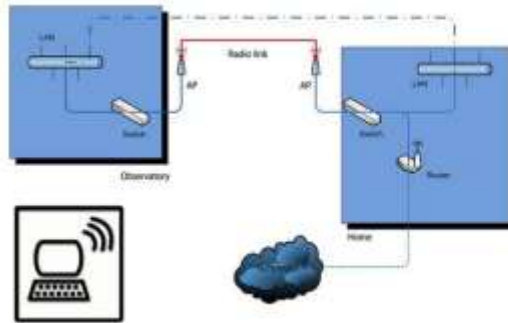
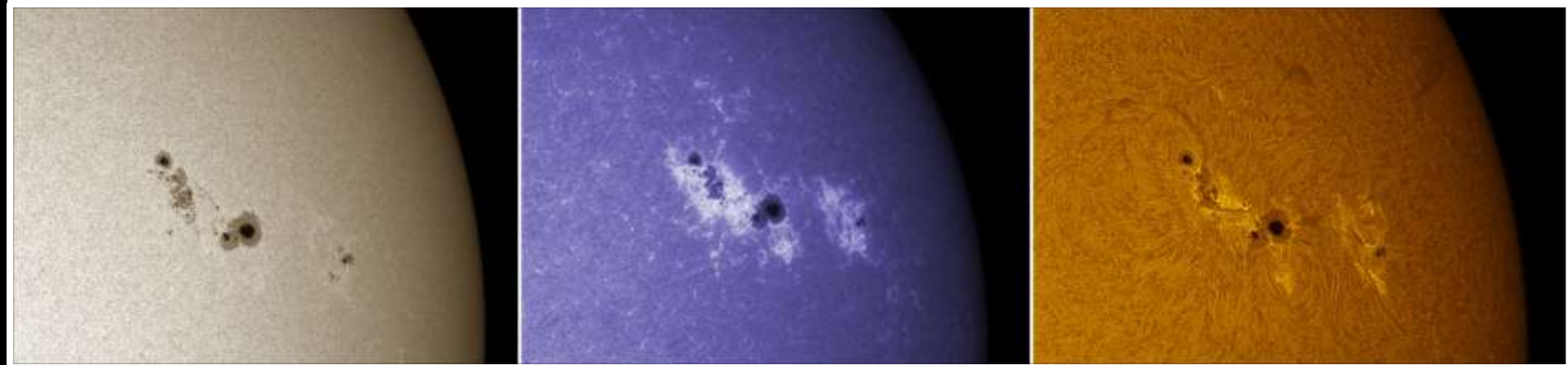
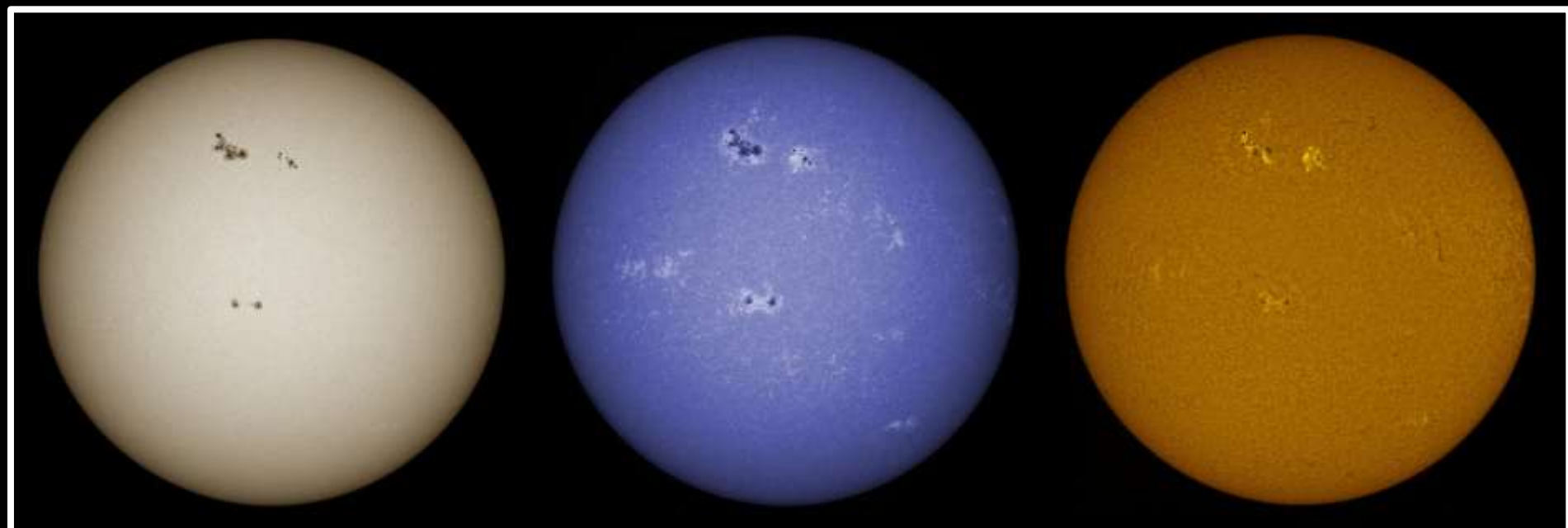


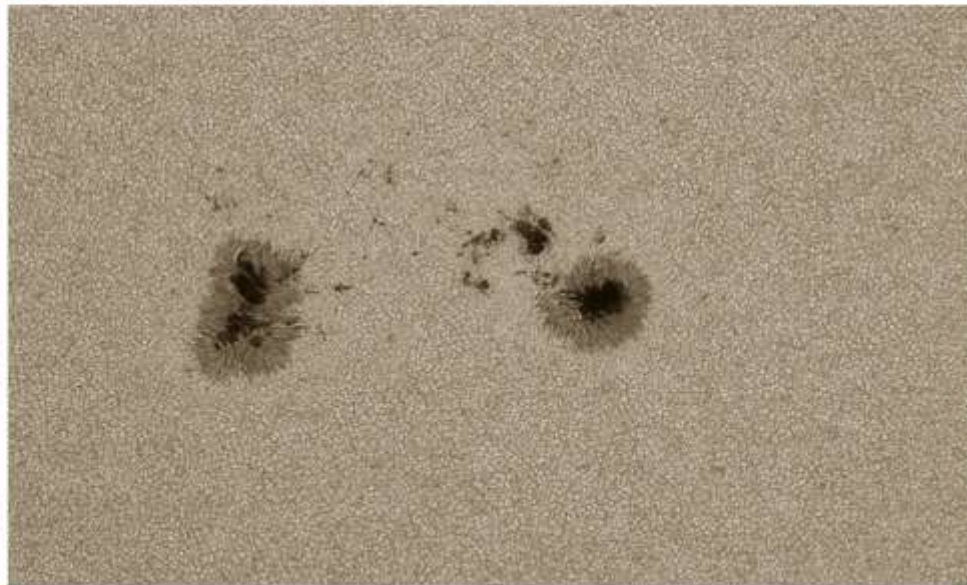
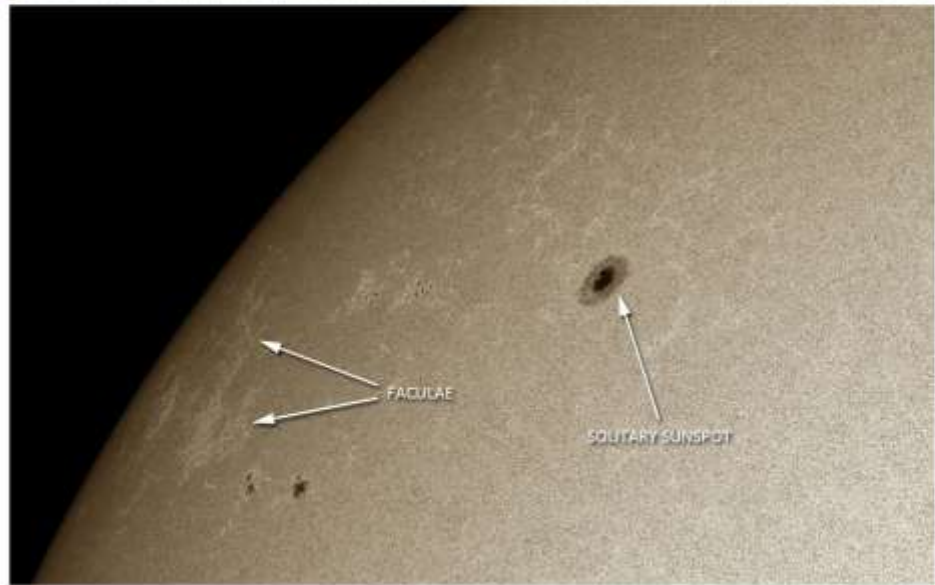
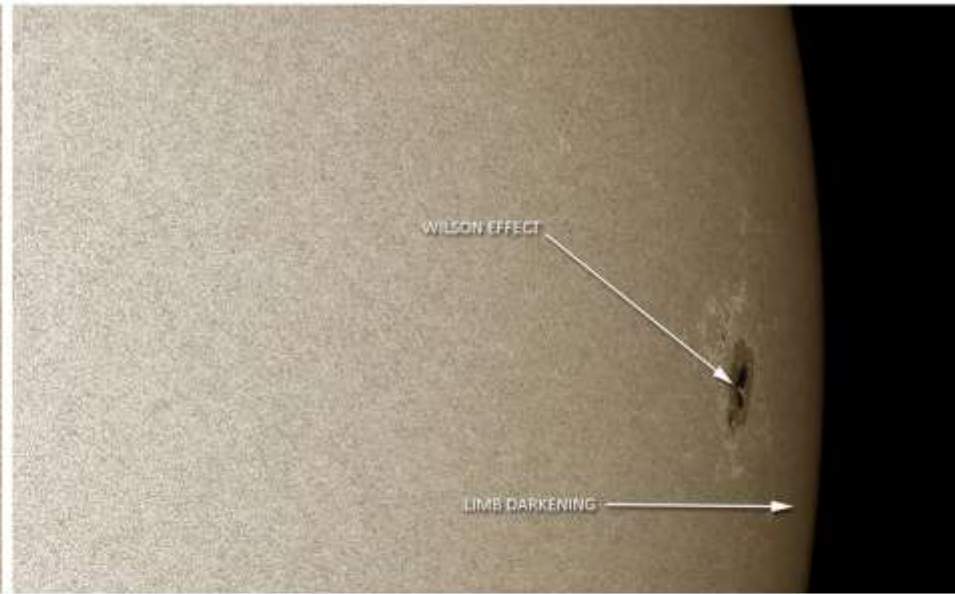
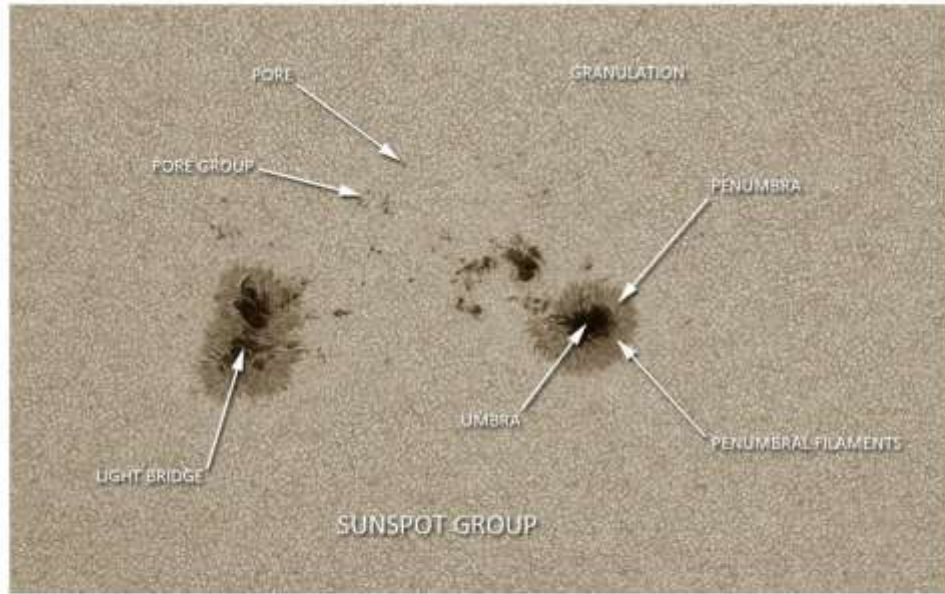
# IMAGING THE SUN

Pedro Ré

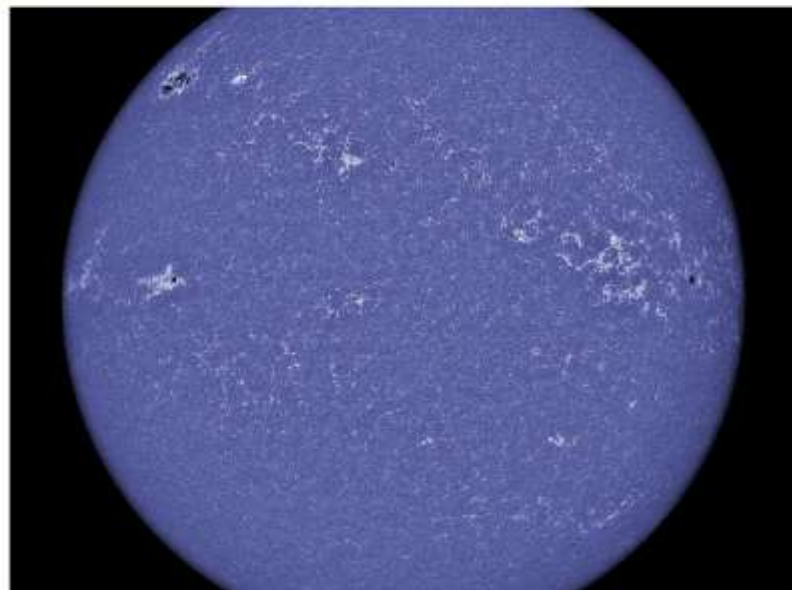
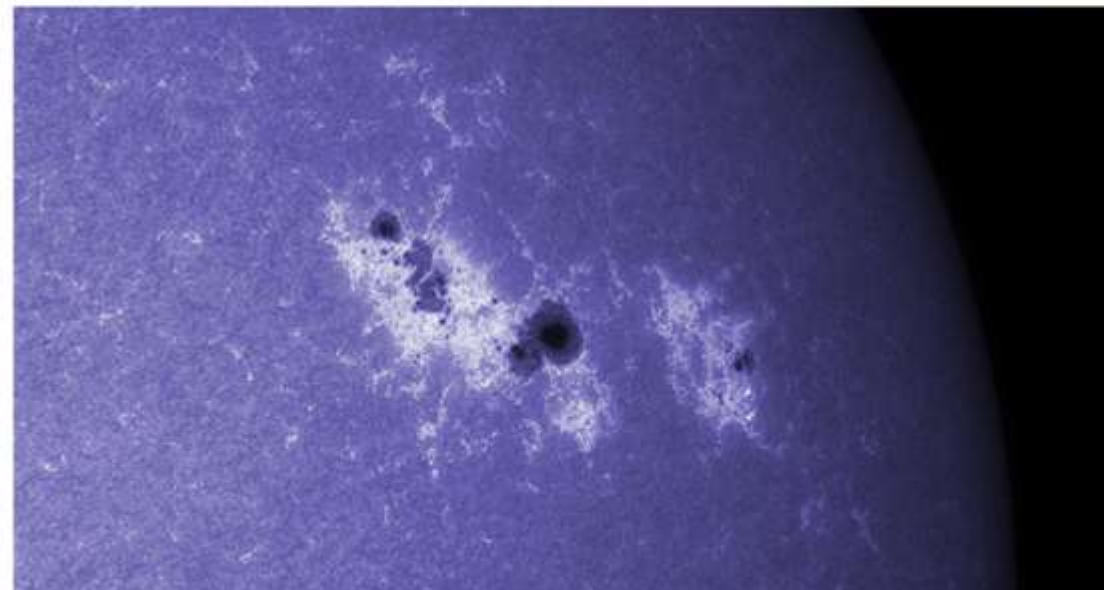
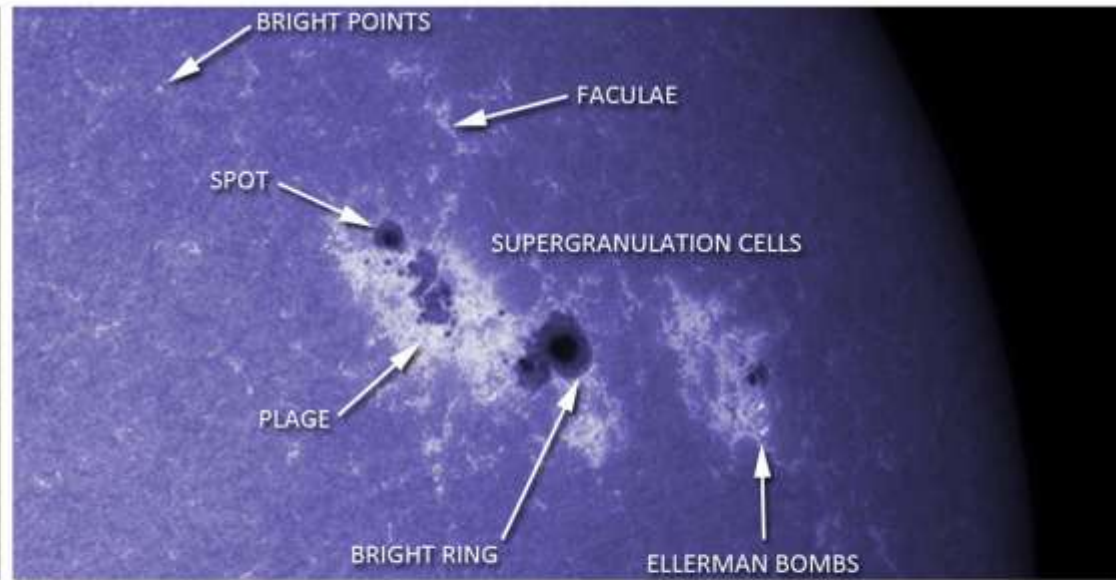
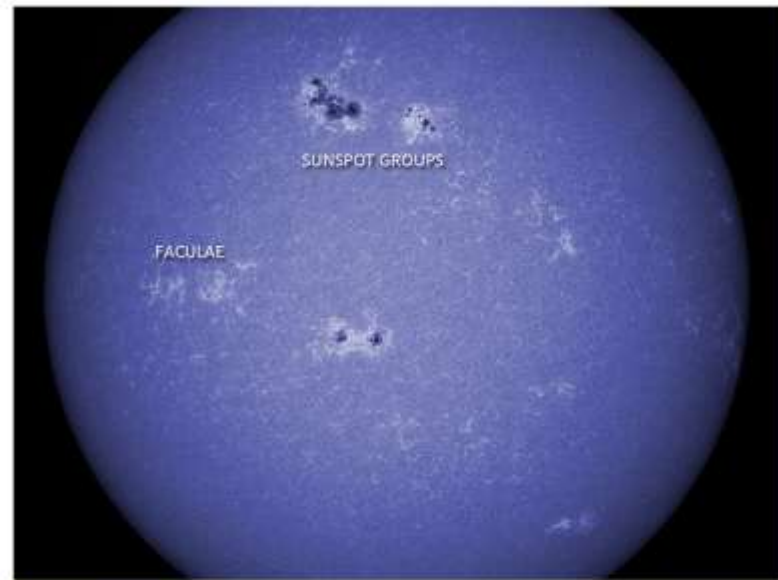




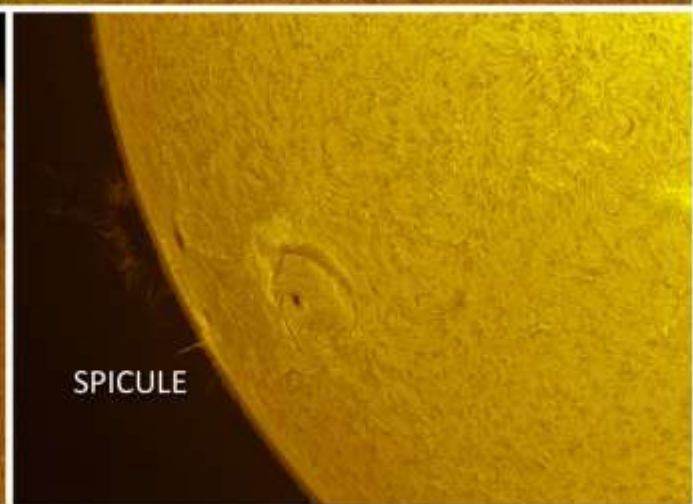
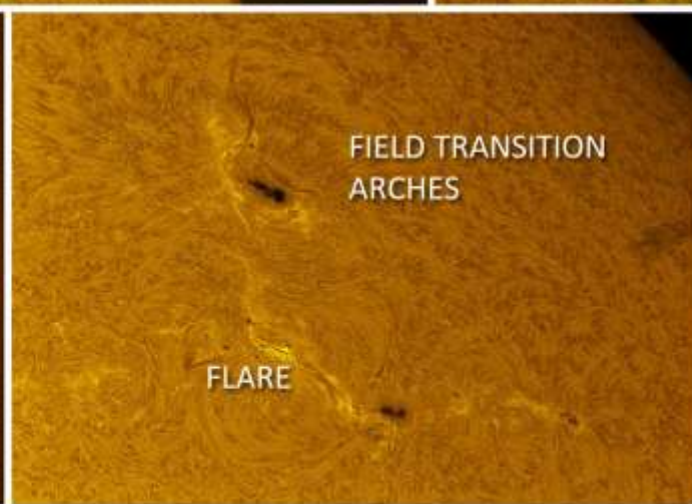
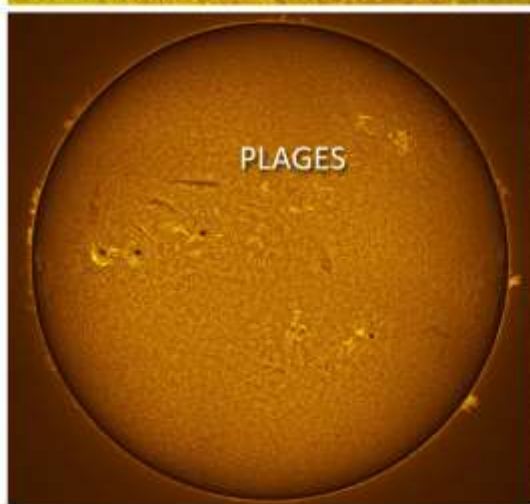
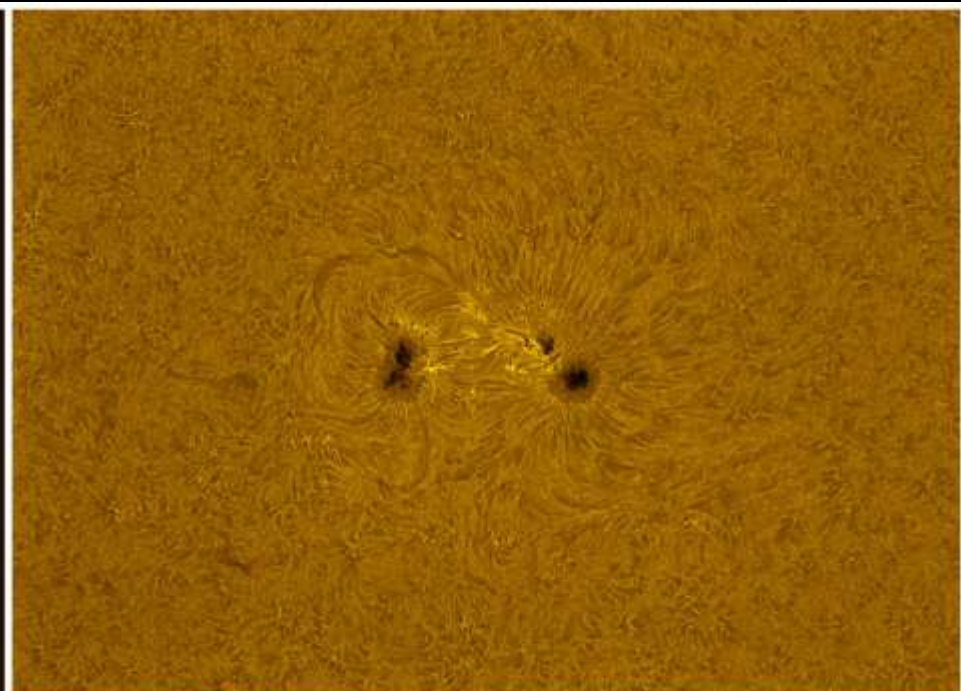
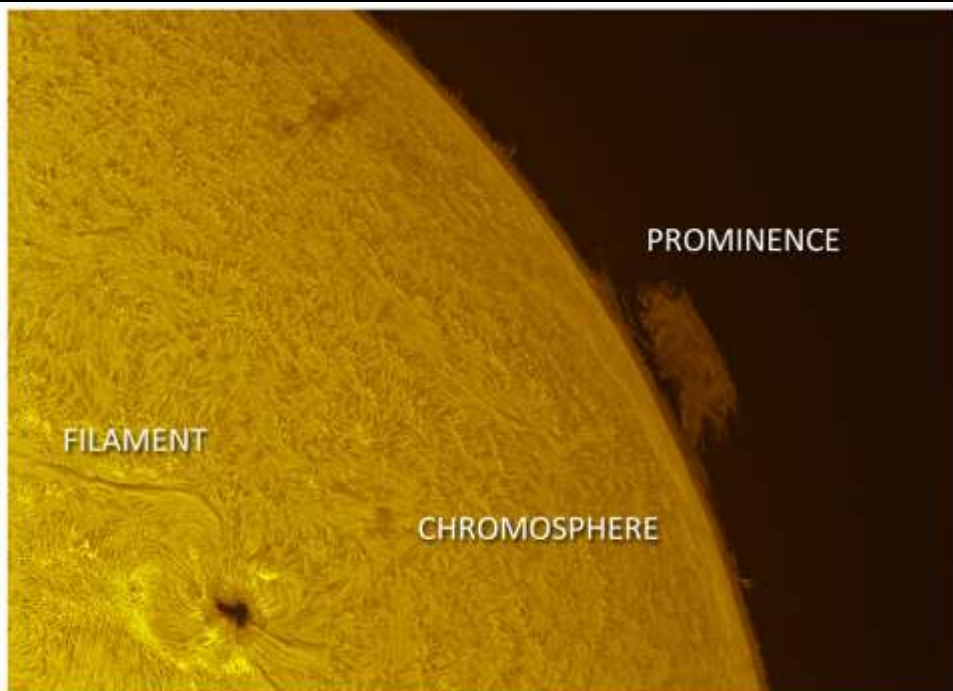
540.0 nm (5400 Å)



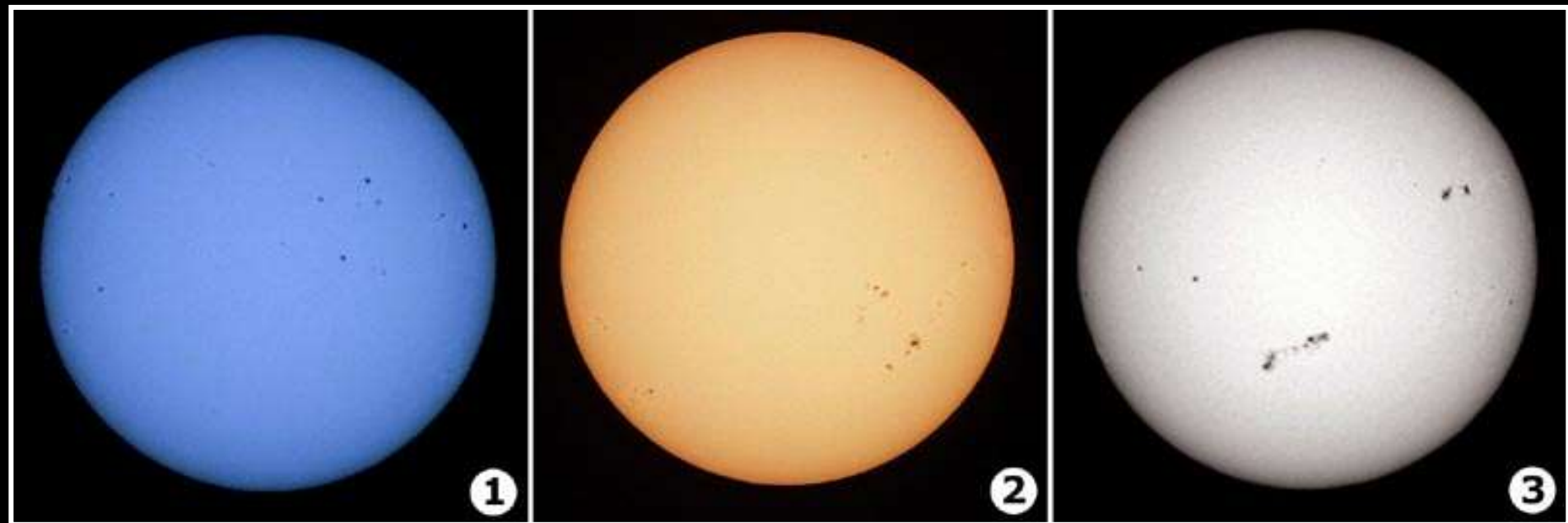
393.3 nm (3933 Å)



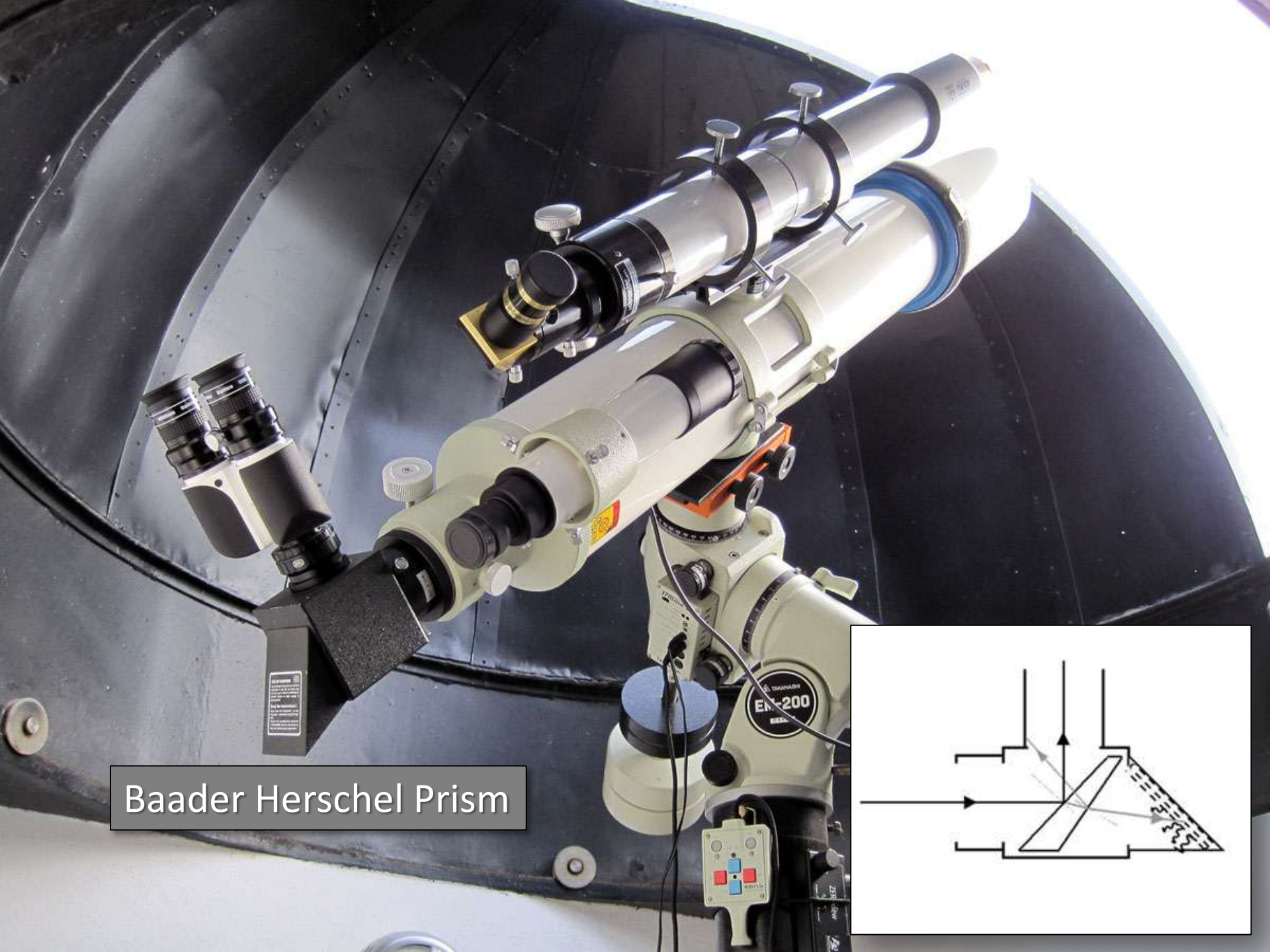
656.3 nm (6563 Å)



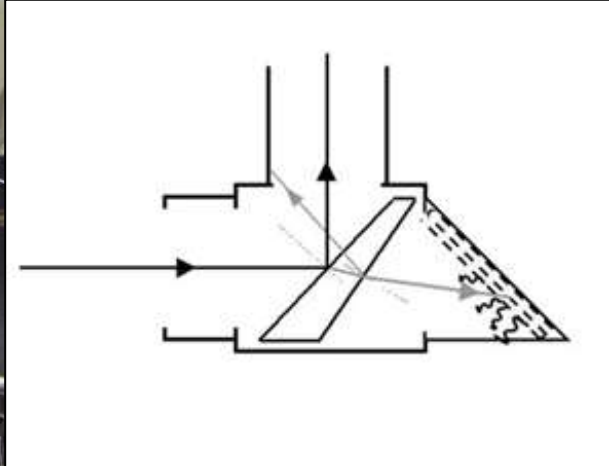




- 1- MYLAR (SOLAR SCREEN)
- 2- THOUSAND OAKS GLASS FILTER
- 3- BAADER ASTROSOLAR™ SAFETY FILM

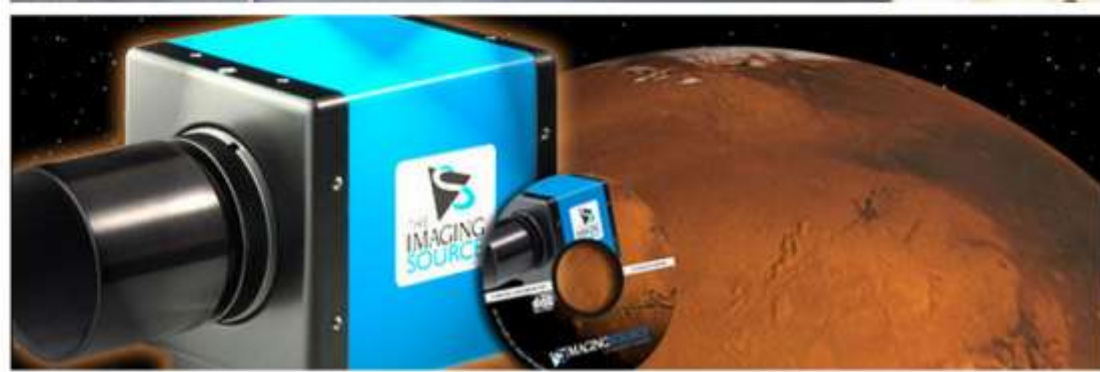


Baader Herschel Prism



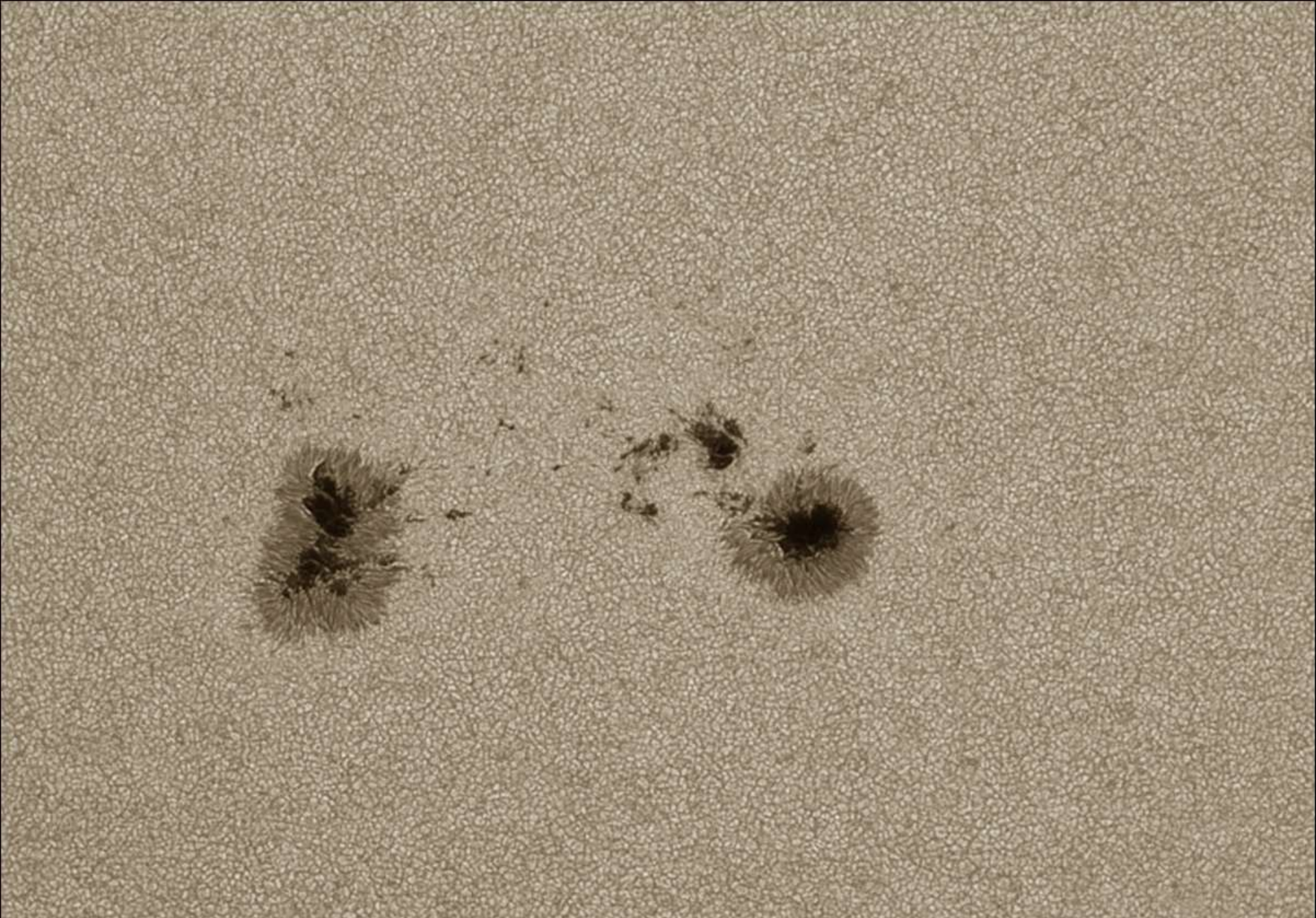


SOLAR WEDGES



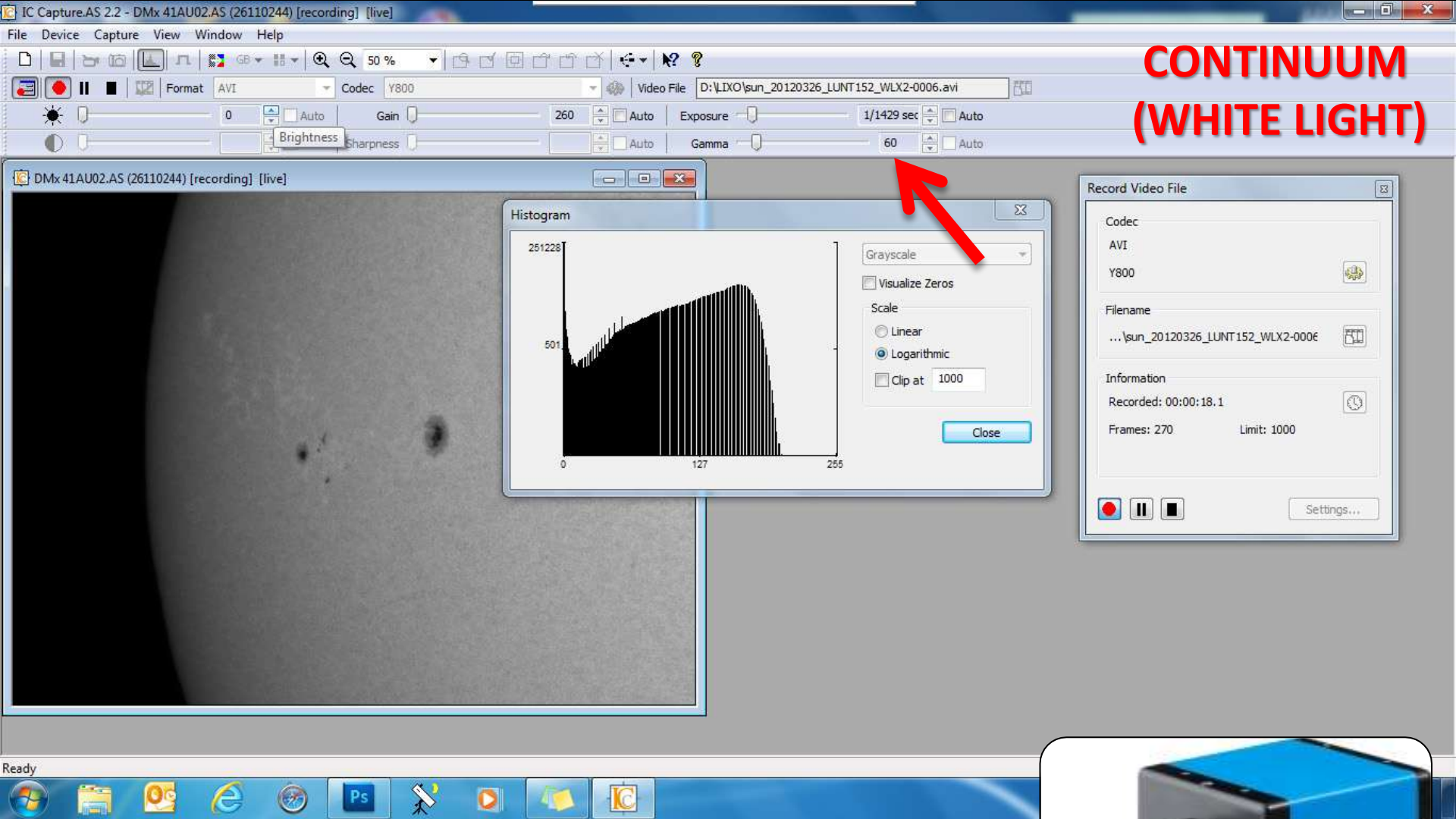
**CONTINUUM (WHITE LIGHT)**

**Lunt 2" Solar Wedge - DMK 41AU02.AS**





SUN (20120218) AR11420. LUNT 152 F/6, 2" Lunt Solar Wedge, X3 Barlow, Baader Solar Continuum filter, DMK41

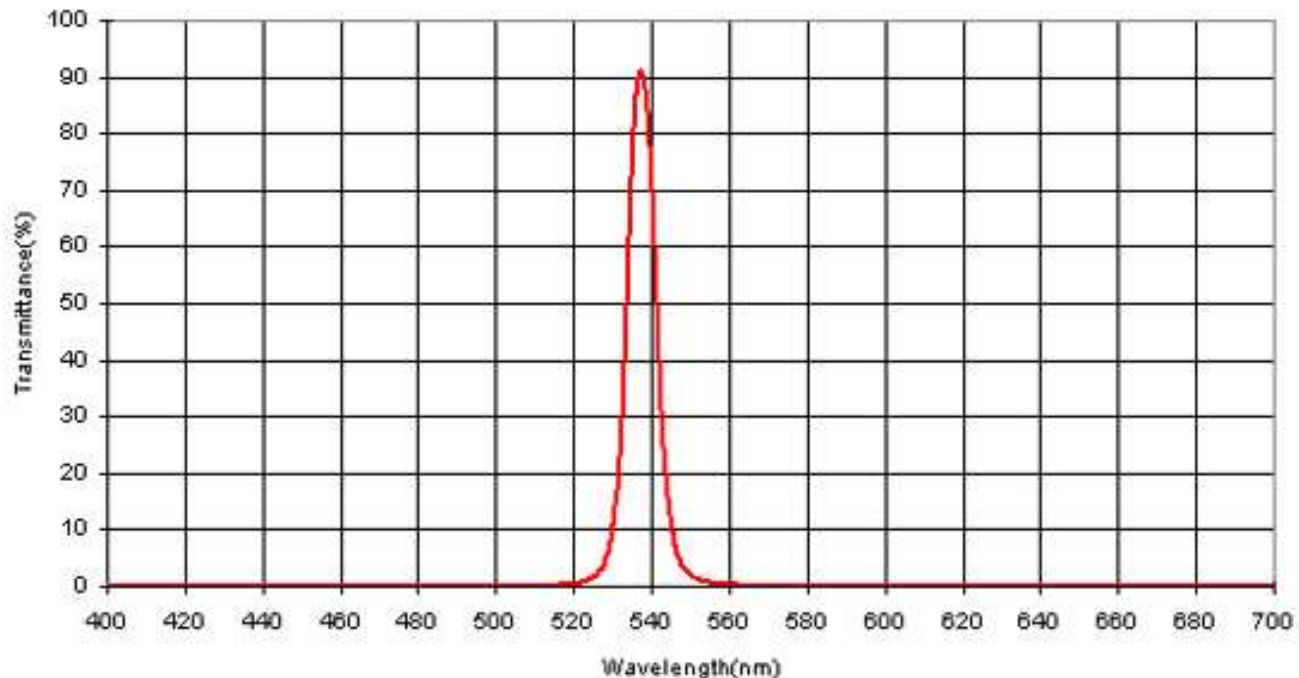


**CONTINUUM  
(WHITE LIGHT)**

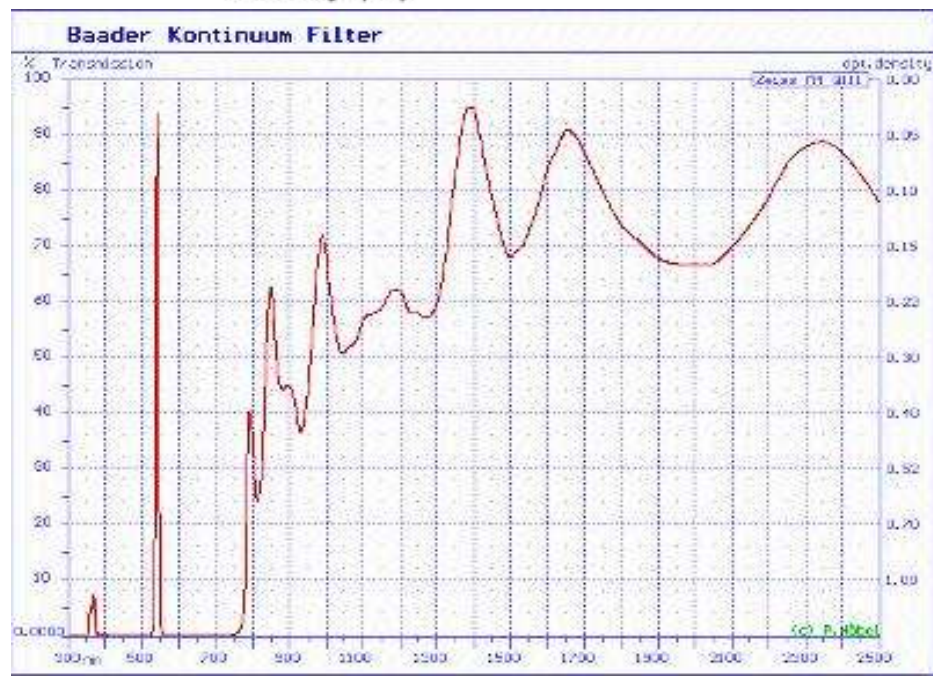
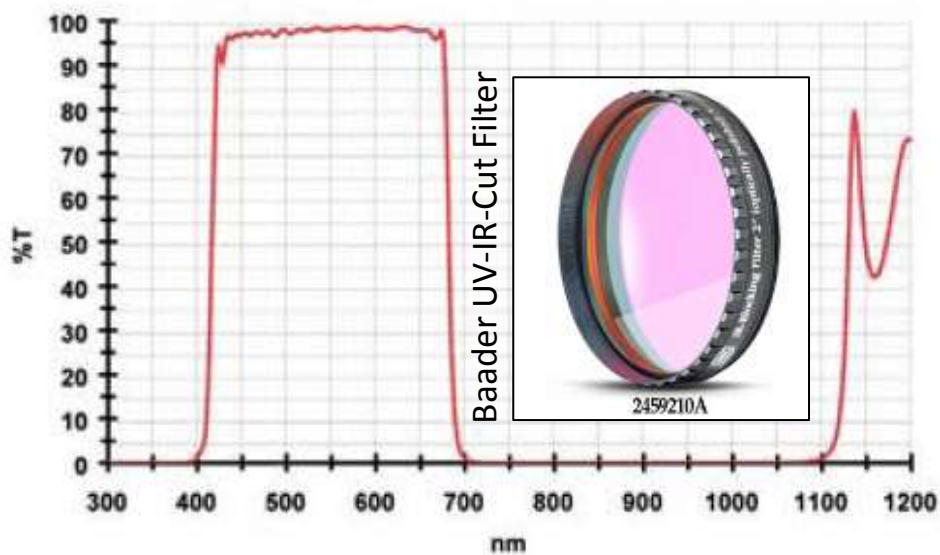
**DMK 41AU02.AS**  
1/2 " CCD, Sony ICX205AL (1280 x 960)  
IC Capture.AS - Camera Control Software



## Baader 2" Solar Continuum Filter (540 nm)



## UV/IR-Sperrfilter ACF-Design (T= 420-680 nm)





[Home](#) [Introduction](#) [Downloads](#) [Images](#) [About](#)

<http://www.avistack.de/>

## Welcome to the **AviStack** homepage!

AviStack is a freeware tool for astronomy that registers, stacks and processes movies and image sequences.

Update of 23 July 2010: **Version 2.00 now available!**

**AviStack2** comes with a new look, is much faster than the old AviStack1.x and offers a whole range of new features. The most important of which is:

- **Fully automatic processing!**

What else is new:

- Pre-setting of all parameters possible.
- Much faster alignment methods.
- Automatic frame pre-selection by frame quality and/or brightness.
- Use of flat-fields/dark frames throughout processing to reduce impact of imaging artifacts.
- Enhanced post-processing module.
- Creation of false color images.
- Remembers GUI geometry from session to session.
- User contributed XML language libraries.

AviStack is supported by  
CREASO GmbH and ITT VIS



AutoStakkert 2 0.0.46 (c) Emil Kraaikamp

Multi-Threading # Memory Usage Color Advanced About

**1) Open**

Image Stabilization  
 Surface  Planet (COG)  
 Size  Expand  Crop

Quality Estimator  
 LQI  Gradient

Noise Robust: 3   
**Normal range**

**2) Analyse**

Reference Frame  
 Last Stack is Reference  
 Auto size (quality based)

Information  
 Mem. usage: 11.8 % (used 261 available 1952 MB)  
 (4 threads, 588 buffering)  
 Done!

No buffering override

Surface Image Stabilization: 24.9 sec  
 Buffering and Image Analysis: 15.5 sec  
 Reference Image  
 Image Alignment  
 Image Stacking  
 MAP Analysis  
 MAP Recombination

Quality Graph  
  
 Cancel...

Output Images  
 TIF  PNG  
 Stack at frame number:    
 Drift percentage (the minimum will be used):  10 %

Sharpened Images

Save in Folder  
 Prefix:

Advanced Settings  
 HQ Refine (Slower)  
 Drizzle:  1.5x  3x

Don't forget: set image size and check AP's Before Stacking!

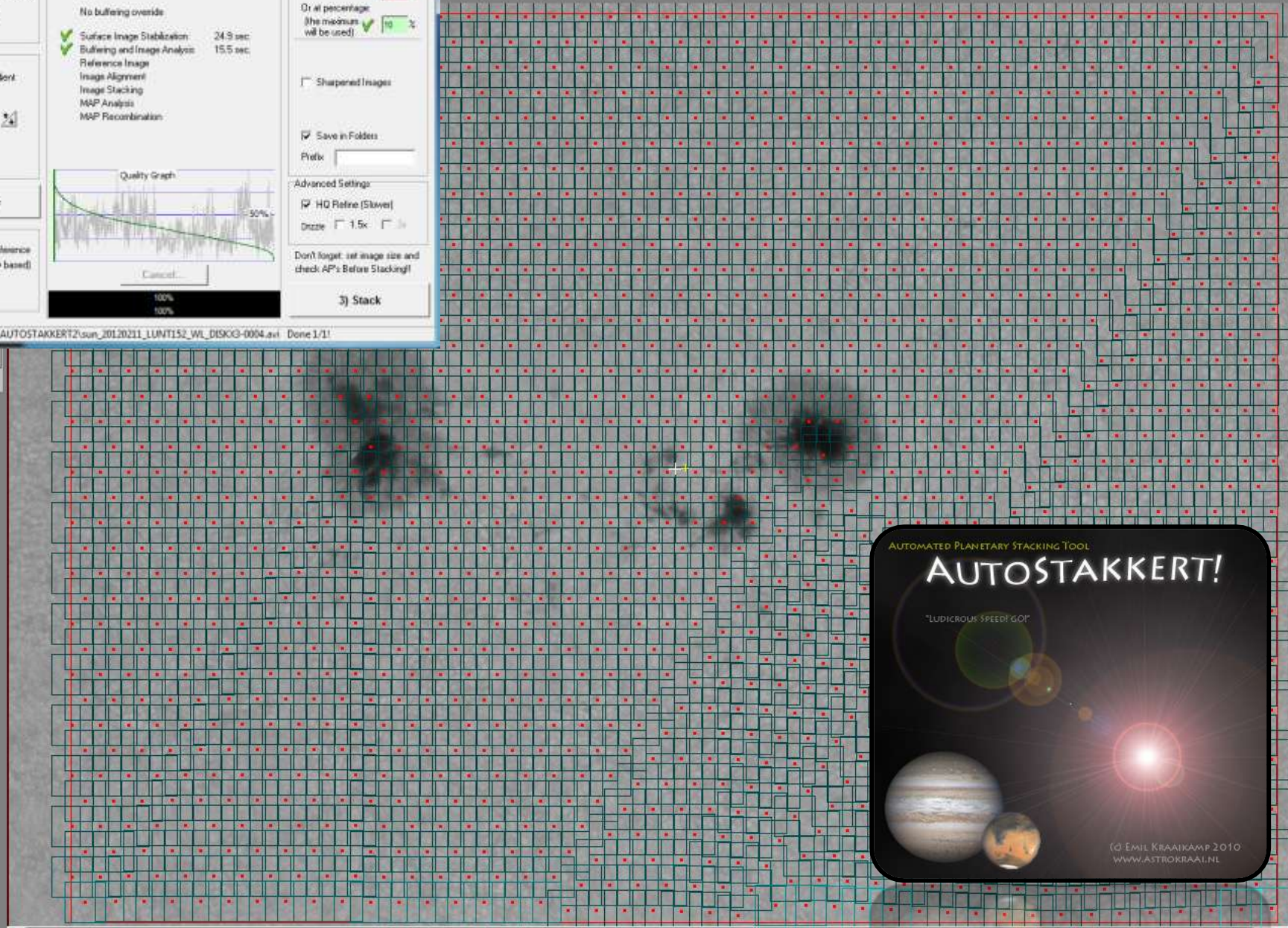
**3) Stack**

1000 Frames D:\AUTOSTAKKERT2\sun\_20120211\_LUNT152\_WL\_DISCOG-0004.avi Done 1/1!

<http://www.astrokraai.nl/wp/download/>

Place APs in Grid  
 Replace

# AUTOSTAKKERT 2



AUTOMATED PLANETARY STACKING TOOL

## AUTOSTAKKERT!

"LUDICROUS SPEED! GO!"

© EMIL KRAAIKAMP 2010  
 WWW.ASTROKRAAI.NL

Free image processing software



Email : [registax@gmail.com](mailto:registax@gmail.com)

### Available files

## RegiStax 6



Update V6.1.08 - requires V6.1 (6 may 2011)

You need to have RegiStax 6 installed before installing this update

**Release 6.1.0.8** (1.6 Mb)

Initial V6.1 Release (2 april 2011)

**Release 6.1.0.0** (3 Mb)

## RegiStax 5



V5.1 update (28 april 2010)

**Release 5.1.9.2** (1847 Kb)

V5.1 update (7 april 2010, updated 10 april 2010)

**Release 5.1.9.1** (1846 Kb)

\*\*\*\*\*  
Previous V5 release (22 dec 2009)

**Release 5.1.0.2** (2030Kb)

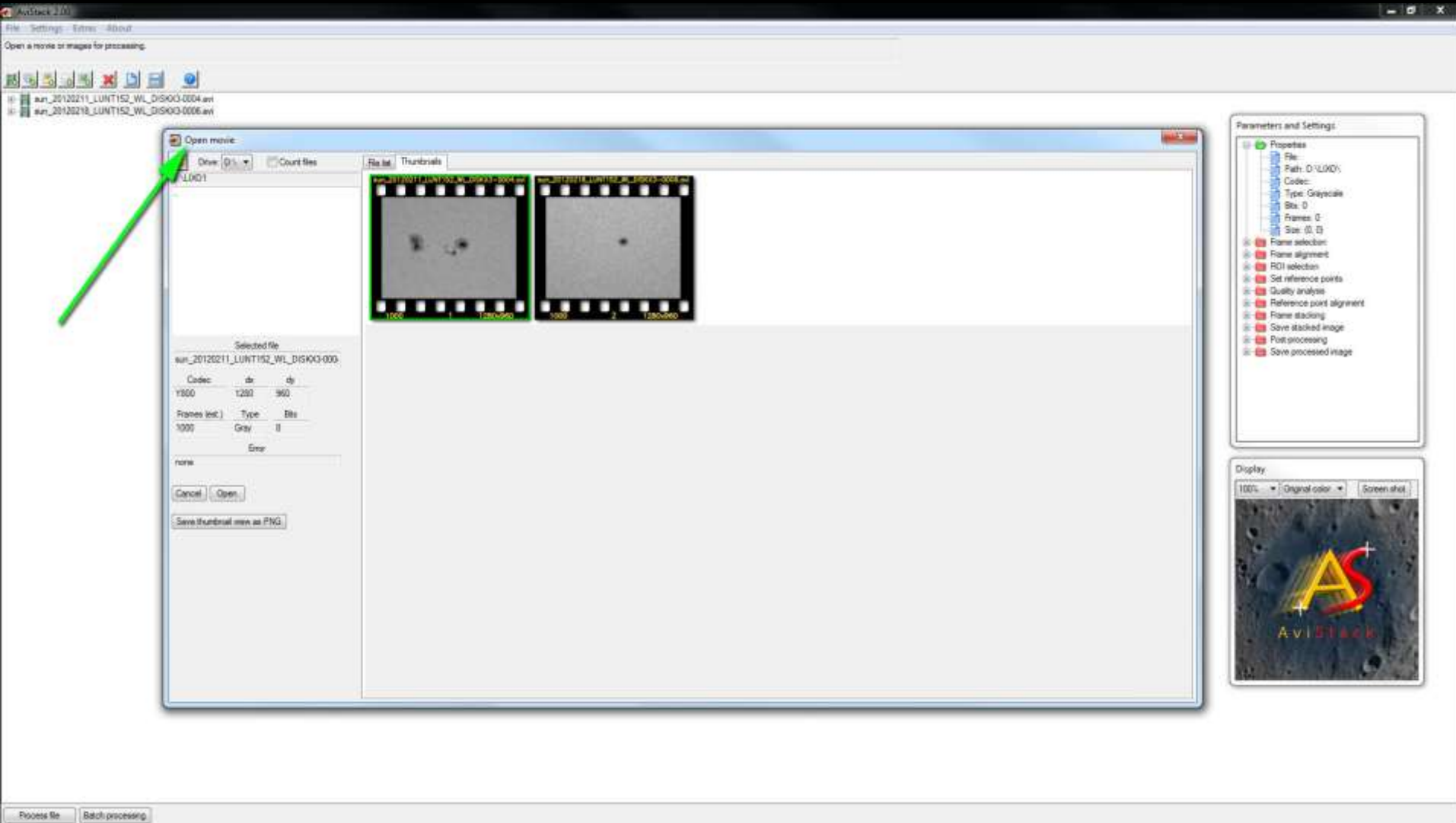
\*\*\*\*\*  
Initial V5 release (21 mar 2009)

## RegiStax 6

Free software for alignment/stacking/processing of images

 <small>S. Weiller</small>	 <small>D. Mokolin</small>
 <small>B. Dederce</small>	 <small>P. Frasnaykov</small>

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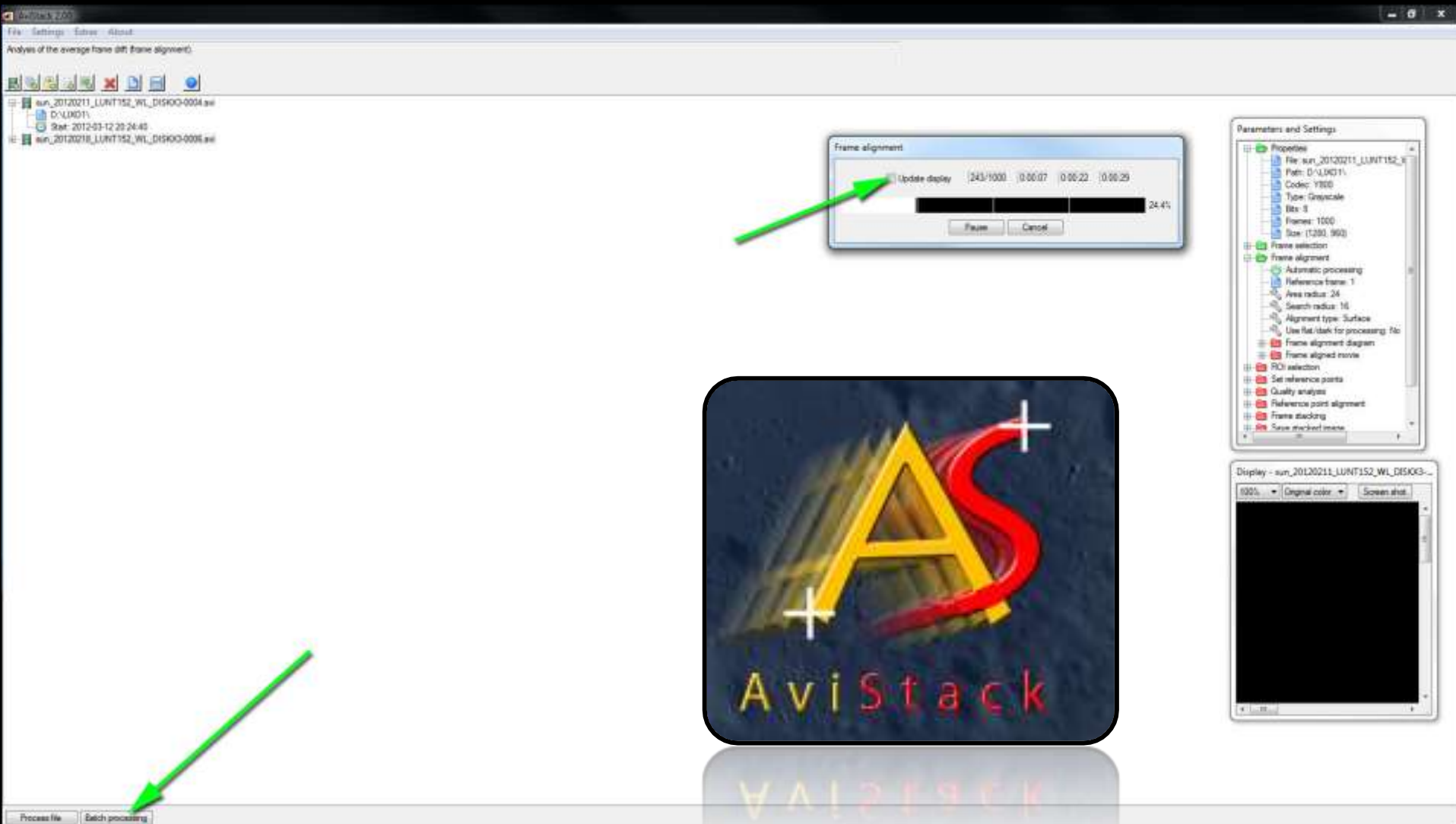
AVISTACK or AUTOSTAKKERT - Select AVI or SER files

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



AVISTACK - Turn off Update display

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



AVISTACK or AUTOSTAKKERT - Choose **BATCH PROCESSING**

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



## RegiStax 6

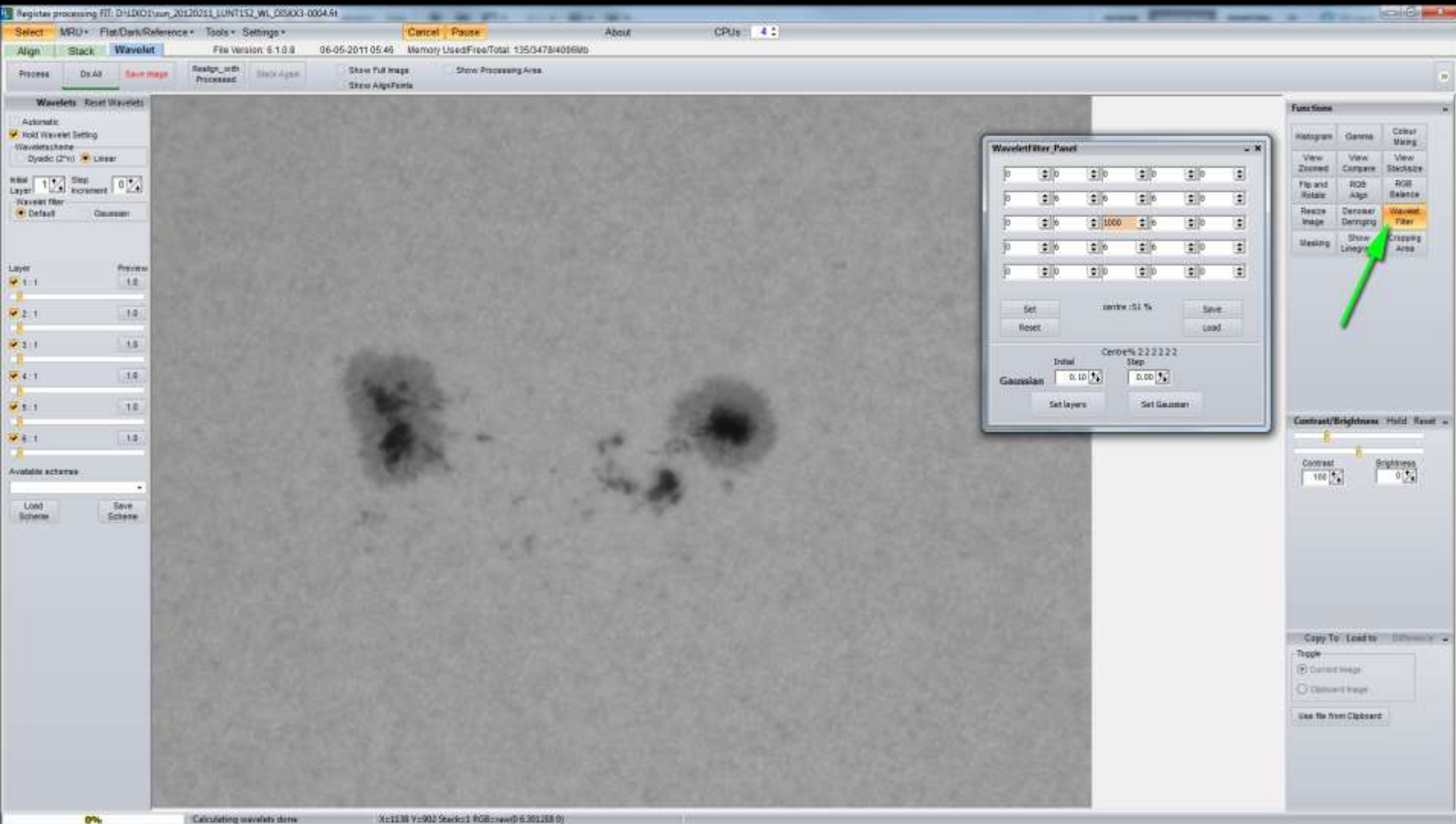
Free software for alignment/stacking/processing of images

 S. Weiller	 O. Makalitin
 B. Dederzo	 P. Pranyatkov

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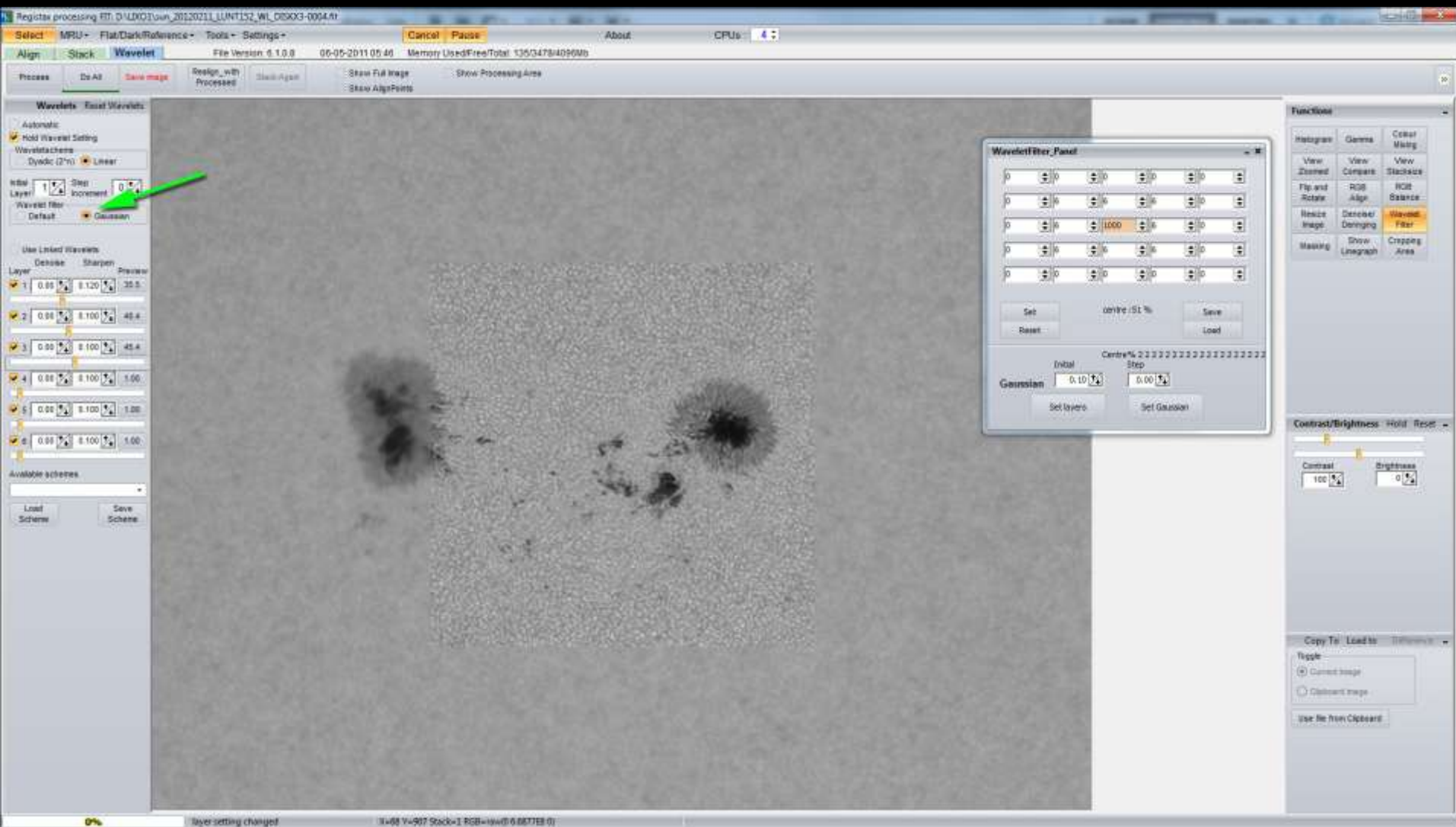
REGISTAX - Open FIT file (aligned and stacked in Avistack)

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



Process the combined image using Wavelet-based image restoration

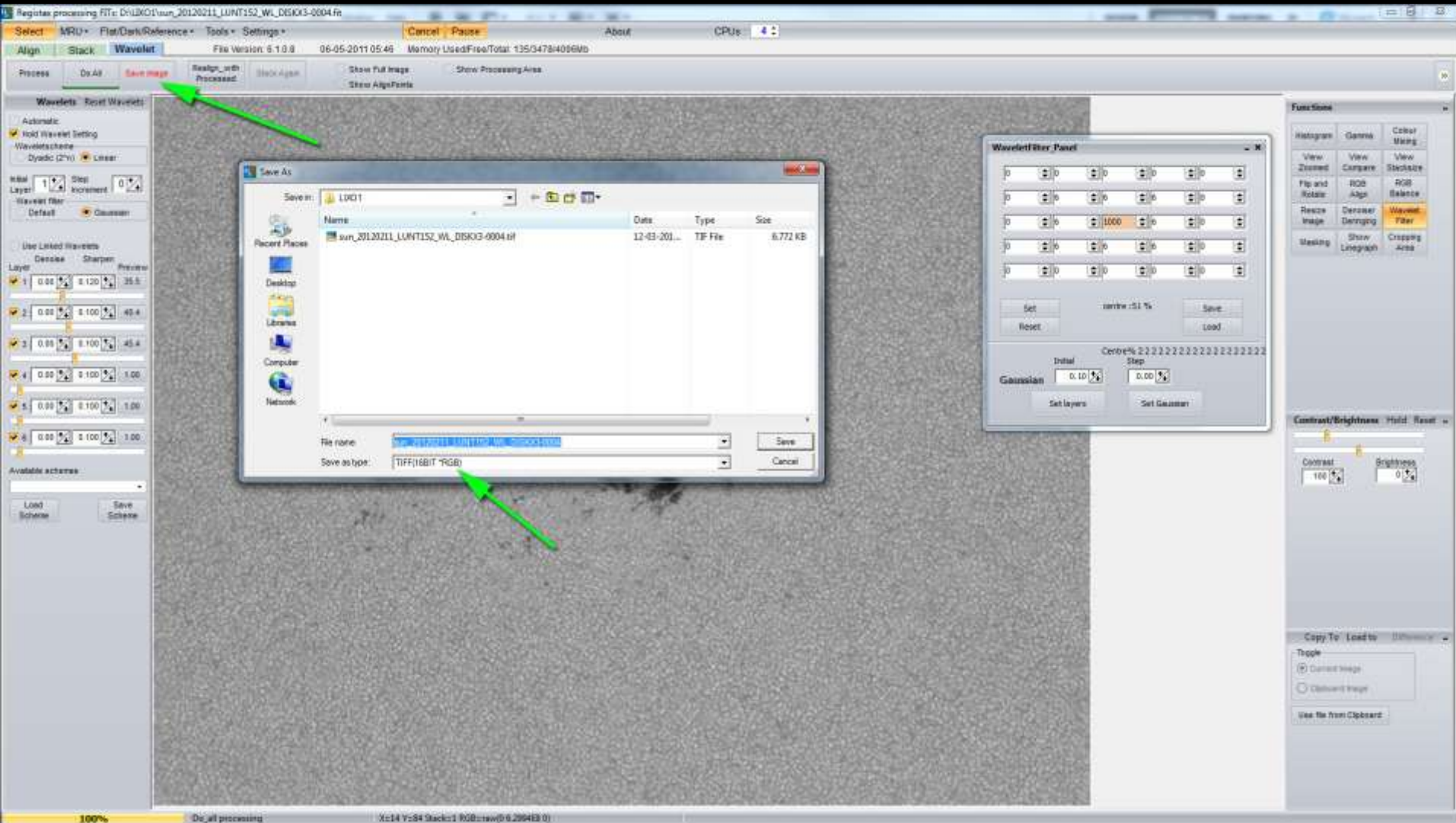
[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



Use layer 1, 2 and 3 of Wavelet filter - **GAUSSIAN**

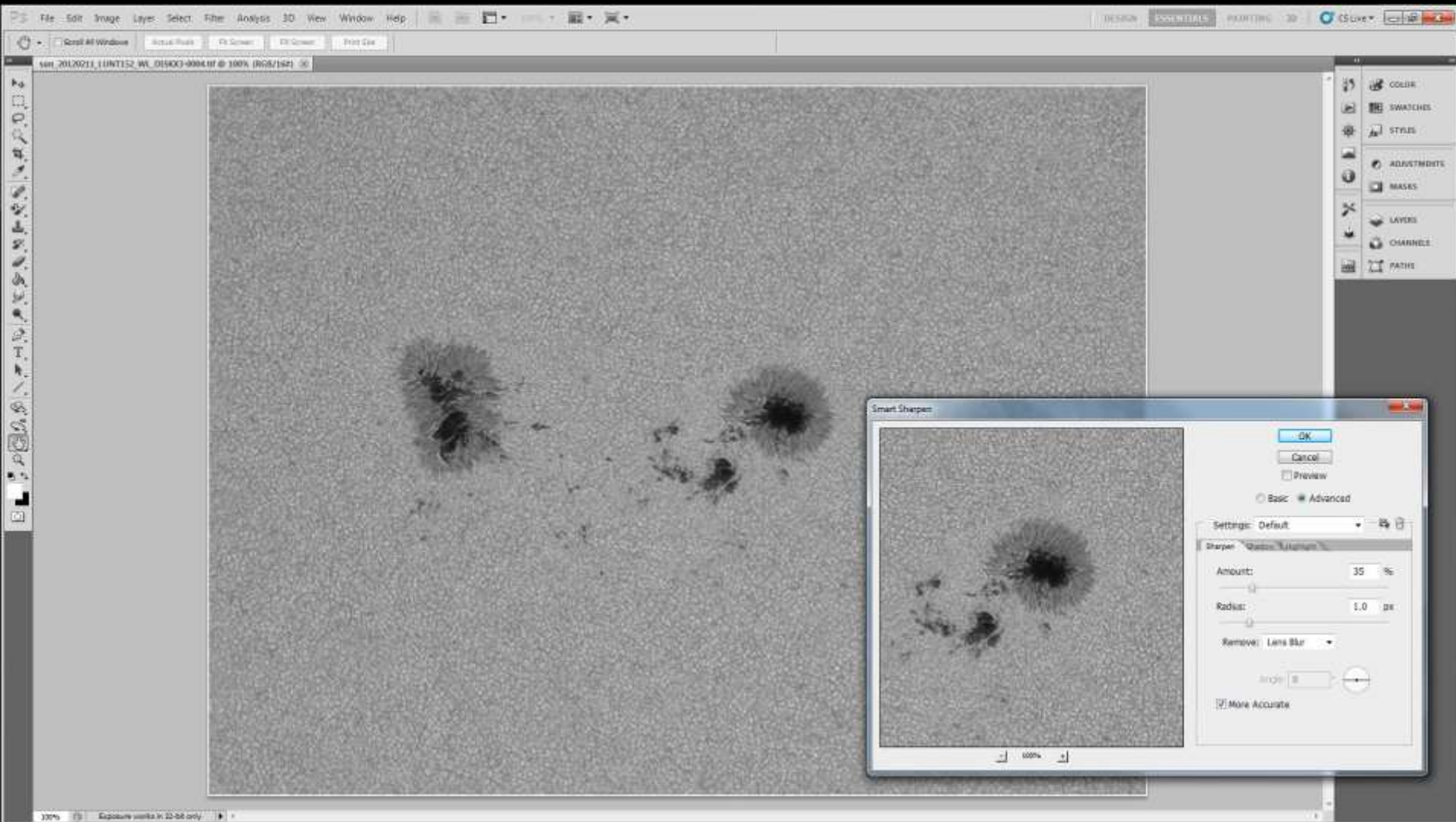
[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)





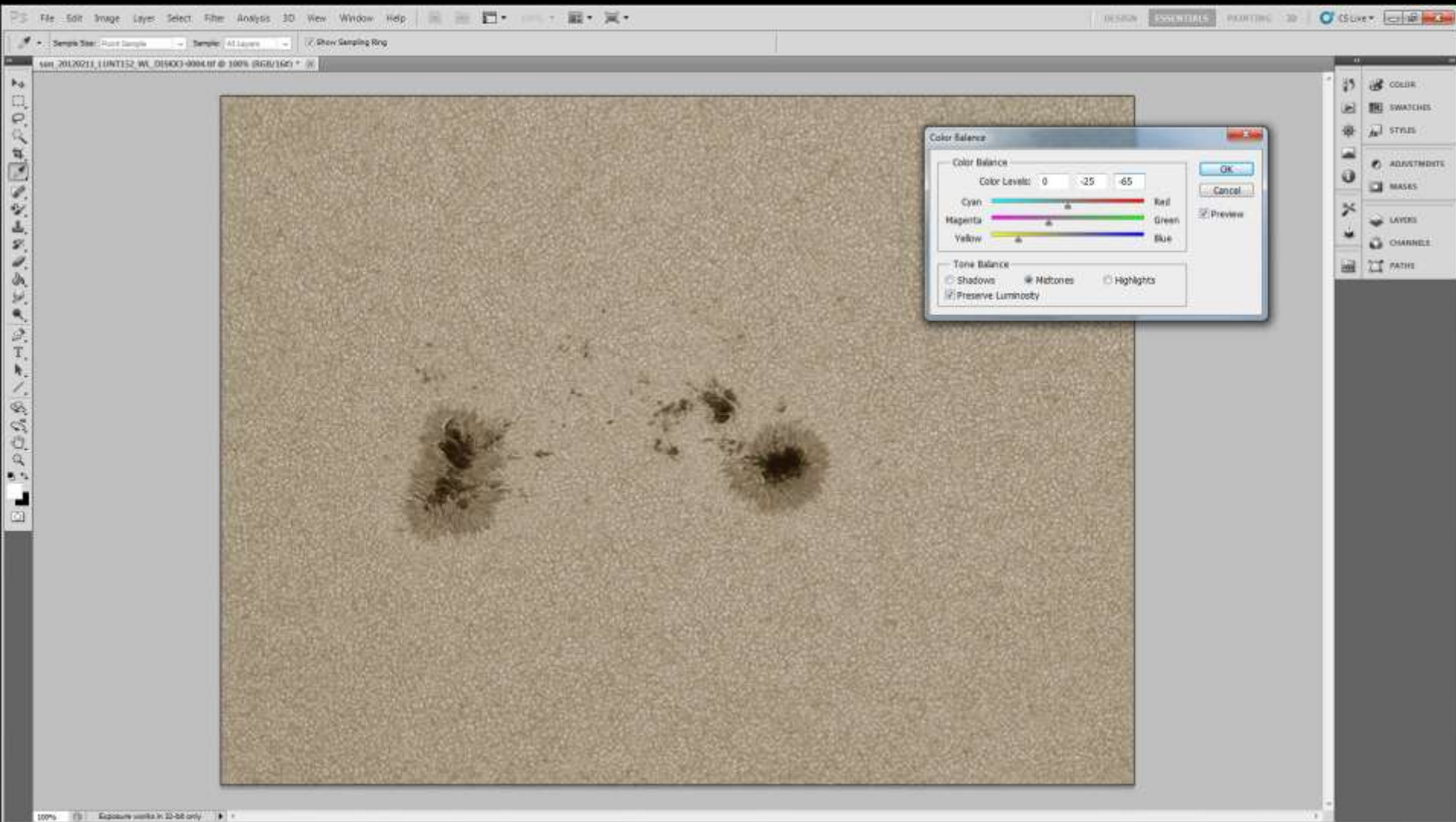
**Save image** (16-bit TIFF file)

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



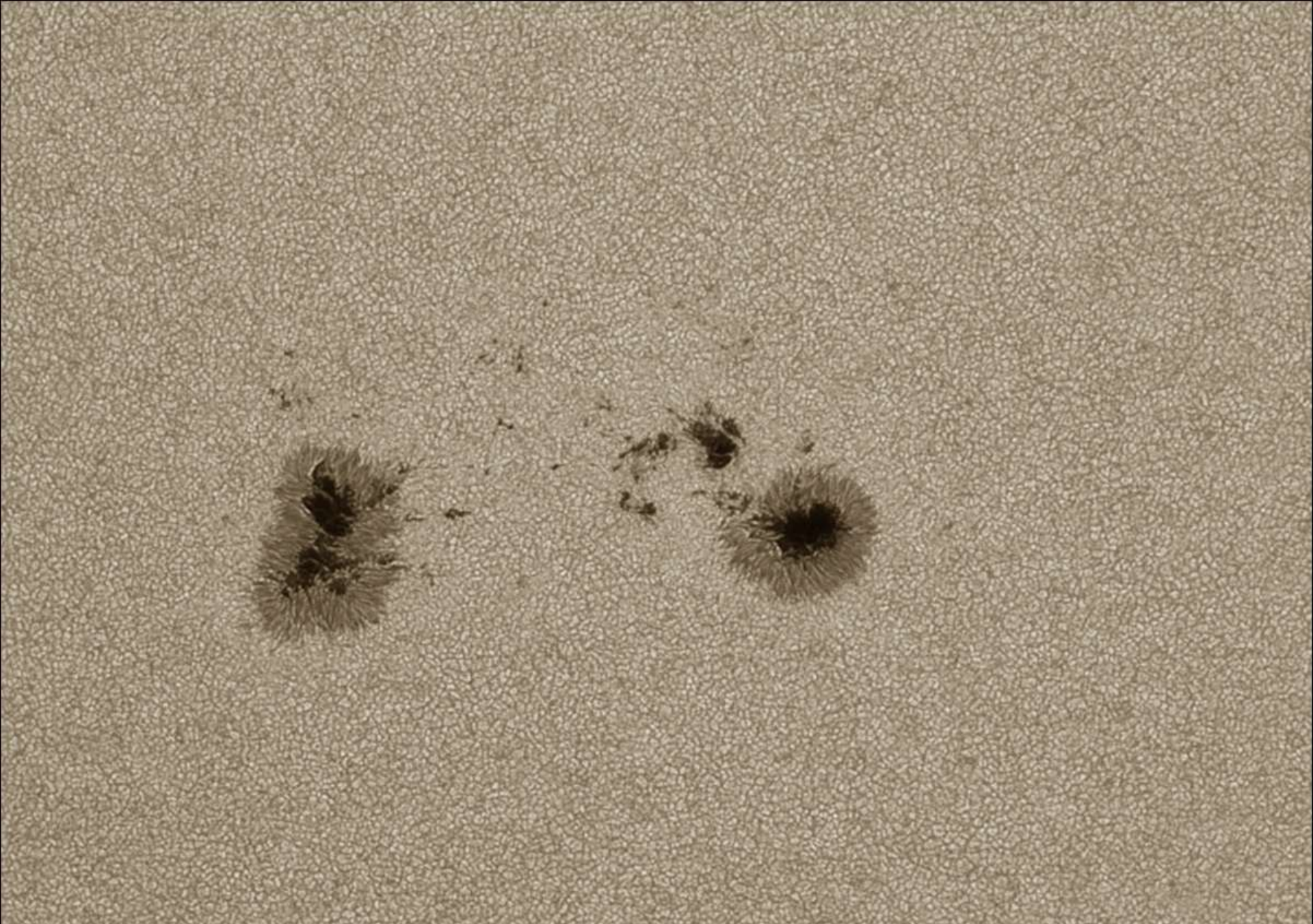
## PHOTOSHOP - Use Smart Sharpen & Curves

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)

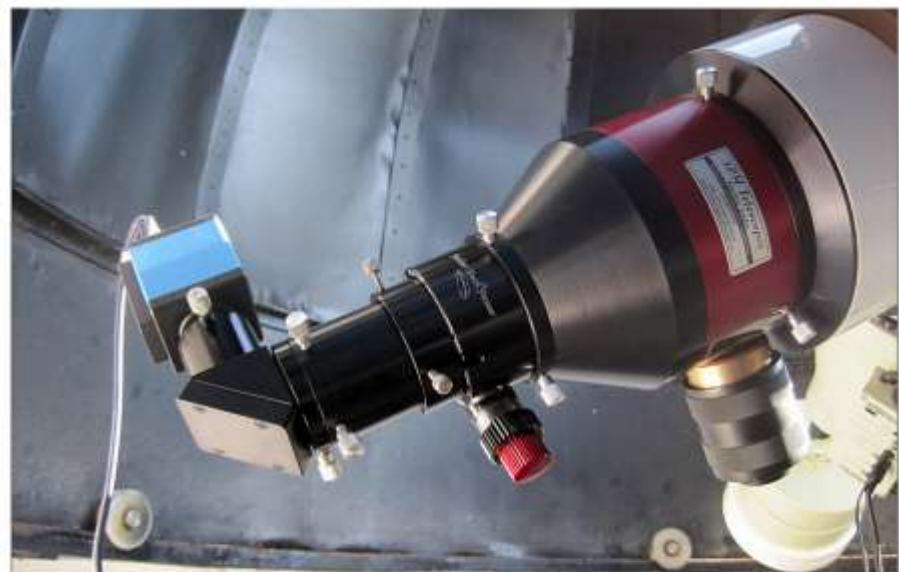


## PHOTOSHOP – False color

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



SUN (20120211) AR11416. LUNT 152 F/6, 2" Lunt Solar Wedge, X3 Barlow, Baader Solar Continuum filter, DMK41



H-ALPHA

LUNT 152/LUNT 60 DMK 41AU02.AS



CaK AT 80 F/7 DMK 41AU02.AS

IC Capture.AS 2.2 - DMx 41AU02.AS (26110244) [50%] [live] [15 FPS]

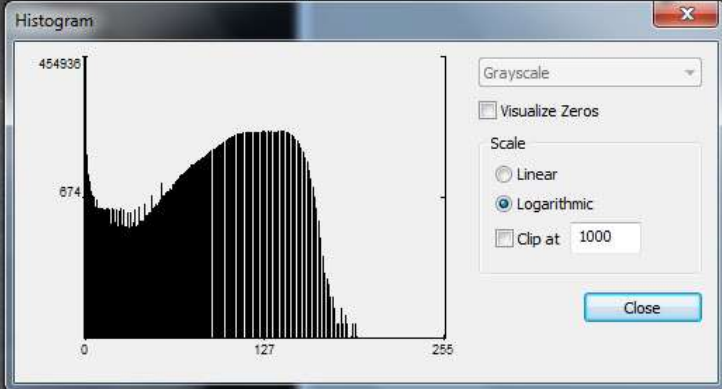
File Device Capture View Window Help

Format AVI Codec Y800 Video File D:\LIXO\sun\_20120318\_LUNT60\_PROMS-0005.avi

Gain 260 Exposure 1/182 sec

Sharpness Gamma 60

DMx 41AU02.AS (26110244) [50%] [live] [15 FPS]



**DISK**

Record Video File

Codec  
AVI  
Y800

Filename  
... \sun\_20120318\_LUNT60\_PROMS-000:

Information  
Recorded: 00:01:06.7  
Frames: 1000 Limit: 1000

Settings...



**DMK 41AU02.AS**  
1/2 " CCD, Sony ICX205AL (1280 x 960)  
IC Capture.AS - Camera Control Software

IC Capture.AS 2.2 - DMx 41AU02.AS (26110244) [recording] [live]

File Device Capture View Window Help

Format AVI Codec Y800 Video File D:\LIXO\sun\_20120318\_LUNT60\_PROMS-0001.avi

Gain 260 Exposure 1/217 sec

Sharpness Gamma 235

# PROMS

DMx 41AU02.AS (26110244) [recording] [live]

Record Video File

Codec AVI Y800

Filename ... \sun\_20120318\_LUNT60\_PROMS-000

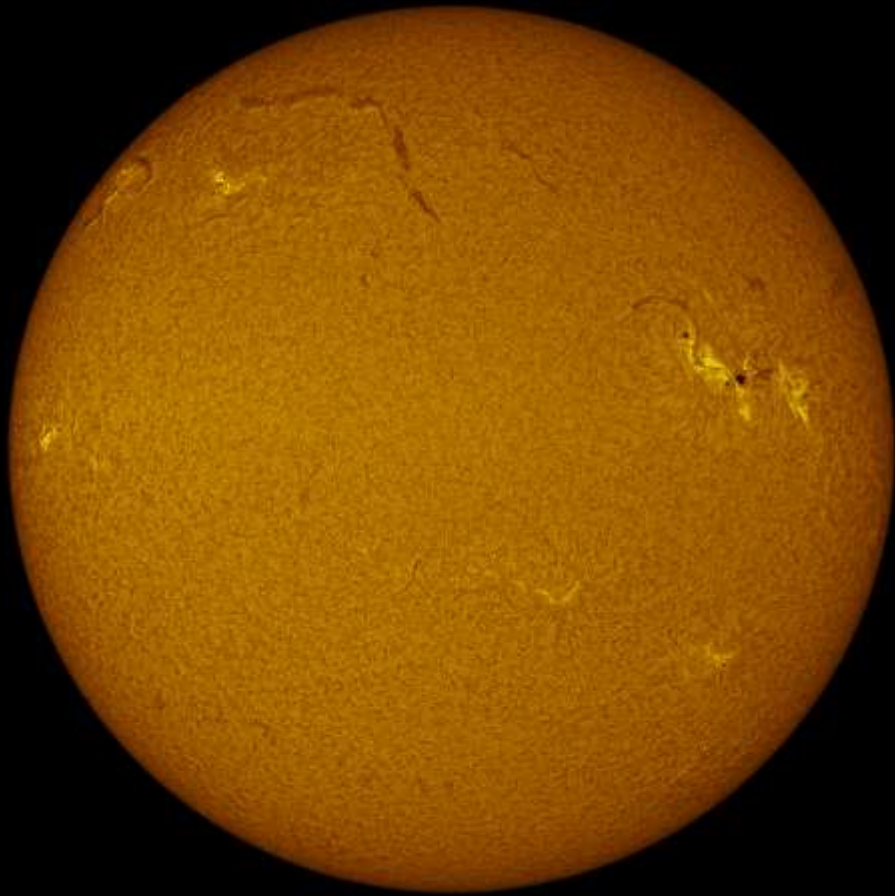
Information Recorded: 00:00:34.9

Frames: 519 Limit: 1000

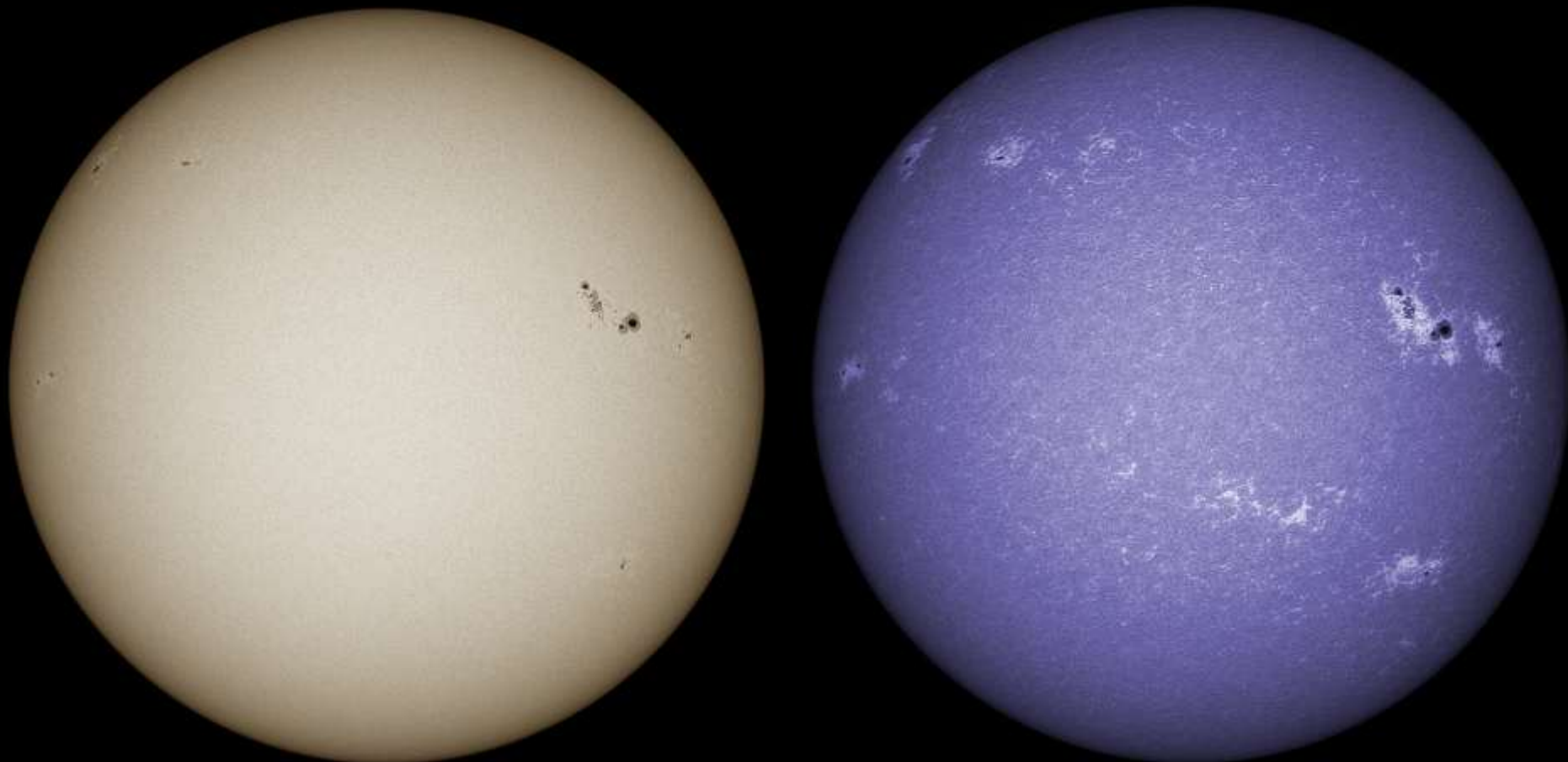
Ready

**DMK 41AU02.AS**  
1/2 " CCD, Sony ICX205AL (1280 x 960)  
IC Capture.AS - Camera Control Software

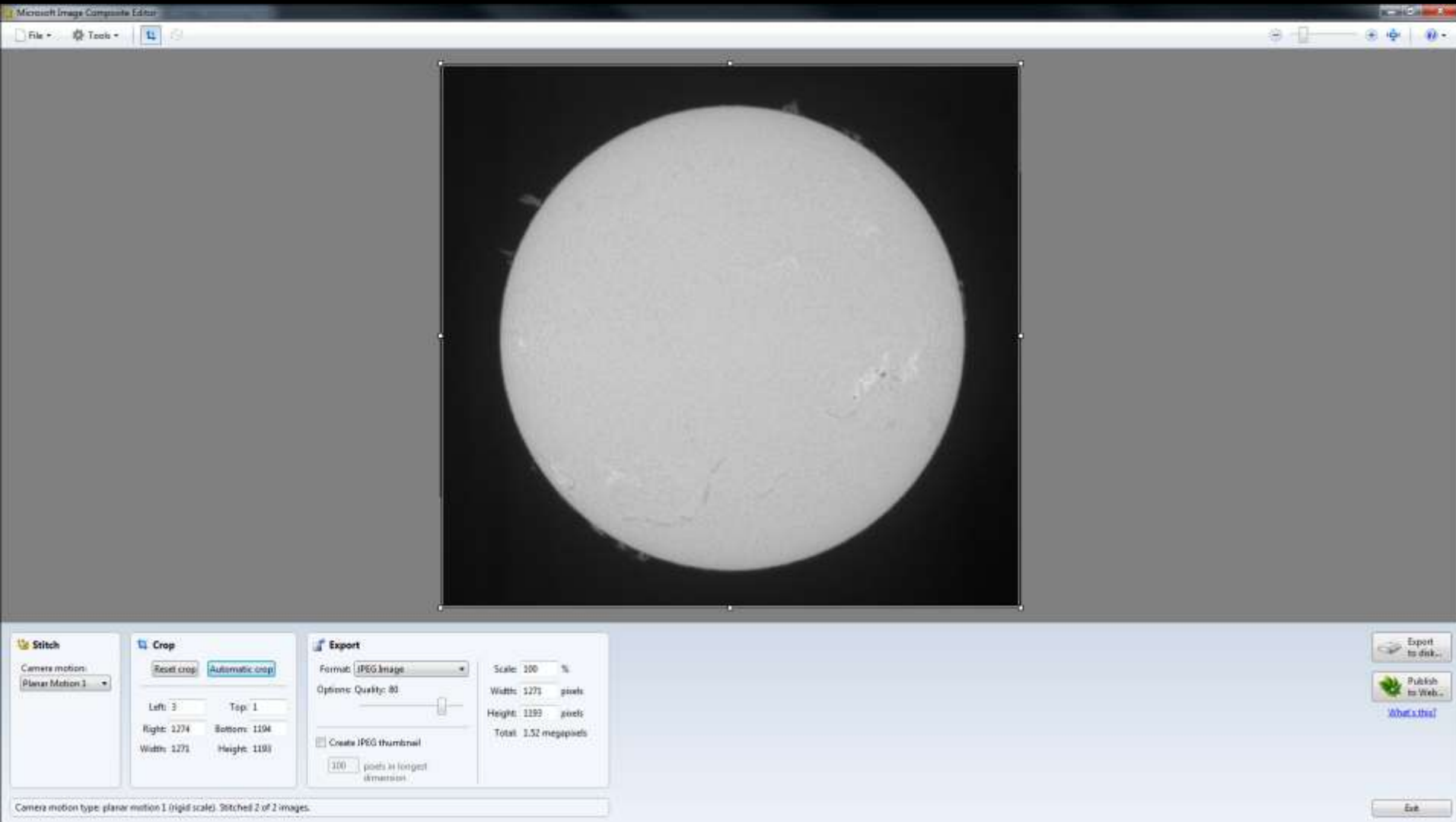




SUN (20120311) H-alpha. LUNT LS60THa/B1200, DMK41

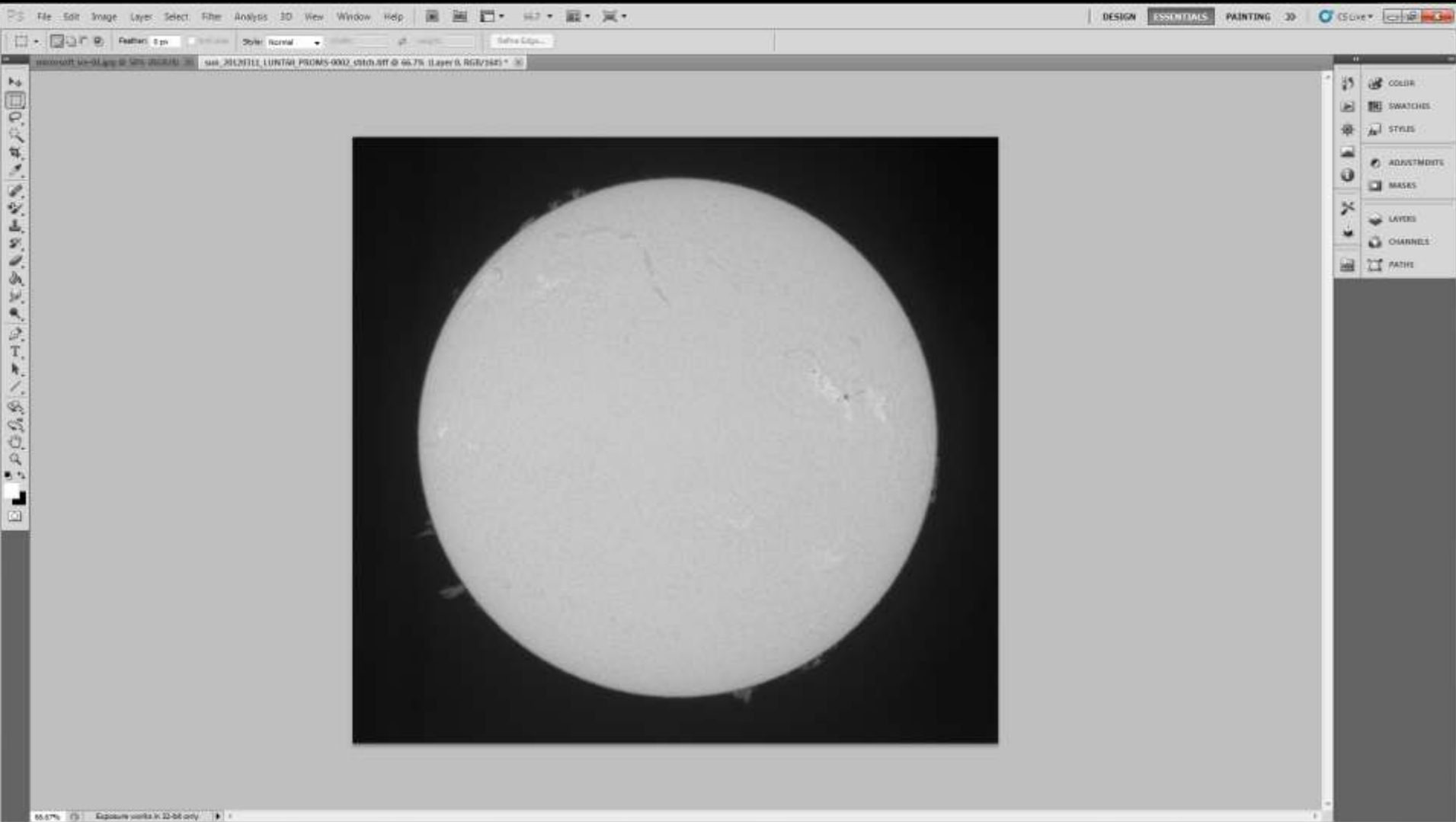


SUN (20120311) WL & CaK. Astro-Tech 80mm EDT F/7,  
1 1/4" APM Solar Wedge, Lunt 1200 CaK Module, DMK41, two-panel mosaics



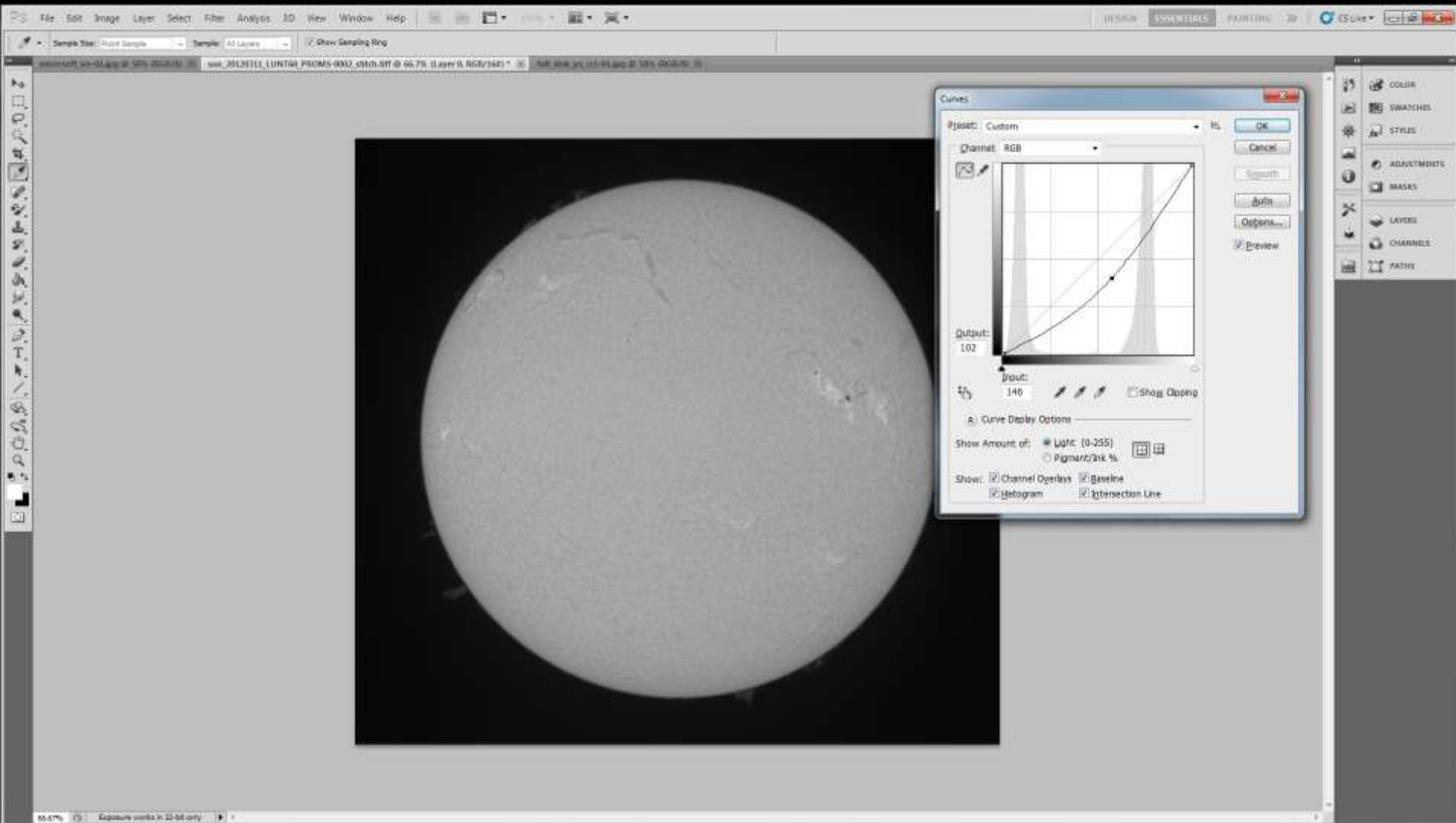
**Compose the Mosaic (drop individual images into Microsoft ICE)**

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



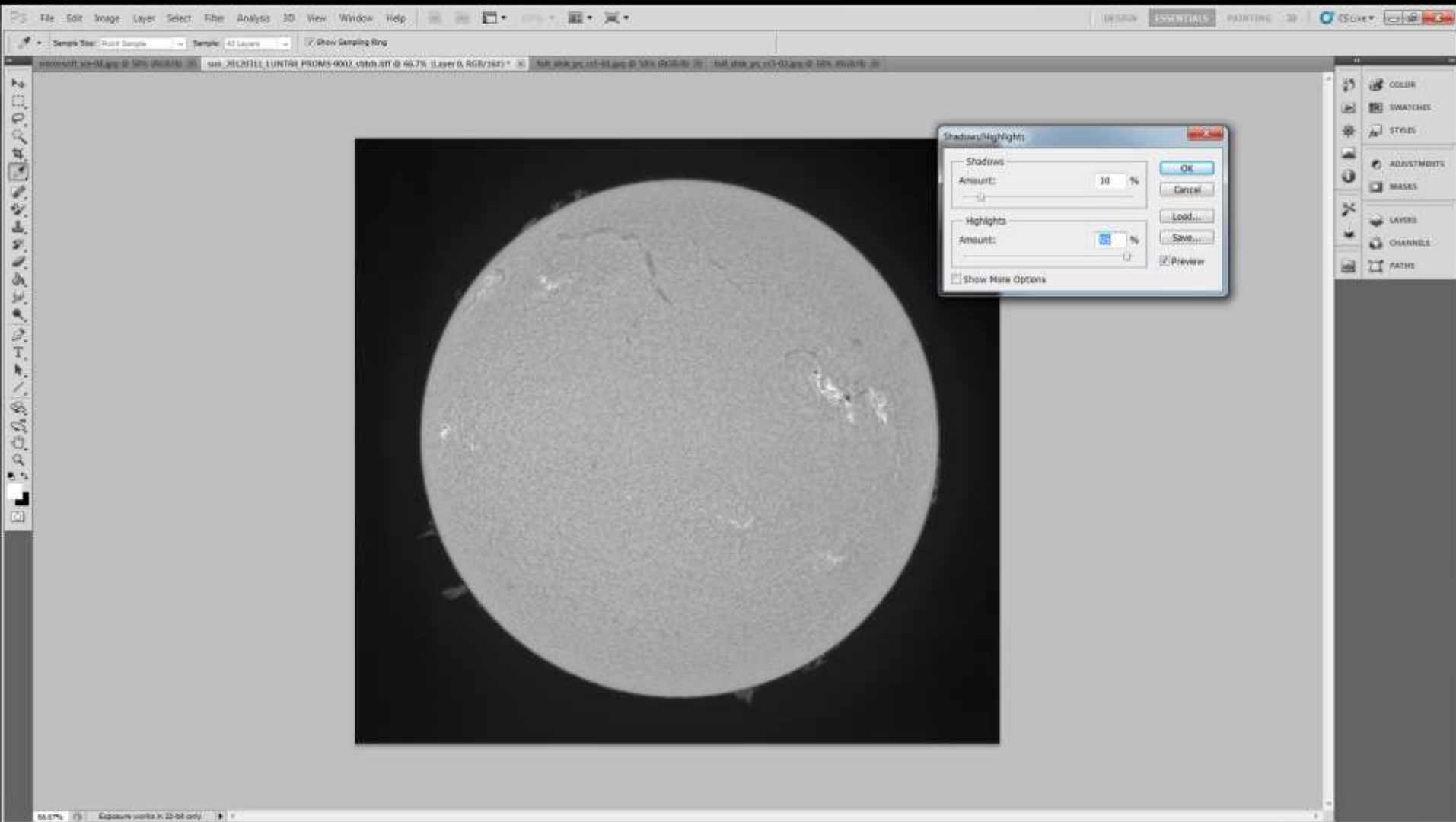
Process TIFF file in PHOTOSHOP

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



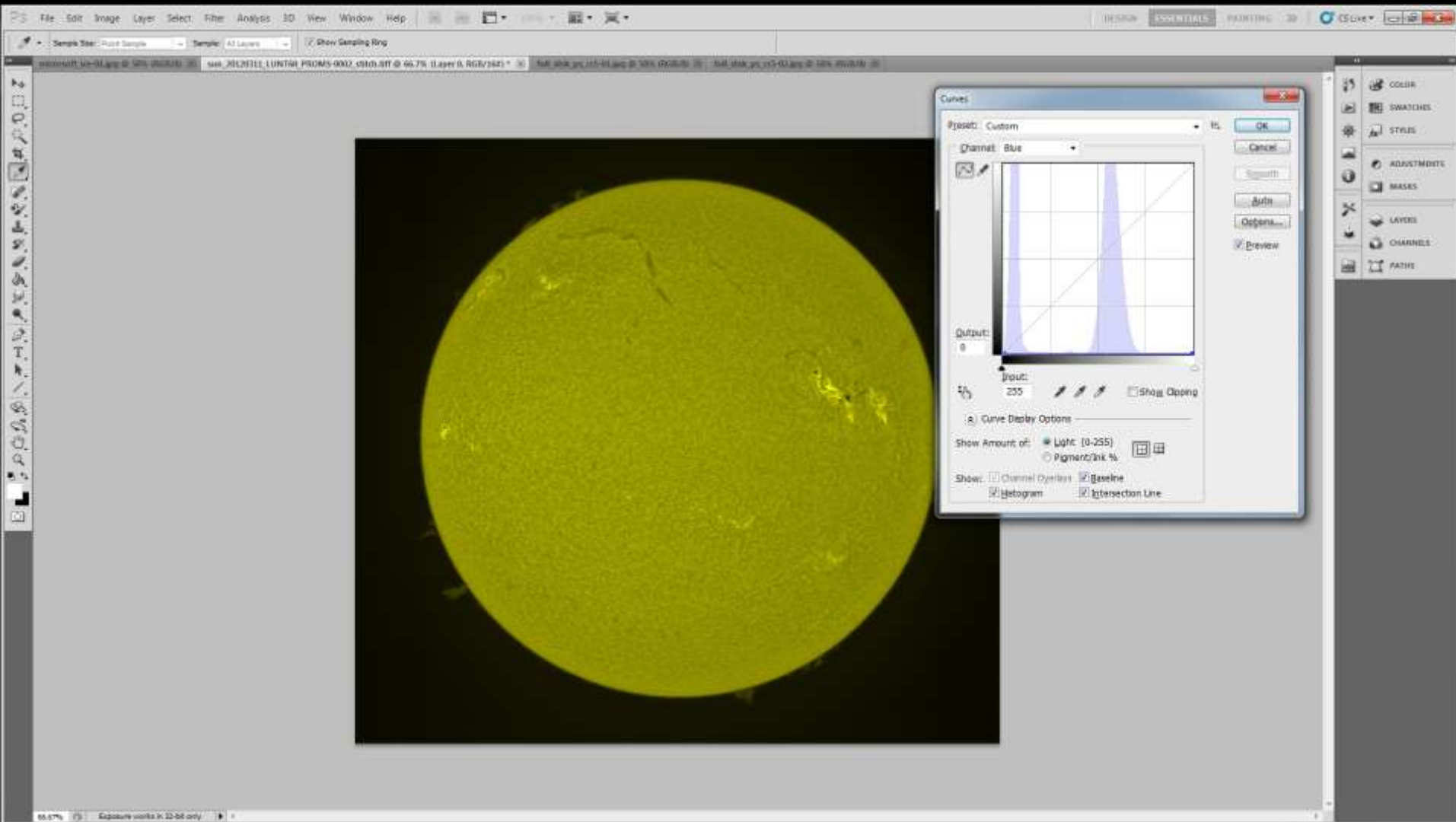
Use Curves to adjust contrast and brightness if necessary

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



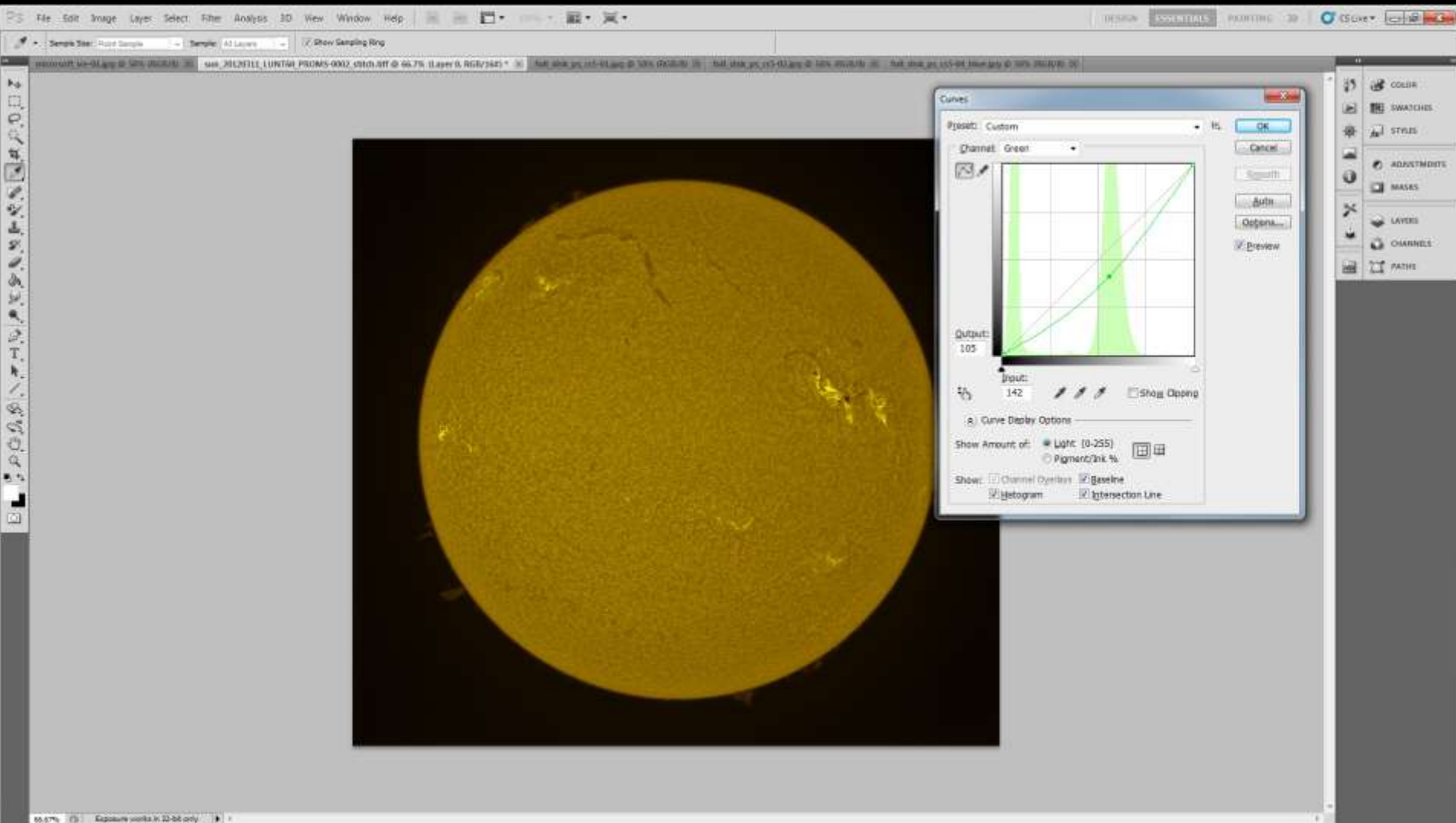
Use Shadow/Highlights option

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



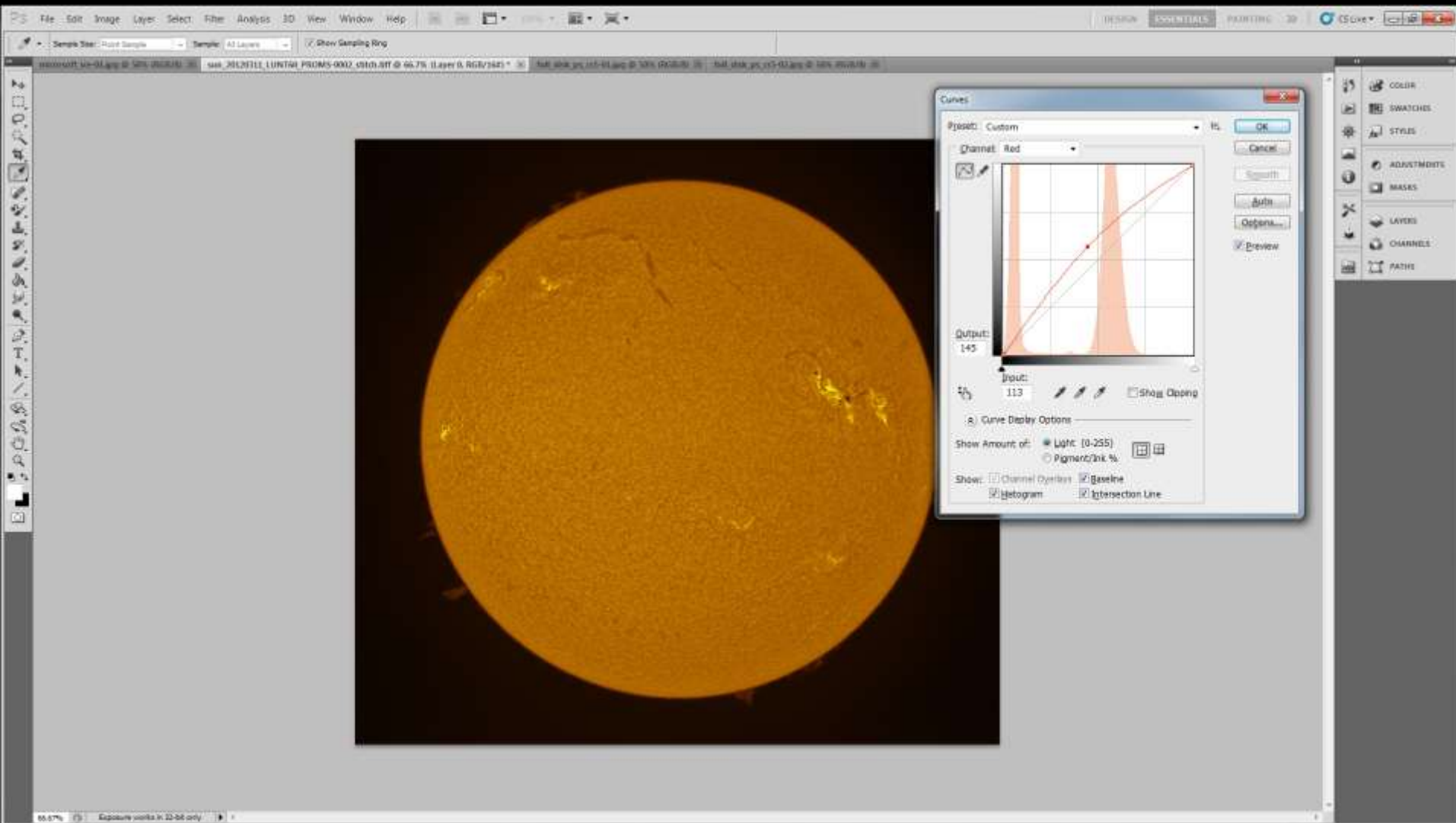
## False Color Mapping BLUE CHANNEL

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



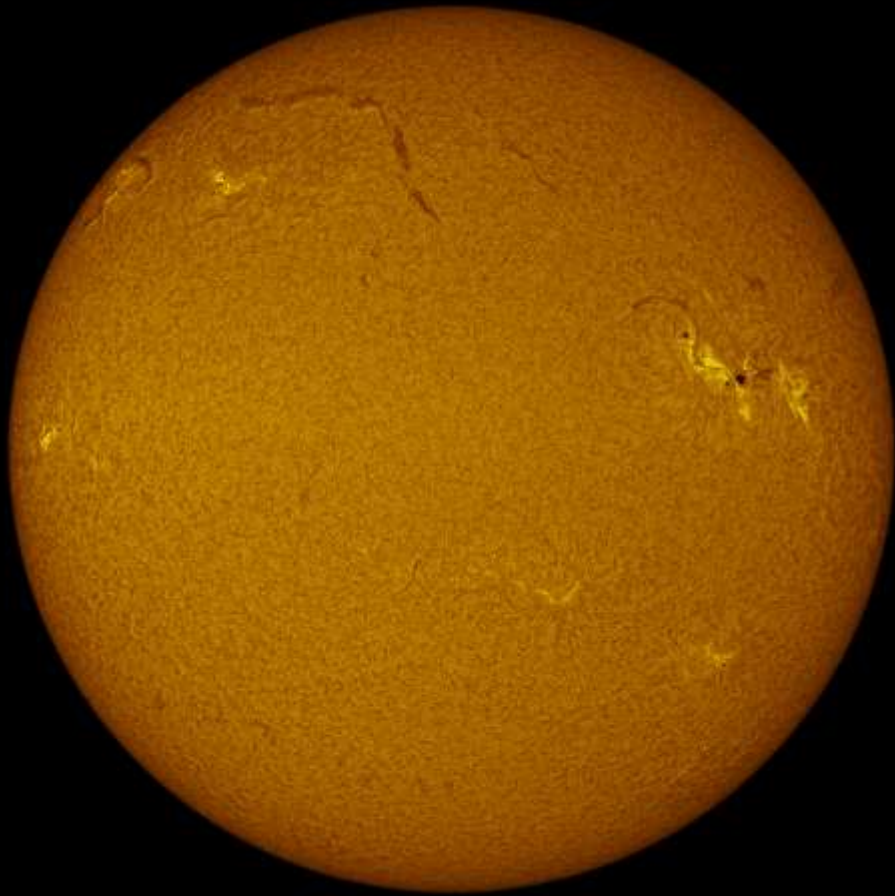
## False Color Mapping GREEN CHANNEL

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



## False Color Mapping Red CHANNEL

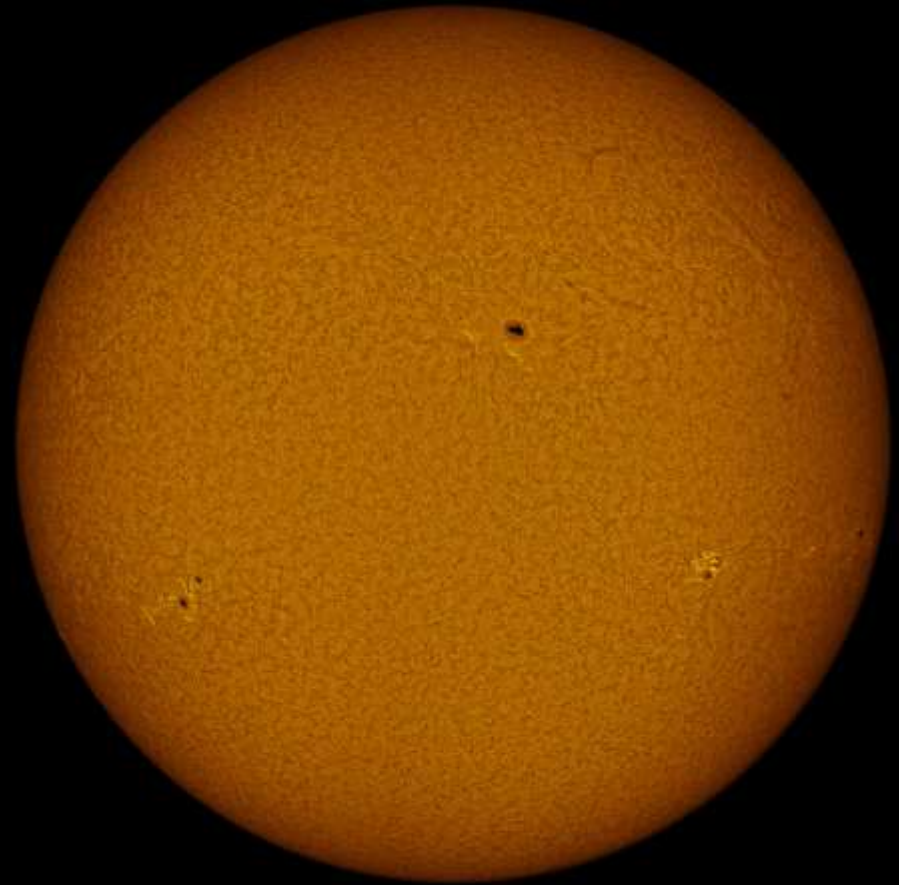
[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



SUN (20120311) H-alpha. LUNT LS60THa/B1200, DMK41

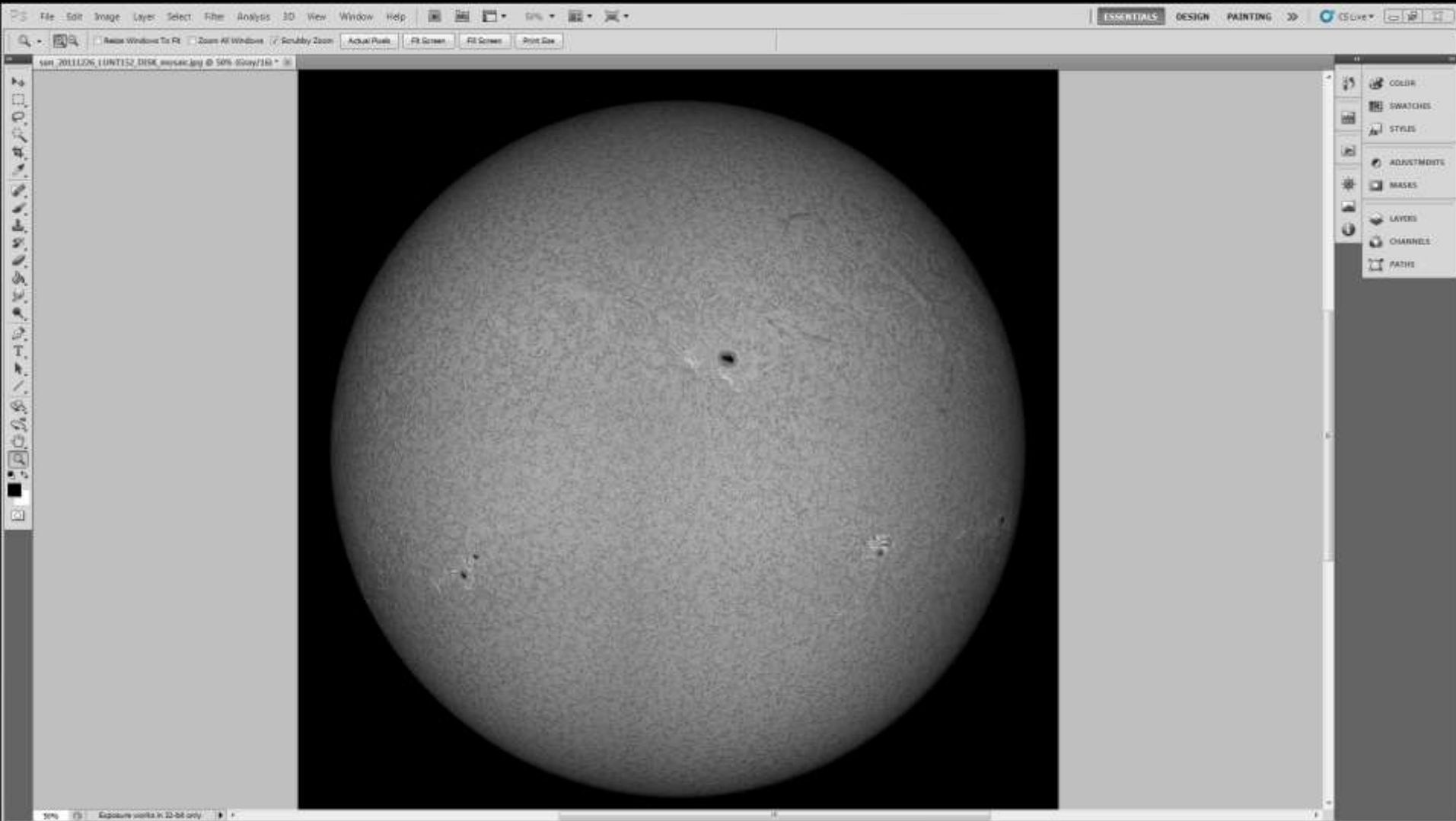


BEFORE



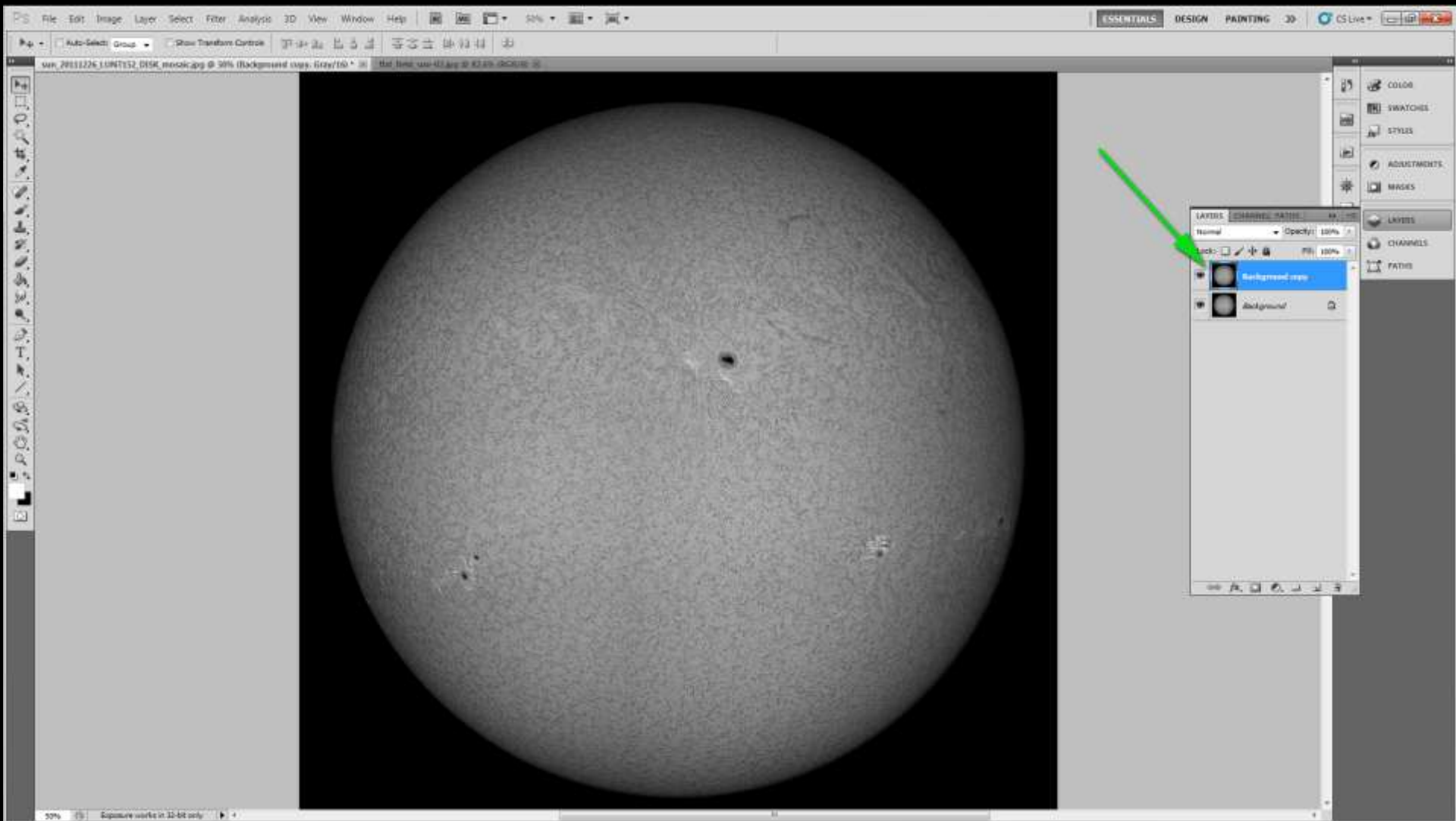
AFTER

**ARTIFICIAL FLAT-FIELD**



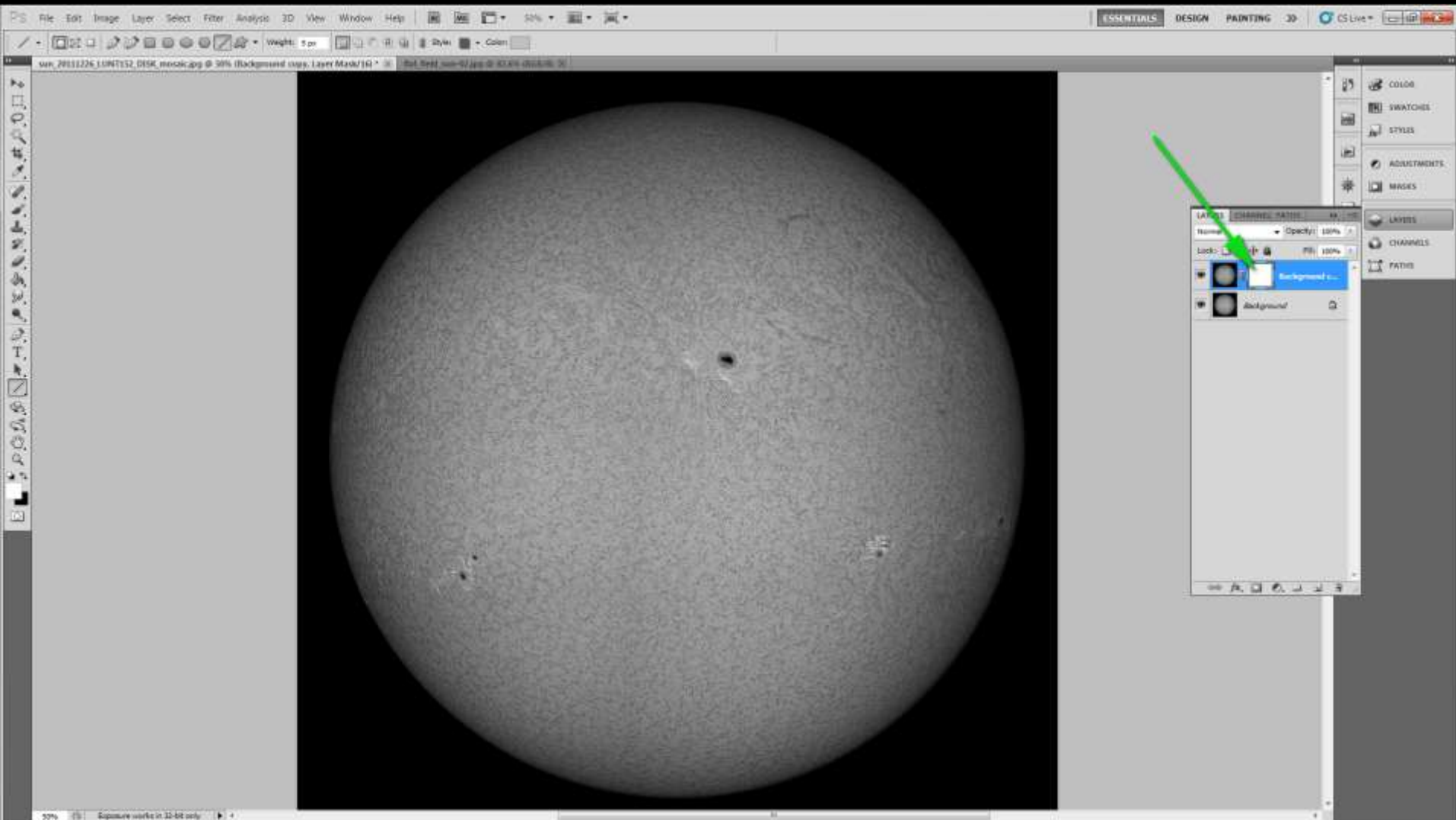
**PHOTOSHOP- Open mosaic image (16-bit TIFF file)**

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



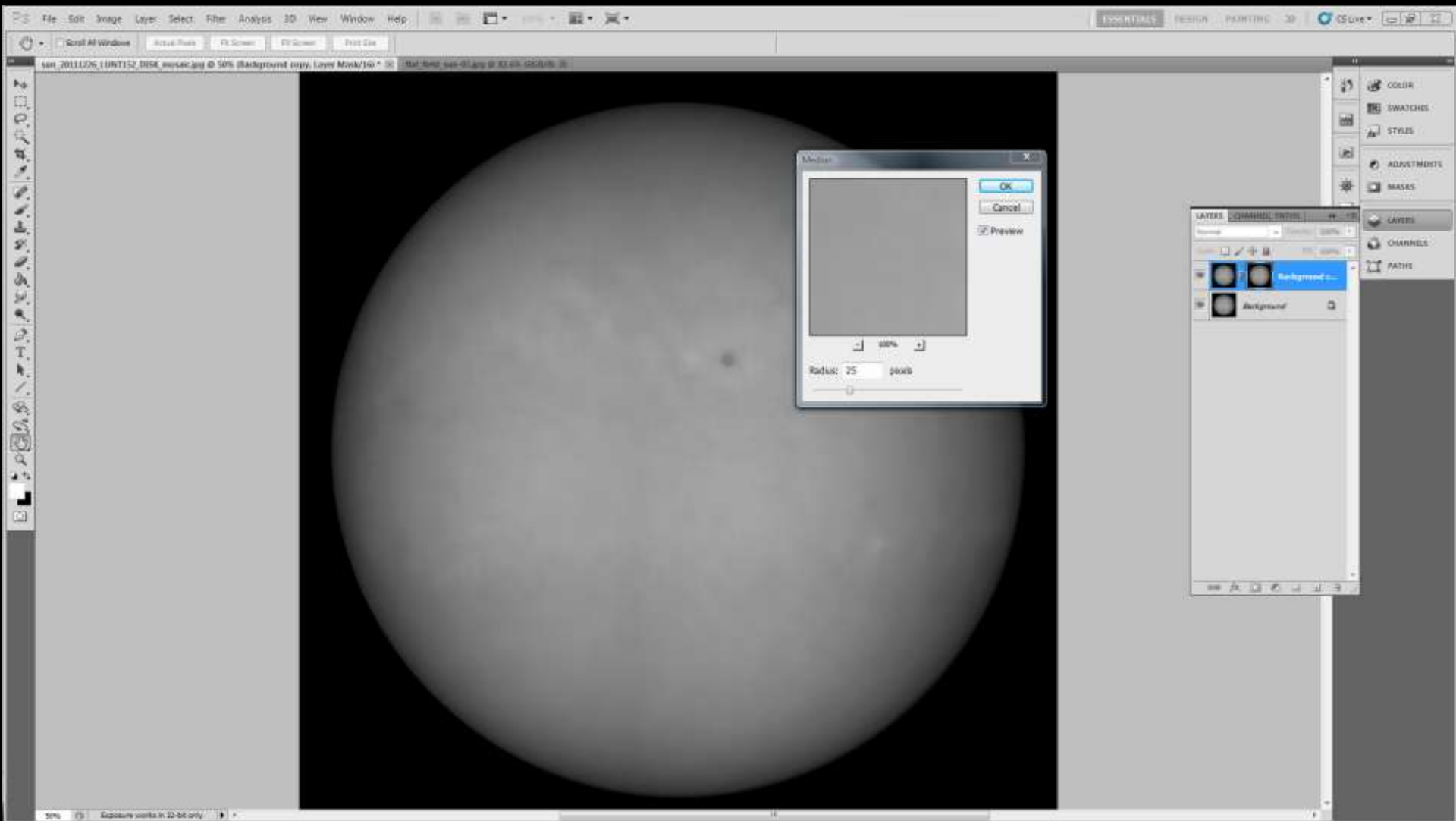
**PHOTOSHOP- duplicate layer**

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



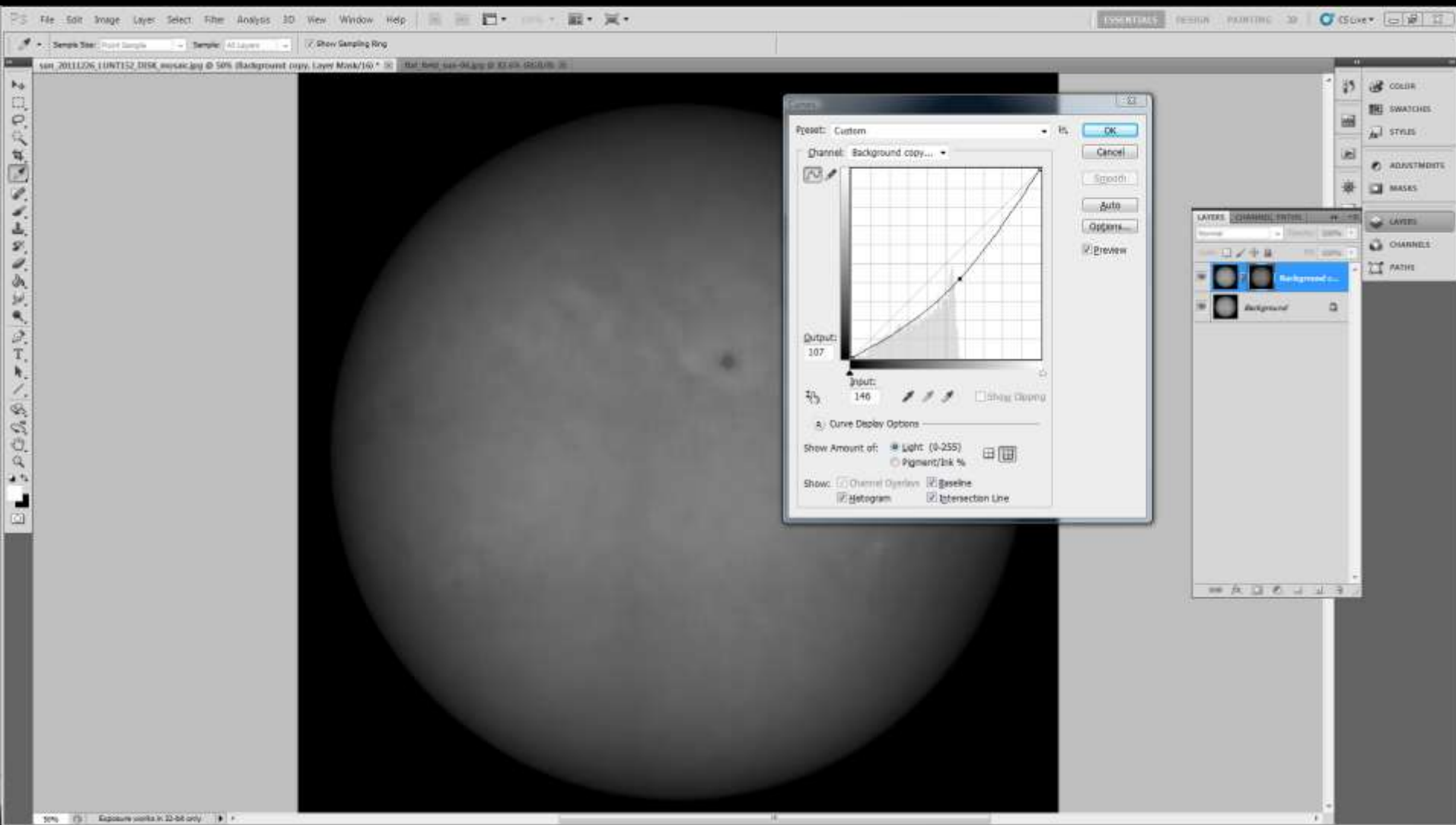
## PHOTOSHOP- Create a MASK

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



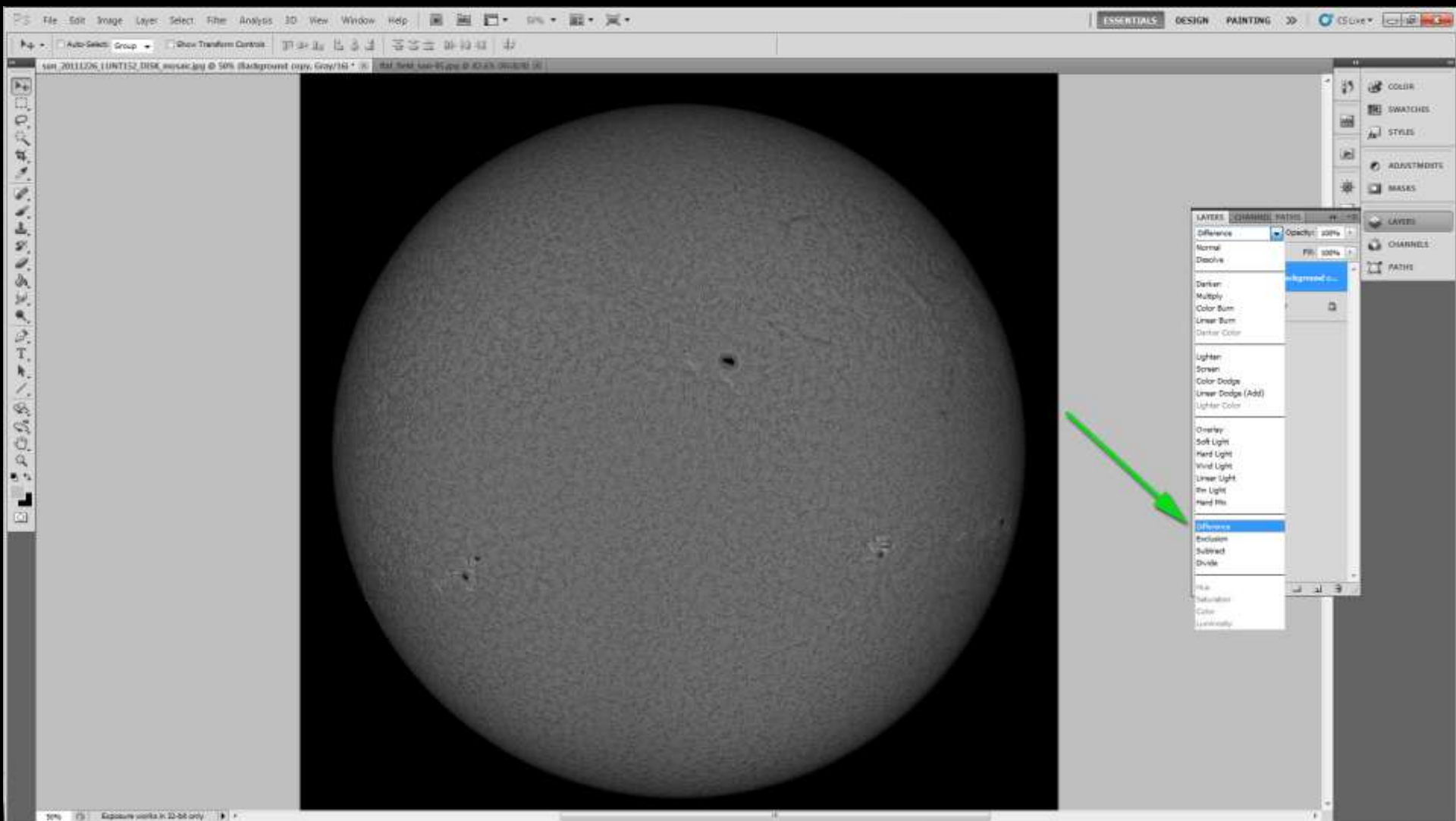
## PHOTOSHOP- Median Filter

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



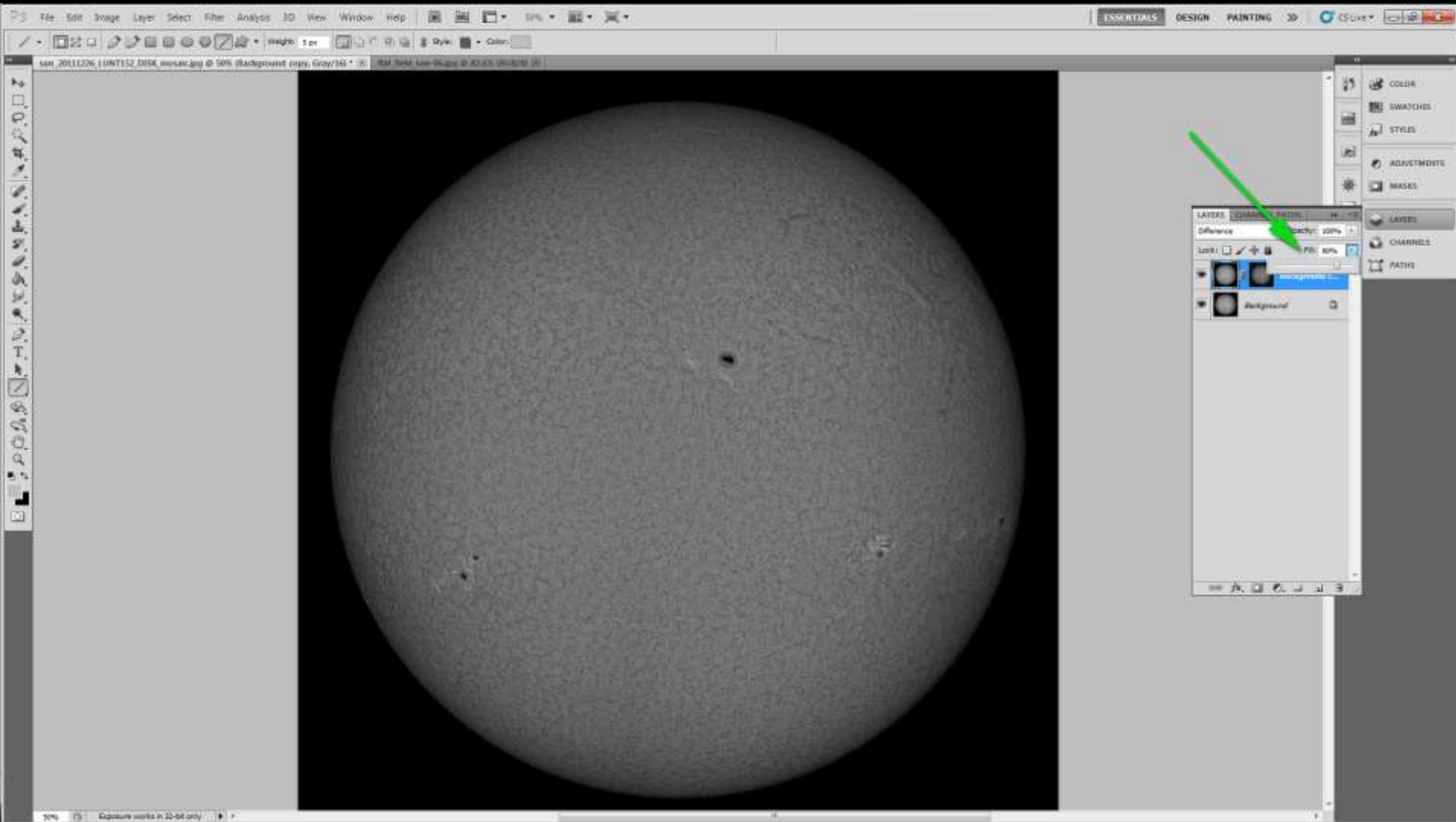
## PHOTOSHOP- Reduce brightness (Curves)

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



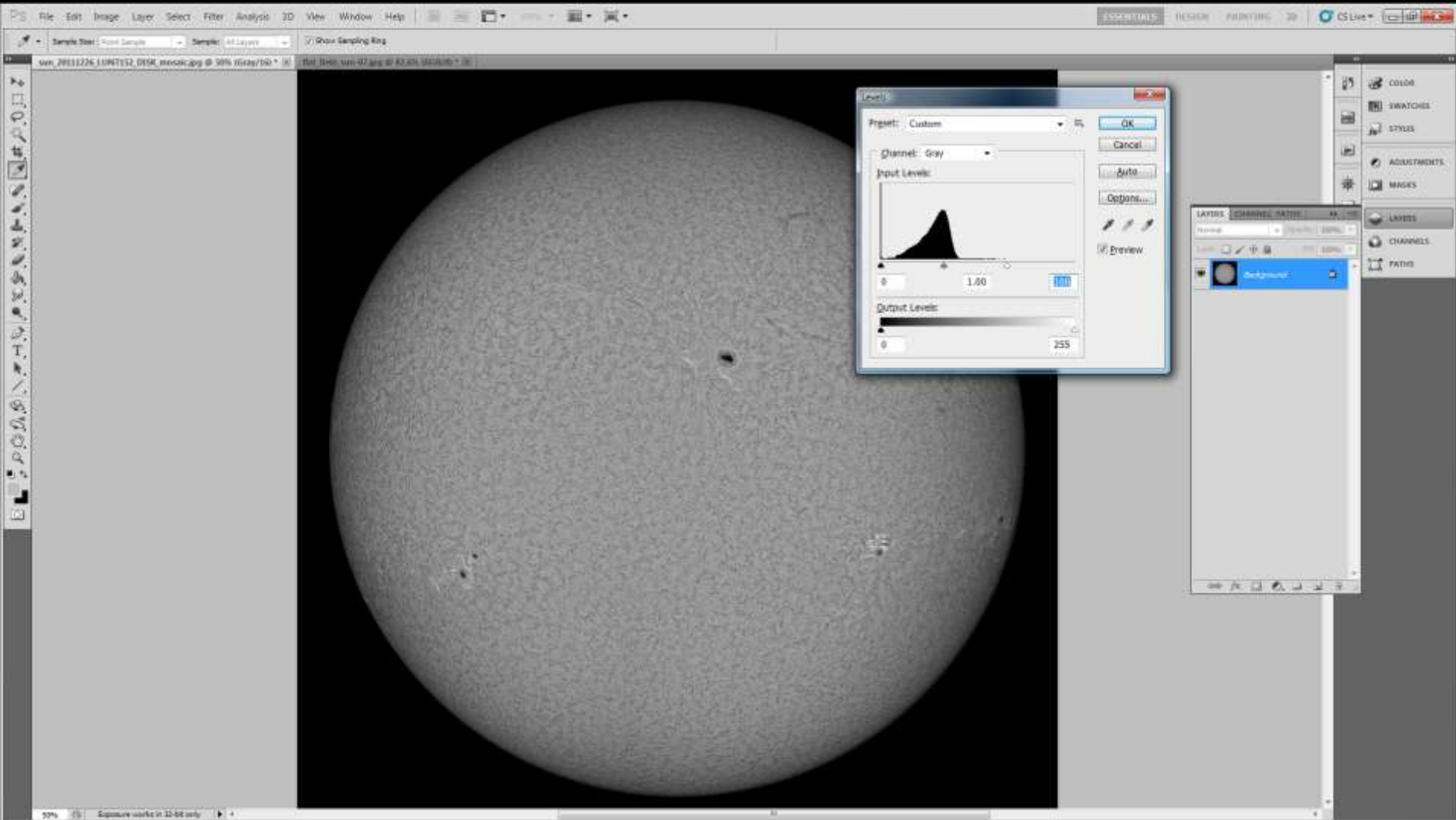
## PHOTOSHOP- Apply Mask

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



## PHOTOSHOP- Reduce Mask Opacity

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)

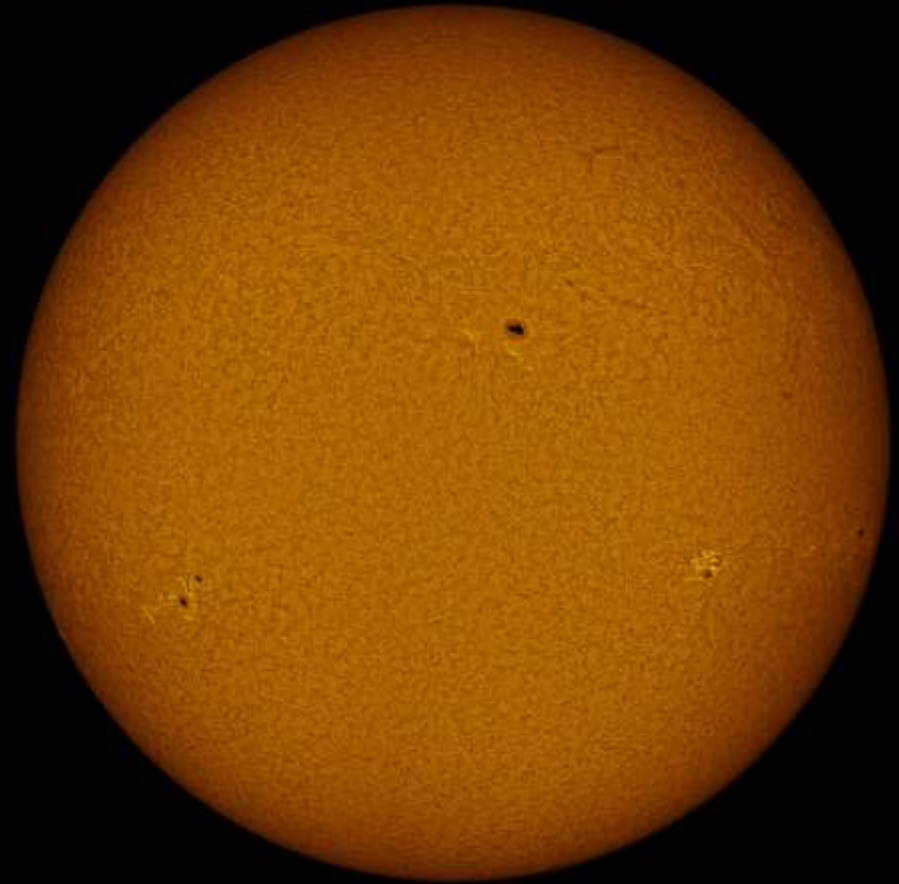


**PHOTOSHOP- Use Curves and/or Levels**

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)

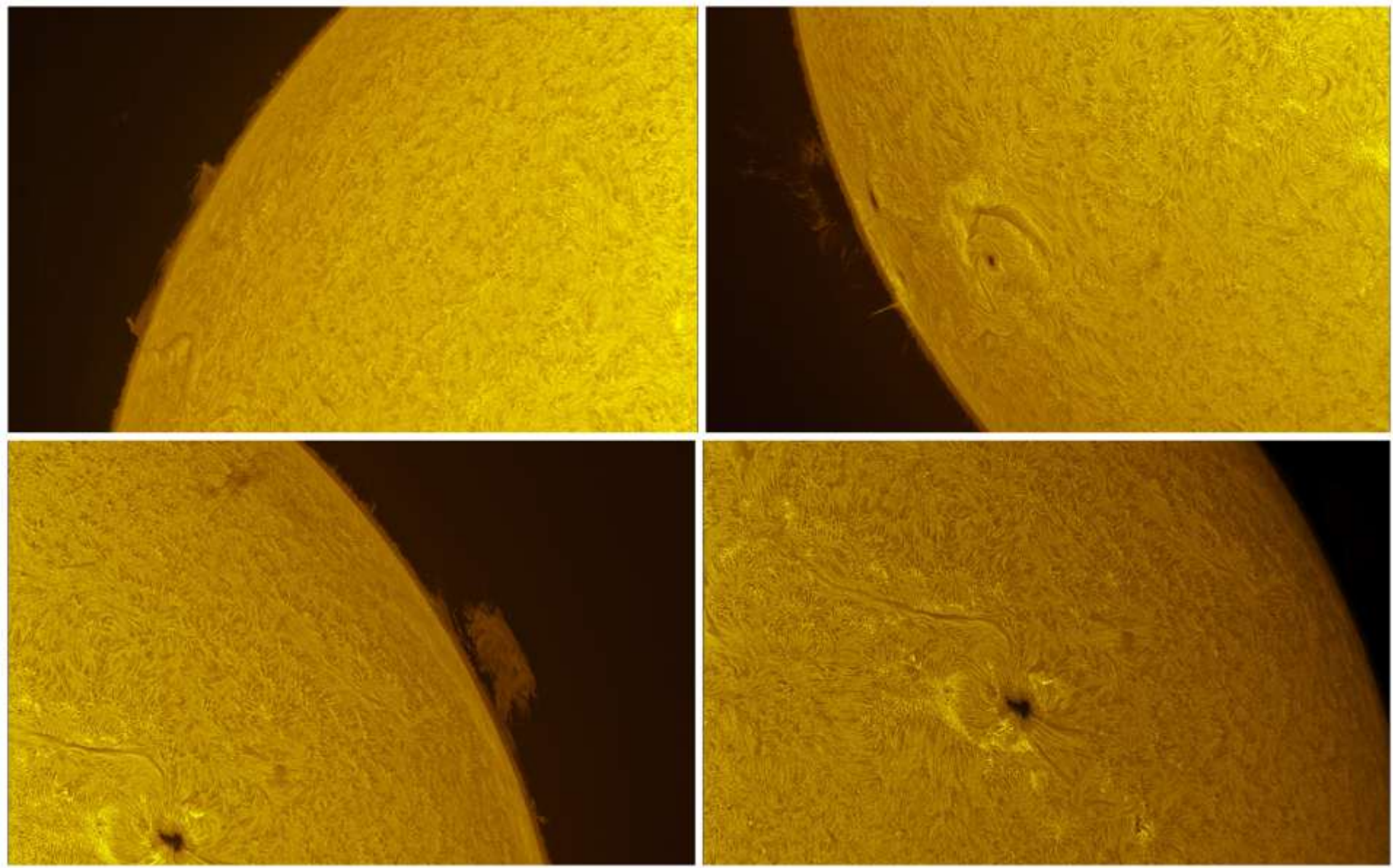


BEFORE



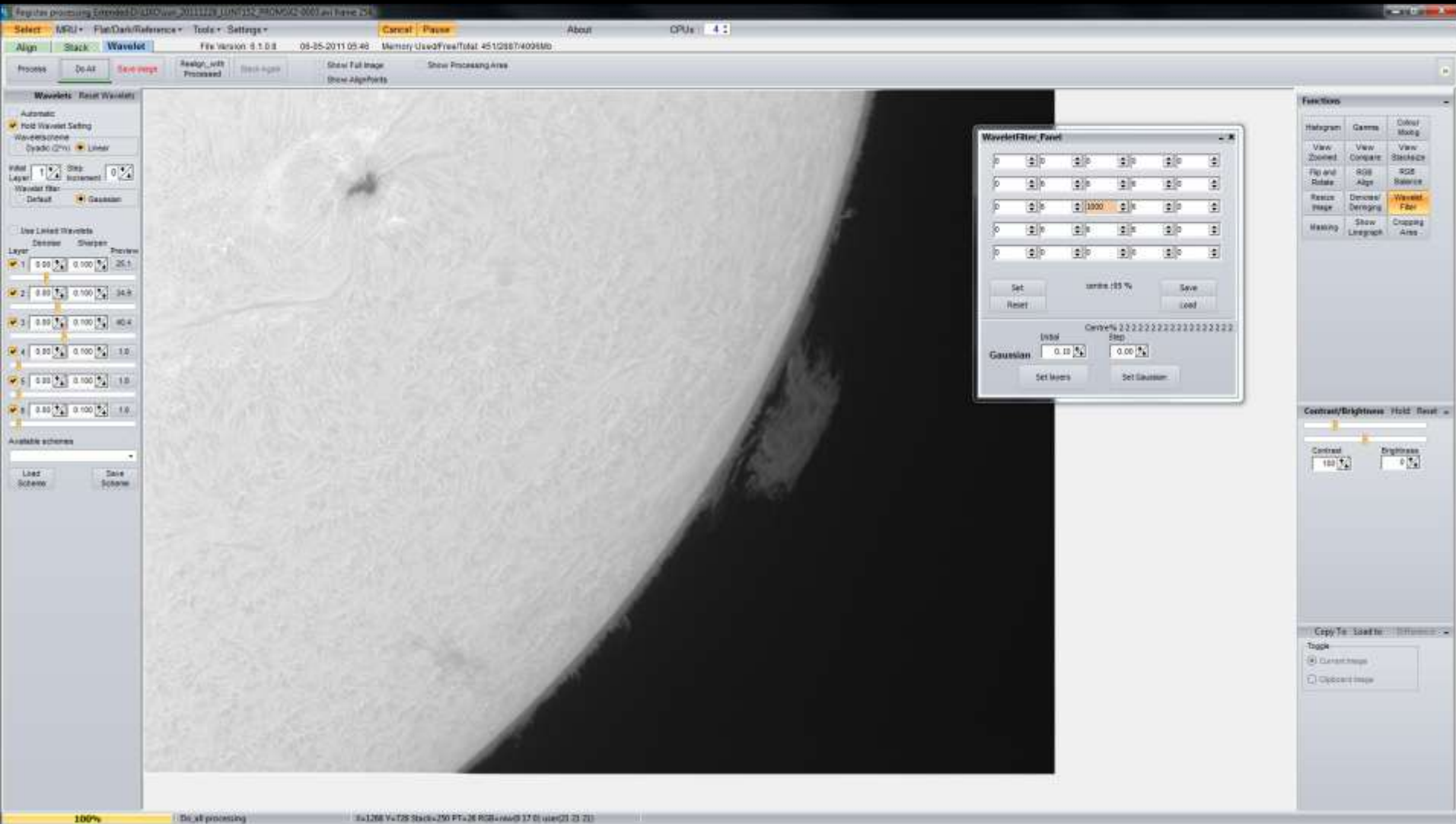
AFTER

**ARTIFICIAL FLAT-FIELD**



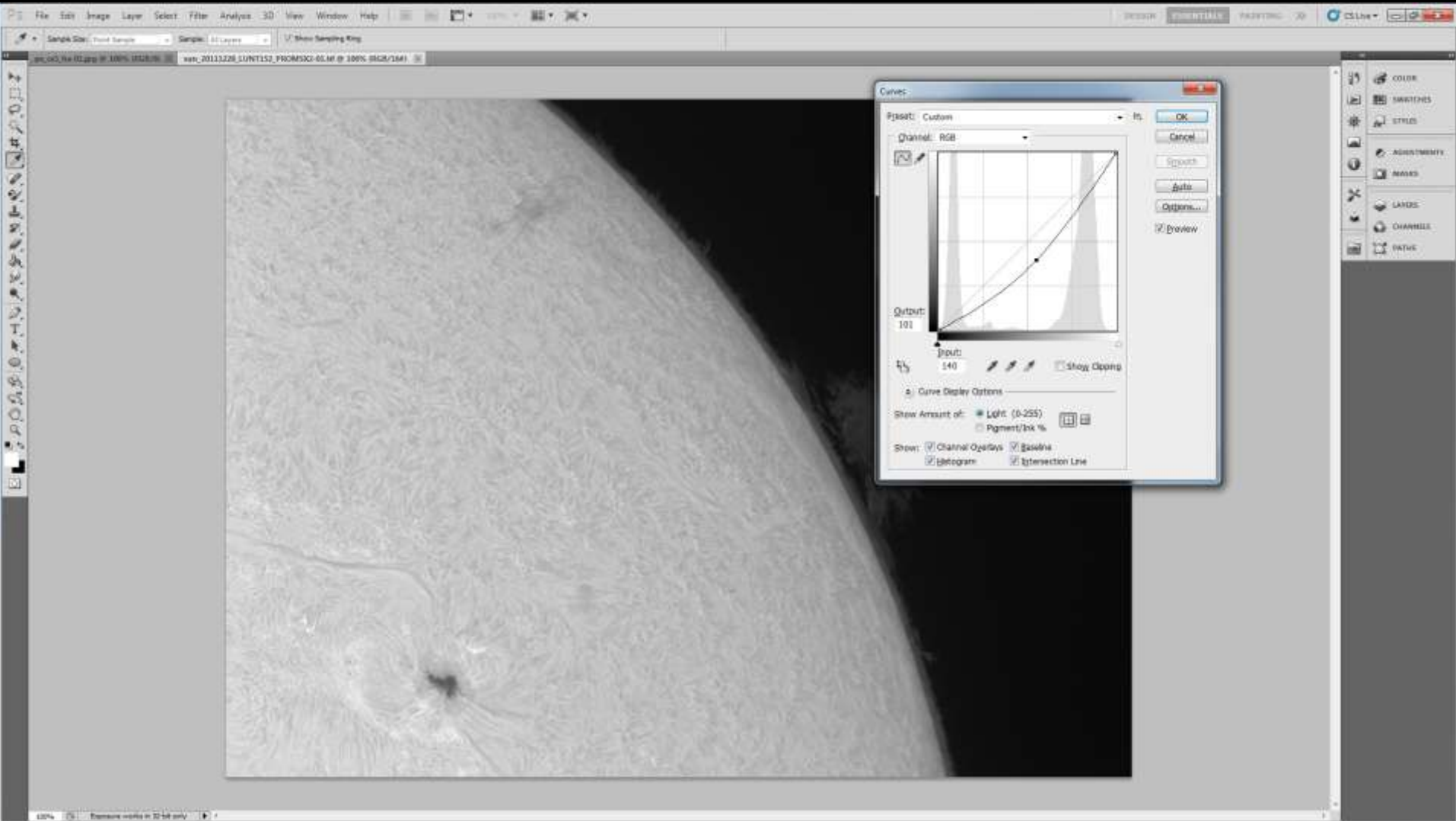
## HIGH RESOLUTION H-ALPHA IMAGING

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



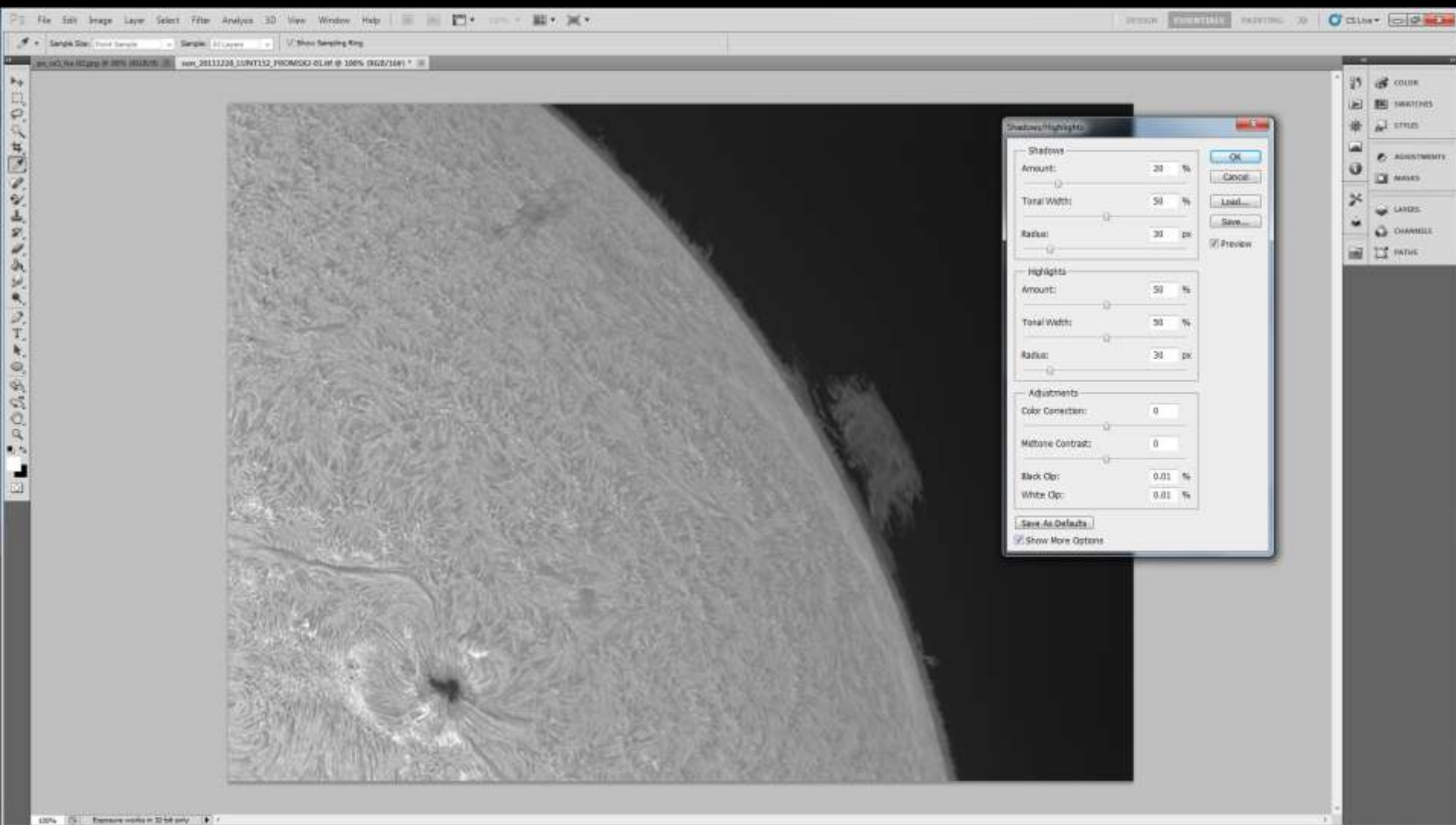
## Wavelet-based image restoration

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



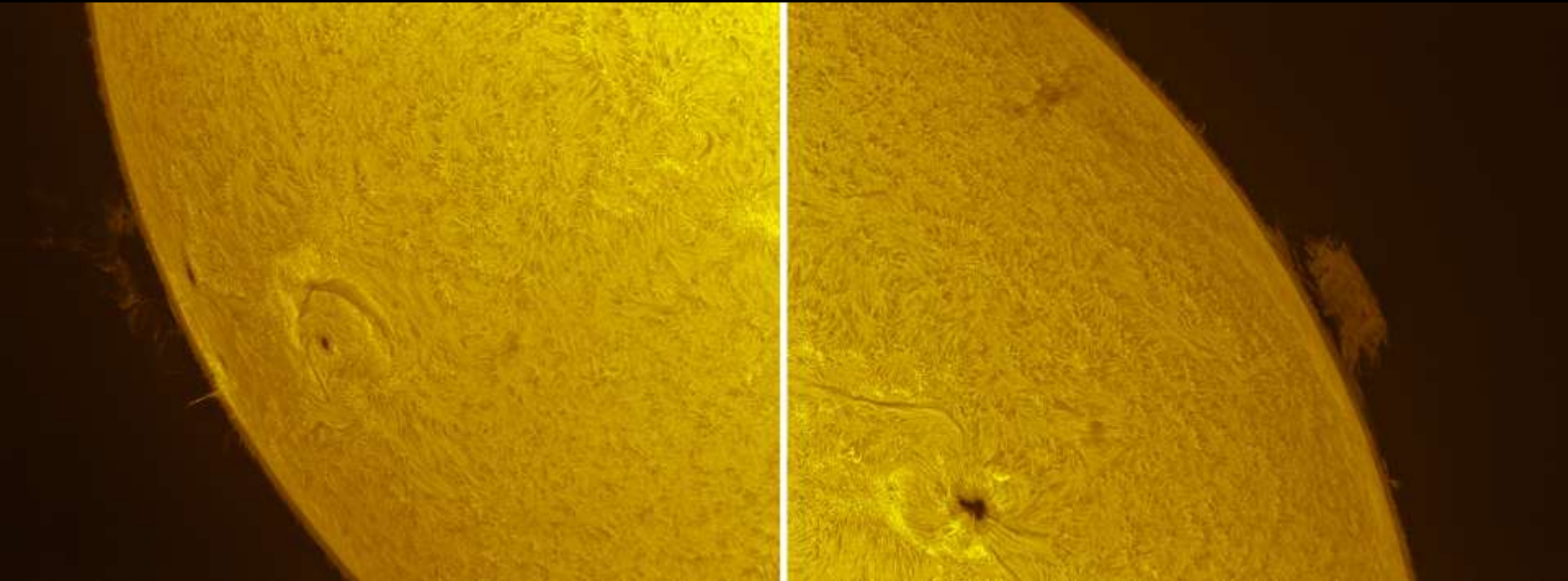
## PHOTOSHOP- Reduce brightness (Curves)

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



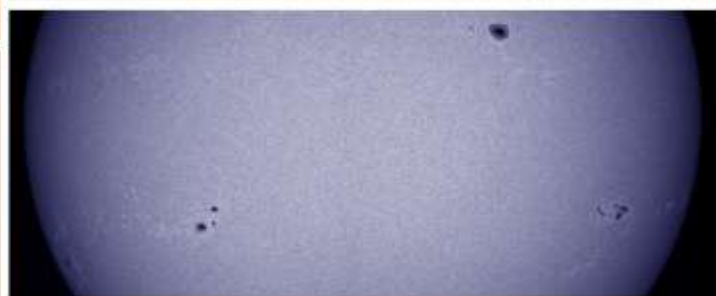
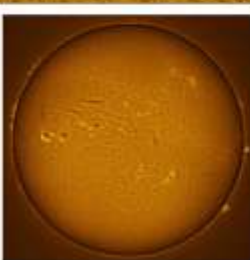
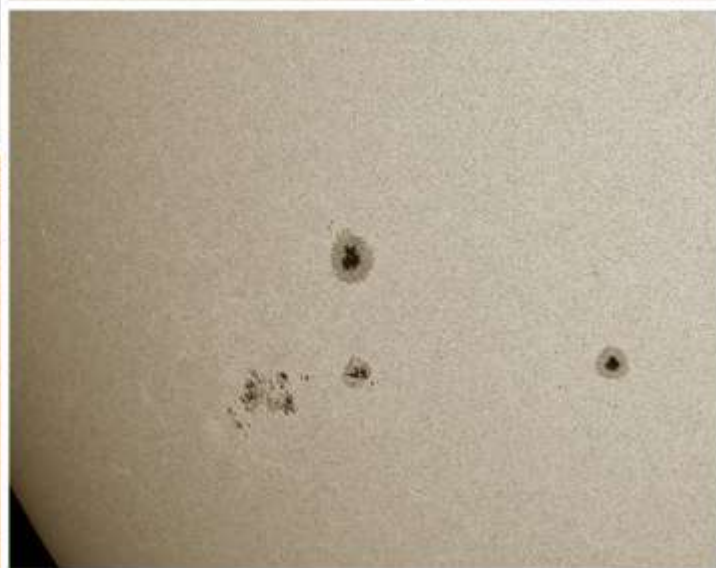
Use Shadow/Highlights option

[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)

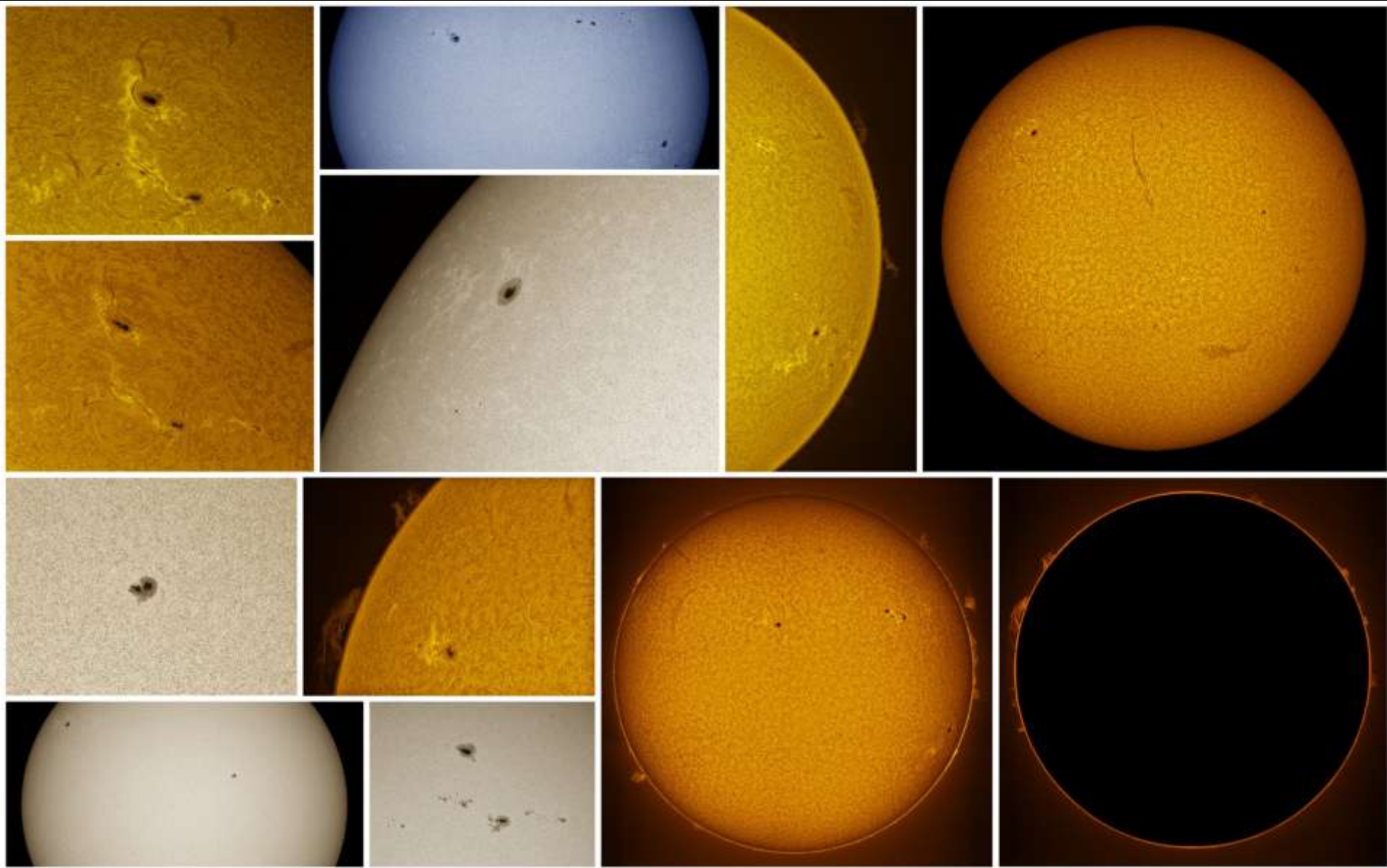


False Color Mapping

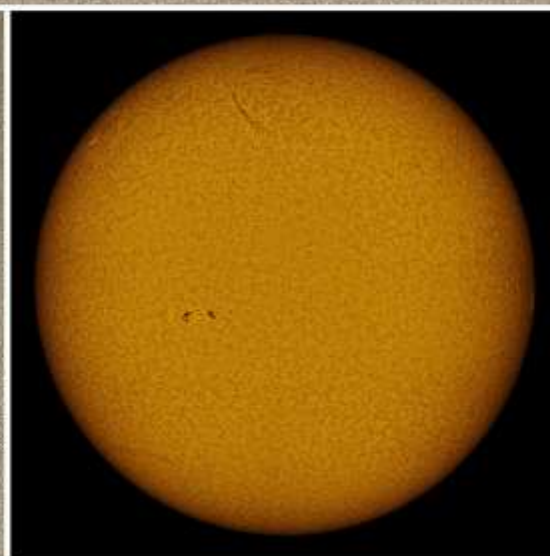
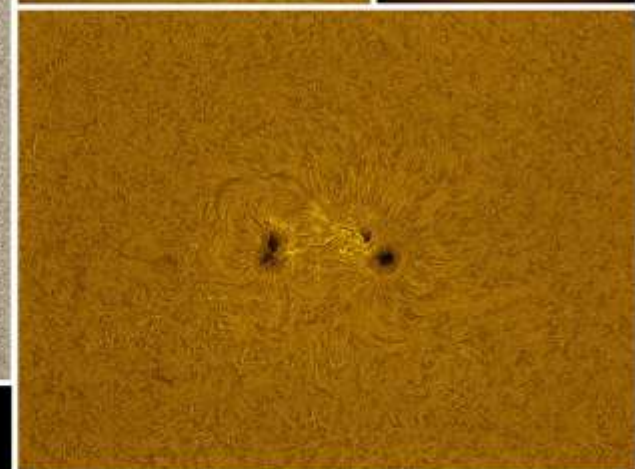
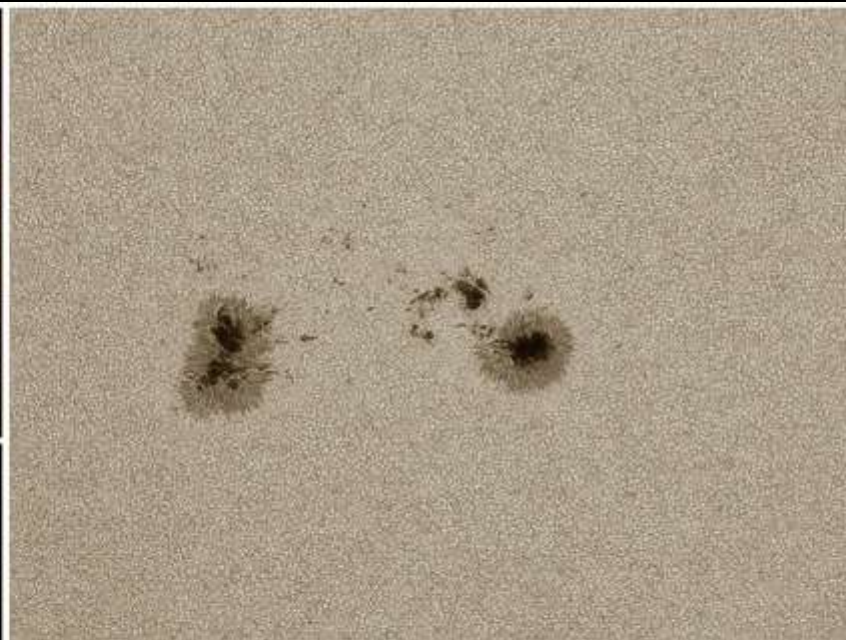
[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



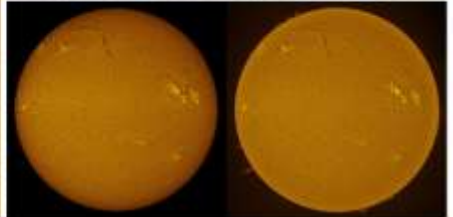
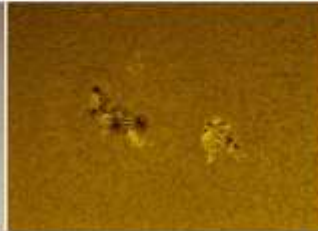
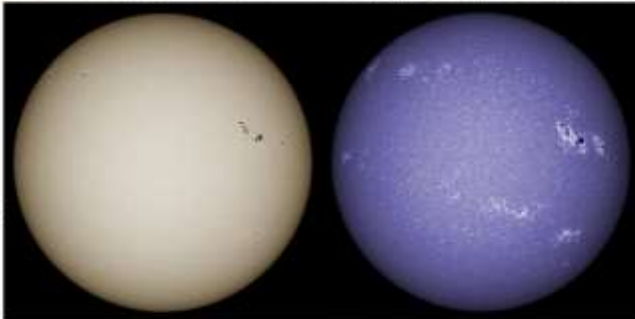
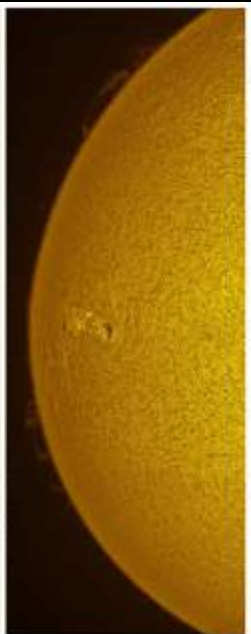
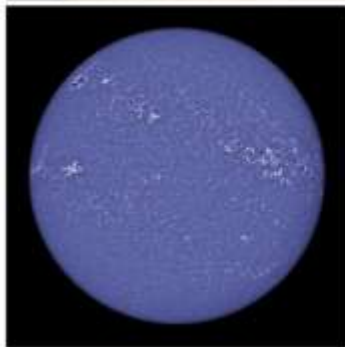
SUN (NOV/DEC 2011)



**SUN (JAN 2012)**



SUN (FEB 2012)



SUN (MAR 2012)

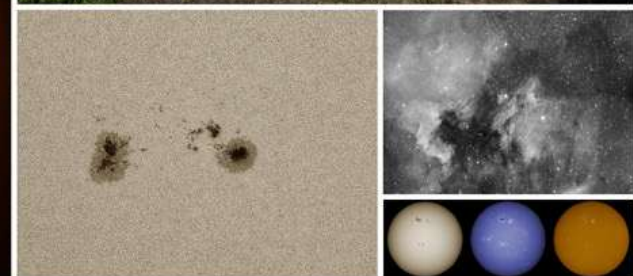
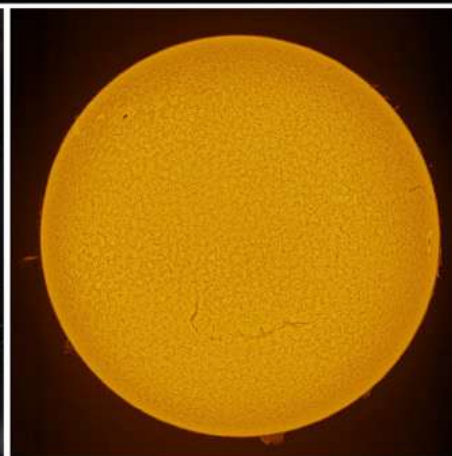
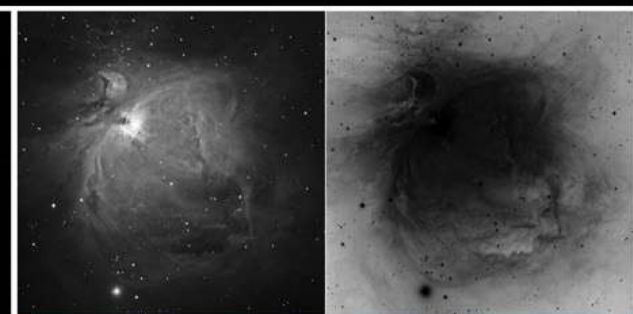
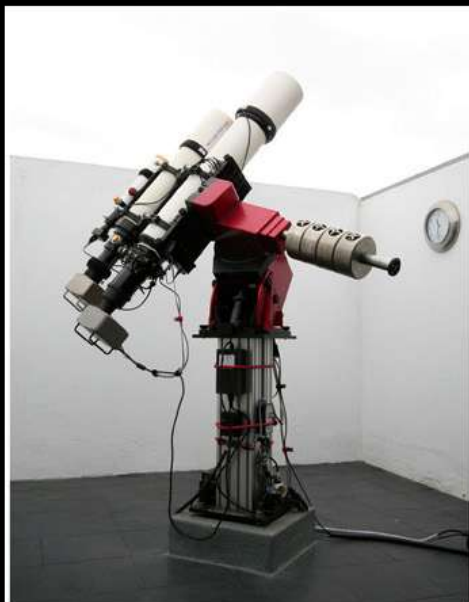


CONTINUUM (WHITE LIGHT) LUNT 2" SOLAR WEDGE DMK 41AU02.AS  
H-ALPHA/CaK LUNT 152/LUNT 60 LUNT CaK 1200 DMK 41AU02.AS

# Narrowband CCD imaging

Deep-Sky, Sun & Moon

by Pedro Ré



IMAGING SETUP

CCD IMAGES

CCD IMAGING

IMAGE PROCESSING

ASTRO WEBPAGE

## IMAGE PROCESSING - Pedro Ré

### FULL DISK IMAGING (SUN)

- Acquire Full Disk images
- Save AVI files or SER files (12 bits) (DMK or SKYnyx cameras)
- Open AVISTACK <http://www.avistack.de/>
- Select AVI or SER files
- Turn off [Update display](#)
- Choose Batch processing - [Batch processing](#)
- Open <http://www.astronomie.be/registax/>
- Open FIT file (aligned and stacked in Avisatck)
- Process the combined image using the Wavelet-based image restoration
- Reset the Wavelet filter (500 to 1000 center value)
- Use layer 1, 2 and 3 of Wavelet filter (try several options)
- Process image (DO ALL button)
- Save image (16-bit TIFF file)
- Compose the Mosaic
- Open Microsoft ICE <http://research.microsoft.com/en-us/um/redmond/groups/lvm/ice/>
- Compose the Mosaic (drop individual images into Microsoft ICE) [Mosaic image \(Full Disk\)](#)
- Crop and save 16-bit TIF file (Microsoft ICE)
- Process TIFF file in Photoshop [Mosaic Image](#)
- Use Curves to adjust contrast and brightness if necessary [Curves](#)
- Use Shadow/Highlights option [Shadow/Highlights](#)
- Use Smart Sharpen if necessary
- False Color Mapping [BLUE CHANNEL GREEN CHANNEL RED CHANNEL](#)
- Save the final 16-bit TIF file (no compression)
- Convert to 8-bit and save JPG file (no compression)

<http://re.apaaweb.com/>



[http://re.apaaweb.com/image\\_processing.html](http://re.apaaweb.com/image_processing.html)



<http://www.solarastronomy.org/>

<http://www.charliebates.org/>



<http://solarchat.natca.net/>