Planets, Stars, and Galaxies, AST 1002. **Prof. Daniel Sega**

WWT Worksheet 2

Instructions: navigate to worldwidetelescope.org and click on WWT webclient. Now follow the following steps and answer the questions. The submission of this assignment is via Canvas and you will submit a file with the question's answers (in pdf format) and 4 screenshots which I will specify in the activity. The screenshots are proof that you have navigated successfully using WWT. Have a good trip to space! (Start my looking at the drop down menu in the lower left corner of the WWT web app).

Planet

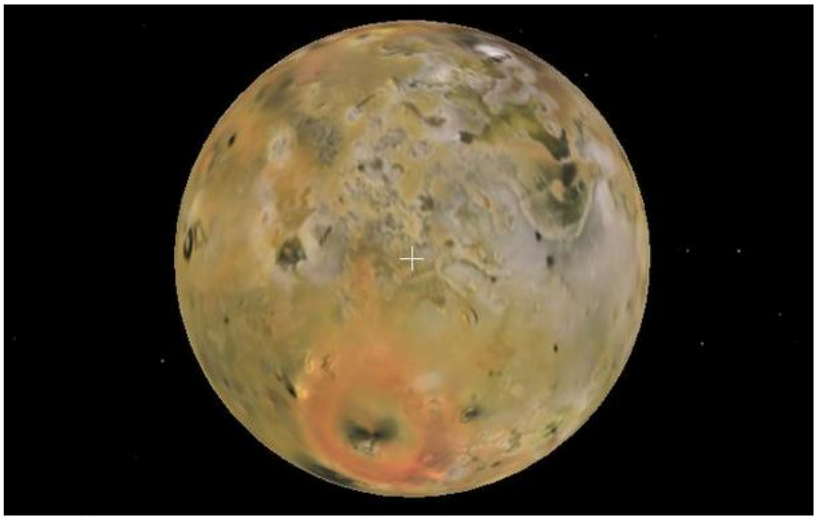
Use Planet view to explore the other planets and some of the moons of the Solar System. To enter Planet view, select Planet from the Look At menu (bottom left).

To Control the View

- Use the mouse wheel to zoom in and out.
- Click and drag to rotate the planet or moon you are viewing.
- To tilt the field of view **CTRL + click** and drag vertically.
- To rotate the field of view **CTRL + click** and drag horizontally.

Use View , Reset Camera to restore the default view and settings.

Some moons are available under the Planet imagery, including Io, one of the best known of Jupiter's many moons:

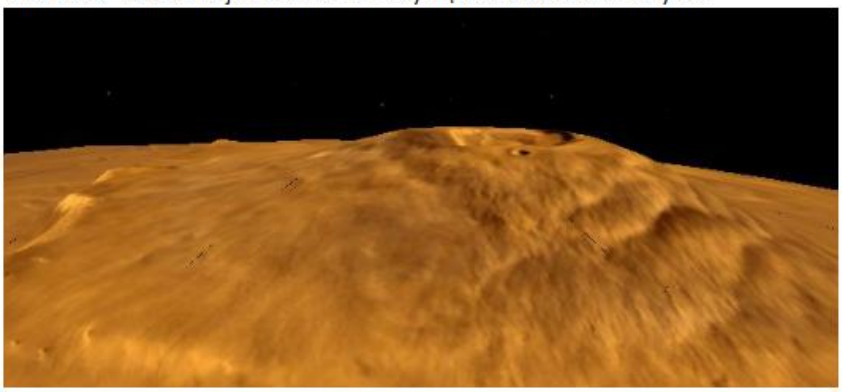


Tutorial: Locating Olympus Mons

Olympus Mons is the tallest mountain on Mars (and indeed the Solar System). At a colossal 17 miles high it is three times higher than Everest. The following tutorial locates the mountain:

1. In the Look At list ensure that Planet has been selected.
2. In the Imagery list click on Mars .
3. Pan and rotate the view in order to locate the mountain, noting that it is close to the Martian equator. The mountain can be located visually either from its top-down view, which is distinctive, or from its proximity to three smaller mountains than are in a near perfect line. These two views are shown in the following images:

4. Zoom in and use the **CTRL** key as you click and drag vertically. This will tilt the view to show just how tall Olympus Mons actually is:



5. Olympus Mons is a *shield* volcano, approximately 340 miles wide. The most recent volcanic activity is estimated at 2 million years ago, so it is difficult to classify the volcano as extinct. One theory for the huge size of the mountain is that Mars does not have tectonic plates, so there is no gradual crust movement to recycle the surface. However this theory is countered by the three mountains in a line, which suggests a plate edge. The three smaller mountains are also volcanoes and are named Arsia Mons, Pavonis Mons and Ascraeus Mons, though they are smaller only in relation to Olympus Mons (Arsia Mons — the southernmost — is the tallest at about 12 miles high, Pavonis Mons — the middle of the three — the shortest at 8.6 miles, and Ascraeus Mons — the northernmost — is about 11 miles high).

Activity 1: Other surface features of Mars to look for is Valles Marineris. Find it and take a screenshot of it using the screen capture or snip function of your computer. Upload the screenshot to Canvas as a png together with the answered questions as a pdf.

Question 1: At what latitude is Valles Marineris located?

Question 2: What is the main geological processes that formed it?

Question 3: How deep is it compared to the Gran Cayon? Why isn't there anything as big on Earth?

Question 4: The tallest building in Pana City is the **J.W Marriot** standing at 293 m and 70 floors. If you were to stack many J.S Marriotts on top of each other, how many would it take to reach the surface starting from the bottom of the deepest part of Valles Marineris?

Panorama

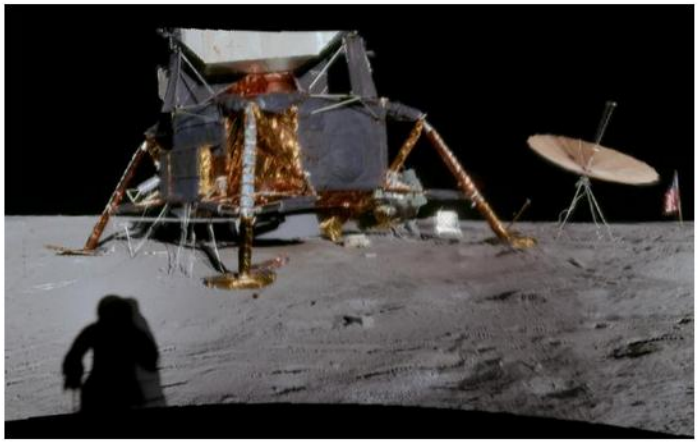
Explore the images sent back by manned and unmanned space vehicles.

To Control the View

- Use the mouse wheel to zoom in and out.
- Click and drag to rotate the view.
- To rotate the field of view **CTRL + click** and drag horizontally.

Use View > Reset Camera to restore the default view and settings.

The Apollo 12 landing site panorama provides some close up detail of the moon surface:



Question 5: You can't see the Earth in the Apollo 12 picture, but you should be able to tell if it's roughly in front or behind the Astronaut. Which is it?

Question 6: What evidence do you have for that?

Activity 2: Take a screenshot of the hill in the Apollo 17 picture.

Question 7: What is the name of this hill? Using the astronauts to scale, estimate the size of this Hill (how many astronauts is the hill? What's the size of the astronaut?).

Solar System

Use Solar System view to explore the Solar System in three dimensions. Zoom in to view the surface details of many planets and moons. Three of the most visited objects in the virtual Universe, the Earth, the Moon and Saturn.

To Control the View

- Click and drag to rotate the planet.
- Use the Planet Size slider to increase or decrease the size of the Sun and planets. 

- Use the mouse wheel to zoom in and out.
- To tilt the field of view **CTRL + click** and drag vertically.
- To rotate the field of view **CTRL + click** and drag horizontally.

Use View > Reset Camera to restore the default view and settings.

Basic navigation is much easier using the lower panel thumbnails as the starting point, as there are only one star, nine planets, and five moons to choose from!

Three of the most visited objects in the virtual Universe, the Earth, the Moon ar Saturn. For this particular image planet size is magnified to the maximum:

Use the mouse wheel to zoom out from the Solar System to view the Cosmos, pausing on the way to look at the Milky Way, noted for its two large spiral arms. The crosshairs show the position of the Solar System.

Activity 3: Take a screenshot of the Milky Way and our position within it.

Question 8: Now go back to the Solar System. What object a very inclined orbit that is misaligned with the inner planets of the Solar System?

Activity 4 (Taking a ride on a "planet"): On the menu on the bottom, click on this object. Then, on the top bar, click "view" and accelerate the time by clicking ⏩ to take a ride on this "planet."

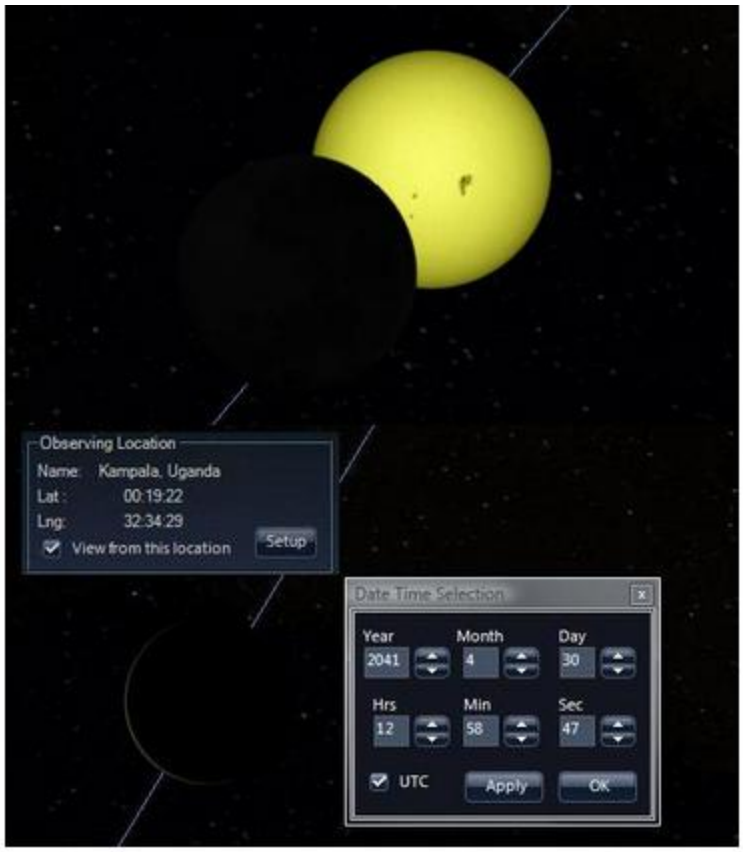
Question 9 How long does it take you to do a full loop around the Sun?

Tutorial: Tracking a Solar Eclipse

A solar eclipse occurs when the Moon passes in front of the Sun, as seen from some locations on Earth. The result is a spectacular mid-day darkness along a path across the Earth. To view the effect in WorldWide Telescope, go through the following procedure:

1. Research a time and location of a total solar eclipse in greater Colombia*. NASA has a website dedicated to this task, as do many other astronomy websites. For example, in the year 2041 April 30th, starting around 12.00 UTC (Universal time, or Greenwich Mean Time) there will be a total eclipse tracking across Africa and passing close to Lake Victoria.
2. In View, select the above-mentioned time and location (Kampala, Uganda). You can select a location by finding it on the list or selecting Choose on Globe.
3. On the drop-down panel on the bottom screen, select Sky
4. Make sure that in letters, make sure that all boxes under 3D Universe object and 2D sky are checked. Also, make sure that Sun in checked.
5. Check ecliptic overview in grid and scroll the sky to look for the Sun and Moon on the ecliptic. Make it dawn (6am) using the View tab
6. Now accelerate time and watch the eclipse happen.
7. Go to Solar System to get a "bird view" of how these three bodies are arranged during

*I tried to do this activity in Panama alone, but giving our size, total eclipses are hard to find.



Activity 4: This was an example. Take two screenshots of a greater Colombian Eclipse: in the Solar system view and in the Sky view. For the solar system view, I want a screenshot where you can see all three bodies (Moon, Sun and Earth). Centering on the moon helps. Upload all screenshots together with the answered questions pdf to Canvas.