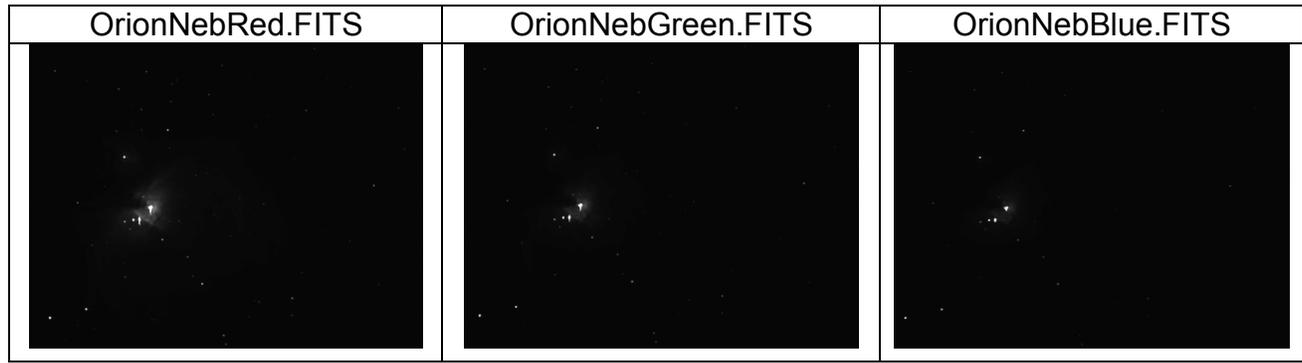# Capture the Colorful Cosmos

Observing With NASA: RGB Challenge

GOAL: To create a 3-color image of the Orion Nebula (or other RGB target object) using telescope images taken with red, green, and blue filters

OrionNebRed.FITS	OrionNebGreen.FITS	OrionNebBlue.FITS

Preparation
- Download your 3 filtered images (red, green, blue) in FITS format
- Download image processing software at http://mo-www.harvard.edu/OWN/

Procedure

1. **Opening the three images**. Launch the MicroObservatory Image processing program on your computer and open the images taken through the red, green, and blue filters. Under the **Process** menu, select **Adjust Image.** When the Adjust Image window opens, select the **Auto** button to get a good first look at each image.

2. Use the sliders in the "Adjust Image" window to further adjust the brightness and contrast for each image if necessary. The purpose is to get a good representation of the object in the image.

3. **Coloring each image red, green or blue.** Working with the red-filtered image first, click on the **Process** menu and select **Color Tables → Red**. The image will turn red. Then work with the green-filtered image, selecting **Process → Color Tables → Green** to turn the image green. Finally, color the blue-filtered image blue.

   Notice that the areas in the original target object that had a lot of red became the **brightest** areas in the red-filtered image. In turn, these bright areas in the red-filtered image will become the **reddest** areas in the final image. The same holds for the green and blue-filtered images.
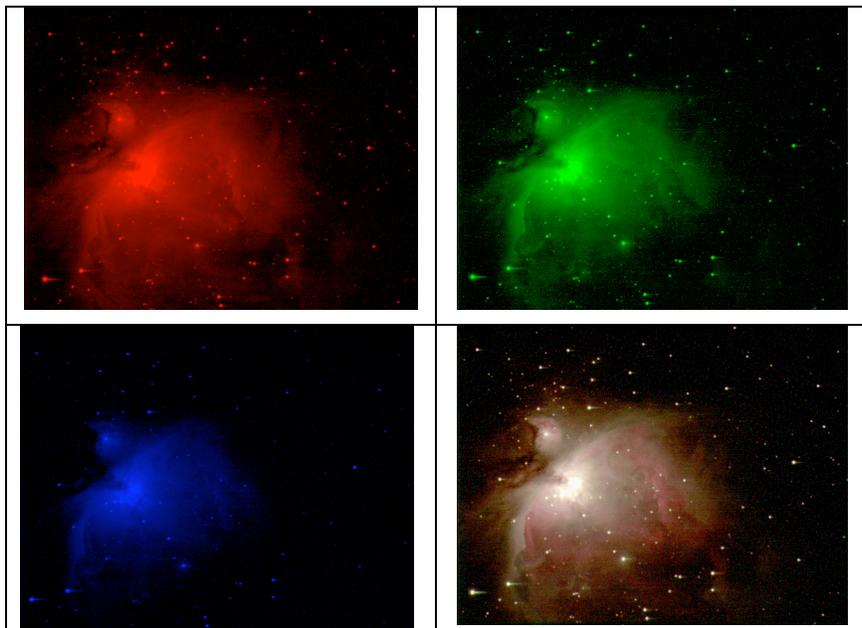
4. **Aligning the images.** Each of the images will most likely be slightly out of alignment with each other. They will need to be aligned, or "shifted" so that when they are combined the result is not blurry.

Capture the Colorful Cosmos

Under the **Process** menu, select **Shift**. As prompted, select one of the images as the **background** image over which they will shift, or align, the other two images. The green image usually makes the best background. Then have them select a **foreground**. (You should see the background image through the slightly transparent foreground image.)

Using the mouse or the keyboard keys "I, J, K, and L," align the two images. Once satisfied with the alignment, they should select the remaining image as the foreground and align it against the same background. Once this is done, you may click the **OK** button.

5. **Stacking the images.** Under the **Process** menu, select **Stack → Convert Images to Stack**. You can flip through these images using the arrow keys at the bottom of the new window to view them individually and check that they are well aligned.

6. **Creating the final color image.** Under the **Process** menu, have participants select **Stack -> Convert Stack to RGB**. The program now merges the red, green, and blue images to create the final full-color image.

7. **Saving the final image.** Make sure to save your final image as a GIF file and label it with a clear filename.