

Rivers on Mars?

Water is essential to life as we know it. It drives our weather and shapes our land by breaking down the rocks and carrying the particles to other places. Scientists become very excited when they find what looks like liquid water elsewhere in the solar system. Mars has channels and other features that many scientists suggest were carved by flowing liquid water – some were carved by slow flowing water and some were carved by fast flowing water.

This activity will simulate the development of the Martian landscape through water flow and erosion.

What You Need:

- Wall-paper tray, or long window box planter with several drainage holes poked in one end
- Foam florist blocks to tip the tray at a small angle (5 degrees) and at a larger angle (10 degrees)
- Moistened playground sand to fill the tray 2/3 of the way
- Some rocks to bury in the sand
- Pitcher of water (refilled several times)
- Large container for drainage water
- Images of rivers on Earth and river-like features on Mars



What To Do:

- Prop up one end of the stream table. Fill the raised end of the stream table with sand. Pick up the raised end and shake the stream table gently until the sand covers about the top two-thirds.
- Invite your child to examine the images of Earth. What features do they observe and how did these features form? Share that they will now make some of those features in their sand box.
- Hold the pitcher or container of water slightly above the high end of the stream table and begin pouring water slowly and steadily
- Observe the small stream that is forming in the sand. Keep pouring and observe the movement of the sand particles. Look for signs of erosion along the river banks. Observe what happens when the water runs into an obstacle like a rock. Look for signs of deposition when the water slows at the end of the tray and drops the sand particles.
- Now experiment and find out what happens in a flood by pouring more water faster down the channel.

Parent Prompts:

What happened to some of the sand as the water flowed over it?

Where did the sand go?

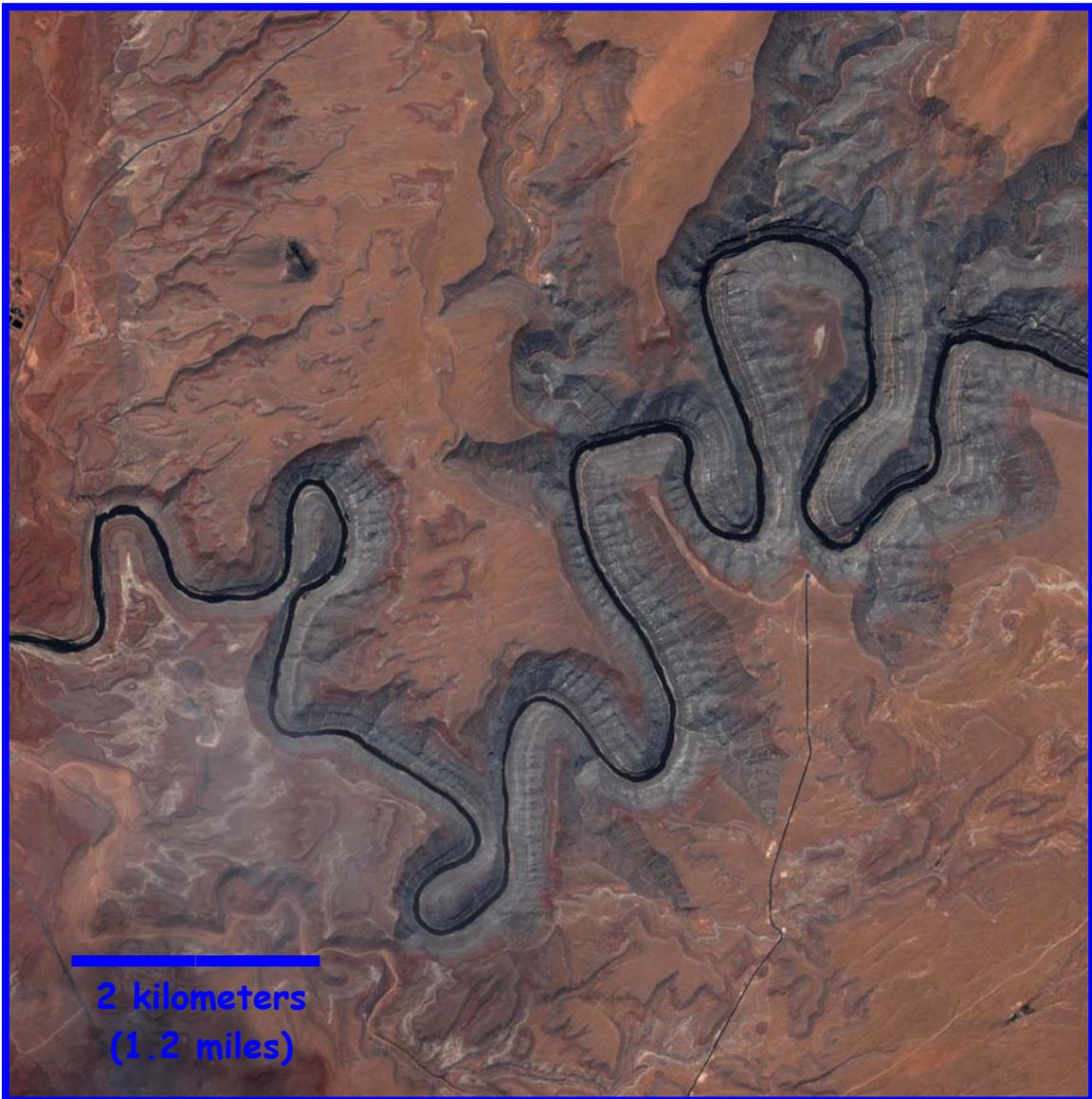
What happened to the channel and to the sand as you poured water faster?

What kind of features did you make?

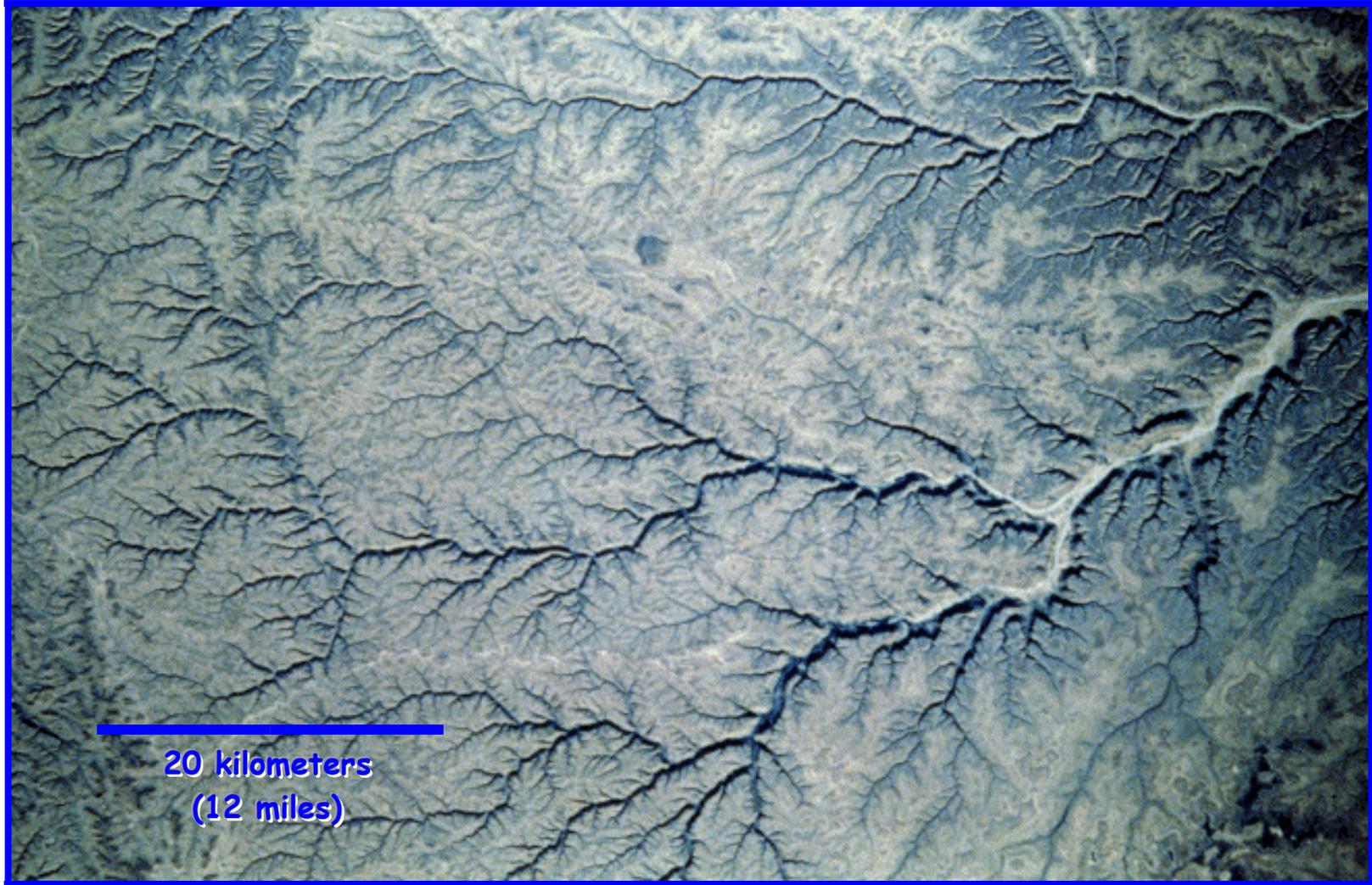
Once the water has gone away, what features do you observe?

If you saw similar features on another planet, what might you think happened?

Invite your child to examine the images of the surface of Mars. What features do they observe? Do they look like features on Earth? Like features your child just made in the sand?



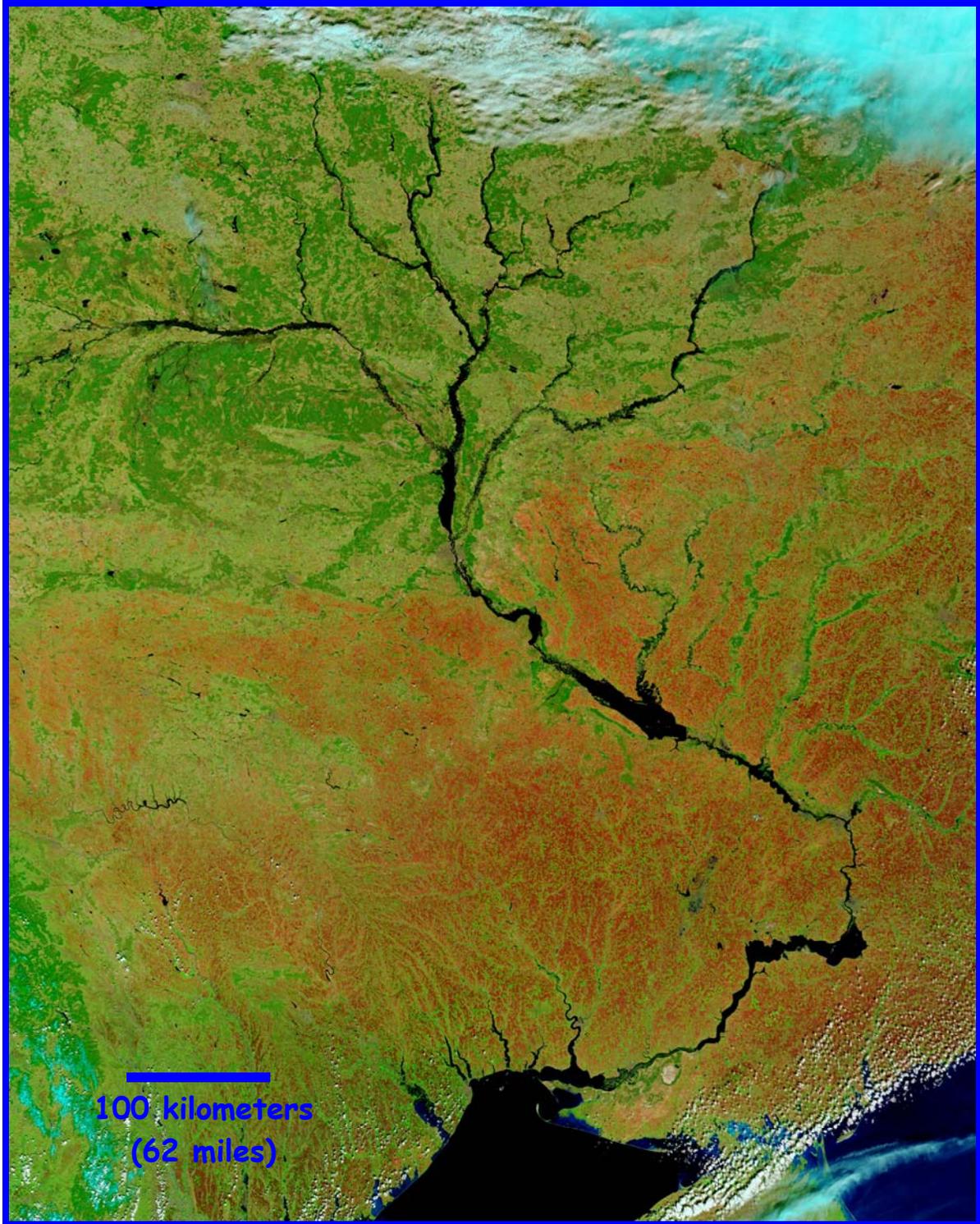
1. Earth



2. Earth



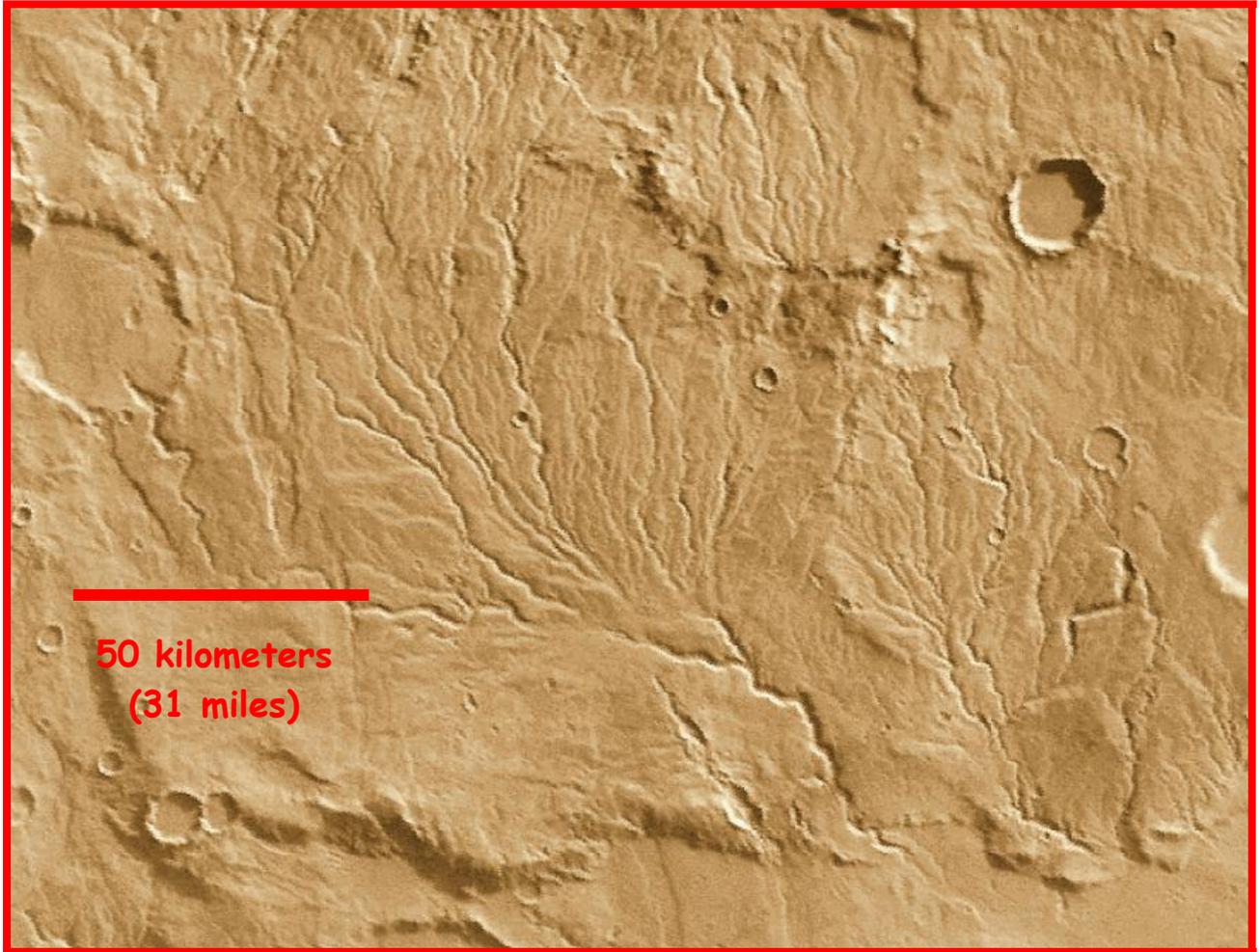
3. Earth



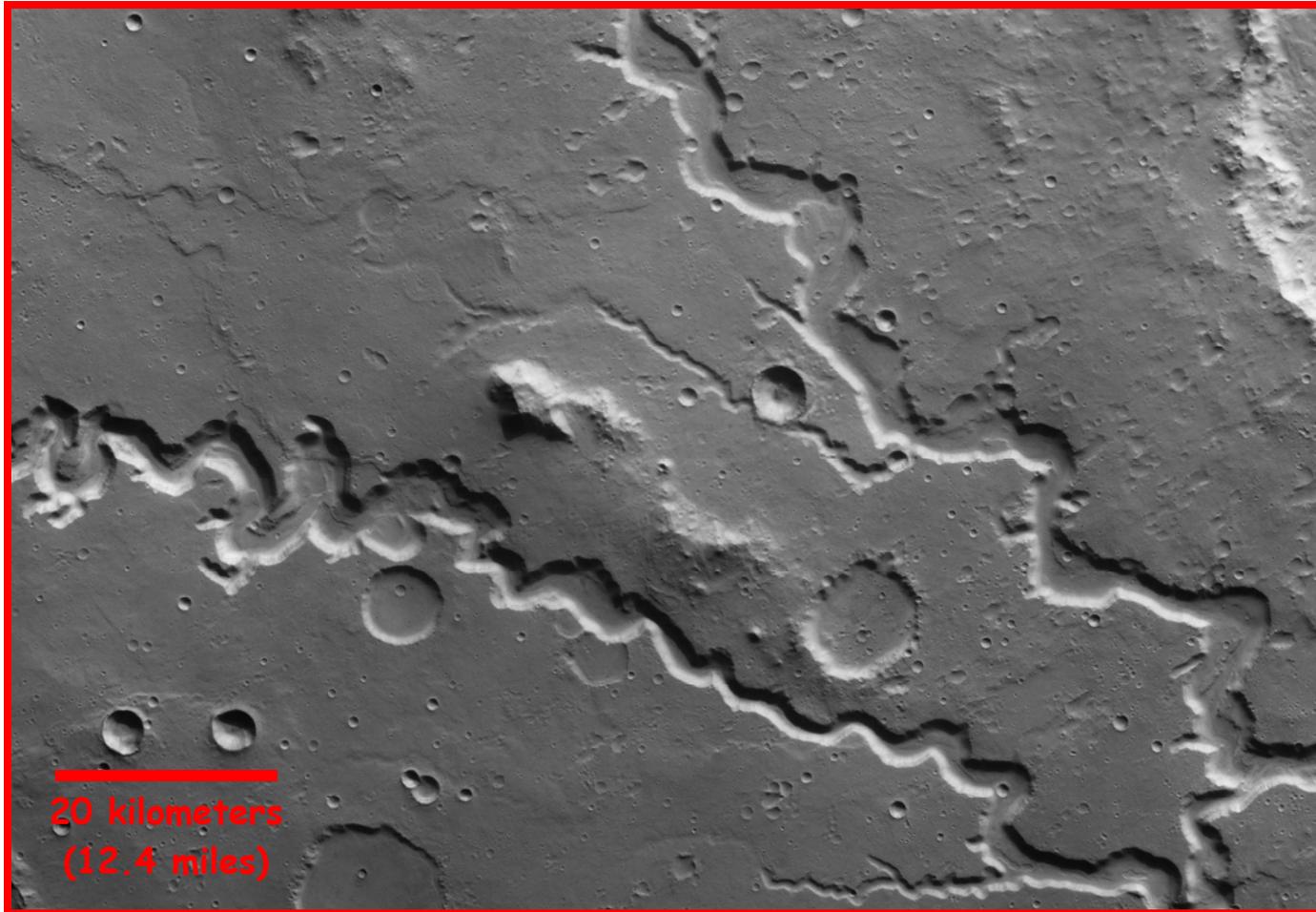
4. Earth



5. Earth



1. Mars



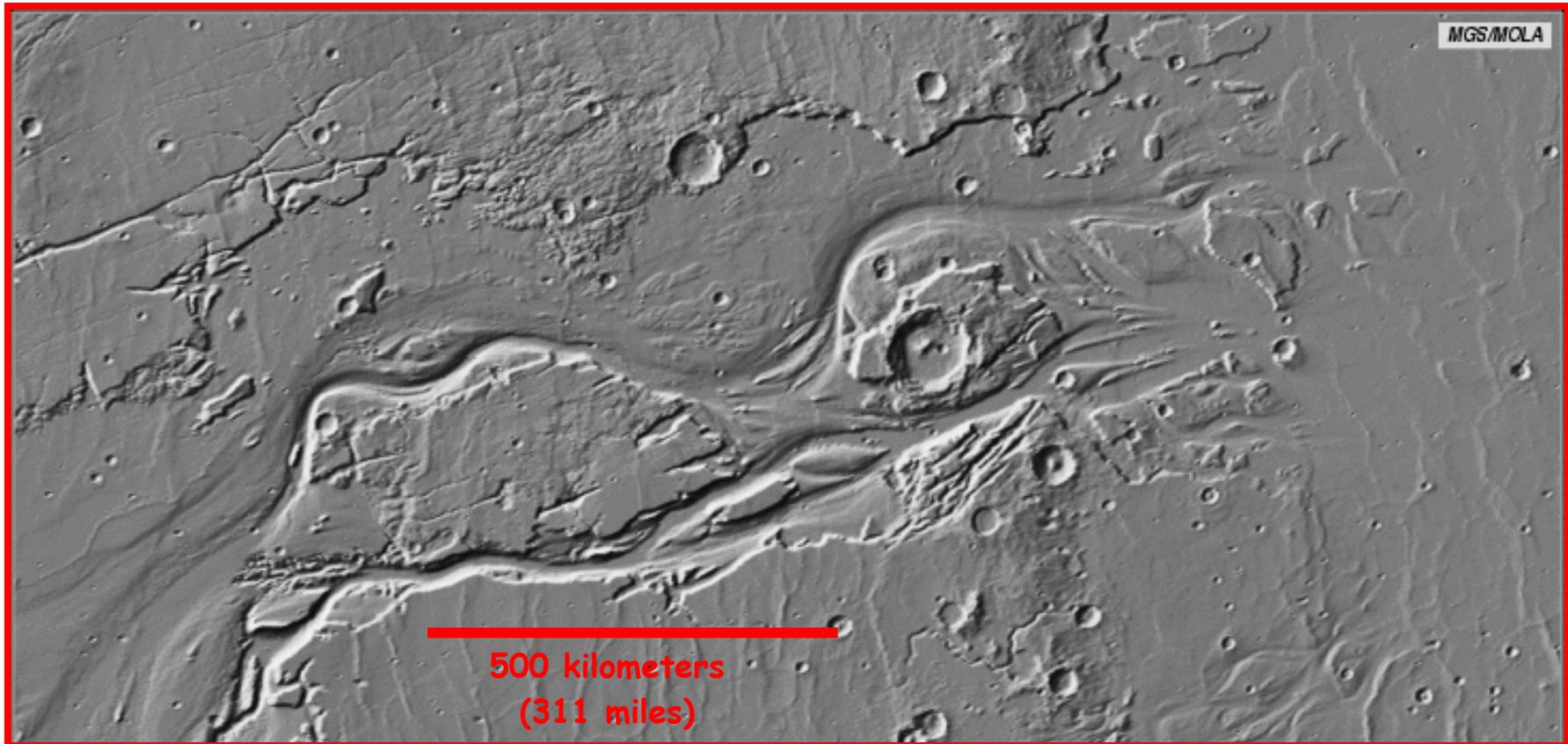
2. Mars



3. Mars



4. Mars



5. Mars



6. Mars

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Earth and Mars Images

1. Earth – Channels

Satellite image of the San Juan River channel in southeastern Utah. The river cuts a ribbon-like pattern in the landscape, where it has eroded down through the layers of rock. The river water looks black in this image.

Image courtesy of NASA's Visible Earth, from Space Imaging
http://visibleearth.nasa.gov/view_rec.php?id=17180

2. Earth – Channels

Image of the Republic of South Yemen taken from the Space Shuttle. While no rivers are flowing now, except for occasional flash floods, the branching pattern – dendritic - was produced by running water. Finding patterns like this on other planets suggests that water flowed across their surfaces.

Space Shuttle Image STS-41G Picture #17-36-036 courtesy of the Lunar and Planetary Institute
http://www.lpi.usra.edu/publications/slidesets/geology/sgeo/slide_21.html

3. Earth – Channels

Image taken of the Mississippi River from above in a plane. The river has carved a ribbon-like channel in the landscape. The water in the river is white because it is reflecting the sunlight. The river lies between hills to the left of the photograph and farm fields to the right.

<http://www.ecology.info/river-that-meanders.htm>

4. Earth – Channels

A false-color satellite image of the Dnieper River and the rivers that feed into it in the region of the Ukraine. The edge of the Black Sea can be seen in the lower part of the image. In the image, vegetation is green, bare ground is tan and pink, and clouds are light blue. Water is black and dark blue. There are several streams that flow into the larger river, but the water flowing through them is not seen in this image.

*Image by Jacques Descloitres, MODIS Rapid Response Team, courtesy of NASA and the Goddard Space Flight Center. **HTTP://VISIBLEEARTH.NASA.GOV/VIEW_REC.PHP?ID=6879***

5. Earth – Channels

Satellite image of the Mississippi River and delta from above. A delta forms where a river makes its way to a lake or ocean and drops – or deposits – all of the sand and silt and clay that it is carrying. In the image, the land is green. The river flows in a ribbon-like channel across the land, and enters the blue-green Gulf of Mexico. The brighter to white regions along the river edge are where cities and fields exist. The water in the river and along the coast is brown because of all of the sediment the river is carrying. The part of the delta that the river is building is the piece that is sticking out in the lower right of the photograph.

Image courtesy of NASA <http://rapidfire.sci.gsfc.nasa.gov/gallery/?search=mississippi>

1. Mars – Channels

Satellite image of river channels on Mars. The branching – dendritic - pattern was produced by flowing water carving ribbon-like channels into the land. No liquid water is present on the surface of Mars today, so these channels were formed by flowing water in the past. The image is about 200 kilometers (124 miles) across.

Image courtesy of the Lunar and Planetary Institute
http://www.lpi.usra.edu/publications/slidesets/redplanet2/slide_26.html

2. Mars - Channels

Spacecraft image of channels carved into the surface of Mars. The channels merge together toward the bottom right of the image. No liquid water is present today, so these ribbon-like channels were cut by flowing water in the past. The sunlight is coming from the upper right side of the image.

Image courtesy of the European Space Agency / DLR / FU Berlin (G. Neukum)

[http://www.esa.int/esa-](http://www.esa.int/esa-mm/mmg/mmg.pl?b=b&type=l&mission=Mars%20Express&single=y&start=91&size=b)

[mmg/mmg.pl?b=b&type=l&mission=Mars%20Express&single=y&start=91&size=b](http://www.esa.int/esa-mm/mmg/mmg.pl?b=b&type=l&mission=Mars%20Express&single=y&start=91&size=b)

3. Mars – Channels (Delta)

Spacecraft image above the surface of Mars showing a fan-shaped landform made up of many ribbon-like channel features. This is interpreted to be a delta, a feature that forms when a river deposits the sediment it is carrying in a lake or river. This is very similar in shape to the Mississippi River delta. The fan is 13 kilometers (8 miles) high by 11 kilometers (7 miles) wide.

Mars Global Surveyor Image courtesy of NASA/JPL/Malin Space Science Systems

http://www.msss.com/mars_images/moc/2005/09/20/eberswalde/

4. Mars – Channels

Spacecraft image above ribbon-like channels cut into the surface of Mars. Unlike the dendritic patterns observed on other images, these channels are wider and have many branches braided together, with tear-drop islands separating the channels. These are interpreted to have been carved by fast flowing water flooding across the surface.

Image courtesy of NASA

http://www.msss.com/moc_gallery/m19_m23/images/M21/M2101914.html MOC narrow-angle image M21-01914

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Image courtesy of NASA. http://jules.unavco.org/Voyager/Docs/ImageGallery/mars_channels

6. Mars – Channels

Spacecraft image above Mars showing ribbon-like channels joining to form a larger channel.

THEMIS image courtesy of NASA/Jet Propulsion Laboratory/Arizona State University

<http://themis.asu.edu/zoom-20060111a>