Class #2 -- Geography of the Ocean Basins
Size, Shape, Rotation of the Earth
Latitude, Longitude; Tilt of Earth's rotational axis
Shapes and sizes of the oceans
Interconnections

Earth's shape -- nearly spherical, radius = 6,371 km

Rotation (spin) about a N-S axis -- 1 revolution per day, or 15 degrees per hour

**Latitude and Longitude -- "grid" system for expressing location**
Latitudes (parallels):
- 0° = Equator; Equator is a "great circle" (intersection of surface with a plane that pass through the center)
- 90° N or S = Poles
- Linear distance between latitudes is constant (1 degree latitude = 60 nautical miles)

If you cannot easily understand what I mean when I say “high latitude”, 60 degrees latitude, etc. you should study Latitude in the appendix.

Longitudes (meridians):
- 0° = Prime Meridian at Royal National Observ., Greenwich, UK
- 180° = International Date Line
- Linear distance between longitudes decrease from Equator to Poles

**Tilt of Earth’s rotational axis**
- 23.5 degree from vertical (relative to orbital plane)
- Accounts for seasonal variation in daylight and solar radiation
- Annual variation in intensity of solar radiation – causes our seasons

**Maps (projections)**
- 2-D representation of Earth's spherical surface.
- Always some distortion.

**Introduction to the oceans**
- Pacific Ocean - largest and deepest (2X)
- Atlantic Ocean - shallower
- Indian Ocean - all in southern hemisphere
- Arctic Ocean - smallest, shallowest, near North Pole
- Antarctic (Southern) Ocean -: Connects Atlantic, Indian, Pacific Oceans

**VERY IMPORTANT**: All oceans are connected, and currents constantly mix the waters between the oceans

**Land masses are mostly in the Northern Hemisphere**
Southern Hemisphere is dominated by Oceans- affects climate

How deep are the oceans?
- Deepest point (Marianas Trench) 11,000 meters
- In comparison, Mt Everest, highest point above sea level, is only 8850 m
- Average Ocean Depth: 3729 (vs. average height of continents above sea level = 840 m)
Humankind’s exploration of the oceans

Progress depended on technology
For Example...Navigating: i.e., NOT getting lost at sea. (not easy)....One needs...

1) Maps-
   - Without good maps, ocean travel is absolutely impossible
   - How are accurate maps made?

2) Navigation methods: Measuring your position
   - Use coastline shapes- earliest method
   - Use the stars- celestial navigation- difficult
   - Use GPS- today's easy method- satellite-based

Commerce also drove exploration and study
   - Example: Ben Franklin’s Map of the Gulf Stream
     Sailing in this current shortened the trip from America to Europe

Technological improvements enabled detailed exploration in the 1800’s:
   - Charles Darwin on the H.M.S. Beagle (1831-1836)
   - The Challenger Expedition (1872-1876)- first oceanography expedition
     - Public interest in ocean life, geology
     - Depth measurements, water analyses, water movement, sampling of organisms and sea floor
     - Challenger Reports (Huge amt. of info...50 volumes over 20 years)

20th Century:
   - Better Technology: radar, sonar, echo sounding
   - Academic research facilities: Govt. supported Ocean Drilling Project
   - Satellites:
     - precise positioning (GPS),
     - measure ocean surface properties from space