

# Unit 3

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## Ocean Current Vocabulary

### Ocean Currents Vocabulary

1. **Convection Current** – warm gas or liquid molecules rising and cooler air or water molecules sinking
2. **Cold Current** – ocean water from the poles travel towards the equator
3. **Warm Current** - ocean water from ~~the~~ *the equator* *travels towards the poles.*
4. **Coriolis Effect** – the curved path of a moving object due to the Earth's rotation
5. **Continental Deflection** – when ocean water travels toward continents it deflects or changes direction
6. **Deep Current** - ocean current that is denser due to higher salinity and lower temperature flowing from the poles to the equator.
7. **Surface Current** - ocean current that is less dense due to lower salinity and higher temperature flowing along the surface of the ocean from the equator to the poles
8. **Density** - how tightly packed particles of a substance are
9. **Thermohaline Circulation** - Large-scale density-driven circulation in the ocean, caused by differences in temperature and salinity.
10. **Global Conveyor Belt** - a system of deep ocean currents that moves water throughout the world's oceans

Assignment #1 due 10/24/18 (Wed.)

Assignment #2 due 10/30/18 (Tues.)

# Ocean Currents Notes

Ocean currents are stream-like movements of water in the ocean.

Surface currents occur at or near the surface of the ocean. Ex. The Gulf Stream

Controlled by 3 factors:

1. Global Winds
  - winds that blow across the Earth's surface
2. Coriolis Effect
  - Earth's rotation causes wind to surface currents to appear to move in curved paths, not straight lines.
3. Continental Deflections
  - when surface currents meet continents the currents change direction.

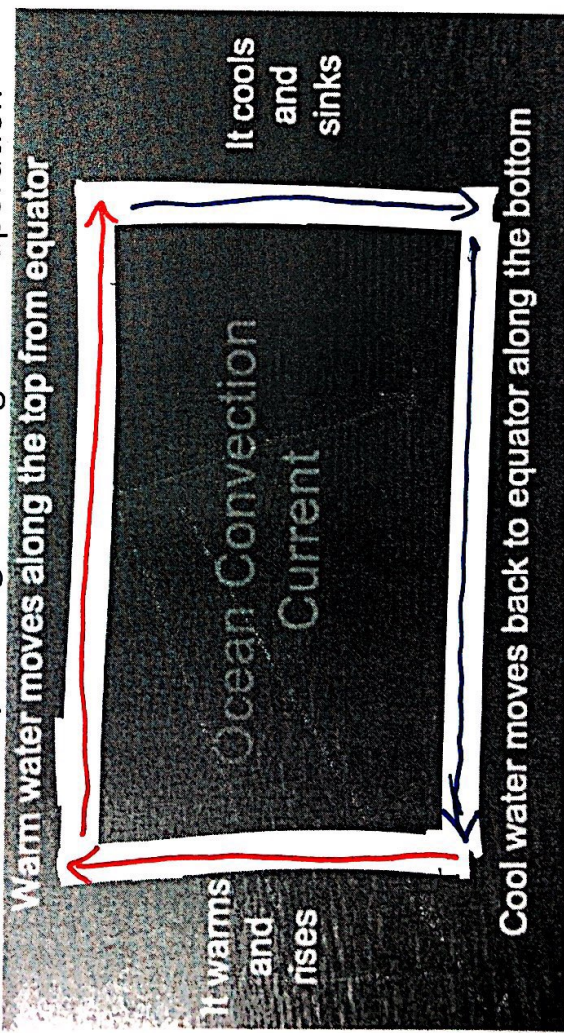
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**Deep water currents:**

- Currents that flow far below the surface.
- They are controlled by water density, NOT wind!
- Form when the density of the ocean water increases and it sinks toward the bottom of the ocean creating a convection current.

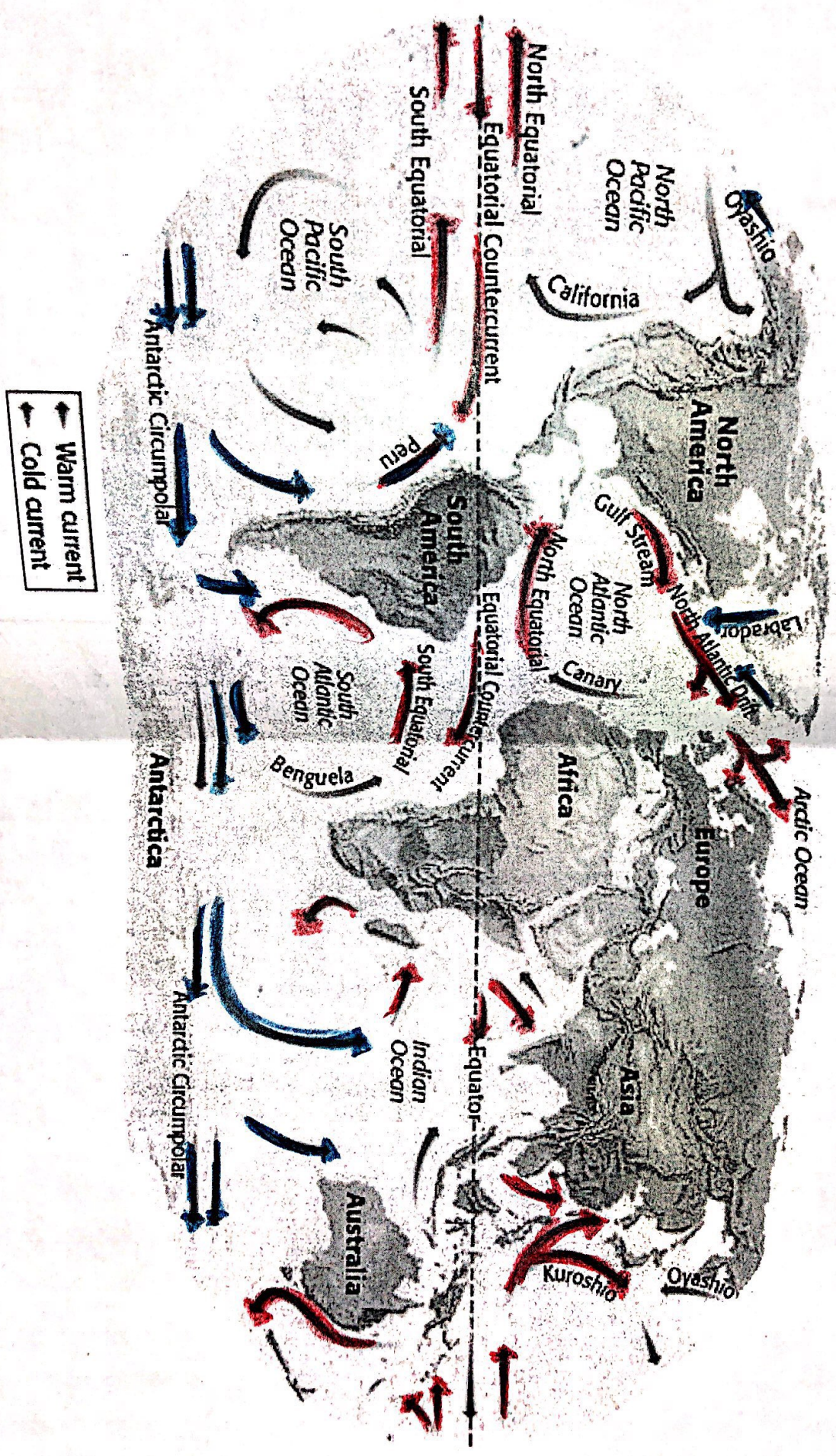
**Density of water increases by:**

- decreasing temperature (cold is denser than warm)
- increasing salinity through freezing and evaporation



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Trace the warm currents in red.  
Trace the cold currents in blue.



Name \_\_\_\_\_

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Name \_\_\_\_\_

### Ocean Current Questions

Use the map and your notebook to help you answer the questions.

1. Using the map, <sup>①</sup>compare the direction of currents in the Northern and Southern Hemispheres of the Earth. <sup>②</sup>What causes the direction of the currents to be different? Explain your answer in complete sentences, and cite evidence from the map.

Currents in the Northern Hemisphere turn clockwise and Southern turn counter-clockwise. This is caused by the Coriolis Effect. The arrows show this.

2. Using the map, <sup>①</sup>explain how the location of currents affects their temperature. <sup>②</sup>Give an example of a cold water current and a warm water current. <sup>③</sup>Where do cold water and warm water currents flow towards? Explain your answer in complete sentences, and cite evidence from the map.

Currents by the equator are warm and by the poles they are cold. A cold current example is Peru and a warm current is the Gulf Stream. Cold currents move towards the equator and warm currents move towards the poles. The arrows show this movement.

3. What happens to the direction of an ocean current when it approaches the coast of a large landmass? Write your answers in complete sentences, and cite evidence from the map.

The water turns when it approaches land. The arrows show the water turning by land.

① Weather vs Climate  
day to day place & time changes

Climate year after year covers large area average

### CLIMATE CONTROL?



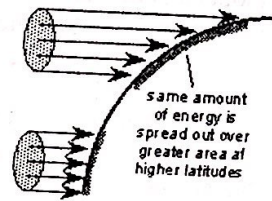
Weather is day-to-day events. The weather may be cloudy one day and rainy the next. Weather refers to the condition of the atmosphere at a particular place and time. Climate, on the other hand, refers to the average, year-after-year conditions of temperature, precipitation, winds, and clouds in an area. The climate of a region is determined by two main factors: temperature and precipitation. A climate region is a large area with similar climate conditions throughout.

Constant changes

### Temperature

similar all across world

The main factors that influence temperature are latitude, altitude, distance from large bodies of water, and ocean currents. In general, climates of locations farther from the equator are cooler than climates that are closer to the equator. As you have learned, the sun's rays hit Earth's surface more directly at the equator. At the poles the same amount of solar radiation is spread out over a larger area, and therefore brings less warmth. Scientists have divided Earth's surface into three temperature zones based on latitude: the polar zone, the temperate zone, and the tropical zone.

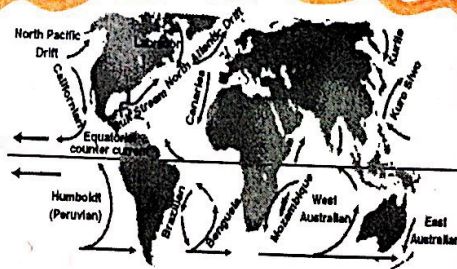


In addition to latitude, the altitude at a particular location will affect temperature. Air temperature decreases as the elevation increases. In the case of high mountains, altitude is a more important factor than latitude. For example, the peak of Mount Kilimanjaro towers high above the African plains at nearly 6 kilometers above sea level. Although it is located at 3° south latitude near the equator, Mt. Kilimanjaro is covered in snow all year round.

Another factor that will affect temperature is the distance a particular location is from a large body of water. Oceans greatly moderate the temperatures of nearby land. Water heats up more slowly than land; it also cools down more slowly. Therefore, winds from the ocean keep coastal regions from reaching extremes of hot and cold. Much of the west coasts of North America, South America, and Europe have mild marine climates. The centers of North America and Asia are too far inland to be warmed or cooled by the oceans. Most of Canada and Russia, as well as the central United States, have continental climates.

SEA & LAND BREEZE

Many marine climates are also influenced by ocean currents. In general, warm ocean currents carry warm water from the tropics toward the poles. Cold currents bring cold water from the polar zones toward the equator. The surface temperature of the water warms or cools the air above it. The warmed or cooled air then travels over the nearby land. So a warmed current brings warm air as a cool current brings cool air to the land it touches.



the current affects the air temp on land

\* We can construct an explanation for how geographic features & ocean currents affect the climate of a region through heat transfer.

Comparing Climates

Names: \_\_\_\_\_ Date: \_\_\_\_\_

## COMPARING CLIMATES

Your group will be assigned two locations with similar latitudes. One location is in a coastal area, the other is landlocked.

Students from each group should go to [http://www.timeanddate.com/](http://www.timeanddate.com/weather.com/) weather.com Find the average monthly temperatures for both cities

city: Nags Head, NC

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
HIGH TEMP	52	54	60	69	76	83	87	86	81	72	63	56
LOW TEMP	36	37	43	51	60	68	73	72	68	58	48	41

city: Clarksville, TN

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
HIGH TEMP	46	52	62	72	79	87	90	90	83	72	61	49
LOW TEMP	27	31	38	47	56	65	70	68	60	47	38	30

#1 City #1: Dallas, TX (32.80°N)  
City #2: Sullivan's Island, SC (32.76°N)

#2 City #1: Jackson, MS (32.29°N)  
City #2: Hilton Head Island, SC (32.21°N)

#3 City #1: Nags Head, NC (36.29°N)  
City #2: Clarksville, TN (36.53°N)

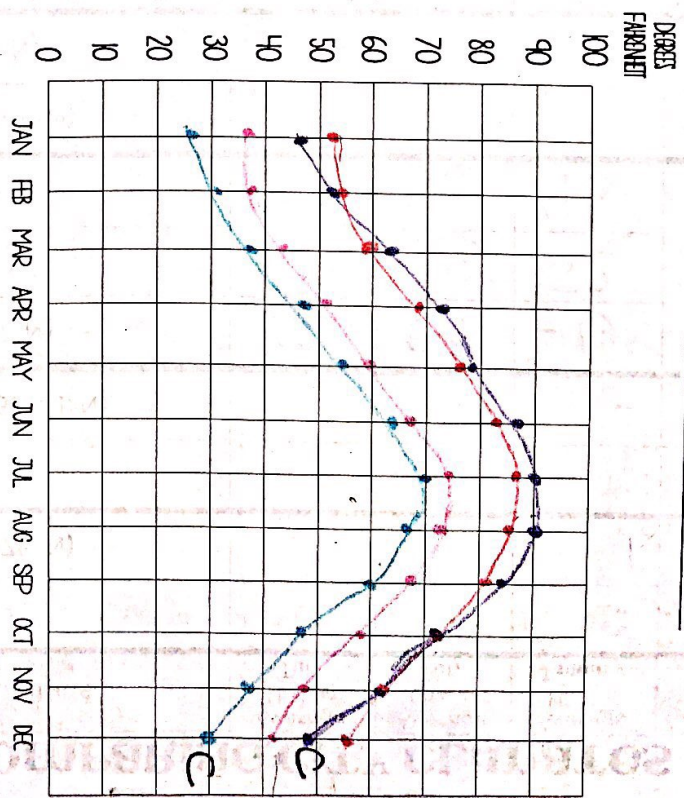
#4 City #1: Lincoln, Nebraska (40.8069°N)  
City #2: Nantucket, MA (41.2835°N)

#5 City #1: Rapid City, SD (44.0805°N)  
City #2: Owis Head, ME (44.0823°N)

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## AVERAGE MONTHLY TEMPERATURES FOR:

CITY #1: \_\_\_\_\_  
CITY #2: \_\_\_\_\_



**GRAPHKEY**

CITY #1 AVERAGE HIGH (red line)

CITY #2 AVERAGE HIGH (blue line)

CITY #1 AVERAGE LOW (red line)

CITY #2 AVERAGE LOW (blue line)

# COMPARING CITY CLIMATES

City - State - Latitude	Average High in July	Average Low in July	Average High in January	Average Low in January	Coastal or Landlocked
Dallas, TX (32.80°N)					
Sullivan's Island, SC (32.76°N)					
Jackson, MS (32.29°N)					
Hilton Head Island, SC (32.21°N)					
Mountain City, TN (36.47°N)	82	59	46	22	land
Nags Head, NC (36.29°N)	87	73	52	36	Coastal
Clarksville, TN (36.53°N)	90	70	46	27	land
Lincoln, Nebraska (40.8069°N)					
Nantucket, MA (41.2835°N)					
Rapid City, SD (44.0805°N)					