

Supai Middle School
MSIP Project Proposal
April, 2011

Introduction:

Science Question: Is there a difference in the relative ages of Olympus Mons and Uranus Tholus and / or the respective calderas, cones and flanks of each of these volcanoes?

Our science question is important and interesting because it would be intriguing to see which of these volcanoes was most recently active. If we were to find that both of these volcanoes were going off at the same time, then it might be possible that there is some type of connection between the two volcanoes.

If we were to find evidence that there is a connection between these two volcanoes, one of which is the largest volcano in the solar system and the other a smaller one on Mars, then it might lead us to hypothesize that there is a connection between the activity of all or most of the volcanoes on Mars with each other. Was there possibly a planet wide event that caused a number of volcanoes to be active at the same time?

Hypothesis: At this point we do not feel that we have enough information to form a hypothesis, and we need to gather more data to answer our science question. As we gather data, before our time at ASU, we may be able to develop a hypothesis.

Background Information:

Olympus Mons and Uranus Tholus are located in the same general area of Mars. Both are located in the Northern hemisphere and the three volcanoes of the Tharsis Region are between these two volcanoes. Olympus Mons is located at 226.3 E and 18.3 N and Uranus Tholus is located at 263 E and 24 N.

Olympus Mons is considered to be the largest volcano on Mars and in the solar system. The volcano according to the THEMIS website and NASA websites is approximately the size of the State of Arizona. It is considered to be a shield volcano. Olympus Mons is visible by spacecraft from a great distance as they approach Mars.

The caldera on Olympus appears to be much wider than it is tall. Olympus Mons also appears to have a gentle slope.

Olympus Mons appears to be younger than Uranus Tholus, and Uranus Tholus is older than the plains surrounding it.

Uranius Tholus is estimated by Oregon State University on their website to be approximately three billion years old. It is much smaller in height and area than Olympus Mons. There is some possibility that it might be older than the plains that surround it. There appears to be a large amount of impact craters on the surface which would support the theory that this is an old volcano.

Uranius Tholus is sixty kilometers in diameter and is 4.5 km high. It is considered to be in the Tharsis region of Mars. It is smaller than Mt. Everest on Earth. Like Olympus Mons, Uranius Tholus is a shield volcano.

Preliminary Observations: Each of these volcanoes has a caldera, cone, and flank. Each volcano also has a number of observable impact craters. Both have been active and erupted in Mars' past geologic history.

Both volcanoes are located on the edge of the Tharsis region of Mars.

Experiment Design

We are planning on using the THEMIS camera aboard the Odyssey spacecraft. We will be using visual images that have been collected by Arizona State University to study these two volcanoes.

Our study will focus on the calderas, cones, and flanks of Olympus Mons and Uranius Tholus to see if the number of impact craters can help us determine whether or not there is a significant difference in the relative ages of the volcanoes and their features.

At a minimum we plan to collect data from at least thirty images. We will collect data from five images of each caldera, five images of each cone, and five images of each flank.

We plan to record our data in a table like the one below:

Image ID #	Latitude	Longitude	Impact Craters	Volcano	Cone, Caldera, Flank	Other Observations
V12345678	2.9	238.8	12	Olympus Mons	Cone	mostly preserved

We plan to count the number of impact craters in three frames of each image, because there may be parts of the image that cover more than just one feature, especially on Uranius Tholus. We will count the impact craters as the images are electronically displayed on a computer screen.

The collection of the amount of impact craters is important, because this will help us determine whether or not there is a difference in the relative ages.

All of our images will come from the THEMIS site at THEMIS.ASU.edu.

Analysis Plan

For our analysis plan, we will including a data table like the one below.

Image ID #	Latitude	Longitude	Impact Craters	Volcano	Cone, Caldera, Flank	Other Observations
V12345678	2.9	238.8	12	Olympus Mons	Cone	mostly preserved

We will create a series of bar graphs using Excel that will compare the number of craters by feature of each volcano and the features of each volcano.

Graphs:

Olympus Mons		Uranus Tholus
Caldera	vs.	Caldera
Flank	vs.	Flank
Cone	vs.	Cone

Olympus Mons

Caldera vs Cone vs Flank

Uranus Tholus

Caldera vs Cone vs Flank

If possible, we will also create a graph that shows the location of each image on a Mola Map that focuses on each area.

Conclusion:

Our science question asks : Is there a difference in the relative ages of Olympus Mons and Uranus Tholus and / or the respective calderas, cones and flanks of each of these volcanoes?

We feel that our science question is important, because it would be interesting to know if the volcanic activity was happening in different regions or the same region of Mars at the same or different times. Was Mars volcanically active during a specific period, or did volcanoes erupt over longer periods of time as they do on Earth.

Bibliography:

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