

February 3, 2015

GEOL 1010-002a (Notes)

## Lecture 5 - Sedimentary Rocks & Processes

### Sedimentary (Sed) Processes

• Why do we care?

① Sed Rocks are the most common rock type at Earth's surface

② Utilize them for numerous things

- Construction sites & building materials

- Almost all fossils are found in Sed rocks

- Fossil fuel, like coal and natural gas, come from Sed rocks

- Soils associated w/ Sedimentary processes

- Landslides involve Sed. processes

### PT 1 - Forming Sedimentary Rock

• Start w/ some pre-existing rock (Parent Rock)

① Doesn't matter what type (i.e. Sed or metamorphic)

• Have to destroy the parent rock to create raw material for building the new Sed rock

### PT 1A - Weathering

• Weathering - breaking down of rock into particles (Sediment)

• Can occur in 2 diff. ways

① Physical Weathering - mechanically or physically

break rock down

- Ex. Roll it down a hill to make it break apart

② Chemical Weathering - Chemically alter rock

in order to break it down

- Ex. Dissolve it in acid

## Examples of Physical Weathering

- Frost wedging - when water freezes, it expands, so the ice presses against the sides of the crack, making it wider
- Each time water gets in the crack and freezes, the crack widens until it finally splits
  - ① Ex. Pot holes (why many form in winter - coldness - and why they seem to open overnight - pressure actually been building for long time)

## Causes of Physical Weathering

- Frost wedging
  - ① water-filled crack  $\rightarrow$  Freezes to ice  $\rightarrow$  Breaks rock

## Chemical Weathering

- Dissolve or chemically break apart rock instead of breaking
- More common than physical weathering in many environments
- Diff. minerals react at diff. rates
- Last minerals to form in Bowen's Reaction Series are most stable at earth's surface

① Form at near-surface conditions (thus hard to break down)

- First minerals to form in BRS are least stable at earth's surface

① Form at T/P conditions very diff from earth's surface, so they are less stable and easier to alter

## Chemical Weathering With Water

- Water key for many chemical weathering reactions
- Rain  $\neq$  pure water

① Contains dissolved  $\text{CO}_2$ ,  $\text{SO}_2$ , nitrates, etc

- $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$  (= Carbonic Acid)
- $\text{Feldspar} + \text{H}_2\text{O} + \text{H}_2\text{CO}_3 \rightarrow \text{Kaolinite} + \text{dissolved ions}$
- So you can change feldspar (Hardness = 6) into kaolinite (Hardness = 1.5) with a little water & acid

## PT 1B - Erosion

- Erosion - moving sediment from one place to another
- 4 things in nature cause erosion

① Water

② Wind

③ Gravity (landslides)

④ Ice (glaciers)

- Requires energy to lift & move sediment

## PT 1C - Deposition

- As energy level drops, sediment can't be carried any farther (Must be put down - deposited)
- Basin - any natural depression that can hold sediment
- Accommodation Space - amount of space available in a basin to hold sed.
- Subsidence - as sed is deposited, its weight may cause basin to sink
- Can open new accommodation space at top of basin

## 1. Deposition

- Sed is deposited in layers (AKA strata, AKA beds)
- Each bed can be named to help geologists communicate easier (they'll know which bed other geologists are talking about)

## PT 1D - Lithification

- Process of becoming Solid

① Ex. Basilisk in Harry Potter lithified ppl when it looked at the

- Involves couple of steps

① Compaction - 1<sup>st</sup>, you have to squish particles of sed closer together

② Ex. - When 1<sup>st</sup> deposited, there is plenty of open space in-between the grains

③ Ex. Time 1 - close-up inspection of

the stratum shows plenty of empty space b/t grains of sed.