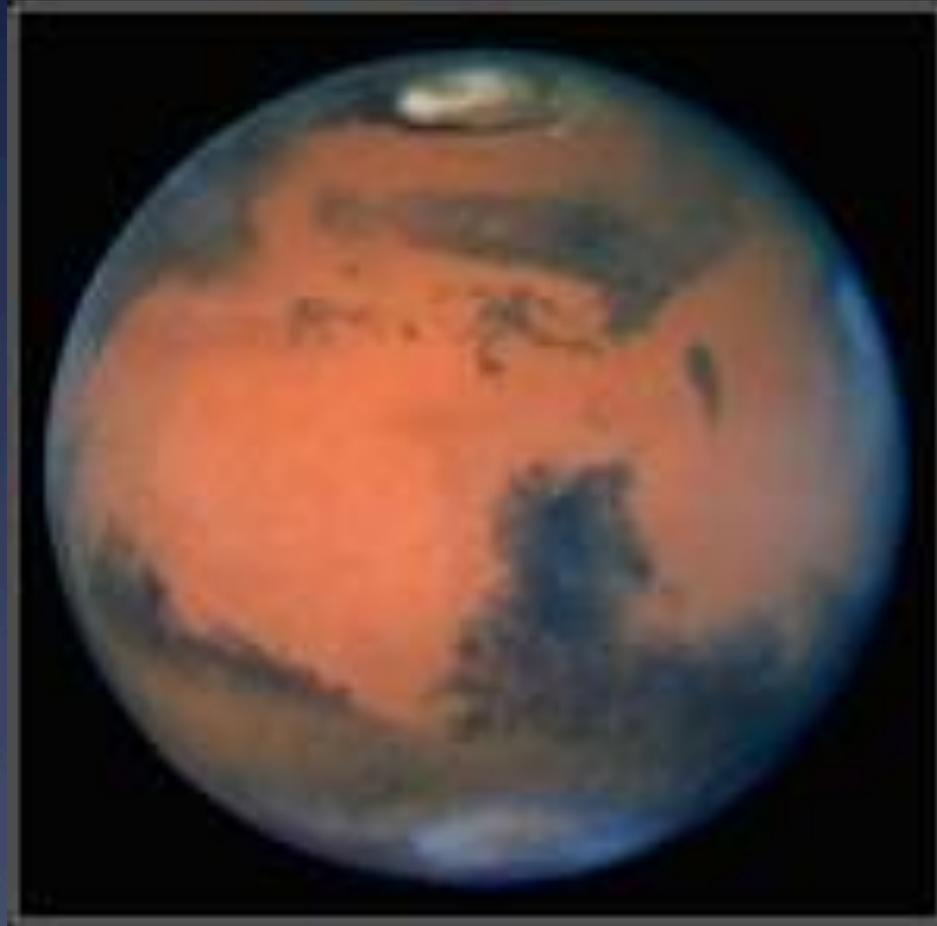


MARS CRATERS



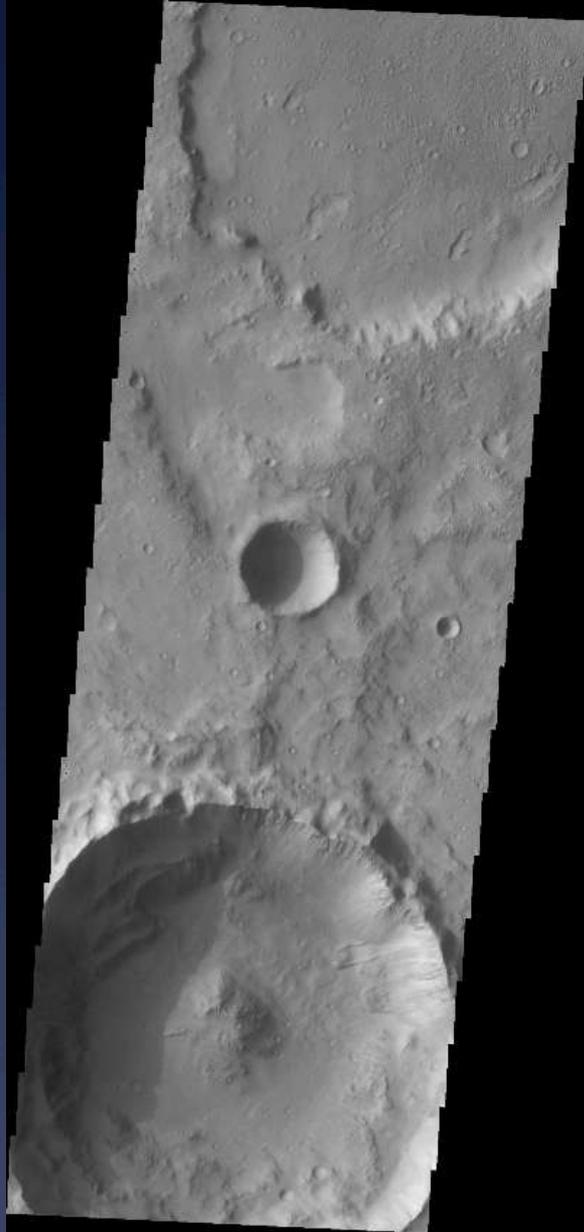
Upper Darby High School

Introduction

- * How did the size of rogue objects in the early solar system change over time?
- * By studying the relative size of rogue objects in the early solar system, we can learn about the formation of the solar system.
- * We hypothesize that if there were more large rogue objects in the early stages of the solar system, then the larger craters on Mars' s surface would be older.

Background

- Craters are formed when meteorites strike a surface and leave a bowl-shaped depression in the area where the meteorite has struck.
- Over time, erosion fills in the depression and slowly modifies the crater. Eventually, the crater is filled by debris, such as sand and dust. This come to a point where the crater can barely be seen. Therefore, it becomes a destroyed crater.
- Studies have shown that the depth of a simple crater is one fifth of its diameter when it is first formed. When it starts filling in, this becomes untrue.



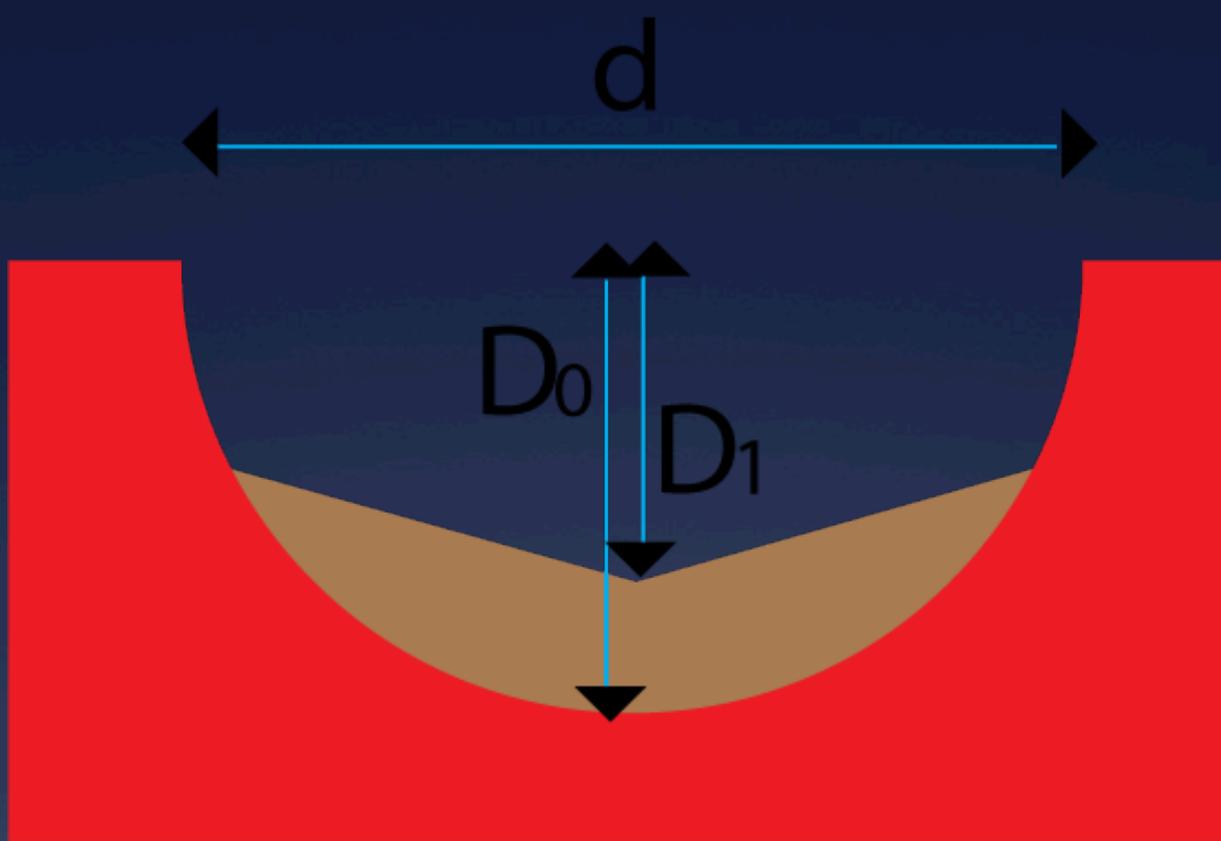
Images like this are what first piqued our interest in the topic we are studying.

This picture displays three craters. The small crater in the middle appears to be more preserved than the two larger craters. The larger craters appear to be worn down from erosion, and therefore significantly older than the smaller crater.

Image ID: V27741031

Experiment Design

- The THEMIS visual image stamps and the MOLA elevation map will be used to collect data.
- We will focus our study on craters between the equator and 5 degrees south latitude. It is important to study between a specific set of latitudes because of how wind patterns effect erosion.
- We will use JMARS to identify craters. We will use the measure tool to determine the diameter of each crater. We will also use the MOLA colorized elevation map to draw a profile line for each crater. This will enable us to find the depth of each crater.



- * d: diameter
- * D_0 : original depth (one-fifth diameter)
- * D_1 : current depth
- * Percent filled = $D_1/D_0 \times 100$

We will use Percent Filled to determine the relative ages of craters

Analysis Plan

Crater	Diameter	Depth Currently	Calculated Original Depth	Percent Filled	Location of the Crater
Example crater A	Diameter of the crater	Depth of the crater	Diameter/5	Current Depth/ Calculated Depth	Latitude and Longitude

We will also use a scatter plot to compare the percentage the crater is filled to its diameter.

Conclusion

- * We would like to determine if a correlation exists between crater age and crater diameter to find new evidence of the formation of our solar system. Our group hypothesizes that the size of rogue objects in the solar system decreased over time, and we will search for evidence of this by showing, on average, larger craters are older than small craters.

Resources

- * http://www.researchgate.net/publication/4703177_increased_depth-diameter_ratios_in_the_Medusae_Fossae_Formation_deposits_of_Mars
- * <http://www.psi.edu/research/isochrons/chron04a.html>
- * <http://www.msss.com/http/ps/age2.html>
- * <http://www.msss.com/http/ps/craterlist.txth>