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Geomorphic Processes

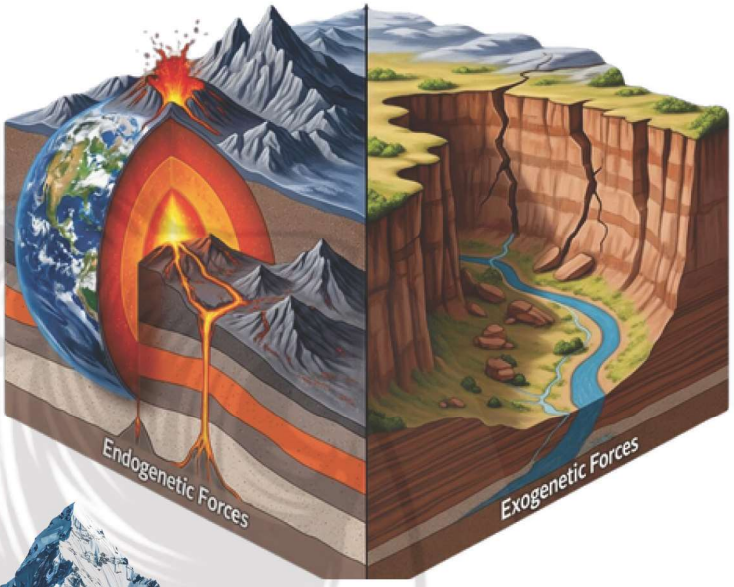




Geomorphological Process

- Geomorphology is description and classification of earth's topographic features.
- Father of geomorphology is **William Morris Davis.**
- All geomorphologic process occur due to **Endogenic (Bole to internal)** & **Exogenic (Bole to External) Forces.**

- Endogenic processes is an internal geomorphic process.
- Endogenic forces get their energy from within the earth (convection current)
- All relief features on earth are due to endogenic and exogenic forces.
  - **Himalayas** : They are continuously increasing, because of more endogenic force.
  - **Aravali**: They are continuously decreasing, because of more exogenic force.







Hydrology

The study of distribution and movement of water, both in and below the Earth's surface as well as the impact of human activity on water availability and condition, is known as Hydrology.

Recall !

- Convection Currents in Asthenosphere in upper Mantle provides energy to endogenic forces.
- Convection Current develops due to Primordial or Residual Heat and Radioactive Decay.
- Convectional Current Theory was given by Arthur Holmes in 1930.

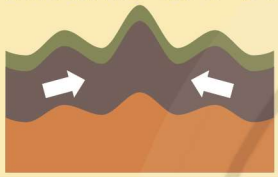
Effect of Endogenic Forces

Diastrophism

Diastrophism is a process of deformation and movement of Earth's crust. These movements are responsible for shaping large-scale landforms over geological time period.

Orogenic Process

Oro: Mountain, Genic: Formation. It is a process through which mountains are built.



Epeirogenic Process

Epeiro: Crust ; Genic : Formation. It involves upliftment of large parts of the Earth's crust.



Earthquake

It involves shaking of Earth.

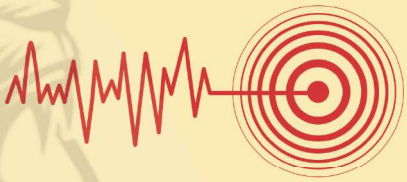
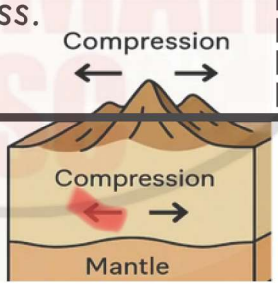
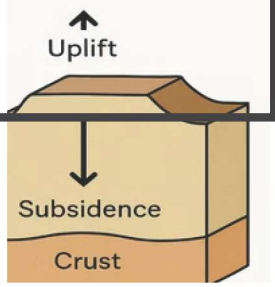


Plate Tectonic

It explains how major landforms are created as a result of Earth's subterranean movements.

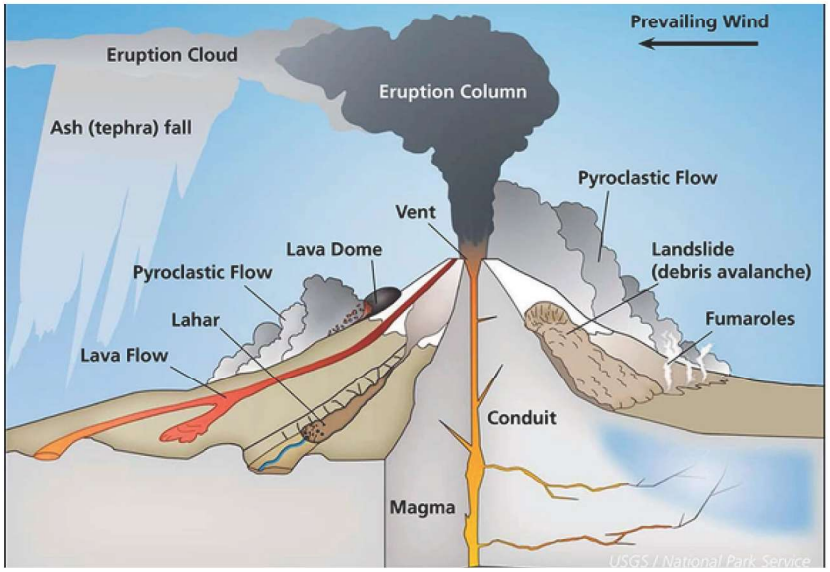
Orogenic Process	Epeirogenic Process
• It is a Horizontal Movement • It does not occurs in large landmass. • It is a faster than Epeirogenic process.	• It is a Vertical Movement • It occurs in large landmass. • It is slower than Orogenic Process.





Volcano

They are commonly described as openings / vents where lava or Magma erupts.



Exogenic Processes

- It is a geological processes that occur on earth's surface due to external forces.
- **Denudation** refers to long term processes that cause the wearing away the earth's surface, leading to a reduction in elevation and relief of landforms and landscapes.
- Source of energy for exogenic forces is the **Sun**.
- Exogenic agents are **Wind, Glaciers, Water**

Process	Driving Force
• **Weathering** (Breaking of rocks)	Gravitational / Molecular stresses / Chemical actions
• **Mass Movement** (Weathering is not a prerequisite but it aids the mass movement)	Gravitational force
• **Erosion / Transportation** (Ex-Situ Process Agents: Wind, Water)	Kinetic Energy

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Weathering

- Weathering is the process of rocks and minerals breaking down or dissolving on the earth's surface.
- It is an In-Situ Process.
- It has three types :

Physical Weathering **Chemical Weathering** **Biological Weathering**







Physical Weathering



Physical weathering involves breakdown of rocks through direct contact with atmospheric conditions such as heat, water, ice etc.

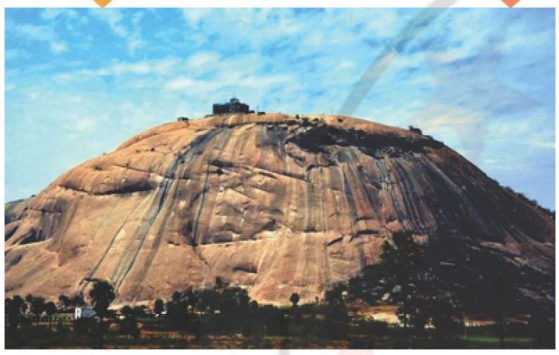
Types of Physical Weathering

01 **Unloading and Expansion**

02 **Temperature Changes & Expansion**

03 **Freezing, Thawing & Frost Wedging**

04 **Salt Weathering**



A large exfoliation dome in granite rock near Bhongir (Bhuvanagiri) town in Andhra Pradesh.

Exfoliation is a process when large, curved plates or slabs of rocks are striped away from the outer surface of a rock mass.

Tor : It is a rounded hill, generally seen in Granite Rocks

Salt Crystallisation is the effective of all the salt weathering processes. It occurs where rate of evaporation is high.

Chemical Weathering

Chemical weathering involves decomposition of rocks through chemical reactions such as oxidation and reduction, carbonation, solution, and hydration.



Types of Chemical Weathering

01 **Solution**

02 **Carbonation**

03 **Hydration**

04 **Oxidation & Reduction**



Solution (Dissolution)



Hydrolysis



Oxidation



Carbonation



Spheroidal Weathering



Hydration

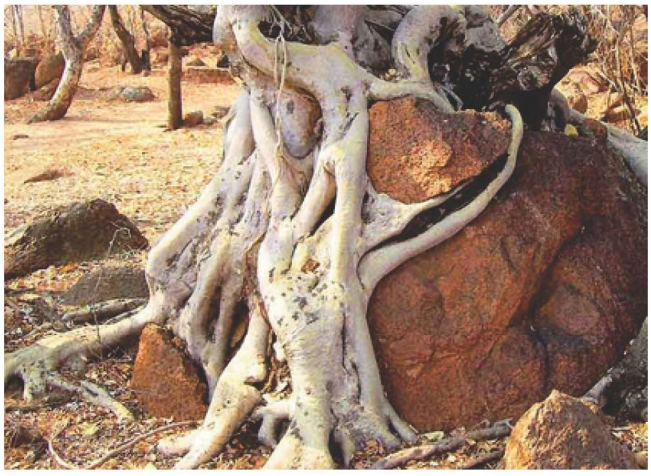
Chemicals like Nitrates, Sulphates, Potassium, Carbonates are prone to leaching, hence they easily washed away and dissolve with water.



Chemicals like $CaSO_4$ absorbs water easily to form Gypsum ($CaSO_4 . 2H_2O$)

Biological Weathering

Biological weathering is the breakdown of rocks through the activities of living organisms such as earthworms, rodents etc.



Mass Movement

It is a downslope movement of soil, rock and other debris under the influence of gravity. Weathering is not a prerequisite but it can aid the mass movement.

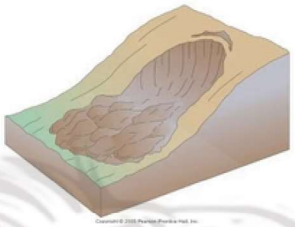
Types

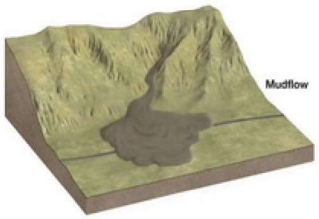
Rapid

- Landslides
- Avalanche
- Earthflow
- Mudflow





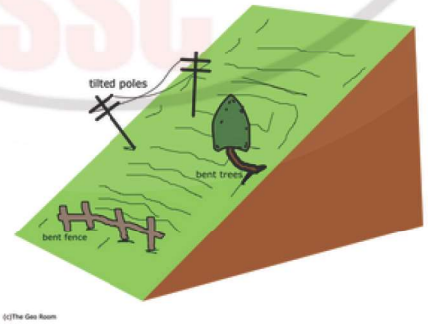


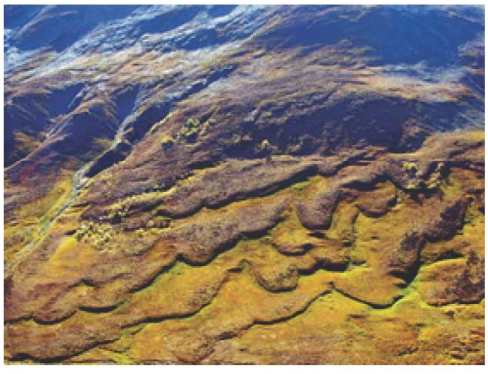


- Earthflow and Mudflow occurs in water saturated regions.
- Earthflow is slow while Mudflow is a fast process.
- Mudflow occurs in absence of Vegetation and is more saturated with water.

Slow

- Creep
- Solifluction

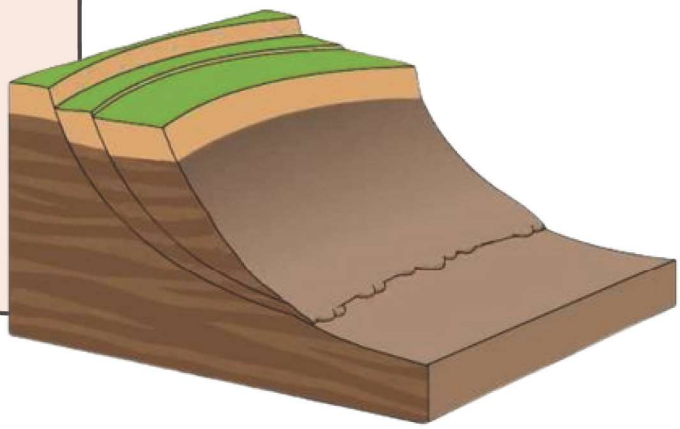




Solifluction Mainly Occurs in **Permafrost** Regions.

Slump

A specific type of mass movement where a coherent mass of soil or rock slides down a slope along a curved, spoon-shaped surface.



Erosion

- It involves transportation of Rock debris through geomorphic agents like running water, ground Water, Glaciers, Winds, and Waves.
- It is an Ex-situ process.

