Weathering and soil formation
Weathering

- Breaking down of Earth's rocks, soils and minerals through direct contact with the planet's atmosphere.

- Weathering occurs \textit{in situ}, or "with no movement", and thus should not be confused with erosion, which involves the movement of rocks and minerals by agents such as water, ice, wind, and gravity.
Two important classifications of weathering processes exist — physical and chemical weathering.

**Mechanical** or **physical weathering** involves the breakdown of rocks and soils through heat, water, ice and pressure.

The second classification, **chemical weathering**, involves the direct effect of atmospheric chemicals or biologically produced chemicals (also known as **biological weathering**) in the breakdown of rocks, soils and minerals.
Physical weathering

- During physical weathering rocks break into pieces without altering its chemistry. Therefore physical weathering is considered as an isochemical process.

- Several forces are responsible for physical weathering such as ice, heat differences and pressure differences. In cold regions, water accumulated inside the fractures of rocks become solidified to ice during the winter season. When water becomes ice, volume increases and the pressure generated from this could help to enlarge the existing fractures and facilitate breaking rocks into pieces. This is called as frost disintegration.
Frost disintegration
In hot climatic conditions..

- During the day time these areas become very hot and that causes rocks to heat up slowly.
- At the night time air temperature cools down very fast affects rock surface as well.
- Since rocks are poor heat conductors the differences of surface temperature and inside temperature is not tolerable result peel off of the rock surface, called as exfoliation.
- Likewise, a rock surface heated up by sunshine during the day exposing to sudden rainfall could cause similar weathering pattern.
Chemical weathering

- Chemical weathering is taking place by reaction of the solution with minerals in rocks.
- Rainwater is slightly acidic due to dissolved carbon dioxide and it reacts with calcium carbonates in limestone rocks. This reaction could dissolve limestone slowly.
- In some cases, water is added to the mineral structure can increase the volume of the rock resulting physical weathering.
- Hydrolysis is another form of chemical weathering which results a different mineral due to reaction with water.
Soil formation

- Different kinds of weathering of rocks result soil formation.
- Soil profile has several soil horizons.
- Not all the horizons are present in every location.
- Horizon A is considered as the top most soil layer. Most of the biological activities are taken place in the A horizon.
- Therefore, soil organisms such as earthworms, nematodes, micro-organisms are concentrated in this.
- Chemical substances leach down from A horizon.
- O horizon stays above A horizon. It contains organic material. Therefore it is known as ‘humus’ as well. No mineral matter is present in this layer.

- B horizon stays beneath A horizon. This is referred to as sub-soil. Mineral constituents leached from A horizon are accumulated here in B horizon. Therefore, this layer is also known as illuviated horizon.

- The horizon with disintegrated parent material is called as C horizon. It is located beneath the layer B. Horizon R consist of unweathered parent material.
Thank you!