Drizzle Your Way to Beautiful Images

Part 2 – Post Capture Image Processing

Using the Envisage Software with Drizzle technology to enhance And improve your DSI images

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Overview

In **"Part I – Introduction and Image Capture"**, I presented an overview of the Drizzle technology and how it can be used during the capture process when imaging with your DSI camera using the Envisage software. In Part 2, I will continue this discussion by presenting the methods available to you when using Drizzle in the post-capture process. In this document, I will discuss the differences between using Drizzle during capture and post-capture, techniques and tools available during processing not available during capture, and hopefully a few hints and tips along the way to make things easier for you.

Differences between Capture and Processing

Other then the obvious fact that you are not capturing images but instead are processing previously captured images, there are a few differences in the post-capture process and a few features that are not available during capture.

First, you have the ability to select the files you wish to process, determine which ones to use from that list, and even decide which image is the "reference" image to use during processing. This means that regardless of the reference images used during capture to determine those that qualify for the stacked image, you can selectively determine which image you feel is the best to use. This might be particularly useful if drift, poor seeing, wind, or any other factors caused your initial evaluation images to have star trails or other issues that make them not as accurate.

Another situation you can control with this process is to ensure that the images used are only those that you pre-determine should be included verses allowing the evaluation images to determine this. For instance, you might have an image that would have a high quality rating based on the star (or stars) selected, but may have poor overall quality, a satellite line thru the image, or any other issue that you feel should disqualify it from being included in the final stack of images. By pre-selecting the images to be included in the final, you can alleviate problems that may have to be taken care of when performing final processing tasks in another application.

Another interesting possibility available to you in using this process, and obviously something not available during capture, is the ability to combine files from different capture sessions. For instance, you may have taken images of varying exposure lengths to ensure detail is available in longer exposures that would normally be blown out. Or perhaps you wish to combine images taken with just your IR filter and those taken with an Ha filter to create your own Luminance that includes both. All of these possible applications are available to you using the post-processing drizzle technology.

As we discuss the post-capture processing of your images in this document, I will point out other areas that are different or require special attention vs. procedures you would follow during the capture process.

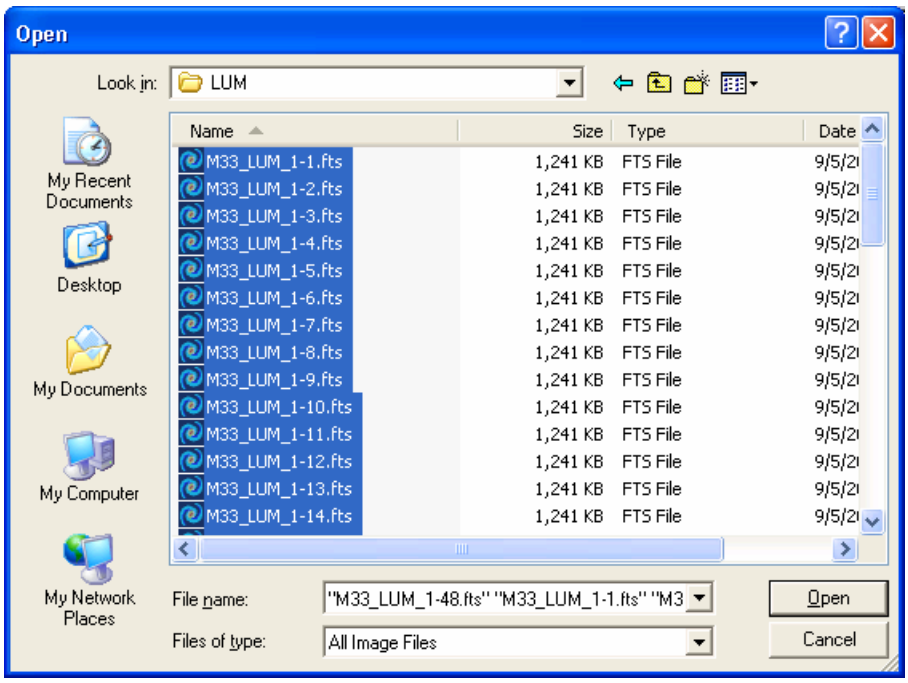
Getting Started

To begin post capture Drizzle processing, start the Envisage software in the normal way. For this process you will not need the camera so I would leave it unplugged. If the camera is plugged in, click on the Image Files tab. If the camera is not plugged in, the Image Files tab will already be selected. Also at this time, ensure that Drizzle is selected from the Image Process drop down menu.

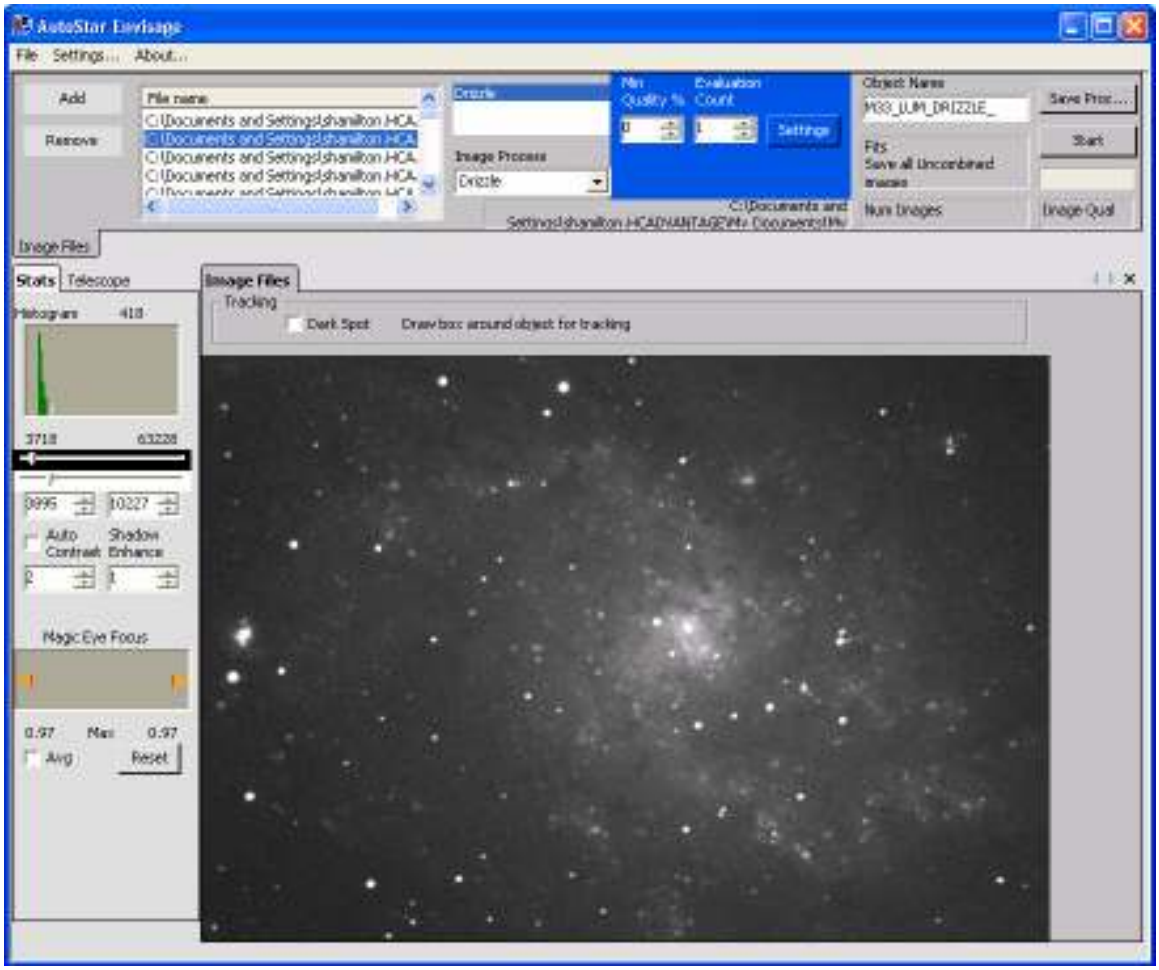
Before I go through the processing steps, I will first walk thru the screen itself and familiarize you with the options available to you. First, in the top left, you will see two buttons and a list box. The buttons are used to Add or remove single or groups of files from the list box titled "File Name". Only those files in the list box will actually be included in your processing. As you will see, you are able to use these buttons and list box to not only manipulate the file list in general but to carefully specify which files get included in your final image ultimately and which ones do not.

> **Note**:
> In order to process captured images with the Drizzle, you must ensure that you use the Add Files button, not the Open menu item on the File menu. Using the Open Menu item simply opens and displays a previously saved file but does not allow it to be used in the Drizzle Process.

To select the files you wish to process, simply click the Add Files button and the files dialogue will be displayed. At this point, go to the directory that contains your files and select the ones wish to include. You may select a single file at a time or you may select multiple files as seen in the illustration below.



The dialogue uses standard Windows input for selecting files, so you may simply select a top and bottom file by clicking the shift key at the same time or you may select files individually by holding down the control key and clicking the files you want. Click the "Open" button to close the dialogue and add these files to your list. The screen should then appear as seen below



At this point, you may choose to add more images or continue on with the image pre-selection. If you wish to add more images to current list, simply click the Add New button again and complete the process as you did before. The new images you have selected will be added to the end of the current list, they will NOT replace the current list of images. If you wish to clear the list and start over with a different set of images, simply click the first image in the list, then scroll to the bottom of the list and while holding down the Shift key, click the last image to select all the images. Then simply click the Remove button and all the images will be removed.

Pre-Selecting and Assigning the Reference Image

Now that all of the images are loaded we wish to include in the Drizzle process, the next step is to pre-select the final combined images and select the image we will use as our reference. As previously noted, we have the ability at this time to pre-determine which images are included based on the images we manually include and the reference image we select.

Although we will be using an Evaluation Count and Minimum Quality setting in the same manner as we do during the capture process, one of the more powerful features available to us in post-capture processing is that ability to manually remove images that we do not want included. As stated previously, this could be due to any number of reasons.

First, if you have selected the "Save All Uncombined" option, then all of your images, those included previously in your initial stacked image and those not included, are saved and are now in your list. These may or may not be automatically removed in your post processing (based on Quality) and as such, it is best to simply remove them yourself at this time. Secondly, if the original stars that were used during the capture evaluation were not perfect due to drift, wind, etc, the quality setting may have actually included images you would not normally keep and excluded others you would want to keep. Thirdly, there may be something in a previously included image that passes the quality test but may have other problems such as extensive noise, graininess, etc.

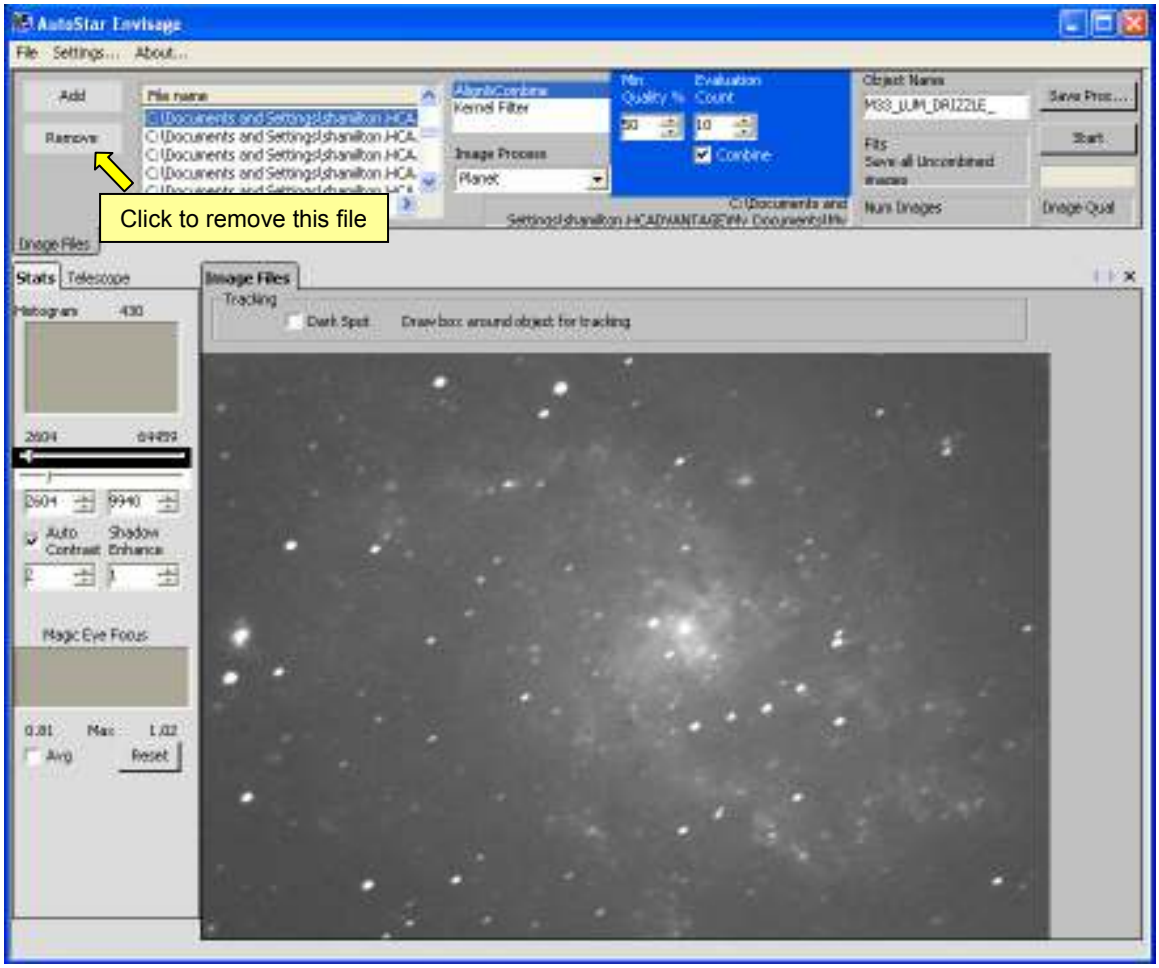
As a first step in pre-selecting the included images, I recommend scrolling thru all of the images prior to deleting any of them. This will give you a good idea of the overall quality of your images and quickly bring to light any blatantly obvious images that should be removed. To scroll thru the images, ensure you have the "Image Files" tab selected and click the first file in the "File Name" list. This will load the selected file and display it in the window.

> **Note**:
> Remember, while scrolling thru your images, that the images are saved only with Histogram information. Any other processing such as shifting and rotation is not saved with the individual images. Shifting and rotation (if needed) will be accomplished during the post-capture Drizzle process again.

You may now select each image you have loaded by either clicking on each file in the file list or by simply pressing the Down Arrow key on your keyboard to display each file. As stated, in this first pass, look for those images that definitely have issues that you wish to not be included in the final set.

> **Note**:
> To ensure you are able to see all defects that may be in your images, you may want to increase the Auto-Contrast or manually stretch the images during this process.

When an image is located that you do not want included, ensure that image name is highlighted in the file name list and click the "remove" button. In the image below, you can see that the stars in this particular shot are definitely out of round and though they would probably be left out due to a quality setting, I will remove it manually at this time anyway.



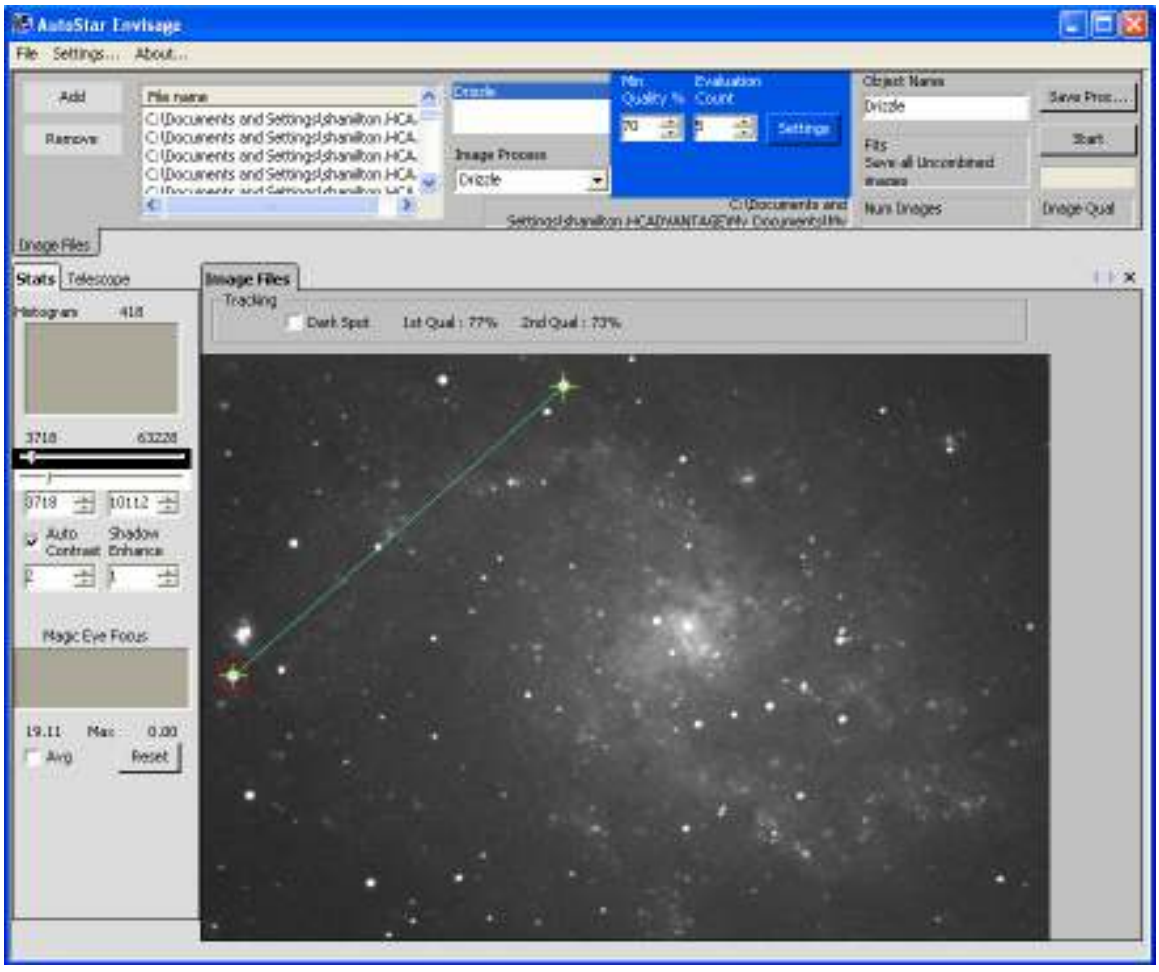
After an initial review of the images and removing any obvious "bad" files, I then carefully step thru the images again and review each one closely to decide further which files to include or not. This may take several passes as you see features that you may not see the first time thru. Remember that we are still going to use a quality setting so some images may still be rejected based on quality later on.

Now that we have the files we wish to include in our final image, the next step is to determine which files will be used as our reference and evaluation images. Just as in the capture routine, the software will automatically look at the files in the order they are loaded to determine the highest quality image to use for its reference during stacking. For this reason, you should pay close attention to the first files in your file list as these will be the ones used during the evaluation process. The big difference of course, between post-capture drizzle and stacking during capture is that you can control the actual evaluation images used.

To select the images that will be included in your evaluation, you want to ensure that you closely review the first set of images that equals the number you have indicated in the Evaluation Count. I generally ensure that all of these images are as close to "perfect" as possible. The goal obviously, is to ensure that your minimum quality is based on a high quality image in that group. By looking thru these images and removing ones that are not of the highest quality, you will ensure that all images are graded according to the best ones available at the beginning of the list.

> **Note**:
> If, during the stacking process, you note that the Image Quality for individual images is excessively high, this may indicate that your evaluation images were too low in quality and you may wish to reselect which images are used for evaluation.

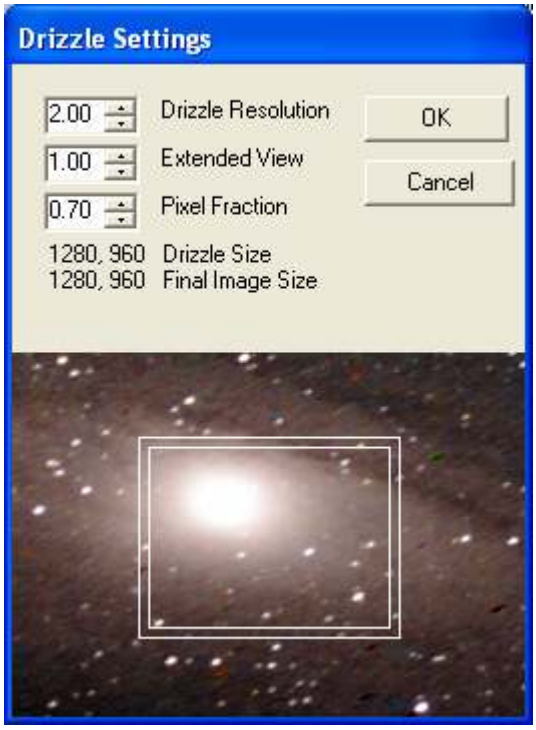
Once you have selected those images to be used for the evaluation quality, you should select the first image in the list and then draw a square around your reference star (or stars) as seen below.



Setting Drizzle Properties

Once all your images selected, the next thing to do is set your processing settings. First, ensure that Drizzle is selected in the Image Process drop down box. Next, we will set our evaluation count and quality settings. Since we have pre-selected the images for our evaluation count, you should set this at the number of images at the beginning of the list that you feel represent the best images in your list. Also, since we have manually limited the entire list to only those images we wish to be included, you can set your Min Quality % to a higher number then you might during capture. For post-capture processing, I generally use at least 80% or so though your situation may dictate a higher or slightly lower number.

Next, we will set the actual Drizzle Settings themselves. To do this, click the "Settings" button next to the Evaluation Count text box. This will display the Drizzle Settings dialogue as seen below.



The first step is to determine the Drizzle Resolution you wish to use. I generally set it to 2.00 (200%) since it can always be reduces in processing later and it tends to provide a high level of precise processing capabilities once imported into another application such as PhotoShop or Paint Shop Pro. Another issue that may come into play here is the total number of images you have. If you are working with only a limited number of images, you may get a better image in the end by using a slightly smaller drizzle resolution, perhaps 1.50 or 1.75.

For purposes of this particular section of the document, we will leave the Extended view at 1.00 for the time being, I will discuss using this in more detail later and other possible uses of this setting.

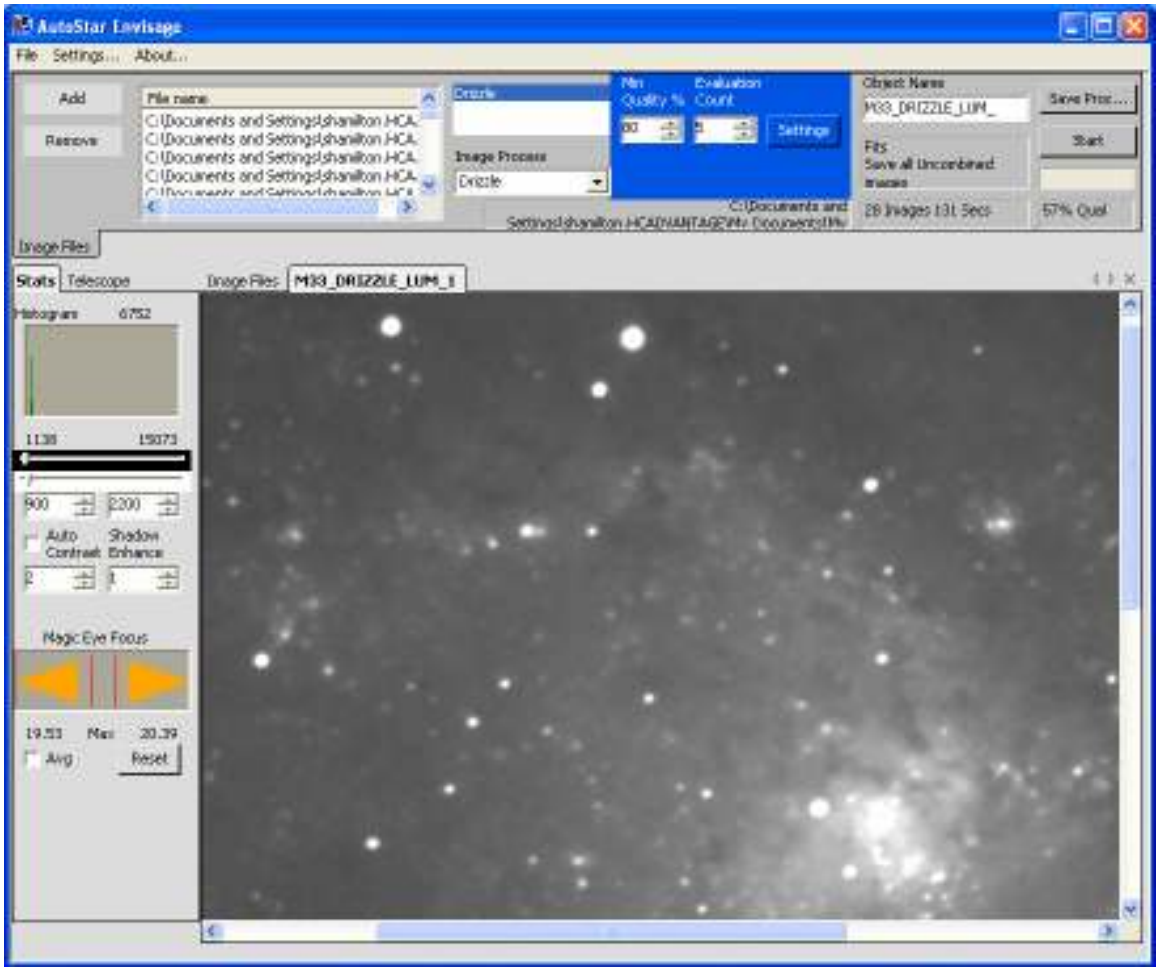
Finally, we should set our pixel fraction. As stated in Part I of this document, this setting will greatly affect the final image produced by the Drizzle process and also provides the greatest power of the Drizzle process. Close attention should be paid to this setting since using a number that is too low may result in images with pixilation or small gaps between pixels and the use of a number that is too High will not attain the smoothest transitions possible when expanding the resolution of the image. For this reason, as a guide, I generally lower the number by no more then the total number of images I expect to stack and generally never go below .70. Through experimentation, this appears to give the best results. So, if you are stacking 10 images, you might set the Pixel Fraction to .90, 20 images to .80 and so on. In the example I am using here, I expect to stack about 30 images out of 48 originals, so I have left the Pixel Fraction at .70. Once complete, click the OK button to close the dialogue.

> **Note**:
> If, at the end of the processing, you notice that you have not stacked the number of images you thought would be stacked or you notice pixilation, you may either change the Pixel Fraction and reprocess the images or change the Quality level and reprocess the same set again

The last step that you should take prior to actually starting the Drizzle Process is to set your Histograms to the settings you wish to use for the final image. Remember that whatever settings you use here will be saved in the final image (The images in the file list will remain unaffected as they are not re-saved).

At this point, you are ready to begin the Drizzle Process. To do so, simply click the Start button. The Envisage software will then begin to evaluate and stack the images utilizing the settings you have entered. This process may take several seconds per image and the same indicators of Image count and quality will be displayed during the process in the same manner as they are during the capture process.

Once complete, the Image file will be displayed in its own tab and you may then review this image. If you wish to make any changes to the image at this point via the Histograms, you may do so and simply click the File / Save menu to re-save the file over itself. The image on the following page is representative of my M33 Luminance image having followed these steps.



Extended View Usage

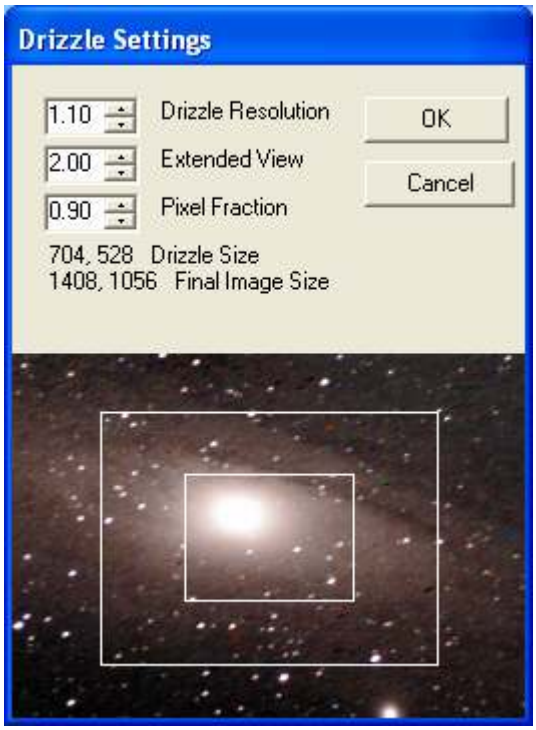
As with the other functions available to you in post-capture Drizzle processing, the Extended View option can also be utilized. If you have taken images during the capture process using the Extended view to create a mosaic, you may re-process these images again using the same principles we have already discussed to improve your final image.

Another possibility for the use of Extended view is to remove clipping that may have occurred in the initial stacked images created. For example, if you were imaging using an Alt / Az mount over an extended period of time and had used Drizzle to capture the final images to a standard 640x480 screen, thru the capture session, the images would be clipped on to fit that size image. You may find that you would prefer to not clip the edges automatically and using the Extended View with the Drizzle Process would allow you to do this.

To get started, follow the steps laid out here thus far for standard Drizzle processing. It should be noted however that as you go thru your images, especially with a mosaic image, that you are careful to not remove too many image in any one sections. This is to ensure that the tracking process will not lose track of your reference stars between large gaps in the exposures.

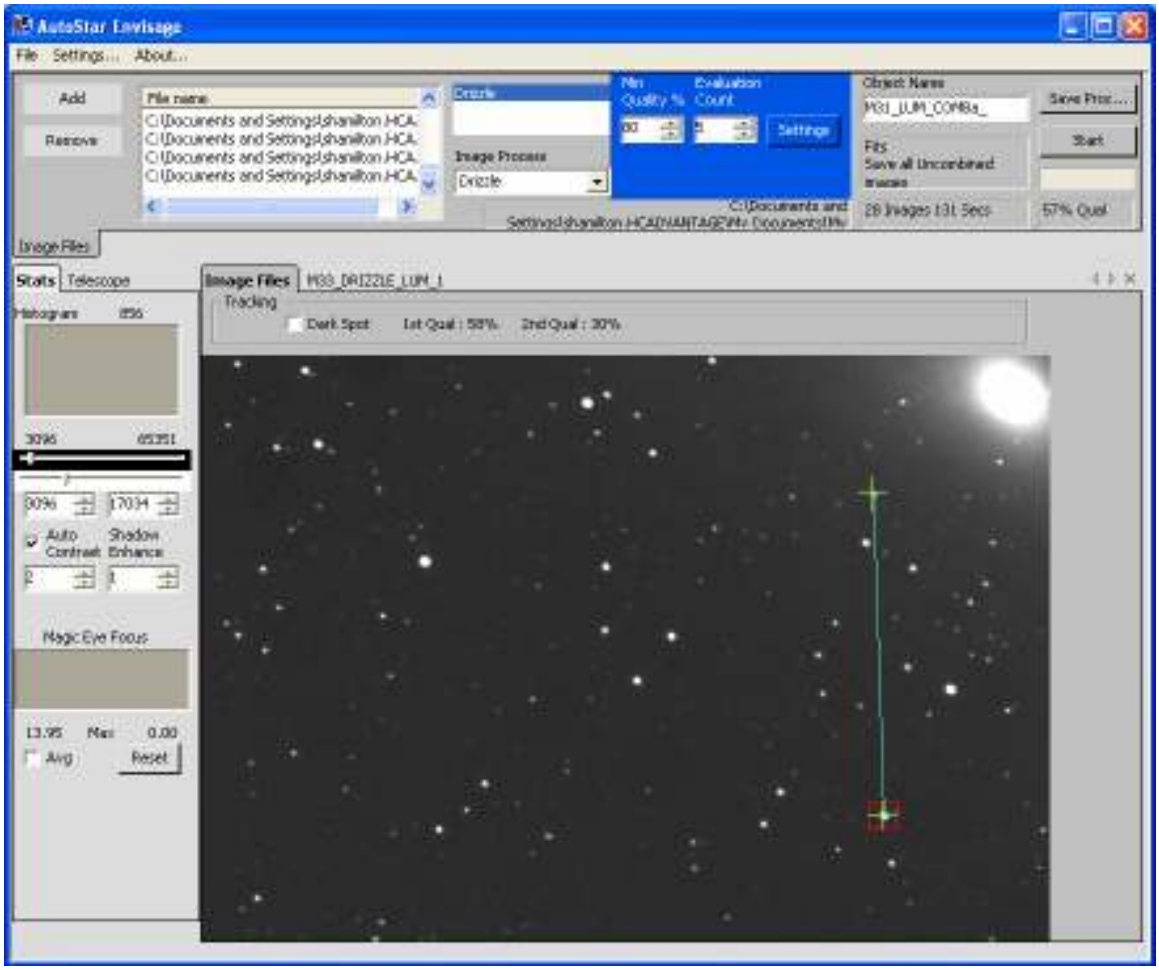
Once your pre-selection of images is complete and you have selected your reference images, click the "Settings" button to open the Settings Dialogue. Depending on what you are trying to accomplish, you should enter the appropriate Extended View setting. For example, if you had captured a mosaic, then you would use the same setting you used during the capture process or slightly larger if available (max value is 2.00). If instead, you are attempting to remove clipped areas due to drift or rotation, you might wish to make the Extended View area slightly smaller.

To take advantage of other drizzle functionality as well, you may also wish to change the Drizzle resolution and Pixel Fraction. Remember, changing the Pixel Fraction without changing the resolution will provide no benefit to the final image and may only add pixilation. For the example shown below, I chose to slightly increase the Drizzle resolution and reduce the Pixel Fraction to .90. One thing to take into consideration here is that if you are doing a mosaic, there may not be as many overlapping images along the edges so your selected Pixel Fraction should be based on how it will be applied to the areas where the least number of images are actually stacked.



Once these settings are entered, you may click OK to close the dialogue and return to the main screen.

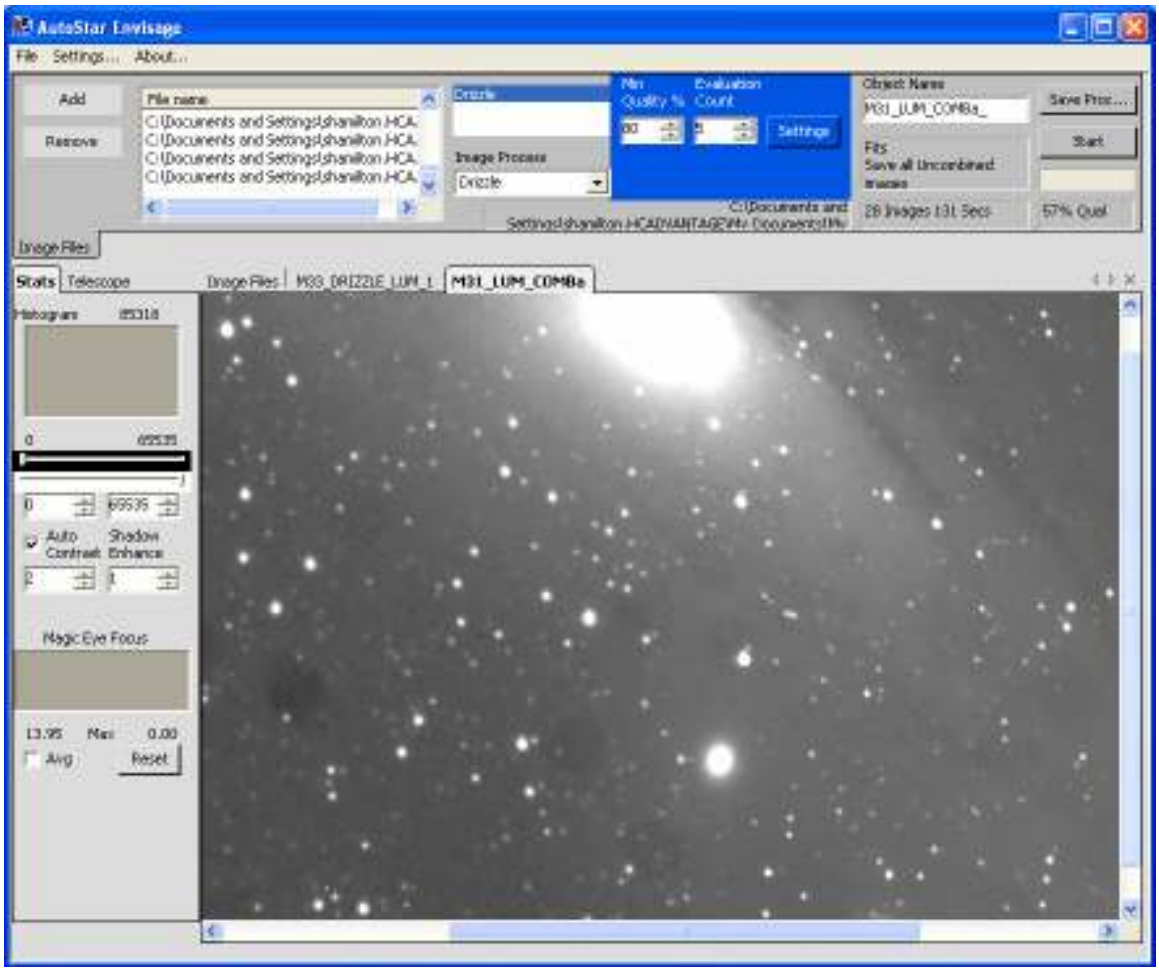
The next step is to select the star (or Stars) you wish to use for tracking purposes. As with the capture process, these should be selected based on their location throughout the entire imaging session. Selecting stars that may rotate out of the frame or drift out of images further in the stack will result in dropped images or possible misalignments. Ensure that the stars selected appear in all frames prior to starting the drizzle process.



Next, ensure the any histogram changes you have made are set to the correct stretch for the drizzle process. Remember that although no changes are made to the files being processed, any histogram settings are saved in the final output image.

Once you are satisfied with your settings and image selection, you should click the Start button to begin the drizzle process. Just as in the capture process, the total number of included images, quality, and duration will be displayed.

Once the Drizzle process is complete, the new image should be displayed. The image below shows a mosaic of a portion of M31 completed utilizing this process.



Conclusion

In these documents, I have attempted to provide just a brief overview of the Drizzle Technology available to you in the Meade Envisage Software for the DSI family of cameras. There are still many other possibilities that are available to you utilizing these tools to enhance your images and provide a more rewarding imaging and processing experience. I would encourage you to try combinations of techniques, different settings, etc. Experimentation is, after all, the best teacher.

Clear Skies and Happy Imaging

Stephen P. Hamilton