

## Multi-planet remote sensing (a.k.a. Googling Earth, Moon and Mars)

The purpose of this activity is to explore new images to compare surface features on terrestrial planets. You will have two lab periods to view the images and complete your write up. Your final product will be a *team report*. In my planetary class, we do this as a two-week exercise with a written report. Today, we'll split into groups and report out our observations.

For this laboratory, please address:

(A) A discussion of the geological high points on Earth, the Moon and Mars (several sentences)

- Earth's "tallest" mountain: Mt. Everest
- Earth's "largest" mountain: Mauna Loa
- The largest volcano in the solar system: Olympus Mons on Mars
- the Moon's high points – you'll have to describe where roughly this is, because of the way that Google Moon repeats the patterns for topographic images.

\* for each mountain, find, either with Google Earth or by searching in NASA's website: the height at the "base" from which the mountain is built, the height of the peak of the mountain, compute the relief (summit elevation – base), and approximate the horizontal distance over which this relief happens.

Be ready to discussion of WHY the largest mountain is found on a planet other than Earth. (consider your results from the problem posed at the end of this lab)

(B) A discussion of geological low points

- Grand Canyon in Arizona
- The Great Rift Valley in East Africa (look at the line of volcanoes between Nairobi and Addis Ababa; Tuesday folks: call Jenny over and have her show you where her thesis area is)
- Marianas Trench (type into Google Earth or use coordinates: 11°54'05" N, 141° 14'48"E)
- Valles Marineris on Mars
- you can generalize where you see low points on the moon (which hemisphere – north or south- on the moon, what geological features contain these low points? And what do you know from earlier labs about the relative ages of these surfaces?

\* for each canyon/valley/low point, find either with Google Earth or by searching within NASA's website the relief/depths of the canyons/valleys, the length of the canyon or rift

(C) one-paragraph descriptions of two new-to-you discoveries of two geological features you discovered on Earth and two such features you discovered on another terrestrial planet or Earth's Moon (for resources for other planets, use either Google-Mars, Google- Moon, or ESA's or NASA's website

### ***For those interested in integrating with calculations :***

The strength of planetary lithosphere is related to overlying lithospheric pressure. This pressure ( $p_L$ ) is given by:

$$p_L = \rho gh,$$

where  $\rho$  = density of the crust,  $g$  = planetary gravitational acceleration, and  $h$  = the height of overlying column of crust. Use the density of basalt for the overlying material ( $\rho = 3000 \text{ kgm}^{-3}$ ).  $g_M = 3.7 \text{ ms}^{-2}$ ;  $g_E = 9.8 \text{ ms}^{-2}$ .

Compute the pressure on a piece of crust at the bottom-of-the-sea base of (a) Mauna Loa and also (b) for Olympus Mons and describe why the tallest volcano in the solar system is located on Mars.

***Useful web links:***

Google Mars – <http://www.google.com/mars/>

Google Moon - <http://www.google.com/moon/>

[www.google.com](http://www.google.com) - for general directions to useful sites

[www.usgs.gov](http://www.usgs.gov) (good for explaining Earth's geological features)

<http://www.lpi.usra.edu/> Lunar and Planetary Institute (especially good for Venus)

[www.nasa.gov](http://www.nasa.gov)

Wikipedia and solarviews are OK to use as sources ( I tell students that they should not constitute the entire list of references).

Couple tips for the new Googles:

- For Google – Moon – the best viewing is when either the visible or topographic boxes are clicked and charts is toggled off so that there is no window in the lower right hand corner.
- For Google – Mars – one can choose visible or topographic views, and in the upper menu bar choose Mountains or Canyons to answer most of the questions. Note that the mountains and canyons are listed alphabetically (on multiple pages) on the left hand side