



## ***Part II—Determining Surface History***

In this part, think about the history of this area of Mars. What has happened to make this area of Mars look the way it does today? To determine the history of this area, you can use two geologic rules or principles. These rules will help you figure out the “relative ages” of features. Relative ages will not tell you the exact age of a feature. They will help you figure out what features are younger or older compared to one another. Two common rules you can use to determine relative ages of features are:

### **The Principle of Superposition:**

This rule says that if one feature looks like it is placed on top of another, the feature on top is younger. An example of this can be seen in the crater image on the Surface Feature ID Chart. The crater is on top of the surface around it. Because of this rule, we can say the crater is younger than the nearby area.

### **The Principle of Cross-Cutting Relationships:**

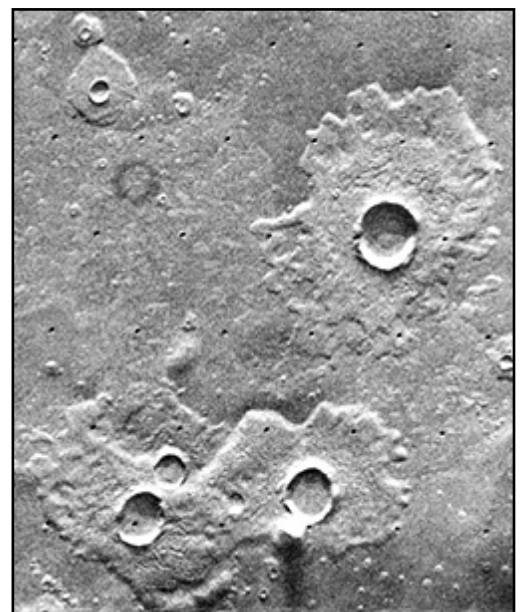
This rule says that if you have one feature that is cut by another feature, the feature that is cut is older. For example, look at the channel picture in the Surface Feature ID Chart. The channel looks like it cuts across the area. This means that the area is older. It also means the channel is younger. Another example of a cross-cutting relationship is Earth’s Grand Canyon. In this case, you had rocks that were cut by the Colorado River. The result was the Grand Canyon itself. In this example, the rocks are the oldest because they were there first. The canyon itself is younger, since it was formed by the Colorado River that cut through the rocks that were there to begin with.

Sometimes you can also see how worn down a feature looks. This can also help you figure out the relative ages of features. Features that have been around longer are most likely more affected by erosion. A feature that is more worn down or eroded is most likely older.

### **What To Do:**

In Part III, you will identify features in one THEMIS image on the Data Log Chart and include additional information as to how those features may have formed. For determining surface history, rank the features you identify on the Data Log Chart according to their relative ages. The oldest feature should be numbered one (1) and the younger features should be numbered two, three, four, etc.

Using the Data Log Chart provided in part 3, answer the questions for each section.





### ***Part III—Identifying Surface Features***

To help you identify features, use the Surface Feature ID Charts and the descriptions provided. Keep in mind that some of the features in the Surface Feature ID Charts will not exactly match what you see in your THEMIS image.

#### **What To Do:**

Choose one image to look at, close to the area where your tile is located. On the Data Log Chart, list the features you found in your image. Write down your best hypothesis (scientific guess) as to how you think each of these features may have formed.

Using the Data Log Chart provided, answer the questions for each section.

#### **Data Log Chart**

THEMIS Image ID# \_\_\_\_\_

Region of Mars \_\_\_\_\_

<b>Feature</b>	<b>How the feature may have formed</b>	<b>Age Rank (part II)</b>

## Identifying surface features in multiple images

In this final part of the activity, you will be identifying and sketching geologic features from several THEMIS images. Be sure to consider the importance of the context image!

### What To Do

Log the following information:

- Surface/Geologic Feature(s) Observed: Name the **specific** surface/geologic features you find interesting in each image. Look for patterns or for the same surface/geologic features in multiple images. Be sure to include those same features in your table multiple times. This will help you remember how a particular feature looks the same (or different) in multiple images – very valuable information! To help you correctly name surface/geologic features, use the **Feature Identification Charts**.
- Image ID Number: If the image has the THEMIS Data Releases link, click on it to find the image identification number. If not, write the title of this image and/or the page, column, and row number to possibly relocate it.
- Sketch the Geologic Feature(s): Make a sketch or drawing of the portion of the THEMIS image that shows the feature(s) you are observing. Do not sketch the entire image.
- Specific Observations of Geologic Feature(s): Write down specific observations of the feature(s) you sketched. Consider patterns you may look for with these features in other images.

Here's an example of how you can fill out the observation table:

Surface/Geologic Feature(s) Observed & Image ID #	Sketch of Surface/Geologic Feature(s)	Specific Observations of Surface/Geologic Feature(s)
<p>Channel with craters</p> <p>Image ID #: V11030007</p>		<p>-Channel does not seem very wide</p> <p>-Can see streamlined islands</p> <p>-Small craters both on the outside and inside of channel</p> <p>-All craters in image seem to be about the same size</p>

## Image Observation Chart

Surface/Geologic Feature(s) Observed & Image ID #	Sketch of Surface/Geologic Feature(s)	Specific Observations of Surface/Geologic Feature(s)
Image ID #:		
Image ID #:		
Image ID #:		
Image ID #:		

Surface/Geologic Feature(s) Observed & Image ID #	Sketch of Surface/Geologic Feature(s)	Specific Observations of Surface/Geologic Feature(s)
Image ID #:		
Image ID #:		
Image ID #:		
Image ID #:		