

Sediments and Sedimentary Rocks

1. Sediments and Sedimentary Rocks & the Rock Cycle
2. Sediments (soft)– a mass of, organic or inorganic, naturally formed, fragments of solid material.
3. Sedimentary Rock (hard)– Any rock that formed by chemical precipitation from water at the Earth's surface or by the lithification (cementation or compaction) of sediment
4. Sediments - unconsolidated particles created by
 - a. The weathering of rock
 - b. The secretions of organisms or decomposition of organic matter
 - c. Chemical precipitation
5. Sedimentary Rocks
 - a. Composed of lithified sediments by compaction – weight of overlying sediment compresses sediment, important in fine-grained sediments
 - b. by cementation – materials carried in solution precipitates minerals - iron oxides, carbonates, silica
 - c. Two Classifications
 - i. clastic
 - ii. nonclastic
6. Sedimentary Rocks
 - a. Clastic Rock – composed of fragments of preexisting rocks.
 - b. Nonclastic Rock – composed of chemical precipitates or biogenic matter.
7. Types of Sediments
 - a. Clastic
 - i. Broken fragments of rock produced by weathering.
 - ii. Classified according to size.
 - iii. Range in size from largest boulder to smallest clay particle.
 - iv. Clastic Texture
 1. Texture - Size, shape, and distribution of particles that collectively make up a rock
 2. Size
 3. Rounding
 4. Sphericity
 5. Sorting
 6. Size
 7. Roundness – the shape of sediment grains.
 - a. Related to the distance sediment has been transported.
 8. Sphericity - how close to a spherical shape a grain is or will be.
 - v. Sorting – separation of sediments by grain size and density.
 1. Poorly sorted – sediment with a wide range of grain sizes.
 2. Well sorted – sediment with a small range of grain sizes.
 - vi. Sorting - a function of transport mechanism

1. Water
 2. Wind
 3. Glaciers
 4. Graded Beds
 5. Texture and Transport Distance
 6. In general, as transport distance increases, rounding and sorting increase.
- b. Biogenic
- i. Composed of remains of plants or animals.
 - ii. Terrestrial sediments - mainly plant matter
 - iii. Marine sediments - mainly carbonates
 1. Corals - large components of reefs.
 2. Bivalves, gastropods, foraminifers - whole or partial skeletons form sand and gravels.
 3. Algae, crinoids, echinoderms, bryozoans - disintegrate to form some sand particles and lime mud.
 4. Diatoms, Radiolaria – bedded chert SiO_2
- c. Chemical
- i. Inorganic process, no biological activity involved.
 - ii. Formed by minerals precipitating from solution. i.e. –
 1. $\text{Ca}^{2+} + \text{CO}_3^{2-} = \text{CaCO}_3$
 2. $\text{Na}^+ + \text{Cl}^- = \text{NaCl}$
 - iii. Terrestrial - Evaporites:
 1. Gypsum - $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
 2. Anhydrite - CaSO_4
 3. Halite - NaCl
 - iv. Marine
 1. Carbonates - CaCO_3 (limestone)
 2. Chert (Quartz) – SiO_2
8. Bedding – Layering or stratification in sedimentary rock
 9. Cross Bedding – water or wind
 10. Sedimentary Environments
 11. Sequence Stratigraphy
 - a. Transgression – advancement of sea
 - b. Regression – retreat of sea
 12. Sedimentary Systems and Plate Tectonics