Weathering and Erosion

Objective:

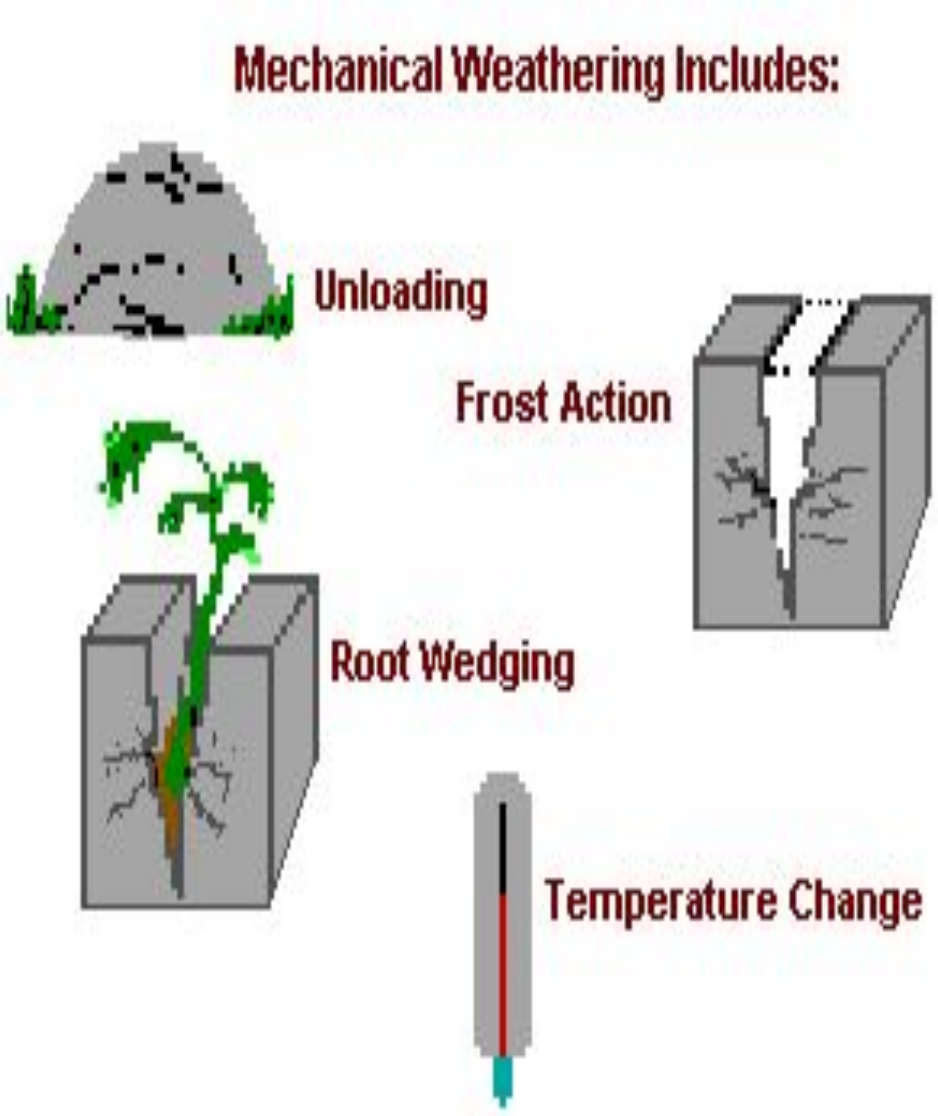
2.1.3

I can explain how natural actions such as weathering, erosion (wind, water and gravity), and soil formation affect Earth's surface.

What is Weathering?

- Is the breaking **<u>down and changing of rocks</u>** near Earth's surface
- Two Types
  - Mechanical
  - Chemical

What is Mechanical Weathering?

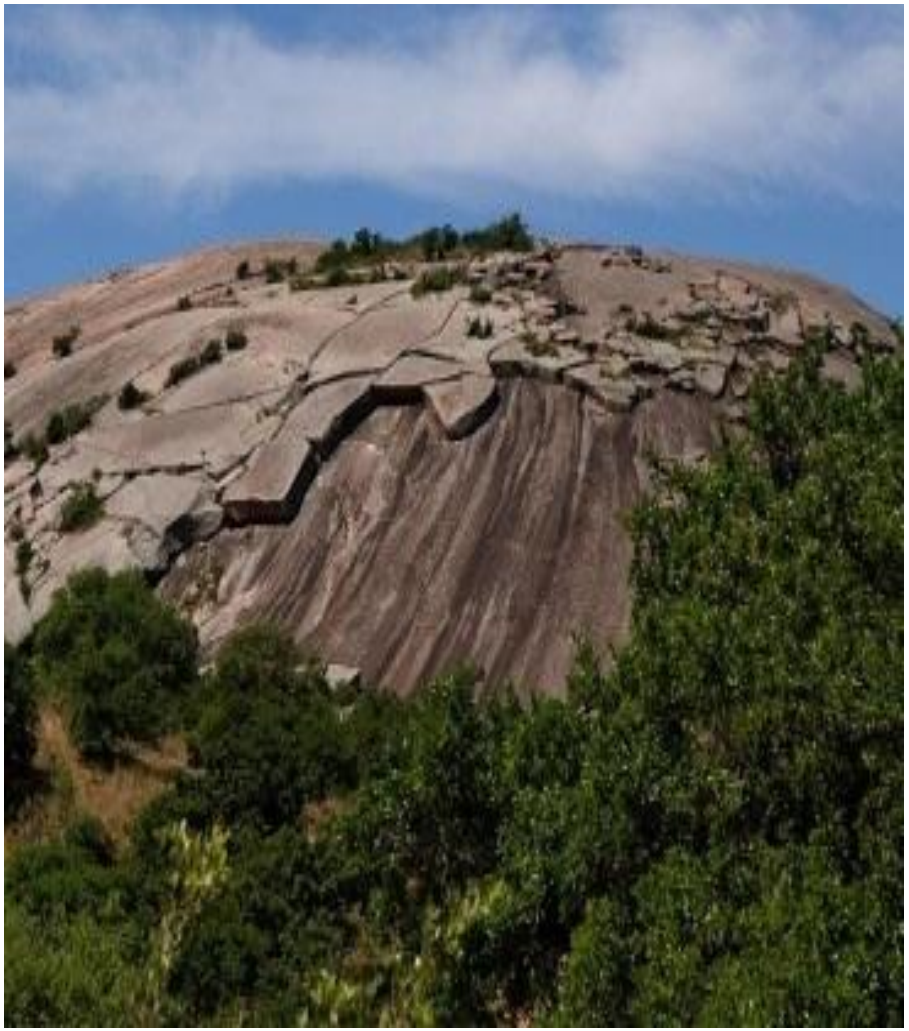


- **When <u>physical forces</u> break rock into smaller pieces**
- **Does <u>not</u> change the <u>rock's composition</u>**
- Three Ways
  - **Frost Wedging**
  - **Unloading**
  - **Biological Activity**

Mechanical Weathering: Frost Wedging

- Water enters cracks and crevices in rocks
- **Water <u>freezes</u> <u>expanding</u> the cracks**
- Eventually breaking rocks into pieces

Mechanical Weathering: Unloading



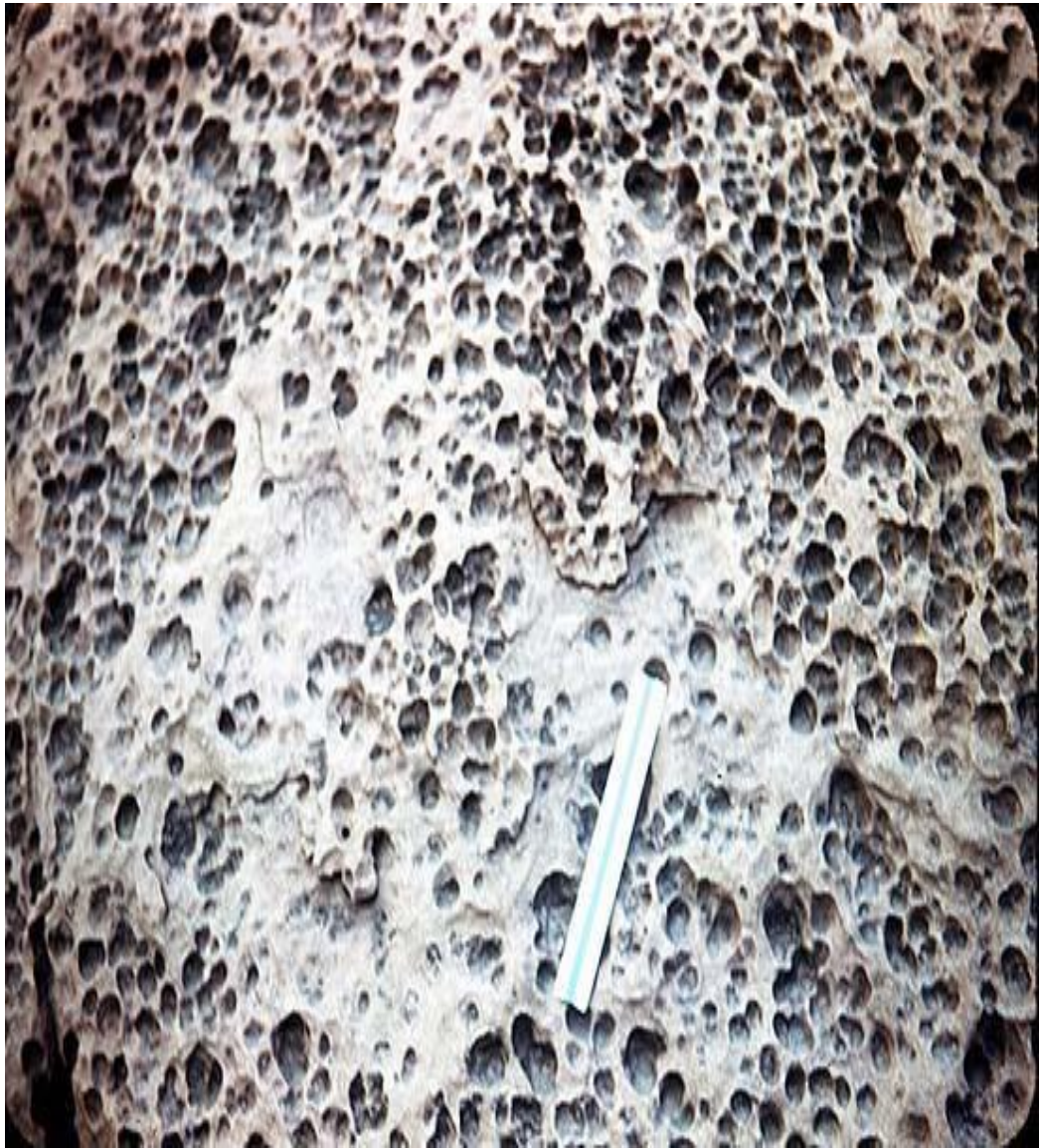
- **The <u>uplift and weathering</u> of rocks overlying igneous rocks**
- Why?
  - Pressure on igneous rocks is reduced causing uplift
- **<u>Exfoliation:</u>** slabs of outer rock **<u>separate and break</u>** loose

Mechanical Weathering: Biological Activity

- **Activities of <u>living organisms</u>**
- **<u>Example:</u>**
  - Plant roots wedge into rocks, breaking them apart

What is Chemical Weathering?

Is the transfer of rock into <u>one or more new</u> compounds



Agents of Chemical Weathering

- **Water**
  - Most important agent
  - **Picks up gases from the atmosphere**
- **Oxygen**
  - **Causes oxidation of metal minerals**
  - Ex: rusting

Chemical Weathering in Action

- **Carbon Dioxide**
  Combines with water in the atmosphere
  Causes acids to form like in acid rain

- **Spheroidal Weathering**
  - Causes the corners and edges of rock to be rounded

Rate of Weathering
What affects it?

- **Rock Characteristics**
  - Mineral composition
  - Mineral solubility
- **Climate**
  - Temperature and moisture
  - Favors high temperatures and abundant moisture

Weathering Lab

Tips:

1. Hot & Cold water is at the front of the room, bring your beaker
2. Clean up your station when you are done
3. DISSOLVED = NO PARTICLES SEEN

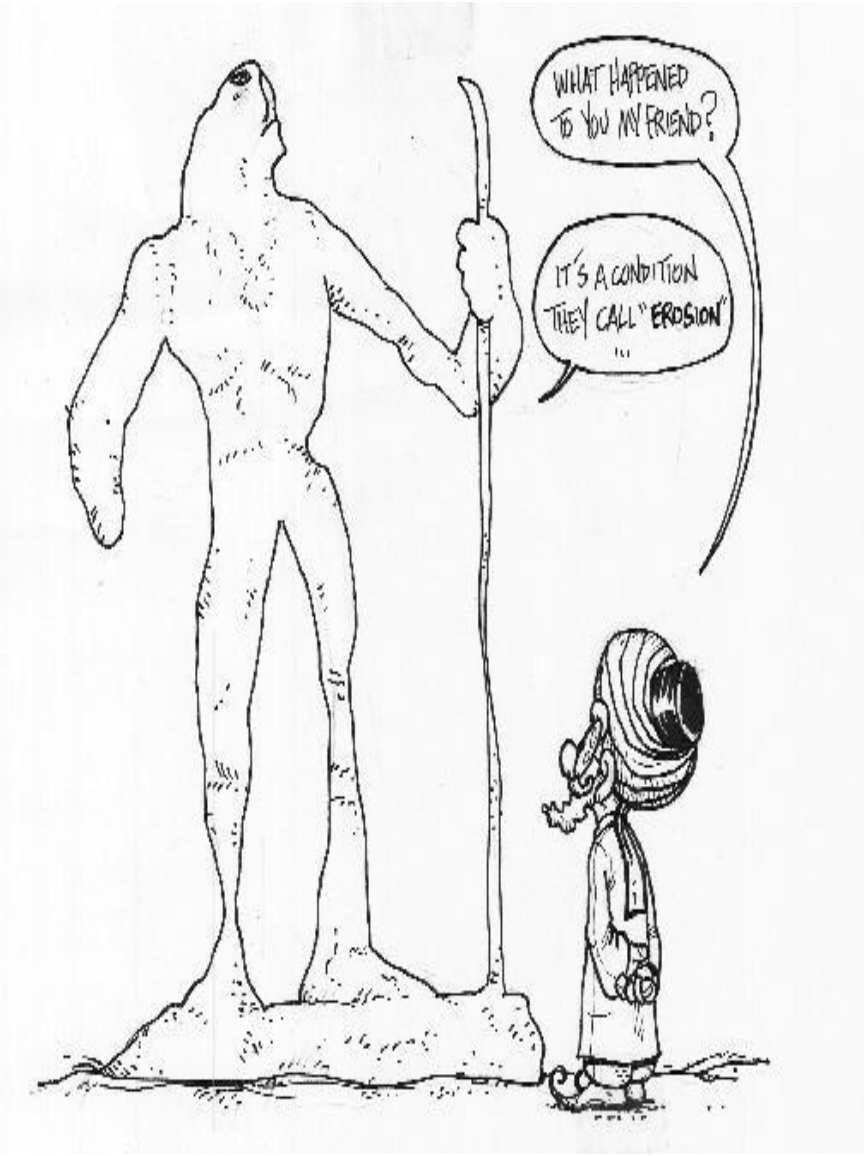
Purpose:

Discover why mechanical and chemical weathering is so different yet feel so similar.

What is Erosion?

- Removal and <u>transport of weathered material</u> from one location to another

Agents of Erosion



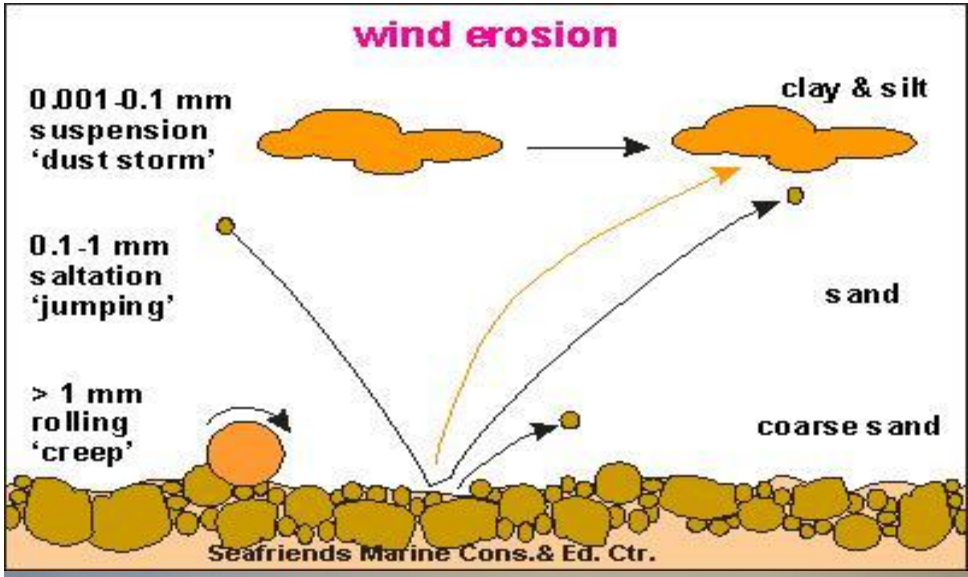
- **<u>Running Water</u>**
- **<u>Wind</u>**
- Glaciers
- Ocean currents and Waves
- Biological Organisms

What happens to the Material?

- **Deposition**
  - **Materials are dropped in another location**
  - Final stage of erosion

How does Wind Erode Soil?

- **Picks up and carry sediment**
- **Sand Dunes**
  - Mounds or ridges of sand
  - **Wind also can cause them to move**

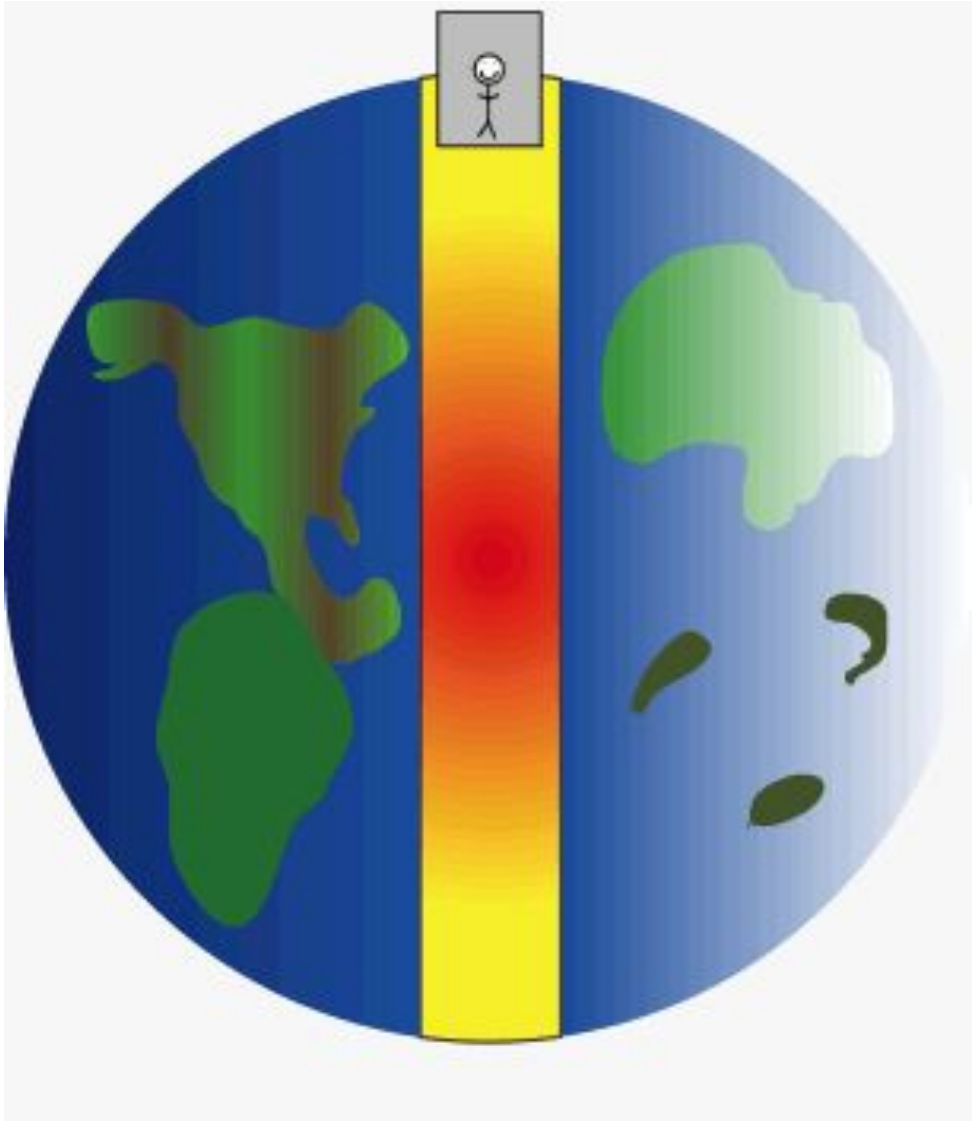


How can humans control erosion?

- Planting <u>rows of trees</u> called windbreakers
- <u>Terracing</u> hillsides
- <u>Plowing along</u> the contours of hills
- Rotating crops

What is Mass Movement?

- The transfer of rock and soil **down-slope** due to **gravity**



How to Classify Mass Movement?

- **Classified by**
  - **Kind of material the move**
  - **How it Moves**
  - **Speed of movement**

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Word Sort Activity

1. Using your vocabulary cards, arrange them into groups of 3 (there should be at least 3 groups) based on their meaning and relatedness.
2. In your notebook, write your three groups (include the vocabulary words for each group) and write 1-2 sentences discussing how they are related (BE SPECIFIC)

What is Soil?

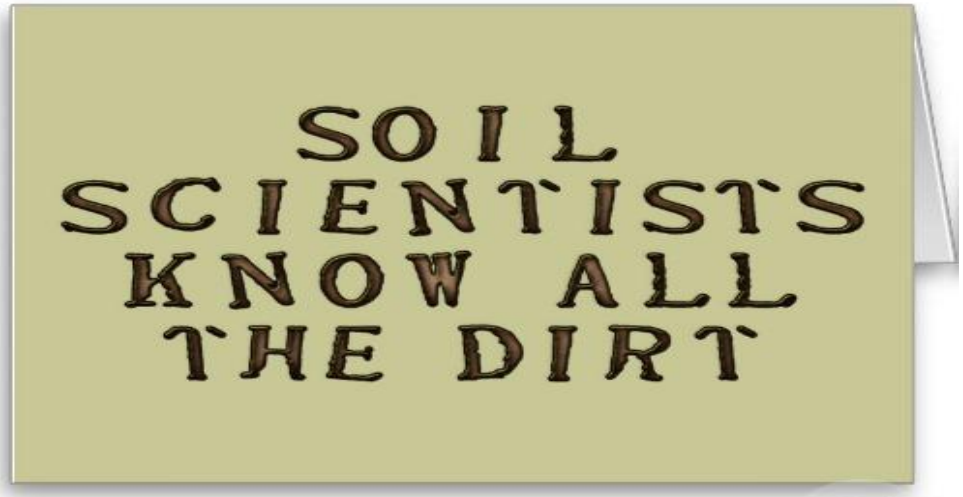
- **Part of the regolith that supports the growth of plants**
- **Regolith**
  - Layer of rock and mineral fragments that cover most of Earth's land surface

How is Soil Formed?

- **Weathering of rocks that is carried away**
- Factors
  - Parent Material
  - Time
  - Climate
  - Organisms
  - Slope

Soil Formation Factors

- **Parent Material**
  - **Source of the mineral matter in the soil**

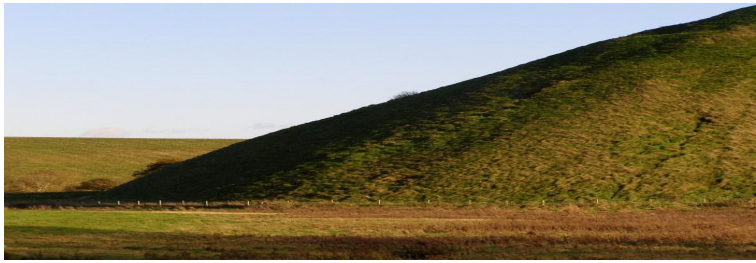


- **Time**
  - Important in all geologic processes
  - **The longer a soil has been forming, the thicker it becomes**

- **Climate**
  - **Greatest effect on soil formation**
  - Influences of temperature and precipitation affect rate, depth and type of weathering

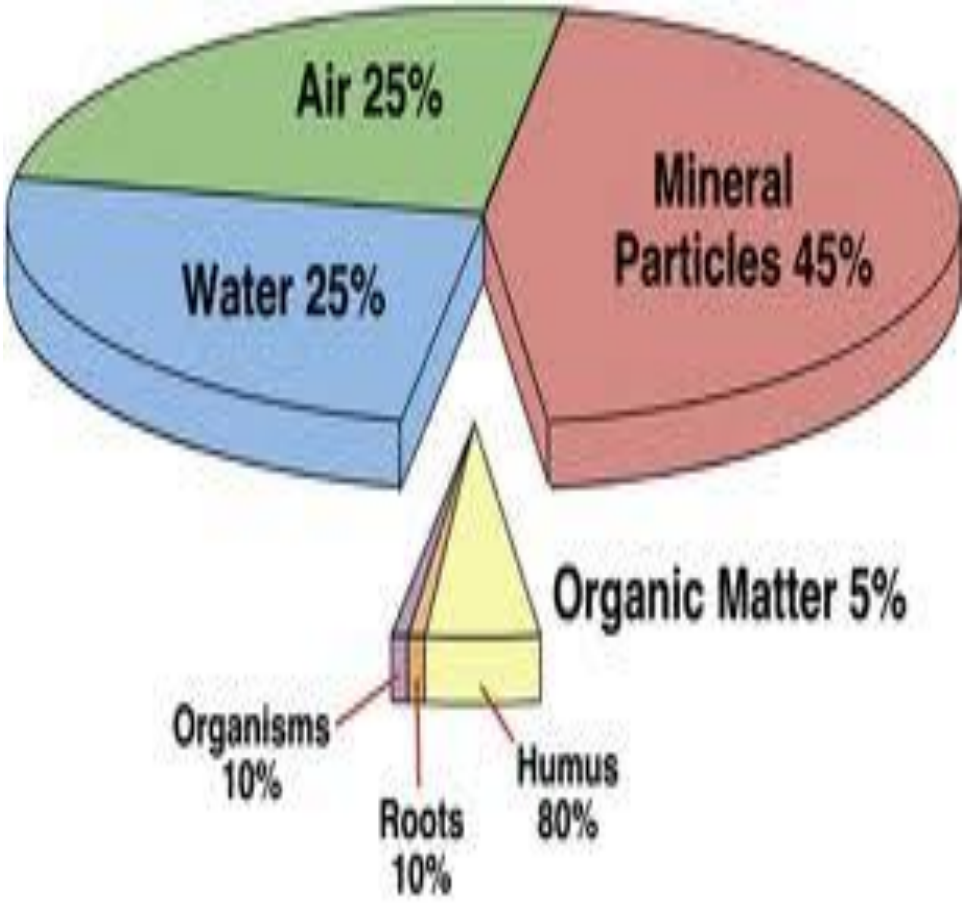
- **Organisms**
  - **Furnish organic matter** in soil

- **Slope**
  - **Steep slopes often have poorly developed soils**

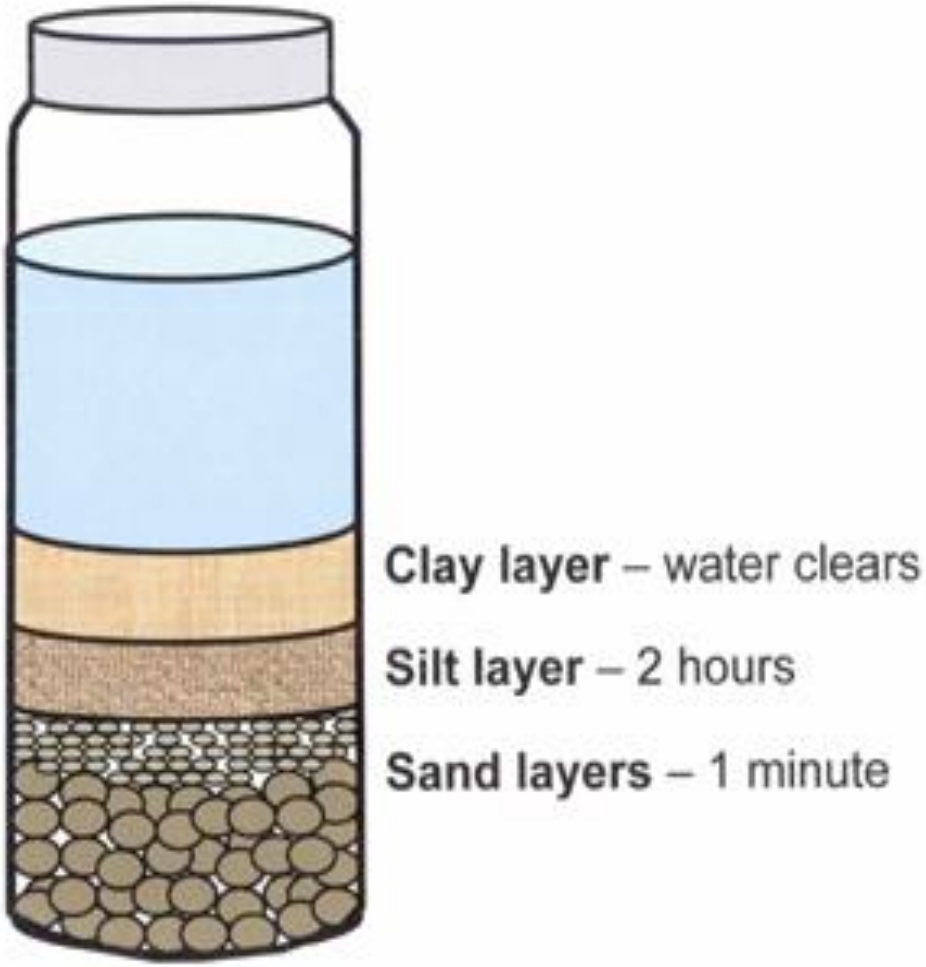


Characteristic of Soil: Soil Composition

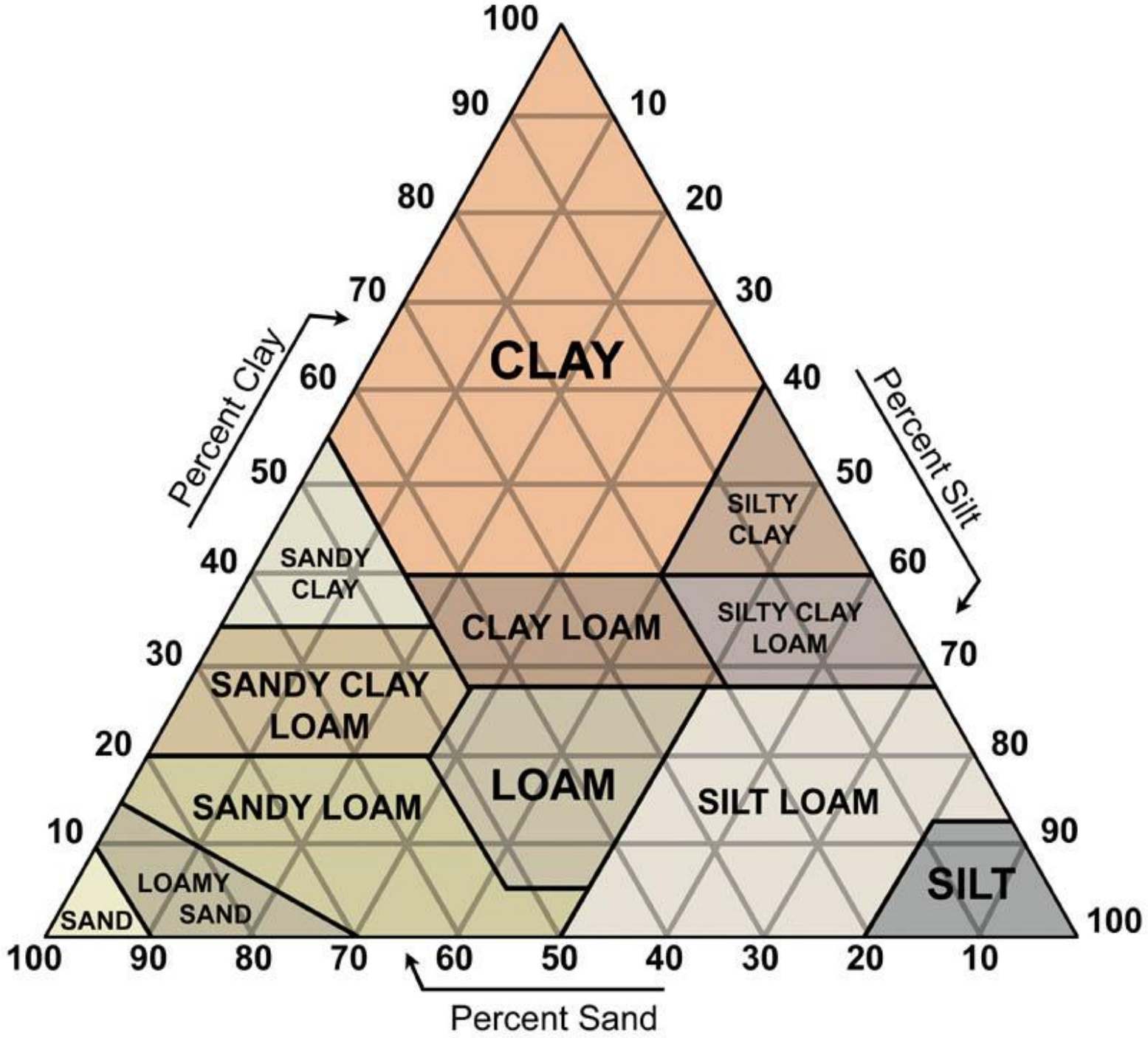
- **45% mineral matter**
- **25% air**
- **25% water**
- **5% humus**
  - Decayed remains of organisms



Characteristic of Soil: Soil Texture



- Refers to the proportions of different particle sizes
  - **Sand (large size)**
  - **Silt (feels like flour)**
  - **Clay (small size)**
  - **Loam (mix of all three; best for plants**)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