

Big Idea

- The Earth is a complex system of interacting rock, water, air, and life!



Weathering and Soils



Important distinction

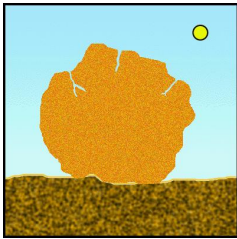
- Weathering
- Erosion



Mechanical weathering



Frost action



Web adventure:
[Frost at work](#)

An example



Thermal expansion

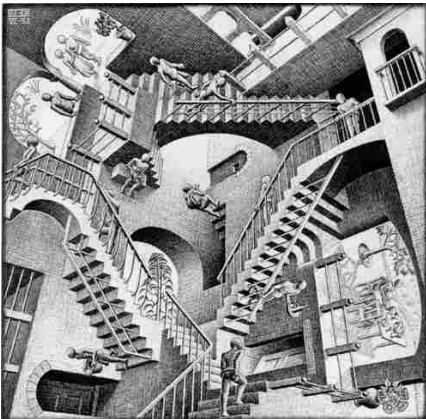
- Solar radiation
- Forest fires



Secondary crystal growth

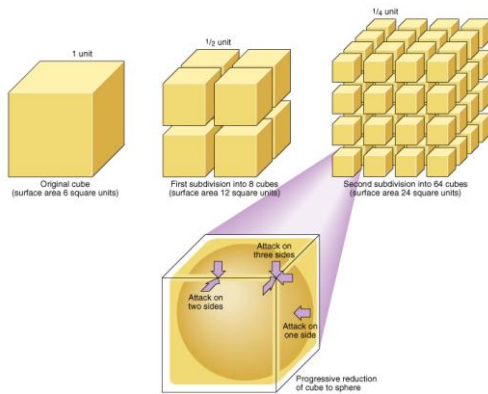
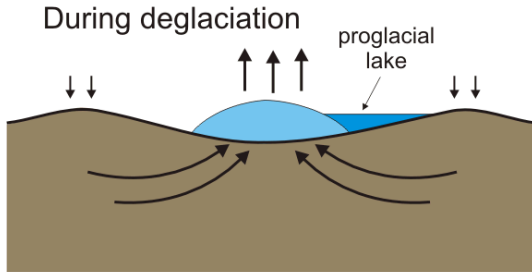
- Salt growth

Gravity



Unloading

- The removal mass (A release of pressure)



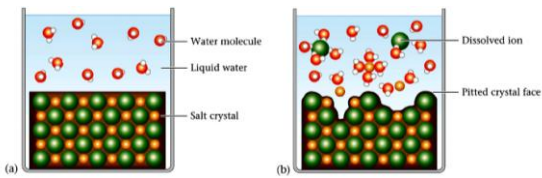
Chemical weathering

- Water
- The products of chemical weathering are
 - a. Dissolved minerals
 - b. Clay
 - c. Formation of altered or new minerals

Major Types of Chemical Weathering

- Solution
- Oxidation and Hydration
- Hydrolysis

Dissolution



Oxidation and Hydration



Hydrolysis

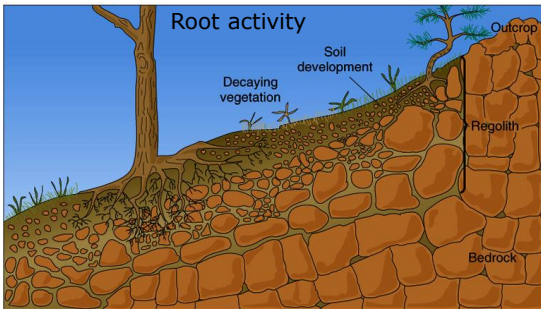
- The most important chemical weathering reaction (soil)
 - $2\text{KAlSi}_3\text{O}_8 + 2\text{H}_2\text{CO}_3 + 9\text{H}_2\text{O} \leftrightarrow \text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4 + 4\text{H}_4\text{SiO}_4 + 2\text{K} + 2\text{HCO}_3^-$
 - Orthoclase + carbonic acid + water \leftrightarrow Kaolinite + silicic acid + potassium + bicarbonate

Orthoclase to Kaolinite (Clay)

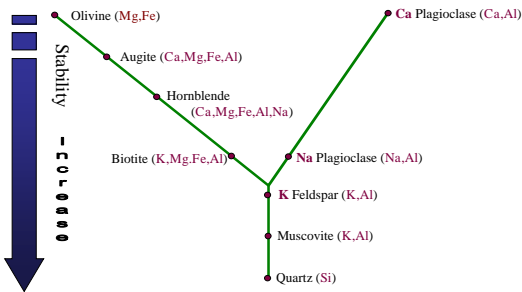


Biologic weathering

- Plants
- Animals
- Humans



Weathering Rates GOLDICH WEATHERING SERIES

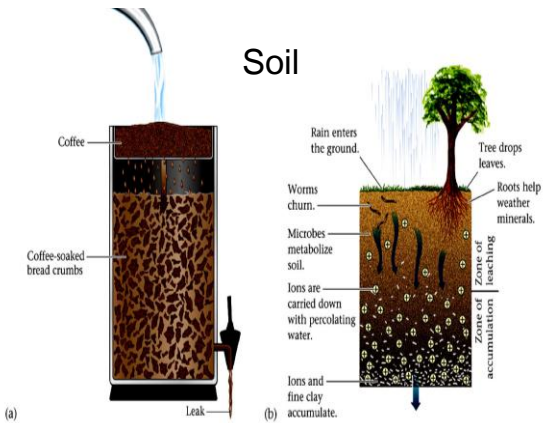


A Soil is;

- a natural occurring body
- weathered horizons of minerals
 - organic matter components;
- variable in thickness
- Differ from the parent material (source)

An important concept

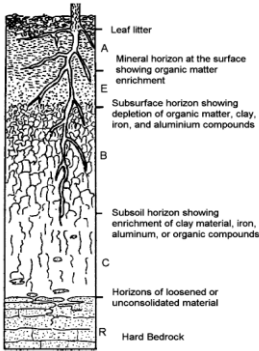
- Soil is **NOT** a geologic deposit

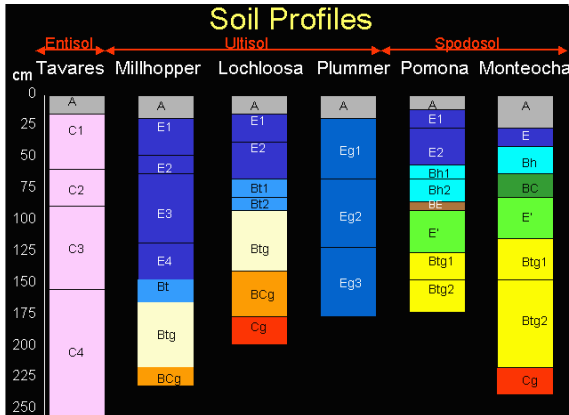


Horizons

- Master horizons: O, A, E, B, C, and R

Soil Profile



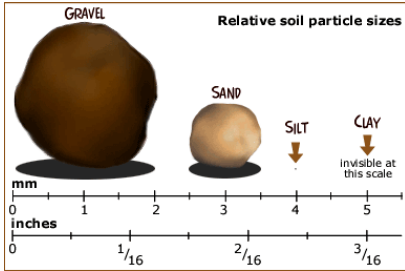


Soil forming factors

- Hans Jenny (1941) Cl, o, r, p, t
- cl, climate
- o, biology
- r, topography
- p, parent material
- t, time

Texture

- Size of the individual peds
 - Sand, Silt, Clay





Soil classification (Naming)

- Pedologists
- Why Classify anything?

Soil Taxonomy

- Order 12
- Suborder 63
- Great Group 319
- Sub Group 2, 484
- Family 8, 000
- Series 19, 000

Soil Problems & Consequences

- Erosion
- Construction/Urbanization

Soil Erosion

- The role of vegetation!!!
- Stream development
 - Wind
