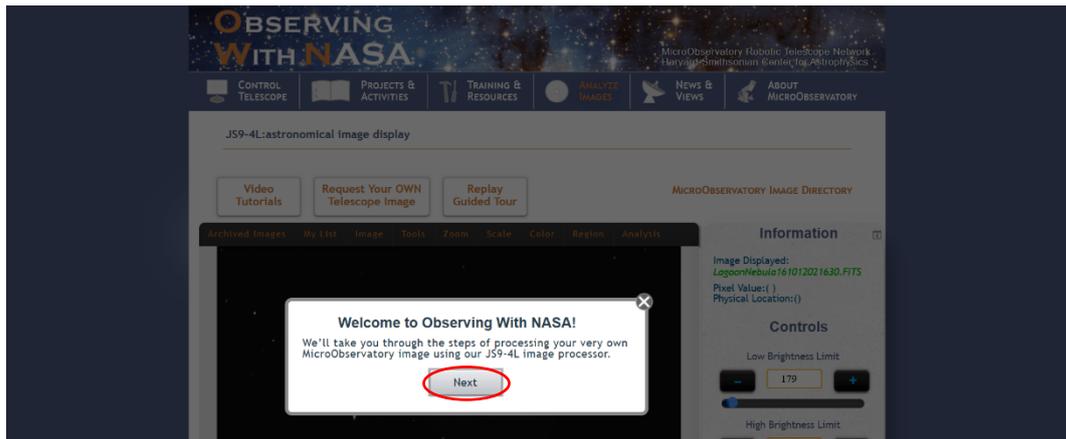


Ri Off the Shelf Masterclass: Satellite Vision

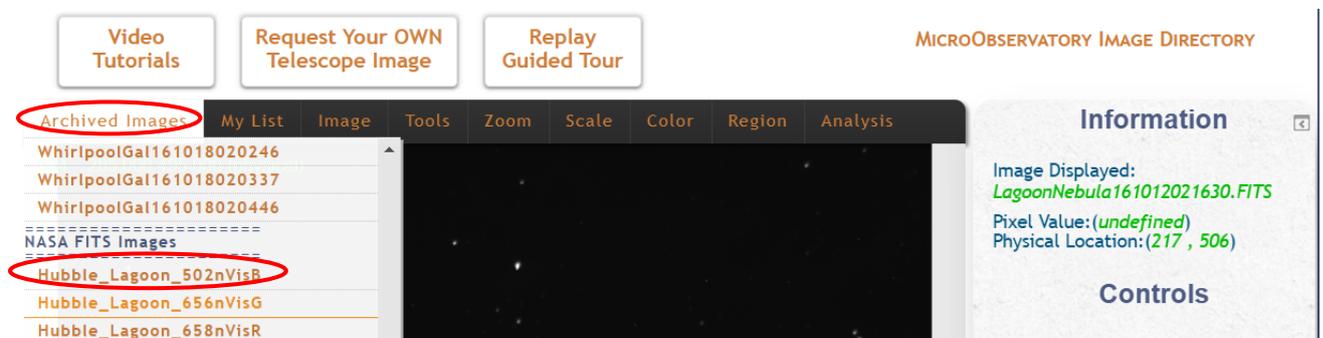
Worksheet 4b – Making a space image – Observing with NASA

You will now learn how to process real telescope data to find hidden objects in space, using an online tool, JS9-4L, provided by NASA's MicroObservatory.

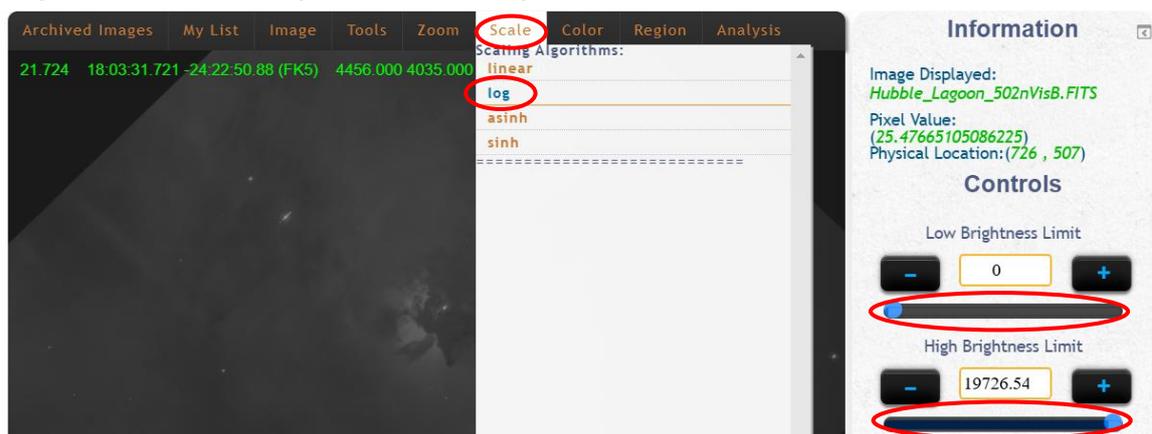
1. Firstly, navigate to JS9-4L, <https://waps.cfa.harvard.edu/eduportal/js9/software.php>.
2. On this page, you will be shown a pop up. Click **'Next'** to go through the guide. If you would like to replay the guide at any point, click **'Replay Guided Tour'**.



3. On the software menu, hover your cursor over **'Archived Images'**, and scroll down the menu that pops up, until you get to **NASA FITS Images**. Unless your session supervisor has said otherwise, you will be using the Hubble_Lagoon_658nVisR, Hubble_Lagoon_656nVisG, and Hubble_Lagoon_502nVisB images. First, select the **'Hubble_Lagoon_502nVisB'** image.



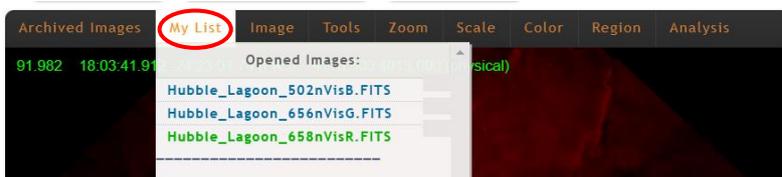
4. First, we will scale the image, so that we can see the detail within it. Click on the **'Scale'** option in the menu, then select **'log'**. You can adjust the maximum and minimum brightness using the sliders on the right, which sets the limit of what the brightest and darkest pixel can be. Play with these controls to see different details.



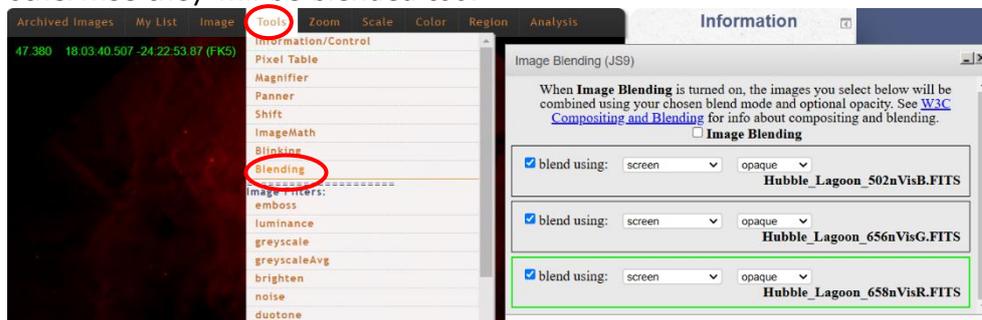
- Next, click on the **'Color'** option to open the colour menu. This will open a menu where you can play around with what the image looks like if different colours are assigned to different brightness levels. You can also invert the colours, to swap the scale. Since this image is labelled with a B at the end, we will select **'blue'**.



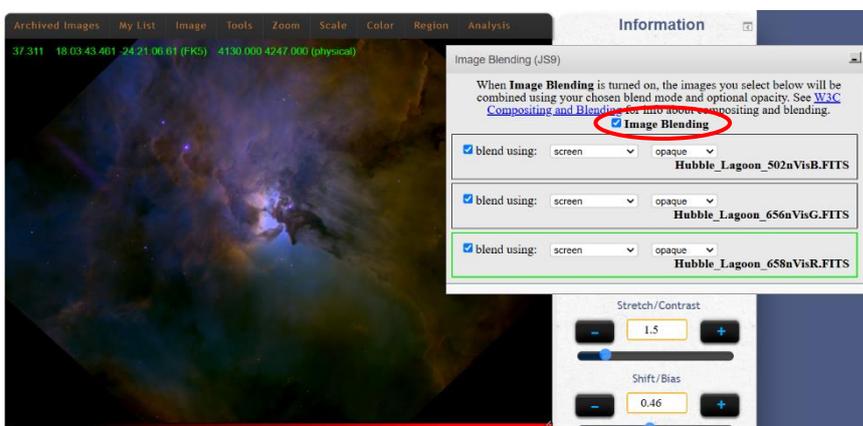
- Once you are happy with your image, repeat steps 3 – 5 with the red (**'Hubble_lagoon_658nVisR'**) and green (**'Hubble_Lagoon_656nVisG'**) images. If you would like to reopen an image, hover over the **'My List'** option in the menu and select the image you would like to open.



- When all three of your images are ready, we can merge them into one image. Hover over the **'Tools'** option in the menu and select **'Blending'**. A pop-up should appear for the blending options. For this example, we will keep the settings as they are, blending using **'screen'** and **'opaque'** for all three images. If you have opened other images, make sure they are not selected by unticking the box next to them, otherwise they will be blended too.



- Click on the checkbox next to the words **'Image Blending'** to complete.



- If you are happy with your results, you can now explore other archived images, by going back to Step 3. Explore the different sights of the universe, and try to answer each of the following questions for every image you process:
 - What is the brightest part of the image? What is the darkest part of the image?
 - If the image has different colour filters (red, green, and blue), what do each of the different colours show? Do they give different details, and if so, what?
 - What might a scientist learn from your image?