TUTORIALE OBRÓBKI KOMET

1. Tutorial ze strony Pixinsight Resources:

http://pixinsight.com.ar/en/info/processing-examples/38/lovejoy-comet.html

Introduction

Highlight the faint tail of the comet in an small set of images. Main notes: *Blink* to inspec and select images. *DynamicBackgroundExtraction* to remove gradients and vignetting. Date: April 2015.

Image Data

- <u>Object</u>: Lovejoy Comet
- <u>Camera</u>: Canon 5DIII - Filter Type I
- <u>Telescope</u>: William Optics 132 FLT - Focal Lenght 925 mm - f/7
- <u>Images</u>: 13 x 1.5 minutes @ ISO 1600
- <u>Total Time</u>: 19.5 minutes
- <u>Processing Software</u>: **PixInsight**
- <u>Comments</u>: From Trenel - La Pampa - Argentina
- <u>Author</u>: Alejandro Tombolini

Processing

On January I had the opportunity of photograph Comet Loveyoy, but due to bad wheather and equipment problems I manage to rescate only 13 images.

Also my flats were very bad in that sesion, so calibration of the images remain with vigneting, dust motes and sky gradient.

I expected to take new images the following night, but of course it was cloudy. I could not even take the image of the stars in the place the comet was the previous night.

Anyway I use the images to test the new features that NKV added to the *CometAlignment* module that allow to integrate only stars from the comet images.

Using *BatchPreprocessing* Script calibrate and Register the Raw files. First using *Blink* to inspect all the images. The following video shows a selected group of 13 images after deleting more than 100.

After execute *BatchPreprocessing* script you can inspect your calibrated_c, debayered_c_d, and registered_c_d_r files.

Once you have checked your images, open *CometAlignment* module and Add Files. Selec the image that you want as reference for the coment to be align, this means that the integrated comet will remain in that position.

Now you have to indicate where the comet is located. Double click on the first image to open it and select the comet (click on the nucleus)
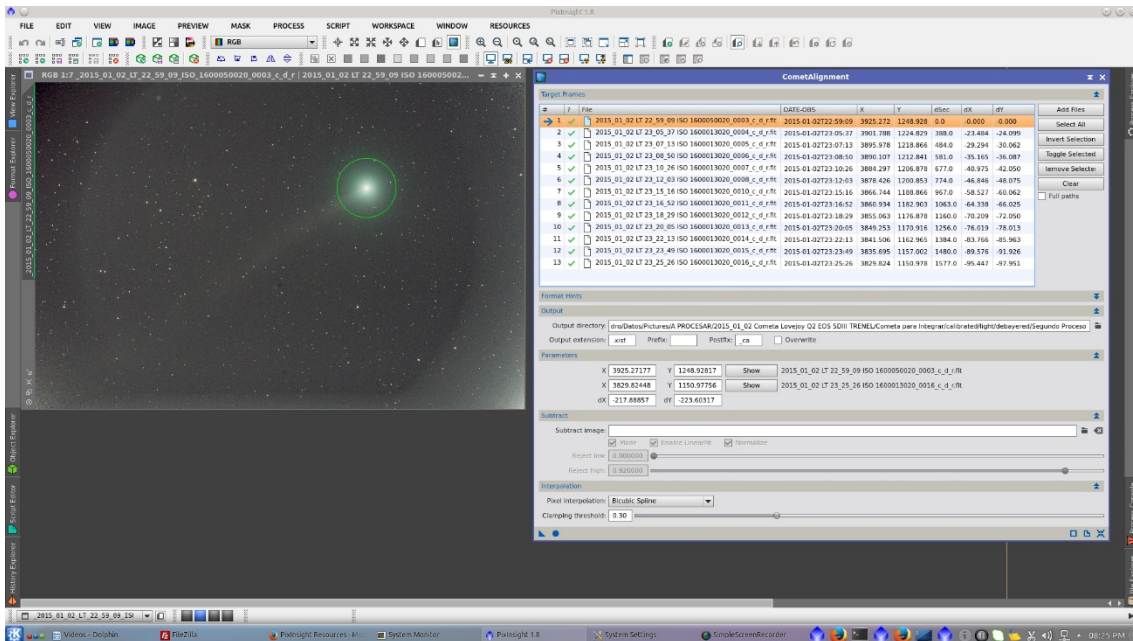

Double click on the last image to open it and select the comet (click on the nucleus)
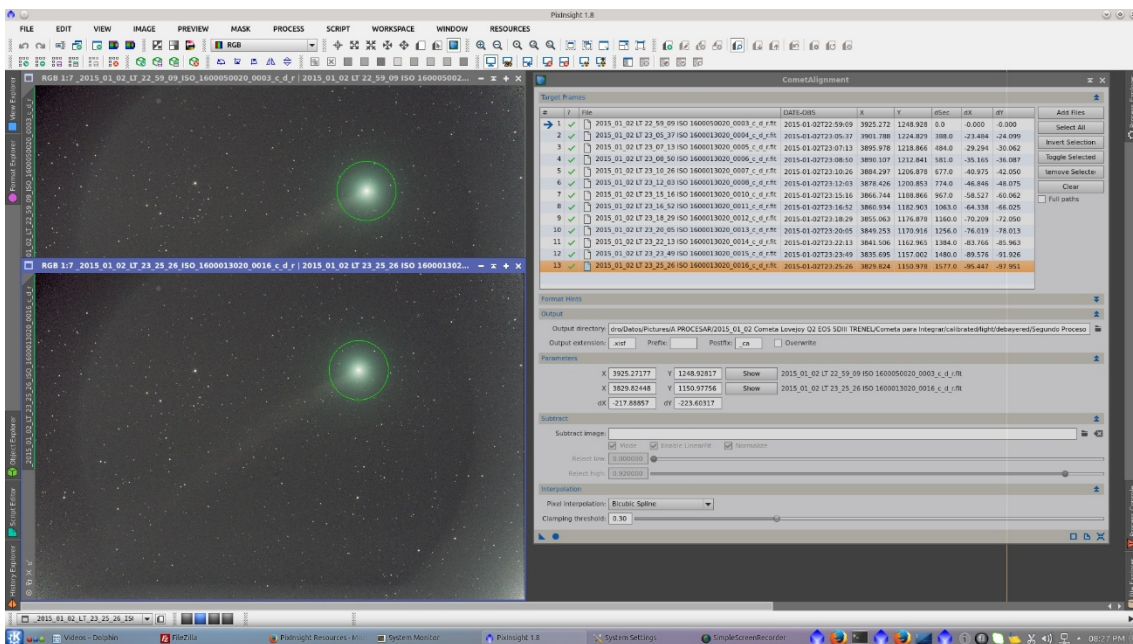
Apply Global and the module will generate the comet aligned images _ca

Use *ImageIntegration* tool for integration of the comet without stars. Choose yours
_c_d_r_ca images. Select a suitable rejection algorithm (Winsorized Sigma Clipping in this
case) and perform a first integration. Then play with the Sigma low and Sigma high values to
find the optimal result.
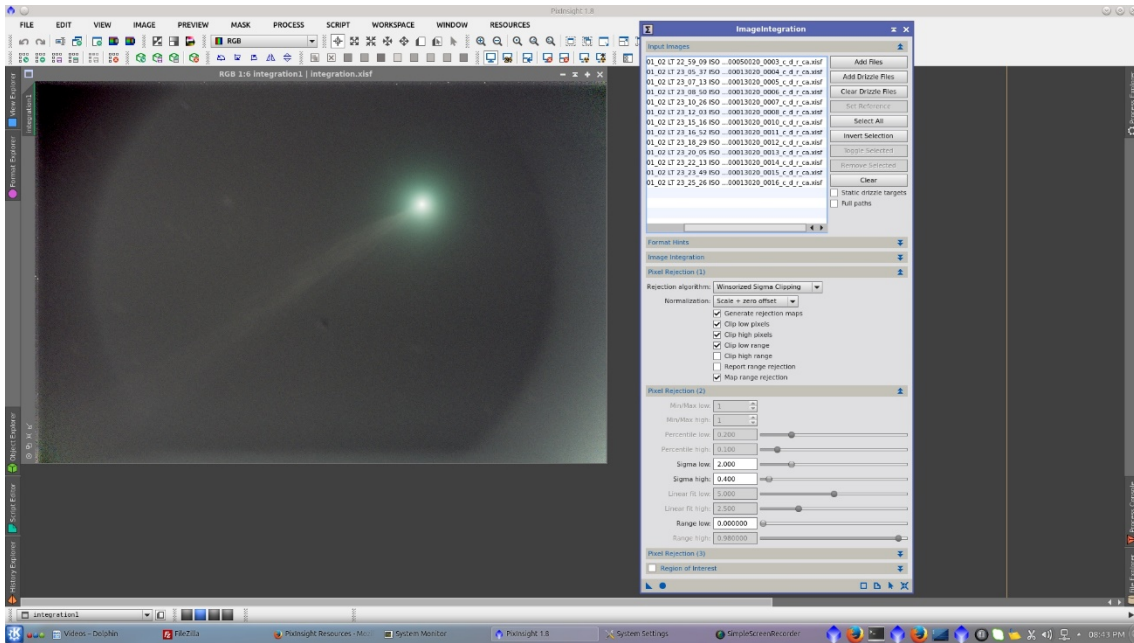
Open *CometAlignment* module, be sure that you have added your _c_d_r files and change
the *Postfix* of the name to samething like "stars".

In "Substract Image" selec the Integration of the comet and check "Mode" and the Comet
integration will be aligned to the target image and then substracted from it. Apply Global
and the module will generate the stars aligned images _stars.
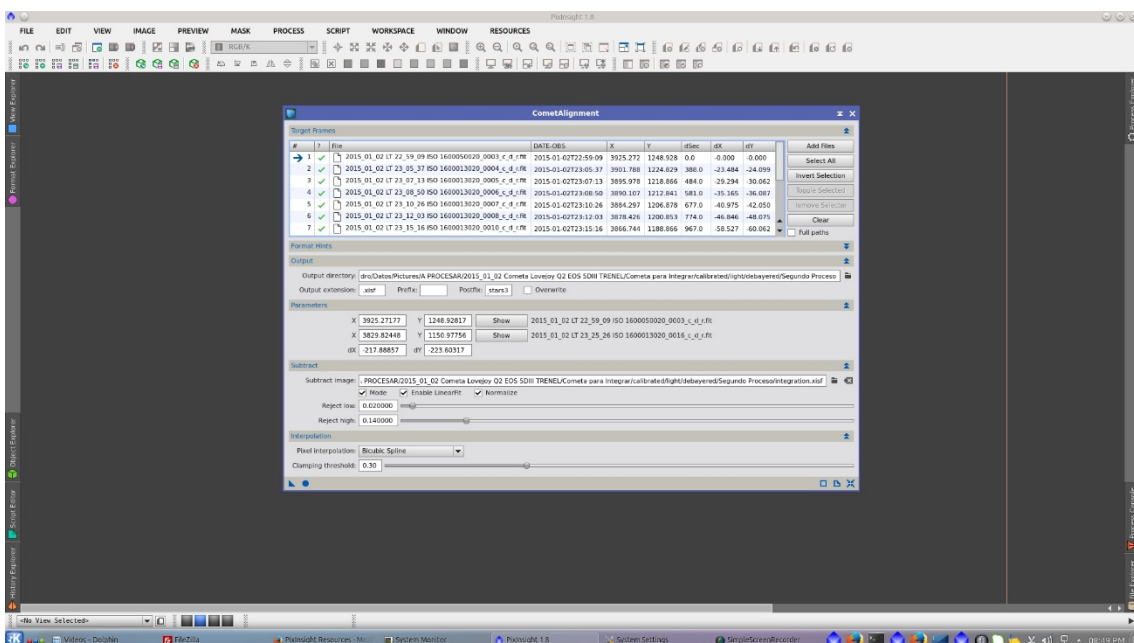
The generated "stars only" images can be inspected using *Blink* tool

Use *ImageIntegration* tool for integrate the stars without comet. Choose yours _c_d_r_stars images. Select a suitable rejection algorithm (Winsorized Sigma Clipping in this case) and perform a first integration. Then play with the Sigma low and Sigma high values to find the optimal result.
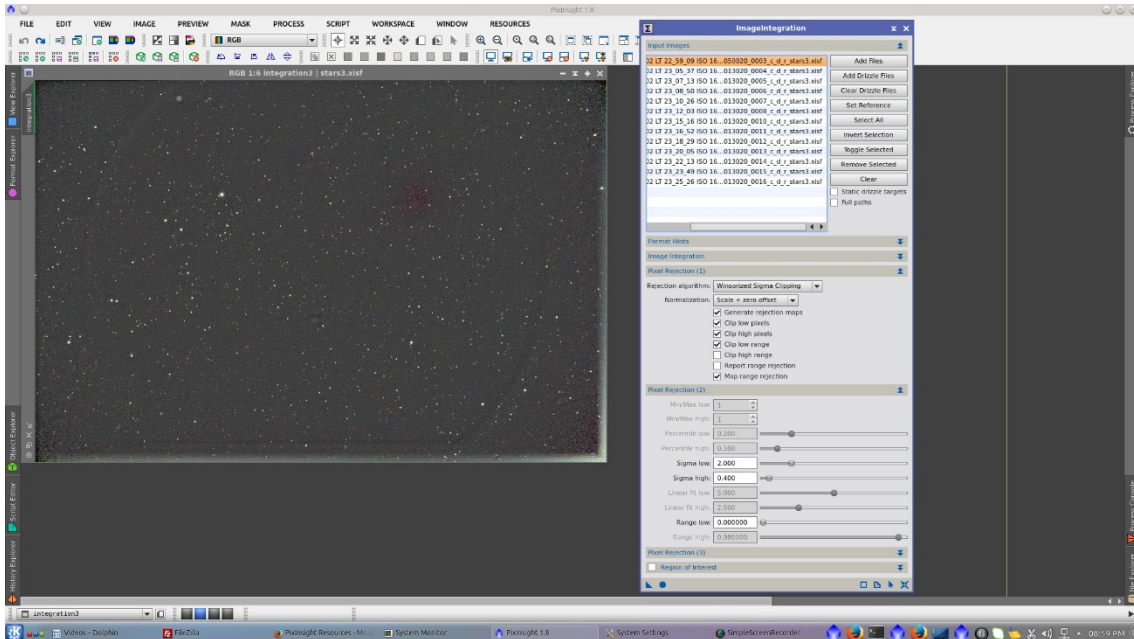
Now you have both integrations "only comet" and "only stars" ready to be processed. There are different ways to mix both images. In this processing example I am going to mix them without using mask.

First crop 100 pixels from the left and the top to eliminate the brigh edges and apply the same process to both images.
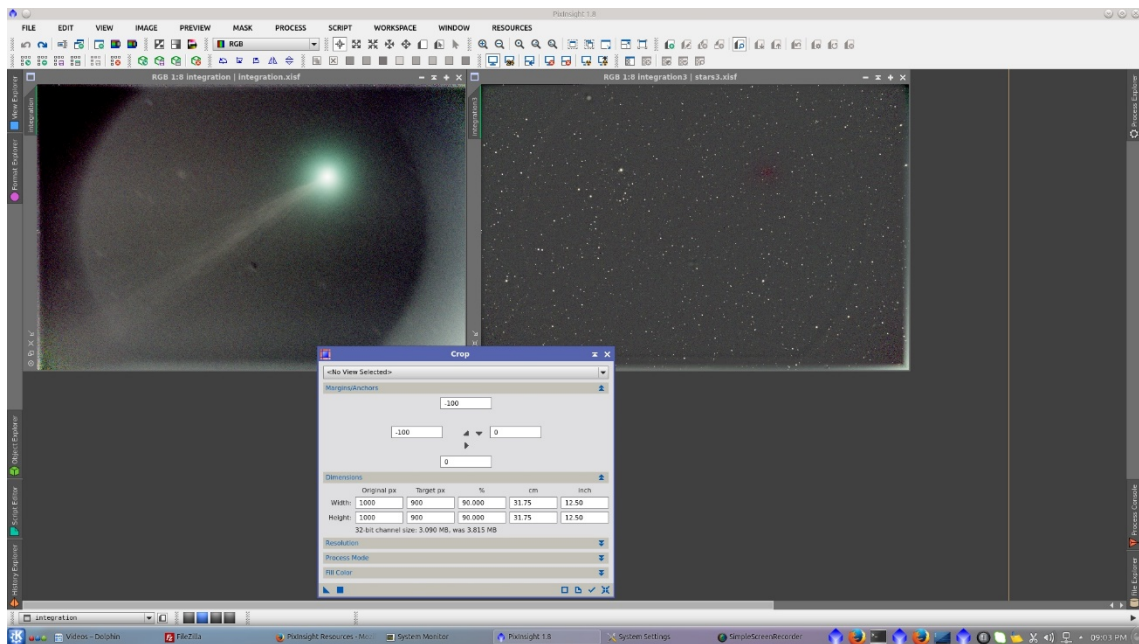
To correct gradients on the comet image, apply *DynamicBackgroundExtraction*.

The present image has vigneting not well corrected by flats. (which would be easy to correct with better flats)

Dust motes not corrected, (also would be easy to correct with better flats, but some of them are moving from frame to frame)

And in this case there are also star trails that remain from integration. In a long serie of image it had been possible remove it integrating interspersed series, but I have only 13 images in this case.

Then I will apply a serie of *DBEs*. First setting a high smoothing factor in order to generate a wide model of the background. This model correct the image pretty well and let remain small and more difficult to correct variation on the corners, vignetting and star trails
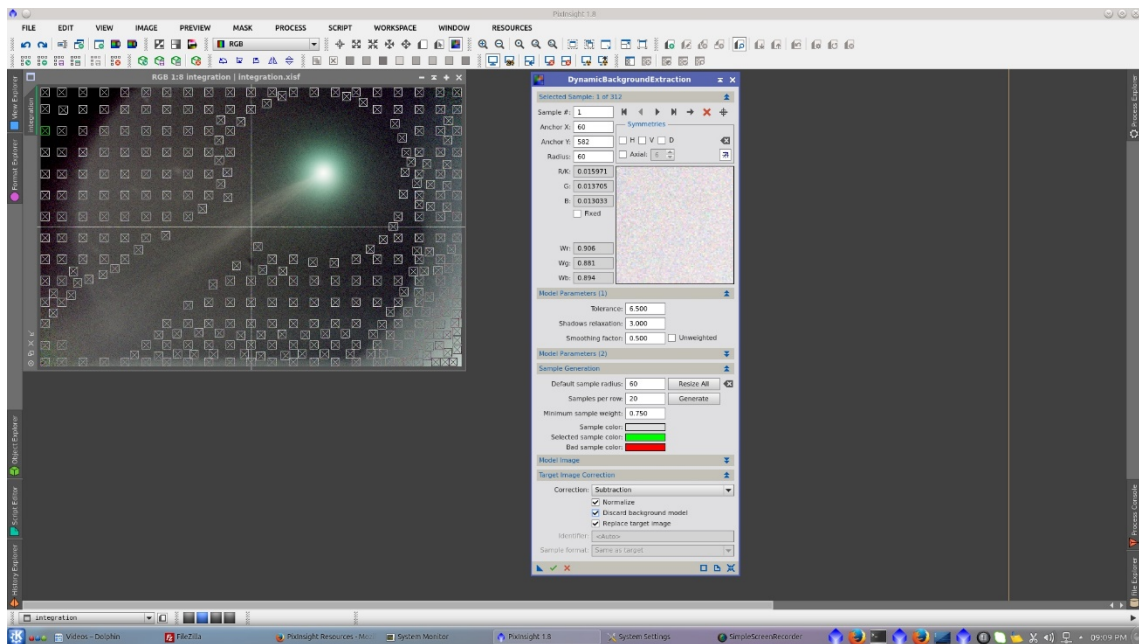
Now, to tell the *DBE* where the small variations are located it is needed a high dense DBE (HD*DBE*) made with little samples and very low smooting factor in order to deal with those small variations of the stars trails and remaining circle from vigneting.

The problem that I found was that the HD*DBE* that I had previosly generated, was not possible to be done. I don know if the limit comes from my computer or from *DBE* to manage a limited amount of samples on the image.

Then I decided to split the image in three parts and make it separately. The maximun amount of samples that I could manage was arround 41.000. Wow!

Caution!: Not recommended for impatient people. :-)

Generate three previews: LEFT, RIGHT_TOP and RIGHT_BOTTOM big enough to have a superposition between them. This will ensure a correct recomposition of the image.
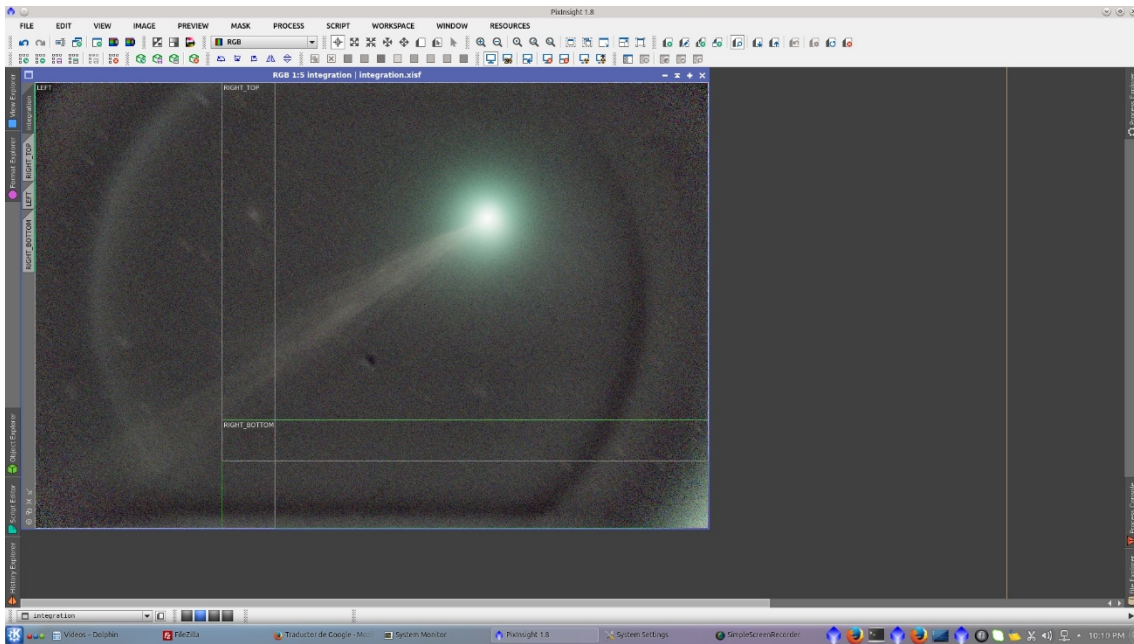
Extract the previews to split the image

To generate the model, set the desired Samples per row and radious and adjust Tolerance and Shadows relaxation in order that samples cover all the image.

This model parameters also generate samples over the comet that have to be deleted manually.

(At this point I had a couple of wishes about *DBE*, as having the ability to set different Model Parameters per area of the images and also delete big amount of samples per selected area)
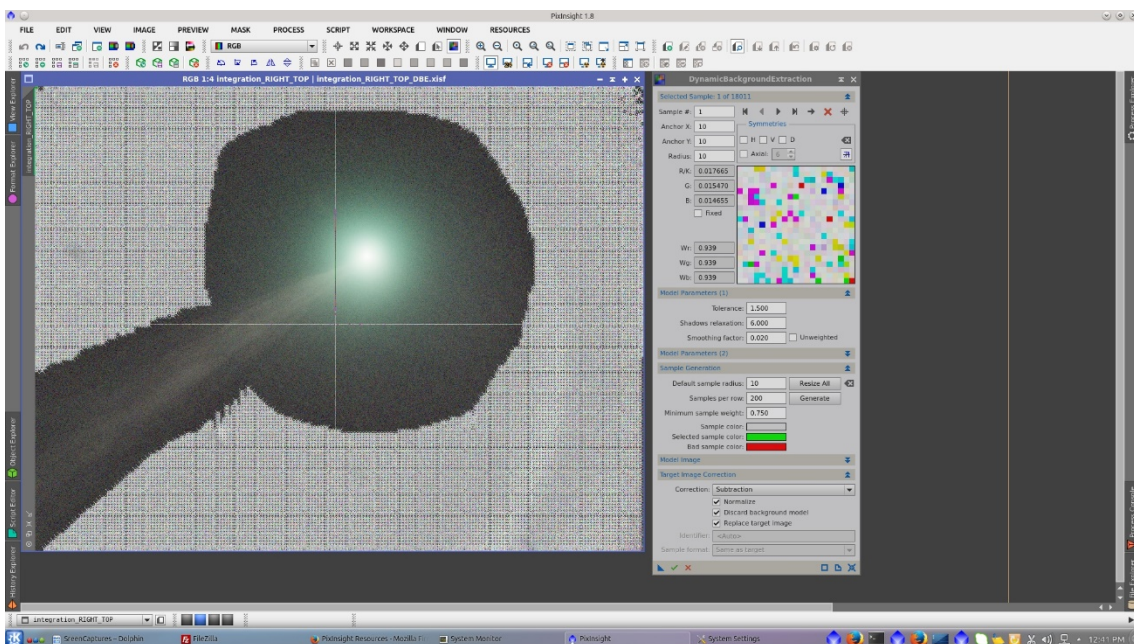
After the subtraction of the model, the image is now better corrected. See before and after of the right top section.
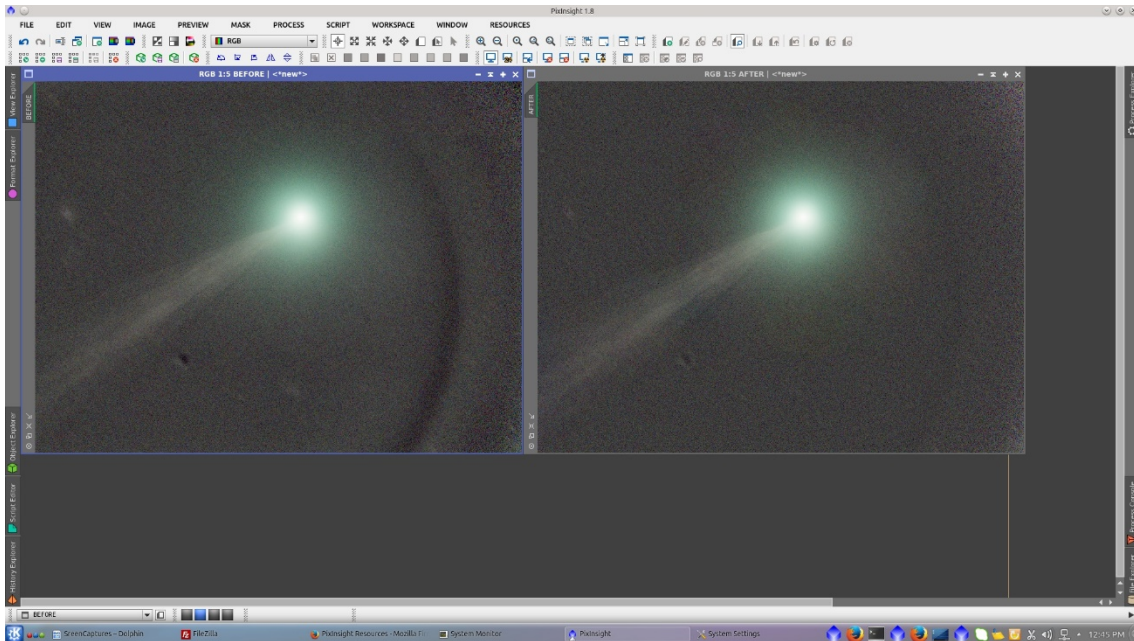

I will leave the image prepared for subsequent reconstruction. I will crop it in the way to add a black area to fit the height of the original image.
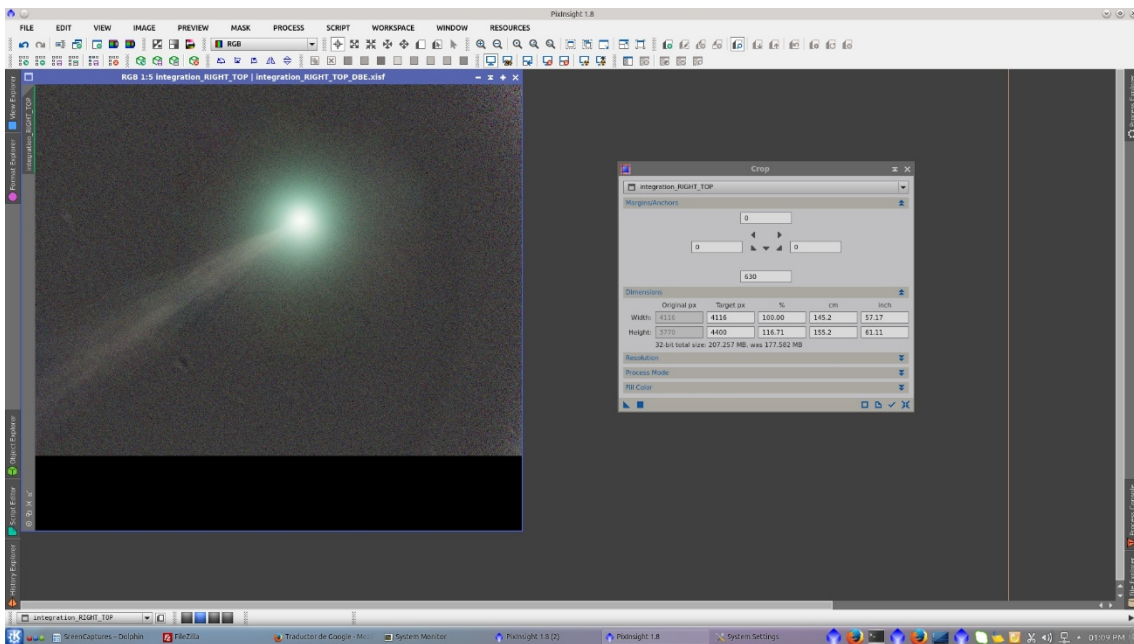
I will repeat the procedure for the other two parts of the images. To generate the model in the right bottom image, set the desired Samples per row and radious and adjust Tolerance and Shadows relaxation in order that samples cover all the image.

This model parameters also generate samples over the tail of the comet in the upper left of the image that have to be deleted manually.
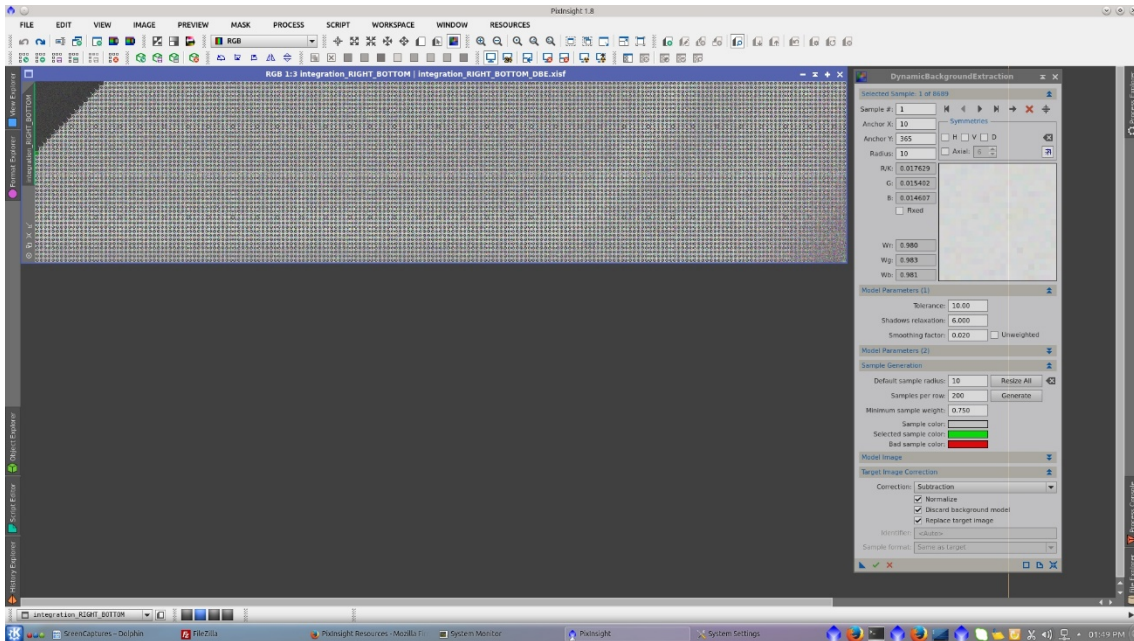
After the subtraction of the model, the image is now better corrected. See before and after of the right bottom section.
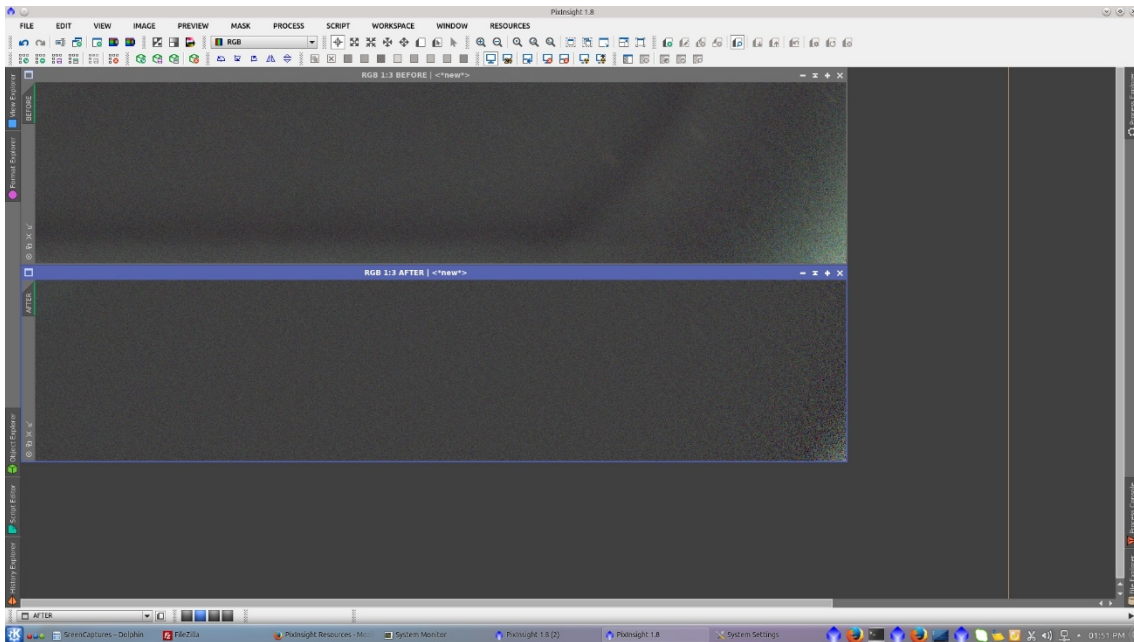
I will leave the image prepared for subsequent reconstruction. I will crop it in the way to add a black area to fit the height of the original image.
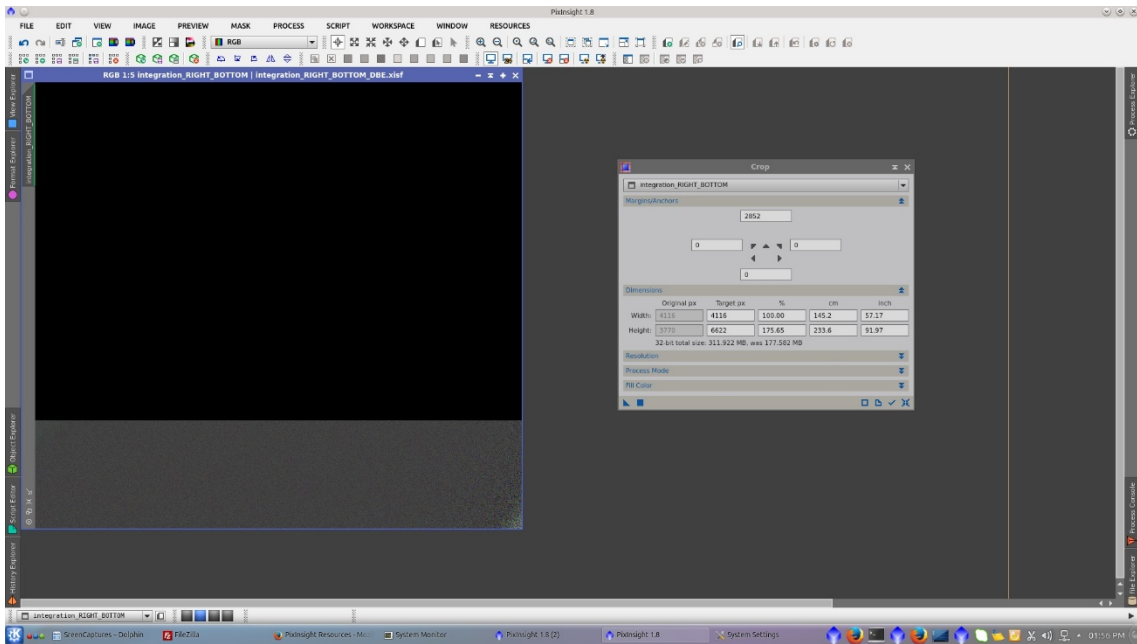
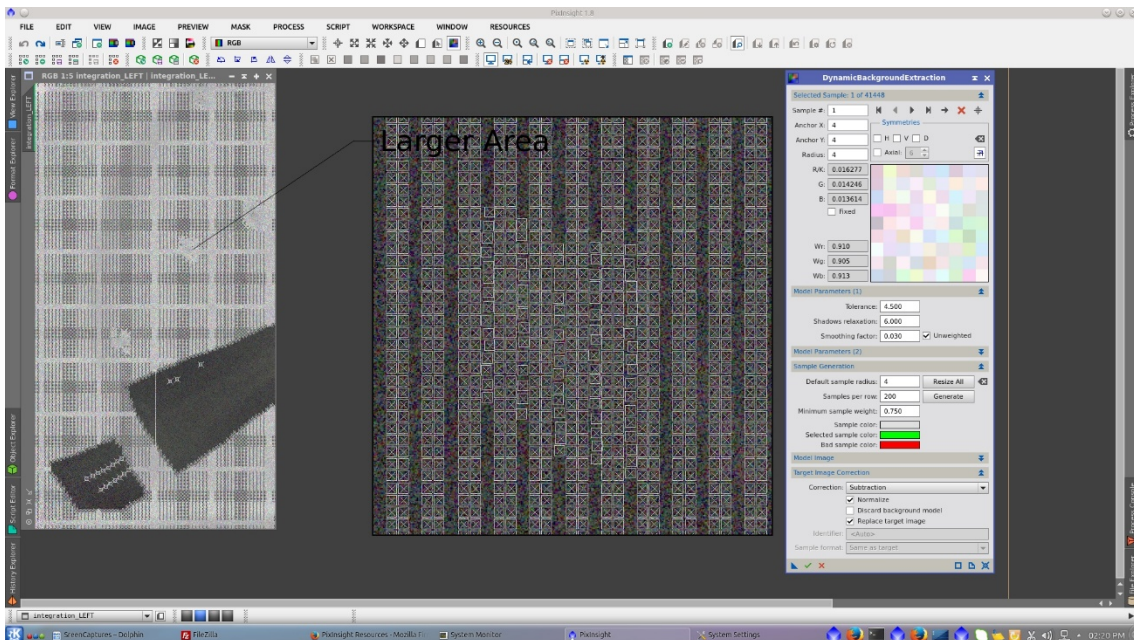To merge both images, use *GradientMergeMosaic* tool with defalut parameters.
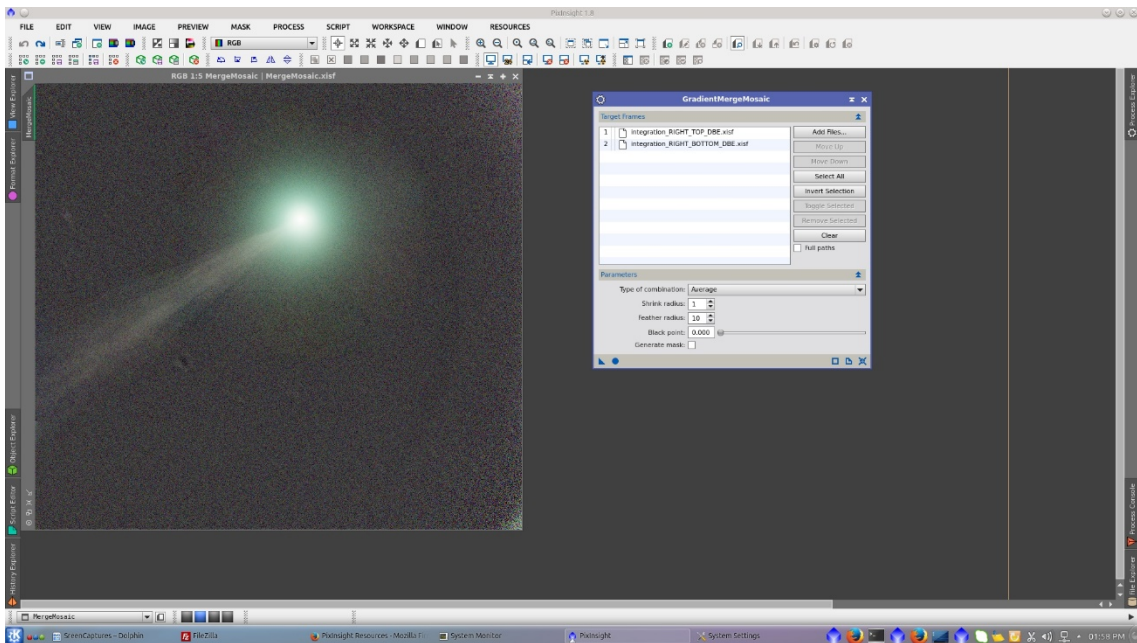
To leave the image prepared for subsequent reconstruction with the left part of the image. I will crop it in the way to add a black area on the left to fit the width of the original image.
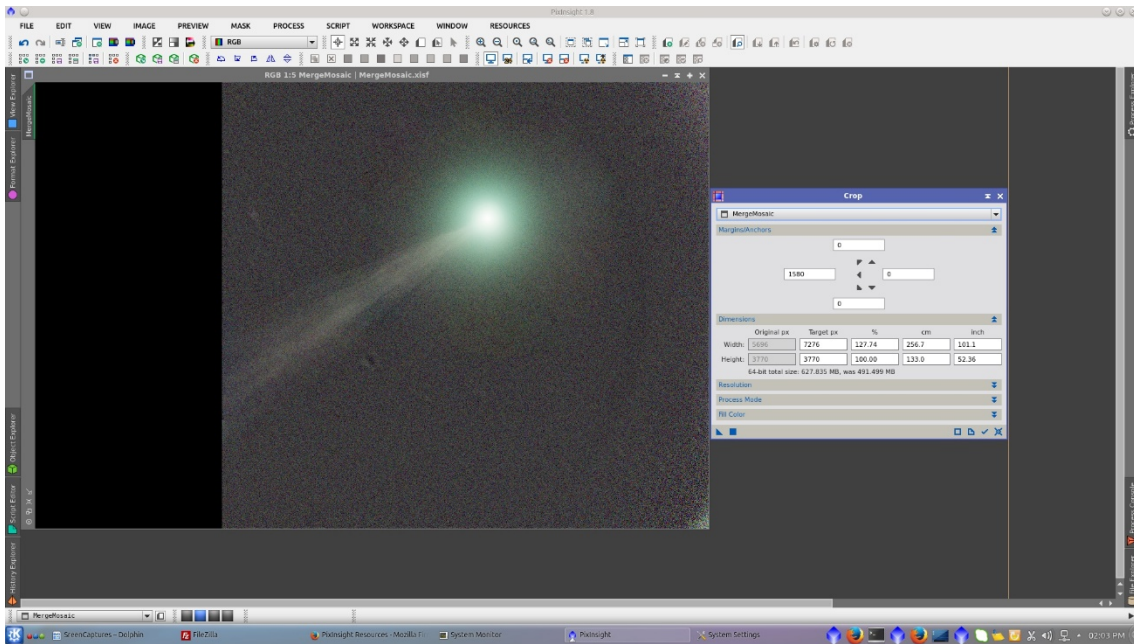
The left part of the images was a little more complicated and time consuming as I had to increase the density of samples to deal with star trails and the circle of vignetting.

The amount of samples overstep the maximum to manage, so I had to delete one every two columns but trying to leave those where there was star trails as showed in the following images.

The generated model visualized with the 24 bit option of *STF* tool shows very well the bright areas containing the circle and the startrails that are going to be subtracted.
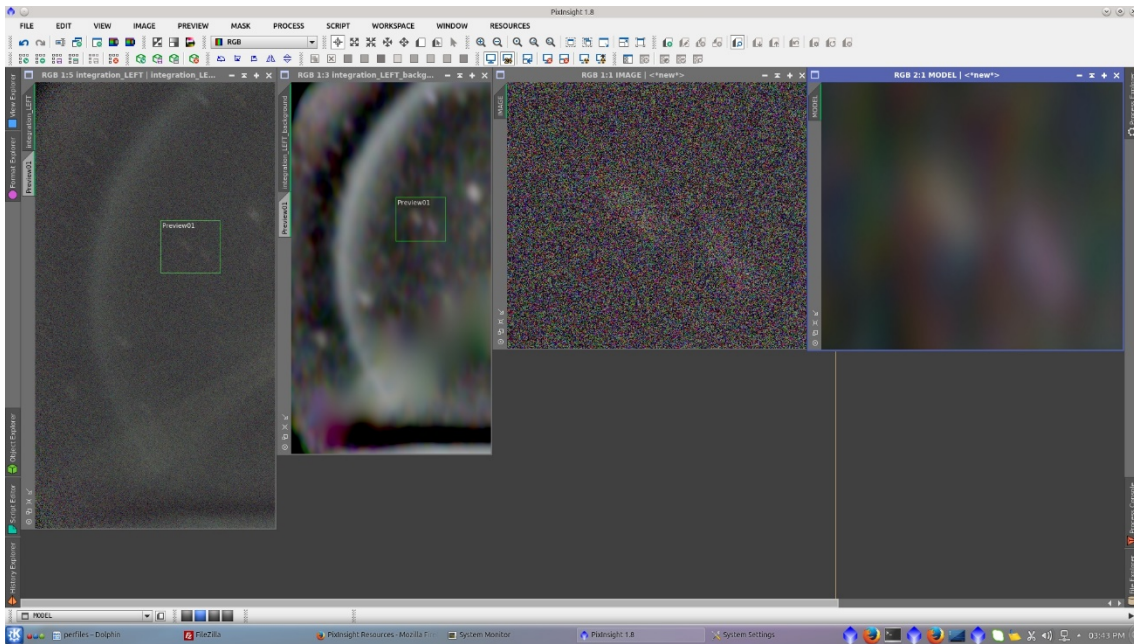
After subtraction of the model, the image is now better corrected. See before and after of the left section.
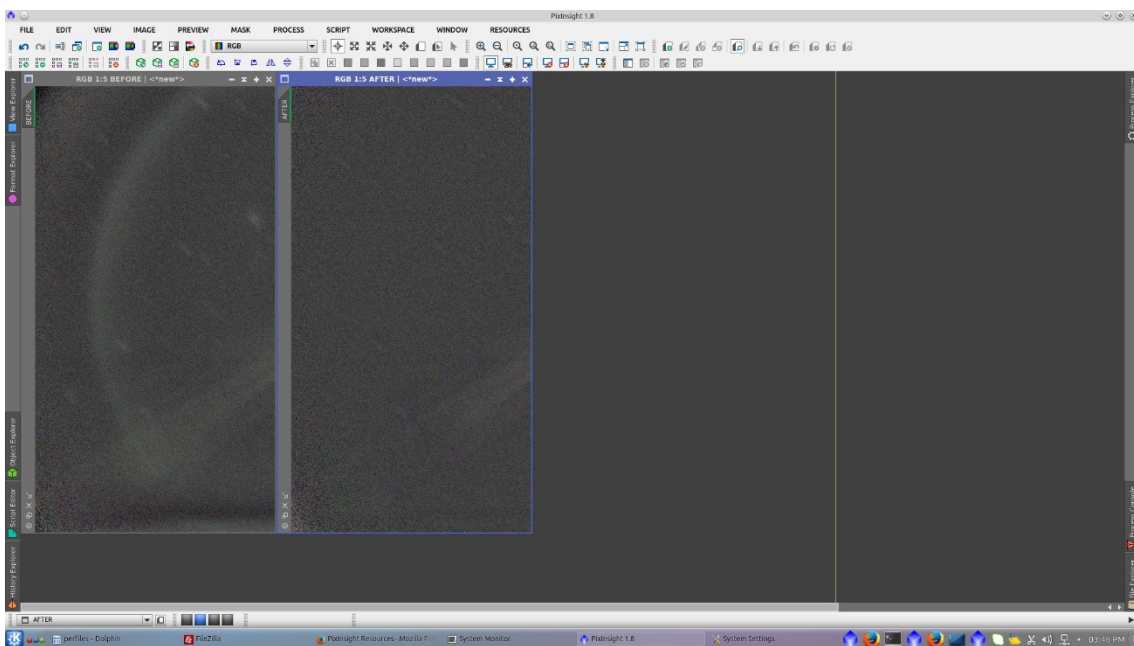
Tips for HD*DBE*:

1) Make tests in small images to see the improvement before apply to the big one.

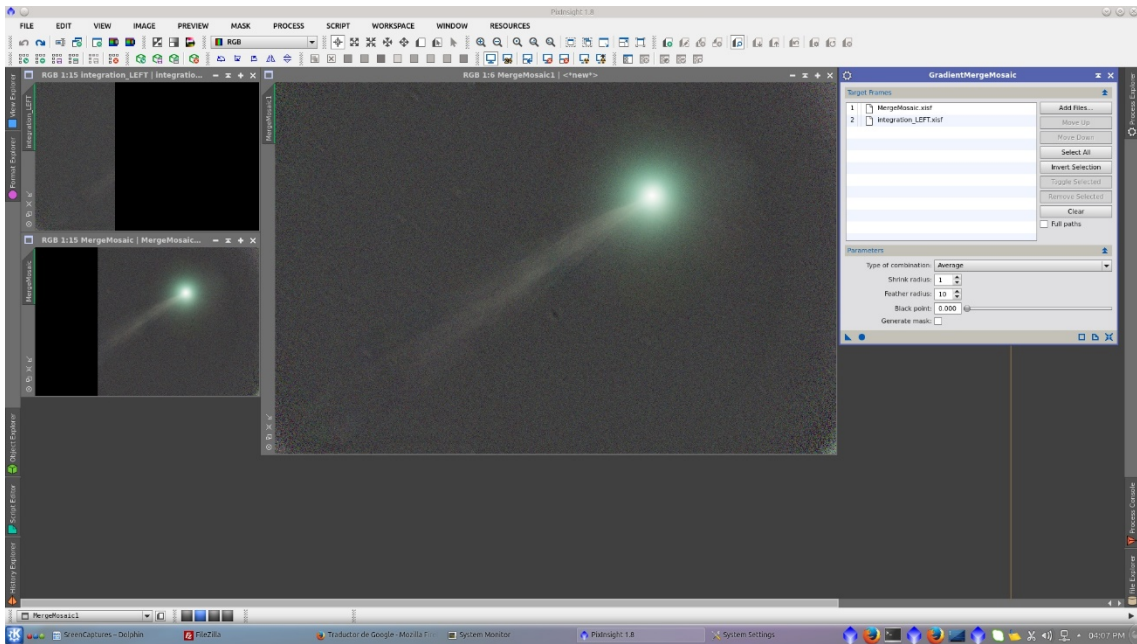2) In this example I open three instances of **PixInsight** and let them working at the same time to make it quicker.

To leave the image prepared for subsequent reconstruction with the right part of the image, I will crop it in the way to add a black area on the right to fit the width of the original image.
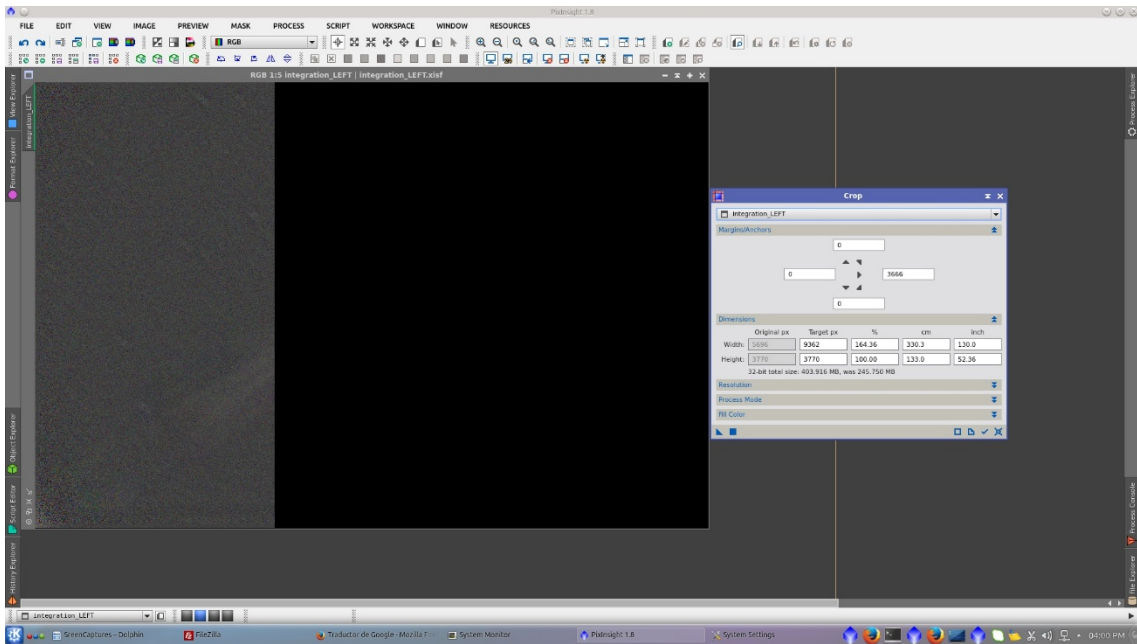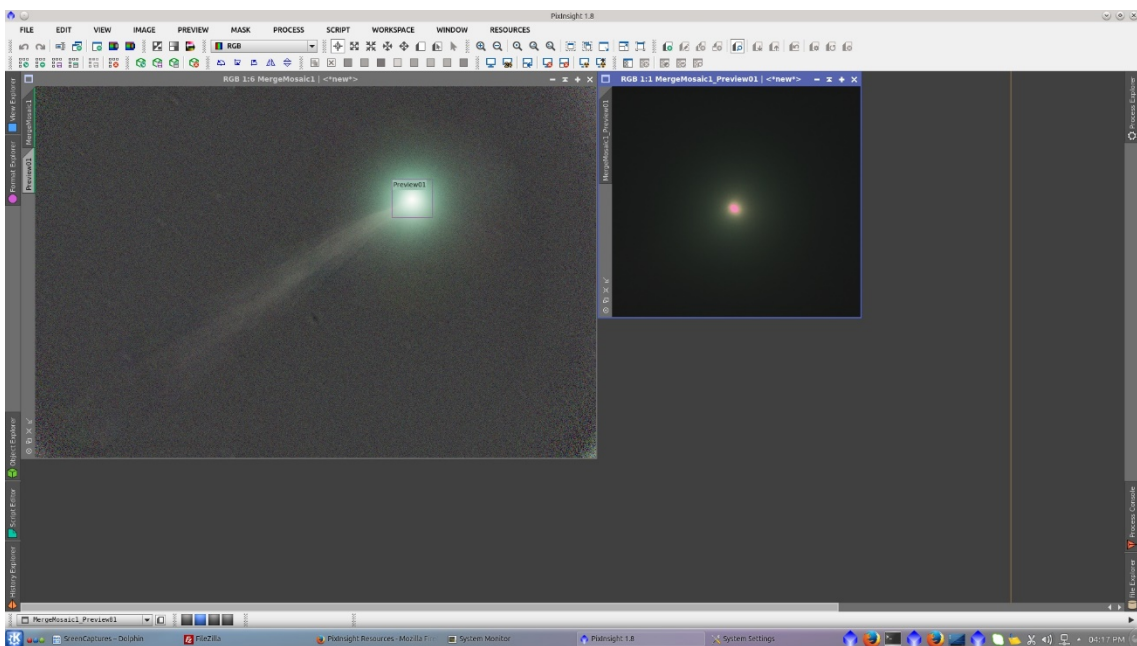
To match the mean background of the left images and the previously created MergeMosaic image, apply *LinearFit* to the new image.
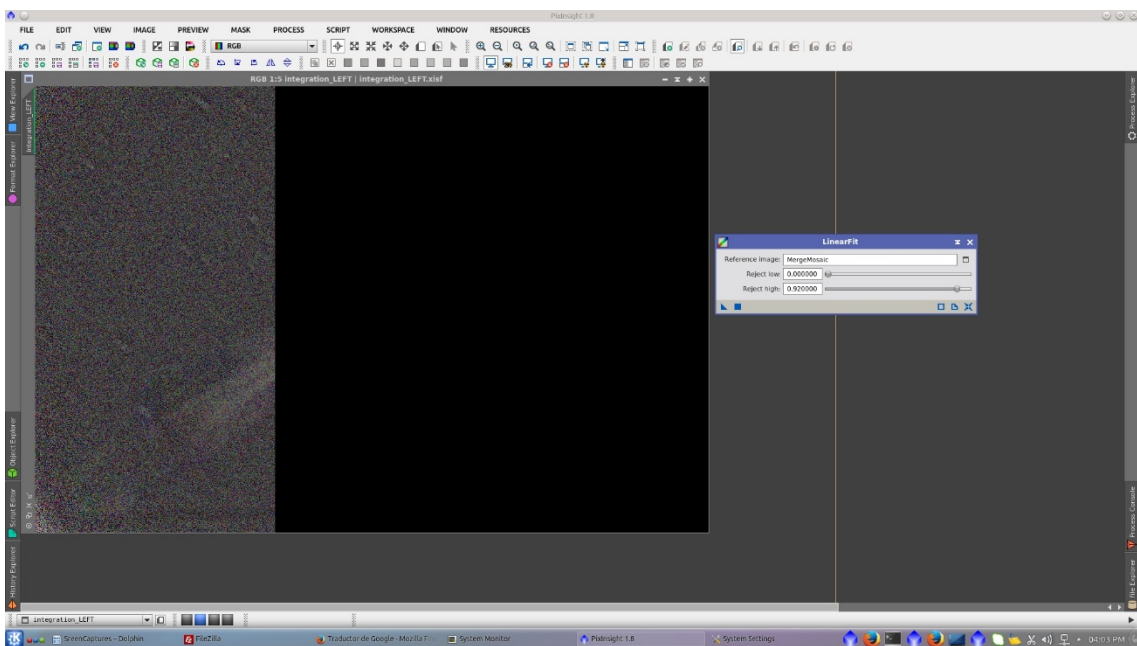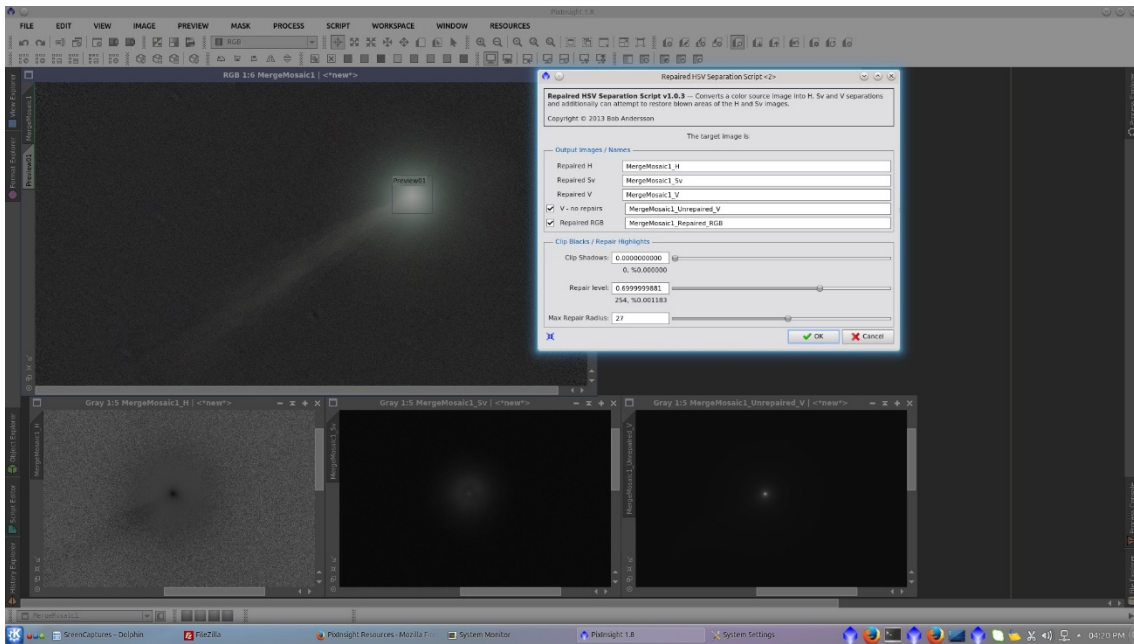

Finally the image can be reconstructed merging the left part of the image with *GradientMergeMosiac* tool.

Visualizing the image without *STF* you can see the saturated nucleus of the comet. To repair it use *Repaired HSV Separation* script.
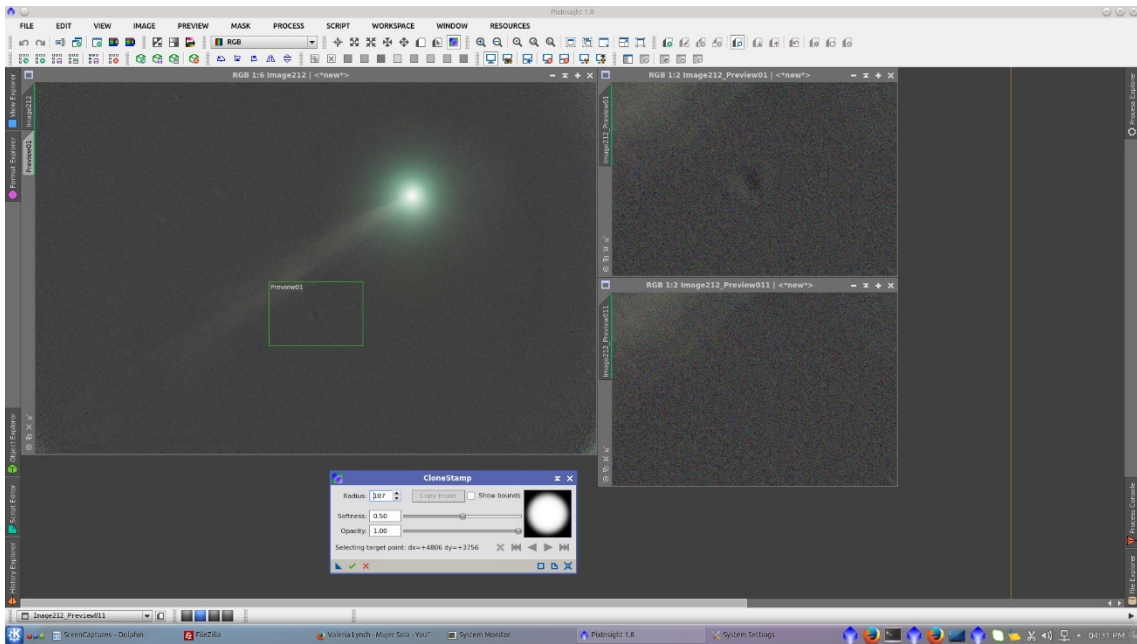

Generate the repaired H and Sv image and also the unrepaired V image with the following parameters:
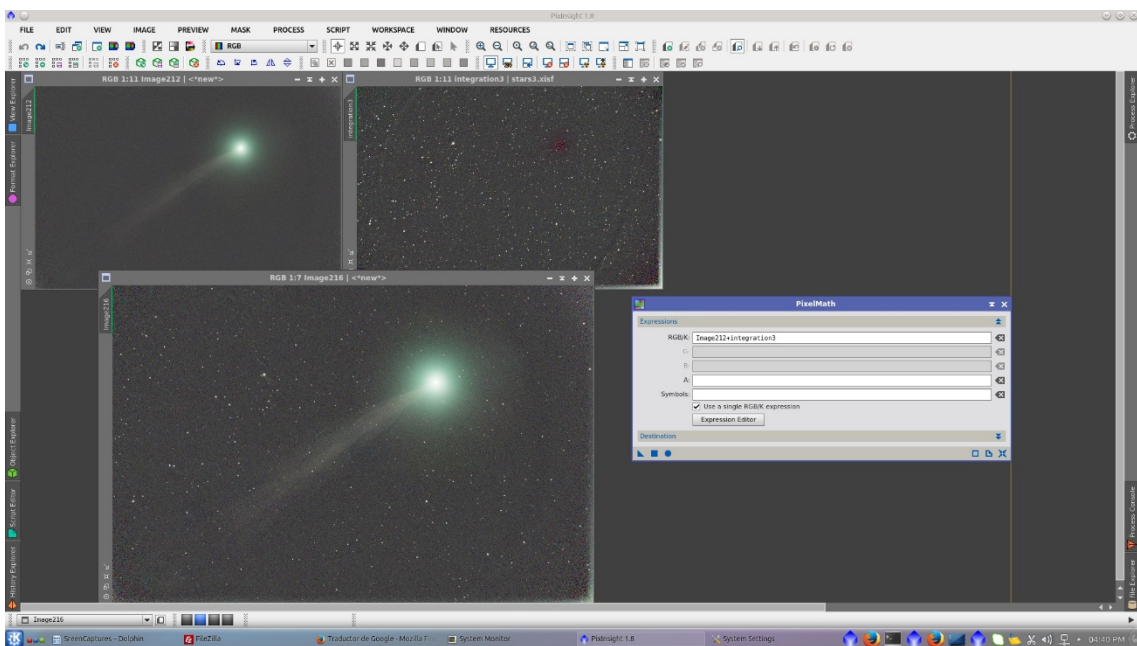
Combine the channels using *ChannelCombination* tool. See before and after of the nucleus of the comet.
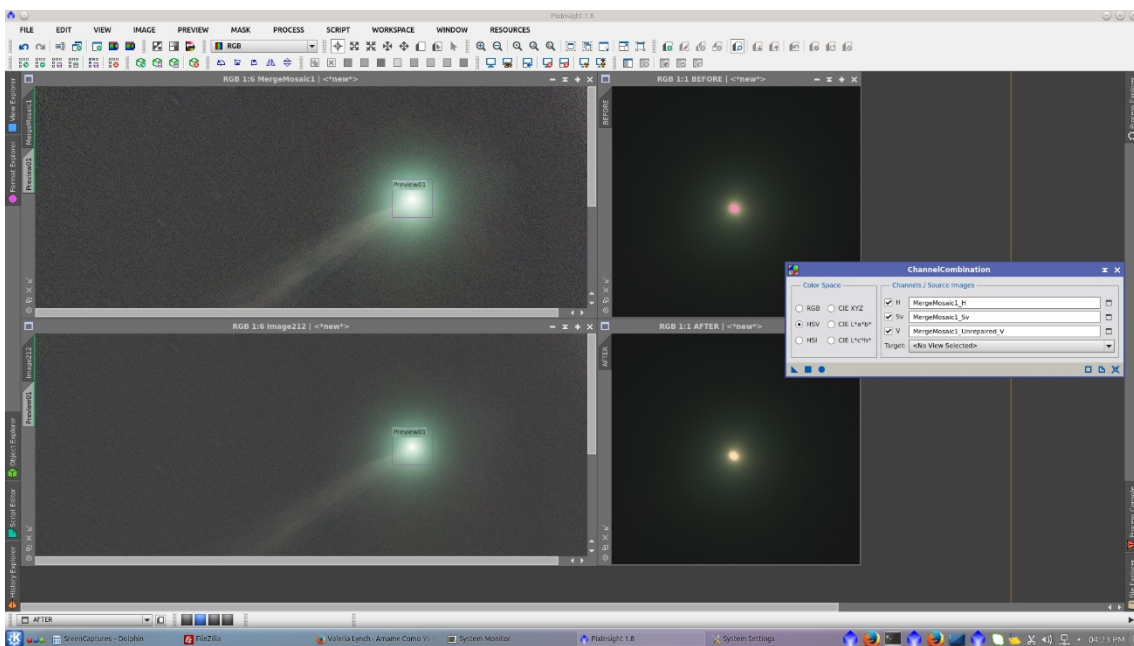
There is a remaining black donut on the background that I will remove using *CloneStamp* tool

Now both images are ready to be combined. Using *PixelMath* add the comet image to the stars image.


Crop the bottom and right of the image to eliminate bright pixels in the edges that comes from the star images
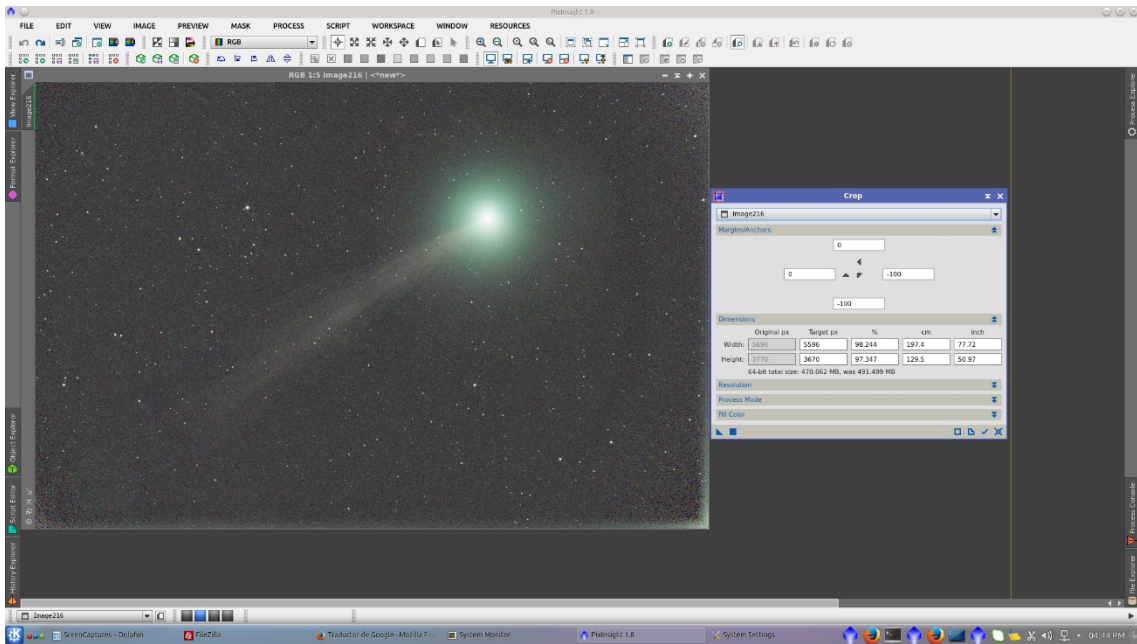
Over the "onlystars" image generate a starmask and after that crop it with the same *Crop* previously used for the combined image to match the size. This mask will protect the comet during deconvolution of stars.
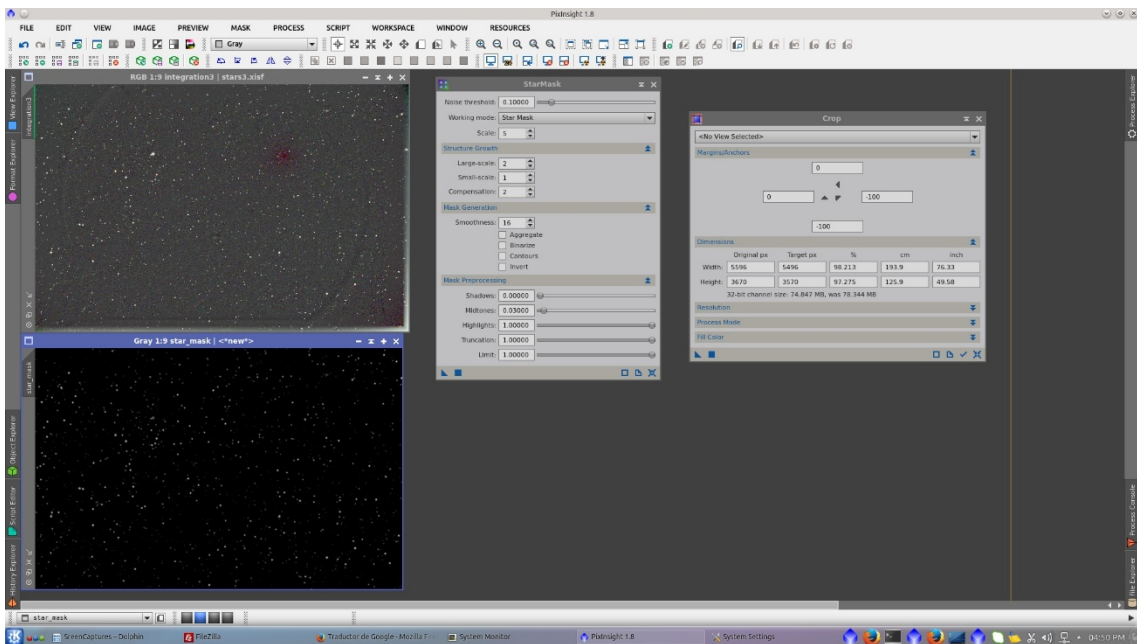

Using the starmask to protect the background of the image, apply D*econvolution* tool using a non regularized Richardson-Lucy Algorithm (but protecting the background with the mask) and a little amount of Global dark in Deringing to prevent ringings artifacts.
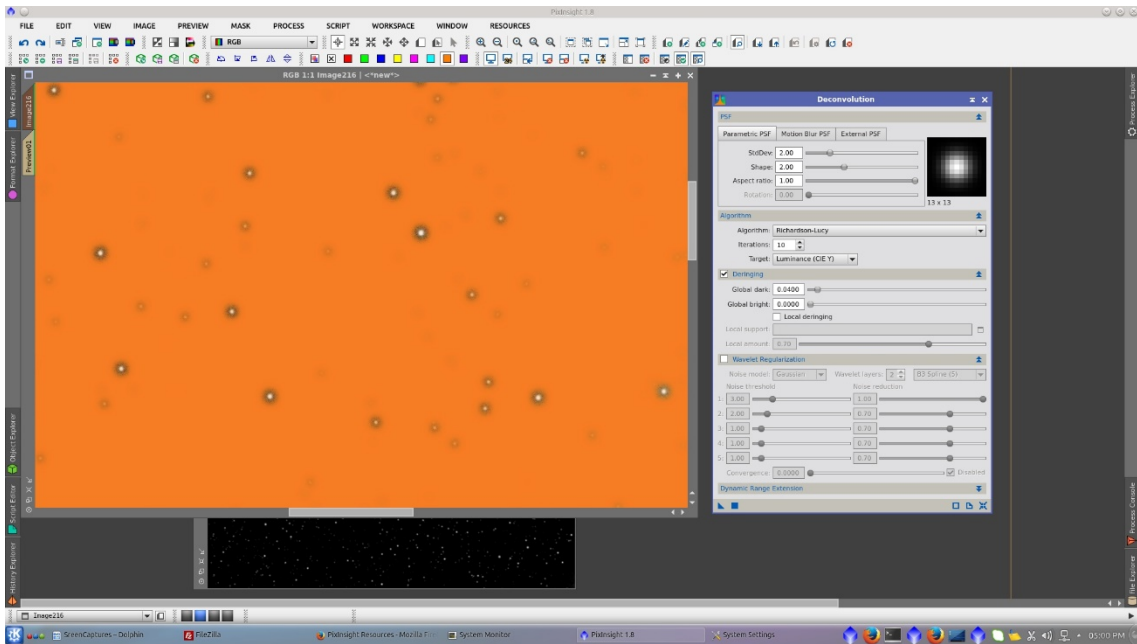
Generate a preview that represent the background of the images to be used as Reference image in *BackgroundNeutralization* tool
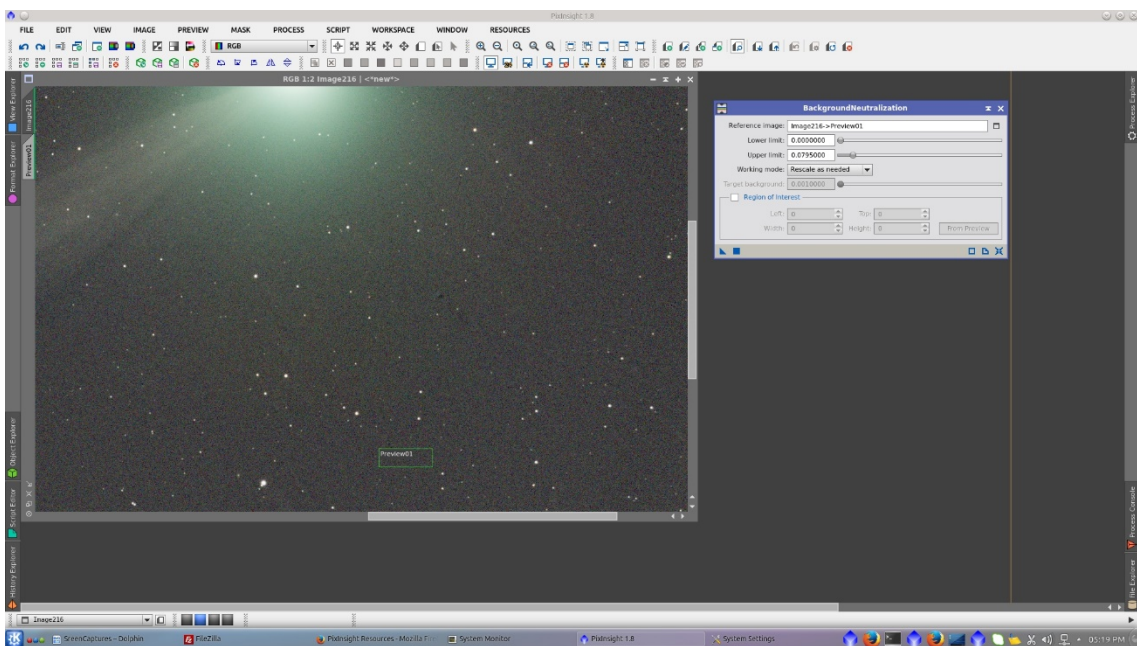

Perform *ColorCalibration* using the same preview as Reference image for Background Reference and the onlystars image as Reference image for White Reference
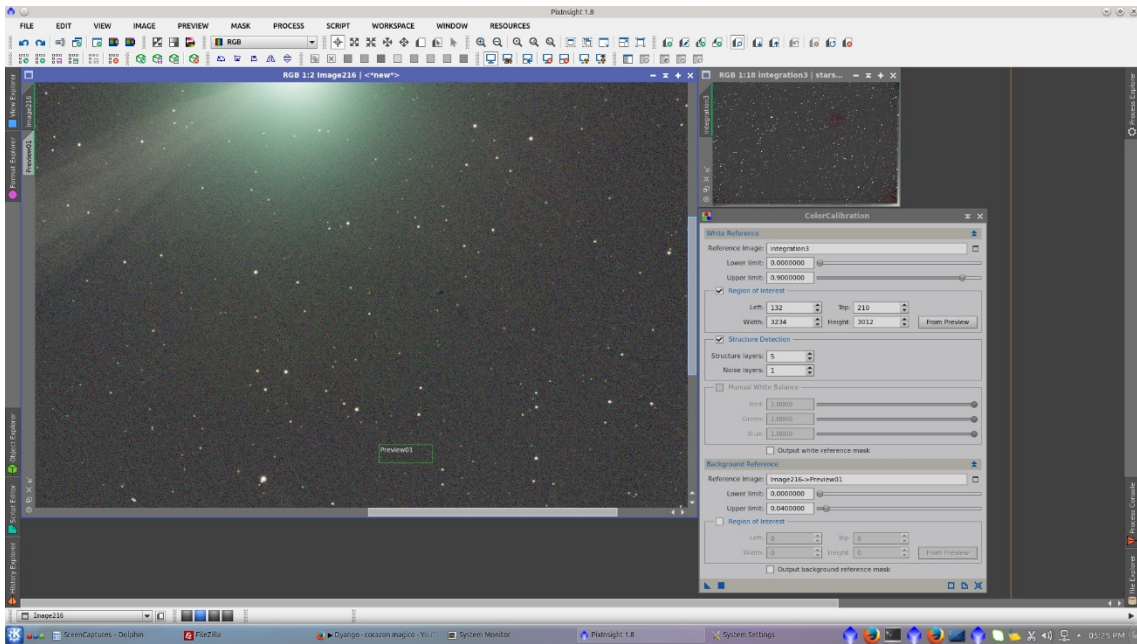
Going further in the processing, I notice during color saturation of the image that an area around the core of the comet had remaining color variations, perhaps due to the first HD*DBE* was not applied in that region. So, I generate a new *DBE* model to correct it
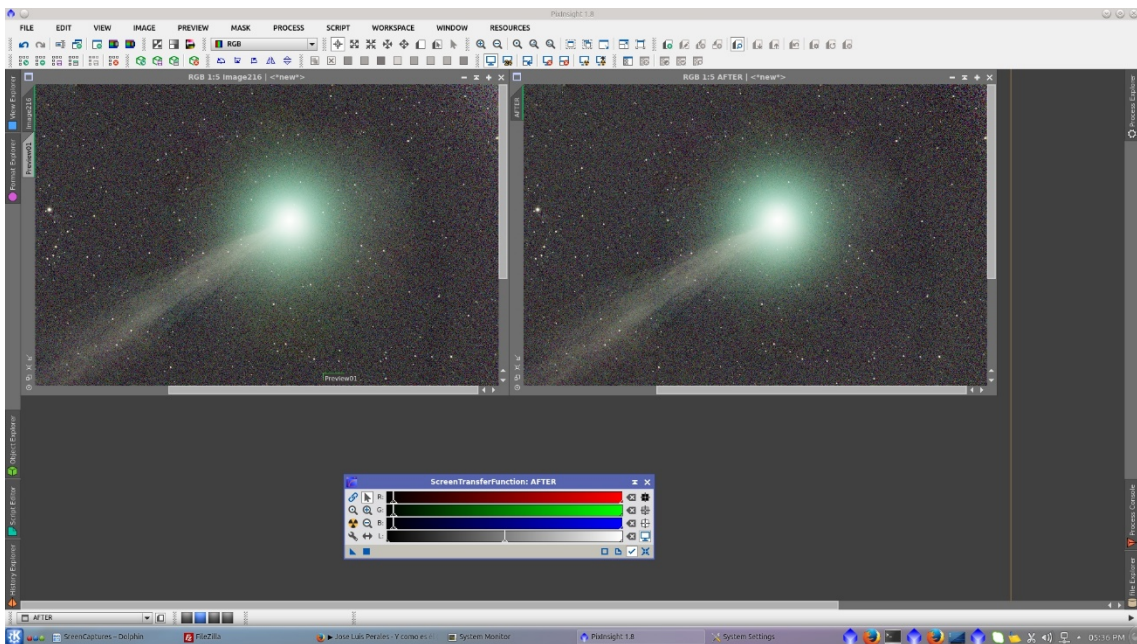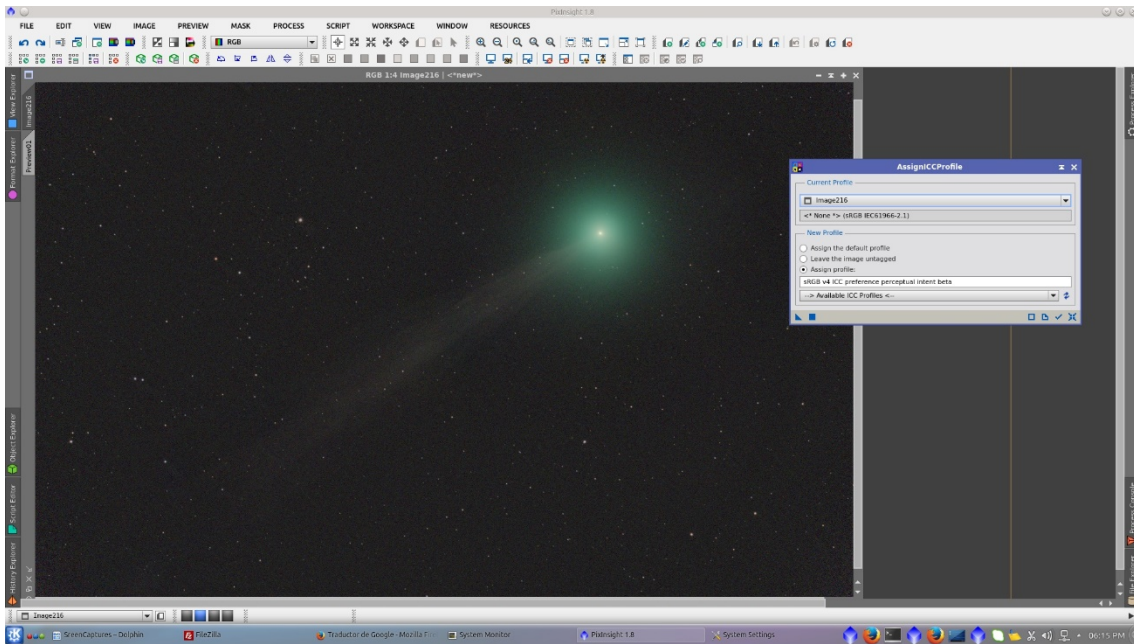

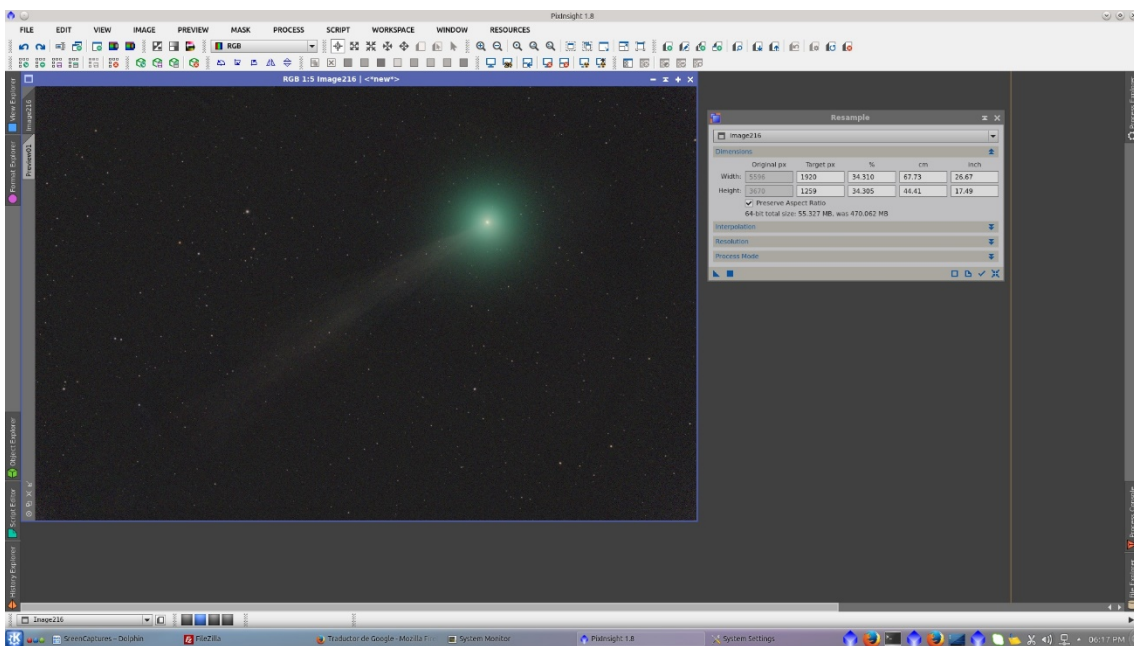Stretch the image using *MaskedStretch* tool.
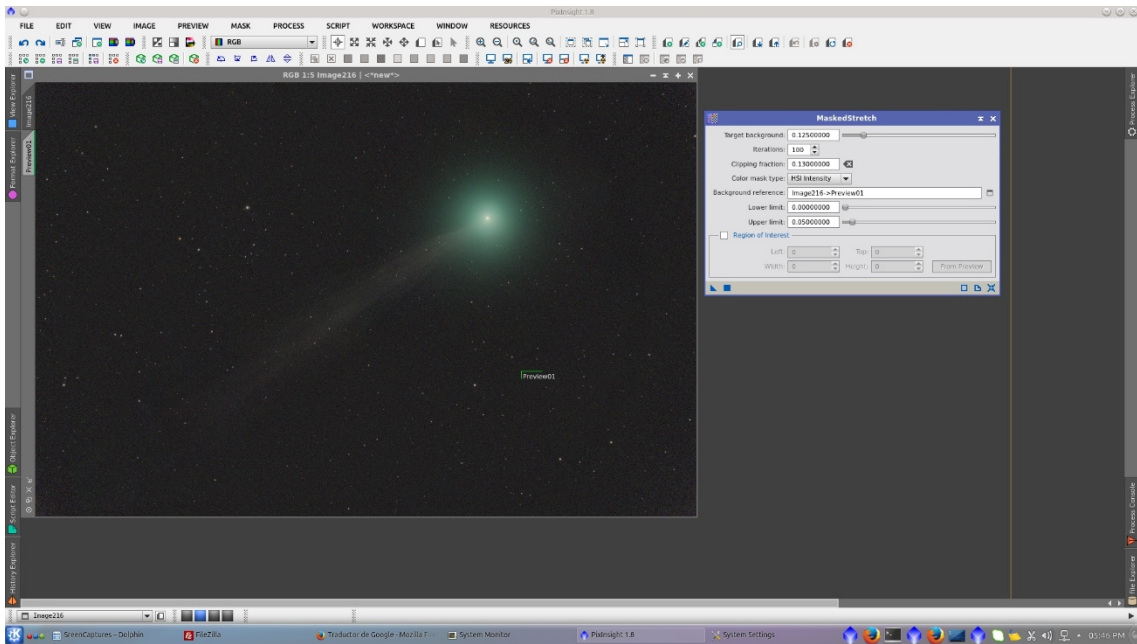
Now is time of color saturation of the image using *ColorSaturation* tool. It can be built a Lightness mask in order to protect the background from saturation, but in this cases it looks fine wihtout mask due the remaining noise is homogeneous.
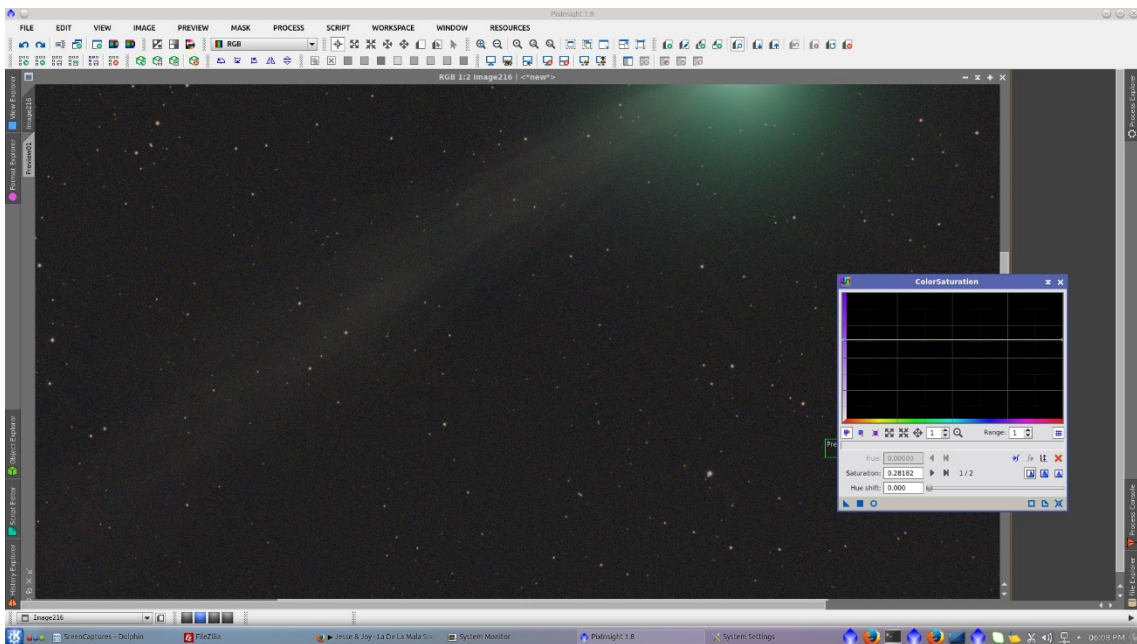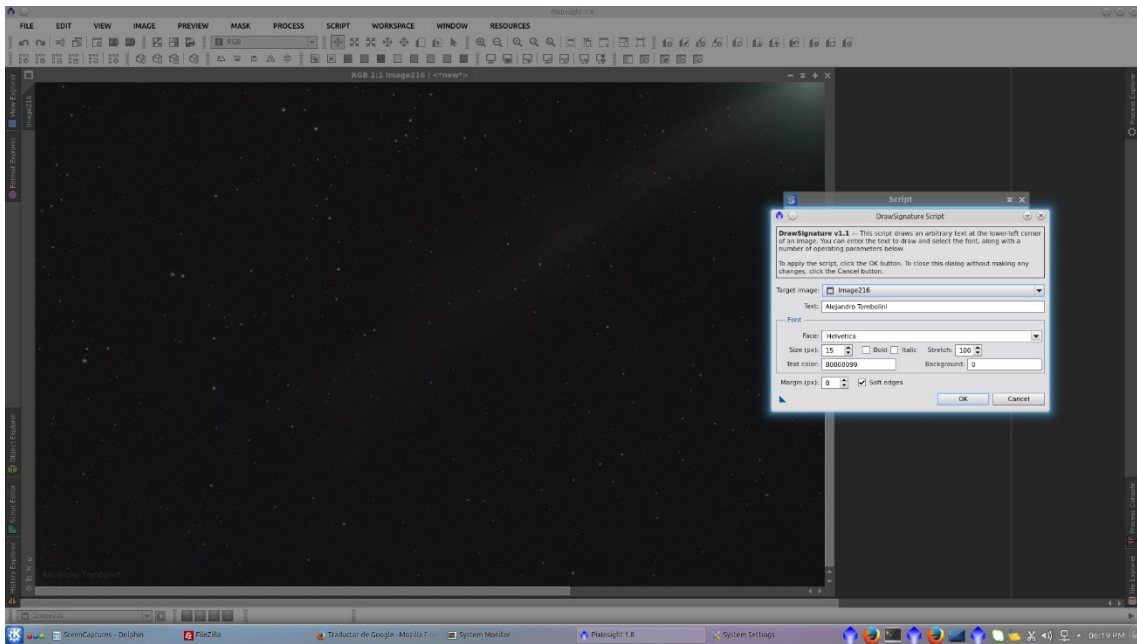

Assing an ICC profile to the image

Resample for web publication

Add Signature with *AddSignature* Script

Final Image

2. Tutorial z Astrobin:

I'm not an expert, but I think your second image (which is supposed to be stars-only) could be improved. Usually the workflow is:

1. Register subs on stars (StarAlignment)
2. Register subs on comet (CometAlignment)
3. Integrate comet (ImageIntegration, checking large scale pixel rejection high will help with stars residuals)

4. Subtract comet master from star aligned subs (CometAlignment. have you missed this? if comet residual is high check nucleus offsets)

5. Integrate stars-only images (ImageIntegration)

6. (optional) You can make a third CometAlignmet/ImageIntegration pass to subtract stars from subs and get cleaner comet master

3. Tutorial ze strony Star-watcher:

https://www.star-watcher.ch/image-processing/comet-processing-tutorial/

To simplify the process I use BatchPreprocessing to generate calibrated, debayered and registered images. These steps also can be done manually.

1. Run BatchPreprocessing
To save time, uncheck "Apply" in Image Integration section. BatchPreprocessing is only used here to calibrate, debayer and register the raw files.
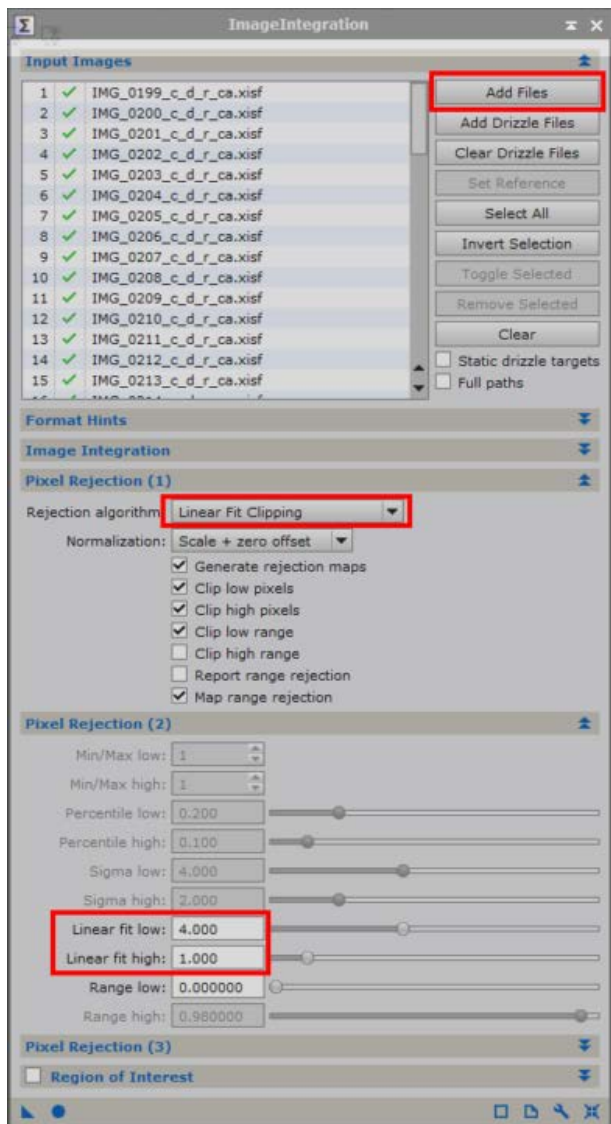
2. Create **comet-only** Image:
Run CometAlignment
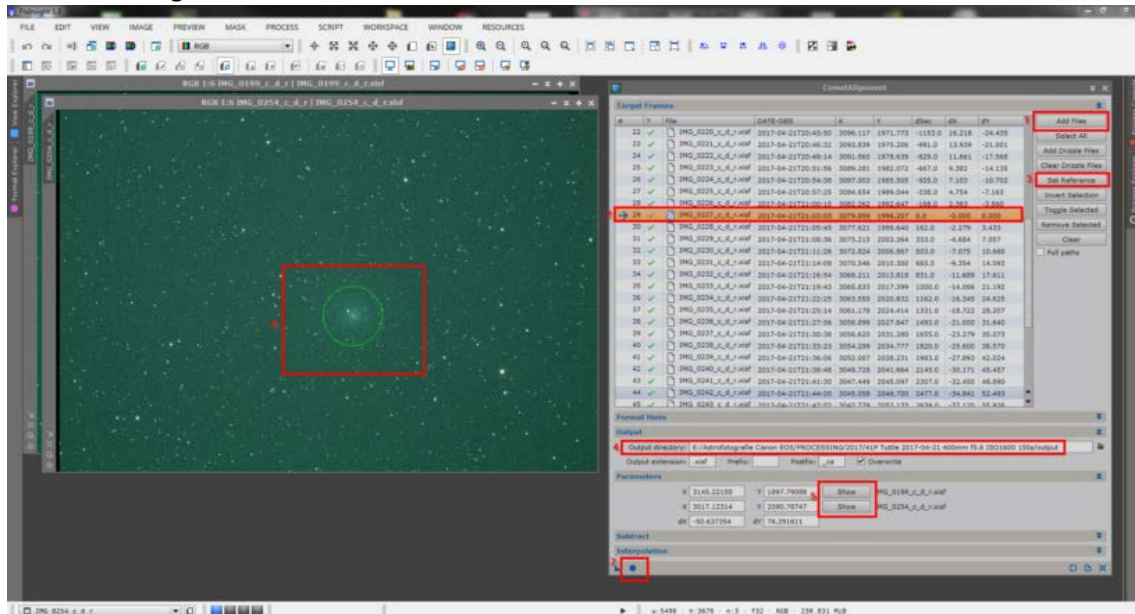
1. Add Registered Images (c_d_r files)
2. Select Reference Image somewhere in the middle
3. Set selected image as reference
4. Select destination folder
5. Open first and last image
6. Set comet position
7. Start processing
3. ImageIntegration with comet aligned images (c_d_r_ca)

Save generated image as xisf file! It's needed later to subtract it from the stars-only images.

With LinearFit low value 4.000 and high value 1.000 I reached the best quality (star trails almost invisible in comet only image), but play around with low and high values…
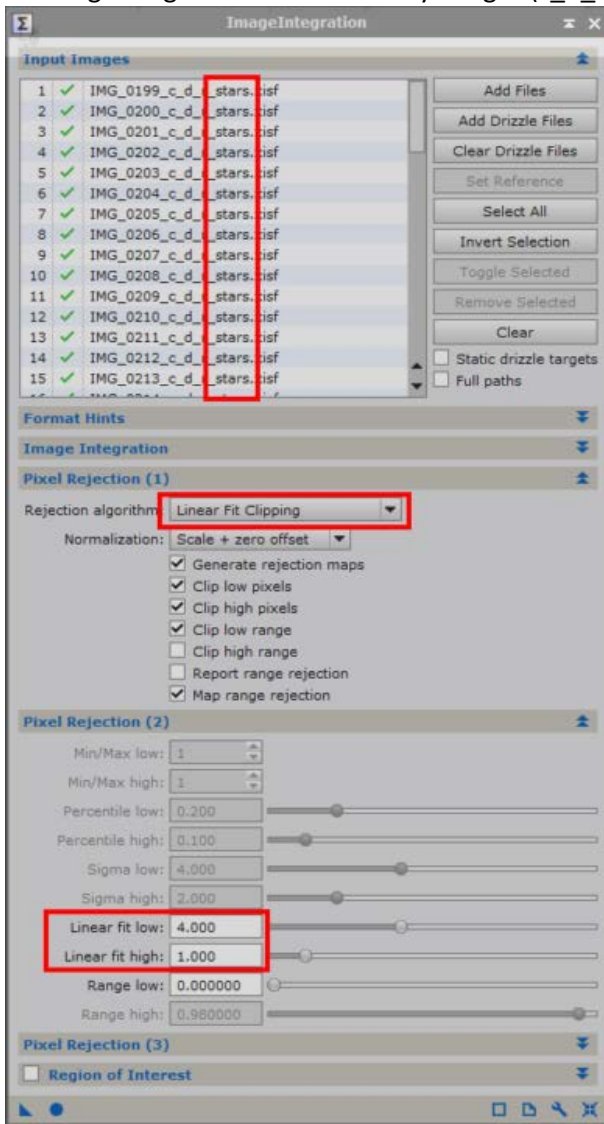
4. Create **stars-only** Image:

CometAlignment again with registered images (c_d_r) to generate a stars-only image
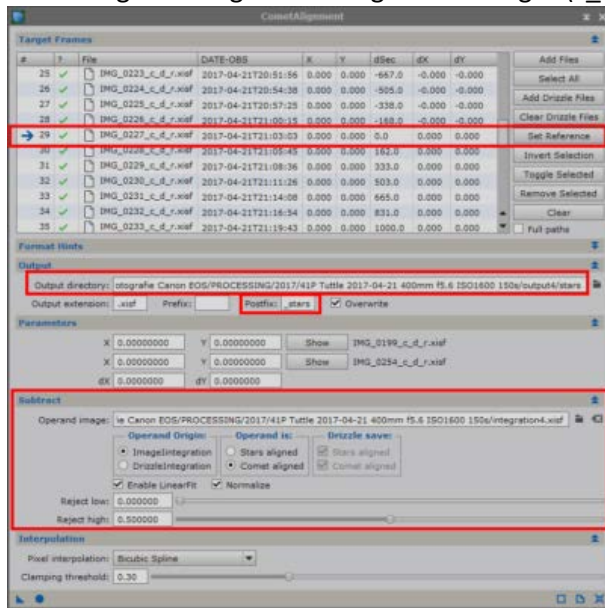
1. Set same reference image like step 2
2. change postfix to _stars or something else
3. select destination folder
4. Open first and last image (like in step 2)
5. Set comet position (like in step 2)
6. subtract comet aligned .xisf image generated in step 3, set "Reject high" to 0.5
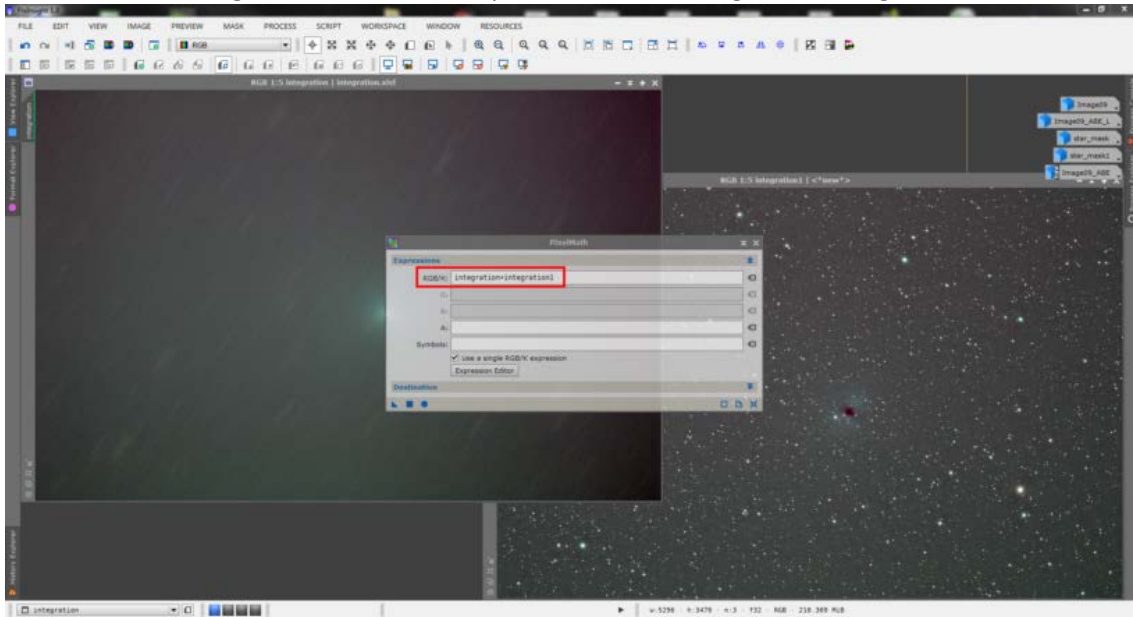
5. ImageIntegration with stars-only images (c_d_r_stars)

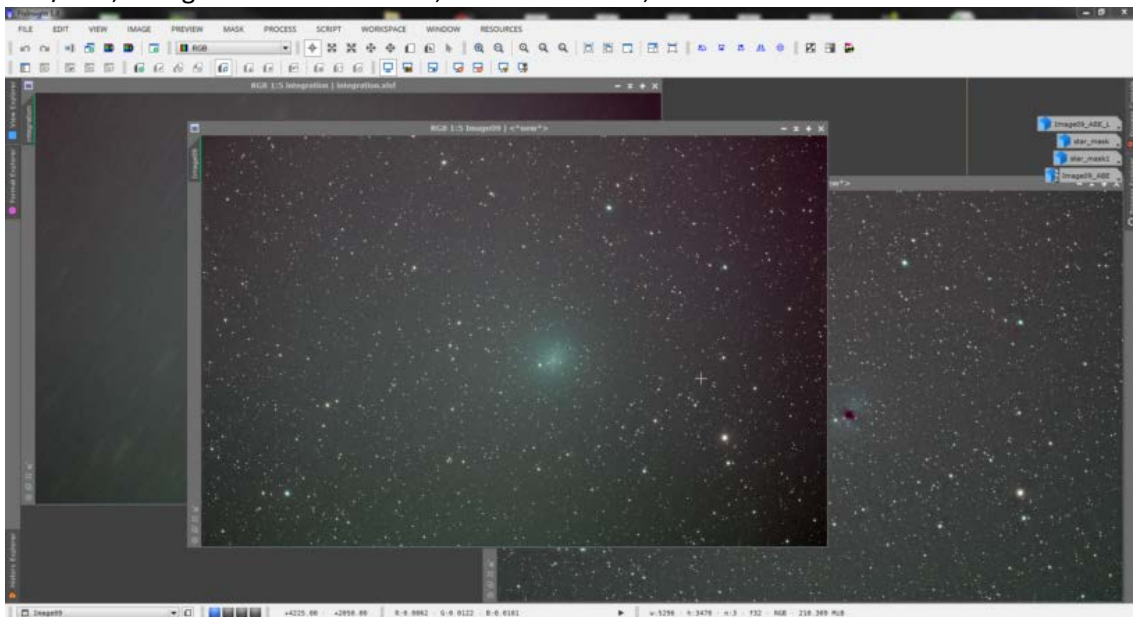6. If you want, **crop** both images, but by the exactly same way
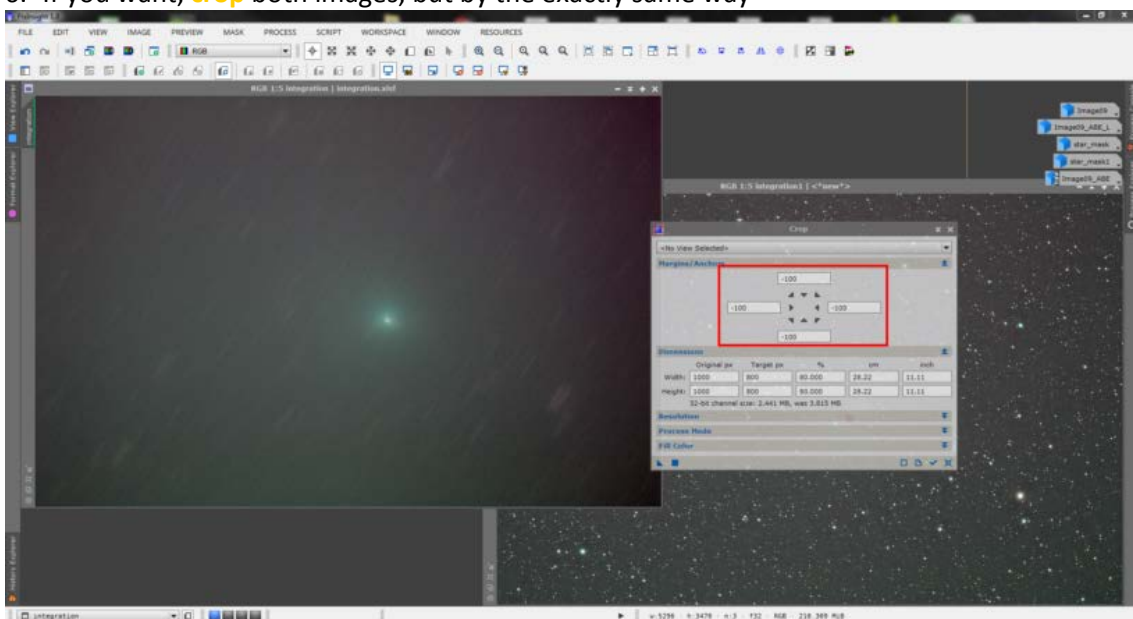
7. **Combine** comet-only and stars-only images

Combine the 2 images with PixelMath expression: CometImage+StarsImage

8. The combined image can now be processed like any other image:
ABE/DBE, BackgroundNeutralitation, ColorCalibration, …

- **Rejection Algorithms**
  - < 12 images: Sigma Clipping (or Percentile Clipping)
  - 13-20 images: Winsorized Sigma
  - > 20 images: Linear Fit Clipping

41P/Tuttle–Giacobini–Kresák

4. Tutorial ze Astropolis:

Poniżej krótki tutorial obróbki zdjęć komety wykonanych kamerą monochromatyczną. Komety na tyle szybkiej, że ujęcie 300 sekund powoduje widoczne rozmycie obrazu.

Opis poświęcony jest tylko specyficznym dla tego typu zdjęć. Nie omawia podstawowych czynności takich jak kalibracja, stack czy składanie RGB i RGB z luminancją.

Mamy więc 6 ujęć po 300 sekund luminancji i po 5 ujęć po 120 sekund każdego ze składników RGB.

1.Wykonujemy kalibrację, alignację NA GWIAZDY i stackowanie luminancji i każdego z kolorów RGB.

2.Składamy RGB dla gwiazd i wykonujemy normalną obróbkę- histogram, krzywe i ew. odszumianie.

3.Składamy luminację dla gwiazd i wykonujemy normalną obróbkę- histogram, krzywe i ew. odszumianie.

4.Otrzymujemy dwa półprodukty –

- kolor dla gwiazd z rozjechanym kolorem w obszarze komety

- luminancję dla gwiazd z rozjechaną i kiepską w sensie kontrastu luminancją komety

5. Wykorzystując ręczną lub automatyczną alignację NA KOMETĘ (np. modułem Comet Alignment PixCore) a następnie stack dla poszczególnych kolorów OBRAZU KOMETY bez zwracania uwagi na resztę. Jeśli składamy funkcją MEDIAN to przesunięte w czasie alignacji w procesie stackowania gwiazdy znikną.
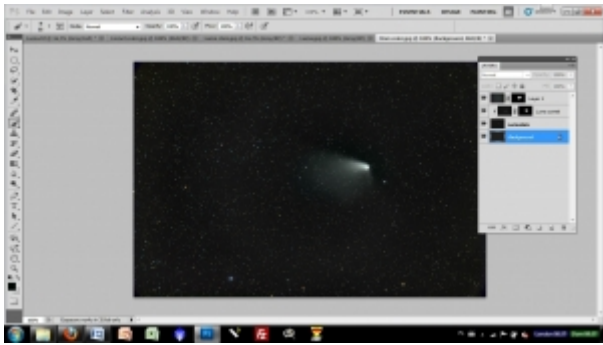
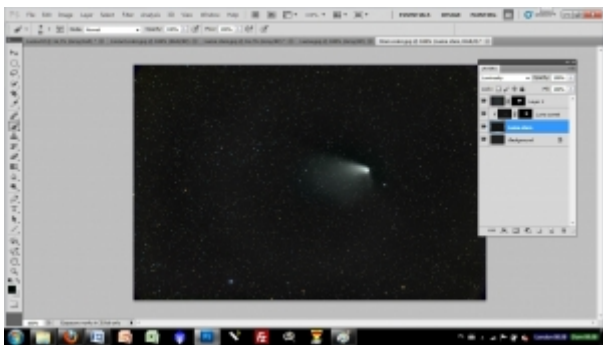Otrzymujemy np. coś takiego jako kolor komety:

6. I teraz zaczynamy najważniejszy etap. Ja to robię Photoshopem CS-5 Extended, ale myślę że można to zrobić innymi narzędziami.

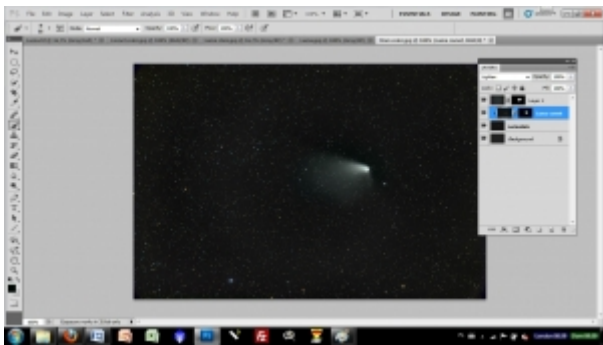- Układamy warstwy w następujący sposób:
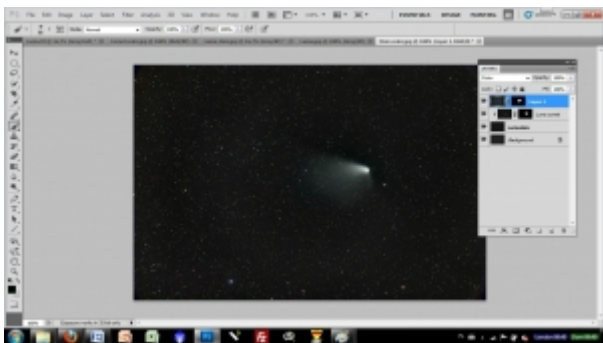
Najniżej jest kolor gwiazd z atrybutem „Background"

Powyżej luminancja gwiazd z atrybutem „Luminosity"

Następnie luminancja komety z atrybutem „Lighten" i podpięciem do warstwy luminancji gwiazd.

Dodatkowo warstwa ta ma maskę „Hide All" z odkrytym wyłącznie obrazkiem komety.

Najwyżej jest kolor naszej komety z atrybutem „ Color" . Ta warstwa też ma maskę „Hide All" z odkrytym obszarem komety.

Taki układ umożliwia precyzyjną regulację nasycenia, poziomu, poziomu czerni i innych parametrów poszczególnych kawałków naszego zdjęcia.

Pozwala też na ręczną, precyzyjną alignację luminacji komety i koloru komety. W końcu wykonujemy Layer > Flatten image 🙂

Po końcowej kosmetyce (crop brudów po skladaniu, usunięcie pozostałych hotpixeli) mamy gotowe zdjęcie.

Kometa C/011 L4 Pannstarrs 15.04.2013

Setup: Veloce RH200, STL 11000, EM-200.