guide. For information on using IRAF in a VMware environment, along with detailed walkthroughs on processing CCD images and handling all of the data processing steps, a *CCD Photometry Cookbook* is available by Dr. John Beaver.[9]

The CCD data from KPNO was provided by Dr. Briley and Dr. Kaltcheva, from a 10 night observation run in 2007 and a 5 night observation run in 2008. The 2007 data includes $uvby\beta$, while 2008 data for M11 includes only the Hβ measurements. Because of a limited number of standard stars, or problems with some of the M11 frames, only some of the nights were used. For this study, 2007 nights 1, 2, and 10 were used. The 2008 data on night 5, which includes two separate observations of M11 in the β filters, was also used. Among all data with error below about 0.2 magnitudes, the average was taken, the stars were matched with the WEBDA catalog, and shown with observed coordinates and magnitudes in Appendix B.

The *uvby* system

The intermediate-band system *uvby* is a four-filter system associated with the ideas of B. Strömgren and D. Crawford. It is intended to overcome complications with the broadband *UBV* system which has overlapping transmission curves. The *uvby* system, having narrower filters than *UBV*, measures more precise details in stellar spectra that can be calibrated in terms of physical stellar parameters. By convention, each of the indices of *UBV* and *uvby* is specified on a logarithmic magnitude scale. For example, $y = -2.5 \log f_y, + C_y$, where f_y is the star's flux in filter y as observed from Earth after any atmospheric effects are removed, and C_y is some calibration constant. Similar to the decibel scale, this relationship allows the ratio of two stellar fluxes, such as f_b / f_y, to be specified by a simple difference of magnitudes: $b - y = -2.5 \log(f_b / f_y) + (C_y - C_b)$. The factor –2.5 means that the scale is reversed. Lower magnitude numbers will refer to brighter stars.

The early stellar magnitude system was established by the classification of stars into magnitudes numbered 1 through 6 based on only the stars the human eye can see. Since this is a range of 5 magnitudes, and it was decided that this range had a flux ratio of 1:100, a logarithm would require a base of $\sqrt[5]{100} \approx 2.512$. However, $\sqrt[5]{100} = 10^{2/5}$, so it is easier to simply multiply the base 10 logarithm ($\log_{10}$) by 5/2 (2.5).

The four *uvby* filters have non-overlapping transmission curves (see Table 1), allowing the magnitudes to be considered almost monochromatic. The y (yellow) in the *uvby* system scales closely with the *V* magnitude in the *UBV* system. It correlates with the visual magnitude as seen with the human eye.

	u	*v*	*b*	*y*
λ (nm)	347	411	467	546
$\Delta\lambda$ (nm)	38	20	10	20

Table 1. *uvby* Filter Characteristics

Three computed parameters are also commonly used. The *b* (blue) in the *uvby* system provides a way to compute the difference $b - y$, which is often called the color. It scales approximately with $B - V$ in the *UBV* system and correlates with the surface temperature of a star. Using *v* (violet) allows calculation of $m_1 = (v - b) - (b - y)$, which is a measure of stellar metallicity. The *u* (ultraviolet) allows the calculation of the index $c_1 = (u - v) - (v - b)$, which is a measure of stellar luminosity.

Because c_1 and m_1 parameters are computed by a difference of symmetrically situated color-related parameters, the apparent color of a star is partly cancelled out. By being less affected by interstellar reddening, these parameters provide information about the nature of a star. The index c_1 measures the Balmer decrement, which is a way to estimate the intrinsic luminosity. The index c_1 is also related to surface gravity. The metallicity index m_1 measures line blocking which is related to the relative iron abundance.

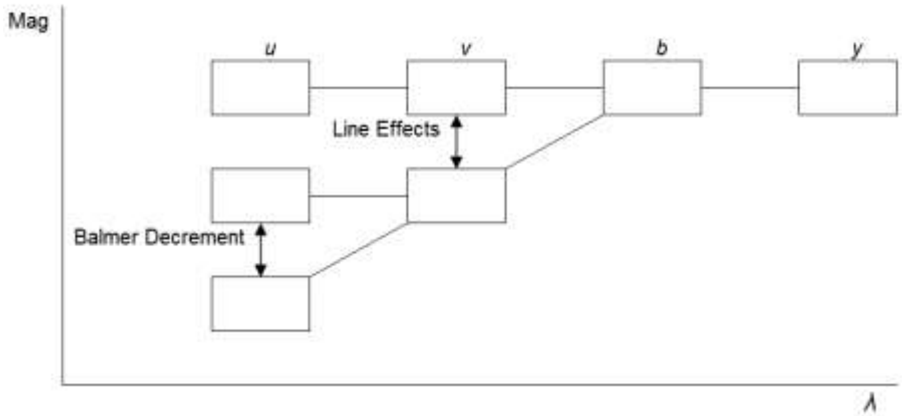

Figure 1. The Balmer Decrement and Line Blocking

This effect is explained using a block diagram[10] (see Figure 1) depicting how each band is affected. Together these intermediate-band filters can characterize the star and its evolutionary status.

β Photometry

Centered on the second hydrogen Balmer line, two optical β filters provide information about the prominence of this particular spectral line.[11] The filters, called narrow and wide, have passbands centered on the same spectral line. On the magnitude scale, a simple difference $\beta = \beta_{\mathrm{narrow}} - \beta_{\mathrm{wide}}$ serves to measure the strength of this line and the absolute magnitude of early type stars. Because β_{narrow} and β_{wide} are similarly affected by reddening, β provides a nearly reddening-free parameter.

The two *β* filters, together with *uvby*, enable processing of images in 6 different filters. This combination, *uvbyβ* photometry, enables accurate classification of stellar types and estimates of absolute magnitude.

Chapter 2 – CCD Image Processing

Data Reduction

This process of reduction involves removing some of the effects of the telescope and CCD hardware. As measured by the CCD, light of uniform intensity across the field of view of the telescope will be measured with varying amounts of optical and electronic gain, as well as offset errors unique to each pixel and scan line of the CCD. There is also the matter of electronic noise, some of which can be subtracted by careful observations.

Typically, an overscan region of the CCD is provided so the each scan line has a reference to detect an offset measured at each line. The overscan is a region of the CCD which does not receive light, and is meant to provide information about the line-by-line bias. In the CCD images used in this study, the last 32 columns of the CCD are considered overscan. These columns are trimmed off the image after they are used for calibration. The initial FITS image is 2080×2048 pixels, and becomes 2048×2048 after the overscan correction. The overscan exists on every frame, because the CCD electronics will cause the line-by-line offset to vary significantly from one frame to the next.

Zero Frames

The zero frame (or bias frame) is a measurement by the CCD of a zero second exposure time. Because the electronics adds some initial values to the CCD, the information will be biased in a way unique to each pixel. It cannot be resolved by overscan correction. This bias for a given pixel exists even if no exposure time passes and no light is incident on the detector. By collecting several of these frames, an average can be taken using *zerocombine,* providing a correction that can be applied to all other frames. Because no light is being measured, the filter is irrelevant and the same combined zero frame can be used for all filters used during the same night.

Dark Noise

Dark noise is provided to the CCD by thermal effects and gamma rays. Some current develops within the CCD that is associated with temperature. The dark current is also proportionate to exposure time. Gamma rays will impact isolated pixels and not their neighbors, so the effect of gamma rays is removed by sigma-rejection in the software. Dark current due to thermally generated electrons is substantially reduced because the CCD is cooled. Therefore, dark noise is considered negligible in this study.

Flat Field

A flat field is meant to provide the astronomer with a reasonably uniform illumination pattern for purpose of calibrating the CCD data. After the zero frame is subtracted from the flat, under exposure to a uniform target, the CCD measurement at each pixel would ideally be constant. However, since the gain is not uniform, the flat data can be used to divide all of the frames to correct for pixel-specific gain values.

A lamp illuminating the telescope dome provides one way to collect a flat field. This method is repeated, and the frames are combined as they were with the zero frames.

The drawback to this method is that the lamp is not a very uniform field. There will be a large-scale gradient, even though it may go unnoticed to the human eye. However, pixels that are close together will be similarly situated with regard to the effect of the lamp.

To correct this gradient problem, a sky flat is taken at twilight of some area of the sky in which (hopefully) there will be no visible stars. Because the sky flat has a much more uniform large-scale illumination than the dome flat, it is less likely to introduce a gradient. However, it may have small scale errors, such as stars that are faint. A compromise is to use both methods – combine the global uniformity of the sky flat with the local uniformity of the dome flat. IRAF includes tasks to make this combination accessible. In this study, sky flats were combined with the dome flat with the task *mkskyflat*, providing a combined flat that can be applied to the stellar imagery. An example of the illumination correction to a flat field, with the scale magnified, is shown in Figure 2. In this example, the true scale of this correction is about 4 percent.

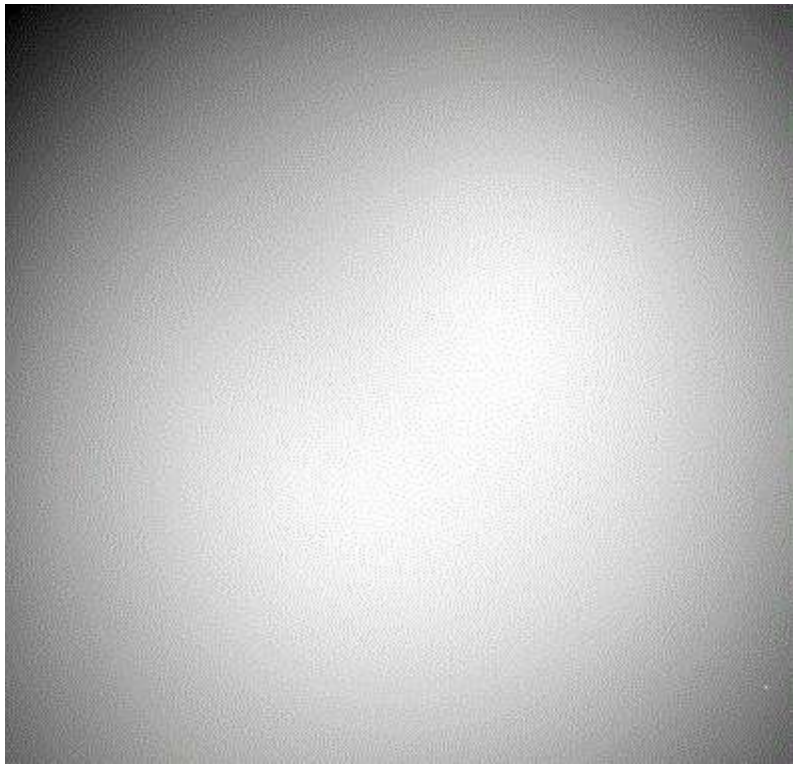

Figure 2. Illumination Correction

Since both the CCD gain and the optics through the telescope can vary from one wavelength to the next, and the filters themselves have some material irregularity, each of the flat images will vary significantly from one filter to the next. Consequently, for each night of observation, all of these flat field calibrations must be performed separately for each filter that is utilized.

Other Image Reduction Techniques

Problems with CCD processing include bad pixels, or entire columns of pixels which simply don't work right. By identifying these pixels or columns, IRAF can synthesize their values by interpolation of nearby good pixels. The *ccdmask* task is designed for this purpose. For this study, it was convenient to divide the flat fields of narrow and wide band Hβ filters using *imarith* to get a field that should be roughly uniform. Running *ccdmask*, one bad column was detected and a pixel mask was created.

In addition to these reduction techniques, there is also some benefit to running *imstat* first and looking at each frame to see if some frames are clearly bad. In some of the frames in this study, star images showed bad focus or tracking problems, or the image statistics found stars near the limit of the 16 bit registers, suggesting the image was overexposed. When possible, these frames were excluded from analysis.

After all of the stellar images have been corrected by these techniques, one can begin the process of collecting photometric data. The photometric measurements will be called instrumental data and must be later corrected, due to the effect of Earth's atmosphere and variations in the parameters of the filters, by calibration to a set of standard stars.

Summary of IRAF Tasks

The essential IRAF tasks needed for data reduction are summarized below:

IRAF Task	Description
zerocombine	Combine zero level images
flatcombine	Combine flat field images
ccdproc	Process CCD images by applying zero, flat, bad pixel corrections
ccdmask	Create a pixel mask from a CCD image
mkskyflat / mkillumflat / mkillumcor / mkskycor	Each of these tasks is meant to correct the illumination pattern in different ways

Table 2. IRAF CCD Image Reduction Tasks

Chapter 3 – Aperture Photometry of Standard Stars

Selection of Standard Stars

Some field standards and clusters were collected the same nights as the M11 CCD images. The photometry of these stars is listed in catalog II/215, the uvby-beta Catalogue[12] in Vizier at http://vizier.u-strasbg.fr/viz-bin/VizieR.

The following standard stars were used:

Observation Night	Reference	Number of stars used	Number of Measurements × Filters
2007 Night 1	IC 4665	5	9 × 2
2007 Night 2	IC 4665	6	12 × 6
	NGC 7209	30	30 × 6
2007 Night 10	HD 122563	1	2 × 6
	HD 139137	1	1 × 6
	IC 4665	9	17 × 6
2008 Night 5	IC 4665	9	30 × 2
	NGC 6664	7	17 × 2
	NGC 6913	17	45 × 2
	Upgren 1	6	17 × 2

Table 3. Measurements of Standard Stars

Standard aperture photometry of each cluster was performed, using the *daofind* process in IRAF, the stars were located automatically and *phot*, which does aperture photometry, was used on each set of coordinates to get photometric measurements of each star.

Matching Standard Stars to the Catalog

The output from *phot* contains a list of *uvby* magnitudes for each star found by *daofind*, but does not contain any catalog identification for each star. Since right ascension and declination parameters for the standard clusters are available, I used the catalog information to find the stars in the field using a computer program. A more detailed description of this matching process will be described in Chapter 5.

Aperture Photometry

A fixed radius, called an aperture, is selected to measure the light inside a disc centered on each star (see Figure 3). For this study, an aperture of 12 was selected.

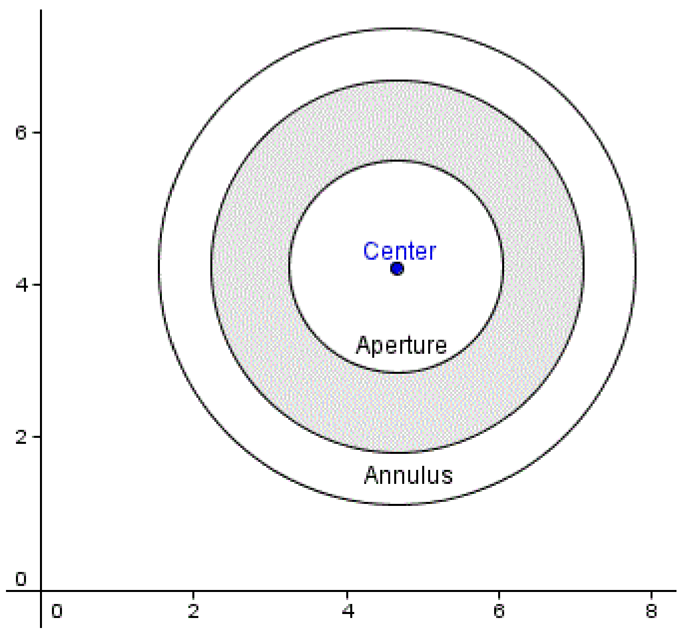

Figure 3. Aperture Photometry Radii

There is a compromise between selecting an aperture large enough to capture the star's light, while excluding light from stars that appear to be neighboring. For uncrowded fields, such as the standard clusters, it is beneficial to choose a larger radius.

An image region called the annulus is the region between two fixed radial distances from a star. The total flux in the annulus region estimates the sky background level in the vicinity of the star. This sky background flux estimate is subtracted away from the aperture flux so that only the star's light contribution inside the aperture is actually being measured. An annulus between 20 and 25 pixels was selected for this study. Because the annulus is spread out over a larger region than the aperture, IRAF can more easily detect and reject neighboring stars that happen to be centered on the annulus.

Calibrations to the Standard System

After the stars are identified, the instrumental values are associated with each star from a standard catalog. The *fitparams* task accepts a set of transformation equations and enables the user to calculate transformational constants needed later to apply to the program stars. The *fitparams* task in IRAF presents a graph of the residuals – the differences between the standard measurements of each star and what a transformation equation estimates those values to be based on the photometry. A choice can be made to reject certain points and re-fit the transformation to the remaining data.

Extinction and Airmass

There exists a decreased intensity of light, therefore a higher magnitude, due to the effect of extinction. Although some extinction is due to attenuation by interstellar gas, the calibration to the standard system involves the extinction due the atmospheric extinction. The attenuation due to atmospheric extinction describes the degree to which a particular wavelength is scattered or blocked by the air. The amount of the air is called airmass, and is typically 1 for a star directly overhead. The angle between the star and the point overhead, the zenith angle ζ, determines how much larger the airmass should be. The airmass can be approximated $X = \sec \zeta$ by a trigonometric argument (see Figure 4). Due to curvature of atmospheric layers, for $\zeta > 60°$, it becomes necessary to include higher order trigonometric terms to calculate a useful approximation of airmass.

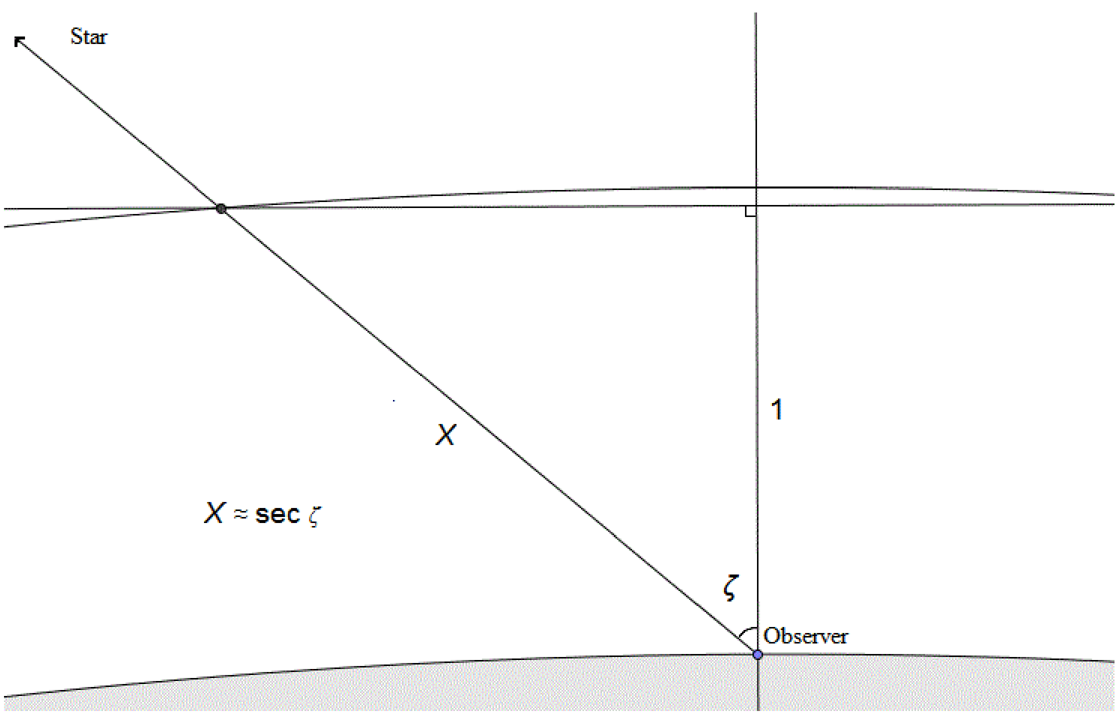

Figure 4. Determining Airmass using Zenith Angle

Transformation Equations

Once airmass is calculated, the degree to which it impacts the magnitude must be determined. By observing a standard star, the instrumental measure of magnitude and the catalog index can help determine what effect the airmass has. For *m*500, the instrumental measure of a star's magnitude in the *y* filter, the value can be connected with the catalog magnitude *V*. An equation might be used such as $m500 = V + kX$, where *k* is some extinction coefficient that varies night to night. But there is also a need to include a color term due to selective reddening effects by Earth's atmosphere. So the equation must be expanded and multiple equations arise for each of the other filters. The IRAF *fitparams* task will calculates these by fitting to the set of standard observations. Using the CCD Photometry Cookbook, an example of a full set of *uvbyβ* equations[13] that *fitparams* might expect is given as

```
yFit : m500 = y1 + Ymag + y2*X500 + y3*BY +y4*X500*BY
bFit : m300 = b1 + (BY + Ymag) + b2*X300 + b3*BY +b4*X300*BY
vFit : m200 = v1 + (M1 + 2*BY + Ymag) + v2*X200 +v3*BY + v4*X200*BY
uFit: m100 = u1 + (C1 + 3*BY + Ymag + 2*M1) + u2*X100 + u3*BY
      +u4*X100*BY
BETAFIT : m600 = h1 + (m700 + BETA) + h2*X600 .
```

In these equations, *m*100, *m*200, *m*300, and *m*500 represent instrumental magnitudes in the filters *u*, *v*, *b*, and *y*. The values *X*100, *X*200, *X*300, and *X*500, represent the corresponding airmasses. Note that for the same "set" of images, these are different airmasses, because each filter was used at slightly different time during the night. The color terms, such as *y*3**BY* and the higher order terms such as *y*4**X*500**BY*, are terms that account for atmospheric reddening.

An alternative way to handle the equations is to fit each of the derived values, such at $b - y$, m_1 and c_1, to the standard system. Although this method might reduce overall error, it requires more careful handling of the airmass. It also has an added benefit of making *fitparams* plot the residuals on a more meaningful $b - y$, m_1, or c_1 scale, rather than an axis of *uvby* magnitudes. An instrumental measurement such as m300 – m500 seems to correlate well with $b - y$. However, since there are now two airmasses to deal with, they must to be handled separately. I was able to accomplish this by solving for airmass separately in the *y* filter, and they applying it as a fixed values in a second run of *fitparams*. Continuing this approach, the other filters can be included. A sample of a set of equations given by this iterative approach is

```
yFit : m500 = y1 + Ymag + 0.185*X500 + y3*BY

bFit : m300 - (m500-0.185*X500) = b1 + BY + b2*X300 + b3*BY

vFit : m200 - 2*(m300-0.257*X300) + (m500-0.185*X500) = v1
+ M1 + v2*X200 + vFit : m200 = v1 + (M1 + 2*BY + Ymag) +
v2*X200 + v3*BY

uFit : m100 - 2*(m200-0.378*X200) + (m300-0.257*X300) = u1
+ C1 + u2*X100 +

BETAFIT : m600 - m700 = h1 + BETA + h2*(X600-X700).
```

Note that the color term in each filter is not being carried to the next equation. But that issue should be irrelevant; the color term is being re-fit to for each parameter. Also, I have made an association with two airmasses in the β equation. Both airmasses ($X600$ and $X700$) contribute in opposite ways because the narrow and wide are being subtracted. Once all of these coefficients are determined, the task *invertfit* can transform any set of instrumental values into the standard system.

Examining the Residuals

The difference between the transformed photometric parameter and its catalog value can be plotted on the vertical axis, with any choice of parameter along the horizontal axis. The purpose is to look for systematic errors in the fitting process. In the case of 2008 night 5, the points in the residuals show the relationship between the difference between the measured and the standard value versus the standard value (see Figure 5 and Figure 6). If a trend is seen, something has not been correctly fit in the transformations.

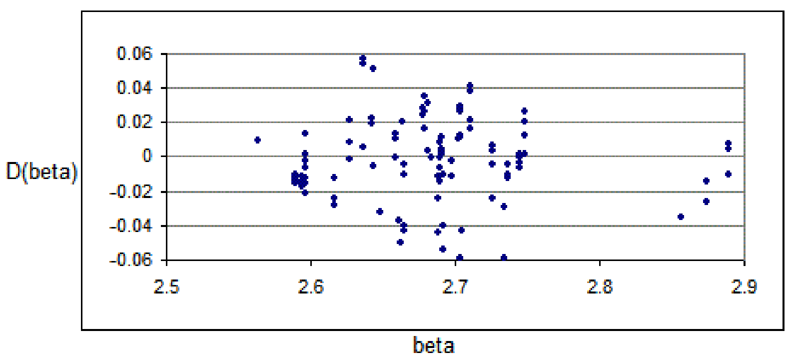

Figure 5. Residuals for 2008 Night 5 Data

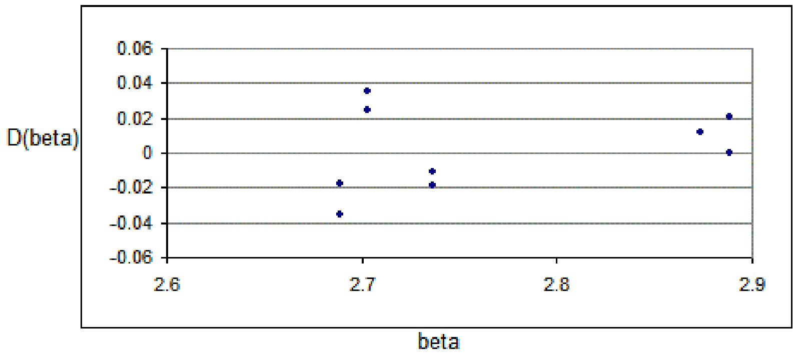

Figure 6. Residuals for 2007 Night 1 Data

In the case of *uvby* data, it is also helpful to plot the differences against each index. In this study, 2007 night 2 (see Figure 7) and night 10 (see Figure 8) *uvby* data was used.

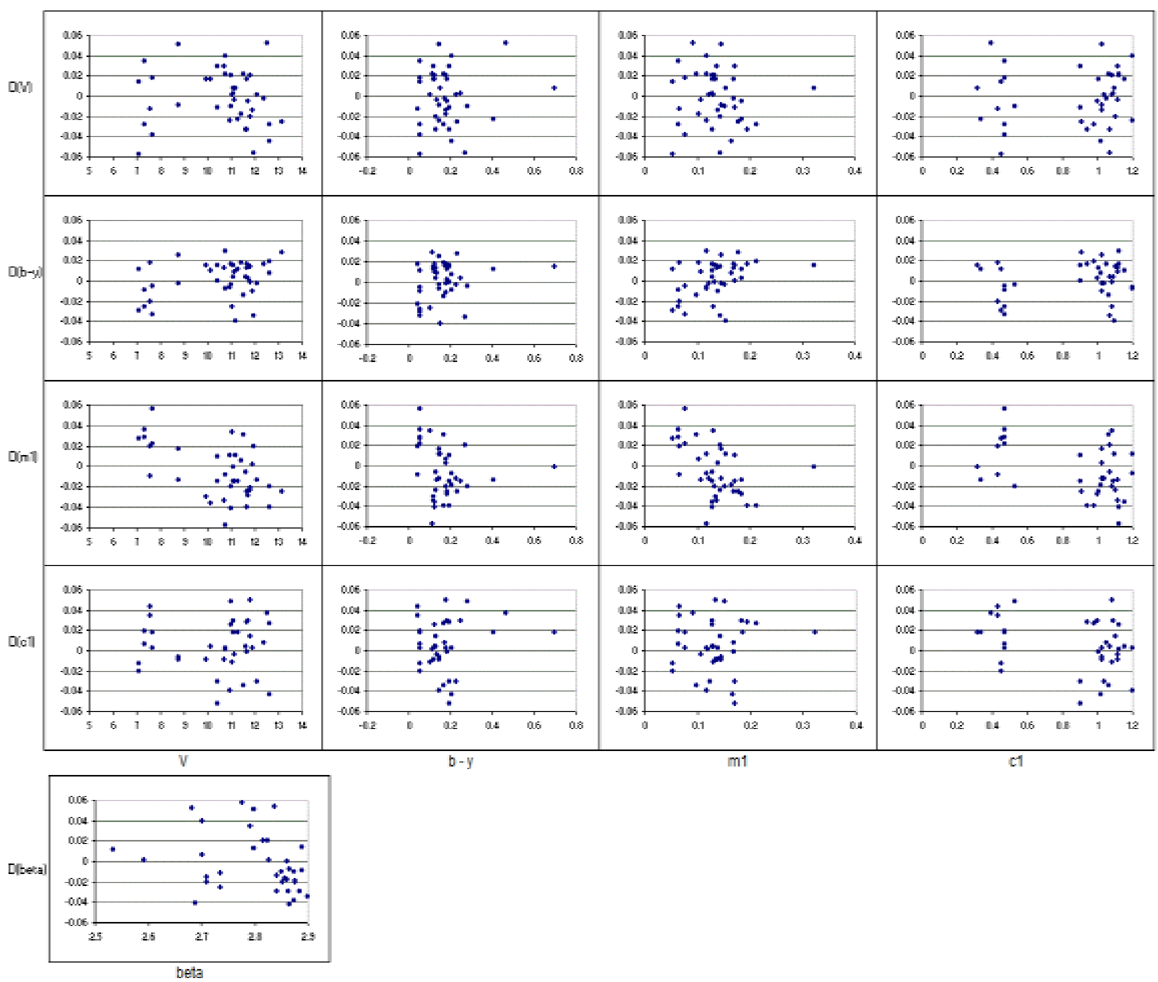

Figure 7. Residuals for 2007 Night 2 Data

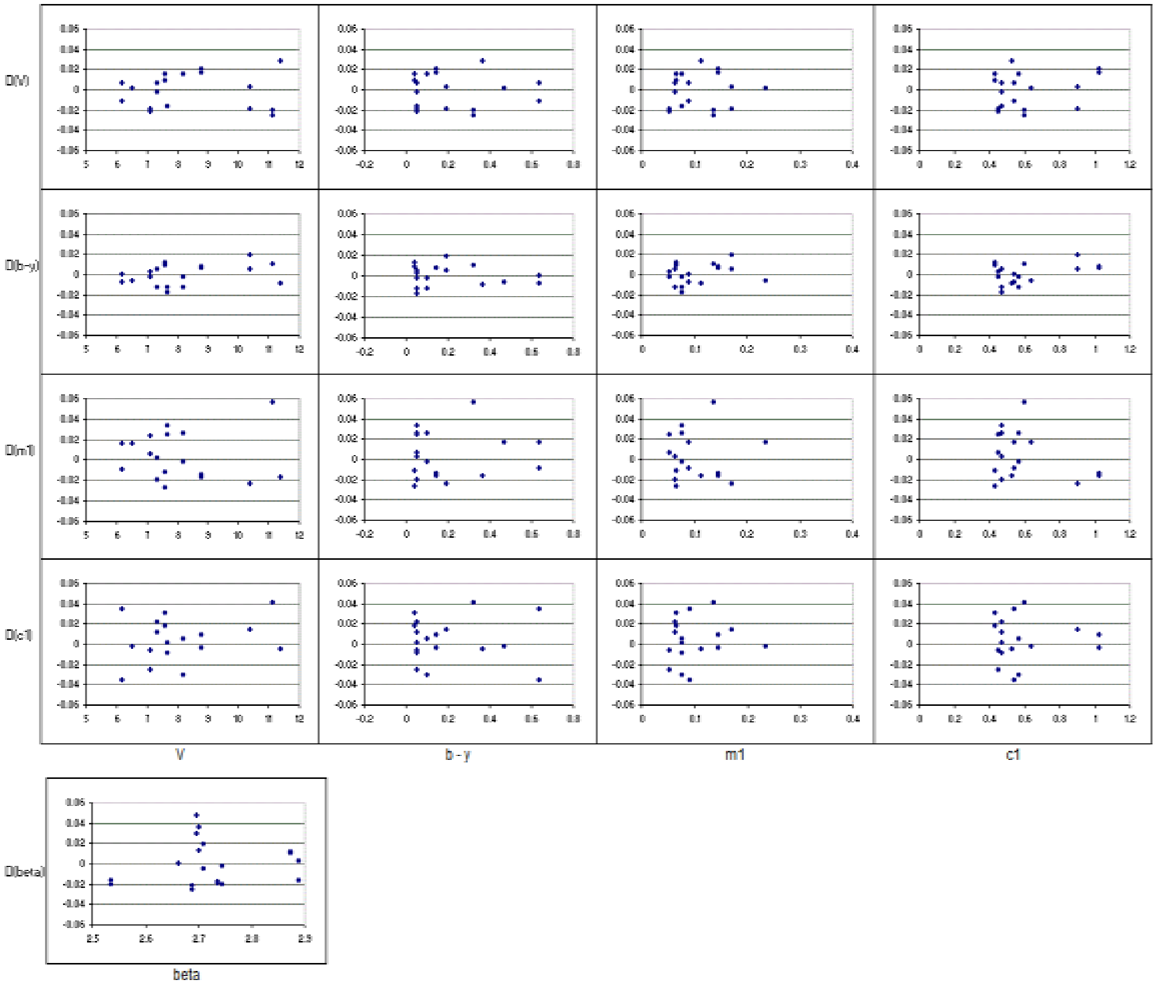

Figure 8. Residuals for 2007 Night 10 Data

Summary of IRAF Tasks

Some IRAF tasks for aperture photometry and calibration are summarized below:

IRAF Task	Description
daofind	Automatically detect stars and build a list of star coordinates
phot	Do aperture photometry on a list of stars
mkobsfile	Make a single observation file, matching up the corresponding observations in each of the filters.
fitparams	Given a set of observations and star catalog values, solve the transformation equations
invertfit	Apply transformation equations to instrumental observations to obtain corrected extra-atmospheric star parameters

Table 4. IRAF Photometry Tasks

Chapter 4 – PSF Photometry

PSF Photometry

The purpose of a PSF is to estimate the distribution of CCD measurements near a star's center and fit the distribution to each star. This is done by choosing some stars in the same field that are uncrowded to make an initial determination of the PSF. Next, the image of every star in the field can be deconvolved by using methods such as a Fourier transform, and the resulting flux can be measured by using a smaller aperture. Stars that are crowded and obscured by one another in the image can be more accurately identified and measured by using a smaller aperture. The IRAF *imexamine* task provides a tool to examine the stars. and a surface plot of a PSF can be shown (see Figure 9).

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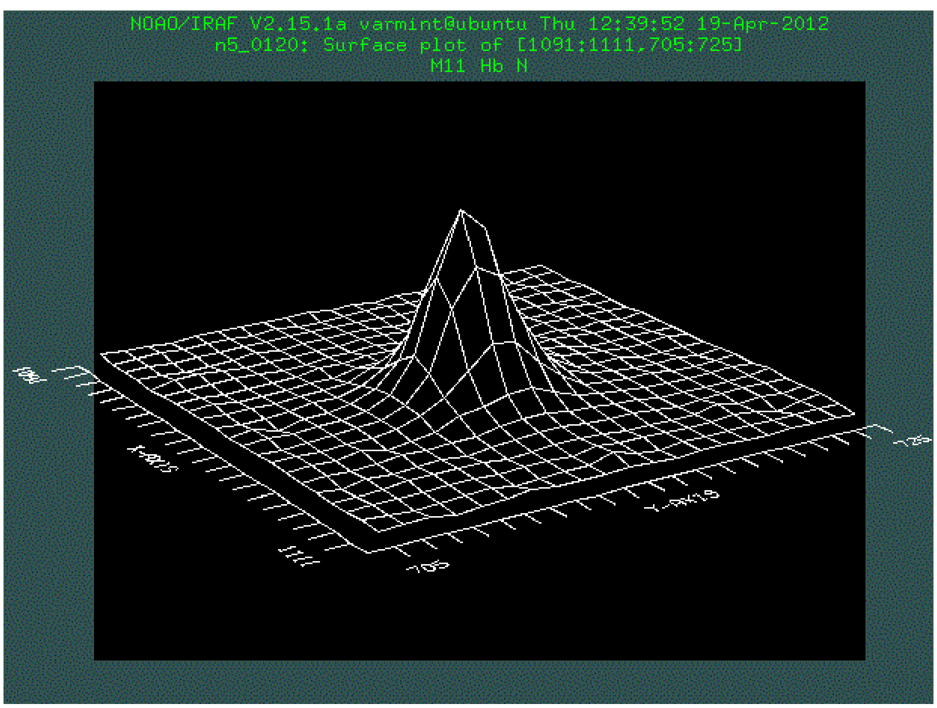

Figure 9. Surface Plot of a Star's Light Distribution

For this study, an aperture of 6 was selected. Because an aperture of 12 was selected for the standard stars, the PSF data must be corrected to compensate for the use of a smaller aperture.

IRAF requires that a choice of "PSF stars" initially be selected to begin the process of finding a PSF estimate. Later the PSF is fit to all of the stars in the field, and photometric values for these stars are computed. IRAF also will "subtract" these PSF estimates of each star, leaving behind only the stars that were not initially detected. An example is shown in Figure 10.

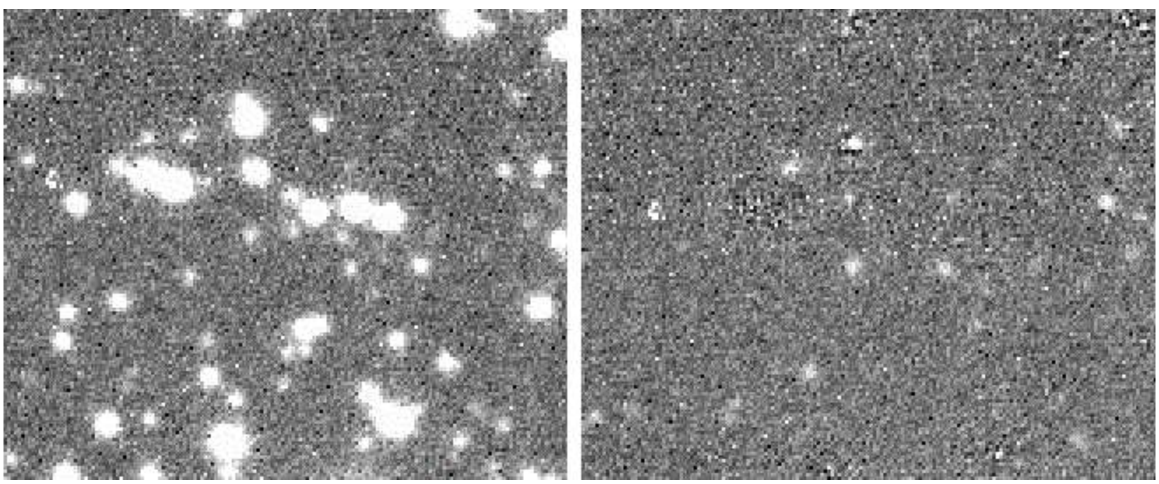

Figure 10. M11 Stars in Narrow β Before and After PSF Subtraction

The PSF fitting can identify and subtract some stars even if they are crowded and almost impossible to measure by ordinary aperture methods. By looking at the image after PSF subtraction, there will remain some objects that are not stars, or they are stars that were missed by the initial PSF fit. An additional iteration of star finding and fitting can take place. For this study, one iteration was sufficient to detect the majority of M11 stars in the fields.

The PSF method will have trouble near stars that saturate the CCD. Even with aperture photometry, the saturation limit of the CCD should be avoided. But with PSF, the problem is worse because the PSF is fit to the shape of the distribution of light around the star (see Figure 11). Because of this, some of the brightest stars in a frame cannot be accurately measured.

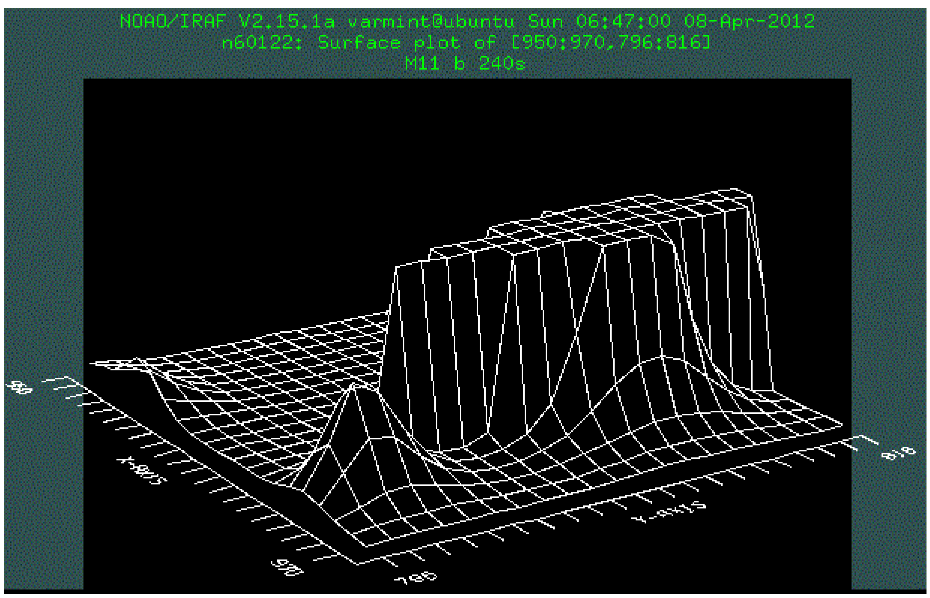

Figure 11. Group of M11 Stars at CCD Saturation

Aperture corrections

Because the PSF-based photometry utilizes a much smaller aperture, each photometric measurement must be adjusted to a value that ideally would have been captured by the large aperture used for the standard stars. This enables the transformation equations to be used correctly. Without these corrections, a significant source of error would be introduced. By measuring several stars through a variety of apertures, an IRAF task can compute a correction needed as a result of using a smaller aperture throughout the PSF process. In this case, IRAF *phot* was used to establish magnitude estimates of the PSF stars based on apertures of radii 5, 6, 7, 8, 9, 10, 11, 12, and 13. A curve was fit to these measurements using the *mkapfile* task (see Figure 12).

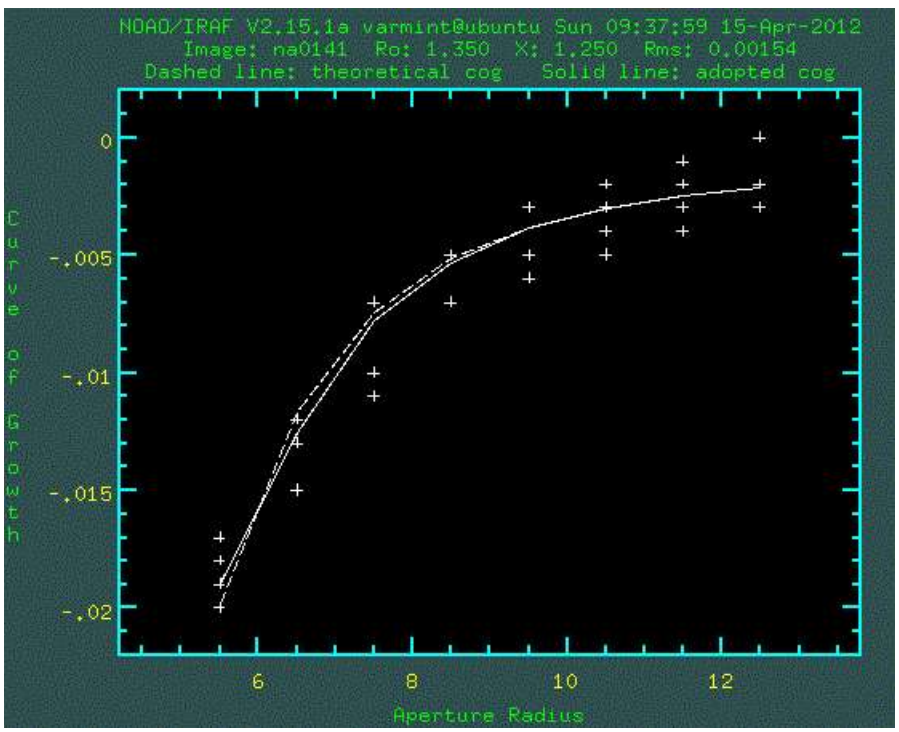

Figure 12. Fitting the Aperture Corrections

The "curve of growth" used by IRAF indicates the rate at which small changes in aperture will affect the magnitude value. Therefore, the task will integrate this function between the two apertures to determine a correction value. Since each frame is subject to a different PSF fit, the aperture correction must be computed for each individual frame. The following corrections were found:

Filter	2007 Night 1	2007 Night 2	2007 Night 10	2008 Night 5 (a)	2008 Night 5 (b)
u		-0.0537	-0.0274		
v		-0.0538	-0.0272		
b		-0.0508	-0.0302		
y		-0.0338	-0.0259		
H*β* narrow	-0.0471	-0.0609	-0.0351	-0.0782	-0.1663
H*β* wide	-0.0322	-0.0554	-0.0254	-0.1224	-0.0705

Table 5. Aperture corrections for each frame

Summary of IRAF Tasks

Tasks useful for PSF photometry and calibration are summarized below:

IRAF Task	Description
psf	Select stars to match a point spread function
nstar	Fit the PSF to groups of stars
substar	Subtract the results of the PSF
allstar	Fit the PSF to all of the stars
mkapfile	Make a set of aperture corrections

Table 6. IRAF PSF Tasks

Chapter 5 – Coordinate Matching

Determining a Coordinate Transformation

When comparing the same set of stars in two different files, it is necessary to establish a transformation from one coordinate system to the other. IRAF contains a task called *xyxymatch* that is capable of matching up coordinates from one file with another by establishing a linear transformation between the data sets. To find the transformation, it has the ability to find sets of 3 stars in one file and match it with the same triangle in the other file. To get an idea how this works, consider three observed stars *A*, *B*, and *C*, where *A*, *B*, and *C* are not along a straight line. Consider this triangle, and a congruent triangle formed by these same stars after they are rotated clockwise 45° around some fixed point O (see Figure 13). The points *A′*, *B′*, *C′* might represent coordinates of those stars in the coordinate system used by a star catalog.

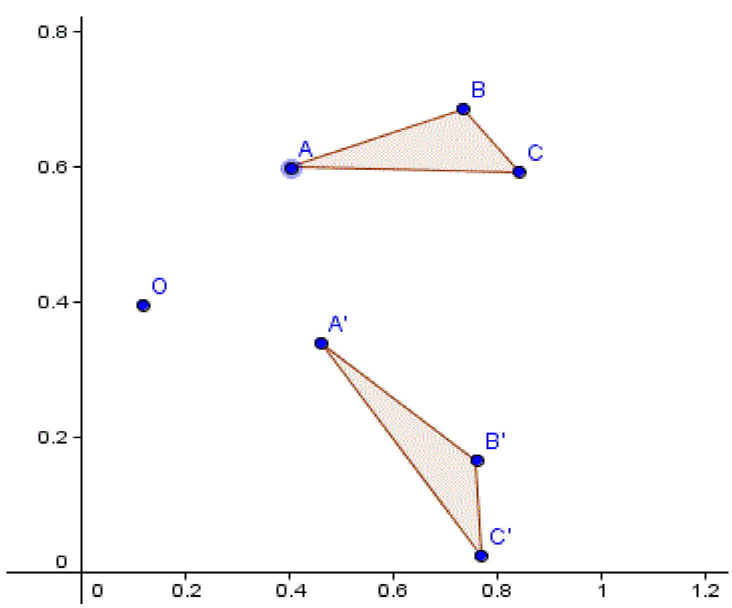

Figure 13. Triangle Rotation

In this case, the transformation is orientation-preserving, since *A*, *B*, and *C* are labeled in a clockwise sequence before and after the transformation. A similar case applies for a translation, or shift, of coordinates. When given two such triangles, it is possible to solve for the transformation that was done, allowing positions of all the other stars in the file to be estimated in the desired coordinate system. Transformations that preserve distances, called isometries, can be classified as rotations, translations, reflections, and glide reflections (see Table 7) .

Type of Isometry	Fixed Points	Effect on Orientation
Rotation	One point	Preserves
Translation	None	Preserves
Reflection	The line of reflection	Reverses
Glide Reflection	None	Reverses

Table 7. List of Isometries

For any orientation-preserving isometry, a matrix equation represents a corresponding rotation by angle θ followed by translation by vector (b_1, b_2) :

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}.$$

A similar result holds for orientation-reversing isometries, such as the glide reflection. However, due to differences in optics, CCD sizes, or units of measure, a more general method to compare the stars' positions is needed. The transformation may stretch or skew the coordinates relative to the local CCD coordinate system. It is easy to generalize the triangle matching to allow for a general linear transformation. The general linear equation can be expressed as

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}.$$

Given any three known matching stars, this equation provides a total of six equations in six unknowns. In most cases, the system can be solved and a unique linear transformation is determined. The quality of this transformation can be judged by how well all of the other stars in the files match up. In this manner, the IRAF task *xyxymatch* can search for matching triangles.

Matching Program Stars to the Catalog

The online database called WEBDA at https://www.univie.ac.at/webda contains information about the position of many stars, including stars near M11. To utilize this data, *X* and *Y* coordinates of 25,256 stars within approximately 20 arcminutes of the center of M11, as well as their Johnson *V* magnitudes, were downloaded and used to match with the PSF data.

WEBDA provides a unique numbering system that references several sources. The task *mkobsfile* will apply the aperture correction and combine the observations from all filters into one file. However, the coordinates in the observation files will be in image *X*, *Y* pixel coordinates rather than the WEBDA *X*, *Y* coordinates. Because the results of *mkobsfile* are in the coordinate system of the CCD, it is necessary to find a linear transformation.

However, *xyxymatch* makes no attempt to compare the actual objects being matched and only verifies their positions are within a certain threshold. I perceive this as a weakness in the matching strategy, so I instead employed my own method which uses a probability-based model to match up the stars with the catalog. I used this method for my research involving Dark Clouds[14], and I expected it to work well with M11 data.

For example, for 2007 data from night 10, I established the following transformation:

$$x' = 44.695 - 0.05589\,x + 0.000885\,y$$

$$y' = -52.115 + 0.000842\,x + 0.055855\,y$$

This was done by matching up 20 stars manually, and using Excel's Solver Add-In to minimize the total variance of the coordinate difference between the two systems. Note the contributions of y in x', and x in y', each on the order of 0.00086. These corrections are necessary because the coordinate systems not only have different scales and zero points, but as discussed with the triangles, they can be rotated or skewed. Since $\sin^{-1}0.00086 \approx 0.049°$, the CCD image coordinates seem tilted by about 0.049° relative to WEBDA's *X* / *Y* system. Without this rotational correction, there is a shift of over a dozen pixels across the CCD image, and stars farther from the image center would be improperly matched. At this point, there has been established a rough correspondence between coordinates in the photometry and coordinates in the WEBDA catalog. The next step is to actually match to stars to the catalog.

Star Matching Functions

After establishing the transformation, my method of matching is to consider each star in the IRAF observation file, and compare it to every target star in the WEBDA file using a smooth distribution, such as a Gaussian function (see Figure 14).

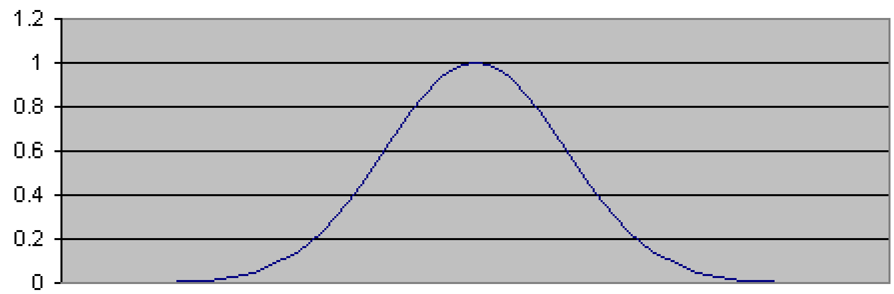

Figure 14. Gaussian Function 1-D

Let r be the coordinate distance between a star and a candidate from the catalog. The distance is determined by $r^2 = (\Delta x)^2 + (\Delta y)^2$, where Δx and Δy are positional differences. I used a Gaussian function $f(r) = \exp(-ar^2)$, where a is a constant. Equivalently, $f(\Delta x, \Delta y) = \exp[-a(\Delta x)^2 - a(\Delta y)^2]$, which is radially symmetric.

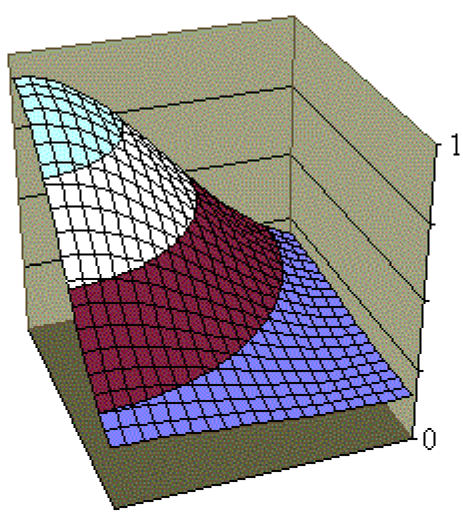

Figure 15. Gaussian Function 2-D

Instead of a hard threshold as in *xyxymatch*, in some sense this function will smoothly weigh the likelihood that a match is valid, accepting some poor (but reasonable) matches once other nearby stars are accounted for. The choice was made to select the number a so that it makes sense for a match to always be rejected when $f < 0.5$, while still attempting to maximize f. So the value a determines a FWHM for matching purposes. In most cases I have found $f > 0.98$ when the right star is matched.

A matching algorithm can attempt to maximize this function over all the stars and a number of associated sets of catalog targets. This method can reduce false matches, and allows stars to be matched with less sensitivity to proper motions, errors in *daofind* / *allstar* position estimates, or errors in catalog X, Y parameters.

As an additional improvement to such an algorithm, I have included magnitude differences between a star, as determined by IRAF's *invertfit*, and its catalog candidate. The difference is defined by $\Delta V = V_{Photometry} - V_{Catalog}$. Such magnitude closeness seems appropriate, as it would be problematic to match up an extremely faint star with a bright star only because of the closeness in the transformed coordinates. The magnitude match can also be applied to a Gaussian function, such as $g(\Delta V) = \exp[\,-b(\Delta V)^2\,]$.

One can argue this seems somewhat artificial, as ΔV is on a logarithmic scale, but Δx, Δy are based on linear coordinates. However, I argue that the use of a logarithmic scale is more acceptable for V since the number of catalog stars at larger apparent magnitudes is not strictly exponential (see Figure 16), and the observed variability of a star will be based on magnitude, not a uniform level of flux.

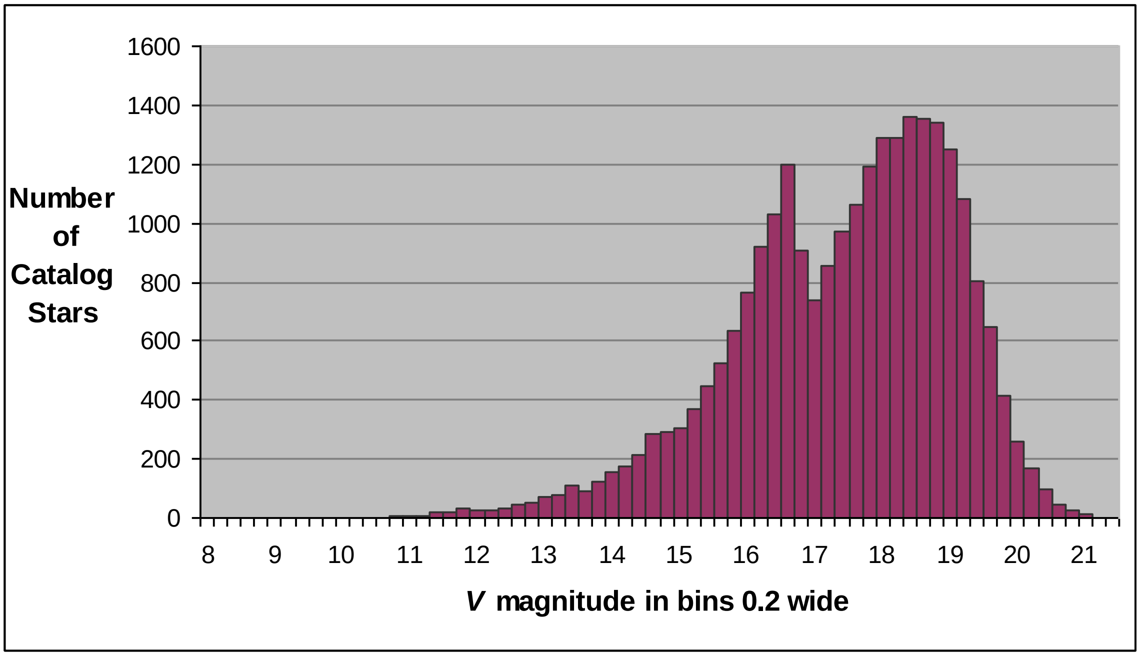

Figure 16. Number of M11 Stars in WEBDA by Magnitude

Although it could be argued that the factor *a* should not be constant, but increased by some factor related to the magnitude *V*, since more stars will enter into the candidate field as *V* increases. At that point the algorithm ought to become slightly more selective. This refinement was not attempted, but it seems like a sound improvement.

The next step is to combine the methods of positional matching and magnitude matching. It can be expected that *X*, *Y* and *V* are independent parameters, and the joint probability is simply the product. So a probability estimator can be derived:

$$F(\Delta x, \Delta y, \Delta V) = f(\Delta x, \Delta y)\, g(\Delta V)$$

$$= \exp[\, - a(\Delta x)^2 - a(\Delta y)^2\,]\, \exp[\, - b(\Delta V)^2\,]\,.$$

$$= \exp[\, - a(\Delta x)^2 - a(\Delta y)^2 - b(\Delta V)^2\,]\,.$$

Note that this function has not been normalized; there is no constant in front, because I only want to maximize the overall sum of this metric among all stars and their best catalog target. For nights 2 and 10, I used $\exp[-16(\Delta x)^2 - 16(\Delta y)^2 - 9(\Delta V)^2]$, a $4^2/3^2$ ratio, which places the $F = 0.5$ threshold at 4 pixels, or 0.28 magnitudes, or some equivalent sum of the squares. For nights with no V parameter in the photometry, I did not drop magnitude sensitivity entirely, but I chose $\exp[-16(\Delta x)^2 - 16(\Delta y)^2 - 1(\Delta V)^2]$, using β_{wide} as an estimator of V. This relaxes the constraint on magnitude difference to about 0.8 magnitude, while still offering some magnitude selectivity.

Searching for Solutions

Theoretically, a nice solution would be to try every combination of candidate matches. As an example, if 5 stars are to be matched with a catalog of 9 stars, a permutation $P(9, 5)$ can determine the total number of solutions that might be considered (see Figure 17).

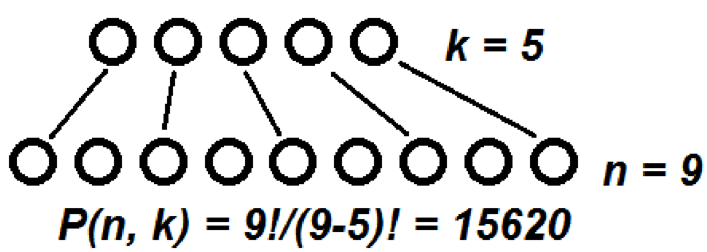

Figure 17. Example of Matching Permutations

This ideal strategy will fail, since there are over 1000 stars in a typical observation file, and it is computationally difficult to try $P(25256, 1000)$ matches. There is an approximation, $n! \approx (2\pi n)^{1/2}e^{-n}n^n$, known as Stirling's formula, which was actually developed by DeMoivre.[15] Applied to the general case,

$$
\begin{aligned}
&P(n,k) = n!/(n-k)! \\
&\approx \sqrt{\frac{2\pi n}{2\pi(n-k)}} \cdot \frac{e^{-n}}{e^{-(n-k)}} \cdot \frac{e^{n\ln n}}{e^{(n-k)\ln(n-k)}} = \sqrt{\frac{n}{n-k}} \cdot e^{-k+n\ln n-(n-k)\ln(n-k)} \\
&= 10^{\frac{1}{\ln 10}\left[\frac{1}{2}\left(\ln\frac{n}{n-k}\right)-k+n\ln n-(n-k)\ln(n-k)\right]}.
\end{aligned}
$$

For $P(25256, 1000)$, the result is roughly 10^{4394} permutations. With this approach, it would be necessary to weigh each one of these attempts using a sum of 1000 terms. A more practical solution is to try an iterative approach, finding the best matches one by one, starting with the brightest stars.

To run this process, I used Visual Basic and a number of nested loops. I made sure both lists of stars are sorted by magnitude, so bright stars (having less reddening and photometric error) are more likely to be matched first. The idea can be described by the following pseudocode:

```
for i = 1 to NumberOfCenters
      greatest := 0
      for j = 1 to NumberOfTargets
            score := F( x(i)-xtarget(j),
                        y(i)-ytarget(j),
                        V(i)-Vtarget(j) )
            if score > 0.5 and score > greatest then
                  for k = 1 to NumberOfCenters
                        CheckForExistingMatch(k,j)
                  next
                  if NoExistingMatches then
                        greatest=score
                        StoreThisMatch(i, j)
                  end if
            end if
      next
next
```

The integer `NumberOfCenters` is the number of *X*, *Y* centers found in the output of *mkobsfile*, typically between 1000 and 2000. As the variable `i` searches through all of the *X*, *Y* centers coming from the photometry, the variable `j` locates a suitable catalog target. The procedure named `StoreThisMatch` would simply replace center `i`'s previous match, if any exists. There is also a basic match-checking loop (variable `k`), so that no two stars are matched up with the same target. In practice, I also check that any prior match was actually better than the one just found by `i` and `j`, otherwise the previous match can be discarded since it could be better to keep match `i`, `j` and let it take precedence. Three passes were made through this process to re-fit any discarded matches. I did not find a problem with the iteration, although without some caution it seems possible a cycle could develop, similar to Newton's method in numerical analysis, and the stellar matching solution may cycle through two or more closely matched permutations. Such a problem could be addressed by building a table of matches and choosing the best among the cycle.

M11 Matching Results

The result of this matching process can be plotted on a bubble plot, with the area of each bubble proportional to the visible flux which is proportional to $10^{-V/2.5}$.

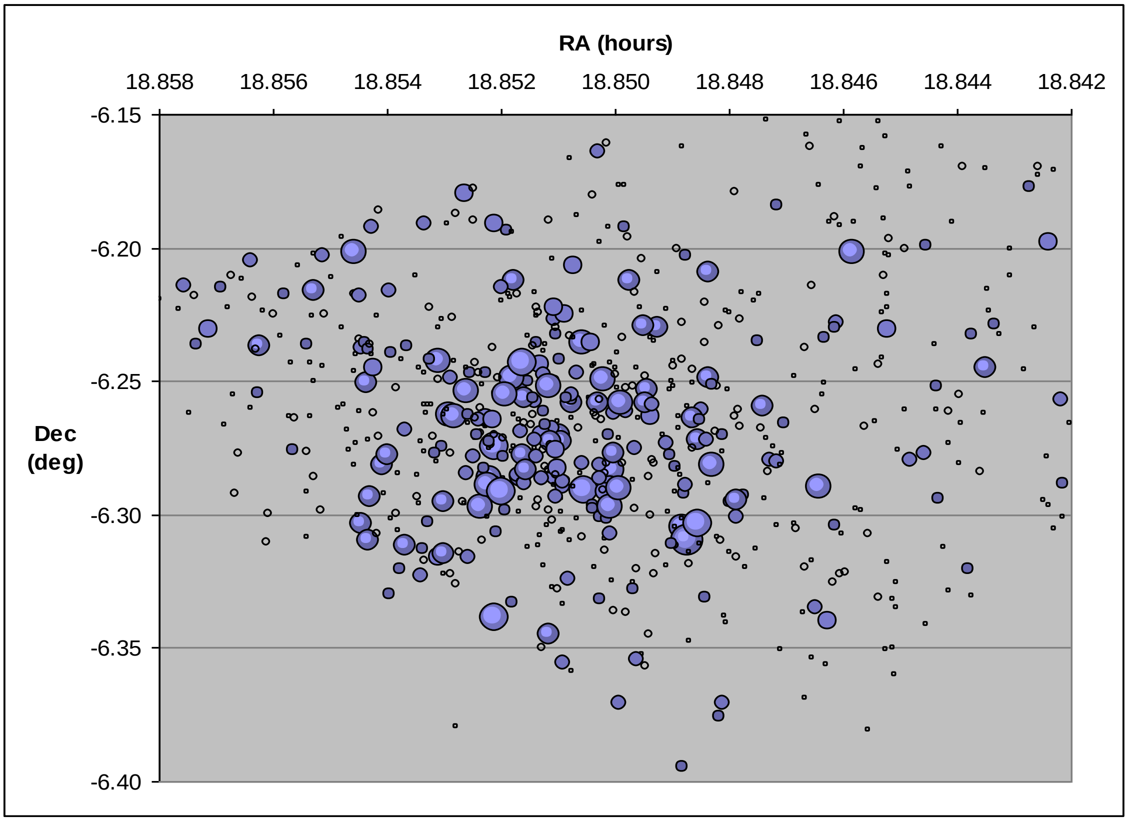

Figure 18. Coordinate Plot of M11 Stellar Flux Based on *V*

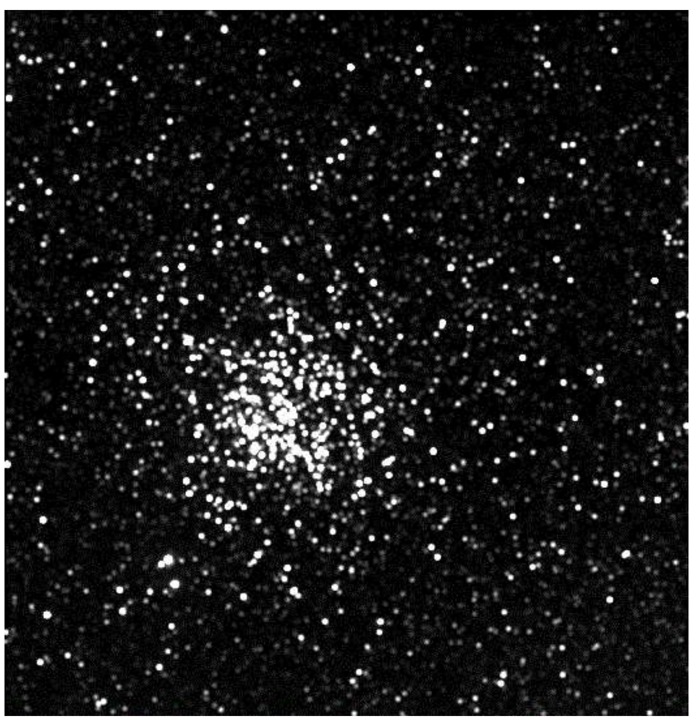

Figure 19. Image of M11 in *y* filter

This demonstrates that the matching works very well near the center of a crowded field. The matching seems to fail for stars near the corners of the image, which could be the result of poor illumination correction in the flat field, or possibly some higher-order coordinate transformational terms. This particular technique of matching was also employed to locate the cluster standards (IC 4665, NGC 7209, NGC 6664, NGC 6913).

Chapter 6 – Analysis

Determination of Stellar Types

The photometric data can be plotted to help identify stellar types. A plot of *V* versus *b* – *y* as shown in Figure 20 will show most stars (dwarfs) in the Main Sequence, and it separates out the stars with greater intrinsic brightness (giants). The interstellar extinction will tend to move stars to the right, so they appear to have a cooler temperature, while at the same time moving them downward so they appear fainter.

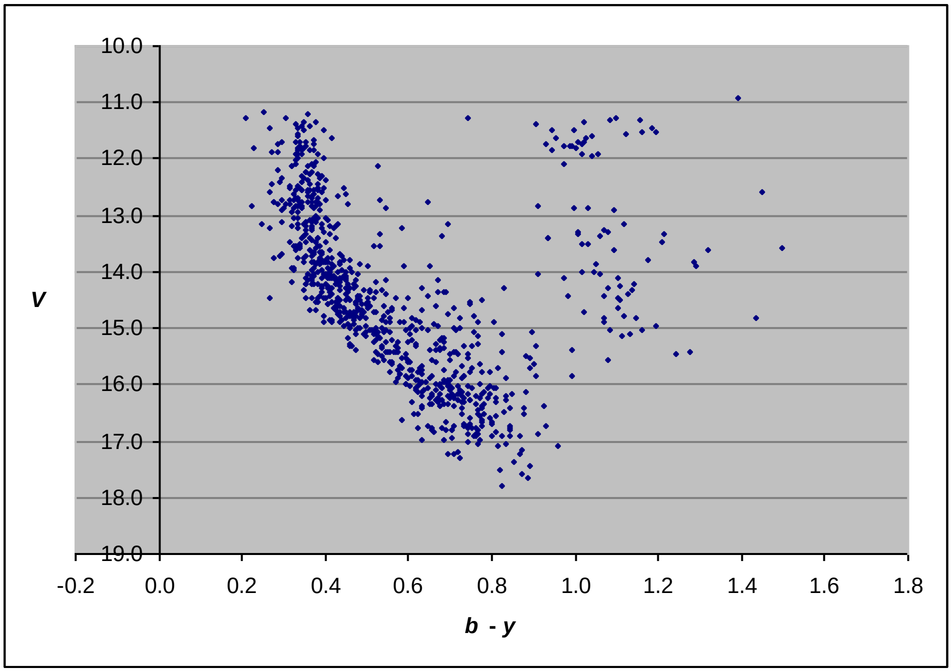

Figure 20. *V* versus *b* - *y*

It is necessary to separate the spectral types in order to estimate the color excess, and therefore determine the intrinsic brightness of the stars. In the *uvby* system, determination of stellar types involves examination of the m_1 and c_1 indices (see Figure 21 and Figure 22).

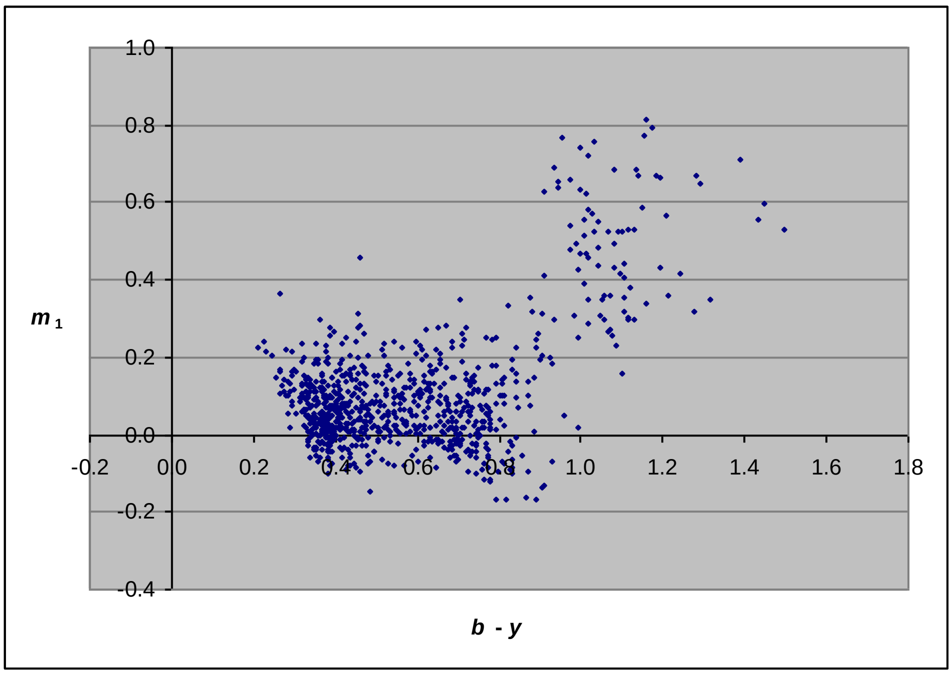

Figure 21. The m_1 Index versus $b - y$

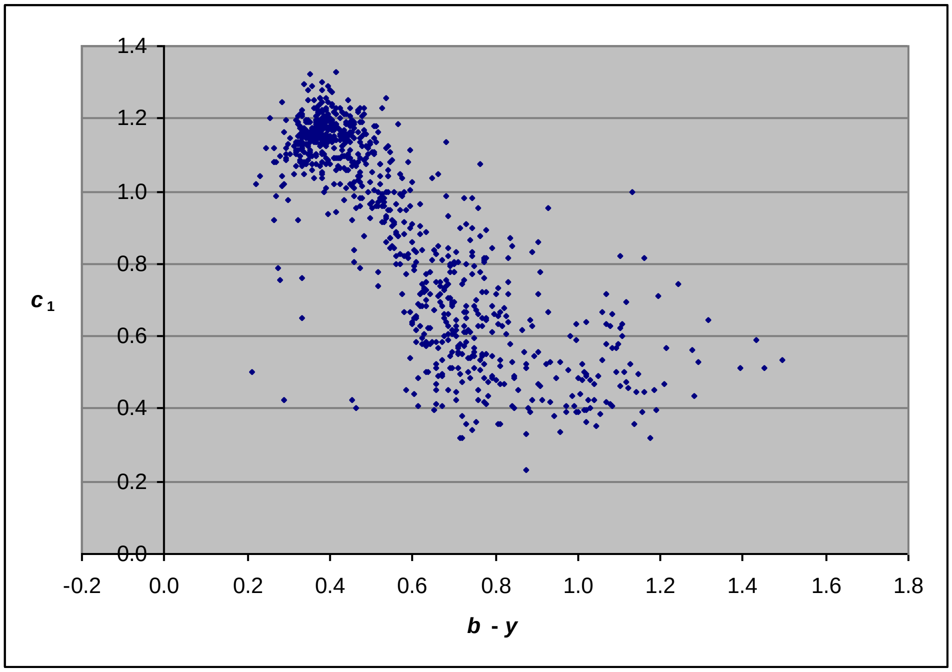

Figure 22. The c_1 Index versus $b - y$

These plots of m_1 and c_1 are showing 849 stars. However, the values are affected by interstellar reddening. It is customary to determine spectral types by correcting the values for such reddening effects. In this study, I used the following definitions:

$$[c_1] = c_1 - 0.20\,(b - y),$$

$$[m_1] = m_1 + 0.33\,(b - y).$$

The values $[c_1]$ and $[m_1]$ are much less affected by the interstellar reddening in comparison to c_1 and m_1. By plotting these two parameters (see Figure 23), we can determine which stars belong to which spectral types.

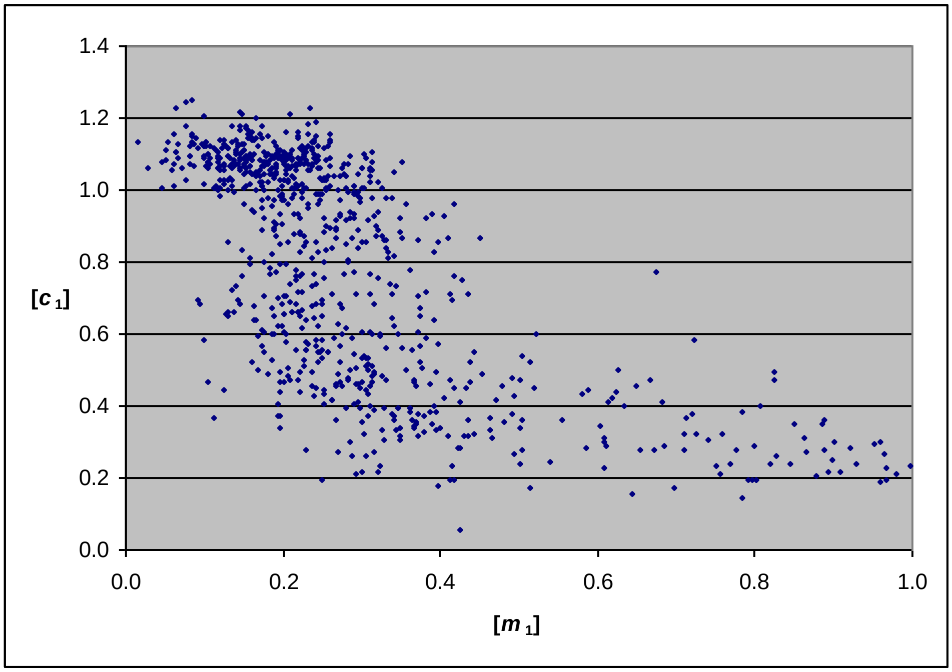

Figure 23. [c_1] versus [m_1]

Using this information, the early type stars (spectral classes A0 and earlier) can be identified. For these stars, the color excess $E(b-y)$ can be obtained via the calibration of Crawford, and the absolute magnitude can be obtained using the calibration of Balona & Shobbrook.[16]

Absolute Magnitudes

In the *uvbyβ* system, the absolute magnitude M_V is related mainly to the β parameter and, to some extent, the c_0 parameter (see Figure 24).

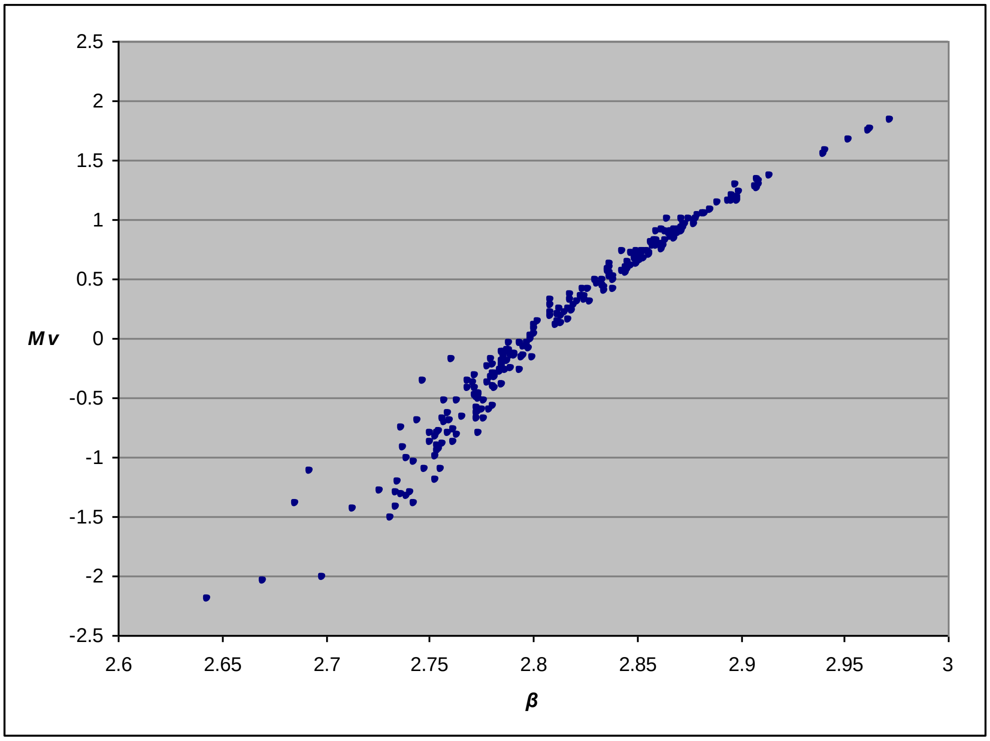

Figure 24. ***M_V* versus *β***

Chapter 7 – Conclusions

In this study, there are 244 stars earlier than A0. The color excess, $E(b-y)$, was calculated via the calibrations of Crawford, while M_V is found using the calibration of Balona and Shobbrook. The distance modulus (*DM*) is the difference between the apparent magnitude corrected for the reddening, and the absolute magnitude, $V_0 - M_V$. The median distance modulus is 11.320 ± 0.034. The distance modulus is directly connected to the distance *r* by the equation $r = 10^{\frac{DM+5}{5}}$.

The corresponding distance is 1837 parsecs. Figure 25 shows the distribution of distances calculated for the sample of 244 stars earlier than spectral type A0.

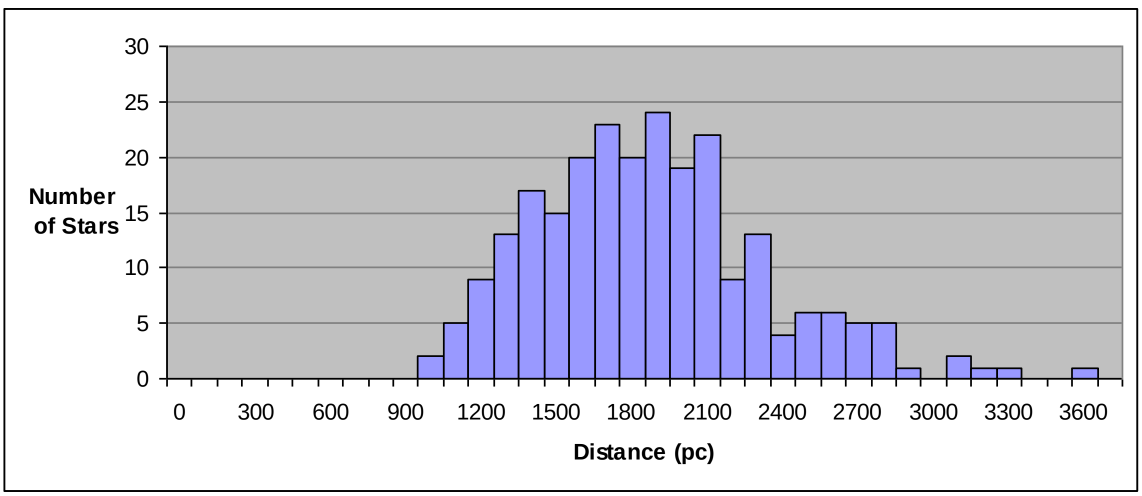

Figure 25. M11 Stars Earlier than A0 by Distance

The WEBDA open cluster web page indicates that M11 is at a distance of 1877 pc. Therefore, this study estimates a similar distance. However, the color excess and distances are considered preliminary, because this data set will be combined with additional data to improve its precision.

Strömgren-Crawford *uvbyβ* photometry is an improvement over the *UBV* system. It provides a distance independent of metallicity when using B-stars.

Another consideration in this study is the use of Gaussian optimization and magnitudes to perform the star matching. I believe this method, if combined with the other methods built into the IRAF star matching utility, would yield a better, more accurate connection to the star catalogs.

APPENDIX A

Standard Star Photometric Results

N	Star	Observed Parameters V	$b-y$	m_1	c_1	β	Catalog Parameters V	$b-y$	m_1	c_1	β
1	4665-0064					2.738					2.703
1	4665-0067					2.889					2.889
1	4665-0049					2.717					2.736
1	4665-0073					2.654					2.689
1	4665-0064					2.728					2.703
1	4665-0067					2.91					2.889
1	4665-0049					2.725					2.736
1	4665-0073					2.671					2.689
1	4665-0066					2.886					2.874
2	4665-0064	7.332	0.047	0.092	0.489	2.742	7.36	0.056	0.064	0.47	2.703
2	4665-0058	7.583	0.061	0.057	0.464	2.695	7.596	0.043	0.066	0.43	2.71
2	4665-0067	8.791	0.171	0.133	1.016	2.88	8.8	0.146	0.146	1.025	2.889
2	4665-0049	7.657	0.051	0.099	0.488	2.725	7.695	0.056	0.077	0.47	2.736
2	4665-0073	7.072	0.067	0.081	0.439	2.648	7.13	0.056	0.054	0.452	2.689
2	4665-0066	10.399	0.196	0.182	0.852	2.836	10.41	0.196	0.172	0.904	2.874
2	4665-0064	7.395	0.03	0.1	0.477	2.709	7.36	0.056	0.064	0.47	2.703
2	4665-0058	7.668	0.022	0.085	0.473	2.69	7.596	0.043	0.066	0.43	2.71
2	4665-0067	8.851	0.143	0.163	1.019	2.903	8.8	0.146	0.146	1.025	2.889
2	4665-0049	7.713	0.023	0.133	0.473	2.711	7.695	0.056	0.077	0.47	2.736
2	4665-0073	7.144	0.027	0.12	0.432	2.628	7.13	0.056	0.054	0.452	2.689
2	4665-0066	10.44	0.211	0.157	0.873	2.864	10.41	0.196	0.172	0.904	2.874
2	7209-0055	11.835	0.175	0.113	1.134	2.877	11.814	0.176	0.134	1.084	2.771
2	7209-0107	11.085	0.255	0.113	1.122	2.843	11.082	0.251	0.128	1.093	2.861
2	7209-0038	10.99	0.141	0.088	1.149	2.841	10.97	0.124	0.129	1.123	2.851
2	7209-0070	10.964	0.276	0.132	0.577	2.734	10.974	0.28	0.152	0.528	2.682
2	7209-0046	10.117	0.132	0.094	1.157	2.861	10.1	0.122	0.13	1.153	2.861
2	7209-0068	10.768	0.195	0.11	1.2	2.828	10.729	0.203	0.118	1.198	2.793
2	7209-0104	11.38	0.196	0.109	1.14	2.812	11.398	0.178	0.103	1.213	2.799
2	7209-0101	11.873	0.235	0.165	0.943	2.846	11.929	0.269	0.145	1.074	2.825
2	7209-0050	12.362	0.187	0.106	1.059	2.894	12.365	0.171	0.169	1.051	2.021
2	7209-0138	12.57	0.401	0.171	0.43	2.645	12.518	0.463	0.092	0.393	2.553
2	7209-0102	11.68	0.187	0.157	1.028	2.829	11.685	0.184	0.185	0.999	2.843
2	7209-0097	11.11	0.712	0.322	0.334	2.546	11.102	0.697	0.323	0.316	2.535
2	7209-0134	13.099	0.261	0.153	0.839	2.844	13.125	0.233	0.178	0.908	2.591
2	7209-0094	11.109	0.145	0.093	1.115	2.836	11.113	0.136	0.107	1.119	2.816
2	7209-0053	10.736	0.131	0.104	1.11	2.866	10.707	0.118	0.138	1.119	2.9
2	7209-0062	10.753	0.144	0.061	1.122	2.832	10.731	0.115	0.119	1.121	2.852
2	7209-0080	11.653	0.197	0.145	1.004	2.856	11.636	0.184	0.17	1.005	2.877
2	7209-0092	12.593	0.185	0.172	1.006	2.824	12.621	0.166	0.212	0.979	2.866
2	7209-0041	11.6	0.212	0.155	0.973	2.849	11.633	0.196	0.195	0.945	2.798
2	7209-0061	9.954	0.135	0.105	1.237	2.834	9.938	0.12	0.135	1.246	2.864
2	7209-0039	11.239	0.417	0.172	0.354	2.593	11.262	0.405	0.186	0.336	2.592
2	7209-0085	12.085	0.225	0.11	1.006	2.828	12.084	0.228	0.123	1.036	2.827
2	7209-0105	11.561	0.135	0.122	1.078	2.857	11.594	0.131	0.128	1.074	2.865
2	7209-0060	12.574	0.211	0.147	0.974	2.891	12.619	0.203	0.166	1.018	2.837

		Observed Parameters					Catalog Parameters				
N	Star	V	$b-y$	m_1	c_1	β	V	$b-y$	m_1	c_1	β
2	7209-0064	11.206	0.111	0.166	1.166	2.856	11.198	0.151	0.155	1.098	2.904
2	7209-0103	10.899	0.14	0.129	1.161	2.814	10.923	0.146	0.118	1.201	2.843
2	7209-0044	11.51	0.152	0.129	1.032	2.855	11.488	0.166	0.098	1.067	2.885
2	7209-0047	11.79	0.142	0.12	1.114	2.84	11.81	0.128	0.144	1.1	2.857
2	7209-0079	11.903	0.167	0.141	1.03	2.834	11.917	0.177	0.139	1.028	2.777
2	7209-0083	11.038	0.077	0.165	1.075	2.857	11.037	0.102	0.131	1.087	2.876
10	HD122563	6.192	0.639	0.107	0.507	2.521	6.203	0.639	0.091	0.543	2.537
10	HD122563	6.21	0.631	0.082	0.578	2.516	6.203	0.639	0.091	0.543	2.537
10	HD139137	6.51	0.462	0.252	0.637	2.663	6.509	0.468	0.236	0.64	2.663
10	4665-0053	11.438	0.357	0.096	0.522	2.553	11.41	0.366	0.113	0.527	2.702
10	4665-0076	8.225	0.09	0.104	0.537	2.742	8.21	0.103	0.078	0.568	2.745
10	4665-0064	7.366	0.043	0.066	0.481	2.716	7.36	0.056	0.064	0.47	2.703
10	4665-0058	7.611	0.052	0.054	0.448	2.705	7.596	0.043	0.066	0.43	2.71
10	4665-0067	8.816	0.154	0.129	1.034	2.892	8.8	0.146	0.146	1.025	2.889
10	4665-0049	7.679	0.038	0.11	0.461	2.718	7.695	0.056	0.077	0.47	2.736
10	4665-0073	7.108	0.053	0.078	0.427	2.667	7.13	0.056	0.054	0.452	2.689
10	4665-0066	10.412	0.201	0.108	0.991	2.884	10.41	0.196	0.172	0.904	2.874
10	4665-0057	11.109	0.337	0.193	0.49	2.727	11.13	0.327	0.137	0.602	2.698
10	4665-0076	8.225	0.1	0.076	0.573	2.725	8.21	0.103	0.078	0.568	2.745
10	4665-0064	7.357	0.061	0.044	0.492	2.739	7.36	0.056	0.064	0.47	2.703
10	4665-0058	7.605	0.055	0.039	0.46	2.729	7.596	0.043	0.066	0.43	2.71
10	4665-0067	8.821	0.153	0.132	1.021	2.873	8.8	0.146	0.146	1.025	2.889
10	4665-0049	7.679	0.043	0.102	0.471	2.717	7.695	0.056	0.077	0.47	2.736
10	4665-0073	7.111	0.058	0.06	0.446	2.663	7.13	0.056	0.054	0.452	2.689
10	4665-0066	10.391	0.215	0.148	0.918	2.885	10.41	0.196	0.172	0.904	2.874
10	4665-0057	11.105	0.411	0.01	0.643	2.745	11.13	0.327	0.137	0.602	2.698
5	4665-0062					2.691					2.69
5	4665-0076					2.742					2.745
5	4665-0064					2.73					2.703
5	4665-0058					2.751					2.71
5	4665-0067					2.879					2.889
5	4665-0073					2.675					2.689
5	4665-0062					2.692					2.69
5	4665-0053					2.712					2.702
5	4665-0076					2.739					2.745
5	4665-0064					2.715					2.703
5	4665-0058					2.731					2.71
5	4665-0067					2.896					2.889
5	4665-0073					2.689					2.689
5	4665-0066					2.848					2.874
5	4665-0057					2.687					2.698
5	4665-0062					2.701					2.69
5	4665-0076					2.745					2.745
5	4665-0064					2.732					2.703
5	4665-0058					2.726					2.71

		Observed Parameters					Catalog Parameters				
N	Star	V	$b-y$	m_1	c_1	β	V	$b-y$	m_1	c_1	β
5	4665-0067					2.893					2.889
5	4665-0073					2.697					2.689
5	4665-0066					2.86					2.874
5	4665-0062					2.694					2.69
5	4665-0076					2.746					2.745
5	4665-0064					2.729					2.703
5	4665-0058					2.748					2.71
5	4665-0067					2.896					2.889
5	4665-0073					2.683					2.689
5	4665-0066					2.848					2.874
5	4665-0057					2.696					2.698
5	6664-0059					2.638					2.692
5	6664-0062					2.705					2.734
5	6664-0058					2.714					2.703
5	6664-0056					2.644					2.688
5	6664-0055					2.639					2.644
5	6664-0063					2.662					2.705
5	6664-0056					2.664					2.688
5	6664-0055					2.639					2.644
5	6664-0059					2.682					2.692
5	6664-0056					2.677					2.688
5	6664-0055					2.695					2.644
5	6664-0059					2.652					2.692
5	6664-0062					2.675					2.734
5	6664-0058					2.644					2.703
5	6664-0056					2.607					2.688
5	6664-0061					2.616					2.648
5	6664-0055					2.576					2.644
5	6913-0005					2.594					2.596
5	6913-0009					2.624					2.661
5	6913-0008					2.612					2.662
5	6913-0027					2.661					2.665
5	6913-0064					2.732					2.736
5	6913-0003					2.58					2.594
5	6913-0007					2.683					2.663
5	6913-0014					2.712					2.681
5	6913-0063					2.722					2.726
5	6913-0002					2.581					2.596
5	6913-0022					2.684					2.684
5	6913-0057					2.573					2.564
5	6913-0004					2.605					2.617
5	6913-0001					2.579					2.589
5	6913-0025					2.76					2.748
5	6913-0108					2.821					2.856
5	6913-0027					2.655					2.665

		Observed Parameters					Catalog Parameters				
N	Star	V	$b-y$	m_1	c_1	β	V	$b-y$	m_1	c_1	β
5	6913-0064					2.724					2.736
5	6913-0010					2.706					2.678
5	6913-0003					2.583					2.594
5	6913-0014					2.684					2.681
5	6913-0063					2.702					2.726
5	6913-0002					2.584					2.596
5	6913-0001					2.574					2.589
5	6913-0025					2.749					2.748
5	6913-0005					2.609					2.596
5	6913-0027					2.625					2.665
5	6913-0064					2.725					2.736
5	6913-0010					2.706					2.678
5	6913-0003					2.577					2.594
5	6913-0063					2.732					2.726
5	6913-0002					2.59					2.596
5	6913-0004					2.593					2.617
5	6913-0001					2.577					2.589
5	6913-0025					2.774					2.748
5	6913-0005					2.597					2.596
5	6913-0027					2.622					2.665
5	6913-0064					2.726					2.736
5	6913-0010					2.702					2.678
5	6913-0003					2.579					2.594
5	6913-0063					2.729					2.726
5	6913-0002					2.575					2.596
5	6913-0004					2.589					2.617
5	6913-0001					2.575					2.589
5	6913-0025					2.768					2.748
5	3601-0004					2.661					2.642
5	3601-0005					2.727					2.64
5	3601-0002					2.69					2.636
5	3601-0003					2.705					2.679
5	3601-0006					2.635					2.627
5	3601-0001					2.669					2.659
5	3601-0004					2.664					2.642
5	3601-0005					2.73					2.64
5	3601-0002					2.693					2.636
5	3601-0003					2.695					2.679
5	3601-0006					2.626					2.627
5	3601-0001					2.659					2.659
5	3601-0005					2.712					2.64
5	3601-0002					2.641					2.636
5	3601-0003					2.714					2.679
5	3601-0006					2.648					2.627
5	3601-0001					2.672					2.659

APPENDIX B

Program Star Photometric Results

Webda No.	RA (hrs)	Dec (deg)	*V*	error	*b – y*	error	m_1	error	c_1	error	*β*	error
231											2.857	0.146
246											2.678	0.098
270											2.613	0.056
303											2.653	0.138
344											2.936	0.055
369	18.858006	-6.219238	14.353	0.046	0.452	0.102	0.242	0.198	0.918	0.202	2.907	0.023
394	18.857663	-6.222980	14.652	0.051	0.710	0.101	0.229	0.189	0.510	0.186	2.723	0.030
401	18.857576	-6.214050	12.376	0.045	0.358	0.088	0.184	0.168	1.077	0.176	2.904	0.016
403											2.644	0.066
411	18.857488	-6.247044	11.325	0.051	1.045	0.096					2.863	0.130
412	18.857492	-6.261627	14.441	0.047	0.385	0.100	0.255	0.194	0.997	0.204	2.986	0.027
413											2.858	0.060
414	18.857393	-6.217834	13.740	0.045	0.277	0.088	0.220	0.167	1.097	0.172	2.995	0.019
418	18.857368	-6.235810	12.833	0.046	0.912	0.094	0.628	0.179	0.423	0.182	2.883	0.151
426	18.857195	-6.257746									2.647	0.040
427	18.857140	-6.230709	12.078	0.047	0.330	0.087	0.133	0.159	1.214	0.157	2.907	0.031
429											2.601	0.156
436	18.856952	-6.238659									2.650	0.027
439	18.856933	-6.224093									2.951	0.032
443	18.856912	-6.214605	12.908	0.041	0.296	0.077	0.161	0.143	1.196	0.144	2.873	0.045
451	18.856862	-6.266445	15.319	0.044	0.459	0.085	0.284	0.160	0.805	0.169	2.897	0.037
453	18.856811	-6.222134	15.355	0.030	0.536	0.074	0.145	0.148	0.861	0.161	2.786	0.140
457	18.856728	-6.210594	13.529	0.038	0.322	0.072	0.152	0.134	1.187	0.136	2.914	0.061
460	18.856700	-6.255099	14.469	0.042	0.382	0.085	0.200	0.159	1.081	0.153	2.957	0.023
462											2.624	0.179
467	18.856684	-6.291926	14.130	0.053	0.544	0.099	0.239	0.184	0.872	0.184	2.866	0.033
470	18.856630	-6.276926	14.230	0.049	0.352	0.091	0.235	0.166	1.149	0.161	2.783	0.137
471	18.856544	-6.211553	14.889	0.032	0.414	0.066	0.235	0.125	0.942	0.125	2.878	0.082
476	18.856463	-6.229474									2.929	0.063
485	18.856388	-6.204862	12.590	0.037	0.265	0.065	0.167	0.118	1.082	0.119	2.776	0.122
487	18.856361	-6.218208	14.146	0.041	0.672	0.078	0.283	0.142	0.494	0.133	2.677	0.063
490	18.856401	-6.260134	14.321	0.052	1.135	0.088	0.683	0.155	0.357	0.158	2.691	0.031
499	18.856277	-6.254116	13.231	0.037	0.265	0.072	0.163	0.135	1.082	0.135	2.956	0.020
500	18.856258	-6.243206									2.830	0.033
503	18.856251	-6.236791	11.840	0.037	0.946	0.071	0.639	0.133	0.485	0.132	2.686	0.017
504	18.856194	-6.223461	15.613	0.032	0.561	0.071	0.226	0.138	0.821	0.141	2.794	0.143
515	18.856033	-6.222167									2.948	0.053
516	18.856108	-6.310032	14.280	0.052	0.389	0.096	0.277	0.179	1.007	0.182	2.990	0.027
517	18.856095	-6.305047									2.696	0.033
518	18.856082	-6.299337	13.683	0.049	0.293	0.093	0.213	0.171	1.118	0.169	2.976	0.022
520	18.855989	-6.225040	13.543	0.036	0.339	0.065	0.145	0.118	1.108	0.113	2.947	0.073
521	18.856012	-6.252078	13.029	0.040							2.640	0.022
525	18.855884	-6.232867	15.801	0.044	0.578	0.077	0.182	0.142	0.823	0.154	2.717	0.156
529	18.855908	-6.294191									2.961	0.058
533	18.855812	-6.217143	13.384	0.036	0.935	0.062	0.689	0.110	0.420	0.109	2.602	0.096

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
534	18.855853	-6.261606									2.733	0.074
546	18.855700	-6.242686	14.669	0.029	0.364	0.064	0.296	0.121	1.036	0.114	2.992	0.031
550	18.855671	-6.275572	13.140	0.048	0.247	0.082	0.202	0.145	1.119	0.136	2.949	0.042
552	18.855566	-6.206523	14.519	0.033	0.379	0.057	0.214	0.098	1.054	0.092	2.938	0.069
553	18.855617	-6.263603	14.306	0.032	0.349	0.067	0.185	0.126	1.131	0.124	2.989	0.023
554	18.855648	-6.296588									2.955	0.039
561	18.855522	-6.285938									2.991	0.025
565	18.855407	-6.236053	12.877	0.035	1.031	0.061	0.757	0.109	0.405	0.105	2.600	0.079
568	18.855334	-6.195381									2.888	0.102
569	18.855411	-6.276056	13.929	0.048	0.318	0.081	0.235	0.143	1.114	0.131	2.995	0.064
570	18.855408	-6.291027	14.458	0.038	0.599	0.075	0.239	0.140	0.642	0.142	2.777	0.025
572	18.855401	-6.308529	14.885	0.044	0.436	0.082	0.204	0.154	0.973	0.158	2.959	0.029
573	18.855309	-6.225572	14.678	0.036	0.633	0.065	0.179	0.114	0.587	0.103	2.633	0.148
574	18.855294	-6.216241	11.796	0.033	0.336	0.056	0.124	0.097	1.297	0.089	2.892	0.079
581	18.855221	-6.211892									2.633	0.063
582	18.855295	-6.285746	13.961	0.039	0.323	0.068	0.200	0.124	1.152	0.129	2.945	0.123
586	18.855138	-6.202676	12.413	0.032	0.290	0.051	0.111	0.086	1.017	0.078	2.842	0.075
592	18.855123	-6.207240									2.534	0.120
593											2.882	0.062
594	18.855119	-6.224863	13.627	0.036	0.328	0.059	0.111	0.100	1.155	0.090	2.970	0.077
595	18.855134	-6.244434	15.055	0.049	0.758	0.067	0.063	0.106	0.662	0.105	2.759	0.086
597	18.855172	-6.298281	14.209	0.044	1.141	0.079	0.671	0.145	0.446	0.175	2.670	0.029
602	18.854994	-6.210931	15.415	0.029	0.523	0.055	0.115	0.099	0.973	0.097	2.764	0.116
612	18.854798	-6.195579	14.674	0.025	0.379	0.046	0.230	0.082	1.035	0.077	3.002	0.027
614	18.854862	-6.260157	15.388	0.028	0.472	0.048	0.260	0.088	0.787	0.100	2.839	0.039
615	18.854801	-6.229955	14.507	0.035	0.461	0.055	0.134	0.092	1.186	0.080	2.924	0.072
616	18.854891	-6.319561									2.800	0.057
621	18.854765	-6.258712	14.545	0.032	0.382	0.058	0.184	0.103	1.101	0.098	3.055	0.096
625	18.854701	-6.267810	14.343	0.034	0.686	0.059	0.226	0.105	0.628	0.102	2.754	0.025
628	18.854595	-6.201412	11.491	0.026	0.349	0.043	0.093	0.075	1.281	0.069	2.940	0.017
630	18.854598	-6.217118	13.492	0.034	1.015	0.048	0.624	0.078	0.502	0.081	2.644	0.064
634	18.854535	-6.209819									2.896	0.086
635	18.854572	-6.246121	15.163	0.030	0.453	0.054	0.198	0.096	1.015	0.093	2.858	0.118
636	18.854564	-6.239850	15.421	0.034	0.557	0.050	0.083	0.086	1.000	0.100	2.787	0.123
637	18.854594	-6.281262	15.553	0.029	0.515	0.057	0.222	0.106	0.740	0.109	2.869	0.040
639	18.854585	-6.279158									2.950	0.031
643	18.854490	-6.218061	12.678	0.032	0.330	0.048	0.050	0.078	1.085	0.068	2.859	0.069
645	18.854506	-6.234399	13.787	0.041	1.173	0.057	0.792	0.091	0.318	0.113	2.614	0.073
647	18.854541	-6.273209	14.464	0.031	0.402	0.053	0.163	0.095	1.074	0.099	2.974	0.031
653	18.854539	-6.310935									2.990	0.027
654	18.854461	-6.237385	12.758	0.037	0.644	0.056	0.221	0.092	0.577	0.079	2.663	0.080
655	18.854477	-6.261407	14.703	0.038	0.447	0.062	0.173	0.106	1.112	0.099	2.972	0.038
657	18.854477	-6.316708									2.973	0.043
658	18.854389	-6.235373	13.228	0.035	0.336	0.054	0.112	0.089	1.082	0.077	2.928	0.057
660	18.854449	-6.303525	11.615	0.039	0.956	0.068	0.767	0.125	0.338	0.127	2.686	0.018
663	18.854356	-6.250578	11.912	0.041	0.328	0.058	0.109	0.092	1.082	0.081	2.845	0.062
664	18.854331	-6.237633	13.189	0.041	0.355	0.058	0.110	0.091	1.143	0.076	2.938	0.060

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
665	18.854277	-6.192271	12.470	0.022	0.315	0.037	0.086	0.065	1.124	0.060	2.924	0.014
667	18.854296	-6.235760	13.485	0.037	0.400	0.052	0.104	0.084	1.153	0.074	2.870	0.073
668	18.854273	-6.239806	14.435	0.040	0.411	0.058	0.167	0.094	1.183	0.079	2.926	0.102
669	18.854351	-6.309474	11.806	0.041	1.000	0.070	0.740	0.127	0.390	0.131	2.912	0.154
672	18.854301	-6.293157	11.877	0.036	0.269	0.062	0.125	0.111	0.988	0.111	2.869	0.015
673	18.854262	-6.264382	11.227	0.059	0.458	0.093	0.160	0.162			2.961	0.122
674	18.854237	-6.244627	12.143	0.042	0.373	0.057	0.080	0.088	1.234	0.075	2.837	0.077
675	18.854192	-6.225250	14.832	0.034	1.148	0.050	0.586	0.086	0.494	0.149	2.686	0.119
676	18.854236	-6.261503	13.910	0.034	0.503	0.053	0.153	0.090	0.971	0.087	2.878	0.022
677	18.854148	-6.186001	14.106	0.026	0.406	0.041	0.091	0.068	1.195	0.061	2.997	0.024
682	18.854141	-6.270376	14.077	0.029	0.369	0.047	0.111	0.085	1.197	0.092	3.004	0.088
683	18.854185	-6.306810	13.546	0.032	0.517	0.063	0.203	0.119	0.778	0.122	2.827	0.020
684	18.854134	-6.277821	14.505	0.045	0.435	0.071	0.170	0.120	1.141	0.104	2.984	0.049
686	18.854094	-6.281427	11.756	0.036	0.973	0.058	0.658	0.101	0.406	0.102	2.676	0.016
688											2.869	0.038
689	18.853978	-6.216031	12.772	0.024	0.340	0.039	0.072	0.066	1.152	0.060	2.867	0.083
690	18.854003	-6.253584	16.373	0.034	0.677	0.052	0.064	0.097	0.726	0.140	2.777	0.051
691	18.854050	-6.291733	14.362	0.030	0.389	0.055	0.100	0.103	1.192	0.105	3.014	0.029
693	18.853996	-6.277725	11.909	0.034	0.333	0.053	0.108	0.091	1.211	0.090	2.920	0.022
694	18.853935	-6.239313	13.033	0.036	0.401	0.049	0.080	0.074	1.189	0.063	2.889	0.065
695	18.854015	-6.319629									3.037	0.032
696	18.853937	-6.301159	14.591	0.034	0.434	0.062	0.156	0.116	1.150	0.123	2.953	0.037
699	18.853958	-6.329654	12.931	0.046	0.334	0.078	0.128	0.142	1.207	0.146	2.868	0.018
700	18.853858	-6.252471	13.821	0.033	0.369	0.046	0.123	0.074	1.198	0.073	2.958	0.062
702	18.853826	-6.241198									3.015	0.117
704	18.853861	-6.299421	14.227	0.031	0.366	0.060	0.138	0.112	1.139	0.113	3.028	0.031
708	18.853762	-6.241510	15.395	0.032	0.667	0.047	0.132	0.080	0.696	0.094	2.673	0.149
709	18.853830	-6.306041	14.478	0.035	0.428	0.064	0.138	0.118	1.126	0.118	2.968	0.046
711	18.853786	-6.283954									3.045	0.028
716	18.853773	-6.319949	12.866	0.040	0.301	0.067	0.117	0.123	1.129	0.128	2.926	0.020
717	18.853696	-6.268114	12.767	0.033	0.359	0.048	0.079	0.081	1.056	0.079	2.854	0.076
718	18.853647	-6.236767	13.067	0.030	0.406	0.043	0.063	0.069	1.195	0.061	2.763	0.103
720	18.853696	-6.311656	11.819	0.033	0.229	0.059	0.215	0.110	1.041	0.117	2.951	0.016
727	18.853630	-6.288249									2.936	0.029
732	18.853514	-6.210305	15.029	0.022	0.510	0.033	0.074	0.058	0.957	0.064	2.962	0.040
734	18.853552	-6.286186									2.774	0.055
735	18.853599	-6.333473									2.987	0.035
739	18.853391	-6.182913									3.014	0.027
740	18.853481	-6.272775									2.887	0.106
741	18.853488	-6.284863	14.887	0.026	0.395	0.052	0.266	0.099	0.936	0.100	2.977	0.035
742	18.853441	-6.244882	15.041	0.032	0.541	0.047	0.094	0.077	1.040	0.075	2.767	0.167
744	18.853365	-6.190716	12.457	0.018	0.383	0.027	0.031	0.045	1.219	0.041	2.933	0.017
745											2.917	0.043
747	18.853468	-6.293184	13.467	0.030	0.316	0.054	0.134	0.099	1.196	0.099	2.909	0.070
748	18.853448	-6.295874	15.388	0.032	0.676	0.060	0.076	0.110	0.603	0.107	2.822	0.121
752	18.853403	-6.277345									2.825	0.021
754	18.853354	-6.258453	14.369	0.041	0.670	0.062	0.172	0.107	0.532	0.106	2.673	0.075

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
755	18.853359	-6.276148	14.816	0.029	0.451	0.048	0.122	0.083	1.092	0.082	2.913	0.072
756	18.853406	-6.322453	12.713	0.041	0.294	0.069	0.151	0.124	1.092	0.126	2.950	0.035
757	18.853395	-6.312499	12.814	0.038	0.303	0.073	0.165	0.135	1.100	0.133	2.916	0.025
758	18.853377	-6.308010									2.754	0.178
759	18.853312	-6.261960	14.909	0.029	0.452	0.045	0.145	0.076	1.072	0.078	2.814	0.155
760	18.853258	-6.221966	13.844	0.022	0.387	0.036	0.074	0.062	1.184	0.053	2.931	0.055
761	18.853357	-6.317035	13.743	0.035	0.348	0.063	0.123	0.116	1.188	0.119	2.978	0.024
764	18.853255	-6.241992	13.323	0.029	0.530	0.042	0.177	0.067	0.971	0.060	2.794	0.077
766	18.853299	-6.302807	13.413	0.029	0.341	0.054	0.128	0.101	1.148	0.103	2.944	0.029
770	18.853199	-6.270547	13.583	0.035	0.376	0.062	0.187	0.112	1.131	0.108	2.968	0.074
771	18.853171	-6.253999									2.783	0.163
774	18.853179	-6.276865	12.935	0.029	0.319	0.046	0.098	0.080	1.130	0.079	2.946	0.018
775	18.853138	-6.246181									2.874	0.113
776	18.853159	-6.263982									2.897	0.101
777	18.853099	-6.229610	14.416	0.032	0.481	0.048	0.057	0.078	1.169	0.069	2.892	0.072
778											2.494	0.099
779	18.853106	-6.242275	11.323	0.025	1.155	0.038	0.775	0.065	0.394	0.060	2.753	0.146
780	18.853111	-6.249395	14.234	0.028	0.353	0.042	0.139	0.070	1.155	0.061	2.980	0.066
784	18.853061	-6.226586	14.834	0.021	0.554	0.033	0.099	0.057	0.914	0.058	2.809	0.138
789			13.134	0.032	0.353	0.045	0.077	0.072	1.162	0.060	2.929	0.056
790	18.853103	-6.315684	12.114	0.036	0.317	0.064	0.127	0.115	1.138	0.114	2.933	0.021
791	18.853052	-6.274460	12.815	0.028	0.284	0.045	0.102	0.077	1.039	0.070	2.853	0.058
792	18.852955	-6.190547	14.581	0.020	0.488	0.028	0.087	0.044	1.089	0.047	2.937	0.032
793	18.853097	-6.325707									2.725	0.013
794											2.962	0.065
799	18.853021	-6.314454	11.843	0.032	0.334	0.060	0.149	0.112	1.223	0.111	2.879	0.016
800	18.853004	-6.294837	11.752	0.028	0.286	0.053	0.137	0.099	1.243	0.096	2.900	0.013
802	18.853020	-6.322127	15.001	0.034	0.481	0.064	0.203	0.119	0.876	0.121	2.927	0.030
804	18.852939	-6.260862	14.854	0.026	0.414	0.042	0.195	0.073	1.060	0.067	2.907	0.097
807	18.852475	-6.270933	14.799	0.024	0.397	0.037	0.127	0.063	1.087	0.063	2.973	0.073
810	18.852871	-6.226030	13.965	0.021	0.441	0.032	0.059	0.054	1.186	0.049	2.979	0.093
812	18.852847	-6.207351									2.903	0.036
814	18.852913	-6.274160									2.587	0.148
815	18.852885	-6.248863	12.682	0.031	0.367	0.045	0.055	0.071	1.141	0.060	2.880	0.063
818	18.852907	-6.276775	13.591	0.038	0.340	0.057	0.133	0.094	1.165	0.085	2.917	0.058
820	18.852803	-6.187355	14.304	0.015	0.413	0.023	0.056	0.039	1.184	0.038	3.013	0.027
827	18.852837	-6.263127	11.342	0.027	1.019	0.042	0.584	0.072	0.488	0.067	2.646	0.072
830	18.852866	-6.279663									2.881	0.101
831	18.852776	-6.221186									2.852	0.092
832	18.852813	-6.254883									2.923	0.084
837	18.852756	-6.244127									2.864	0.147
840	18.852654	-6.179595	12.037	0.012	0.331	0.020	0.010	0.034	1.071	0.030	2.907	0.018
841	18.852806	-6.325842	14.243	0.037	0.407	0.071	0.107	0.129	1.272	0.123	3.012	0.024
845	18.852732	-6.270303									2.659	0.171
846	18.852879	-6.408553									2.985	0.033
847	18.852723	-6.272102									2.899	0.080
848	18.852751	-6.314249	13.547	0.032	0.330	0.059	0.142	0.110	1.182	0.110	2.986	0.021

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
850	18.852805	-6.379229	14.403	0.053	1.129	0.104	0.529	0.192	0.524	0.199	2.719	0.027
851			14.146	0.023	0.366	0.036	0.154	0.062	1.133	0.058	2.901	0.074
854	18.852658	-6.275220									2.854	0.071
855	18.852689	-6.295284	13.713	0.028	0.290	0.053	0.133	0.099	1.162	0.096	2.922	0.098
858	18.852614	-6.244667	15.068	0.014	0.519	0.028	0.073	0.052	1.165	0.056	2.853	0.112
860	18.852641	-6.273125									2.919	0.065
862	18.852601	-6.253821	11.549	0.040	0.335	0.059	0.096	0.097	1.135	0.081	2.873	0.251
863	18.852608	-6.260028									2.870	0.091
867	18.852627	-6.284522	12.431	0.030	0.272	0.049	0.111	0.083	1.083	0.075	2.870	0.070
868	18.852598	-6.265375	14.726	0.028	0.467	0.042	0.087	0.068	1.081	0.067	2.861	0.089
869	18.852582	-6.262424	12.871	0.036	0.344	0.060	0.046	0.104	1.164	0.091	2.875	0.076
870	18.852563	-6.246961	12.858	0.015	0.372	0.026	0.054	0.046	1.152	0.043	2.838	0.077
872	18.852484	-6.177872	14.005	0.013	0.411	0.019	0.028	0.032	1.219	0.030	2.982	0.026
873	18.852491	-6.189865	13.987	0.011	0.382	0.019	0.054	0.032	1.226	0.035	2.973	0.021
878	18.852582	-6.315884	12.714	0.033	0.316	0.059	0.108	0.107	1.071	0.104	2.915	0.033
879	18.852542	-6.279217									2.854	0.071
883	18.852485	-6.272406									2.817	0.196
884	18.852467	-6.263487	14.227	0.024	0.370	0.036	0.103	0.061	1.195	0.058	2.918	0.063
885	18.852463	-6.265158	14.943	0.021	0.460	0.032	0.115	0.056	0.987	0.065	2.864	0.092
886	18.852401	-6.214571									2.639	0.033
889	18.852414	-6.246470	13.485	0.016	0.378	0.027	0.023	0.048	1.179	0.046	2.924	0.085
890	18.852420	-6.269824	13.143	0.026	0.346	0.040	0.036	0.067	1.197	0.058	2.890	0.055
891	18.852396	-6.264260	12.505	0.022	0.316	0.034	0.061	0.057	1.102	0.052	2.885	0.058
893	18.852378	-6.260061	14.215	0.021	0.382	0.033	0.096	0.056	1.155	0.052	2.912	0.072
894	18.852387	-6.282966									2.972	0.070
895	18.852320	-6.240974									2.881	0.075
896	18.852368	-6.289053	14.194	0.023	0.317	0.047	0.190	0.088	1.106	0.084	2.958	0.071
898	18.852371	-6.296902	11.513	0.023	1.160	0.047	0.812	0.089	0.444	0.090	2.668	0.015
901	18.852381	-6.343147									3.047	0.036
902	18.852333	-6.309632	14.043	0.026	0.403	0.049	0.085	0.091	1.239	0.094	3.001	0.023
903	18.852263	-6.246802	13.424	0.013	0.369	0.025	0.059	0.046	1.098	0.040	2.927	0.054
905	18.852299	-6.287384									2.967	0.046
906	18.852272	-6.266856	14.548	0.018	0.381	0.030	0.125	0.055	1.108	0.061	2.924	0.084
907	18.852262	-6.264002	12.206	0.022	0.286	0.035	0.057	0.058	1.016	0.049	2.837	0.072
911	18.852223	-6.275119	14.761	0.038	0.463	0.062	0.177	0.104	0.951	0.091	2.820	0.089
913	18.852121	-6.190999	12.297	0.010	0.345	0.015	0.012	0.026	1.088	0.026	2.936	0.023
914	18.852241	-6.301049	14.618	0.021	0.424	0.045	0.159	0.087	1.062	0.089	2.943	0.028
915	18.852210	-6.272748	13.388	0.024	0.362	0.041	0.121	0.071	1.155	0.060	2.884	0.065
916	18.852215	-6.286419	11.485	0.022	0.945	0.043	0.654	0.079	0.382	0.075	2.744	0.150
917	18.852149	-6.237104	14.027	0.015	0.405	0.027	0.037	0.047	1.237	0.042	2.981	0.078
919	18.852154	-6.264469	12.132	0.022	0.321	0.035	0.066	0.058	1.207	0.050	2.849	0.071
921	18.852137	-6.254071	14.871	0.017	0.467	0.029	0.074	0.050	1.101	0.047	2.937	0.075
922	18.852207	-6.323433									2.838	0.045
923	18.852108	-6.238412									2.914	0.055
925	18.852123	-6.270244	13.974	0.020	0.393	0.032	0.096	0.054	1.178	0.050	2.895	0.109
926	18.852122	-6.274094	11.258	0.024	0.741	0.037	0.136	0.062	0.867	0.054	2.701	0.063
927	18.852134	-6.287590	13.107	0.020	0.295	0.040	0.073	0.075	1.084	0.068	2.903	0.055

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
928	18.852054	-6.248553	13.970	0.015	0.368	0.027	0.049	0.047	1.158	0.043	2.935	0.057
931	18.852095	-6.306121	13.150	0.024	0.334	0.048	0.125	0.091	1.123	0.088	2.948	0.095
932			14.161	0.018	0.356	0.030	0.080	0.053	1.153	0.049	2.992	0.085
933	18.852131	-6.338659	11.273	0.037	0.211	0.060	0.223	0.106	0.504	0.109	2.863	0.048
934	18.851994	-6.214533	12.633	0.012	0.322	0.019	0.023	0.032	0.921	0.027	2.909	0.026
935	18.852076	-6.295370	14.950	0.025	0.671	0.048	0.090	0.089	0.587	0.089	2.865	0.144
936	18.851988	-6.219554	15.196	0.017	0.674	0.025	0.015	0.045	0.812	0.059	2.790	0.035
942	18.851998	-6.291041	11.183	0.022	0.254	0.037	0.149	0.067	1.204	0.067	2.886	0.053
945	18.851942	-6.251639	14.907	0.015	0.580	0.027	0.061	0.051	0.917	0.055	2.769	0.090
946	18.851962	-6.271239	13.841	0.033	0.389	0.054	0.063	0.092	1.199	0.081	2.927	0.099
947	18.851968	-6.286487	15.136	0.041	0.496	0.066	0.081	0.114	0.927	0.108	2.921	0.106
948	18.851958	-6.278371	13.241	0.024	0.419	0.046	0.151	0.083	1.070	0.067	2.933	0.064
949	18.851929	-6.255138	11.584	0.014	0.335	0.025	0.043	0.045	1.161	0.038	2.881	0.043
951	18.851866	-6.217022	15.040	0.014	0.544	0.022	0.022	0.040	1.080	0.046	2.901	0.028
953	18.851945	-6.298090	12.873	0.029	0.324	0.047	0.067	0.082	1.129	0.078	2.956	0.020
954	18.851855	-6.218268	15.081	0.016	0.541	0.023	0.054	0.040	1.057	0.047	2.827	0.132
956			14.562	0.020	0.408	0.032	0.137	0.055	1.118	0.049	3.011	0.130
957	18.851821	-6.193788	14.716	0.012	0.473	0.018	0.076	0.031	1.053	0.040	2.751	0.150
960	18.851893	-6.282135									2.907	0.063
963	18.851795	-6.211941	11.588	0.010	1.042	0.017	0.549	0.029	0.427	0.028	2.724	0.015
965	18.851813	-6.248695	11.374	0.012	0.327	0.024	0.021	0.042	1.095	0.035	2.860	0.055
968	18.851830	-6.294110									2.818	0.104
969	18.851809	-6.277064									2.956	0.073
970	18.851764	-6.237878									2.669	0.036
971	18.851785	-6.262124	14.587	0.013	0.408	0.028	0.125	0.053	1.092	0.049	2.861	0.093
973	18.851719	-6.216915	13.864	0.011	0.416	0.019	0.018	0.032	1.228	0.030	2.974	0.021
974	18.851781	-6.274153	14.928	0.013	0.469	0.027	0.131	0.052	1.031	0.055	2.921	0.111
977	18.851815	-6.332770	12.832	0.037	0.365	0.062	0.117	0.109	1.182	0.105	2.958	0.041
980	18.851782	-6.328377									2.866	0.037
981	18.851649	-6.215721									2.981	0.025
982	18.851649	-6.225126									2.938	0.018
984	18.851694	-6.276500									2.962	0.059
985	18.851721	-6.285205	12.333	0.019	0.296	0.046	0.086	0.092	1.101	0.100	2.843	0.080
986			13.861	0.019	0.376	0.033	0.070	0.058	1.185	0.045	2.929	0.068
987	18.851657	-6.285592	11.711	0.019	0.297	0.035	0.170	0.064	0.976	0.056	2.820	0.064
988	18.851662	-6.268588	12.784	0.019	0.383	0.032	0.021	0.054	1.203	0.044	2.875	0.066
990	18.851691	-6.298902	14.472	0.022	0.501	0.041	0.139	0.076	0.954	0.080	2.886	0.061
992	18.851629	-6.242768	11.203	0.012	0.358	0.020	0.028	0.034	1.290	0.029	2.930	0.014
994	18.851673	-6.293823	14.691	0.024	0.426	0.045	0.159	0.082	1.093	0.082	2.940	0.089
996	18.851655	-6.291571									2.822	0.058
997	18.851620	-6.277583	11.717	0.020	0.329	0.034	0.066	0.059	1.174	0.050	2.870	0.064
998	18.851595	-6.256183	11.848	0.011	0.341	0.024	0.033	0.043	1.129	0.035	2.853	0.075
999	18.851606	-6.265377	13.691	0.011	0.374	0.020	0.011	0.038	1.255	0.040	2.908	0.088
1001	18.851610	-6.288132	12.523	0.019	0.340	0.035	0.038	0.065	1.156	0.061	2.860	0.065
1003	18.851537	-6.250040	12.832	0.012	0.343	0.021	0.036	0.036	1.076	0.029	2.898	0.090
1004	18.851564	-6.283059	11.704	0.020	0.340	0.033	0.030	0.058	1.194	0.054	2.741	0.105
1008			12.335	0.014	0.347	0.022	0.017	0.039	1.103	0.034	2.878	0.035

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1010	18.851543	-6.311868	15.228	0.020	0.516	0.045	0.130	0.089	0.958	0.100	2.977	0.035
1011	18.851483	-6.266453	14.049	0.015	0.477	0.022	0.048	0.036	1.122	0.036	2.933	0.054
1013	18.851434	-6.236913	13.804	0.014	0.460	0.019	0.040	0.031	1.193	0.031	3.005	0.022
1015	18.851408	-6.216471	14.886	0.011	0.768	0.022	0.074	0.045	0.547	0.061	2.740	0.032
1016	18.851443	-6.255914	13.084	0.009	0.369	0.020	0.015	0.036	1.155	0.030	2.902	0.061
1017	18.851447	-6.262512	13.658	0.011	0.366	0.021	0.029	0.038	1.184	0.035	2.910	0.096
1018	18.851398	-6.225293	15.322	0.017	0.570	0.025	0.066	0.045	0.947	0.068	2.919	0.040
1019	18.851391	-6.221935	14.069	0.010	0.416	0.017	0.043	0.031	1.183	0.034	2.999	0.023
1020	18.851394	-6.235181	13.162	0.008	0.392	0.016	0.000	0.028	1.077	0.027	2.908	0.022
1021	18.851422	-6.271665	12.500	0.022	0.398	0.033	0.014	0.053	1.246	0.040	2.829	0.083
1022	18.851407	-6.257132	12.687	0.010	0.336	0.020	0.009	0.037	1.050	0.031	2.841	0.096
1024	18.851417	-6.274854	14.759	0.016	0.694	0.029	0.032	0.053	0.554	0.053	2.638	0.079
1025	18.851399	-6.266395									3.015	0.064
1029	18.851340	-6.224162	14.279	0.012	0.447	0.016	0.010	0.025	1.188	0.030	3.016	0.026
1030	18.851396	-6.278140	12.388	0.016	0.401	0.027	0.034	0.048	1.278	0.041	2.840	0.087
1031	18.851383	-6.284068									2.916	0.059
1033	18.851391	-6.296742	13.480	0.020	0.376	0.037	0.084	0.068	1.173	0.066	2.958	0.068
1034	18.851333	-6.243431	12.056	0.012	0.375	0.018	-0.009	0.030	1.187	0.025	2.915	0.014
1035	18.851367	-6.264111	13.786	0.081	0.678	0.086					2.882	0.067
1039	18.851240	-6.188024									2.779	0.031
1040											2.644	0.059
1042	18.851361	-6.311275	15.110	0.021	0.493	0.042	0.155	0.078	0.999	0.077	2.993	0.043
1044	18.851341	-6.294745	13.613	0.018	0.362	0.038	0.055	0.071	1.149	0.062	2.923	0.047
1046	18.851275	-6.238522	14.565	0.011	0.472	0.019	0.033	0.034	1.228	0.036	2.974	0.035
1047	18.851264	-6.247238	12.595	0.010	0.391	0.017	0.014	0.029	1.203	0.026	2.967	0.019
1049	18.851285	-6.269997	12.230	0.013	0.353	0.023	0.018	0.040	1.096	0.033	2.881	0.085
1050	18.851311	-6.307900	14.531	0.023	0.416	0.040	0.153	0.074	1.092	0.077	2.997	0.029
1051	18.851232	-6.235848	14.825	0.014	0.485	0.021	0.083	0.037	1.086	0.048	2.966	0.104
1052	18.851285	-6.288396	15.006	0.022	0.457	0.033	0.156	0.056	1.006	0.062	3.019	0.126
1054	18.851283	-6.286599	12.723	0.019	0.325	0.043	0.096	0.080	1.112	0.070	2.916	0.074
1055	18.851261	-6.271396	14.488	0.017	0.450	0.026	0.069	0.045	1.093	0.043	2.933	0.124
1057	18.851248	-6.261154	12.836	0.015	0.367	0.023	0.012	0.038	1.138	0.030	2.853	0.081
1059	18.851168	-6.189879	13.763	0.011	0.408	0.019	0.019	0.036	1.167	0.043	2.919	0.150
1061	18.851256	-6.275456	13.693	0.015	0.390	0.025	0.026	0.043	1.231	0.038	2.874	0.098
1064	18.851244	-6.282152	13.819	0.015	0.381	0.025	0.038	0.044	1.176	0.043	2.946	0.057
1066	18.851216	-6.265943	13.121	0.012	0.366	0.020	0.033	0.034	1.167	0.029	2.952	0.076
1068	18.851180	-6.251899	11.497	0.009	0.396	0.018	0.016	0.032	1.289	0.028	2.873	0.081
1069	18.851250	-6.318845	14.520	0.025	0.431	0.050	0.110	0.092	1.114	0.088	2.992	0.093
1070	18.851140	-6.218069									2.964	0.069
1076	18.851162	-6.282947	13.531	0.012	0.380	0.024	0.010	0.045	1.146	0.042	2.909	0.057
1077	18.851152	-6.272195	11.917	0.014	0.345	0.022	0.005	0.037	1.127	0.031	2.842	0.071
1079	18.851150	-6.273970	14.089	0.022	0.409	0.036	0.012	0.061	1.185	0.049	2.967	0.068
1080	18.851086	-6.222516	12.119	0.010	0.357	0.015	-0.002	0.026	1.148	0.025	2.941	0.015
1081	18.851159	-6.298206	14.169	0.031	0.436	0.051	0.085	0.087	1.171	0.077	2.912	0.070
1082	18.851072	-6.226458	12.740	0.010	0.332	0.016	-0.010	0.028	0.652	0.028	2.847	0.017
1083	18.851075	-6.228693									3.004	0.038
1084	18.851168	-6.316143									2.991	0.044

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1085	18.851114	-6.267232	12.427	0.015	0.341	0.023	0.001	0.039	1.082	0.034	2.890	0.101
1086	18.851089	-6.249800	13.216	0.010	0.365	0.018	0.004	0.031	1.143	0.027	2.988	0.021
1087	18.851051	-6.232069	13.223	0.016	0.391	0.022	0.007	0.034	1.090	0.031	2.968	0.021
1090	18.851168	-6.344963	11.694	0.034	1.019	0.056	0.721	0.100	0.362	0.102	2.852	0.104
1093	18.851115	-6.301977	13.662	0.019	0.372	0.036	0.116	0.067	1.176	0.066	2.907	0.057
1098	18.851116	-6.327439	15.404	0.029	0.543	0.058	0.112	0.109	1.044	0.123	2.942	0.039
1099	18.851055	-6.279777	14.790	0.017	0.487	0.029	0.049	0.052	1.156	0.055	2.908	0.092
1101	18.851055	-6.285725	12.080	0.015	0.974	0.029	0.480	0.054	0.390	0.052	2.628	0.092
1105	18.851031	-6.275843	11.986	0.017	0.394	0.025	0.005	0.042	1.214	0.035	2.890	0.092
1106											2.955	0.049
1109	18.851006	-6.265109	14.712	0.021	0.523	0.034	0.025	0.057	1.077	0.052	2.869	0.083
1110	18.850972	-6.241436	12.906	0.010	0.388	0.015	0.013	0.026	1.187	0.025	2.964	0.021
1111	18.850990	-6.269723	11.778	0.010	0.986	0.020	0.495	0.035	0.436	0.032	2.683	0.080
1112	18.851002	-6.282558	12.082	0.017	0.367	0.028	0.009	0.049	1.190	0.043	2.841	0.060
1113	18.850974	-6.278853									2.840	0.114
1114	18.851028	-6.327487	13.518	0.026	1.030	0.046	0.524	0.084	0.481	0.087	2.707	0.021
1117	18.850943	-6.272221	11.694	0.012	1.006	0.022	0.512	0.038	0.440	0.035	2.616	0.077
1120	18.850884	-6.224453	12.237	0.008	0.365	0.016	0.005	0.029	1.102	0.029	2.916	0.015
1121	18.850941	-6.293984	14.844	0.018	0.439	0.033	0.144	0.062	1.009	0.069	2.910	0.082
1124	18.850949	-6.306500	14.704	0.019	0.442	0.039	0.144	0.074	1.101	0.073	2.956	0.076
1125	18.850928	-6.289616	12.760	0.015	0.278	0.031	0.102	0.058	0.757	0.049	2.815	0.044
1128	18.850929	-6.287562	12.769	0.035	0.341	0.058	0.033	0.100	1.167	0.090	2.903	0.063
1130	18.850874	-6.255929	13.250	0.010	0.367	0.018	-0.017	0.031	1.174	0.029	2.865	0.090
1131	18.850914	-6.305811	14.771	0.019	0.472	0.039	0.165	0.073	0.982	0.071	2.880	0.101
1135	18.850932	-6.333662	15.277	0.028	0.457	0.057	0.277	0.108	0.839	0.109	2.967	0.037
1138	18.850807	-6.233068	14.257	0.009	0.473	0.015	0.012	0.028	1.145	0.033	2.964	0.022
1141	18.850802	-6.260214									2.917	0.137
1143	18.850736	-6.206371	12.307	0.007	0.393	0.015	0.024	0.030	1.254	0.032	2.934	0.022
1145	18.850783	-6.258316	11.897	0.011	1.015	0.019	0.467	0.034	0.395	0.030	2.608	0.079
1146	18.850817	-6.289344									2.863	0.056
1147	18.850773	-6.256864	13.179	0.008	0.426	0.016	0.031	0.028	1.143	0.027	2.916	0.069
1148	18.850770	-6.254927	12.563	0.009	0.364	0.017	-0.021	0.031	1.164	0.027	2.884	0.019
1149	18.850739	-6.233365	14.382	0.010	0.447	0.017	0.034	0.031	1.164	0.038	2.966	0.023
1150	18.850682	-6.187727	15.699	0.021	0.891	0.032	0.224	0.063	0.628	0.118	2.653	0.042
1152	18.850818	-6.313288									3.055	0.031
1153	18.850759	-6.263497	15.012	0.014	0.535	0.038	-0.003	0.071	1.120	0.061	2.977	0.042
1154	18.850806	-6.306454									2.880	0.111
1156	18.850803	-6.309379	14.644	0.023	0.445	0.036	0.107	0.063	1.091	0.065	2.957	0.072
1157	18.850764	-6.274308									2.874	0.039
1158	18.850819	-6.323690	12.774	0.023	0.276	0.046	0.145	0.085	0.788	0.078	2.883	0.020
1159											2.831	0.155
1160			13.919	0.015	0.326	0.030	0.147	0.056	1.096	0.052	2.952	0.075
1166	18.850679	-6.246828	12.547	0.009	0.359	0.018	-0.020	0.033	1.166	0.030	2.906	0.016
1167	18.850627	-6.218034									2.915	0.028
1168			13.412	0.014	0.382	0.022	0.011	0.039	1.143	0.034	2.927	0.065
1169	18.850639	-6.254062									2.959	0.034
1170	18.850681	-6.301411	15.087	0.017	0.472	0.034	0.172	0.064	0.957	0.065	2.864	0.138

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1171	18.850614	-6.240481									3.001	0.030
1172	18.850596	-6.223511	14.787	0.012	0.460	0.018	0.063	0.031	1.079	0.042	2.999	0.031
1173	18.850611	-6.238181									2.942	0.149
1174	18.850639	-6.267169	13.831	0.011	0.435	0.017	0.008	0.028	1.148	0.030	2.896	0.098
1175	18.850578	-6.235615	11.453	0.011	0.332	0.017	-0.018	0.028	0.761	0.026	2.831	0.022
1176			13.110	0.008	0.378	0.015	-0.008	0.027	1.167	0.028	2.868	0.036
1177	18.850724	-6.378084									2.969	0.020
1179	18.850606	-6.284446	14.632	0.014	0.418	0.024	0.075	0.044	1.091	0.045	3.037	0.080
1181	18.850592	-6.280649	12.747	0.012	0.377	0.022	0.014	0.039	1.072	0.036	2.863	0.079
1183	18.850589	-6.307987	14.243	0.018	0.392	0.036	0.148	0.067	1.122	0.068	2.954	0.093
1184	18.850561	-6.290704	11.289	0.029	1.099	0.049	0.525	0.098	0.579	0.140	2.605	0.102
1187	18.850392	-6.180241	14.145	0.015	0.448	0.026	-0.007	0.047	1.230	0.052	2.983	0.021
1188	18.850479	-6.265461									2.717	0.040
1191	18.850442	-6.235323	12.225	0.007	0.352	0.014	0.002	0.027	1.134	0.029	2.960	0.017
1195	18.850404	-6.226496									3.049	0.025
1196	18.850476	-6.292791									2.865	0.078
1197	18.850473	-6.294778	14.051	0.014	0.910	0.030	0.410	0.058	0.461	0.063	2.621	0.063
1200	18.850295	-6.163599	12.721	0.011	0.529	0.023	0.052	0.044	0.980	0.048	2.897	0.023
1205	18.850406	-6.297617	13.066	0.017	0.372	0.026	0.038	0.046	1.214	0.047	2.889	0.077
1206	18.850362	-6.261838	13.824	0.009	0.401	0.015	-0.002	0.026	1.199	0.028	3.002	0.078
1207	18.850392	-6.296279	13.349	0.048	0.682	0.062	-0.060	0.089	1.135	0.067	2.860	0.096
1208	18.850331	-6.262855	13.992	0.009	0.447	0.015	0.014	0.025	1.134	0.027	2.929	0.045
1209	18.850339	-6.272583	14.463	0.012	0.432	0.018	0.073	0.031	1.153	0.033	2.952	0.068
1210	18.850323	-6.257986	11.670	0.009	0.371	0.015	-0.023	0.025	1.198	0.025	2.896	0.013
1214	18.850303	-6.260374	14.536	0.014	0.473	0.018	0.036	0.029	1.138	0.037	2.934	0.077
1215	18.850355	-6.319649	15.201	0.027	0.561	0.048	0.096	0.087	0.964	0.086	2.964	0.038
1218	18.850271	-6.256747	13.597	0.010	0.409	0.016	-0.015	0.029	1.218	0.035	2.961	0.025
1219	18.850288	-6.286519	12.542	0.016	0.371	0.025	0.043	0.044	1.220	0.039	2.832	0.101
1220	18.850145	-6.160609	13.834	0.014	0.403	0.025	0.017	0.047	1.168	0.051	2.998	0.025
1221	18.850265	-6.281287	12.525	0.011	0.383	0.019	-0.006	0.034	1.167	0.033	2.857	0.078
1222	18.850234	-6.264293	13.810	0.009	0.348	0.015	0.030	0.025	1.151	0.026	2.937	0.069
1223	18.850217	-6.248992	11.377	0.010	0.904	0.018	0.206	0.032	0.719	0.032	2.765	0.024
1224	18.850263	-6.296333	14.659	0.020	0.426	0.031	0.078	0.053	1.094	0.053	2.890	0.122
1225	18.850265	-6.300974	13.350	0.015	0.350	0.027	0.056	0.051	1.109	0.051	2.891	0.099
1226	18.850184	-6.229291	15.019	0.011	0.714	0.024	0.071	0.048	0.576	0.062	2.691	0.033
1228	18.850277	-6.331723	13.350	0.027	0.346	0.045	0.109	0.079	1.158	0.076	3.011	0.016
1231	18.850178	-6.284192	14.091	0.011	0.402	0.018	0.058	0.032	1.151	0.038	2.951	0.084
1232	18.850173	-6.291398	11.968	0.013	0.334	0.027	0.042	0.050	1.117	0.042	2.866	0.077
1234	18.850195	-6.313165	14.233	0.019	0.423	0.036	0.083	0.067	1.200	0.065	2.934	0.098
1236	18.850154	-6.280361	13.934	0.011	0.407	0.020	0.055	0.036	1.171	0.033	2.936	0.087
1238	18.850175	-6.309057	15.019	0.036	0.593	0.057	0.134	0.098	0.957	0.097	2.836	0.118
1239	18.850098	-6.242888	14.655	0.016	0.502	0.022	0.020	0.037	1.055	0.047	2.992	0.031
1240	18.850235	-6.383192									3.025	0.021
1241	18.850110	-6.269691	13.314	0.009	0.410	0.015	-0.010	0.025	1.219	0.026	2.889	0.071
1243	18.850143	-6.301319	13.346	0.011	0.352	0.027	0.095	0.052	1.111	0.052	2.902	0.062
1245			13.013	0.016	0.379	0.032	0.048	0.059	1.046	0.055	2.859	0.064
1246	18.850104	-6.278330	14.926	0.030	0.660	0.045	0.006	0.073	0.851	0.072	2.749	0.150

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1247	18.850070	-6.279614									2.641	0.132
1248	18.850083	-6.288558	11.949	0.038	1.041	0.044	0.483	0.056	0.467	0.045	2.599	0.090
1249	18.850096	-6.307108	12.714	0.025	0.403	0.042	0.071	0.072	1.136	0.062	2.873	0.075
1250	18.850084	-6.297023	11.433	0.014	0.362	0.027	0.054	0.050	1.249	0.045	2.852	0.088
1251	18.849951	-6.176613	15.305	0.024	0.567	0.032	0.089	0.054	0.879	0.063	2.878	0.035
1255	18.850011	-6.244555	14.676	0.012	0.488	0.019	0.019	0.035	1.074	0.044	2.933	0.081
1256	18.850053	-6.283311	11.461	0.010	1.183	0.017	0.667	0.032	0.454	0.040	2.625	0.088
1257	18.850028	-6.262043	12.640	0.024	0.369	0.036	0.004	0.059	1.142	0.048	2.912	0.083
1258	18.850007	-6.247109	13.536	0.008	0.529	0.014	0.054	0.026	0.961	0.034	2.894	0.020
1259	18.850002	-6.250712									2.772	0.043
1260	18.850012	-6.259602	14.614	0.015	0.664	0.022	-0.032	0.037	1.045	0.044	2.840	0.030
1261	18.850018	-6.277182	11.833	0.010	0.373	0.018	0.007	0.031	1.191	0.029	2.868	0.062
1262	18.850066	-6.324397	15.428	0.019	0.568	0.042	0.123	0.082	0.826	0.091	2.933	0.038
1263	18.849972	-6.252295	14.818	0.030	0.609	0.055	0.001	0.098	0.830	0.093	2.800	0.053
1264	18.849990	-6.293471	14.119	0.016	0.415	0.025	0.079	0.042	1.140	0.041	2.975	0.095
1265	18.850016	-6.336076	14.101	0.026	0.365	0.044	0.124	0.080	1.154	0.081	3.046	0.024
1266	18.849915	-6.244391									2.861	0.026
1267											2.949	0.059
1269	18.849917	-6.260551									2.871	0.157
1270	18.849912	-6.258196	11.353	0.009	0.350	0.017	-0.032	0.031	1.321	0.029	2.931	0.012
1271	18.849924	-6.271458	15.432	0.017	0.572	0.024	0.030	0.041	1.045	0.057	2.902	0.039
1272	18.849835	-6.192057	12.807	0.016	0.387	0.025	-0.010	0.047	1.173	0.055	2.942	0.018
1273	18.849941	-6.290246	11.342	0.011	0.378	0.021	0.020	0.038	1.254	0.034	2.837	0.069
1274	18.849934	-6.287227									2.928	0.062
1276	18.849913	-6.273887									2.923	0.070
1277	18.849864	-6.233759	13.793	0.014	0.445	0.019	-0.002	0.033	1.143	0.040	2.999	0.025
1278	18.849874	-6.280518	13.758	0.011	0.416	0.018	0.043	0.031	1.182	0.033	2.920	0.096
1279	18.849779	-6.196114	14.271	0.014	1.081	0.023	0.492	0.073	0.566	0.137	2.604	0.082
1280	18.849820	-6.240233									3.033	0.036
1281	18.849830	-6.261157	12.765	0.011	0.383	0.015	-0.042	0.025	1.224	0.028	2.923	0.070
1284	18.849812	-6.252452	13.723	0.010	0.353	0.017	-0.040	0.031	1.097	0.036	2.985	0.024
1286	18.849764	-6.212076	11.772	0.014	0.991	0.022	0.429	0.041	0.410	0.046	2.694	0.021
1287	18.849945	-6.370415	12.802	0.042	0.455	0.070	0.313	0.125	0.425	0.120	2.766	0.023
1290			13.054	0.012	0.335	0.026	0.081	0.050	1.116	0.049	2.925	0.108
1295	18.849800	-6.296348									2.935	0.100
1296	18.849775	-6.278212									2.609	0.076
1298	18.849777	-6.286208									2.617	0.094
1299	18.849804	-6.336383	14.091	0.027	0.372	0.042	0.138	0.075	1.166	0.078	3.065	0.023
1301			13.925	0.014	0.373	0.027	0.095	0.050	1.162	0.047	2.954	0.096
1302	18.849689	-6.251893	14.282	0.026	0.466	0.032	-0.015	0.046	1.164	0.042	2.960	0.064
1303	18.849650	-6.216554	13.988	0.011	0.462	0.020	0.060	0.038	1.070	0.043	2.764	0.209
1306	18.849705	-6.287211	14.618	0.011	0.541	0.020	0.082	0.038	1.000	0.044	2.926	0.114
1307	18.849625	-6.244831	14.559	0.015	0.495	0.022	-0.044	0.039	1.129	0.049	3.010	0.027
1308	18.849706	-6.325379	14.774	0.018	0.437	0.037	0.154	0.068	1.056	0.067	2.853	0.148
1310	18.849651	-6.275069	12.625	0.016	0.370	0.025	0.009	0.042	1.161	0.034	2.827	0.088
1311	18.849568	-6.206659									3.000	0.029
1312	18.849659	-6.297311	13.843	0.010	0.374	0.021	0.103	0.041	1.172	0.043	2.934	0.061

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1313	18.849692	-6.327552	12.847	0.019	0.327	0.036	0.092	0.068	1.136	0.066	2.945	0.027
1315	18.849570	-6.222476	14.709	0.016	0.549	0.024	0.023	0.044	0.905	0.054	2.881	0.030
1317	18.849608	-6.263383	14.468	0.014	0.453	0.019	0.037	0.031	1.153	0.034	2.963	0.046
1319	18.849531	-6.203995	13.784	0.014	0.390	0.024	-0.017	0.048	1.195	0.063	2.810	0.163
1320	18.849577	-6.257611									2.909	0.048
1322	18.849636	-6.320111	14.119	0.031	0.975	0.054	0.541	0.099	0.505	0.105	2.590	0.158
1324	18.849542	-6.231885	14.643	0.012	0.589	0.018	-0.053	0.034	0.815	0.050	2.795	0.028
1329	18.849499	-6.229297	11.711	0.010	0.352	0.016	-0.054	0.031	1.142	0.042	2.924	0.017
1333	18.849619	-6.354031	12.534	0.032	0.331	0.052	0.102	0.091	1.147	0.090	2.971	0.016
1334	18.849463	-6.213828									2.972	0.034
1335	18.849495	-6.250545									2.745	0.116
1336	18.849484	-6.258064	11.814	0.009	0.349	0.015	-0.038	0.025	1.249	0.029	2.932	0.017
1338	18.849469	-6.248216	13.649	0.010	0.386	0.017	-0.026	0.031	1.198	0.034	2.982	0.023
1346	18.849527	-6.352029	14.899	0.027	0.590	0.050	0.143	0.092	0.828	0.092	2.863	0.033
1347	18.849394	-6.233435	14.458	0.014	0.455	0.020	-0.007	0.036	1.165	0.046	2.977	0.024
1349	18.849451	-6.302692	15.936	0.021	0.630	0.035	0.117	0.065	0.607	0.089	2.581	0.258
1350	18.849397	-6.263315	12.285	0.009	0.381	0.014	-0.025	0.024	1.142	0.029	2.918	0.035
1351	18.849416	-6.285921	14.178	0.011	0.432	0.021	0.057	0.038	1.097	0.036	2.969	0.080
1352	18.849319	-6.210912									3.002	0.043
1353	18.849369	-6.258559	12.566	0.009	0.383	0.015	-0.028	0.025	1.280	0.029	2.932	0.019
1354	18.849474	-6.356394	14.121	0.032	0.391	0.054	0.149	0.096	1.151	0.094	3.083	0.024
1357	18.849399	-6.299911	14.140	0.026	0.424	0.037	0.062	0.058	1.160	0.048	2.899	0.087
1359	18.849313	-6.234712	14.989	0.018	0.603	0.025	-0.068	0.043	0.782	0.055	2.797	0.064
1360	18.849358	-6.279437	13.821	0.009	0.407	0.017	0.044	0.033	1.176	0.041	2.916	0.068
1361	18.849418	-6.344831	13.728	0.030	0.369	0.049	0.115	0.086	1.205	0.081	3.047	0.023
1363	18.849308	-6.280825	14.139	0.043	0.474	0.059	-0.027	0.091	1.190	0.074	2.946	0.102
1364	18.849247	-6.229615	11.740	0.011	0.930	0.020	0.183	0.039	0.665	0.047	2.739	0.014
1366	18.849165	-6.176896									2.651	0.031
1367	18.849322	-6.322107	14.183	0.020	0.519	0.036	0.238	0.065	0.968	0.063	2.943	0.030
1370	18.849288	-6.314321	14.094	0.015	0.353	0.031	0.094	0.059	1.161	0.056	2.975	0.073
1371	18.849300	-6.329747									2.848	0.141
1372			14.026	0.011	0.397	0.020	0.065	0.036	1.168	0.035	2.932	0.097
1373	18.849116	-6.222885	14.716	0.029	0.518	0.042	0.017	0.067	0.997	0.056	2.885	0.054
1374	18.849167	-6.270011	15.186	0.016	0.530	0.023	0.061	0.042	0.917	0.055	2.909	0.053
1378	18.849111	-6.272911	12.555	0.011	0.343	0.019	-0.001	0.034	1.076	0.038	2.945	0.013
1381	18.849091	-6.285632									2.882	0.091
1382	18.849047	-6.252775	15.065	0.012	0.896	0.024	0.260	0.053	0.543	0.089	2.673	0.043
1383	18.849107	-6.319205	15.346	0.014	0.574	0.030	0.001	0.059	0.986	0.070	2.891	0.118
1384	18.849083	-6.299111	15.121	0.015	1.114	0.027	0.303	0.064	0.503	0.122	2.585	0.118
1385	18.849060	-6.277654	13.330	0.011	1.009	0.017	0.556	0.031	0.482	0.052	2.746	0.177
1386	18.849020	-6.249785	14.998	0.012	0.520	0.021	-0.008	0.039	1.044	0.053	2.889	0.033
1387	18.848995	-6.244219	13.621	0.034	1.317	0.055	0.349	0.095	0.644	0.100	2.683	0.080
1390	18.849080	-6.344752									2.845	0.029
1391	18.848970	-6.242627	15.026	0.019	0.472	0.028	0.005	0.050	1.041	0.056	2.939	0.031
1393	18.848975	-6.251698	14.700	0.014	0.433	0.022	0.031	0.041	1.097	0.046	3.021	0.033
1394	18.848910	-6.200169	13.844	0.018	0.396	0.029	-0.013	0.055	1.138	0.065	2.989	0.033
1396	18.848990	-6.288254									2.827	0.125

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1398	18.848966	-6.282183	12.842	0.014	0.332	0.023	0.047	0.039	1.117	0.030	2.907	0.085
1399	18.849000	-6.310865	13.197	0.017	0.321	0.027	0.062	0.047	1.189	0.043	2.890	0.092
1401	18.848984	-6.313235	15.985	0.022	0.693	0.035	0.062	0.080	0.545	0.127	2.861	0.051
1402	18.848953	-6.291425	14.782	0.016	0.456	0.024	0.098	0.041	1.082	0.045	2.839	0.156
1404	18.848959	-6.304392	14.751	0.014	0.432	0.025	0.081	0.047	1.066	0.054	2.884	0.115
1406	18.848951	-6.311631	14.081	0.015	0.450	0.027	0.124	0.049	1.017	0.044	2.902	0.092
1408	18.848889	-6.263211	14.442	0.012	0.479	0.020	0.063	0.037	0.980	0.046	2.979	0.027
1410	18.848884	-6.267219	14.546	0.014	0.426	0.019	0.011	0.034	1.167	0.042	2.981	0.025
1411	18.848838	-6.234118									2.939	0.030
1412	18.848824	-6.228198	13.473	0.014	0.355	0.025	-0.035	0.049	1.145	0.062	2.913	0.048
1413	18.848877	-6.282503	14.757	0.011	0.487	0.019	0.036	0.032	1.127	0.047	2.934	0.030
1415	18.848823	-6.241934	13.871	0.010	0.387	0.023	-0.043	0.047	1.208	0.055	3.001	0.032
1417	18.848766	-6.202921	13.156	0.023	1.116	0.033	0.530	0.056	0.472	0.067	2.841	0.139
1419	18.848848	-6.285302	14.346	0.015	0.520	0.022	0.050	0.036	0.980	0.036	2.906	0.064
1421	18.848959	-6.398133									2.928	0.053
1423	18.848824	-6.304553	11.294	0.012	1.083	0.023	0.687	0.042	0.406	0.043	2.614	0.079
1424	18.848816	-6.301183	14.816	0.016	0.498	0.030	0.088	0.055	1.023	0.059	2.883	0.088
1426	18.848789	-6.291880	13.069	0.006	0.364	0.014	0.037	0.026	1.137	0.028	2.982	0.142
1427	18.848783	-6.289034	12.513	0.010	0.382	0.020	0.026	0.035	1.246	0.031	2.816	0.076
1428	18.848745	-6.259193	14.368	0.011	0.410	0.019	0.015	0.037	1.150	0.048	3.032	0.025
1431	18.848697	-6.235263									2.890	0.030
1433	18.848838	-6.394450	12.837	0.031	0.223	0.076	0.240	0.145	1.020	0.135	2.954	0.020
1434	18.848744	-6.309318	10.924	0.009	1.391	0.023	0.710	0.047	0.513	0.058	2.783	0.162
1435	18.848643	-6.245728	13.819	0.013	0.392	0.022	-0.041	0.042	1.224	0.052	2.822	0.132
1436	18.848664	-6.265979	13.888	0.008	1.292	0.018	0.651	0.048	0.530	0.117	2.732	0.094
1437	18.848708	-6.318383	13.879	0.016	0.375	0.030	0.099	0.055	1.193	0.052	2.945	0.085
1438											2.658	0.083
1439	18.848640	-6.263496	11.768	0.009	0.337	0.015	-0.061	0.026	1.176	0.033	2.878	0.018
1440	18.848634	-6.274796	14.044	0.018	0.374	0.024	0.042	0.037	1.127	0.036	2.992	0.136
1441	18.848707	-6.347009	14.901	0.028	0.629	0.042	0.163	0.073	0.734	0.080	2.907	0.031
1444	18.848603	-6.289494									2.973	0.030
1446	18.848547	-6.272100	11.749	0.010	1.018	0.019	0.460	0.034	0.399	0.035	2.683	0.013
1447	18.848538	-6.264587	13.131	0.012	0.351	0.020	-0.035	0.035	1.193	0.040	2.924	0.039
1452	18.848552	-6.303319	11.266	0.007	0.303	0.020	0.054	0.039	1.147	0.037	2.819	0.075
1454	18.848439	-6.220547	14.288	0.014	0.631	0.030	-0.007	0.060	0.729	0.069	2.886	0.151
1455	18.848479	-6.260471	12.675	0.010	0.357	0.019	-0.071	0.035	1.076	0.043	2.916	0.015
1456	18.848620	-6.394953									2.772	0.235
1457	18.848518	-6.310691	15.706	0.016	0.751	0.029	0.114	0.061	0.543	0.100	2.736	0.053
1458	18.848422	-6.235595	13.458	0.011	1.210	0.025	0.568	0.050	0.471	0.075	2.644	0.020
1459	18.848569	-6.382317									2.861	0.022
1461	18.848362	-6.209004	11.647	0.016	0.414	0.027	-0.061	0.051	1.328	0.059	2.921	0.024
1463	18.848404	-6.272085	12.592	0.008	1.450	0.016	0.599	0.034	0.511	0.065	2.578	0.069
1466	18.848363	-6.248765	11.782	0.012	0.355	0.023	-0.054	0.042	1.176	0.049	2.899	0.034
1467	18.848382	-6.288071	14.657	0.008	0.477	0.016	0.025	0.031	1.150	0.041	3.000	0.028
1468	18.848422	-6.330741	13.056	0.020	0.324	0.033	0.098	0.058	1.134	0.052	2.919	0.092
1469	18.848367	-6.283747									2.653	0.028
1470	18.848316	-6.256472	15.856	0.027	0.607	0.042	0.095	0.074	0.584	0.089	2.842	0.054

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1472	18.848301	-6.251126	13.409	0.012	0.384	0.023	-0.039	0.044	1.204	0.054	2.975	0.019
1474	18.848306	-6.281083	11.424	0.009	0.341	0.016	0.011	0.028	1.197	0.028	2.906	0.027
1478	18.848238	-6.268978	13.503	0.010	0.340	0.018	-0.005	0.033	1.189	0.038	2.994	0.050
1480	18.848213	-6.251900	13.776	0.029	0.399	0.044	0.009	0.074	1.178	0.074	3.000	0.063
1481	18.848184	-6.229341	13.885	0.013	0.421	0.028	-0.032	0.057	1.174	0.067	2.953	0.023
1485	18.848207	-6.308063	14.442	0.013	1.067	0.025	0.527	0.055	0.420	0.086	2.619	0.100
1487	18.848068	-6.198856									2.966	0.031
1490	18.848125	-6.269760	12.822	0.011	0.333	0.020	-0.029	0.037	1.161	0.041	2.977	0.084
1492	18.848151	-6.309373	14.106	0.012	0.410	0.024	0.063	0.044	1.174	0.047	2.965	0.106
1494	18.848112	-6.276300	14.331	0.014	0.436	0.020	0.042	0.035	1.131	0.044	3.001	0.026
1496	18.847974	-6.177590	13.377	0.022	0.659	0.045					2.895	0.037
1498	18.848178	-6.375490	13.031	0.035	0.371	0.062	0.096	0.109	1.222	0.095	2.991	0.022
1500	18.847991	-6.224379	14.652	0.019	0.560	0.035	0.005	0.076	0.884	0.102	2.978	0.032
1502	18.848106	-6.337708	15.194	0.024	0.523	0.036	0.107	0.063	1.021	0.071	2.943	0.123
1504	18.848017	-6.253154	14.794	0.016	1.116	0.029	0.299	0.060	0.694	0.113	2.631	0.033
1505	18.848131	-6.370507	12.572	0.034	0.356	0.059	0.084	0.101	1.097	0.085	2.922	0.019
1506	18.847905	-6.178848	14.111	0.035	1.105	0.049	0.441	0.083	0.622	0.102	2.689	0.028
1507	18.848010	-6.295044	13.251	0.011	0.355	0.049	0.044	0.094	1.153	0.066	2.944	0.046
1509	18.848047	-6.340172	15.473	0.021	0.593	0.037	0.087	0.068	1.113	0.087	3.005	0.182
1511	18.847987	-6.314239	15.063	0.016	0.497	0.026	0.102	0.048	0.964	0.053	2.951	0.126
1512	18.847891	-6.221938									2.647	0.040
1516	18.847903	-6.262756	13.995	0.024	0.411	0.030	-0.031	0.047	1.184	0.053	3.001	0.089
1517	18.847992	-6.362103									2.988	0.040
1518	18.847935	-6.330229									2.961	0.098
1520	18.847888	-6.294268	11.723	0.010	0.374	0.017	0.033	0.030	1.242	0.031	2.912	0.011
1522	18.847813	-6.226839	13.690	0.014	0.437	0.030	-0.078	0.060	1.214	0.071	2.958	0.027
1523	18.847848	-6.260348	13.944	0.012	0.417	0.023	-0.036	0.044	1.215	0.051	2.992	0.040
1525	18.847798	-6.216362	15.301	0.021	0.534	0.036	-0.004	0.069	0.998	0.089	2.869	0.033
1528	18.847864	-6.300633	12.431	0.009	0.363	0.020	0.032	0.037	1.152	0.034	2.826	0.074
1529	18.847799	-6.240928									2.955	0.033
1530	18.847863	-6.315634	13.753	0.010	0.386	0.021	0.066	0.039	1.185	0.040	2.944	0.109
1531	18.847806	-6.266888	14.252	0.019	0.437	0.028	0.009	0.046	1.150	0.050	3.001	0.032
1534	18.847748	-6.246507									2.663	0.041
1537	18.847759	-6.292841	13.173	0.007	0.365	0.016	0.025	0.031	1.164	0.033	2.884	0.077
1538											2.978	0.056
1541	18.847711	-6.311254									2.879	0.080
1542	18.847648	-6.252765									2.625	0.047
1543	18.847714	-6.319840	15.027	0.048	0.619	0.075	0.023	0.127	0.967	0.113	2.842	0.137
1544			13.194	0.021	0.410	0.036	0.101	0.061	1.147	0.049	2.967	0.056
1545	18.847583	-6.219728	15.157	0.021	0.678	0.041	-0.019	0.078	0.733	0.084	2.893	0.111
1548	18.847491	-6.217020	14.510	0.022	0.481	0.040	-0.054	0.076	1.158	0.086	3.014	0.092
1549	18.847499	-6.234576	13.049	0.019	0.384	0.032	-0.100	0.060	1.136	0.070	2.973	0.021
1551	18.847537	-6.312950	14.839	0.013	0.411	0.037	0.186	0.072	1.019	0.064	2.952	0.100
1553	18.847350	-6.152121	15.293	0.023	0.766	0.049	0.116	0.101	0.505	0.125	2.726	0.033
1554	18.847454	-6.267349	14.068	0.014	0.420	0.026	-0.008	0.049	1.176	0.057	2.961	0.026
1556	18.847418	-6.259244	11.913	0.011	0.381	0.024	-0.061	0.047	1.303	0.058	2.918	0.017
1560	18.847360	-6.271389	15.441	0.010	1.241	0.027	0.416	0.103	0.745	0.311	2.830	0.146

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1563	18.847332	-6.283557	14.290	0.011	0.461	0.019	0.009	0.035	1.173	0.045	3.001	0.026
1566	18.847291	-6.279361	12.676	0.011	0.384	0.021	-0.008	0.039	1.146	0.044	2.934	0.018
1569	18.847172	-6.184083	13.370	0.024	1.058	0.043	0.360	0.082	0.532	0.096	2.663	0.025
1572	18.847240	-6.300849									3.026	0.024
1575	18.847063	-6.176602									2.905	0.030
1578	18.847158	-6.280109	12.791	0.011	0.383	0.018	-0.021	0.032	1.153	0.041	2.925	0.021
1579	18.847107	-6.281543	14.597	0.047	0.506	0.063	0.010	0.094	1.178	0.068	3.049	0.074
1583	18.847044	-6.265750	13.300	0.012	1.009	0.024	0.391	0.049	0.525	0.068	2.846	0.125
1588	18.847109	-6.350628	14.406	0.022	0.416	0.035	0.095	0.059	1.141	0.055	3.005	0.057
1589	18.847073	-6.318095	15.837	0.023	0.733	0.032	0.104	0.068	0.541	0.120	2.706	0.136
1596	18.846865	-6.247831	15.053	0.016	0.528	0.030	0.033	0.060	0.961	0.076	2.883	0.039
1599	18.846873	-6.303316	15.718	0.019	0.625	0.029	0.086	0.053	0.837	0.084	2.798	0.043
1601	18.846826	-6.305060	13.534	0.008	0.387	0.013	0.046	0.026	1.100	0.041	2.928	0.048
1602	18.846653	-6.157666	14.892	0.023	0.553	0.047	0.006	0.094	1.084	0.109	2.958	0.045
1605	18.846644	-6.198599									2.684	0.030
1606	18.846691	-6.237345	14.116	0.020	0.437	0.037	-0.058	0.070	1.155	0.082	2.973	0.024
1607	18.846596	-6.161669	13.859	0.027	0.435	0.051	-0.047	0.105	1.213	0.131	2.990	0.031
1609	18.846685	-6.319417	14.287	0.012	0.406	0.020	0.071	0.036	1.170	0.043	2.957	0.095
1610	18.846620	-6.270223	13.120	0.148	0.934	0.157					2.921	0.038
1611	18.846550	-6.213768	14.117	0.017	0.441	0.032	-0.029	0.067	1.192	0.086	2.974	0.033
1612	18.846640	-6.336979									2.870	0.123
1613	18.846668	-6.368408	14.751	0.025	0.468	0.044	0.104	0.079	1.226	0.078	2.951	0.087
1616	18.846548	-6.317189	15.033	0.015	0.508	0.026	0.088	0.047	1.001	0.053	2.846	0.111
1617	18.846482	-6.260381	13.993	0.020	0.430	0.034	0.008	0.064	1.160	0.076	2.932	0.030
1618	18.846564	-6.353315	15.588	0.018	0.557	0.038	0.098	0.073	0.911	0.091	2.858	0.142
1619	18.846320	-6.157027	11.480	0.025	0.394	0.045					2.765	0.013
1622	18.846485	-6.334965	12.538	0.010	0.372	0.020	0.012	0.036	1.145	0.036	2.860	0.073
1625	18.846421	-6.289244	11.531	0.010	1.192	0.016	0.666	0.032	0.399	0.051	2.695	0.014
1627	18.846327	-6.233524	13.419	0.015	0.933	0.028	0.296	0.058	0.531	0.077	2.650	0.024
1628	18.846404	-6.317437									3.016	0.031
1633	18.846238	-6.190024	14.969	0.026	0.609	0.048	0.026	0.092	0.650	0.106	2.791	0.032
1634	18.846220	-6.176866									2.623	0.027
1639	18.846157	-6.188141	14.041	0.025	1.058	0.050	0.300	0.094	0.669	0.106	2.670	0.033
1640	18.846307	-6.356042	15.085	0.020	0.514	0.035	0.045	0.063	1.135	0.070	2.822	0.171
1641	18.846290	-6.339600	12.281	0.014	0.361	0.019	-0.001	0.032	1.163	0.034	2.838	0.090
1642	18.846149	-6.229682	13.401	0.021	0.384	0.040	-0.063	0.078	1.183	0.092	2.991	0.024
1644	18.846050	-6.152615	14.798	0.028	0.541	0.055	-0.079	0.104	1.127	0.104	2.931	0.030
1645	18.846116	-6.227927	12.333	0.019	0.385	0.035	-0.082	0.069	1.154	0.086	2.916	0.025
1647	18.846057	-6.191494	14.994	0.024	0.634	0.047	-0.017	0.090	0.747	0.098	2.778	0.028
1648	18.846196	-6.325565	13.811	0.009	1.284	0.018	0.668	0.043	0.434	0.111	2.572	0.091
1649	18.846141	-6.303811	12.829	0.009	0.379	0.018	-0.001	0.034	1.131	0.042	2.957	0.015
1652	18.846065	-6.322244	14.074	0.011	0.442	0.019	0.015	0.035	1.249	0.038	2.967	0.028
1653	18.846031	-6.307280	14.338	0.011	0.534	0.022	-0.018	0.040	1.257	0.046	2.982	0.033
1657	18.846011	-6.338850	16.128	0.026	0.729	0.039	0.127	0.075	0.611	0.138	2.828	0.055
1658	18.845851	-6.201739	11.548	0.027	1.120	0.050	0.380	0.094	0.460	0.101	2.671	0.018
1659	18.845975	-6.321304	14.233	0.013	0.467	0.022	-0.026	0.038	1.216	0.040	2.992	0.028
1661	18.845815	-6.190279	14.470	0.023	0.480	0.046	-0.077	0.087	1.192	0.089	2.960	0.029

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1662	18.845844	-6.247655									2.804	0.112
1666	18.845771	-6.245229	15.011	0.019	0.723	0.034	0.033	0.067	0.665	0.086	2.737	0.037
1667	18.845763	-6.246961									2.708	0.043
1668	18.845678	-6.169548	14.791	0.025	0.756	0.050	-0.089	0.098	0.673	0.113	2.665	0.029
1669	18.845650	-6.162395	14.810	0.024	1.067	0.055	0.267	0.110	0.634	0.134	2.653	0.040
1670	18.845799	-6.297759	14.648	0.015	1.104	0.022	0.405	0.047	0.461	0.095	2.662	0.030
1672	18.845771	-6.296571									2.988	0.046
1674	18.845720	-6.267765									2.875	0.045
1677	18.845690	-6.298176	14.894	0.019	0.807	0.033	0.100	0.058	0.635	0.065	2.768	0.060
1678	18.845620	-6.266662	13.603	0.017	1.093	0.030	0.526	0.057	0.567	0.081	2.823	0.153
1682	18.845480	-6.148038									2.656	0.042
1685	18.845523	-6.229175									2.719	0.030
1686	18.845562	-6.306756	14.103	0.010	0.449	0.019	-0.026	0.033	1.207	0.039	3.000	0.053
1687	18.845420	-6.177722	14.422	0.024	0.984	0.049	0.308	0.098	0.599	0.121	2.649	0.028
1688	18.845389	-6.152404	14.511	0.035	0.778	0.064	0.040	0.119	0.552	0.124	2.741	0.063
1694	18.845406	-6.207441									2.760	0.045
1695	18.845444	-6.264749	15.353	0.024	0.674	0.041	0.078	0.074	0.491	0.086	2.739	0.032
1698	18.845558	-6.380319	15.004	0.022	0.476	0.046	0.127	0.091	1.016	0.103	2.851	0.120
1700	18.845449	-6.294356									2.643	0.025
1702	18.845372	-6.243421	13.567	0.020	1.497	0.040	0.531	0.078	0.533	0.119	2.595	0.040
1703	18.845384	-6.254558									2.987	0.038
1705	18.845263	-6.158012	15.142	0.030	0.768	0.059	-0.021	0.116	0.724	0.135	2.688	0.031
1706	18.845316	-6.223837	14.851	0.023	0.535	0.043	0.008	0.085	0.931	0.109	2.873	0.031
1707	18.845330	-6.240895	15.510	0.016	0.892	0.032	0.246	0.070	0.425	0.115	2.641	0.042
1708	18.845296	-6.210429	13.872	0.024	1.049	0.051	0.307	0.103	0.488	0.123	2.638	0.023
1709	18.845274	-6.202160	14.802	0.027	1.433	0.054	0.557	0.116	0.592	0.335	2.674	0.029
1711	18.845392	-6.331046	13.910	0.009	0.589	0.017	0.049	0.031	1.080	0.034	2.913	0.022
1714	18.845281	-6.234167									2.802	0.037
1715	18.845243	-6.222493	15.064	0.021	0.553	0.044	-0.025	0.085	0.919	0.095	2.884	0.031
1716	18.845207	-6.196589	13.930	0.027	0.461	0.054	-0.094	0.104	1.148	0.112	2.964	0.022
1717	18.845224	-6.217396	14.817	0.022	0.467	0.047	0.019	0.092	1.041	0.103	2.941	0.033
1718	18.845200	-6.202928	14.847	0.027	0.615	0.054	-0.029	0.104	0.687	0.120	2.878	0.082
1719	18.845223	-6.230659	12.317	0.022	0.390	0.043	-0.076	0.083	1.209	0.100	2.744	0.094
1725	18.845221	-6.317620	14.881	0.012	0.547	0.020	0.014	0.036	1.110	0.052	3.020	0.036
1727	18.845253	-6.350668	14.466	0.042	1.103	0.048	0.157	0.101	0.821	0.182	2.612	0.103
1729	18.845044	-6.220095									2.845	0.097
1730	18.845144	-6.331514	15.023	0.045	1.085	0.065	0.231	0.108	0.663	0.138	2.599	0.081
1731	18.845044	-6.275404	14.575	0.016	0.748	0.035	-0.007	0.065	0.793	0.070	2.721	0.031
1732	18.845092	-6.325484	14.951	0.015	1.196	0.027	0.431	0.068	0.709	0.172	2.641	0.035
1734	18.844936	-6.200550	13.988	0.030	1.018	0.056	0.288	0.107	0.640	0.123	2.668	0.074
1735	18.845101	-6.360074	14.386	0.018	0.544	0.031	0.115	0.057	0.949	0.062	2.751	0.111
1736	18.845062	-6.334524	14.358	0.012	0.505	0.018	0.061	0.035	1.107	0.049	2.966	0.027
1737	18.844874	-6.171093	15.097	0.029	0.825	0.059	-0.020	0.114	0.607	0.125	2.687	0.051
1738											2.902	0.131
1740	18.844933	-6.260333	14.611	0.019	0.507	0.035	0.008	0.065	1.103	0.076	2.982	0.029
1741	18.844842	-6.177211	15.261	0.049	0.598	0.079	0.011	0.139	0.859	0.136	2.833	0.060
1742	18.845058	-6.406860									2.953	0.022

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1746	18.844822	-6.238522									2.917	0.033
1748	18.844827	-6.279510	12.632	0.016	0.451	0.032	-0.083	0.060	1.177	0.069	2.880	0.016
1754	18.844562	-6.198693	13.270	0.026	1.071	0.049	0.359	0.097	0.580	0.119	2.805	0.167
1761	18.844572	-6.277189	12.650	0.018	0.429	0.035	-0.081	0.065	1.095	0.071	2.886	0.037
1768	18.844540	-6.340944	15.310	0.016	0.750	0.027	0.004	0.054	0.558	0.074	2.686	0.035
1769											2.762	0.098
1770	18.844394	-6.236261	14.515	0.023	1.107	0.041	0.354	0.085	0.601	0.131	2.667	0.040
1772	18.844276	-6.162181	15.641	0.032	0.902	0.064	0.193	0.124	0.559	0.152	2.651	0.041
1773	18.844371	-6.251939	13.139	0.020	0.694	0.041	-0.023	0.081	0.620	0.094	2.738	0.023
1776	18.844361	-6.260465	14.711	0.019	0.471	0.038	0.069	0.073	1.091	0.085	2.969	0.096
1780	18.844342	-6.293812	13.141	0.015	0.431	0.027	-0.040	0.049	1.219	0.052	2.940	0.038
1781											3.020	0.120
1790	18.844232	-6.312024	15.179	0.015	0.687	0.027	0.017	0.052	0.661	0.073	2.736	0.060
1791	18.844161	-6.261411	14.308	0.019	0.505	0.033	-0.017	0.064	1.147	0.079	2.969	0.036
1792	18.844085	-6.190279	15.303	0.028	0.732	0.049	-0.021	0.097	0.797	0.127	2.731	0.033
1794	18.844157	-6.273408	14.480	0.051	0.567	0.060	-0.079	0.084	1.183	0.087	2.971	0.028
1796	18.844046	-6.178724									2.650	0.033
1801	18.844139	-6.328156	14.710	0.010	0.491	0.017	0.045	0.031	1.120	0.044	2.980	0.028
1803	18.844119	-6.314112									2.975	0.026
1805	18.843970	-6.221261	14.198	0.024							2.893	0.038
1807											2.912	0.054
1809	18.843897	-6.169411	14.281	0.026	0.831	0.057	-0.026	0.114	0.748	0.132	2.706	0.025
1810	18.843978	-6.255196	14.251	0.018	1.106	0.039	0.316	0.079	0.635	0.102	2.609	0.030
1813	18.843950	-6.265311	15.542	0.019	0.740	0.039	0.116	0.076	0.542	0.096	2.635	0.051
1817											2.609	0.087
1822	18.843767	-6.232129	13.295	0.024	1.077	0.047	0.258	0.092	0.627	0.113	2.627	0.020
1824	18.843828	-6.320329	12.865	0.010	0.545	0.018	0.062	0.031	0.846	0.036	2.845	0.016
1825	18.843756	-6.291027									2.657	0.035
1827	18.843755	-6.330318	14.419	0.014	0.645	0.019	0.023	0.033	0.621	0.042	2.756	0.026
1828	18.843753	-6.333823									2.753	0.051
1831	18.843606	-6.283730	14.210	0.019	0.455	0.033	-0.011	0.061	1.198	0.075	2.985	0.026
1836	18.843533	-6.261734	15.308	0.022	0.617	0.039	0.013	0.077	0.882	0.107	2.860	0.045
1837	18.843516	-6.244674	11.905	0.028	1.054	0.047	0.349	0.088	0.384	0.104	2.662	0.016
1838	18.843484	-6.215386	14.474	0.029	0.514	0.056	-0.066	0.108	1.178	0.129	2.979	0.031
1841	18.843446	-6.223667	14.808	0.022	0.724	0.046	-0.039	0.092	0.612	0.113	2.754	0.028
1845	18.843359	-6.228347	13.413	0.026	0.424	0.049	-0.089	0.098	1.166	0.120	2.975	0.022
1848											2.479	0.104
1853	18.843270	-6.232233	15.271	0.027	0.617	0.052	-0.020	0.102	0.905	0.126	2.795	0.038
1854	18.843265	-6.223245									2.633	0.041
1860	18.843215	-6.237783									2.888	0.035
1866											2.746	0.077
1871	18.843088	-6.210204	14.358	0.030	0.688	0.056	-0.052	0.109	0.742	0.130	2.747	0.027
1872	18.843073	-6.200244	15.016	0.031	1.160	0.054	0.339	0.110	0.814	0.179	2.708	0.037
1874	18.843093	-6.248339									2.646	0.065
1880	18.842905	-6.215392									2.678	0.038
1891	18.842830	-6.245403	14.674	0.023	0.485	0.047	-0.068	0.092	1.212	0.108	2.967	0.027
1892	18.842748	-6.177002	13.334	0.031	1.214	0.063	0.358	0.124	0.566	0.144	2.873	0.145

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
1900	18.842582	-6.172300	14.325	0.029	0.494	0.060	-0.046	0.122	1.101	0.150	3.010	0.027
1902	18.842573	-6.169284	13.879	0.032	0.485	0.066	-0.146	0.129	1.231	0.148	2.999	0.041
1904	18.842639	-6.229680	14.896	0.032	1.070	0.052	0.274	0.093	0.716	0.132	2.642	0.033
1914	18.842413	-6.197816	12.117	0.029	0.527	0.058	-0.074	0.115	1.230	0.141	2.953	0.016
1915	18.842489	-6.294636	14.707	0.018	1.019	0.037	0.347	0.072	0.495	0.091	2.626	0.029
1918											2.667	0.114
1922	18.842387	-6.296296	15.240	0.016	0.546	0.036	0.042	0.072	0.870	0.088	2.632	0.193
1924	18.842231	-6.201752	14.523	0.028							2.640	0.033
1926	18.842313	-6.305110	14.725	0.014	0.459	0.029	0.045	0.054	1.026	0.058	2.902	0.028
1927	18.842283	-6.278899									2.836	0.129
1931	18.842192	-6.256551	12.508	0.022	0.446	0.047	-0.077	0.093	1.151	0.109	2.906	0.016
1936	18.842155	-6.288035	13.289	0.017	0.396	0.033	0.005	0.063	1.143	0.092	2.994	0.018
1937	18.842169	-6.300620	14.945	0.019	0.495	0.033	0.025	0.060	1.134	0.071	2.934	0.029
1939											2.948	0.083
1942											2.921	0.068
1943	18.842027	-6.265560	15.104	0.021	1.132	0.043	0.300	0.089	0.996	0.229	2.719	0.035
1945	18.841966	-6.207743									2.908	0.020
1954											2.729	0.110
1958	18.841832	-6.258555	14.429	0.021	0.480	0.048	-0.008	0.093	1.206	0.106	2.998	0.026
1961	18.841731	-6.182268									2.793	0.022
1963	18.841813	-6.273478	12.906	0.019	1.094	0.042	0.415	0.082	0.499	0.091	2.662	0.017
1978											2.832	0.110
1979											2.757	0.140
2015											2.609	0.140
2110	18.849802	-6.306797									2.934	0.089
2112	18.849905	-6.291424	15.322	0.025	0.462	0.061	0.455	0.113	0.405	0.090	2.803	0.131
2114	18.850215	-6.290542	14.297	0.014	0.409	0.023	0.067	0.042	1.178	0.042	2.927	0.108
2120	18.850978	-6.356192									2.689	0.018
2122	18.851037	-6.293142	12.785	0.024	0.314	0.042	0.094	0.075	1.049	0.071	2.862	0.090
2126	18.851226	-6.350859									3.017	0.033
2127	18.851270	-6.350347									3.050	0.024
2134	18.851733	-6.253497	11.642	0.011	1.027	0.024	0.569	0.045	0.424	0.046	2.614	0.071
2139	18.852179	-6.273575	14.148	0.024	0.423	0.038	0.071	0.064	1.151	0.060	2.920	0.070
2141	18.852238	-6.289119	11.466	0.024	0.264	0.044	0.104	0.079	1.120	0.074	2.894	0.013
2142											2.703	0.063
2145											2.685	0.028
2147	18.852370	-6.269555	14.012	0.025	0.411	0.041	0.118	0.071	1.090	0.067	2.899	0.081
2149	18.852460	-6.279166									2.839	0.093
2150	18.852505	-6.278403	12.486	0.041	0.332	0.067	0.047	0.115	1.134	0.097	2.866	0.072
2151	18.852471	-6.242914	13.805	0.022	0.388	0.042	0.094	0.075	1.151	0.063	2.953	0.074
2156	18.853026	-6.262249	14.542	0.025	0.474	0.039	0.160	0.068	1.025	0.068	2.871	0.075
3038	18.850730	-6.289727	14.472	0.017	0.266	0.050	0.362	0.095	0.922	0.076	3.075	0.075
3048	18.851082	-6.288814	15.218	0.023	0.610	0.051	0.107	0.100	0.658	0.110	2.761	0.099
3057	18.850632	-6.288231									2.721	0.113
3060	18.851667	-6.287714	14.211	0.016	0.399	0.035	0.114	0.066	1.143	0.062	2.907	0.078
3061	18.851142	-6.287738									2.960	0.100
3063	18.850864	-6.287182	13.645	0.030	0.392	0.048	0.073	0.079	1.159	0.062	2.916	0.053

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
3083	18.851378	-6.284997	15.608	0.017	0.597	0.037	0.001	0.073	1.025	0.087	2.857	0.160
3084	18.851041	-6.284745	14.102	0.017	0.424	0.028	0.021	0.049	1.231	0.045	2.946	0.085
3085											2.927	0.068
3087											2.855	0.056
3089	18.849940	-6.284497									2.766	0.227
3094	18.849474	-6.283478									2.614	0.110
3099	18.851095	-6.282647									2.893	0.156
3101	18.850629	-6.282216	15.782	0.020	0.620	0.044	0.119	0.090	0.719	0.112	2.654	0.245
3106	18.850313	-6.281875									2.944	0.059
3128	18.850336	-6.278829									2.747	0.065
3140	18.850735	-6.277474									2.830	0.055
3163	18.851323	-6.274210									2.972	0.096
3166	18.851504	-6.273898	17.135	0.049	0.848	0.083	0.166	0.208			3.016	0.133
3168	18.849983	-6.273845	16.397	0.029	0.728	0.042	-0.056	0.078	0.911	0.146	2.805	0.062
3170	18.850236	-6.273466	16.892	0.063	0.758	0.093	0.019	0.163	0.426	0.215	2.711	0.112
3172	18.849652	-6.273218									2.749	0.074
3199	18.850323	-6.269157	16.323	0.025	0.731	0.038	0.132	0.087	0.667	0.162	2.764	0.054
3212			15.003	0.014	0.710	0.025	0.060	0.047	0.552	0.057	2.781	0.102
3214											2.960	0.098
3229	18.849413	-6.265633									2.926	0.057
3236	18.851698	-6.264529	15.636	0.018	0.559	0.028	0.065	0.050	0.797	0.069	2.704	0.185
3238											2.941	0.138
3246	18.851621	-6.263419	16.156	0.037	0.717	0.071	0.277	0.130	0.317	0.169	2.704	0.051
3265	18.851726	-6.261079	16.255	0.036	0.679	0.052	0.019	0.094	0.757	0.131	2.856	0.063
3267	18.850257	-6.261006	16.375	0.018	0.778	0.036	0.014	0.078	0.645	0.133	2.830	0.087
3268	18.851634	-6.260765	16.903	0.026	0.798	0.054	-0.096	0.117	0.659	0.185	2.778	0.095
3282	18.849938	-6.259454	15.815	0.020	0.633	0.033	0.019	0.066	0.702	0.097	2.972	0.055
3295	18.850242	-6.257710	15.257	0.018	0.574	0.027	0.032	0.047	1.038	0.059	2.852	0.070
3308	18.850513	-6.256197	15.907	0.029	0.615	0.041	0.138	0.071	0.484	0.096	2.811	0.063
3312	18.849632	-6.255374									2.669	0.088
3320	18.849434	-6.253988	12.766	0.011	0.366	0.017	-0.038	0.029	1.227	0.034	2.984	0.057
3321			11.864	0.012	0.287	0.024	0.016	0.043	0.422	0.036	2.663	0.022
3328	18.850289	-6.253047									2.711	0.115
3346	18.851630	-6.250704									2.650	0.082
3347			15.100	0.012	0.603	0.024	0.076	0.045	0.791	0.060	2.954	0.026
3349	18.849796	-6.250675									2.682	0.056
3364	18.851349	-6.248653									2.647	0.195
3372	18.850431	-6.247549									2.839	0.058
3377	18.850253	-6.247065	17.507	0.069	0.818	0.105	-0.165	0.207	0.630	0.336	2.684	0.107
3387	18.850553	-6.245765									2.812	0.040
3396	18.849372	-6.244516									2.807	0.062
3402	18.849554	-6.243881									2.799	0.076
3405	18.850361	-6.243509	14.460	0.011	0.394	0.018	0.049	0.032	1.149	0.038	3.037	0.029
3425	18.849958	-6.239501	15.657	0.015	0.632	0.029	-0.061	0.058	0.886	0.070	2.879	0.039
3430	18.851406	-6.238618									2.783	0.050
3432	18.850564	-6.238550									2.838	0.095
3436	18.849756	-6.237870	16.894	0.035	0.760	0.057	0.033	0.133	0.454	0.224	2.781	0.082

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
3444	18.850395	-6.236275									2.857	0.077
3463	18.851534	-6.233208	15.058	0.014	0.523	0.024	0.100	0.043	1.076	0.048	2.947	0.064
3473	18.851502	-6.231123									2.813	0.041
3481	18.851044	-6.229707	13.722	0.009	0.441	0.015	0.030	0.027	1.134	0.033	2.774	0.200
4989	18.840866	-6.257092	15.425	0.027	1.277	0.055	0.320	0.116	0.561	0.240	2.713	0.042
5128	18.841708	-6.230250									2.802	0.060
5155	18.841882	-6.222985									2.737	0.054
5165	18.841930	-6.218537									2.616	0.058
5181	18.842119	-6.294295	16.257	0.039	0.718	0.068	0.159	0.127	0.320	0.149	2.629	0.061
5190	18.842145	-6.272300									2.780	0.075
5200	18.842203	-6.245946	16.235	0.038	0.773	0.057	-0.036	0.103	0.817	0.164	2.745	0.076
5210	18.842326	-6.336450									2.871	0.079
5225	18.842349	-6.239038									2.707	0.052
5226	18.842293	-6.170557	15.474	0.025	0.744	0.048	-0.030	0.098	0.900	0.130	2.795	0.047
5227	18.842416	-6.294161									2.782	0.052
5229	18.842420	-6.277836	15.829	0.030	0.655	0.046	0.184	0.081	0.471	0.104	2.728	0.041
5236	18.842435	-6.230321	16.501	0.037	0.830	0.076	-0.065	0.154	0.638	0.210	2.702	0.066
5242	18.842439	-6.172751									2.684	0.087
5256	18.842634	-6.309359	16.516	0.029	0.624	0.048	0.124	0.097	0.684	0.145	2.749	0.071
5278	18.842691	-6.195286	15.615	0.027	0.711	0.066	-0.073	0.135			2.973	0.043
5282	18.842759	-6.246456									2.645	0.070
5286	18.842759	-6.235811	16.270	0.038	0.834	0.055	-0.099	0.111	0.870	0.176	2.798	0.059
5329	18.842979	-6.214506									2.609	0.049
5334	18.843080	-6.262930									2.721	0.069
5340	18.843130	-6.264451	16.123	0.024	0.884	0.052	0.146	0.103	0.644	0.139	2.640	0.056
5368	18.843269	-6.229959									2.815	0.037
5380	18.843415	-6.308041	16.009	0.025	0.718	0.039	0.086	0.073	0.378	0.099	2.618	0.048
5381	18.843348	-6.220270									2.768	0.062
5382	18.843414	-6.279519									2.725	0.048
5417	18.843591	-6.291523	16.128	0.020	0.780	0.040	0.058	0.078	0.648	0.100	2.695	0.051
5422	18.843521	-6.170270	15.565	0.032	0.598	0.063	-0.040	0.122	0.912	0.136	2.880	0.040
5430	18.843572	-6.185059									2.717	0.069
5451	18.843804	-6.273600									2.839	0.060
5454	18.843813	-6.252418									2.640	0.056
5464	18.843834	-6.191997									2.800	0.067
5471	18.843958	-6.280763	15.761	0.028	0.793	0.043	0.013	0.088	0.614	0.137	2.670	0.044
5517	18.844268	-6.243448									2.643	0.060
5518	18.844252	-6.211262									2.637	0.057
5530	18.844392	-6.218373									2.689	0.046
5537	18.844384	-6.168566	16.519	0.035	0.718	0.070	-0.098	0.140			3.000	0.068
5539	18.844416	-6.189235									2.779	0.045
5540	18.844576	-6.378060									2.677	0.058
5548	18.844608	-6.350296	16.410	0.021	0.842	0.040	0.224	0.107	0.409	0.211	2.717	0.059
5565	18.844611	-6.213332	16.116	0.038	0.727	0.061	0.000	0.108	0.573	0.142	2.735	0.055
5573	18.844741	-6.292312									2.594	0.076
5574	18.844663	-6.187952									2.688	0.063
5576	18.844691	-6.217927	16.345	0.041	0.649	0.062	0.052	0.114	0.585	0.162	2.742	0.071

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
5587	18.844759	-6.217042									2.809	0.050
5588	18.844779	-6.227590	15.944	0.027	0.691	0.048	-0.010	0.097	0.798	0.136	2.778	0.062
5595	18.844846	-6.257843	16.157	0.028	0.741	0.046	0.151	0.104	0.484	0.165	2.708	0.059
5609	18.845037	-6.349093									2.752	0.053
5611											2.645	0.065
5624	18.845136	-6.349787	15.548	0.021	1.080	0.037	0.434	0.094	0.412	0.198	2.590	0.117
5639	18.845179	-6.321322									2.716	0.051
5641	18.845087	-6.206343	16.060	0.026	0.754	0.057	-0.001	0.110	0.699	0.137	2.734	0.050
5654	18.845239	-6.333838	15.837	0.045	0.994	0.060	0.018	0.108	0.591	0.156	2.666	0.059
5655	18.845215	-6.298784	16.231	0.021	0.809	0.038	0.145	0.084	0.356	0.140	2.686	0.052
5659	18.845133	-6.165592	16.174	0.027	0.794	0.060	0.081	0.125	0.492	0.186	2.702	0.056
5667	18.845260	-6.238760									2.725	0.052
5684	18.845370	-6.282571	16.185	0.026	0.834	0.042	0.195	0.089	0.581	0.190	2.592	0.057
5687	18.845303	-6.188789	15.349	0.027	0.683	0.051	-0.037	0.102	0.739	0.125	2.872	0.113
5688	18.845461	-6.373876									2.866	0.111
5713	18.845444	-6.203045									2.752	0.060
5719	18.845551	-6.297919	16.123	0.021	0.632	0.035	0.097	0.072	0.573	0.113	2.776	0.048
5727	18.845512	-6.201262	16.423	0.033	0.778	0.058	-0.120	0.113	0.815	0.155	2.772	0.058
5729	18.845601	-6.293033									2.722	0.051
5732	18.845505	-6.169660	16.530	0.033	0.726	0.058	-0.093	0.113	0.981	0.158	2.749	0.065
5733	18.845556	-6.219932	15.949	0.025	0.570	0.047	0.027	0.090	0.798	0.115	2.750	0.047
5750	18.845646	-6.165106	16.000	0.023	0.676	0.060	0.082	0.125	0.648	0.149	2.734	0.055
5766	18.845887	-6.331897									2.823	0.054
5773	18.845913	-6.319623	15.864	0.033	0.906	0.062	-0.136	0.113	0.859	0.128	2.715	0.059
5776	18.845789	-6.165588									2.687	0.044
5777	18.845845	-6.229046									2.633	0.077
5779	18.845886	-6.264962									2.705	0.084
5782	18.845900	-6.256987	15.981	0.031	0.595	0.047	0.047	0.085	0.667	0.111	2.692	0.049
5801	18.846081	-6.352911									2.746	0.059
5807	18.846140	-6.362387	16.043	0.035	0.702	0.052	-0.003	0.093	0.777	0.123	2.814	0.053
5819	18.846076	-6.197273	16.279	0.029	0.667	0.055	0.022	0.104	0.714	0.122	2.736	0.052
5820	18.846104	-6.208643	15.986	0.027	0.625	0.051	-0.020	0.100	0.723	0.120	2.769	0.046
5835	18.846218	-6.244283	16.016	0.026	0.693	0.048	-0.067	0.090	0.775	0.104	2.798	0.047
5861	18.846324	-6.250743	15.589	0.020	0.603	0.032	0.020	0.063	0.840	0.095	2.877	0.076
5866	18.846372	-6.255194	15.124	0.017	0.527	0.033	0.015	0.065	0.993	0.078	2.892	0.027
5867	18.846424	-6.312072									2.798	0.060
5870	18.846343	-6.207408									2.704	0.050
5872	18.846380	-6.236543	16.217	0.026	0.762	0.050	0.019	0.100	0.778	0.153	2.742	0.055
5877	18.846360	-6.161992									2.756	0.061
5878	18.846532	-6.361273	15.875	0.027	0.726	0.046	0.074	0.086	0.628	0.111	2.792	0.160
5883	18.846519	-6.309707	16.225	0.028	0.671	0.037	0.094	0.062	0.408	0.091	2.766	0.049
5886	18.846583	-6.373327									2.740	0.047
5887	18.846470	-6.241143									2.684	0.045
5889	18.846423	-6.177777	16.062	0.028	0.806	0.047	0.131	0.089	0.734	0.133	2.670	0.057
5892	18.846441	-6.176581	15.764	0.028	0.775	0.057	-0.056	0.110	0.812	0.129	2.746	0.043
5902	18.846468	-6.175144	16.303	0.027	0.669	0.054	0.089	0.112	0.738	0.160	2.758	0.060
5904	18.846577	-6.258688									2.725	0.063

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
5910	18.846696	-6.336286	15.514	0.020	0.583	0.032	0.140	0.058	0.946	0.079	2.813	0.170
5920	18.846677	-6.250530									2.980	0.080
5921	18.846708	-6.284639									2.730	0.053
5923	18.846646	-6.162913									2.668	0.047
5924	18.846790	-6.323905	16.335	0.030	0.696	0.046	-0.053	0.083	0.689	0.128	2.841	0.058
5934	18.846740	-6.197347	16.075	0.036	0.645	0.054	-0.083	0.092	0.779	0.107	2.812	0.049
5944	18.846899	-6.316718									2.724	0.039
5945	18.846834	-6.242929	15.929	0.027	0.696	0.042	-0.011	0.076	0.609	0.099	2.726	0.044
5946	18.846837	-6.217734									2.874	0.037
5958	18.847030	-6.334201									2.736	0.061
5970	18.846972	-6.233979	16.506	0.024	0.783	0.045	0.246	0.098	0.434	0.180	2.731	0.058
5982	18.847086	-6.277142	15.557	0.014	0.541	0.028	0.083	0.056	0.947	0.076	2.875	0.041
5992	18.847097	-6.226963									2.692	0.050
5994	18.847166	-6.304064	15.761	0.016	0.627	0.027	0.068	0.052	0.724	0.080	2.949	0.059
5997	18.847212	-6.314570									2.700	0.067
6009	18.847239	-6.274078	15.420	0.015	0.564	0.026	0.039	0.054	0.879	0.076	2.824	0.117
6010	18.847295	-6.320430									2.506	0.205
6012	18.847214	-6.217139	16.278	0.028	0.747	0.046	0.118	0.088	0.513	0.134	2.740	0.048
6016	18.847337	-6.293557	16.104	0.025	0.636	0.032	0.097	0.061	0.625	0.094	2.771	0.045
6019	18.847280	-6.196218									2.786	0.061
6021	18.847370	-6.293948	15.389	0.014	0.652	0.022	-0.012	0.041	0.838	0.059	2.813	0.036
6024	18.847384	-6.278588	16.391	0.018	0.707	0.038	0.351	0.089	0.425	0.209	2.627	0.084
6027	18.847372	-6.246045									2.689	0.052
6034	18.847462	-6.276245									2.702	0.044
6037	18.847520	-6.301189	15.873	0.018	0.600	0.033	0.111	0.067	0.636	0.101	2.844	0.051
6047	18.847550	-6.280557	16.419	0.025	0.875	0.043	0.354	0.118	0.333	0.252	2.717	0.062
6048	18.847453	-6.165620	15.943	0.028	0.639	0.052	0.130	0.110	0.501	0.157	2.759	0.046
6051	18.847490	-6.197542	16.632	0.038	0.582	0.060	0.061	0.116	1.000	0.170	2.871	0.066
6056	18.847614	-6.333108									2.621	0.221
6059	18.847544	-6.229546									2.670	0.046
6061	18.847624	-6.319519	16.064	0.024	0.810	0.040	0.082	0.079	0.467	0.121	2.794	0.053
6064	18.847620	-6.291984									2.737	0.055
6081	18.847707	-6.304694									2.721	0.212
6085	18.847718	-6.287371	16.195	0.024	0.633	0.039	0.130	0.077	0.773	0.124	2.837	0.056
6091	18.847687	-6.215234									2.662	0.056
6104	18.847825	-6.269167									2.760	0.051
6111	18.847886	-6.285851									2.767	0.054
6114	18.847897	-6.272131	16.243	0.023	0.733	0.038	0.072	0.085	0.616	0.156	2.714	0.062
6126	18.848030	-6.337570									2.825	0.166
6127	18.847989	-6.289638									2.692	0.061
6136	18.847990	-6.244326	16.303	0.029	0.737	0.046	0.177	0.104			2.748	0.054
6140	18.848105	-6.308338									2.826	0.056
6145	18.848054	-6.223301	15.795	0.019	0.580	0.033	0.066	0.075	0.667	0.121	2.784	0.050
6173	18.848239	-6.274312	16.089	0.019	1.314	0.050	0.448	0.156			2.727	0.061
6193	18.848408	-6.327302									2.585	0.200
6195	18.848308	-6.198943	16.203	0.031	0.728	0.048	-0.044	0.089	0.587	0.119	2.657	0.051
6208	18.848361	-6.203168	16.048	0.030	0.792	0.046	-0.167	0.086	0.844	0.126	2.767	0.052

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
6225	18.848437	-6.240648	15.977	0.020	0.663	0.039	-0.016	0.075	0.713	0.111	2.704	0.053
6232	18.848530	-6.317394	15.865	0.020	0.574	0.041	0.124	0.082	0.717	0.099	2.812	0.202
6245											2.792	0.131
6254	18.848585	-6.272694	14.005	0.015	1.043	0.021	0.439	0.044	0.355	0.070	2.691	0.025
6259	18.848560	-6.239453									2.751	0.052
6268	18.848670	-6.284260	16.357	0.021	0.685	0.037	-0.030	0.076	0.932	0.125	2.812	0.055
6273	18.848651	-6.250481	15.296	0.015	0.664	0.027	0.003	0.049	0.569	0.056	2.708	0.033
6275	18.848714	-6.313801	15.413	0.016	0.551	0.034	0.153	0.064	0.850	0.081	2.762	0.187
6281	18.848682	-6.231064									2.700	0.066
6285	18.848717	-6.248987									2.616	0.060
6290	18.848719	-6.215895									2.829	0.146
6293	18.848804	-6.298121									2.660	0.119
6300	18.848864	-6.324363	16.061	0.018	0.680	0.040	0.061	0.088	0.638	0.125	2.728	0.215
6301	18.848880	-6.327878	16.052	0.029	0.619	0.045	0.153	0.079	0.626	0.098	2.881	0.053
6306	18.848918	-6.309097									2.679	0.161
6312	18.848821	-6.161855	15.391	0.023	0.994	0.043	0.252	0.084	0.632	0.130	2.655	0.038
6313	18.848934	-6.289517	16.018	0.020	0.673	0.032	0.035	0.063	0.686	0.089	2.617	0.203
6317	18.848943	-6.265848	16.340	0.064	0.907	0.090					2.827	0.108
6320	18.848919	-6.196015									2.794	0.041
6330	18.849075	-6.323032									2.848	0.054
6340	18.849076	-6.265391									2.683	0.063
6345	18.849095	-6.250040	16.100	0.032	0.617	0.039	0.060	0.063	0.715	0.094	2.781	0.052
6349	18.849116	-6.251488	16.077	0.027	0.664	0.037	0.049	0.065	0.492	0.090	2.783	0.044
6358	18.849265	-6.379242									2.887	0.031
6376	18.849239	-6.256742									2.753	0.054
6377	18.849218	-6.227655	15.781	0.018	0.749	0.029	0.015	0.060	0.569	0.087	2.649	0.045
6390	18.849273	-6.209190	15.689	0.020	0.584	0.033	0.009	0.062	0.770	0.082	2.791	0.040
6392	18.849374	-6.320174	16.283	0.026	0.747	0.042	0.003	0.082	0.683	0.118	2.795	0.055
6406	18.849452	-6.295612									2.740	0.154
6409											2.981	0.071
6410	18.849456	-6.252705	11.832	0.010	0.362	0.015	-0.059	0.025	1.228	0.030	2.928	0.015
6411	18.849552	-6.362917									2.848	0.070
6412	18.849543	-6.346988									2.952	0.042
6419	18.849504	-6.255140	16.123	0.018	0.620	0.029	0.044	0.059	0.681	0.092	2.828	0.060
6420	18.849543	-6.286167	16.302	0.024	0.811	0.038	0.150	0.082	0.358	0.145	2.661	0.053
6425	18.849496	-6.222226									2.647	0.047
6426	18.849554	-6.263276									2.864	0.042
6433	18.849495	-6.169177									2.705	0.049
6434	18.849623	-6.306381	16.216	0.023	0.657	0.039	0.121	0.073	0.510	0.108	2.834	0.054
6443	18.849593	-6.160795	16.184	0.023	0.694	0.039	0.001	0.071	0.693	0.100	2.769	0.056
6450	18.849784	-6.339896									2.922	0.068
6461	18.849764	-6.293093	15.997	0.023	0.693	0.035	0.013	0.064	0.708	0.090	2.638	0.167
6471	18.849713	-6.177905									2.733	0.056
6482	18.849820	-6.217641	16.371	0.033	0.632	0.046	0.020	0.083	0.683	0.115	2.731	0.054
6488	18.849952	-6.341431									2.857	0.054
6494	18.849846	-6.176371	15.624	0.020	0.772	0.033	0.070	0.068	0.486	0.098	2.651	0.040
6496	18.849860	-6.189203									2.632	0.154

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
6498	18.849970	-6.292430									2.746	0.053
6500	18.849872	-6.165653									2.870	0.044
6505	18.850080	-6.388555									2.754	0.111
6508	18.849898	-6.169047									2.814	0.052
6510	18.849911	-6.181399									2.794	0.061
6512	18.850010	-6.290915									2.753	0.239
6514	18.849924	-6.188761									2.711	0.046
6517	18.849914	-6.162967									2.768	0.051
6519	18.850062	-6.316355	15.958	0.024	0.693	0.040	0.021	0.079	0.791	0.109	2.922	0.049
6522	18.850065	-6.298909	14.686	0.019	0.562	0.027	0.104	0.047	0.886	0.057	2.750	0.143
6533	18.850000	-6.200577	16.360	0.026	1.318	0.054	0.590	0.195			2.596	0.075
6534	18.850095	-6.303593	16.154	0.025	0.848	0.042	0.068	0.084	0.488	0.134	2.707	0.057
6548	18.850123	-6.191836	15.757	0.023	0.604	0.035	0.106	0.064	0.652	0.090	2.814	0.046
6552	18.850230	-6.302795									2.732	0.053
6574											2.913	0.074
6580	18.850344	-6.293756									2.711	0.067
6581	18.850281	-6.197993	15.573	0.024	0.700	0.035	-0.021	0.058	0.800	0.070	2.727	0.043
6592	18.850388	-6.244167	15.452	0.018	0.719	0.029	-0.045	0.057	0.552	0.074	2.693	0.042
6593	18.850499	-6.336255									2.951	0.046
6599	18.850456	-6.256304	15.016	0.054	0.648	0.083	-0.015	0.141	0.811	0.134	2.728	0.060
6601	18.850448	-6.241950									2.810	0.034
6602	18.850447	-6.229417									2.791	0.049
6607	18.850437	-6.208127									2.739	0.048
6614	18.850605	-6.356488									2.883	0.079
6627	18.850651	-6.296056									2.738	0.163
6628	18.850583	-6.221067	16.253	0.021	0.699	0.037	-0.065	0.079	0.777	0.126	2.756	0.055
6639	18.850754	-6.358438	15.420	0.038	0.824	0.062	0.336	0.112	0.466	0.131	2.751	0.042
6644	18.850633	-6.195597									2.733	0.055
6648	18.850732	-6.304618									2.986	0.123
6655	18.850697	-6.199847	15.890	0.023	0.832	0.035	0.167	0.070	0.718	0.116	2.677	0.041
6672	18.850875	-6.307411									2.778	0.171
6678	18.850937	-6.355413	12.552	0.043	0.342	0.067	0.073	0.116	1.161	0.112	2.944	0.018
6683	18.850807	-6.166461	15.707	0.051	0.813	0.059	-0.074	0.080	0.534	0.083	2.604	0.054
6688	18.850946	-6.298692	15.549	0.020	0.657	0.035	0.033	0.068	0.826	0.091	2.899	0.150
6702	18.850988	-6.217559	15.988	0.020	0.772	0.033	-0.083	0.061	0.763	0.088	2.674	0.046
6704	18.851032	-6.230349									2.896	0.074
6706	18.851139	-6.333109									2.907	0.059
6707	18.851010	-6.184935									2.756	0.049
6726	18.851187	-6.304076	15.682	0.024	0.580	0.044	0.120	0.083	0.883	0.100	2.726	0.163
6730	18.851123	-6.203715	15.742	0.018	0.572	0.027	0.024	0.049	0.991	0.073	2.782	0.045
6736	18.851277	-6.349749	13.755	0.046	0.334	0.079	0.129	0.141	1.156	0.135	2.933	0.110
6743	18.851282	-6.326860									2.723	0.069
6768	18.851339	-6.180541									2.669	0.053
6779	18.851430	-6.204931	15.896	0.020	0.649	0.031	-0.023	0.057	1.038	0.080	2.866	0.048
6792	18.851608	-6.292671									2.916	0.131
6798	18.851613	-6.278376	14.528	0.019	0.503	0.037	-0.013	0.068	1.109	0.063	2.914	0.074
6799	18.851556	-6.211822									2.770	0.052

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
6810	18.851591	-6.205147									2.797	0.054
6828	18.851802	-6.316788									2.842	0.047
6829	18.851791	-6.304272									2.799	0.054
6832	18.851808	-6.306098	16.009	0.022	0.794	0.050	0.251	0.113	0.682	0.180	2.743	0.078
6836	18.851803	-6.276126	15.235	0.019	0.686	0.034	0.045	0.064	0.604	0.074	2.681	0.106
6841	18.851916	-6.387704	15.969	0.048	0.685	0.099	0.016	0.186	0.823	0.188	2.917	0.049
6850	18.851887	-6.305665									2.802	0.056
6861	18.851954	-6.318905									2.845	0.042
6863	18.851955	-6.312191	16.041	0.034	0.740	0.052	0.022	0.096	0.610	0.132	2.822	0.045
6879	18.851922	-6.193477	13.218	0.005	0.583	0.013	0.156	0.028	0.453	0.034	2.722	0.020
6889	18.852032	-6.243636									2.806	0.107
6892	18.852106	-6.308253									2.842	0.044
6897	18.852060	-6.225755									2.870	0.046
6905	18.852145	-6.295877	16.663	0.036	0.691	0.066	0.150	0.135	0.511	0.198	2.674	0.077
6908	18.852119	-6.250952	16.153	0.024	0.658	0.038	0.099	0.075	0.521	0.116	2.774	0.067
6920	18.852129	-6.225440									2.720	0.057
6922	18.852132	-6.224068	16.591	0.029	0.745	0.046	-0.061	0.090	0.820	0.141	2.732	0.065
6924	18.852209	-6.297287	16.365	0.032	0.925	0.075	0.197	0.159	0.525	0.267	2.605	0.062
6926	18.852154	-6.221332	16.087	0.021	0.700	0.029	-0.019	0.059	0.802	0.121	2.686	0.057
6930	18.852215	-6.280662									2.785	0.067
6945	18.852274	-6.262136									2.479	0.163
6949	18.852323	-6.282261	12.873	0.031	0.999	0.050	0.470	0.087	0.487	0.085	2.792	0.183
6953	18.852292	-6.219211									2.813	0.052
6958	18.852345	-6.251201	15.544	0.021	0.592	0.036	0.022	0.064	0.898	0.076	2.719	0.166
6960											2.593	0.052
6972	18.852423	-6.270737	14.948	0.025	0.442	0.046	0.101	0.082	1.061	0.073	3.006	0.028
6979	18.852502	-6.297928									2.639	0.076
7003	18.852531	-6.223961									2.901	0.042
7008	18.852513	-6.182672									2.843	0.037
7020	18.852649	-6.295750	14.479	0.022	0.365	0.049	0.159	0.094	1.077	0.089	2.755	0.128
7021	18.852650	-6.298685	16.172	0.030	0.677	0.063	-0.037	0.124	0.661	0.149	2.854	0.049
7023	18.852680	-6.302947									2.816	0.059
7025	18.852628	-6.259087									2.957	0.171
7026	18.852629	-6.246694									2.844	0.152
7030	18.852684	-6.283379	15.913	0.058	0.697	0.086	0.079	0.145	0.510	0.148	2.753	0.073
7039	18.852741	-6.262926	15.329	0.029	0.905	0.041	0.313	0.070	0.471	0.094	2.740	0.135
7044	18.852718	-6.202228									2.623	0.050
7052	18.852767	-6.210594									2.858	0.044
7058	18.852900	-6.321883	13.909	0.039	0.651	0.069	0.278	0.126	0.398	0.121	2.729	0.021
7060	18.852846	-6.242093	15.406	0.025	0.714	0.044	0.017	0.080	0.897	0.088	2.666	0.116
7069	18.852935	-6.295652									2.931	0.081
7072	18.852937	-6.285332									2.914	0.059
7074	18.852910	-6.243115	16.204	0.021	0.657	0.039	-0.014	0.078			2.939	0.223
7078	18.852935	-6.262651	11.482	0.028	0.998	0.042	0.631	0.071	0.390	0.066	2.622	0.064
7088	18.852988	-6.288063	16.534	0.031	0.612	0.069	0.221	0.140	0.406	0.184	2.762	0.057
7090	18.852990	-6.272637									2.739	0.184
7099	18.853000	-6.223580									2.820	0.078

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
7100	18.853084	-6.311667									2.874	0.126
7101	18.852977	-6.195335									2.751	0.052
7124	18.853145	-6.280190	15.660	0.032	0.728	0.052	0.136	0.097	0.652	0.123	2.701	0.095
7138	18.853174	-6.229950									2.791	0.085
7143	18.853218	-6.258751	15.744	0.031	0.607	0.043	0.115	0.074	0.805	0.101	2.825	0.215
7146	18.853181	-6.205346									2.731	0.053
7164	18.853299	-6.258577	15.407	0.058	0.708	0.079	-0.010	0.127	0.806	0.134	2.790	0.066
7182	18.853369	-6.246472	15.608	0.028	0.524	0.044	0.161	0.078	0.916	0.095	2.842	0.146
7186	18.853417	-6.272684	15.471	0.038	0.701	0.065	0.100	0.116	0.610	0.115	2.638	0.125
7189	18.853411	-6.253798	16.227	0.033	0.791	0.059	0.133	0.110	0.543	0.154	2.692	0.183
7193	18.853526	-6.348531									2.824	0.050
7214	18.853531	-6.244560	16.332	0.044	0.761	0.057	-0.075	0.095	0.951	0.139	2.738	0.077
7215	18.853527	-6.236696									2.875	0.252
7220	18.853628	-6.322091									2.855	0.049
7225	18.853568	-6.245307	15.903	0.038	0.685	0.050	0.149	0.083	0.704	0.116	2.829	0.132
7230	18.853592	-6.241260									2.658	0.161
7248	18.853669	-6.218712	16.516	0.035	0.877	0.050	0.077	0.106	0.521	0.192	2.708	0.062
7251	18.853719	-6.243136	15.913	0.032	0.624	0.048	0.134	0.088	0.745	0.128	2.845	0.051
7259	18.853797	-6.294089									2.772	0.069
7265	18.853861	-6.343274	16.538	0.061	0.773	0.097	0.119	0.179	0.807	0.256	2.881	0.067
7269	18.853821	-6.284568	15.739	0.036	0.633	0.059	0.114	0.103	0.725	0.111	2.829	0.041
7272	18.853836	-6.292877									2.974	0.025
7281	18.853898	-6.278685	15.485	0.040	0.534	0.068	0.166	0.120	0.926	0.112	2.916	0.050
7294	18.854029	-6.306559									2.697	0.053
7304	18.854056	-6.268874	16.342	0.028	0.655	0.054	0.209	0.107	0.413	0.138	2.732	0.062
7308											2.942	0.110
7310	18.854107	-6.273565	16.223	0.032	0.650	0.057	0.088	0.106	0.671	0.127	2.816	0.054
7324	18.854170	-6.242457									2.616	0.161
7341	18.854280	-6.286010	16.209	0.041	0.709	0.065	0.190	0.128	0.555	0.189	2.709	0.052
7358	18.854368	-6.304266									2.787	0.062
7359	18.854346	-6.272019	15.768	0.031	0.715	0.054	0.244	0.100	0.498	0.129	2.678	0.040
7362	18.854354	-6.269511									2.703	0.046
7364	18.854345	-6.248375	16.303	0.032	0.610	0.062	0.193	0.119	0.617	0.152	2.736	0.054
7374	18.854429	-6.255979	16.397	0.033	0.634	0.055	0.163	0.103	0.504	0.135	2.807	0.058
7381	18.854498	-6.262852	15.975	0.033	0.595	0.052	0.209	0.095	0.542	0.118	2.776	0.045
7382	18.854534	-6.300267	15.746	0.030	0.686	0.070	0.240	0.140	0.451	0.152	2.740	0.047
7386	18.854472	-6.196578									2.899	0.054
7393	18.854589	-6.294236									2.843	0.045
7396	18.854560	-6.252674	16.174	0.034	0.704	0.058	0.084	0.110	0.630	0.145	2.741	0.202
7398	18.854536	-6.220591									2.758	0.054
7410	18.854572	-6.195559	16.302	0.025	0.730	0.051	0.059	0.101	0.682	0.134	2.771	0.057
7413	18.854670	-6.275386	14.447	0.032	0.354	0.058	0.195	0.107	1.149	0.105	2.986	0.068
7429	18.854772	-6.291133	16.438	0.035	0.768	0.079	0.249	0.160	0.628	0.213	2.780	0.058
7450	18.854970	-6.352865	16.019	0.087	0.622	0.151	0.206	0.274	0.598	0.282	2.323	0.139
7465	18.854937	-6.254079									2.681	0.064
7482	18.855023	-6.252001									2.789	0.059
7485	18.855067	-6.265562	15.847	0.031	0.593	0.066	0.099	0.126	1.005	0.144	2.857	0.047

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
7492	18.855151	-6.299803									2.750	0.063
7496	18.855193	-6.322212									2.767	0.061
7499	18.855131	-6.250235									2.835	0.053
7504	18.855221	-6.328766									2.716	0.041
7511	18.855266	-6.308820									2.634	0.058
7514	18.855221	-6.200340									2.721	0.061
7520	18.855286	-6.249994	15.776	0.028	0.556	0.059	0.160	0.115	0.842	0.131	2.876	0.049
7527	18.855302	-6.202299	15.489	0.031	0.880	0.056	0.318	0.105	0.403	0.126	2.541	0.138
7529	18.855355	-6.262937	15.584	0.042	0.667	0.071	0.059	0.125	0.752	0.121	2.804	0.047
7534	18.855367	-6.243193	15.447	0.034	0.524	0.062	0.154	0.111	0.976	0.107	2.810	0.157
7537	18.855386	-6.245377									2.693	0.043
7538	18.855374	-6.229207	16.170	0.067	0.778	0.099	0.030	0.165	0.416	0.163	2.774	0.074
7539	18.855420	-6.281505									2.782	0.049
7555	18.855486	-6.301702									2.724	0.053
7571	18.855645	-6.353979									2.633	0.052
7589	18.855632	-6.238557									2.744	0.055
7599	18.855625	-6.181858	16.086	0.032	0.722	0.052	0.107	0.104	0.743	0.165	2.755	0.049
7603	18.855720	-6.262844	14.548	0.044	0.748	0.081	0.171	0.146	0.598	0.142	2.782	0.093
7606	18.855703	-6.220065									2.710	0.062
7616	18.855762	-6.242745	15.843	0.034	0.732	0.068	-0.046	0.127	0.613	0.131	2.740	0.084
7628	18.855874	-6.278606	16.035	0.035	0.699	0.068	-0.014	0.129	0.696	0.149	2.765	0.046
7634	18.855883	-6.252860									2.677	0.043
7643	18.855965	-6.286670									2.642	0.047
7651	18.855942	-6.213143	16.011	0.023	0.605	0.051	0.230	0.107	0.439	0.145	2.557	0.185
7659	18.856104	-6.360506	16.222	0.058	0.710	0.104	0.260	0.194	0.569	0.229	2.714	0.050
7692	18.856178	-6.245924	16.344	0.041	0.782	0.080	0.177	0.163	0.474	0.219	2.673	0.057
7711	18.856295	-6.238028	14.044	0.036	0.356	0.073	0.196	0.137	1.174	0.140	2.990	0.024
7713	18.856264	-6.186403	16.602	0.048	0.795	0.082	0.180	0.167	0.484	0.249	0.000	0.000
7719			14.203	0.038	0.424	0.077	0.249	0.144	1.018	0.140	2.927	0.077
7764	18.856652	-6.228447									2.831	0.036
7776	18.856717	-6.223515									2.741	0.058
7792											2.920	0.078
7800	18.856868	-6.195024									2.663	0.223
7809	18.856994	-6.279018	15.841	0.050	0.707	0.090	0.004	0.171	0.599	0.188	2.842	0.162
7829	18.857205	-6.304552									2.806	0.041
7851	18.857268	-6.211067									2.621	0.224
7883	18.857522	-6.290157									2.715	0.060
8141											2.990	0.143
8258											2.946	0.085
10411											2.982	0.115
11553	18.849978	-6.147661									2.771	0.142
11606	18.849246	-6.149851									0.000	0.000
11700	18.848802	-6.153272	17.022	0.045	0.743	0.065	-0.024	0.118	0.979	0.231	3.039	0.085
11835	18.845997	-6.157993									2.793	0.099
11836	18.844569	-6.158398									2.800	0.069
12172	18.849712	-6.167341									2.776	0.072
12213	18.853342	-6.167981									2.978	0.122

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
12261	18.842183	-6.172038									2.885	0.174
12470	18.847495	-6.177511	16.790	0.036	0.688	0.059	0.015	0.125	0.588	0.194	2.845	0.077
12535	18.850871	-6.178852									2.651	0.115
12618	18.846933	-6.182468									2.669	0.076
12682	18.851699	-6.183319	16.731	0.037	0.929	0.056	-0.067	0.127	0.954	0.297	2.708	0.083
12763	18.849797	-6.186023									2.744	0.129
12796	18.850339	-6.187514									2.690	0.088
12801	18.848919	-6.187391									2.743	0.117
12891	18.845411	-6.190449									2.798	0.076
12913	18.849484	-6.190370									2.748	0.093
12934	18.851572	-6.190664	17.220	0.057	0.694	0.085	0.061	0.164	0.682	0.272	2.780	0.095
13022	18.844744	-6.194584									2.797	0.129
13065	18.844475	-6.195701									2.728	0.083
13077	18.853303	-6.194549									2.747	0.075
13079	18.847050	-6.195752									0.000	0.000
13130	18.841775	-6.197856									2.619	0.144
13149	18.849269	-6.197475	17.812	0.078	0.825	0.116	-0.092	0.238	0.654	0.512	2.846	0.174
13180	18.842671	-6.199756									2.789	0.102
13198	18.846392	-6.199620	16.796	0.048	0.706	0.067	-0.026	0.117	0.645	0.164	2.672	0.070
13226	18.846982	-6.200187									2.734	0.063
13298	18.846548	-6.202654									2.618	0.081
13299	18.846342	-6.202812									2.755	0.072
13398	18.849858	-6.205320									2.604	0.100
13407	18.841565	-6.207006									2.752	0.087
13426	18.849889	-6.206070	16.758	0.040	0.762	0.059	-0.117	0.118	0.875	0.206	2.730	0.071
13450	18.841729	-6.207900									2.812	0.094
13472	18.847575	-6.207614									2.763	0.108
13500	18.846188	-6.208931	16.978	0.044	0.686	0.073	0.036	0.147	0.846	0.264	2.674	0.087
13570	18.847180	-6.210901									2.819	0.069
13803	18.845248	-6.219148	16.963	0.040	0.771	0.058	0.051	0.129	0.417	0.229	2.739	0.083
13829	18.852187	-6.218980	16.640	0.025	0.777	0.060	-0.117	0.119	0.891	0.173	2.740	0.104
13858	18.852867	-6.219516									2.803	0.178
13893	18.851909	-6.220770	16.754	0.042	0.623	0.054	0.273	0.108	0.579	0.194	2.655	0.076
13949	18.850271	-6.223295	16.750	0.037	0.744	0.059	-0.046	0.122	0.771	0.195	2.809	0.067
13958	18.844138	-6.224818									2.827	0.072
13964	18.850121	-6.223902	16.713	0.040	0.731	0.057	0.052	0.106	0.360	0.158	2.726	0.080
13966	18.847387	-6.224486									2.719	0.162
13990	18.842922	-6.226208									2.884	0.098
14050	18.846217	-6.227731									2.494	0.123
14115	18.844231	-6.230515									2.725	0.136
14130	18.846477	-6.230561	16.755	0.042	0.682	0.063	-0.028	0.119	0.987	0.207	2.729	0.083
14149	18.848794	-6.230615									2.819	0.091
14176	18.848404	-6.231616									2.815	0.107
14184	18.852745	-6.230960	17.035	0.046	0.768	0.068	-0.031	0.150	0.648	0.281	2.653	0.091
14188	18.844735	-6.232390	16.890	0.032	0.910	0.066	-0.132	0.153	0.777	0.272	2.722	0.079
14210	18.853800	-6.231766	17.657	0.068	0.885	0.114	0.007	0.262	0.392	0.461	2.670	0.140
14257	18.845592	-6.234579									2.773	0.137

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
14290	18.843819	-6.236230									2.616	0.085
14307	18.852184	-6.235382	16.752	0.037	0.753	0.053	0.073	0.100	0.365	0.187	2.753	0.071
14321	18.854006	-6.235615									2.942	0.090
14357	18.846644	-6.238452	17.482	0.045	0.630	0.078	0.261	0.184			2.672	0.109
14388	18.857507	-6.237782									2.620	0.084
14484	18.847052	-6.243286									2.824	0.070
14664	18.845232	-6.250493									2.679	0.069
14673	18.847793	-6.250594									2.645	0.073
14697	18.846818	-6.251705									2.848	0.143
14710	18.846688	-6.252338	17.296	0.064	0.724	0.085	0.062	0.154	0.753	0.286	2.638	0.106
14742	18.847239	-6.253492	16.948	0.036	0.706	0.057	0.050	0.125	0.616	0.233	2.583	0.088
14771	18.844064	-6.255320									2.679	0.115
14782	18.846831	-6.255357	16.663	0.029	0.775	0.047	-0.059	0.092	0.526	0.149	2.758	0.074
14812	18.846507	-6.256521									2.696	0.072
14834	18.848139	-6.256875									2.751	0.084
14872	18.852297	-6.257330									2.811	0.095
14877	18.847736	-6.258313	16.875	0.038	0.743	0.058	-0.100	0.113	0.833	0.192	2.739	0.134
14894	18.847212	-6.259273									2.749	0.086
14933	18.848987	-6.260619	17.156	0.041	0.867	0.081					2.589	0.098
14991	18.847179	-6.263598	16.855	0.041	0.659	0.063	0.007	0.114	0.747	0.166	2.715	0.075
14992	18.843738	-6.264224									2.675	0.072
15098	18.848369	-6.267587									2.737	0.114
15119	18.842584	-6.269179									2.645	0.099
15179	18.855362	-6.270031									2.766	0.071
15190	18.844814	-6.272207									2.632	0.074
15215	18.846059	-6.273271									2.777	0.087
15259	18.845981	-6.275197	16.805	0.036	0.704	0.060	0.096	0.122	0.446	0.203	2.689	0.078
15282	18.844013	-6.276358	16.557	0.030	0.810	0.049	0.025	0.105	0.668	0.225	2.825	0.060
15288	18.855180	-6.274387									2.818	0.082
15354	18.846523	-6.278595									2.757	0.065
15369	18.857421	-6.277236	17.425	0.086	0.891	0.140	-0.166	0.253	0.833	0.326	2.808	0.108
15372	18.844197	-6.279554									2.707	0.083
15377	18.844051	-6.280124									2.587	0.101
15408	18.847236	-6.280493									2.884	0.120
15425	18.842165	-6.282153									2.717	0.070
15461	18.845109	-6.282963									2.811	0.071
15511	18.845088	-6.284796									2.702	0.094
15533	18.857377	-6.283575	17.244	0.057	0.866	0.111	-0.162	0.220	0.617	0.299	2.834	0.104
15572	18.846230	-6.286882									2.873	0.073
15578	18.841375	-6.287930									2.691	0.088
15588	18.849296	-6.287064									2.654	0.085
15589	18.847391	-6.287413	16.857	0.028	0.761	0.047	0.032	0.102	0.629	0.199	2.739	0.078
15665	18.855106	-6.288868									2.822	0.081
15676	18.846985	-6.290731									2.678	0.095
15691	18.842866	-6.292093	16.736	0.033	0.842	0.065	0.158	0.148	0.531	0.264	2.684	0.082
15699	18.842043	-6.292683									2.732	0.095
15716	18.845003	-6.292803									2.739	0.066

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
15761	18.845928	-6.293827	16.963	0.037	0.634	0.052	0.159	0.109	0.585	0.191	2.588	0.079
15773	18.854745	-6.292902	17.245	0.054	0.704	0.108	0.317	0.221			2.743	0.101
15786	18.853238	-6.293373									2.740	0.080
15834	18.843077	-6.297297	16.700	0.038	0.745	0.058	0.035	0.105	0.545	0.148	2.644	0.066
15856	18.848038	-6.297057	16.671	0.037	0.802	0.052	0.038	0.104	0.482	0.176	2.763	0.074
15865	18.853189	-6.296530	16.845	0.060	0.809	0.101	-0.071	0.191	0.654	0.266	2.595	0.081
15866	18.852815	-6.296519									2.709	0.078
15870	18.847083	-6.297661	17.595	0.047	0.873	0.083	-0.093	0.204	0.513	0.381	2.566	0.177
15877	18.846464	-6.298109									2.613	0.074
15895	18.843581	-6.299203									2.718	0.083
15907	18.847462	-6.299176	16.779	0.035	0.658	0.055	0.192	0.109	0.451	0.181	2.752	0.064
15937	18.846300	-6.300058									2.740	0.081
16025	18.852230	-6.302484									2.670	0.122
16058	18.847511	-6.304228									2.764	0.124
16117	18.848982	-6.305847	17.232	0.045	0.707	0.070	-0.024	0.135	0.831	0.254	2.708	0.100
16165	18.851779	-6.307316	17.449	0.053	0.912	0.084					2.754	0.135
16202	18.846750	-6.309762	16.733	0.032	0.777	0.048	0.017	0.107	0.722	0.198	2.828	0.072
16226	18.849329	-6.310195									2.818	0.082
16247	18.843827	-6.311796									2.655	0.085
16264	18.851653	-6.311100	16.890	0.044	0.765	0.077	0.108	0.164	0.537	0.258	2.729	0.073
16358	18.841943	-6.315264	16.884	0.040	0.941	0.063	0.407	0.163			2.818	0.091
16431	18.851607	-6.315758	17.357	0.046	0.854	0.087	-0.053	0.197	0.451	0.328	2.679	0.115
16481	18.850535	-6.317276									2.557	0.135
16489	18.847182	-6.318389									2.806	0.077
16518	18.845633	-6.319597									2.796	0.095
16524	18.842635	-6.320346	16.738	0.025	0.711	0.052	0.018	0.107	0.573	0.170	2.673	0.066
16580	18.846865	-6.321432	16.895	0.026	0.822	0.055	-0.046	0.117	0.678	0.212	2.747	0.074
16727	18.850245	-6.324842	17.189	0.056	0.718	0.099	0.143	0.195	0.474	0.280	2.779	0.105
16738	18.847516	-6.325937									2.949	0.082
16746	18.846732	-6.326214									2.837	0.095
16793	18.847368	-6.327470									2.838	0.079
16807	18.852186	-6.327072	16.773	0.042	0.844	0.088	0.094	0.186	0.487	0.304	2.794	0.078
16916	18.847179	-6.330875	16.966	0.057	0.811	0.077	0.206	0.159			2.710	0.091
16973	18.844955	-6.333005									2.418	0.082
16974	18.844622	-6.333066									2.837	0.116
17021	18.849423	-6.333303	16.529	0.052	0.765	0.078	-0.076	0.139	1.073	0.201	2.806	0.077
17172	18.851656	-6.338326									2.938	0.082
17665	18.848054	-6.352797									2.800	0.075
17968	18.852012	-6.361131	16.728	0.046	0.734	0.079	0.147	0.165	0.499	0.238	2.877	0.067
18049	18.844772	-6.365073									2.642	0.082
18102	18.851568	-6.365187	17.086	0.082	0.959	0.129	0.051	0.260	0.531	0.432	2.832	0.134
18176	18.851827	-6.367132									2.866	0.128
18420	18.846598	-6.375631									2.821	0.080
18857	18.855203	-6.385809									2.619	0.106
18874	18.851700	-6.386888									2.892	0.092
19032											2.906	0.035
21907	18.851670	-6.211187									2.609	0.076

Webda No.	RA (hrs)	Dec (deg)	V	error	$b-y$	error	m_1	error	c_1	error	β	error
22035	18.846611	-6.267841	17.292	0.055	0.797	0.101					2.720	0.123
22047	18.841668	-6.277331									2.609	0.088
22056	18.848331	-6.279185	16.817	0.044	0.767	0.072	0.057	0.143	0.551	0.340	2.598	0.094
22838	18.846013	-6.201991									2.850	0.153
22851	18.841100	-6.210380	17.098	0.048	0.814	0.086	0.101	0.194	0.517	0.337	2.649	0.092
22878	18.841057	-6.271519									2.748	0.084
23385	18.846952	-6.226171									2.643	0.086
23434	18.848719	-6.306445									2.704	0.087
23462	18.848523	-6.328723									2.788	0.067
23889	18.854410	-6.244923									2.732	0.098
24560	18.846542	-6.186139	16.815	0.035	0.655	0.064	0.082	0.133	0.582	0.186	2.729	0.076
24649	18.846644	-6.255678									2.742	0.060
24690	18.840808	-6.197031									2.787	0.076
24699	18.848119	-6.266837									2.692	0.081
24706	18.843864	-6.236355	17.168	0.029	0.702	0.071	0.223	0.187			2.762	0.104
24716	18.844894	-6.216969									2.805	0.119
24736	18.847608	-6.290592	16.711	0.035	0.800	0.050	0.099	0.104	0.717	0.190	2.659	0.074
24739	18.845167	-6.334957									0.000	0.000
24748	18.846521	-6.348496									2.786	0.109
24780	18.842094	-6.290806	16.737	0.035	0.644	0.052	0.169	0.097	0.717	0.164	2.622	0.067
24914	18.848541	-6.204954									2.833	0.083
24986	18.851455	-6.182219	16.794	0.039	0.841	0.065	-0.005	0.126	0.850	0.238	2.680	0.074
25026	18.852904	-6.239807	17.150	0.036	0.873	0.065	0.137	0.163	0.231	0.314	2.744	0.112
25038	18.853230	-6.272937	17.068	0.034	0.832	0.072	-0.086	0.164	0.817	0.303	2.738	0.093
25042	18.848935	-6.237210									2.774	0.113
25047	18.849195	-6.289337									2.728	0.141
25062	18.848824	-6.258878	16.747	0.028	0.742	0.047	0.004	0.111	0.343	0.188	2.756	0.073
25064	18.853106	-6.252949									2.731	0.085
25074	18.851095	-6.299301	16.893	0.051	0.869	0.074	0.099	0.169	0.555	0.318	2.773	0.083
25095	18.852853	-6.268329	16.923	0.040	0.844	0.056	0.136	0.128	0.400	0.321	2.648	0.088
25528	18.855085	-6.206273									2.890	0.118
26513	18.844541	-6.311156									2.686	0.100

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