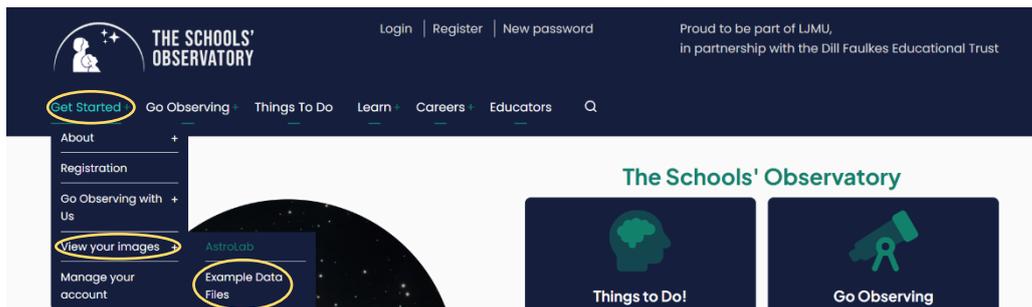


Ri Off the Shelf Masterclass: Satellite Vision

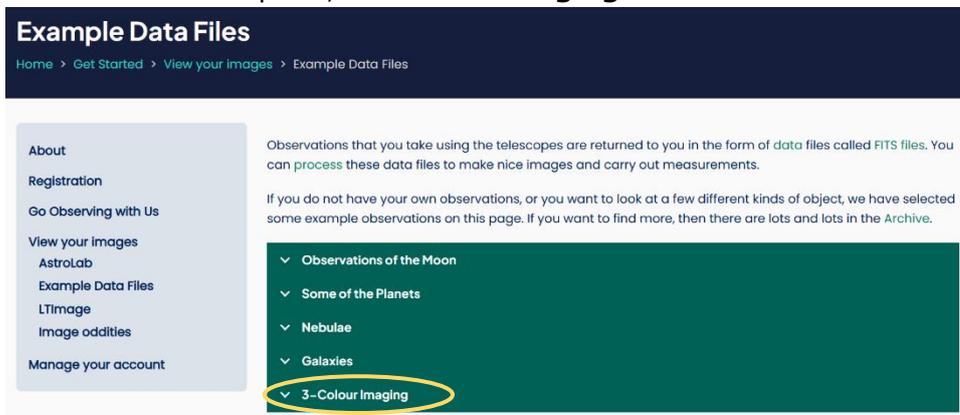
Worksheet 4a – Making a space image – AstroLab

You will now learn how to process real telescope data to find hidden objects in space, using an online tool, AstroLab, provided by The School's Observatory.

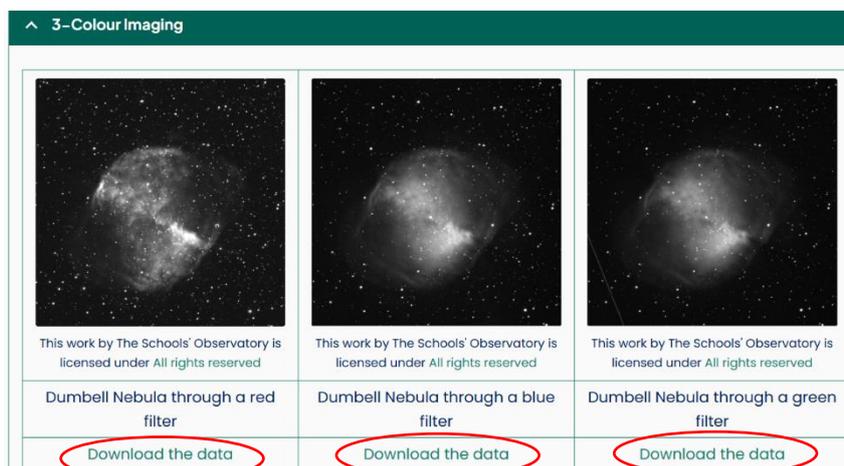
1. Firstly, navigate to The Schools' Observatory website, www.schoolsobservatory.org.
2. From the homepage, hover over the menu item '**Get Started**'. This will show a drop-down menu, including an option to '**View Your images**'. Hover over this option to show an additional menu, with the option '**Example Data Files**', and click on this.



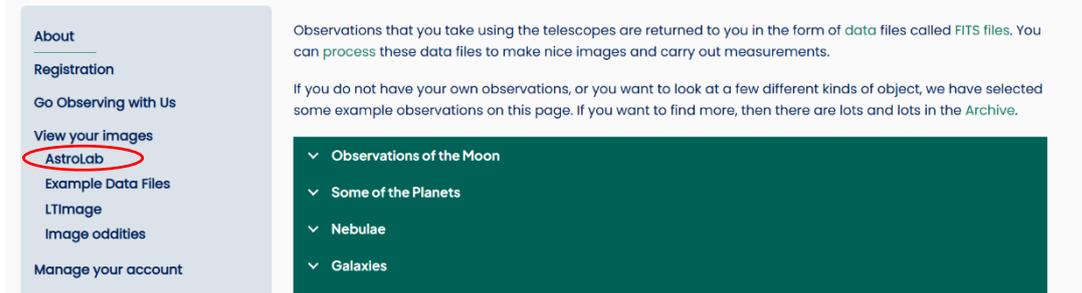
3. When the page loads, it will show a menu of different example observations. If your session leader has told you a specific image to use, follow their guidance. Otherwise, click on the bottom option, '**3-Colour Imaging**'.



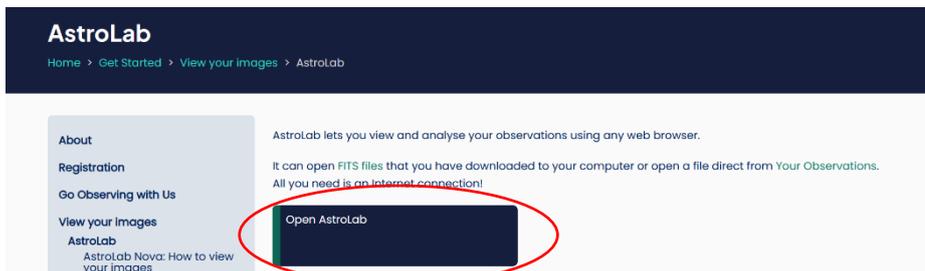
4. We will start by looking at the Dumbbell Nebula. Click on the option to '**Download the data**' for each of the three images, labelled the red, blue, and green filters.



5. Now that your space data has downloaded, we will open the software. On the left hand side of the page, there is a menu. Click on the option that says **'AstroLab'**.



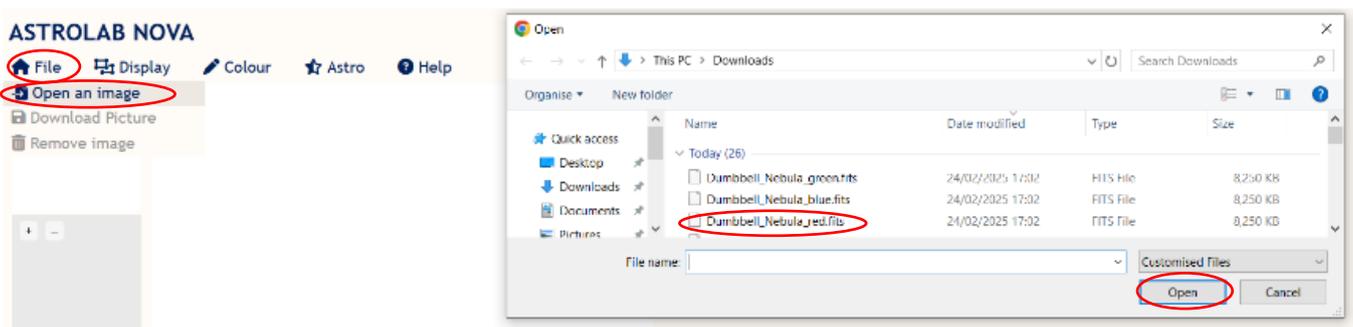
6. On the new page that loads, click the button that says **'Open AstroLab'**.



7. This will open the AstroLab software. You can also navigate directly to the software by visiting www.schoolsobservatory.org/astrolab/. When the software loads, it should look like this:



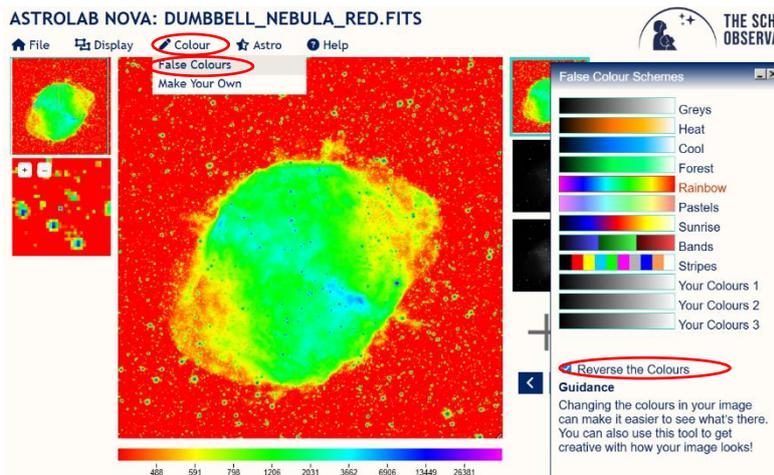
8. In the top left corner, click **'File'**, then **'Open an image'**, and select the red filter image from the pop up that opens. Repeat this with the green and blue filter images.



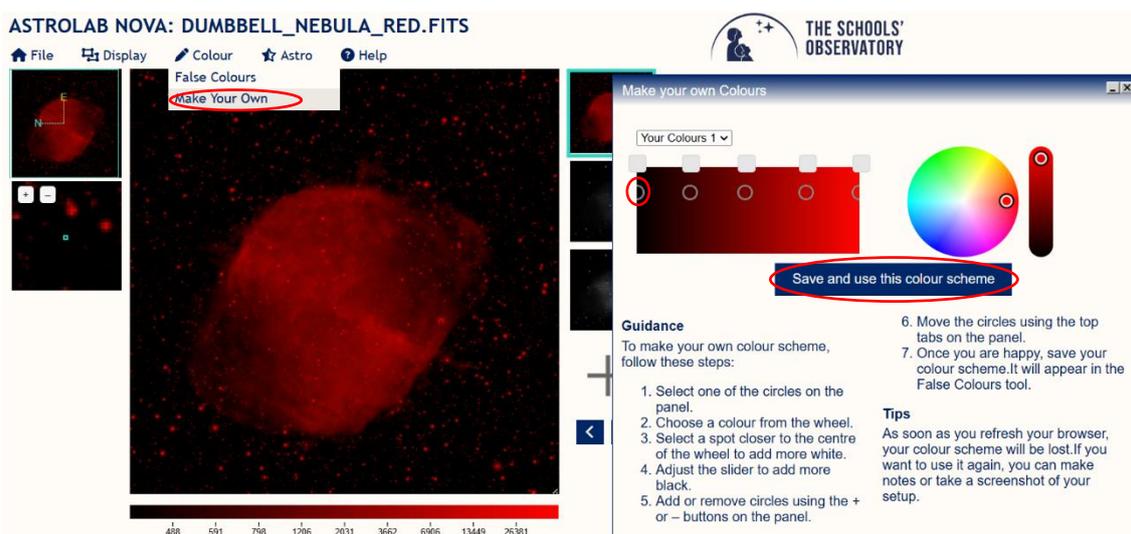
9. First, we will scale the image, so that we can see the detail within it. Click on one of the images, then click **'Display'**, then **'Scaling'**. The scale menu should appear on the right. Click on **'Most detail'**. You can adjust the maximum and minimum brightness using the sliders, which sets the limit of what the brightest and darkest pixel can be.



10. Now that your image is scaled, we can add colour to it! Click on the **'Colour'** option to open the colour menu and select **'False Colours'**. 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 reverse the colours, to swap the scale.

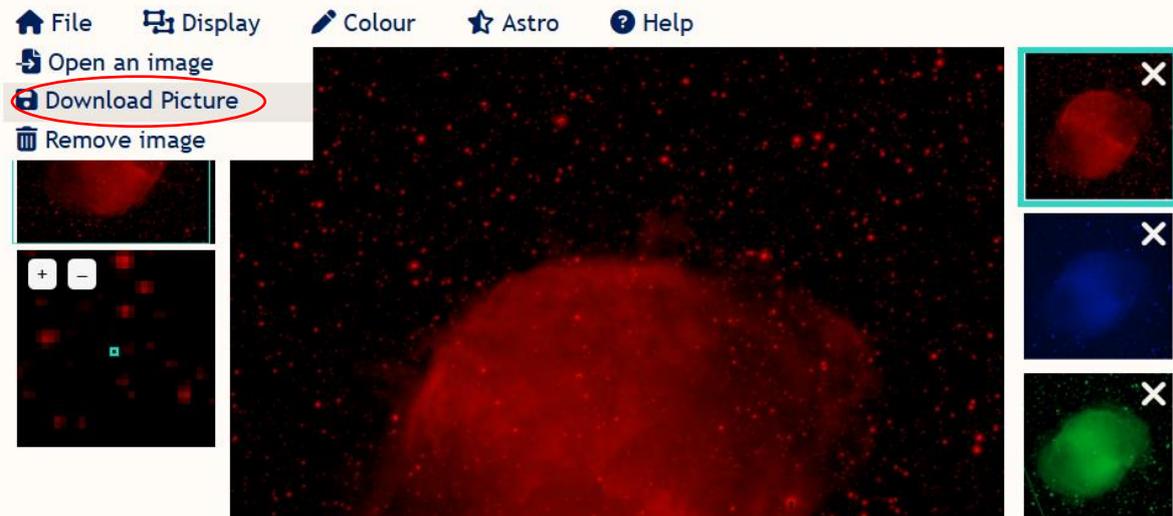


11. You can also make your own scheme, by selecting **'Colour'**, then **'Make Your Own'**. Click on the circles in the rectangle, then use the colour wheel and the gradient column to adjust the colours to the colours you would like. Click **'Save and use this colour scheme'**, then go back to **'False Colours'** and select the scheme.



- Repeat this with each of the images. Once you are happy with the images, you can download them. Click **'File'**, then **'Download Picture'**. If you accidentally uploaded the wrong image, you can also **'Remove image'**.

ASTROLAB NOVA: DUMBBELL_NEBULA_RED.FITS



- If you are happy with your results, you can now explore the other example data files, by going back to Step 3. You can have a look at galaxies, planets, and even parts of the moon! 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?
 - What colours did you chose for your image, and why?
 - How many pixels are in your image?