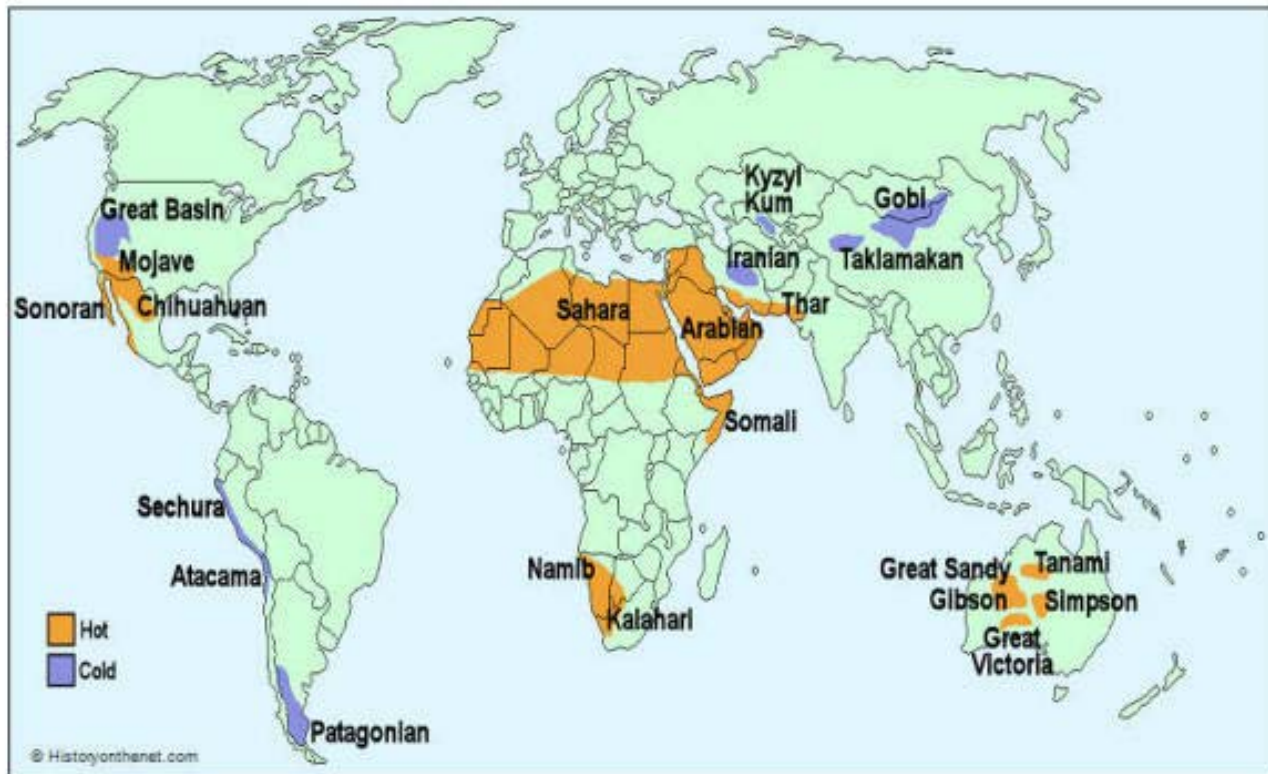


Deserts, Wind Erosion and Deposition

- By definition, a desert has less than 10 in (25 cm) of precipitation per year.
- Deserts occur at 30° and 60° in regions of descending air.
- Deserts can be hot or cold.

The World's Deserts



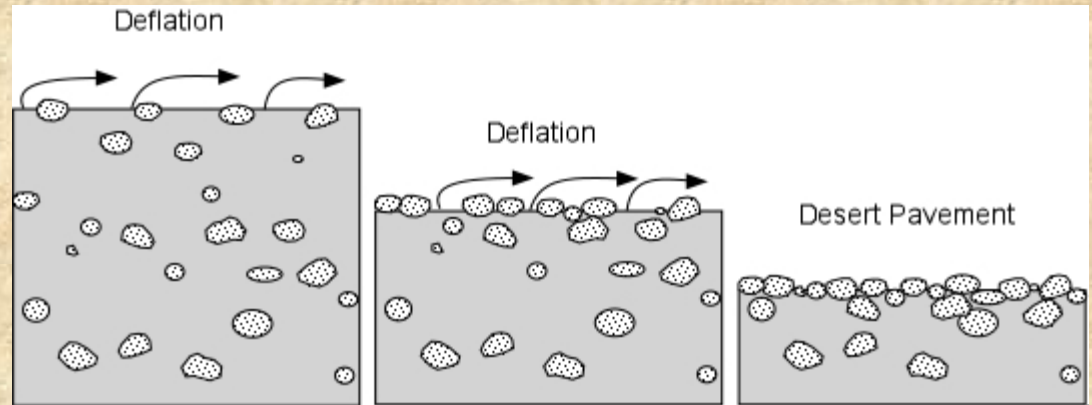


Types of Deserts:

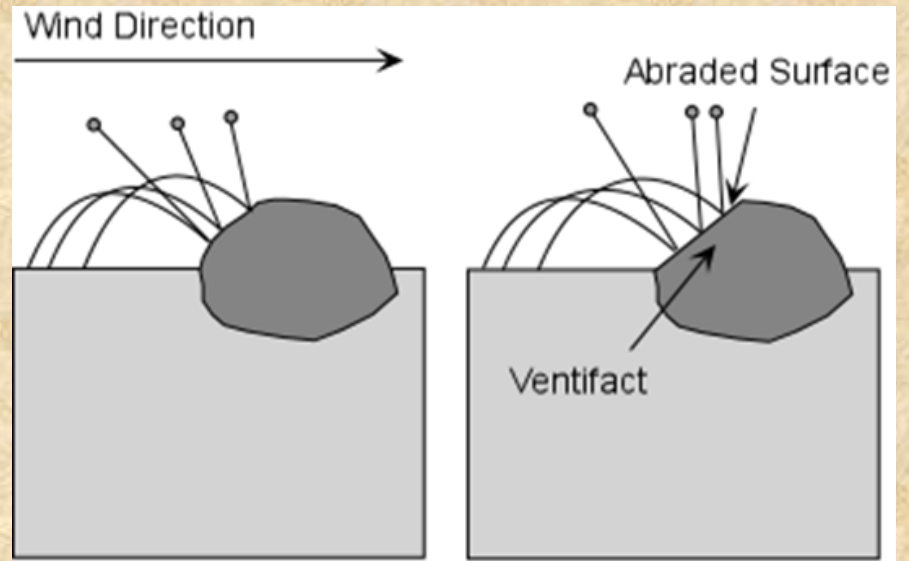
- ***Subtropical Deserts*** - general atmospheric circulation brings dry, subtropical air into mid-latitudes. Examples: Sahara of Northern Africa, Kalhari of Southern Africa, and the Great Australian Desert.
- ***Continental Deserts*** - areas in the continental interiors, far from source of moisture with hot summers and cold winters. Examples: Gobi, Takla Makan
- ***Rainshadow Deserts*** - areas where mountainous regions cause air to rise and condense, dropping its moisture as it passes over the mountains. Examples: Deserts east of the Sierra Nevada Mountains, California & Nevada, East of the Cascades of Oregon and Washington, and East of the Andes Mountains in South America.
- ***Coastal Deserts*** - Areas where cold upwelling seawater cools the air and decreases its ability to hold moisture. Examples : Atacama Desert of coastal Peru, Namib Desert of coastal South Africa.
- ***Polar Deserts*** - Cold polar regions where cold dry air prevails and moisture available remains frozen throughout the entire year. Examples: Northern Greenland, and ice-free areas of Antarctica.

Erosion

- Even in deserts, the main agent of erosion is water.
- Wind is a secondary agent of erosion. Fine sand grains are removed leaving behind coarser material. The process is called *deflation* and the material left behind forms a *desert pavement*.

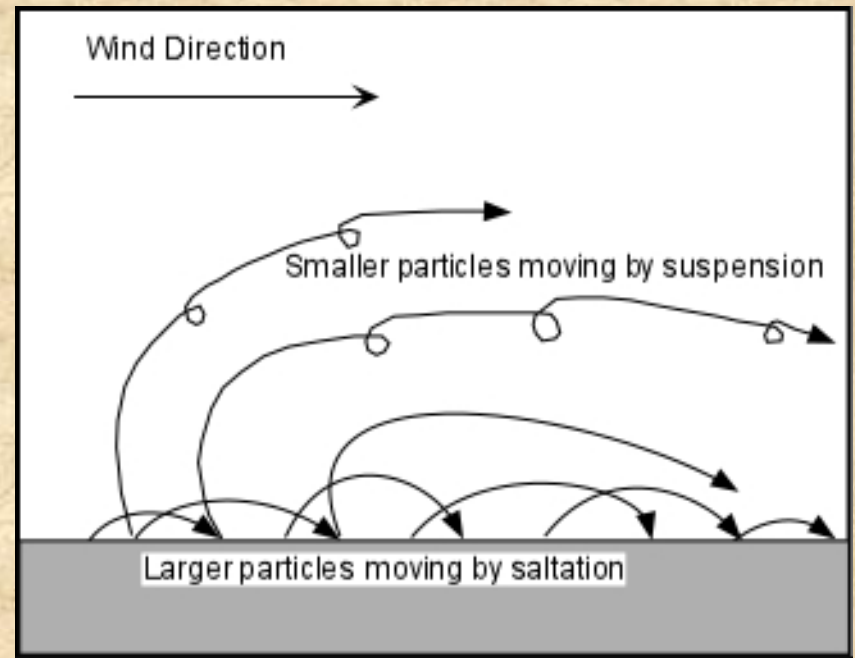


Wind erosion can also occur by abrasion. *Ventifacts* are any bedrock surface or stone that has been abraded or shaped by wind-blown sediment in a process similar to sand blasting.



Sediment transport

- Suspension
- Saltation
- Rolling along surface



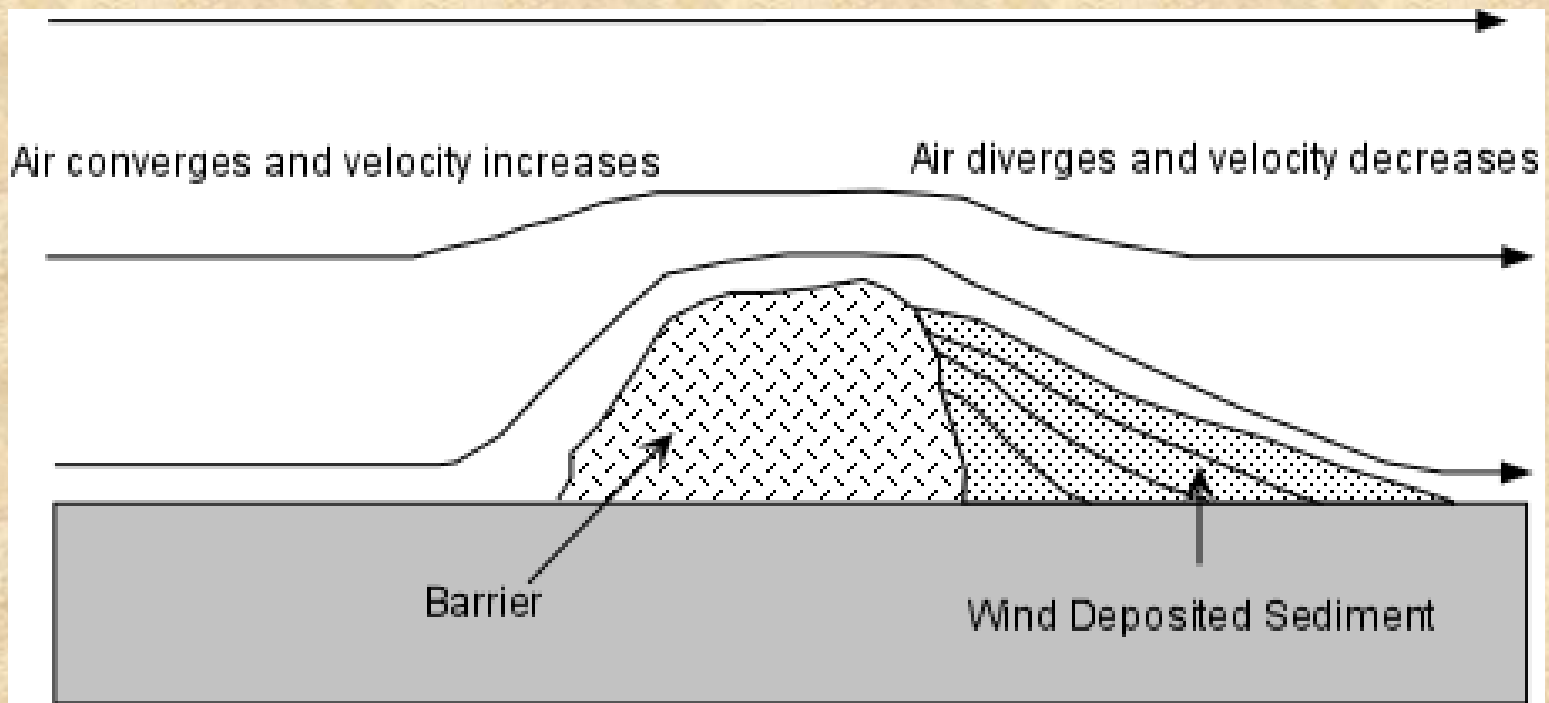
Suspension



Saltation

Deposition:

- Wind deposits form when a topographic barrier causes a drop in wind velocity on the downwind side of the barrier.
- Topographic barriers can be such things as rocks, vegetation, and human made structures that protrude above the land surface.



Dune sand versus stream sand:

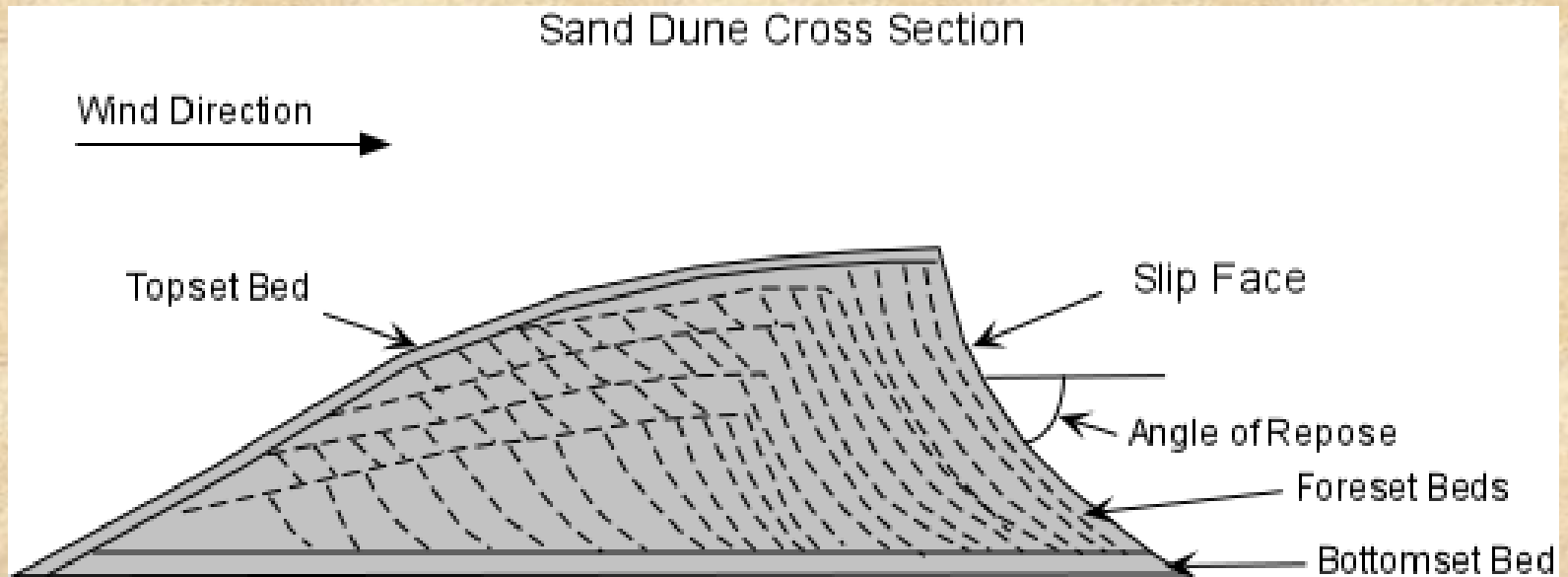
- Dune sand is finer grained than stream sand because of the much lower density and viscosity of air.
- Smaller range in grain size (well sorted). Wind can only move a narrow range of particle sizes.
- Dune sand is well rounded. Stream sand is more angular



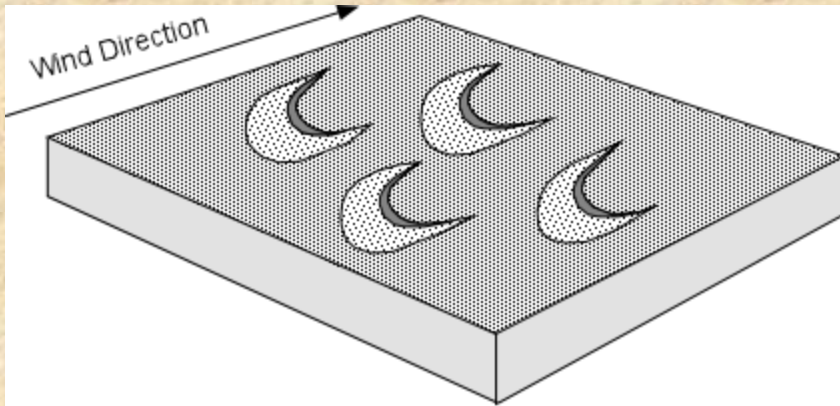
Sand dunes form when there is

- (1) a ready supply of sand
- (2) a steady wind
- (3) an obstacle such as vegetation, rocks, or fences, to trap some of the sand.

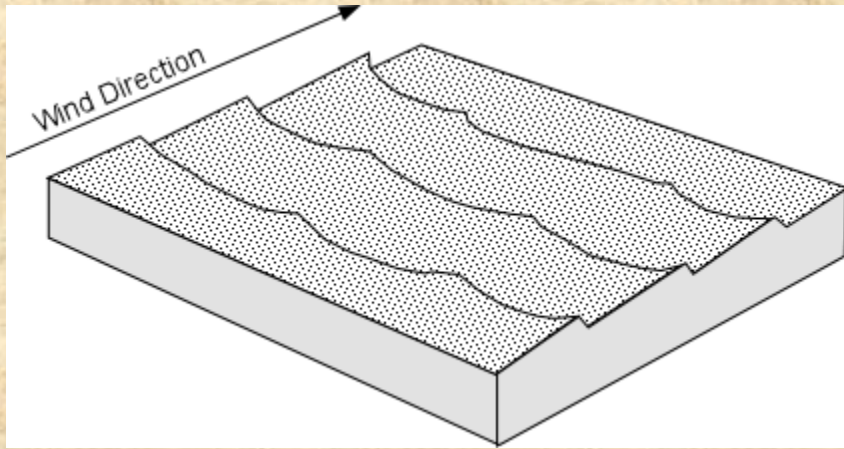
Dunes migrate by erosion of sand by the wind on the gentle upwind slope and deposition and sliding on the slip face.



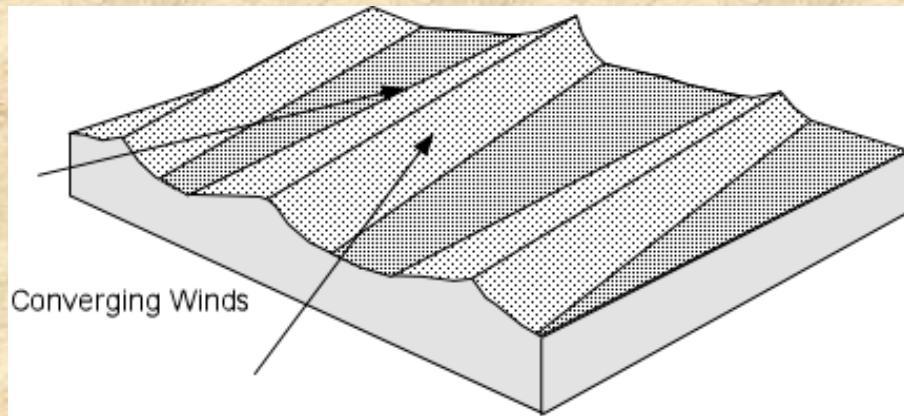
Barchan Dunes - crescent-shaped dunes with the points of the crescents pointing in the downwind direction, and a curved slip face on the downwind side of the dune. They form in areas where there is a hard ground surface, a moderate supply of sand, and a constant wind direction.



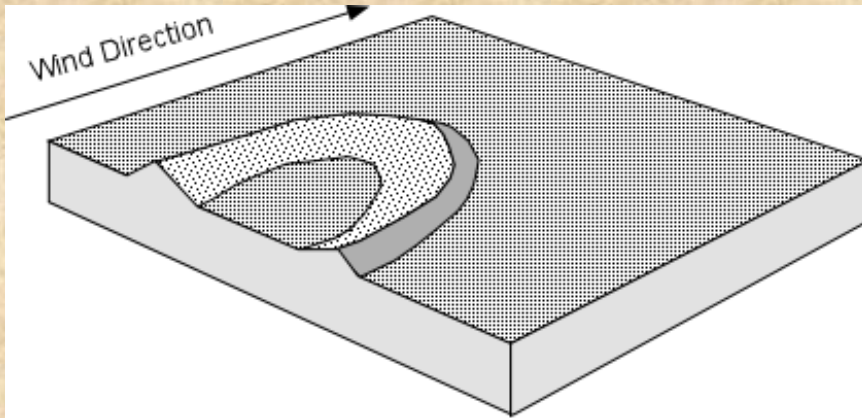
Transverse Dunes - large fields of dunes that resemble sand ripples on a large scale. They consist of ridges of sand with a steep face in the downwind side, and form in areas where there is abundant supply of sand and a constant wind direction.



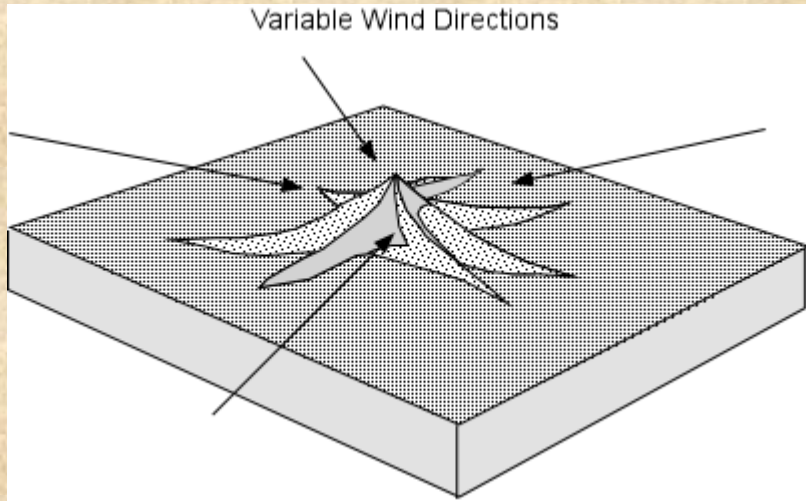
Linear Dunes - long straight dunes that form in areas with a limited sand supply and converging wind directions.



Parabolic (also called blowout) Dunes - "U" shaped dunes with an open end facing upwind. They are usually stabilized by vegetation, and occur where there is abundant vegetation, a constant wind direction, and an abundant sand supply. They are common in coastal areas.



Star Dunes - are dunes with several arms and variable slip face directions that form in areas where there is abundant sand and variable wind directions.



Loess - large deposit of wind deposited dust. Much of the loess was derived from debris left by glacial erosion. Yellow river and loess deposits, China.



Alluvial Fans and Bajadas - An ***alluvial fan*** forms where a mountain stream enters a broad flat valley and deposits sediment as its velocity decreases on entering the flatter valley. When a linear mountain range has several closely spaced valleys, the alluvial fans may coalesce to form a gentle undulated slope on the sides of the bounding lowlands. Such coalesced alluvial fans are known as ***Bajadas***.



Playa Lakes - standing bodies of water are rare in desert regions because rainfall and input from streams occurs only intermittently. Lakes that do form during the rare periods of rainfall, quickly evaporate, leaving a dry lake bed behind. Playa Lakes (also called dry lakes) are formed in basins of internal drainage. The lake beds often consist of salts (evaporites) that were carried in by streams and precipitated during evaporation. These precipitated salts give the dry lake bed a white color resembling a beach (playa means beach in Spanish).



Inselbergs - steep sided hills that rise above a surrounding relatively flat plain. They appear to form because the rock making up the inselberg is more resistant to erosion than the rocks that once made up the surrounding plain. Inselbergs are common in desert regions, although they can also occur in other areas where differential erosion takes place.

Two of the most famous Inselbergs on Earth: Shiprock (l) and Uluru (r)



Desertification occurs as a result of climatic changes, such as changing positions of the continents, or changes in ocean and air circulation patterns. Human impacts, such as overgrazing, draining of land, and lowering of the groundwater table, can also contribute to desertification. As vegetation dies out, the soil is more easily eroded and may be lost so that other vegetation becomes destabilized. Since soil can hold moisture, if the soil erodes, the area may become arid, and the desert expands.

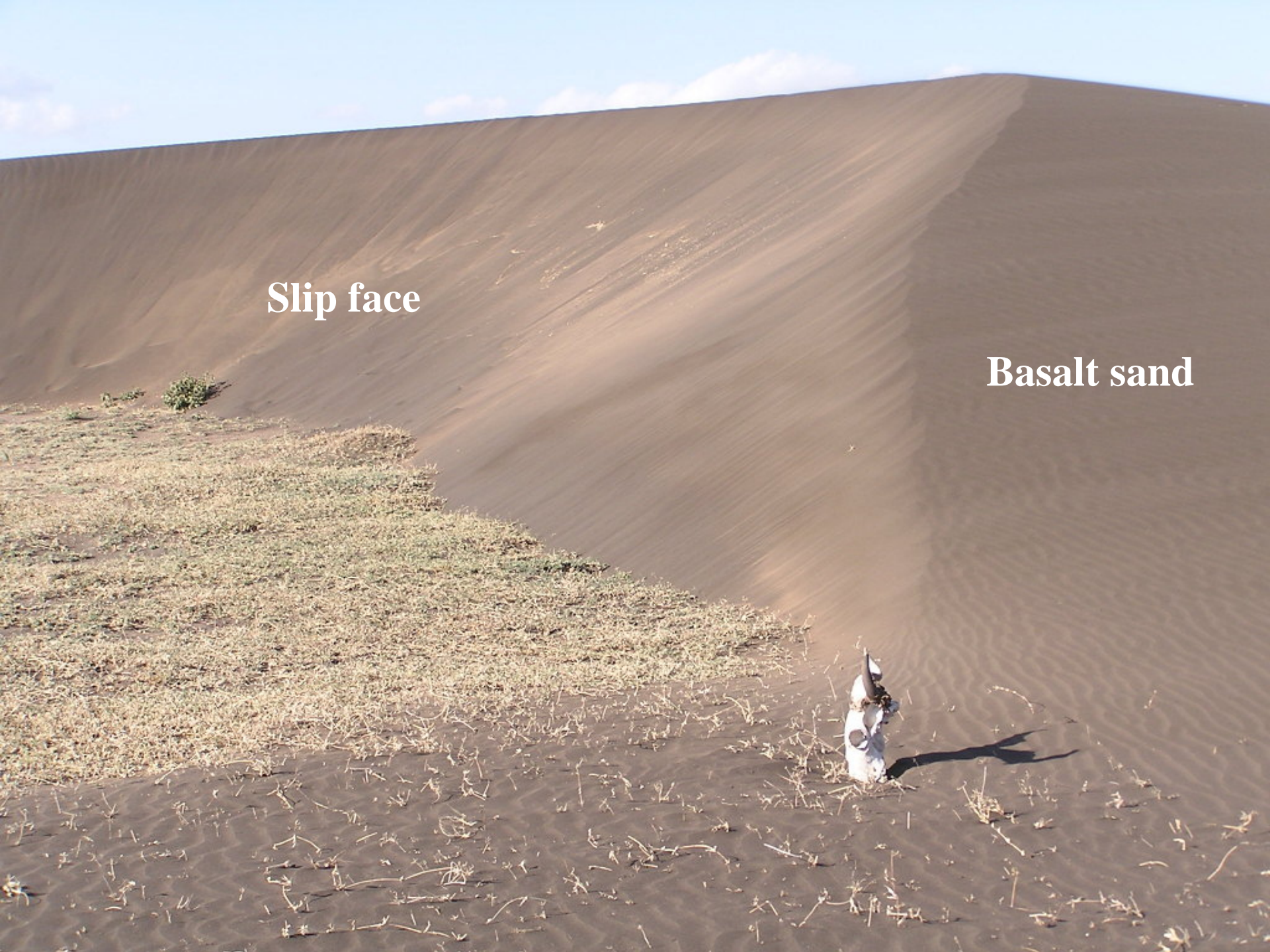


Shifting Sands - Tanzania



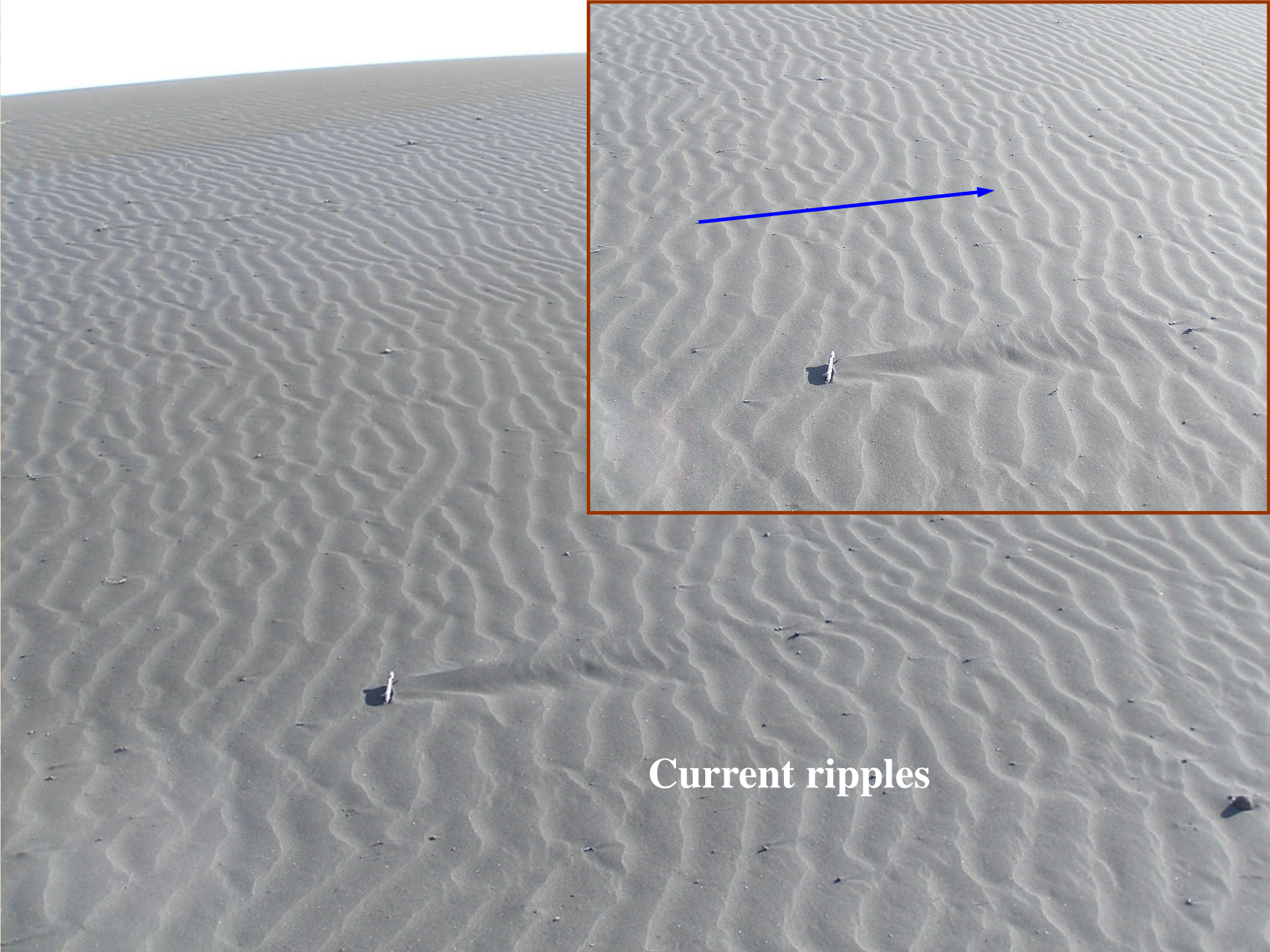






Slip face

Basalt sand



Current ripples

Barchan Dune

Net wind direction

