


# Weathering & Erosion

January 5, 2015

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## Today's Goals!



- Describe the difference between weathering and erosion
- Distinguish between mechanical/physical and chemical weathering

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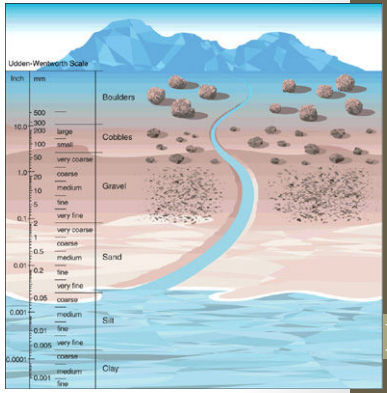
## Introduction Video

- Study Jams Weathering and Erosion (3 minutes)
- <https://www.youtube.com/watch?v=lyysL02zvQ8>

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## Weathering

- **Weathering:**  
**Breakdown of rocks due to physical or chemical changes.**




Unit	Particle Size Range	Category
ft	> 500	Boulders
mm	100 - 500	Cobbles
	20 - 100	Gravel
	2 - 20	Sand
	0.075 - 2	Silt
	< 0.075	Clay

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## Erosion of Sediments

- **Erosion:** Weathered rock (sediments) is carried away by gravity, water, wind and ice.



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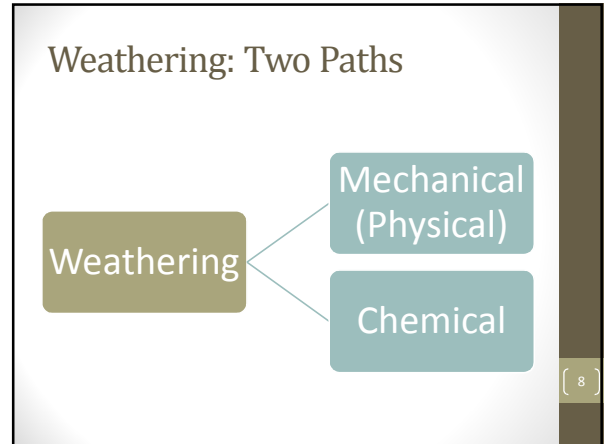
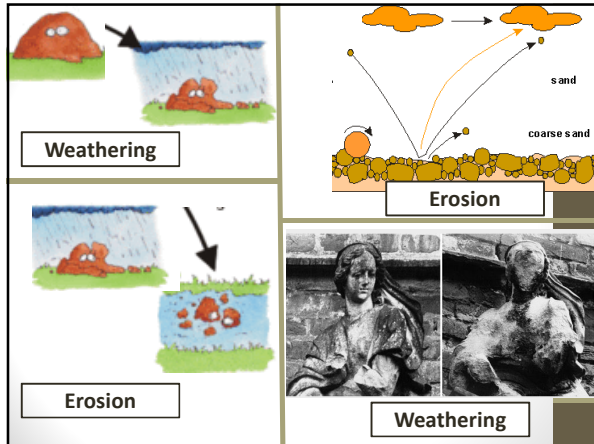
## Whiteboards!

Weathering

Erosion

Can you tell the difference?

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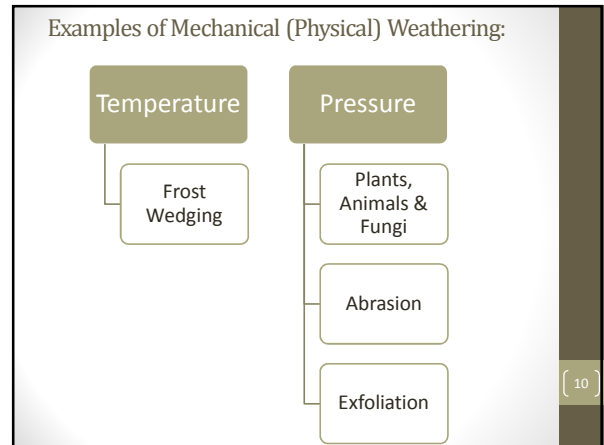
### Mechanical (Physical) Weathering

- Mechanical (Physical) Weathering: Changes rocks size and shape, but not composition

Help me out!

Give me examples that you know of that cause mechanical (physical) weathering.

Whiteboards!



### Examples of Mechanical (Physical) Weathering:

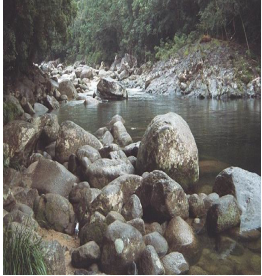
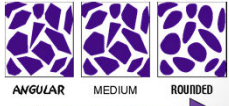
- Frost Wedging:  
Water enters crack → Freezes → Expands → widens crack.
- Process repeats until the rock splits

### Examples of Mechanical (Physical) Weathering:

- Plant Roots, Moss, Animals, & Lichen
- The deep roots of trees and low ground fungi as well as tunneling animals often break apart rocks

Examples of Mechanical (Physical) Weathering:

- **Abrasion** particles or wind rubbing against rocks wearing them down
- Why are rocks that travel for a long time in a river smooth and round?
- Particles are carried in water, they bump and rub against rocks

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Examples of Mechanical (Physical) Weathering:

- **Exfoliation**  
Sheets of rock peel off a rock face




- Exfoliation is a common term used in skin care for removing dead skin cells on the surface

<http://www.as.uky.edu/sites/default/files/elearning/module07swf.swf> (Animation)

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Rocks, rocks, rocks, rocks, rocks, rocks

- Broken up rocks are sediments. Different terms are assigned to sediment of various sizes.

Order the following sediment terms from largest to smallest



Whiteboards!

Cobbles   Silt   Boulders   Sand   Clay   Pebbles

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Boulders, Cobbles, Pebbles, Sand, Silt, Clay

Large → Small

SEDIMENT COMES IN ALL SIZES		
256 mm and up	BOULDERS	GRAVEL
64-256 mm	COBBLES	
2-64 mm	PEBBLES	
0.0625-2 mm	SAND	●●●●●
0.002-0.0625 mm	SILT	
0.002 mm and smaller	CLAY	

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## Chemical Weathering

- **Chemical Weathering:** Changes rocks composition by chemical reactions

Mechanical (Physical) Weathering is a Physical Change

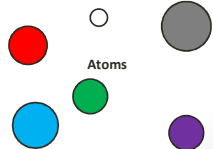
Chemical Weathering is a Chemical Change where the atoms are rearranged into new compounds/elements

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## Let's Practice: Chemical or Physical Change?

**Chemical**  
(new atom combinations)

Can you tell the difference?

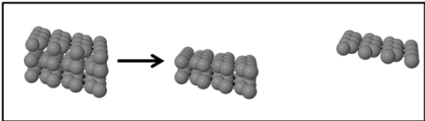


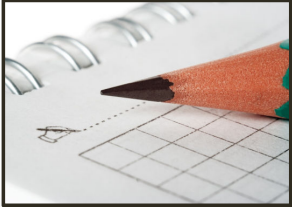
Atoms

Physical

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**Fragmentation of Graphite**

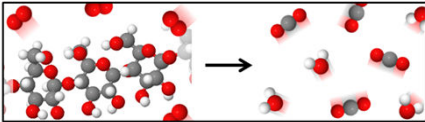





Physical  
Change

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**Forest Fire Combustion of wood**

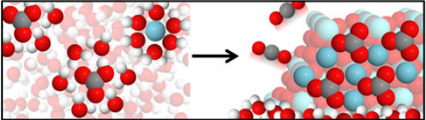





Chemical  
Change

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**Formation of Stalactites/Stalagmites**

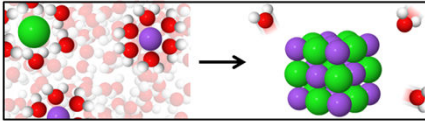





Chemical  
Change

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**Refining Salt from the Sea**






Physical  
Change

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Examples of Chemical Weathering:

- **Hydrolysis**  
Water (hydro) reacts with minerals such as feldspar and forms kaolinite (clay)




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Examples of Chemical Weathering:

- **Oxidation**  
Oxygen reacts with minerals especially those containing iron to form rust.  
(Occurs faster with water)

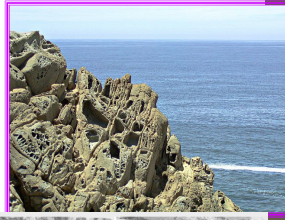
$2\text{Fe}_3\text{O}_4 + \frac{1}{2} \text{O}_2 \rightarrow 3\text{Fe}_2\text{O}_3$   
Magnetite                  Hematite



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### Examples of Chemical Weathering:

- **Carbon Dioxide** dissolves in water to form carbonic acid (weak)
- Can cause minerals to dissolve, especially those containing calcite. Can rain down or be found in soil.
- **Acid Rain** is strong forms from sulfur dioxide



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Helpful Textbook Pages: 152-162; 167; Glossary

### Today's Main Idea

- Factors: **Mechanical weathering:** temperature & pressure. **Chemical weathering:** water, oxygen, carbon dioxide, and acid rain.

### Explore Question

2. Explore today's main idea with this question:

List several variables that affect the rate of weathering

### Vocabulary

- Deposition
- Soil

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