Physical Weathering Processes

Prepared by

Jyotish Bairaggya
Assistant Professor of Geography
Rani Dhanya Kumari College
Jiaganj, Murshidabad, West Bengal

Weathering and Denudation

- **Weathering** is the breaking down or dissolving of rocks and minerals on Earth's surface by the agents of weather. Water, ice, acids, salts, plants, animals, and changes in temperature are all agents of weathering.

Fig: Weathering

Fig: Denudation

- **Denudation** is the wearing away of landmasses by various process like weathering, mass movement, erosion, transportation. In denudation, moving water, ice, wind and waves erode the earth's surface and leading to a reduction in elevation and in relief of landforms and landscape.

Physical Weathering Process

- **Physical** weathering, also known as **mechanical** weathering, is the process by which rocks breakdown or change shape and texture by external forces.
  - So, it is a process that causes the disintegration of rocks, minerals and soils without chemical change.
- Physical weathering is caused by effects of changing temperature on rocks, freeze-thaw cycles in snow covered mountainous region, pressure release process, abrasion, root expansion, and wet-dry cycles etc. The major physical weathering processes are as follows:

- **Block Disintegration:** Block disintegration occurs due to repeated expansion and contraction of rocks during day and night, causing stress on the joints of the rocks, which eventually **splits the rocks into blocks**. It occurs in the area where the **diurnal range of temperature** is very high. Block disintegration is when the rocks split along joints forming large rectangular shaped blocks.

Fig: Block Disintegration

- **Granular Disintegration:** Granular disintegration is a type of mechanical weathering found in the hot and arid desert regions. Due to of differential heating, the various minerals present in the rocks expand and contract alternately and these rates of expansion and contraction differ in case of different minerals. As a result, the rocks are broken down into small fragments. This process is known, as granular disintegration. Temperature and frost plays a vital role in granular disintegration.

Fig: Granular Disintegration

- **Exfoliation:** Exfoliation is a process in which large flat or curved sheets of rock fracture and are detached from the outcrop due to pressure release. As erosion removes the overburden from a rock that formed at high pressure deep in the Earth´s crust, it allows the rock to expand, thus resulting in cracks and fractures along sheet joints parallel to the erosion surface.

Fig: Exfoliation

- **Slaking:** Slaking is the process of alternate wetting and drying. Rocks, especially those containing clays, tend to swell on wetting, with subsequent contraction on drying. When water enters the pores of a rock, the rock expands creating tensile stresses and generating tension cracks

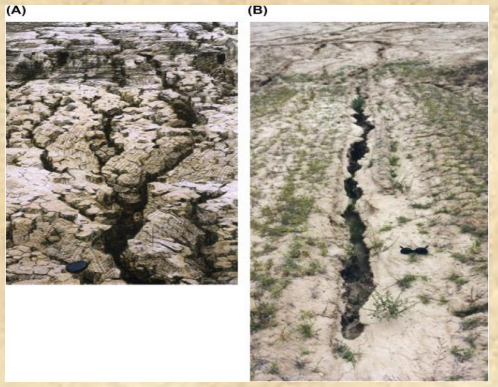
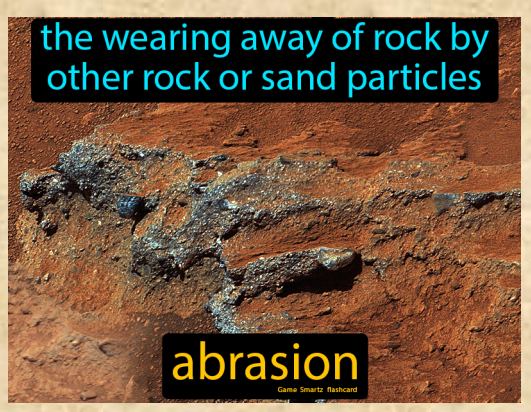


Fig: Slaking

- **Spalling**: Spalling is a common mechanism of rock weathering, and occurs at the surface of a rock when there are large shear stresses under the surface. This form of mechanical weathering can be caused by freezing and thawing, unloading, thermal expansion and contraction, or salt deposition.

Fig: Spalling

- **Abrasion:** *Abrasion weathering* occurs when rocks are broken down by forces like wind and water. In abrasion, one rock bumps against another rock.



- **Frost wedging:** Frost wedging is a form of physical weathering that breaks down the rocks through the freezing and thawing proess. First water enters the rock through cracks and pores traveling deep within the rock. As water Freezes, it expands 10% and causing the cracks and pores to grow. The ice then thaws and water travels deeper within the rocks. This freeze-thaw cycle continues to happen until the rocks breaks down completely.

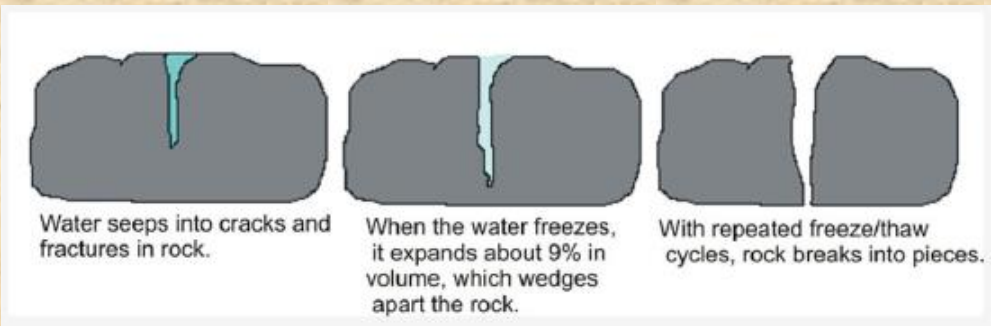


Fig: Ice Wedging

- **Salt Weathering:** Salt weathering is the process of rocks disintegration by salts that have accumulated near the rocks surface. It is dominant weathering process in deserts, especially in coastal areas, playa areas where saline ground water is dominant.

Fig: Salt Weathering

THANK YOU