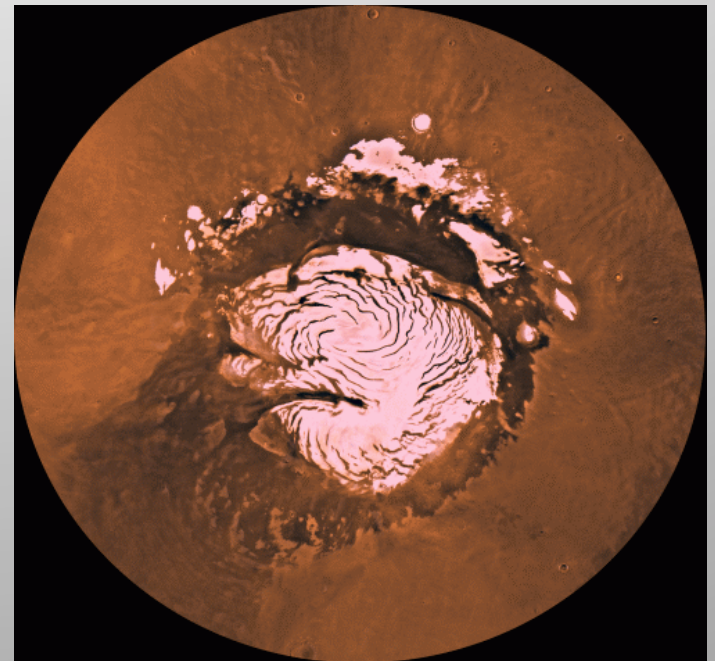


An aerial photograph of a large, layered rock formation on Mars, possibly a volcano or impact crater. The formation is characterized by numerous concentric, wavy layers of varying shades of brown and tan, creating a complex, textured appearance. The surrounding terrain is a darker, reddish-brown color. The text "Upper Darby High School Mars Project Fall 2012" is overlaid in the center of the image in a bold, black, sans-serif font.

Upper Darby High School  
Mars Project Fall 2012

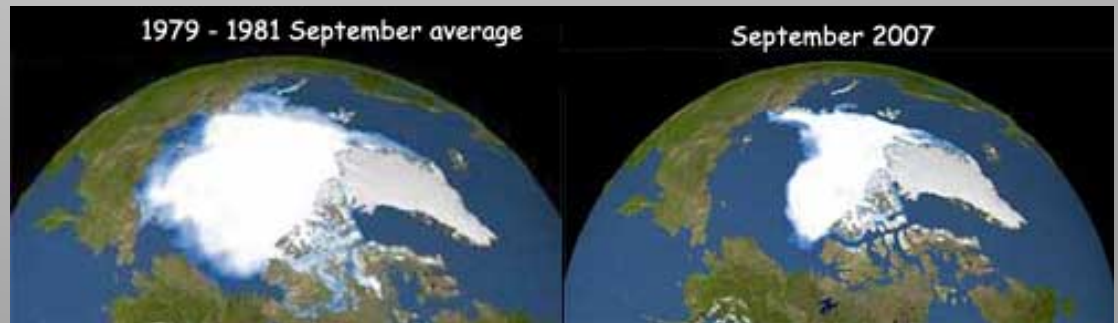
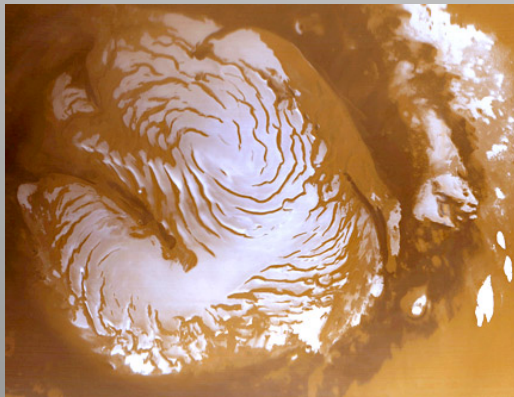
# Introduction

- How do the polar ice caps on Mars change in area and volume from year to year?
- This question is important to us because Earth's ice caps are changing in area and volume as well, with many scientists agreeing that human activity is the primary cause. However, if the same effects are occurring on Mars, then humans may not be the sole cause on Earth.
- Hypothesis: Earth's icecaps have declined in area at a rate of 13% per decade therefore, Mar's polar caps will decline at a lower rate because they are a greater distance from the sun and do not have human activity.



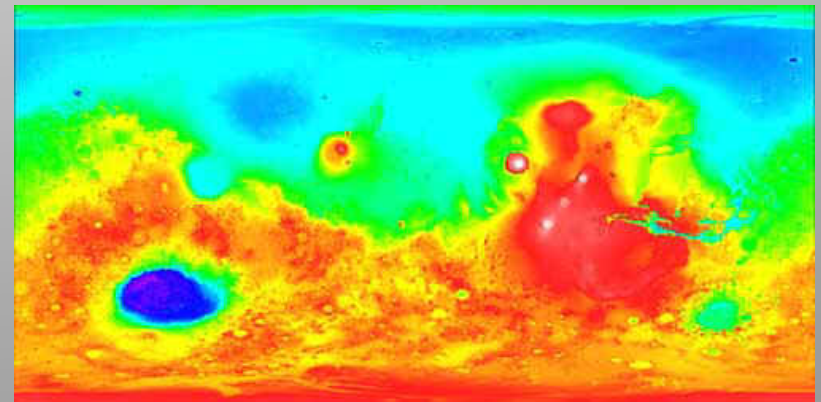
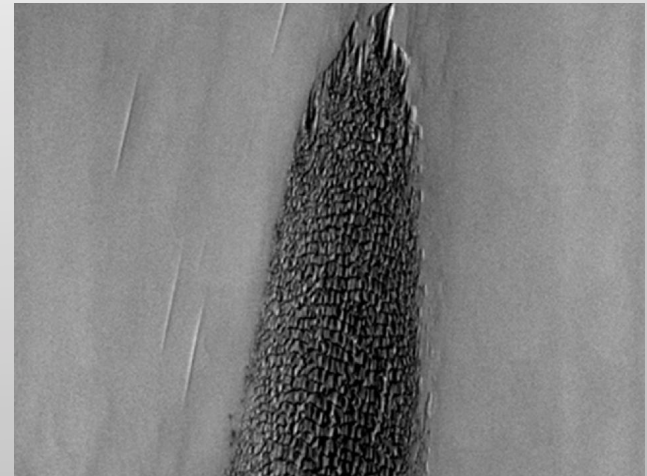
# Background

- Similar to Earth, Mars also has experienced periodic ice ages.
- Currently, Mars is experiencing a warming era, which is diminishing the Martian polar ice caps
- The ice caps are approximately 1m thick, that are composed mostly of water and carbon ice.
- Martian summer temperatures reaches up to 0° C.
- Northern Martian ice caps are approx 1,000km, while the Southern ice caps are approx 350km (diameters)
- Mars does not have a moon so its axis wobbles greatly, leading to a large variation of climate.



# Experimental Design

- In order to attain the area of the polar ice caps, we will use the images from the THEMIS visible camera to obtain the outline. We will use the Custom Shape application to find the area of the ice cap. We will do this repeatedly for a series of seven years during the following three times of the year: early spring, mid summer, late fall. This will allow us to determine the relative area from year to year.
- Furthermore, we will determine the elevation of the polar ice caps by using the MOLA altitude map and the Profile feature. We will use the elevation to find relative volumes



# Analysis Plan

- We will make a data table as follows for each of the seasons we will measure.

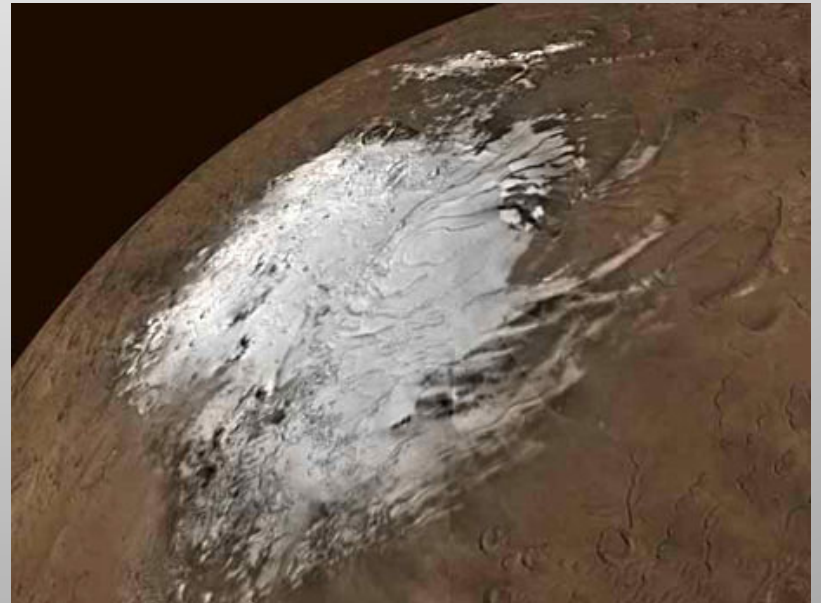
Year	Area	Elevation	Volume

# Analysis Plan Continued

- For each season, we will make two scatter plots; one comparing area and year, and another comparing volume and year.

# Conclusion

The crux of our experiment is investigating the rate at which the Martian polar ice caps are declining. We will compare this rate to the rate on Earth to determine the extent human activity has on the polar ice caps. We predict that the rate of decline on Mars is significantly lower than the rate of decline on Earth. This experiment is important to us because it will solidify whether or not humans are the main cause of global warming.



# References

- [http://science.nasa.gov/science-news/science-at-nasa/2001/ast09feb\\_1/](http://science.nasa.gov/science-news/science-at-nasa/2001/ast09feb_1/)
- <http://www.skepticalscience.com/global-warming-on-mars.htm>
- <http://www.nasa.gov/topics/earth/features/arctic-seaice-2012.html>
- [http://science.nasa.gov/science-news/science-at-nasa/2003/07aug\\_southpole/](http://science.nasa.gov/science-news/science-at-nasa/2003/07aug_southpole/)
- <http://news.nationalgeographic.com/news/2007/02/070228-mars-warming.html>