Bell Ringer

1. What kind of rock is formed by applying heat and pressure to existing rock?
2. What would be required to turn a sedimentary rock into an igneous rock?
3. How are sedimentary rocks classified?

Bill Nye: Rocks and Soil

Weathering – the physical & chemical breakdown of rocks.

- Atmosphere (gas)
- Lithosphere (solid)
- Hydrosphere (liq.)

Involving an interaction between the 3 spheres of the earth.

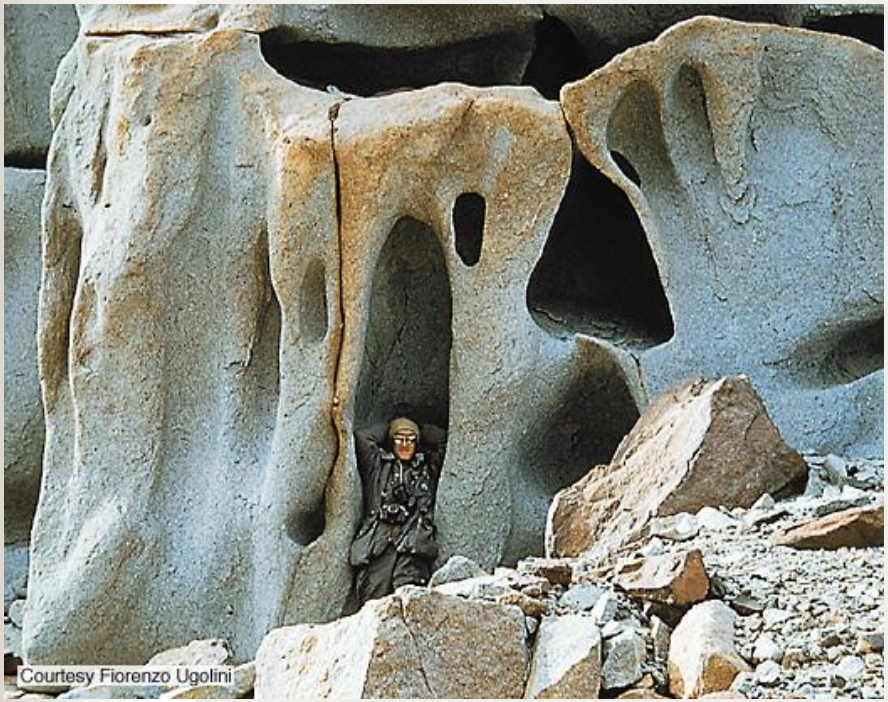
Two types of weathering

- Physical
- Chemical

Weathering – the physical & chemical breakdown of rocks.

I. Physical Weathering

- rocks break into pieces
- changing size and shape
- but not their composition.



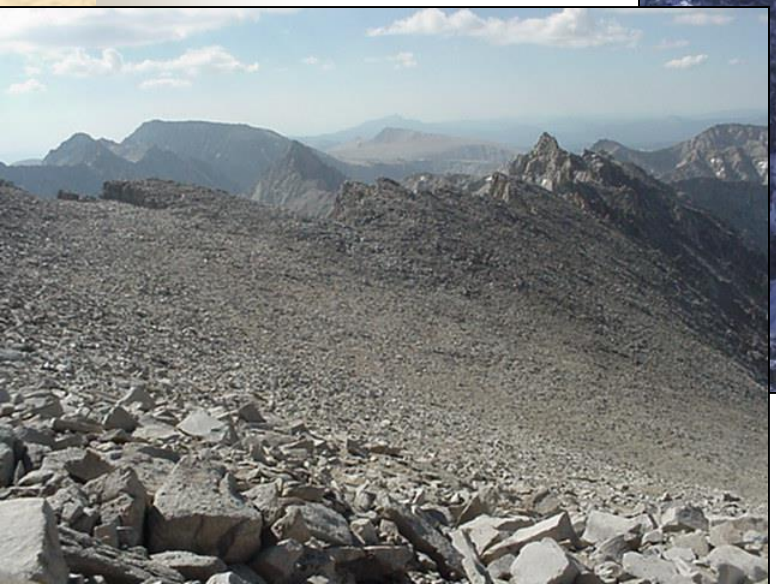
Four main ways physical weathering occurs

1. Frost action
2. Plant action
3. Abrasion (stuff hitting each other)
4. Pressure unloading

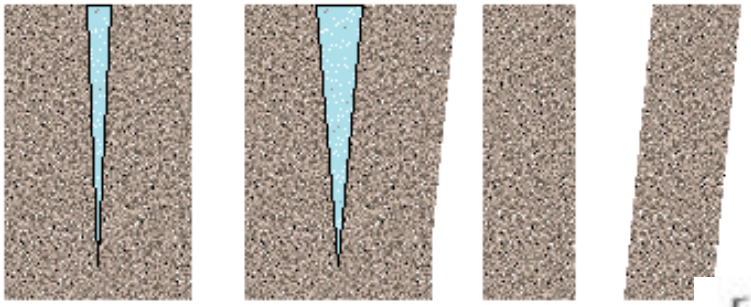
AGENTS OF PHYSICAL WEATHERING

1. *Frost Action* -The freezing and thawing causes alternate expansion and contraction of rocks eventually breaking them apart.

- Dominate in mountain or polar regions.
- More likely to occur in winter

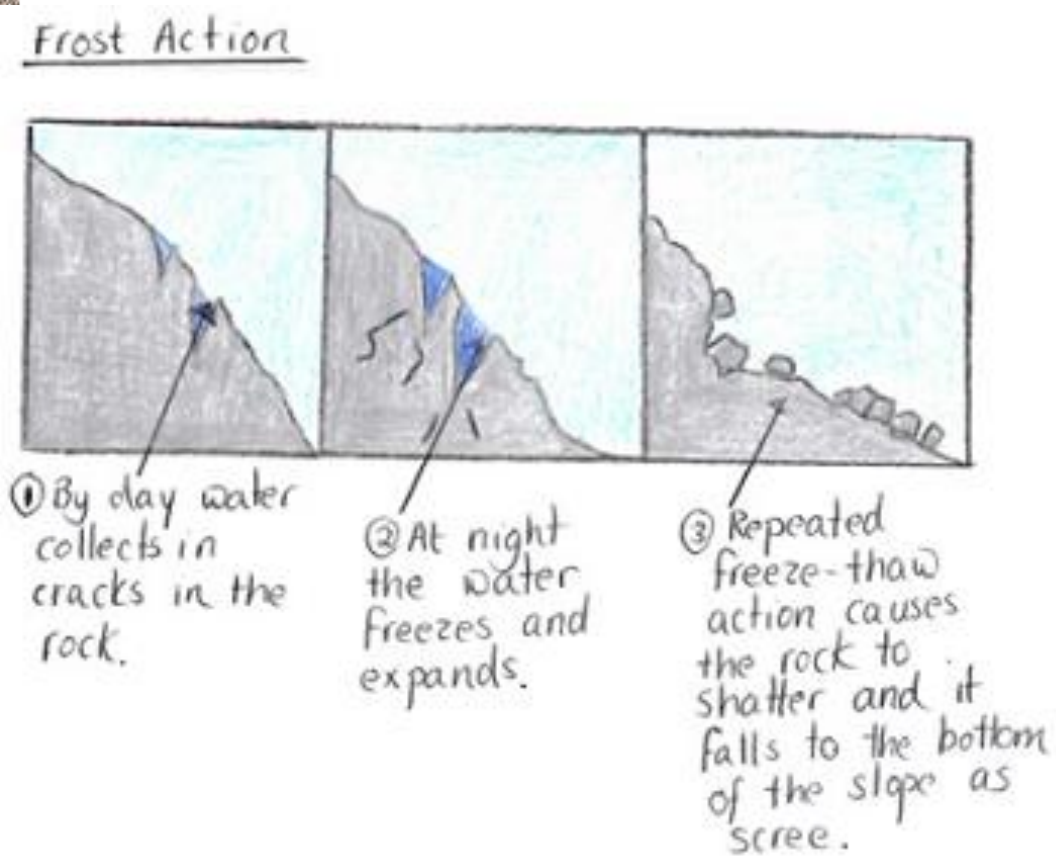


Frost Wedging



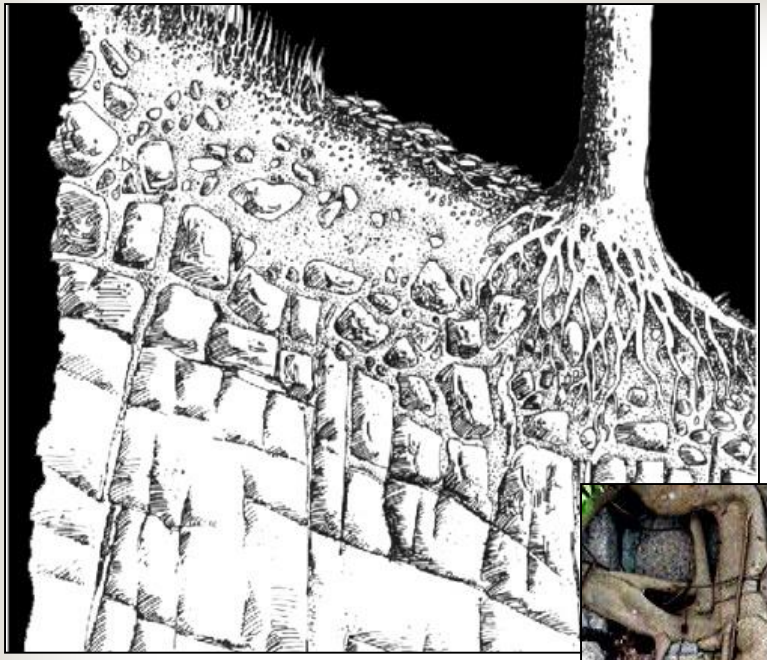
Water-filled crack | Freezes to ice | Breaks Rock

https://www.youtube.com/watch?v=_XnCTcjNpuc

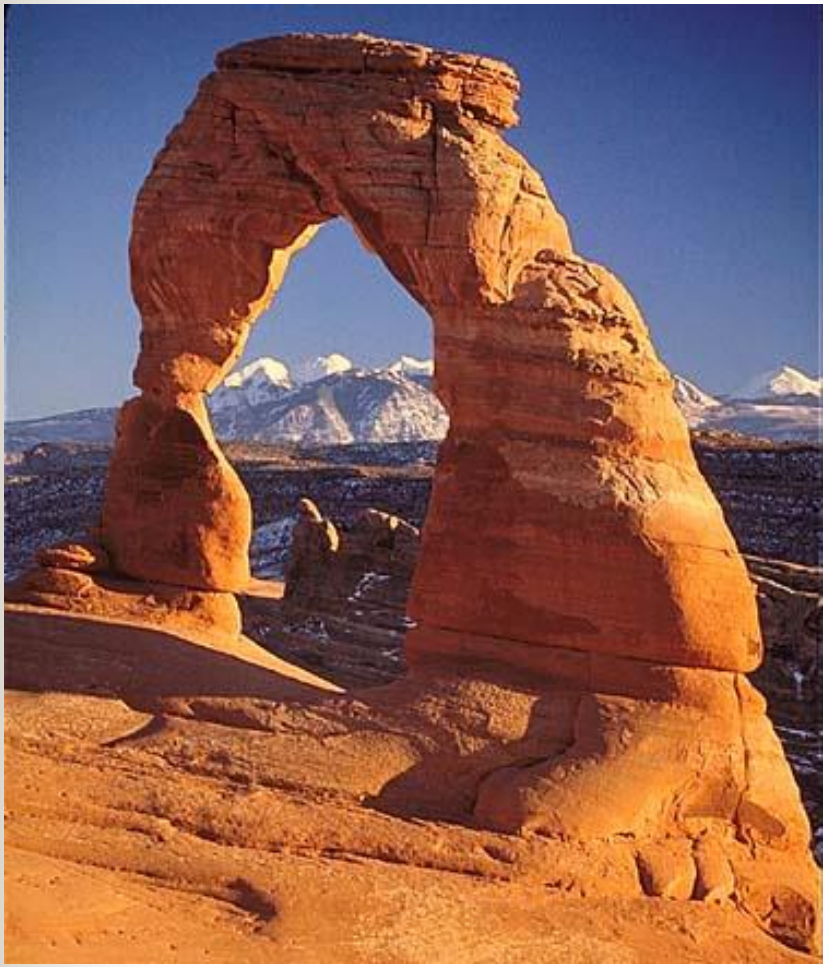


2. *Plant Action* "Biological Action" - With plant growth the root system will increase in volume and cause cracks in the rock to expand.

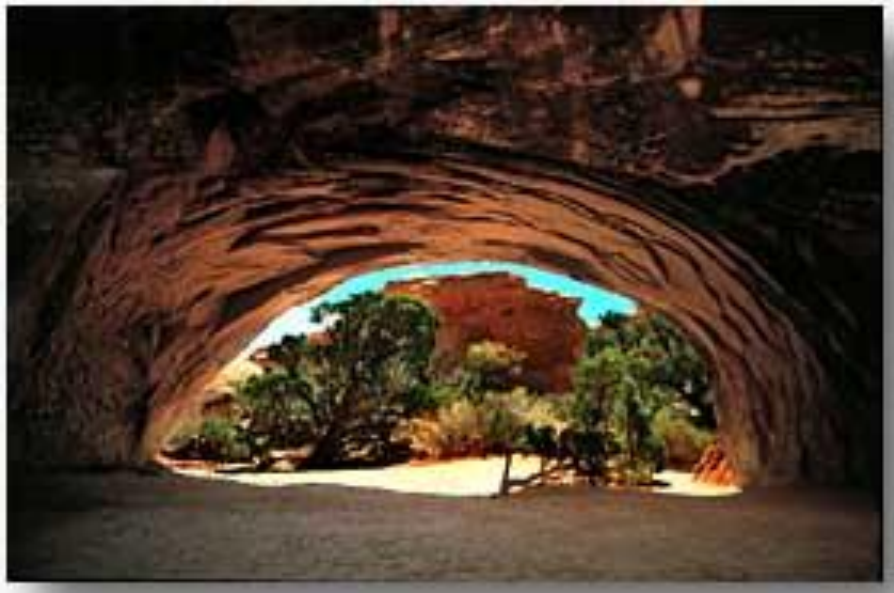
- Lichens are primary soil producers creating conditions for larger plant growth.

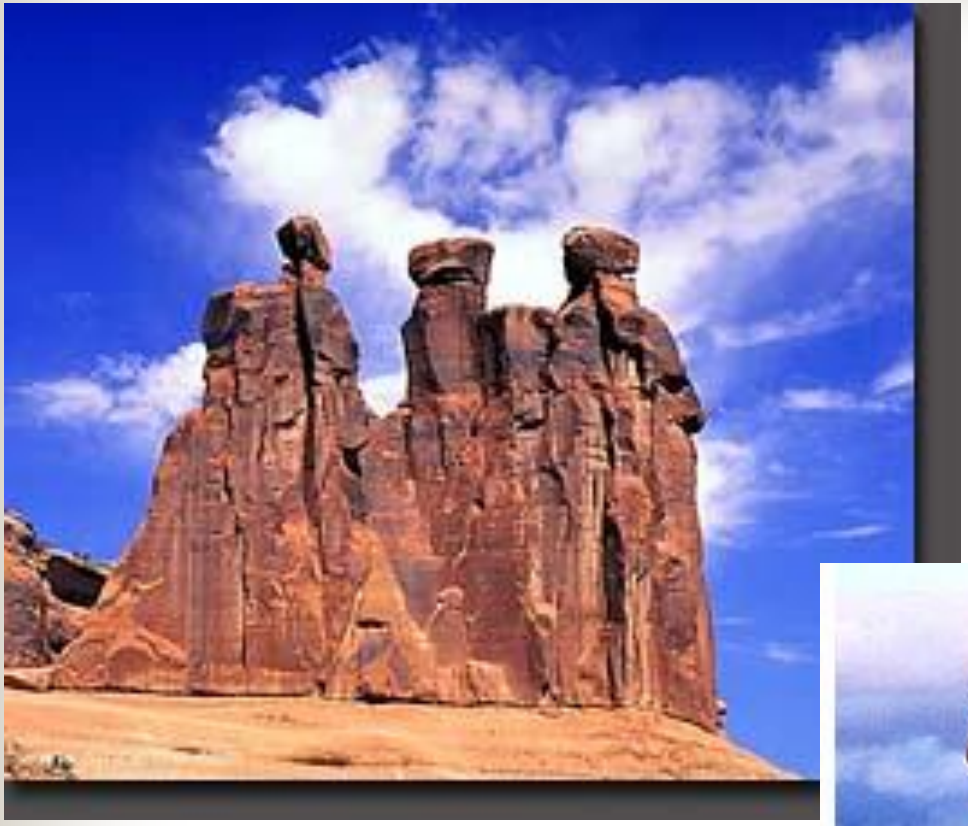


3. *Abrasion-* When ice, water, or wind causes sediments to have collisions physical weathering results.



- Wind abrasion is similar to sandblasting and slowly weathers the rock down.



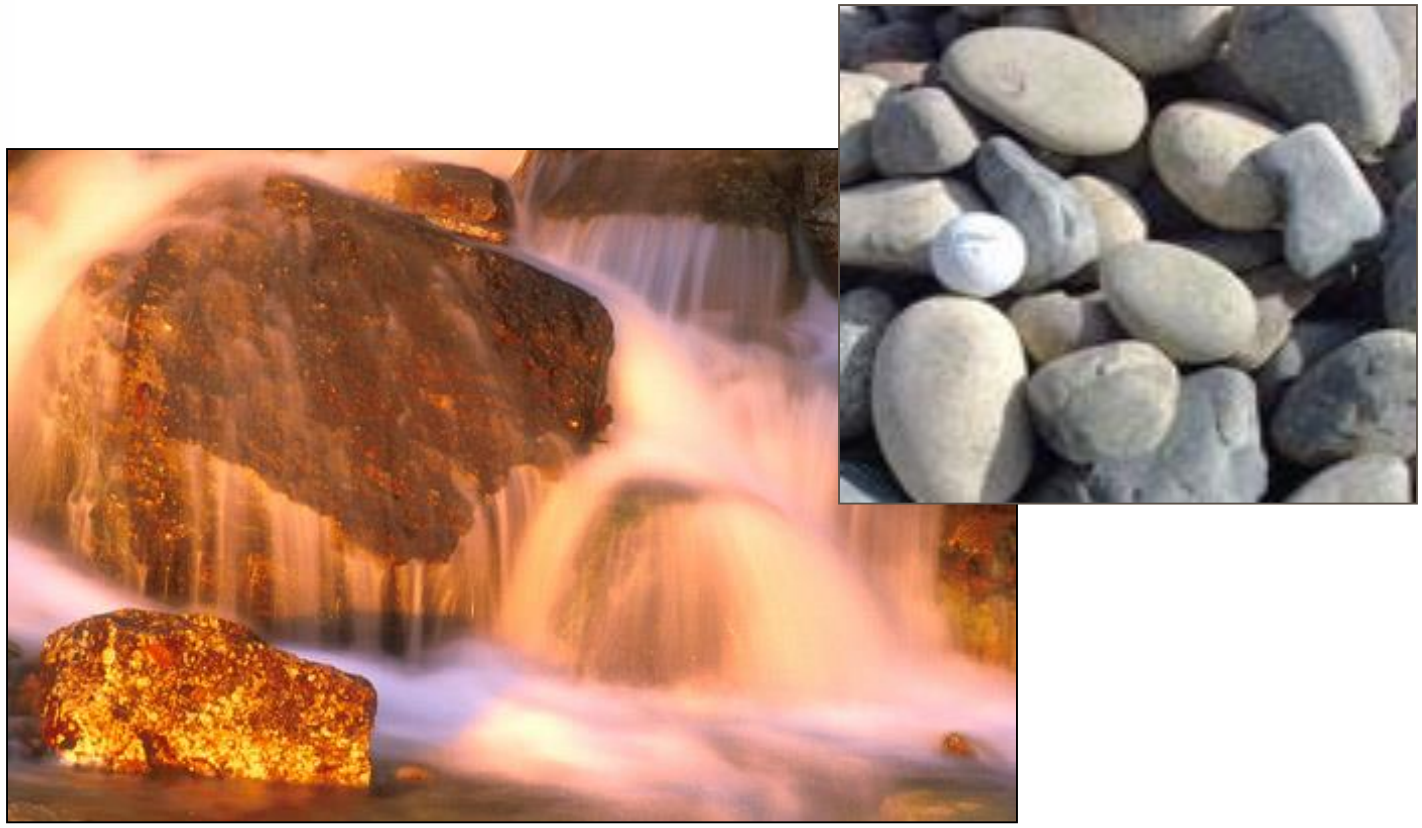


- WIND ABRASION
- Wind abrasion occurs in arid environments
- Note the lack of soil and angular rock features.

https://www.youtube.com/watch?v=VMsAAv6bjNs

WATER ABRASION

- Water abrasion occurs in moist and humid climates
- Water produces rounded fragments as the sediments are rolled and bounced along the stream bottom.



ICE ABRASION

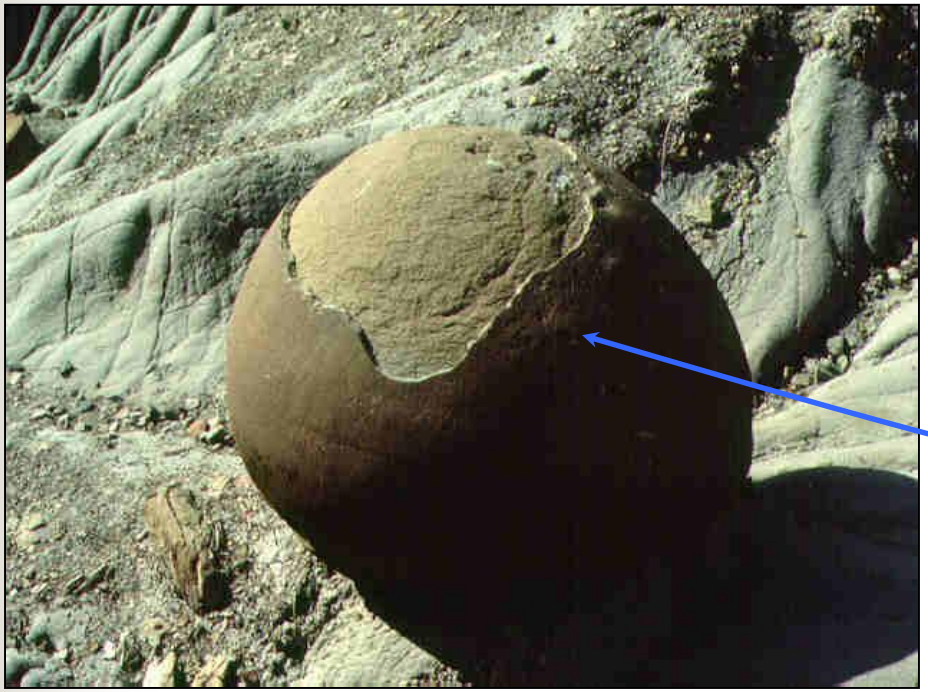
- Glacial Abrasion occurs when sediments are trapped with in the ice and scrape against the bedrock.
- Forming Striations In the Rock (Scratches)

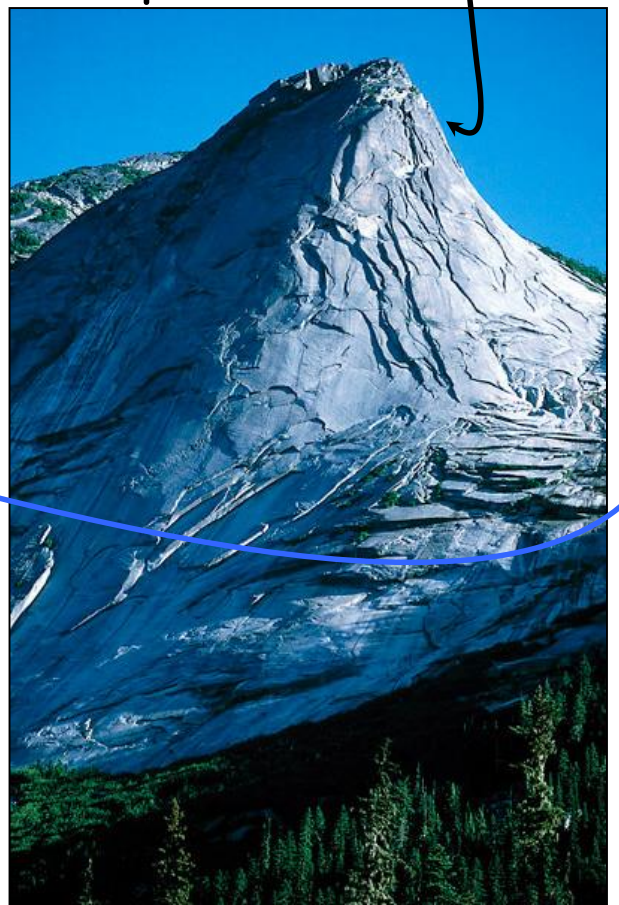
- Glaciers are found in cold climates
  - high altitudes
  - latitudes

4. *Pressure Unloading / Exfoliation* –

-The top rock layers are removed releasing pressure. Yellowstone.

-The underlying rocks then crack and fall apart.





https://www.youtube.com/watch?v=yAZ1V_DJKV8

Chemical Weathering - when agents of weathering chemically change the composition of a rock.

II. AGENTS OF CHEMICAL WEATHERING

1. Oxidation
2. Hydration
3. Carbonation
4. Water

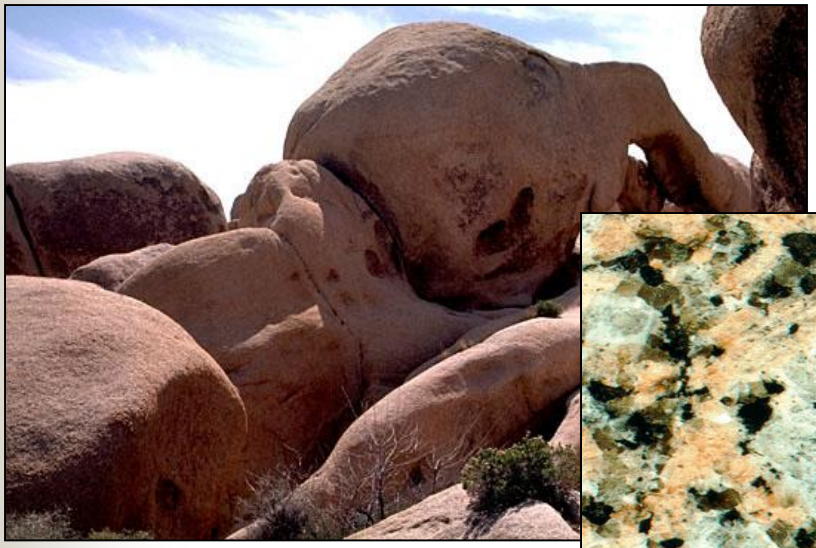
Chemical Weathering - when agents of weathering chemically change the composition of a rock.

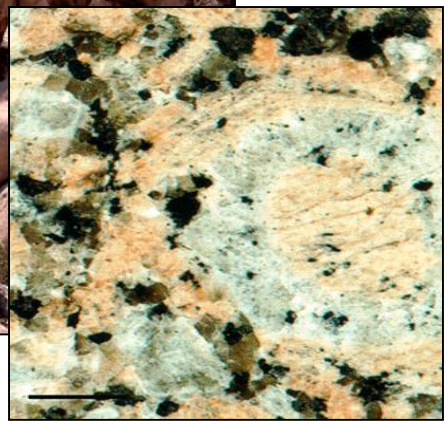
II. AGENTS OF CHEMICAL WEATHERING

1. *Oxidation* – Oxygen combines with minerals to form oxides. (iron + oxygen = Rust)

- Oxidation weakens the bedrock making it softer.

2. *Hydration-* minerals absorb water and chemically change the composition of the material

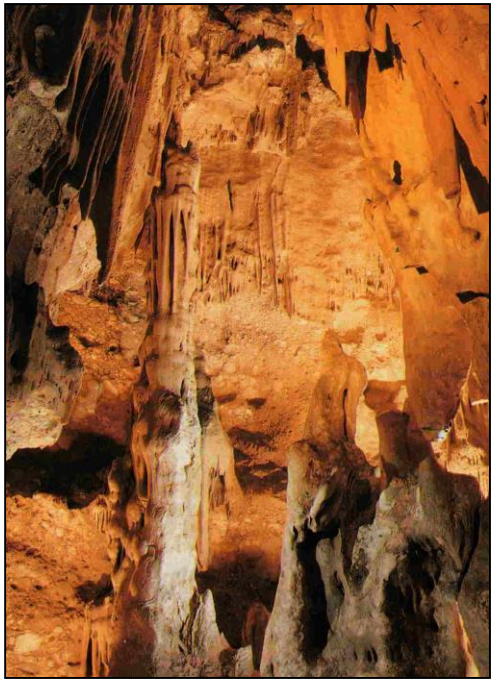




- Ex. granite contains mica.
- Mica has a weak chemical composition and absorbs water.
- Turns into clay

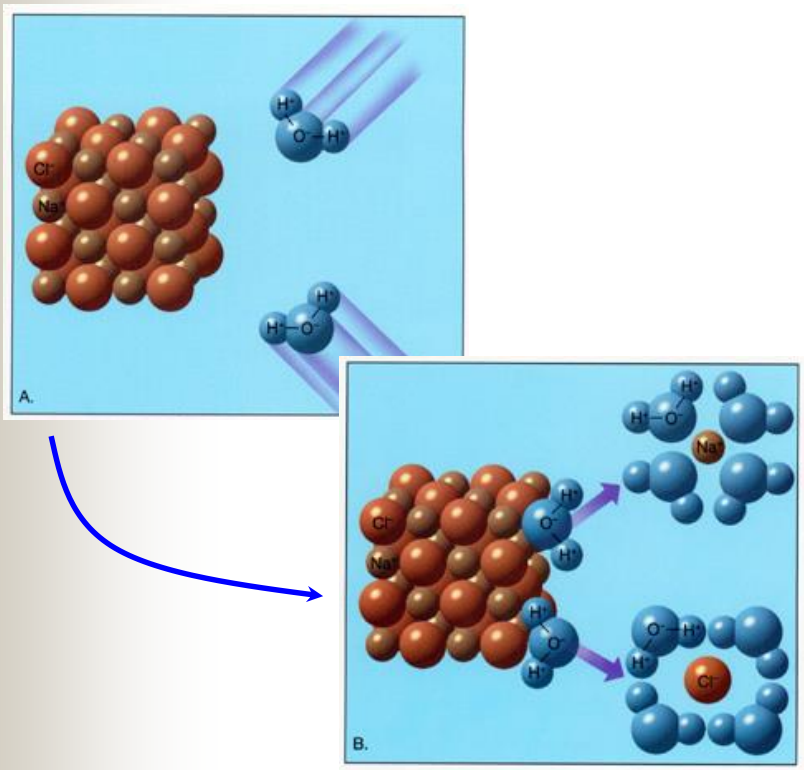
3. *Carbonation* – When pollutants like Carbon Dioxide, Nitrogen & Sulfuric Oxides mix with rain water creating acid rain, which can dissolve limestone and harm the living environment.

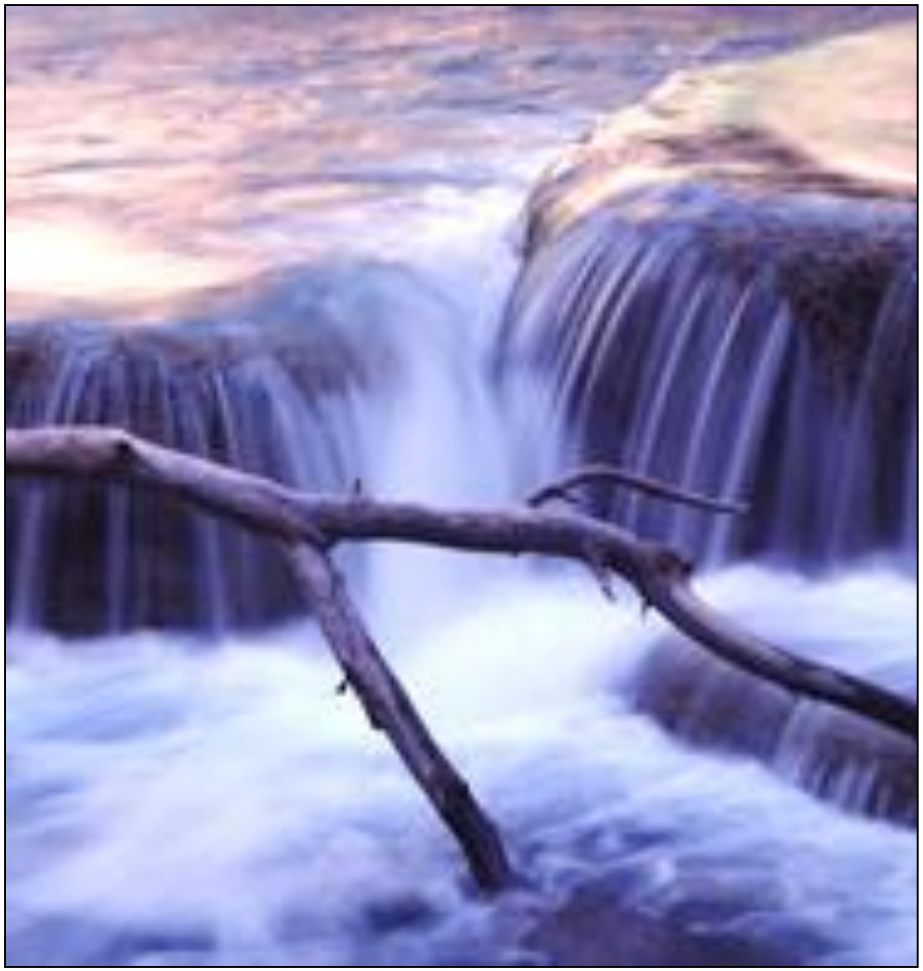
- Coal Burning For Electricity
- Fossil Fuel Consumption for Cars



4. *Water* - Is unique and dissolves most minerals and metals in our environment.

- (universal solvent).





III. FACTORS AFFECTING The Rates of WEATHERING.

1. Climate Differences
2. Grain size and shape
3. Mineral/rock composition

III. FACTORS AFFECTING The Rates of WEATHERING.

1. Climate Differences

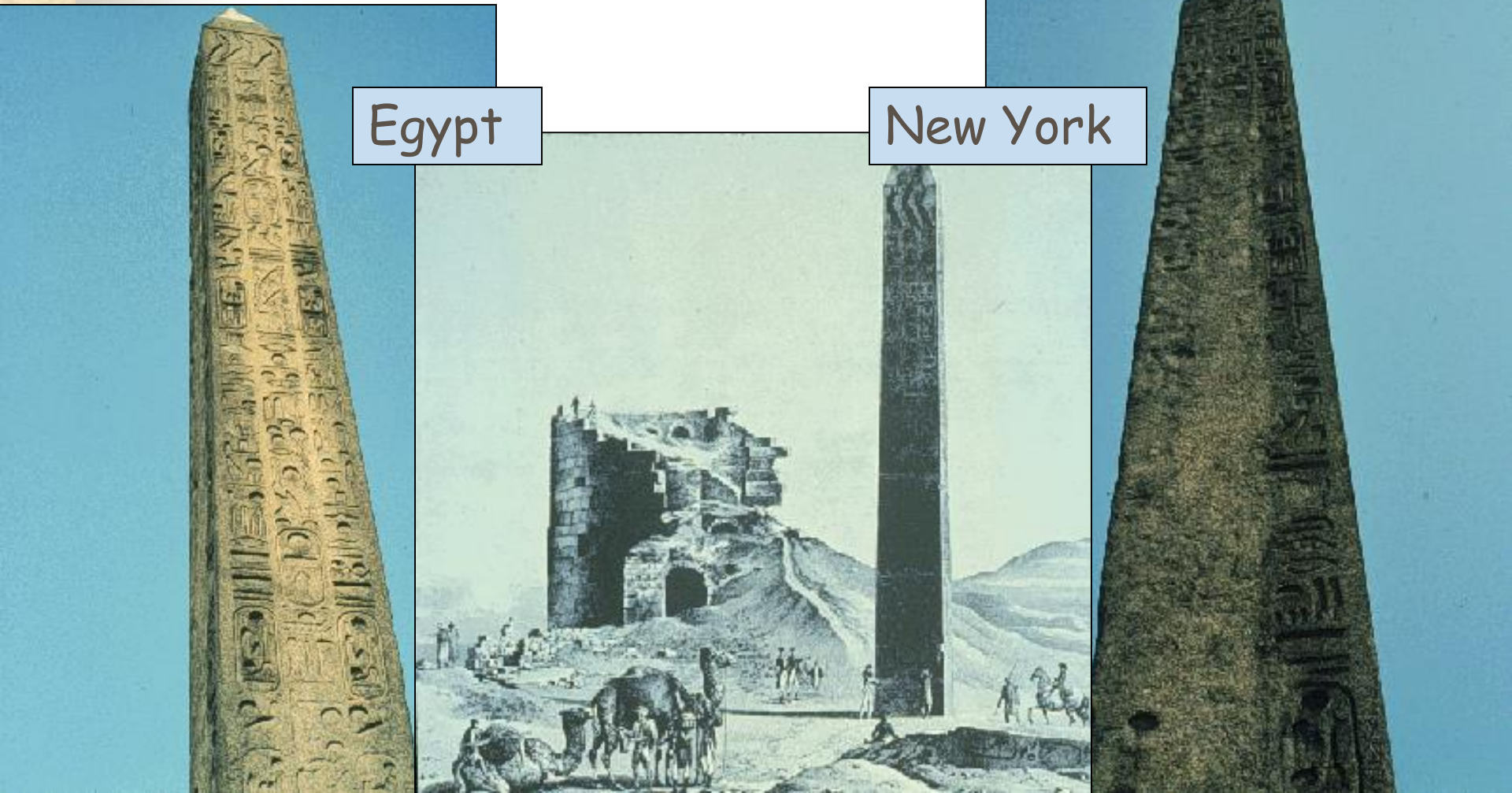
Arid Climates are very dry and the rate of weathering is slow.

Humid Climates are moist and the rate of weathering is fairly fast.

- Usually in the presence of heat weathering rates will also increase.
- Different climates and temperatures produce more favorable forms of weathering.

- Arid and Humid Climates cause different rates of weathering.

  ex, Cleopatra's Obelisk

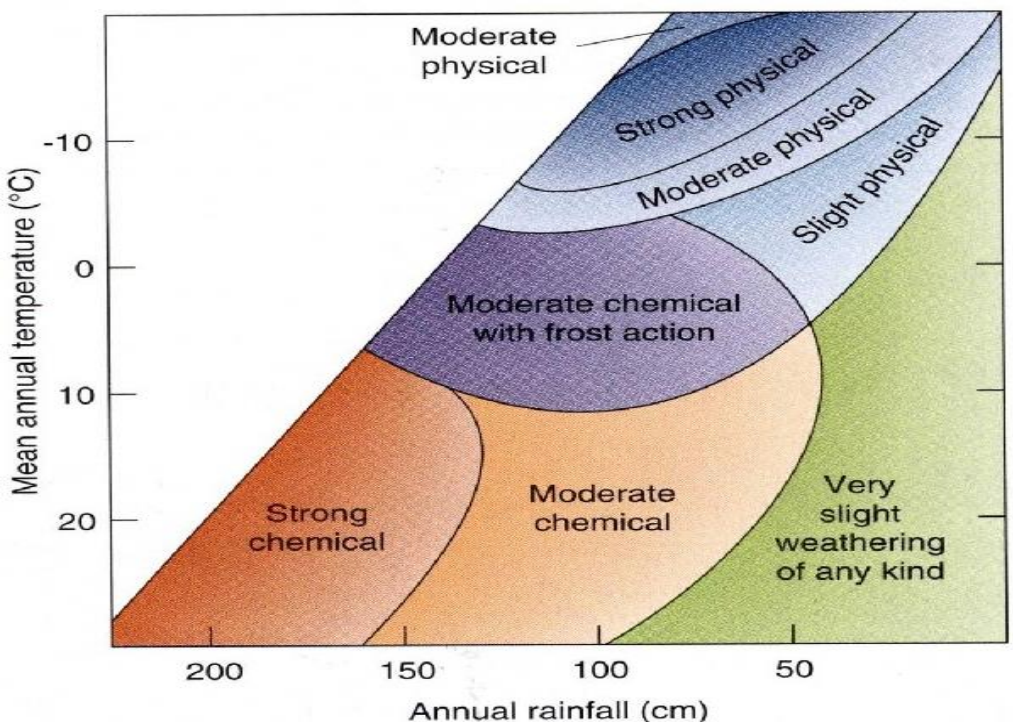


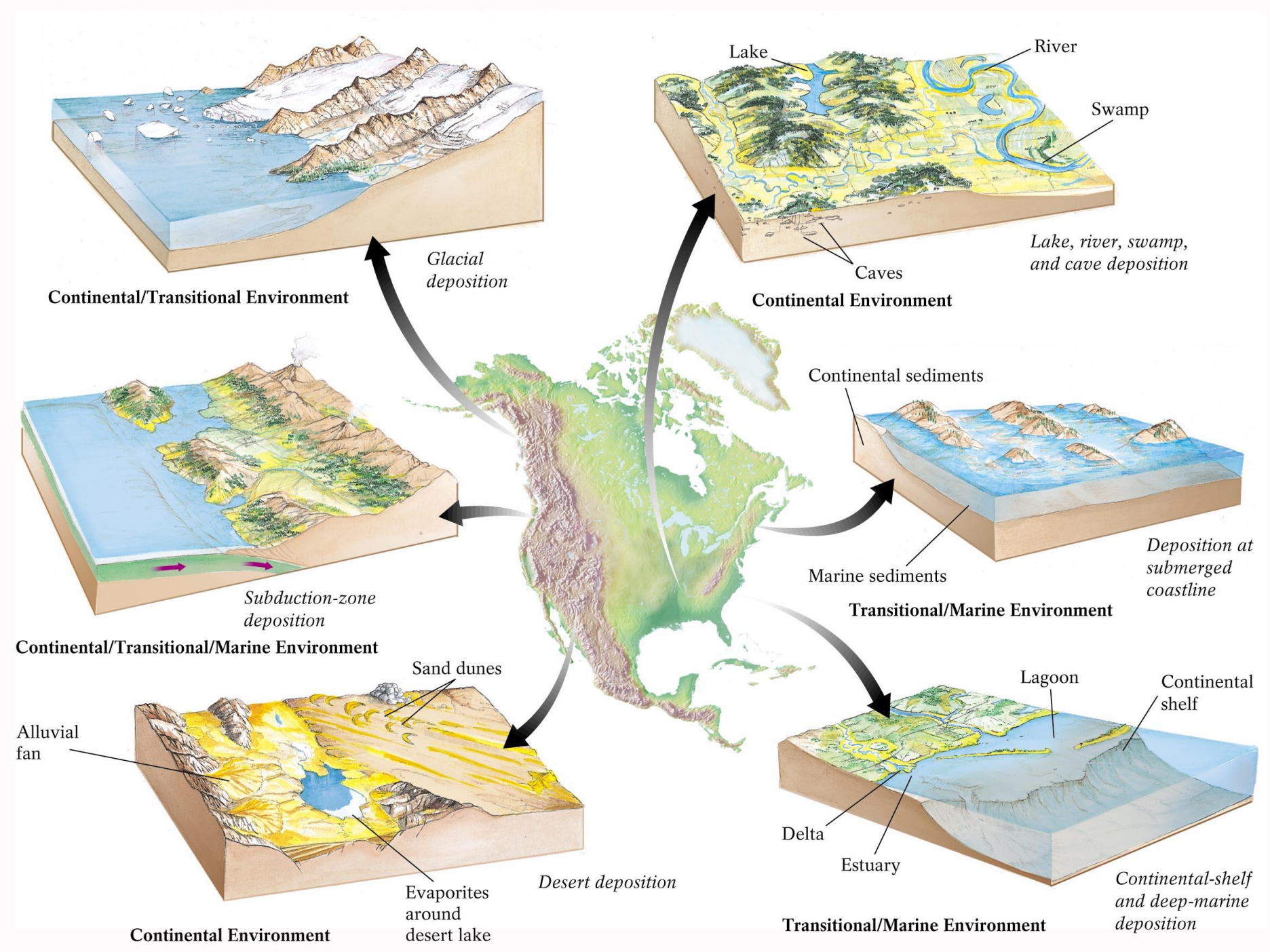
Cold and Humid -Physical weathering is dominant at high latitudes, altitudes, or in the winter.

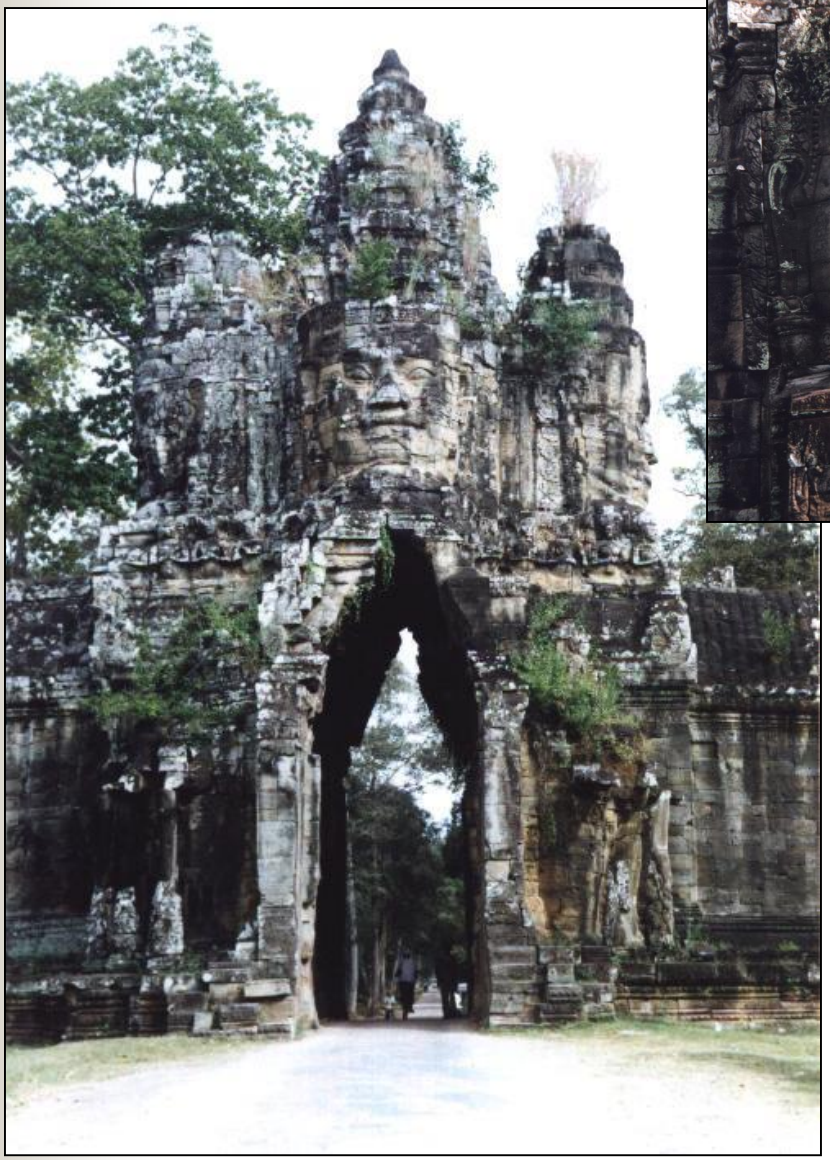
- Frost Action and Glacial Abrasion

Hot and Humid - Chemical weathering is dominate near the equator and in the summer.

-Oxidation, Hydration



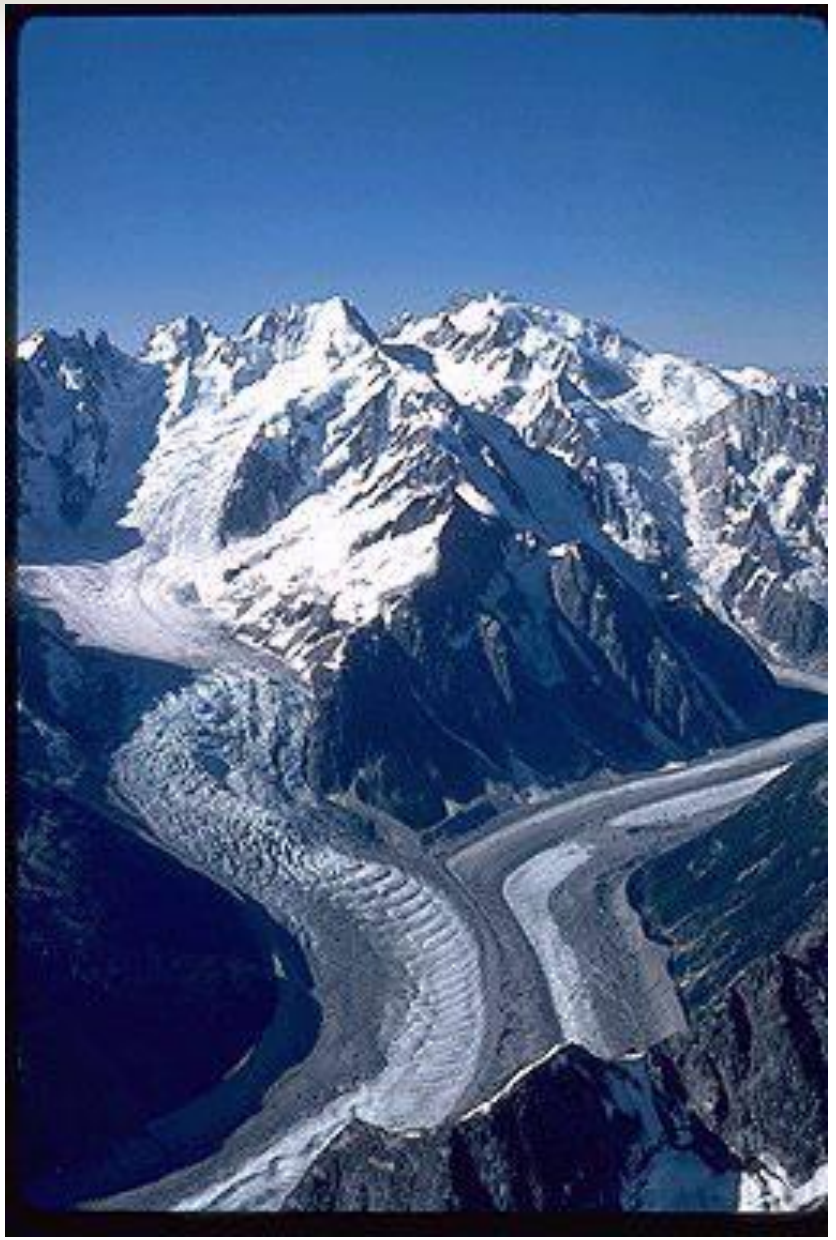

Lake
River
Swamp
Caves
Lake, river, swamp, and cave deposition
Continental Environment
Glacial deposition
Continental/Transitional Environment
Continental sediments
Marine sediments
Deposition at submerged coastline
Transitional/Marine Environment
Subduction-zone deposition
Continental/Transitional/Marine Environment
Sand dunes
Alluvial fan
Evaporites around desert lake
Desert deposition
Continental Environment
Lagoon
Continental shelf
Delta
Estuary
Continental-shelf and deep-marine deposition
Transitional/Marine Environment



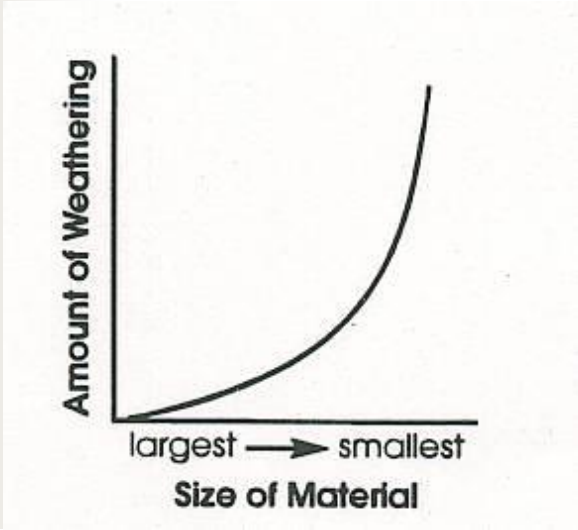
- Humid climates also favors chemical weathering and increases the rate in which water will dissolve minerals.

- Hot & humid climates can also increase the rate of physical weathering by biological action.

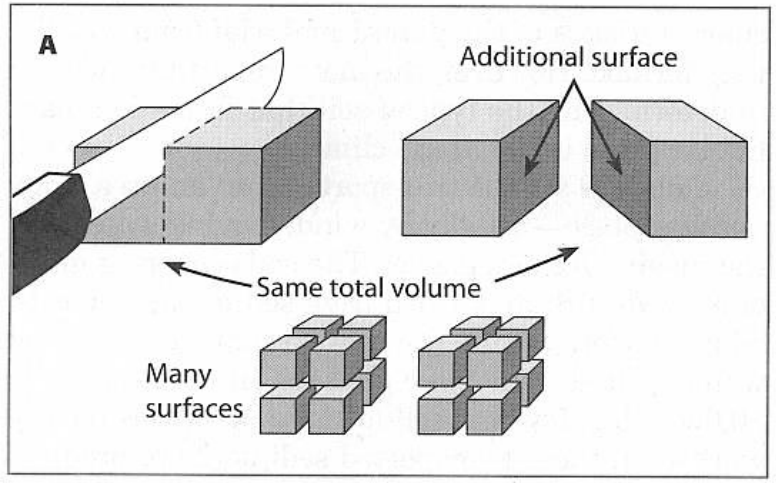
- In the mountains and at the poles physical weathering like frost action and abrasion are more likely.

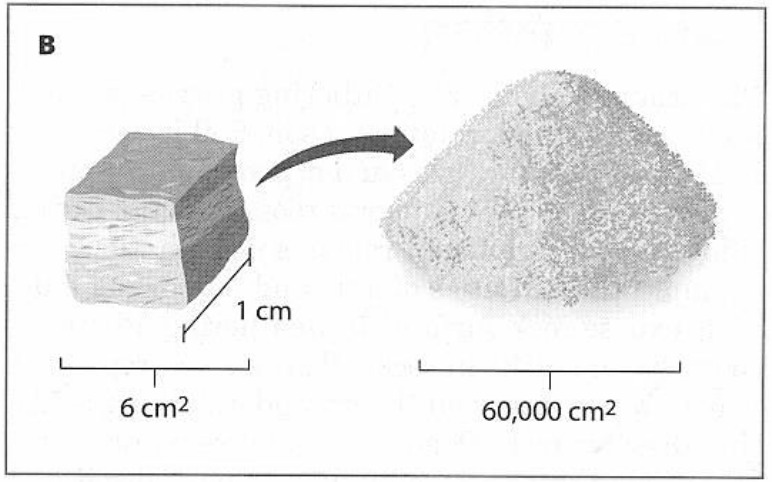


2.Particle Size and Shape as particle size decreases the weathering rate increases



- When The Surface Area Increases
- More Sides Are Able To React With The Elements



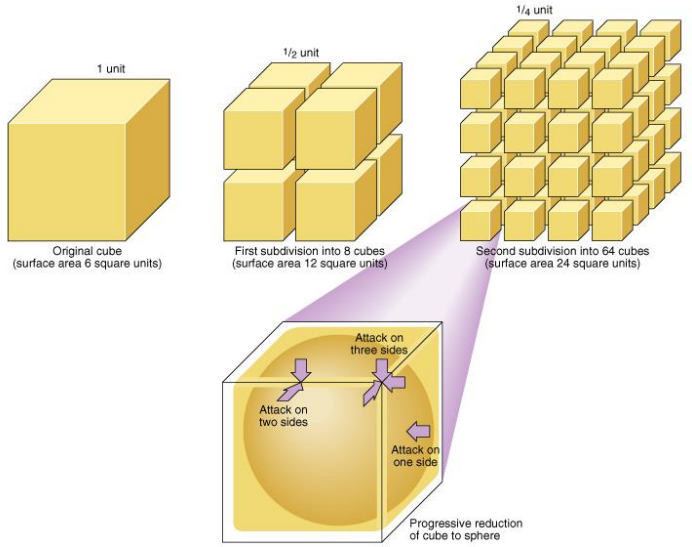


- Angular Sediments have more surface area.

  -weather at a faster rate.

- Round sediments have less surface area

  -weathering rate decreases.

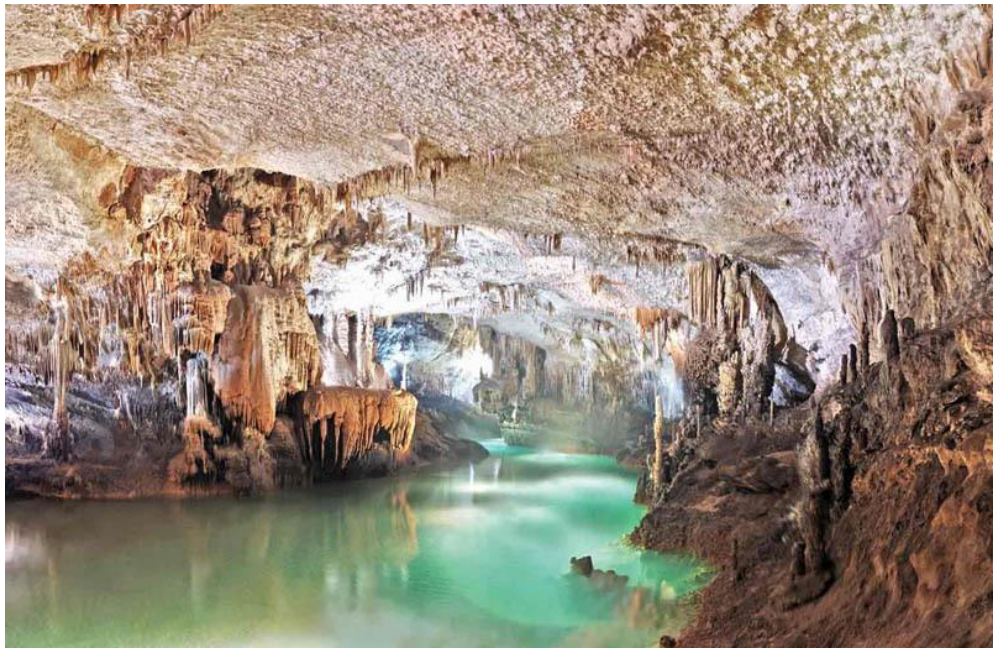


3. Mineral Composition - some rocks are resistant to weathering because of their composition

- Less Resistant
- Soft Rocks have Weak chemical compositions

- More Resistant
- Hard Rocks have Strong Chemical Compositions

- Rocks will weather at different rates due to their chemical compositions.



- Granite w/ strong chemical composition (hard rock)
- Limestone w/ weak chemical composition (soft rock)

Bill Nye: Erosion

BELL RINGER

1. What are the two types of weathering that occur?
2. How might plants have an effect on weathering?
3. What is frost action?