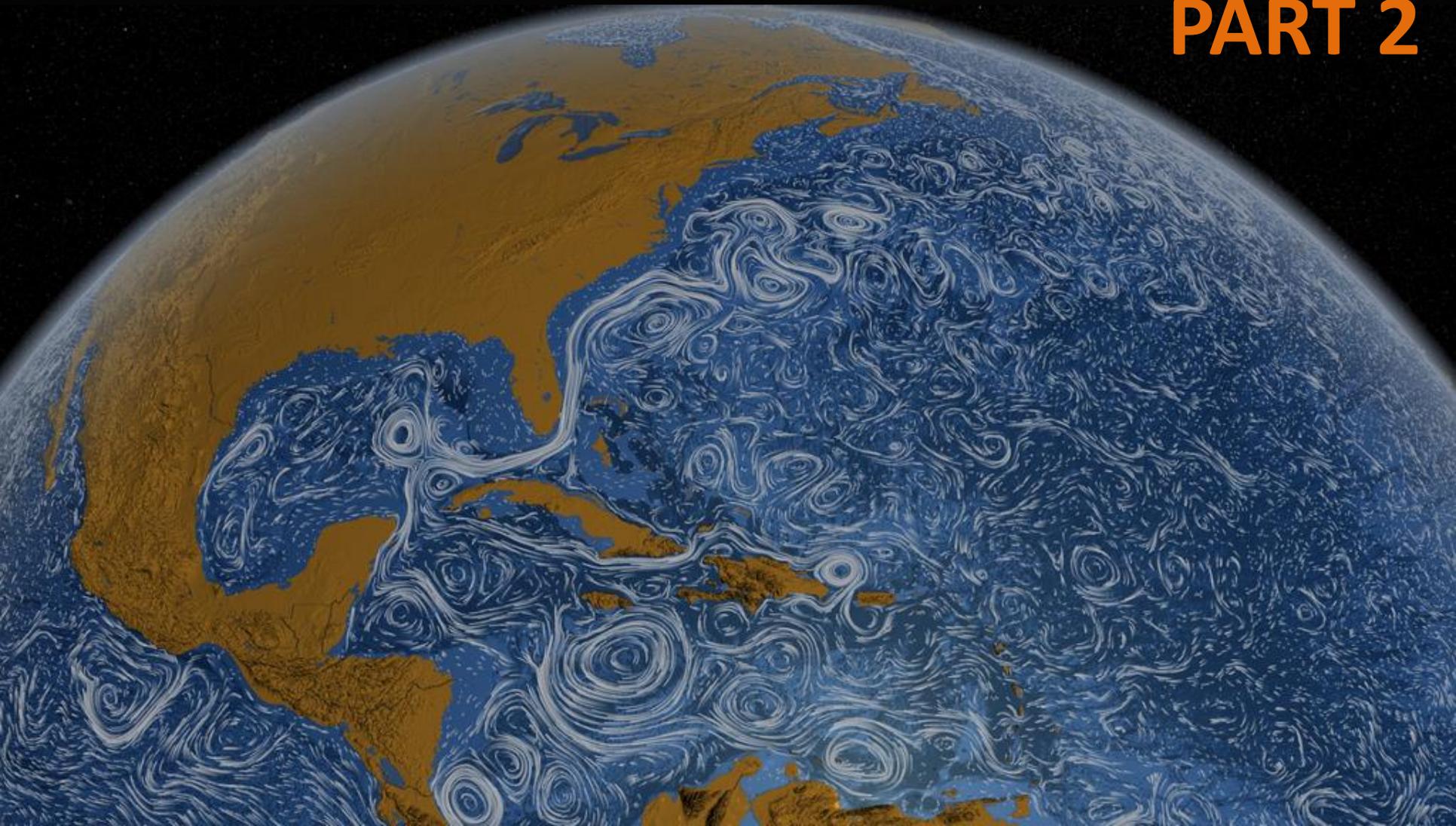


# WORLD OCEAN

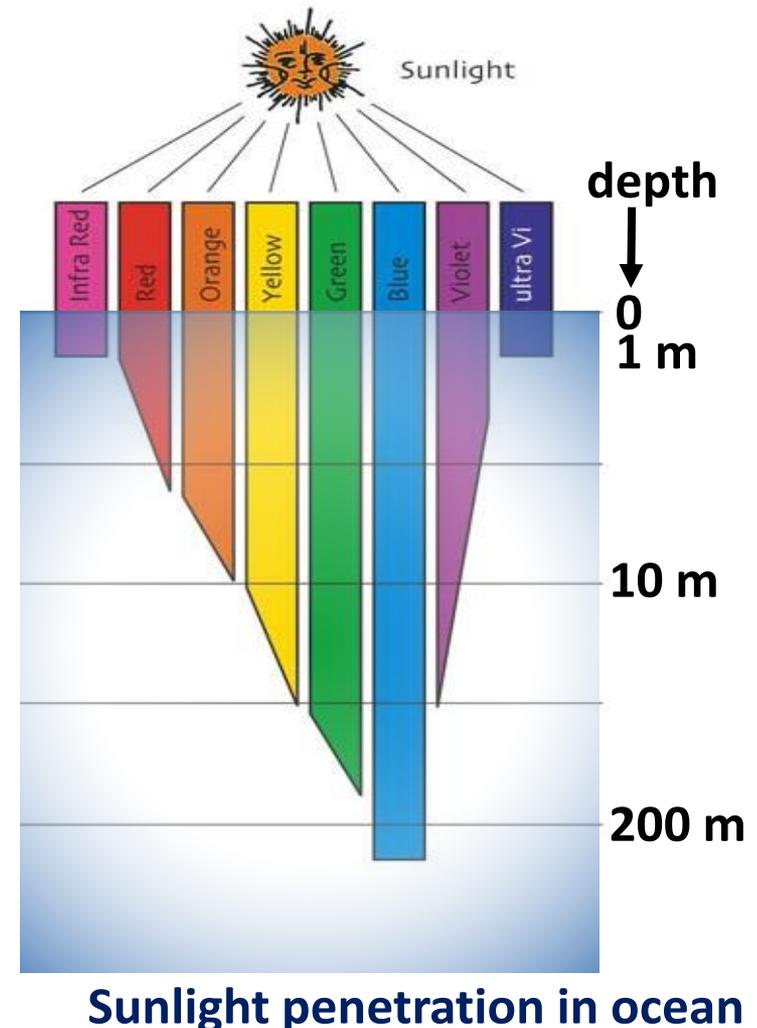
PART 2



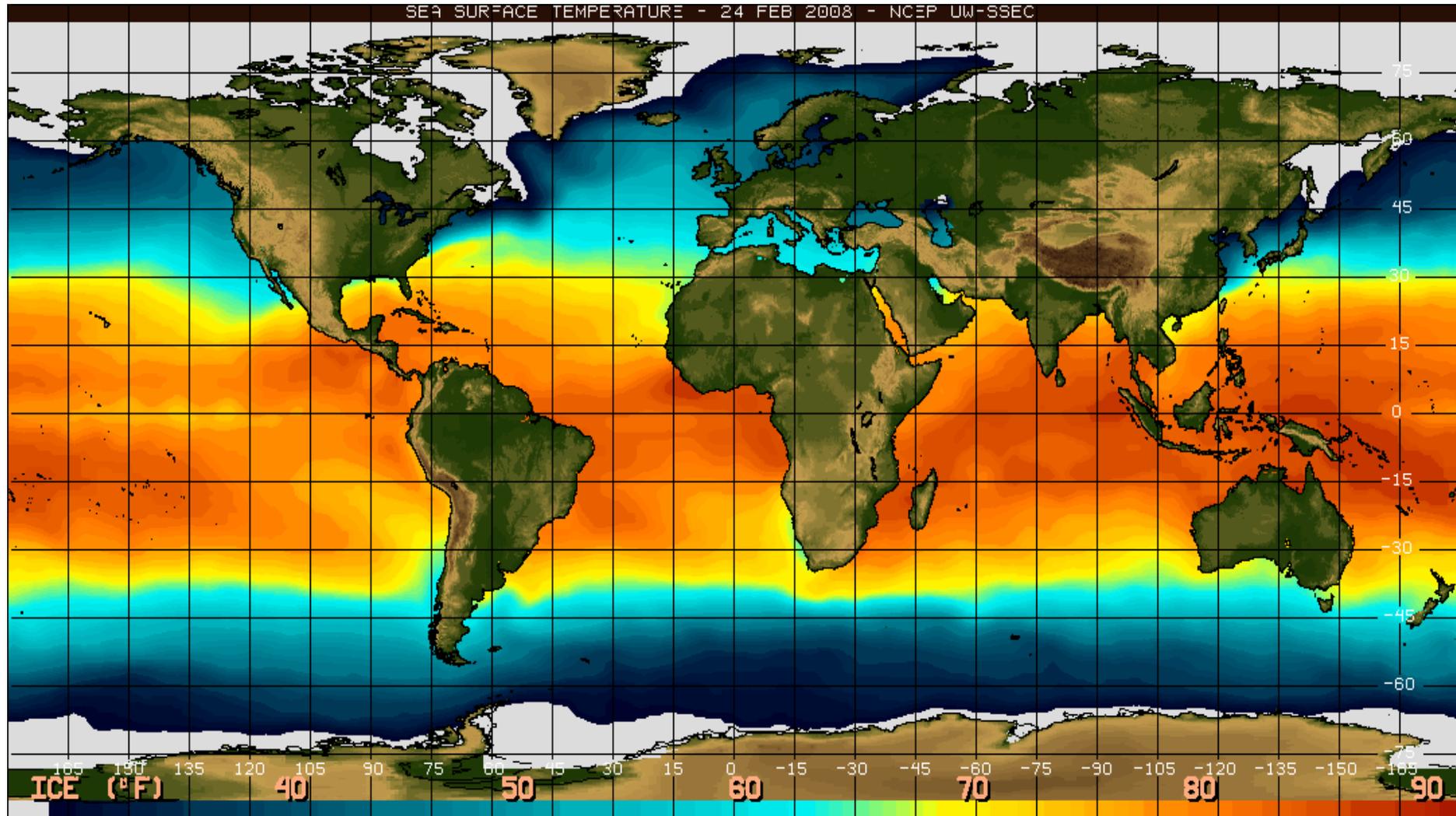
# Ocean Temperature

Ocean temperature varies with depth, latitude, and season.

- **Ocean** is **heated by the Sun** from the surface downward.
- Ocean surface temperature can vary a lot but **deep waters are very cold**, 75% of the ocean is between 30 to 43°F (-1 to +6°C).
- Both *seasonal* and *latitude* variation of ocean surface temperature are mostly due to the relative position of the Earth and the Sun.
- **Seasonal** change is **slight**: water loses or gains heat much more slowly than land.

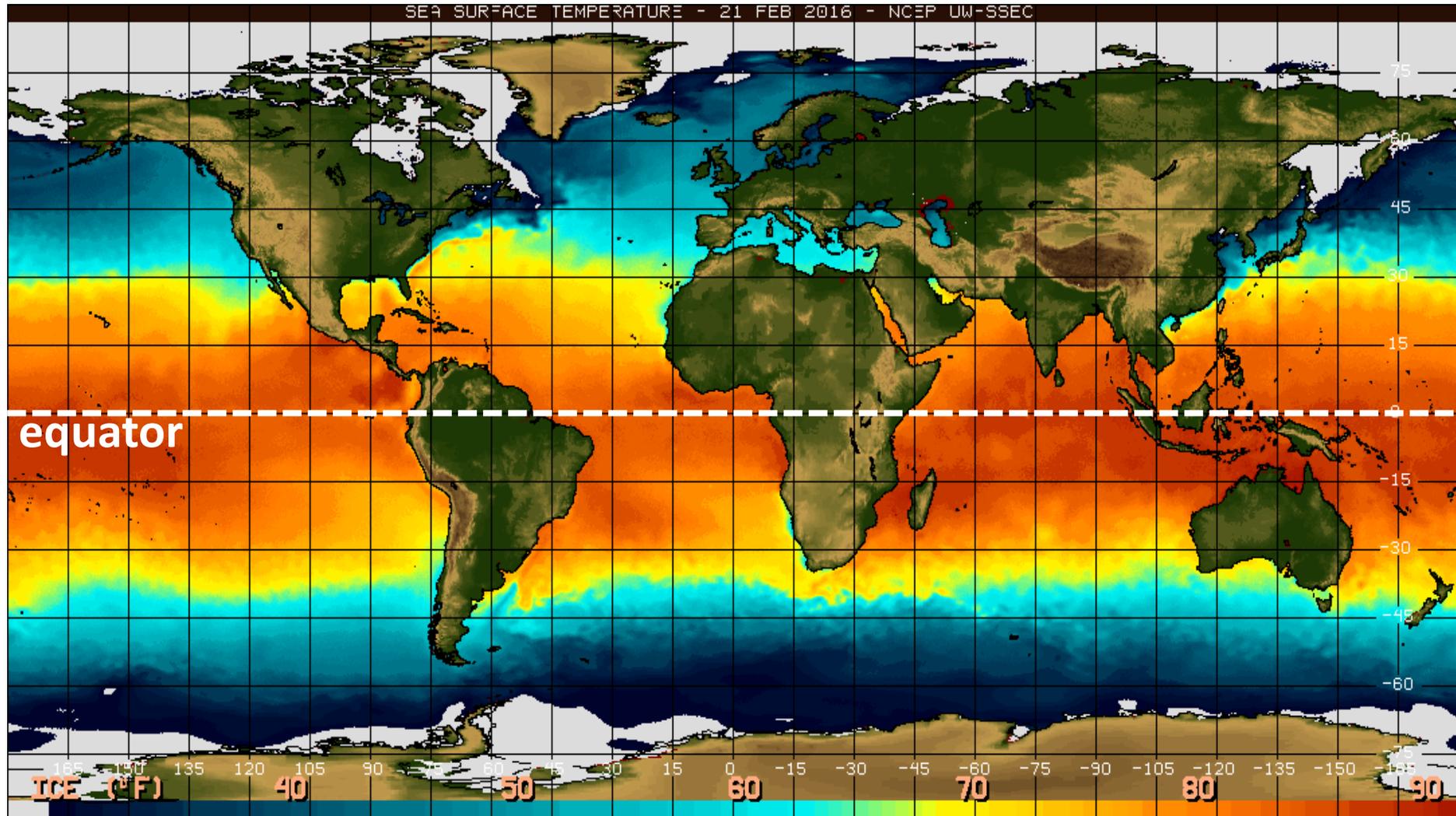


# Temperature: Latitude Variation



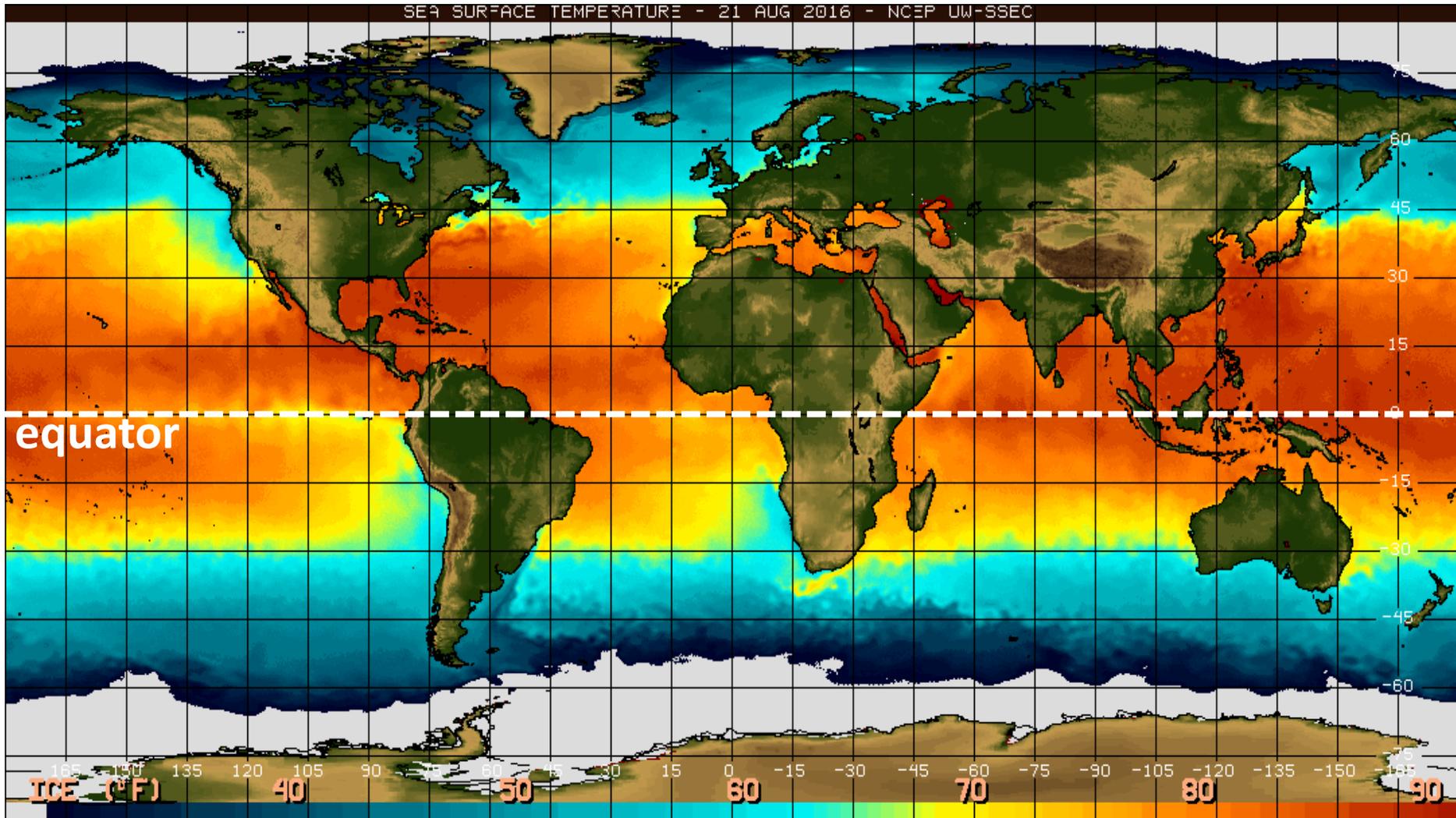
Ocean **surface temperature** varies greatly with latitude.

# Temperature: Seasonal Variation



Ocean **surface temperature** on **February 21, 2016**.

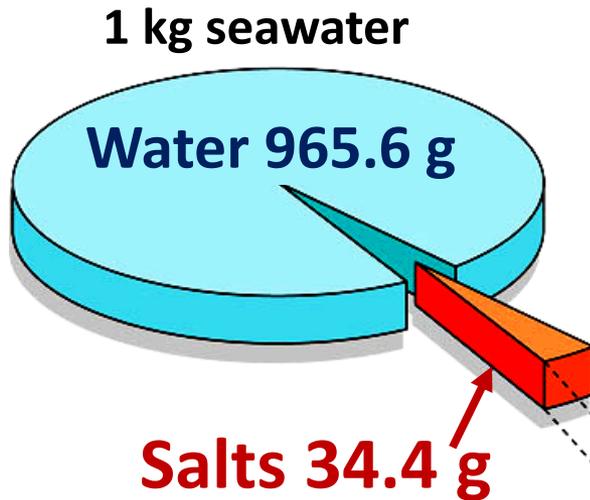
# Temperature: Seasonal Variation



Ocean **surface temperature** on **August 21, 2016**.

# Ocean Salinity

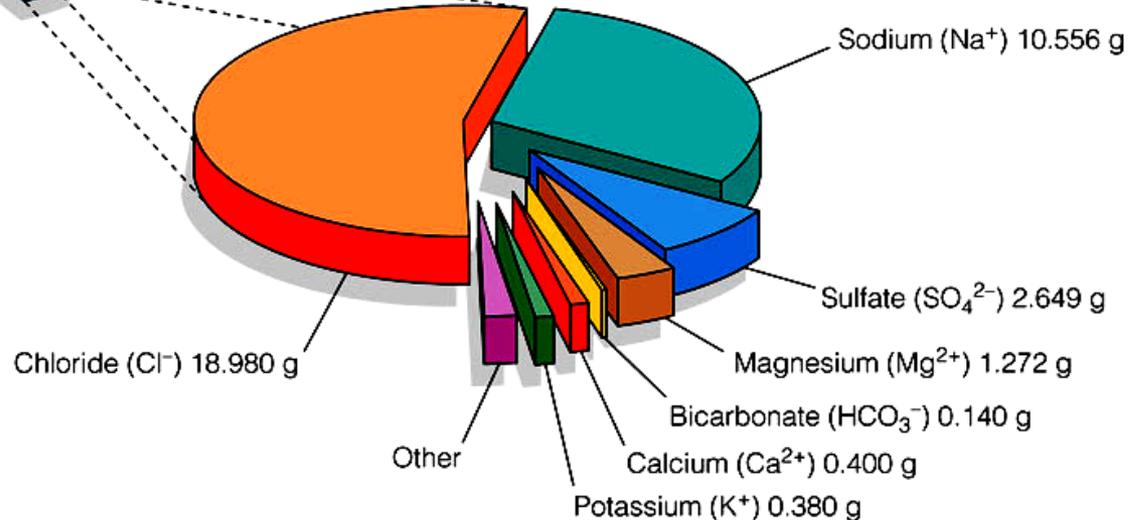
**Salinity** is a measure of the **amount of salt dissolved in a liquid** (measured in *percent*, % or *parts per thousand*, ppt or ‰).



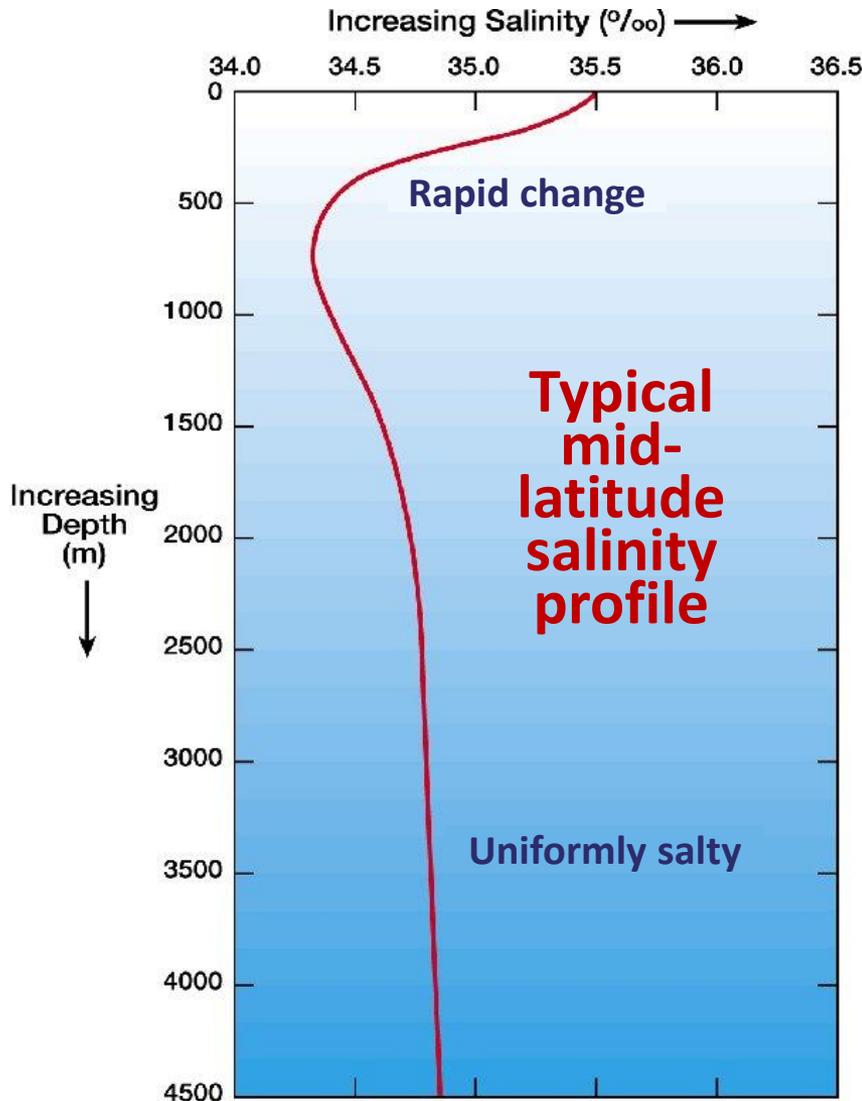
Salty **seawater** was created due to **salts** dissolved from the lithosphere:

- leached out of the ocean floor when the ocean formed
- brought by river flow over the ground and into the ocean

Ocean salinity has been **stable for billions of years**, most likely as a consequence of a **chemical/tectonic system** which removes as much salt as is deposited.



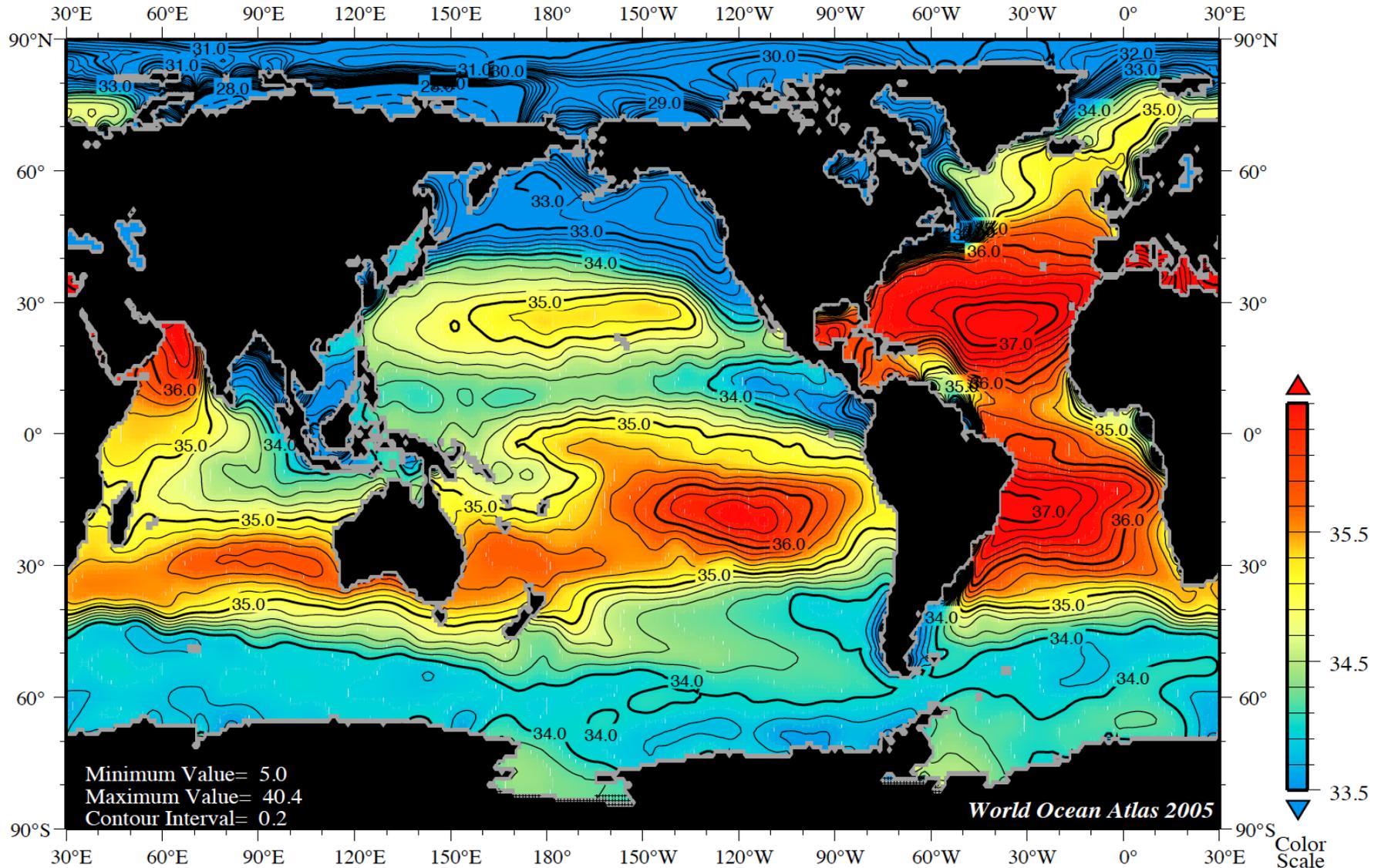
# Salinity: Variation with Depth



Seawater is **not uniformly saline** throughout the world.

- Surface (mixed) layer salinity is influenced by:
  - evaporation of water (‰↑)
  - ice formation (‰↑)
  - ice melting (‰↓).
- Saltier water is denser and consequently, it sinks down.
- Beyond ~1000 m, salt content changes very little.

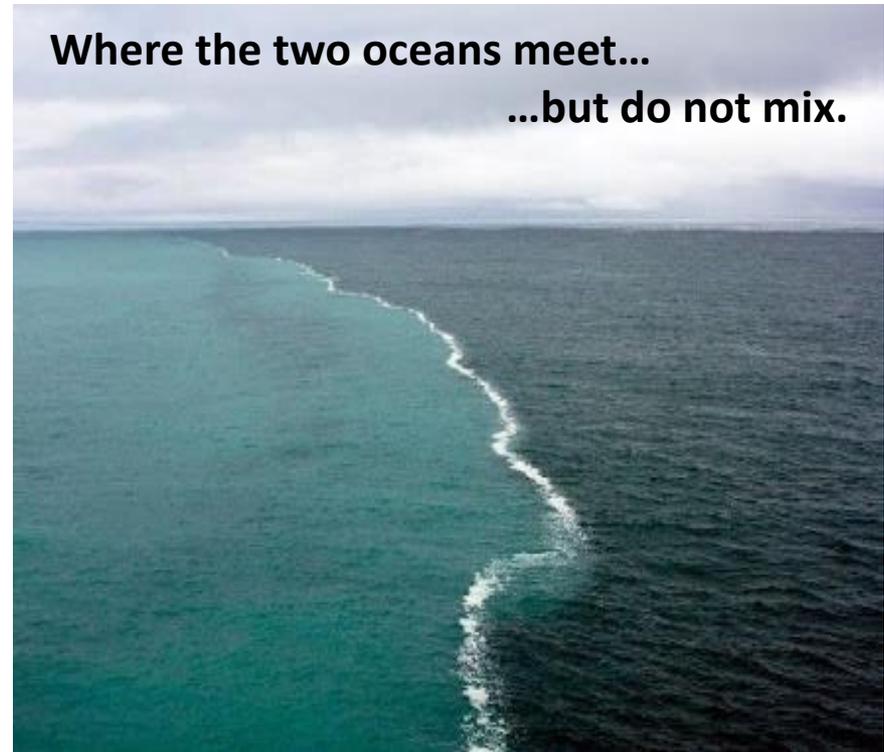
# Ocean Surface Salinity Pattern



# Difference in Salinity

Two bodies of water merging in the middle of The Gulf of Alaska form a strange and distinctive junction:

- One side is water from the melting glaciers (very low salinity) while the other has a higher percentage of salt.
- **Different salinity means different densities** and therefore makes it more difficult to mix.



**Question: which side is which?**

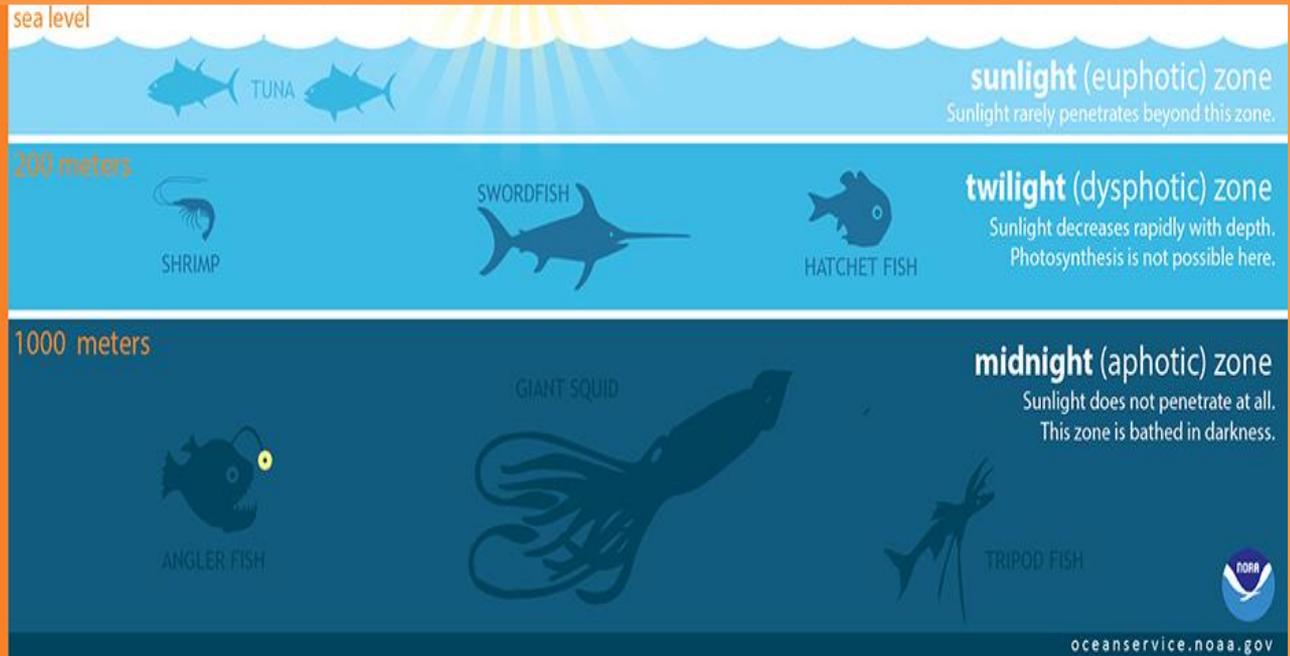
Salinity is an **ecological factor** of great importance, influencing:

- the types of organisms that live in a body of water,
- the kinds of plants that grow either in a water body, or on nearby land.

# Ocean Layers

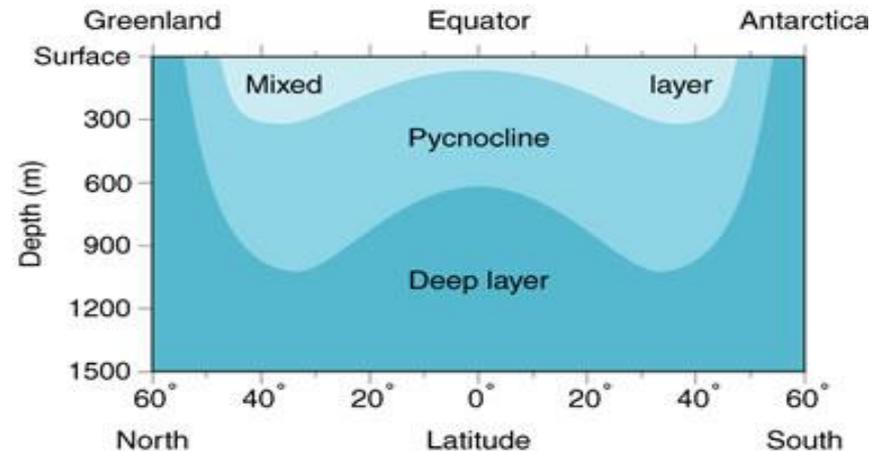
## Based on sunlight penetration:

- Sunlight (photosynthesis is possible)
- Twilight
- Midnight



## Based on water density:

- Mixed layer
- Pycnocline (rapid change of temperature/salinity)
- Deep ocean (cold and salty)



# NASA Perpetual Ocean

<https://www.youtube.com/watch?v=xusdWPuWAoU>

**Visualization of global  
ocean *surface* currents  
during 2005-2007**

