

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