



SalsaJ

(Such a Lovely Software for Astronomy)

Practical Session







Installation



Open the webpage <http://www.euhou.net/> and click on software





What is SalsaJ



SalsaJ is a:
free
easy to install
student friendly
multi-platform
multi-lingual
astronomical software to:
display
analyse
manipulate
images and spectra





Installation




Choose

The screenshot shows the EU-HOU website's 'Download' page. The page has a blue header with the EU-HOU logo and a navigation bar with various European country flags. A sidebar on the left contains a menu with items like 'Home', 'EU-HOU SRT Network', 'What is EU-HOU?', 'Exercises', 'SalsaJ software', 'Facebook', 'News', 'Other live', 'Training sessions', 'Radio Exhibit', 'CD Rom', and 'Newsletter'. The main content area is titled 'Download' and features a sub-section 'Download' with a green background. Below this, it states 'October 2012: New release: SalsaJ 2.3.' and includes a logo for SalsaJ. There are two sections: 'Version with macros but no associated images' and 'Version with macros and associated images', each with a list of download links for Windows, Linux, and Mac OS X. At the bottom, there is a 'Plugins:' section with links for 'Stackreg' and 'TurboReg'.

Home ► SalsaJ software ► Download

Download

October 2012: **New release: SalsaJ 2.3.**



Version with macros but no associated images

- Windows (all version): [SALSAJ 2.3](#)
- Linux (all version): [SALSAJ 2.3](#)
- Mac OS X (all version): [SALSAJ 2.3](#)

Version with macros and associated images

- Windows (all version): [SALSAJ 2.3](#)
- Linux (all version): [SALSAJ 2.3](#)
- Mac OS X (all version): [SALSAJ 2.3](#)

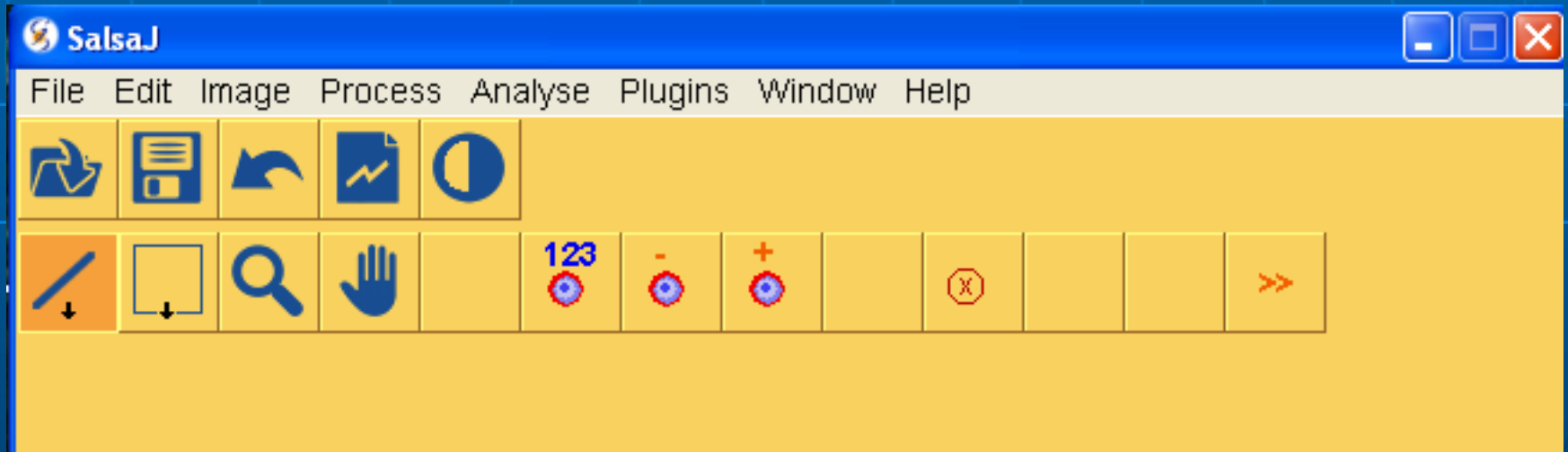
Plugins:

[Stackreg](#) and [TurboReg](#)



Open the SalsaJ program

After completing the installation click on this icon :



Change language

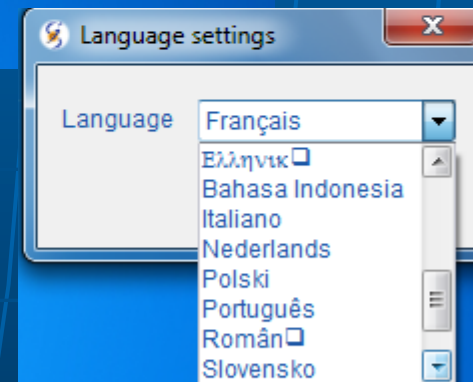
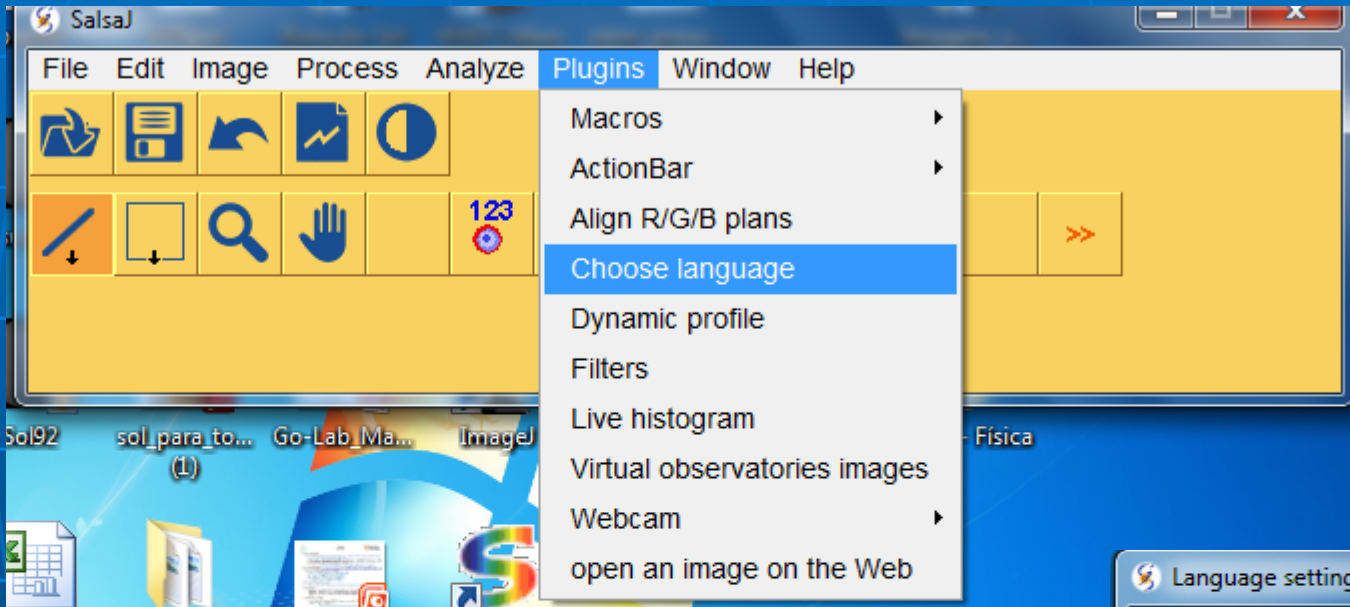
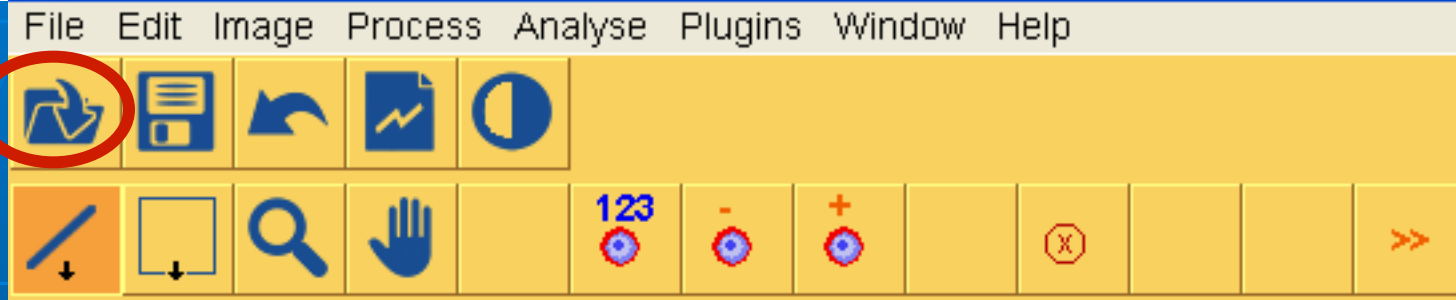
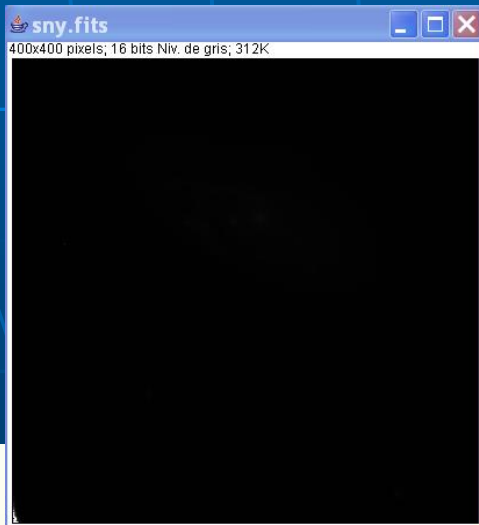


Image brightness

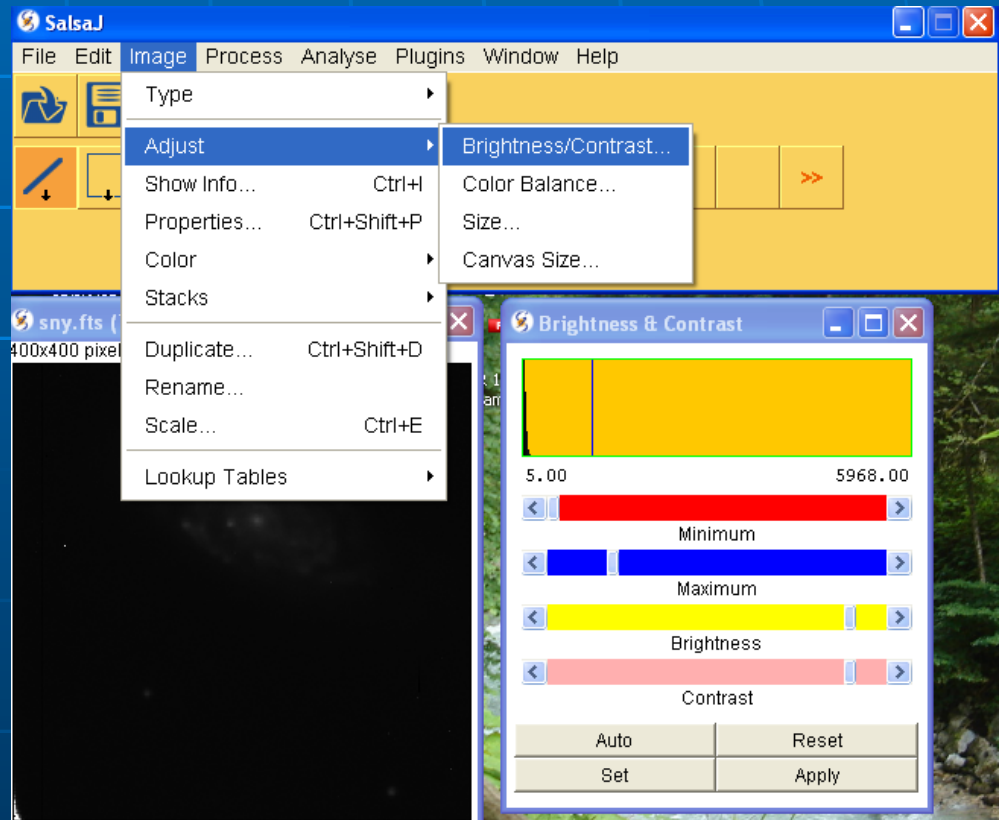
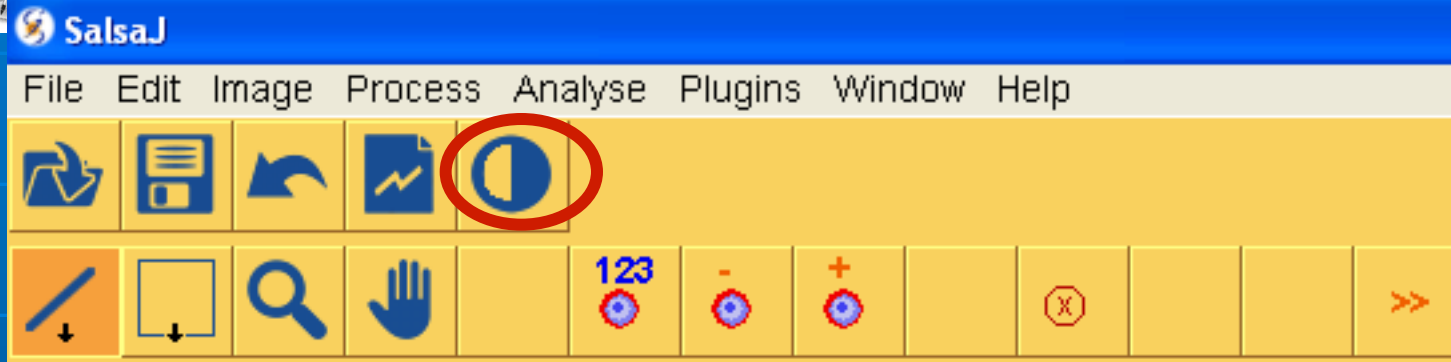


- Click on the icon or click on 'Open' in the 'File' menu
- Choose your image, e.g. the image 'sny.fits' :



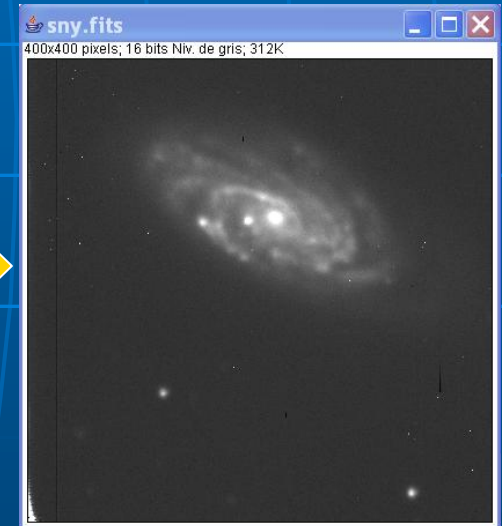
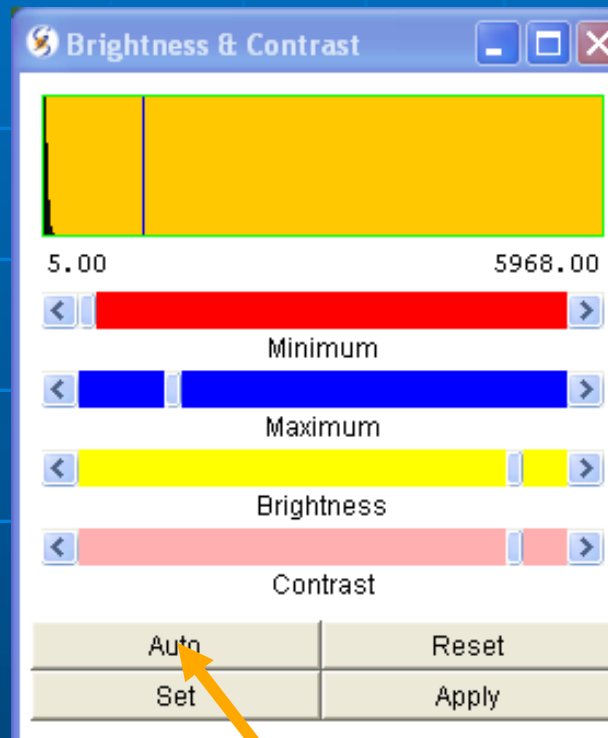
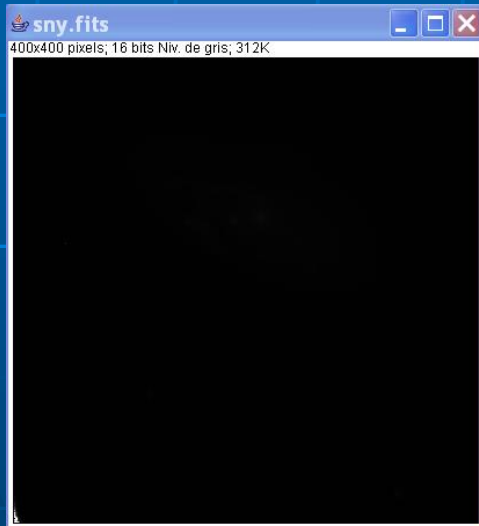
How to adjust the image brightness?

Image brightness



Click on the icon or on 'Image' menu of the toolbar, choose "Adjust" and "Brightness/Contrast"

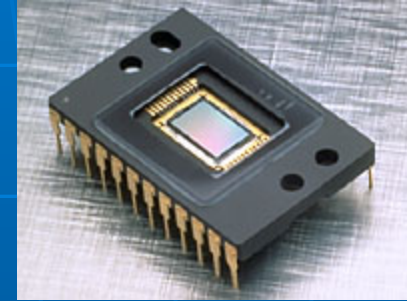
Adjust with Auto



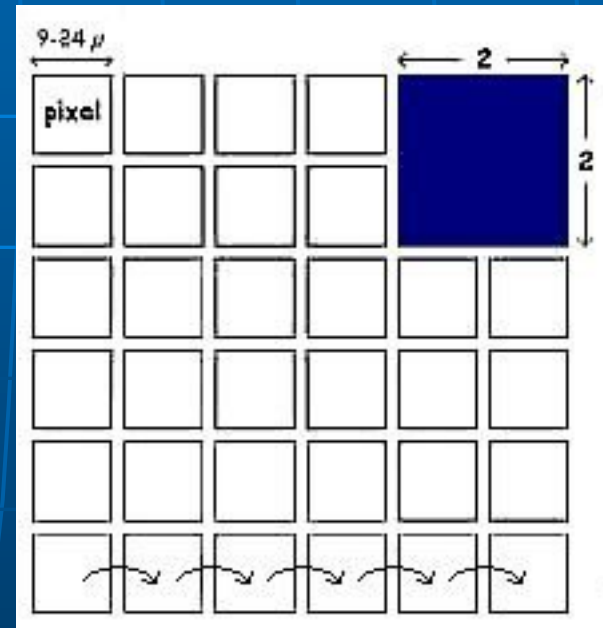
click 'Auto'

How to measure Light

- A CCD (Charge Coupled Device) converts photons in electrons creating an electric current.



- CCDs are detectors made out of silicon. Each element is a pixel (*picture element*).





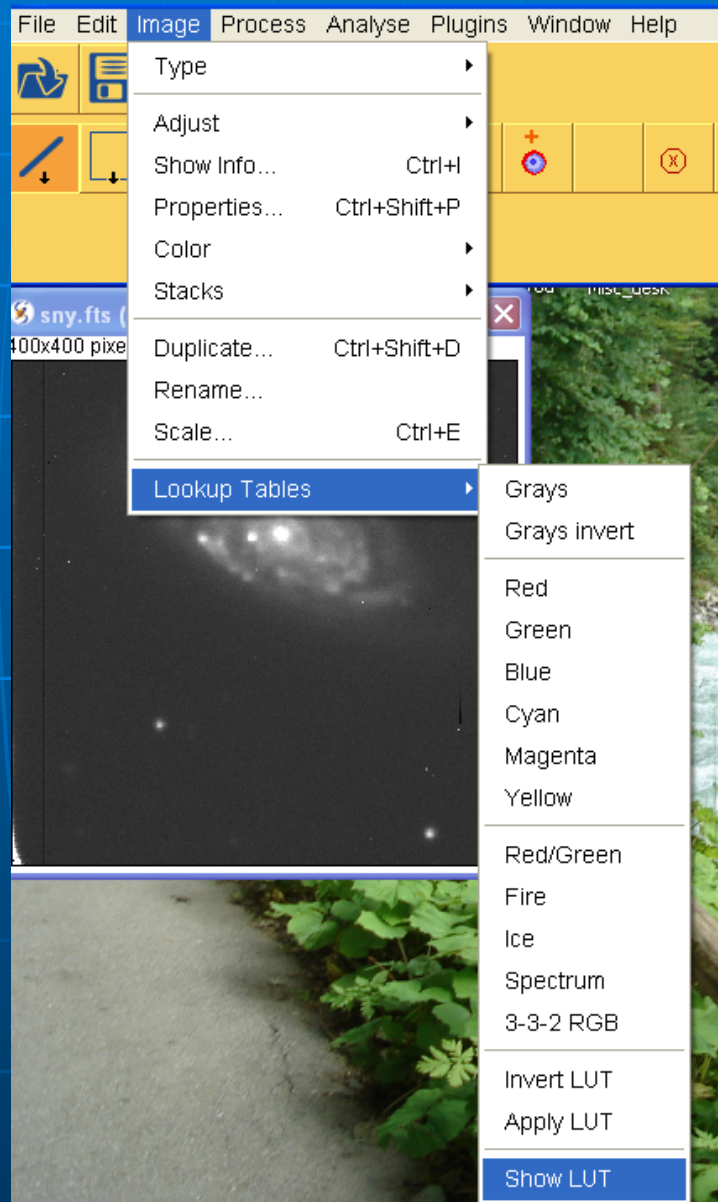
What is an image?



- What are colors in an image?



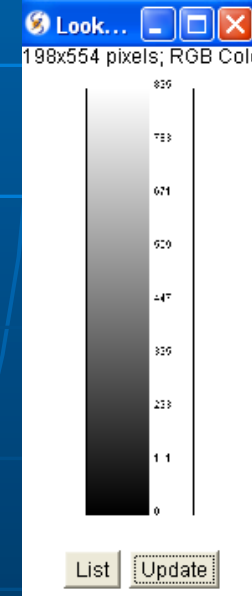
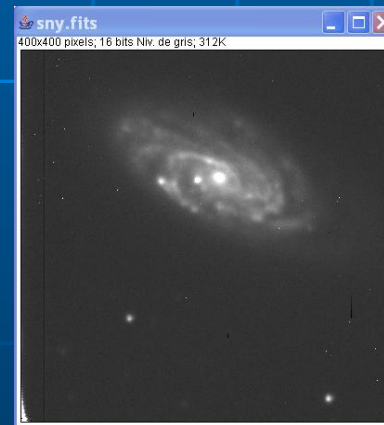
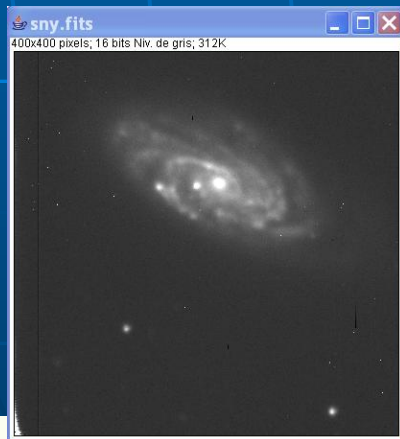
Display the Look-Up Table



Display the Look-Up Table

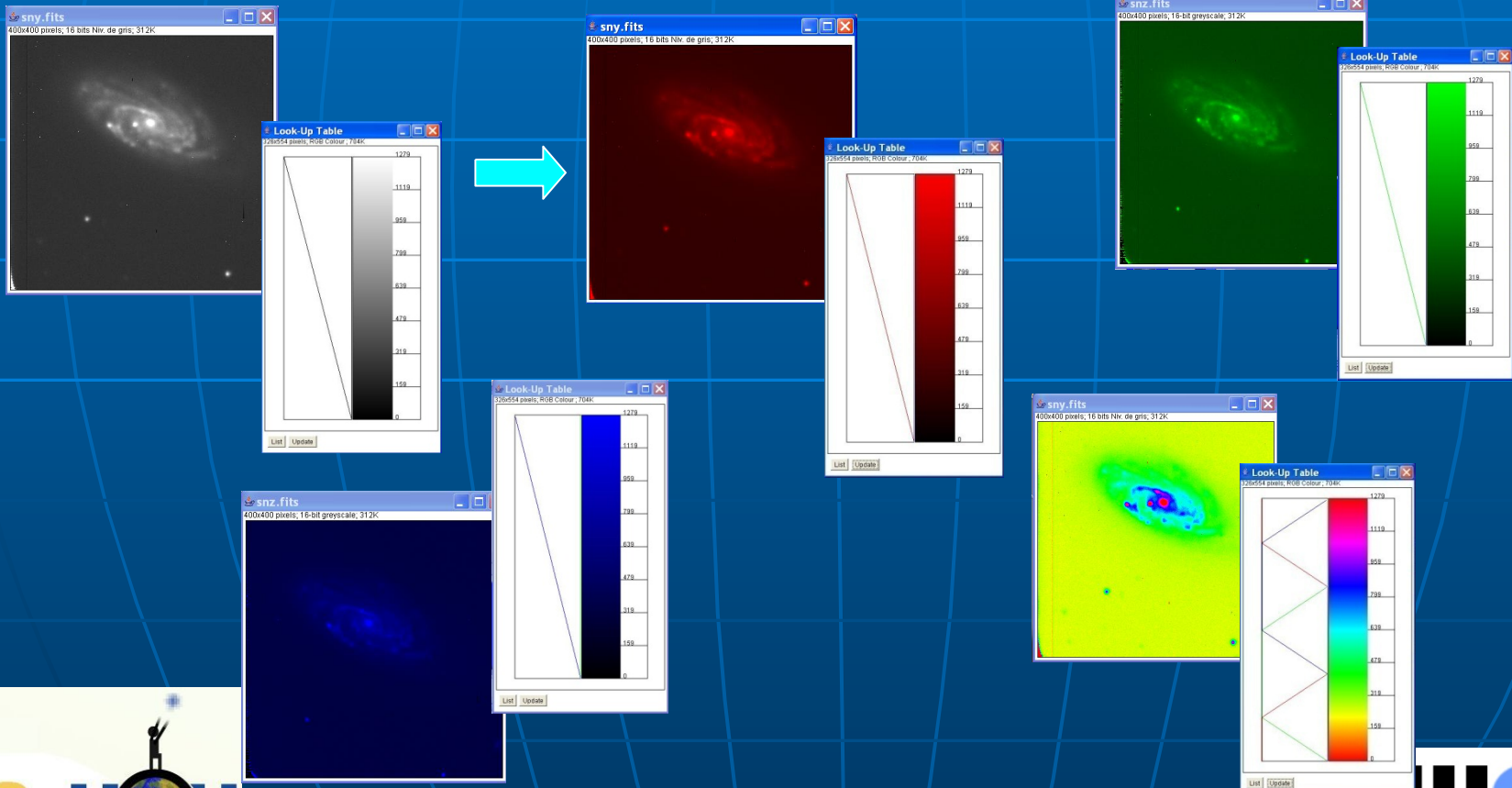
The Look-Up Table (LUT) represents the relation between color and intensity of stars.

Select the option 'Show LUT' in the 'Image' menu.

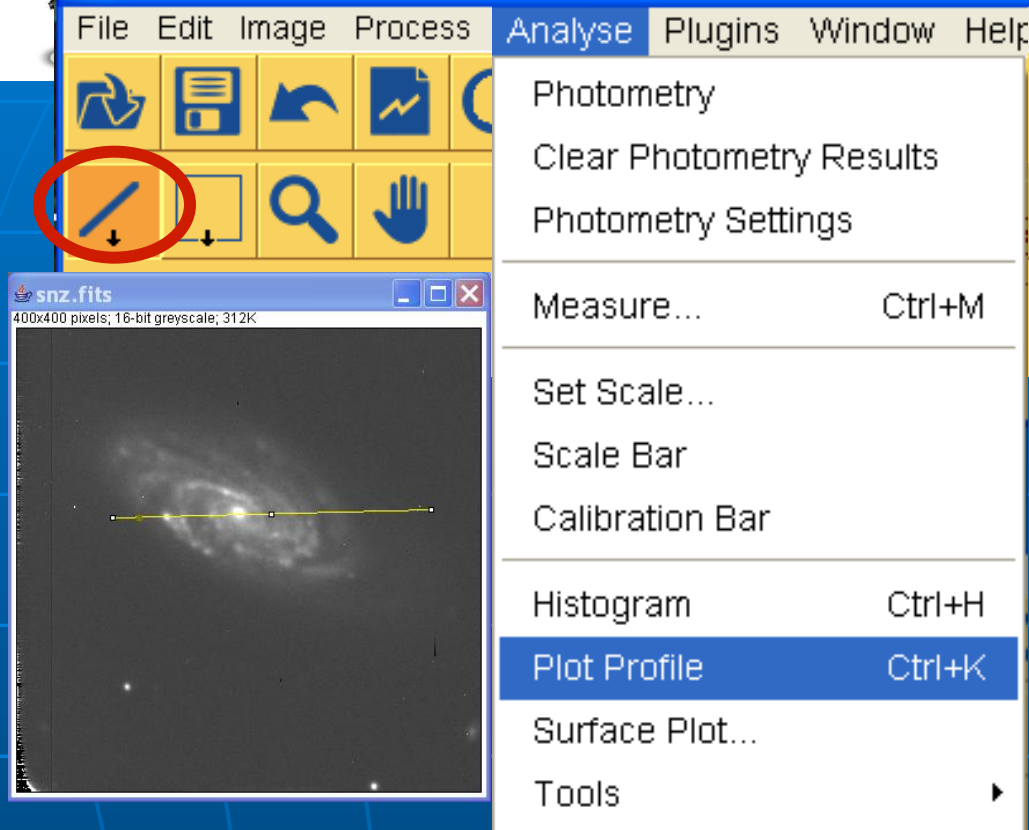


Change the Look-Up Table

Select the option 'Lookup Tables' in the 'Image' menu, for example 'Red', 'Green', 'Blue' or multi-color LUT 'Spectrum'.

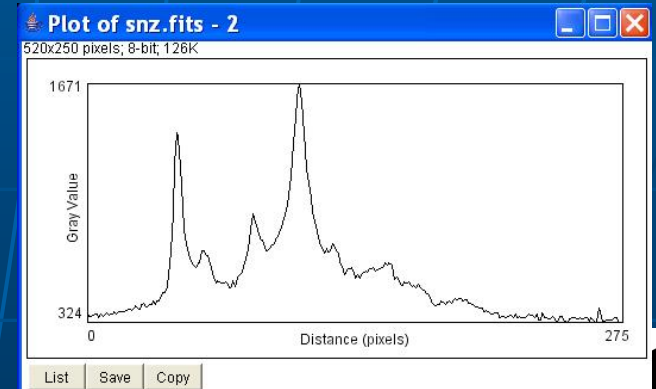


Make a profile



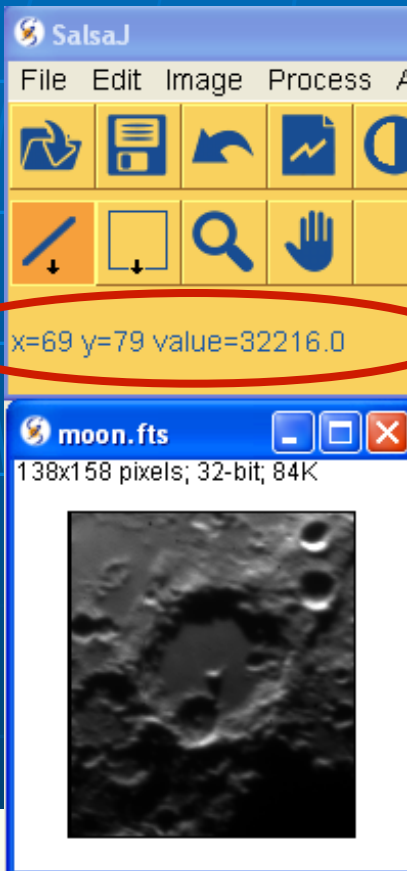
The cursor on the segment displays the actual position on the profile.

Plot a segment on the image to get the corresponding plot profile.



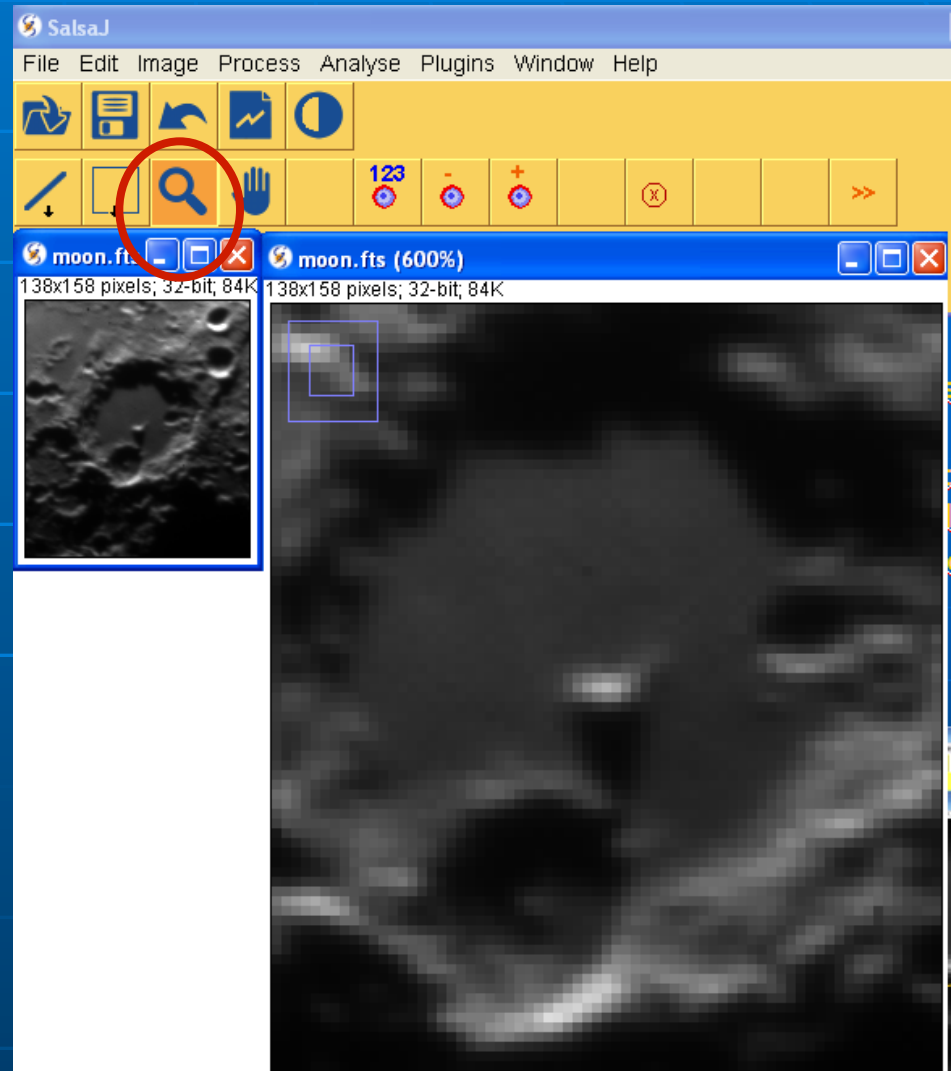
About the Display

- Open a moon image



- x and y are the coordinates of the cursor.
- In this example x and y are the coordinates of the central spike of the biggest crater.
- Value is the number of counts of the pixel which coordinates are displayed (brightness)

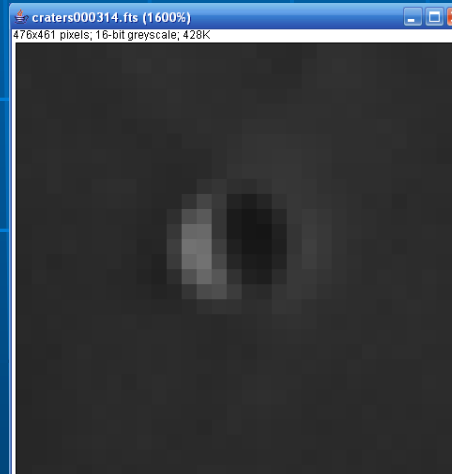
- In SalsaJ, you can “zoom” the image using the magnifying glass tool in the tool bar.
- Just click anywhere in the image and it zooms in.
- To “zoom out” hold down Ctrl key while clicking on the image or use the right side or your mouse.



Measuring size with images



Open an
image
and
zoom in



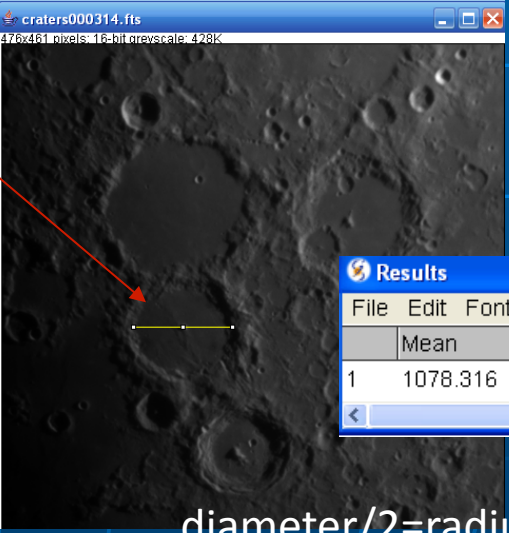
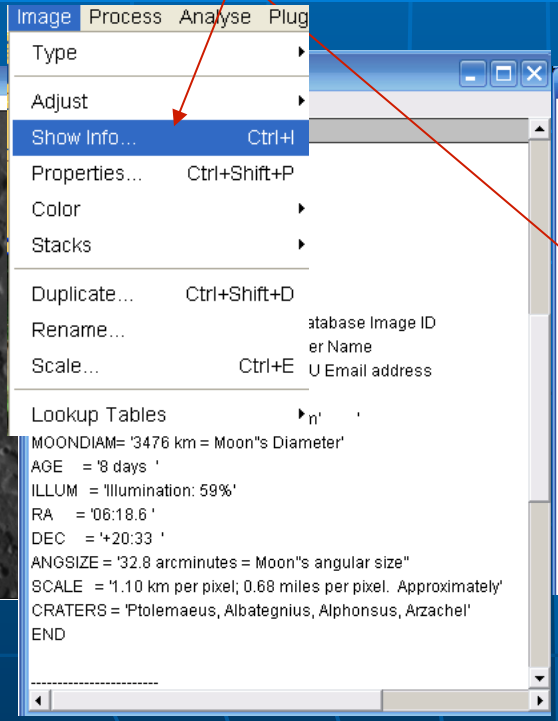
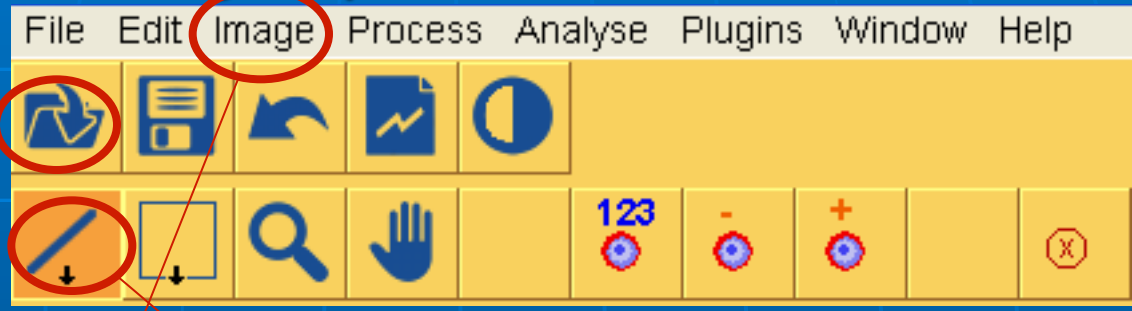
Each square is
a pixel
(picture
element)

Measuring size with images

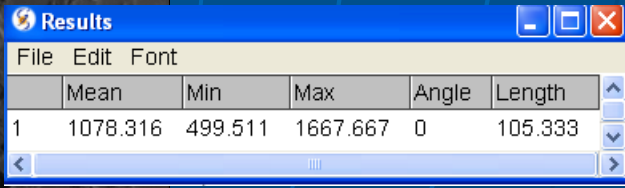
- Find a crater as big as your town.

Open image

Craters000314.fits



Finally in "Analyse" menu choose 'measure'

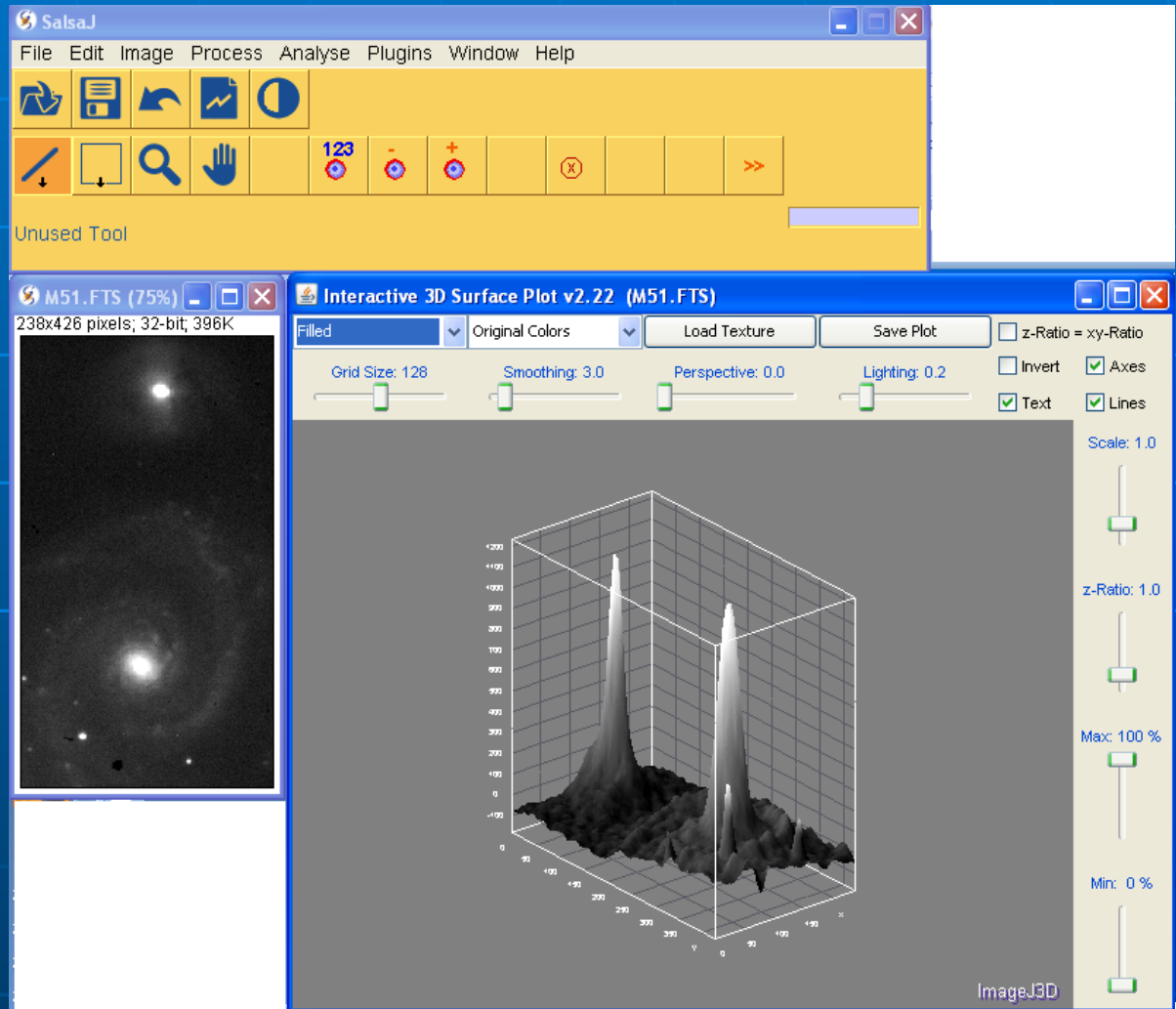


	Mean	Min	Max	Angle	Length
1	1078.316	499.511	1667.667	0	105.333

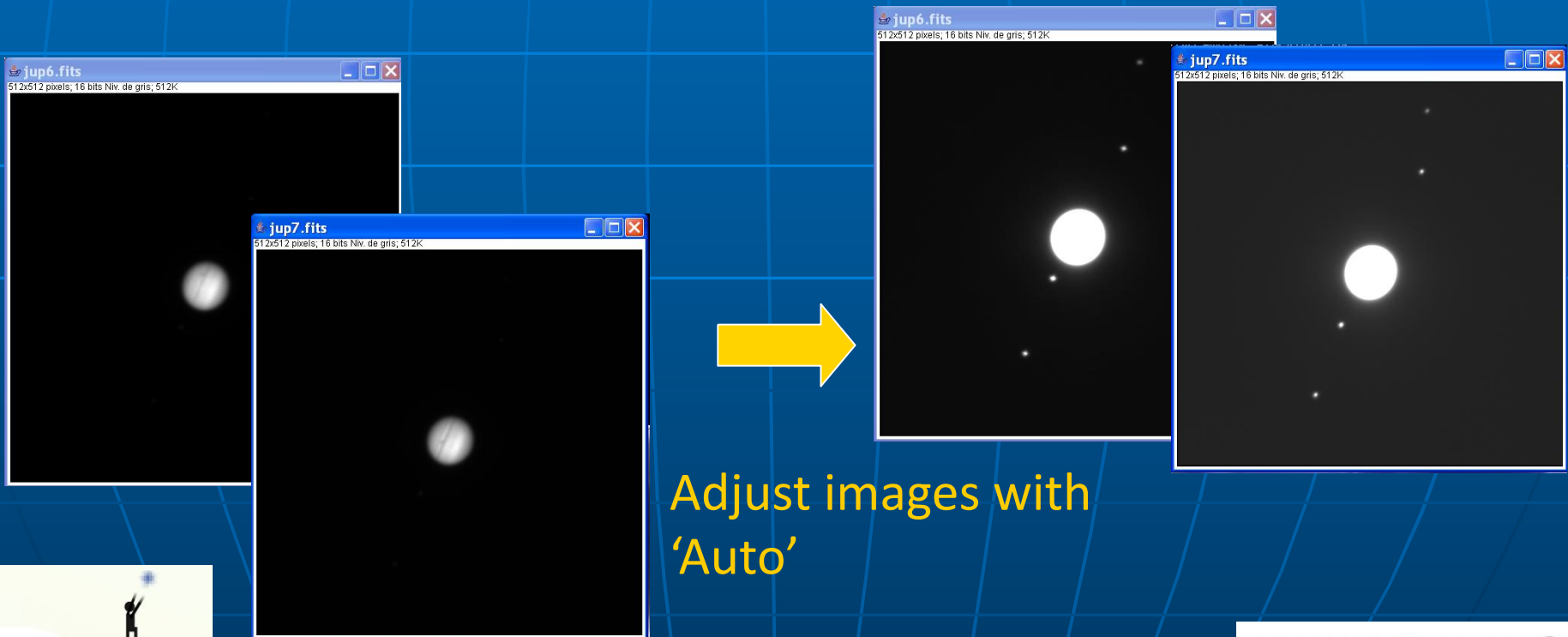
diameter/2=radius
 radius x 1.1km
 Area= π radius²

Make a surface plot

- Select a region in image “M51.fits” to obtain the correspondent surface plot or just measure the whole image
- Open the “Analyze” menu and choose “Surface plot” and accept the default options.

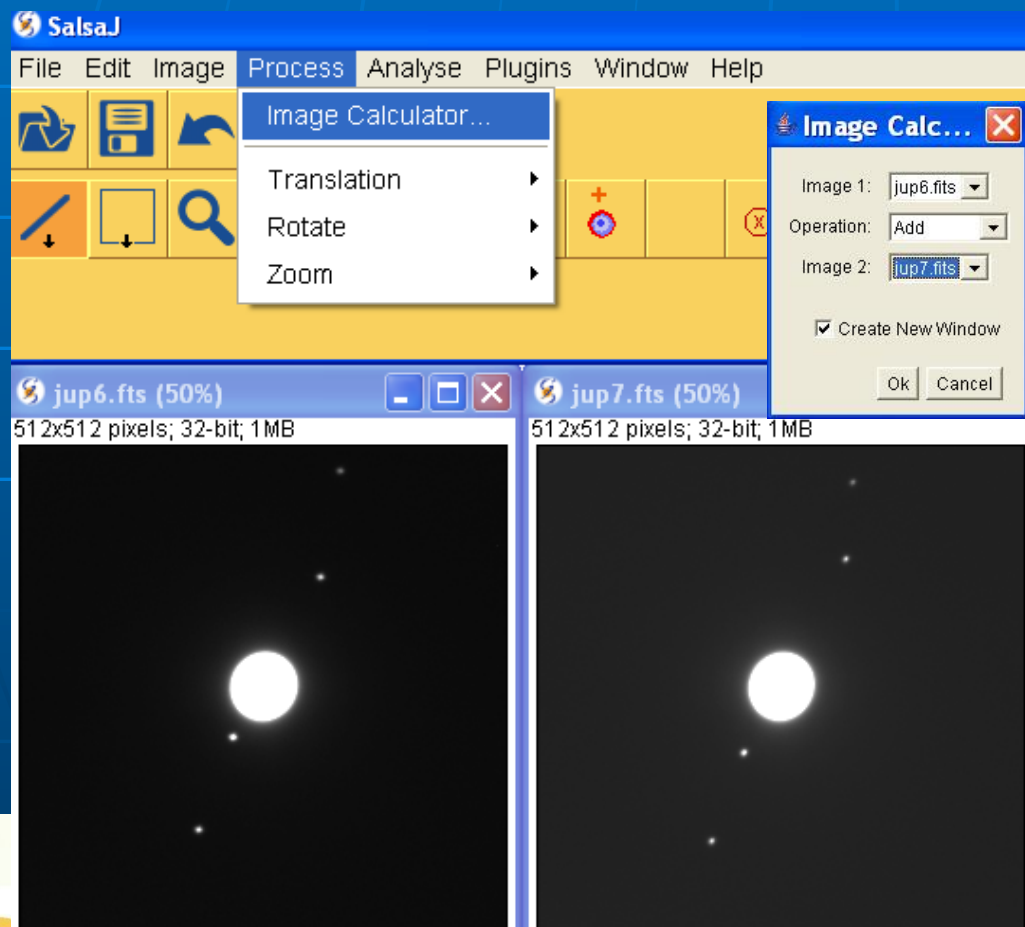


Open two images to make some basic operations :

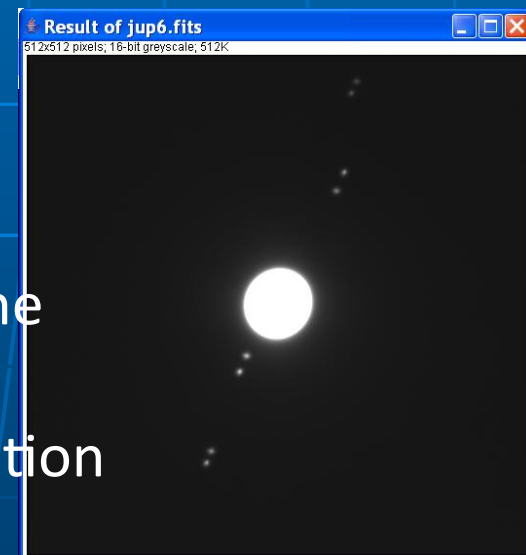


Add two images

To compare two images, it is interesting to add them : Select in the 'Process' menu the option 'Image Calculator...', the result will be created in a new window.

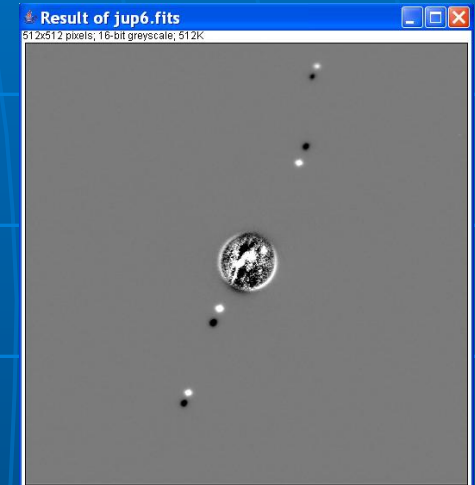
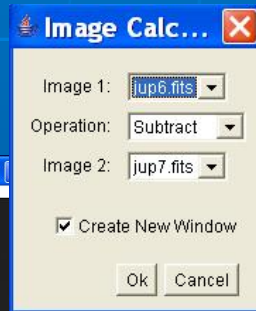


Choose the images, the operation and click 'OK'



Subtract two images

It is also interesting to subtract them :



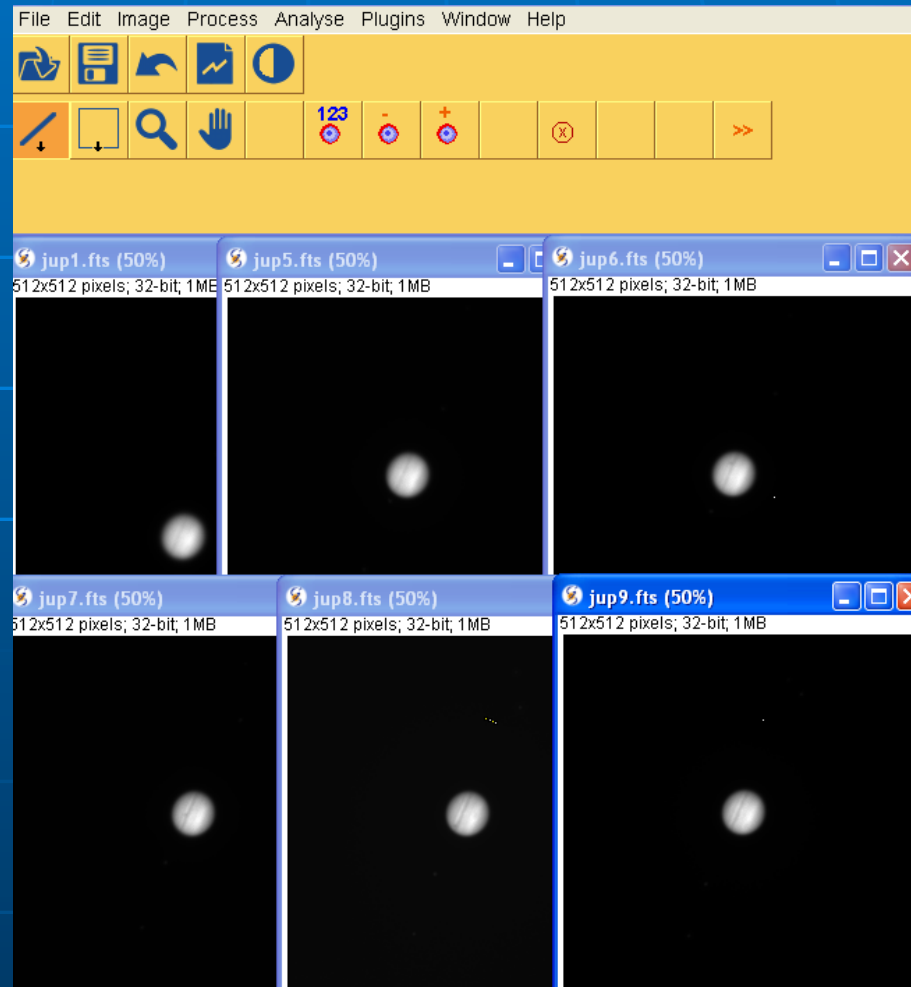


Make a movie



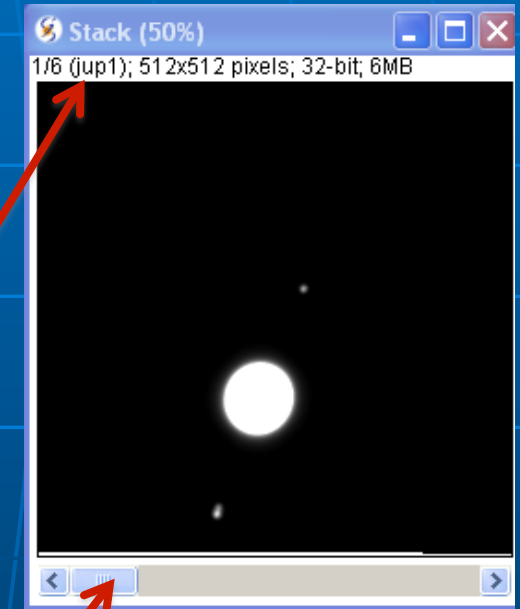
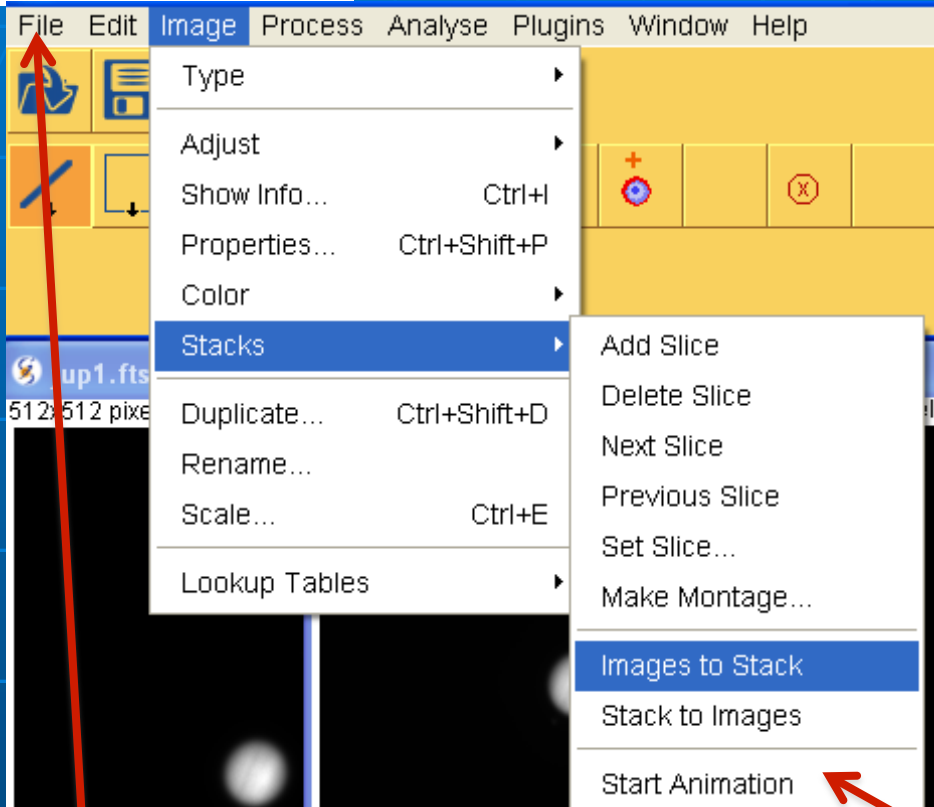
To make a movie open all the images and chose in the Image menu the option Stacks followed by Images to Stack

Open all Jupiter files



Make a movie

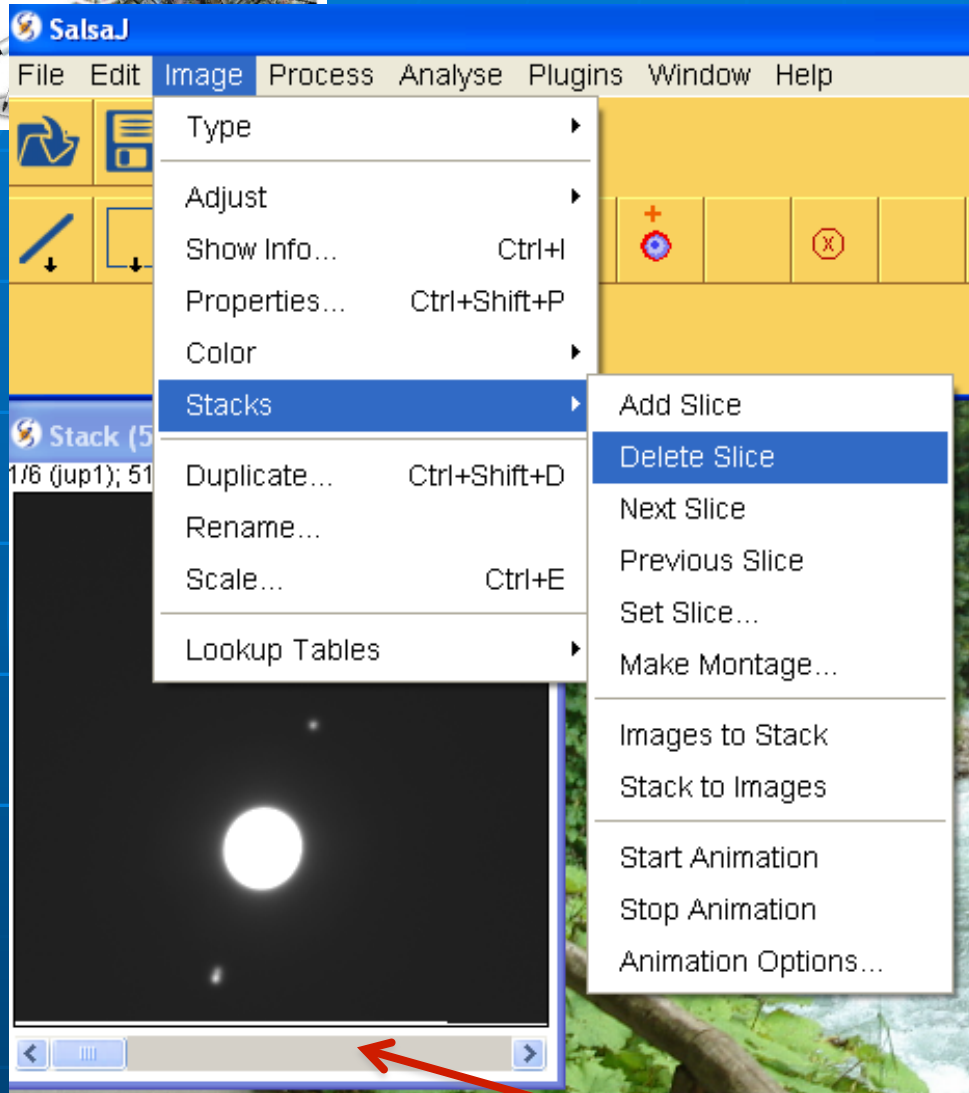
Convert images to stack. Adjust brightness and contrast to be able to see the Moons



Identify the image that doesn't belong to the sequence

Manually scroll to see the animation. Or Start animation

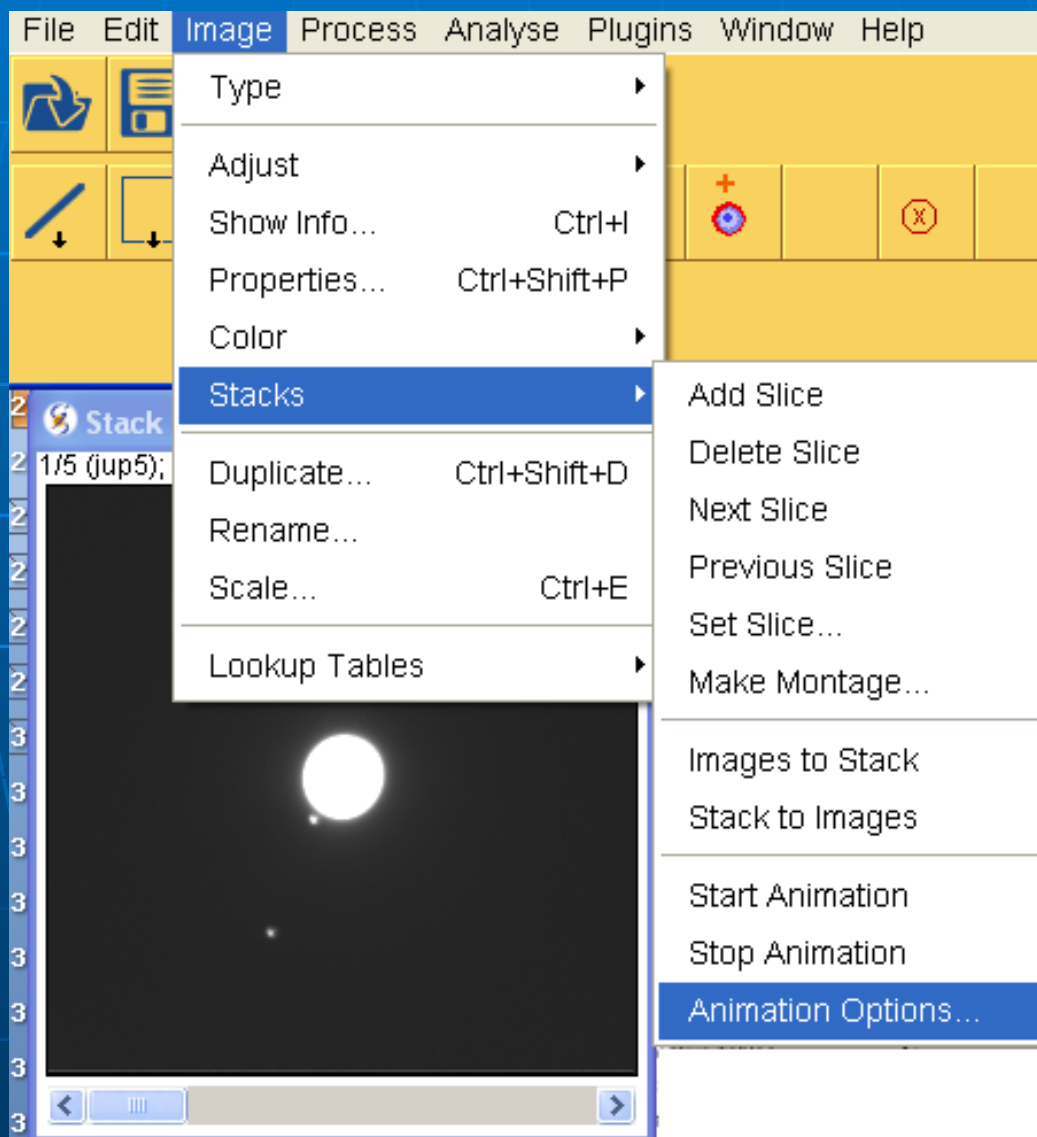
You can save the stack as and .avi file



Delete a slice

Manually position in the slice you want to delete

Change the Speed



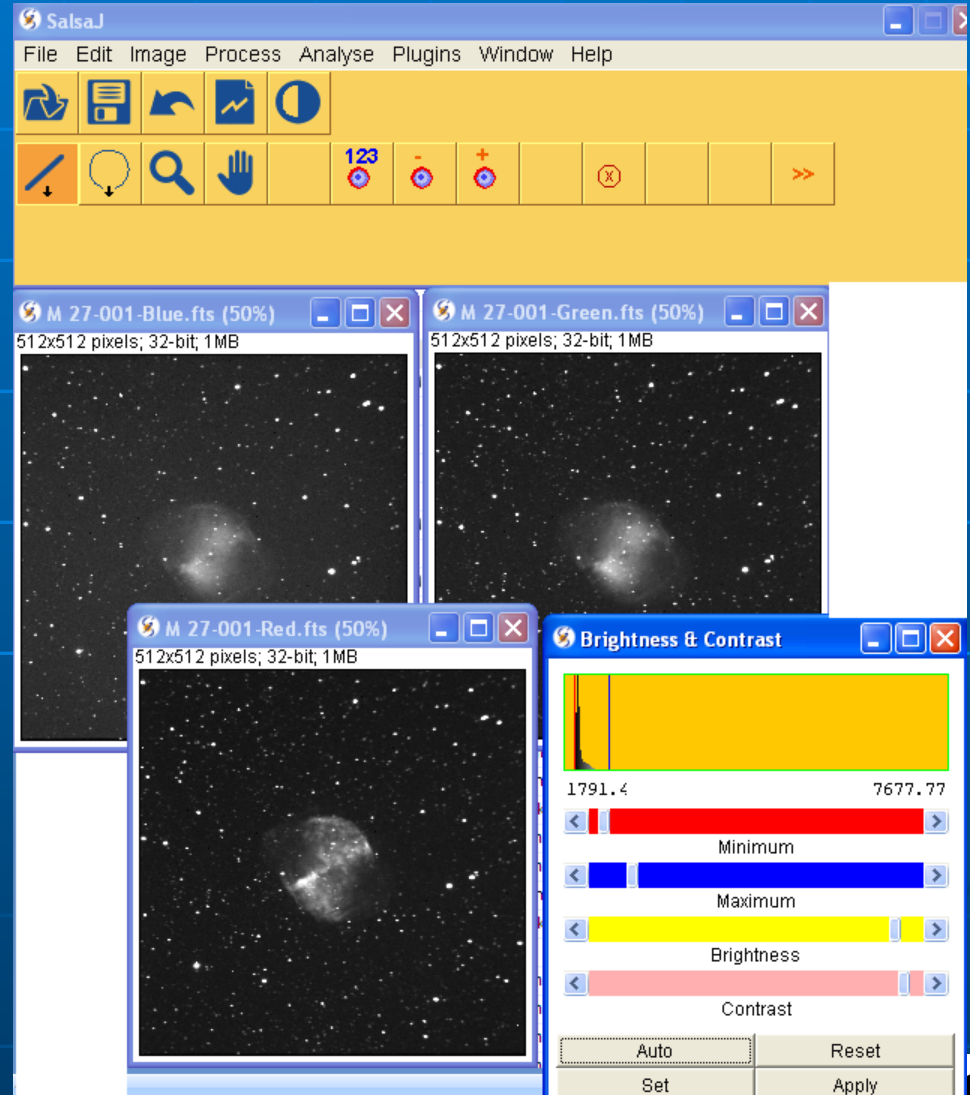
The screenshot shows the 'Image' menu with the following options:

- Type
- Adjust
- Show Info... (Ctrl+I)
- Properties... (Ctrl+Shift+P)
- Color
- Stacks (selected)
 - Add Slice
 - Delete Slice
 - Next Slice
 - Previous Slice
 - Set Slice...
 - Make Montage...
 - Images to Stack
 - Stack to Images
 - Start Animation
 - Stop Animation
 - Animation Options... (selected)
- Duplicate... (Ctrl+Shift+D)
- Rename...
- Scale... (Ctrl+E)
- Lookup Tables

The background shows a software interface with a toolbar on the left, a stack of images on the left, and a main window displaying a bright celestial object (likely Jupiter) against a dark background.

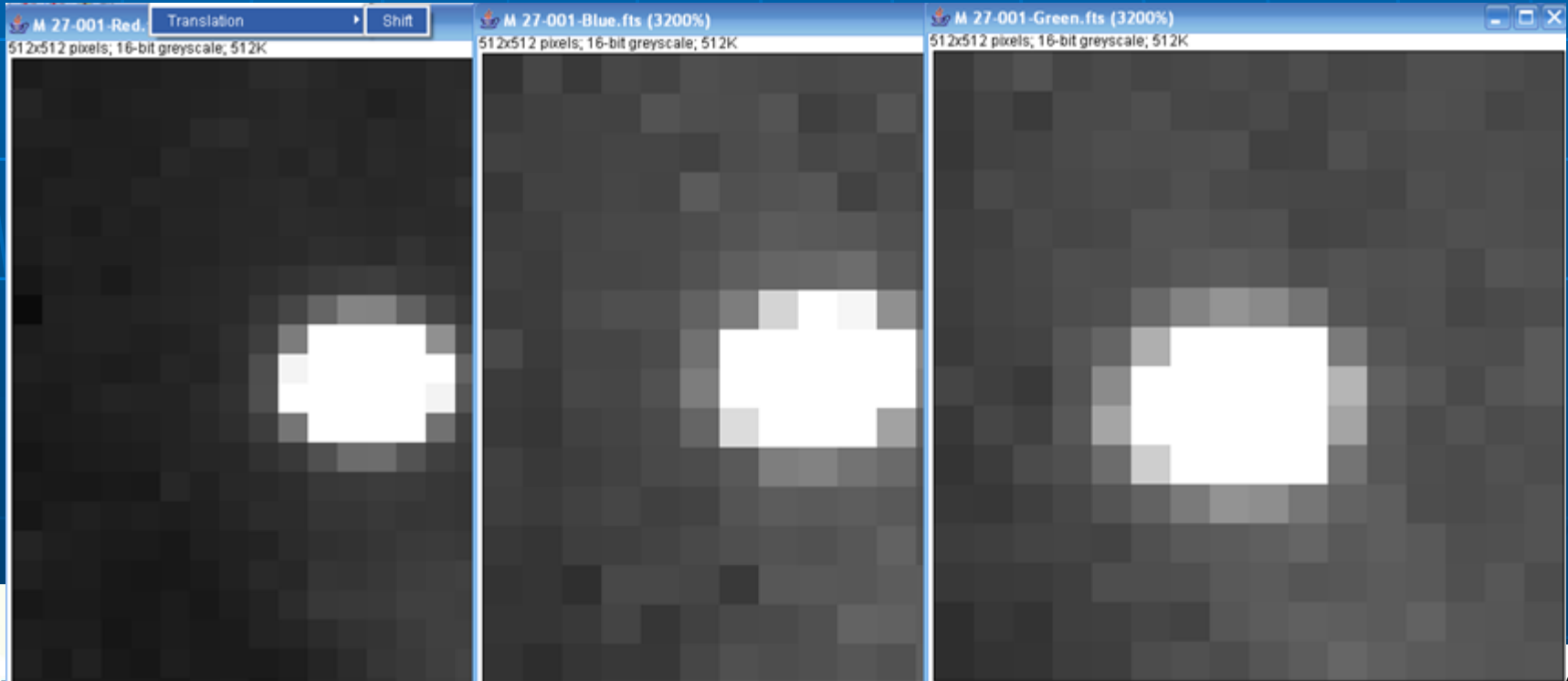
Color Images with SalsaJ

- Open M27 blue, green and red images. Remember to adjust brightness and contrast



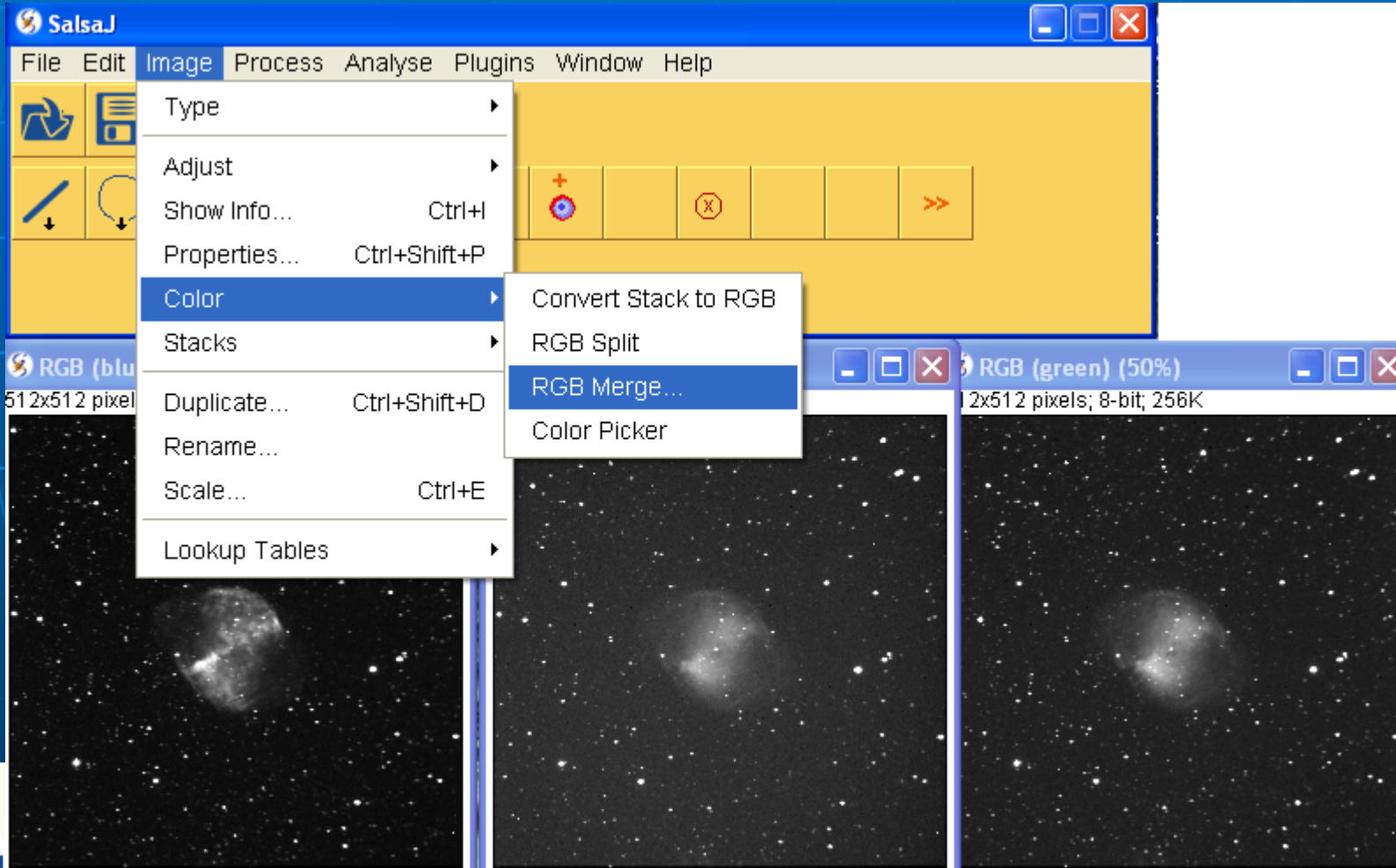
color images with SalsaJ

- After zooming each image to the maximum, verify the coordinates of the pixel with higher counts (value) and use the function 'translation' in "Process" menu to correct the shift...if needed ... you will not need it in this example.



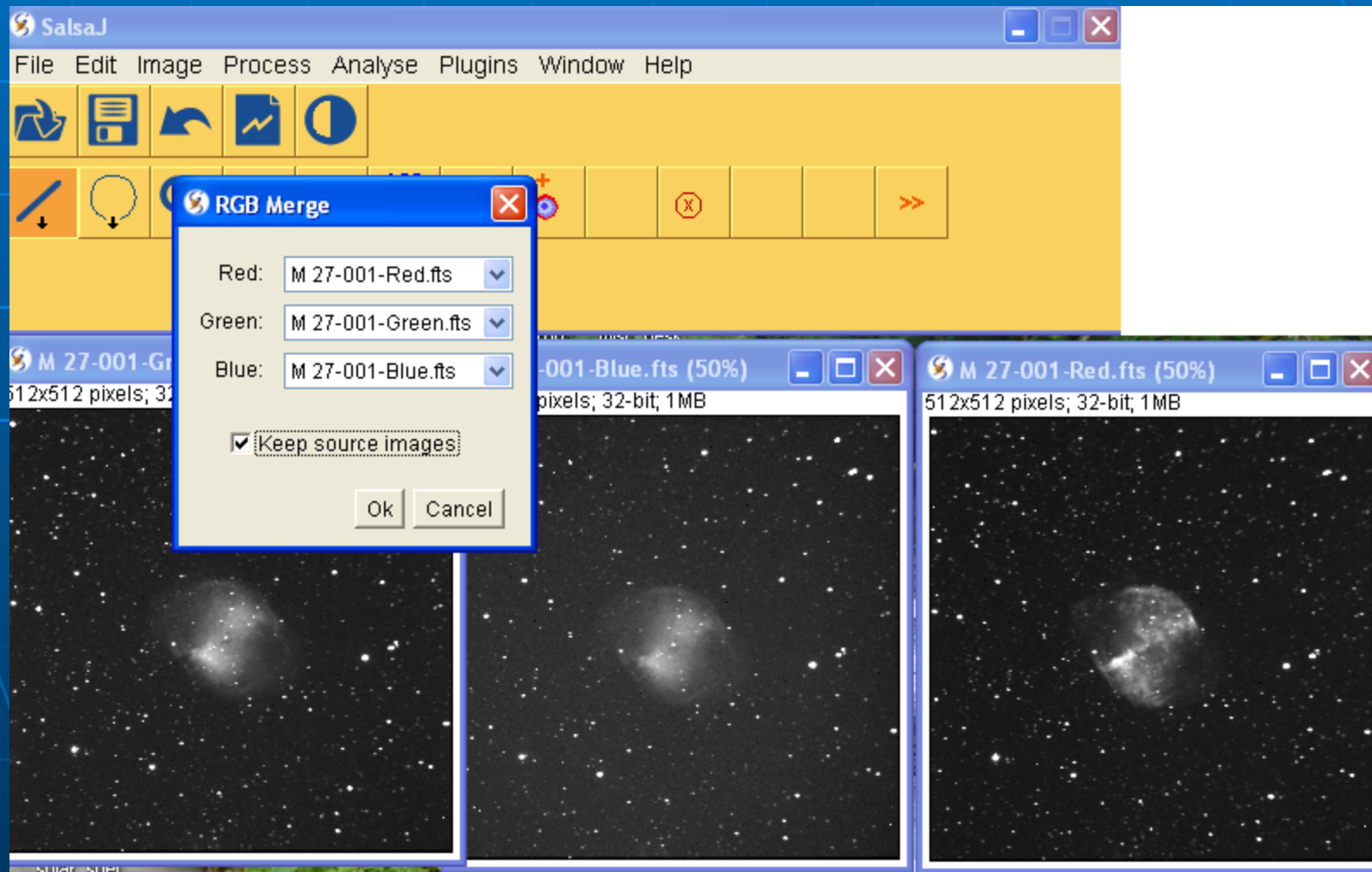
Color Images with SalsaJ

- Build a color image using 'RGB Merge' of 'color' in "Image" menu.



Color Images with SalsaJ

- On the displayed box choose the correspondent image and remember to check the option 'keep source stacks'.





Color Images with SalsaJ



- Usually the filter is not part of the name of the image. To find this check the image info.

Att.: jpeg images don't have this type of info associated to it. This is a FITS feature

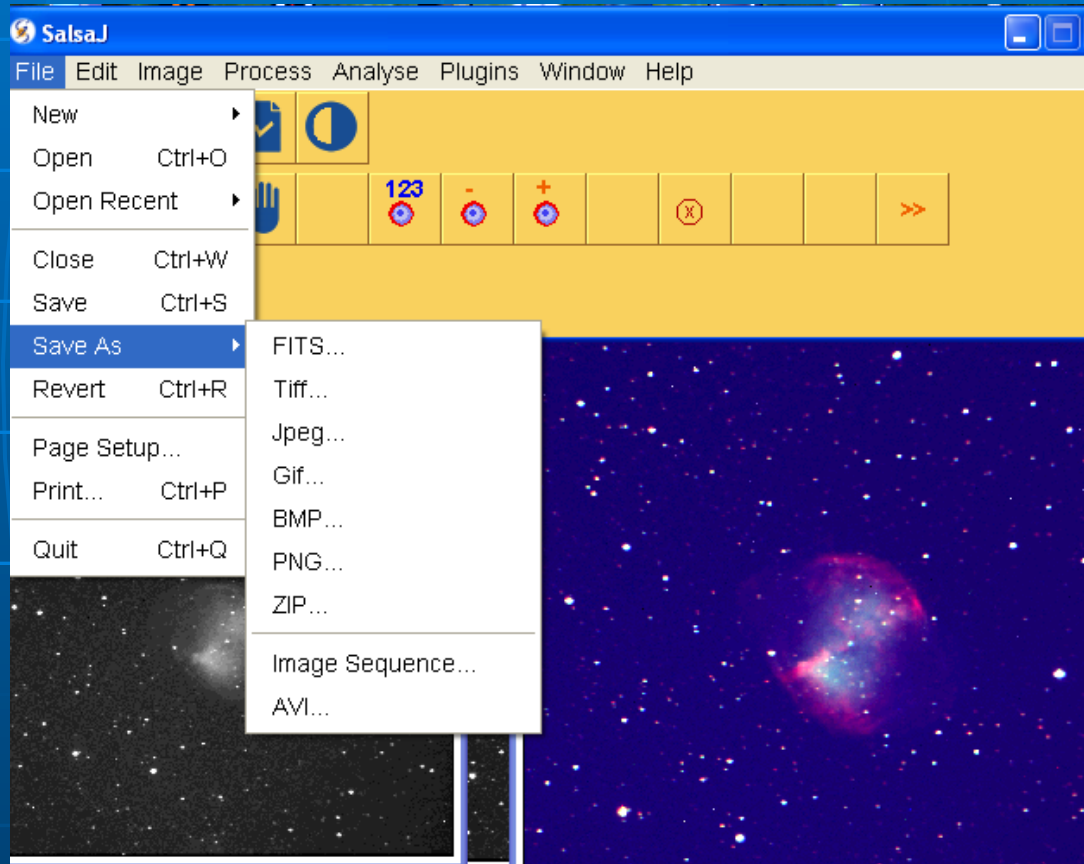
SIMPLE	=	T
BITPIX	=	16 /8 unsigned int, 16 & 32 int, -32 & -64 real
NAXIS	=	2 /number of axes
NAXIS1	=	512 /fastest changing axis
NAXIS2	=	512 /next to fastest changing axis
BSCALE	=	1.0000000000000000 /physical = BZERO + BSCALE*2

FITS or Flexible Image Transport System is a digital file format used to store, transmit, and manipulate images.

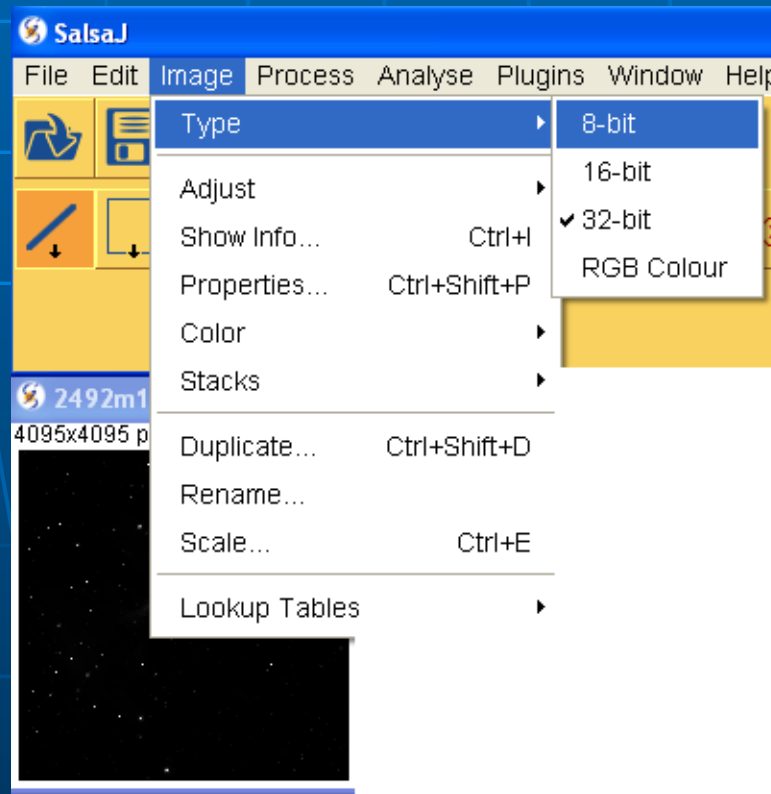


color images with SalsaJ

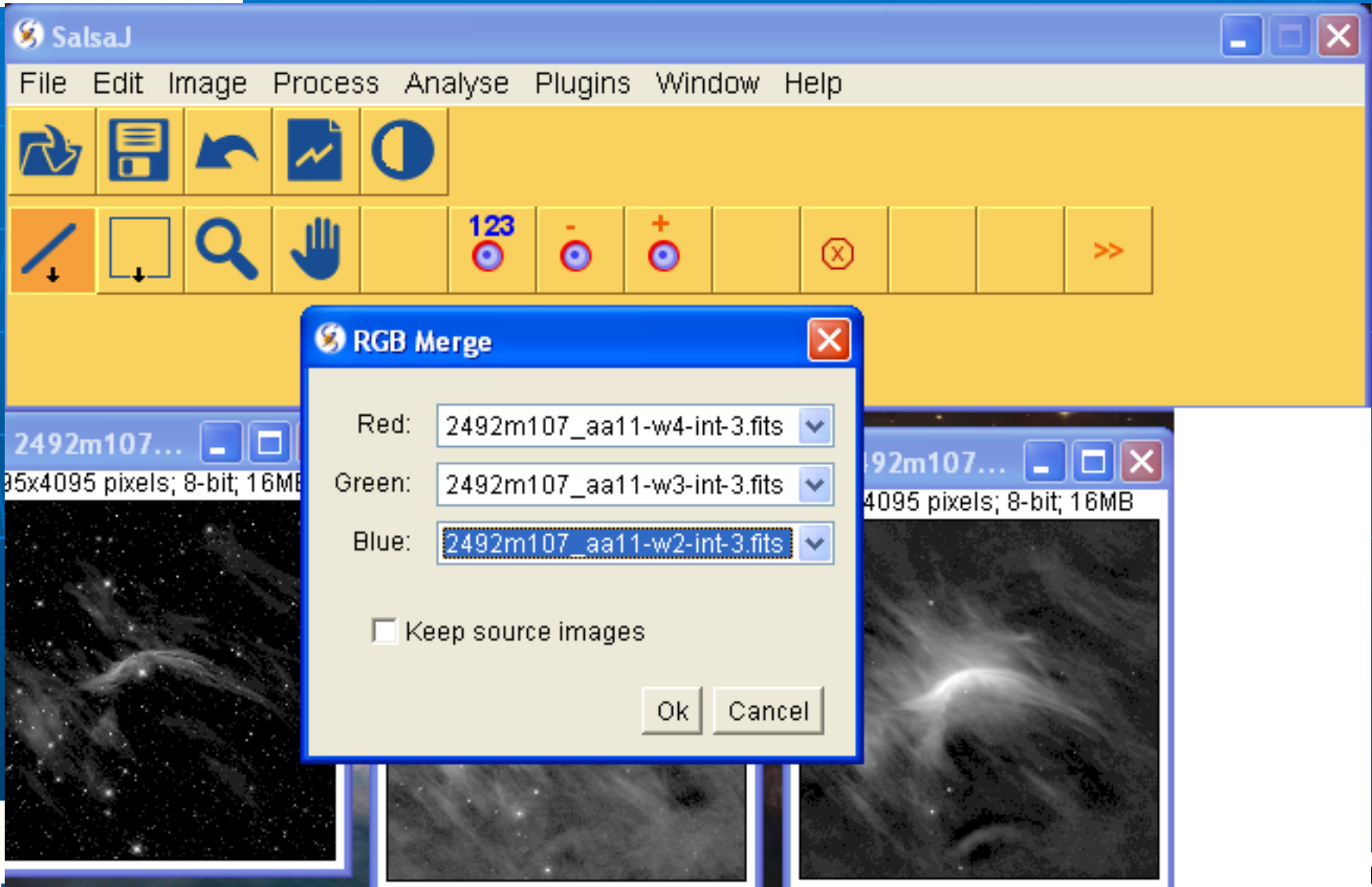
- If the result is good save the image.



- Open the ZetaOph images W2, W3 and W4 from WISE telescope one by one and change the type to 8 bit to reduce the size if needed

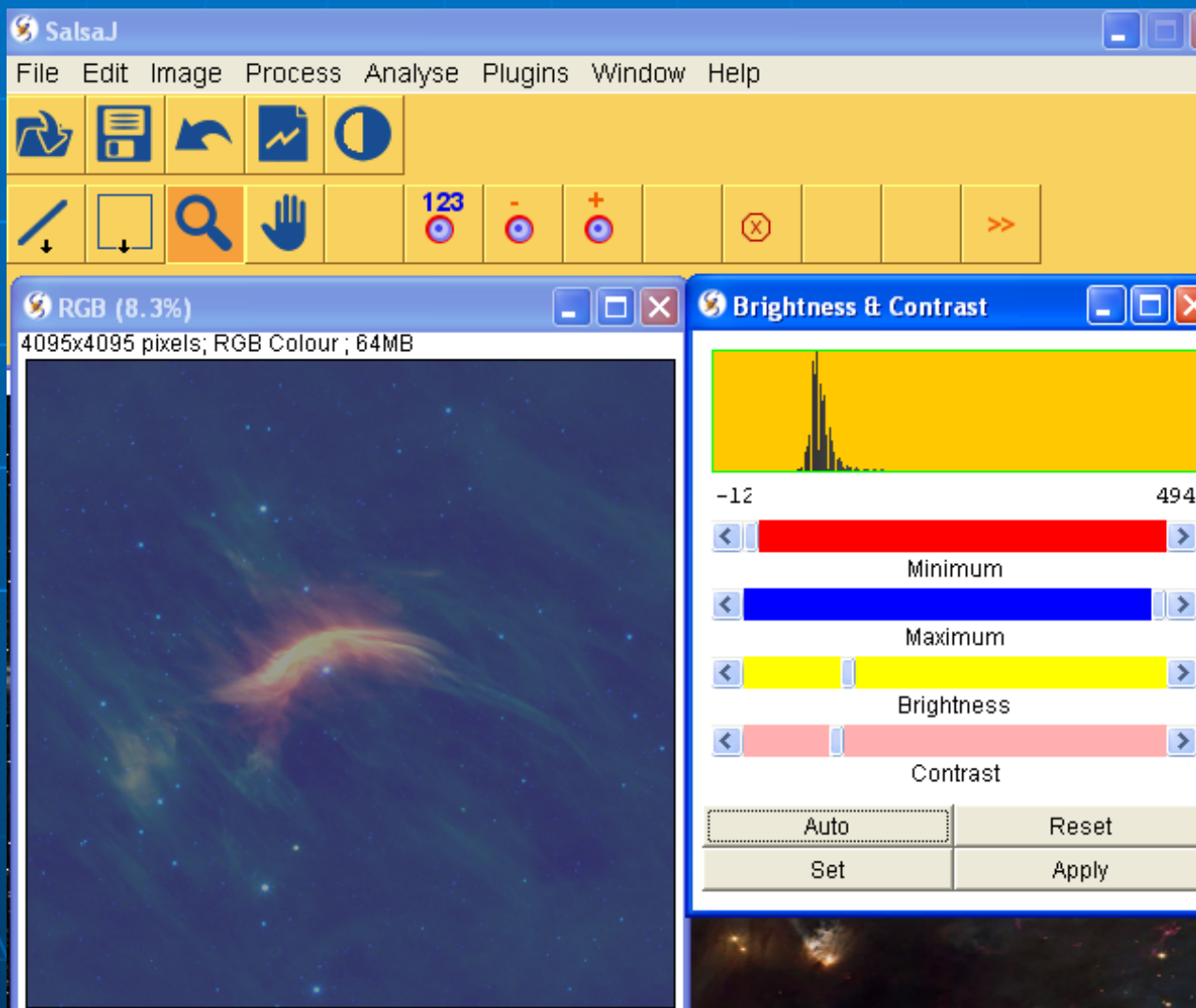


Make your color image



The screenshot shows the SalsaJ software interface. The main window has a menu bar (File, Edit, Image, Process, Analyse, Plugins, Window, Help) and a toolbar with various icons. A dialog box titled "RGB Merge" is open in the foreground, allowing the user to select source images for the Red, Green, and Blue channels. The Red channel is set to "2492m107_aa11-w4-int-3.fits", the Green channel to "2492m107_aa11-w3-int-3.fits", and the Blue channel to "2492m107_aa11-w2-int-3.fits". There is an unchecked checkbox for "Keep source images" and "Ok" and "Cancel" buttons at the bottom of the dialog. The background shows a multi-panel astronomical image of a nebula, with the central panel being the largest and most prominent.

Play with the image



SalsaJ

File Edit Image Process Analyse Plugins Window Help

RGB (8.3%)
4095x4095 pixels; RGB Colour; 64MB

Brightness & Contrast

-12 494

Minimum

Maximum

Brightness

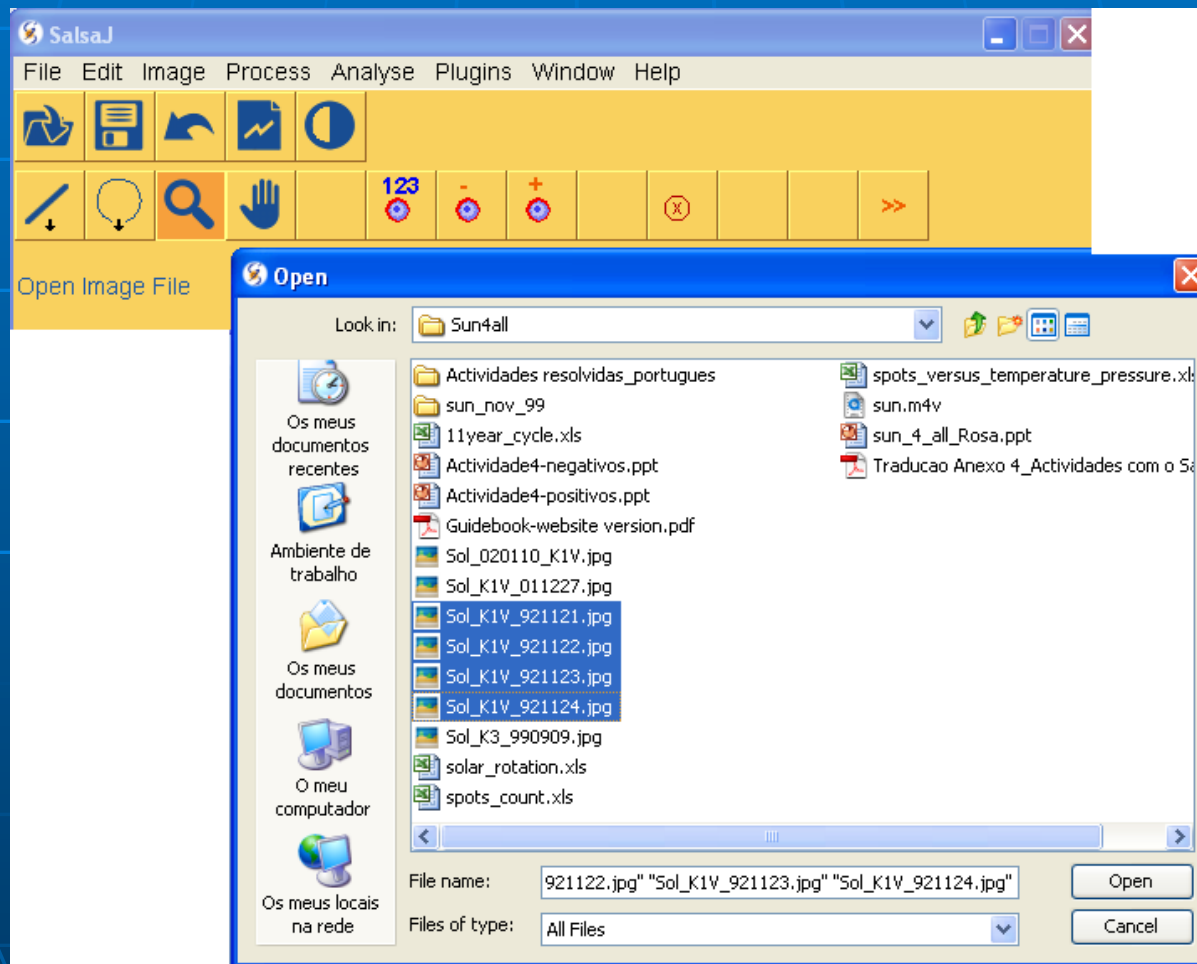
Contrast

Auto Reset

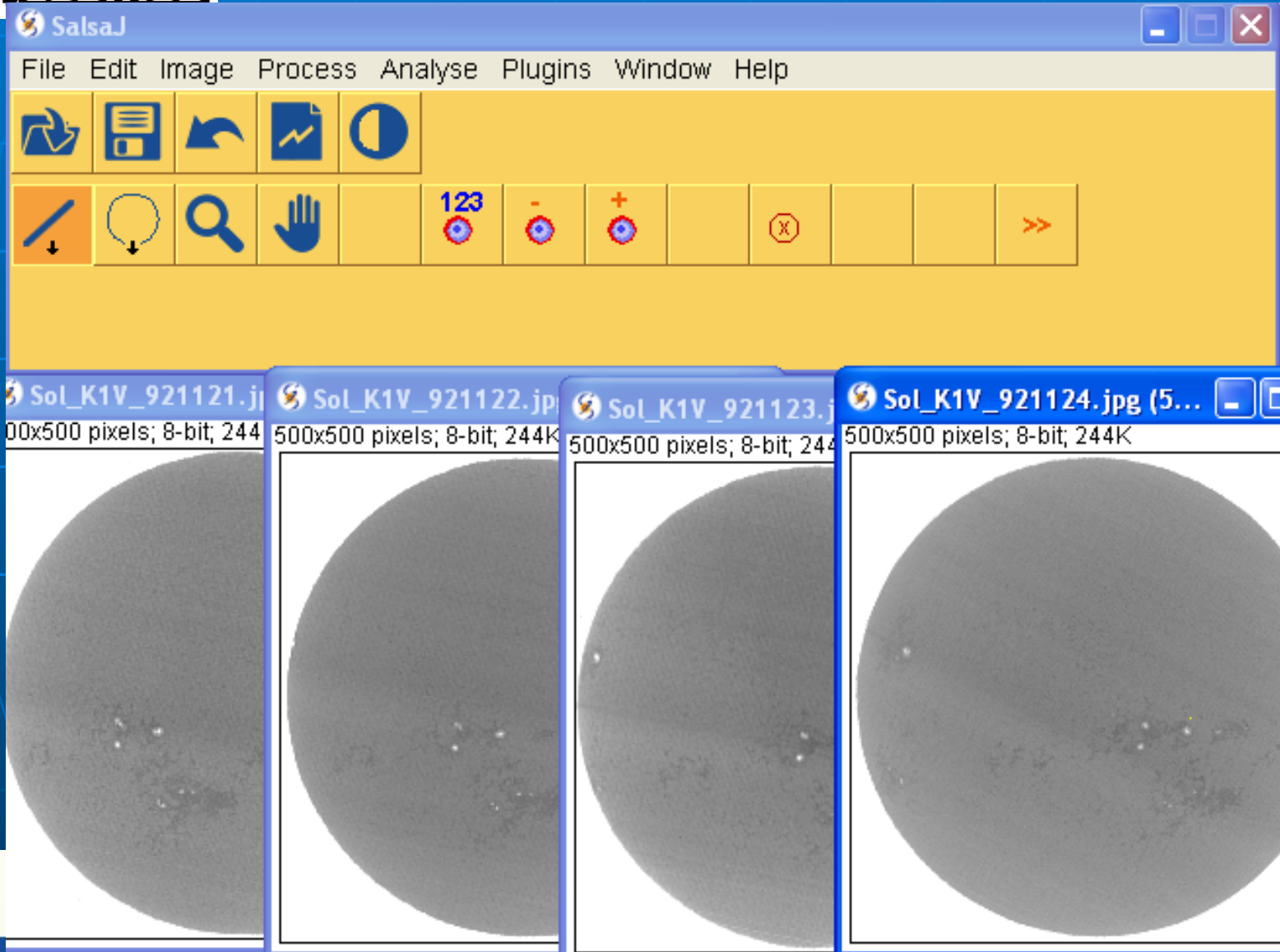
Set Apply

Making a movie

- Open the images of the Sun

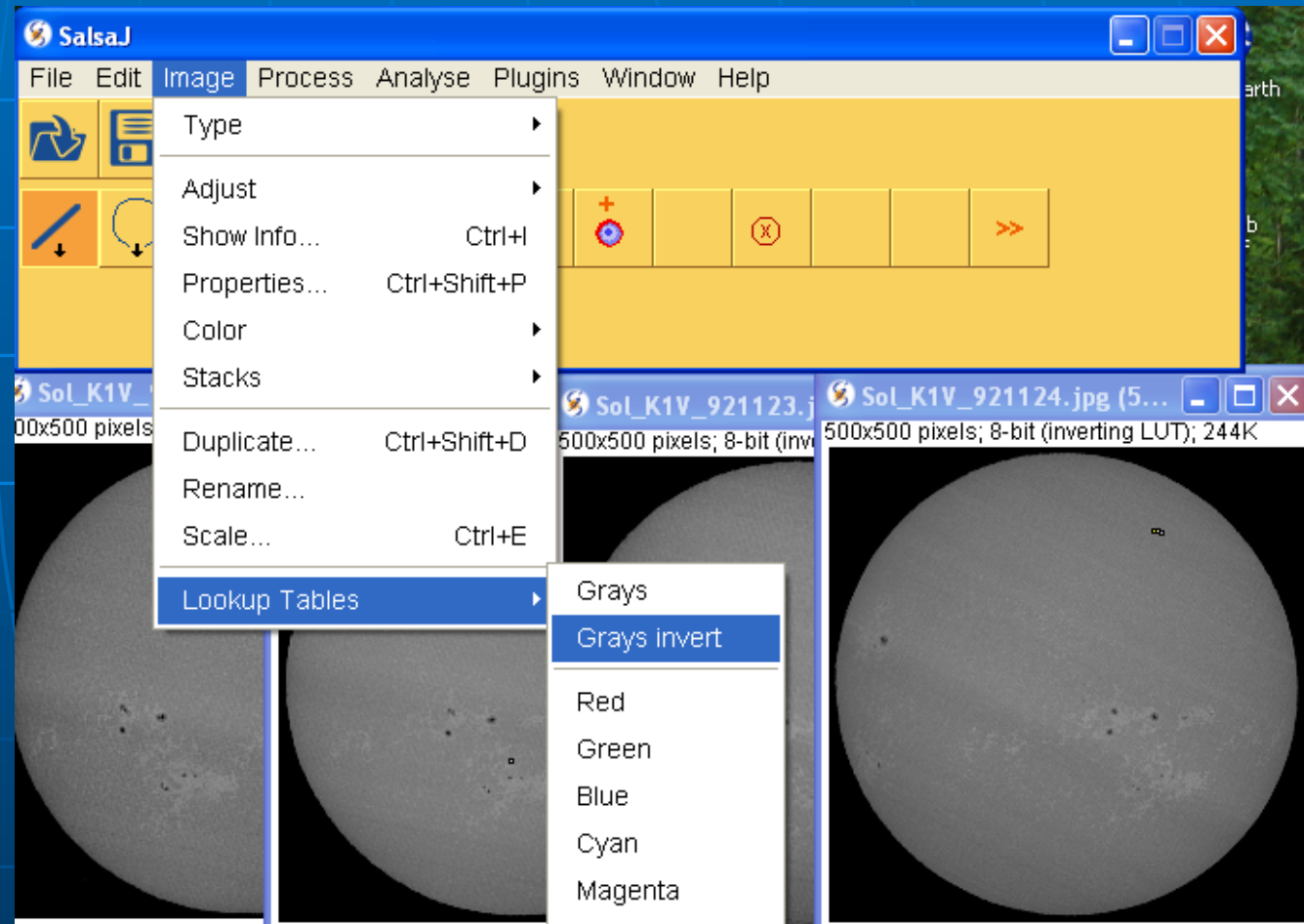


Making a movie

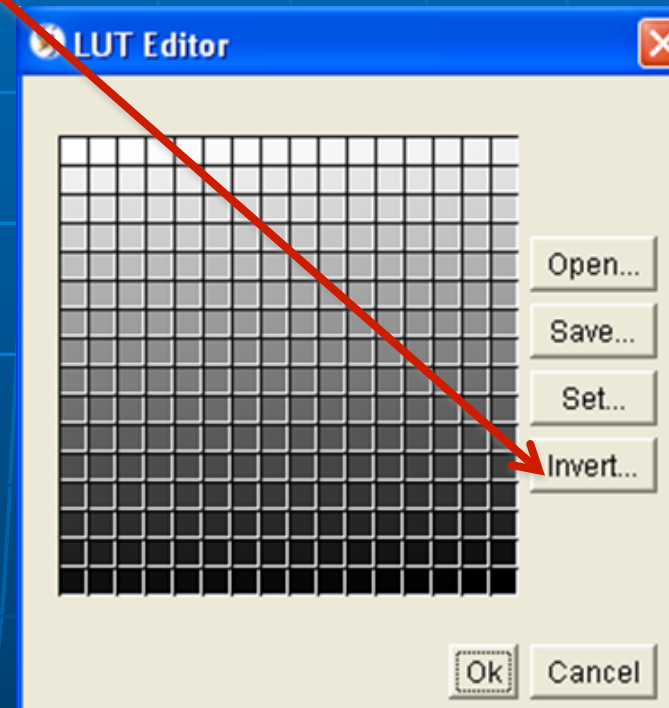
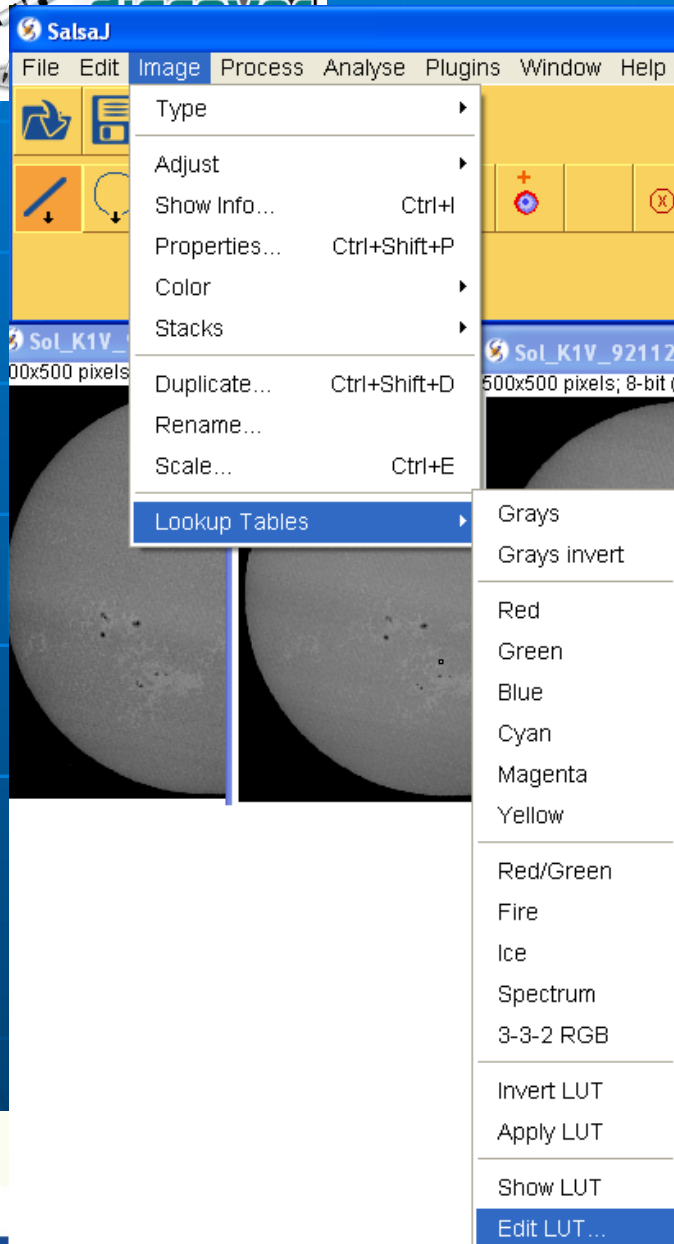


Making a movie

- Invert the color of the images

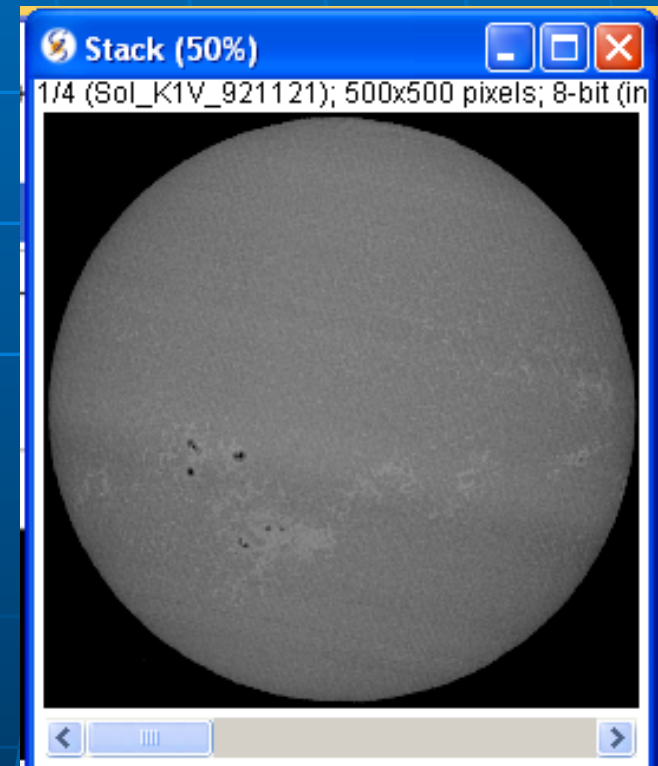
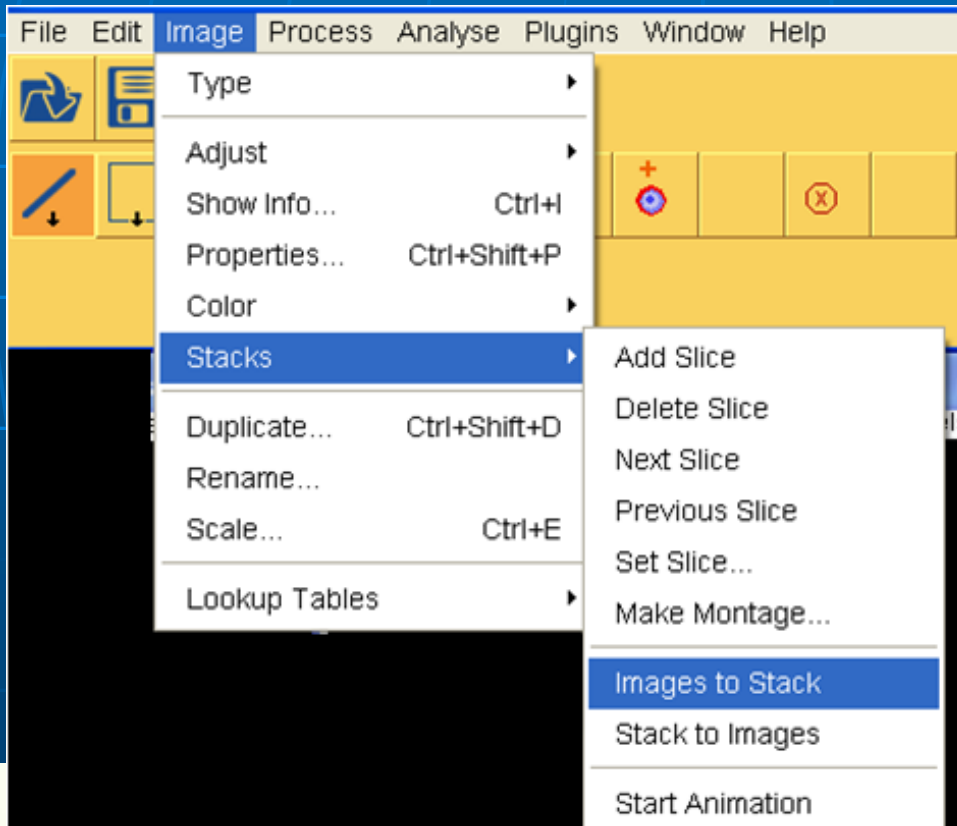


■ Other alternative to invert the color



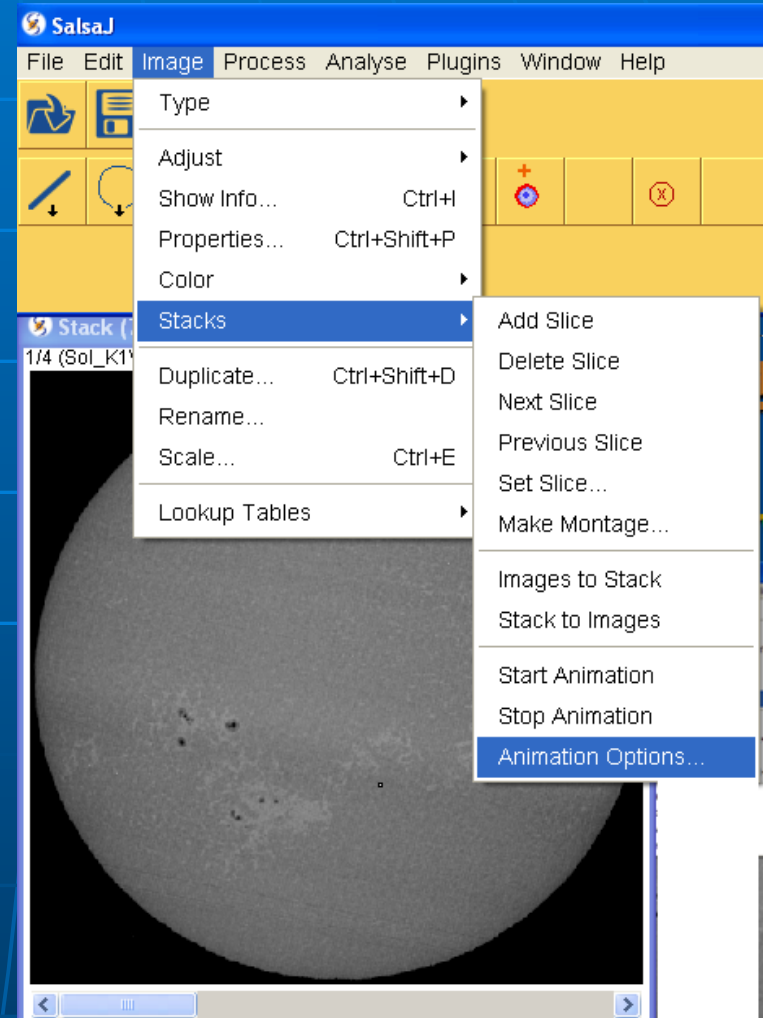
Making a movie

■ Stack -> Convert images to Stack

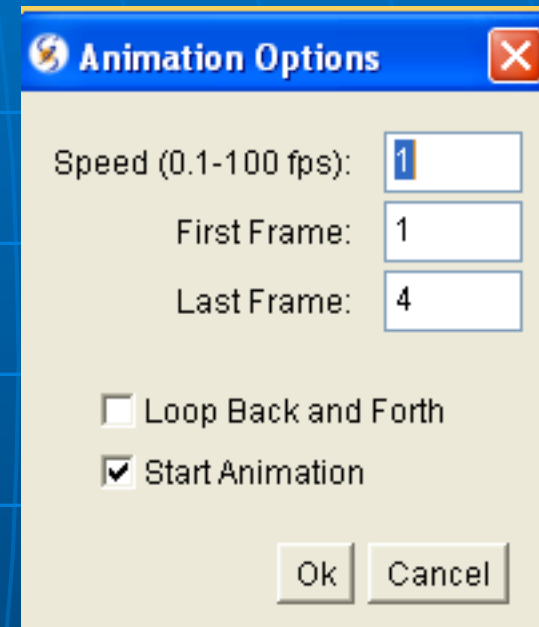
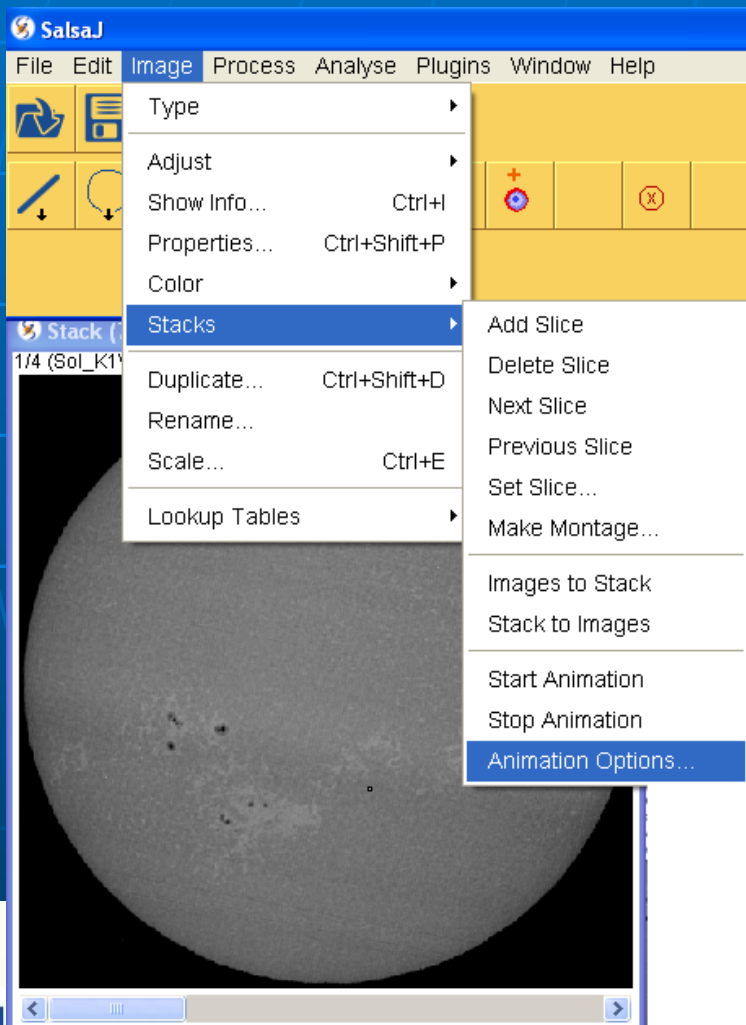


Making a movie

Change the animation options if needed



Making a movie



Change the animation to 1 frame/seg and start animation



COUNTING SUNSPOTS WITH PLOT PROFILE



The screenshot shows the SalsaJ software interface. The 'Analyse' menu is open, and 'Plot Profile' is highlighted. The menu items are:

- Photometry
- Clear Photometry Results
- Photometry Settings
- Measure... (Ctrl+M)
- Set Scale...
- Scale Bar
- Calibration Bar
- Histogram (Ctrl+H)
- Plot Profile (Ctrl+K)**
- Surface Plot...
- Tools

The background image shows a solar image with a yellow line profile drawn across a sunspot. The window title is 'SalsaJ' and the menu bar includes File, Edit, Image, Process, Analyse, Plugins, Window, and Help. The toolbar contains icons for various functions like zoom, pan, and selection.



SalsaJ

File Edit Image Process Analyse Plugins Window Help

520x250 pixels; 8-bit; 126K

Plot of 2011125_0000_hmiigr_512

512x512 pixels; RGB Colour; 1MB

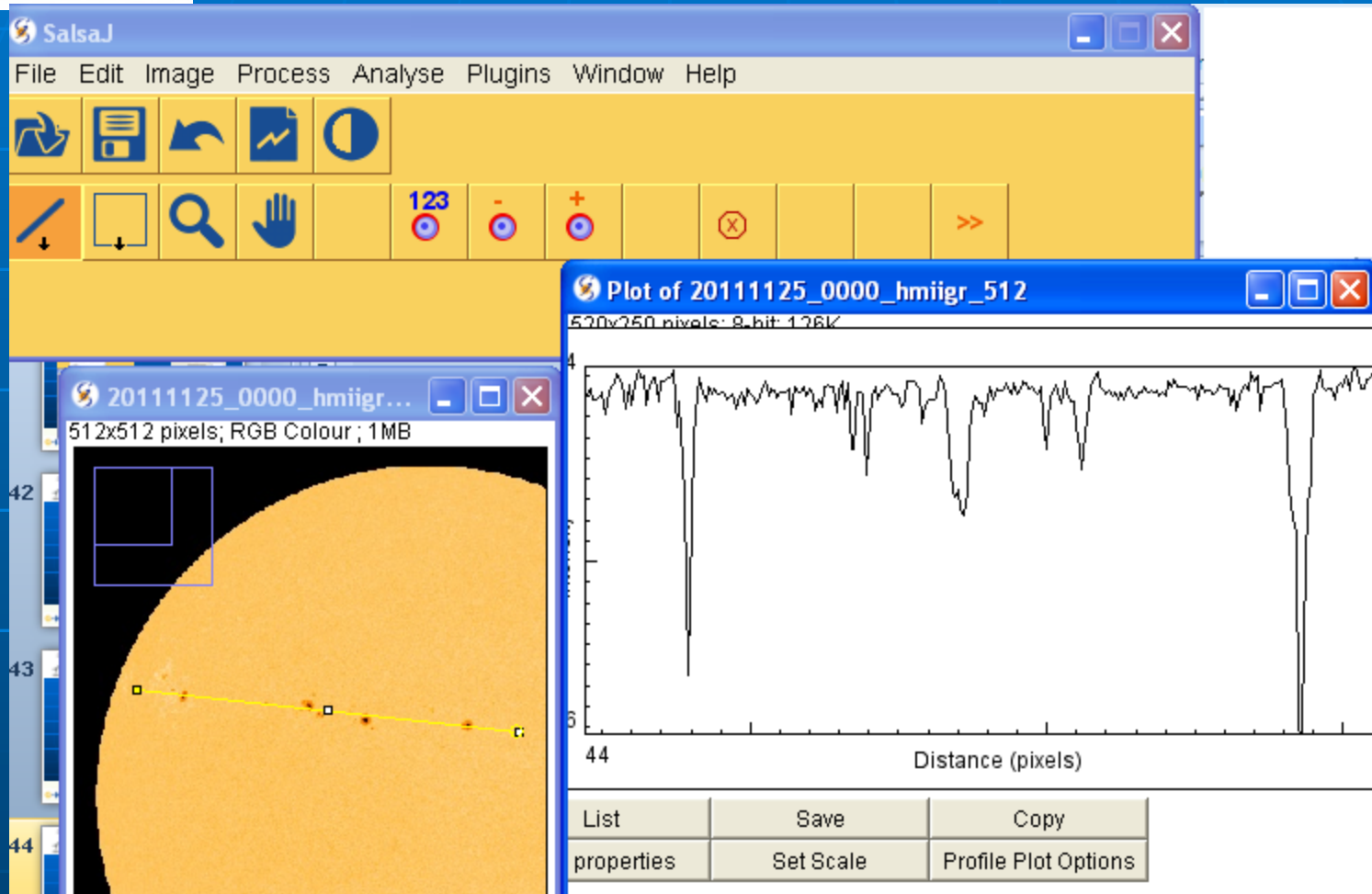
42

43

44

Distance (pixels)

List	Save	Copy
properties	Set Scale	Profile Plot Options





COUNTING SUNSPOTS WITH SURFACE PLOT



The screenshot shows the SalsaJ software interface. The 'Analyse' menu is open, listing various analysis tools. The 'Surface Plot...' option is highlighted in blue. The main window displays a solar image with a yellow rectangular selection box around a sunspot. The status bar indicates the image is 512x512 pixels, RGB Colour, and 1MB.

Menu Item	Shortcut
Photometry	
Clear Photometry Results	
Photometry Settings	
Measure...	Ctrl+M
Set Scale...	
Scale Bar	
Calibration Bar	
Histogram	Ctrl+H
Plot Profile	Ctrl+K
Surface Plot...	
Tools	



SalsaJ

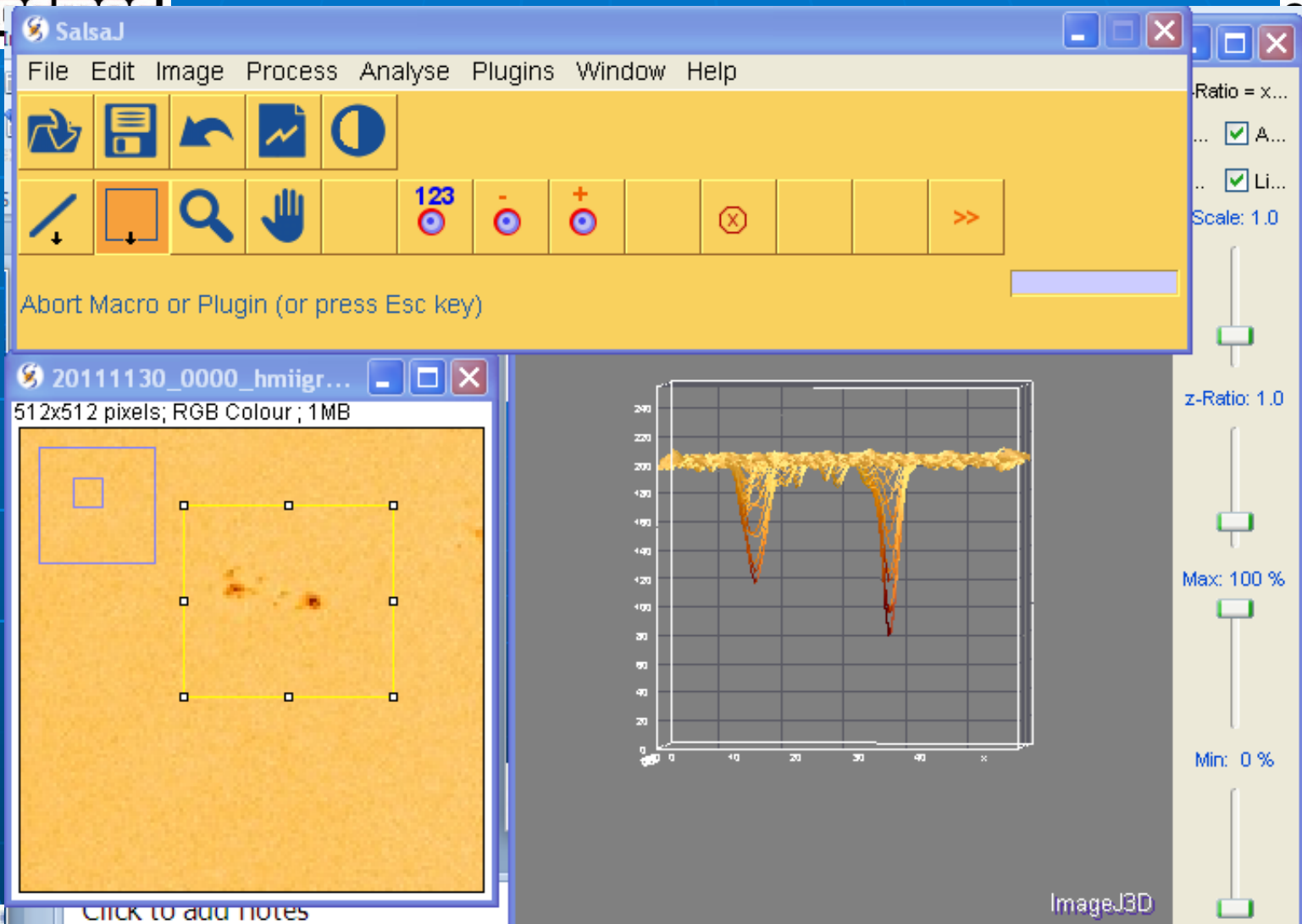
File Edit Image Process Analyse Plugins Window Help

Ratio = x...
... A...
... Li...
Scale: 1.0
z-Ratio: 1.0
Max: 100 %
Min: 0 %

123 - +

Abort Macro or Plugin (or press Esc key)

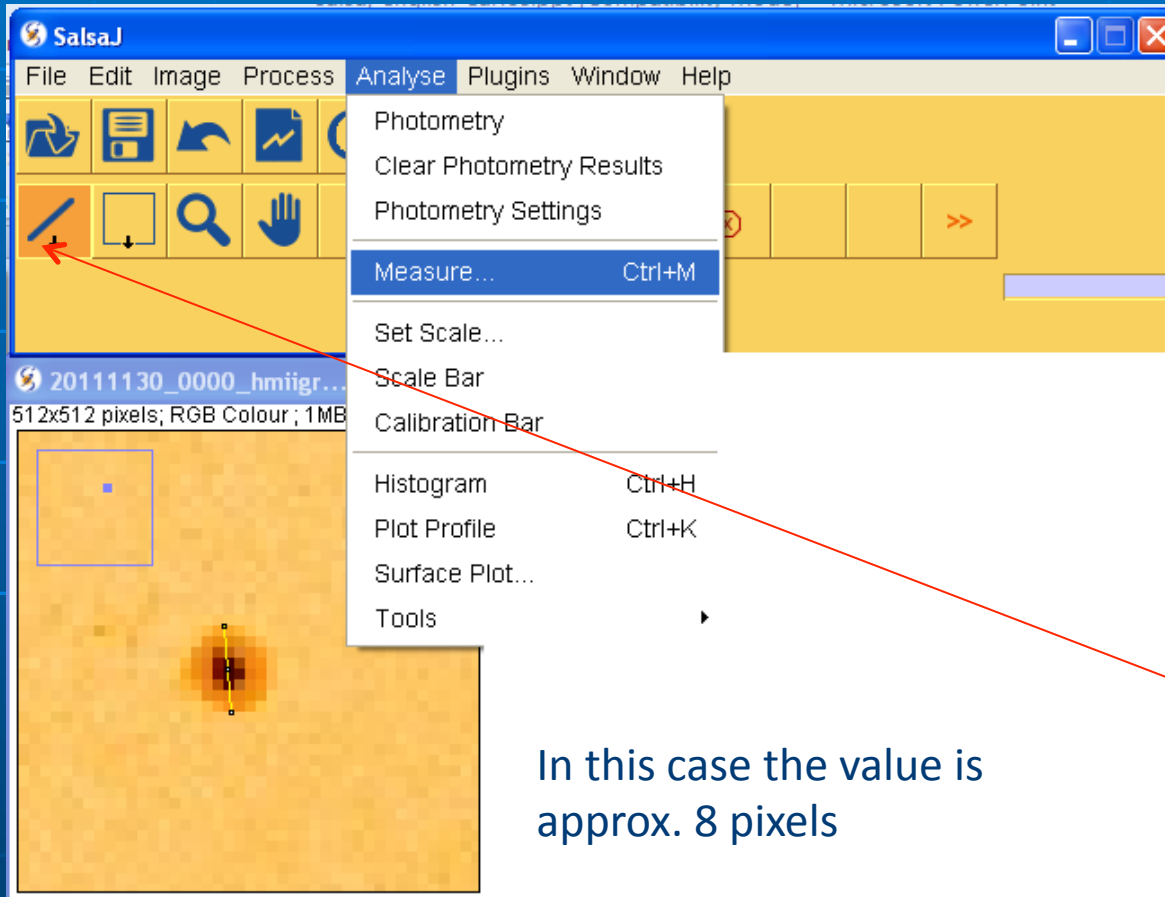
20111130_0000_hmiigr...
512x512 pixels; RGB Colour; 1MB



Click to add notes

ImageJ3D

Measuring the size of a sunspot



20111130_0000_hmiigr...
512x512 pixels; RGB Colour; 1MB

In this case the value is approx. 8 pixels

Zoom in to measure the spot in pixels.

Select the straight line and draw it across the spot.

Then Select : Analyse and Measure from the menu.

Measuring the diameter of the Sun

SalsaJ

File Edit Image Process Analyse Plugins Window Help

- Photometry
- Clear Photometry Results
- Photometry Settings
- Measure... Ctrl+M**
- Set Scale...
- Scale Bar
- Calibration Bar
- Histogram Ctrl+H
- Plot Profile Ctrl+K
- Surface Plot...
- Tools

20111130_0000_hmiigr...
512x512 pixels; RGB Colour; 1MB

In this case the value is approx. 486 pixels

Select the straight line and draw it across the Sun.

Then Select : Analyse and Measure from the menu.

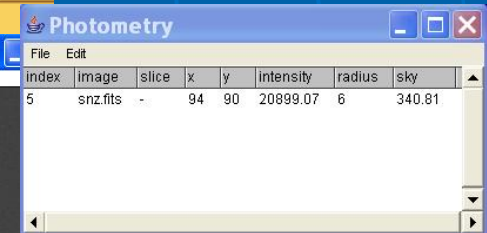
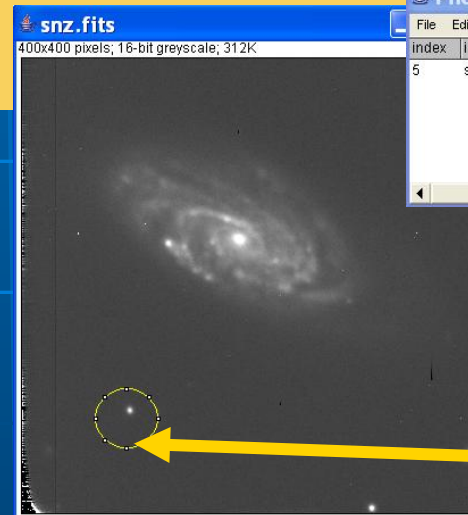
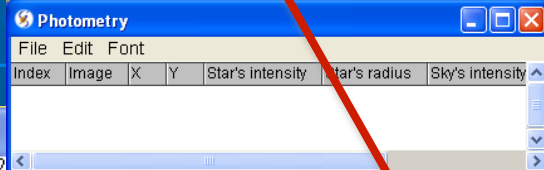
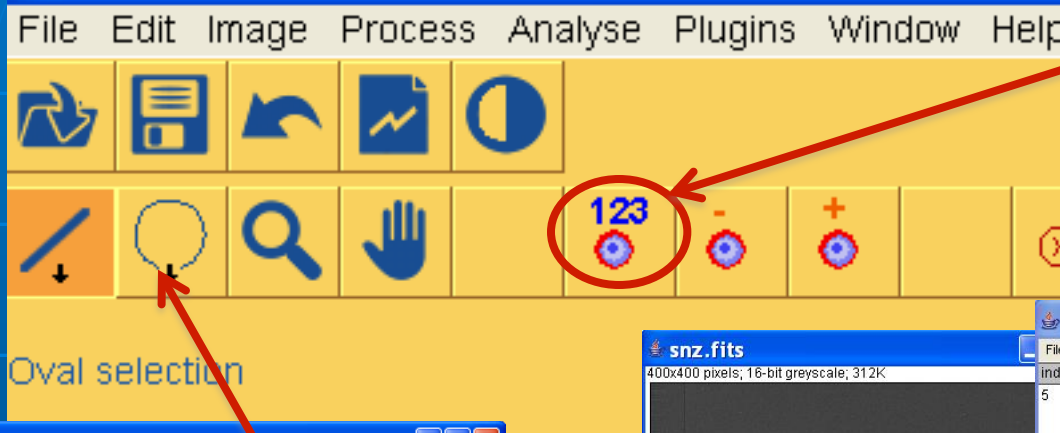


Measuring the size of a sunspot

- Knowing that the sun has a diameter of approximately 1 360 000 km you can calculate the size of the spot.
- Solar disk $\sim 1\,380\,000$ km \leftrightarrow 486 pixels
- Sunspot $\times \quad \leftrightarrow \quad 8$ pixels
- Sunspot size $\sim 22\,716$ km (1,7 times de size of the Earth)



The photometry tool enables to measure the brightness of stars.



Click on the object you want to measure.
The result appears in the second window.

With the right button of your mouse choose the circle

You can make adjustments in the photometry parameters

