Erosion

- Erosion is a natural process where rocks and soil are Broken and Moved

- We will focus on 4 types of erosion; Wind, Rain, Ice and Water
Wind Erosion

- Usually in dry environments
- Wind moves dust, sand, and sometimes larger rocks across other rocks wearing them down
- The wind often carries these small rock particles to another
Types of Water Erosion

- Rain
- Frost Wedging
- Glaciers
- Flowing water
- Costal wave
Rain

- Rain erosion is a result of raindrops hitting soil or rock
- The rain can move particles to a new location
Frost Wedging

- Caused by the Expansion of water as it goes from liquid to solid (Water to Ice)
- Ice gains 9% Volume when it freezes from water
- This force can crack and crumble rocks
Glaciers

- Glaciers are huge sheets of ice that stay frozen all year.
- The glaciers slowly move and “flow.”
- This force **Pushes** and drops rocks as it moves, and can **Scrape** bedrock behind it.
Flowing Water

• Water flowing downhill moves sediment and grinds away rocks
• It can grind away rock and make canyons
• It can sort material by size and deposit it in new places
Costal-Wave

- Wave action can cut and form rock cliffs
- It deposits material on the beach, and the seafloor
- It can sort material by size
Rock Properties

- Clastic
- Bioclastic
- Biochemical
- Chemical

- Grain size
- Grain sorting
- Cementation
- Fissile
Clastic rocks are made of **Rock or Mineral** particles **Cemented** together.

Bioclastic rocks are made of **Organic** and **inorganic** particles **Cemented** together.

Biochemical rocks are made of **Organic** and **inorganic** particles **Crystallized** together.

Chemical rocks are made of **Crystals** deposited from a solution.
Grains

The relative and actual size of the grains tell us about the conditions under which the rock was formed.
Cementation

Most cements in sedimentary rock are calcite, quartz or feldspar.
Fissile - Somewhat Fissile - Not Fissile
Sedimentary Rocks

• Sandstone (14B)
• Limestone-Shell (13B)
• Shale (15B)
• Conglomerate (12B)
• Bituminous Coal (11B)

**Special for 2016:**
• Breccia
• Coquina
• Travertine Limestone
Sandstone 14B

- Made of cemented uniform sand grains
- Sand can be made up of almost any material
- Most sandstone is made of Quartz
- It sometimes breaks in flat pieces
Sandstone 14B

- Sandstone can form in a **wet** or **dry** environment
- Sandstone can be used for building and abrasives
- Sandstone can contain fossils
Limestone-fossil 13B

- Limestone Fossil is often made of firmly cemented shells from Ocean Life
- Can be made of large or tiny shells
- It will react with acid, because it contains Carbonates
Limestone-Fossil 13B

- It is used to make blocks for buildings
- It can be carved and made into countertops
Shale 15B

- Shale is made of well sorted fine grained clay sediment
- It always breaks into flat pieces
- It forms in medium to deep ocean
Shale 15B

- Some shale contains oil or natural gas
- It can be used to make bricks and cement
- It sometimes contains fossils
• True conglomerates form from various rock and mineral particles
• They are made of a variety of grain sizes ranging from pebbles to silt
• The grains are mostly rounded in shape and cemented together
• The rock and mineral types are usually very weather resistant
• They can form from river, beach, or glacial deposits
Breccia Conglomerate

- Breccia is like conglomerate except the breccia grains are very angular
- There is a variety of grain sizes
- The rock and mineral types are sometimes not very weather resistant
- They can form from landslide deposits
Coquina

- Coquina is made of broken shells cemented together
- It can be loosely or moderately cemented together
- It is often found near the ocean
- It is occasionally used as a building material, but is not very durable
Travertine Limestone

- Travertine is limestone that has been deposited from saturated water
- It often has bands and layers
- It is often formed in hot springs or caves
- It is often used as a decorative building material
Travertine Limestone

• Travertine is associated with other limestone or carbonates, and flowing water
• Yellowstone has lots of travertine
• Cave formations are made of travertine
Puddingstone (Metaconglomerate)

- Puddingstones start out like a regular conglomerate, usually made of silica sand and jasper pieces.
- The conglomerate is exposed to metamorphic heat and pressure and becomes more like marble with pebbles.
- The puddingstones we find in Michigan are usually rounded, because they were carried south and worn down by a glacier.
Coal is made of decaying Organic matter.
Young forms can break into flat layers.
Coal is a valuable natural resource.
We burn coal for fuel.
Burial pressure, heat, and time

Peat → Lignite → Bituminous → Sub-bituminous → Anthracite → Graphite

Graphite 11B
Coal Mining and Power Plants

- Coal is mined above ground and underground
- The burning of coal powers steam driven power plants
- Coal products are also used to smelt metals