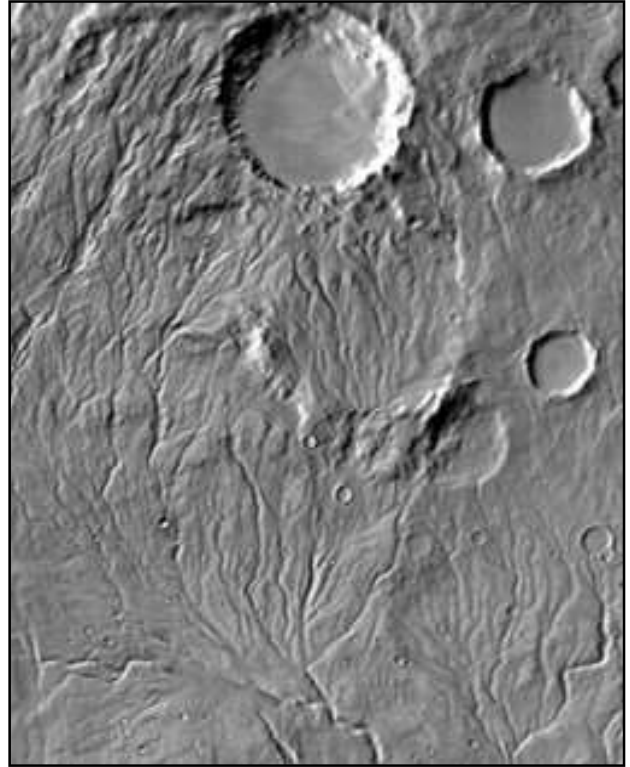


LANDFORMS *HANDOUT*

River valleys: A river valley is a long, narrow region of low land between ranges of mountains, hills, or other high areas, formed by the erosion of land by running water. The presence of valleys indicates that water once flowed and eroded the landscape.



Google Earth image of a branching network of water-carved channels in the Atacama desert in South America, one of the driest places on Earth, receiving less than 15 mm of rainfall every year.



Warrego Vallis, Mars. The branching network of valleys is evidence that there used to be flowing water on Mars. Circular features are impact craters. Image credit: NASA/JPL-Caltech/Arizona State University

LANDFORMS *HANDOUT*

Layered rocks: Layered, or sedimentary, rocks are formed by the deposition and cementation (hardening) of small particles (like sand) at the surface of a planet. Some layered rocks are deposited in water, while other types are deposited by the wind.



Google Earth image of layered sedimentary rocks in a tributary of the Grand Canyon. The rock layers were deposited by water (limestone and shale) and wind (sandstones).



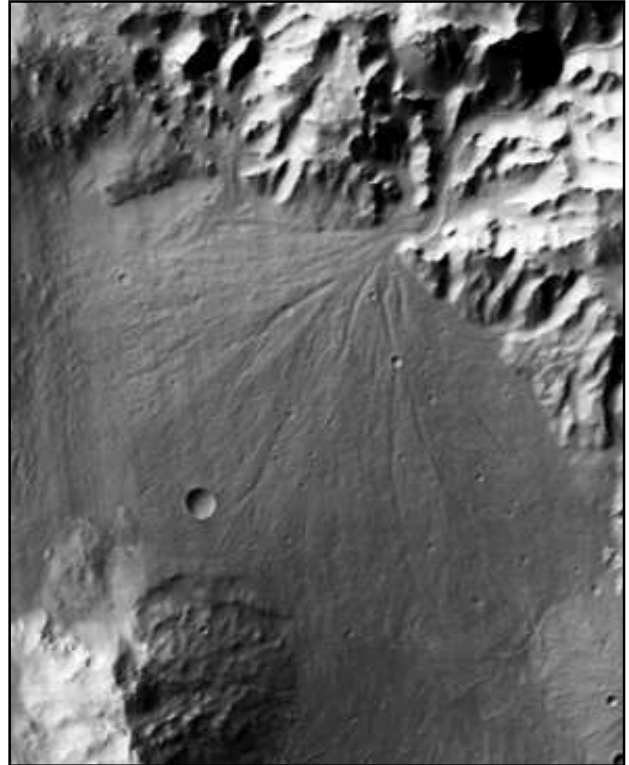
This grayscale image shows layered rocks formed through the accumulation of sediment (sand and dust) in an impact crater in the Meridiani Planum region of Mars. These sediments once covered the floor of the crater, but have been eroded by the wind to their present shape. Image credit: NASA/JPL/University of Arizona

LANDFORMS *HANDOUT*

Alluvial Fan: A fan- or cone-shaped deposit of sediment crossed and built up by streams, usually found where a canyon draining from mountainous terrain emerges out onto a flatter plain.



False color example of a large alluvial fan in China. Image source: NASA/METI/AIST/ Japan Space Systems, and U.S./Japan ASTER Science Team.



Grayscale image of an alluvial fan in a crater on Mars. Image credit: NASA/JPL/MSSS

LANDFORMS *HANDOUT*

Delta: A river delta is a landform formed when a river enters a standing body of water such as an ocean, sea, or lake and deposits the sediment it was carrying. The Mississippi river delta and the Nile river delta are famous examples on Earth.



False color image of the Selenga river delta in Russia. Image credit: Landsat/USGS.



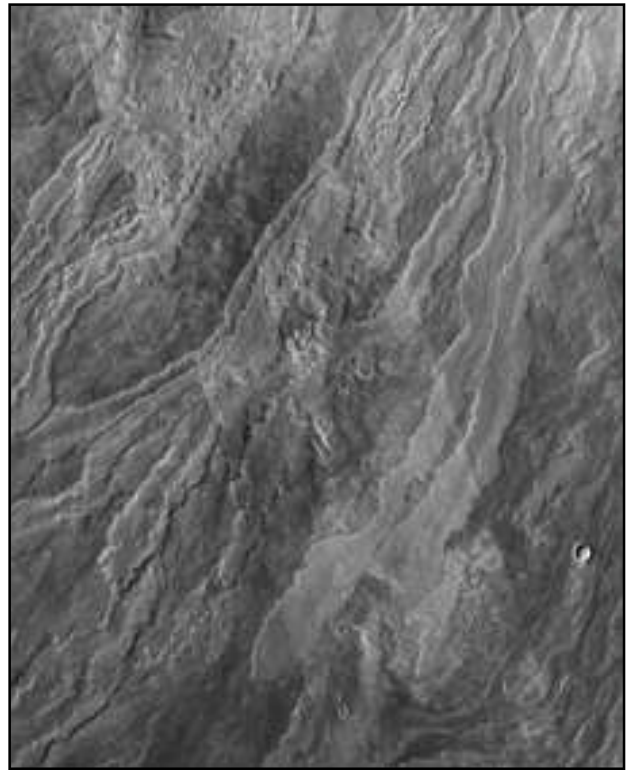
Eberswalde delta on Mars. Image credit: NASA/JPL/MSSS.

LANDFORMS *HANDOUT*

Lava flows: Flowing lava hardens into “lobes” of very hard volcanic rock. Lava flows often are stronger than other rocks in the area, so they form a hard “cap” that resists erosion, and on Mars they often have lots of impact craters. Volcanic rocks can be analyzed to determine how old they are.



Google Earth image of SP Crater in northern Arizona. Black and gray volcanic rocks overlying tan and red sedimentary rocks.



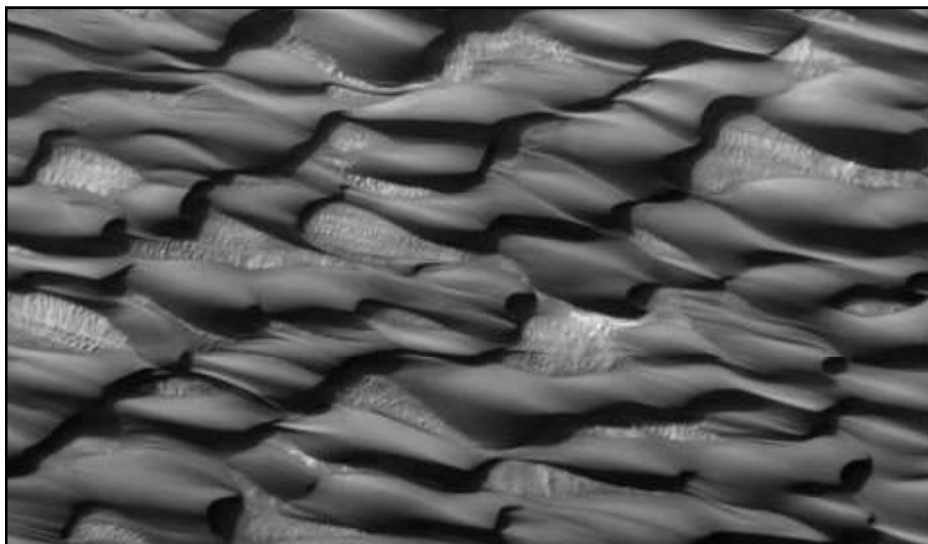
Grayscale image mosaic of young lava flows on the flank of the giant volcano Arsia Mons on Mars. Diagonal lines are seams between individual images. Image credit: NASA/JPL/MSSS

LANDFORMS *HANDOUT*

Sand dunes: These moving piles of sand can carry minerals from elsewhere and are interesting targets to learn about the environment on modern Mars, but don't tell us as much about ancient Mars. Many sand dunes on Mars are dark because the sand comes from the erosion of black volcanic rocks.



Google Earth false color image of the Rub' al Khali dune field in Saudi Arabia.



Grayscale image of sand dunes on Mars in an area called Abalos Undae near the north polar ice cap.

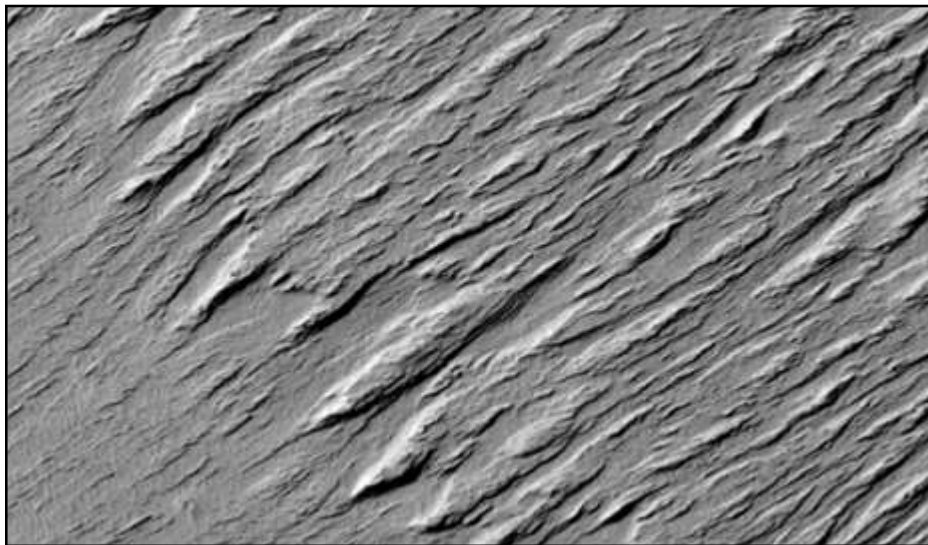
Image credit: NASA/JPL/University of Arizona

LANDFORMS *HANDOUT*

Yardangs: Wind erosion can sculpt soft rock into elongated, streamlined groups of ridges and hills called yardangs. These are most often found on the Earth in deserts.



Google Earth image of yardangs in the Dasht-e Lut desert, Iran.



Grayscale image of yardangs on Mars in an area called the Medusae Fossae Formation. Image credit: NASA/MSSS