Introduction

In introducing our research on mars we have asked the question: Is there a correlation between the width of an impact crater and the depth of that crater? This will lead to answering the question: Does a larger meteor always have a deeper impact than smaller meteors?

Hypothesis:

The hypothesis we have come up with due to our research is asking if the larger the width of the impact crater means the depth will be larger along with the width. This includes the questioning of if the width of the impact crater was smaller, would impact have been smaller as well?

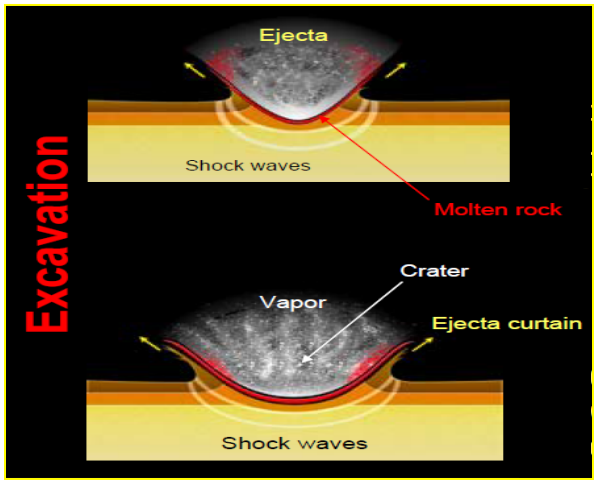
Background

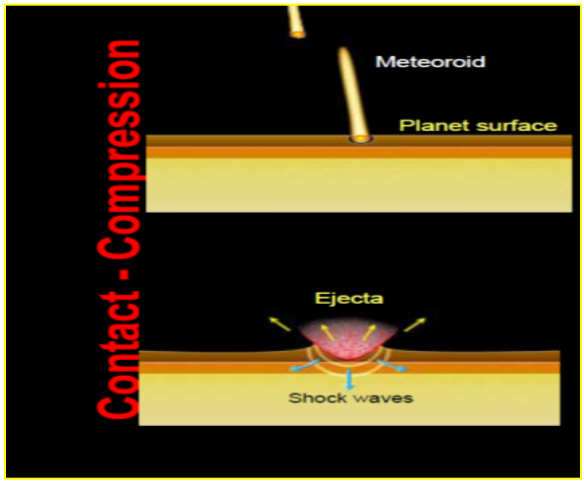
Definitions:

Crater- circular bowl shaped depression on a surface such as Earth or Mars

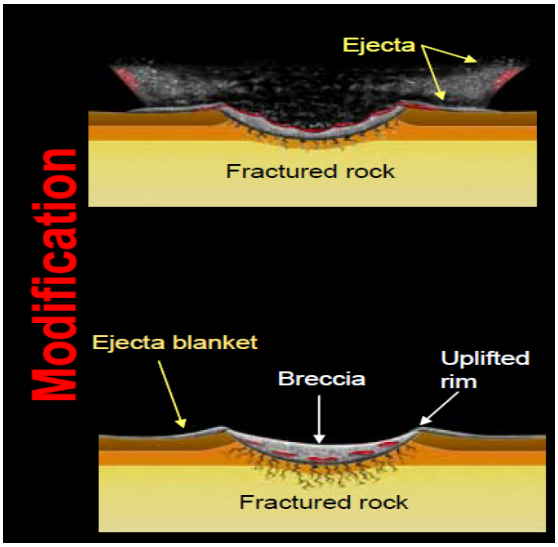
Meteor- a very small meteoroid that has entered the earth's atmosphere. Such objects have speeds approaching 70 kilometers per second

Ejecta Blanket- is a generally symmetrical apron of ejecta that surrounds a crater.



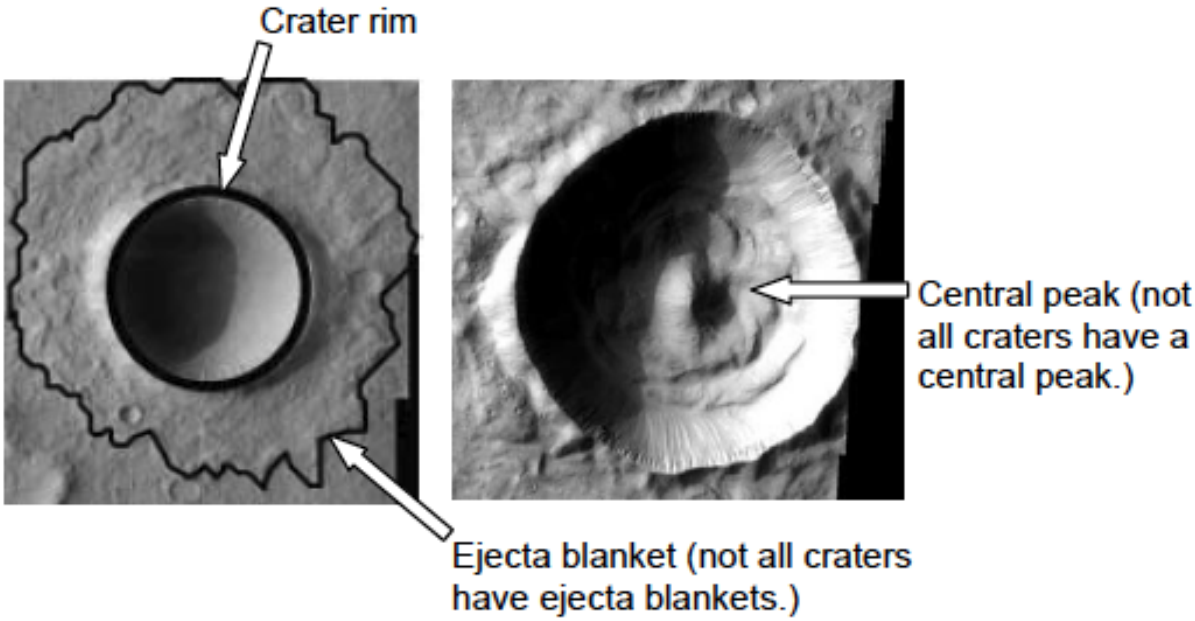


In the Contact-compression image, the first picture shows a meteoroid traveling at 10-15 kilometers/second striking the surface of a planet. The second picture of the Contact-Compression image shows that the shockwaves compress the rocky surface and the metior is vaporized. In the second image, known as Elevation, the intense shock waves travel through the ground, breaking up and melting the surrounding rock. The second picture of the Elevation image shows that a crater is formed as shock waves and the ejecta expand outward around the center.



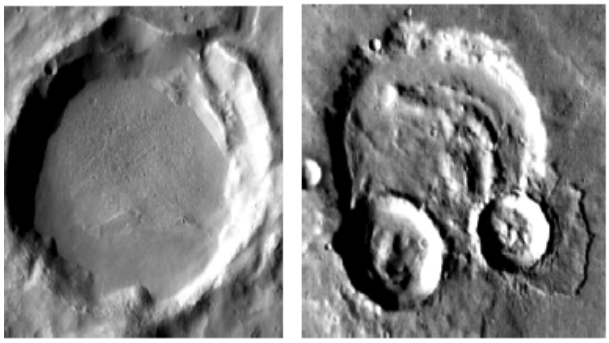
The first picture of the Modification image show that the shock waves die out and the ejecta settles forming a blanket around the crater rim. Then in the second picture of the Modification image, the crater is fully formed and is modified by gravity, erosion, and sedimentation over geologic time.

Preserved craters



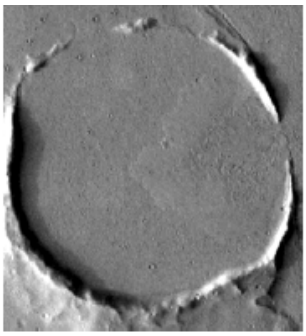
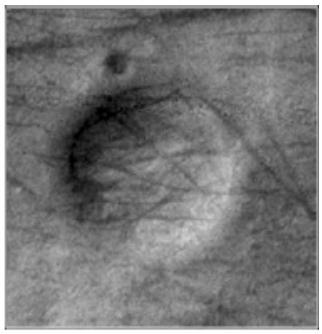
In a preserved crater you can observe nearly perfect craters, raised rims, and sometimes the ejecta blanket or central peak. Preserved craters look like new and are sometimes called young craters because the more recently they have been formed, the easier they are to see.

Modified craters



Modified craters have been changed or modified by an outside change such as: erosion, wind, water, lava. But in other cases the ejecta blanket looks eroded. The crater may also have a smooth floor occasionally due to being partially filled in with material or sediment- middle aged craters as they are called.

Destroyed craters

Destroyed craters look very worn away. They often have broken rims and/or have been filled with sediment. This leaves them severely changed or modified, these are typically very old craters.

What we know

What we have already found in research is the numbers of craters and morphologies record the effects of erosion of a deposition that have been altering the face of mars throughout history, recorded by observable craters. Also, if superposition to the formation of such structures as volcanoes, stream channels, and lava flows, then we will know the broad outline of the Martian surface. There are 635,000 impact craters on mars that are roughly a kilometer of more in diameter. The impact craters are shallow and smoother than lunar craters, indicating that mars has more active history erosion and deposition on the moon. The research also shows that Mar's has the greatest diversity of impact crater types of any planet in the Solar System. Mar's also has a rate of volcanic and tectonic activity low enough that ancient, eroded craters are still preserved, yet high enough to have resurfaced large areas.

Experimental Design

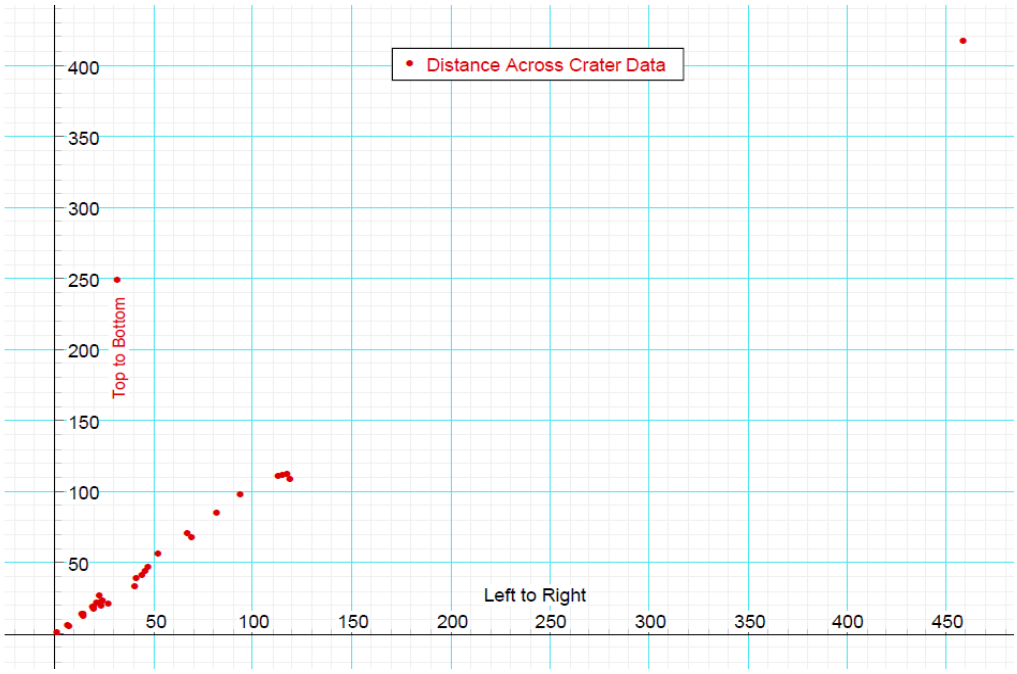
In our experimental design we used the THEMIS camera system from the Mars Odyssey Spacecraft, the visible imagine system. In the design we also used the THEMIS website to select images of craters searching within a set location (latitude of -10 to +13).We have also used JMARS to explore selected images and found the latitude and longitude of the selected craters in the images. We have also recorded measurements of the widths and depths of the craters in the selected images. We have kept noted any additional information.

Conclusion

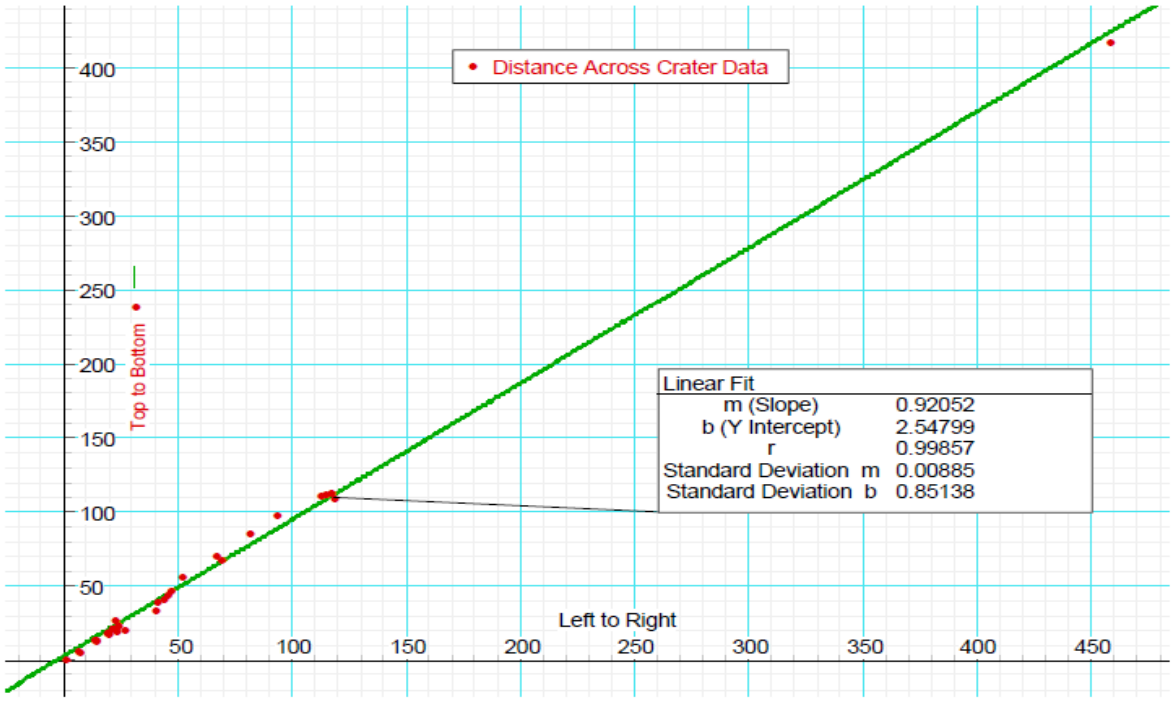
In conclusion we have asked the question," Will we ever inhabit Mars and how can we prepare for future meteor showers her on earth. In order to answer these questions Knowing about the meteors on Mars and the relationship to size and depth will help us in determining if other meteor showers could destroy the entire surface of the planet or not. An initial research question we have asked is," Is there a correlation between the width of an impact crater and the depth of that crater?" Our final data Analysis is that our evidence fails to support that conclusion. Additionally we have examined the crater's diameters, and our data showed that there was a one-to-one ratio meaning that the craters were circular in shape.

Calculating the Average Diameter of the Crater

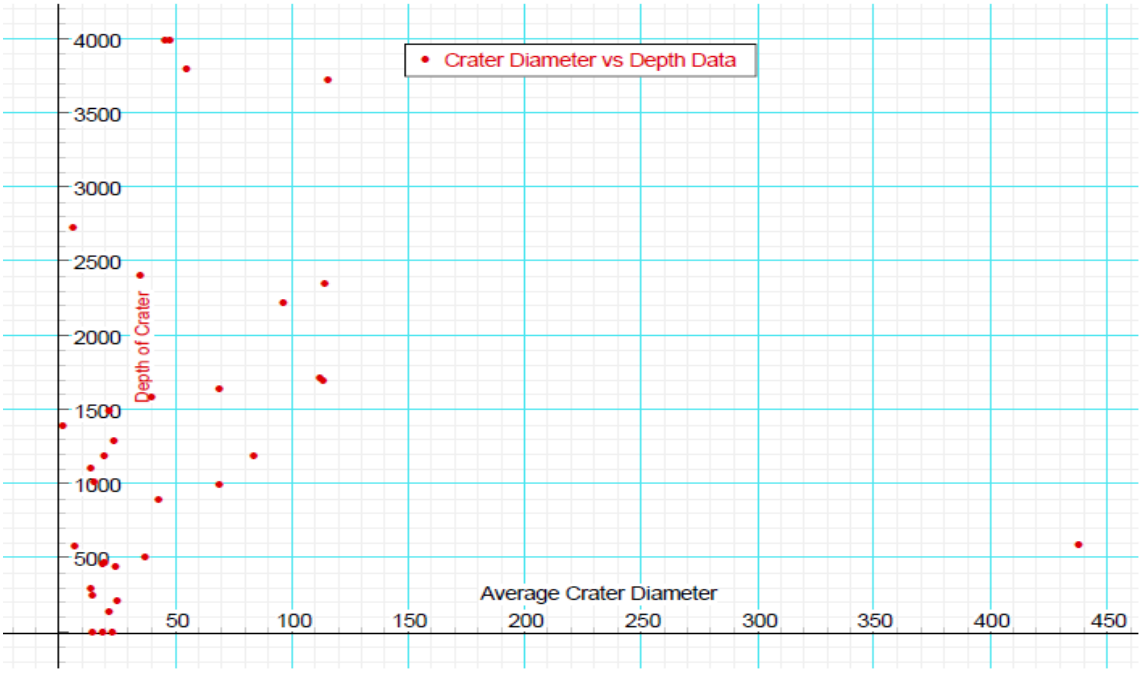
In calculating the average diameter of the crater we used a formula to determine the average of the diameter from left to right, and we have measured the diameter from top to bottom.



Just data points



With linear fit



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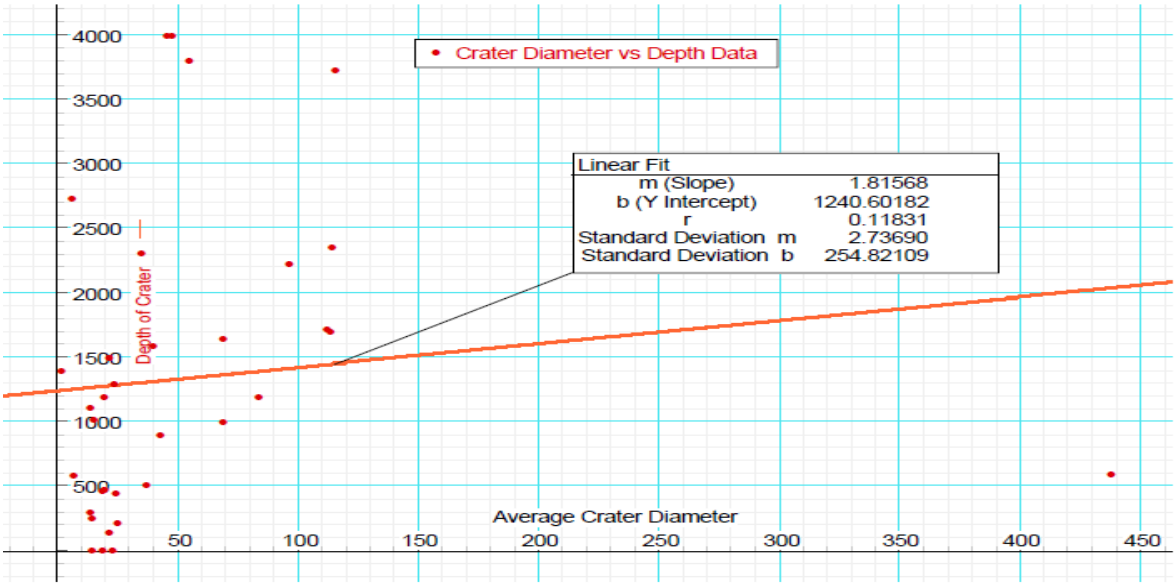
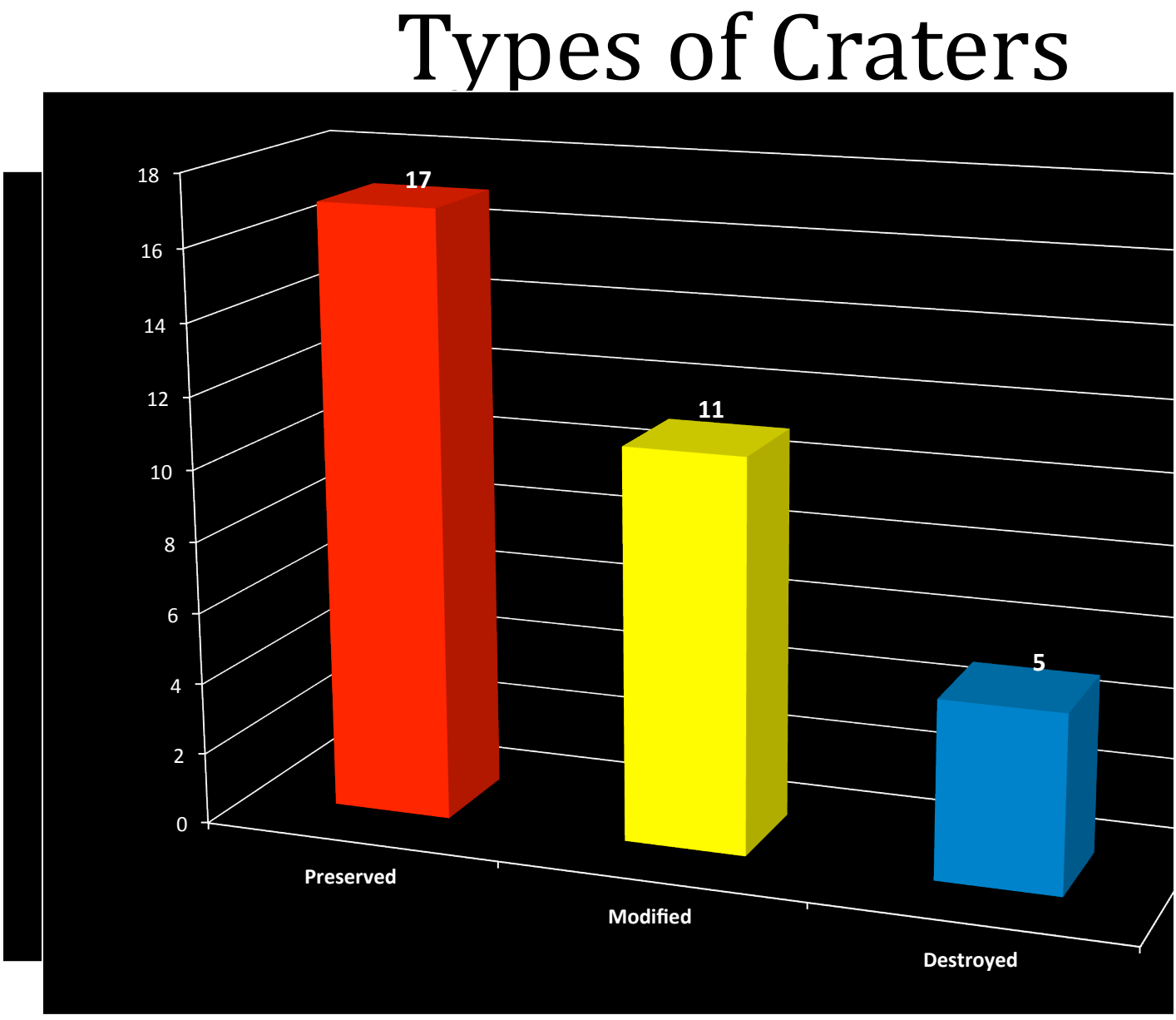
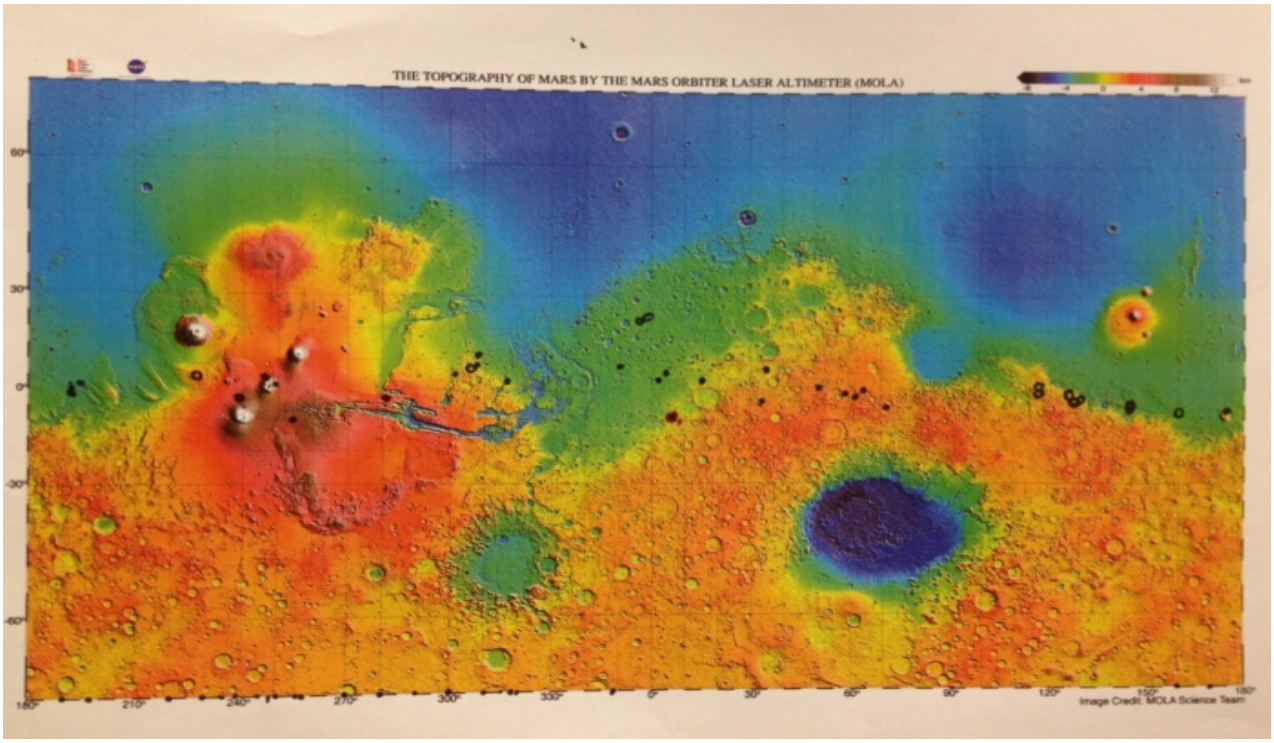
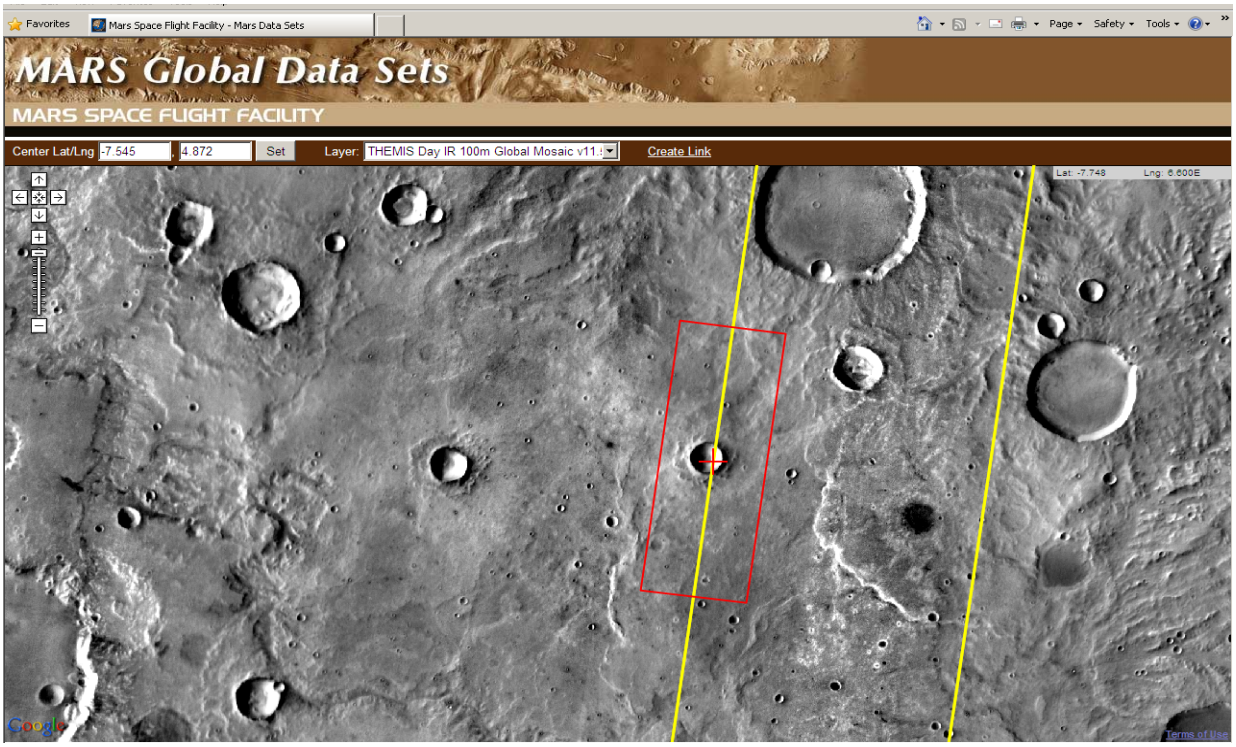

Crater Diameter vs Depth Data
Linear Fit
m (Slope) 1.81568
b (Y Intercept) 1240.60182
r 0.11831
Standard Deviation m 2.73690
Standard Deviation b 254.82109
Depth of Crater
Average Crater Diameter
4000
3500
3000
2500
2000
1500
1000
500
50
100
150
200
250
300
350
400
450

With linear fit

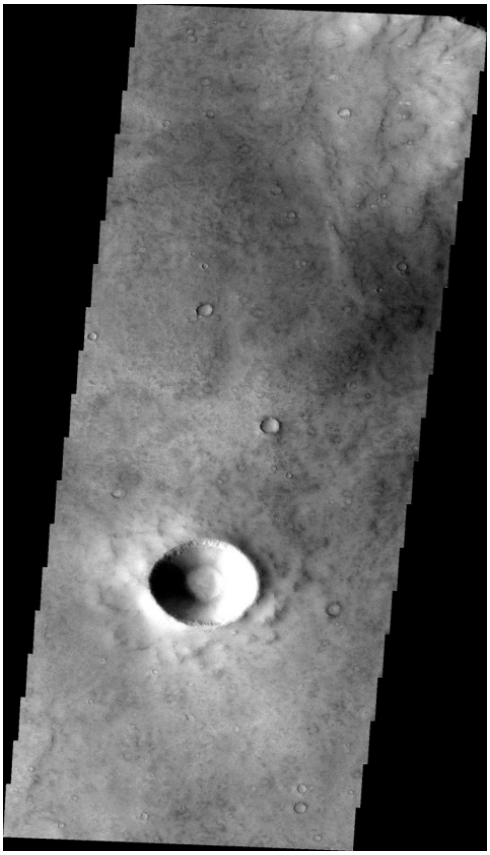




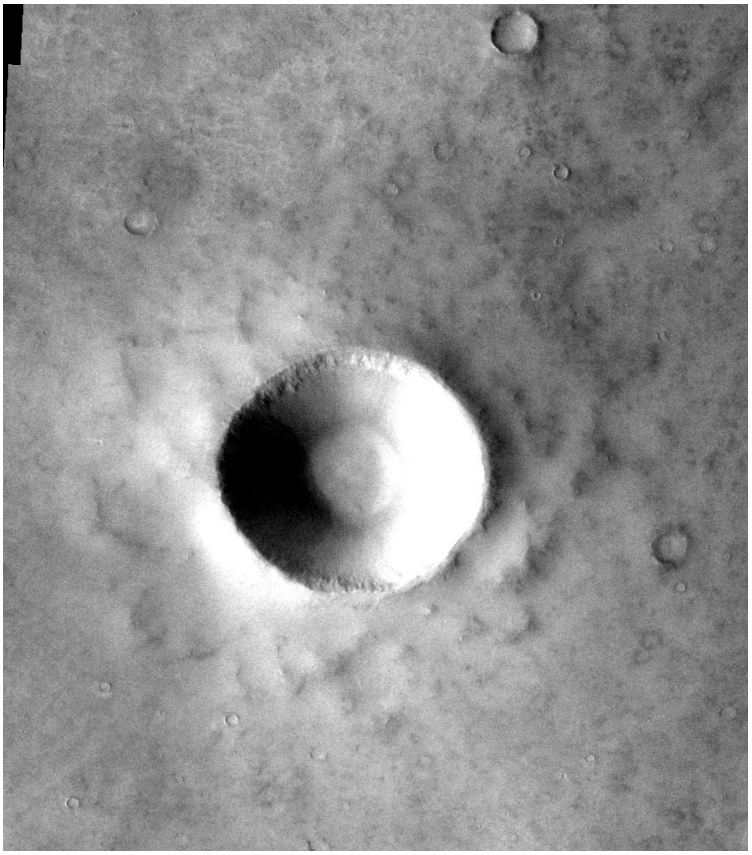
MOLA MAP with blue dots representing craters researched and red dot represented target spot.



Targeting Link with image selected



Themis Image



Zoomed in Themis Image

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