Landforms Part-II

What is the Landform Made by Wind?

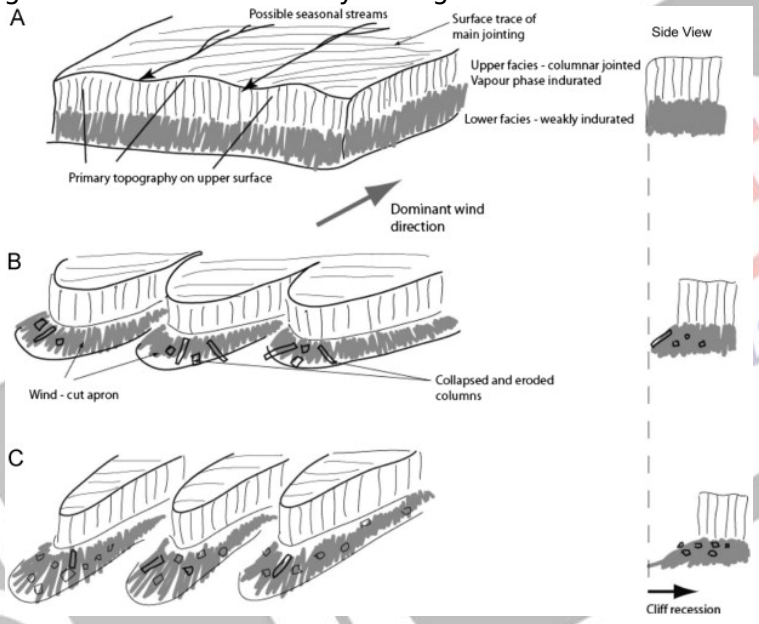
- Wind is a **geomorphic agent in all terrestrial environments.** It is more active in arid regions with fine-textured soils and sediments and little or no vegetation.
- Wind can **erode desert rocks in two ways:**
    - **Deflation:** The removal of fine, loose particles from the surface of rocks.
    - **Abrasion:** Small particles being carried by the wind scrape of particles from the rock surface. It then transports the eroded material by three processes:
        - **Suspension:** Very small particles (<0.15mm) are picked up and carried by the wind.
        - **Saltation:** Small particles (0.15-0.25mm) are temporarily lifted from the ground and bounce along the surface.
        - **Surface Creep:** Larger particles (>0.25mm) are hit and pushed along the ground by particles being moved by saltation.
    - **Attrition:**
        - Sand particles carried by winds **start a friction process within itself and because of this their size reduces.** This is known as attrition.
        - **Erosion process of high speed winds** is also fast.
        - **Soft rocks break down easily** but on the other hand the erosion process is long in case of hard rocks.

Erosional Landforms formed by Wind

- **Deflation Hollows and Caves:**
    - **Deflation Hollows:**
        - Deflation basins, called blowouts, are hollows **formed by the removal of particles by wind.**
        - Blowouts are generally small, but may be up to several kilometers in diameter. //

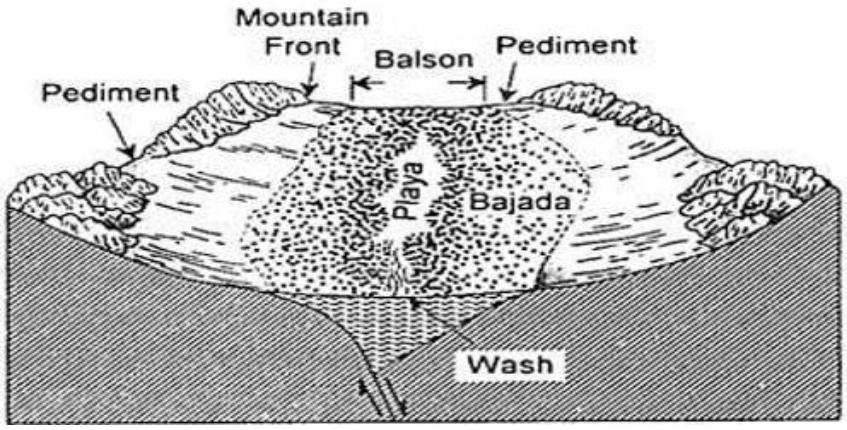
- **Caves:**
  - As wind-borne sand impacts the rock faces, **some of the blow-outs become deeper and wider and fit to be called caves.**

- **Yardangs**:
  - Yardangs are **parallel troughs cut into softer rock** running in the direction of the wind, separated by ridges. The direction of the yardangs can indicate the direction of the prevailing wind.



- **Zeugen:**
  - A zeugen is a **tabular mass of resistant rock**, standing prominently in the desert.
  - It is **usually composed of alternating layers** of hard and soft rocks.

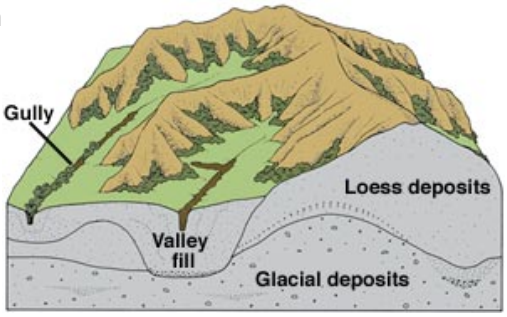
- **Playas:**
  - Playa is a **flat-bottom depression found in interior desert basins** and adjacent to coasts in arid and semiarid regions, periodically covered by water.
  - It slowly **filtrates into the groundwater system or evaporates into the atmosphere,** causing salt, sand, and mud deposition along the bottom and around the depression's edges.



Depositional Landforms formed by Wind

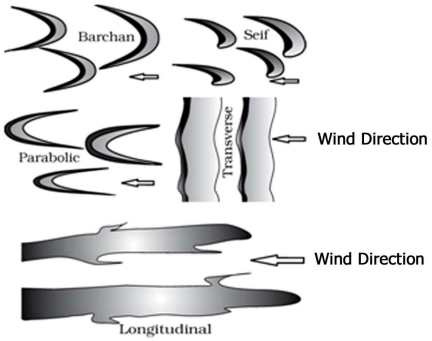
- **Ripples:**
  - They are regular, **wavelike undulations lying at right-angles** to the prevailing wind direction.

- **Loess:**
  - Loess is **terrestrial sediment composed largely of windblown silt particles** made of quartz. Loess **requires three things:**
    - A source of silt
    - Wind to transport the silt
    - A suitable site for deposition and accumulation



- **Dunes:**
  - Dunes are **collections of loose sand built piecemeal by the wind.**
  - It is **usually composed of quartz**, which is extremely hard and doesn't easily decay.
  - **Most Common types of Dunes:**
    - **Barchans:**
      - Barchans have **crescent-shaped points or wings** that face away from the wind, or downwind, and where sand is moving over an almost uniform surface from where the wind is constant.

- Seif:
    - It is also called **linear dunesis similar to barchans** with a small difference as it has only one wing or point.

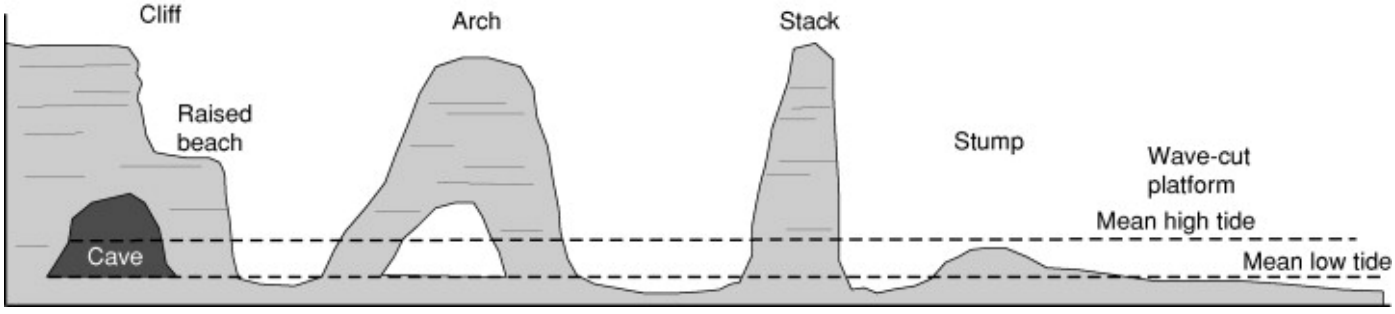


What are the Coastal Landforms?

- Coastal processes are among the most dynamic geologic processes since changes in the morphology of many coasts can be seen on an annual (or shorter) timescale.
- Other than the action of waves, the coastal landforms depend upon:
    - The configuration of land and sea floor
    - Whether the coast is advancing (emerging) seaward or retreating (submerging) landward.

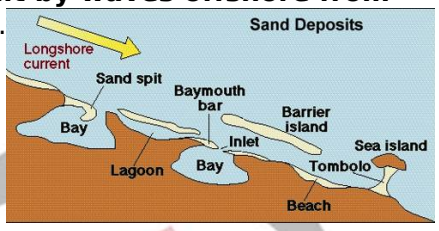
Erosional Coastal Landforms

- **Cliffs, Terraces, Caves and Stacks:**
    - **Cliffs:**
        - A sea cliff is a **vertical precipice created by waves** crashing directly on a steeply inclined slope. Hydraulic action, abrasion, and chemical solution all work to cut a notch at the high water level near the base of the cliff. Constant undercutting and erosion causes the cliffs to retreat landward.
    - **Sea Caves:**
        - Sea caves **form along lines of weakness in cohesive** but well-jointed bedrock. Sea caves are prominent headlands where wave refraction attacks the shore.
    - **Sea Stacks:**
        - A **sea arch forms when sea caves merge from opposite sides** of a headland. If the arch collapses, a pillar of rock remains behind as a sea stack.
    - **Sea Terraces:**
        - It is a **rock terrace formed where a sea cliff, with a wave-cut platform before it**, is raised above sea level.



Depositional Coastal Landforms

- **Beaches:**
  - Beaches are **deposits of loose sediment adjacent to a body of water.** In addition to sand, beaches around the world have a remarkable diversity of sediment size, from boulders to fine silt.
- **Spits and Bars:**
  - **Spits:**
    - A sand spit is a **linear accumulation of sediment** that is attached to land at one end.
    - They **usually develop where the coastline bends inland** from the longshore drift direction. The spit follows the **longshore direction of the updrift coast.**
  - **Bars:**
    - Sandbar, also known as Offshore Bar, is a **ridge built by waves offshore from the beach**, usually submerged or partially exposed.

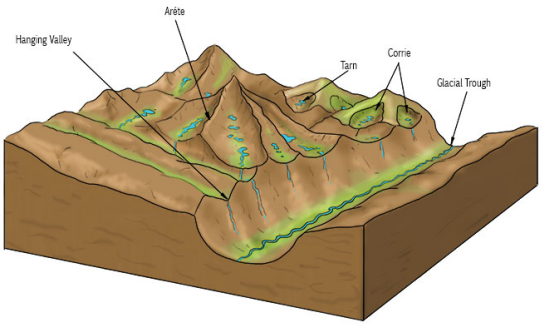


What are the Landforms Formed by Glaciers?

- Glaciers have played a **major role in the shaping of landscapes in the middle and high latitudes** and in alpine environments. They are remarkably **effective at eroding soil and rock**, transporting sediment, and depositing sediment.
- A **glacier is a mass of ice that moves over land as sheets** (continental glacier or piedmont glacier) or as linear flows flowing down slopes of mountains into valleys (mountain and valley glacier).

Erosional Landforms formed by Glaciers

- **Glacial Valleys/Troughs:**
  - These valleys are **trough-like and U-shaped with broad floors** and relatively smooth, and steep sides.
    - The valleys may contain littered debris or debris shaped as moraines with swampy appearance.
    - **Very deep glacial troughs filled with sea water** and making up shorelines (in high latitudes) are called fjords/fiords.

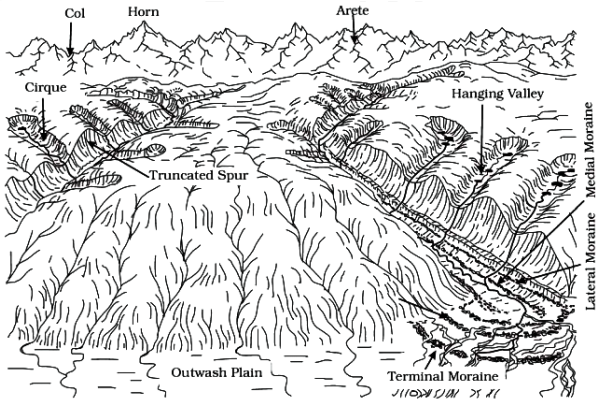


- **Cirques:**
  - Often found at the **heads of glacial valleys**, these are the most common of landforms in glaciated mountains.
    - They are **deep, long and wide troughs or basins** with very steep concave to vertically dropping high walls at its head as well as sides.

        - **A lake of water can be seen quite often** within the cirques after the glacier disappears. Such lakes are called **cirque lakes or tarn lakes.**
- **Horns and Serrated:**
    - **Ridges Horns form through headward erosion** of the cirque walls.
        - If **three or more radiating glaciers cut headward** until their cirques meet, high, sharp pointed and steep sided peaks called **horns form.**

Depositional Landforms formed by Glaciers

- **Glacial Till:**
    - The **unassorted coarse and fine debris** dropped by the melting glaciers is called glacial till.
        - **Some amount of rock debris small enough to be carried** by such melt-water streams is washed down and deposited.
            - **Such glaciofluvial deposits** are called outwash deposits.
            - The outwash deposits are roughly stratified and assorted.
- **Moraines:**
    - They are **long ridges of deposits of glacial till.**
        - Terminal moraines are **long ridges of debris deposited at the end (toe) of the glaciers.**
        - Lateral moraines form along the sides parallel to the glacial valleys.
        - Many valley glaciers retreating rapidly leave an irregular sheet of till over their valley floors called ground moraines.
        - The **moraine in the centre of the glacial valley flanked** by lateral moraines is called medial moraine.
            - They are **imperfectly formed as compared to lateral moraines.**
            - Sometimes medial moraines are indistinguishable from ground moraines.
- **Eskers:**
    - These are **ridges made of sands and gravels,** deposited by glacial meltwater flowing through tunnels within and underneath glaciers, or through meltwater channels on top of glaciers.
        - Over time, the **channel or tunnel gets filled up with sediments.** As the ice retreats, the sediments are left behind as a ridge in the landscape.
- **Drumlins:**
    - They are **smooth oval shaped ridge-like features** composed mainly of glacial till with some masses of gravel and sand.
        - The long axes of drumlins are parallel to the direction of ice movement.
        - They may measure up to 1 km in length and 30 m or so in height.
        - The **drumlin end facing the glacier is called the stoss end** and is blunter and steeper than the other end called tail.



Landforms made by Winds		
Erosional Landforms formed by Wind		
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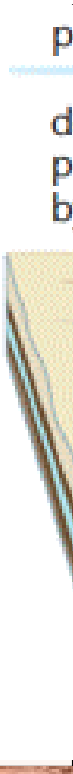
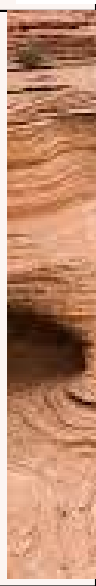
		
Caves	▪ Formed when blowouts formed by winds become deeper and wider and fit to be called caves.	
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		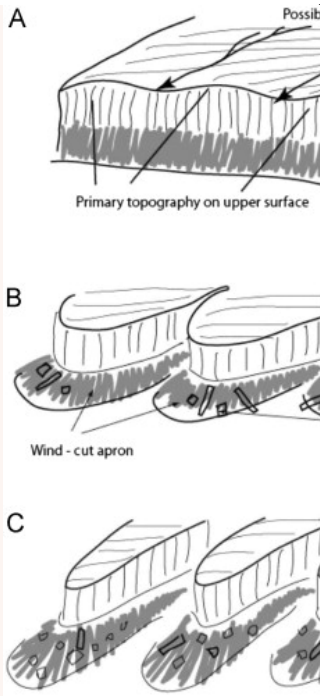
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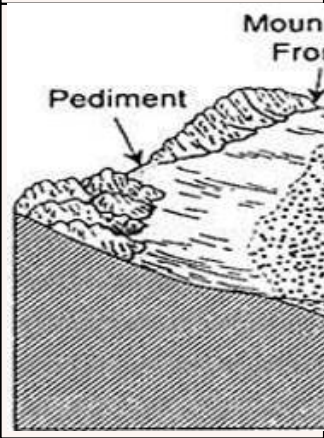
Playas	▪ Flat-bottom depression found in interior desert basins and adjacent to coasts in arid and semiarid regions, periodically covered by water.	
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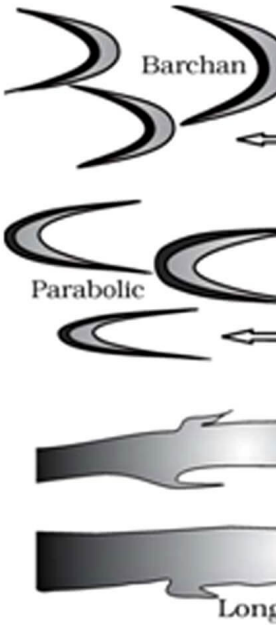
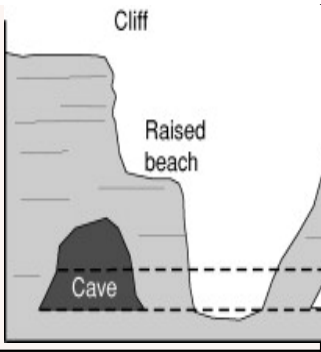
Dunes	▪ Collections of loose sand built piecemeal by the wind.	

Coastal Landforms

Erosional Coastal Landforms

Cliffs	▪ **Vertical precipice created by waves** crashing directly on a steeply inclined slope.	
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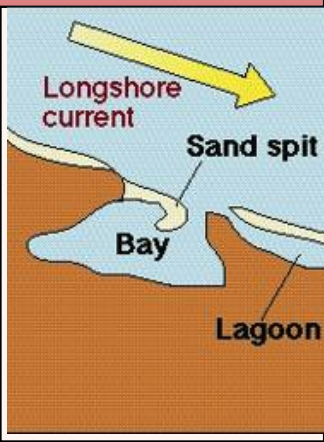
Beaches	▪ Deposits of loose sediment adjacent to a body of water.	
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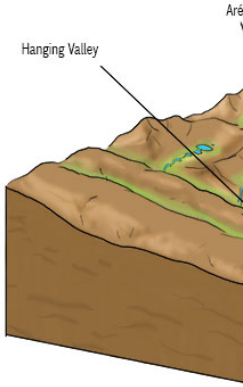
Glacial Valleys/Troughs	▪ Trough-like and U-shaped with broad floors and relatively smooth, and steep sides	
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		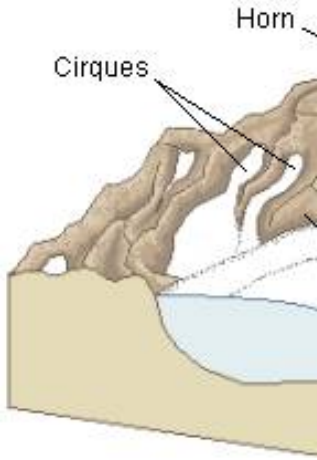
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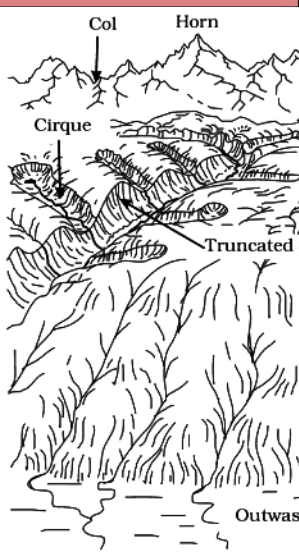
Glacial Till	▪ Formed when unassorted coarse and fine debris dropped by the melting glaciers.	
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