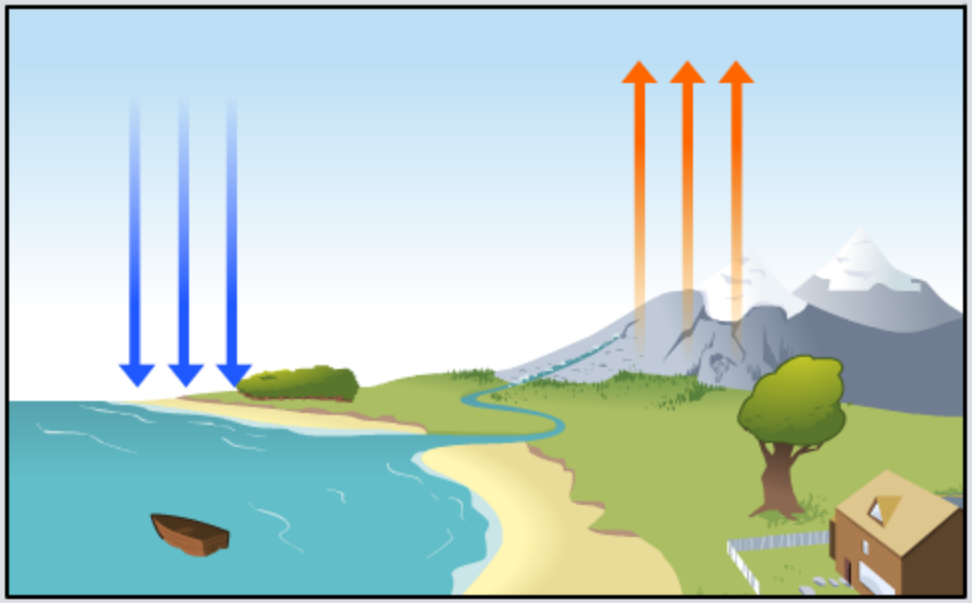
Wind and Ocean Currents

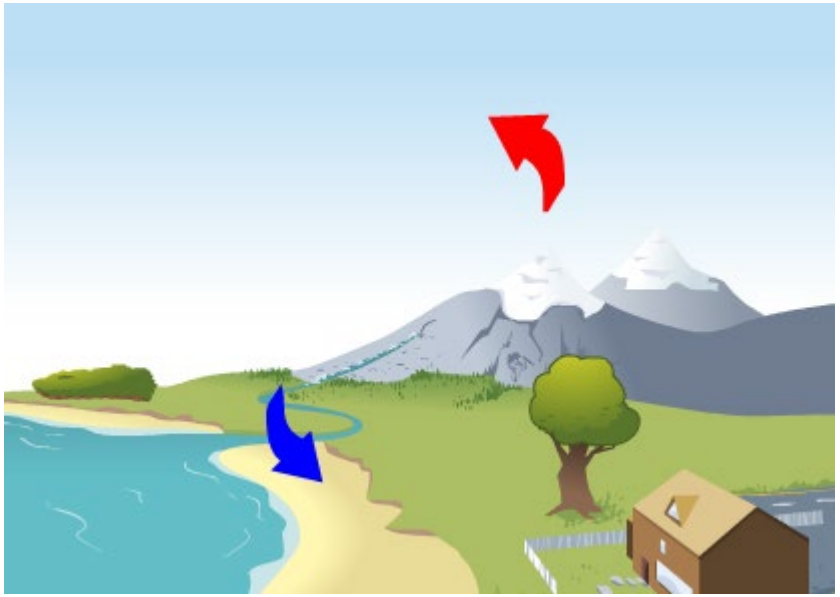


Convection currents

Local weather is affected by the movement of air masses all over the world.

Some of this movement happens because the Sun heats the surface of the Earth unevenly. Temperature differences in the air cause **convection currents**.

Convection currents in the atmosphere move warm air into colder areas. These wind currents take place anywhere there are temperature differences in the air. This often happens in places with nearby water.



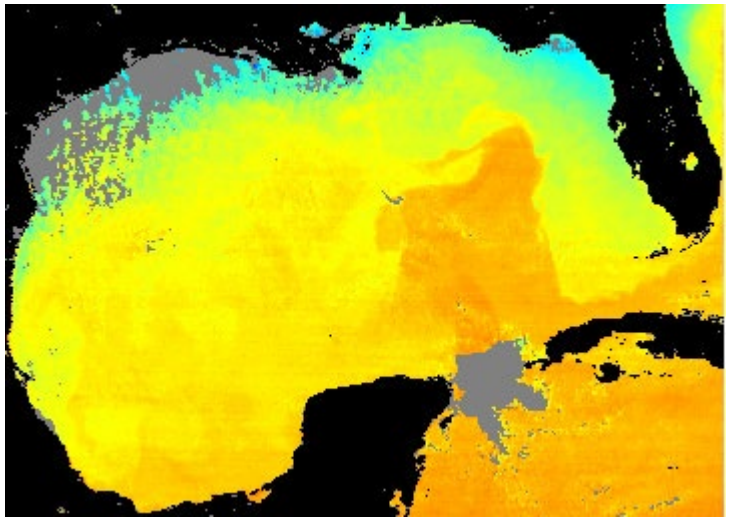
Sea breezes and land breezes

Nearby water

Air, land and water all absorb heat differently. Water is better at conserving heat than air or land.

When it is hot outside, deep, cold water keeps the overall temperature of the water low. This cools the air above the water.

The cool air moves ashore, lowering the land temperature.



When it is cold outside, water holds its heat better than land. The warm water releases heat into the air. This warm air moves ashore, raising the land temperature.

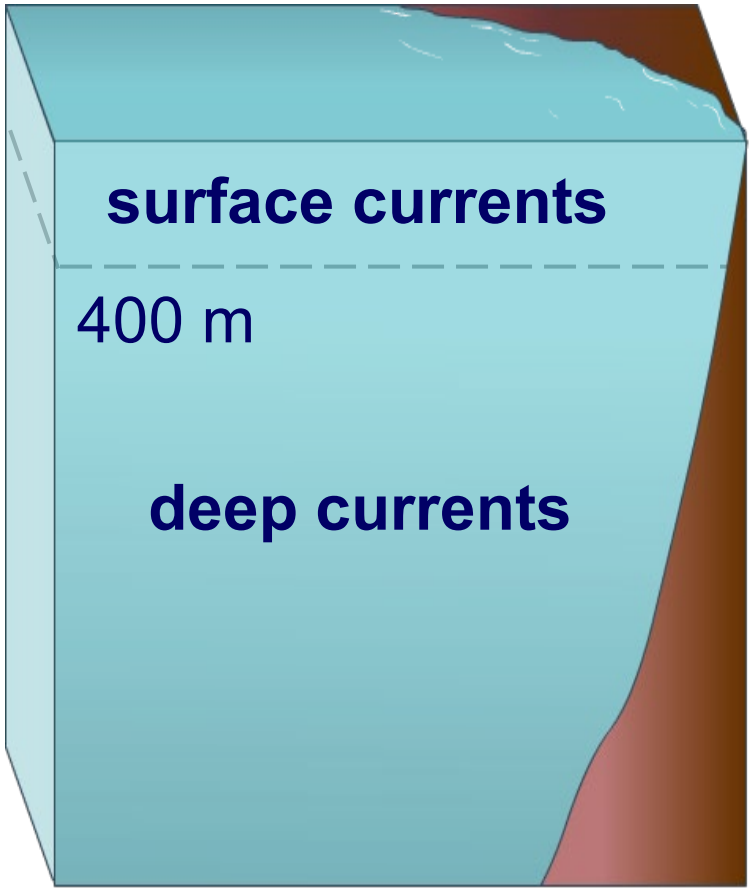
The rotation of the Earth

Ocean currents

Heating of the Earth's surface and atmosphere by the Sun also drives convection in the oceans, producing ocean currents.

There are two circulation systems in the ocean:

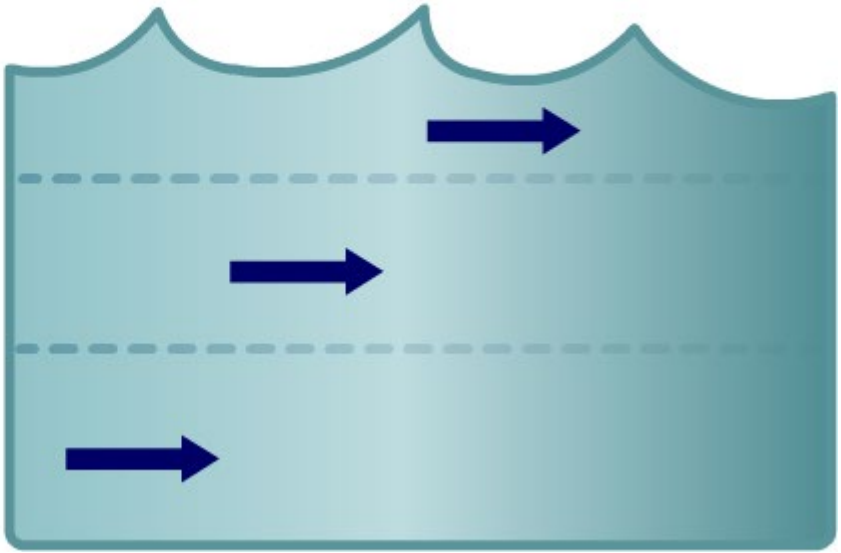
- **surface currents** – this occurs in the upper part of the ocean. This involves just the top 10% of the water in the ocean.
- **deep currents** – this occurs below 400 meter depth.



What causes ocean currents?

The Earth's oceans are all connected to form one big ocean. Ocean currents move water around the world, affecting global and local weather.

There are many factors that affect ocean currents. **Wind** can cause the surface of the ocean to move, which can move the layers below.

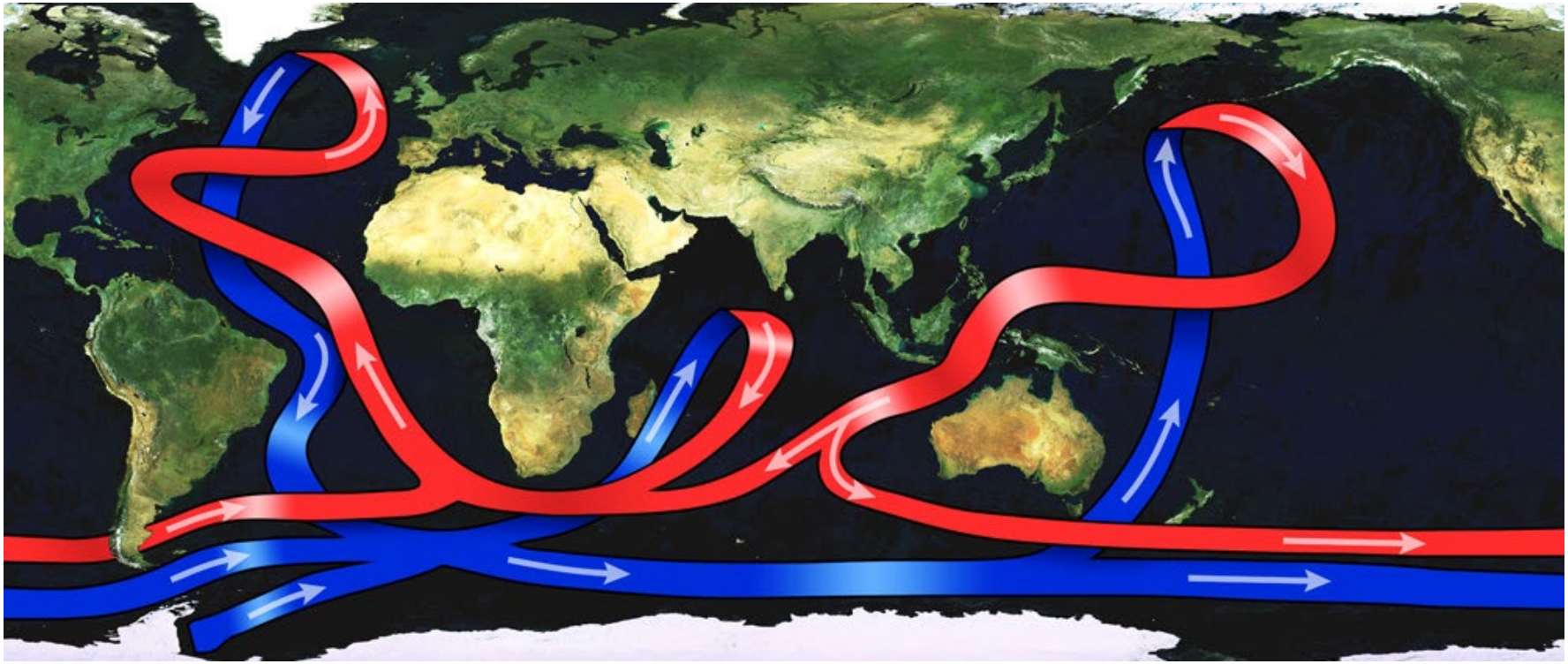


The rotation of the Earth affects ocean currents the same way it affects air currents. The **Coriolis effect** can shift the flow of ocean currents to the right or left of its intended destination.

Global ocean conveyor belt

Water's temperature and density also affect its movement. Cold water is denser than warm water. The dense water sinks, starting a deep current that moves water around the world.

This is often called the **global ocean conveyor belt**.



Ocean currents and weather

The movements of **ocean currents** can have a major effect on global and local weather.

Ocean currents can move streams of warm or cool water thousands of miles, warming or cooling the air above them.

For example, the **Gulf Stream** moves warm water from the Gulf of Mexico to the northern Atlantic around Western Europe. This means that the average temperature of London, England is not much colder than that of San Francisco, CA, despite being much farther from the equator.

True or false?