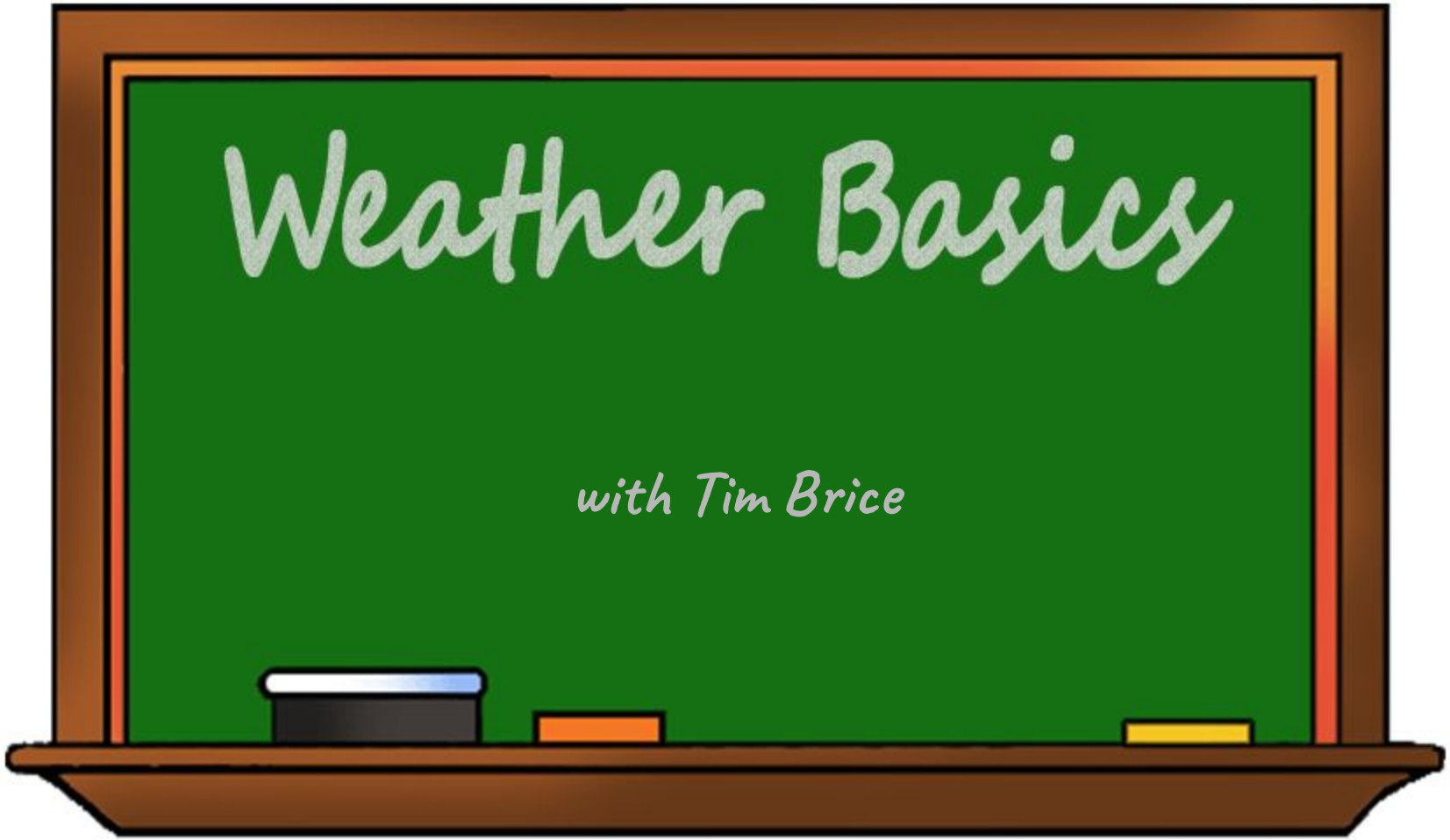
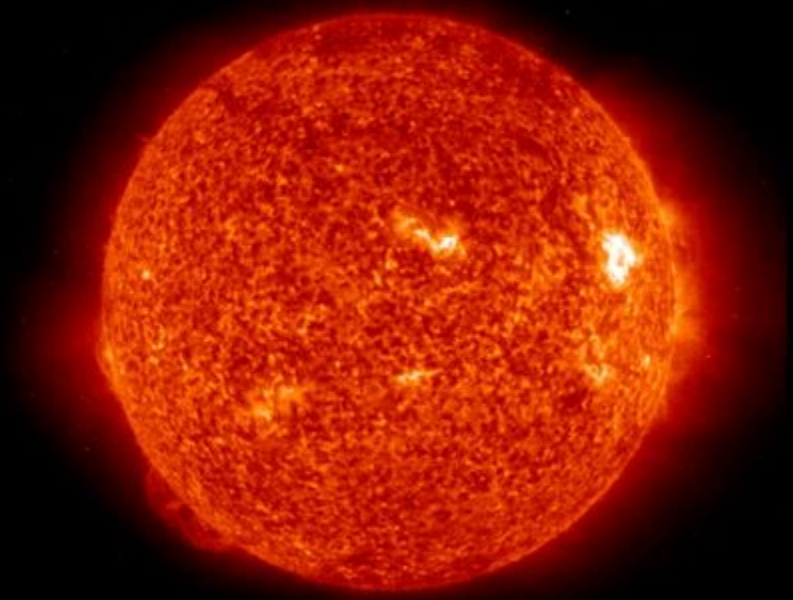

Weather Basics
with Tim Brice

# The Sun is where it all starts...




The Sun Heats the Earth...
The Earth Heats the Air
Cold
Cool
Warm
Incoming Solar Radiation passes through the atmosphere and is absorbed by the Earth's surface.
Outgoing Terrestrial Radiation is absorbed by the atmosphere.

# Uneven Heating of the Earth

**Oblique Rays** *(Less Radiation Recieved)*

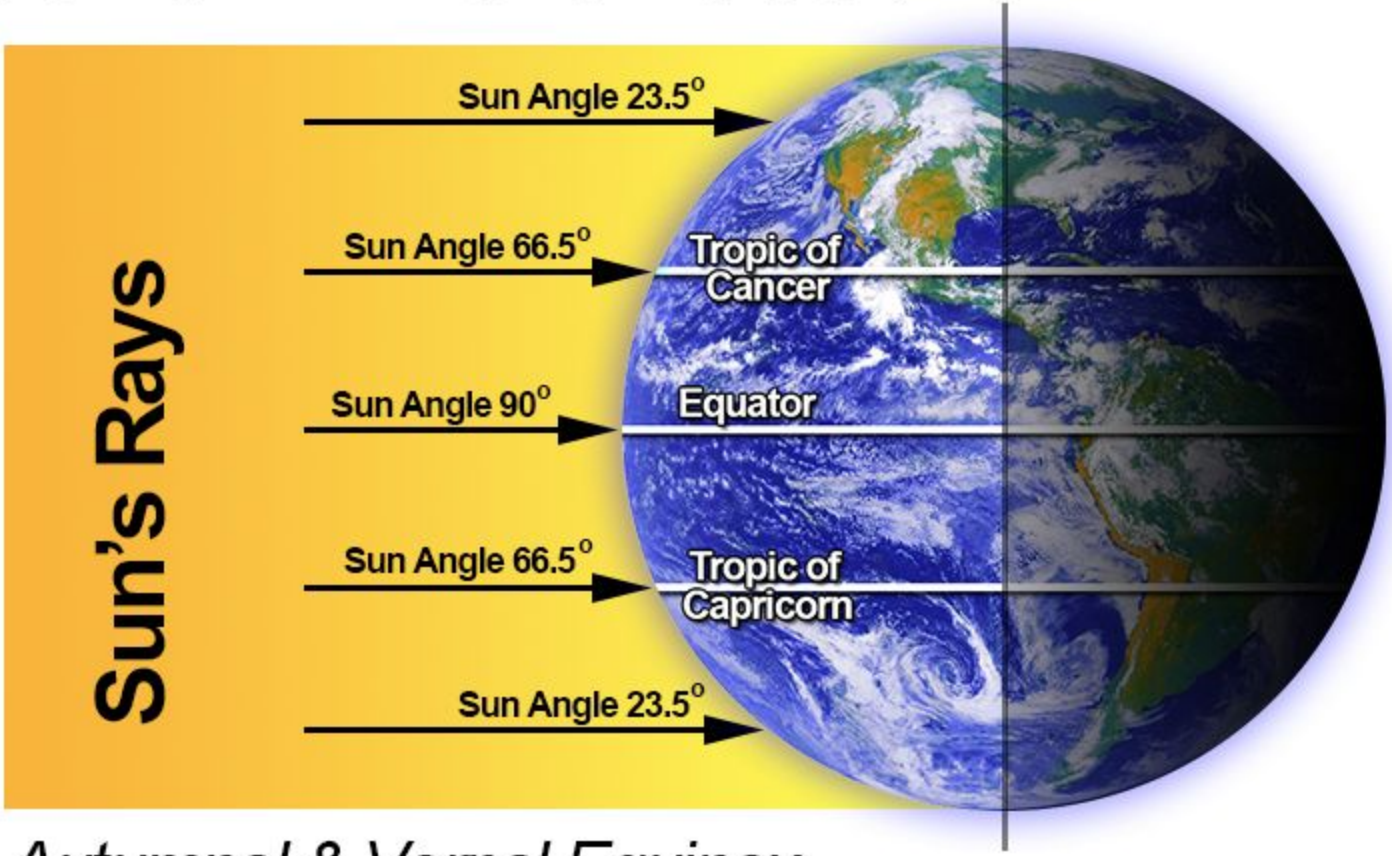
**Vertical Rays** *(More Radiation Recieved)*

**Oblique Rays** *(Less Radiation Recieved)*

**Equatorial Regions are Warmer** (*Higher Sun Angles*)

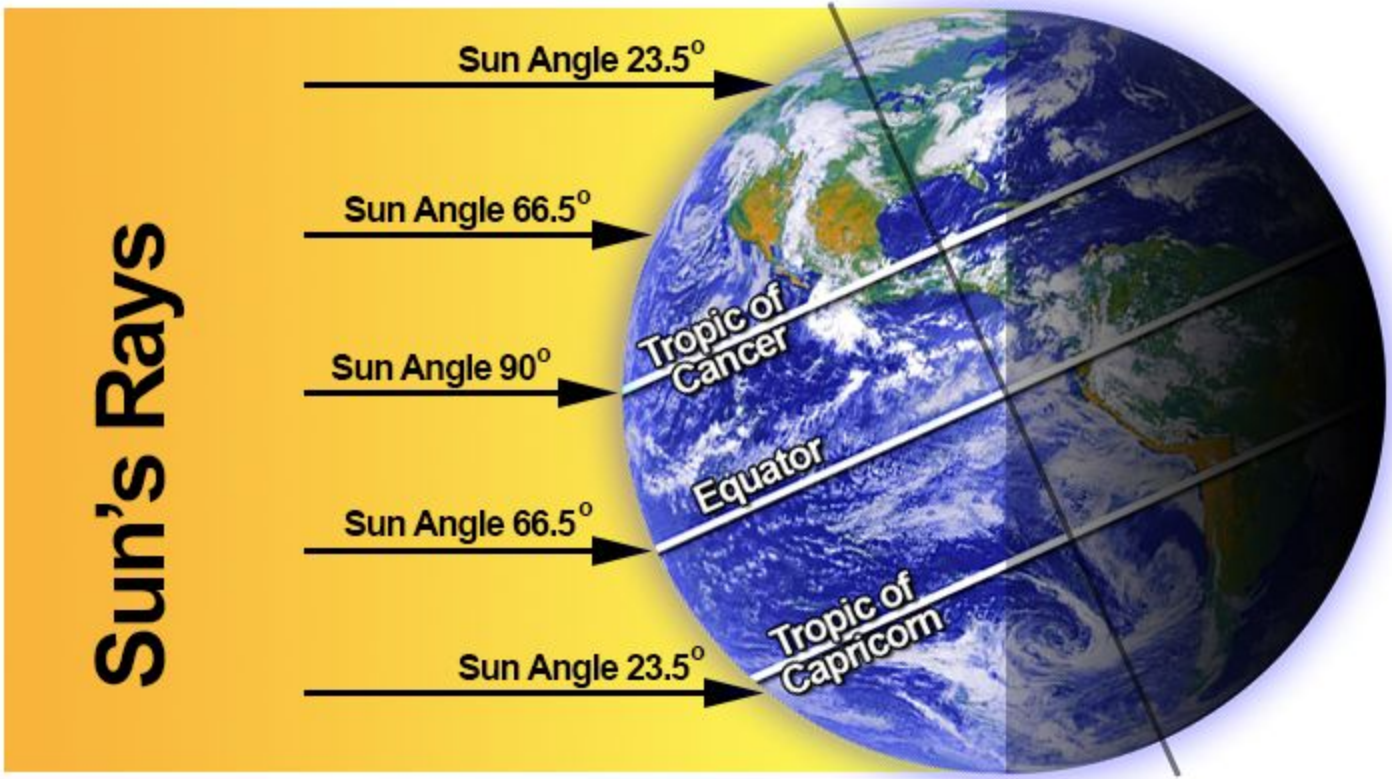
**Polar Regions are Colder** (*Lower Sun Angles*)

# Seasonal Differences *(Due to Earth's Axial Tilt)*



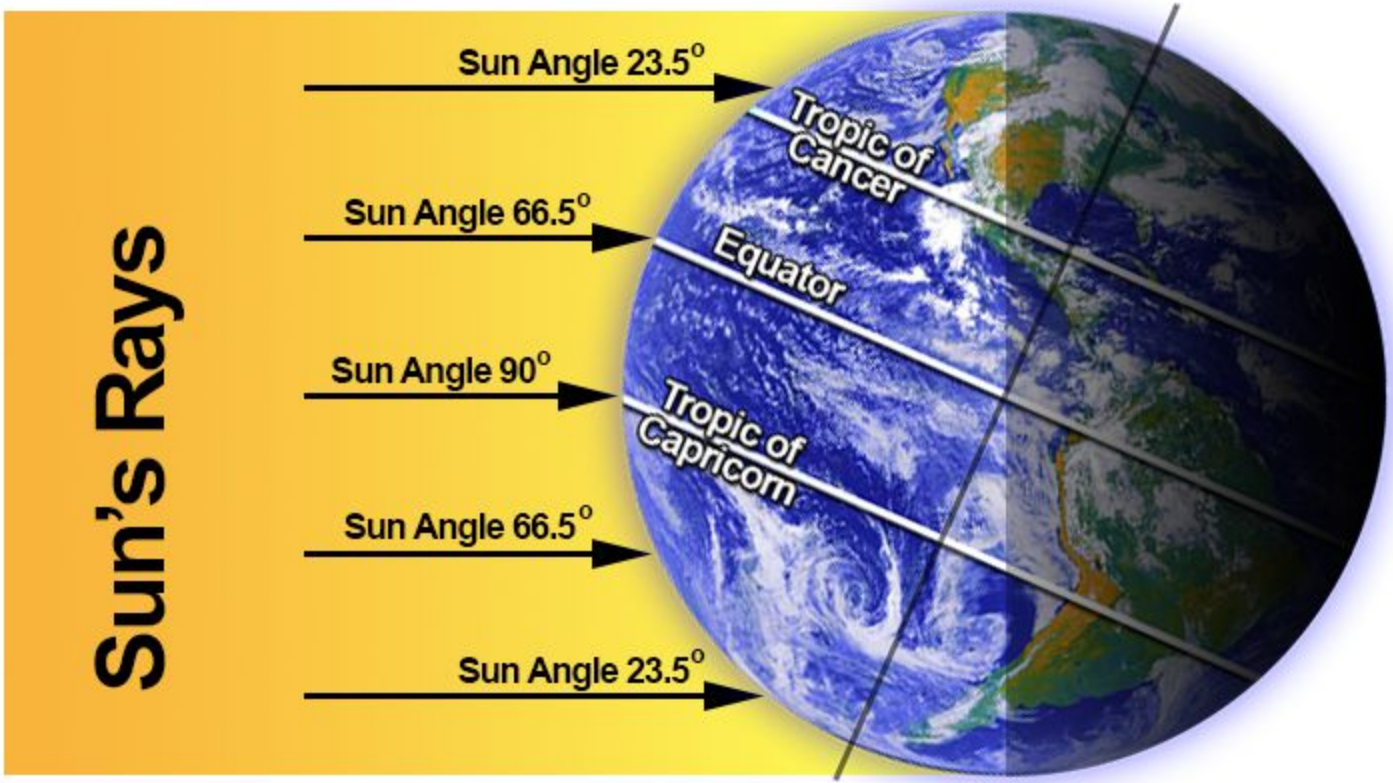

*Autumnal & Vernal Equinox*

# Seasonal Differences *(Due to Earth's Axial Tilt)*



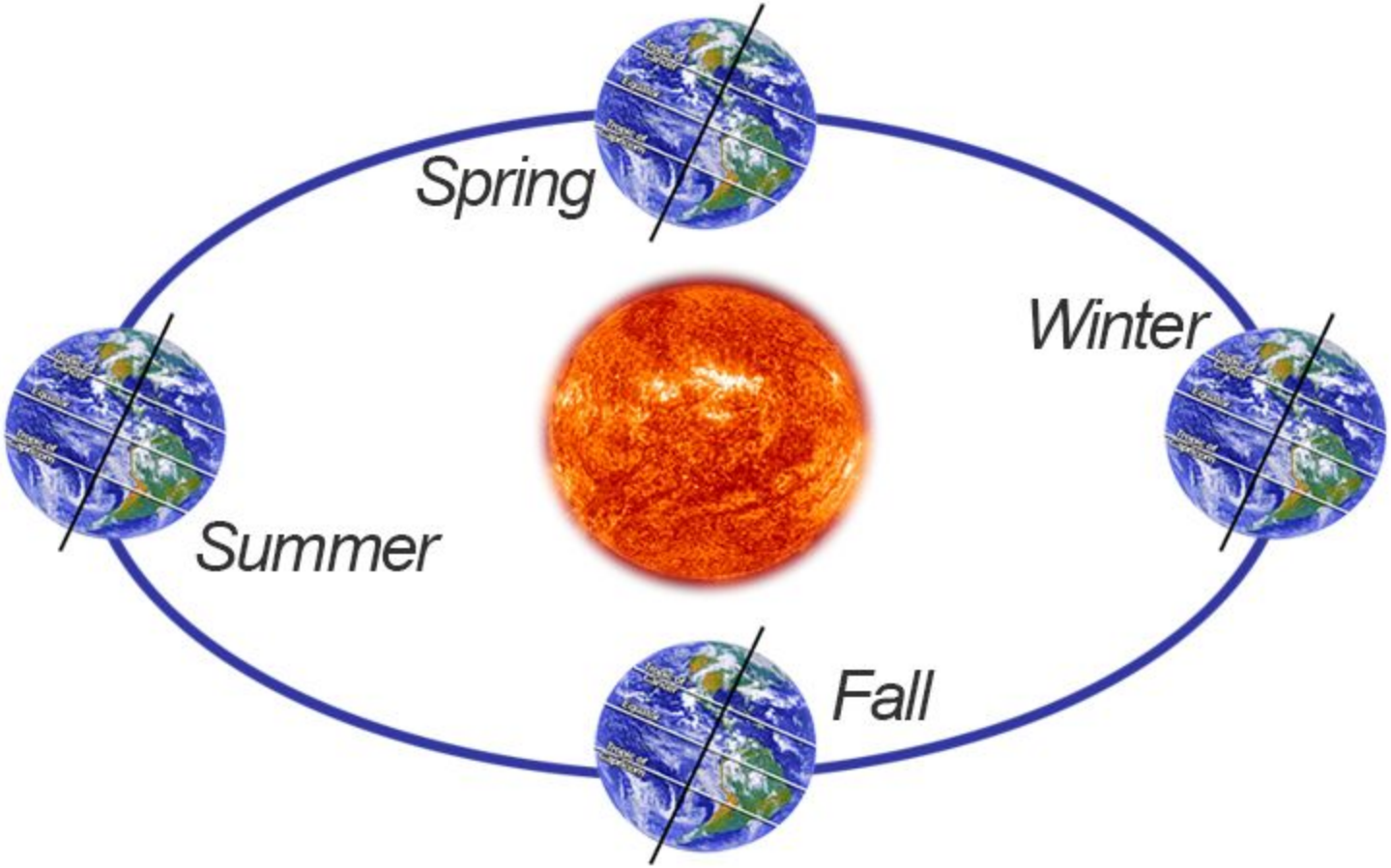

*Summer Solstice*

# Seasonal Differences *(Due to Earth's Axial Tilt)*



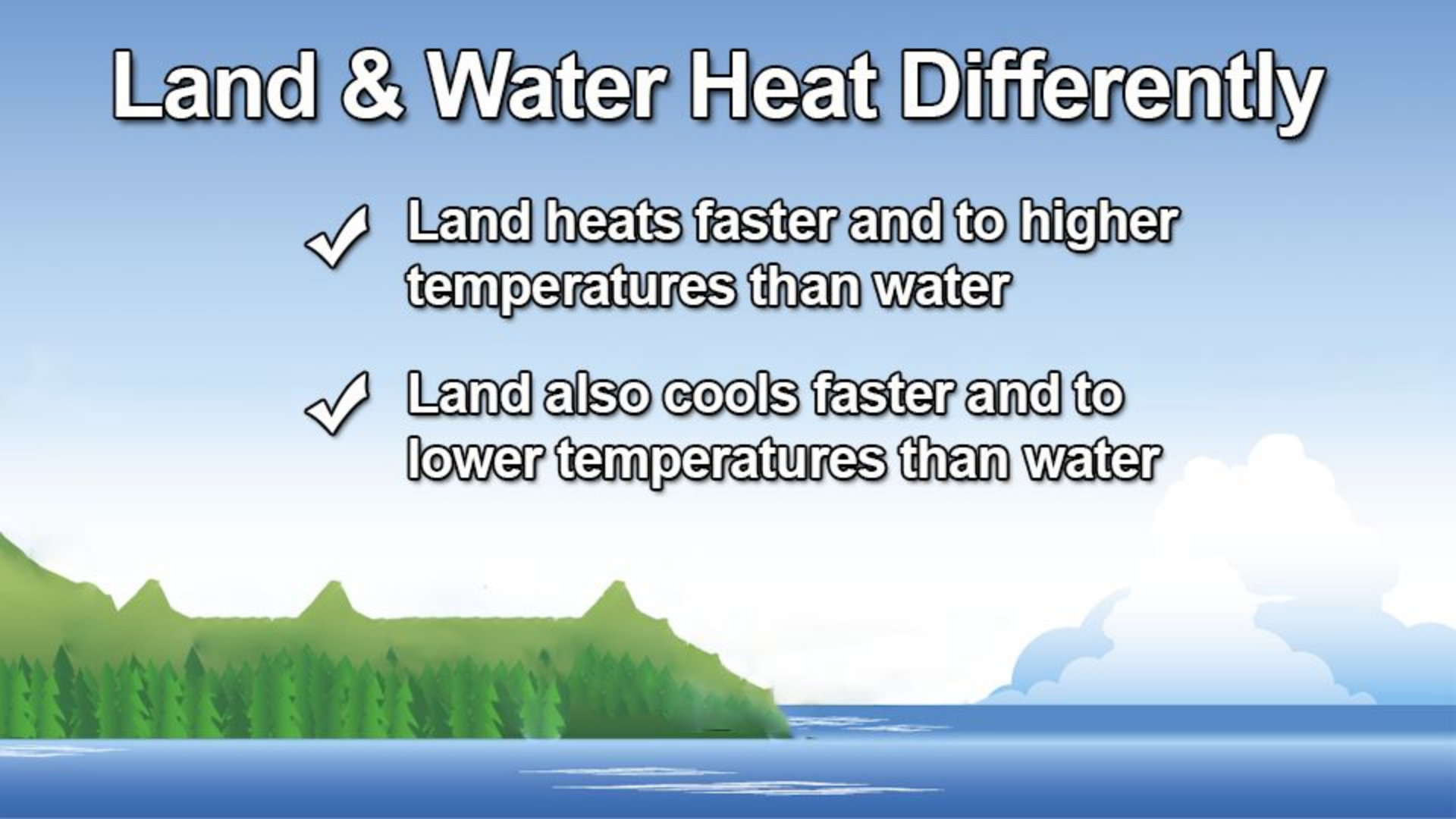

*Winter Solstice*

# Seasons Change as Earth Revolves Around the Sun

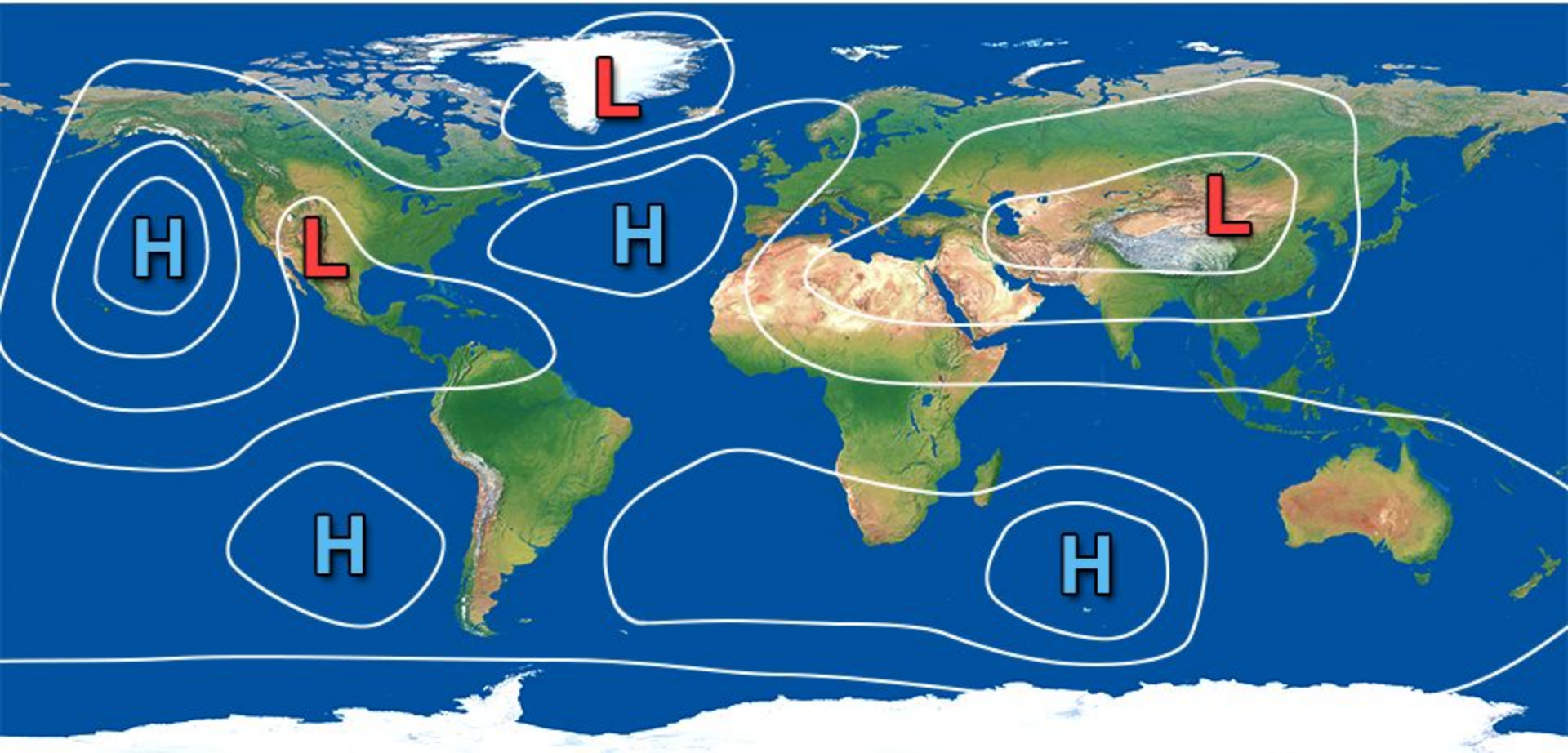


# Land & Water Heat Differently

- ✓ Land heats faster and to higher temperatures than water
- ✓ Land also cools faster and to lower temperatures than water



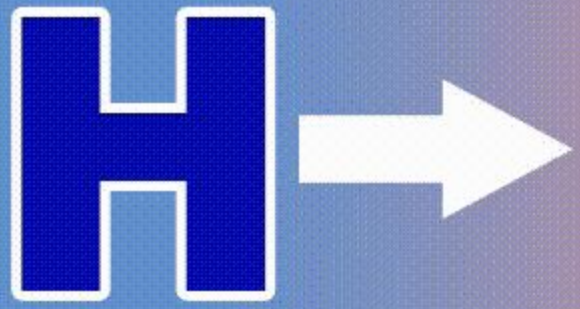
# Uneven Heating = Uneven Pressure Distribution



# Pressure & Wind

## Air moves from High to Low Pressure

*Moving air is called "WIND"*



*High Pressure*

*Low Pressure*

COOL

WARM

# Question:

Because of the Earth's 23.5° tilt we get what?

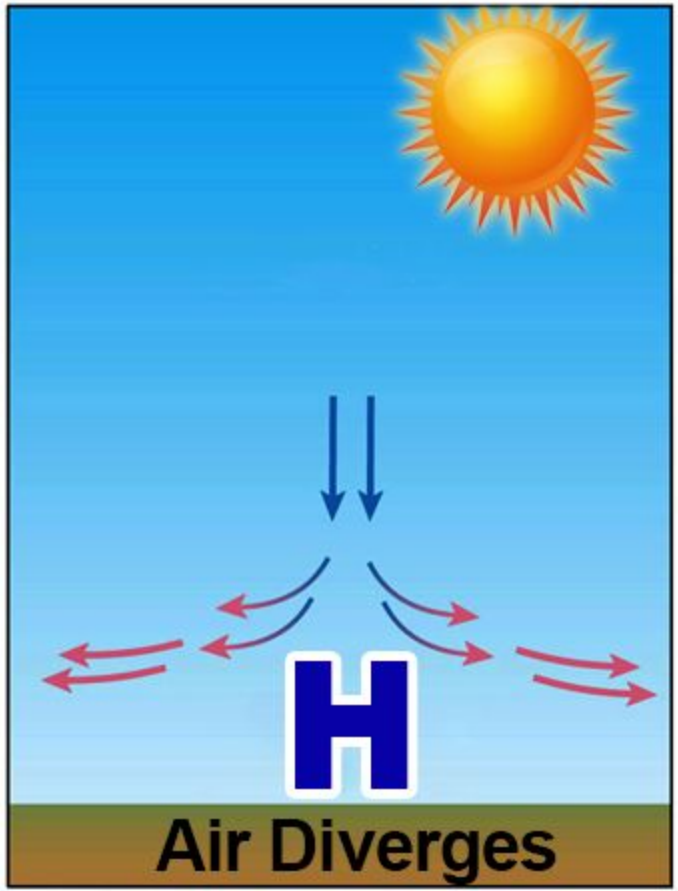
1) Day & Night
2) Gravity
3) Winter, Spring, Summer, & Fall
4) The Lunar Cycle

# Question:

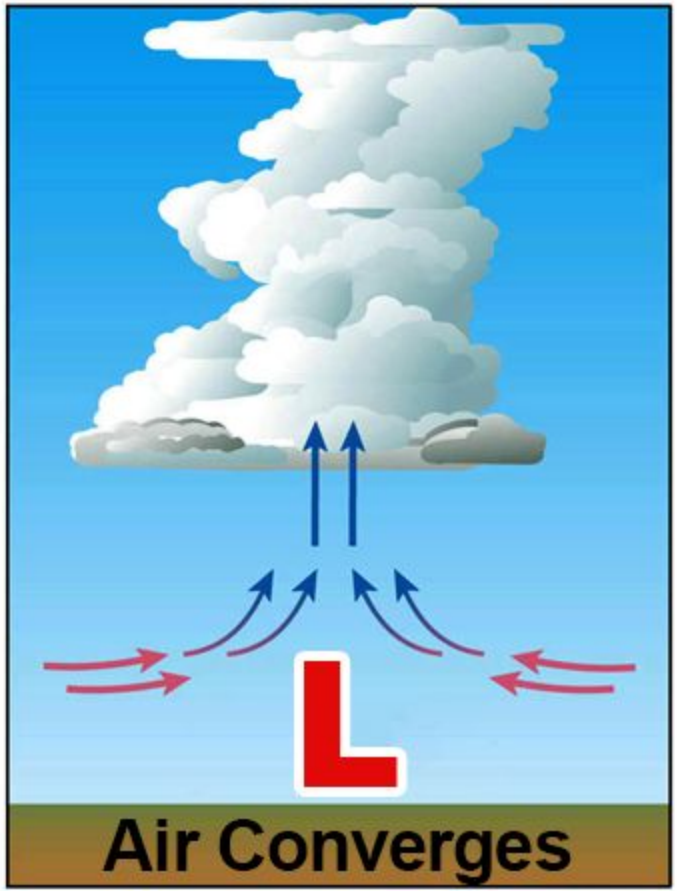
When it is Summer in the northern Hemisphere, what season is it in the Southern Hemisphere?

1) Summer
2) Winter
3) Fall
4) Spring

# High Pressure



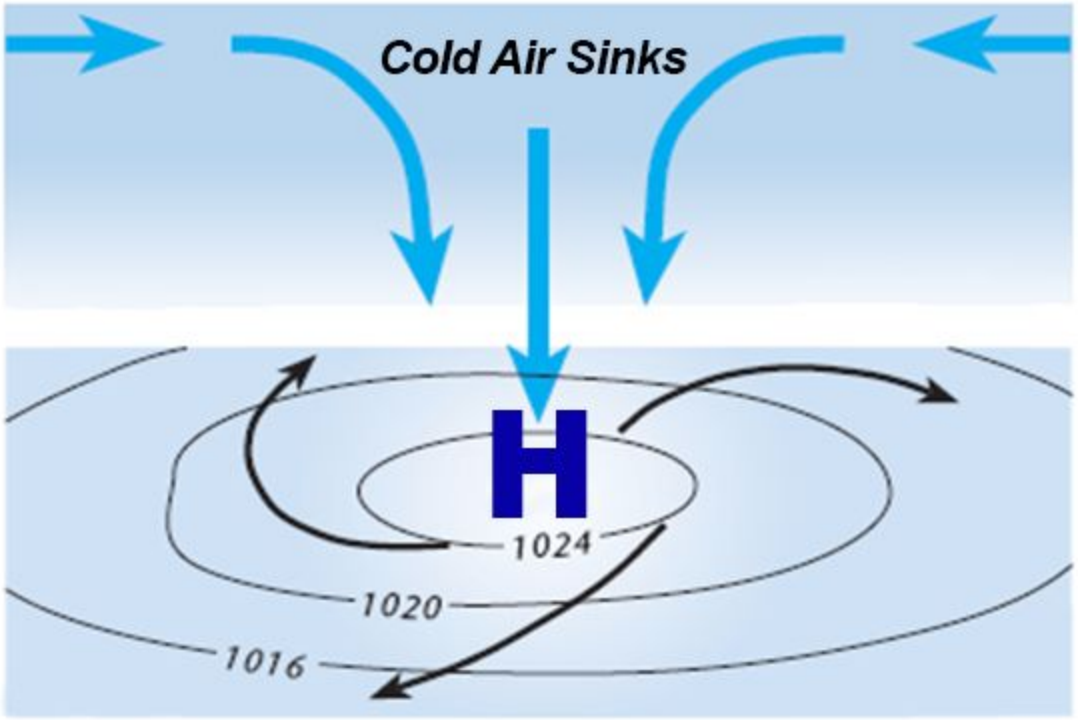

# Low Pressure



# High Pressure

**H** stands for "High Pressure" which brings... Happy Weather!

- ✔ Clear Skies
- ✔ Calm Conditions
- ✔ Dry Weather
- ✔ High Day Temps
- ✔ Low Night Temps

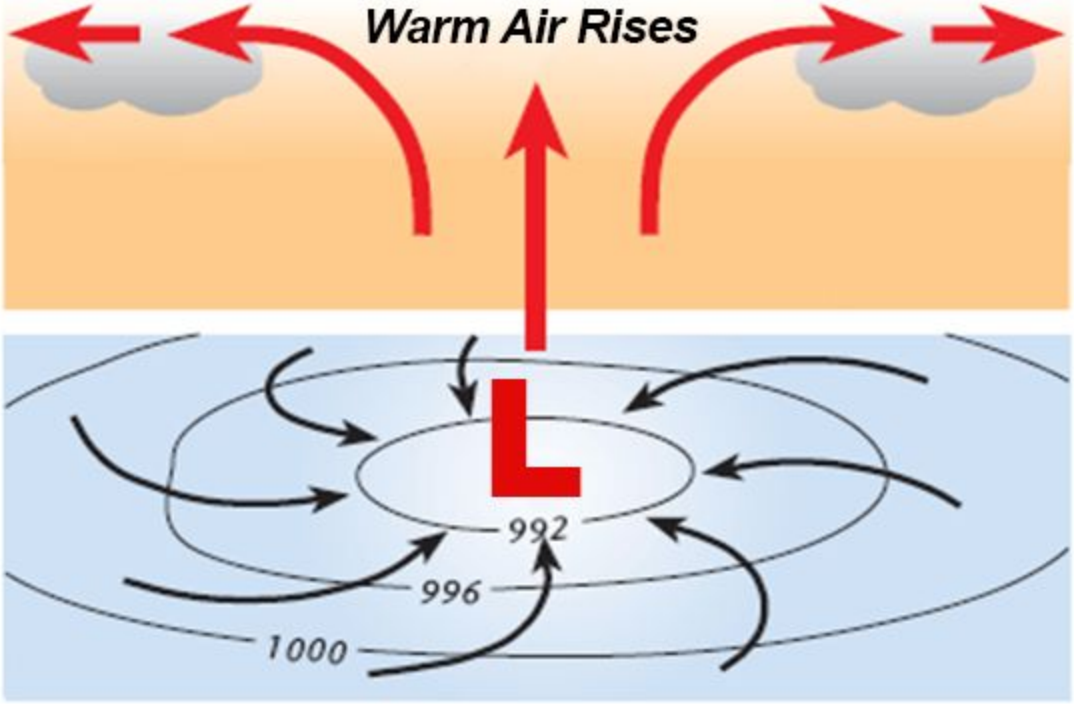



*Surface Winds Flow Outwards*

# Low Pressure

**L** stands for "Low Pressure" which brings... Lousy Weather!

- ✓ Cloudy Skies
- ✓ Windy Conditions
- ✓ Wet Weather
- ✓ Followed by colder weather




*Surface Winds Flow Inwards*

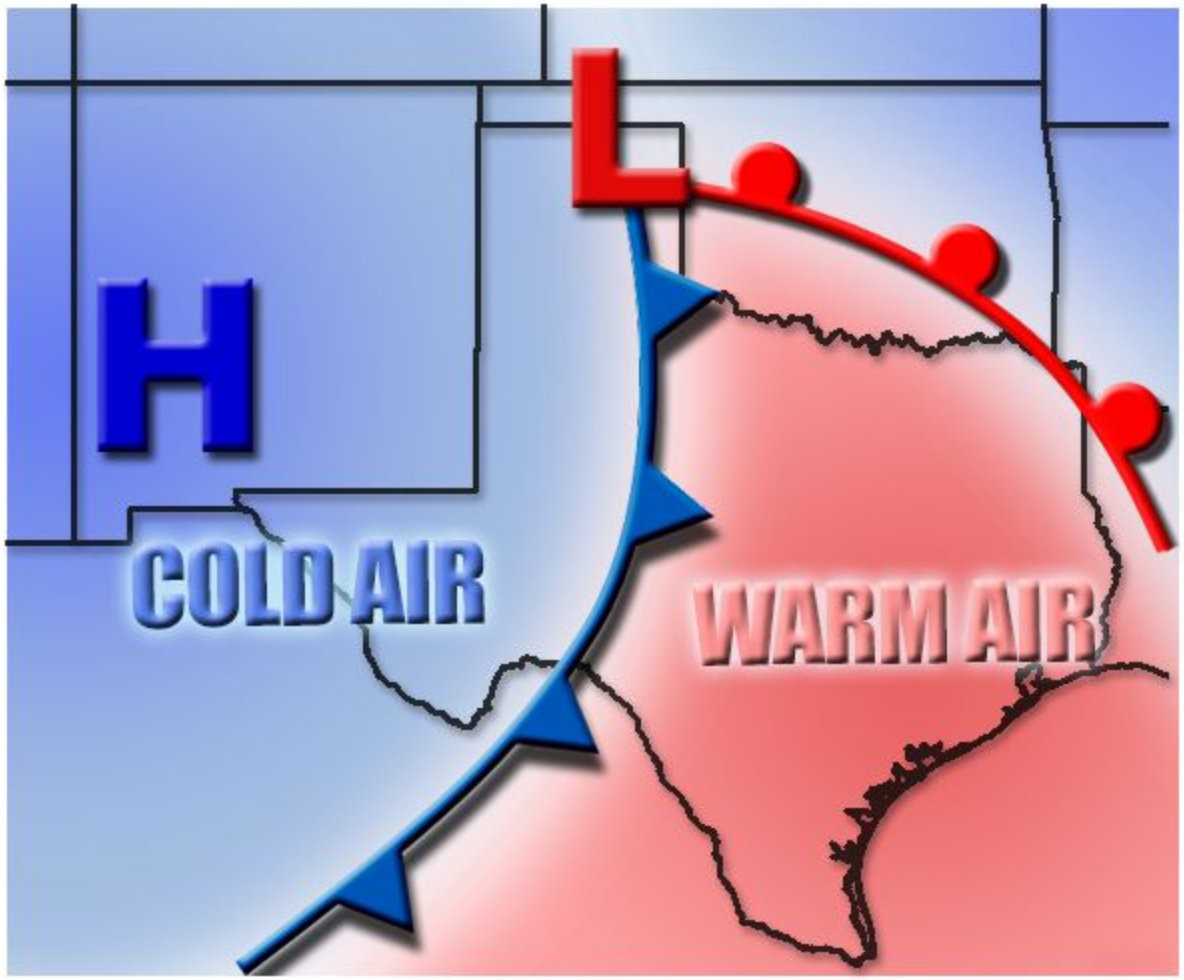
# Typical Weather Map

High Pressure

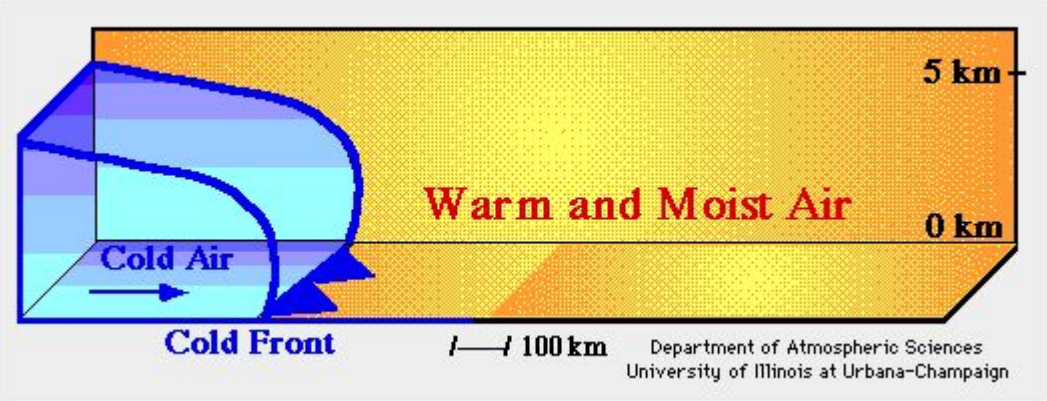
Low Pressure

Cold Fronts

Warm Fronts



# Warm and Cold Fronts




## Cold Front

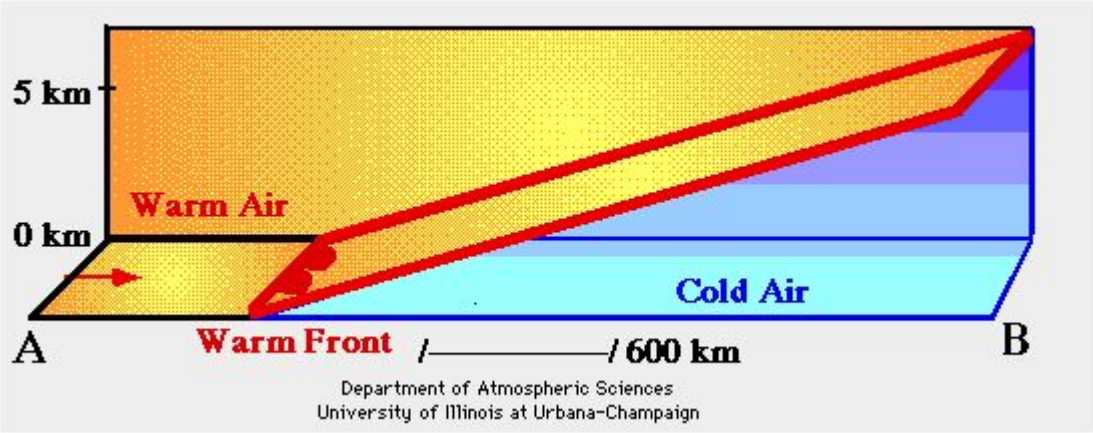
**Cold Air Displaces Warm Air At The Surface**

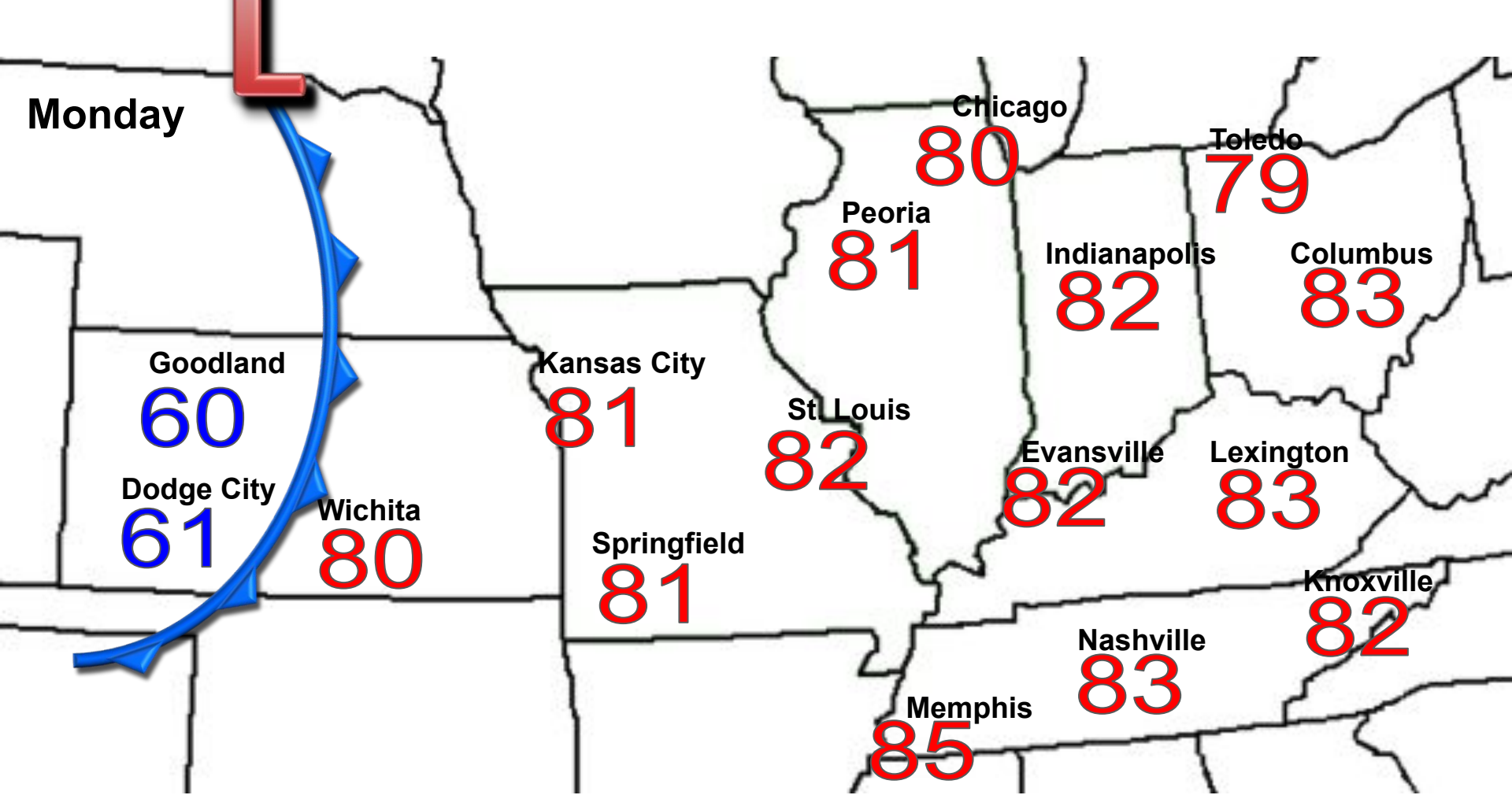
**Moves More Rapidly**

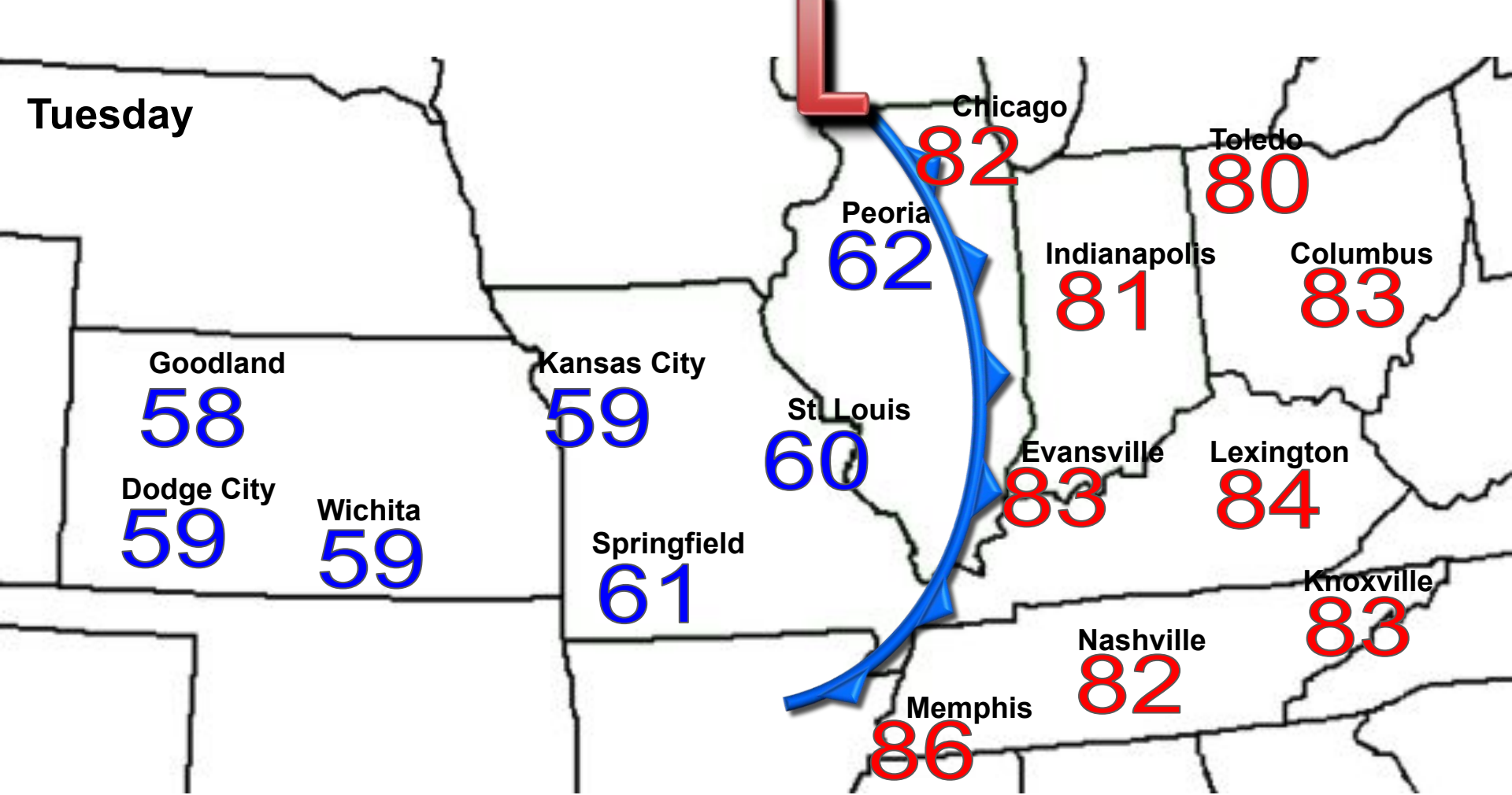
## Warm Front

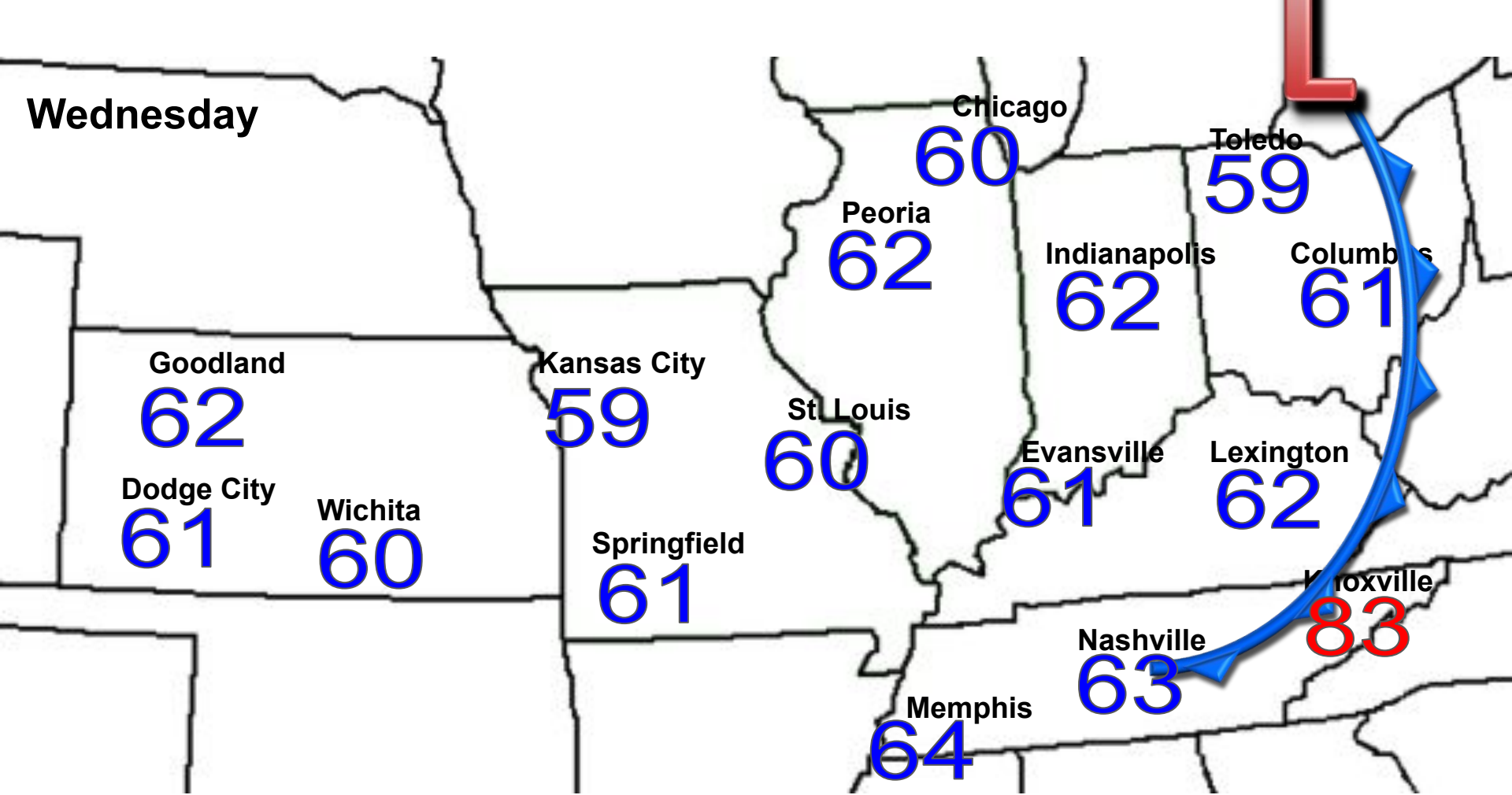
**Warm Air Displaces Cold Air At The Surface**

**Moves More Slowly**




Monday
Chicago
80
Toledo
79
Peoria
81
Indianapolis
82
Columbus
83
Goodland
60
Kansas City
81
St. Louis
82
Evansville
82
Lexington
83
Dodge City
61
Wichita
80
Springfield
81
Knoxville
82
Nashville
83
Memphis
85


Tuesday
Chicago
82
Toledo
80
Peoria
62
Indianapolis
81
Columbus
83
Goodland
58
Kansas City
59
St. Louis
60
Evansville
83
Lexington
84
Dodge City
59
Wichita
59
Springfield
61
Knoxville
83
Nashville
82
Memphis
86


Wednesday
Chicago
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Toledo
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Peoria
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Indianapolis
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Columbus
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Goodland
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Kansas City
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Evansville
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Dodge City
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Springfield
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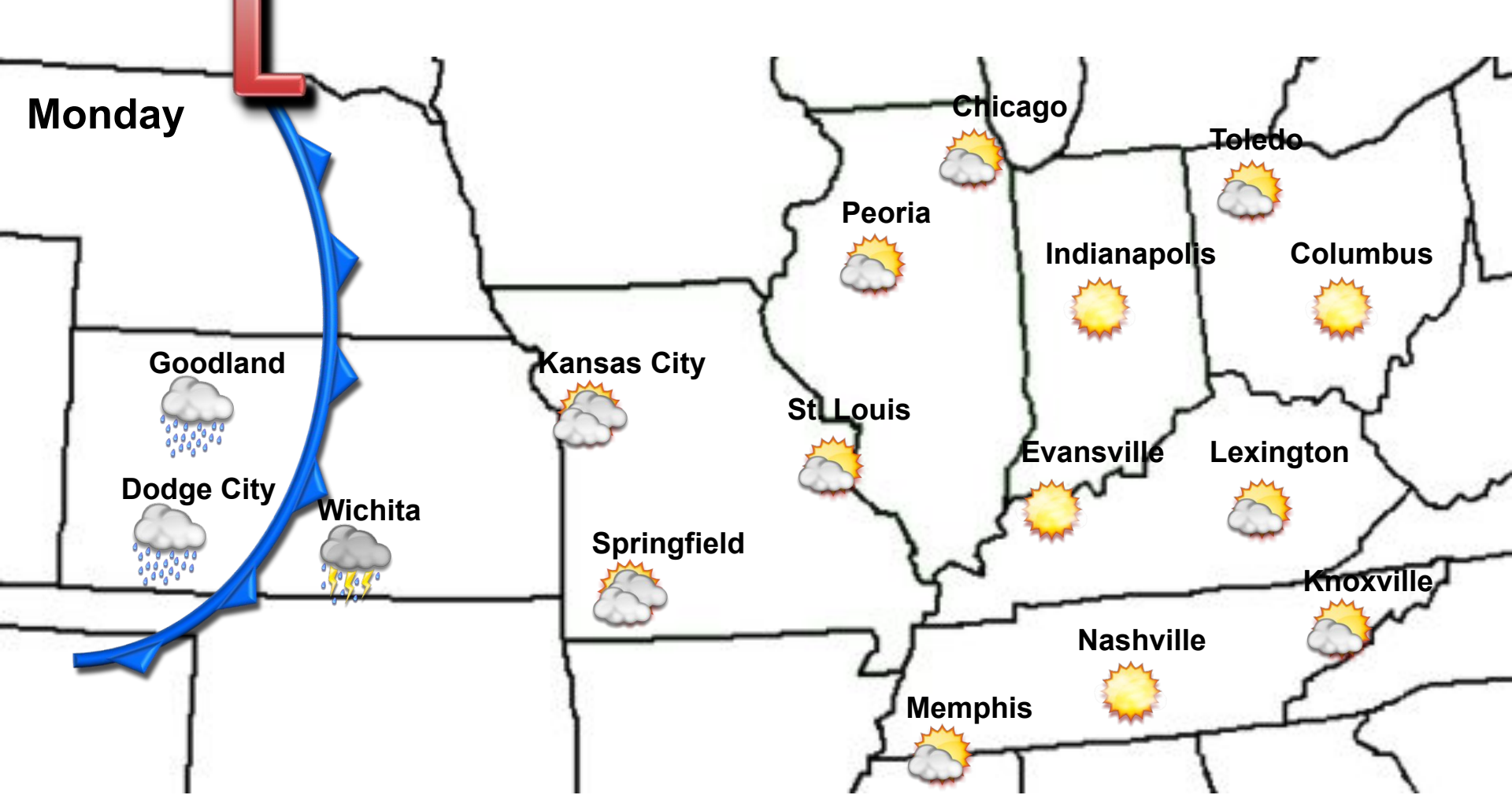
Knoxville
83
Nashville
63
Memphis
64


Monday
Chicago
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Peoria
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St. Louis
Evansville
Lexington
Dodge City
Wichita
Springfield
Knoxville
Nashville
Memphis


Tuesday
Chicago
Toledo
Peoria
Indianapolis
Columbus
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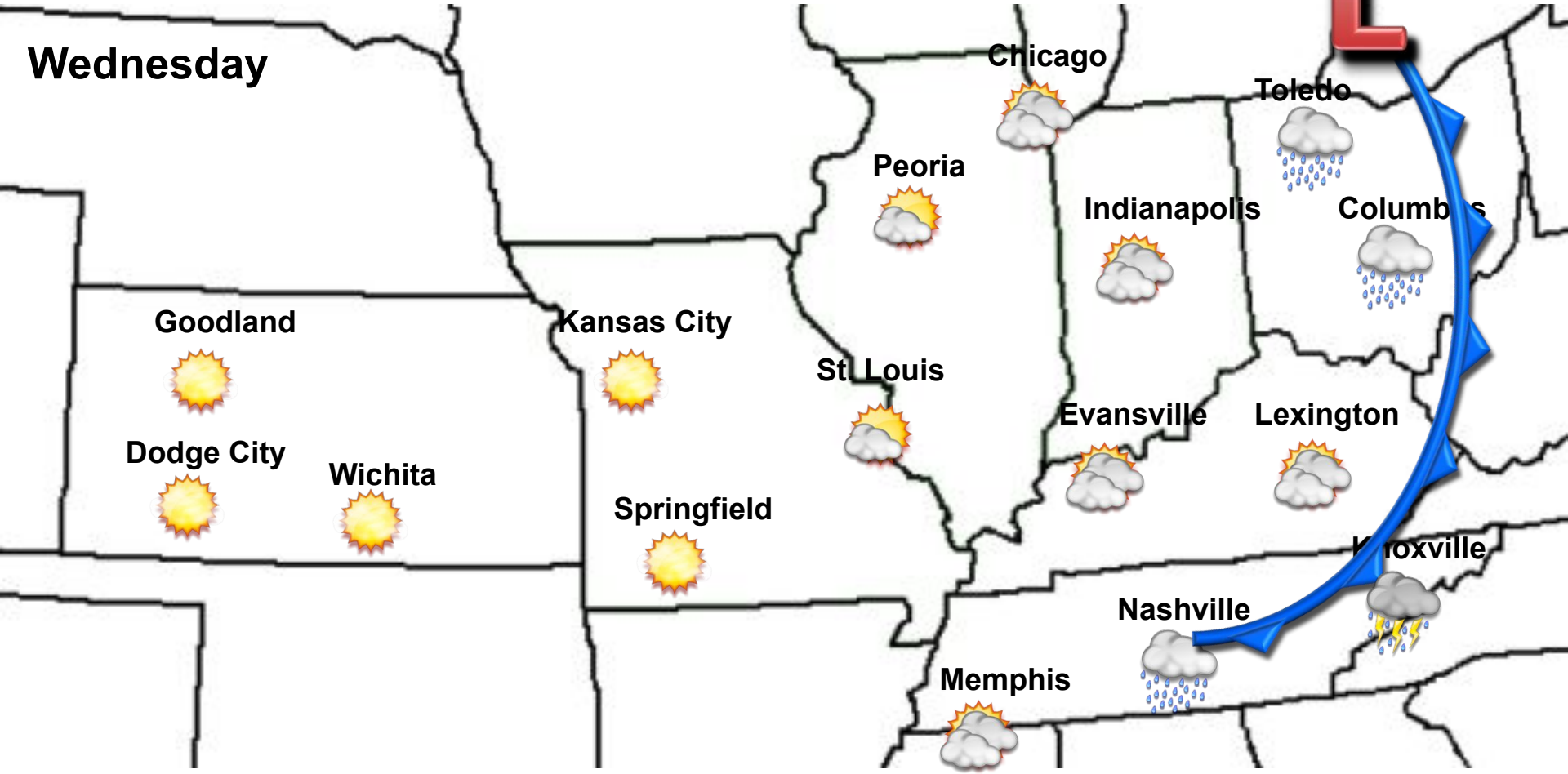
Kansas City
St. Louis
Evansville
Lexington
Dodge City
Wichita
Springfield
Knoxville
Nashville
Memphis


Wednesday
Chicago
Toledo
Peoria
Indianapolis
Columb s
Goodland
Kansas City
St. Louis
Evansville
Lexington
Dodge City
Wichita
Springfield
Knoxville
Nashville
Memphis

# Question:

The most common type of weather associated with “High” pressure is _____.

1) Cloudy skies
2) Gusty winds
3) Sunny skies
4) Thunderstorms

# Question:

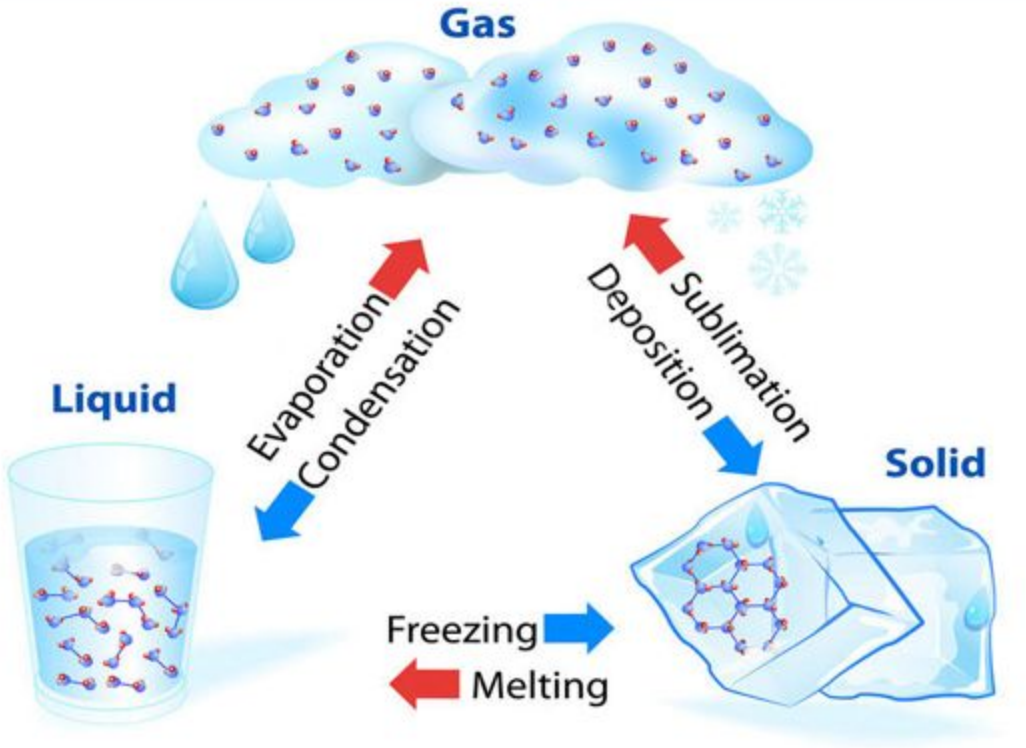
The most vigorous weather (ie, thunderstorms) occur with what kind of front?

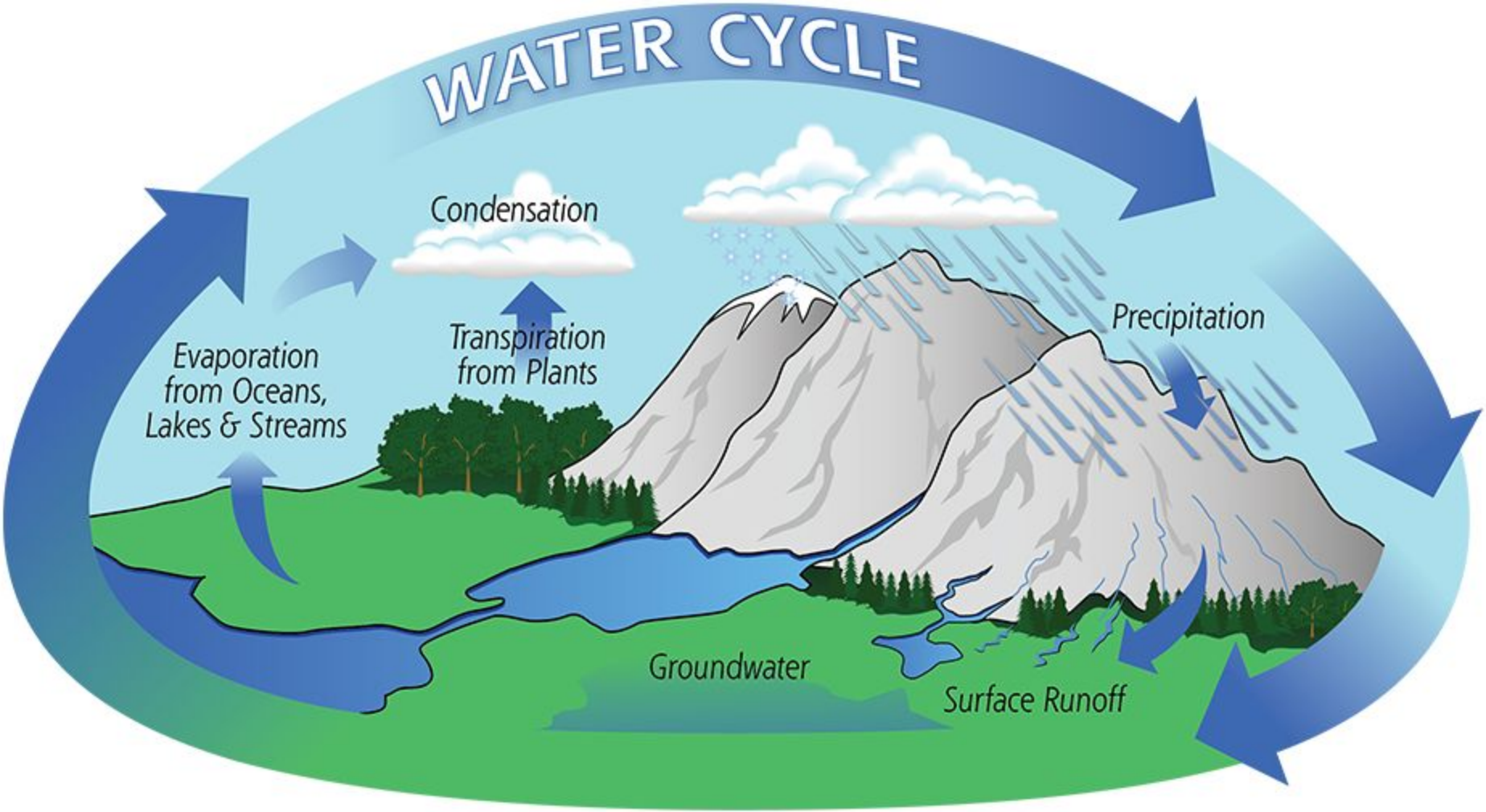
1) Warm front
2) Cold front
3) Occluded front
4) None of the above

# WATER... An Amazing Molecule!

## Solid, Liquid, & Gas

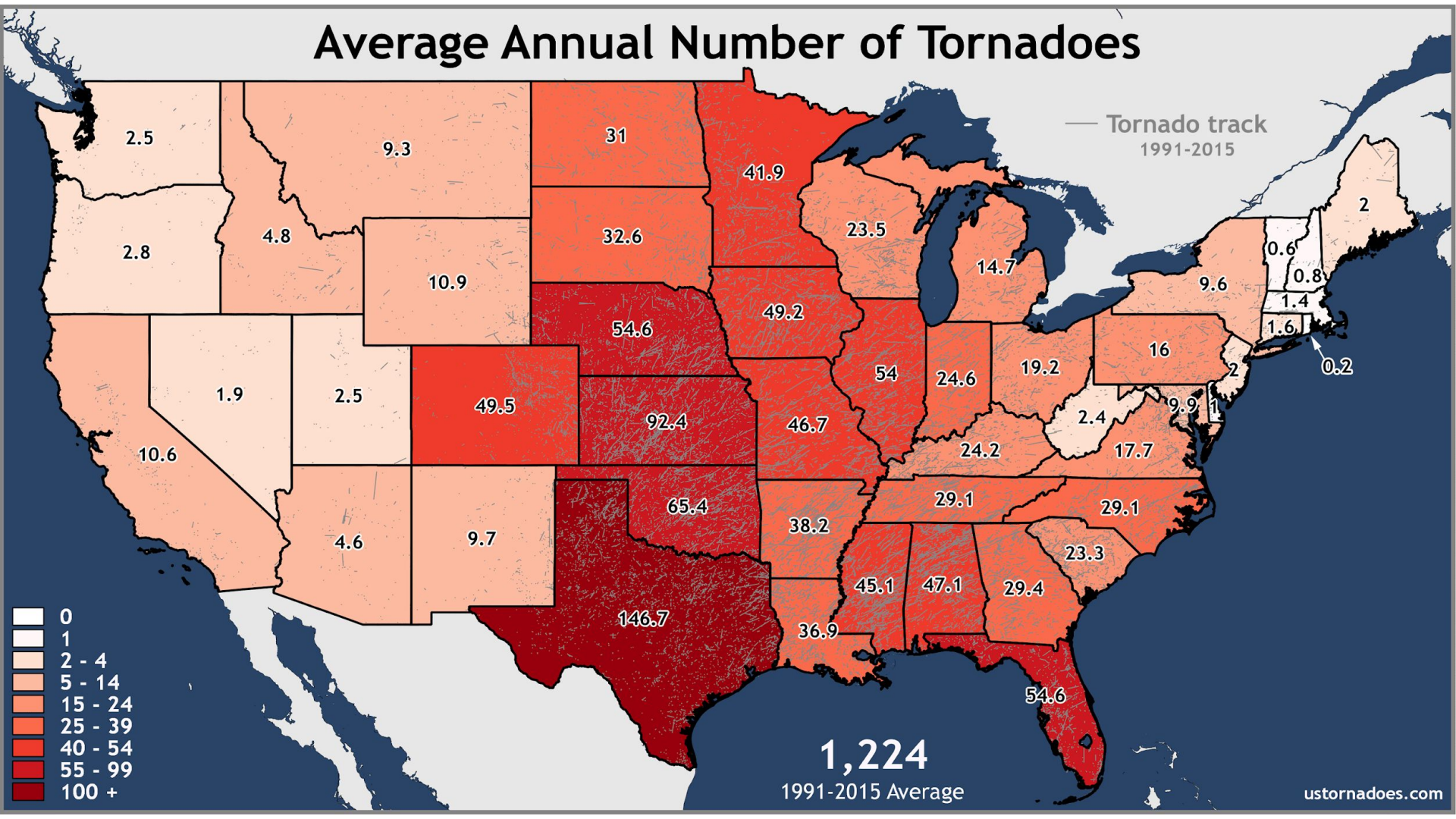
# WATER... An Amazing Molecule!

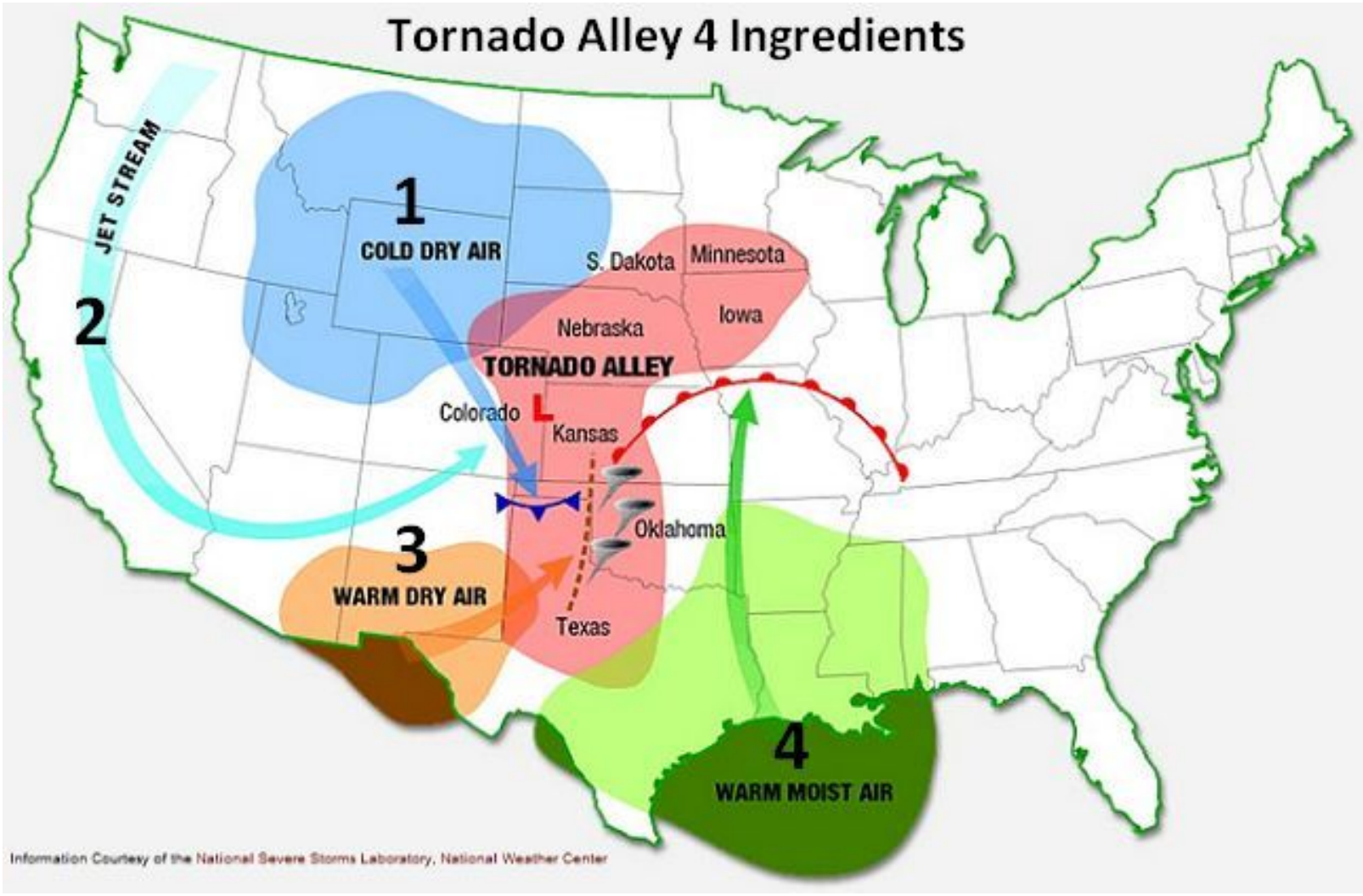


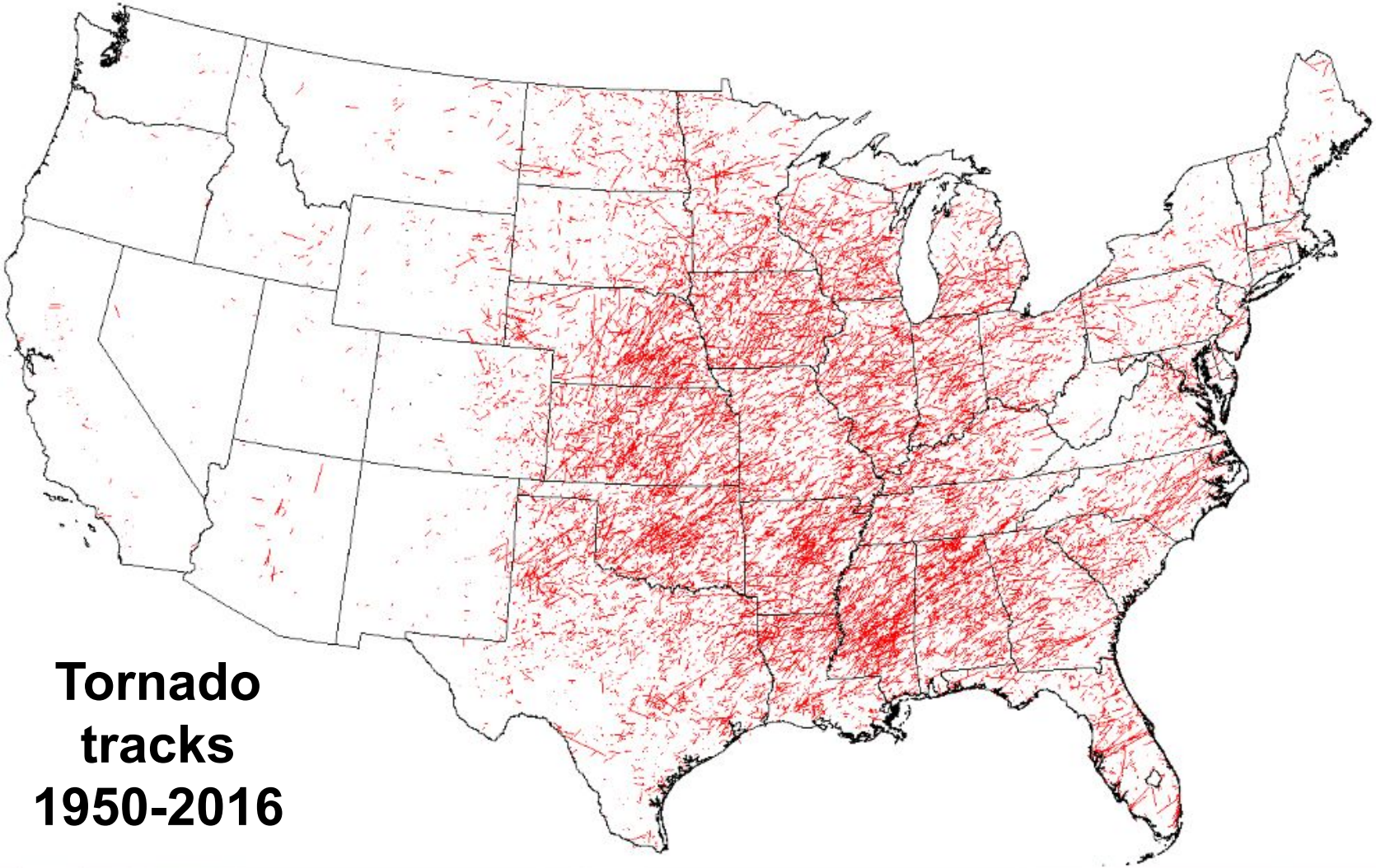

WATER CYCLE
Condensation
Transpiration from Plants
Evaporation from Oceans, Lakes & Streams
Precipitation
Groundwater
Surface Runoff

# Tornado...

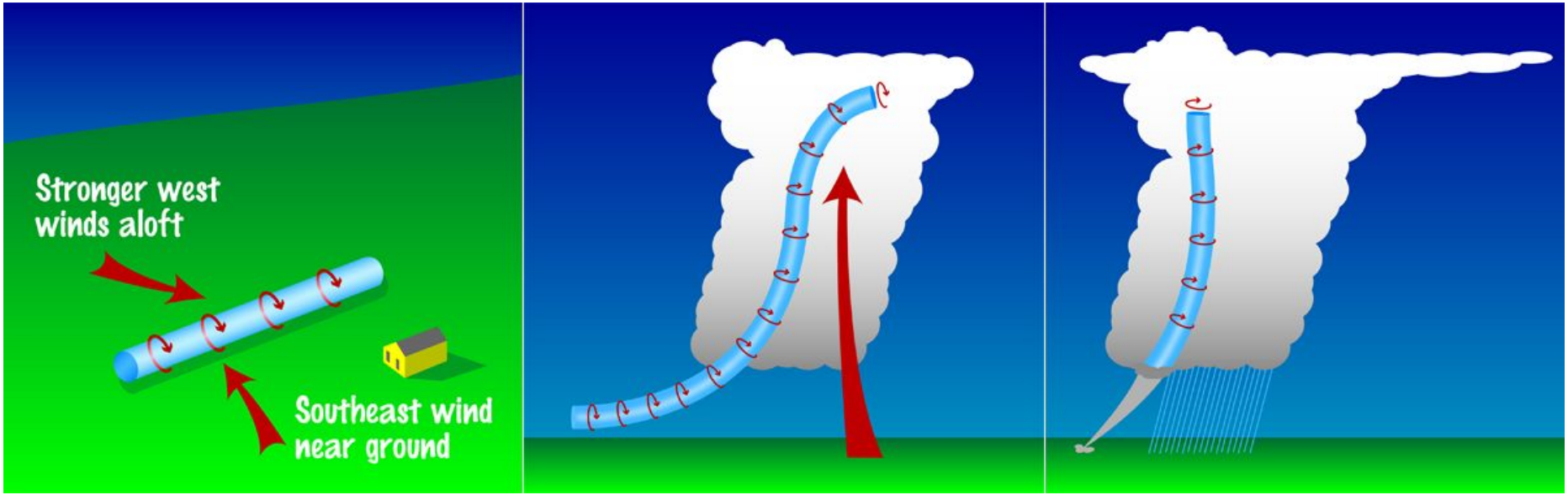
# Average Annual Number of Tornadoes




Tornado Alley 4 Ingredients
JET STREAM
1
COLD DRY AIR
2
S. Dakota
Minnesota
Iowa
Nebraska
TORNADO ALLEY
Colorado
L
Kansas
Oklahoma
3
WARM DRY AIR
Texas
4
WARM MOIST AIR
Information Courtesy of the National Severe Storms Laboratory, National Weather Center


Tornado
tracks
1950-2016

# How a tornado forms



# Tornado Safety - Outside

Arlington, TX April 2012

- People in open rural areas may be able to drive away from a distant approaching tornado
- If tornado is unavoidable, seek shelter in strong building or ditch
- Do not ride out tornado in auto!

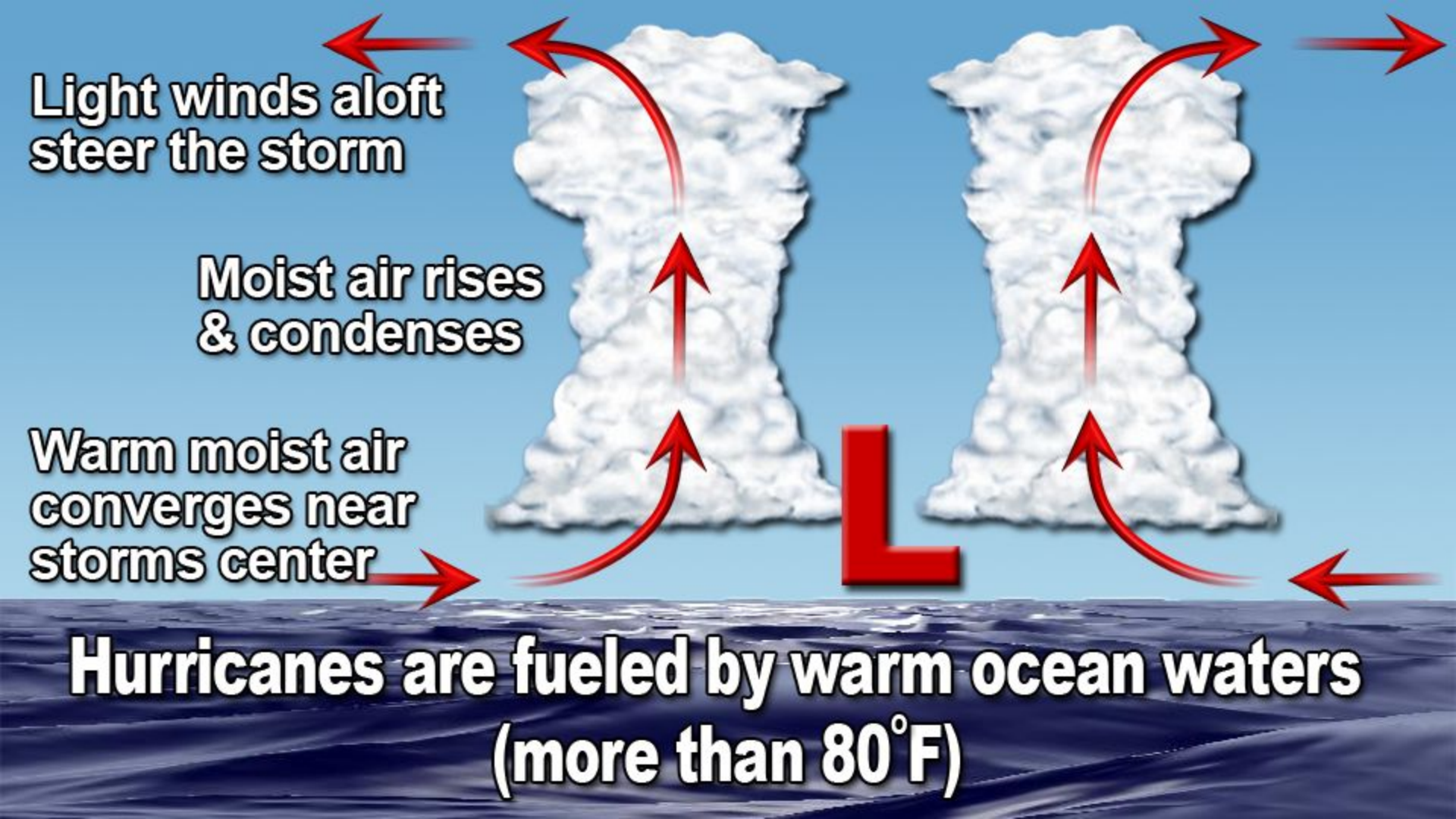
# Tornado Safety – Inside *(best by far!)*

Jarrell, TX May 1997

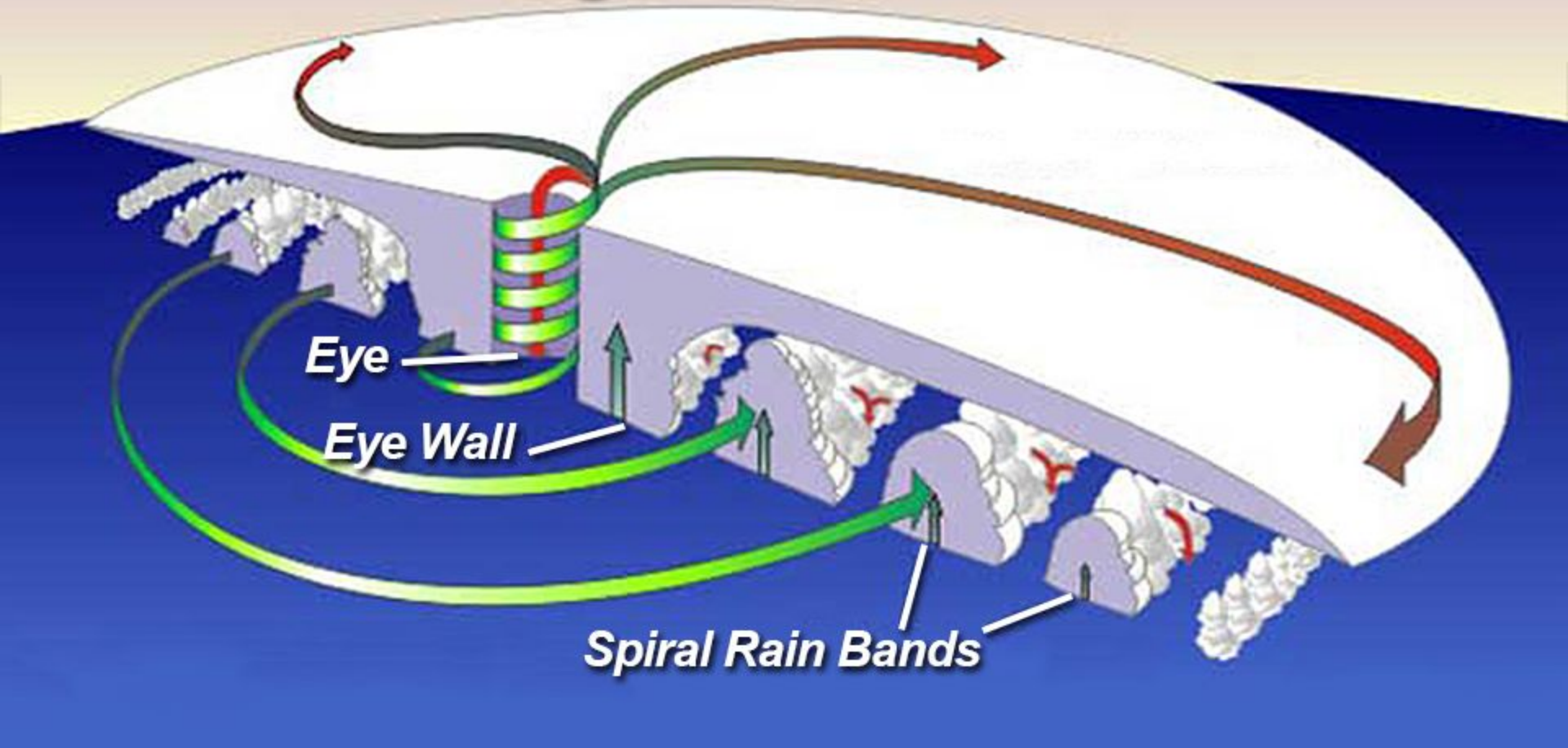
- **Seek shelter in a strong building**
- ***Underground shelter & "safe room" by far the best if "up to code".***
- **Otherwise small interior room on lowest floor for most twisters (bathroom or closet, cover yourself)**
- **Stay away from windows!!!**
- **Abandon mobile homes!**

# Hurricane...


Hurricane Names Around The World
Atlantic Ocean
Central & Eastern Pacific Oceans
"Hurricane"
"Hurricane"
"Typhoon"
"Cyclone"
Western Pacific
Indian Ocean
"Willy-Willy"
Coast of Australia


Light winds aloft steer the storm
Moist air rises & condenses
Warm moist air converges near storms center
L
Hurricanes are fueled by warm ocean waters (more than 80°F)

# Anatomy of a Hurricane

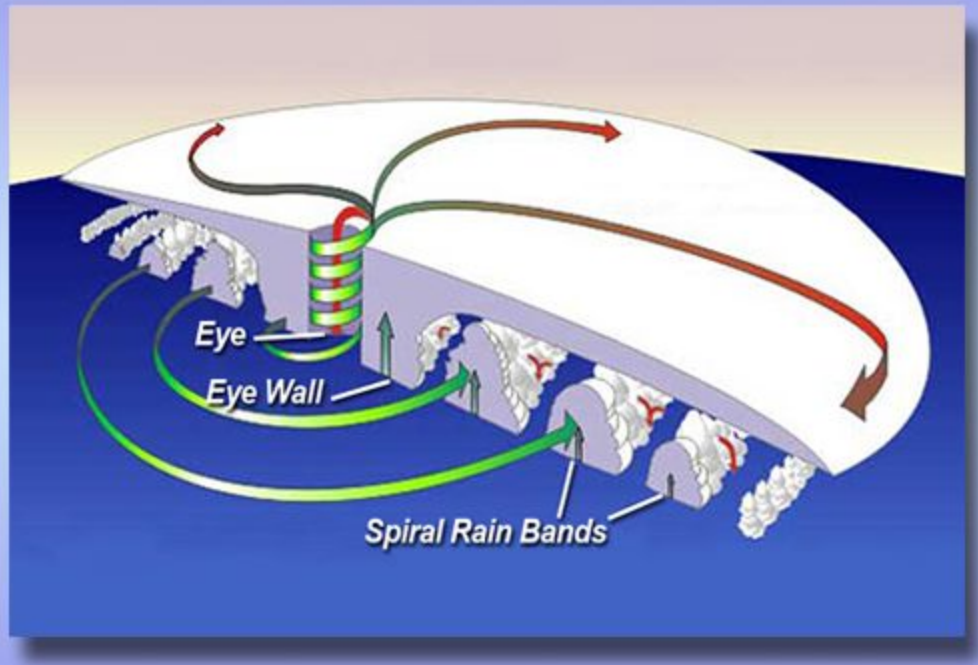


# Anatomy of a Hurricane

**Eye:** Light winds, mostly sunny, very low surface pressure

**Eye Wall:** Strongest winds, heaviest rain

**Spiral Rain Bands:** Rotate around the storm, moderate to heavy rain, strong winds, possible weak tornadoes



# Weather vs. Climate

**Weather** consists of the short-term (minutes to days) variations in the atmosphere. Weather is expressed in terms of temperature, humidity, precipitation, cloudiness, visibility and wind.

# Weather vs. Climate

**Climate** is the average weather in a place over many years. While the weather can change in just a few hours, climate takes hundreds, thousands, even millions of years to change.

# Weather vs. Climate

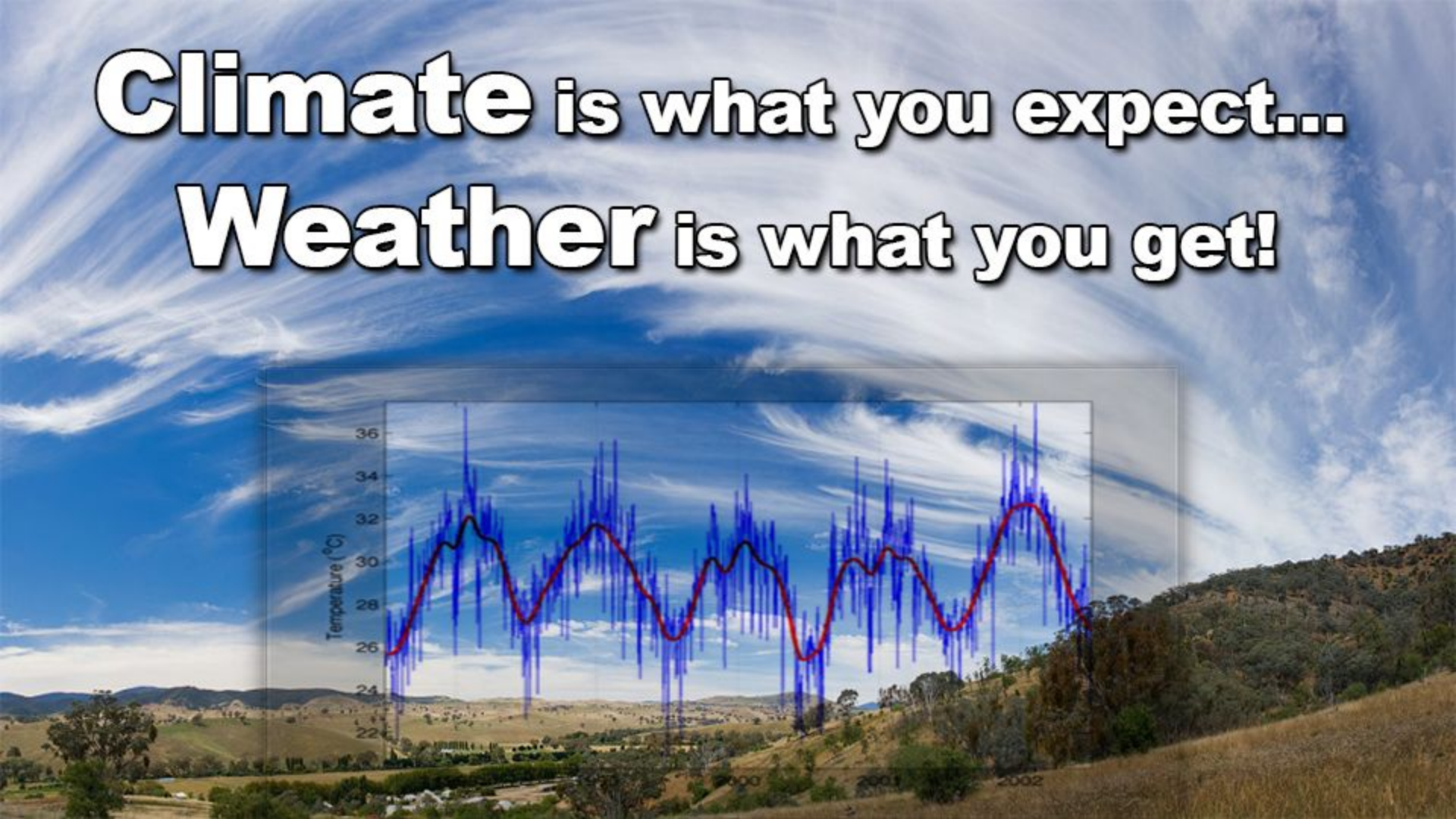
**Weather** happens at a particular time and place.

**Climate** is regional and long-term.

*Is it news* (weather) *or history* (climate)?

# Climate is what you expect...

# Weather is what you get!



# Question:

What is the fuel source for a hurricane?

1) Warm ocean water
2) Peanut butter & jelly sandwich
3) Rotation of the Earth
4) Cold ocean water

# Question:

*True or False…*

Tornadoes can form in any state of the United States

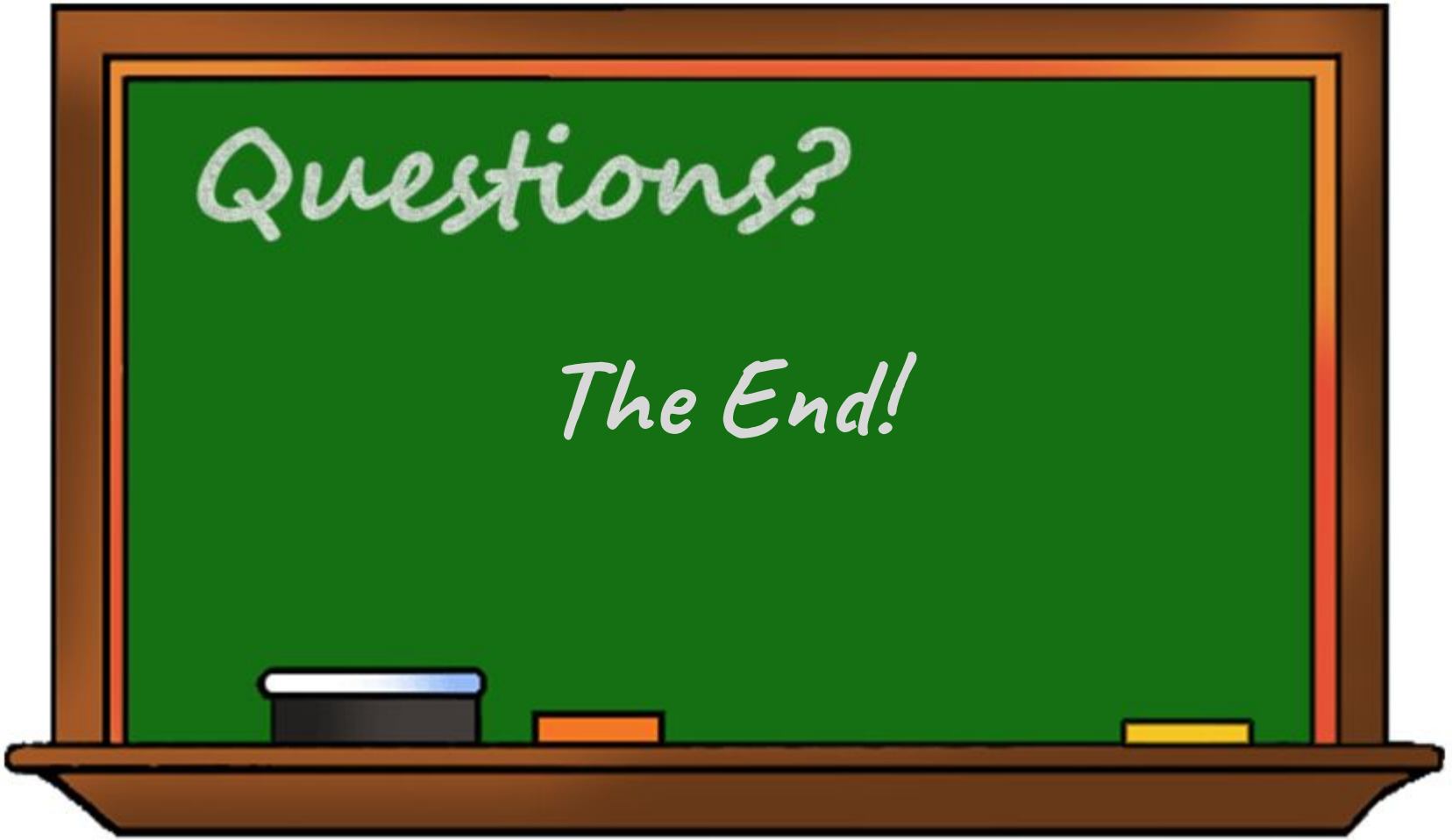
1) True
2) False

# Question:

*True or False…*

Climate is the average weather in a region over many years.

1) True
2) False


Questions?
The End!