

## Mars for Earthlings

**LESSON 15: Ice Ages*****In-Class Activity 1****Ice Ages Through Time***Purpose:**

Come to understand climate changes over time, hypothesize the causes of ice ages on Earth, and extrapolate those causes to Mars

**I. Ice Ages on Earth:**

Watch Earth's Paleogeography through time.

<http://www.youtube.com/watch?v=Q2dAmLnR3tA>

After watching the video, answer the following questions:

1. At what Earth age (ages) was there the greatest extent of ice cover towards the South/Southern Pole?

At what Earth age (ages) was there the greatest extent of ice cover towards the North/Northern Pole?

**II. Extreme Ice Survey on Earth**

Watch this 21 min. Ted Talk 2009 movie on James Balog: Time-lapse proof of extreme ice loss: <https://www.youtube.com/watch?v=DjeIpbjAqsM>

What is he trying to do and show?

How does he power his equipment?

What is his photography showing?

1. Why do glaciers matter? See [extremeicesurvey.org/why-do-glaciers-matter/](http://extremeicesurvey.org/why-do-glaciers-matter/)  
Give 3 reasons:
  - a.
  - b.
  - c.



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### III. Milankovitch Cycles and Glaciation

1. What are Milankovitch cycles and how do they affect glaciation? (For help use: [http://www.indiana.edu/~geol105/images/gaia\\_chapter\\_4/milankovitch.htm](http://www.indiana.edu/~geol105/images/gaia_chapter_4/milankovitch.htm))
2. What are some major differences between the Milankovitch cycles of both Mars and Earth? (For help use: <http://phoenix.lpl.arizona.edu/mars172.php#1>)
3. How might those differences affect climate changes on Mars compared to Earth especially related to ice ages?

### IV. Mars and Ice Ages

1. Would you hypothesize that Mars experiences ice ages as well? Explain your reasoning.
2. Why or how would the orbital parameter of Mars affect potential ice ages?



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### Homework 1

Ice Ages\_MFE

*Ice on Mars*

**Objective:** Find and understand terrains on Mars that contain or harbor ice.

### Activity/Assignment:

1. Research regions on Mars that have been identified to have fretted terrain.

Hint: Fretted terrain is most common in northern Arabia, between latitudes 30°N and 50°N and longitudes 270°W and 360°W. Two good examples of fretted terrain are Deuteronilus Mensae and Protonilus Mensae.

2. Using JMARS, search for and capture images of the following:
  - a. Fretted terrain
  - b. Softened terrain
  - c. Lobate morphologies
  - d. Make note of the following for each captured image:
    - i. Lat/Long,
    - ii. Zoom increment
    - iii. Map used for each image captured (THEMIS, MOLA etc.)

### What you turn in:

3. Compile your findings into a .ppt presentation (print out your slide presentation with speaker notes where you've indicated any important info)
  - a. Label all features.
  - b. For JMARS images, label the feature, Lat/Long, Zoom increment, and Map on each slide (with the image).
  - c. Use the "speaker notes" to further elaborate on your findings.
  - d. You should have at least 3 slides
    - i. Slide 1: fretted terrain
    - ii. Slide 2: softened terrain
    - iii. Slide 3: lobate morphology

