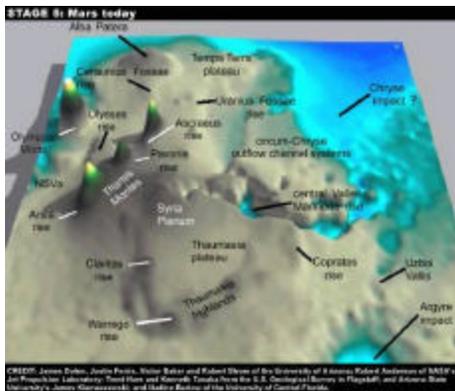


**ANCIENT MARS: Tharsis region before most of the uplift occurred. Only a handful of mountains and rises surround the Tharsis basin, which may have held vast amounts of water.**



**MARS TODAY: The central Tharsis basin, which may still harbor an aquifer, has risen and possibly forced water outward.**



**Project Description:** Water search on Mars is the main driver for future explorations to show previous existence or sustain current life . Secondly, the molecular components of water can be a source of fuel and be stored as either hydrogen or oxygen propellant for future human missions consumption.

**Situation:**

Assume we are currently at the beginning of a 79 year cycle where Mars is closest and is in full view of the dark side of the moon.

The Tharsis complex floodwaters sit roughly 6 miles (10 kilometers) above the surrounding terrain and covers 11.6 million square miles (30 million square kilometers). That's more than three times the size of the United States on a planet that is only about half the size of Earth. "It lends strong support to studies that show Mars may once have been wet and possibly capable of supporting life. And it bolsters the suspicion that water still lurks just a few hundred feet under the surface."- University of Arizona geologist James Dohm

Mars is 55,758,006 km (34,646,418 miles) at it's closest approach to the earth. The moon's diameter is 2,160 miles. The Moon has almost no atmosphere, so a layer of dust -- or a footprint -- can sit undisturbed for centuries. And without an atmosphere, heat is not held near the planet, so temperatures vary wildly. Daytime temperatures on the sunny side of the Moon reach 273 degrees F; on the dark side it gets as cold as -243.

**Objectives:** Find subsurface reservoirs of water on Mars by microwave remote sensing from the Moon. Use the best combinations of radiometers from ULF/ELF to sub-millimeter wavelengths to provide indications of subsurface water but require large apertures, to shorter wavelengths that provide adequate spatial resolution. For example, if the Earth/Mars closest approach is used as slant range (SR), moon diameter is used as Collecting Aperture Diameter, and lambda is chosen as 21 cm (good for soil moisture to 5 cm penetration), spatial resolution on Mars would be 9 km or good enough to direct water finding robots.

Build a multi-spectral array to map the Lunar surface before the current closest approach ends.

**Student Tasks:** Extend this work to include lunar astronauts planning martian prospecting using remote sensing data obtained from the moon . Provide a Technology Roadmap to show how the technology demonstrations may proceed from Earth/Moon sensing to Mars sensing, relate to each other and to the whole.