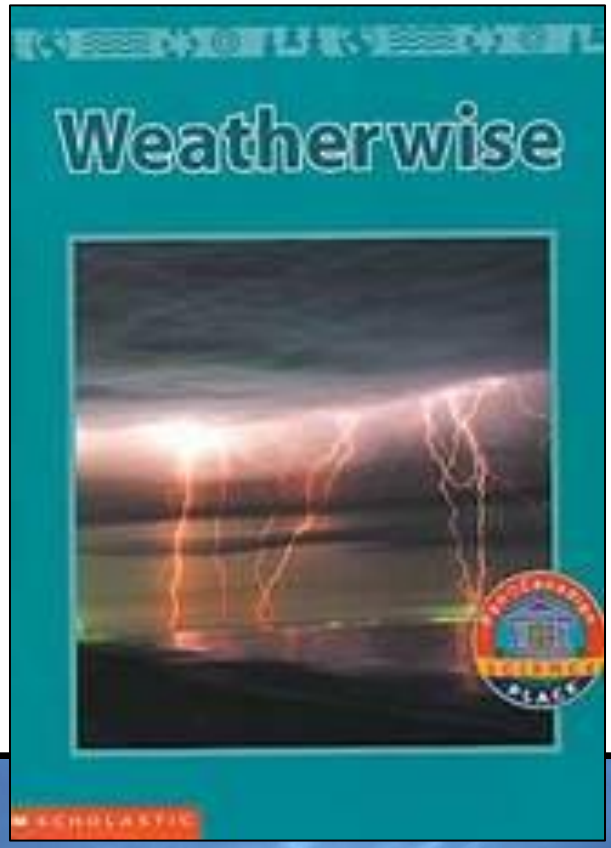
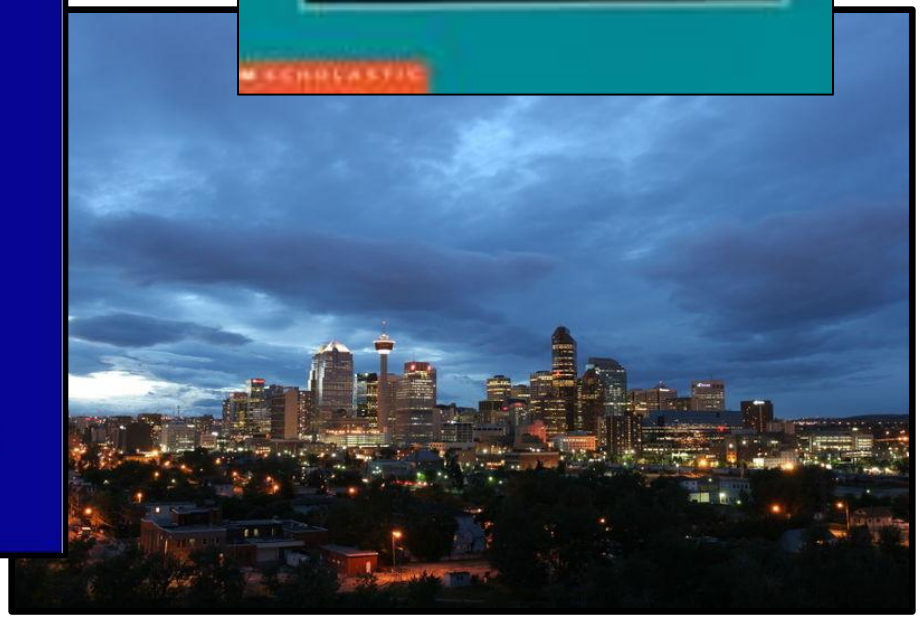
# Grade 5 Science

# Unit 1: Weatherwise



# What is the Atmosphere?

The air that surrounds the Earth.

# Characteristics of Air

- Air has no shape or color
- You cannot smell or taste air
- Air takes up space
- Air has mass
- Air exerts pressure

# Layers of the Atmosphere

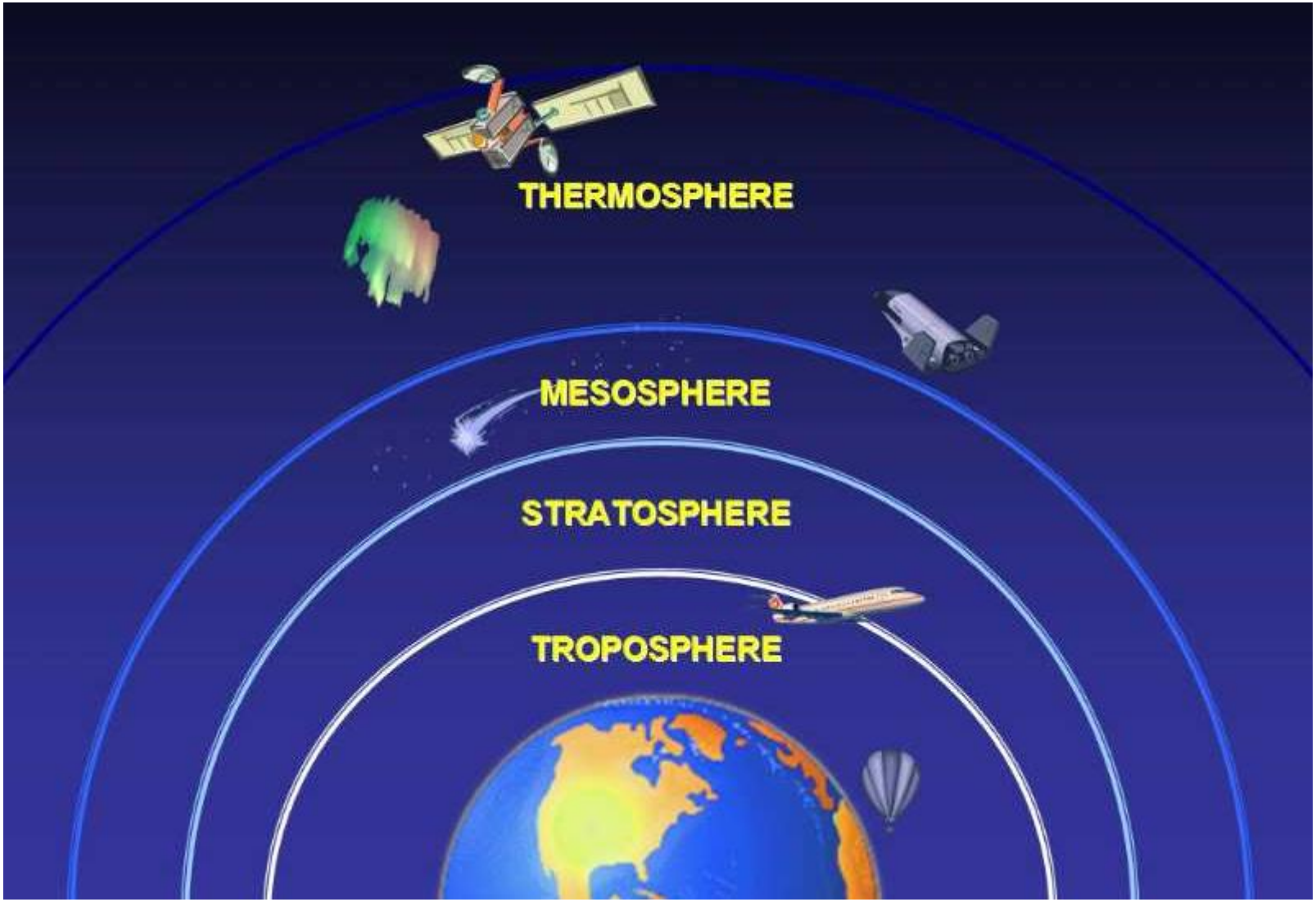
1. TROPOSPHERE: Surface of Earth to 16km. All weather happens here.

2. STRATOSPHERE: 16-50 km above Earth's surface. No weather here. Airplanes fly here.

3. MESOSPHERE: 50-80 km above Earth's surface. Meteors burn up here.

4. THERMOSPHERE: 200-500 km above Earth's surface. Satellites, Space Station are here.

# Layers of the Atmosphere



# What is Air Pressure?

It is the force with which air pushes against the earth's surface.

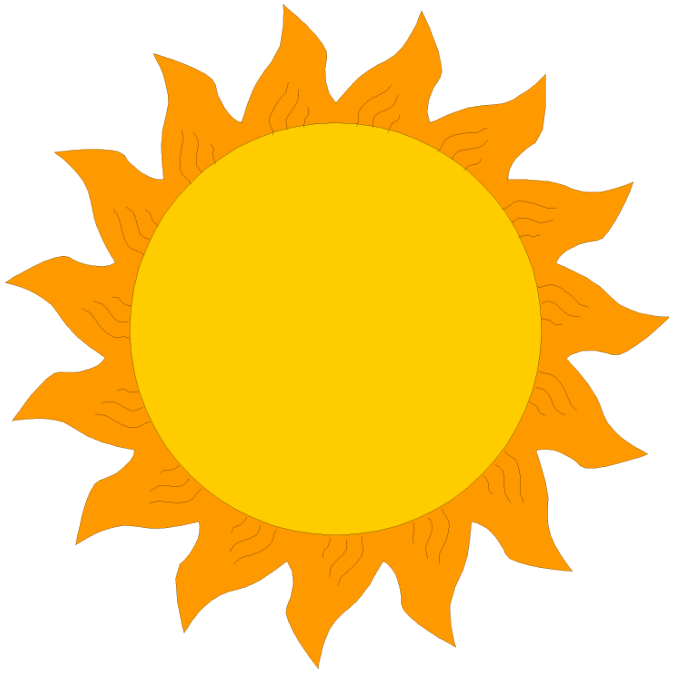
# Why does air exert pressure?

Air has mass. That means it puts pressure on things around it. It will press in (down).

If this is the case, why doesn't the air around us crush us?

Because there is air inside of us and it is pushing back against the air outside of us.

# The Sun:



How does the sun affect:

- ❑ people?
- ❑ the earth?
- ❑ the weather
- ❑ the atmosphere?

1. HEAT: The sun heats up the earth's atmosphere. Cloud cover helps keep that heat in.

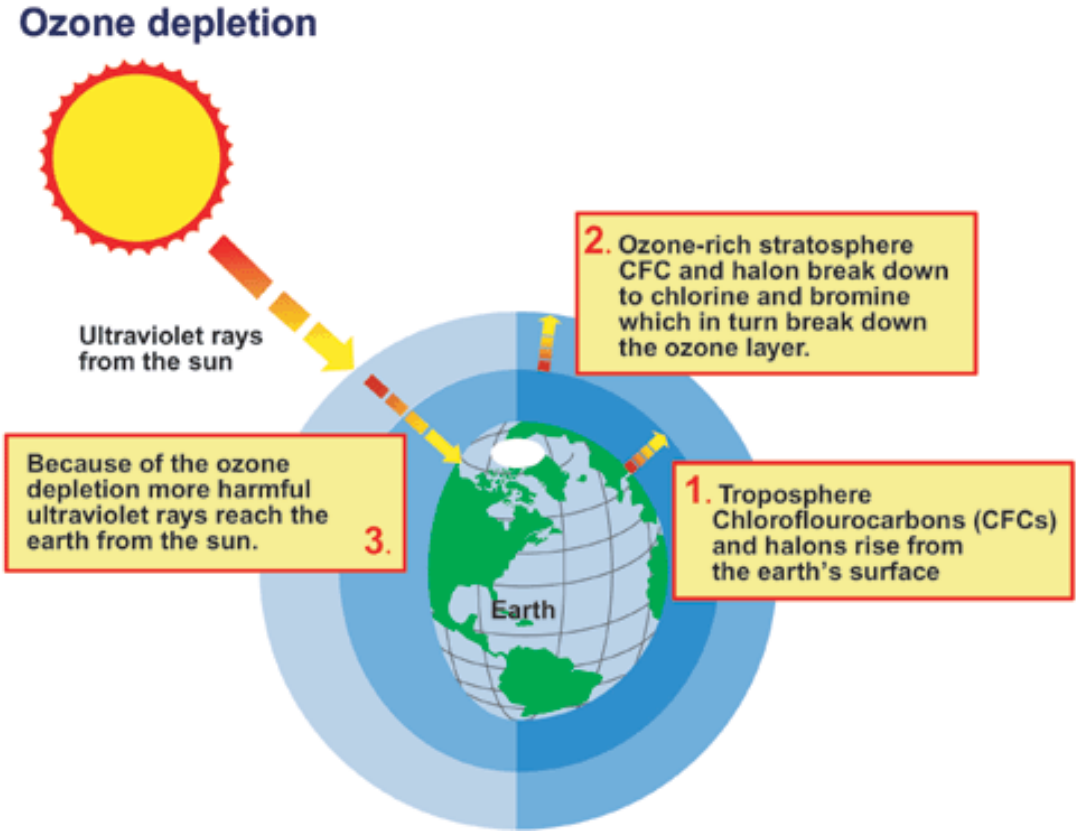
2. LIGHT: Light from the sun passes through the atmosphere and provides light for people and plants.

3. RADIATION: the earth's atmosphere shields the earth from the sun's harmful radiation. *However*…

… (UV) Ultraviolet rays are invisible, high energy rays from the sun that can damage eyes, cause skin cancer, and contribute to global warming.

Compared to past decades, why do we need to be more careful today about UV rays? How are we more careful?

*Pollution (CFCs) is depleting the Ozone Layer (a layer of gas in the stratosphere that blocks dangerous UV rays from reaching the earth's surface).*



# Clouds:

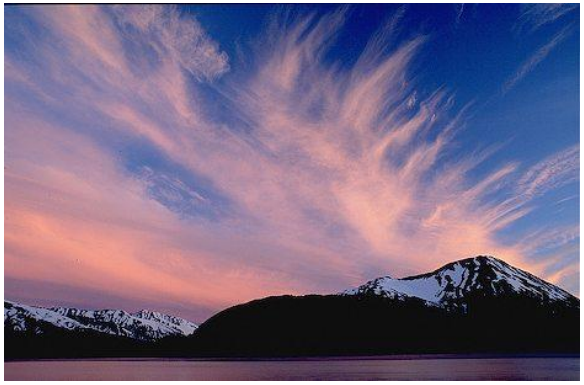
Water (a liquid) evaporates, changes into water vapour (a gas) that rises into the atmosphere. There, it cools, condenses into tiny water droplets, and forms clouds.

There are 3 main types of clouds:

1. Cirrus — *Latin word for "tuft or curl of hair"*
2. Cumulus — *Latin word for "heap or pile"*
3. Stratus — *Latin word for "spread out"*

# CIRRUS CLOUDS:

- These clouds look thin and feathery.
- They are so high up that they are made up of bits of ice.
- They  usually mean pleasant weather is going to change.



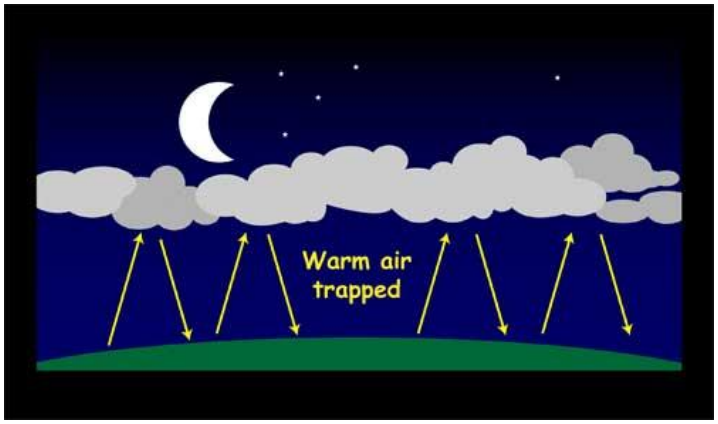
# CUMULUS CLOUDS:

- These are big and fluffy clouds that look like cotton.
- Flat bottoms, low to the ground, and tall, puffy tops.
- May indicate the coming of rain.

# STRATUS CLOUDS:

- These clouds look flat and thin, like blankets covering the sky.
- "Overcast"… may lead to drizzle and fog.
- In morning, precedes storm. In afternoon, follows storm.

# What do clouds do for the Earth?

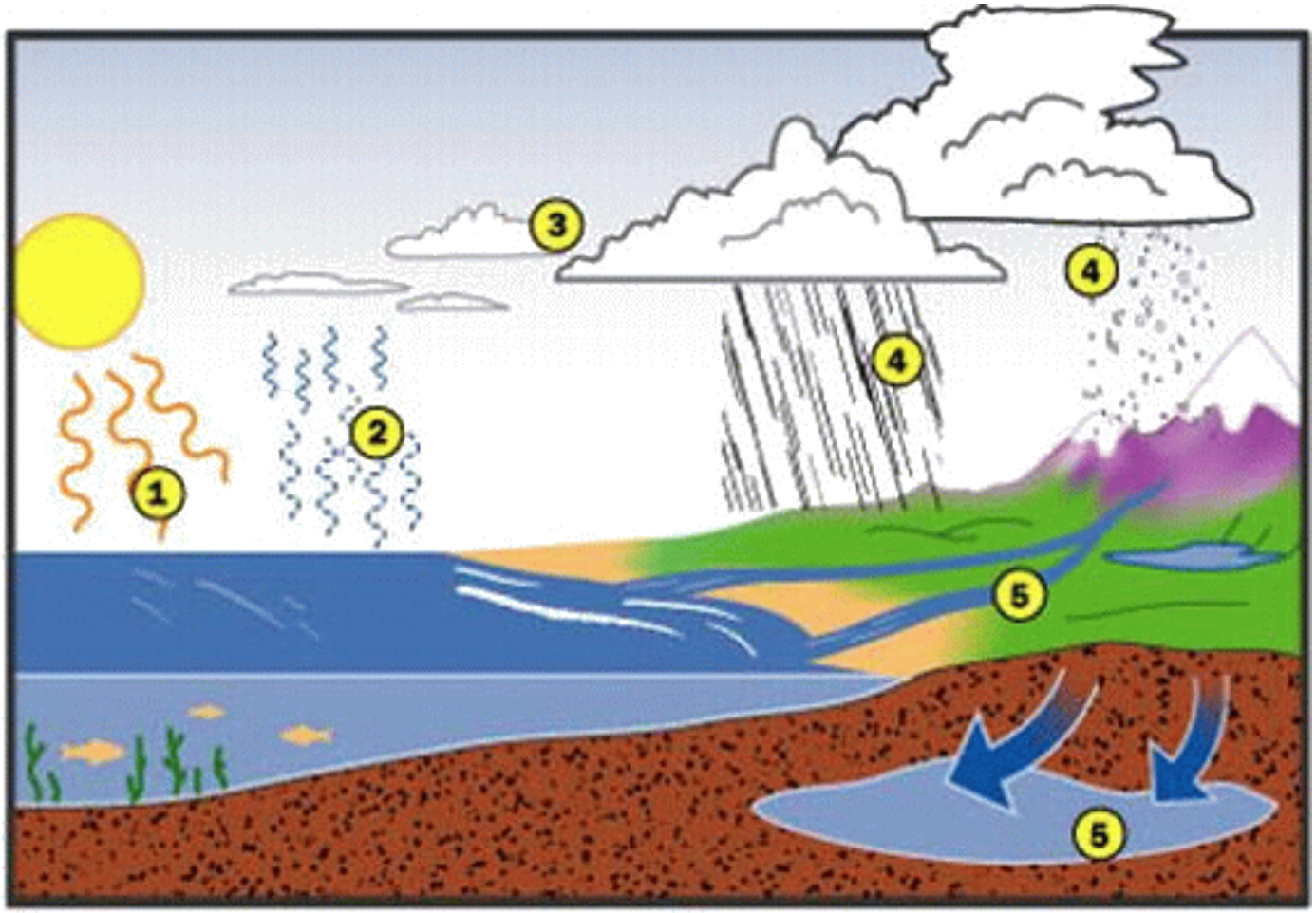



- Like a coat or blanket, clouds protect earth from the cold "outside".
- They also prevent earth's heat from escaping.

*Which night do you think is colder – a clear, starry night, or a cloudy night? Why?*

*A clear night will be colder because there is no "cover" (clouds) over the earth to keep it warm.*

# The Water Cycle




1. The sun heats the ocean.
2. Ocean water evaporates and rises into the air.
3. The water vapor cools and condenses to become droplets, which form clouds.
4. If enough water condenses, the drops become heavy enough to fall to the ground as rain and snow.
5. Some rain collects in groundwells. The rest flows through rivers back into the ocean.

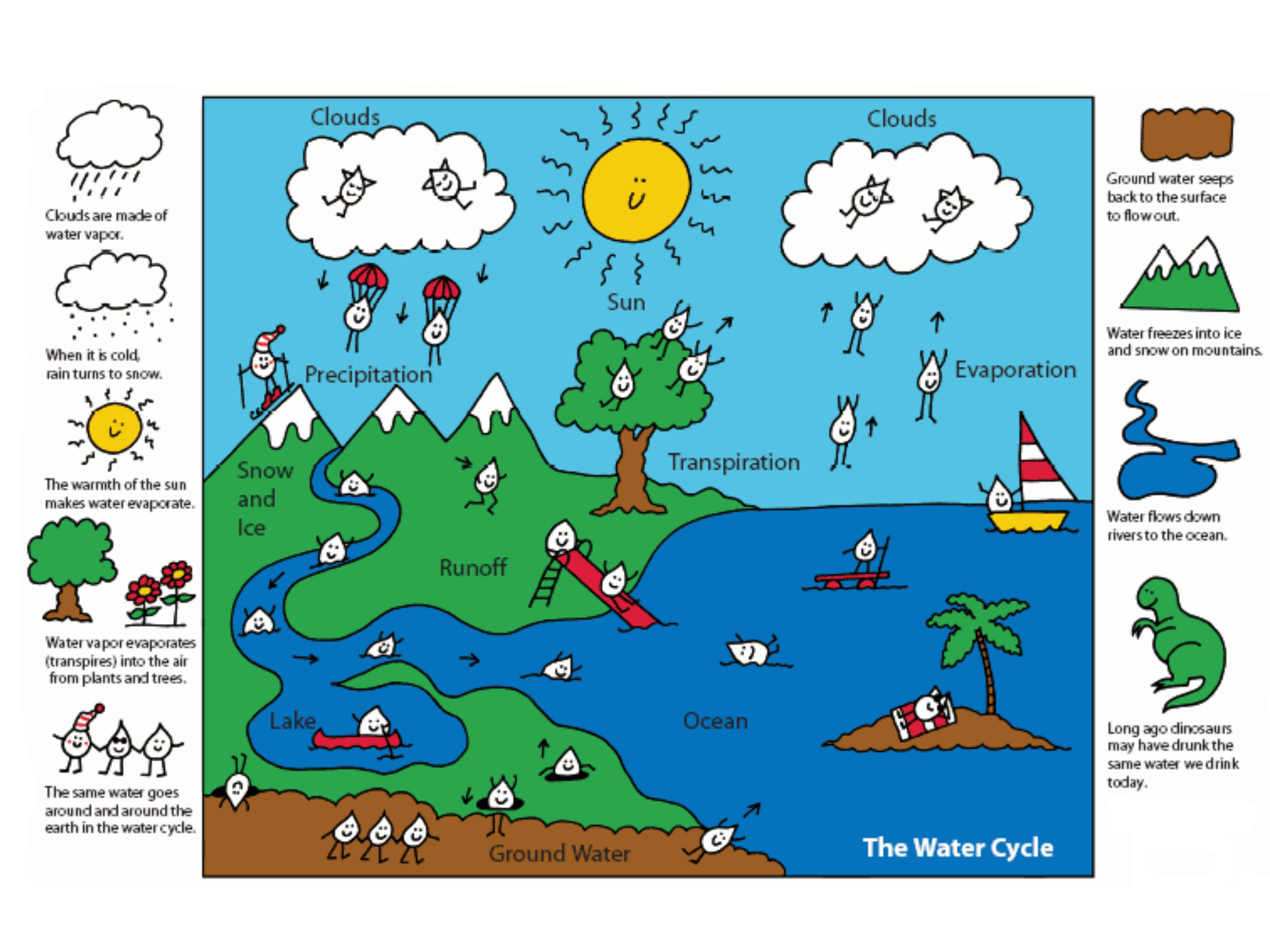
# The Water Cycle

- EVAPORATION: Heat from the sun evaporates water from oceans, lakes, trees, etc.

- CONDENSATION: The rising water vapor cools, turns to water droplets and comes into contact with dust particles in the air to form clouds.

- PRECIPITATION: When the clouds become too full of water droplets, rain, sleet or snow occurs.

- This cycle repeats, making “the water cycle”.


Clouds are made of water vapor.
When it is cold, rain turns to snow.
The warmth of the sun makes water evaporate.
Water vapor evaporates (transpires) into the air from plants and trees.
The same water goes around and around the earth in the water cycle.
Clouds
Sun
Clouds
Precipitation
Evaporation
Transpiration
Snow and Ice
Runoff
Lake
Ocean
Ground Water
The Water Cycle
Ground water seeps back to the surface to flow out.
Water freezes into ice and snow on mountains.
Water flows down rivers to the ocean.
Long ago dinosaurs may have drunk the same water we drink today.

# Fog!

- Fog is nothing more than a cloud on the ground.

- When warm air flows over cool land, water vapor condenses into tiny droplets. This is FOG.

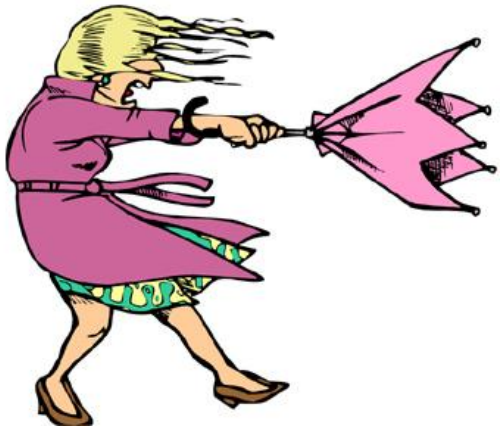
- 3 Types:

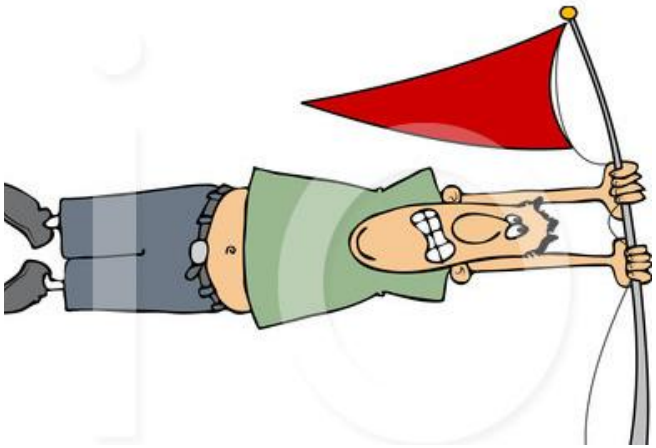
1. Ground Fog: 100 m thick
2. Valley Fog: 500 m thick
3. Ice Fog: contains ice particles



# Wind

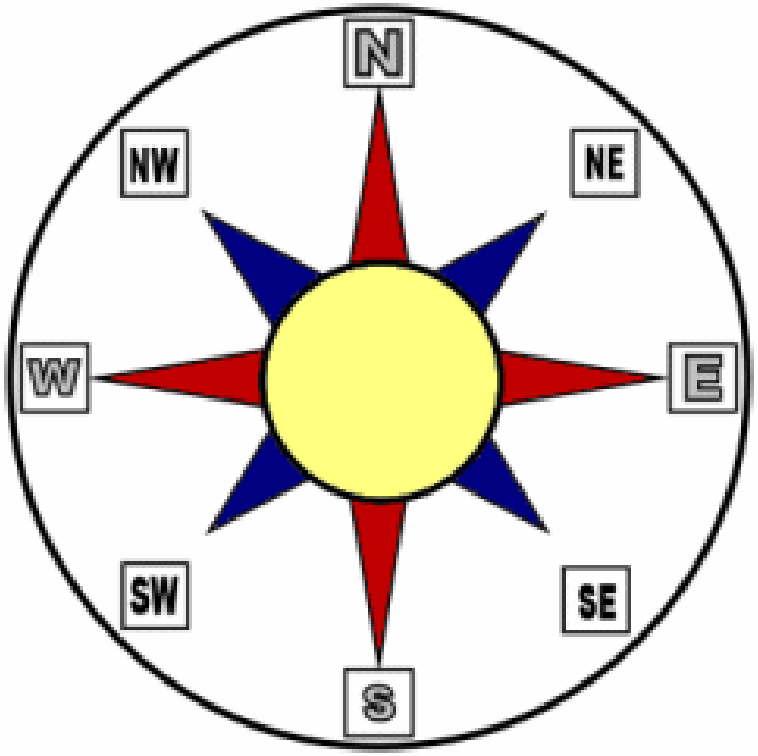
**The sun heats the earth's surface unevenly. This creates air masses of different temperatures. Warm air is lighter than cold air. Cold air masses push under hot air masses, causing them to rise. This movement of air is called WIND.**





**WIND DIRECTION:**

**Winds are named for the direction from which they blow.**




**<u>For example</u> (in NL):**

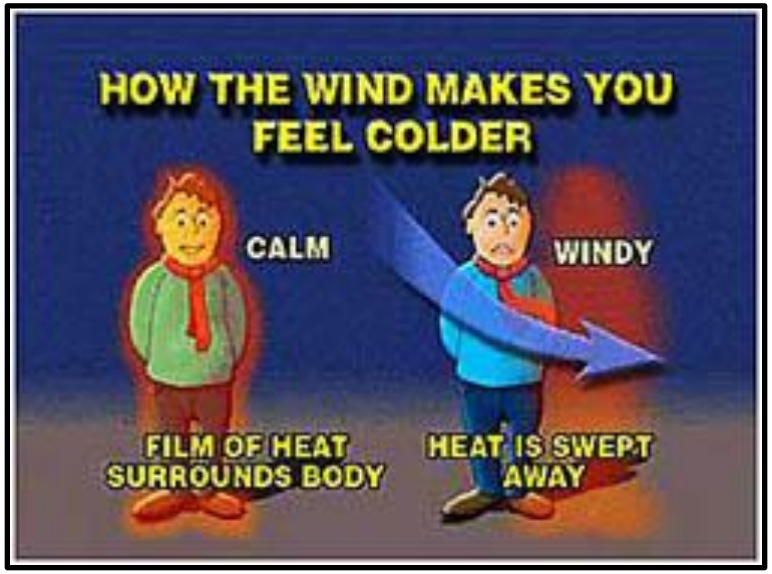
**A northeasterly wind does not blow TO the north east. It blows FROM the north east. It has a cooling effect.**

**A southwesterly wind blows FROM the south west. It has a warming effect.**

# Wind Chill Factor

A measure of how cold air feels to the skin.

The actual temperature + the chilling effect of the wind.




## Churchill

**WIND CHILL WARNING IN EFFECT**

### Current Conditions

More info +

-37 °C

| | | | |
|---|---|---|---|
| Observed at: | Churchill Airport | | |
| Date: | 10:00 AM CST Tuesday 17 January 2012 | | |
| Condition: | Sunny | Temperature: | -36.6°C |
| Pressure: | 101.6 kPa | Dewpoint: | -40.5°C |
| Visibility: | 16 km | Humidity: | 68 % |
| | | Wind: | WSW 31 km/h |
| | | Wind Chill: | -55 |

# STORMS

When air masses have differences in air temperature and air pressure, storms can form.

# Thunder & Lightning

- Cumulonimbus clouds are also called “storm clouds”. They are dark grey and billow up to 16 km high.

- They cause high wind, lightning and thunder.

- See bottom of pp. 24-25 to see how lightning and thunder occur.

- Lightning is hot (24 000˚C) and fast (120 000 km/h).

# Tornadoes

- A tube of air that hangs from the thunderstorm like an elephant's trunk.

- Occurs when a strong, fast column of warm air starts spinning.

- Acts like a vacuum cleaner, sucking in air at the bottom and whirling it upwards, picking up anything in its path!

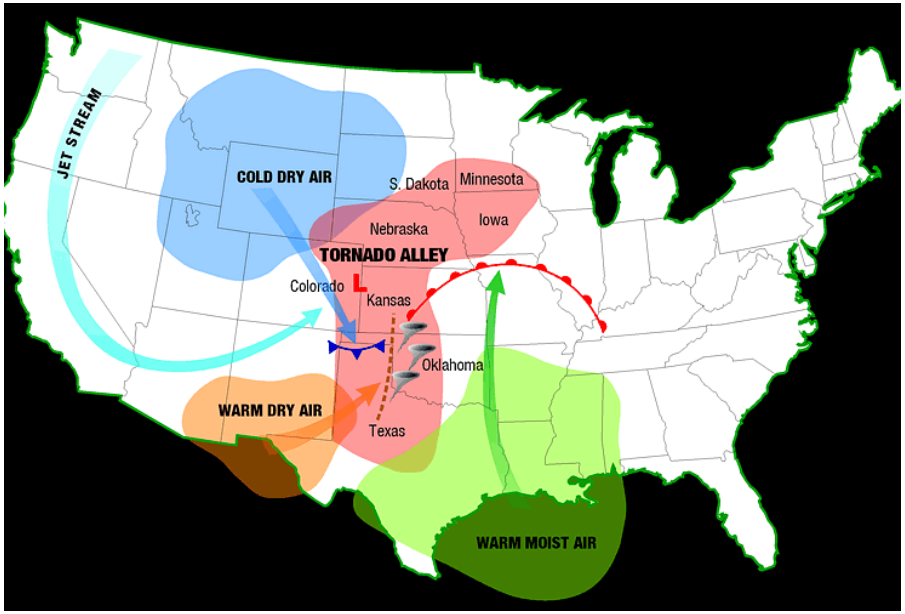
# Did you know?

- Tornadoes can lift railway cars, destroy houses, and ruin whole towns… in seconds!

- Some tornadoes have winds as fast as 500 kmh.

- No one knows why tornadoes form in some storms and not others.

- There are nearly 100 tornadoes in Canada each year.


JET STREAM
COLD DRY AIR
S. Dakota
Minnesota
Nebraska
Iowa
TORNADO ALLEY
Colorado
Kansas
Oklahoma
WARM DRY AIR
Texas
WARM MOIST AIR


CANADIAN TORNADOES
MAIN TORNADO AREA
CANADA'S "TORNADO ALLEY"
CANADA

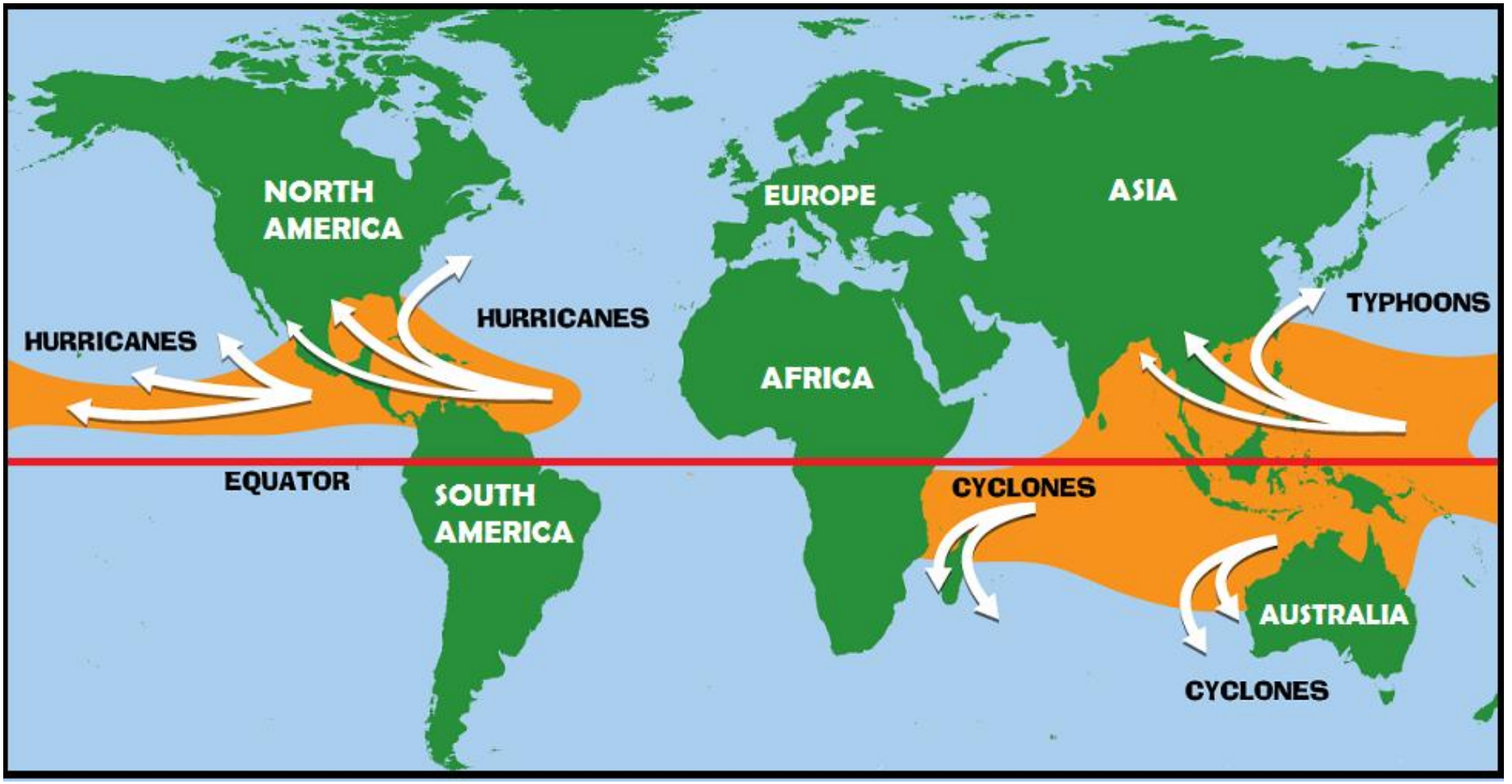
# Hurricanes, Typhoons, Cyclones:

Violent, cyclonic storms that form in tropical waters and eventually make landfall, causing much destruction.

They are different only in **where** they happen):

**Hurricane**: Canada / US
**Typhoon**: China, Japan, Southeast Asia
**Cyclone**: between Africa / Australia

See map, next slide…


NORTH AMERICA
EUROPE
ASIA
HURRICANES
HURRICANES
TYPHOONS
AFRICA
EQUATOR
SOUTH AMERICA
CYCLONES
AUSTRALIA
CYCLONES

# DID YOU KNOW ?

- The low pressure center of these storms is called the "**eye of the storm**"

- These storms have a powerful cyclonic (circular) wind motion. In the **Northern Hemisphere** the winds go clockwise, and in the **Southern Hemisphere**, counter clockwise.