## Big Idea

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





# Important distinction

- Weathering
- Erosion

UN

## 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)
  - $\begin{array}{l} \quad 2KAISi_3O_8 + 2H_2CO_3 + 9H_2O \leftrightarrow Al_2Si_2O_5 \ (OH_4) \\ + 4H_4SiO_4 + 2K + 2HCO_3 \end{array}$
  - Orthoclase + carbonic acid + water ↔
    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



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Soil Profiles						
<pre></pre>		Lochloosa Plummer		Pomona Monteoc		
0	A	A	A E1	A	A E1	A
20 50	C1	E1	E2	Eg1	E2	E
75	C2	E2	Bt1		Bh1 Bh2	BC
100		E3	Bt2	Eg2	E,	E,
125	C3	E4	Btg		Btg1	Btg1
150		Bt	BCg	Eg3	Btg2	
200	04	Btg	Cg			Btg2
225	64	BCg				Cg
250						

## 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