Currents

Objectives

- **Describe** surface currents.
- **List** the three factors that control surface currents.
- **Describe** deep currents.
- **Identify** the three factors that form deep currents.

I. One Way to Explore Currents

A. Ocean water contains streamlike movements of water that follow a regular pattern called **ocean currents.**

B. Norwegian explorer Thor Heyerdahl proved his theory that ocean currents influenced human migration by using a raft that was powered only by wind and ocean currents.

II. Surface Currents

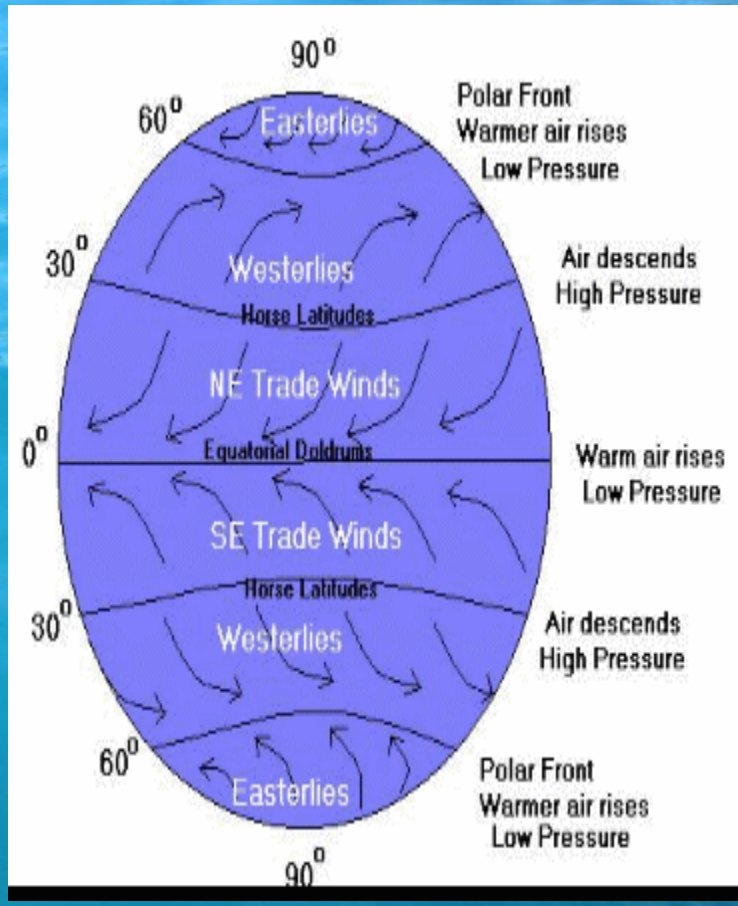
A. Horizontal, streamlike movements of water that occur at or near the surface of the ocean are called **surface currents.**

B. Surface currents are controlled by three factors: global winds, the Coriolis effect, and continental deflections.

II. Surface Currents, *continued*

C. Global Winds Winds that blow across the Earth's surface create surface currents in the ocean. Different winds cause currents to flow in different directions.

D. The Coriolis Effect is the apparent curving of moving objects from a straight path due to the Earth's rotation.



II. Surface Currents, *continued*

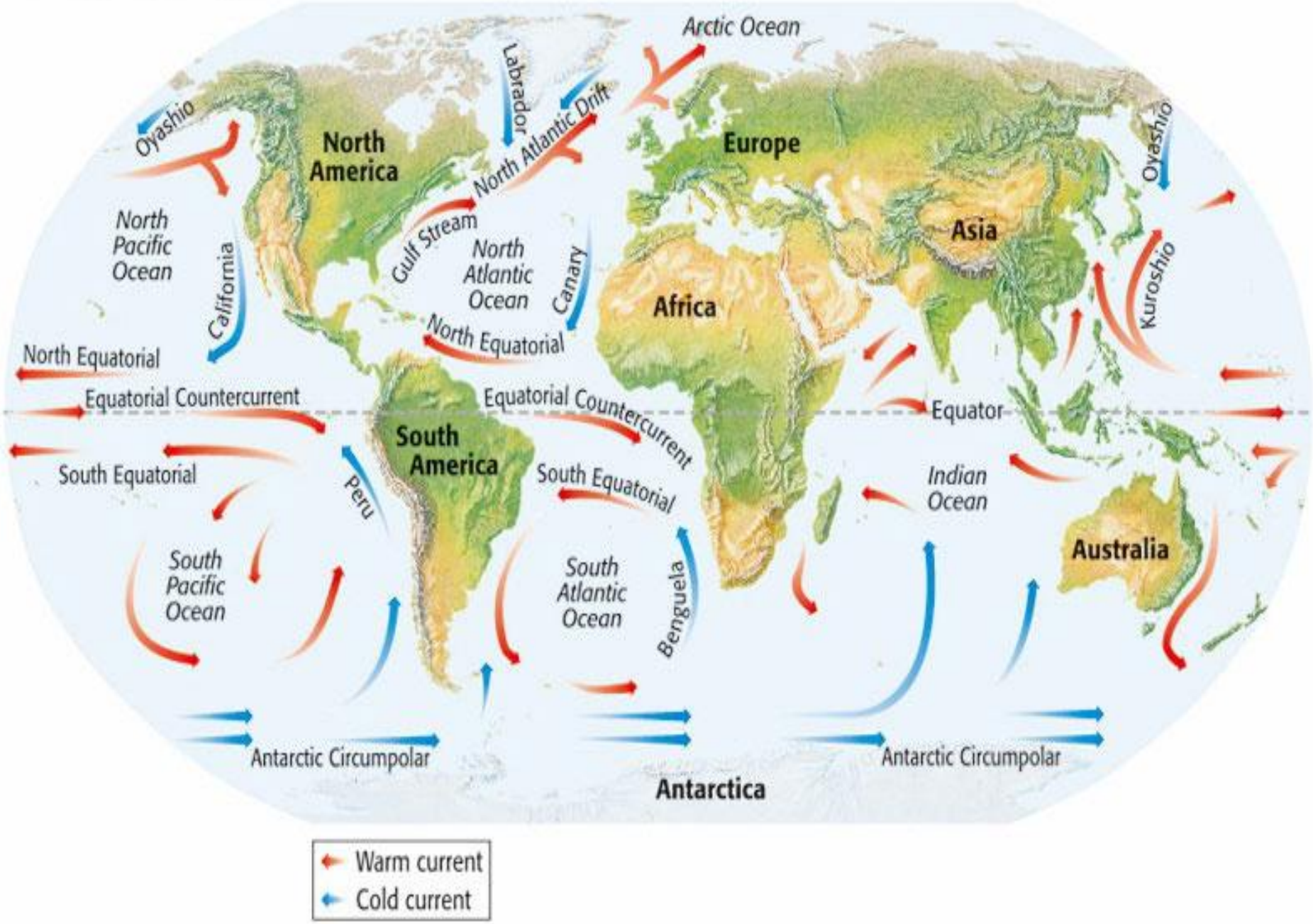
E. Continental Deflections When surface currents meet continents, the currents deflect, or change direction.

II. Surface Currents, *continued*

F. Taking Temperature
Currents are also affected by the temperature of the water in which they form.

G. The next slide shows Earth's surface currents. Warm-water currents are shown as red arrows, and cold-water currents are shown as blue arrows.

Earth's Surface Currents



Critical Thinking Time!

- Give two characteristics of surface currents.
- Give one example of a surface current.

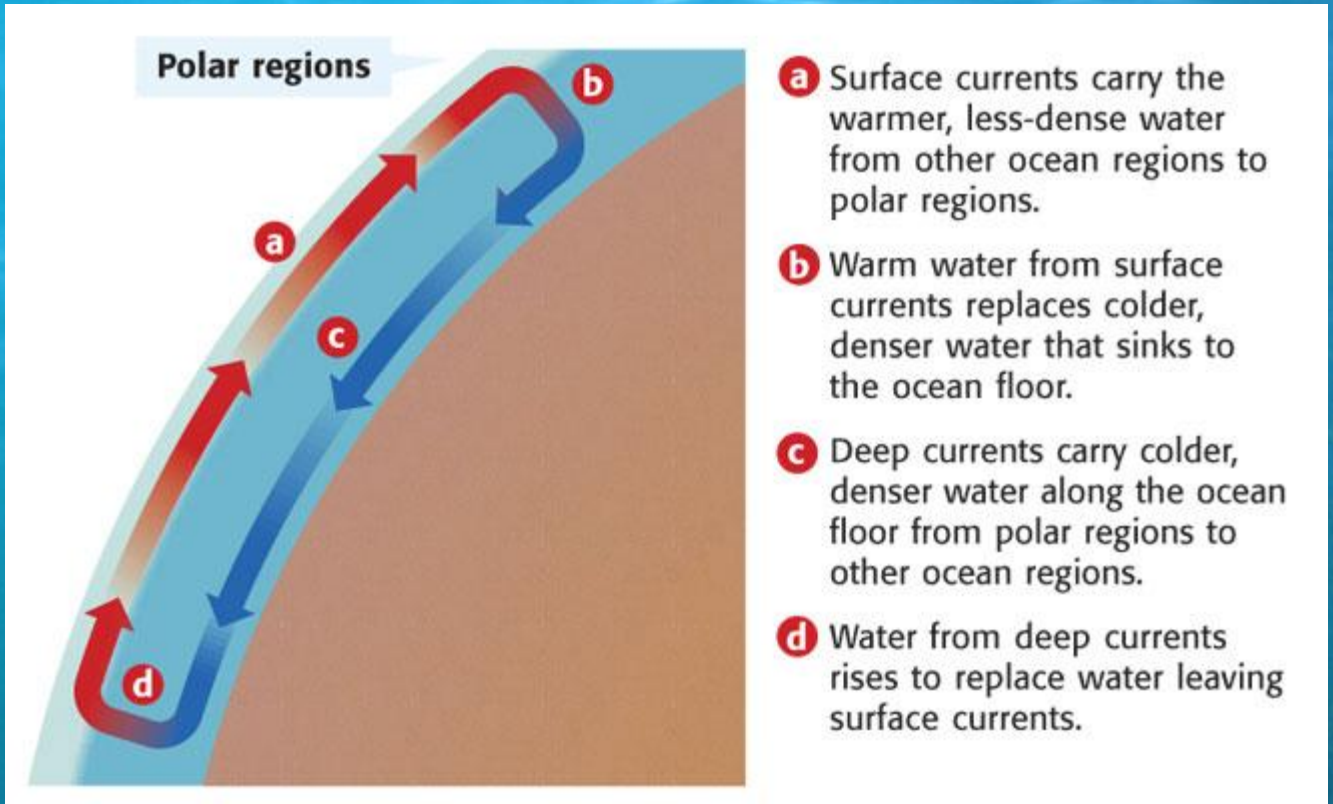
III. Deep Currents

A. Streamlike movements of ocean water located far below the surface are called **deep currents.** Deep currents are not controlled by wind.

B. Deep currents form in parts of the ocean where water density increases. The density of the ocean is affected by temperature and salinity.

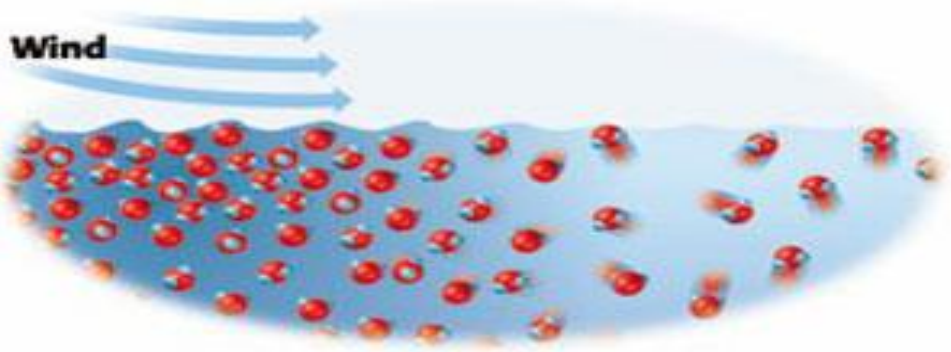
III. Deep Currents, *continued*

C. Formation and Movement of Deep Currents Differences in water density cause variations in the movement of deep currents.

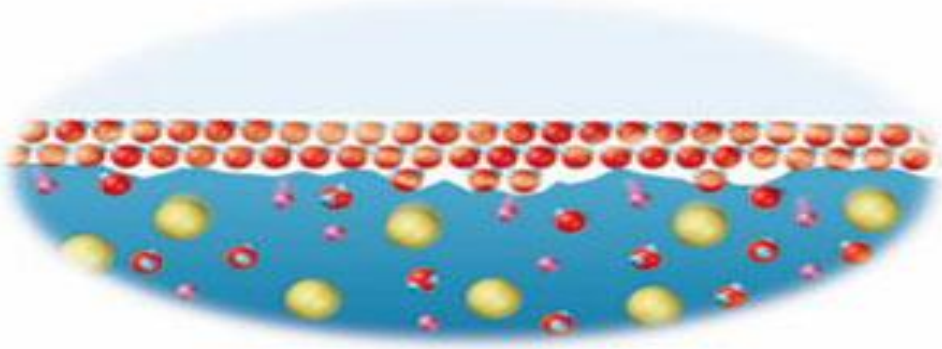


How Deep Currents Form

Decreasing Temperature In Earth's polar regions, cold air chills the water molecules at the ocean's surface, which causes the molecules to slow down and move closer together. This reaction causes the water's volume to decrease. Thus, the water becomes denser. The dense water sinks and eventually travels toward the equator as a deep current along the ocean floor.



Increasing Salinity Through Freezing If the ocean water freezes at the surface, ice will float on top of the water because ice is less dense than liquid water. The dissolved solids are squeezed out of the ice and enter the liquid water below the ice. This process increases the salinity of the water. As a result of the increased salinity, the water's density increases.



Increasing Salinity Through Evaporation Another way salinity increases is through evaporation of surface water, which removes water but leaves solids behind. This process is especially common in warm climates. Increasing salinity through freezing or evaporation causes water to become denser, to sink to the ocean floor, and to form a deep current.