



Wednesday, Nov 28, 2018

Pick up: Doodle page pg78/Earth's Changing Surface pg 79 (leave loose)/Concept Map pg 82

Today you will:


- **Rock Interactive due today**
- Notes on Weathering pg 83
- Complete concept map & doodle page by Friday
- Earth's Changing Surface (Weathering)-due Friday

HOMEWORK:

Quiz on Weathering Friday, 11/30

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Weathering

- Weathering is a mechanical or chemical surface process that breaks rocks into smaller pieces. 
- Freezing and thawing, oxygen in the air, and even plants and animals can affect the stability of rock.




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Mechanical Weathering

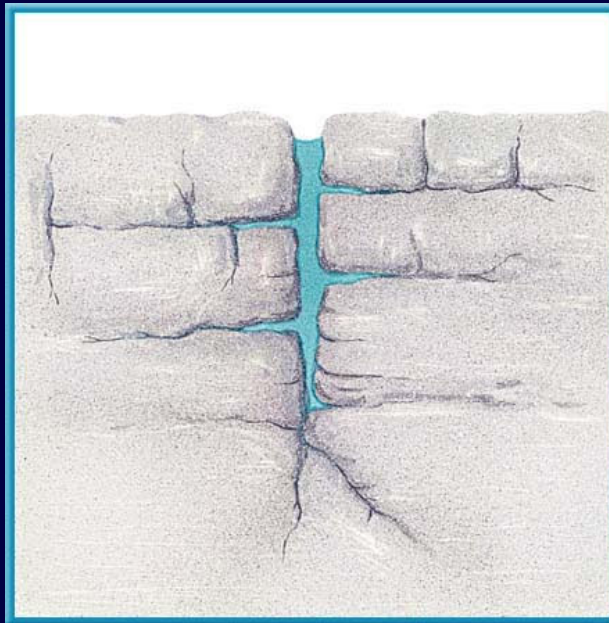
- **Mechanical weathering** breaks rocks into smaller pieces without changing them chemically. 
- The small pieces are identical in composition to the original rock.
- Two of the many causes of mechanical weathering are ice wedging and living organisms.



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Ice Wedging

- Water seeps into cracks, it freezes, it expands, it breaks the rock.



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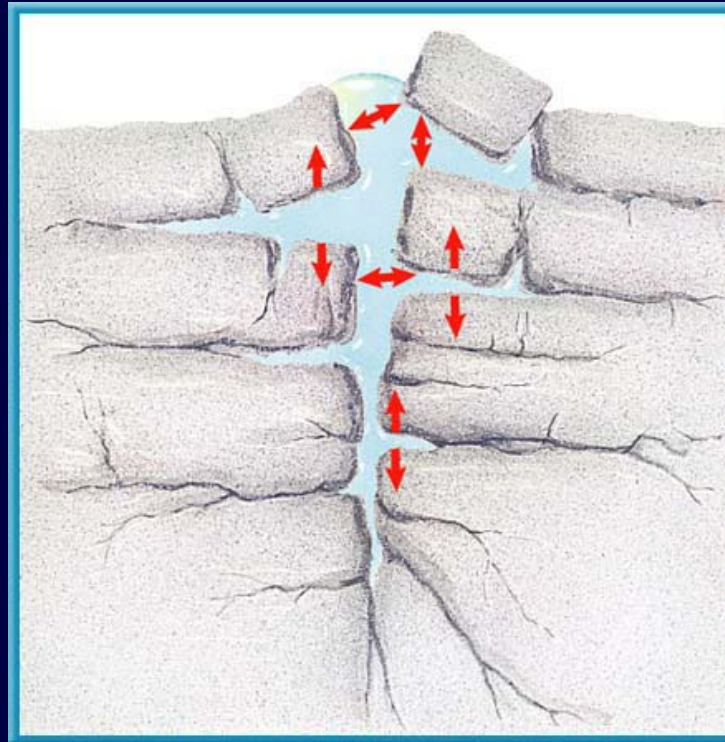


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Ice Wedging

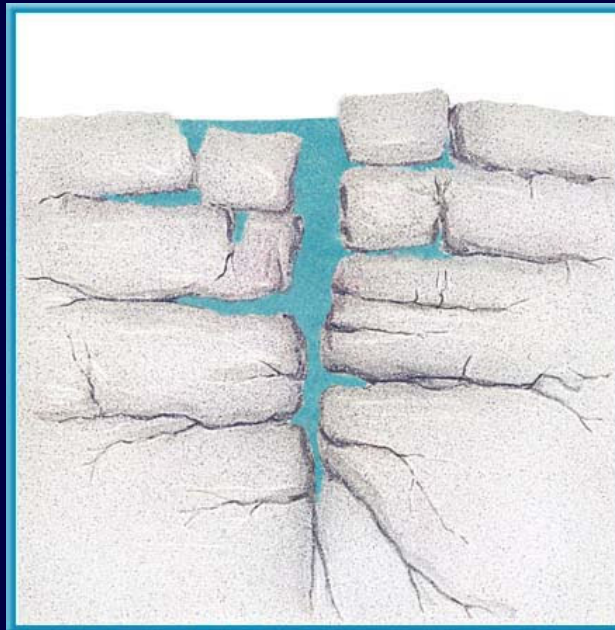
- The water freezes and expands, forcing the cracks to open further.



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Ice Wedging

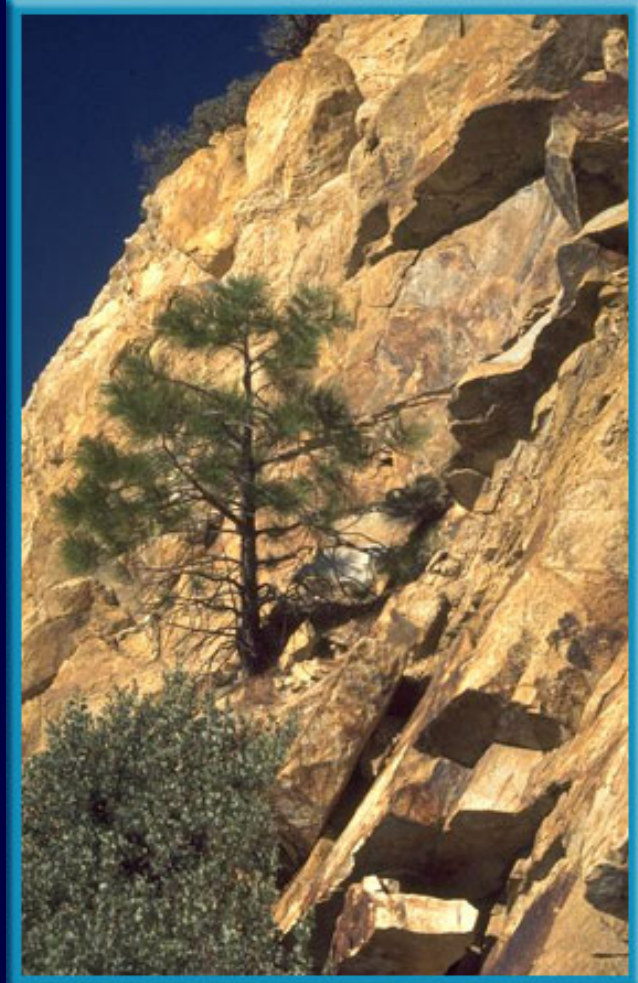
- The ice melts.
- If the temperature falls below freezing again, the process will repeat itself.



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Plants and Animals

- Plant roots grow deep into cracks in rock where water collects.
- As they grow, roots become thicker and longer, slowly exerting pressure and wedging rock apart.



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Plants and Animals

- Gophers and prairie dogs also weather rock—as do other animals that burrow in the ground.
- As they burrow through sediment or soft sedimentary rock, animals break rock apart.



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Chemical Weathering

- Chemical weathering occurs when the chemical composition of rock changes. 
- This kind of weathering is rapid in tropical regions where it's moist and warm most of the time.



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Chemical Weathering

- The table summarizes the rates of chemical weathering for different climates.

Rates of Weathering	
Climate	Chemical Weathering
Hot and dry	Slow
Hot and wet	Fast
Cold and dry	Slow
Cold and wet	Slow



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Natural Acids

- Some rocks react chemically with natural acids in the environment.
- When water mixes with carbon dioxide in air or soil, for example, carbonic acids forms.
- Carbonic acid - CO₂ mixes with water and dissolves limestone.



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Natural Acids

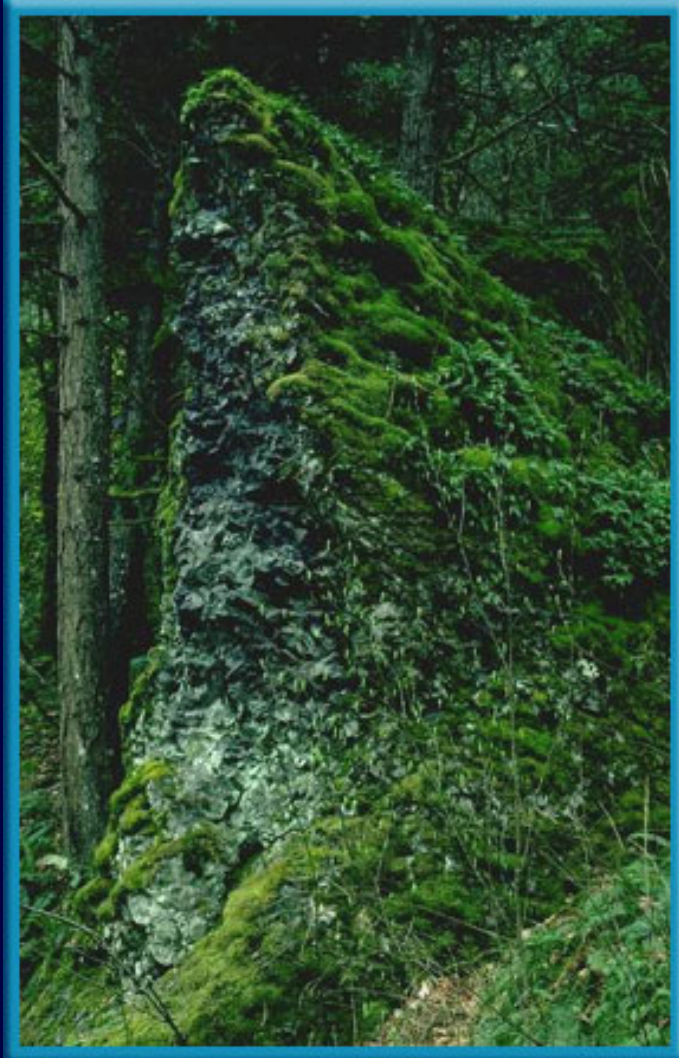
- Although carbonic acid is weak, it reacts chemically with many rocks.
- When carbonic acid comes in contact with rocks like limestone, dolomite, and marble, they dissolve.



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Plant Acids

- Many plants produce a substance called tannin.
- In solution, tannin forms tannic acid.
- This acid dissolves some minerals in rocks.
- Moss growing on rocks can cause chemical weathering.



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Effect of Oxygen

- Oxidation is the effect of chemical changes caused by oxygen.



- Oxidation – iron reacts with oxygen and water to form rust. This weakens rock.



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Effect of Oxygen

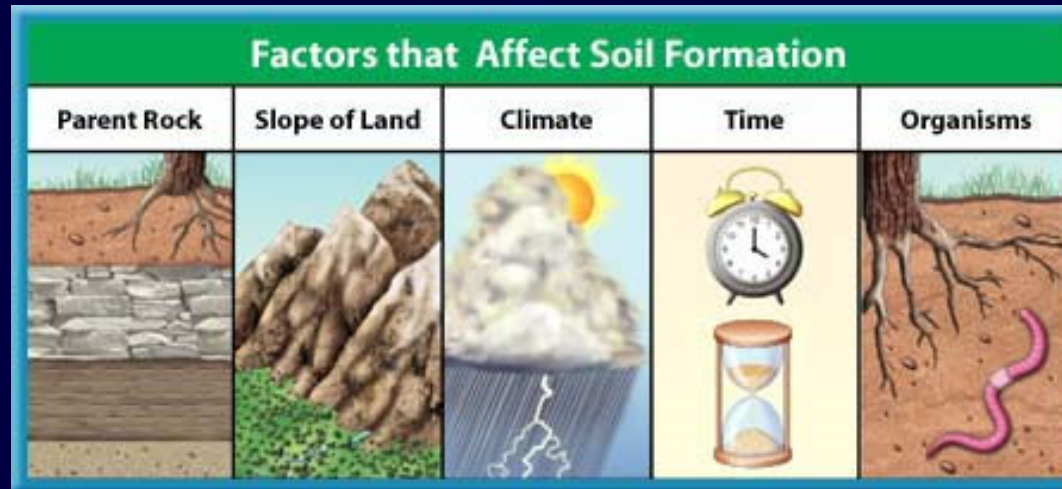
- When some iron-containing minerals are exposed to oxygen, they can weather to minerals that are like rust.
- This leaves the rock weakened, and it can break apart.



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Soil

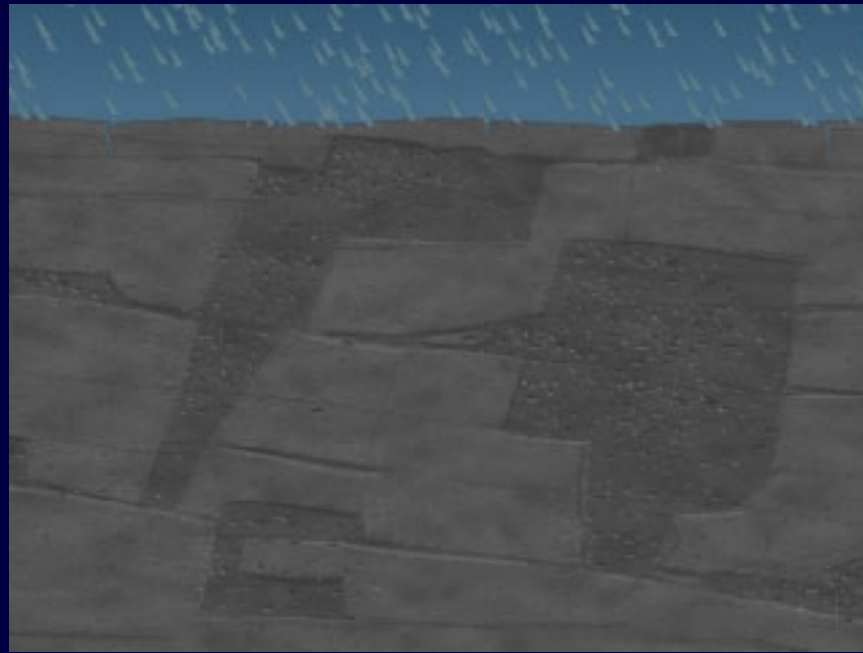
- Soil is a mixture of weathered rock, organic matter, water, and air that supports the growth plant life. 
- Organic matter includes decomposed leaves, twigs, roots, and other material.



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Parent Rock

- One factor affecting soil formation is the kind of parent rock that is being weathered.
- For example, in areas where sandstone is weathered, sandy soil forms.



Click image to view movie.




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The Slope of the Land

- The **topography**, or surface features, of an area also influence the types of soil that develop. 
- On steep hillsides, soil has little chance of developing.
- This is because rock fragments move downhill constantly.



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Climate

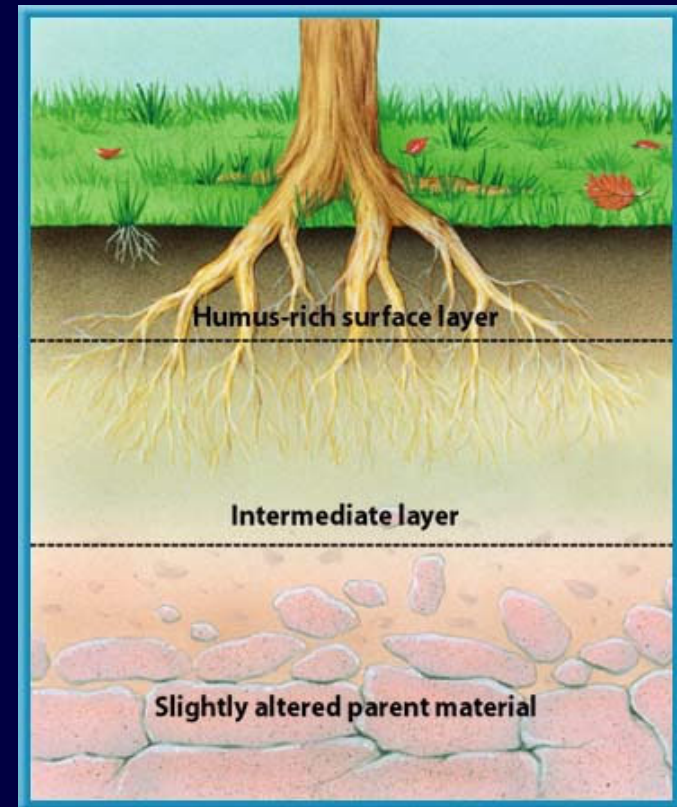
- Climate affects the amount of organic material in soil.
- Soils in desert climates contain little organic material.
- However, in warm, humid climates, vegetation is lush and much organic material is present.



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Climate

- The result is the formation of a dark-colored material called humus.
- Most of the organic matter in soil is humus.
- Humus helps soil hold water and provides nutrients that plants need to grow.



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Time

- It can take thousands of years for some soil to form.
- As soils develop, they become less like the rock from which they formed.
- Thicker, well-developed soils often are found in areas where weathering has gone on undisturbed for a long period of time.



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Organisms

- Organisms influence soil development.
- Lichens can grow directly on rock.
- As they grow, they take nutrients from the rock that they are starting to break down, forming a thin soil.



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Organisms

- After a soil has formed, many types of plants such as grasses and trees can grow.
- The roots of these plants further break down the parent rock.



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Organisms

- Dead plant material such as leaves accumulates and adds organic matter to the soil.



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Question 1

Explain how a tree can break apart rock.

Answer

As the tree grows, its roots become thicker and longer. The roots exert pressure on the rocks eventually breaking them apart.



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Question 2

How is a rusty nail an example of chemical weathering?

Answer

When iron-containing materials, such as a nail, are exposed to oxygen, a chemical reaction occurs and rust is produced. The rust has a different chemical composition than the nail.



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Question 3

Which of the following does NOT affect soil formation?

- A. climate
- B. carbonic acid
- C. organisms
- D. topography



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Answer

The answer is B. Many factors affect soil formation. Carbonic acid is responsible for changing the chemical composition of minerals in rock.



2

Agents of Erosion

- **Erosion** is the movement of sediment.



- Erosion occurs because gravity, ice, wind, and water sculpt Earth's surface.



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