

# WEATHER TEACHER GROUP

## STUDENT VIEW COPY

Introduce

6-4.7

6-4.8

6-4.9

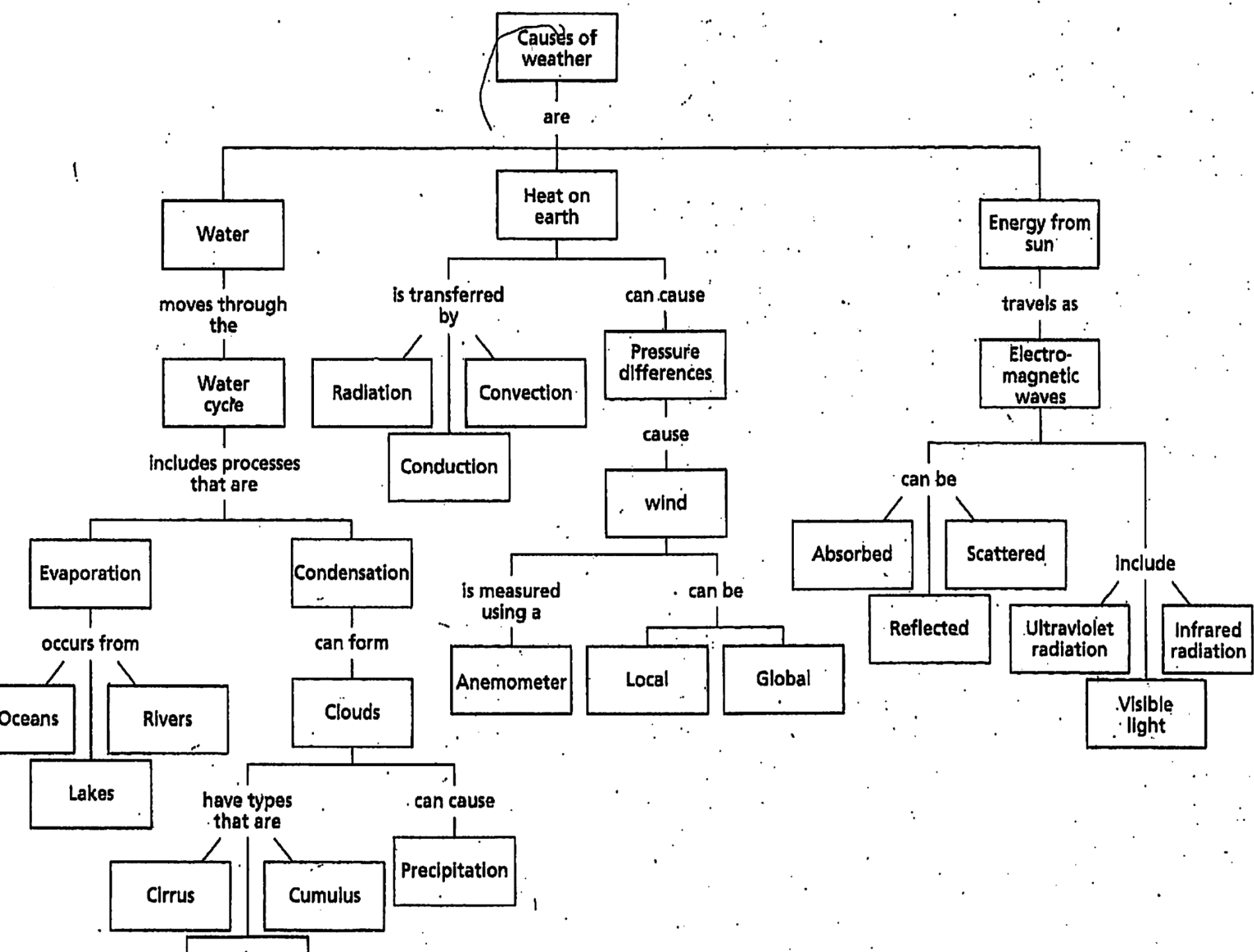
Review 6-4.1 through 6-4.6

## **WARM UP**

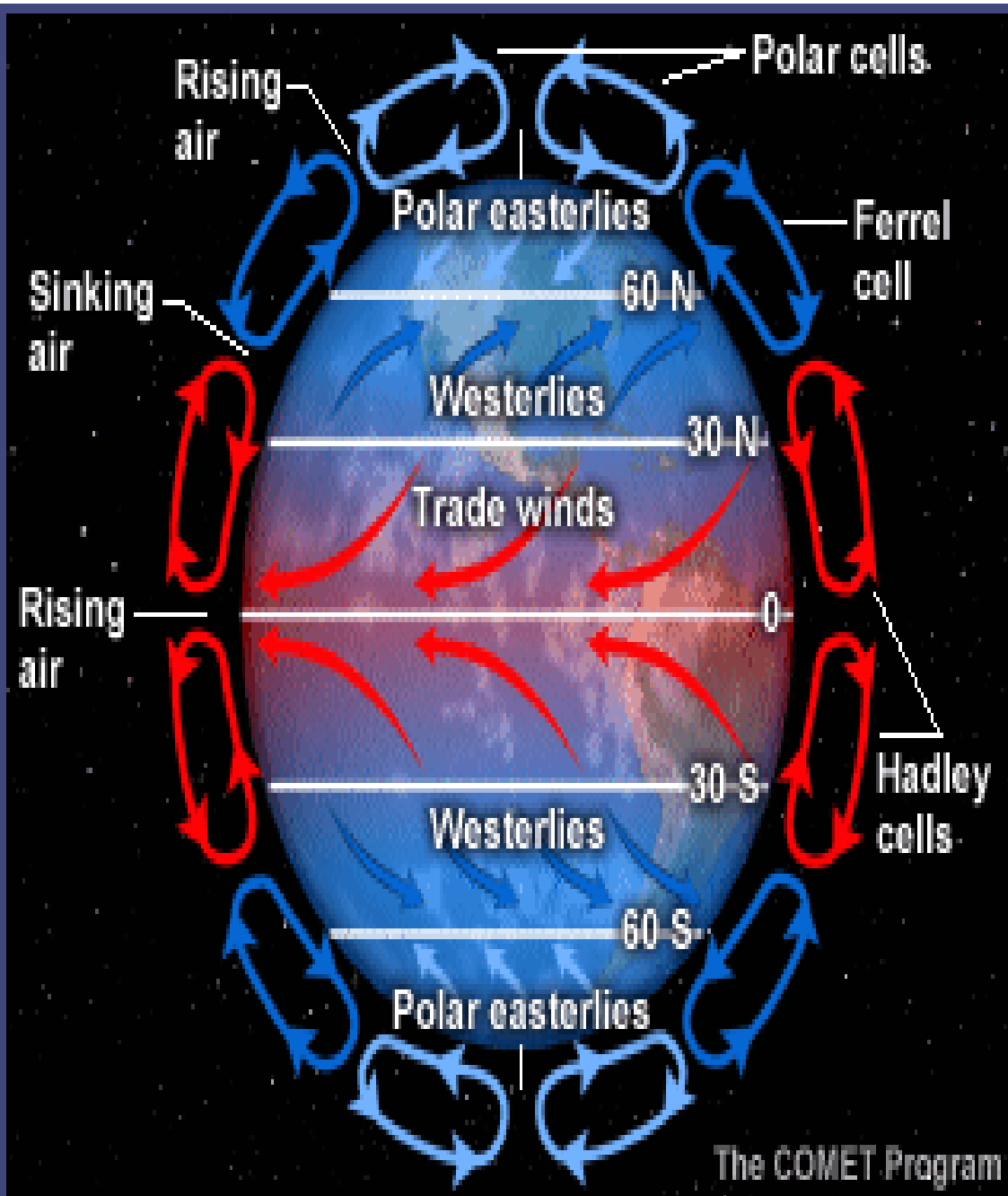
- 1. Some of the Sun's energy coming through Earth's atmosphere is reflected or absorbed by gases and/or \_\_\_\_\_.**
- 2. \_\_\_\_\_ needs to absorb lots of solar energy to warm up**
- 3. The \_\_\_\_\_ heats and releases its heat up fairly quickly.**
- 4. The \_\_\_\_\_ on Earth helps to regulate the temperature range of Earth's atmosphere.**
- 5. Solar energy that is absorbed by Earth's land and water is changed to heat but is trapped in the troposphere is know as the \_\_\_\_\_.**

# **Closure**

**Explain how solar energy affects Earth's land and water.**



# WARM UP (copy right hand side only, not picture)



**North pole, 90° to 60°  
\_\_\_\_\_ region**

**60° to 30°  
\_\_\_\_\_ region**

**30° to equator  
\_\_\_\_\_ region**

# **CLOSURE**

**What causes convection currents in the atmosphere?**

# WARM UP

**1. Name two convection currents near bodies of water that cause local winds.**

**land and sea breezes**

**2. Name the warm surface current in the Atlantic**

**Gulf Stream**

**3. Name the cold surface current in the Pacific**

**California current**

# **CLOSURE**

**Since temperature is a major factor in climate zones, name three things that are related to climate.**

- 1. Convection regions are at different latitudes**
- 2. Temperature differences between the equator and the poles**
- 3. Warm and cold surface ocean currents**



# **WARM UP**

**1. Convection cells are in the atmosphere and Earth is spinning on its axis. This causes the global winds to curve. What is this called?**

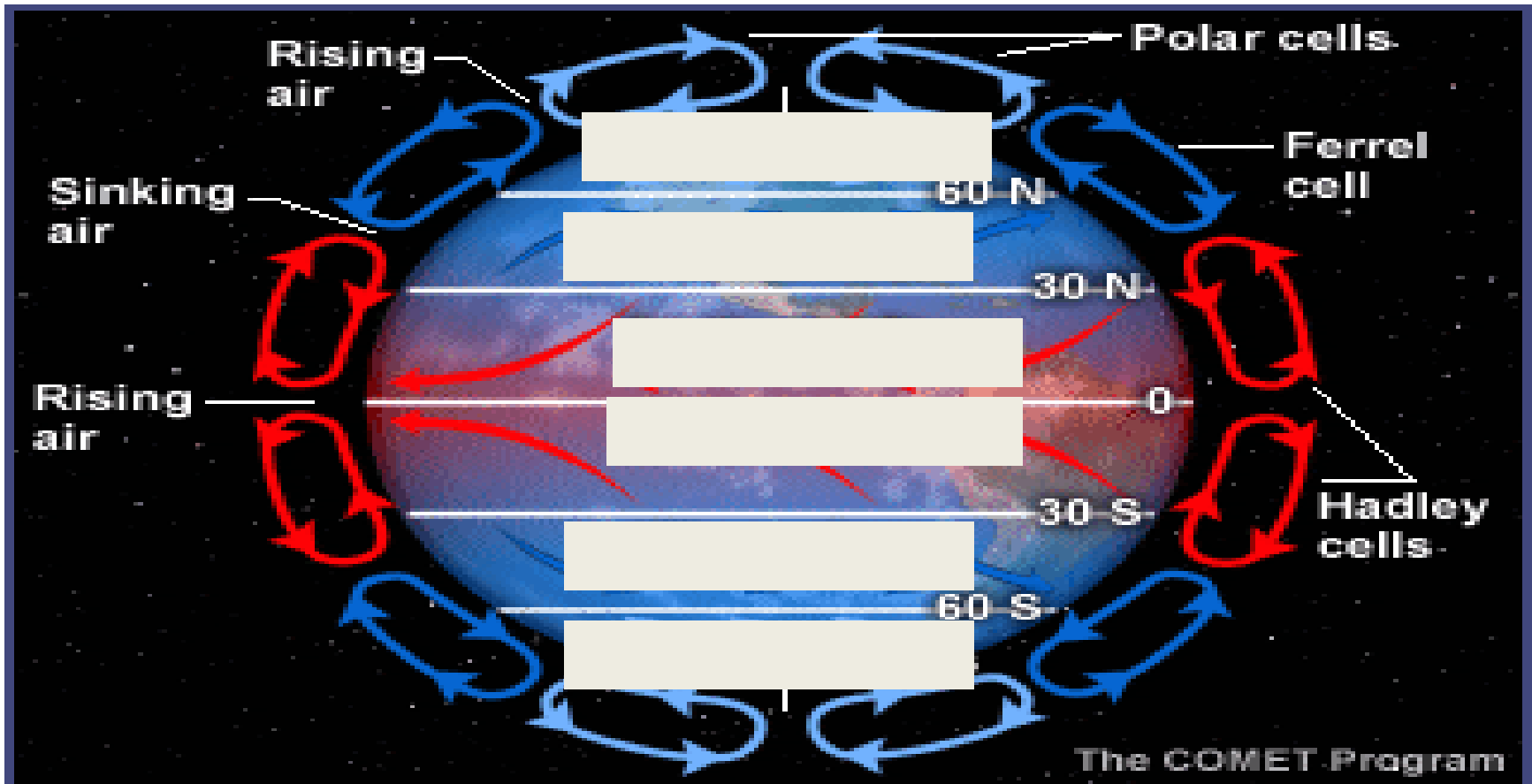
**Coriolis effect**

**2. What do the Westerlies and the Jet Stream have in common?**

**both blow from west to east**

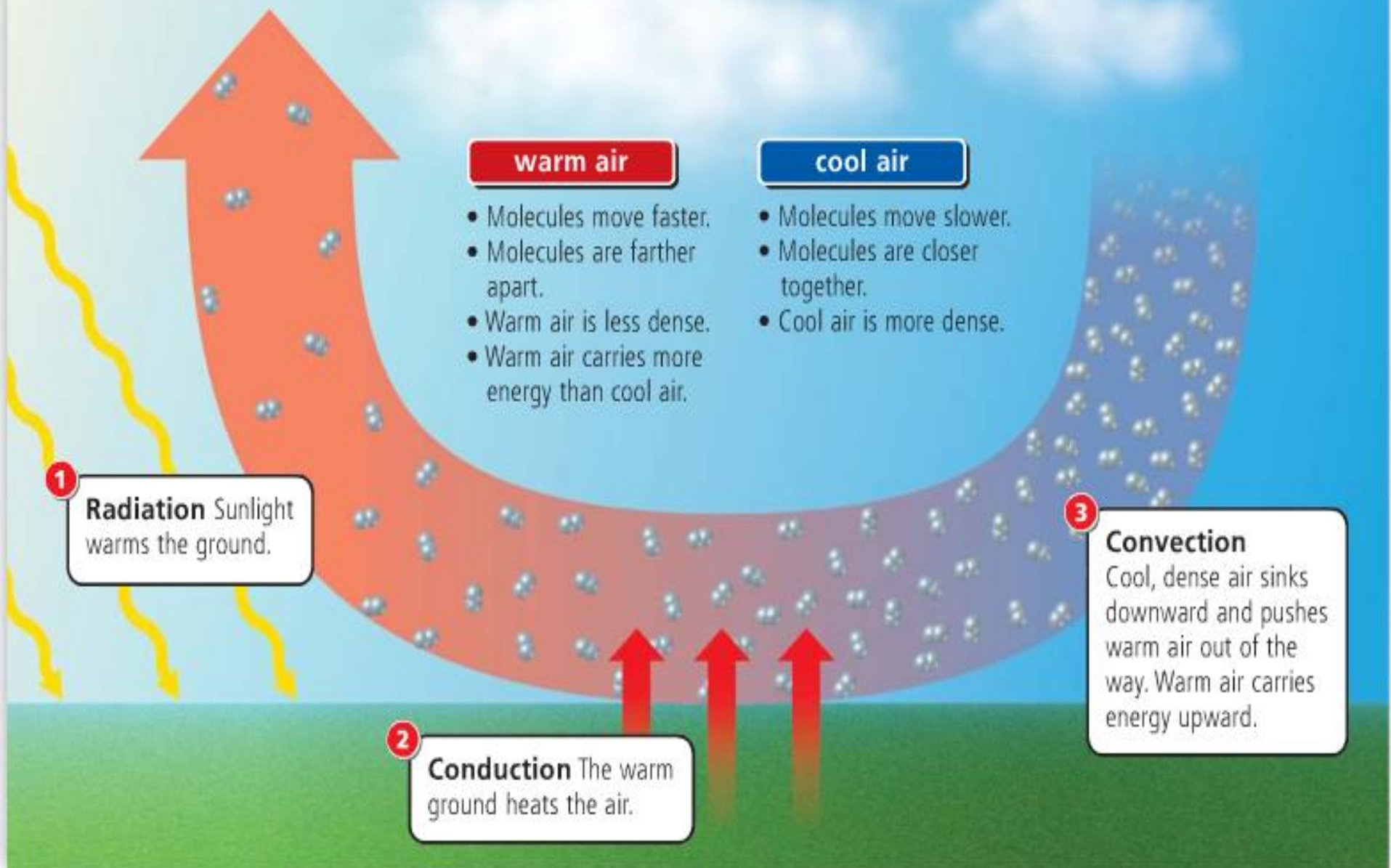
# Closure

**Name the global winds from the poles to the equator.**



# Transfer of Energy

Radiation, conduction, and convection move energy from place to place.



#### 6.4.7 Explain how solar energy affects Earth's atmosphere and surface (land and water).

## Solar Energy

- The driving energy source for heating of Earth and circulation in Earth's atmosphere comes from the Sun and is known as solar energy.

## Reflection or Absorption by Gasses or Clouds

- Some of the Sun's energy coming through Earth's atmosphere is reflected or absorbed by gases and/or clouds in the atmosphere.



## Getting the Idea

On a bright, sunny day you might experience the warmth of the sun on your skin. Have you ever walked barefoot outside and felt the heat from the hot pavement or sand? What you are feeling is energy that came from the sun. What happens to the sunlight that reaches Earth?

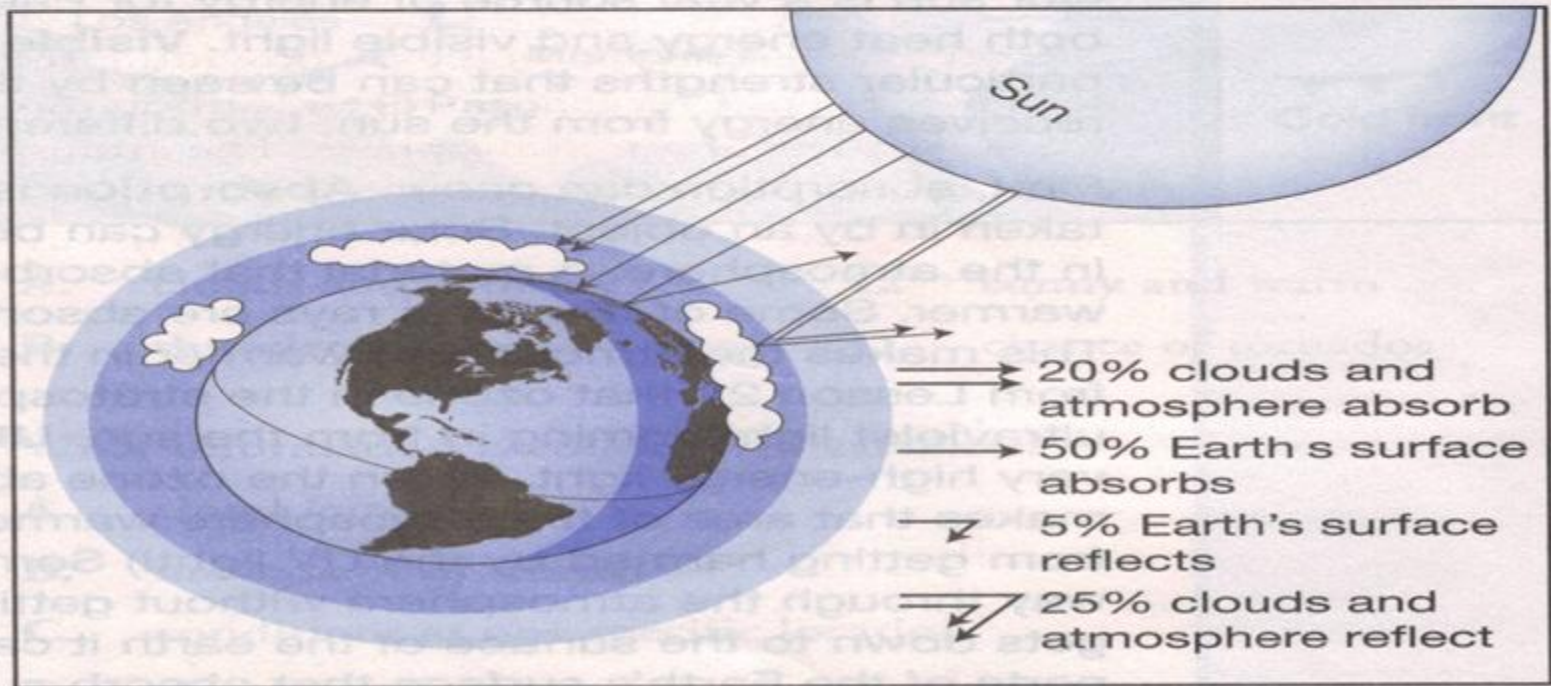
### Reflection and Absorption

Our sun is a vital source of energy for Earth. The sun gives off both heat energy and visible light. **Visible light** is energy of particular strengths that can be seen by the human eye. As Earth receives energy from the sun, two different processes can happen.

First, absorption can occur. **Absorption** is when the energy is taken in by an object. Solar energy can be absorbed by the gases in the atmosphere. A material that absorbs sunlight will get warmer. Some of the sun's rays are absorbed by the atmosphere. This makes the atmosphere warmer in these areas. Remember from Lesson 22 that ozone in the stratosphere absorbs the ultraviolet light coming in from the sun. **Ultraviolet (UV) light** is very high-energy light. When the ozone absorbs the UV light, it makes that area of the atmosphere warmer (and also keeps us from getting harmed by the UV light!) Some sunlight passes all the way through the atmosphere without getting absorbed. When it gets down to the surface of the earth it can be absorbed. The parts of the Earth's surface that absorb sunlight get warmer. Imagine walking barefoot on black concrete in the summer. It's hot! It has absorbed a lot of sunlight. The oceans also absorb a great deal of solar energy. In general, dark surfaces on the Earth absorb sunlight and make the Earth warmer.

The rays of the sun's energy coming toward the Earth can also be reflected back up into space by materials in the atmosphere or by materials on the surface of the earth. **Reflection** is when energy bounces off a surface. Clouds tend to reflect sunlight back out into space. White surfaces such as ice caps and snow also reflect sunlight. Since they reflect the energy, they don't get warmed by it. Walking on a white surface in the summer isn't as hot on your feet as that black concrete! The energy that is reflected by these materials doesn't stay in the atmosphere or on Earth's surface.

So there is an important balance happening every day with the solar energy coming to Earth. Some of it is absorbed, which drives the weather cycle and keeps the Earth's atmosphere and surface warm enough for organisms to live. But some of the energy is reflected, which is good because if this process didn't happen, the Earth would get too hot. Earth's atmosphere and surface create a delicate balance between energy received and energy lost.



# Solar Radiation

Uneven heating of the earth's surfaces produce winds through convection currents.

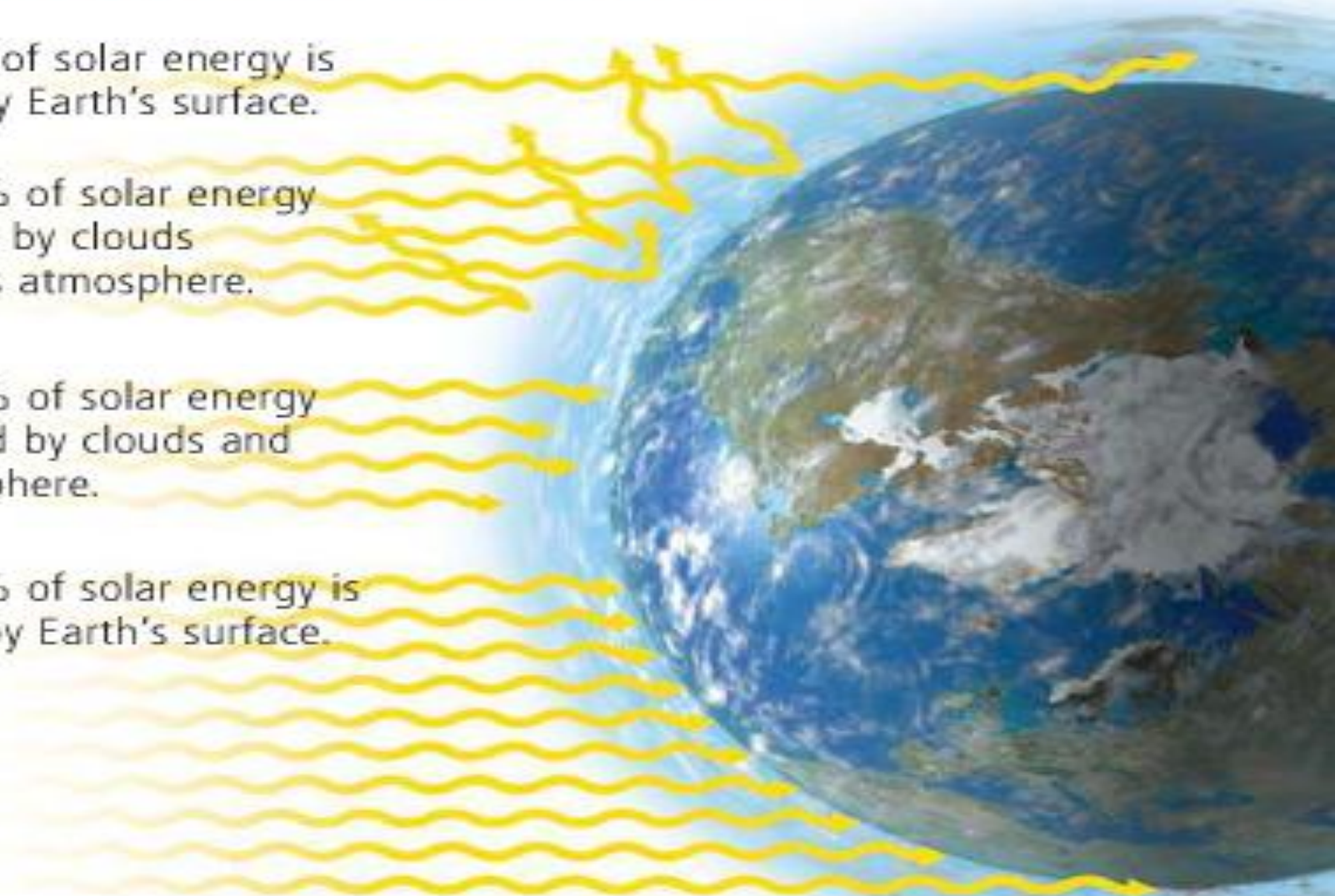
**Arrows show the average global reflection and absorption of solar radiation.**

About 5% of solar energy is reflected by Earth's surface.

About 25% of solar energy is reflected by clouds and Earth's atmosphere.

About 20% of solar energy is absorbed by clouds and the atmosphere.

About 50% of solar energy is absorbed by Earth's surface.



# The Greenhouse Effect

Some of the infrared radiation passes through the atmosphere but most is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth's surface and the lower atmosphere.

Solar radiation powers the climate system.



Some solar radiation is reflected by the Earth and the atmosphere.



About half the solar radiation is absorbed by the Earth's surface and warms it.

50%

ATMOSPHERE

EARTH

Infrared radiation is emitted from the Earth's surface.





#### 6.4.7 Explain how solar energy affects Earth's atmosphere and surface (land and water).

### Heating Up Land and Water

- The land heats up and releases its heat fairly quickly, but water needs to absorb lots of solar energy to warm up. This property of water allows it to warm more slowly but also to release the heat energy more slowly. It is the water on Earth that helps to regulate the temperature range of Earth's atmosphere.

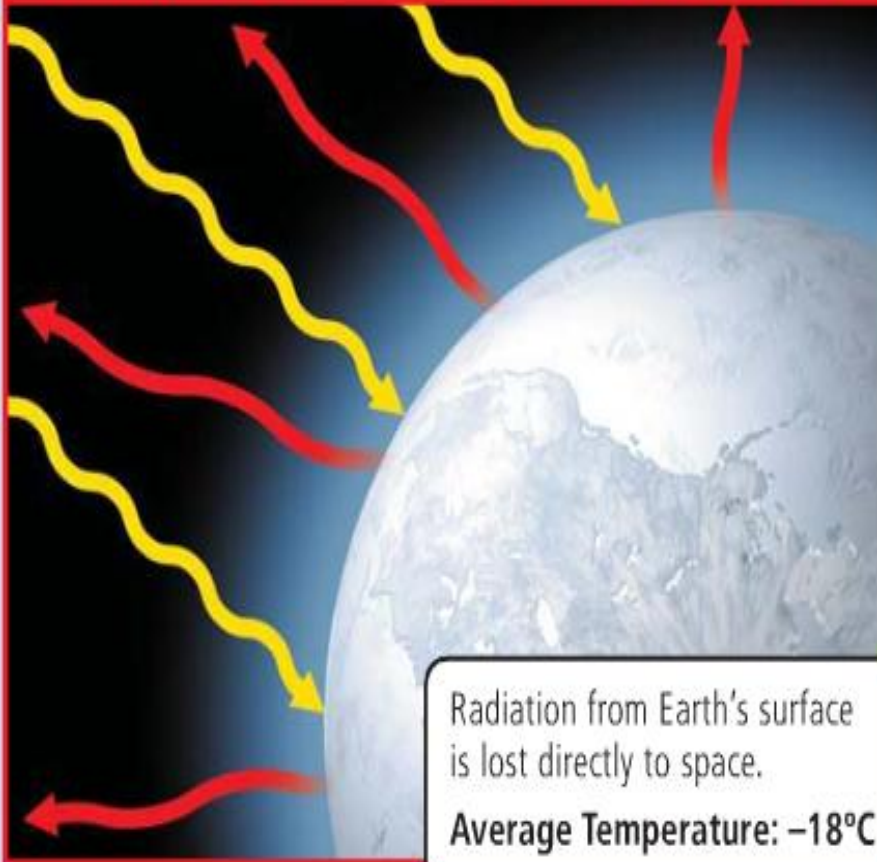
### Greenhouse Effect

- Solar energy that is absorbed by Earth's land and water surfaces is changed to heat that moves/radiates back into the atmosphere (troposphere) where the heat cannot be transmitted through the atmosphere so it is trapped, a process known as the greenhouse effect.

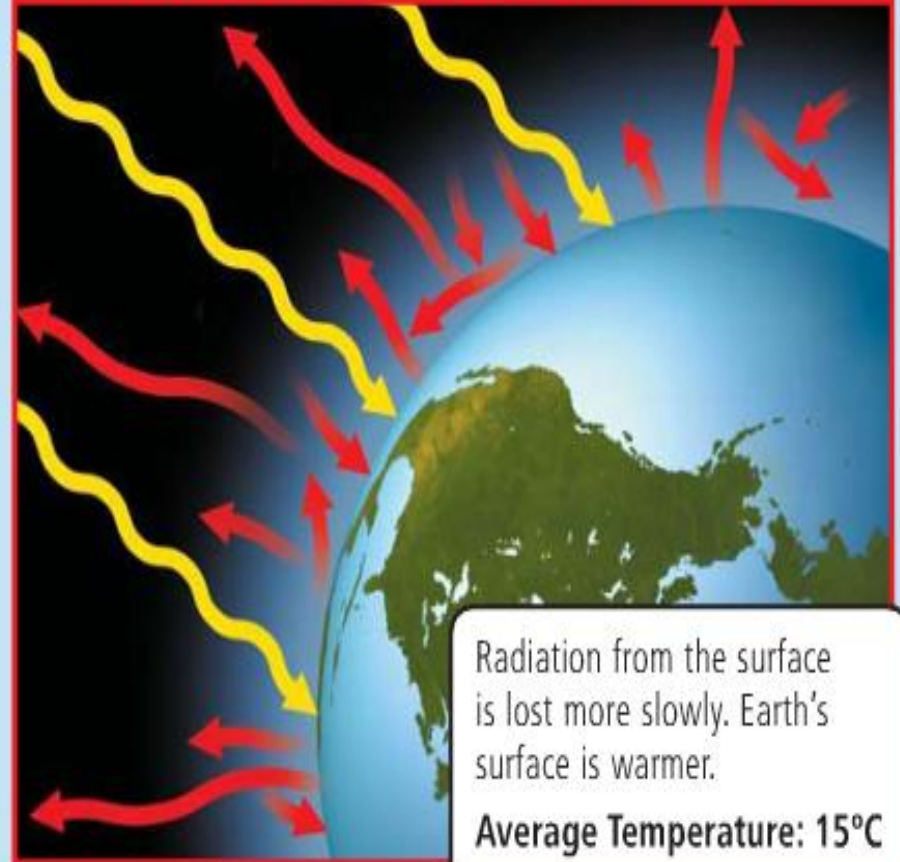
# The Greenhouse Effect

Greenhouse gas molecules absorb and emit infrared radiation.

**Atmosphere without Greenhouse Gases**



**Atmosphere with Greenhouse Gases**



sunlight

infrared radiation

*The atmosphere is much thinner than shown here.*

## 6-4.8 Explain how convection affects weather patterns and climate.

### Convection Currents

- Because warm air near Earth's surface rises and then cools as it goes up, a convection current is set up in the atmosphere. There are three atmospheric convection areas in the northern hemisphere and three in the southern hemisphere.

### Three Types of Convection Areas

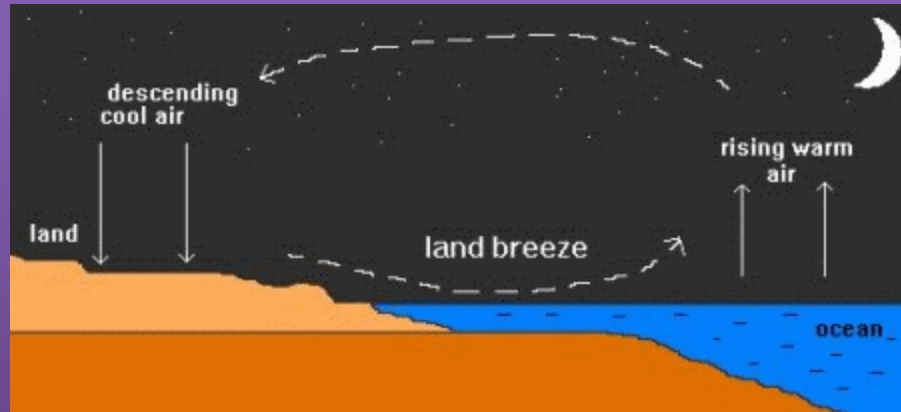
- the tropical region begins at the equator and extends to the about 30 degrees north latitude;
- the temperate region extends from there to about 60 degrees north latitude, and
- the polar region extends from there to the north pole, 90 degrees north latitude.

# Land & Sea Breezes

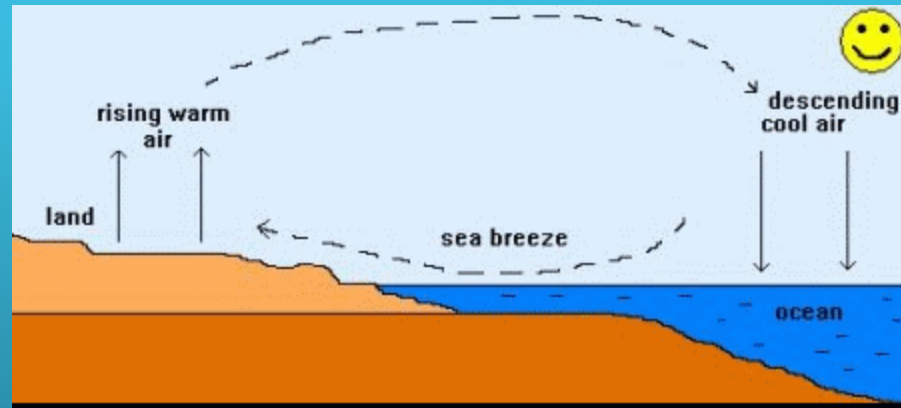
- On a smaller scale, convection currents near bodies of water can cause local winds known as land and sea breezes.

## 6-4.8 Explain how convection affects weather patterns and climate.

### Land Breeze



### Sea Breeze



# Land Breeze

## What is a land breeze?

A land breeze occurs at night when the land cools faster than the sea. In this case, it is air above the warmer surface water that is heated and rises, pulling in air from the cooler land surface.

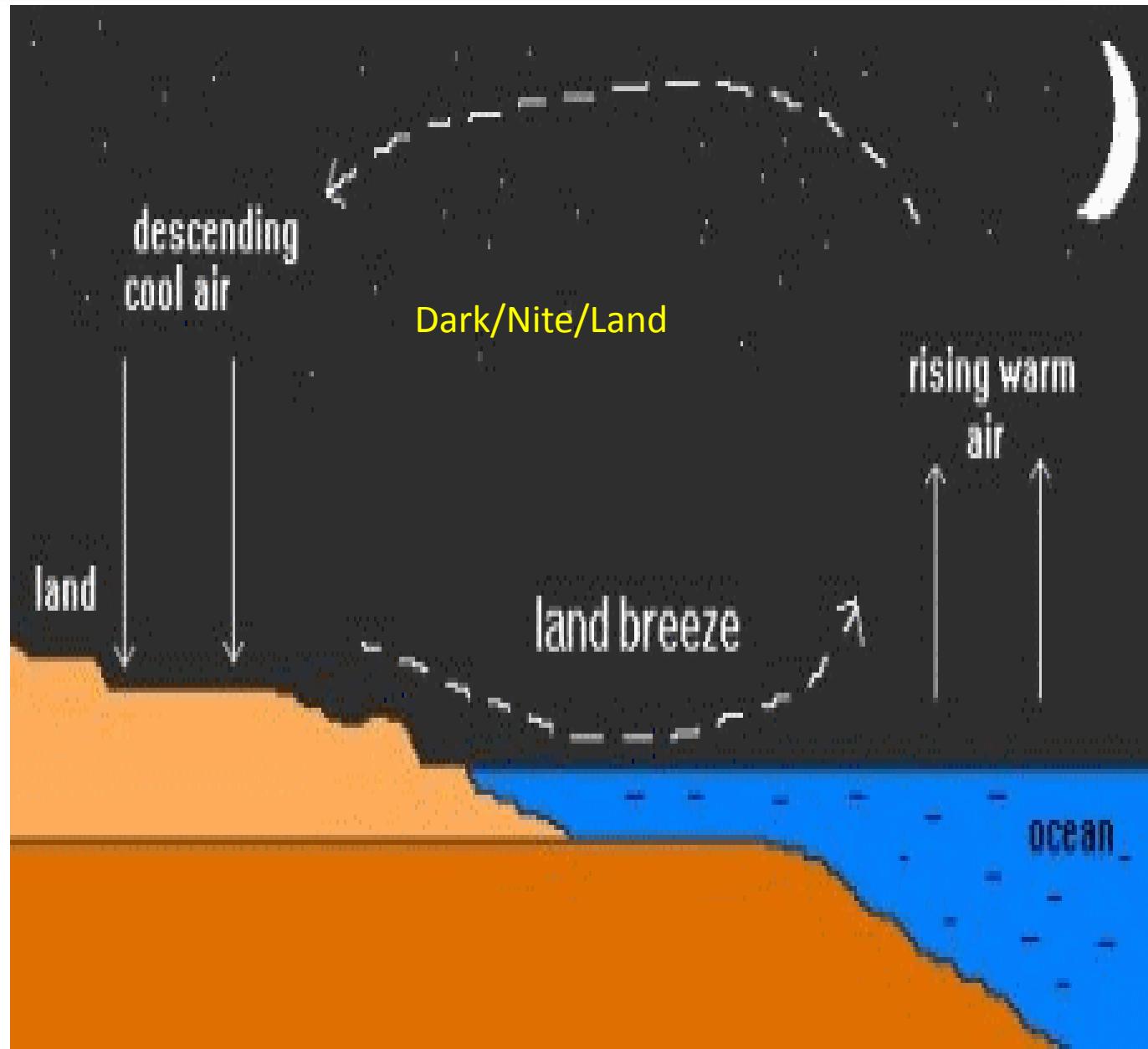
Hint to remember this:

4 letters in:

Dark

Nite (not night) ☺

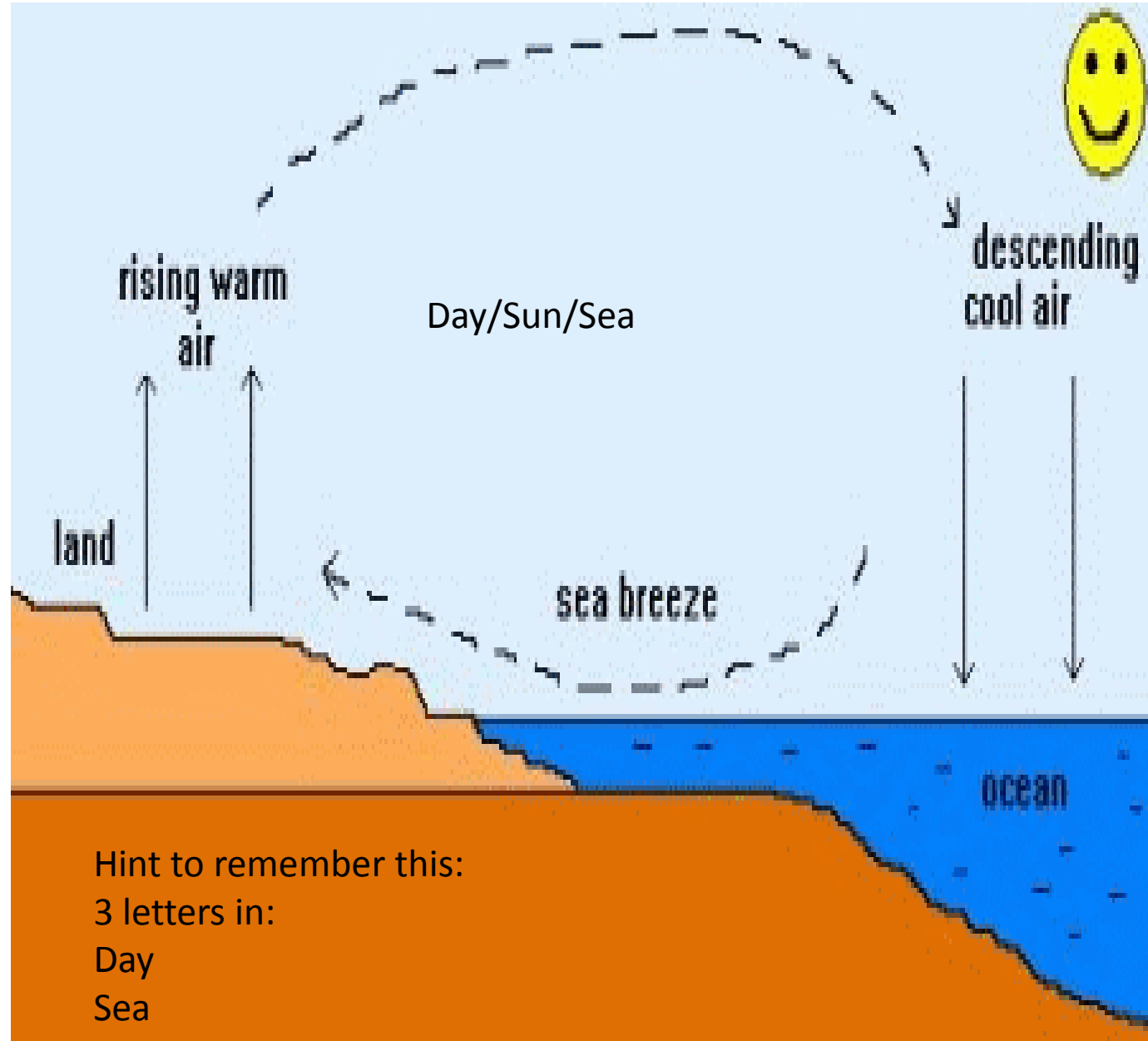
Land



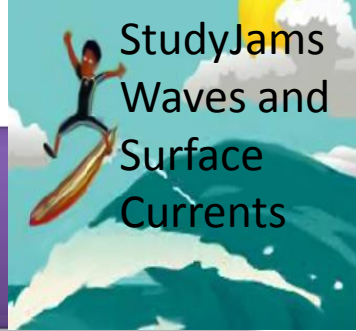
# Sea Breeze

## What is a sea breeze?

On a warm summer day along the coast, this differential heating of land and sea leads to the development of local winds called sea breezes. As air above the land surface is heated by radiation from the Sun, it expands and begins to rise, being lighter than the surrounding air. To replace the rising air, cooler air is drawn in from above the surface of the sea. This is the sea breeze, and can offer a pleasant cooling influence on hot summer afternoons.



Hint to remember this:  
3 letters in:  
Day  
Sea



## Surface Currents

<http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/waves-and-currents.htm>

- The surface currents of Earth's oceans that circulate warm and cold ocean waters in convection patterns also influence the weather and climates of the landmasses nearby.

## Gulf Stream Current = WARM

- The warm Gulf Stream current water influences the eastern Atlantic shoreline of the U.S., while the cold California current influences its western Pacific shoreline.

## California Current = COLD



# Climate Zones

<http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/weather-and-climate.htm>



StudyJams  
Weather and  
Climate

- Because of the unequal heating of Earth, climate zones (tropical, temperate, and polar) occur.
- Since temperature is a major factor in climate zones, climate is related to:
  - the convection regions at various latitudes,
  - temperature differences between the equator and the poles, and also
  - warm and cold surface ocean currents.

6-4.8 Explain how convection affects weather patterns and climate.

## Global Winds

<http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/air-pressure-and-wind.htm>



- Convection happens on a global scale in the atmosphere and causes global winds. These winds then move weather systems and surface ocean currents in particular directions.

## Global Wind Belts

- Due to the spinning of Earth, the weather systems in these regions move in certain directions because the global wind belts are set up.

6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

## Coriolis Effect

- Global winds are found in each convection region.
- Because convection cells are in place in the atmosphere and Earth is spinning on its axis, these global winds appear to curve. This is known as the Coriolis effect.

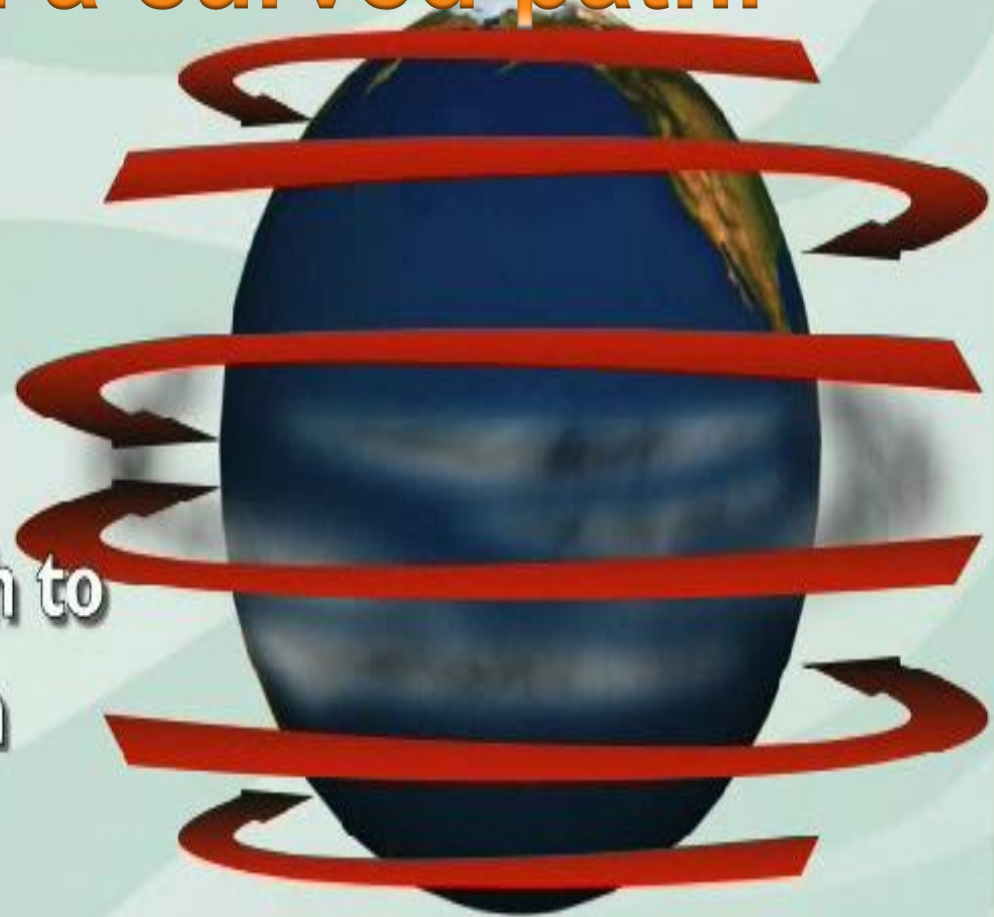
# Coriolis Effect Chant

- **Winds CURVE and BEND because of the SPIN, causing**
- **Trade, Westerlies and Prevailing Winds,**
- **Coriolis Effect, Coriolis Effect!**
- **Coriolis Effect, Coriolis Effect!**

**Because the earth spins it causes wind to blow in a curved path.**

## Coriolis Effect

Causes wind on Earth to blow in a curved path



**West to east and east to west.**

# Types of winds

Polar easterlies

Prevailing westerlies

Trade winds



Chant: "Coriolis Effect"-  
Winds curve and bend, because  
of the spin,  
causing Trade, Westerlies and  
Prevailing winds!  
Coriolis Effect, Coriolis Effect!

**Cause U.S. hurricanes blow from West to East  
(when they originate for us in Africa)**

# C O R I O L I S E F F E C T

Air flows from areas of higher pressure to areas of lower pressure. Based on this fact, the predicted wind direction for the area on the left side of this satellite image would be from the southeast. The Coriolis Effect influences wind by deflecting its path to the right in the Northern Hemisphere. The sequence of weather satellite images shows that the actual wind direction is from the southwest. The satellite images show atmospheric motion over the northern Pacific Ocean for a 36-hour period. Click the image to see the animation. Use the movie controls to step through or replay the movie.

[Observe an animation of the Coriolis effect over Earth's surface.](#)

Keycode: ES1904

# C O R I O L I S E F F E C T

A plane flying from Anchorage, Alaska directly toward Miami, Florida would miss its target due to the Coriolis effect. The target location where the plane was headed when it took off has moved with Earth's rotation, so the plane would end up to the right of its original target.

[Observe how the Coriolis effect influences wind direction.](#)

Keycode: ES1905



6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

# Global Wind Belts

- In the global wind belt regions, the prevailing direction of the winds and how air movement in these large regions affects weather conditions.

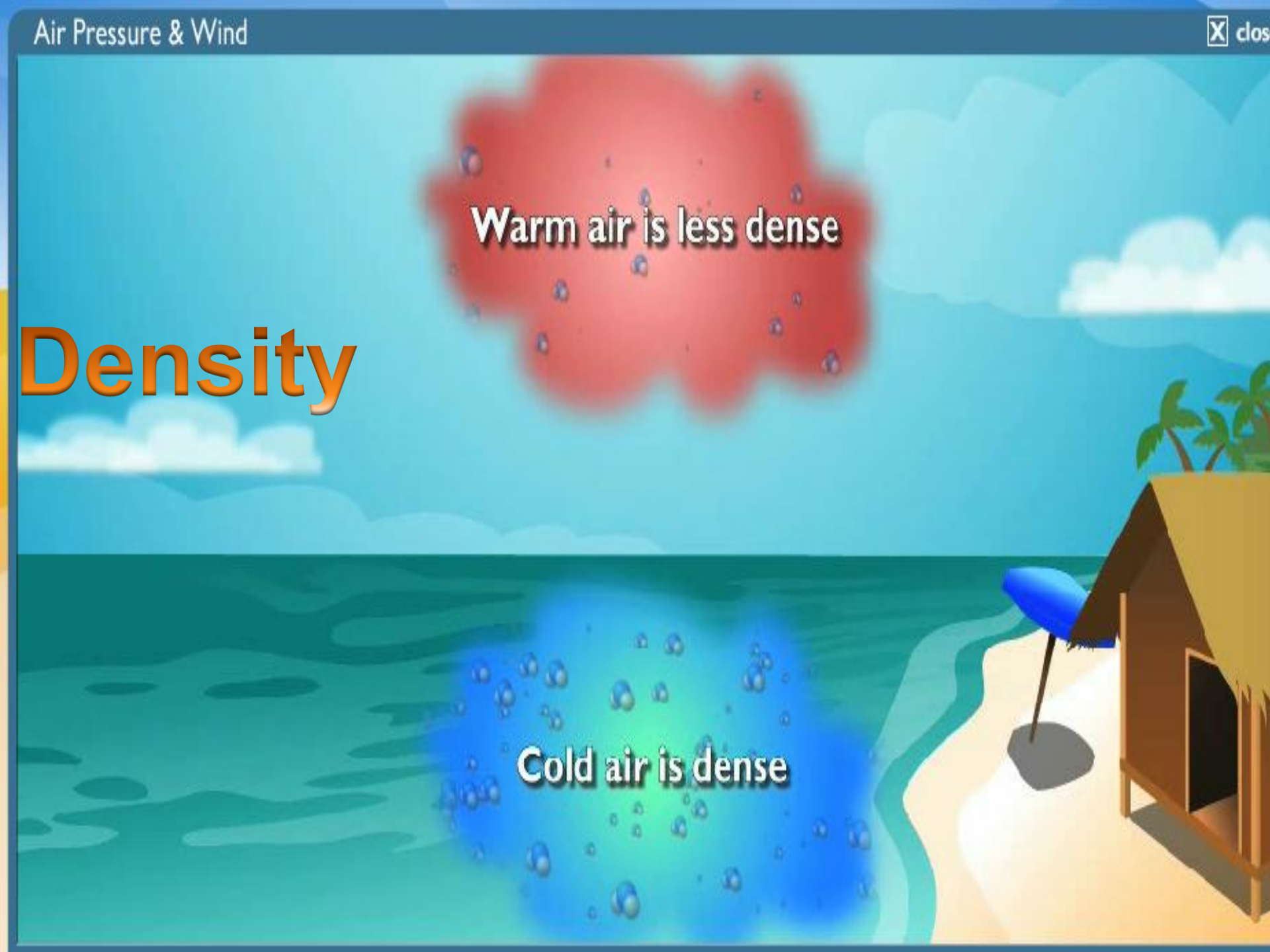
# Global Winds Chant

- **Global Winds are caused by the spinning of the earth.**
- **The spinning of the earth, the spinning of the earth.**
- **Global Winds are caused by the spinning of the earth.**
- **The spinning causes Global Winds!**

Warm air is less dense

Cold air is dense

# Density



# Convection Cell

D  
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w  
n  
d  
r  
a  
f  
t

U  
p  
d  
r  
a  
f  
t

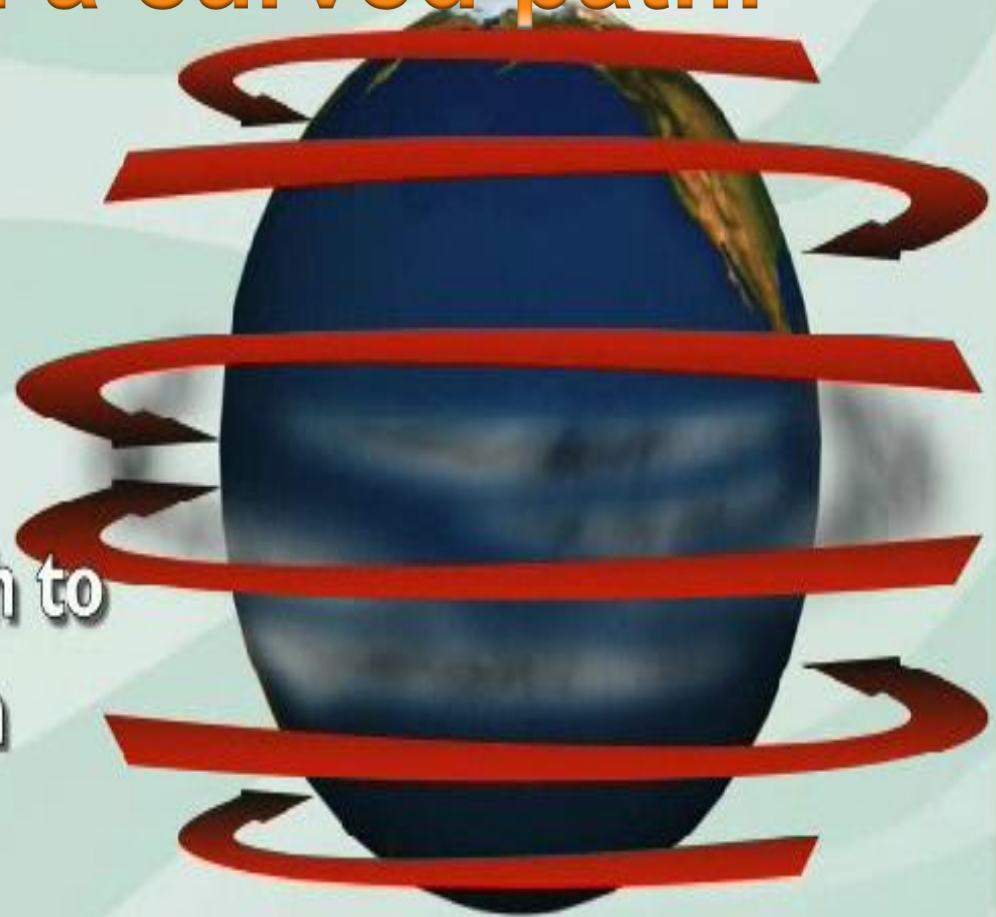
Cause of wind



**Because the earth spins it causes wind to blow in a curved path.**

## Coriolis Effect

Causes wind on Earth to blow in a curved path



**West to east and east to west.**

# Types of winds

Polar easterlies

Prevailing westerlies

Trade winds

**Chant:**

**“Coriolis Effect” -  
wind curves and  
bends, because of  
the spin,  
causing trade,  
westerlies and  
prevailing winds!**

**Cause U.S. hurricanes blow from West to East  
(when they originate for us in Africa)**

# Summary

- Wind is caused by changes in air pressure
- Air pressure is affected by:  
temperature, height above sea level, and amount  
of water vapor
- In a convection cell, hot air rises and moves out  
to sea and cold air sinks and moves over land
- The Coriolis effect makes wind move around the  
earth on a curved path, from the east or west

Next  
slide



Radiation warms  
the surface.



Cooler air pushes  
warm air upward,  
creating a  
convection current.



The air near  
Earth's surface  
is heated by  
conduction.



Heat from Sun

Cold air

Cold air

Warm air

HIGH  
PRESSURE

HIGH  
PRESSURE

WINDS

LOW  
PRESSURE  
warm

WINDS

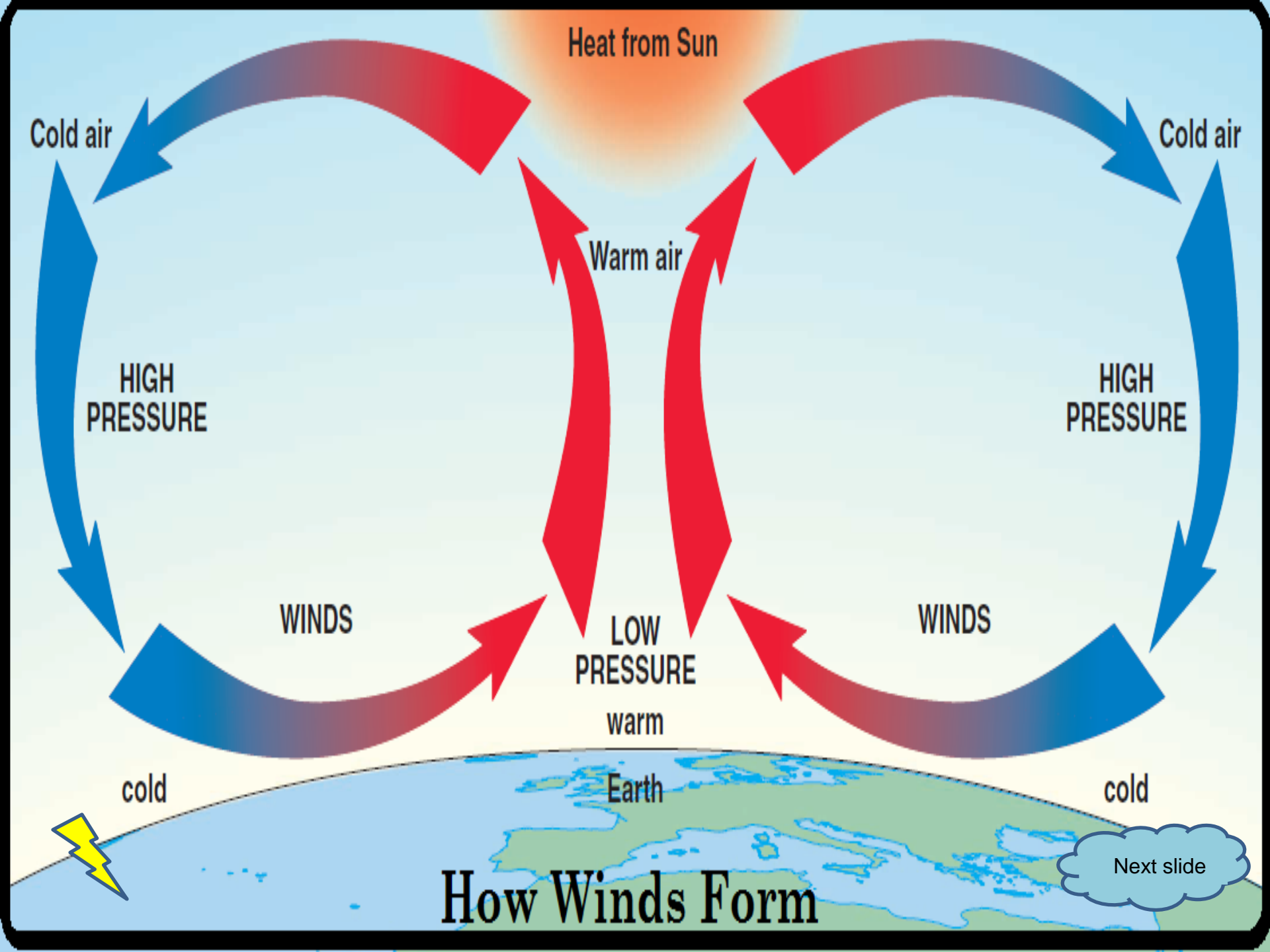
cold

Earth

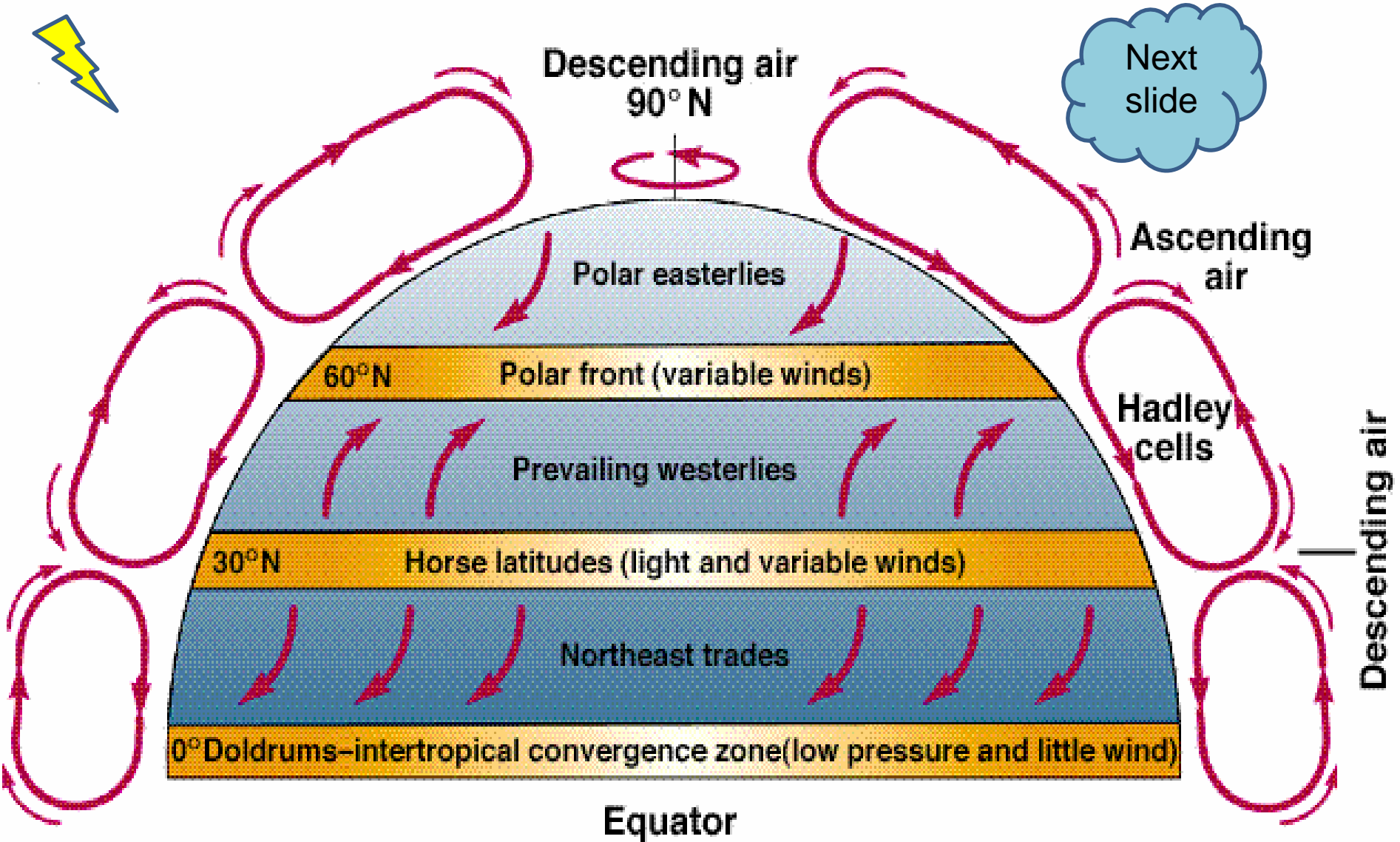
cold

# How Winds Form

Next slide



# General circulation patterns over the Northern Hemisphere.



# WINDS WILL BLOW

C  
O  
L  
D

WIND

W  
A  
R  
M

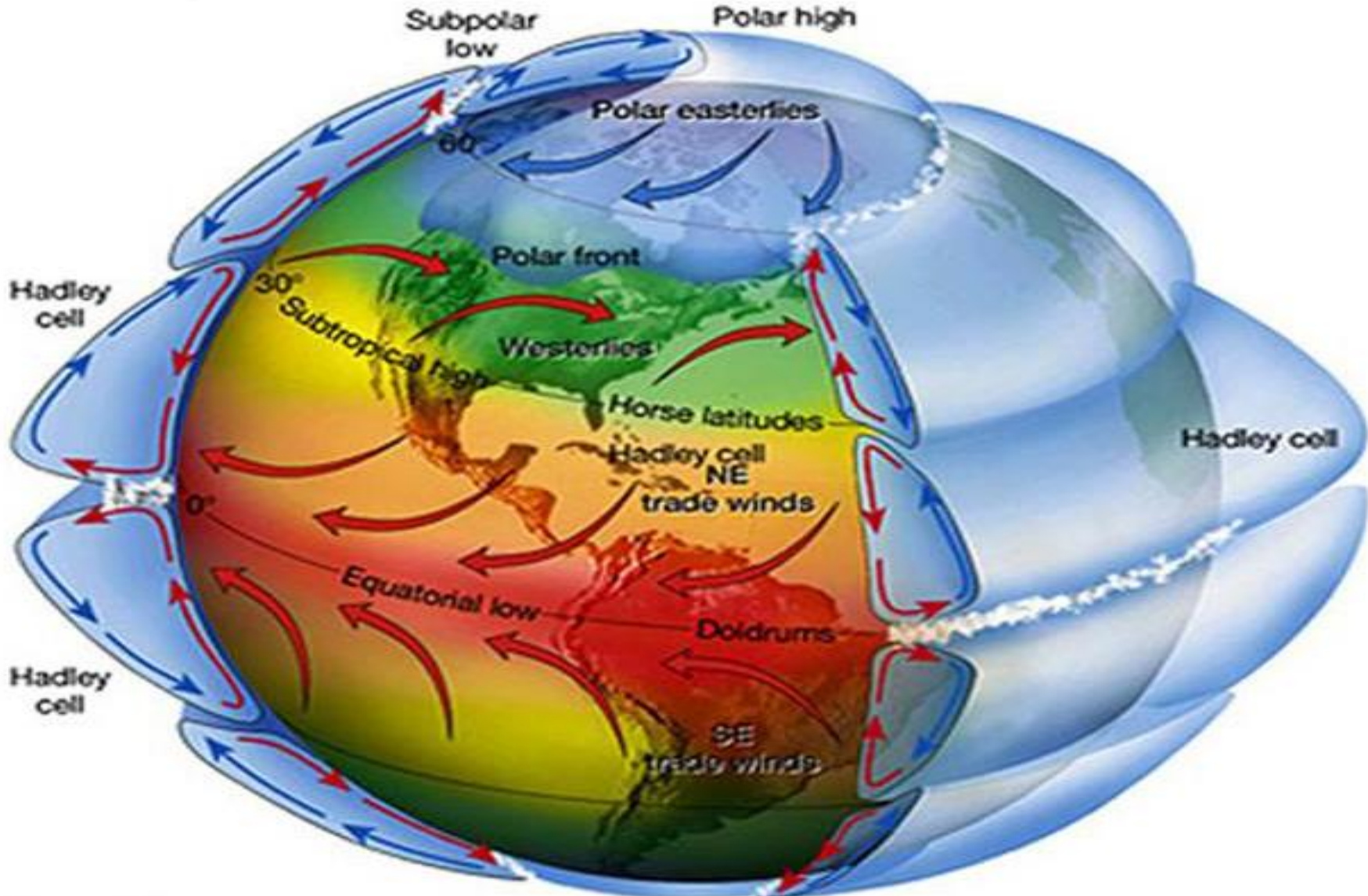
FROM HIGH TO LOW

# High to Low Chant

- No matter where you are or where you go-
- Winds are going to blow from  
**High to Low!**
- No matter where you are or where you go-
- Winds are going to blow from  
**High to Low!**

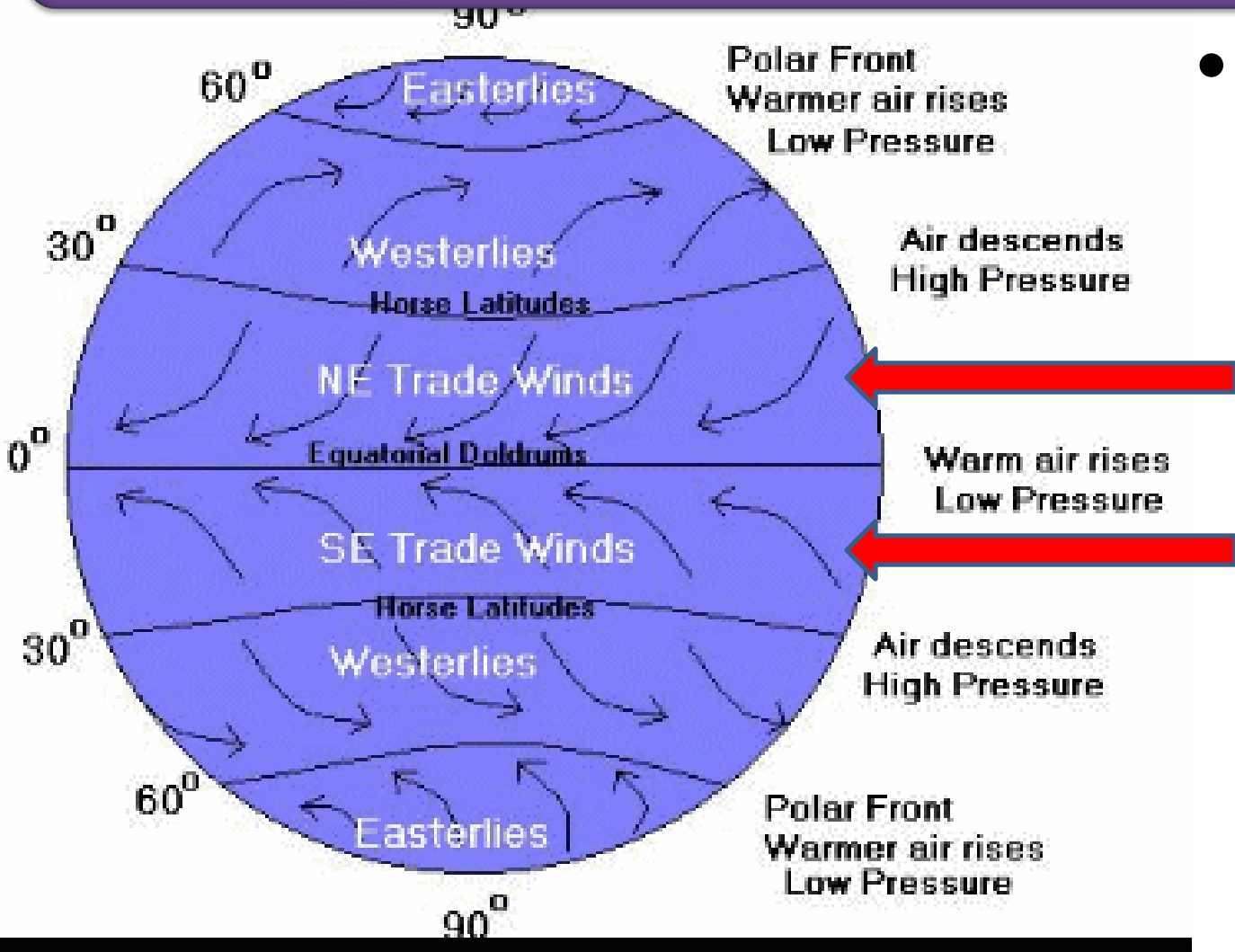
6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

Global Wind Belts



6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

# Trade Winds



- The trade winds blow from east to west in the tropical region moving warm tropical air in that climate zone.

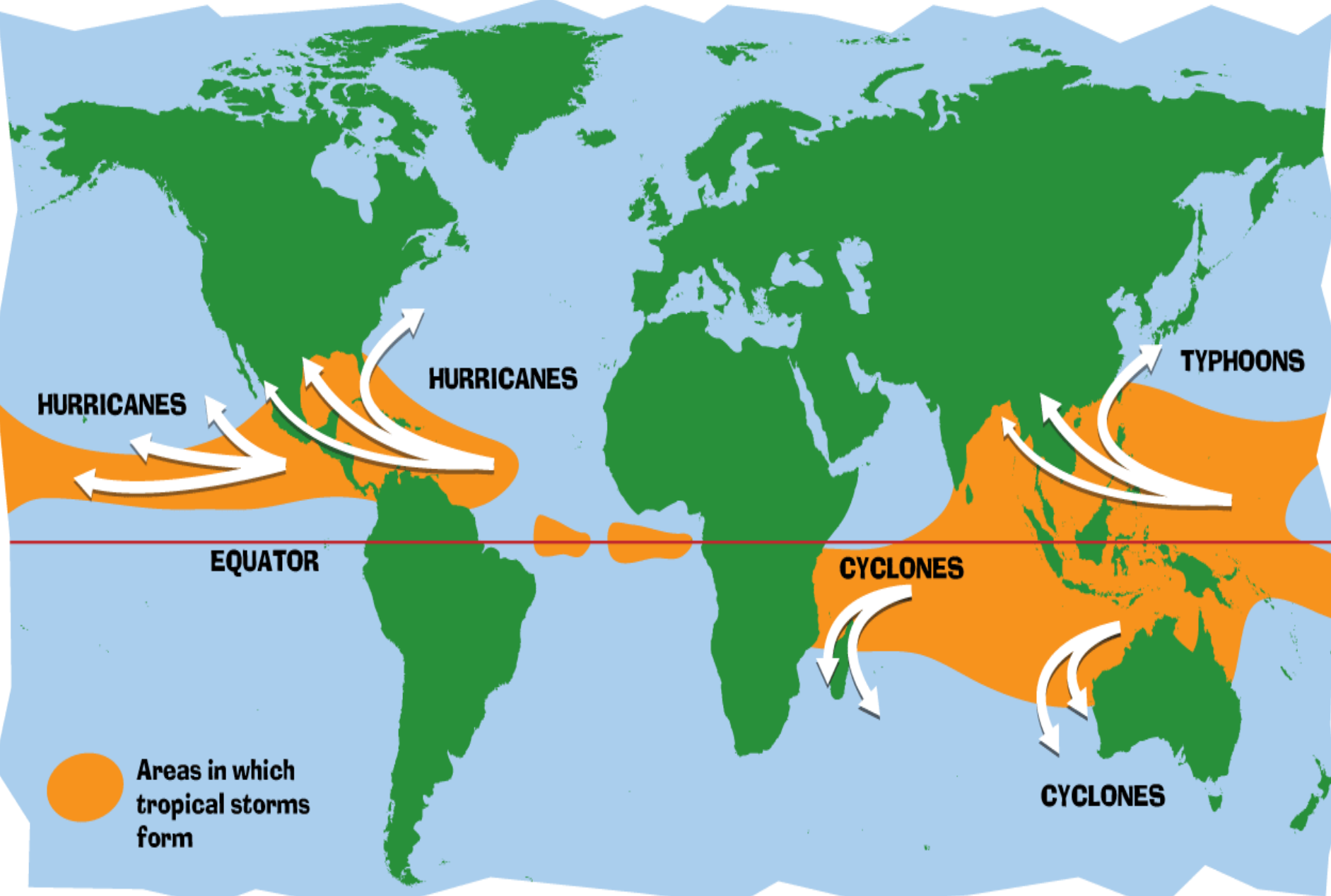
#### 6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

### Trade Winds Move Hurricanes from Africa to the U.S. Eastern Coastline

- Tropical weather systems, for example hurricanes, are moved in the prevailing direction of the trade winds. If they enter the westerly wind belt, they are often turned, and move in the direction of that prevailing system.



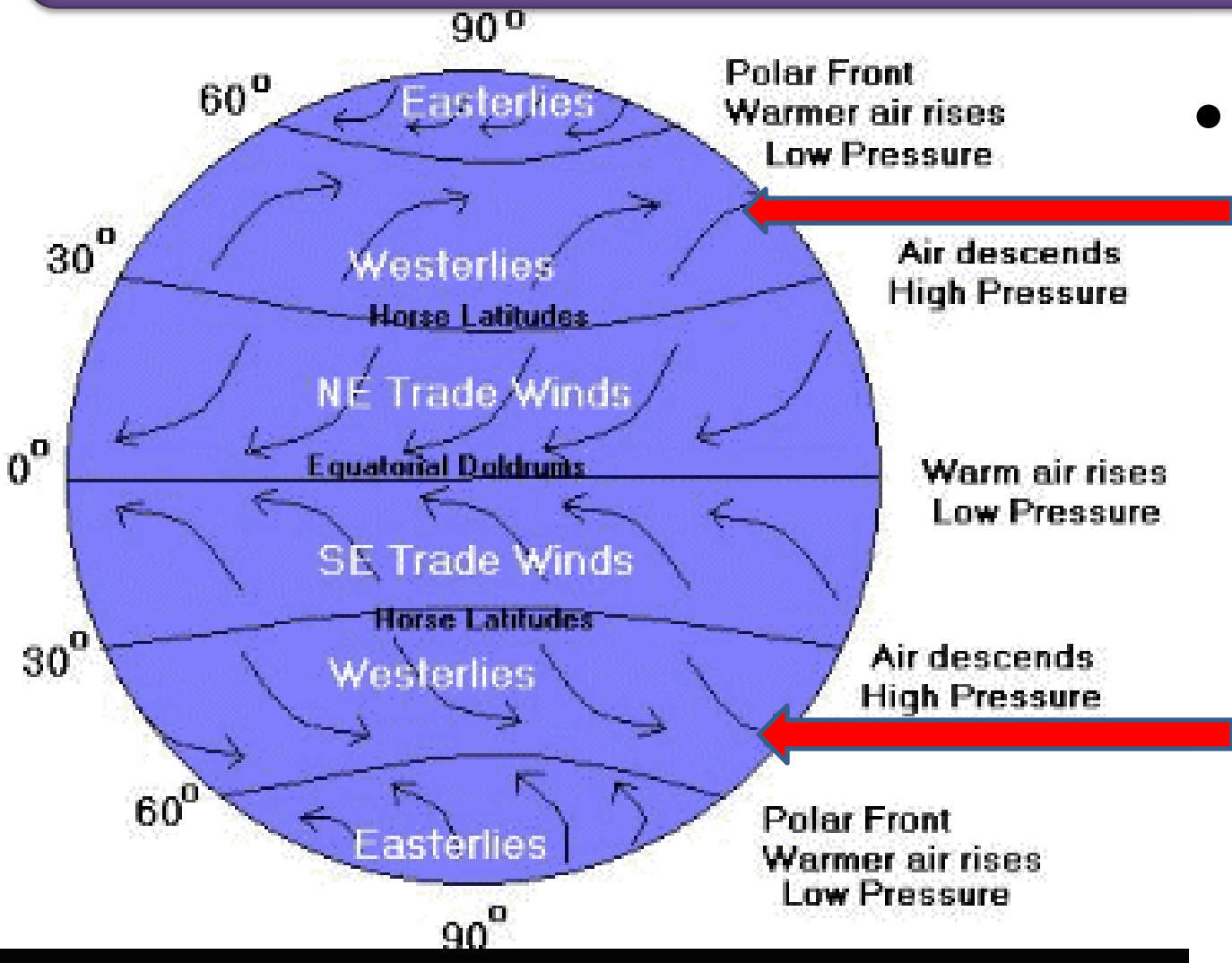
6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.





6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

# Prevailing Westerlies



- The prevailing westerly winds blow from west to east in the temperate region.

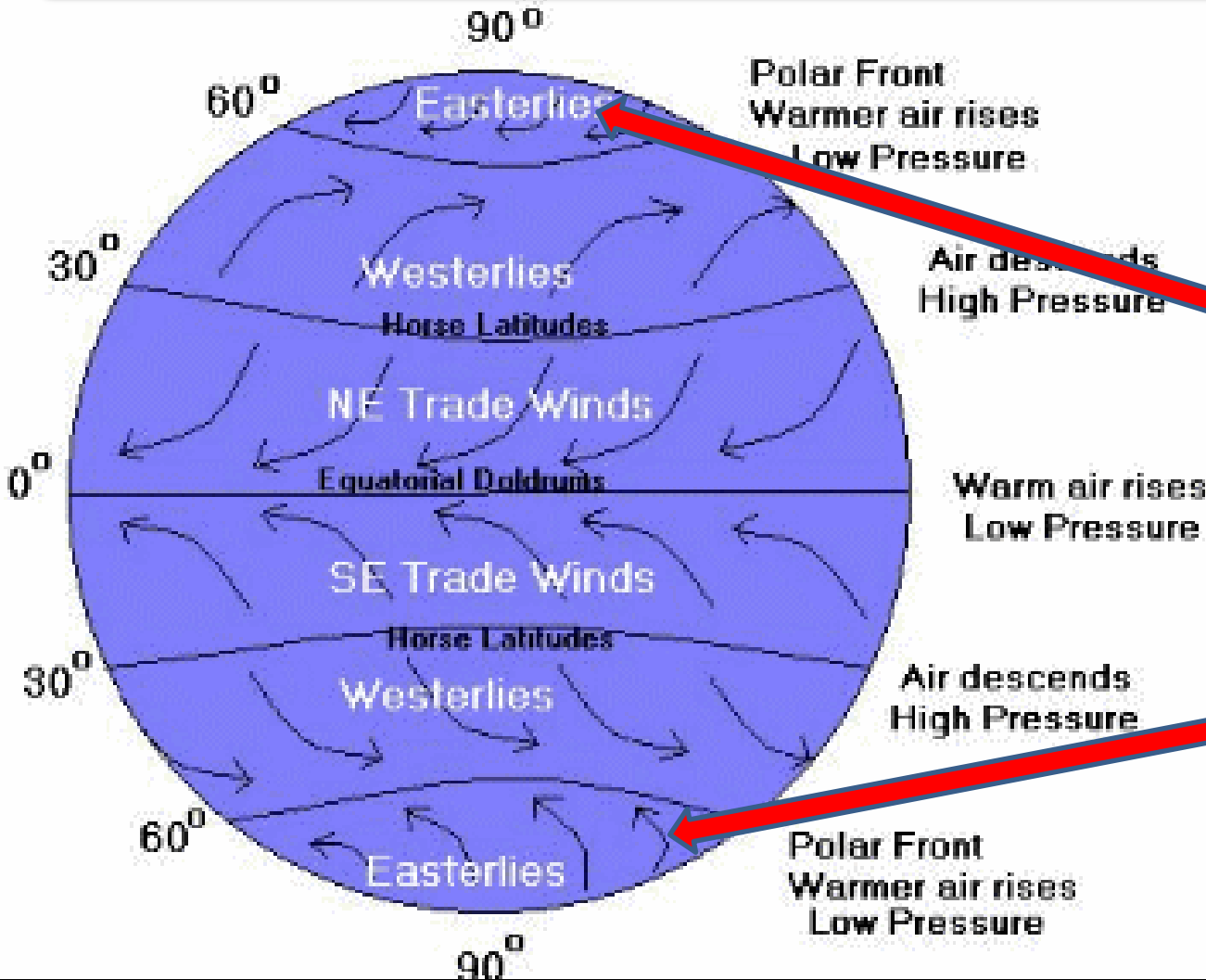
6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

•The temperate zone temperatures are affected most by the changing seasons, but since the westerly wind belt is in that region, the weather systems during any season move from west to east.

Since the United States is in the westerly wind belt, the weather systems move across the country from **west to east**.

6-4.8 Explain how convection affects weather patterns and climate.

# Polar Easterlies (Polar Winds)



- The polar winds blow northeast to west in the polar region moving cold polar air in that climate zone from the poles toward the west.

# 6-4.9 Global Winds & the Jet Stream

**The jet stream and global winds have direct effects on weather and climatic conditions.**

# Global Winds

- **Trade Winds blow from east to west in the tropical region moving warm air in that climate zone.**
- **The prevailing westerly winds blow from west to east in the temperate region. The temperate zone temperatures are affected most by the changing seasons, but since the westerly wind belt is in that region, the weather systems during any season move from west to east. Since the U.S. is in the westerly wind belt, the weather systems move across the country from west to east.**
- **Tropical weather systems, for example, hurricanes, are moved in the prevailing direction of the trade winds. If they enter the westerly wind belt, they are often turned and move in the direction of that prevailing system.**
- **The polar winds blow northeast to west in the polar region moving cold polar air in that climate zone from the poles toward the west.**

# Jet Stream

- Is a fast-moving ribbon of air that moves around the globe of Earth. It dips and bends constantly changing positions.
- As these changes occur, air masses and weather systems in its path are moved along by the fast moving air.
- The polar jet stream can bring down cold polar conditions from the north.
- The subtropical jet stream can bring warm tropical conditions from the south (in the northern hemisphere).

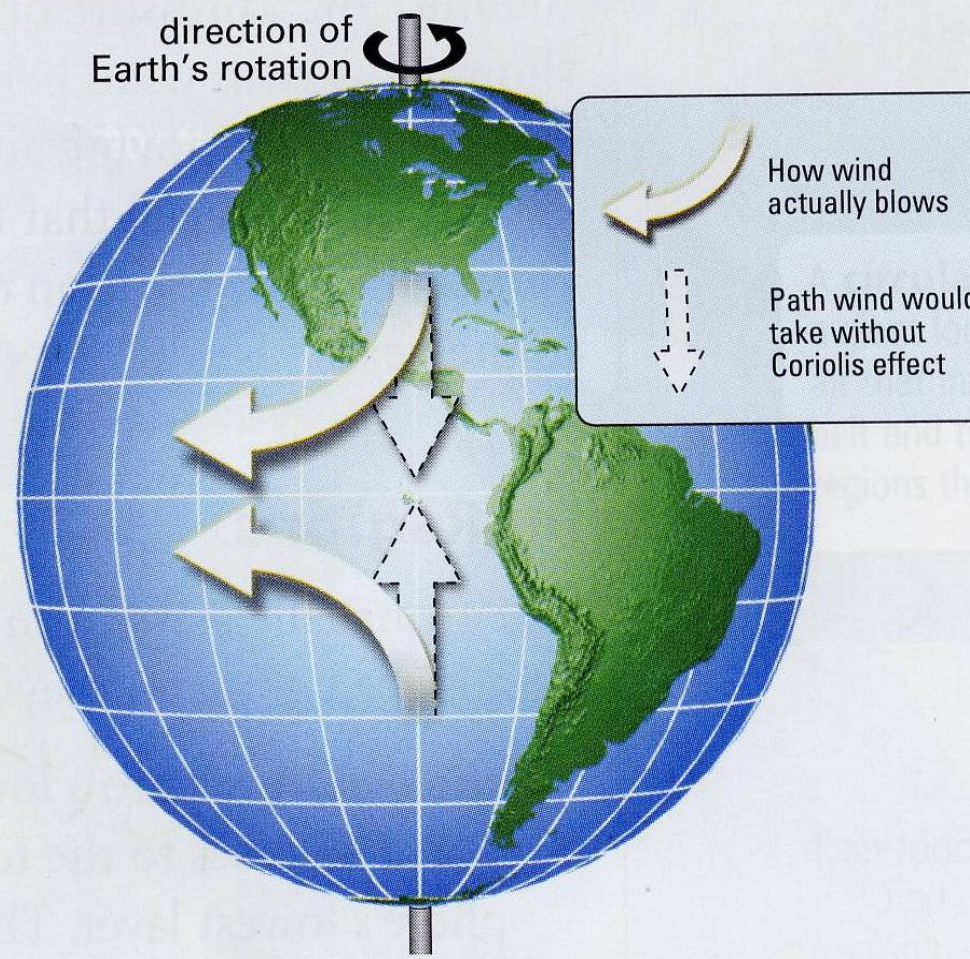
**Why do you think this matters to you as a person?**

**Because of cause and effect: the jet stream and global winds have direct effects on weather and climatic conditions**

# Earth's rotation affects wind direction.

If Earth did not rotate, global winds would flow directly from the poles to the equator. However, Earth's rotation changes the direction of winds and other objects moving over Earth. The influence of Earth's rotation is called the **Coriolis effect** (KAWR-ee-OH-lihs). Global winds curve as Earth turns beneath them. In the Northern Hemisphere, winds curve to the right in the direction of motion. Winds in the Southern Hemisphere curve to the left. The Coriolis effect is noticeable only for winds that travel long distances.

Because the Coriolis effect causes global winds to curve, they cannot flow directly from the poles to the equator. Instead, global winds travel along three routes in each hemisphere. These routes, which circle the world, are called global wind belts.



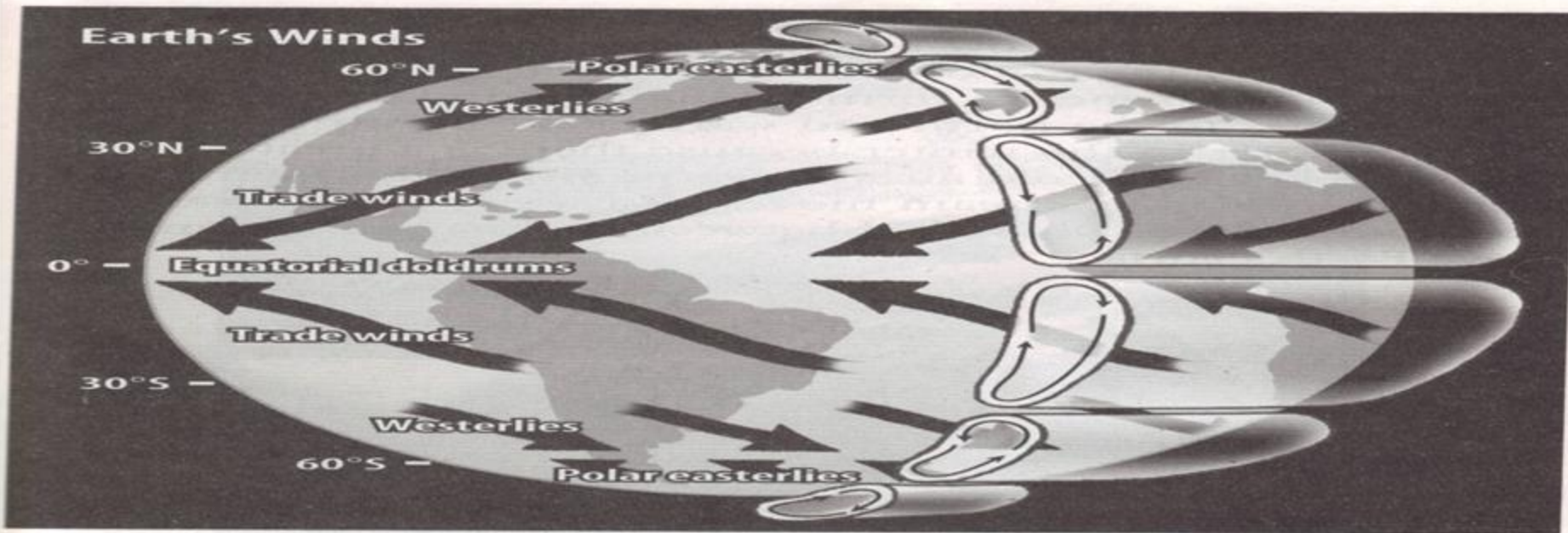


Actual path of wind

Path of wind without Coriolis effect

Earth's rotation





### What winds blow near Earth's surface?

The figure above shows some of the winds that blow near Earth's surface. These prevailing winds move heat and moisture around Earth.

**Trade Winds** Air descending to Earth's surface near 30° north latitude and 30° south latitude creates steady winds. These winds blow in tropical regions. Early sailors liked them because they moved their ships along quickly. Sailors named them trade winds because they relied on these winds to help them sail to many places to trade goods. ✓

**Prevailing westerlies** Between 30° latitude and 60° latitude in the northern and southern hemispheres, winds called the prevailing westerlies blow. These winds blow in the opposite direction from the trade winds. Prevailing westerlies cause much of the movement of weather across North America.

**Polar easterlies** Another surface wind, polar easterlies, are found near the poles. Near the north pole, easterlies blow from northeast to southwest. Near the south pole, polar easterlies blow from the southeast to the northwest.

## Did You Know?



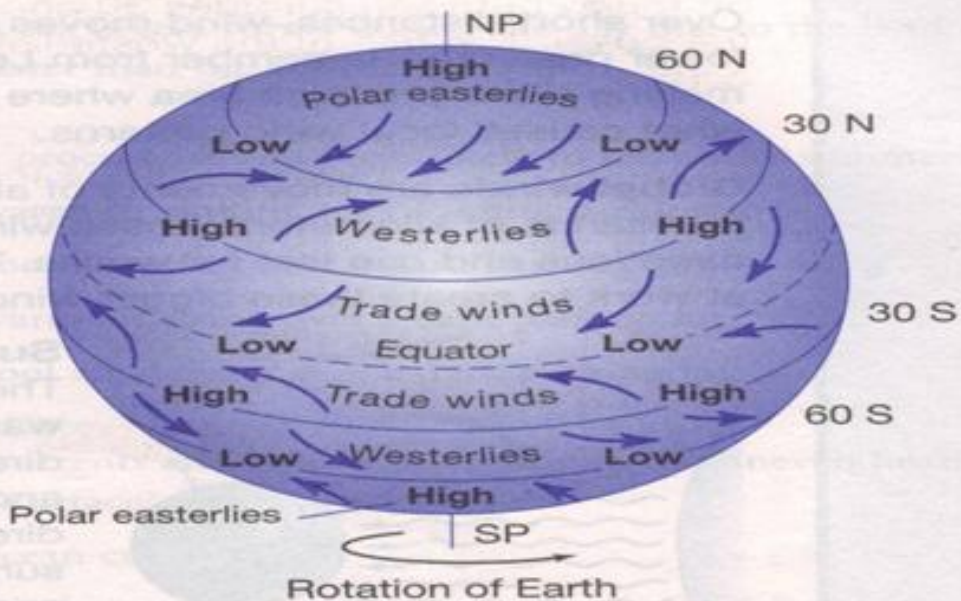
Not only do wind systems influence the weather, but they also determine when and where planes and ships can travel more efficiently.

This means that in general, the sun creates big areas of low pressure along the equator by warming the air there and making it rise. Since the air is colder at the poles, it sinks. This means that the poles are areas of high pressure. Remember this as we look at the final factor that helps to create global wind patterns.

### The Earth's Rotation and Global Winds

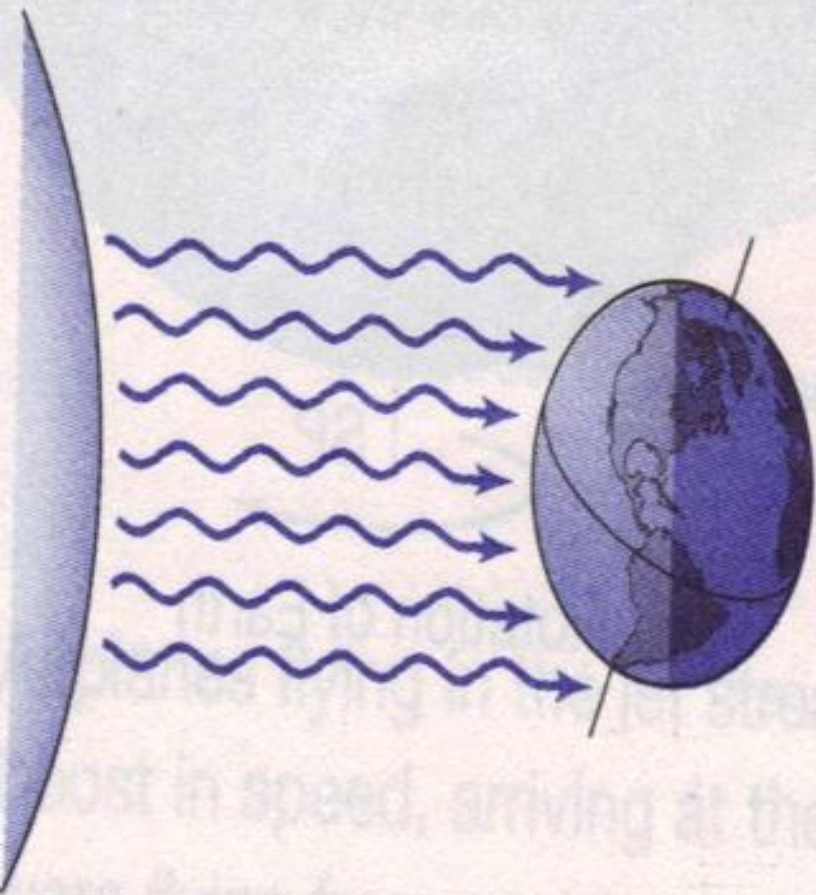
The last factor involves the rotation of the Earth. You might think that global winds move straight from the poles down toward the equator, from high pressure into low pressure. They just might—except there is an apparent curving of the path of winds and ocean currents due to the rotation of the Earth. The fact that the winds curve is known as the **Coriolis effect** and is the reason why weather patterns tend to move in curving, circular patterns. In the Northern Hemisphere, winds traveling north curve to the east and the winds traveling south curve to the west. Weather forecasters need to know this to make accurate predictions about where wind and air masses will go.

At every 30 degrees of latitude, the Coriolis effect produces patterns of air movements in the global winds that can be seen in this picture.



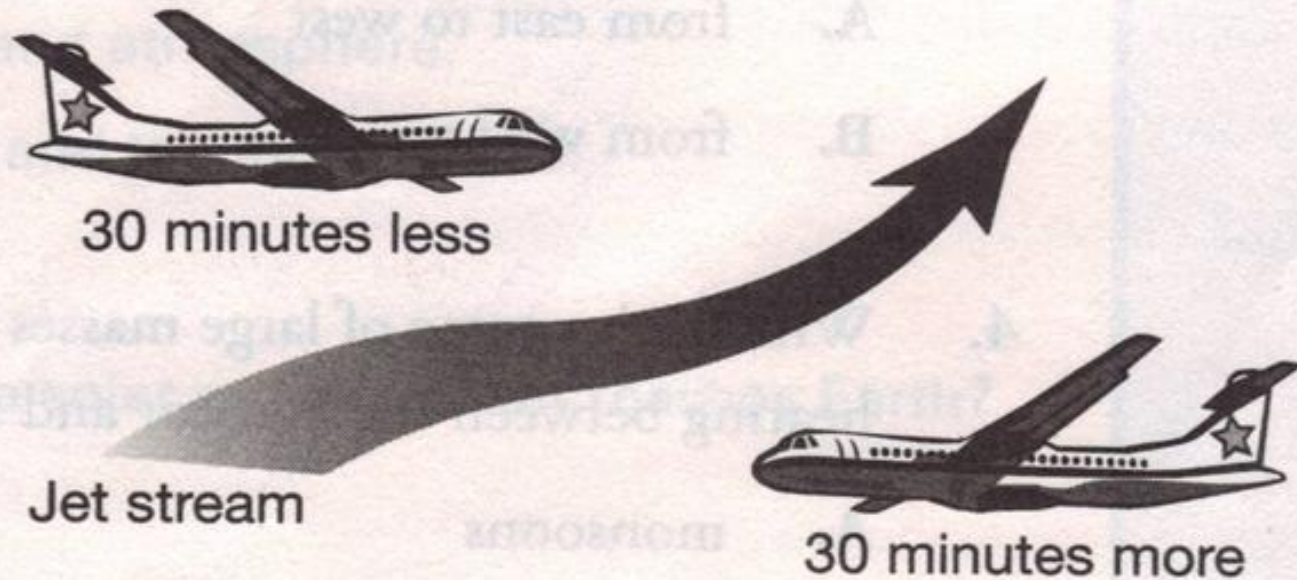
## Sunlight and Global Winds

The areas around the equator are warmest because sunlight is more directly overhead near the equator and it strikes the surface more directly. Closer to the poles, sunlight strikes the Earth at an angle. This means that the sun's energy is less powerful by the time it reaches the Earth at the poles and these areas do not get as much warming from the sun.



The sun's radiation heats the Earth. Uneven heating causes weather.

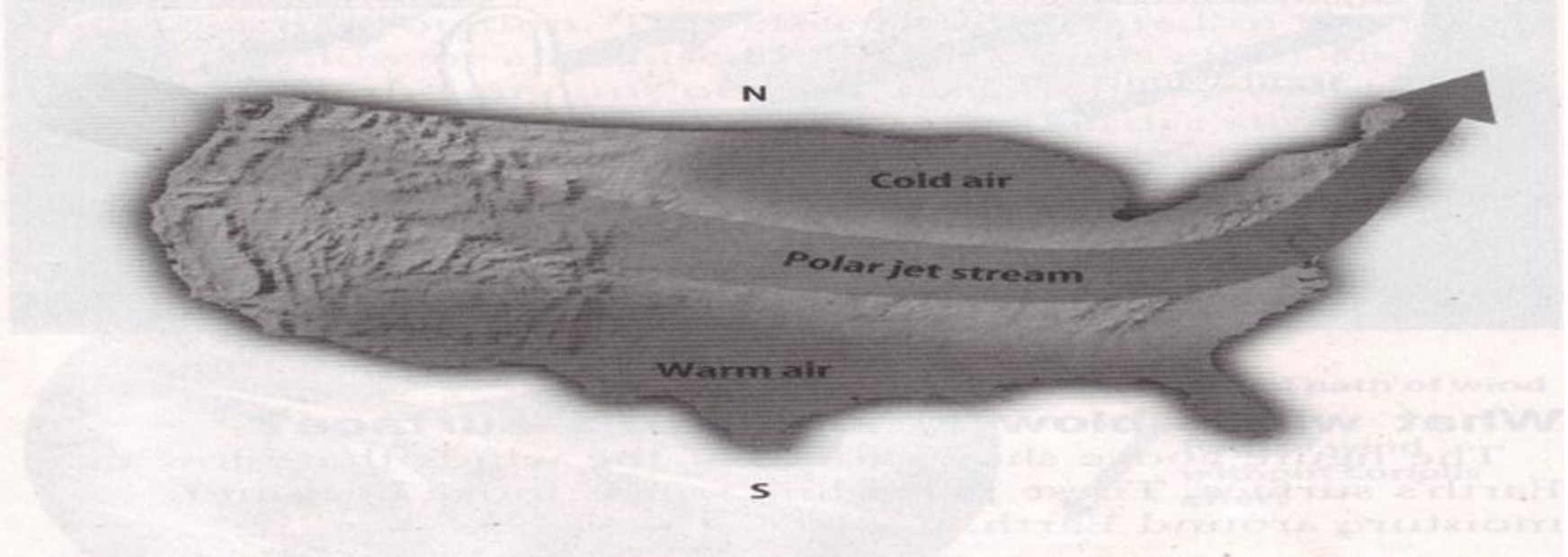
Near the top of the troposphere, flowing for thousands of kilometers from west to east are the **jet streams**. These “river of winds” do not follow regular paths around Earth and can reach speeds up to 400 km/h.



Airplanes flying in the jet stream from west to east get an extra boost in speed, arriving at their destination earlier than if they were flying from east to west. Knowing the path of a jet stream is important not only to pilots, but to meteorologists who can track the movement of storms if they know the location of a jet stream.

## What winds are in the upper troposphere?

Jet streams are narrow bands of strong winds that blow near the top of the troposphere. The polar jet stream affecting North America forms along a boundary where colder air lies to the north and warmer air lies to the south. It moves faster in the winter because there is a greater difference between cold air and warm air. As the figure below shows, the polar jet stream moves in a wavy west-to-east direction. It is usually found between 10 km and 15 km above Earth's surface. ☑



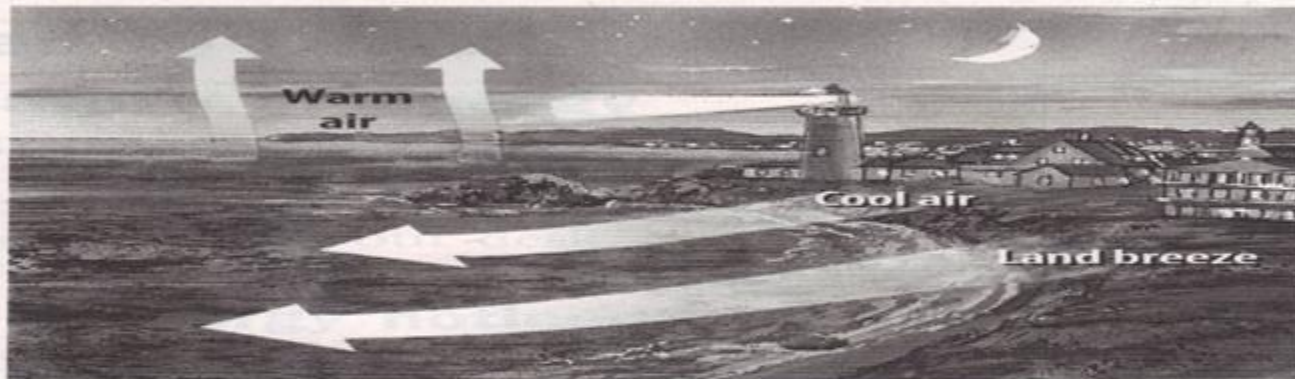
## What are the effects of the jet stream?

The jet stream helps move storms across the country from the west to the east. Jet pilots use information about jet streams to help them fly. When flying to the east, planes save time and fuel. Going west, planes avoid the jet stream by flying at a different altitude. Flying from Boston to Seattle may take 30 minutes longer than flying from Seattle to Boston.

## Sea Breeze



## Land Breeze



### **What causes sea breezes and land breezes?**

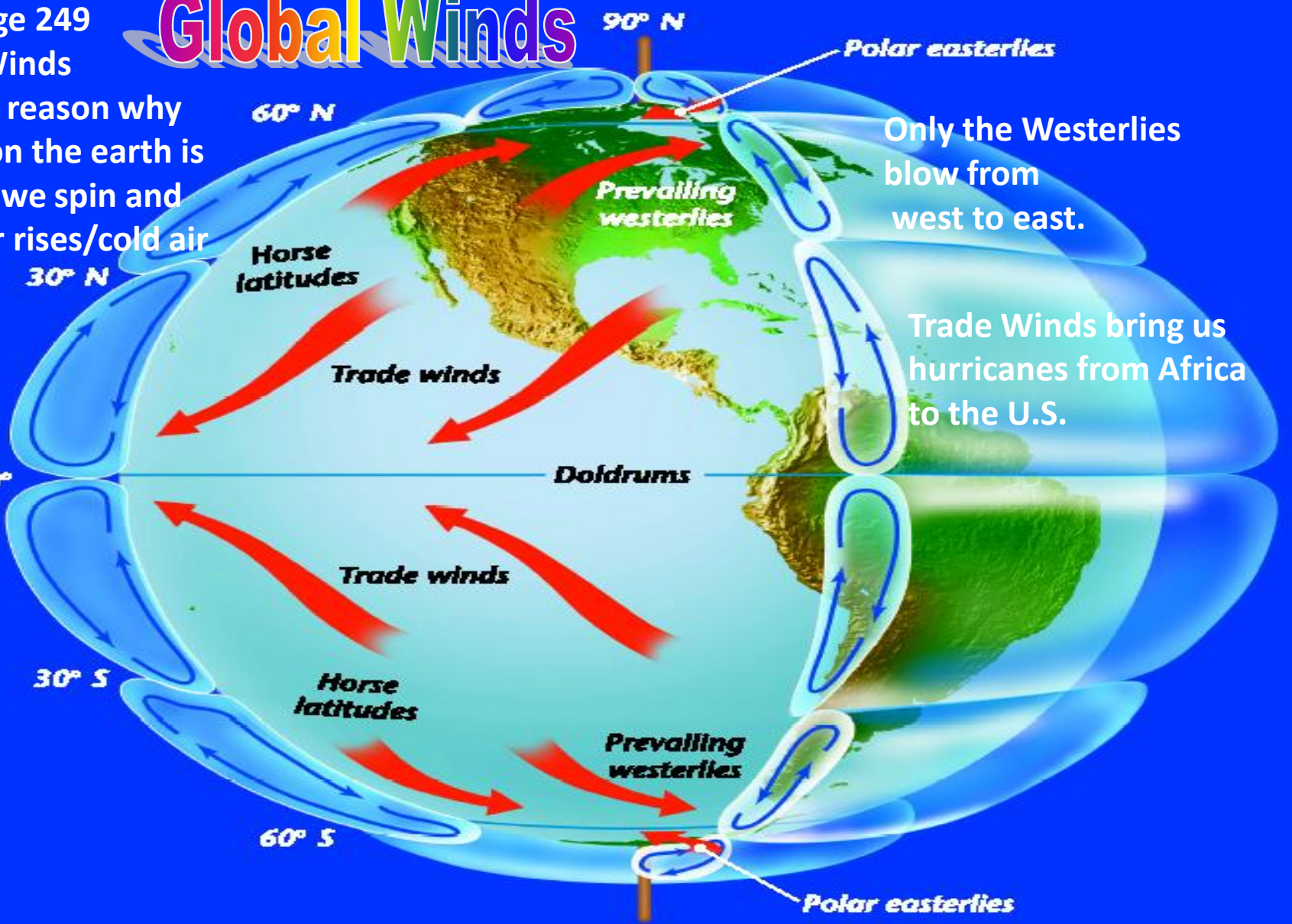
Convection currents over areas where the land meets the sea can cause wind. During the day, the Sun's heat warms the land more than it warms the water. A **sea breeze** is the movement of air from sea to land during the day. Air over the land is heated by conduction. This heated air is less dense and has lower pressure. Cooler, denser air over the water has higher pressure and flows towards the warmer, less dense air above the land. A convection current results, and wind blows from the sea toward the land. ☑

At night, the land and the air above it cool much faster than ocean water. Cooler, denser air above the land moves over the water, as the warm air over the water rises. The movement of air from land to sea is a **land breeze**.

# Global Winds

The only reason why wind is on the earth is because we spin and warm air rises/cold air sinks.

# Global Winds



Only the Westerlies blow from west to east.

Trade Winds bring us hurricanes from Africa to the U.S.

# Global Winds

- **Trade Winds blow from east to west in the tropical region moving warm air in that climate zone.**
- **The prevailing westerly winds blow from west to east in the temperate region. The temperate zone temperatures are affected most by the changing seasons, but since the westerly wind belt is in that region, the weather systems during any season move from west to east. Since the U.S. is in the westerly wind belt, the weather systems move across the country from west to east.**
- **Tropical weather systems, for example, hurricanes, are moved in the prevailing direction of the trade winds. If they enter the westerly wind belt, they are often turned and move in the direction of that prevailing system.**
- **The polar winds blow northeast to west in the polar region moving cold polar air in that climate zone from the poles toward the west.**



# Jet Stream

- Is a fast-moving ribbon of air that moves around the globe of Earth. It dips and bends constantly changing positions.
- As these changes occur, air masses and weather systems in its path are moved along by the fast moving air.
- The polar jet stream can bring down cold polar conditions from the north.
- The subtropical jet stream can bring warm tropical conditions from the south (in the northern hemisphere).

**Why do you think this matters to you as a person?**

**Because of cause and effect: the jet stream and global winds have direct effects on weather and climatic conditions**

6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

# Jet Stream

- Jet stream- A fast-moving ribbon of air that moves from west to east in the Northern Hemisphere around Earth. It dips and bends and constantly changes positions.
- As these changes occur, air masses and weather systems in its path are moved along by the fast moving air.

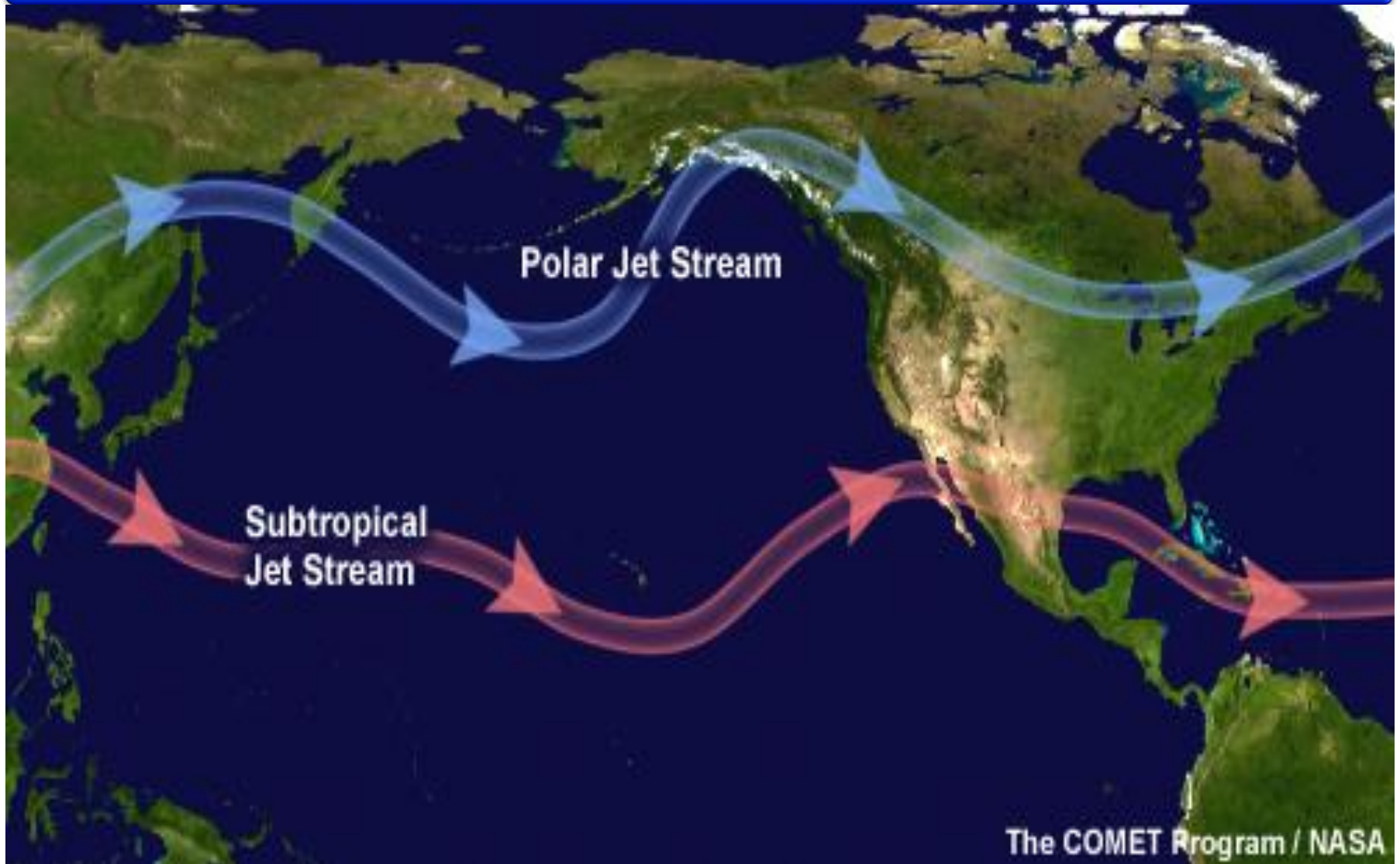
6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

## Jet Stream

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## 6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

### Polar Jet Stream & Subtropical Jet Stream



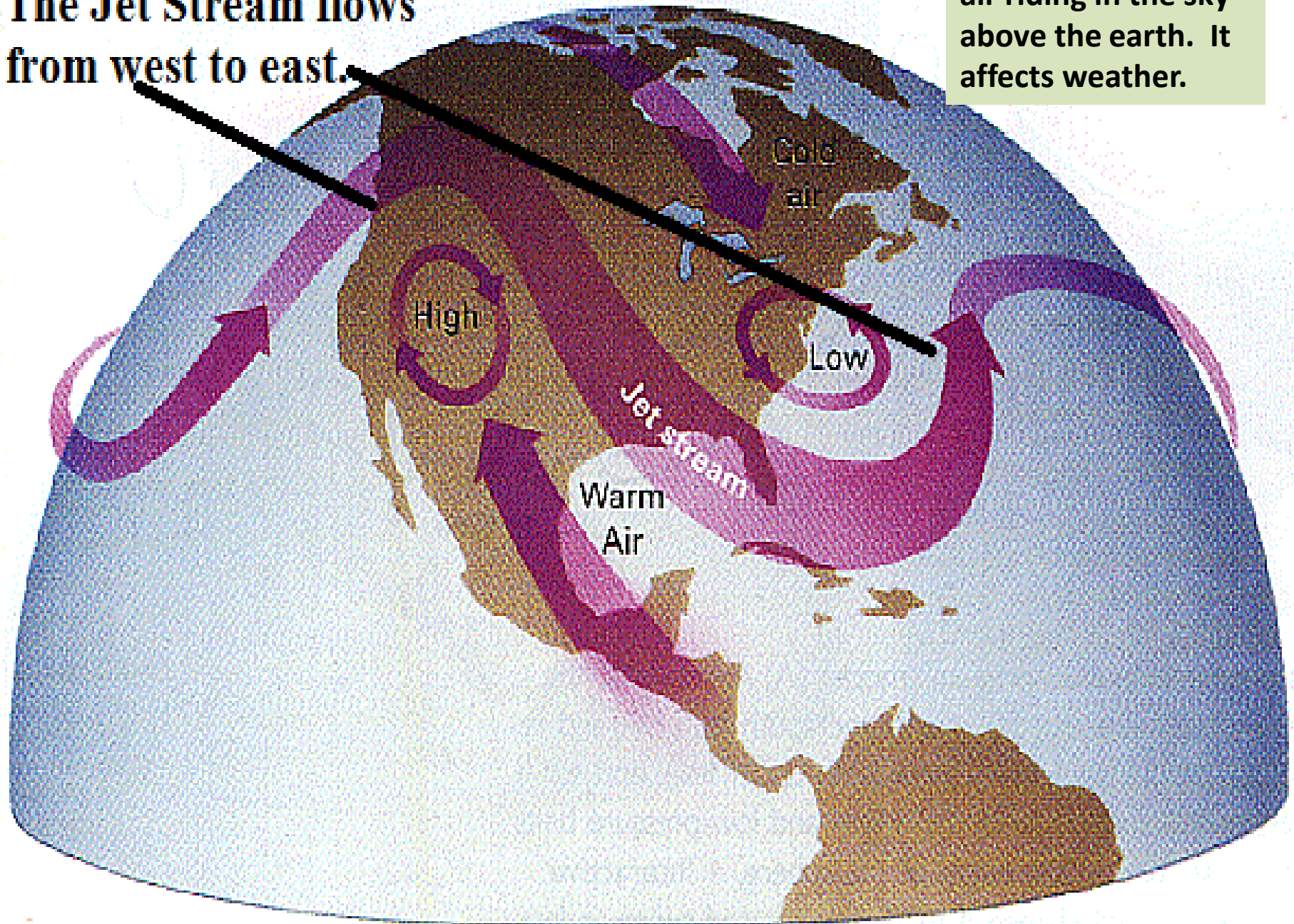
6.4.9 Explain the influence of global winds and the jet stream on weather and climatic conditions.

# Polar Jet Stream

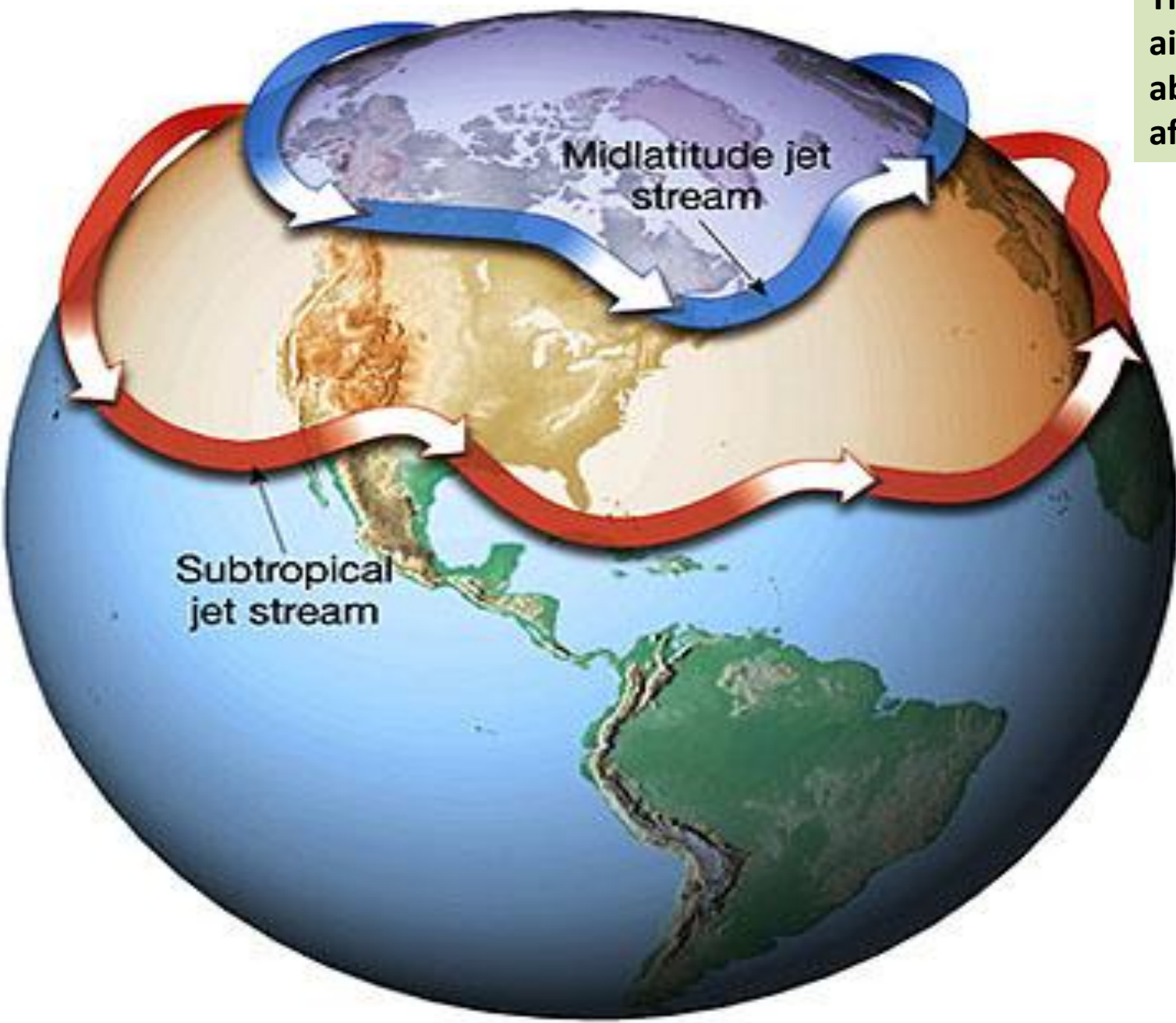


**The Jet Stream flows from west to east.**

This is a column of air riding in the sky above the earth. It affects weather.



This is a ribbon of air riding in the sky above the earth. It affects weather.



## What is the jet stream?

The jet stream is a fast flowing, river of air found in the atmosphere at around 12 km above the surface of the Earth just under the tropopause. They form at the boundaries of adjacent air masses with significant differences in temperature, such as of the polar region and the warmer air to the south. Because of the effect of the Earth's rotation the streams flow west to east, propagating in a serpentine or wave-like manner at lower speeds than that of the actual wind within the flow.

This is a ribbon of air riding in the sky above the earth. It affects weather.

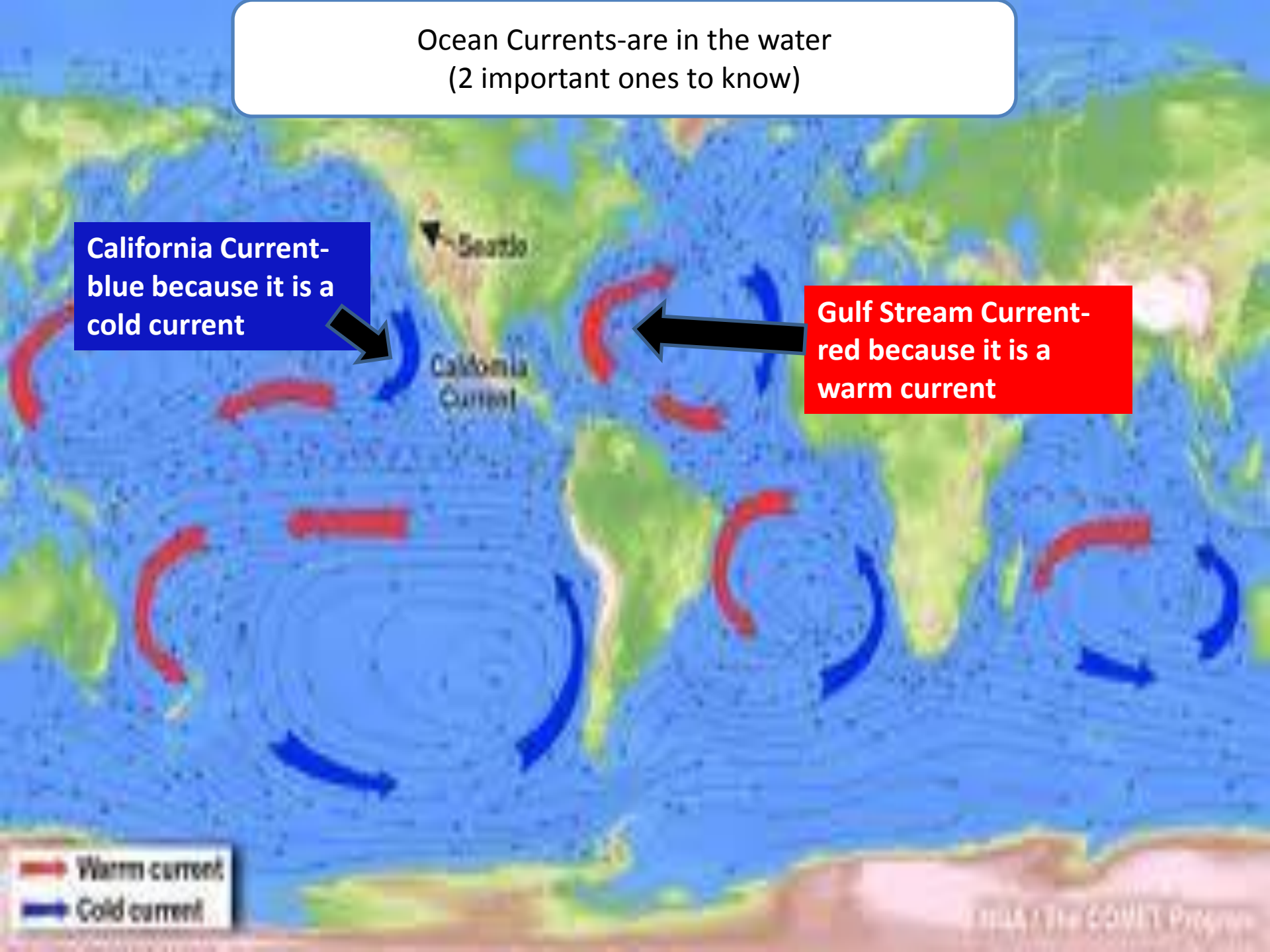




Ocean Currents-are in the water  
(2 important ones to know)

California Current-  
blue because it is a  
cold current

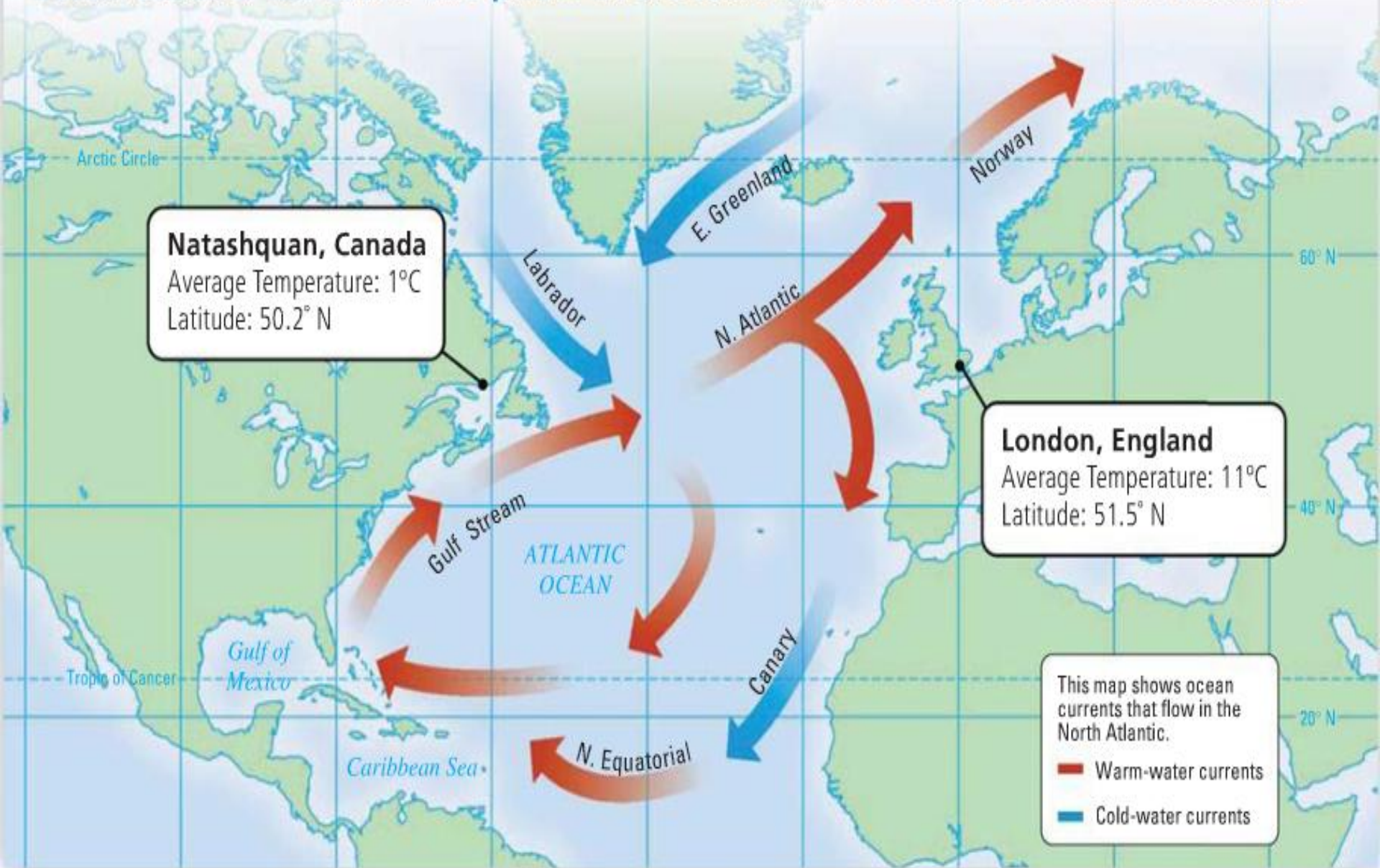
Gulf Stream Current-  
red because it is a  
warm current



→ Warm current  
→ Cold current

# Ocean Currents

Ocean currents can cause two places at the same latitude to have different climates.

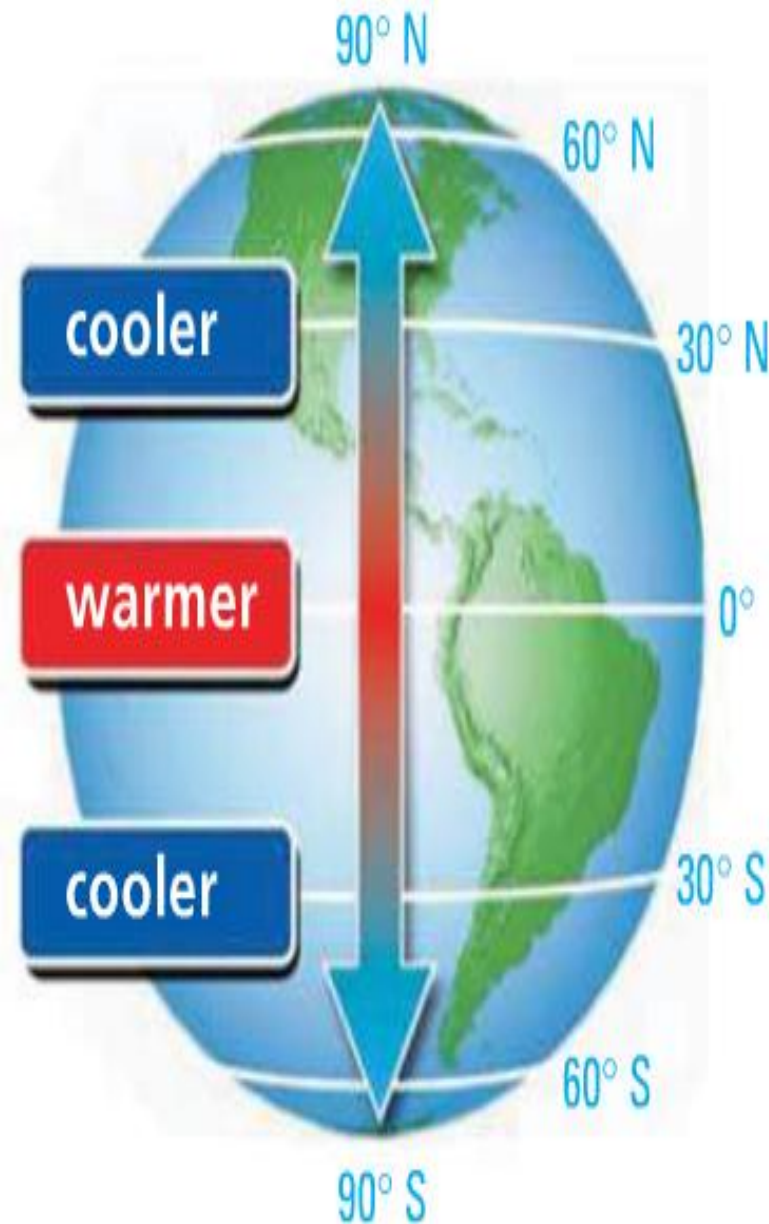


# Climate is a long-term weather pattern.

The main factors that influence climate are

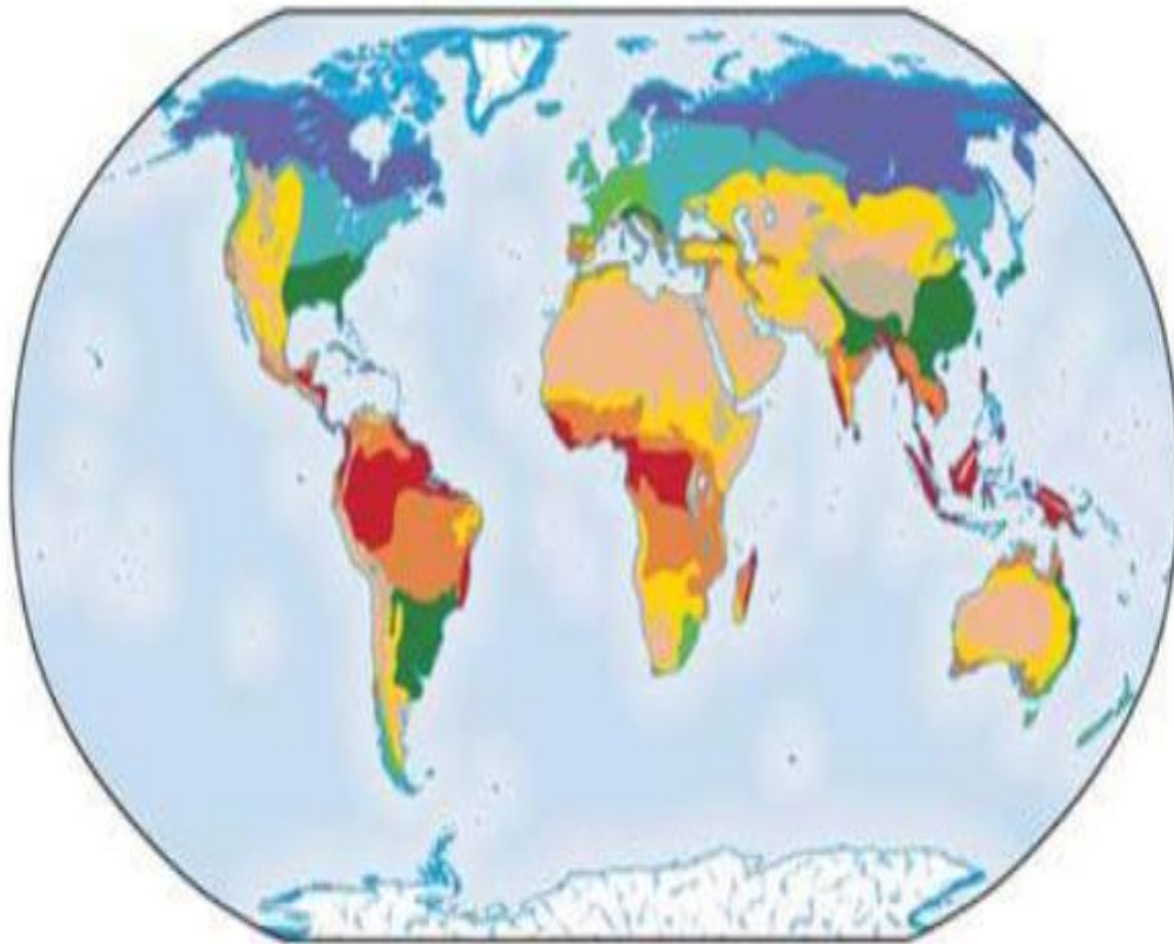
- latitude
- altitude
- distance from large bodies of water
- ocean currents

Seasonal changes are also part of climate patterns.



Temperatures usually decrease as latitude increases.

# Earth has a variety of climates.



Each color on the map shows a different subclimate.

Scientists usually group climates by temperature and precipitation. There are six major climate zones. Climate zones can be divided into subclimates. Microclimates are smaller areas within subclimates.

# WEATHER TEACHER GROUP

## Review 6-4.6

# Information on a Weather Map

Meteorologists use maps to display a lot of weather information at once.

## Station Symbol

air pressure: 1015.6 millibars  
temperature: 47°F

47 156

23  
wind: SW at 15 knots  
dew point: 23°F  
cloud cover: 100%

What do you know about this map?

Cold front



Warm front



Stationary front



Precipitation



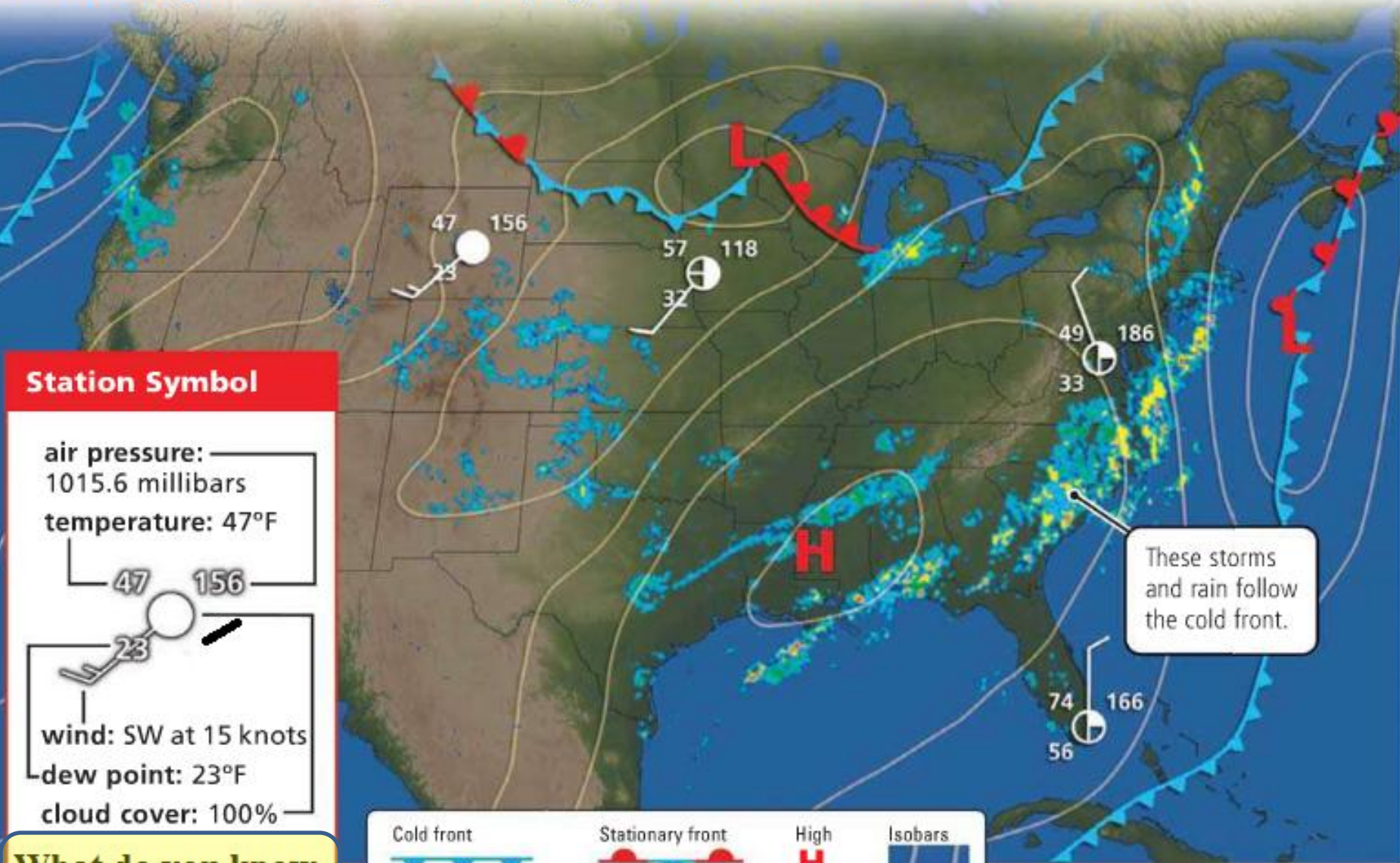
High

H

Low

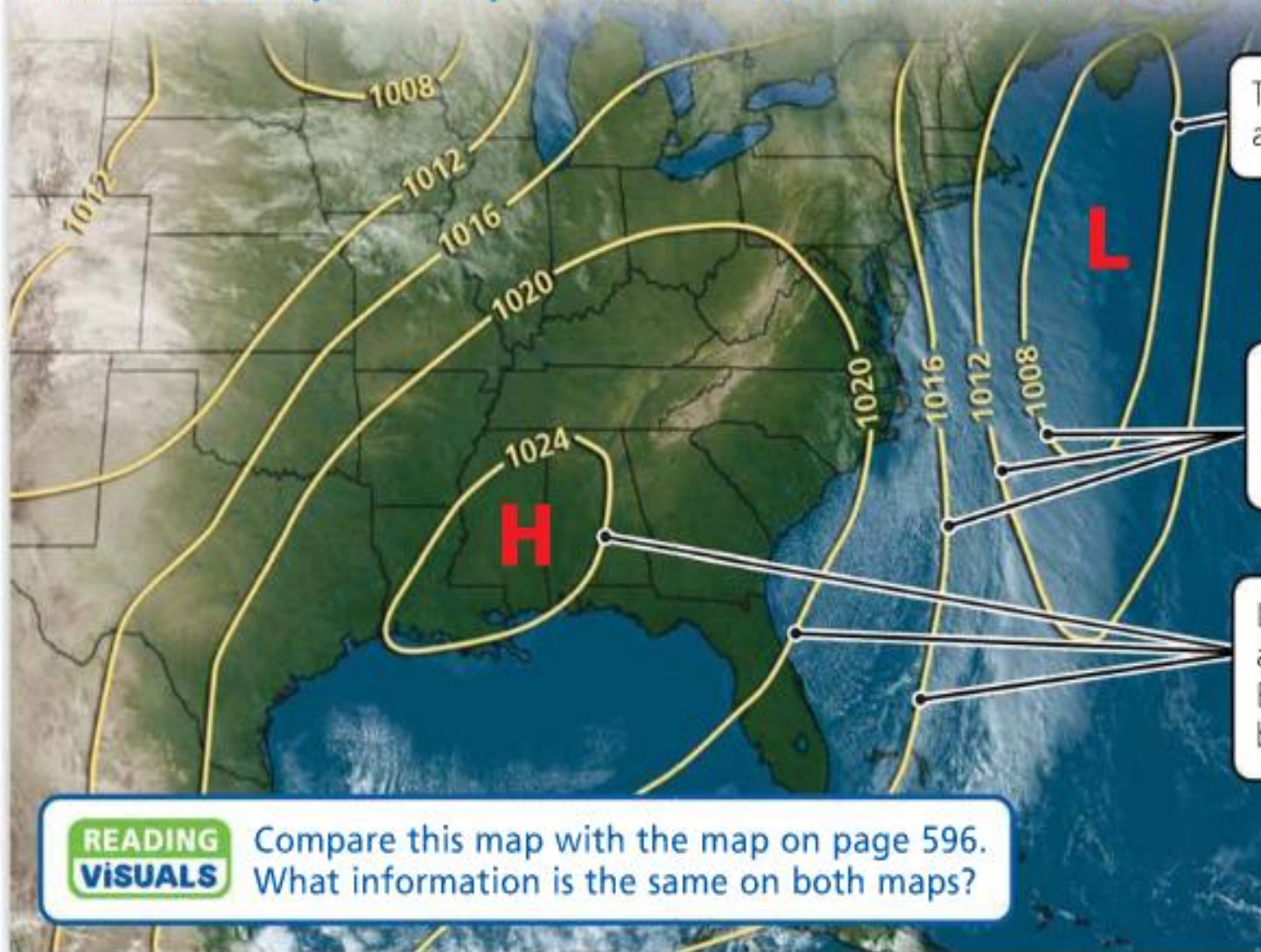
L

Isobars



# Understanding Isobars

Isobars show pressure patterns, which determine winds.



The pressure is 1008 millibars all along this line.

Lines close together show a big difference in air pressure. Expect strong winds here.

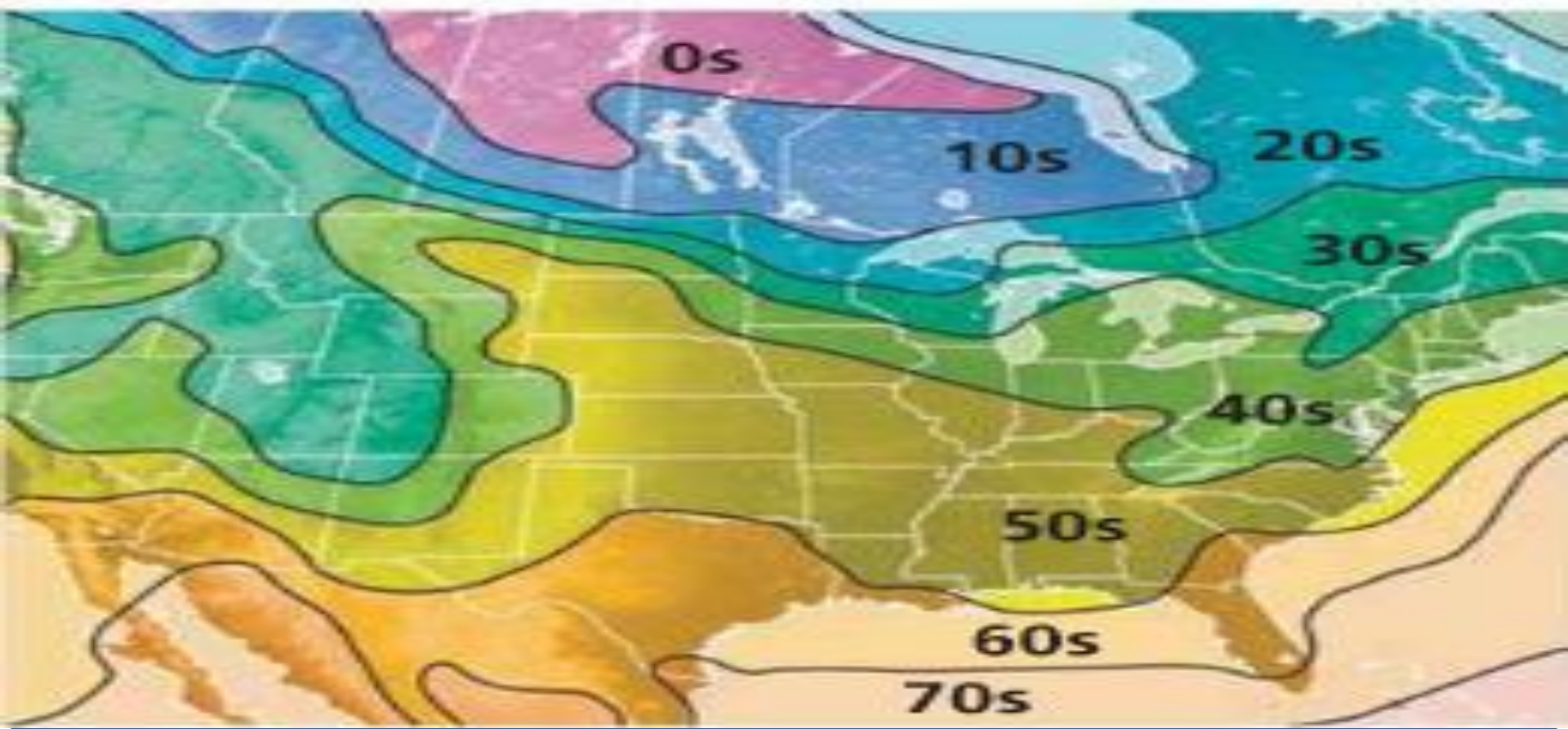
Lines are far apart where the air pressure is almost even. Expect calm air or light breezes near this high.

**READING VISUALS** Compare this map with the map on page 596. What information is the same on both maps?

**What is the barometric pressure in North Carolina?**

# Isotherm Map

The colors on this map represent different ranges of temperature (°F).



What is the average temperatures in the Carolinas?



# Swinging a Sling Psychrometer

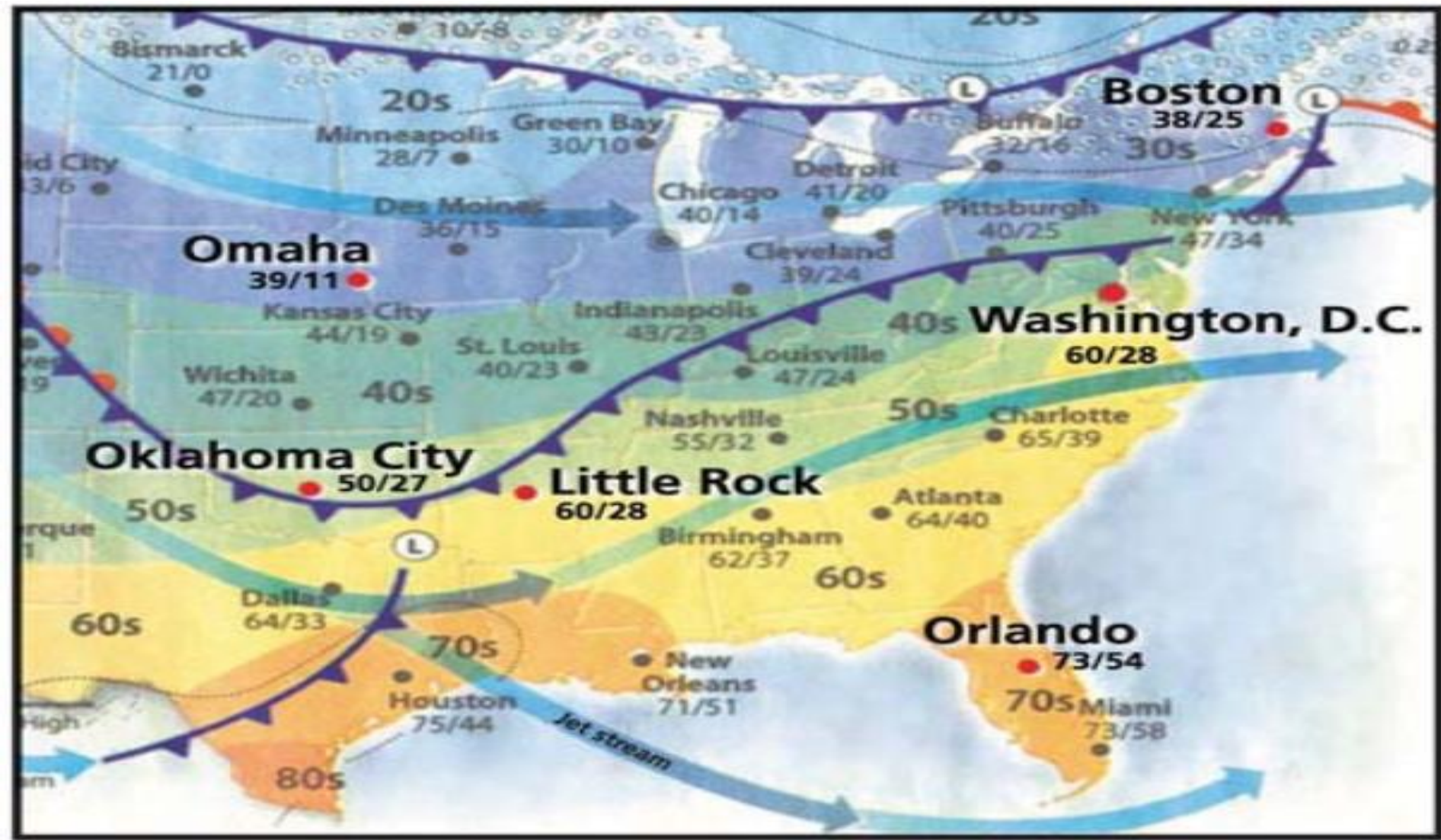


Sling Psychromet



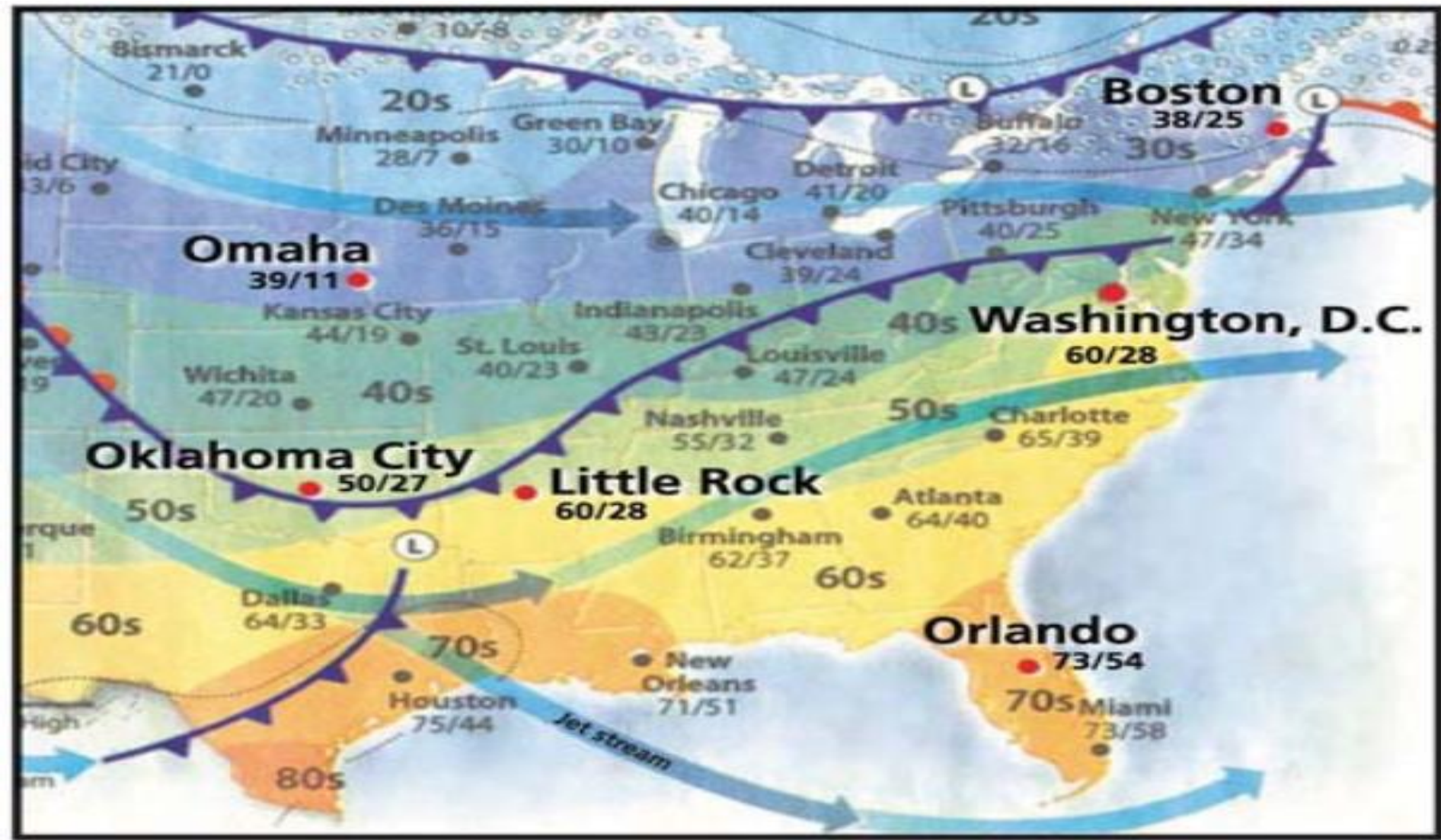
What would the man be swinging this instrument to measure?

# Interpret the Weather



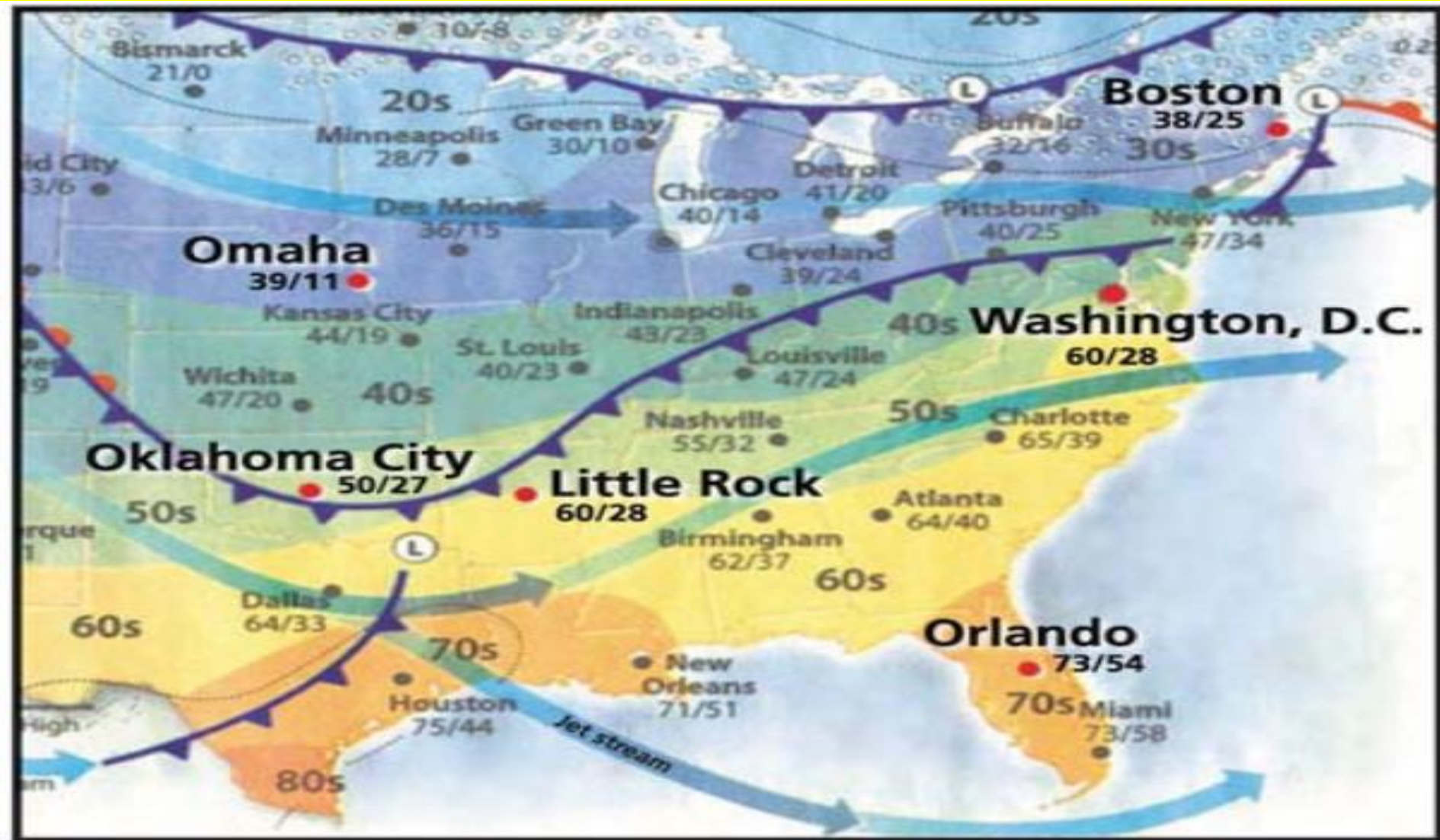
**INFER** Name and describe the air mass that has moved south to Omaha from Canada.

# Interpret the Weather



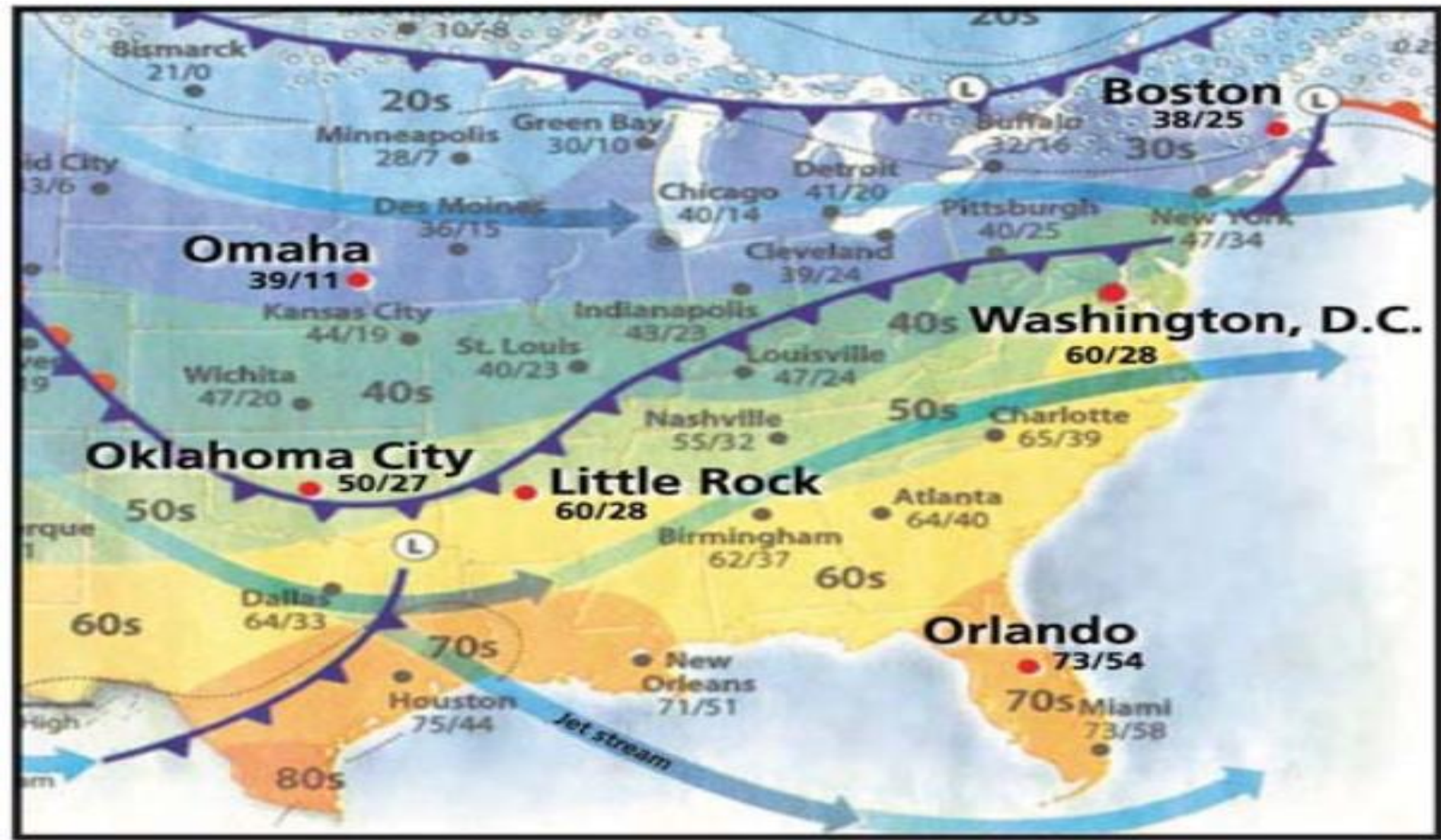
**IDENTIFY EFFECTS** How are two low-pressure systems affecting the weather near Boston?

# Interpret the Weather



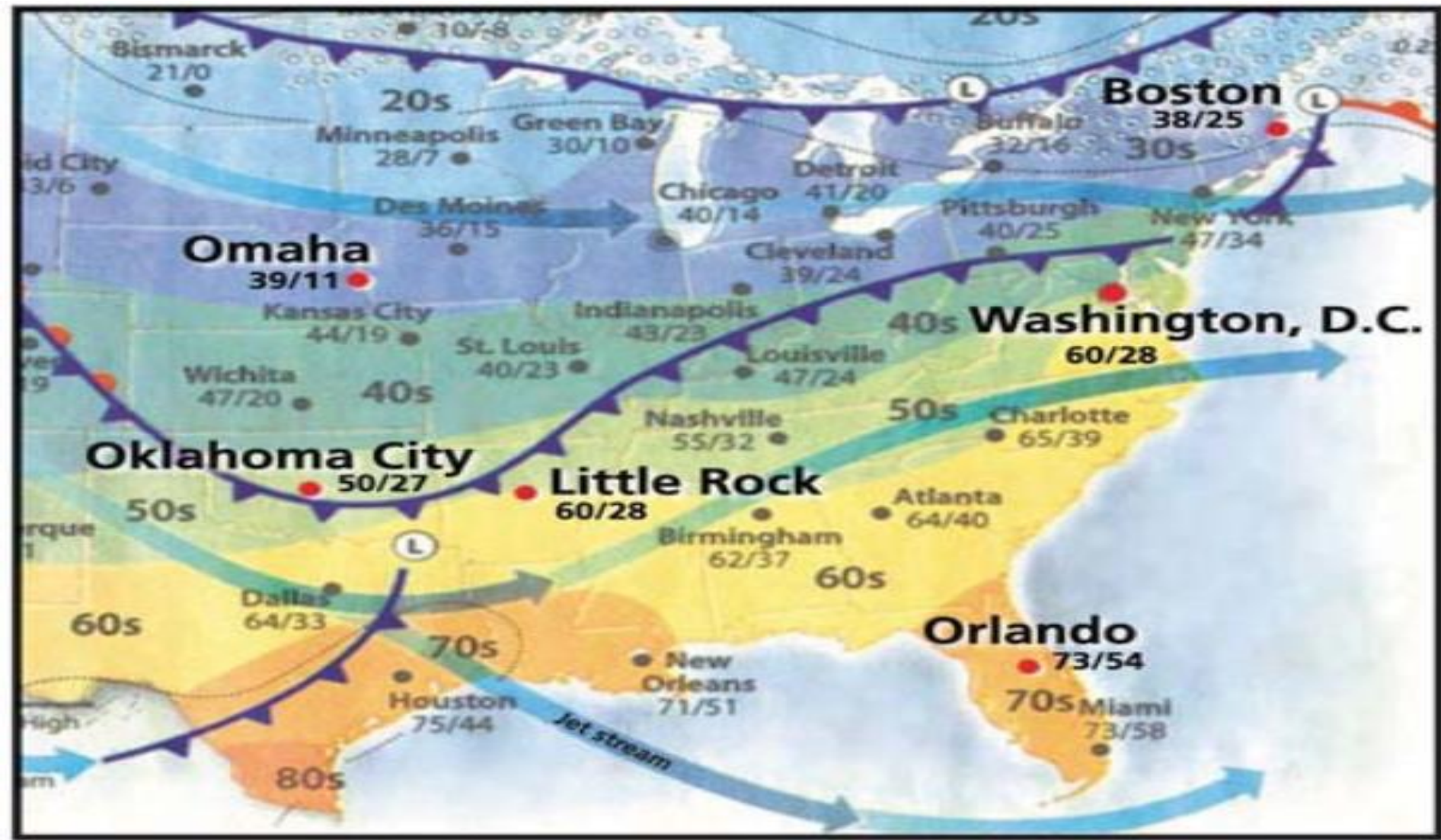
**PREDICT** Explain whether Washington, D.C., or Orlando is more likely to have a big change in weather in the next two days.

# Interpret the Weather



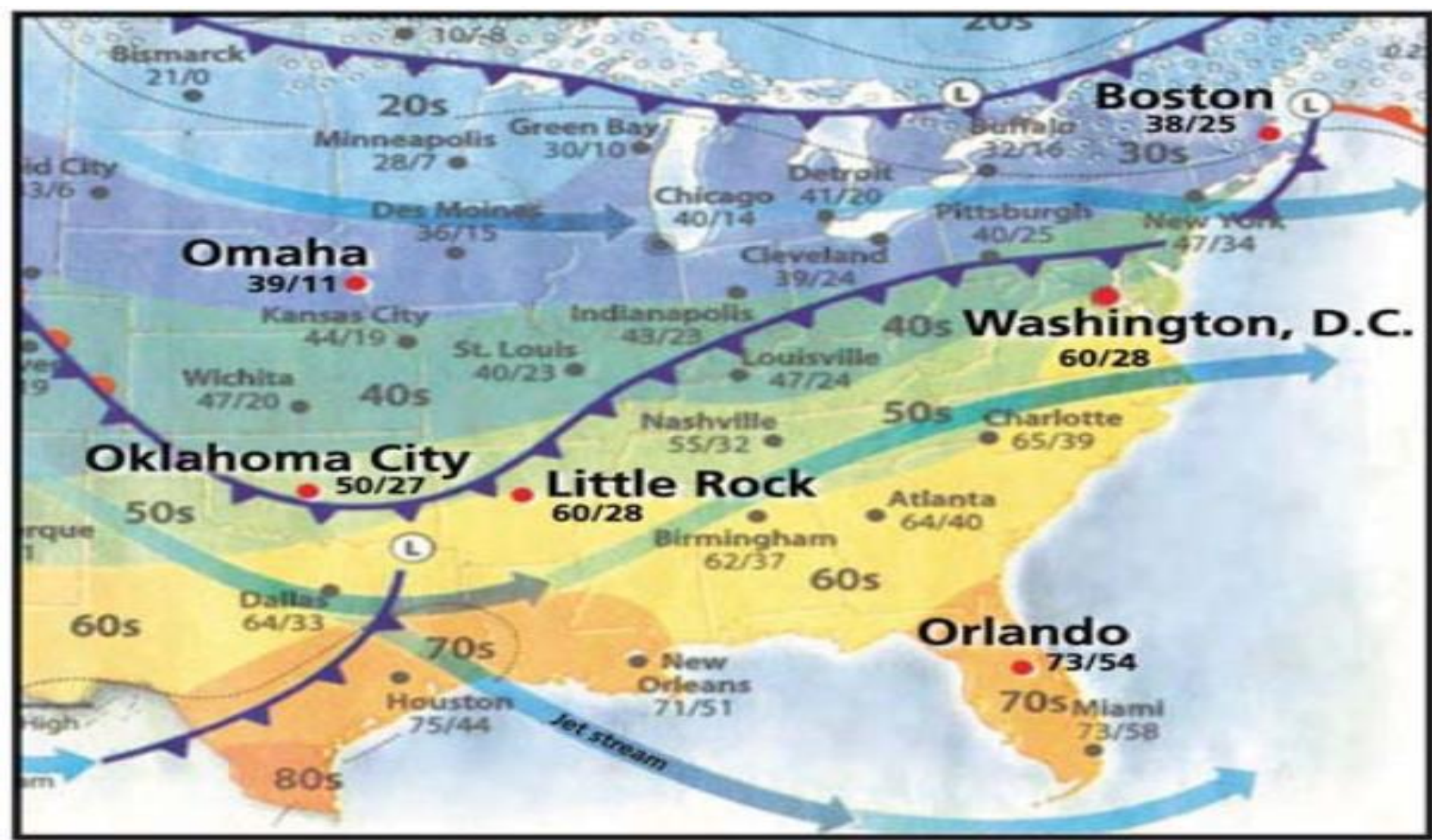
**COMPARE AND CONTRAST** Explain the difference in temperature between Oklahoma City and Little Rock.

# Interpret the Weather



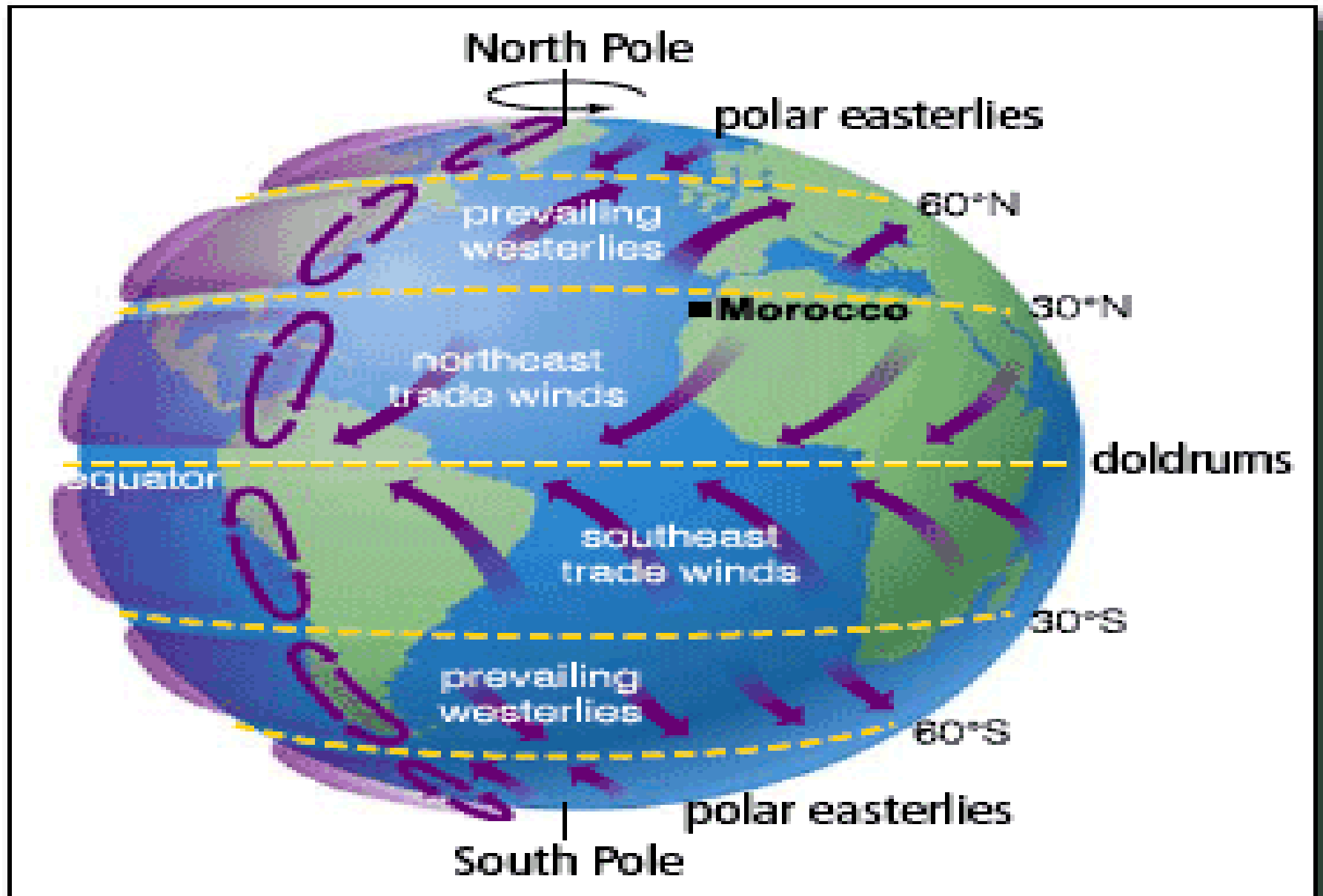
**PREDICT** How will the weather in Little Rock change in the next day or two?

# Interpret the Weather



**APPLY** Does this map indicate that it is hurricane season? Explain your reasoning.

# Do You Remember?





# Do You Remember?

- **Convection currents** are caused by warm air rising and cool air sinking. This is responsible for land and sea breezes.
- **Remember:** Winds will blow from HIGH to LOW.
- **Global Wind Belts** caused by the spinning of the earth.
- **Coriolis Effect**-bending of wind caused by the spinning of the earth
- **Easterlies**-cold air from the poles from east to west
- **Trade Winds**-move hurricanes off the coast of Africa from East to West.
- **Westerlies**-move air from west to east (influenced by the Jet Stream).
- **Jet Stream**-great fast moving ribbon of air between the troposphere and the stratosphere (tropopause) that moves from west to the east affecting the U.S. weather.

# Do You Remember?

- **Greenhouse Effect**-water vapor and oxygen are the gasses that trap heat in.
- **Solar Energy** -50% absorbed by earths land/waters
- **Cities** away from the beach much colder than those close to the beach because the ocean holds heat longer.
- **Land** heats up quick and cools off quick.
- **Water** heats up slow and cools off slow.
- **Land Breeze**-happens at night, breeze blown out from land (spell NITE four letters and LAND four letters)
- **Sea Breeze**-happens during day breeze blown in from ocean. (SEA for DAY)