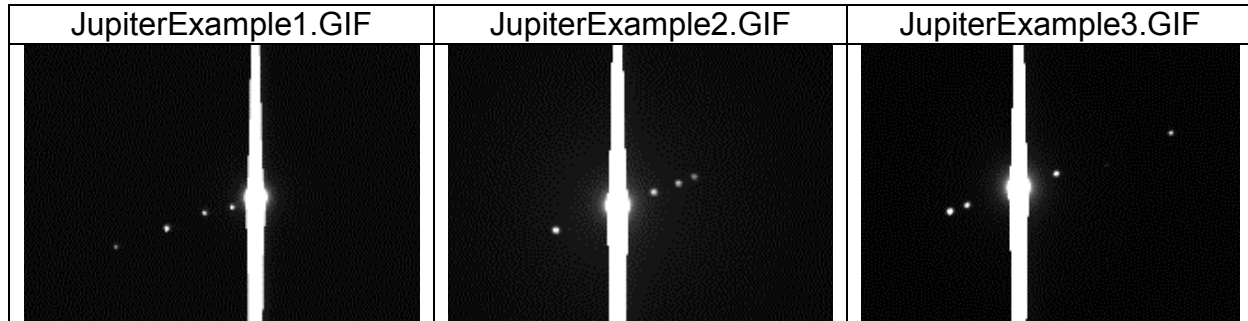# Observing With NASA: Image Animation Challenge

GOAL: To create an animation using the MicroObservatory Image processing software.

This challenge can be used to create animations of the movement of Jupiter's moons or an asteroid, as well as the phases of Earth's Moon or Venus.

JupiterExample1.GIF	JupiterExample2.GIF	JupiterExample3.GIF

Preparation
- Download in FITS format the images you want to animate, e.g.:
    - Images of Jupiter's moons taken several hours or nights apart
    - Images of Earth's Moon taken over the course of a month
    - Images of an asteroid taken several hours/nights apart
    - Images of Venus taken over several weeks/months
- Download image processing software at http://mo-www.harvard.edu/OWN/

Procedure

1. Download your images and save them to a single appropriately named folder. Rename your files "1.FITS," "2.FITS," "3.FITS," etc. in chronological order from oldest to newest. Both Windows and Mac OS will order the images appropriately when the files are left with their default names and sorted alphabetically, so you should start at the top when renaming the files.

2. Launch the MicroObservatory Image processing program on your computer and open the images. Check to see that all the images came out. Close any images where the target objects (e.g. planet and moons) are not visible.

3. Select **Process → Adjust Image** and use the **Auto** tool with the **Linear** button selected for their images. For images of the Moon, click on **Sharpen** under the "Process" menu. If desired, use the sliders or Min/Max fields in the **Adjust Image** window to further tweak the brightness and contrast of the image.

4. Click on your images in reverse order – "3.FITS," "2.FITS," "1.FITS." This step organizes the order of the frames in their animation. When properly arranged, the number 1 image is the top frame. This is easily accomplished by going up to **Window** on the menu bar and clicking on the images in reverse chronological order as mentioned above.

5. Select **Process → Stack → Convert images to stack**.

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6. Using the arrow buttons at the bottom right of the resulting windows, scroll through each of your frames. If the main target object (e.g. Jupiter) seems to "jump" from place to place, the images need to be aligned.

7. To align the images, select **Process → Shift**. You will select a single image as the **background** frame and select another image for the **foreground** frame. The foreground frame is layered over the background frame and made slightly transparent.

8. Align the foreground frame's picture of the target against the background frame. (For the images of Jupiter's moons, you should disregard the positions of the moons and instead focus on lining up the "Jupiters.") This step is repeated for the remaining images by selecting each one as a foreground frame and repeating the alignment procedure. Click **OK** when done.

9. Again, scroll through their frames again using the arrow keys. If you have aligned their images well, the target (e.g. Jupiter) will not appear to jump. If there are any obvious errors, repeat the previous step.

10. Select **Process → Stack → Start Animation** to view your animation. Selecting **Process → Stack → Stop Animation** will stop the new clip.

11. To change the speed of your animation, select **Process → Stack → Animation Options**. Look at the number in the **Frames Per Second** field and change it as desired. Larger numbers will make the animation switch between images faster. A smaller number will make the animation slower. Then click **OK**.

12. The frame rate and alignment of images are still editable when the animation has stopped. You may revise these if an image is obviously out of alignment or if a different frame rate may be more comfortable to watch.

13. Select **File → Save as → Animated GIF** and name and save the file normally.

14. Animated GIF images may be opened in a web browser, even when Internet access is not available.

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