Unit 10: Oceanography
A. Ocean Water (salinity & density)

- **Salinity** – total amount of solid material dissolved in water (mainly salt)
A. Ocean Water (salinity & density)

- Ocean temperature depends on the solar radiation received and latitude
- Ocean density depends on temperature and salinity of water
- Cold water is more dense than warm water
- Deeper ocean water is colder than surface ocean water
heat loss from ocean

ATMOSPHERE

heat input to ocean

cold water sinks

mixing

warm water moves polewards

cold water warmed

pole

equator
B. Ocean Currents

- Surface currents are caused by winds
- Surface currents move warm water from the equator towards the colder water at the poles
B. Ocean Currents

- Deep ocean currents are effected by the density of the ocean water
- Downwelling – movement of water from the surface to greater depths
- Upwelling – movement of water up to the surface
B. Surface Currents

- Downwelling and upwelling create a convection current in the ocean
- Barrier island – long ridge of sand or other sediments deposited or shaped by currents that are separated from the mainland
  - Can be up to tens of kilometers long!
C. Coastal vs. Inland Climates

- Water has a high heat capacity – takes a lot of energy to change the temperature of water
- Oceans take longer to heat or cool than land due to the huge amount of energy required
- The oceans respond very slowly to changes in the seasons
- The ocean makes winters in coastal regions slightly warmer and summers near the coast slightly cooler than inland areas
D. Ocean Acidification

- The ocean removes about 1/3 of the CO₂ released into the atmosphere as a result of photosynthesis of aquatic plants.
- When CO₂ dissolves in seawater, it leads to decreased pH levels.
- Acidification is a consequence of human emissions of carbon dioxide in the atmosphere.
D. Ocean Acidification

- Effects of ocean acidification:
  - Decreases amount of carbonate ions for marine animals to make bones and shells
  - Coral reefs are unable to grow and are more vulnerable to erosion which reduces food supply for other marine organisms
  - Reduces phytoplankton
E. Sea Levels

- Sea levels rise depending on land elevation changes
- Increased temperatures will cause the melting of glaciers and ice caps which raise the sea levels
F. Changing Sea Levels

- 3 reasons for changing sea levels
  - As water warms and cools it expands and contracts
  - The amount of water contained as ice on land surfaces changes over time
  - The earth’s surface is dynamic and can move vertically
F. Changing Sea Levels

- Hurricanes can cause erosion to create a longer shore-link and push the ocean back
- Global warming can raise sea levels due to the melting of polar ice caps
G. Ocean Life Zones

- Photic Zone (photo=light) – upper part of the ocean where sunlight penetrates
  - Euphotic zone (eu=good) – portion of the photic zone strong enough for photosynthesis to occur
- Aphotic (a=no/not) – portion of the ocean where there is no sunlight
- Benthic zone – any sea-bottom surface