

Webcam imaging with a spectroheliograph.

Imaging with a spectroheliograph consists in recreating a complete image of the sun from a multitude of images of a line chosen in the spectrum provided by a diffraction pattern. The assembly is placed so that the image of the sun drifts in front of the narrow slit of the spectroheliograph, at its sidereal speed. The webcam's refresh rate determines the number of captured lines which can be used to create the image of the sun.

The result of the first operation is a great quantity of frames of the selected spectral band obtained on each intermediate position of the sun in front of the slit.

The difficulty lies in the rebuilding of the complete image of the sun starting from this multitude of lines.

AstroSnap Pro makes it possible to obtain the solar image directly, by carrying out this image rebuilding in real time.

Complete procedure

Start the camera as you normally do with the software.

Have the sun drift in front of the slit a first time in order to locate the band you are interested in.

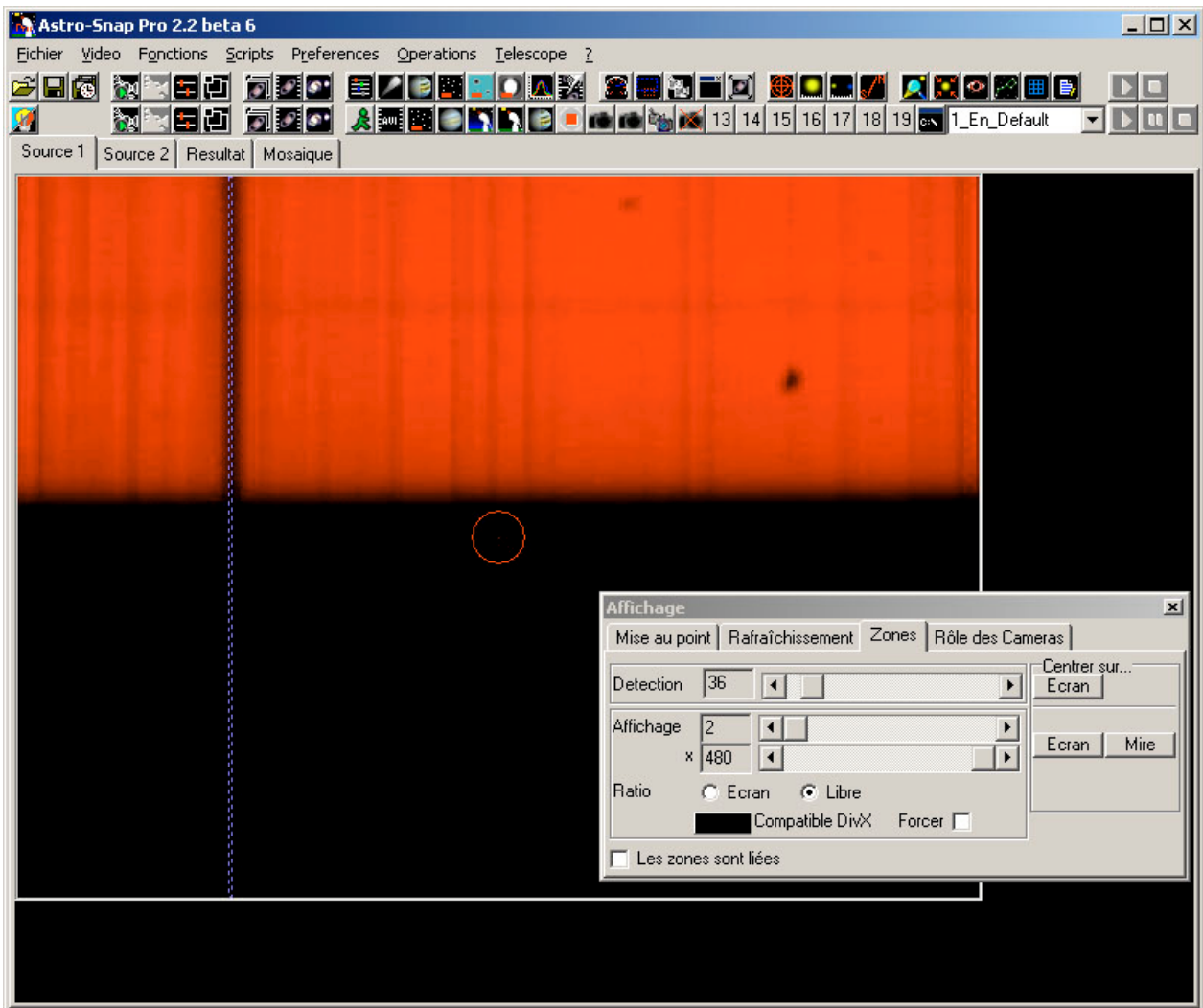
Open the "Zones" window.

In the menu, click on "Functions", then "Display", and finally choose "Zones".

In the window, on the field called "Ratio" click on "Free".

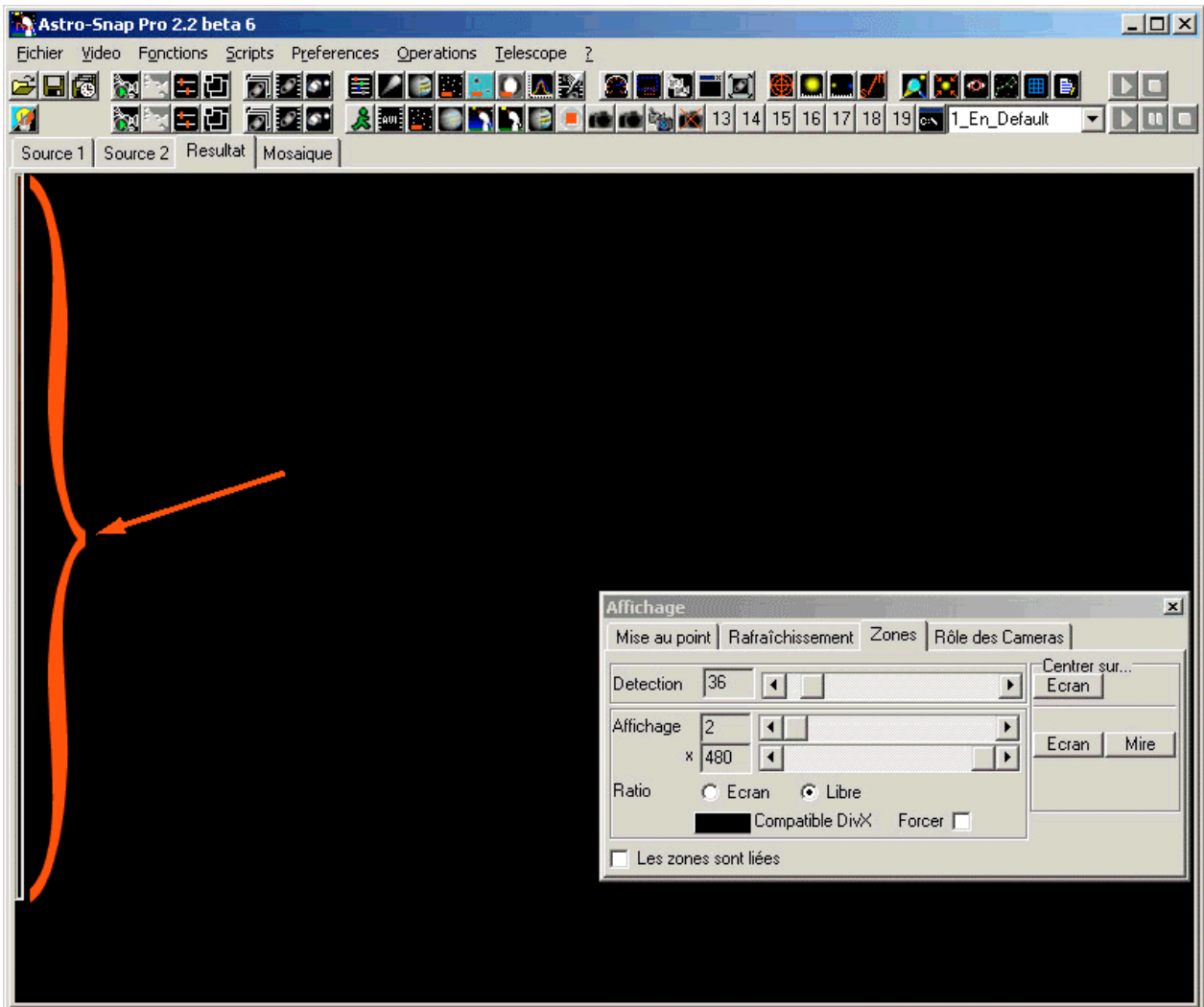
Then, choose a display zone width of 2

And a display zone height of 480.



This way you create an extremely thin display zone that takes all the height of the video window. With the **right** mouse button, put the display zone on the selected line (H-Alpha, for example), which is presented by a vertical band darker than the remainder of the displayed spectrum.

The resulting image is transferred to the "Result" window, but we will ignore this from now on.



Afterwards, we are going to prepare the mosaic to create.
Before, I suggest that you open the "Minisource" window, that allows you to show a little floating window with the source image. This way you can see what you're doing 😊.

Go to the "**Mosaic**" tab.

Choose the size of the resulting mosaic, by filling the "**Length**" and "**Height**" fields.

Click the little "**Options**" button.

In the resulting window, click "**Standalone drift**"

And choose "**Pixels / sec**"

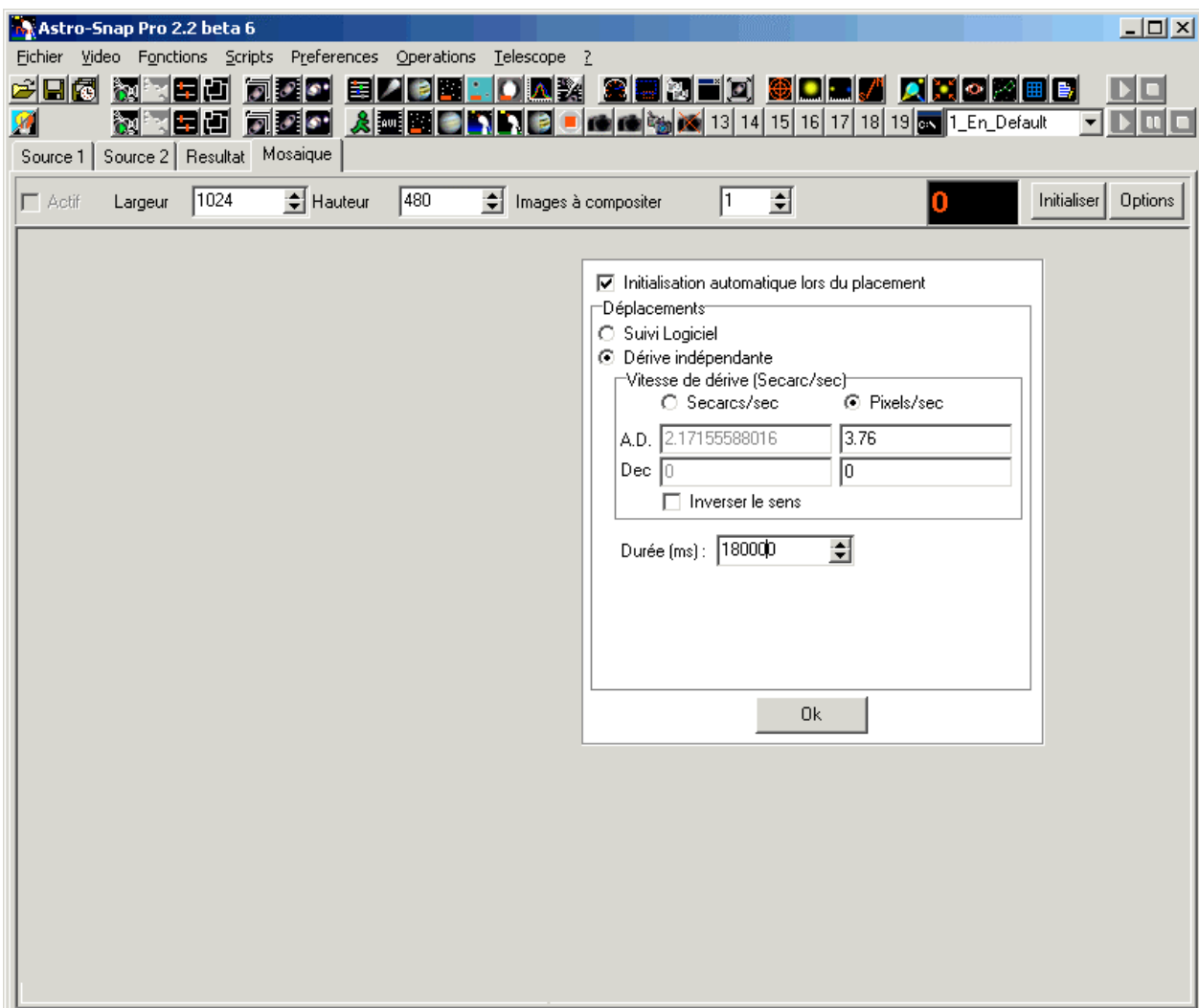
Choose the speed the band will have on the mosaic. If the band must drift horizontally, then only give a value for "**R.A.**" speed. If the band must drift vertically, then only give a value for "**Dec**" speed.

After this if you wish, you can define a fixed capture length, by giving a value in the "**Length**" field (milliseconds).

But this is optional.

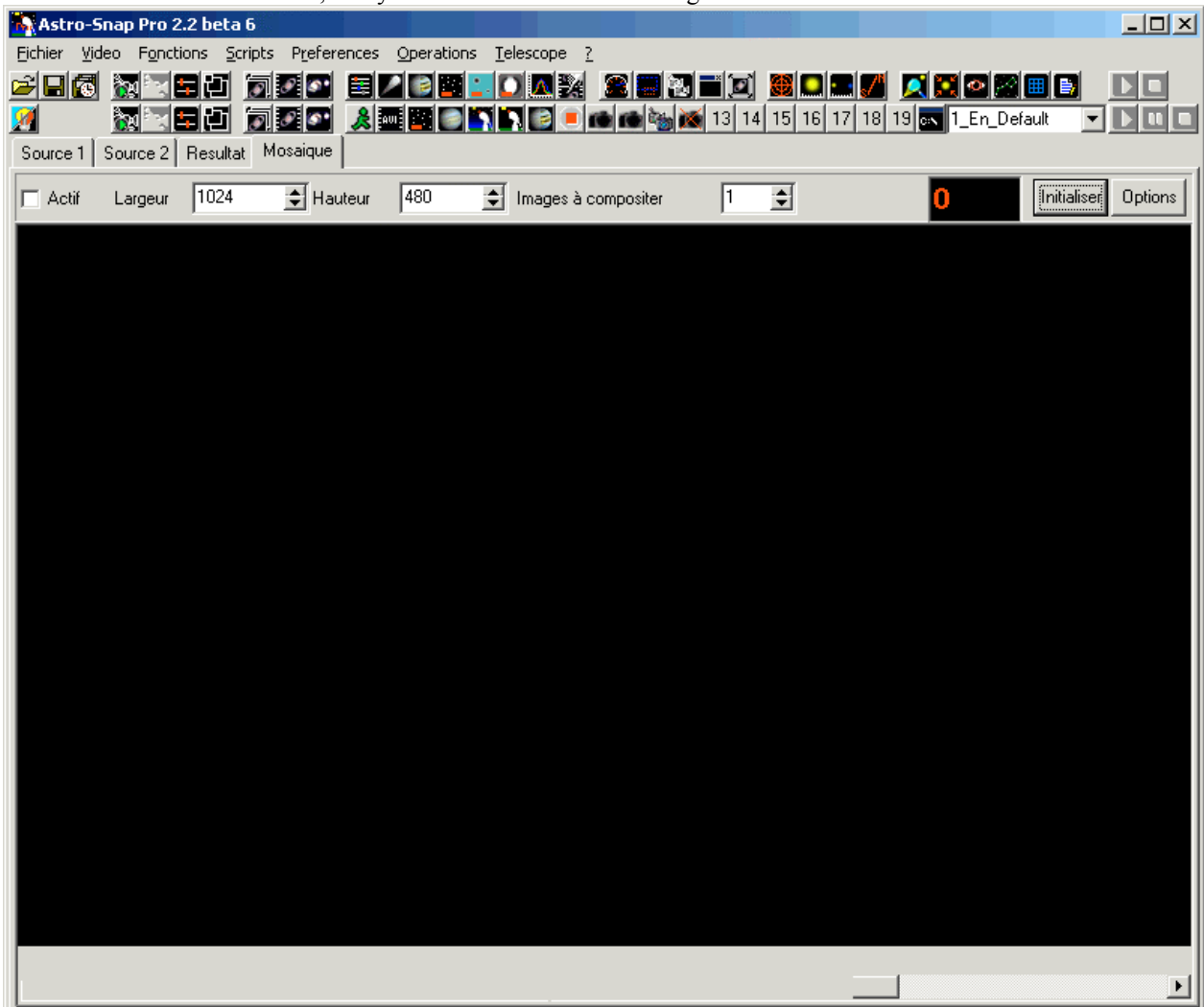
Finally, I suggest you check the box "**Automatic initialization**". This initializes (or resets) the mosaic each time you place the starting point.

The starting point is the position on the mosaic where the band will start drifting.



Then click **"Ok"**.

You can now initialize the mosaic by clicking the **"Initialize"** button. This creates the main mosaic frame, and enables the **"Active"** checkbox, that you will check to start the image reconstruction.

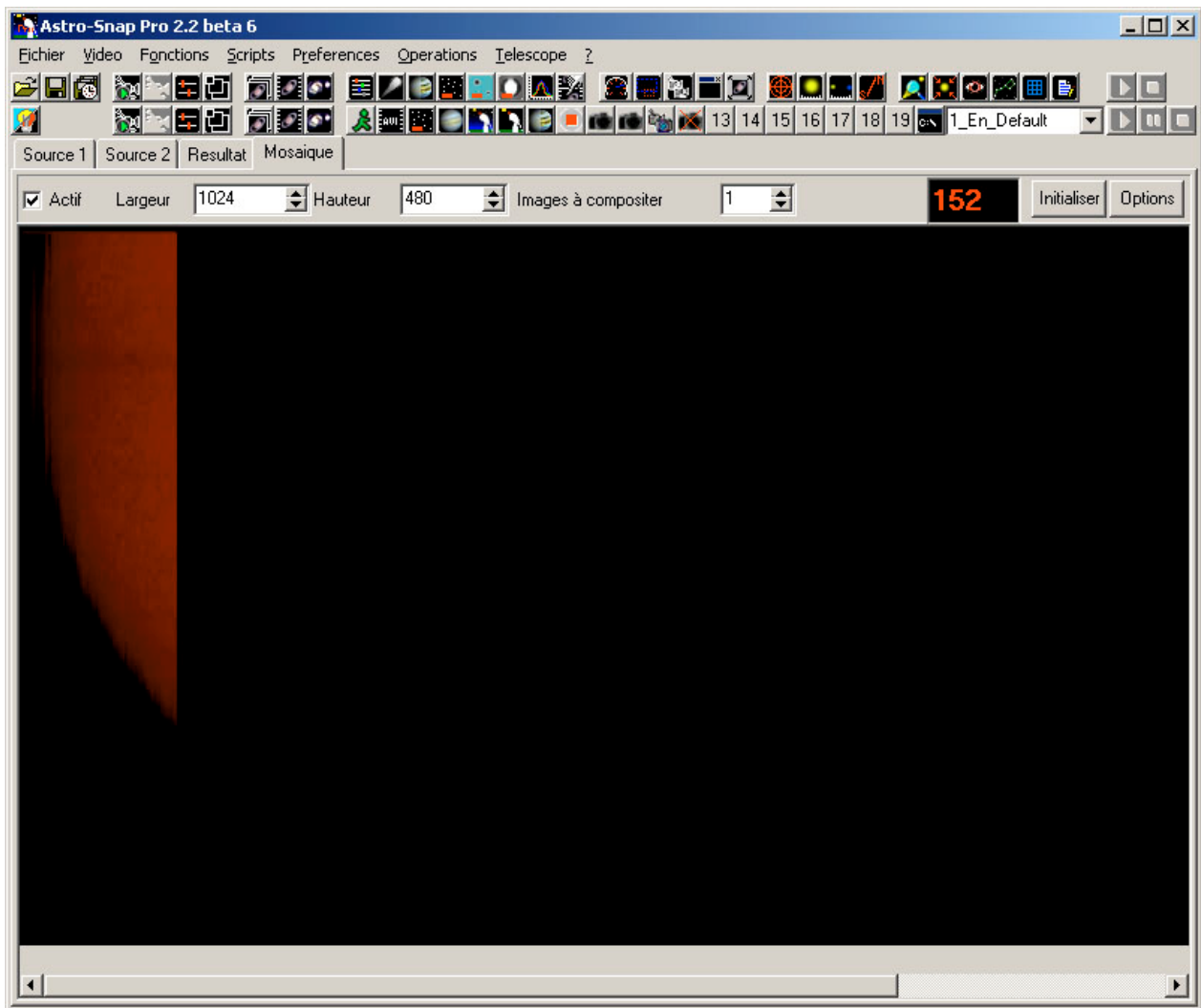


Click the **"Active"** button.

The program will start accumulating the vertical lines one after another at the drift speed that you have indicated. For the moment, the image is still black, because I imagine that the sun is not yet in front of the slit.

You are going to place your instrument, so that the sun is about to touch the slit.

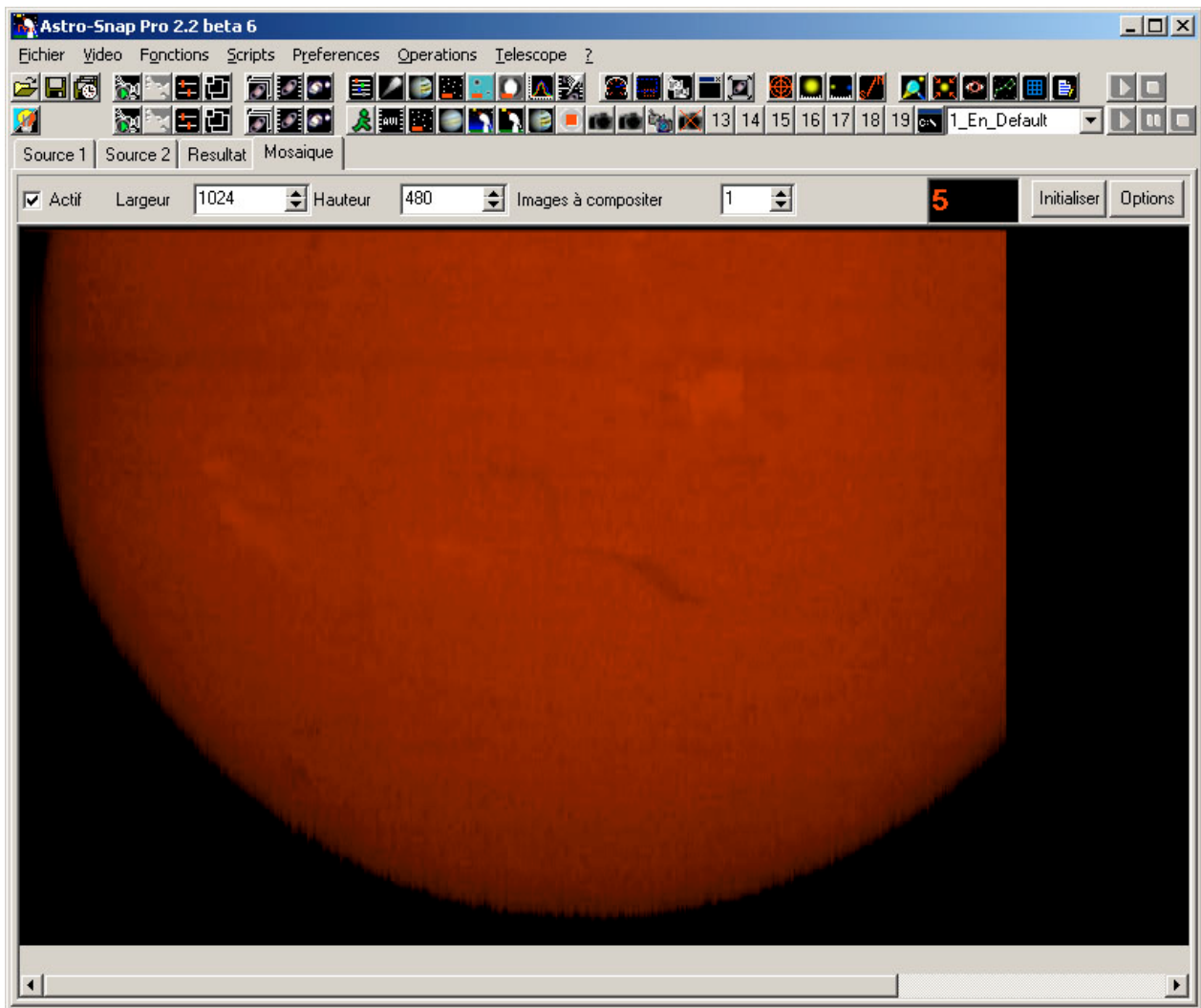
Once this is done, click the top left corner of the mosaic window to initialize and re-position the starting point.



Now, let the sun do the rest.

Captured lines are automatically aligned one besides the previous one, and you can see the sun's image progressively being reconstructed.

When the image is finished, you can uncheck the "**Active**" to stop reconstruction.



Finally, click "**File**" and "**Save**", to save the final image.

If the sun has a rugby ball shape, then you can adjust the different drift speeds until you have found the correct speed. Do write down the obtained speed for your next imaging sessions.

You can vary the procedure in a couple of ways.

For example, to obtain a more complete image of the sun, you could turn the camera 90° counterclockwise, and have the spectral band drift vertically instead of horizontally. The image would be higher (640 pixels instead of 480).

You can also use the loop integration feature to enhance the image quality. You must be careful though, not to put too many frames in the loop buffer, since you can, on the contrary, get a worse result, the image being darker. For example, if your drift speed is of 3.7 pixels/second, and the camera's refresh rate is of 10 frames per second, you could integrate a maximum of $10/3.7 = 2.7$ frames (round it down to 2 or 3 frames).