

Water Erosion and Deposition



Essential Standard 2.1

Explain how processes and forces affect the lithosphere.

Learning Objective 2.1.3

Explain how natural actions such as weathering, erosion (wind, water, and gravity), and soil formation affect Earth's surface.

I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can distinguish between weathering erosion, and deposition.
- I can identify various methods by which erosion can occur.
- I can describe characteristics of deposits made by various methods of erosion.

Weathering

Erosion is not the same as weathering.

Weathering is the process where rock is broken down or dissolved into smaller pieces by physical, chemical or biological weathering processes.



Physical
Weathering



Chemical
Weathering



Biological
Weathering

Erosion

Erosion involves the movement of weathered rock (now pebbles, sand, or soil) from one place to another by wind, ice, water, and gravity.



Deposition

Deposition is the process by which sediments are dropped or deposited.



Role of Gravity

Gravity is associated with most of the erosional agents because the force of gravity helps to pull sediments downhill.



Wind Erosion

Wind erosion occurs mostly in areas with limited rainfall.



In dry areas, there are less plants to help anchor the soil.

Wind Erosion

Except during large storms, winds generally cannot carry large particles.



Wind is a weaker erosional agent than water and ice.



Wind picks up finer particles, leaving the coarser particles behind creating desert pavement.

Wind Deposition

Wind deposits tend to accumulate where an object such as a rock, blocks the particles forward movement.



Over time, the pile of windblown sand develops into a dune.

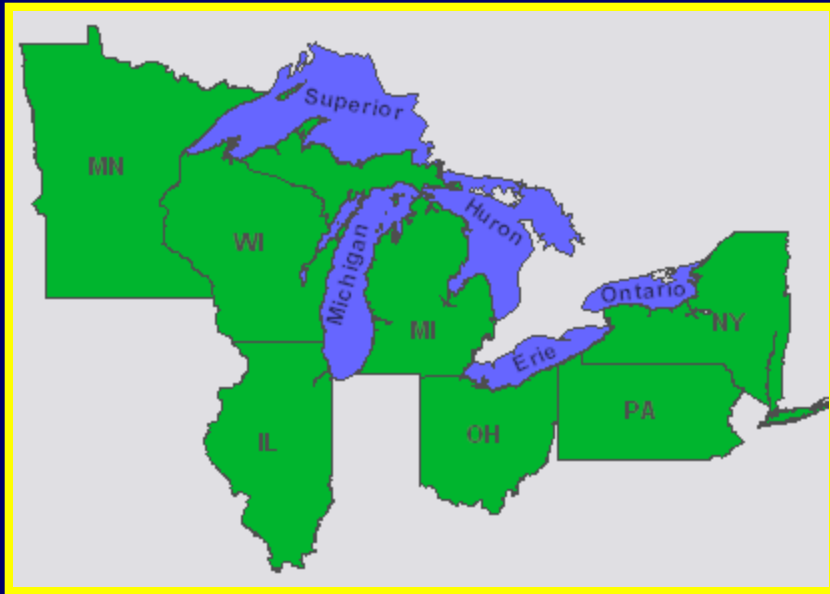
Glaciers

Glaciers are large, moving masses of ice that form near Earth's poles and on mountains at high elevations.



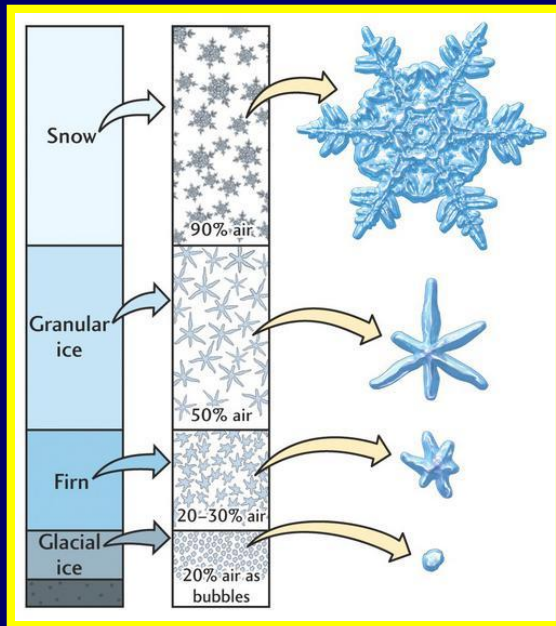
Most Powerful

Of all the erosional agents, glaciers are the most powerful and are responsible for several large scale geological features such as the Great Lakes and Niagara Falls.



Glacial Formation

Glaciers form in areas with cold temperatures, year round, that prevent fallen snow from completely melting.



As snow builds up, pressure causes the lower layers to crystallize into ice.

Same thing happens when you pack a snowball.



Glacial Erosion

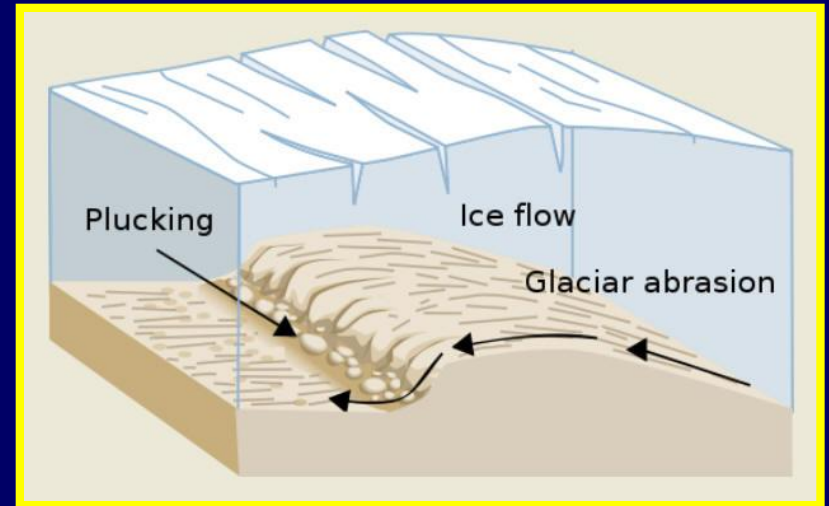
Mountain glaciers flow downhill, due to gravity, like a very thick liquid.



As mountain glaciers flow downhill, they carve out U-shaped valleys.

Glacial Erosion

When a glacier moves, it breaks off pieces of rock in a process called plucking.



The plucked rocks act like grains of sand paper, grinding out parallel grooves, called striations, in the bedrock.

Glacial Deposition

The plucked rocks that become embedded in glaciers are collectively known as glacial till.



When a glacier melts, glacial till is left behind.



Ridges consisting of glacial deposits are called moraines and contain unsorted rocks of all sizes.

Water Erosion

Water from rain or melted snow tends to begin running overland in sheets.



But as water flows overland, it will begin to follow paths of least resistance, eventually carving out channels called rills or gullies.

Water Erosion

As water continues to flow, it will pick up loose sediment and carry it downhill.



Eventually the water will enter a stream, carrying the sediment along with it.

Streams

In streams, erosion often occurs along the outside curves of the stream banks.



Deposition, in streams, tends to occur along the inside curves of the stream banks.

Meanders

Overtime, as the outside curves continue to erode and deposition continues on the inside curve, the curve begins to change location.



The movement of curves in a stream is called a meander.

Deposition

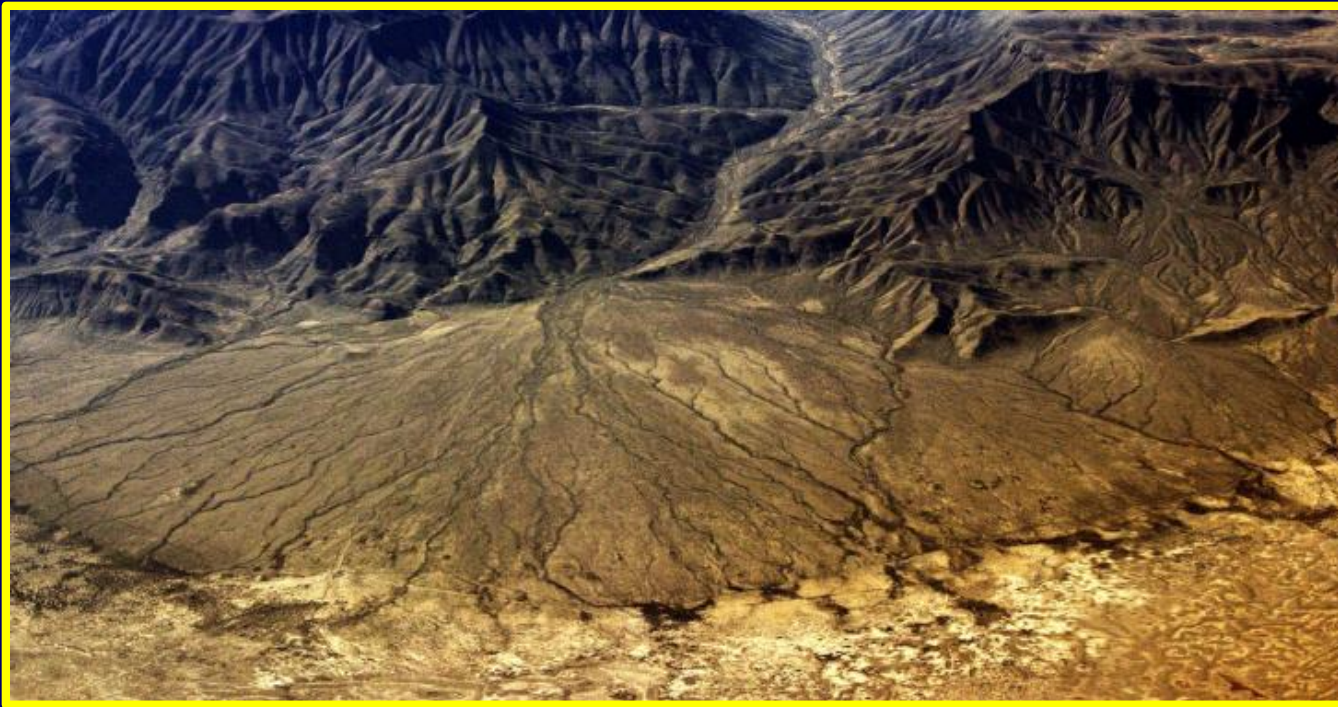
When sediments are deposited by running water, heavier particles are deposited first, as the water loses energy.



That's why mountain streams usually contain larger rocks than streams on flat land.

Alluvial Fans

If a stream flows down a steep hill, mountain, or cliff, it will deposit lots of material in a triangular pattern called an alluvial fan.



Well Sorted Sediments

As a stream continues flowing downslope, the rocks become rounded and polished, and continue to decrease in size.



Lighter sediments, such as clay, are carried for longer distances and are deposited last.

Mississippi River

Deltas

When a stream meets ocean water, the water slows down and deposits large amounts of sediment, creating a delta.

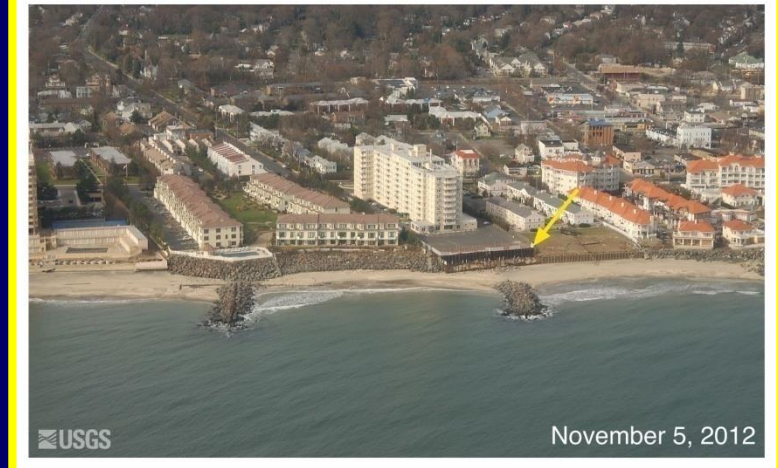
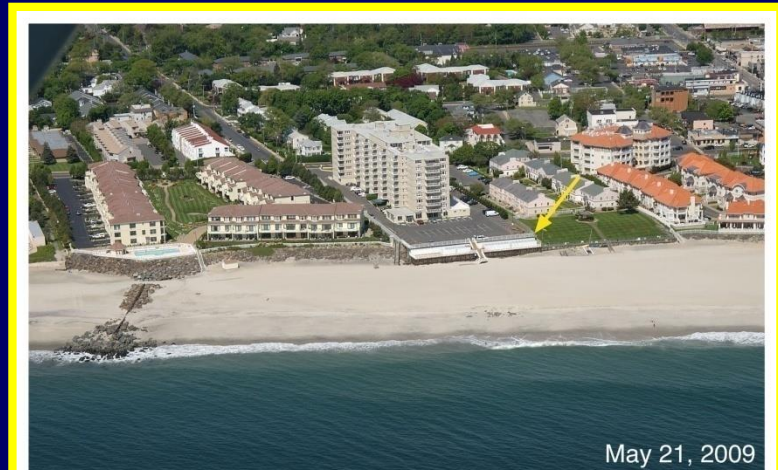


New Orleans was built on the Mississippi Delta



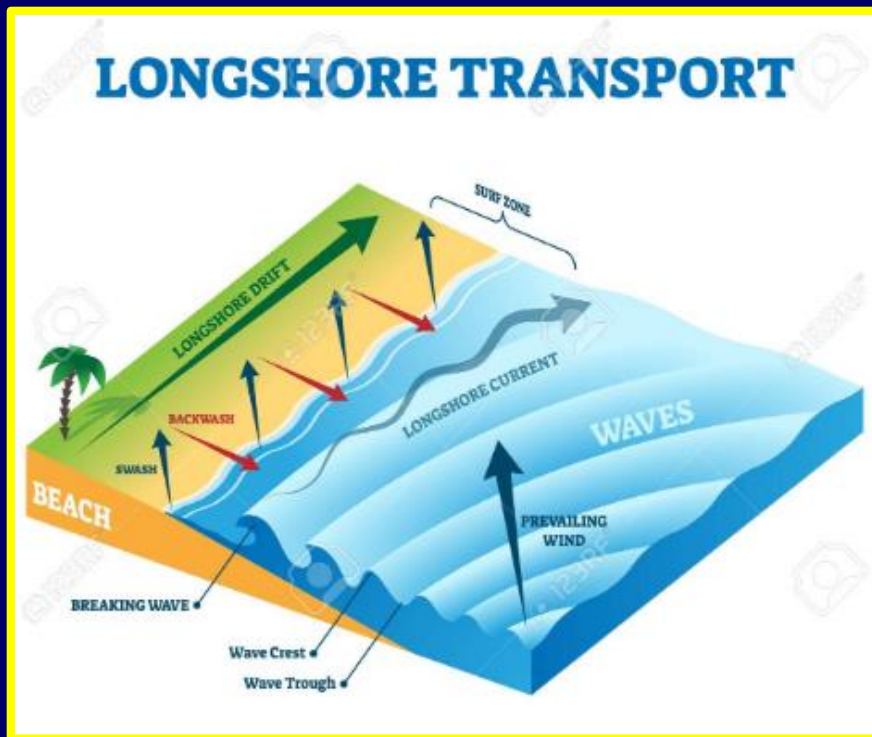
Beach Erosion

In the ocean, erosion continues with the help of ocean currents and waves.



Longshore Current

Longshore currents occur where waves strike the beach at an angle.



Sediment is picked up and carried downstream in a process called longshore drift.

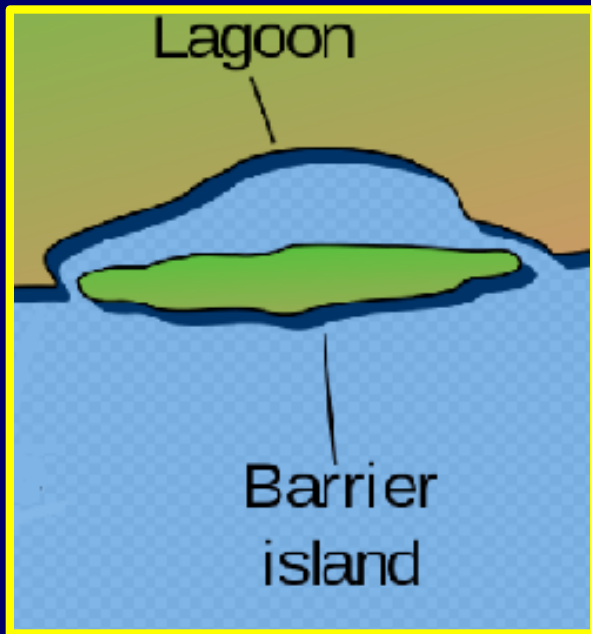
Sand Bars

In places where the current isn't as strong, sand is deposited to form sand bars.



Barrier Islands

If the sand bars continue to build up, overtime barrier islands will form.



A barrier island is an island that forms a barrier between the ocean and the mainland, thereby protecting the mainland from the ocean.

Barrier Islands

Between the barrier island and the mainland is a sound or lagoon which contains a mixture of salty-fresh water, called brackish water.



Barrier Islands

Along the lagoon side of the barrier islands are saltwater marshes and tidal creeks.



Inlets form where tidal creeks flow through the barrier islands, towards the ocean.

Inlet Migration



Mason's Inlet - 2012

When the longshore current encounters an inlet, it will deposit sand on the north shore.

Meanwhile, the water leaving the inlet will erode sand from the south shore.

Inlet Migration

Mason Inlet Migration

October 1989 - November 1995
The red circle shows the location of Shell
Island resort.



October 1989



May 1990



November 1993



November 1995

Over time, the inlet
migrates southward
in a process called
inlet migration.



Erosion due to Waves

On a daily basis, waves break on the beach, carrying sediments away, eventually causing the beach to decrease in size.



Beach erosion from waves is especially accelerated during storms.

Erosion on Rocky Coasts

Waves crashing on rocky shores continually remove sediment from the rocky cliffs until only sea stacks and sea arches are left behind.



The End

