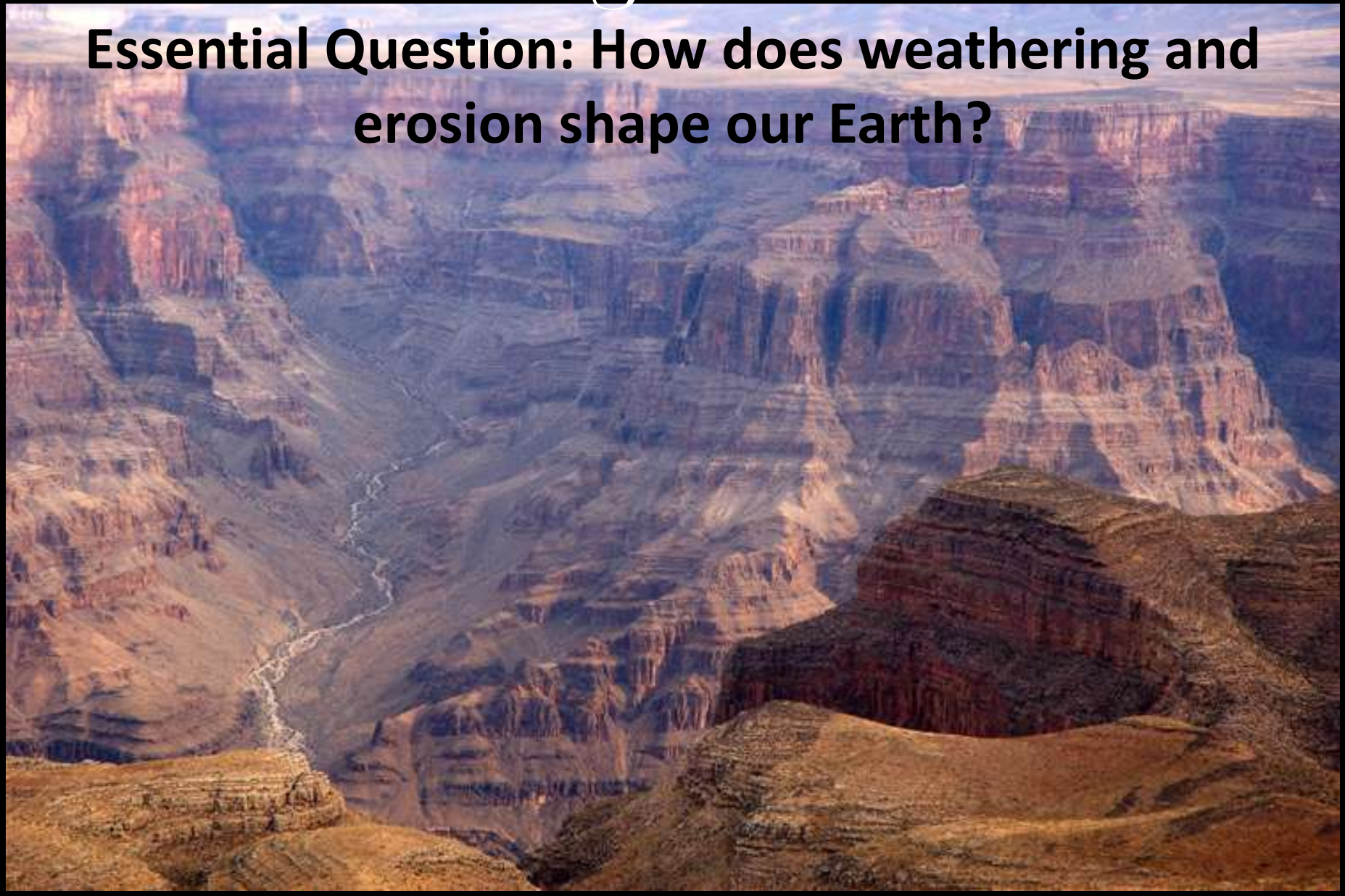
Weathering and Erosion

Essential Question: How does weathering and erosion shape our Earth?



What is Weathering?

Weathering is the process of breaking down rocks

Two forms of weathering:

Mechanical

Chemical

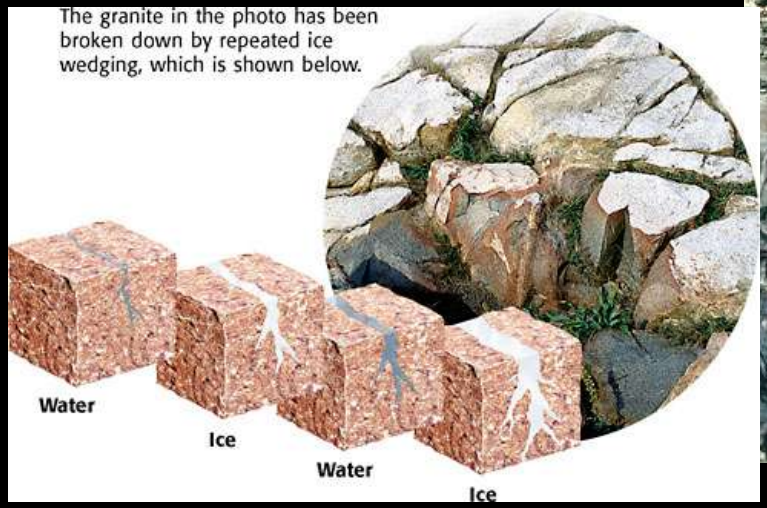
What is Mechanical Weathering?

Mechanical weathering is breaking down by natural or physical processes

Ice

Animals

Plant Growth



What is Chemical Weathering?

Chemical weathering occurs when minerals are chemically changed causing them to dissolve or change to another mineral

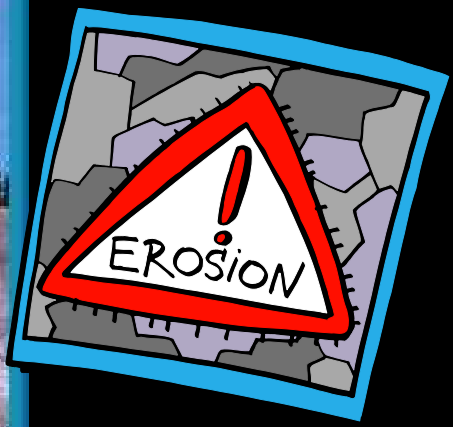
Oxidation

Acid

Water

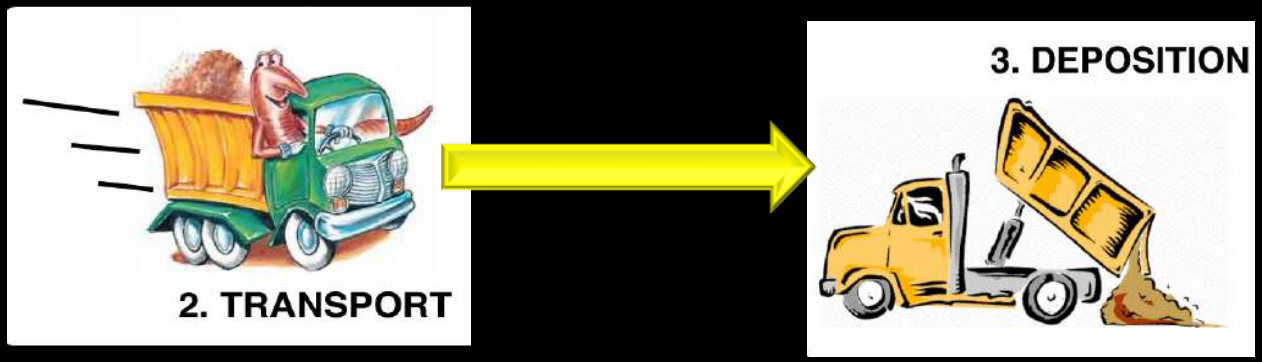
What is Erosion?

Erosion is the removal and transport of material from one place to another
Gravity is a huge erosion force
Agents of erosion are wind, water, and glaciers



What happens to the sediments?

When sediments are eroded, they are not lost from Earth—they are just relocated
Deposition is when sediments are moved and deposited or "dropped off"



- Weathering, erosion, and deposition act together in a cycle that wears down and builds up Earth's surface

What are the agents of Erosion?

- There are 5 agents of erosion:
  - Gravity
  - Running water
  - Glaciers
  - Waves
  - Wind

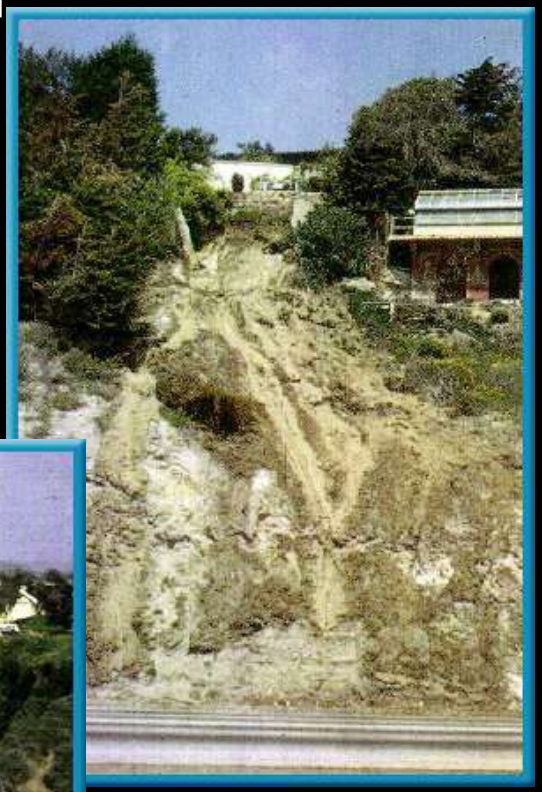
How does Gravity cause Erosion?

A mass movement is any type of erosion that happens as gravity moves materials down slope

Landslides

Mudslides

Rock slides



What are the different types of mass movement?

- Landslide is the most destructive kind of mass movement. It is when rock and soil slide quickly down a steep slope
- Mudflow is a rapid downhill movement of a mixture of water, rock, and soil. Usually occurs after heavy rains in normally dry areas.

What are the different types of mass movement?

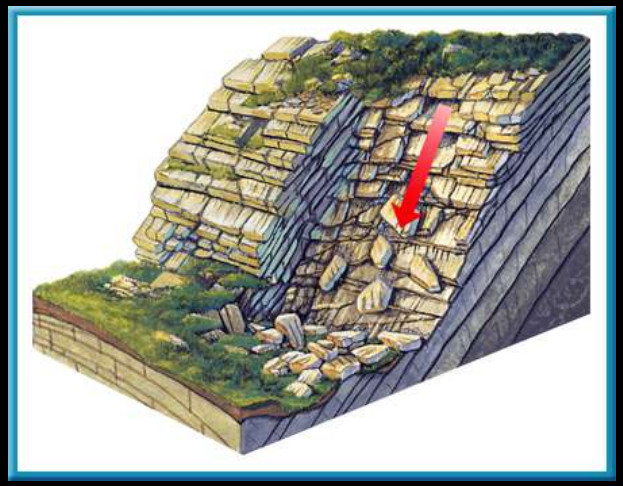
- Slump is a mass of rock and soil suddenly slips down a slope. The difference is that the material in a slump moves in one large mass.
- Creep is very slow downhill movement of rock and soil. Often a result of freezing and thawing of water in cracked layers of rock beneath the soil. It is so slow, you can hardly notice it!

Self Check

1. What is erosion?

The removal and transportation of material

2. What type of mass movement is shown in this illustration?



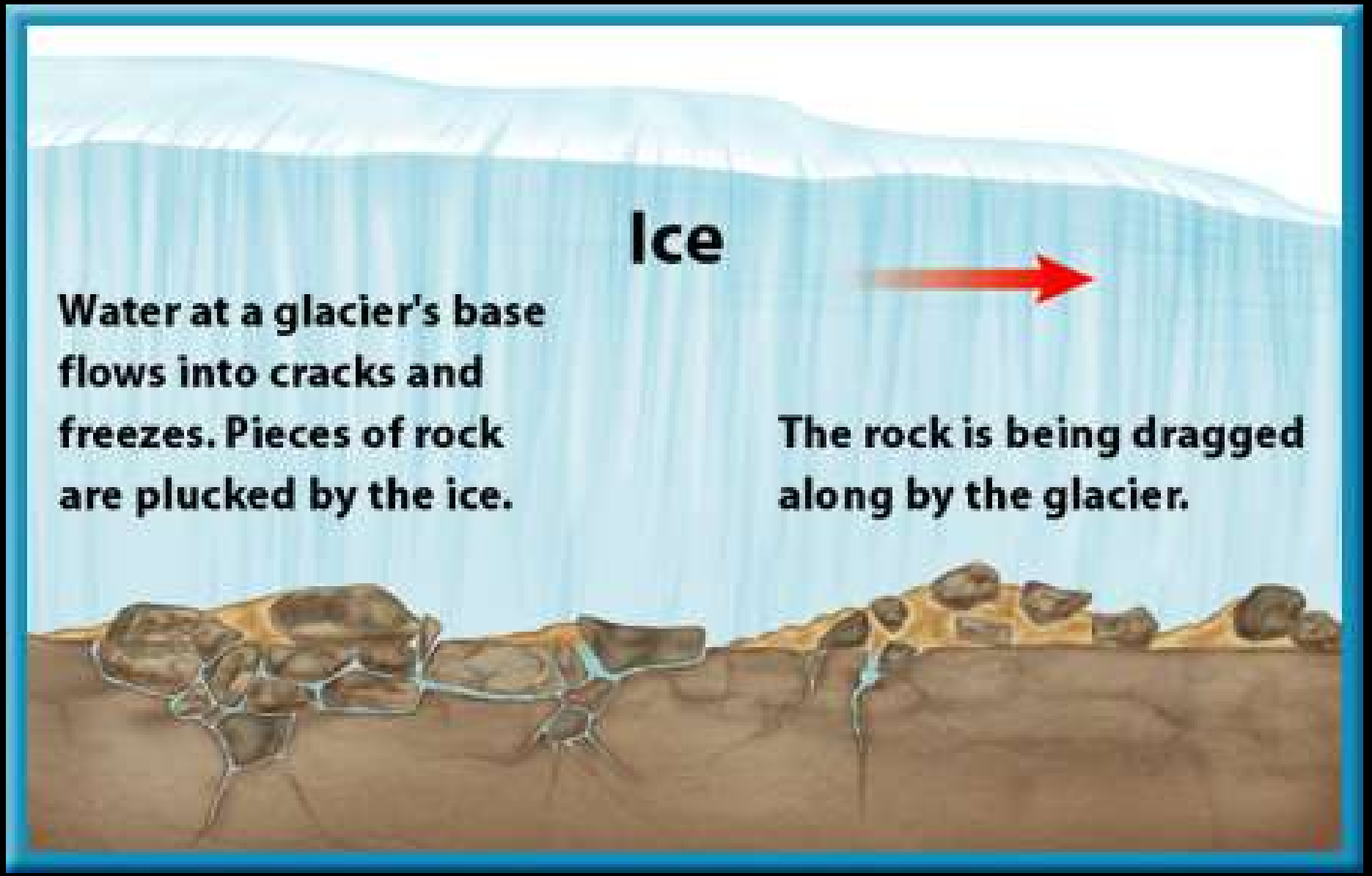
Rock Slide

3. What are the 5 agents of erosion?

Gravity, glaciers, running water, waves, and wind

How do Glaciers cause Erosion?

A glacier is a large mass of ice and snow moving on land under its own weight
As glaciers pass over land, they erode it, changing features on the surface
Glaciers then carry eroded material along and deposit it somewhere else.
There are 2 types of glaciers: Continental and Valley Glaciers


Ice
Water at a glacier's base flows into cracks and freezes. Pieces of rock are plucked by the ice.
The rock is being dragged along by the glacier.

What are Continental Glaciers?

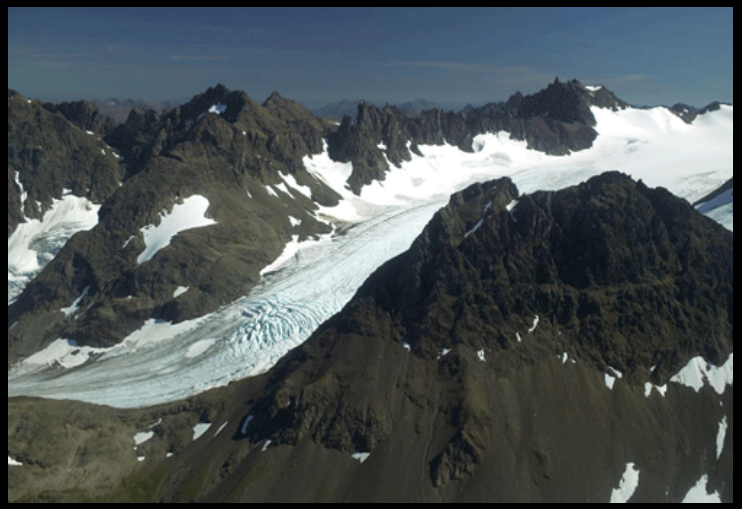
Continental Glacier is a glacier that covers much of a continent or large island

Today, they cover about 10% of Earth's land and cover most of Antarctica and Greenland

These glaciers can flow out in all directions, spreading out like pancake batter in a pan

What is a Valley Glacier?

A Valley Glacier is a long, narrow glacier that forms when snow and ice build up high in a mountain valley
The sides of the mountains keep these glaciers from spreading out in all directions
Usually these glaciers are smaller than continental glaciers, but can be kilometers long

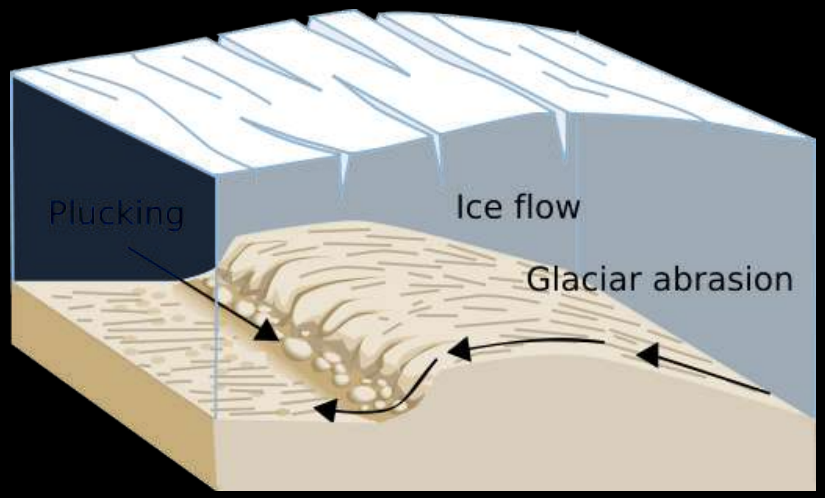


How do Glaciers shape the land?

The movement of a glacier changes the land beneath it

Although glaciers work slowly, they are a major force of erosion

The two process by which glaciers erode the land are plucking and abrasion



How do Glaciers shape the land?

As a glacier flows over the land, it picks up rocks in a process called plucking

Due to the glaciers extreme weight, it can break rocks apart and then the rocks freeze to the bottom of the rock carrying it with it when it moves

As rocks remain on the bottom of the glacier and it drags them across the land, abrasion occurs as it scratches the bedrock

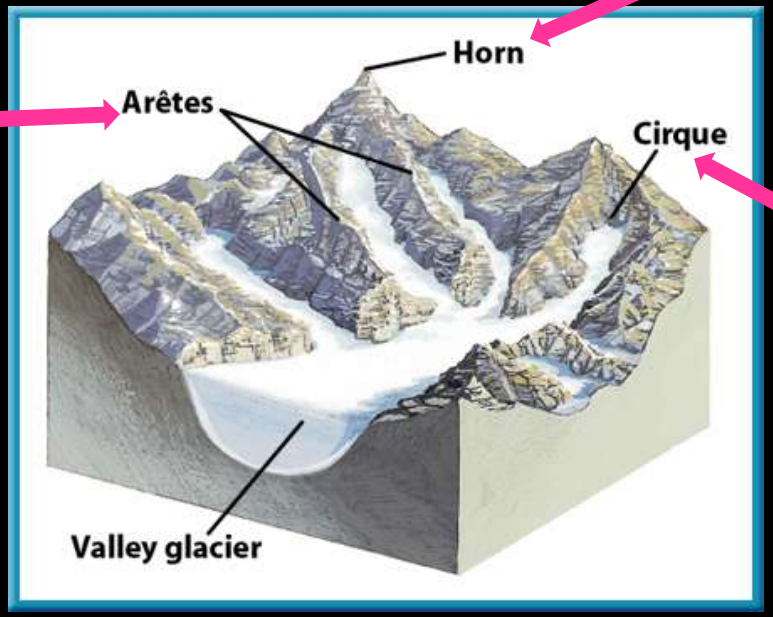
How do Glaciers shape the land?

A glacier gathers a huge amount of rock and soil as it erodes the land in its path

When a glacier melts, it deposits the sediment it eroded from the land creating various landforms

A sharpened peak

A sharp ridge separating two cirques



A bowl-shaped hollow

How does wind contribute to erosion?

Wind by itself is the weakest agent of erosion, however, it can be a powerful force in shaping the land areas where there are few plants to hold the soil in place

Wind causes erosion by deflation and abrasion

How does wind contribute to erosion?

Deflation is the process where wind blows loose sediment, removing small particles

The stronger the wind the heavier sediment that can be moved

Deflation was one factor in the loss of soil during the 1930's Dust Bowl

How does wind contribute to erosion?

Abrasion by wind-carried sand can polish rock, but causes little erosion
It was once thought that the sediment carried by wind cut the stone shape, but now more evidence shows that most landforms are the result of weathering and water erosion

What are some landforms created by wind erosion?

Sand dunes are mounds of sediment drifted by the wind
Dunes can be see along shore of oceans, but are common in desert regions
Loess are fine, wind blown sediment like silt and clay
Loess help to form fertile soil and create valuable farmlands

Self Check

1. What are two ways in which glaciers erode Earth's surface?

   Plucking and Abrasion

2. What is the difference between a continental and a valley glacier?

   Continental glacier covers much of a continent or large island, where a valley glacier is a long, narrow glacier found in a mountain valley

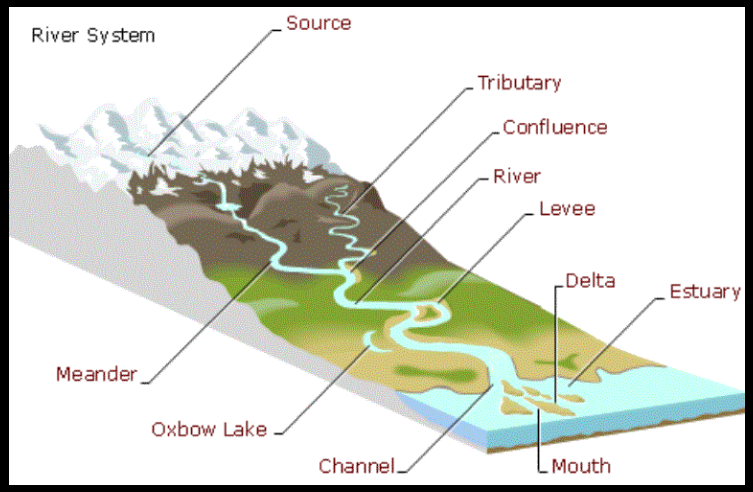
How is water an agent of Erosion?

Moving water is the major agent of erosion that has shaped Earth's land surface

Through erosion, a river creates valleys, water falls, flood plains, and other landforms

Deposition of sediments creates landforms such as deltas and also adds soil to a river's flood plain

A delta is sediment that are deposited where a river flows into an ocean or lake building up a landform



How is water an agent of Erosion?

Ground water is another agent of erosion through the process of chemical weathering

Ground water is water that fills the cracks and spaces in underground soil and rock layers

Ground water containing carbonic acid can break down limestone creating caves or caverns.

Stalactites and stalagmites are also formed from the deposit of calcite due to chemical weathering

How do waves contribute to Erosion?

The energy in waves comes from wind that blows across the water's surface

Waves shape the coast through erosion by breaking down rock and transporting sand and other sediment

Waves shape a coast when they deposit sediment, forming coastal features such as beaches

Self Check

1. What is the source of the energy in ocean waves?

   Energy is transferred to ocean waves from wind

2. What process is the cause of ground water erosion?

   Chemical weathering