Chapter 5: Sediments

The Memory of the Ocean

* + The Mediterranean Sea was once a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Theory based on the presence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (CaSO4 · 2H2O) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (sodium chloride - NaCl)
  + Beneath sediments that suggest the Mediterranean Sea once \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Input of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ water from southern Europe, Egypt (Nile River), and Black Sea is insufficient to keep the Mediterranean Sea alive - there must be inflow through the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to keep it wet
  + This occurred about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ million years ago

1. What Sediments Look Like
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - particles of organic or inorganic matter that accumulate in a loose, unconsolidated form.
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rate varies from a few cm per year to a few mm per 1000 years
   * Beach sand, mud, broken shell fragments, and CaCO3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are all sediments
   * Two types of sediment
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*: composed of particles*
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*: Precipitated from chemicals dissolved in water*
2. Classifying Sediment By \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sediment is composed of particles of other rocks
   * Classified by particles size
     + Boulder
     + Cobble
     + Pebble
     + Granule
     + Sand
     + Silt
     + Clay
   * Size distribution of sediment is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     + A well sorted sediment will have the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     + A poorly sorted sediment will have a wide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of particles sizes
     + Sorting is dependent on the energy (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) of water or wind that is transporting the sediment
3. Classifying Sediment by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * + - * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - detrital sediment
     + Erosion of land
     + Volcanic eruptions
     + Blown dust
       - * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - remains of dead organisms
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - made of the mineral calcite (CaCO3)
   * + - *chalk*
       - *coral*
       - *shelly materials*
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *depth (CCD)* 
       - roughly 4500 m deep water
       - where falling \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ shells start to dissolve
       - because of increased \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of H2O + CO2 => H2CO3 (carbonic acid)
       - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has more CO2 dissolved in it thus lowers the solubility of calcite shells
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - made of the mineral quartz (SiO2)
   * + - *chert (radiolaria)*
       - *diatomaceous earth (diatoms)*
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - coal
7. Hard parts (shells) of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - precipitation of dissolved minerals in water
   * + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of chemicals from sea water, often by bacteria
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ nodules
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ deposits
     + Chert
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ minerals
       - *Mediterranean Sea*
       - *halite*
       - *gypsum*
9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - dust and meteorite fragments from Outer Space

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ spheres
* Glassy nodules
* Some red nickel-rich clays
* Most sediment is composed of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of all the above sediments

1. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of Marine Sediments
   * Sediment is classified by its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sediment
     + near shore (of the coast)
     + primarily terrigenous material
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sediment
     + deep-sea sediments
2. The Sediments of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Sediments reach continental margins by several methods
  + - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Some sediments \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the coastal zone though wind (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) transport
    - Sediment \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and Sorting Along Continental Margins
    - Sediment in the coastal setting is sorted by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *stay close to their source areas (river or glaciers)*
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *move along coasts by wave action*
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *and* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *are suspended in the water column by wave action and carried out to the deep sea*
    - Biota may ingest fine sediments and make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which deposit quickly
    - Continental Shelves
      * Shallow platforms (~100m) surrounding land masses
      * Shelves developed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, longshore currents, glaciers, and submarine channels
      * Terraces are ancient shelves uplifted or down warped by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or sea level changes
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ margin shelves broad
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ margin shelves narrow or nonexistent
    - Shelf Sediments
      * Dominated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ material - sands and some silts
      * Locally important \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ components - coral reefs
      * When sediment supply is low - eroded rock platforms may be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ margin shelves may contain old shoreline feature

1. The Sediments of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_has over 1 km of sediment, Pacific only .5 km
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is larger, more spread out
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_has more rivers
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_has more trenches

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—deposits left over from turbidity currents

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—covers 38% of ocean floor, very tiny particle size causes far movement

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—higher in proportion further out to sea

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_oozes—made of glass (radiolarians, diatoms)
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_oozes—made of calcium carbonate (foraminiferans, pteropods, coccolithophores)—White Cliffs of Dover
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_falls faster

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Materials—usually from chemical reactions with terrigenous and biogenous sediments—manganese nodules

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—salts evaporating in shallow pools or isolated ocean arms

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Sands—precipitations from acidity or temperature changes

1. Studying Sediments—List some methods: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_