Mars for Earthlings

LESSON 13: The Water Underneath, Mars Groundwater

In-Class Activity 1

Catastrophic Flow Experiment

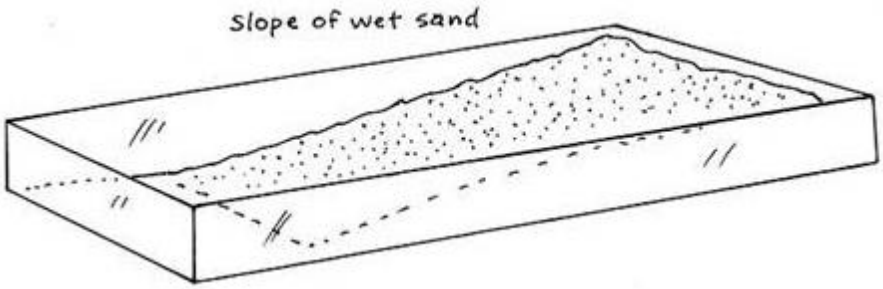
Adapted from J. Weller Cochise College, AZ (2008)

Purpose: To conduct a small benchtop experiment to understand the surface expressions of groundwater springs, sapping, and gullies.

Materials: A sandbox (could be a plastic bin filled about ½ way with sand), small plastic bag(s) proportional to your sandbox and sand supply, scissors.

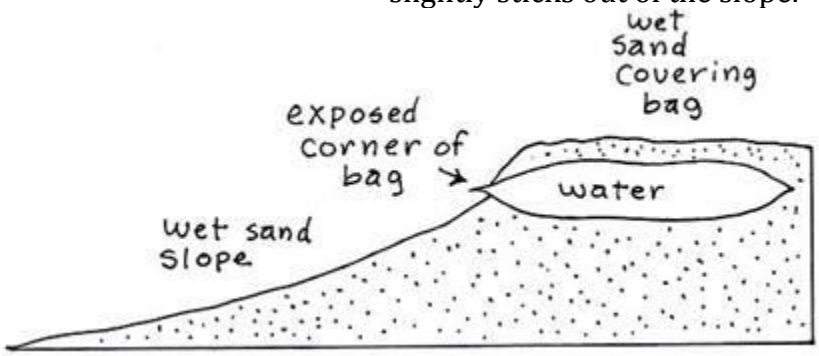
Directions: Using a sandbox, let's try to see if we can duplicate some of the features seen in the Martian photographs.

1. First, fill a zip-lock plastic bag with water. Try not to leave any air in the bag. Next, create a long, low angle slope of wet sand in the sandbox.



Credit: J. Weller Cochise College, AZ (2008)

2. At the top of the slope, bury the plastic bag of water so that one corner of the bag slightly sticks out of the slope.



Same as above: J. Weller Cochise College, AZ (2008)

3. Cover the bag with about one inch of wet sand. The water in the bag will slosh around, so smooth the surface above the bag so that there are no cracks at the surface.
4. If available, dust the slope with a very thin layer of dark dirt (although this may make sand less usable in future). This will help show the flow channel better.

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5. With a pair of good scissors, quickly cut a small nip in the exposed corner of the water-filled plastic bag, setting off the flood and collapse.

Discussion:

1. Would the rate of water outflow change the surface expression? Why or why not?

2. Consider a liquid with higher viscosity then water (e.g. molasses), that might be used in the bag. Would the surface expression change?

3. This hypothesis is considered by many Mars researchers to be the cause of extensive deep channels and canyons present on the surface of Mars. Does groundwater sapping seem plausible as a formation mechanism for channels on Mars? Can it account for channeling as large and deep as Valles Marineris? Why or why not?

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