

## Mars for Earthlings

**LESSON 11: Age & Times of Mars vs. Earth*****In-Class Activity 1******A Timescale Comparison*****Mars vs. Earth Time**

Compare the geologic timescales of Earth vs. Mars and answer the following questions.

1. What differences do you observe in the timescales?
2. What do you think is responsible for those differences?

**The Noachian**

View the following YouTube video about the Noachian period of Mars (an artist's rendition/animation of the period): <http://www.youtube.com/watch?v=JfYIvkTQ2pc>

1. What do you notice about the early period of Mars?
2. How similar/dissimilar is it from Earth?



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### ***Geologic Map of Earth***

View a geologic Map of the state of Utah.

[http://geology.utah.gov/maps/geomap/postcards/pdf/utgeo\\_postcd.pdf](http://geology.utah.gov/maps/geomap/postcards/pdf/utgeo_postcd.pdf)

Note: this map is simplified

1. What is the scale of the map?

How many degrees of latitude and longitude does the map cover?

2. Roughly how many colors are used on the map and what do they represent?

3. How old is the oldest terrain in Utah? (give “age name” and years)

In your opinion why is there so little of this terrain?

### **Geologic Map of Mars**

View a geologic Map of Mars:

[http://www.lpi.usra.edu/resources/mars\\_maps/1083/index.html](http://www.lpi.usra.edu/resources/mars_maps/1083/index.html)

1. What is the scale of the map (ratio)?

How many degrees of latitude and longitude does the map cover?

2. What does the color scale indicate on the map and how does this differ from the Utah map?

3. How old is the oldest terrain according to the map? (give “age name”)

If this is hard to discern, why is this?



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4. Now look at the latest map of Mars (click on map sheet) at:

<http://pubs.usgs.gov/sim/3292/>

Name 3 ways in which it is different from the earlier map of Mars that you looked at? (hint look at the abstract)

- a.
- b.
- c.

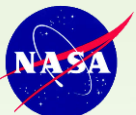
### Why the difference?

1. Consider the difference between Mars and Earth. Why was mainly only a geologic map of Utah (and then N. America) provided to you?

What is the potential difficulty in providing you a geologic map of the entire Earth?

2. Notice how the shapes and geometries of colored units on Mars vs. colored units on Earth. Cite 3 ways in which the mapped geologic features of Mars are distinctive or different from Earth (comment on the implication of the processes that are different):

- a.
- b.
- c.



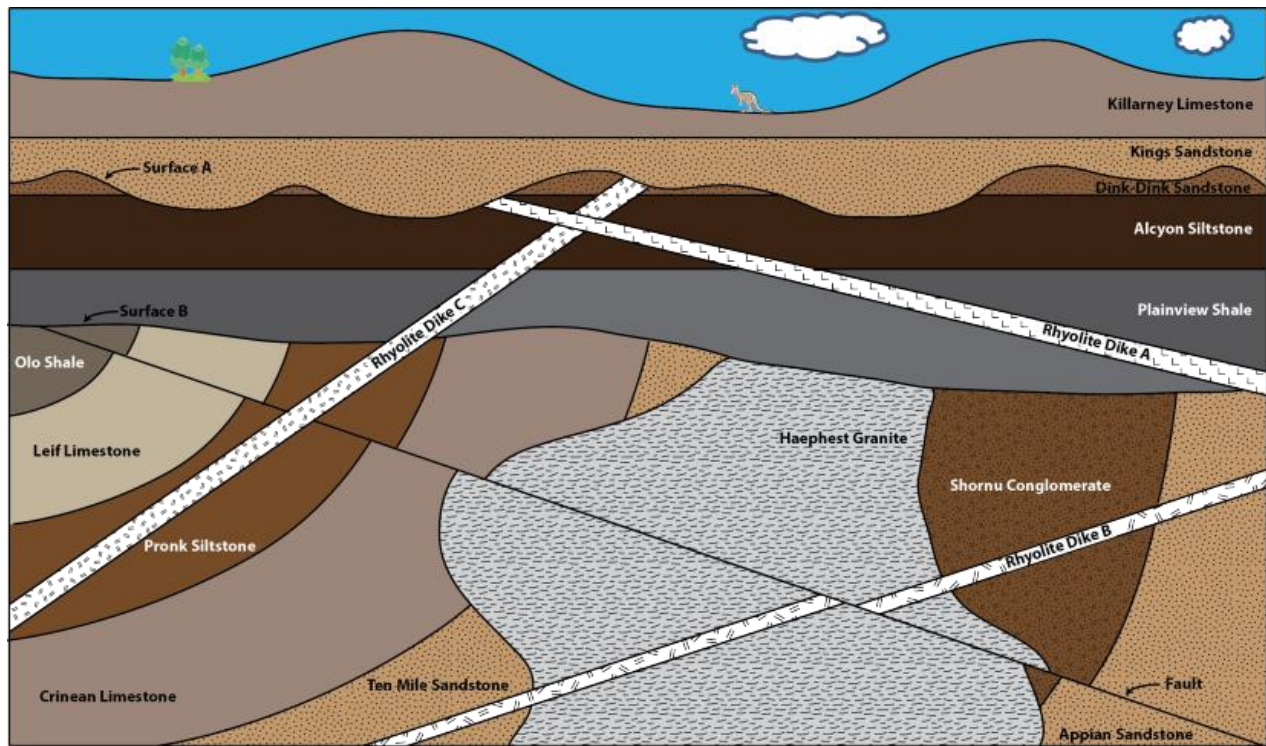
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### Homework 1

Age & Times of Mars vs. Earth\_MFE

*It's All Relative*

**Objective:** Apply relative dating laws to interpret block diagrams, Earth road cuts, and Mars imagery.



**Figure 1** Block diagram. Source: <http://fractalplanet.wordpress.com/2013/02/11/relative-dating-activity/>

1. How many unconformities (erosional breaks) are present in the image? Name each kind and explain your reasoning.
2. What law did you use to determine the relative ages of the Ten Mile Sandstone and Appian Sandstone?

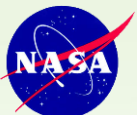
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3. List the order of geologic events by name from *oldest to youngest* below (i.e. Surface A, Rhyolite Dike C, Ten Mile Sandstone etc.):

### Road Cuts on Earth

Navigate to the website: <http://www.gigapan.com/gigapans/104247> to view the Moab Fault Zone in Utah.

4. How many faults do you observe?
5. How many geologic units do you see? What criteria are you using to differentiate your geologic units?
6. What principle of relative dating is most useful for interpreting this image?
7. Are there any unconformities? If so, how many and what type?

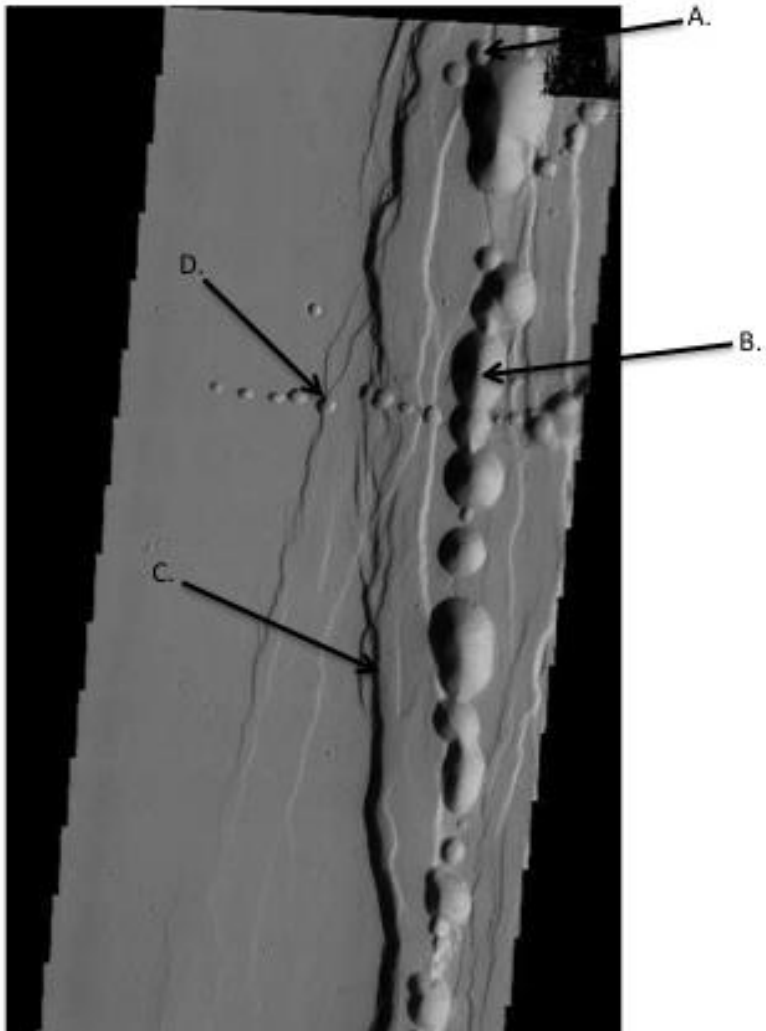




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### Tractus Catena on the south of Alba Mons

Below (Figure 2) is an image taken by THEMIS of a fracture zone on Mars. Observe the image and answer the following questions:



**Figure 2** Tractus Catena on the south of Alba Mons, Mars. Themis image; Image Credit: NASA/JPL/ASU. Source: <http://themis.asu.edu/node/5918>

8. Order the geologic events (A-D) from *oldest to youngest*. Make sure you note the entire image as you make your decisions.

9. What makes this image difficult to interpret?

10. What law(s)/principles of relative dating did you use to interpret the image?

11. If you are already familiar with tectonics, are features B and D likely related to extension or compression? Justify your answer.