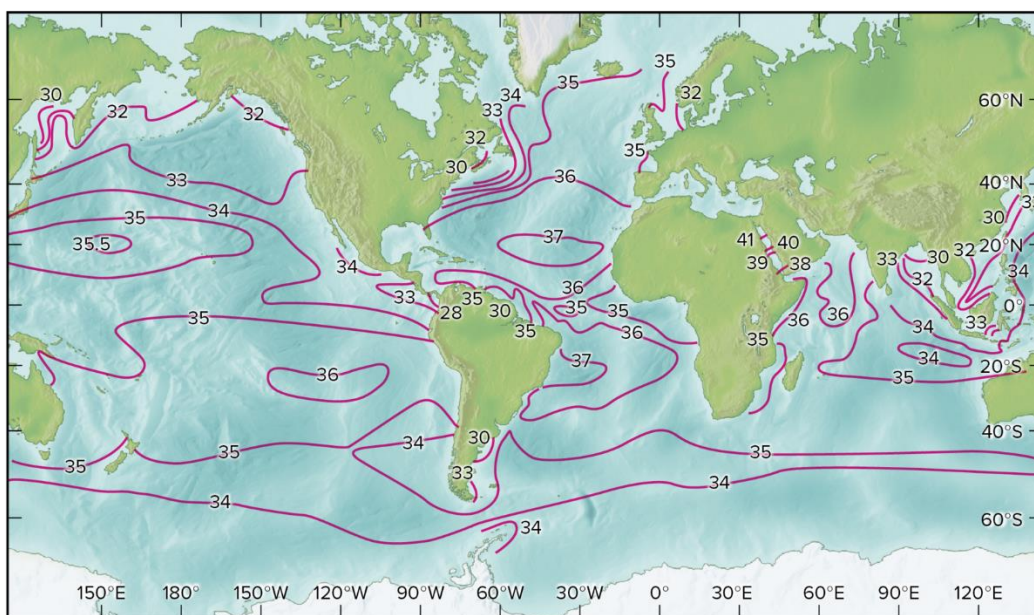


EAR117 Recitation: ASSIGNMENT 5**Ocean Salinity (20)**

1. Refer to the figure below.
  - A. The Pacific Ocean is generally (more/less) \_\_\_\_\_ saline than the Atlantic Ocean (5)
  - B. What are the two atmospheric processes that have the most effect on open ocean salinity? (10)
  - C. Ocean salinity is (more/less) \_\_\_\_\_ near shorelines than in open ocean (5)
  - D. Between 20°N and 40°N there is (more/less) \_\_\_\_\_ rainfall than at 40° N to 60°N. (5)



*Fig 5.3 (Textbook): Average sea surface salinity contours in parts per thousand. Degrees Latitude on Right hand axis.*

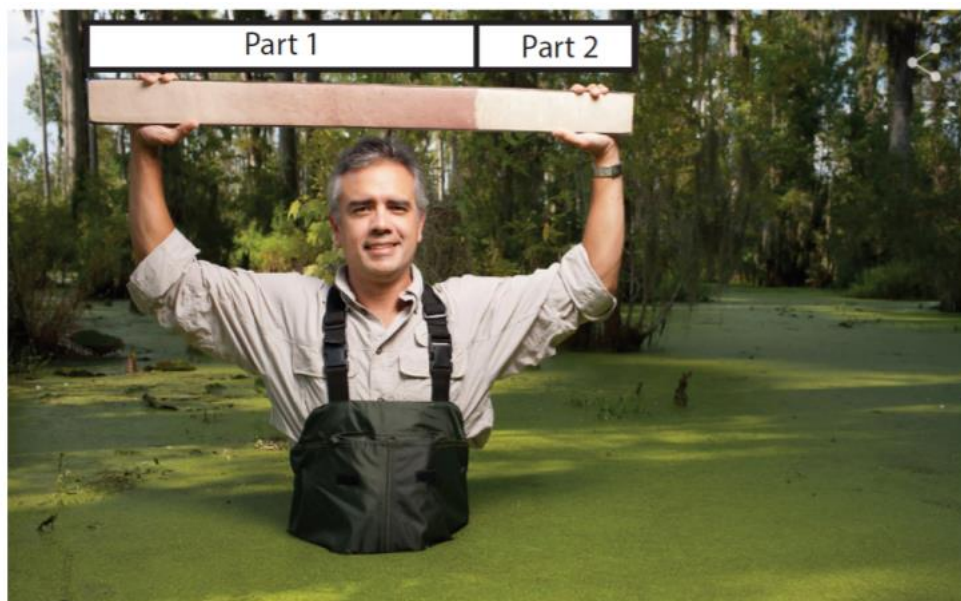
**Ocean pH and acidification (30)**

2. pH is a measurement of the acidity or alkalinity of a solution. It is associated with the hydrogen ion (or proton) concentration. For the pure water, it is in \_\_\_\_\_ (neutral/ acidic/ basic) state, with the pH = \_\_\_\_\_ (>7, =7, <7) (5)
3. Oceans are the largest water reservoir on the Earth, and its pH can be buffered by the carbonate system. Carbon dioxide growth in the atmosphere causes ocean acidification because CO<sub>2</sub> produces \_\_\_\_\_ acid with water (H<sub>2</sub>O). This can make oceans less

inhabitable for marine organisms. On the other hand, \_\_\_\_\_ on the seafloor can buffer the acidification by \_\_\_\_\_ (precipitation/dissolution). However, the Earth cannot handle the fast increase of CO<sub>2</sub> and acidification, because the rate of dissolution on the seafloor is \_\_\_\_\_ (slower/faster) than the acidification rate which is related to incorporation of CO<sub>2</sub> from the atmosphere (15)

4. Paleocene-Eocene Thermal Maximum (PETM) was a time period with more than 5-8 °C global temperature rise and large increase of CO<sub>2</sub> level, occurred around 55 million years ago (Ma). 1) The figure below shows a sediment core found at the boundary of the Paleocene and Eocene. A sharp color change can be observed. The light color indicates \_\_\_\_\_ (more/less) carbonate minerals in sediments, and the dark color indicates \_\_\_\_\_ (more/less) carbonate fraction. (5)
5. **Bonus part: (5)** In the picture below, Prof. Zachos is holding a core sampled near the PETM event. Which part of the core was formed during the PETM? \_\_\_\_\_

(Hint: think about results of the ocean acidification)

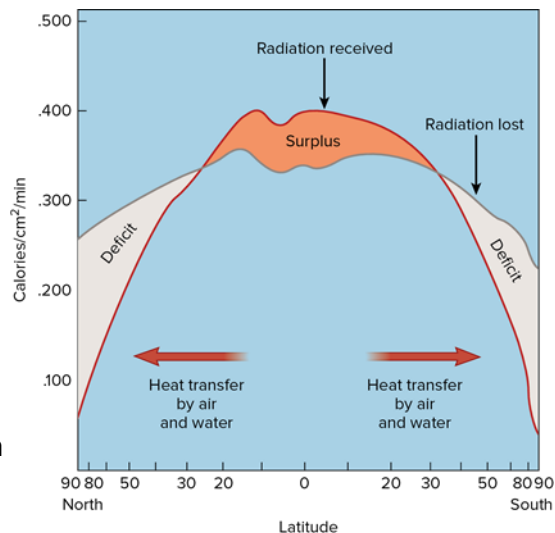


**Heat input and Solar Radiation (20)**

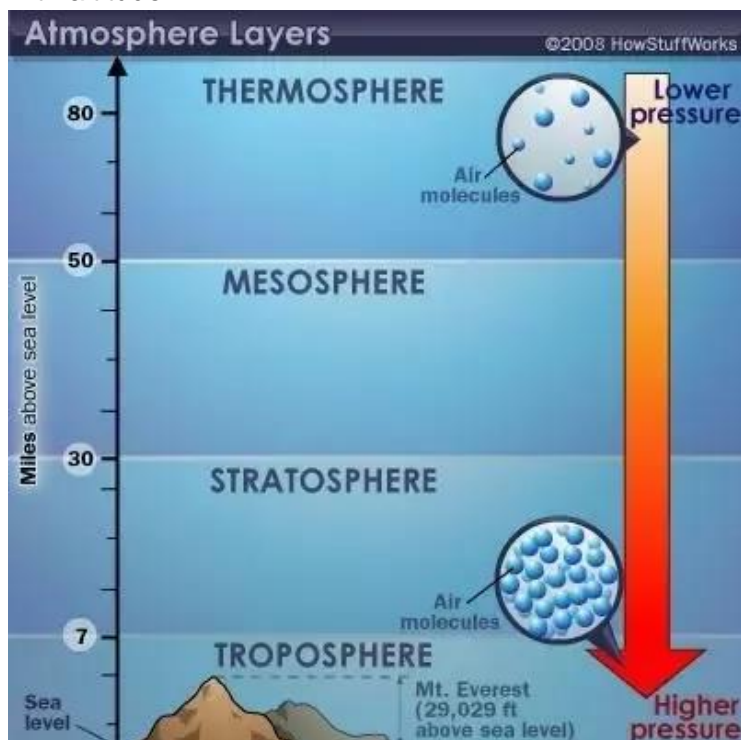
6. A. At the tropics, more radiation is received than is radiated out. This creates a \_\_\_\_\_ (deficit/surplus) in the heat budget. At higher latitudes, less radiation is received than is lost through radiation, creating a net \_\_\_\_\_ (deficit/surplus) in the heat budget.

B. The heat capacity of the ocean is (greater/lesser) \_\_\_\_\_ than land.

C. \_\_\_\_\_ and \_\_\_\_\_ transfer the heat from the tropics to higher latitudes.

**Layers of Atmosphere (20)**

7. A. On the figure, label where the ozone layer is found. (You may use the molecular formula O<sub>3</sub>). \_\_\_\_\_
- B. In which layer does most weather occur? \_\_\_\_\_
- C. In which layer do most commercial jet airplanes fly if they usually hit cruising altitude at 35,000 ft (~6.6 mi)? \_\_\_\_\_
- D. In the \_\_\_\_\_ (troposphere/stratosphere) the temperature decreases with altitude. In the \_\_\_\_\_ (troposphere/stratosphere), the temperature increase with altitude



**Atmosphere in Motion (15)**

8. Refer to the figure below

A. What two processes contribute to the direction of atmospheric circulation that we see in Figure below (Hint: one process is related to the sun and the other is related to the Earth's spin) \_\_\_\_\_, \_\_\_\_\_.

B. A plane (or parcel of air) starting at 30°N and moving north toward 60°N will be deflected east or west? \_\_\_\_\_

