

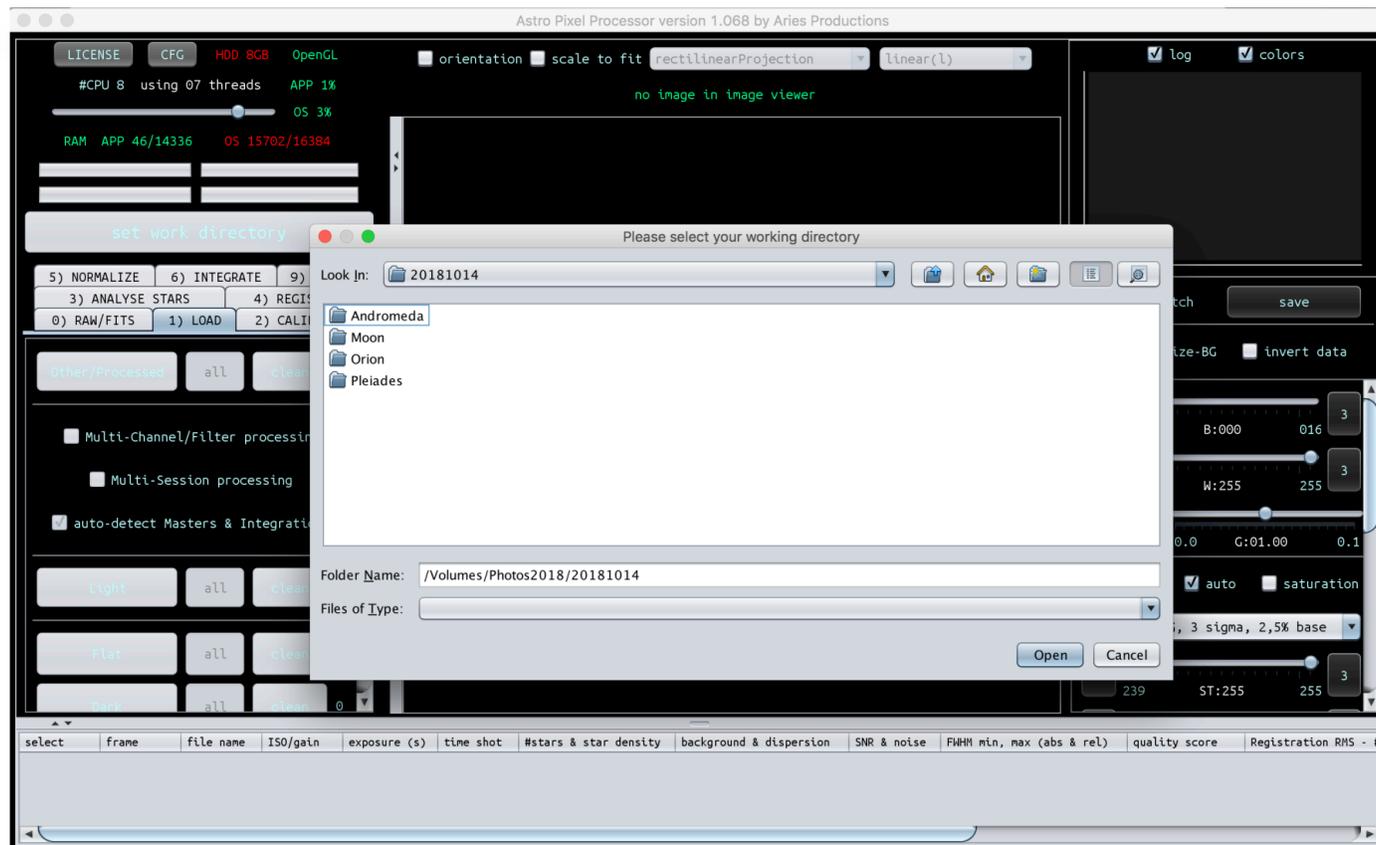
ASTRO PIXEL PROCESSOR : A SIMPLE STEP-BY-STEP TUTORIAL

PART 0 : LAUNCHING AND CONFIGURING APP

1

When you open the software, it asks for a Work Folder

Choose a folder with enough space for all your temporary processing

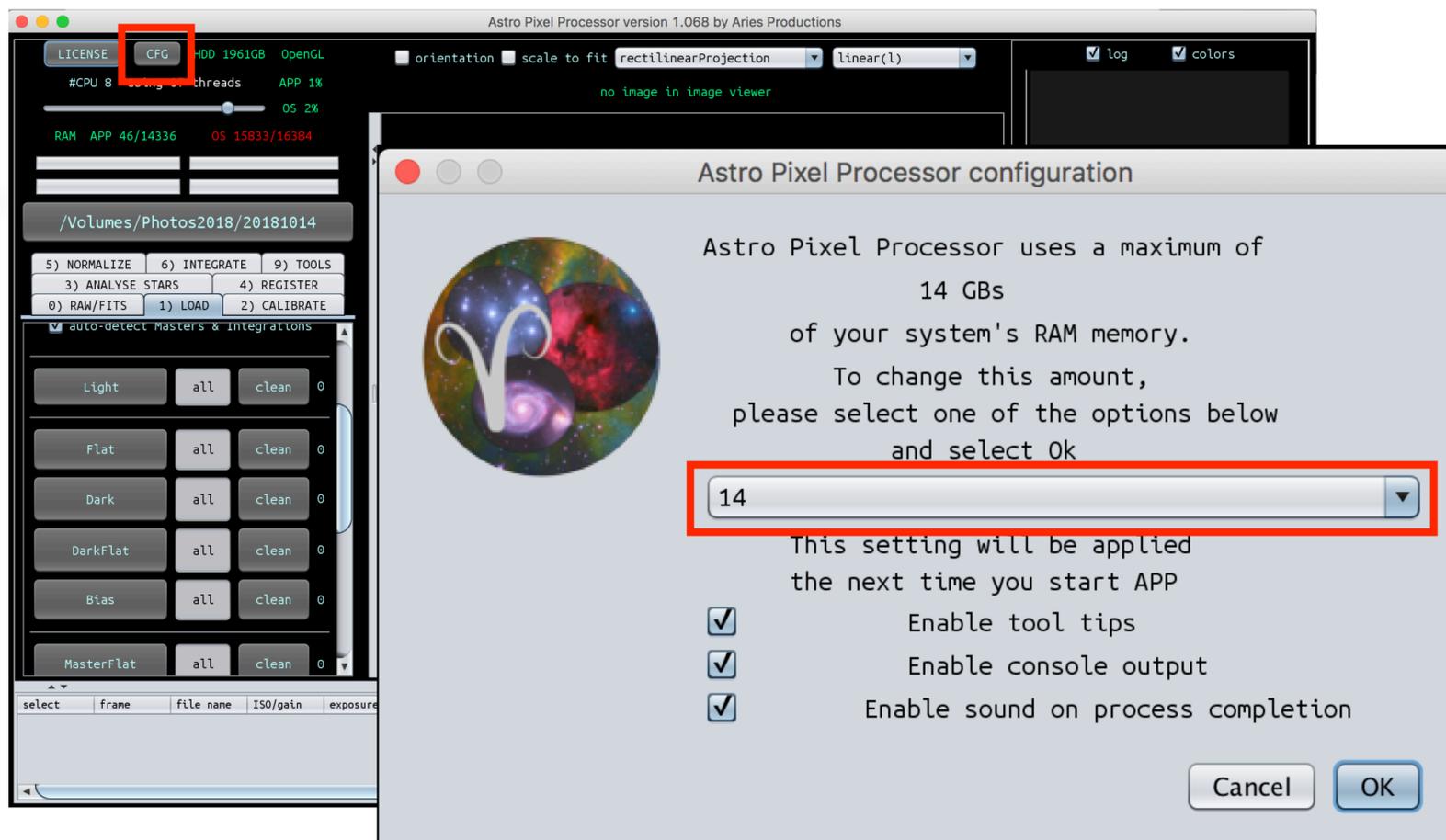


Tip: Use an external drive if you're working on a laptop without a lot of space

Hit the CFG button, and increase the memory size to something appropriate, hit OK and relaunch APP

Tip: 8Gb is good enough for stacking ~100 subs of 20MPixel color images

2

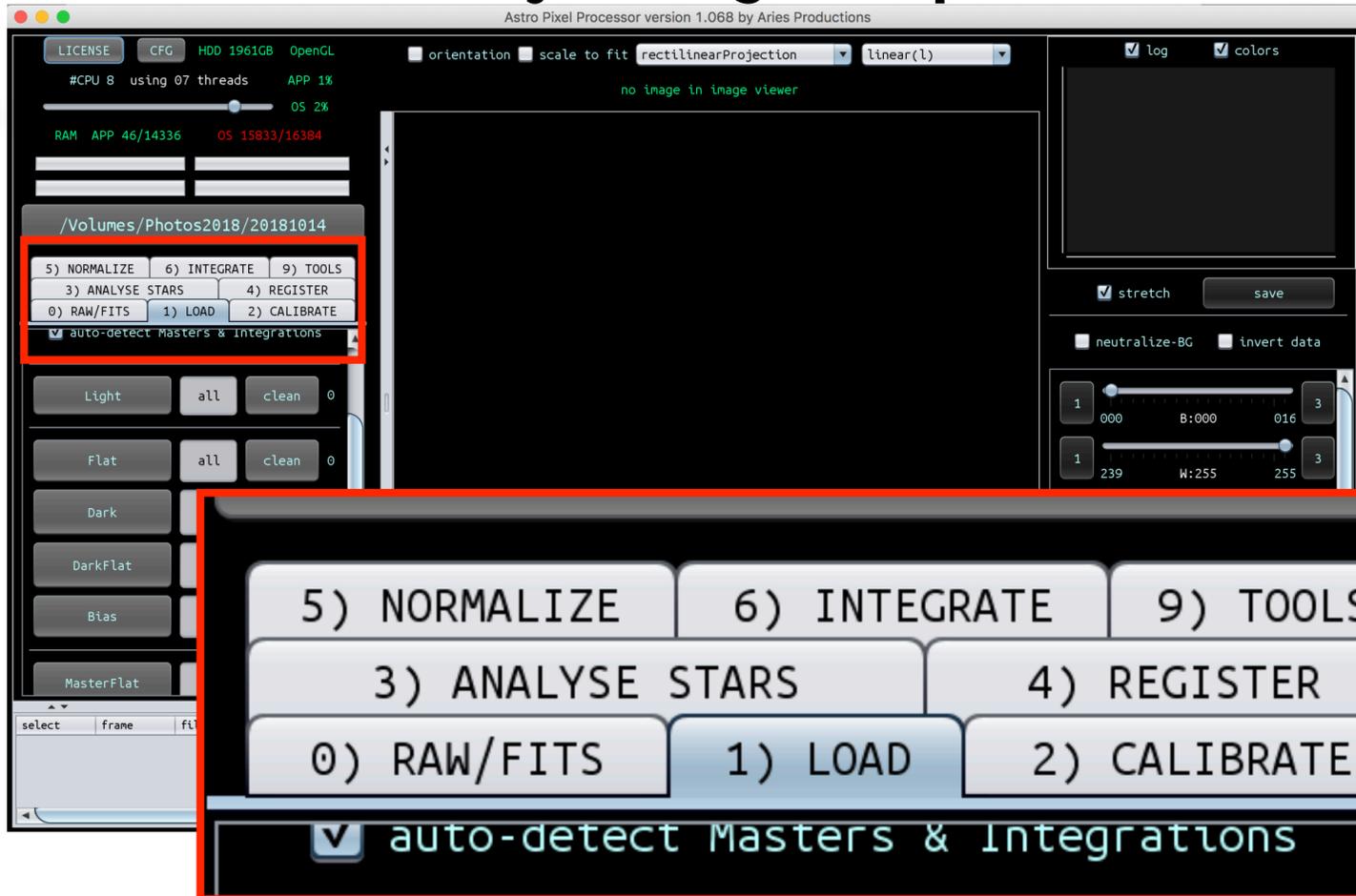


...on to loading images !

PART 1 : LOADING THE LIGHT AND CALIBRATION IMAGES

1

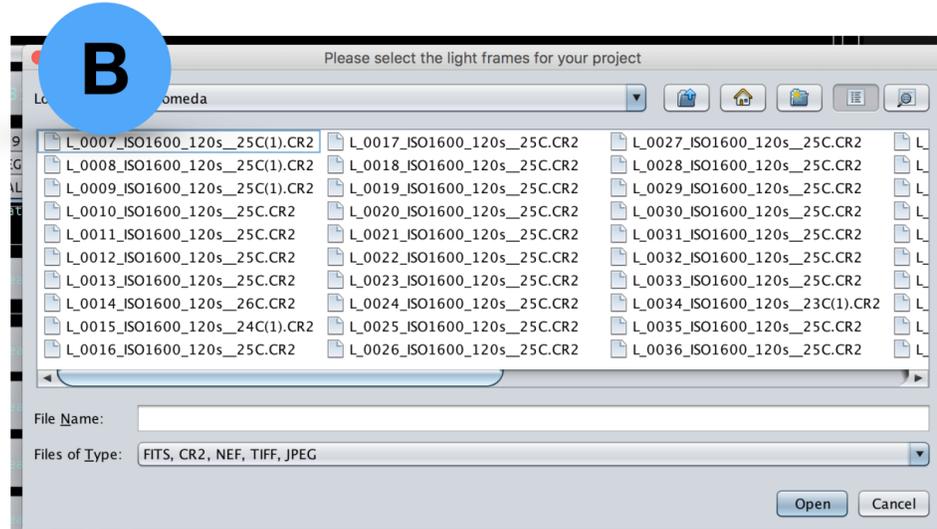
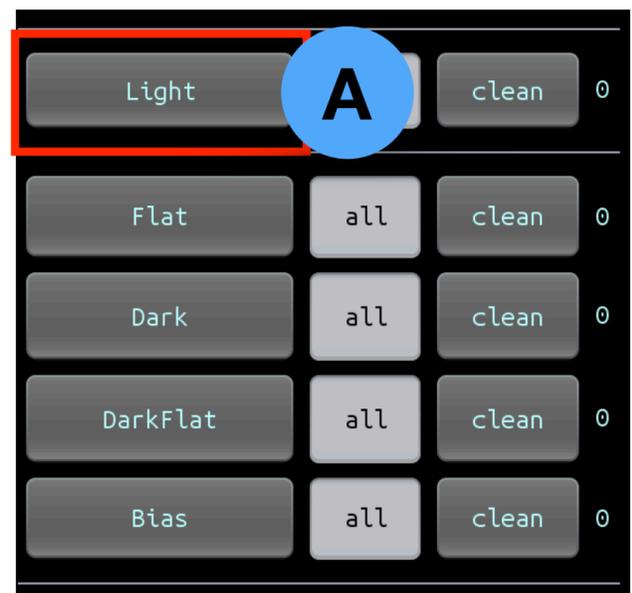
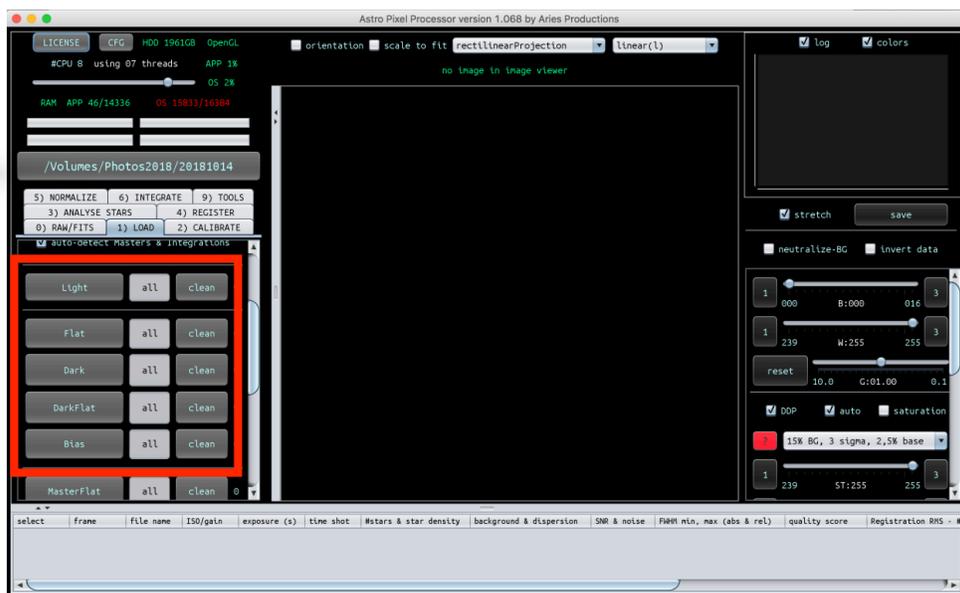
Let's start by loading some pictures



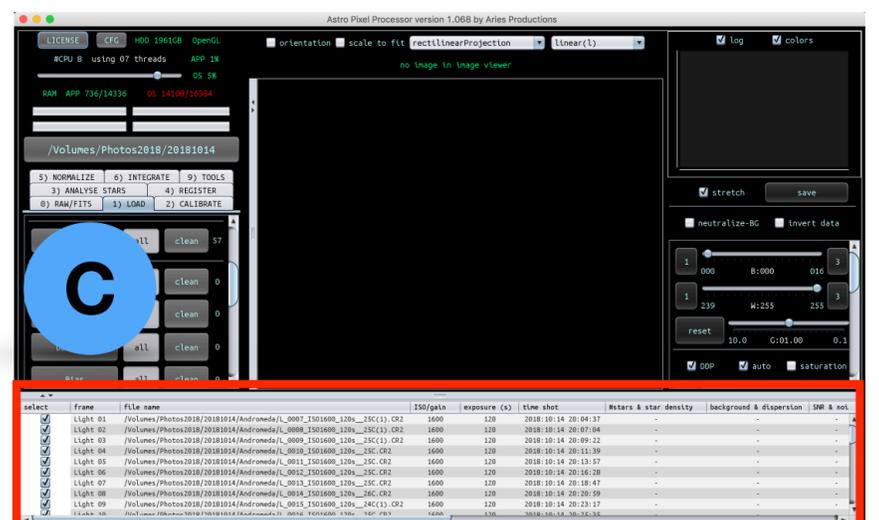
Make sure Load Tab is selected

LOAD IMAGES : Start with Lights then continue with Calibration files

2



Tip : Ctrl+A selects all files in a folder

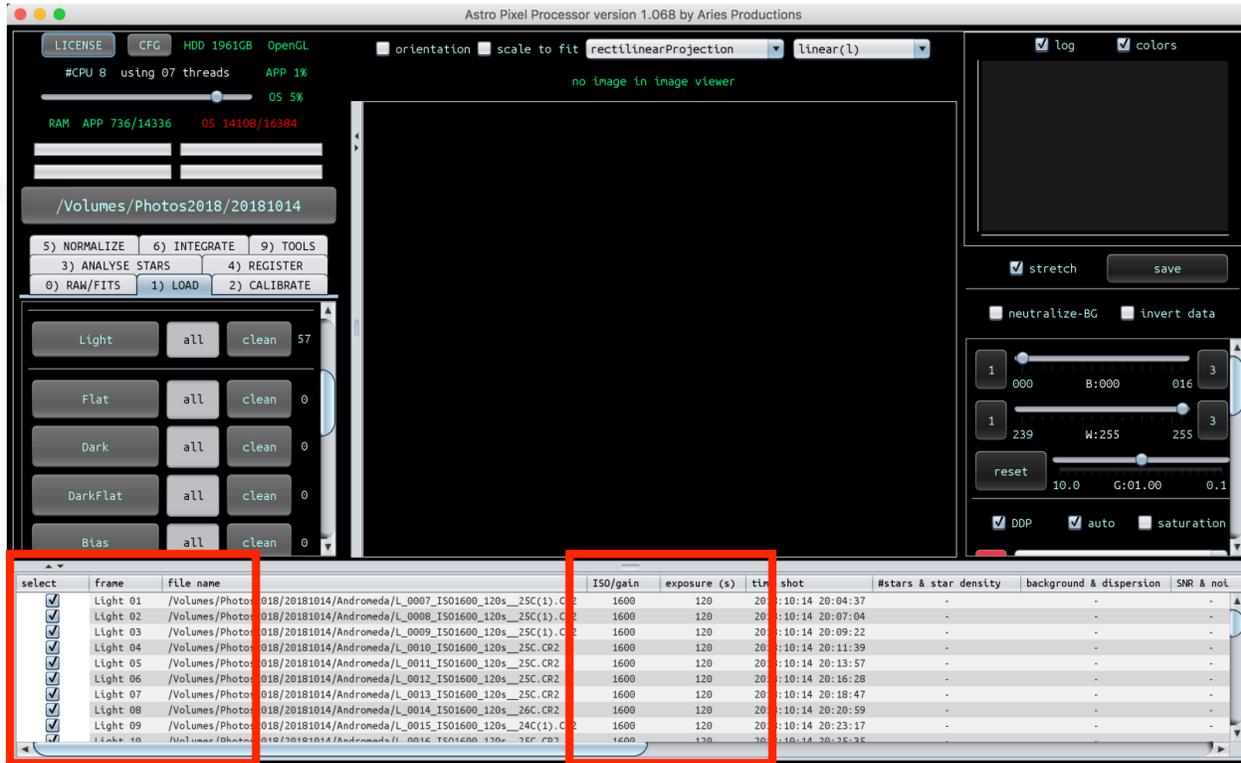


Loaded Images appear Here

You can double click on the the list to view an image (it takes some time)

The Image List on the bottom provides plenty of details about the images you loaded

3



The type of each loaded image is displayed in the Frame column

Check that Iso and Exposure match on Lights and Darks

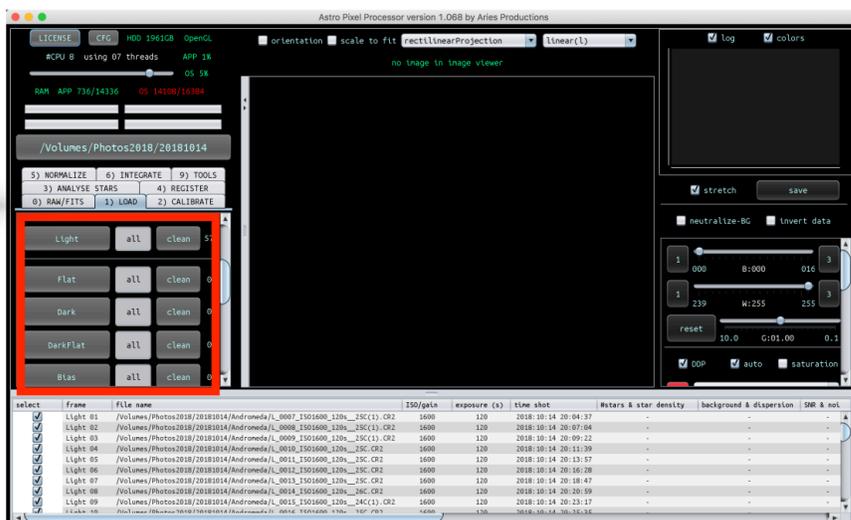
4

select	frame	file name
<input checked="" type="checkbox"/>	Light 53	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Light 54	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Light 55	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Light 56	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Light 57	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Dark 02	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Dark 04	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Dark 06	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Dark 08	/Volumes/Photos2018/
<input checked="" type="checkbox"/>	Dark 10	/Volumes/Photos2018/

ISO/gain	exposure (s)	time shot
1600	120	2018:10:14
1600	120	2018:10:14
1600	120	2018:10:14
1600	120	2018:10:14
1600	120	2018:10:14
1600	120	2018:10:14
1600	120	2018:10:13
1600	120	2018:10:13
1600	120	2018:10:13
1600	120	2018:10:13
1600	120	2018:10:13

This tallies up how many images we have for each Type

5



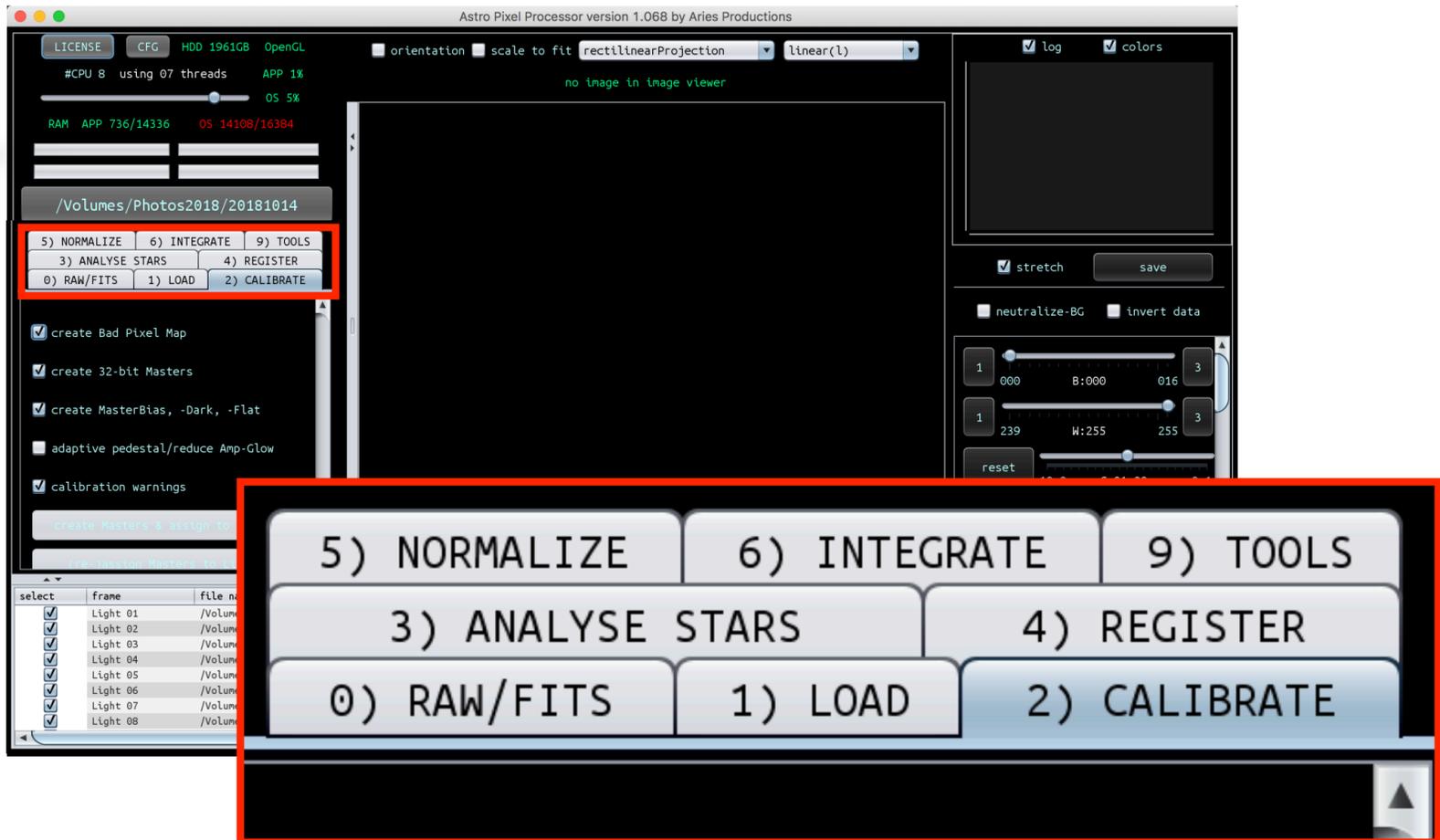
Light	all	clean	57
Flat	all	clean	77
Dark	all	clean	71
DarkFlat	all	clean	0
Bias	all	clean	137

...on to calibration !

PART 2 : CREATING CALIBRATION FILES (MASTERS)

Select the Calibrate Tab

1



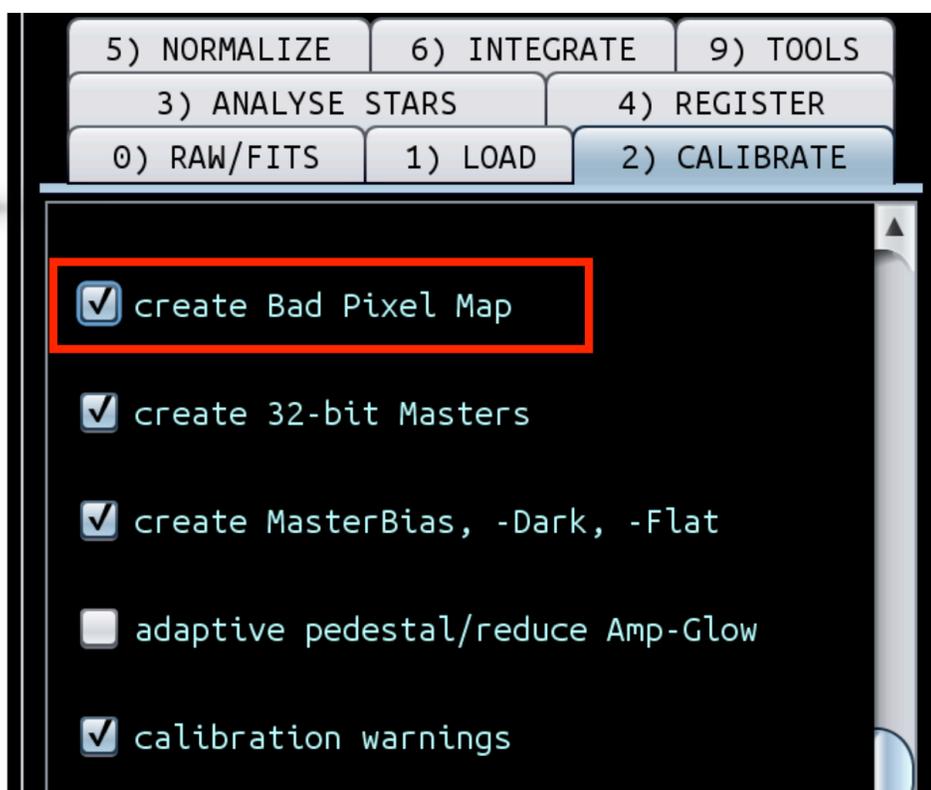
All default values are already OK, but scroll down...

2

Tip : In case something goes awry, just put everything in:
Average | No Rejection | Kappa=3.0 | Iterations 1

...and check "Create Bad Pixel Map"

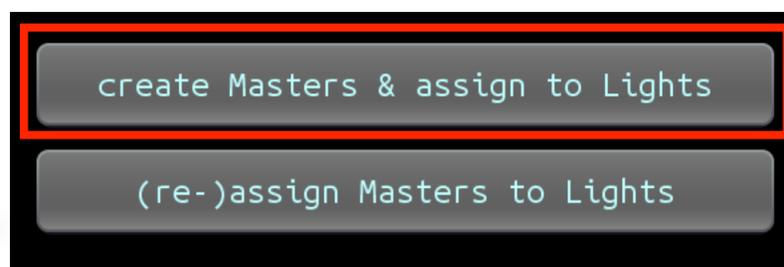
3



Tip : Create Bad Pixel Map only works if you have both Flat and Dark files

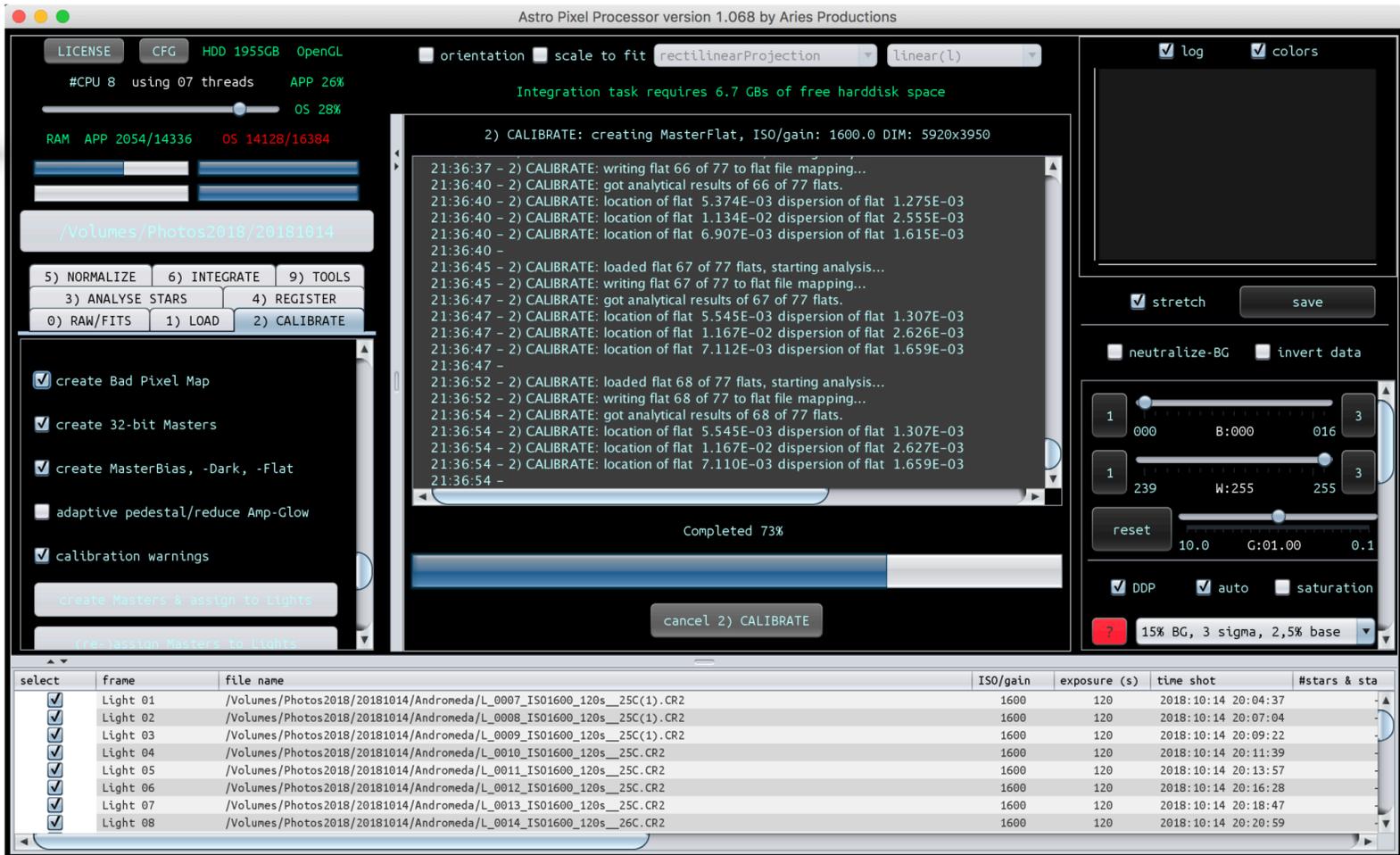
Now hit "Create Masters & Assign to Lights"

4



Let it compute for a while, depending on how many pictures you have it can take a while

5



Scroll to the bottom of the list and you should see 3 master files

6



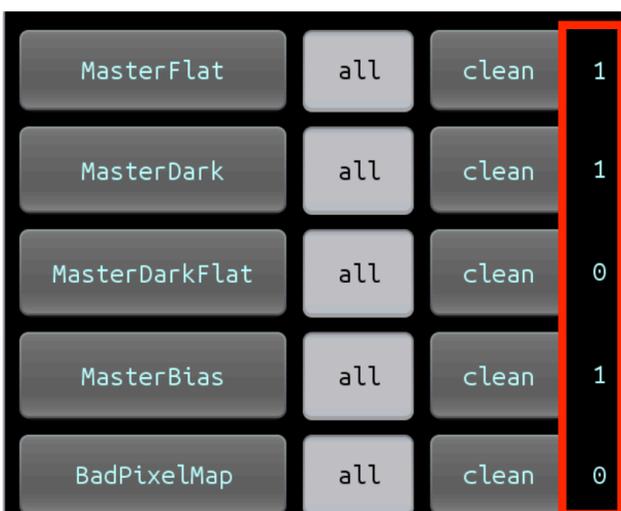
Scroll back to the top and you should see MB-1 MD-1 MF-1 CA

select	frame	file name
<input checked="" type="checkbox"/>	Light 01	MB-1 MD-1 MF-1 CA /Volumes/Pho
<input checked="" type="checkbox"/>	Light 02	MB-1 MD-1 MF-1 CA /Volumes/Pho
<input checked="" type="checkbox"/>	Light 03	MB-1 MD-1 MF-1 CA /Volumes/Pho
<input checked="" type="checkbox"/>	Light 04	MB-1 MD-1 MF-1 CA /Volumes/Pho

Tip : If you are combining multiple stacks of pictures you might have multiple Master Calibration Frames (MD-1, MD-2, ...)

If you go back to the LOAD tab and scroll down you will see the masters appear there too

7



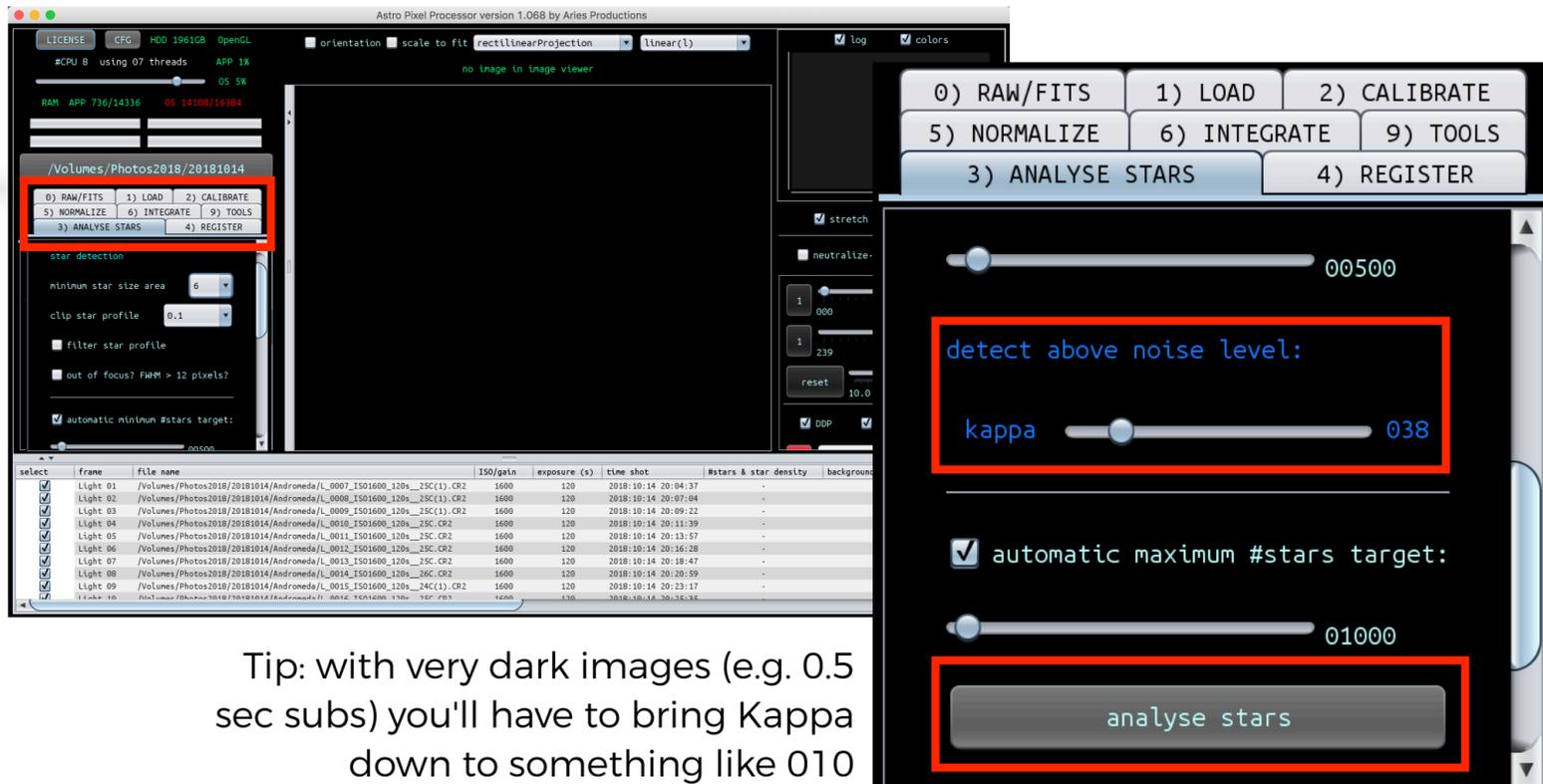
Tip: Next time you open APP you can load the Master Files instead of recomputing the calibration files. Just push any of the Master buttons and load all the Master Calibration files, APP will automatically sort them out

...on to star alignment !

PART 3 : FINDING STARS IN THE IMAGES (ANALYSE STARS)

Select the Analyse Stars tab, scroll down to the bottom and hit the Analyse Stars button

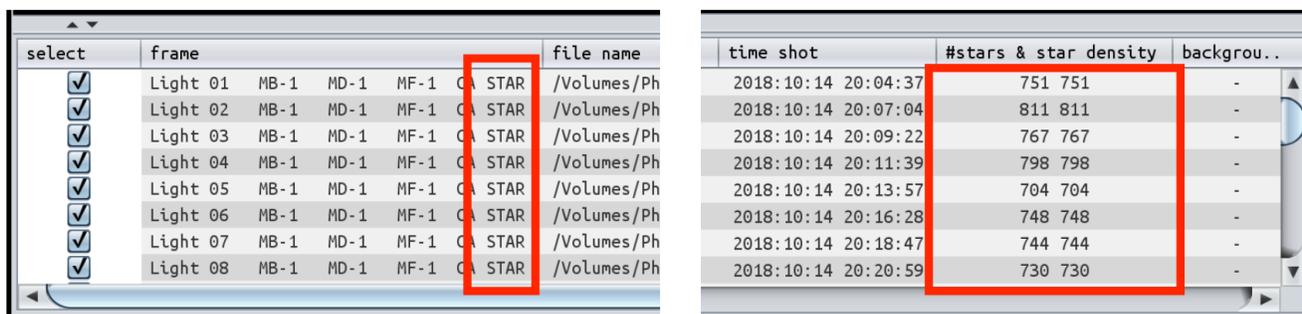
1



Tip: with very dark images (e.g. 0.5 sec subs) you'll have to bring Kappa down to something like 010

The default settings should work, (if they dont APP will kindly tell you) and STAR should appear next to the Light images

2



Scrolling the Image List to the right, will show the number of stars that have been detected, having 200+ stars should be enough to get a good registration

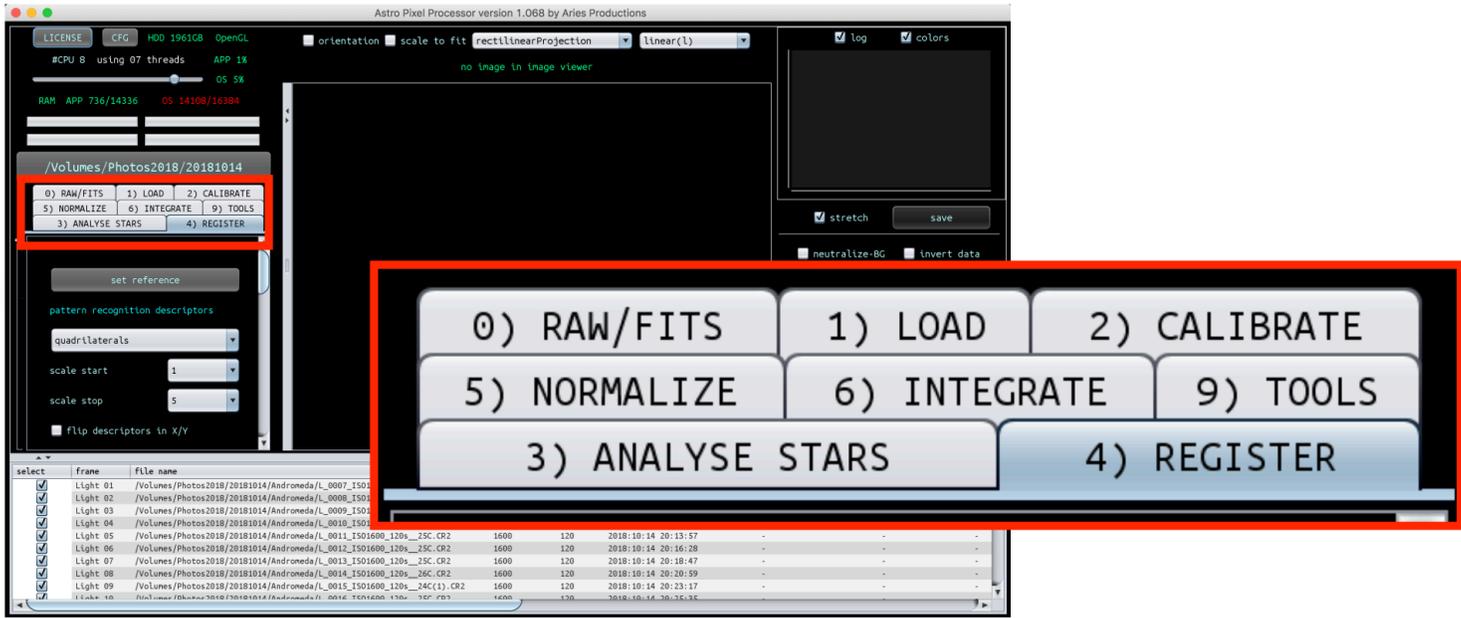
Tip: If your pictures move around a lot between subs, you'll need more stars, as many stars detected on one image will be in parts that dont overlap with any of the other images

...on to registration !

PART 4 : ALIGNING IMAGES TOGETHER (REGISTRATION)

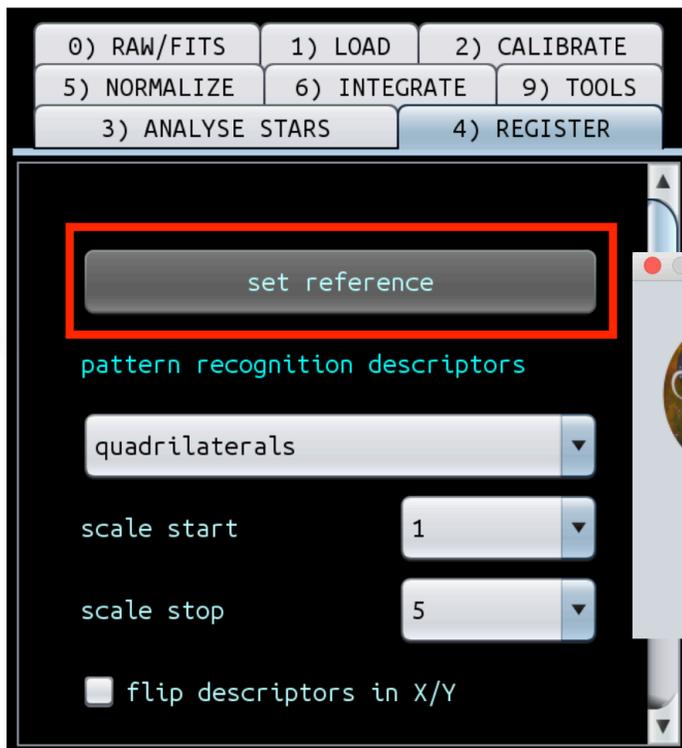
Select the Register tab

1

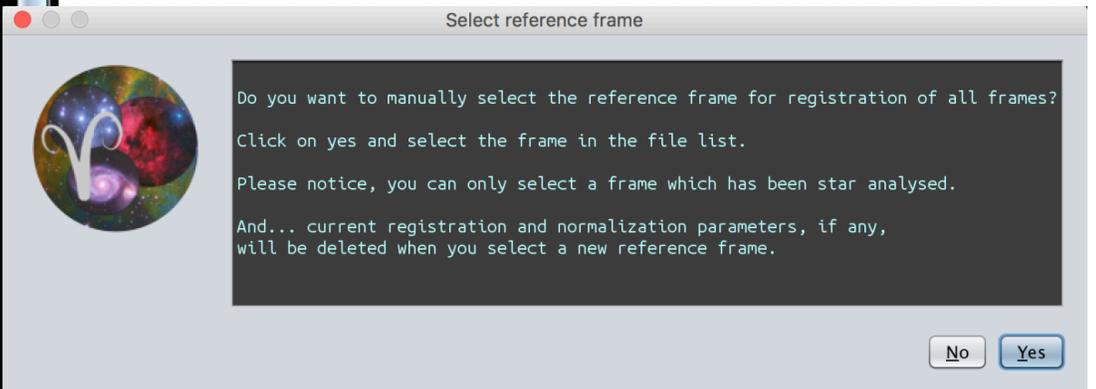


Click on Set Reference, then Yes, then click on an image in the Image List

2



Tip: You can skip this step, but it will let us choose the frame we stack everything on later during the Integrate process



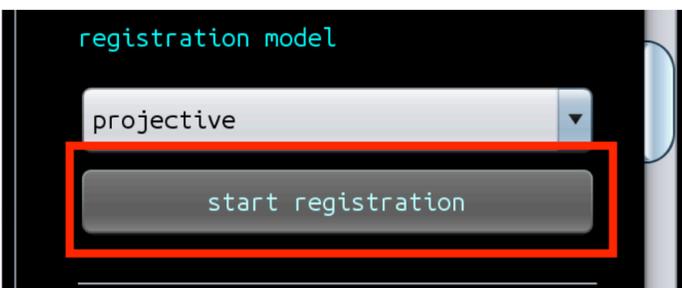
You'll know it worked if the image you selected is now highlighted dark blue and says "REF"

3

select	frame	file name	WHM min, max (abs & rel)	quality score
<input checked="" type="checkbox"/>	Light 24 MB-1 MD-1 MF-1 CA STAR	/Volumes/Photos2018/20181014/Andromeda/L_0007_ISO1	3.58 3.68 -- 3.58 3.68	467.88 INTEGRATE
<input checked="" type="checkbox"/>	Light 25 MB-1 MD-1 MF-1 CA STAR	/Volumes/Photos2018/20181014/Andromeda/L_0008_ISO1	3.32 3.49 -- 3.32 3.49	545.90 INTEGRATE
<input checked="" type="checkbox"/>	Light 26 MB-1 MD-1 MF-1 CA STAR	/Volumes/Photos2018/20181014/Andromeda/L_0009_ISO1	3.44 3.52 -- 3.44 3.52	526.00 INTEGRATE REF
<input checked="" type="checkbox"/>	Light 27 MB-1 MD-1 MF-1 CA STAR	/Volumes/Photos2018/20181014/Andromeda/L_0010_ISO1	3.41 3.56 -- 3.41 3.56	515.61 INTEGRATE
<input checked="" type="checkbox"/>	Light 28 MB-1 MD-1 MF-1 CA STAR	/Volumes/Photos2018/20181014/Andromeda/L_0011_ISO1600_120s_25C_CR2	3.56 3.65 -- 3.56 3.65	485.25 INTEGRATE
<input checked="" type="checkbox"/>	Light 29 MB-1 MD-1 MF-1 CA STAR	/Volumes/Photos2018/20181014/Andromeda/L_0012_ISO1600_120s_25C_CR2	3.57 3.76 -- 3.57 3.76	463.75 INTEGRATE
<input checked="" type="checkbox"/>	Light 30 MB-1 MD-1 MF-1 CA STAR	/Volumes/Photos2018/20181014/Andromeda/L_0013_ISO1600_120s_25C_CR2	3.82 3.99 -- 3.82 3.99	499.71 INTEGRATE
<input checked="" type="checkbox"/>	Light 31 MB-1 MD-1 MF-1 CA STAR	/Volumes/Photos2018/20181014/Andromeda/L_0014_ISO1600_120s_26C_CR2	3.70 3.73 -- 3.70 3.73	600.59 INTEGRATE

Scroll down and hit Start Registration (this should be quick)

4



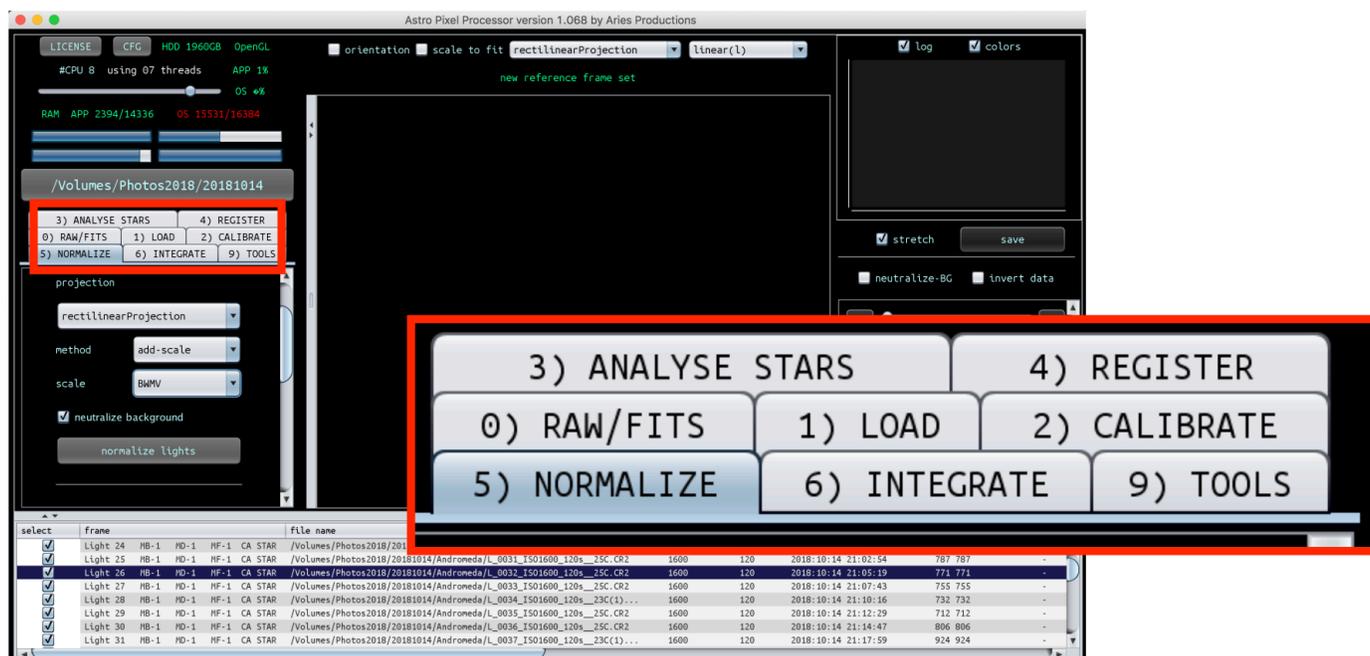
Tip: This step can fail if you dont have enough overlapping stars. APP lets you know which images failed registration in the image list by changing their color

...on to normalisation !

PART 5 : NORMALISING THE LUMINOSITY OF IMAGES

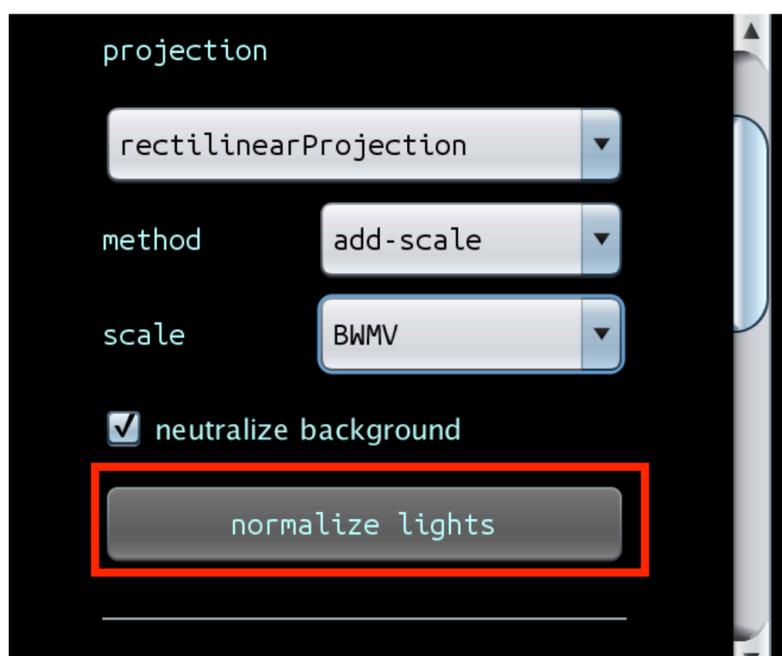
Select the Normalize tab

1



Leave everything as is, scroll down a bit and hit Normalise Lights

2



This will take a while, you deserve a coffee break. You know it will have worked if NORM appears on the image list

3

select	frame								
<input checked="" type="checkbox"/>	Light 24	MB-1	MD-1	MF-1	CA	STAR	REC	NORM	/\
<input checked="" type="checkbox"/>	Light 25	MB-1	MD-1	MF-1	CA	STAR	REC	NORM	/\
<input checked="" type="checkbox"/>	Light 26	MB-1	MD-1	MF-1	CA	STAR	REC	NORM	/\
<input checked="" type="checkbox"/>	Light 27	MB-1	MD-1	MF-1	CA	STAR	REC	NORM	/\
<input checked="" type="checkbox"/>	Light 28	MB-1	MD-1	MF-1	CA	STAR	REC	NORM	/\
<input checked="" type="checkbox"/>	Light 29	MB-1	MD-1	MF-1	CA	STAR	REC	NORM	/\
<input checked="" type="checkbox"/>	Light 30	MB-1	MD-1	MF-1	CA	STAR	REC	NORM	/\
<input checked="" type="checkbox"/>	Light 31	MB-1	MD-1	MF-1	CA	STAR	REC	NORM	/\

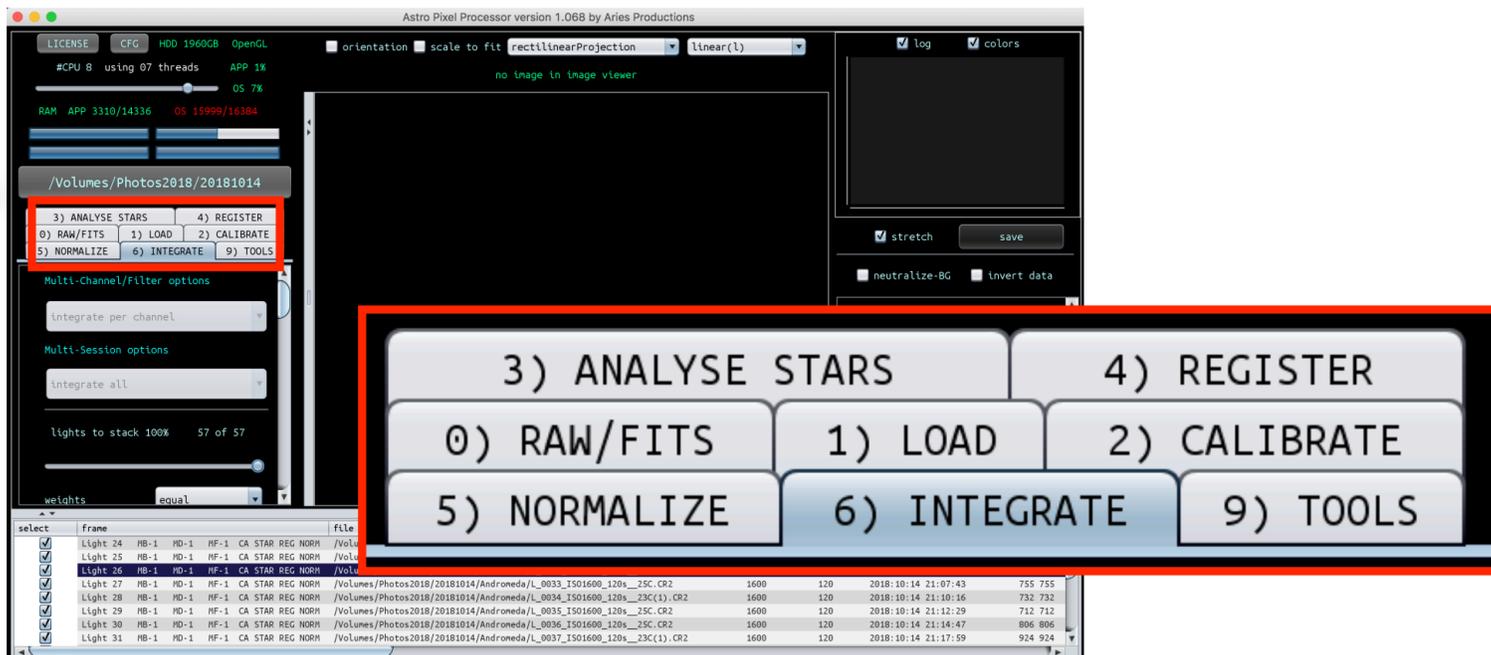
We're now ready for the final step of Pre-Processing

...on to integration !

PART 6 : STACKING THE IMAGES (INTEGRATION)

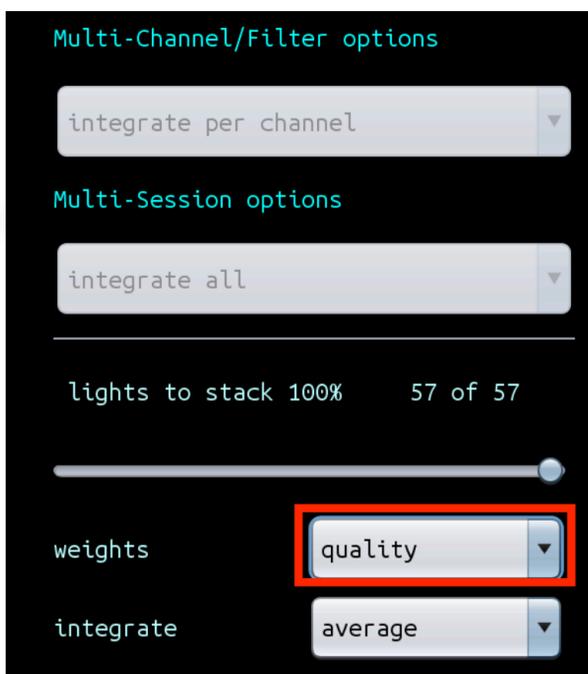
Select the Integrate tab and let's configure the Integration step

1

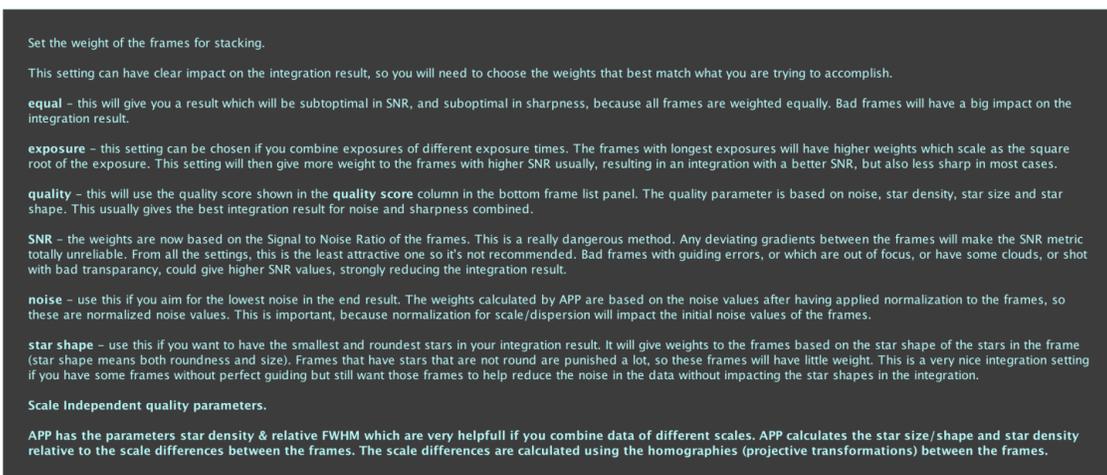


Let's start with Weights: set it to Quality

2



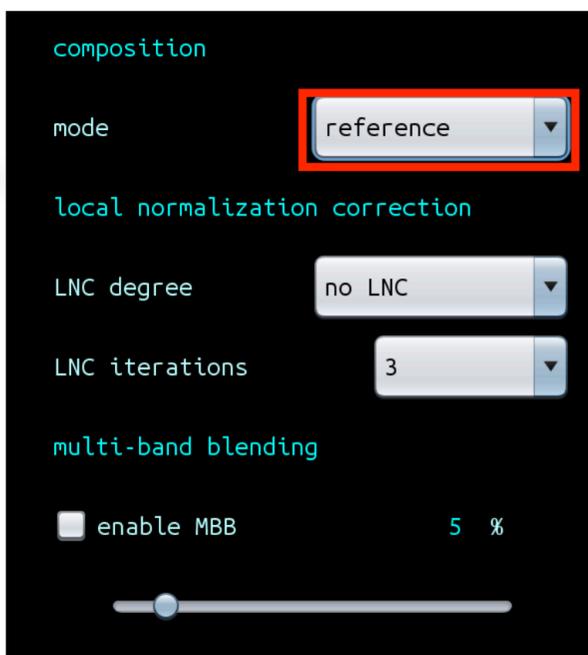
Tip: Hover on the parameters to have a very detailed description of each value



If you have few images (less than 20) set Integrate to Median

Set Composition Mode to Reference (leave it to Full if you want the maximum surface to be stacked and you will crop the image later)

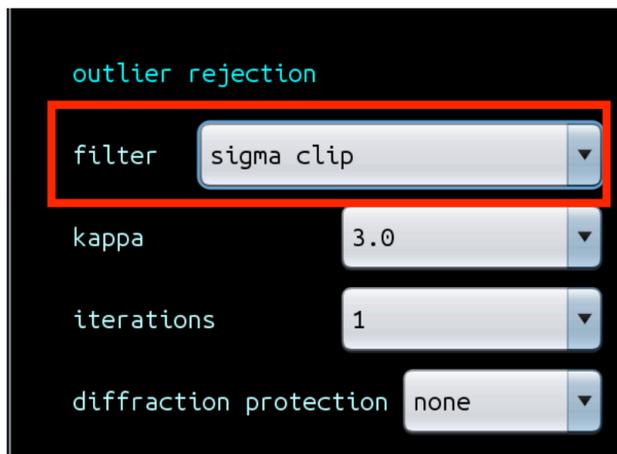
3



Tip: Setting Reference (or Crop) can help avoid Out of Memory errors when stacking a lot of images or using Drizzle and will speed up the process

Scroll down to Outlier Rejection and select Sigma Clip

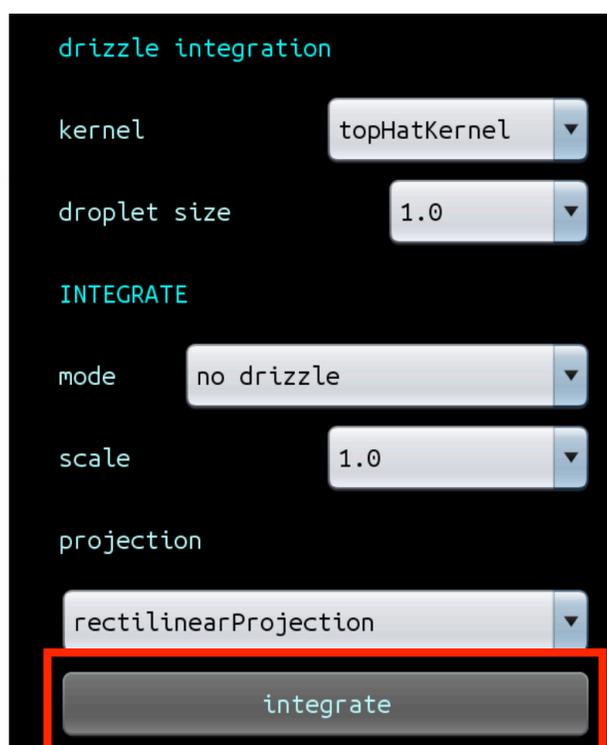
4



Tip: This will remove airplane trails, satellites as well as bad pixels if you took your images with dithering

Ignore Drizzle settings for now, hit Integrate and go wash that coffee cup

5

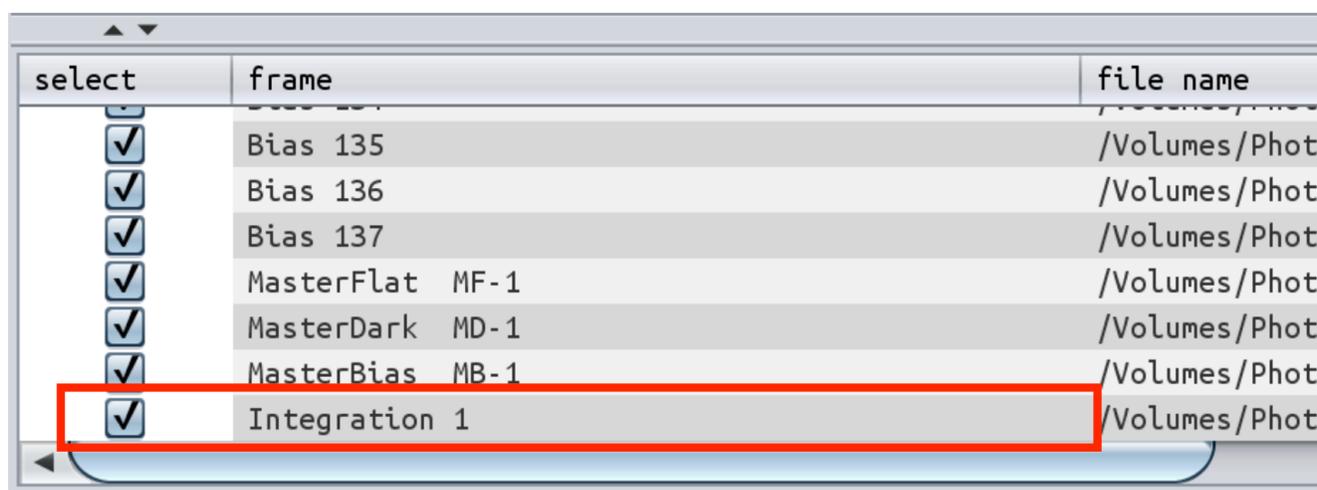


Tip: With a lot of images, Drizzle increases the resolution and makes stars sharper, at the cost of less noise reduction

Oh, and it eats A LOT OF MEMORY

Once it's done, the bell will toll and you'll have a new image at the bottom of your Image List. Double click on it!

6

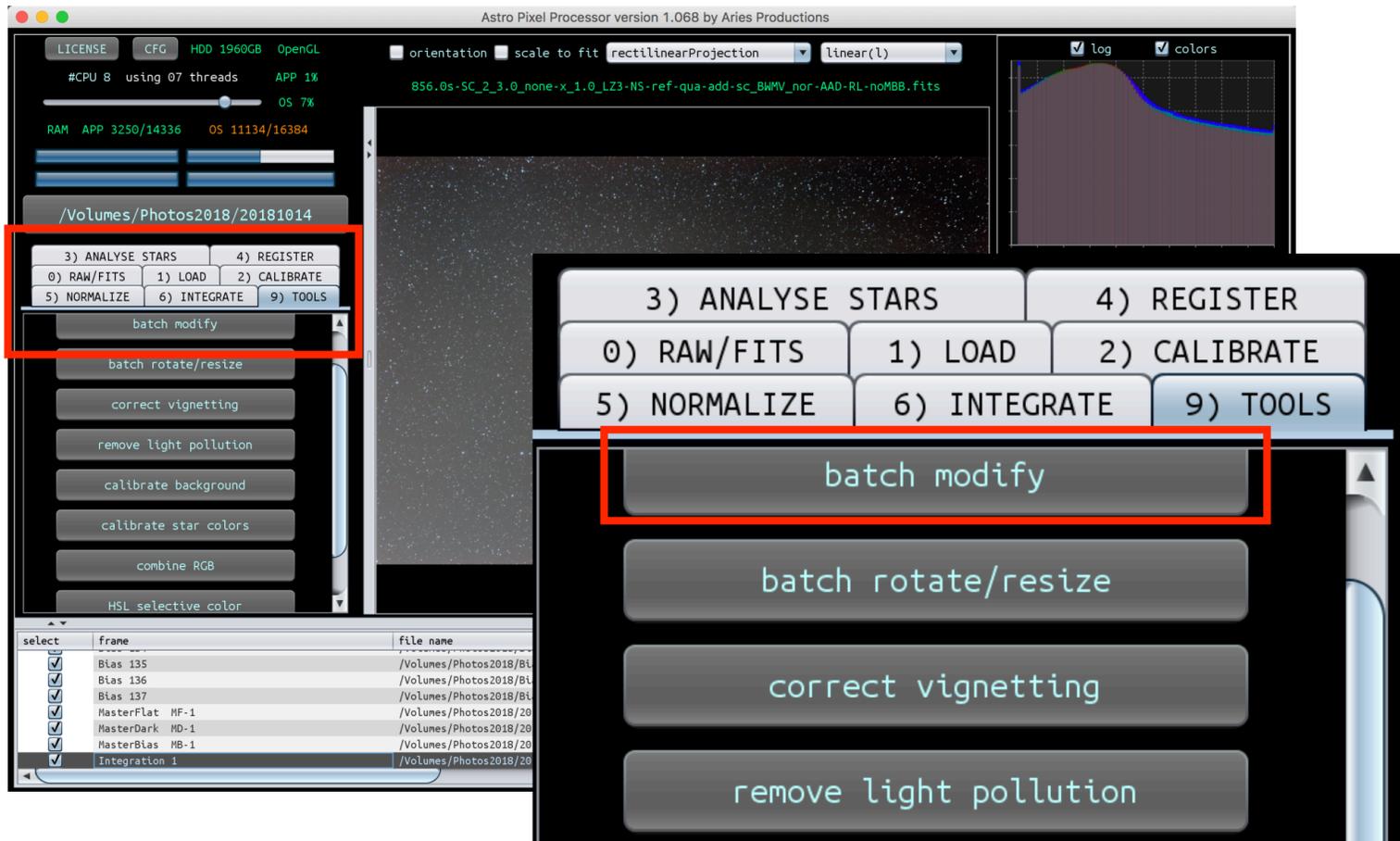


...on to processing !

PART 7 : CROPPING THE IMAGE

1

To crop the image, select the Tools tab and click on Batch Modify



Click Yes and you'll be sent to a different pane. Draw a rectangle in the area of the image you want to keep, scroll down and hit "crop OK"



Click ok to save the cropped image

Tip: The cropped image will appear at the bottom of the Image List as "Other/Processed X"

PART 8 : LIGHT POLLUTION REMOVAL

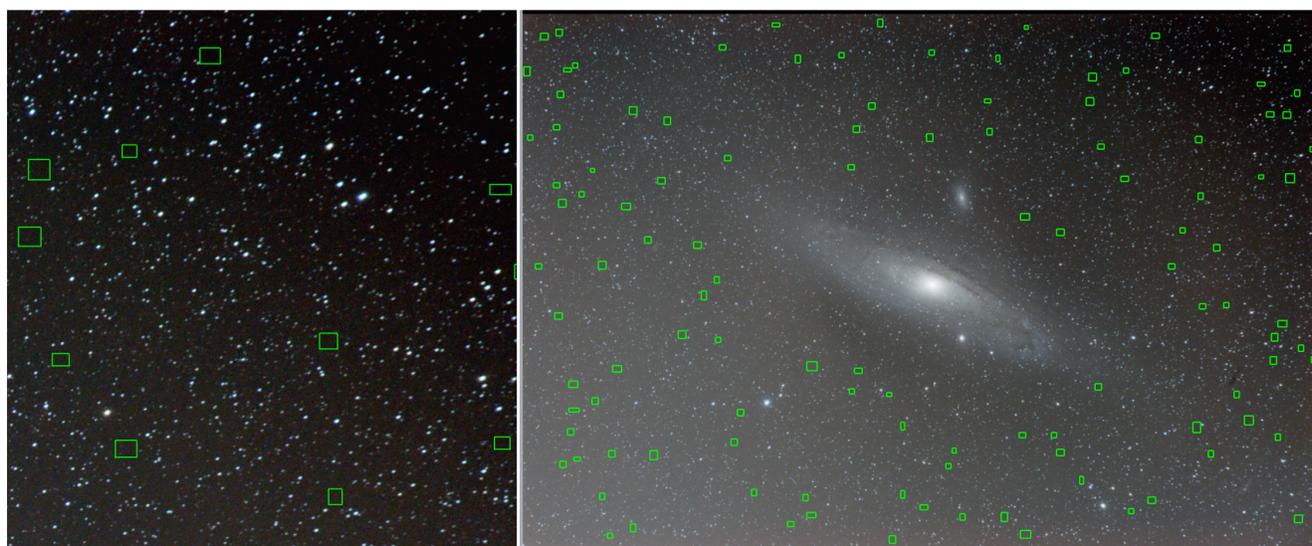
Hit Remove Light Pollution and the left pane will change again

1



The goal here is to draw plenty of small regions that do not contain any stars, cover the regions where the light pollution gradient changes and avoid DSOs

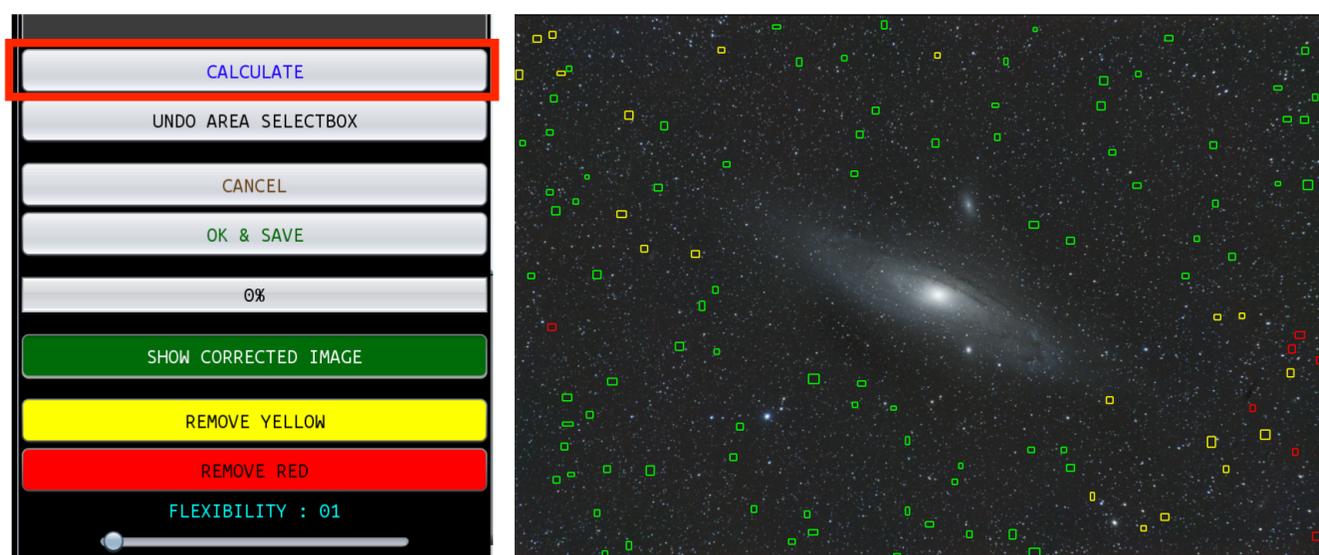
2



Tip: a single Left Click will zoom in, Right Click will zoom out.
Careful clicking too fast as it will start lagging considerably

Hit Calculate to see the current result, adjust your samples and when you're satisfied click OK & Save

3

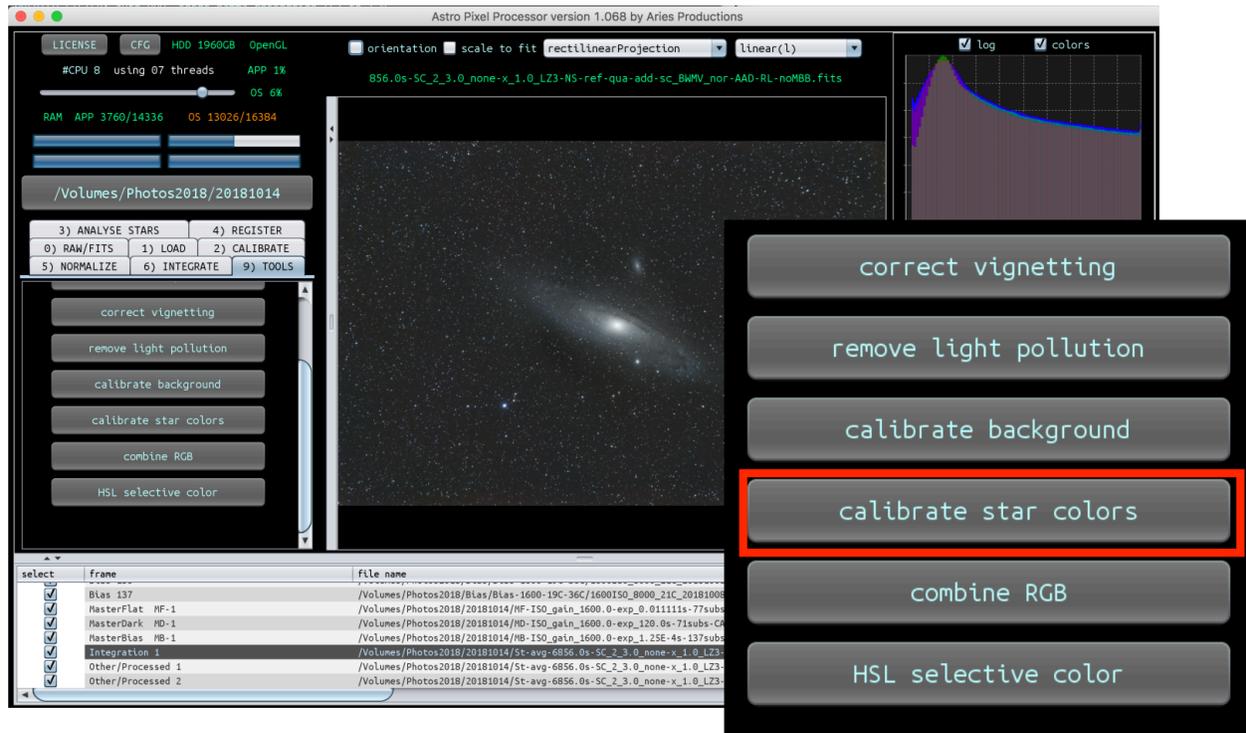


Tip: red and yellow selections either contain stars or do not match the gradient model, you can delete them and select other regions

PART 9 : STAR COLOR CORRECTION

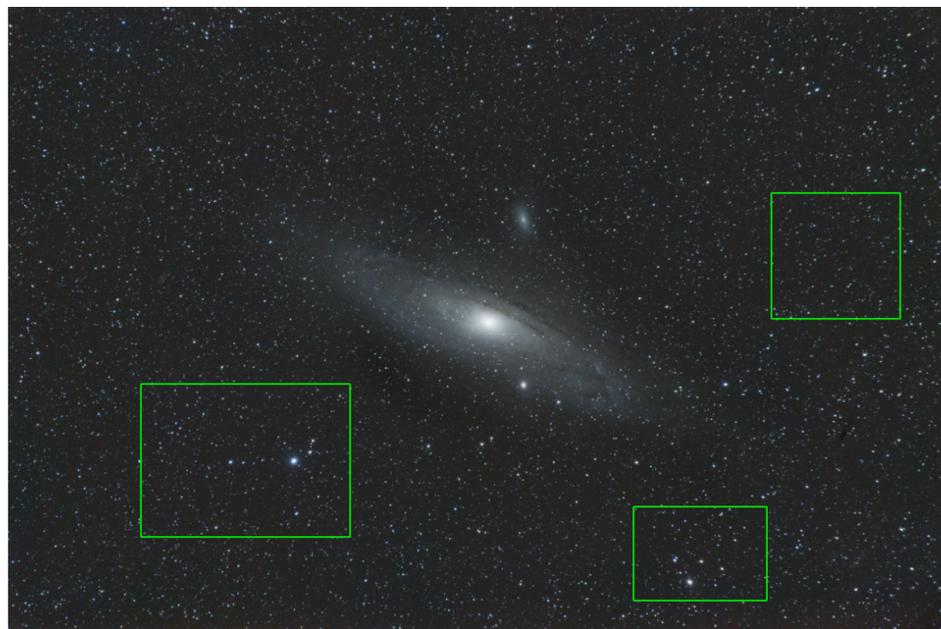
Hit Calibrate Star Colors to open up the corresponding panel

1



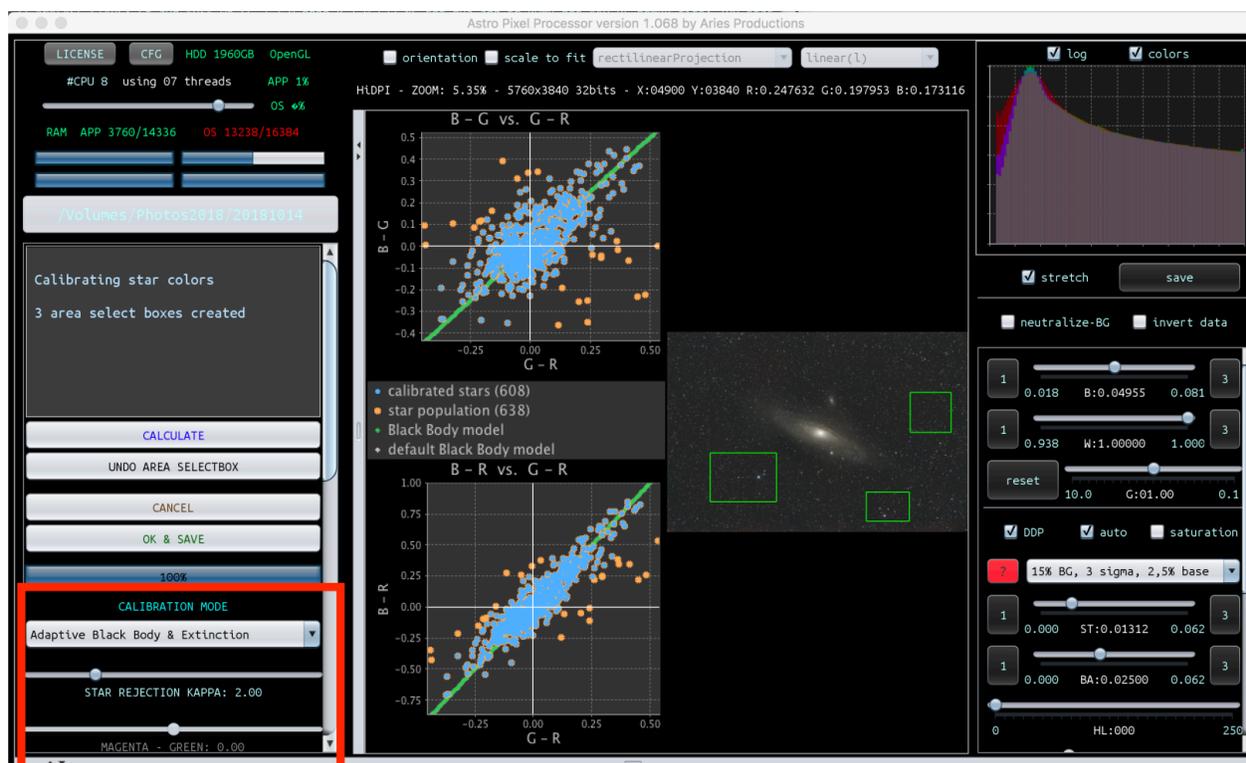
Make some selections of brightish stars on a dark background (no DSOs), and hit Calculate

2



Adjust the "temperature" of the stars using the controls on the left

3

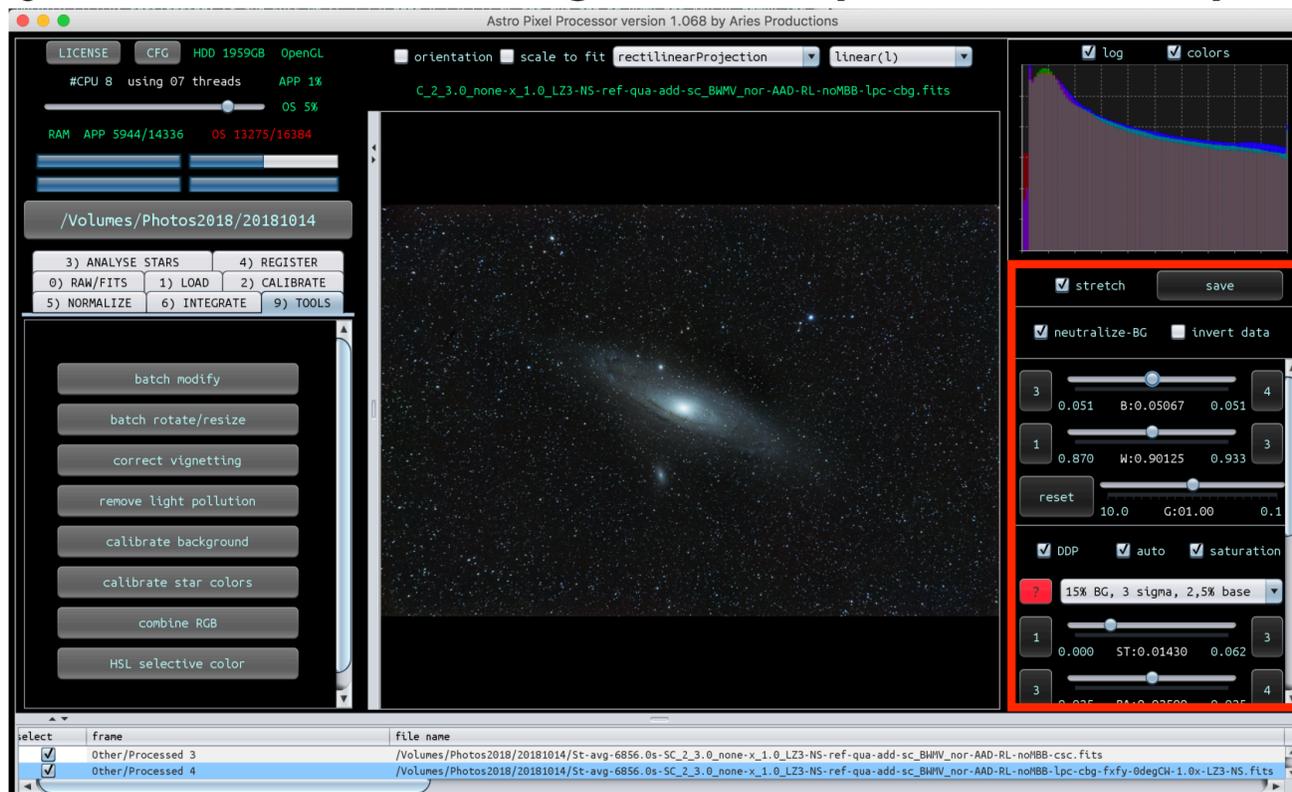


Hit OK & Save when satisfied to save the changes

PART 10 : FURTHER PROCESSING AND EXPORTING

Play around with the Right-Hand pane and its options

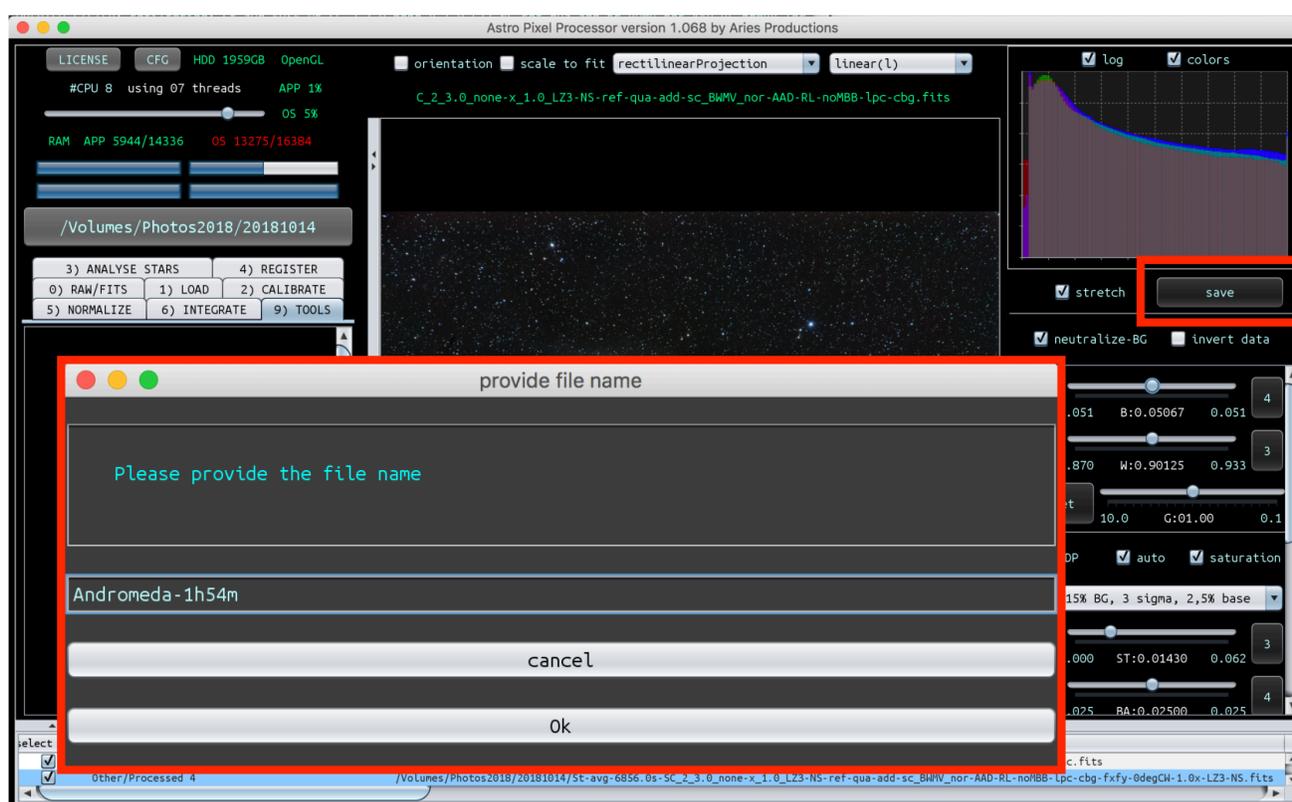
1



Tip: The red "?" button provides visual examples of the parameter options. Play around with the parameters but be careful with the sliders as they can be finicky

Save the File by clicking on Save and providing a name

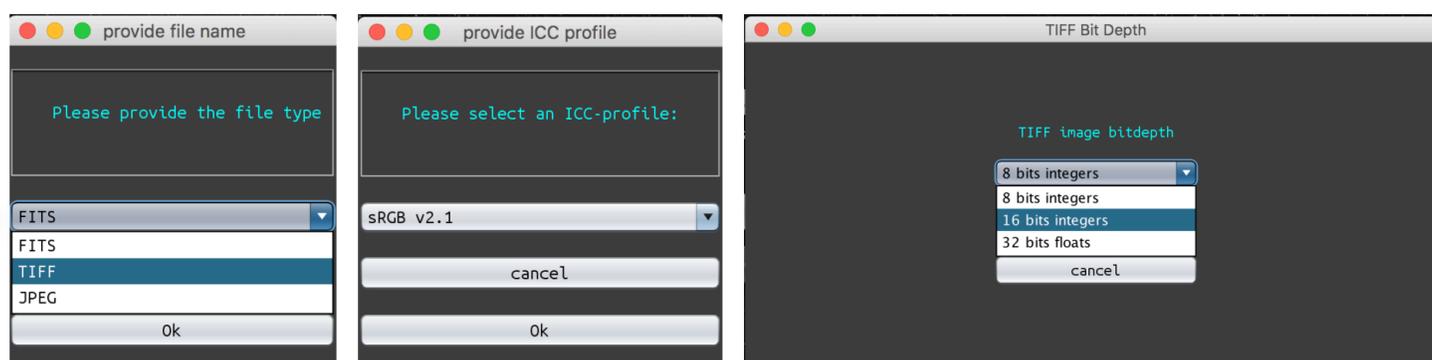
2



Tip: All steps of the process are saved in FITS format, and you dont need to save them again

Select the format, OK OK OK and edit away on your favourite software

3



Tip: Careful with your mouse, the interface tends to lag a bit and you can mis-click on buttons if the combobox disappears at the wrong moment

PART 11 : TIPS AND TRICKS

1

If you Load the images and go directly to the "Integrate" tab, all the other steps will be performed automatically, without having to go step by step

Tip: You will not be able to set a reference though, so you better do:

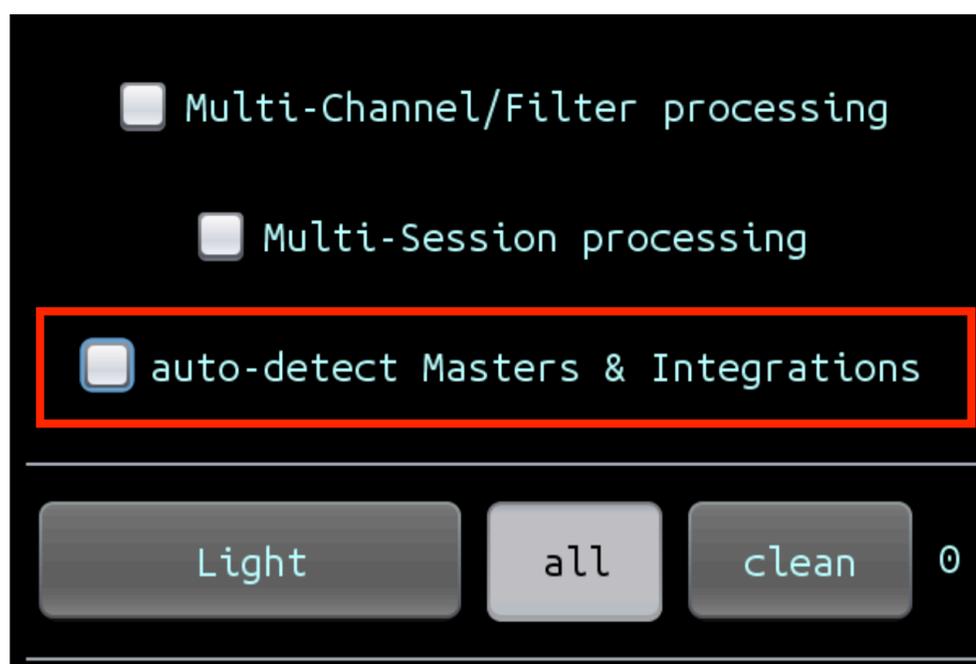
1 - "Analyse Stars"

2 - "Set Reference Image"

3 - Jump all the way to "Integrate" and launch the rest of the process

2

If you're running out of memory, split your subs into 2 groups, stack them together, then RELOAD the two stacked images as Lights and re-stack them



Make sure you DISABLE Auto-Detect Masters first otherwise you won't be able to reload the Integrations as Lights

Tip: When you split into groups dont pick images sequentially (beginning of the night in group 1, second half of the night in group two) but divide them evenly in time. This will improve the quality of each individual stack and make their combination closer to the result you'd obtain if stacking everything in one shot. An easy way to split the images uniformly is to display them in Icon view, resize the explorer/finder window to have two column of images, and select one entire column of images

3

APP automatically recognises master calibration files, so if you have already created them, you can simply load everything at the same time alongside the Lights

Tip: If you have imaged multiple objects, with the same settings make multiple copies of the Master Calibration files once you have them and put them in each folder of your Lights. You can now load everything with a simple Ctrl + A from the Load Light button