

# Global Wind Belts and Ocean Currents

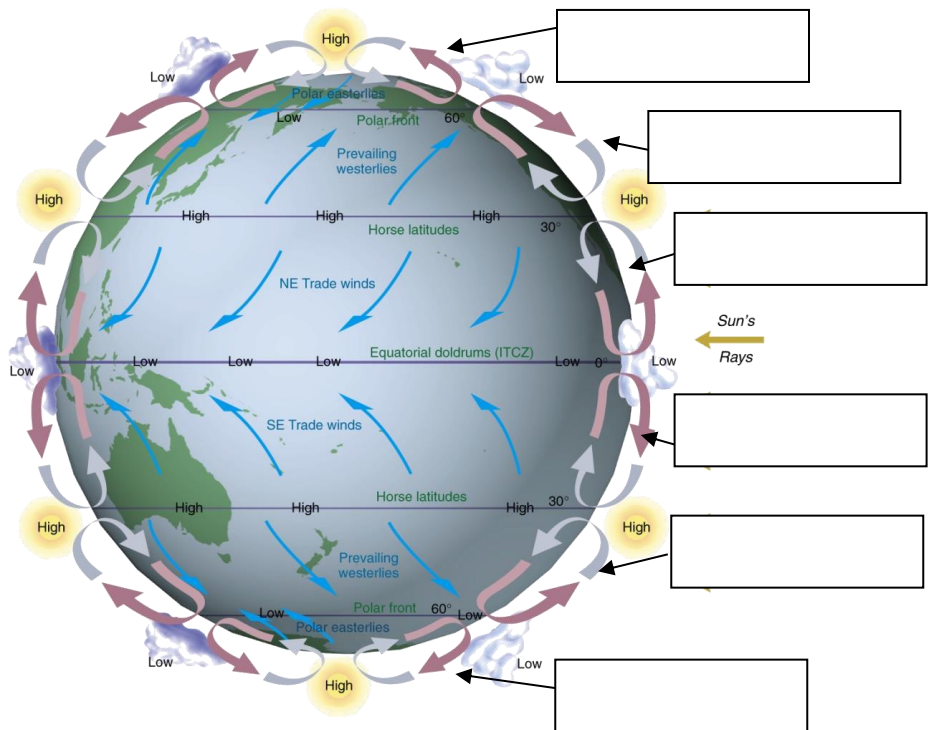
## Background:

Surface currents in the ocean are one of the main way heat is distributed around our planet. But what causes these “rivers” of seawater to flow over thousands of kilometers across the oceans? **The answer is winds.** On a global scale, winds tend to blow pretty regularly in the same direction, depending on their latitude. Today you will be labeling both the Earth’s global wind belts and the large circular surface ocean currents called **gyres**.

Below you will find directions for labeling your maps as well as various questions that relate to the global wind belts and ocean surface currents. Keep in mind that these questions are your notes. **WRITE THOUGHTFUL ANSWERS.**

## Part 1: Global Winds

- The earth’s rotation causes the global winds of the earth to deflect and flow in a certain way. What is the name of this effect? Explain how it works (*see p. 449*). **Make sure to tell which way the deflection occurs depending on the hemisphere (Northern vs. Southern).**



- The following is a list of large convection cells that occur in the earth’s atmosphere. These “cells” are shown on the picture above. **Label these cells in the boxes to the right of the picture above** according to the latitudes listed below. (All 3 occur both in the north AND the south)
  - HADLEY CELL** → warm air rises at the equator (0° latitude) and cools/sinks as it approaches 30° latitude
  - FERRELL CELL** → warm air rises at 60° latitude and cools/sinks as it approaches 30° latitude
  - POLAR CELL** → warm air rises at 60° latitude and cools/sinks as it approaches the poles
- The picture above shows the winds that blow along the Earth’s surface at different latitudes. ON YOUR WIND BELTS MAP (see separate sheet with blank map), **draw in the wind belts** from the globe above and **label their names**, e.g. SE Trade Winds, Westerlies, Polar Easterlies, etc. (*There’s another picture on p. 541.*)
- Look at the convection cells on the globe above. What seems to be forming along the equator as the winds converge and rise? (Warm, moist air rising creates...?) Explain why this makes sense considering the conditions you’d expect to find in tropical environments.

## Part 2: Surface Currents

5. What is a **surface current**? Explain what causes these currents, **in your own words**. (See p. 448)
  
6. Large circular surface currents of water within the ocean are called **ocean gyres**. Using the map on the other side of your global winds map, label the 5 main ocean gyres listed below. You can see them in *Figure 2* on p. 449. Notice that each gyre is made up of several different currents. You do not need to write the names of each of these, but **draw them in using red and blue colored pencil based on the current's temperature**.
  - *North Atlantic Gyre*
  - *South Atlantic Gyre*
  - *North Pacific Gyre*
  - *South Pacific Gyre*
  - *Indian Ocean Gyre*
  
7. On this same map, label the **names of just the four currents associated with the North Atlantic Gyre**.
  
8. Based on the colors of these currents, why do you think much of Europe has such a similar climate to our own even though many countries (such as the UK) are significantly farther north? Which current plays the biggest role in this?
  
  
  
  
  
  
  
  
  
  
9. **Winds** are the main driver of surface currents. What causes water to circulate in the deep ocean?
  
  
  
  
  
  
  
  
  
  
10. Draw a basic diagram showing what is meant by the global ocean conveyor belt. (*Your diagram can be a simplified version of the figure on p. 453.*) Include a caption that explains your diagram.
  
  
  
  
  
  
  
  
  
  
11. Look at *Figure 8* again. What is happening to the surface water when it gets near Greenland, and WHY?
  
  
  
  
  
  
  
  
  
  
12. What two places do the cold deep-water currents seem to be returning to the surface?