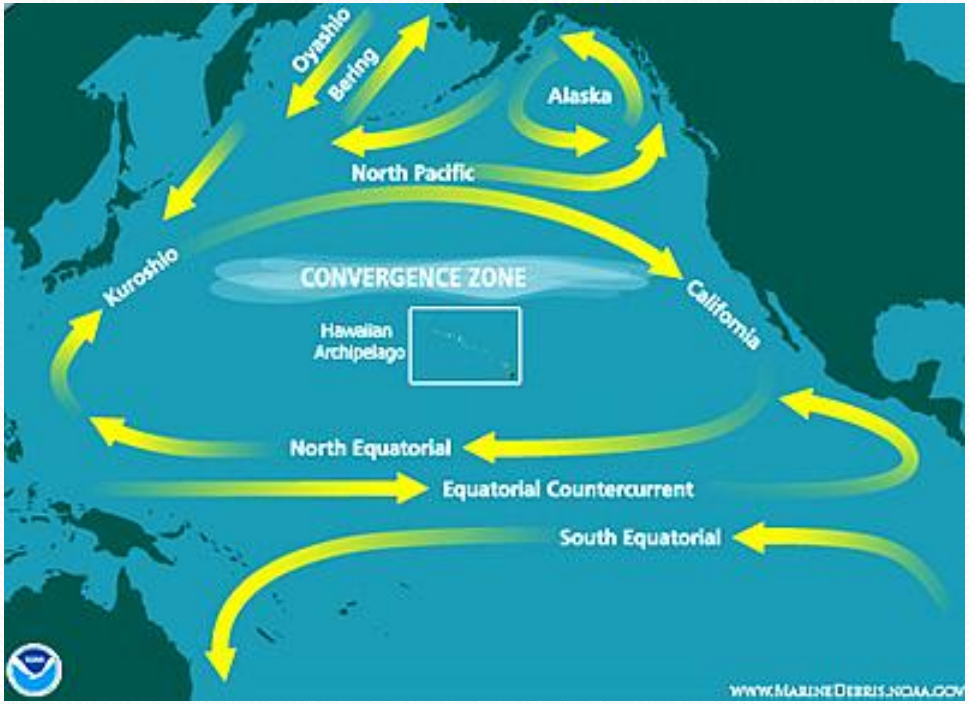
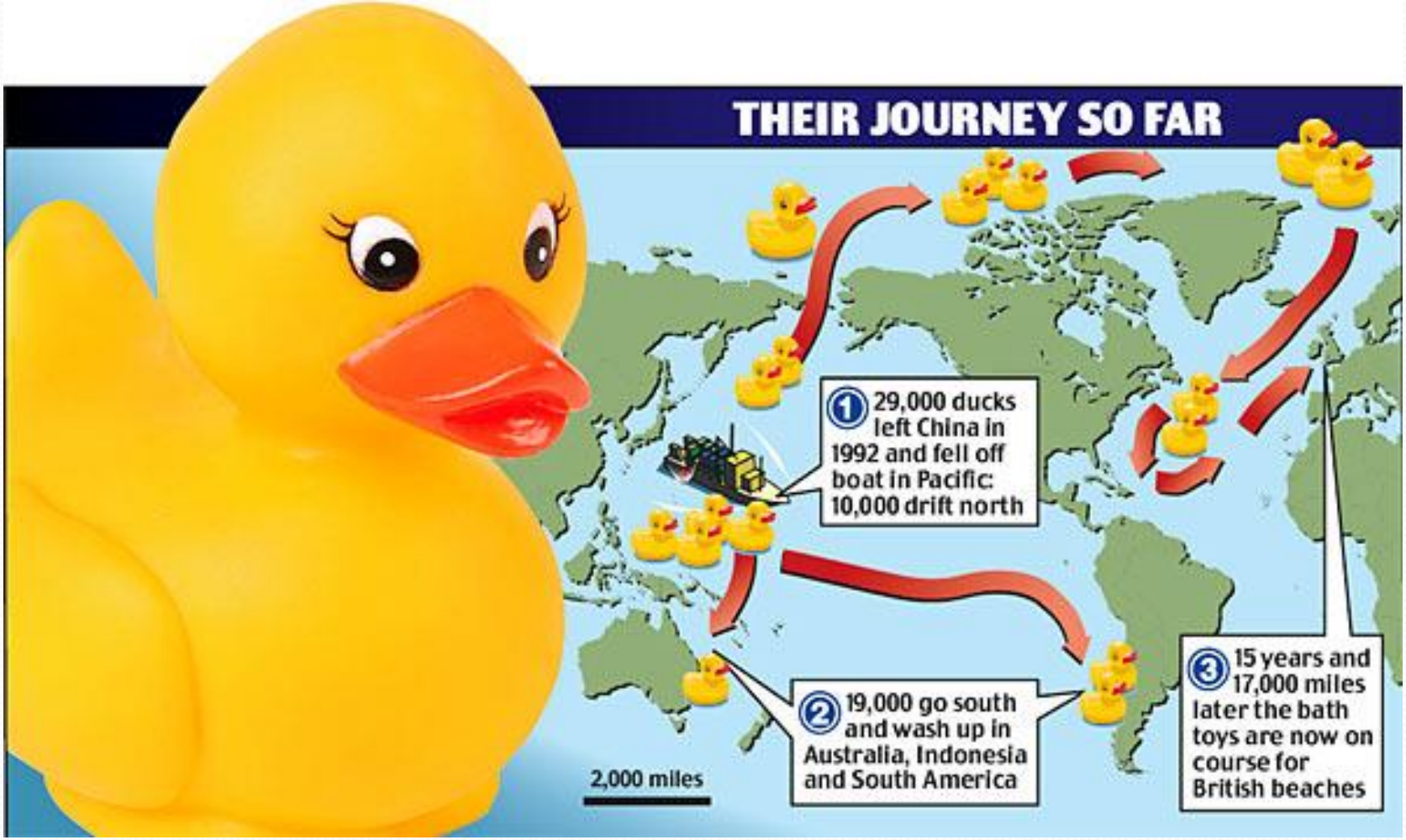
Currents and Climate

What is a ocean current?

- Ocean currents are **masses of water** that **flow from one place to another**.
- Currents can be on the surface of the ocean or in deep water.



Ocean currents move water! And more!



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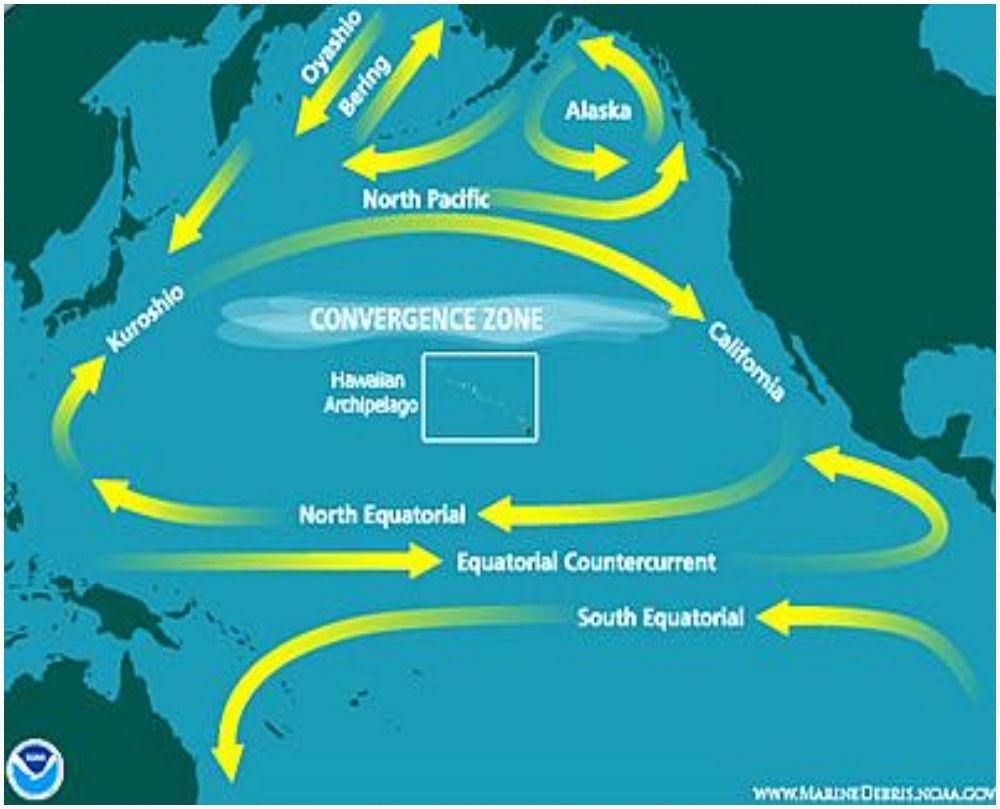
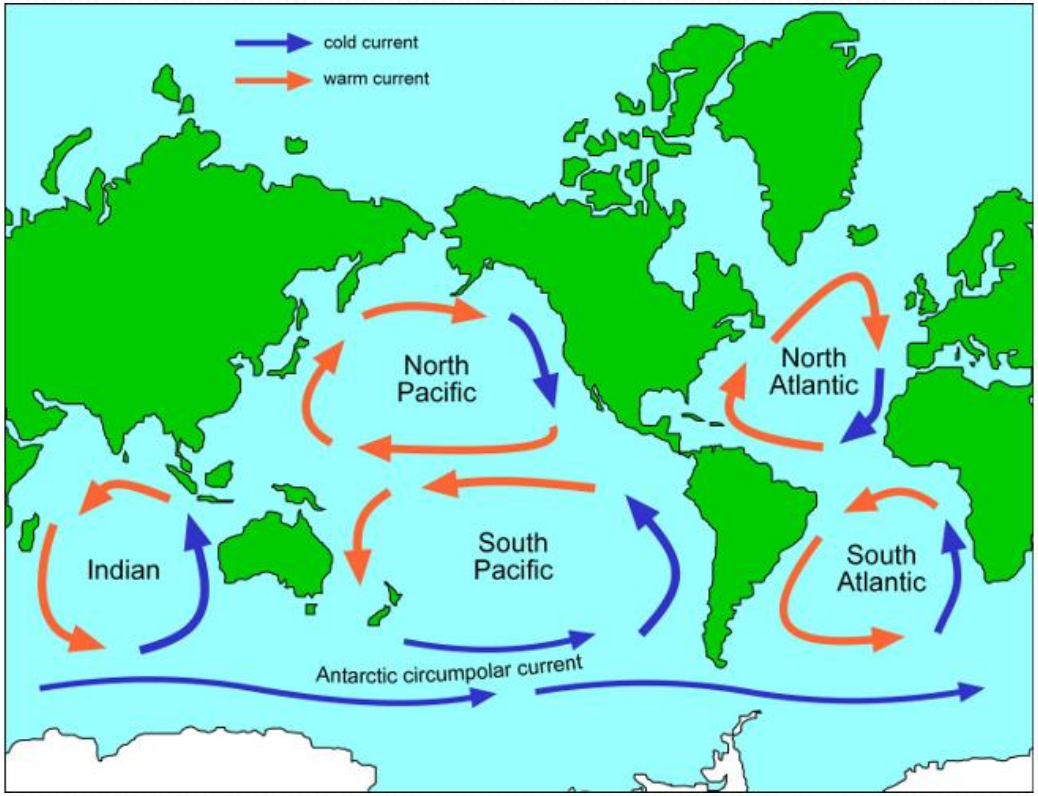
What are surface currents?

- Surface currents are movements of water that flow horizontally in the upper part of the ocean's surface.
- **The energy that drives surface ocean currents comes from wind**



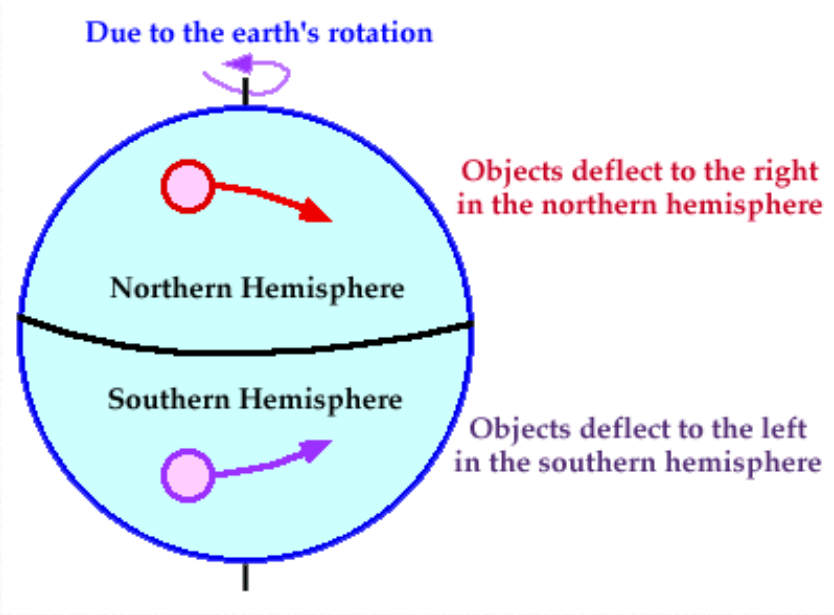
What are Gyres?

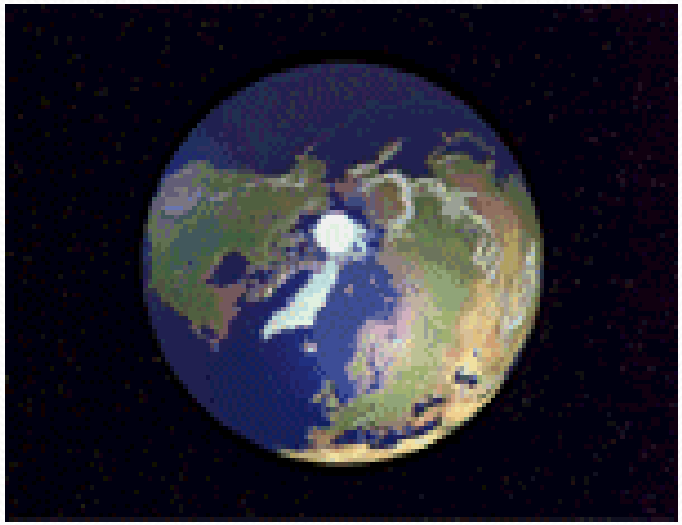
- Gyres are large whirls of water within an ocean basin.
  - North Pacific
  - South Pacific
  - North Atlantic
  - South Atlantic
  - India Ocean



Why do currents move in a circular pattern?

- Because of the Earth's rotation, **currents are deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.**
- This is called the Coriolis Effect



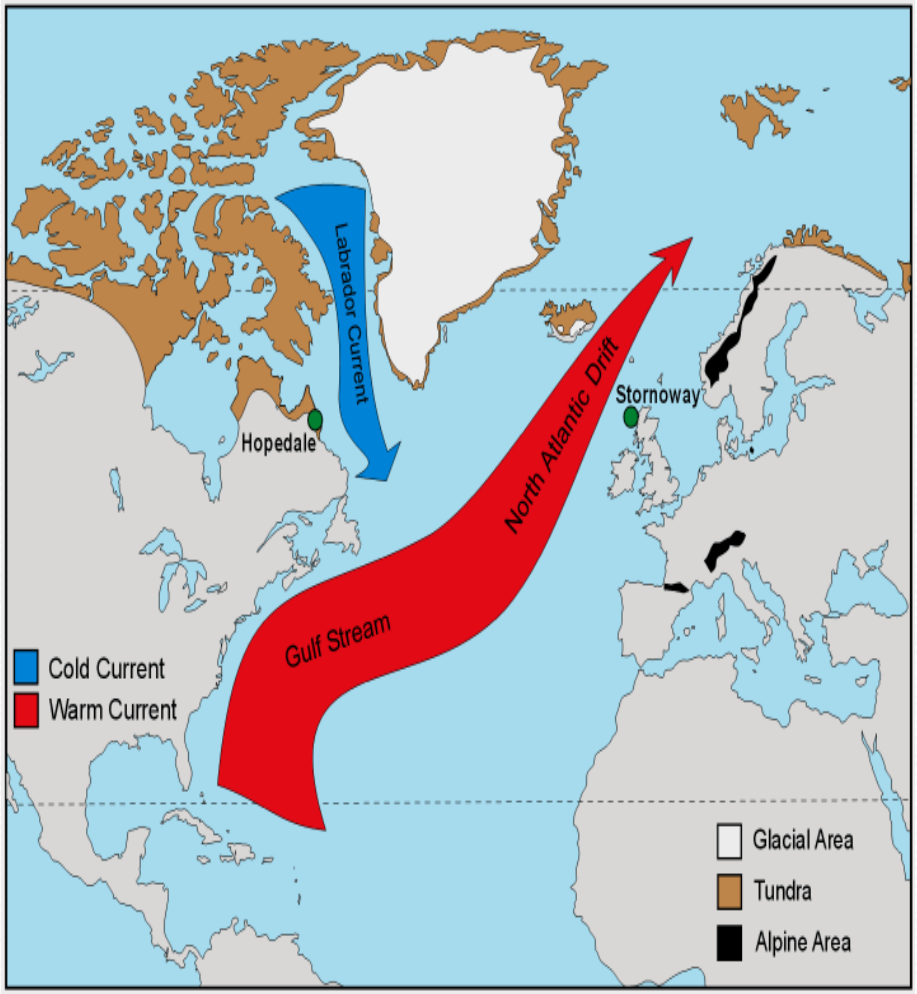


Ocean Currents and Climate

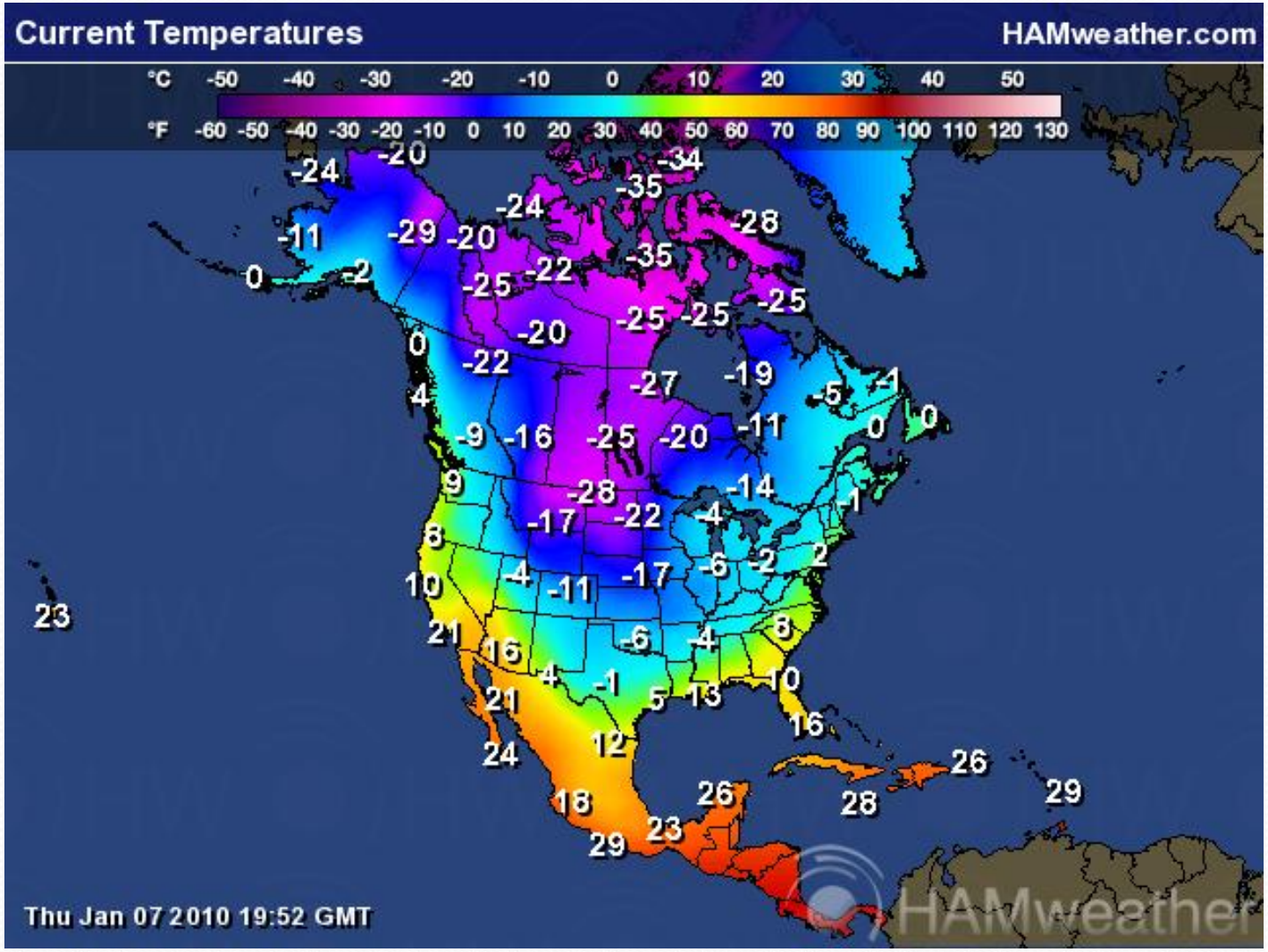
- **Oceans maintain the balance of heat energy by ocean currents cycling between the equator and the polar regions**
  - When currents from low-latitude regions move into higher latitudes, they transfer heat from warmer to cooler areas on Earth.

Ocean Currents and Climate

- Ocean currents are especially important to coastal regions
  - **Warm or cool the air temperatures along these coastal regions**
  - **An example of this is the Gulf Stream which warms the climate of Great Britain**



Temperatures in North America



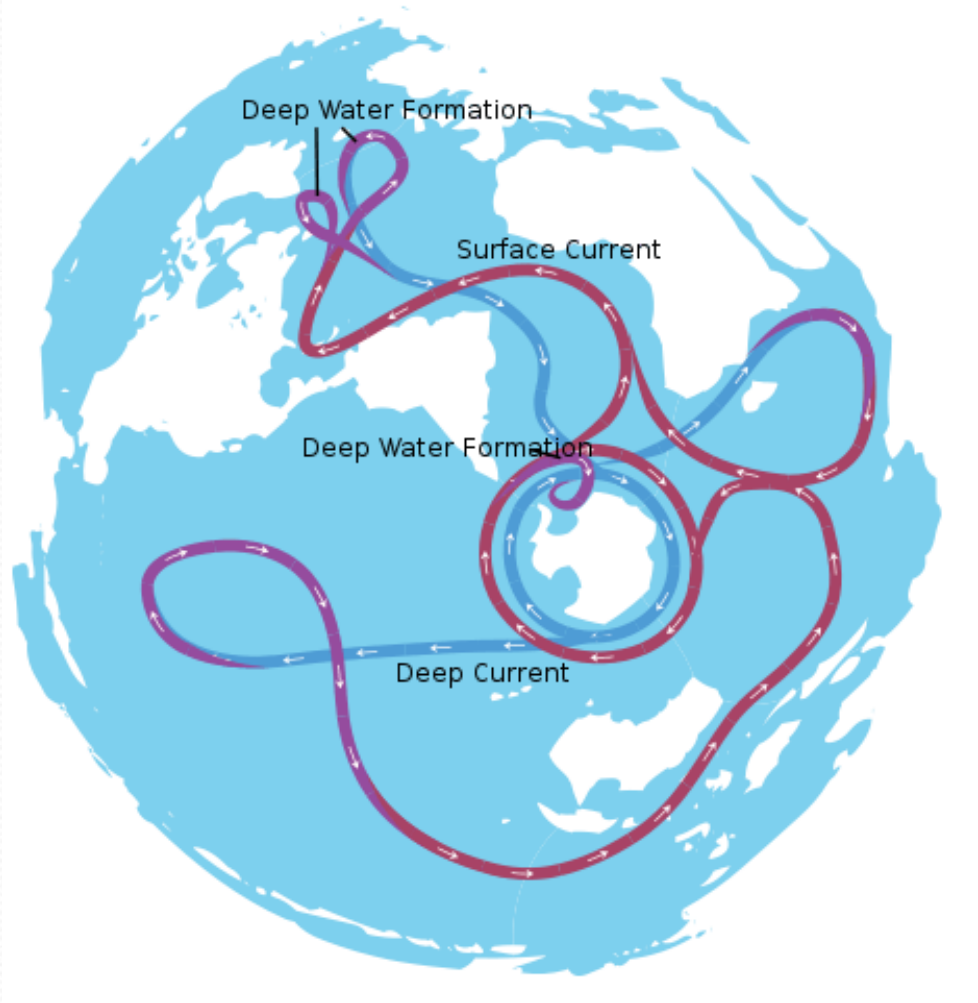
Deep (density) currents

- Deep (density) currents are vertical currents of ocean water that result from density differences among water masses.
- **Factors that affect the density of seawater:**
  - **Water temperature**
  - **Salinity**

- Decreasing temperature and increasing salinity cause water to become more dense

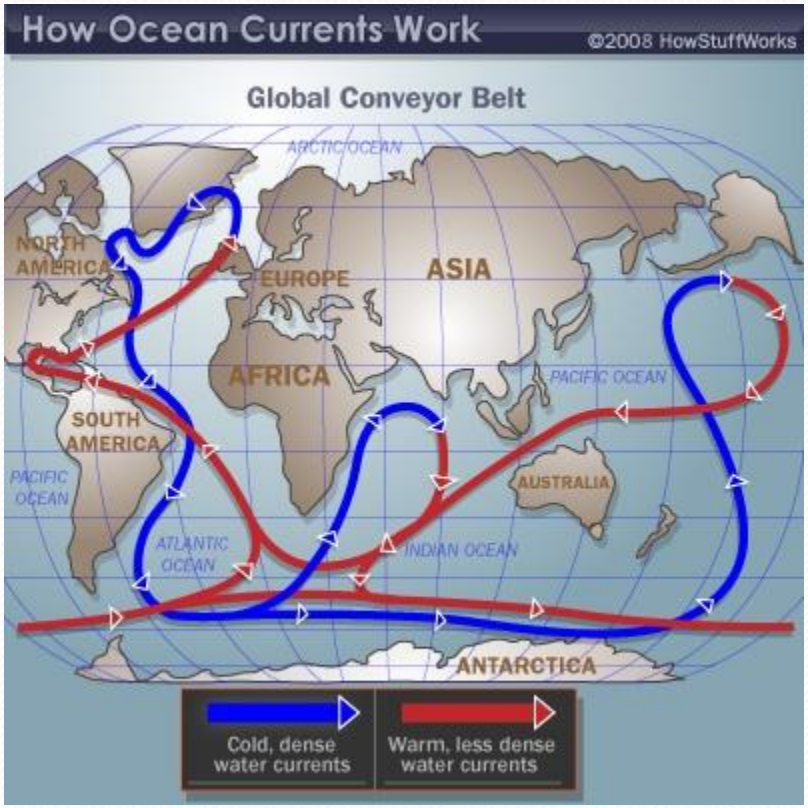
Deep currents

- Near Antarctica, surface conditions create the highest density water in the world.
- Icicles of Death Link



Deep currents

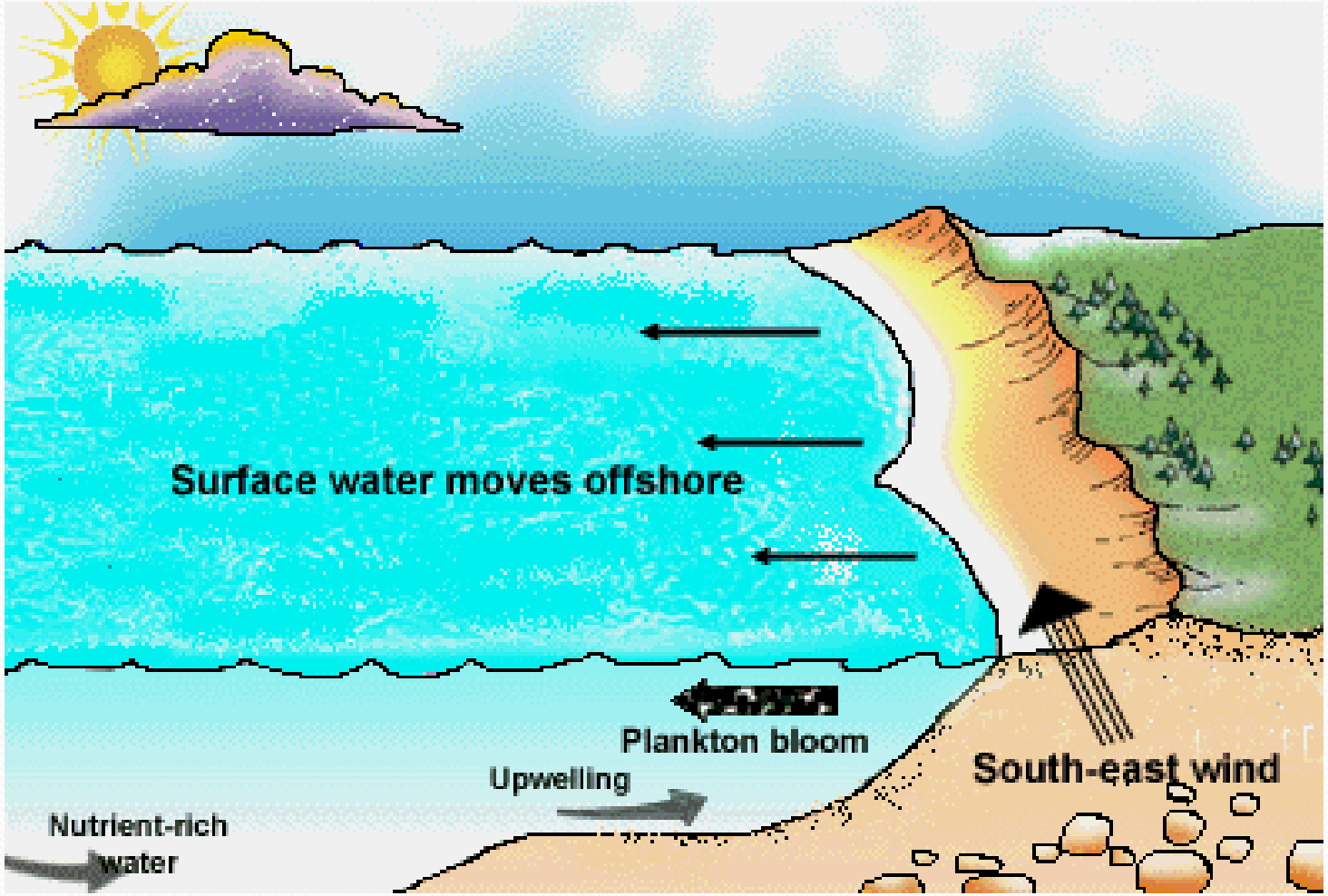
- Evaporation results in increased salinity—lowering water density.
- A simplified model of ocean circulation is called the conveyor belt.



What is upwelling?

- Upwelling is the rising of cold water from deeper layers to replace warmer surface water
- Winds blow the warm surface water away and it is replaced by cold waters (with lots of nutrients!)

- Deep water is very rich in nutrients and is brought to the surface



What's the impact of upwelling?

- Upwelling revitalizes the ocean and keeps the ocean healthy.