



# weather philippines

My Philippines. My Weather.

## WEATHER 101: Basic Weather Elements, Processes and Systems

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# Meteorology

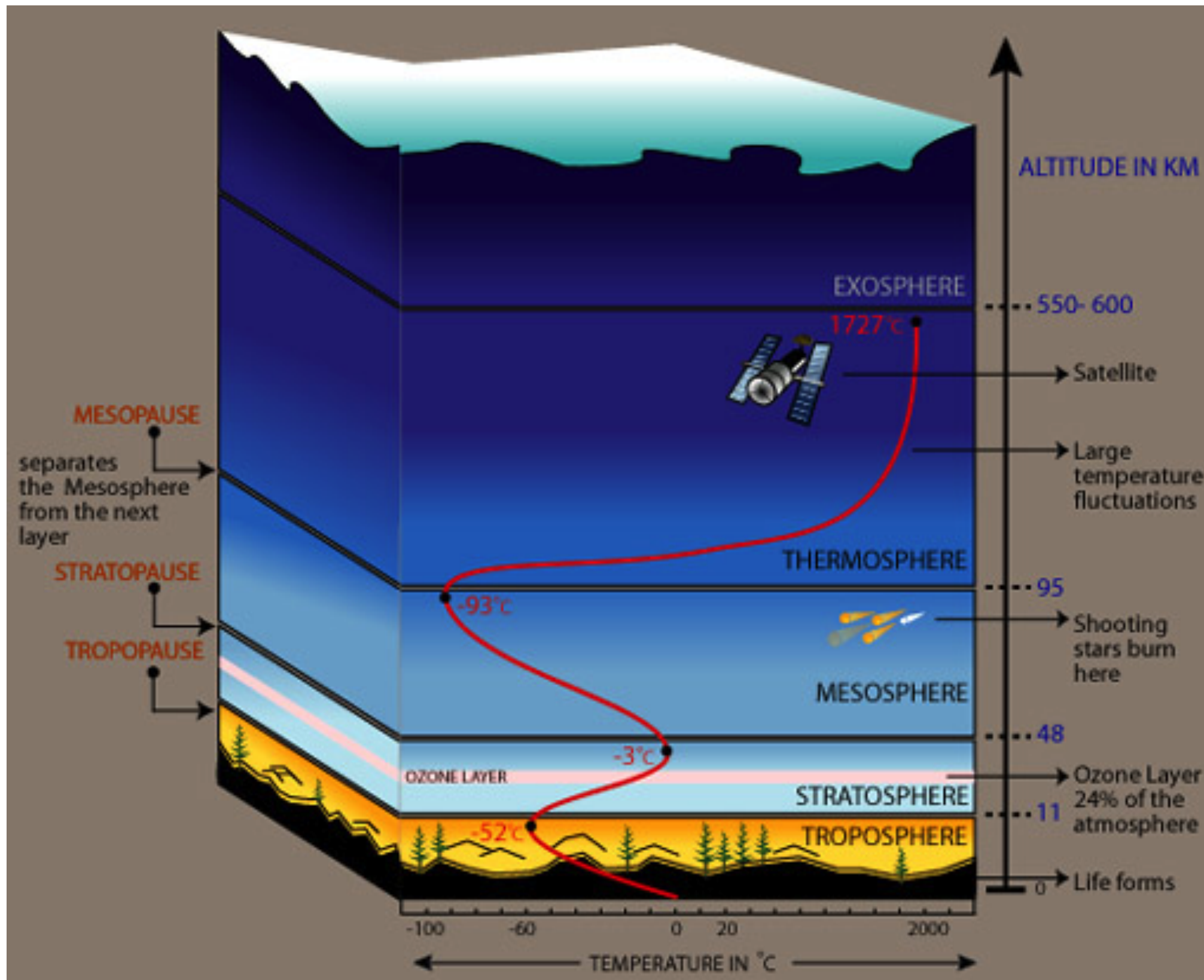
- Science that deals with the study of the **atmosphere** and its phenomena especially with **weather**.

An **Atmosphere** is a layer of gases surrounding the Earth that is held in place by Earth's gravity.



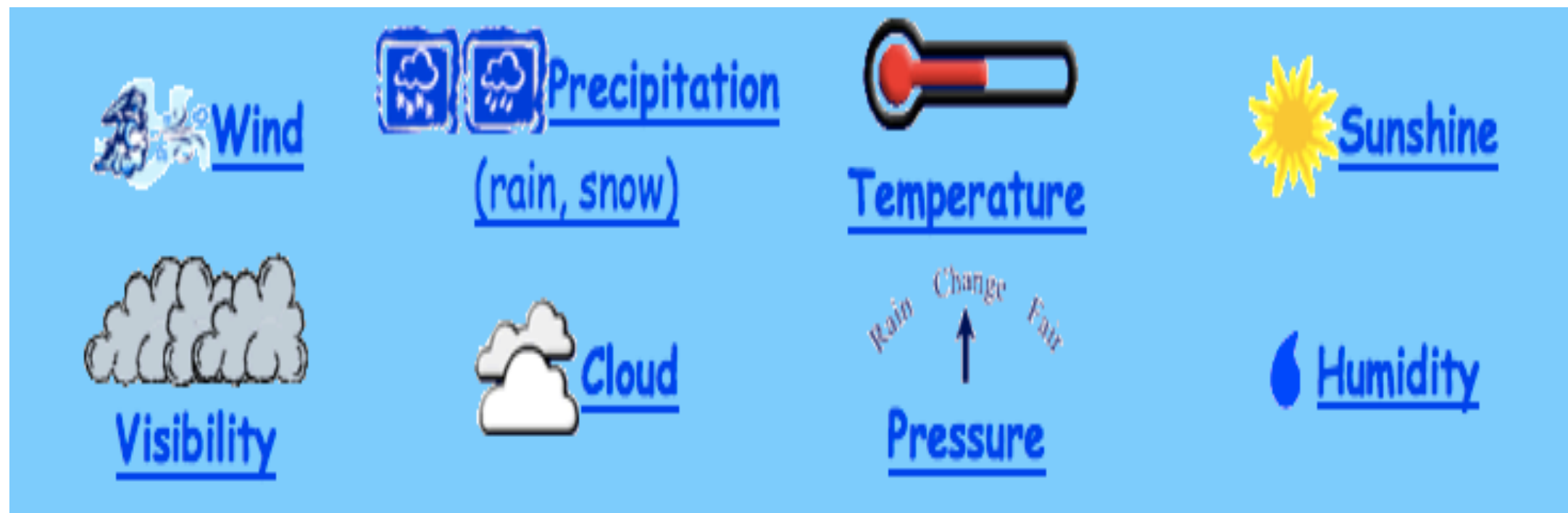


# Layers of the Atmosphere:



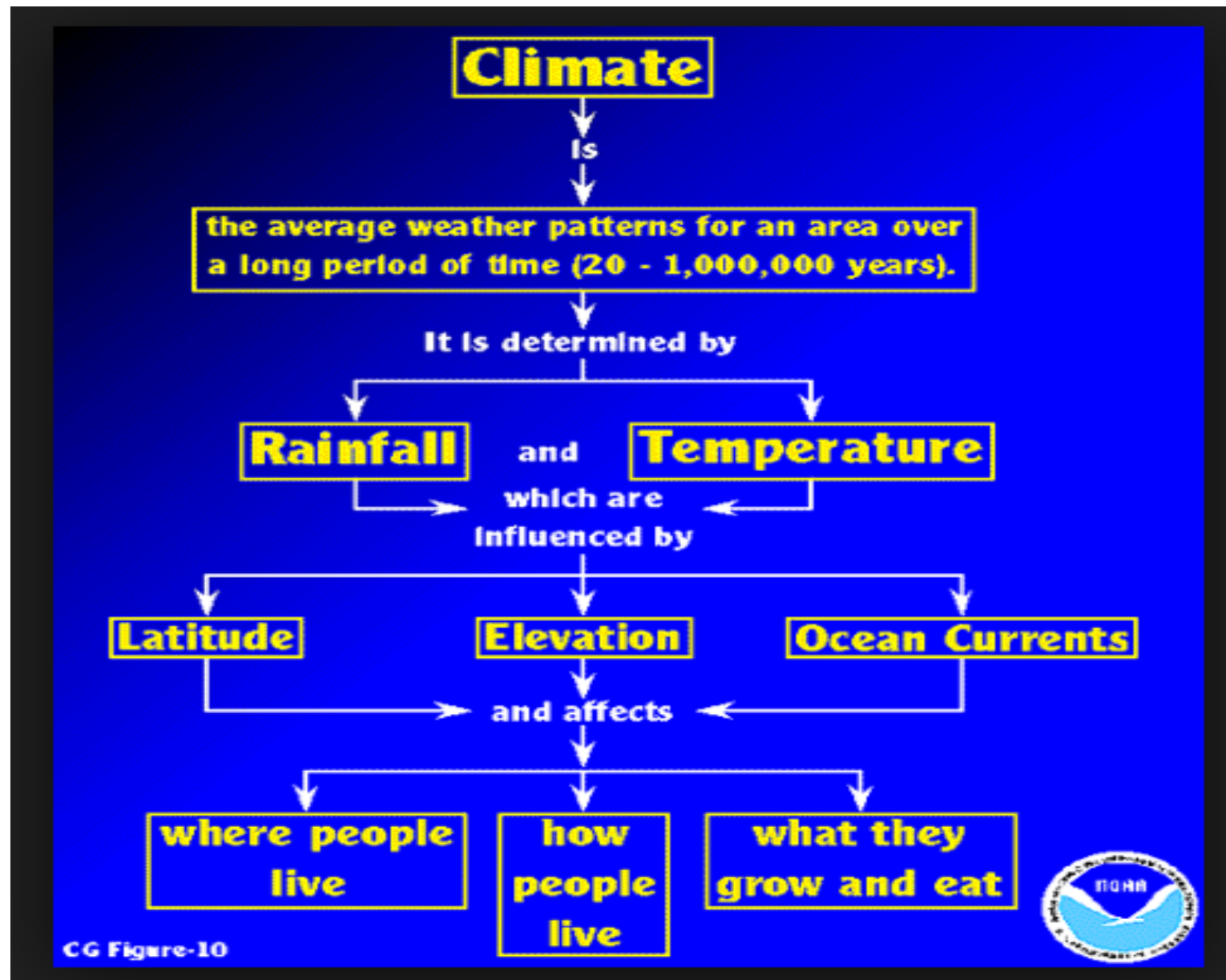
# Weather and Climate:

**Weather** – is the condition of the atmosphere at a particular place over a short period of time in terms of...



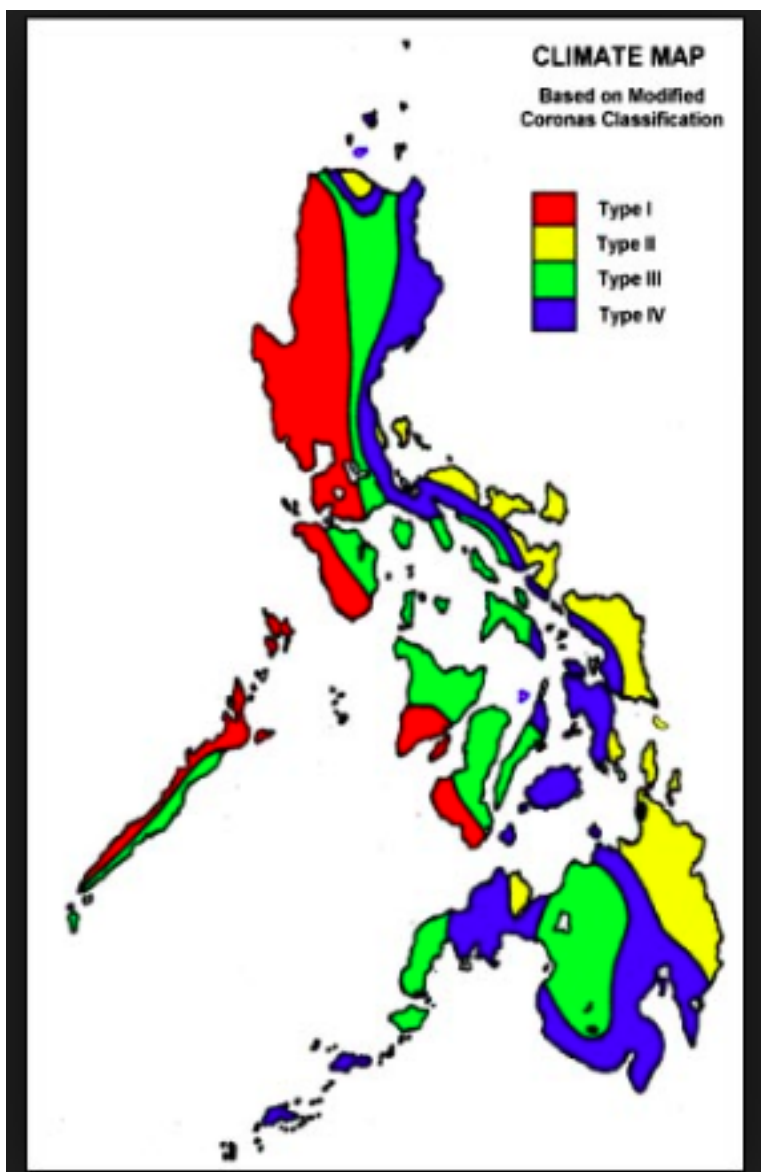


**Climate** – refers to the weather pattern of a place over a long period of time.



**Based on the modified Corona classification, the four climate types in the Philippines are the Types I, II, III, and IV.**

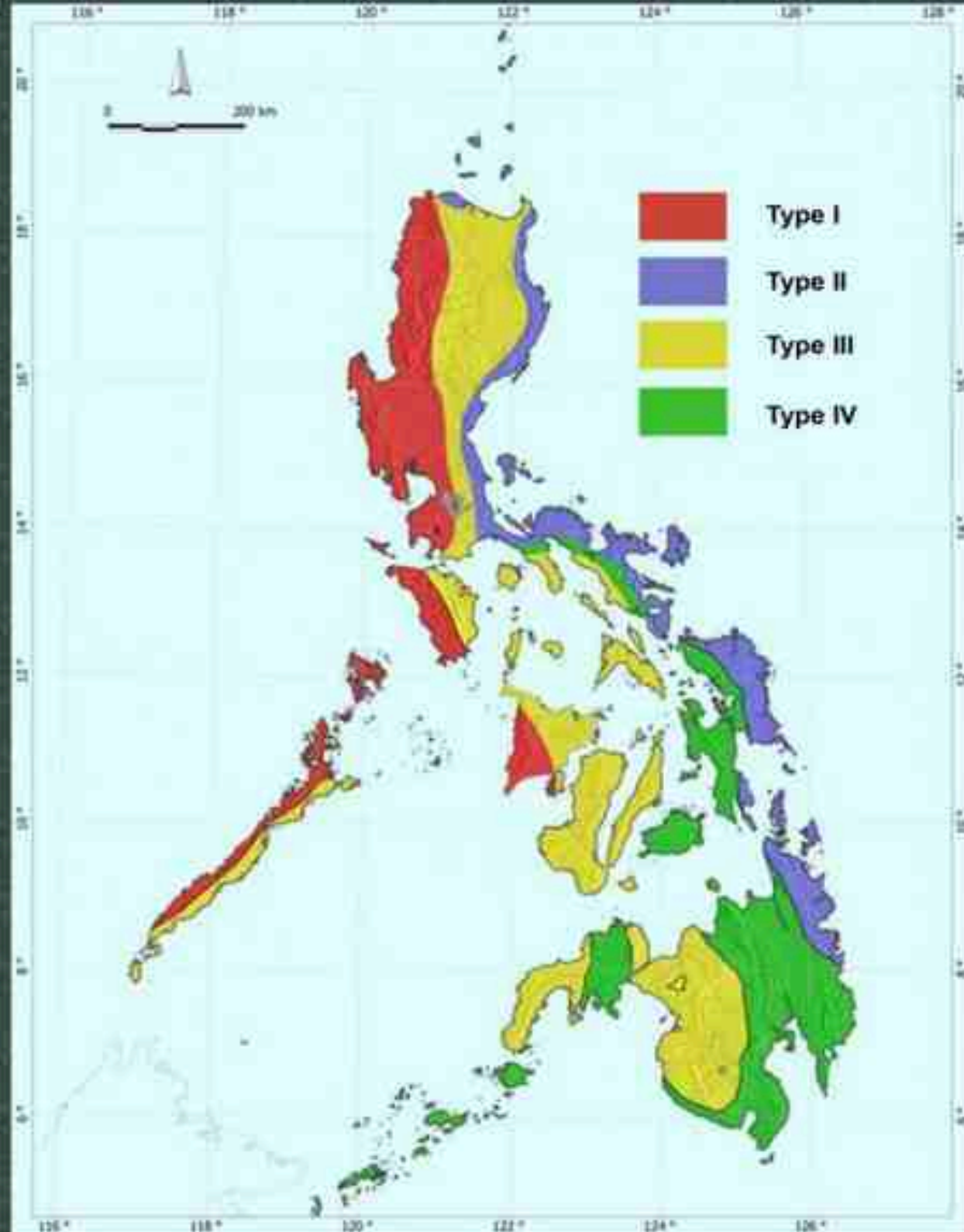
This system of climate classification was devised by Fr. J. Corona in 1920 (Lantican 2001) (1903-1918)



Type	Dry Season	Wet Season
I	November - April	Rest of the year
II	No dry season	Maximum rain period from December to February; Minimum rainfall during the period from March to May
III	Short dry season either during the period from December to February or from March to May	No very pronounced maximum rain period
IV	No dry season	Rainfall evenly distributed throughout the year



## Climate Map of the Philippines based on the Modified Coronas Classification



## Description

**Type I** - two pronounced seasons, dry from November to April and wet during the rest of the year. Maximum rain period is from June to September.

**Type II** - no dry season with a very pronounced maximum rain period from December to February. There is not a single dry month. Minimum monthly rainfall occurs during the period from March to May.

**Type III** - no very pronounced maximum rain period with a dry season lasting only from one to three months, either during the period from December to February or from March to May. This type resembles type I since it has a short dry season.

**Type IV** - rainfall is more or less evenly distributed throughout the year. This type resembles type II since it has no dry season.



The dry season may be subdivided further into:

- **cool dry season**, from **December to February**; and
- **hot dry season**, from **March to May**.

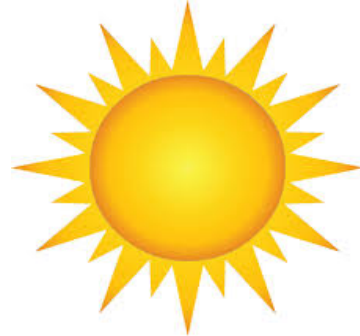
Month	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Rainfall	DRY						RAINY					
Temperature	COOL			HOT								
Season	Cool Dry			Hot Dry			Rainy					





# 1<sup>ST</sup> Set of Weather Elements

- **Sunshine**

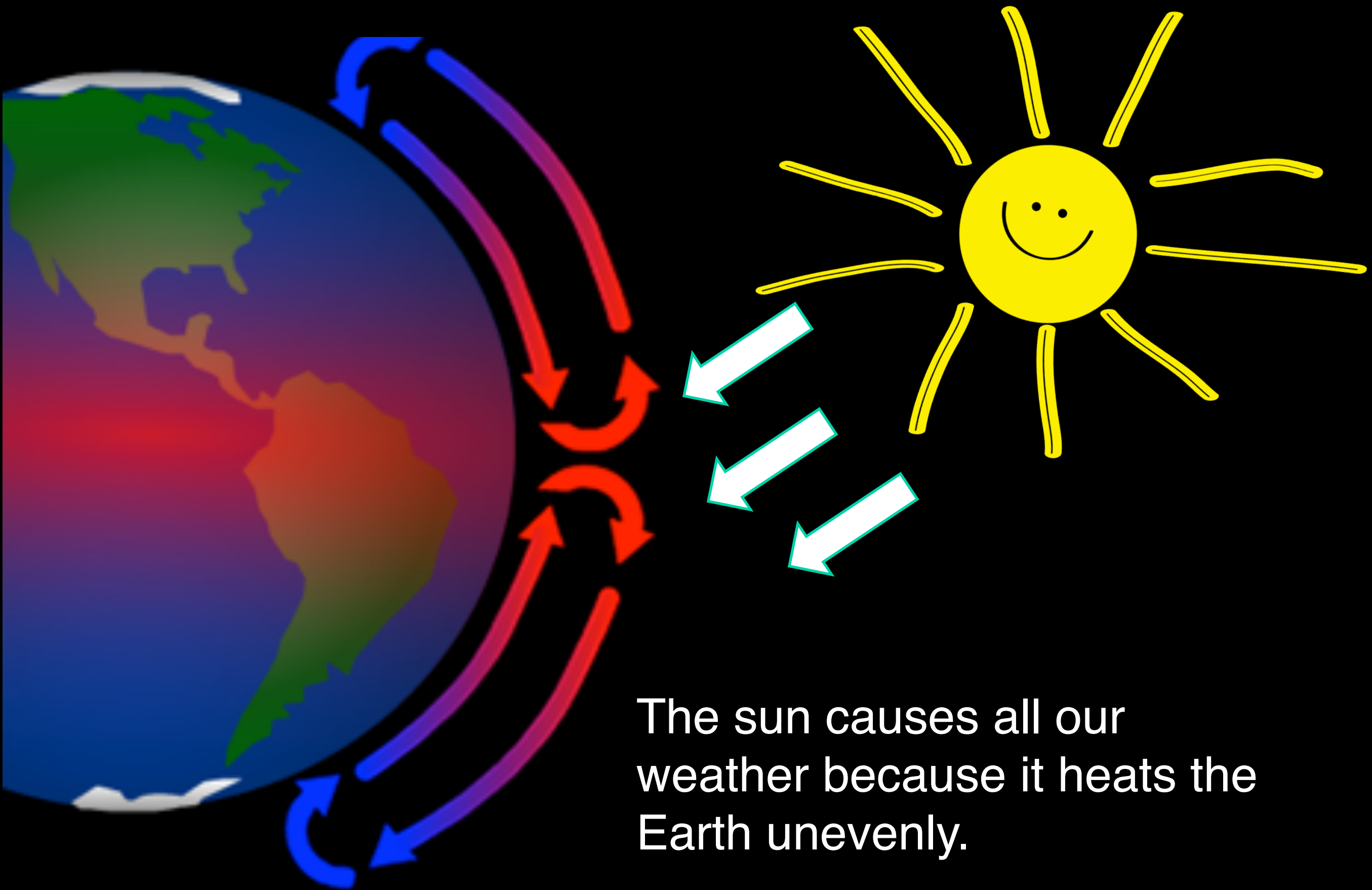


- **Air Pressure**



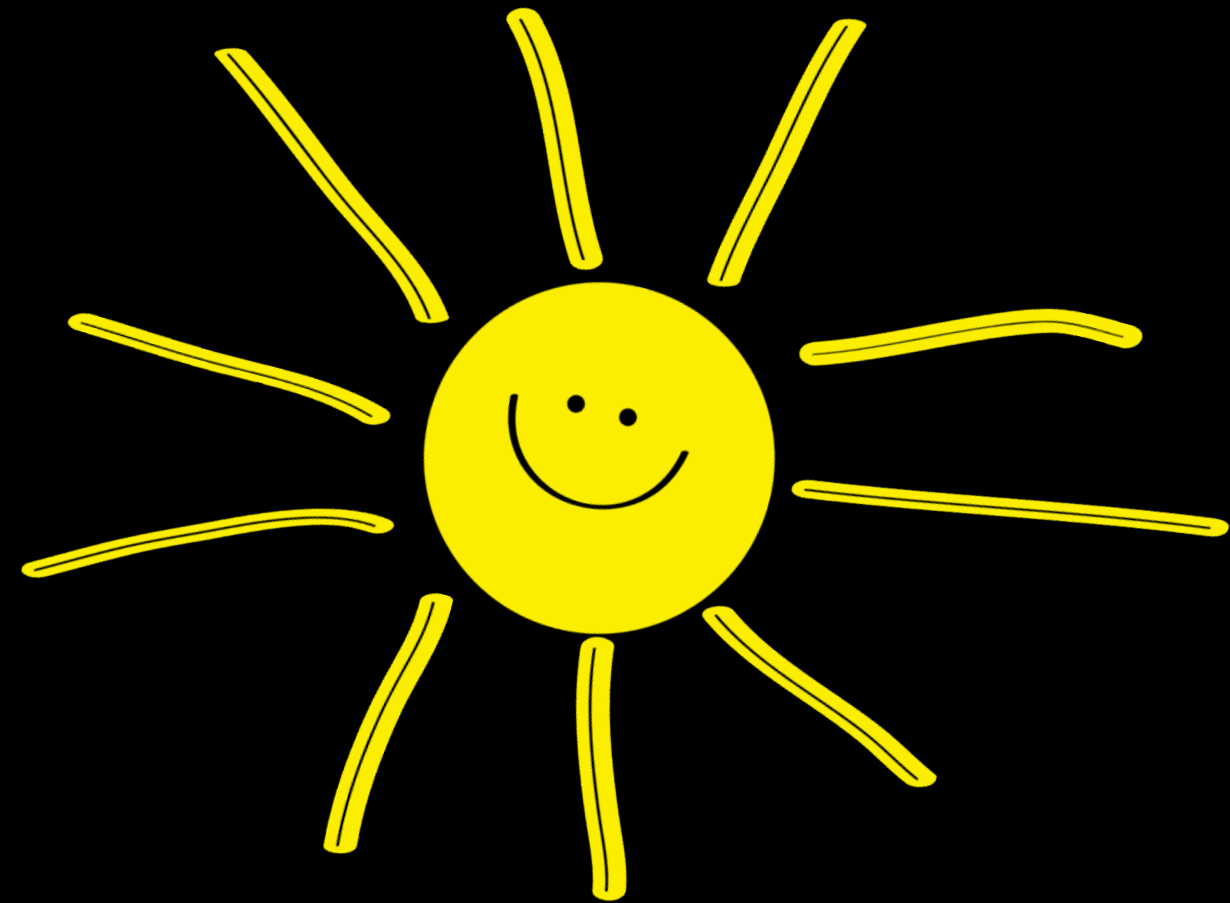
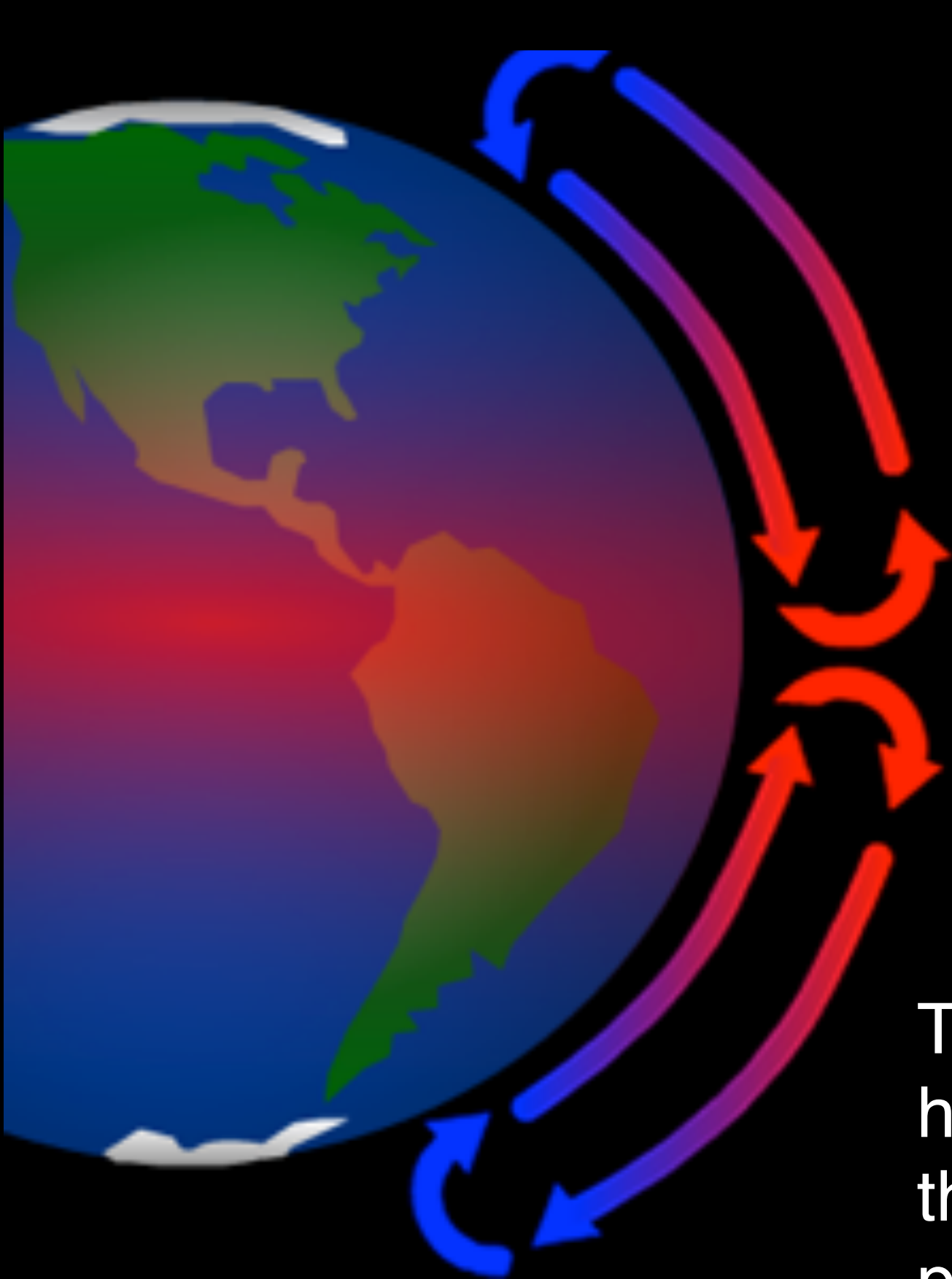
- **Wind**



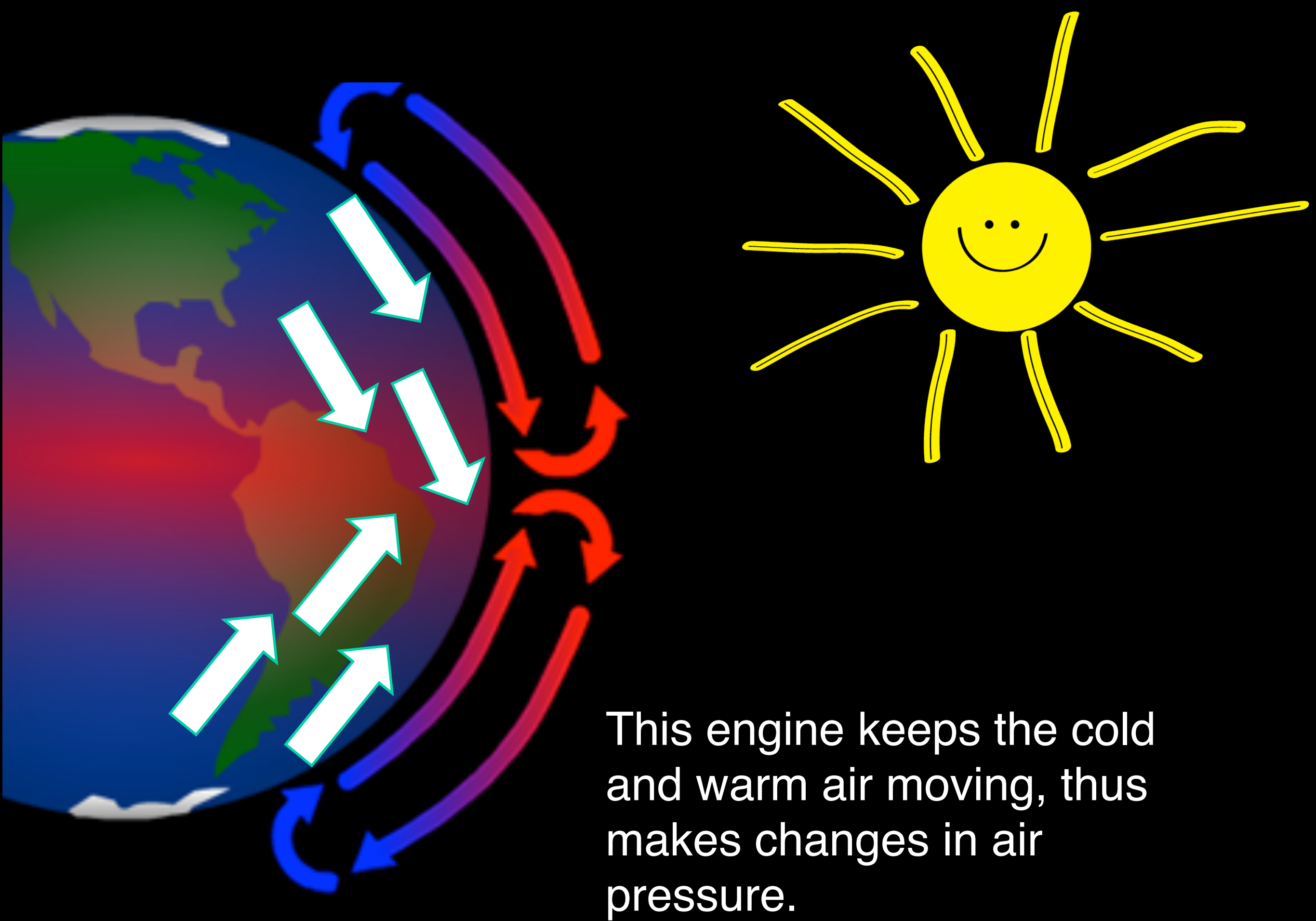


The sun causes all our weather because it heats the Earth unevenly.



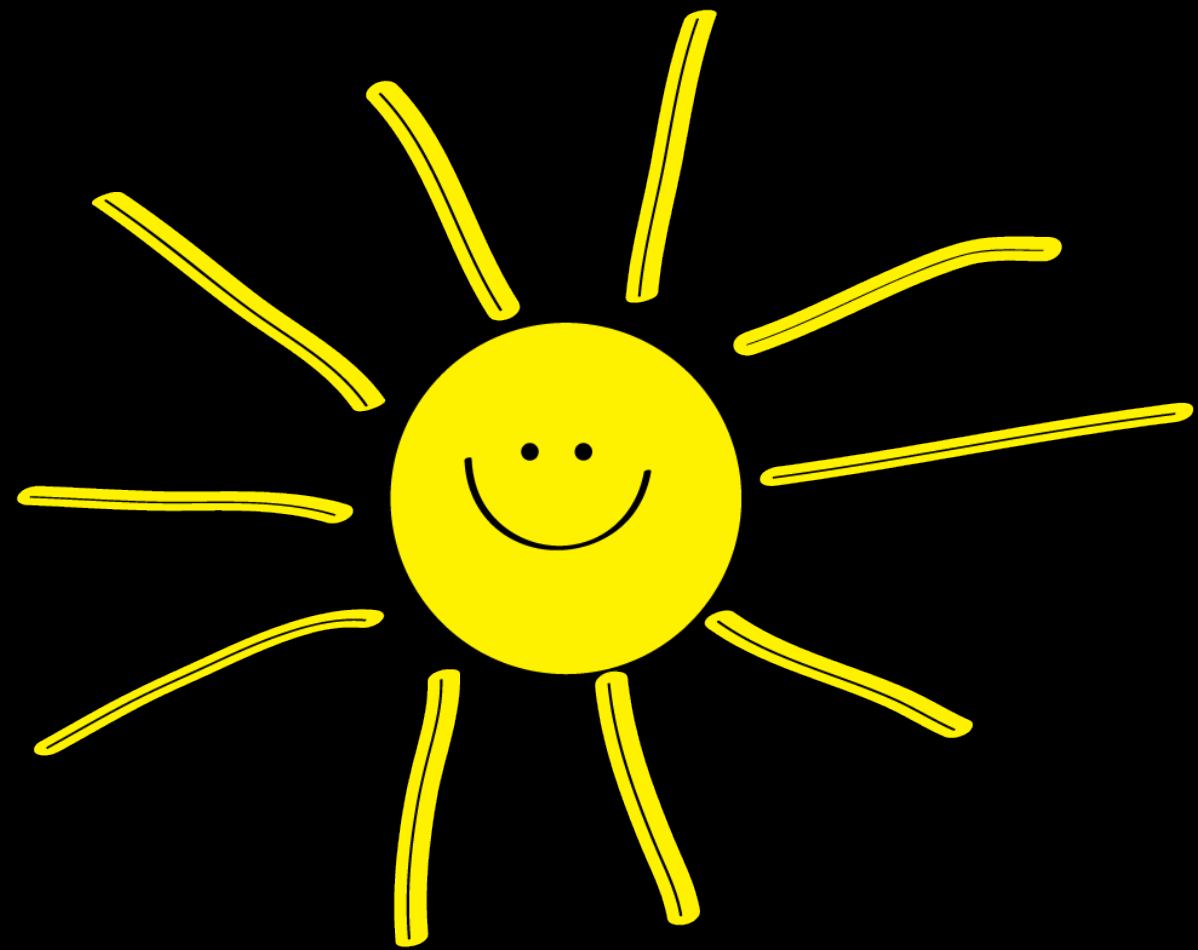
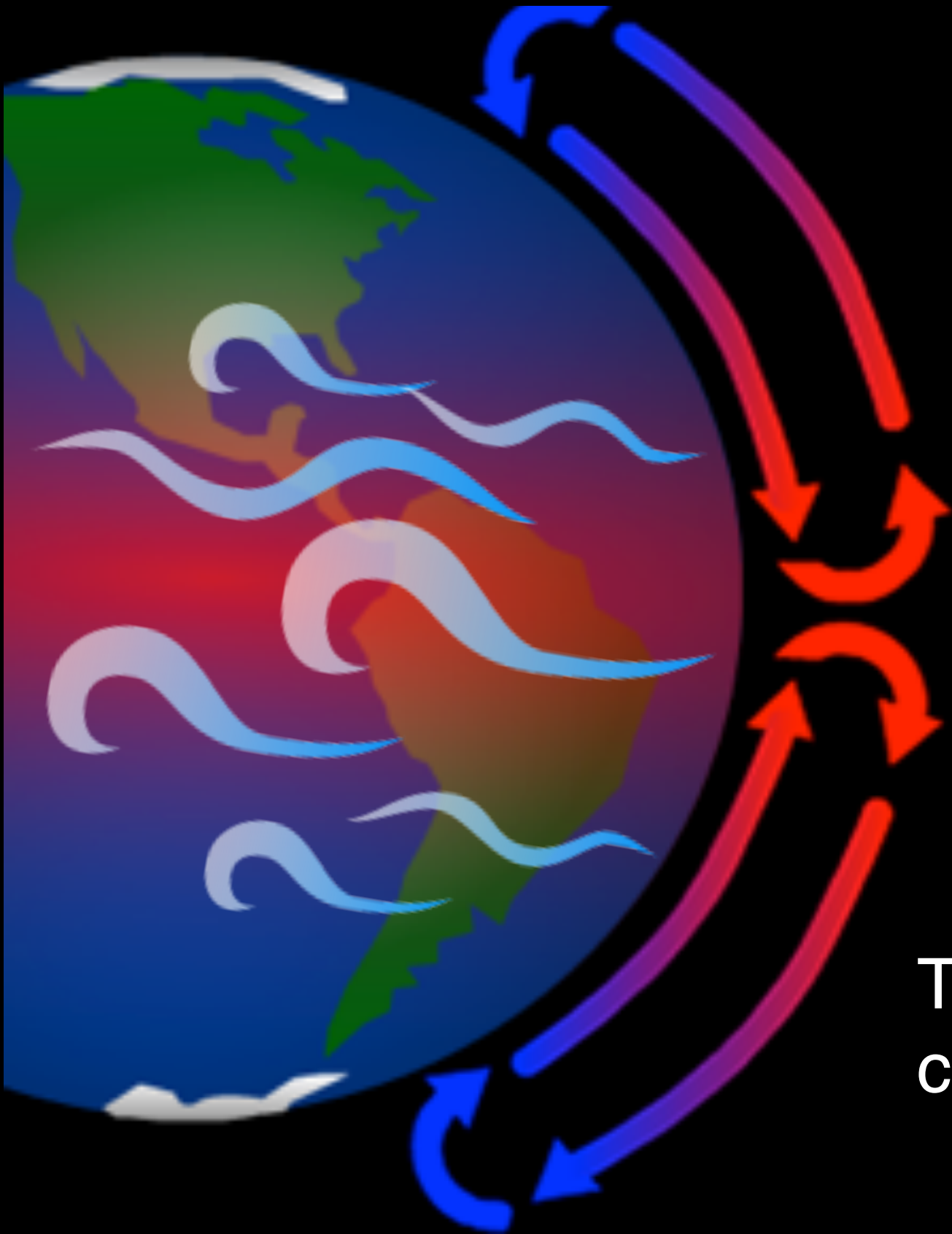


The contrast between Earth's hot parts and cold parts turns the atmosphere into a powerful engine.



This engine keeps the cold and warm air moving, thus makes changes in air pressure.





Those air pressure changes  
cause wind.

# Air Pressure

- Weight of the atmosphere pressing down on the earth.
- Measured by a barometer in units called millibars or hectopascals.
- Changes with altitude.

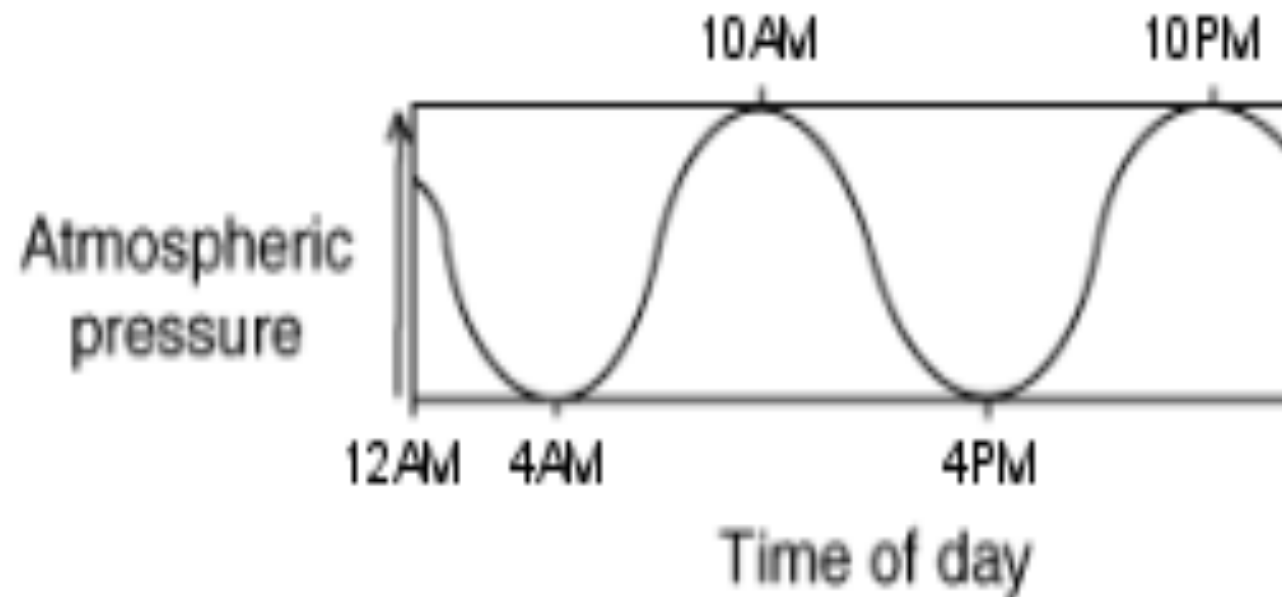


Source: [www.e-missions.net](http://www.e-missions.net)



# Diurnal Variation of Air Pressure

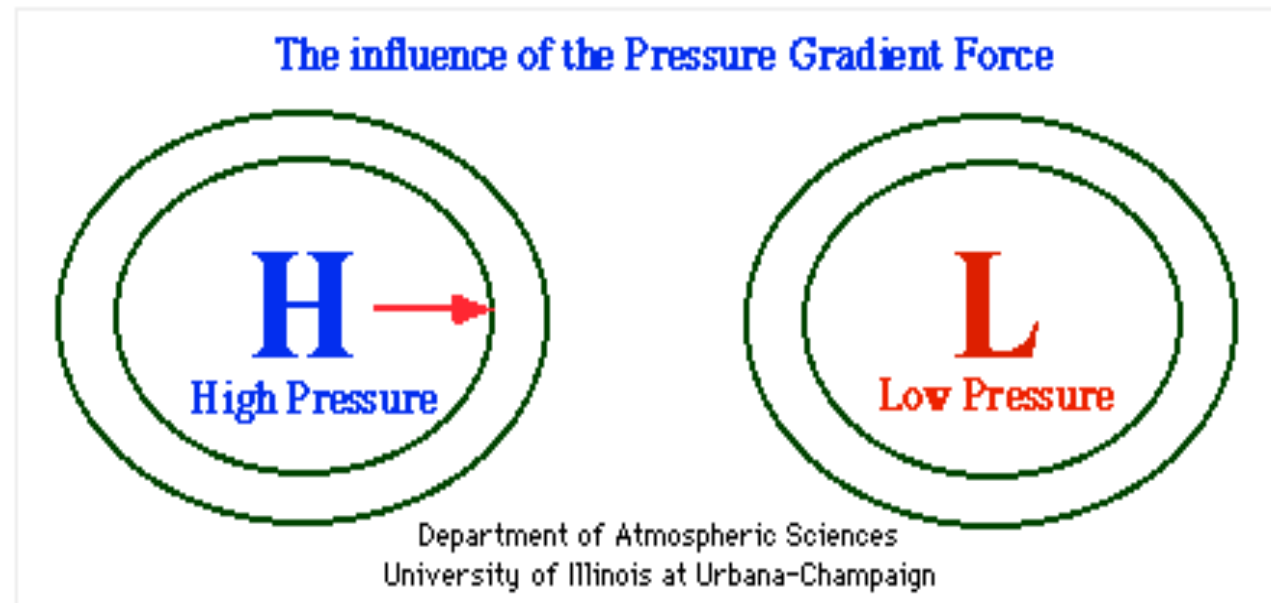
- A variation of pressure during one 24-hour period



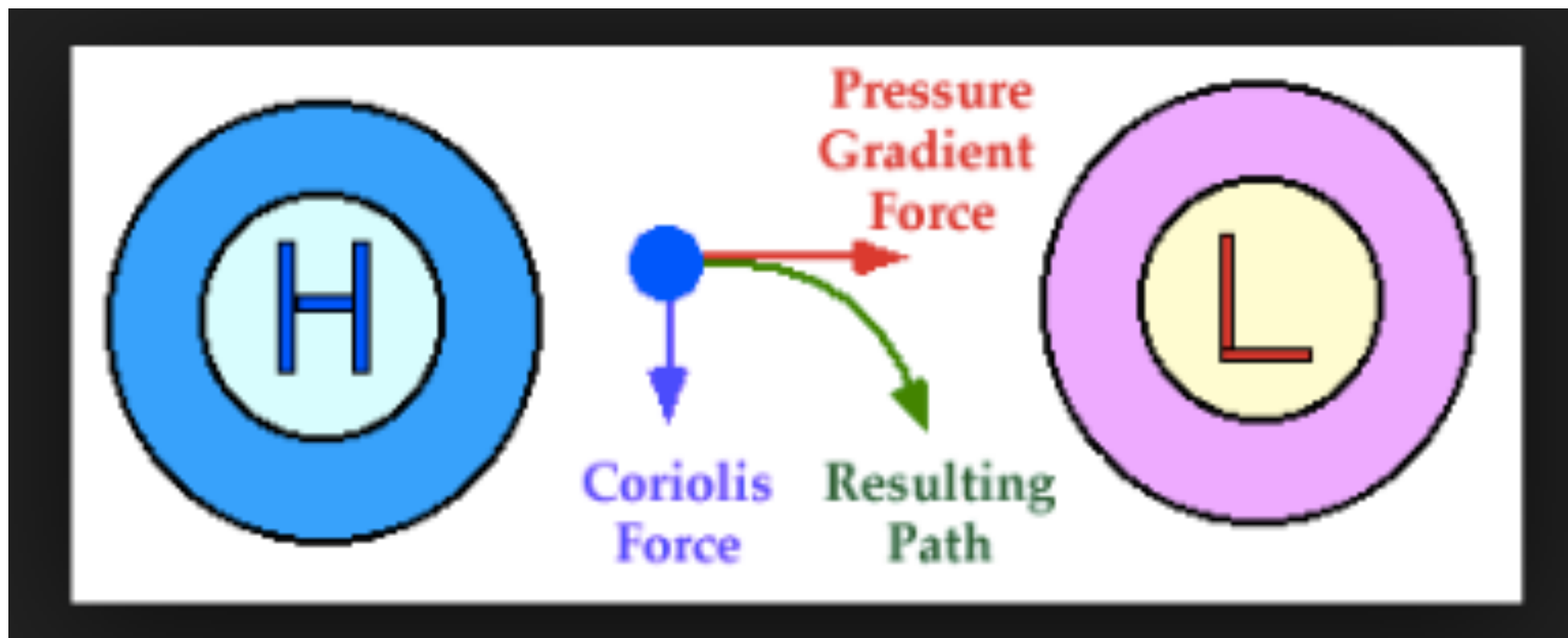


# Pressure Gradient Force

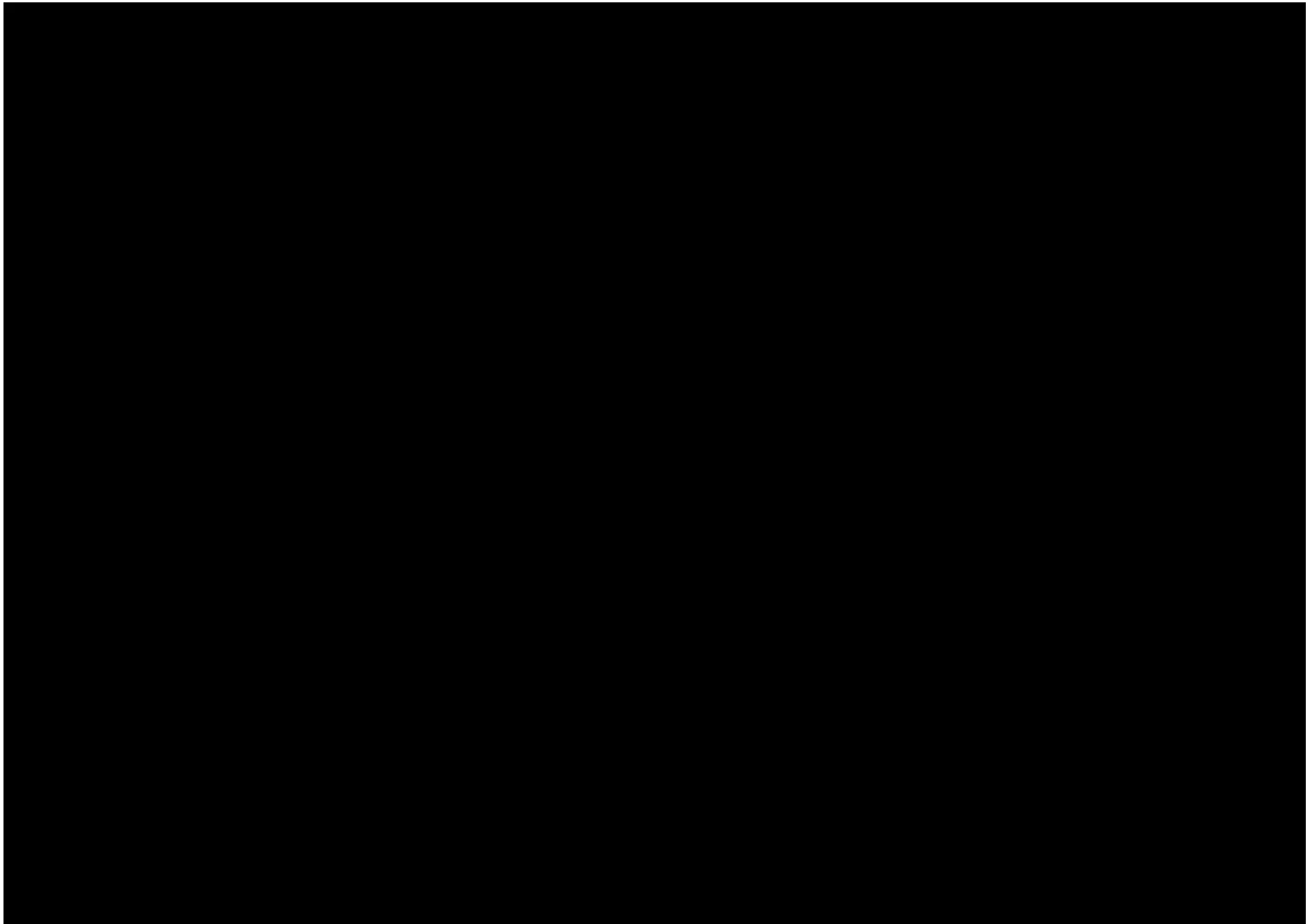
- Force which results when there is a difference in pressure across a surface.
- Constitutes one of the main forces acting on the air to make it move as wind.
- Largely responsible for the wind circulation.



Resulting path of Pressure Gradient Force with Coriolis Force acting on it:

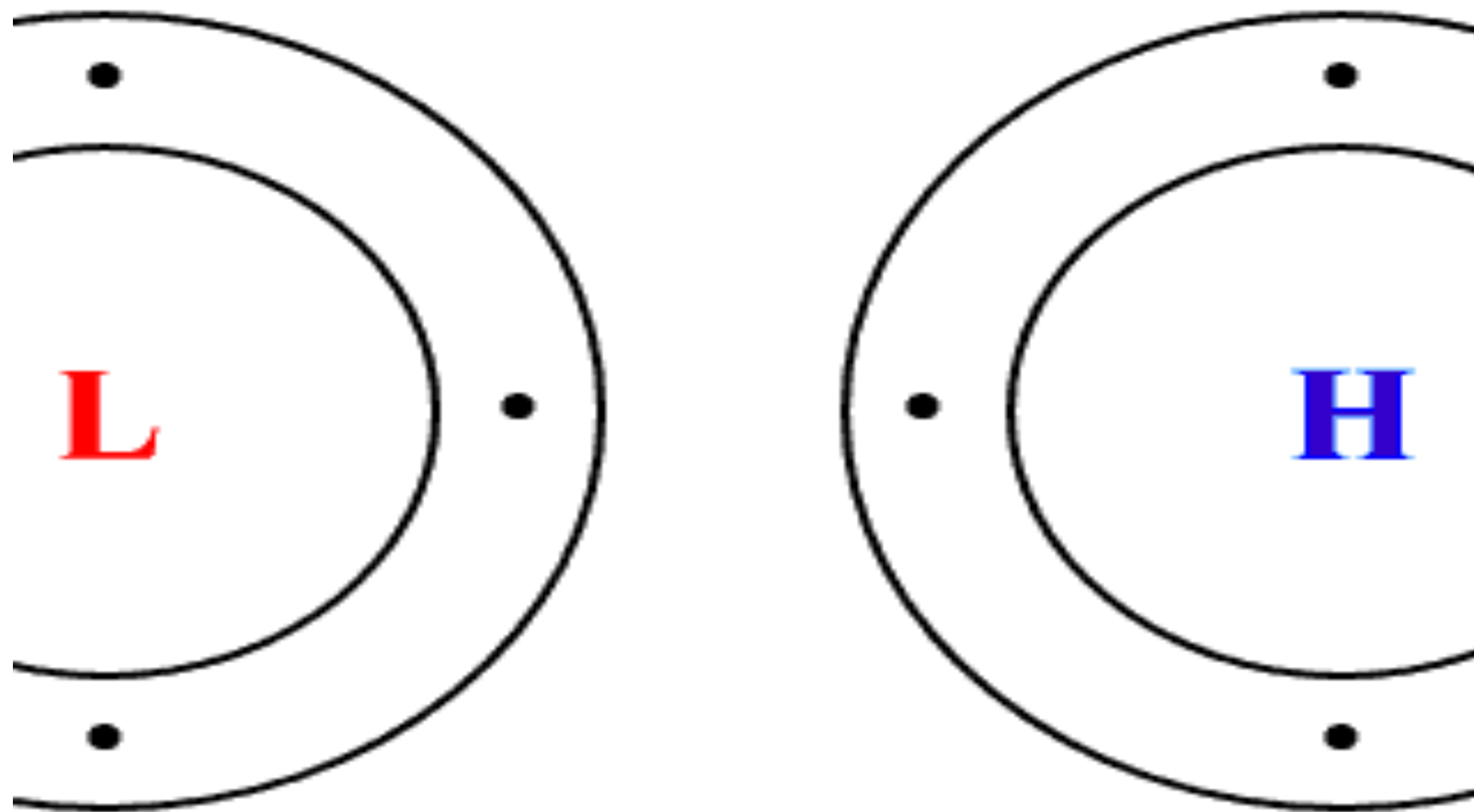


# Coriolis Effect:





Pressure Gradient Force with Coriolis and Friction forces acting on it:



# WIND

**Wind** - is the movement of air relative to the Earth's surface, caused by horizontal and vertical differences in atmospheric pressure.



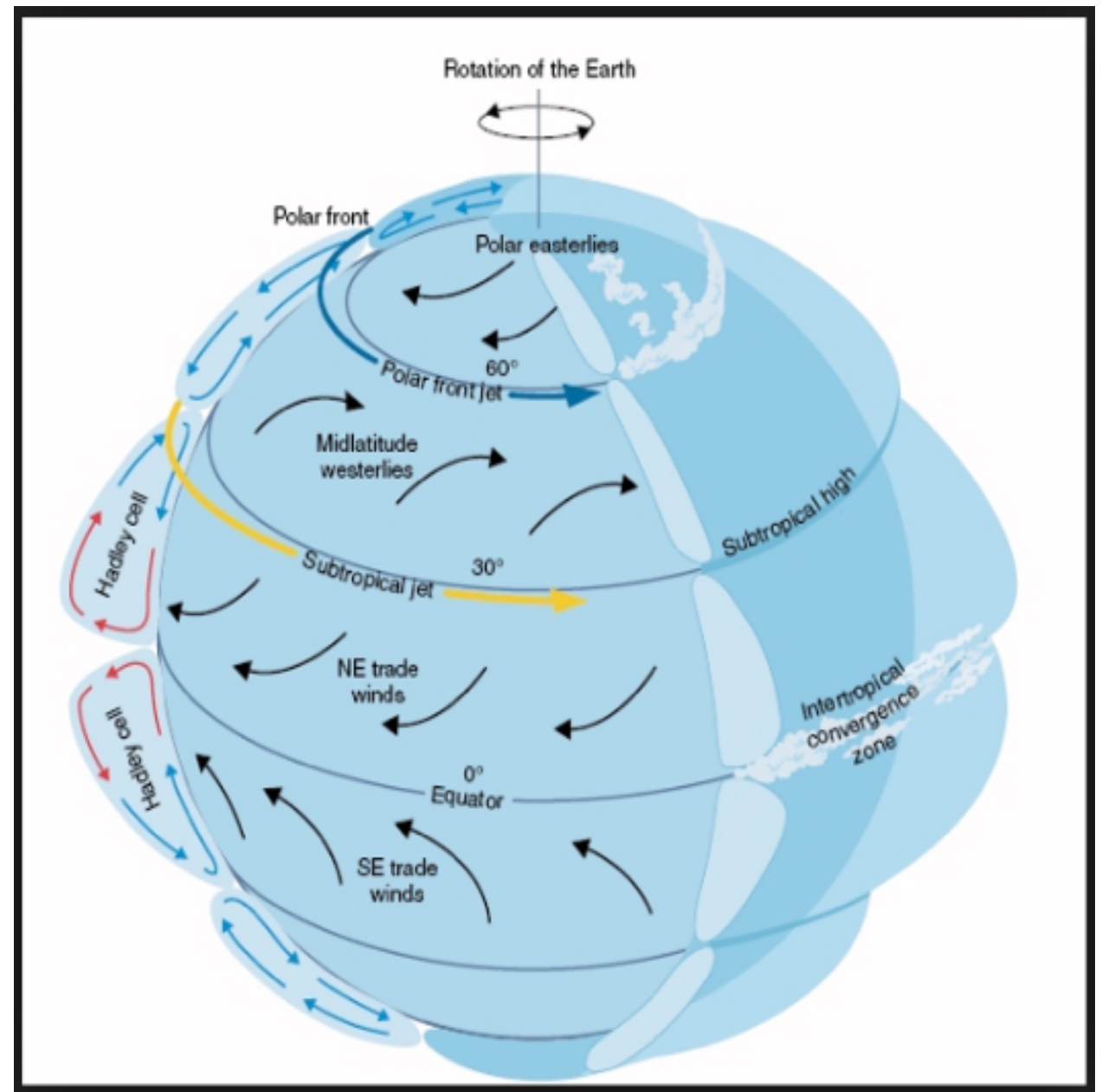
**Wind speed** - is the speed of the weather related air movement from one place to the next in an outside environment.

**Wind direction** - is reported by the direction from which it originates.



# Global Wind Patterns

- Also known as the "general circulation"
- The surface winds of each hemisphere are divided into three wind belts:
  - **Polar Easterlies:** From 60-90 degrees latitude.
  - **Prevailing Westerlies:** From 30-60 degrees latitude (Westerlies).
  - **Tropical Easterlies:** From 0-30 degrees latitude (Trade Winds).





# Global Wind Circulation:



# 2<sup>nd</sup> Set of Weather Elements

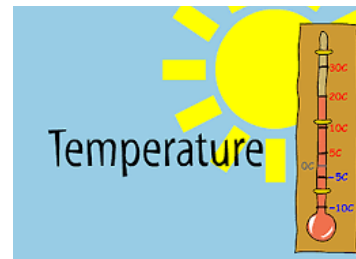
- Cloud Cover



- Humidity



- Temperature



- Precipitation



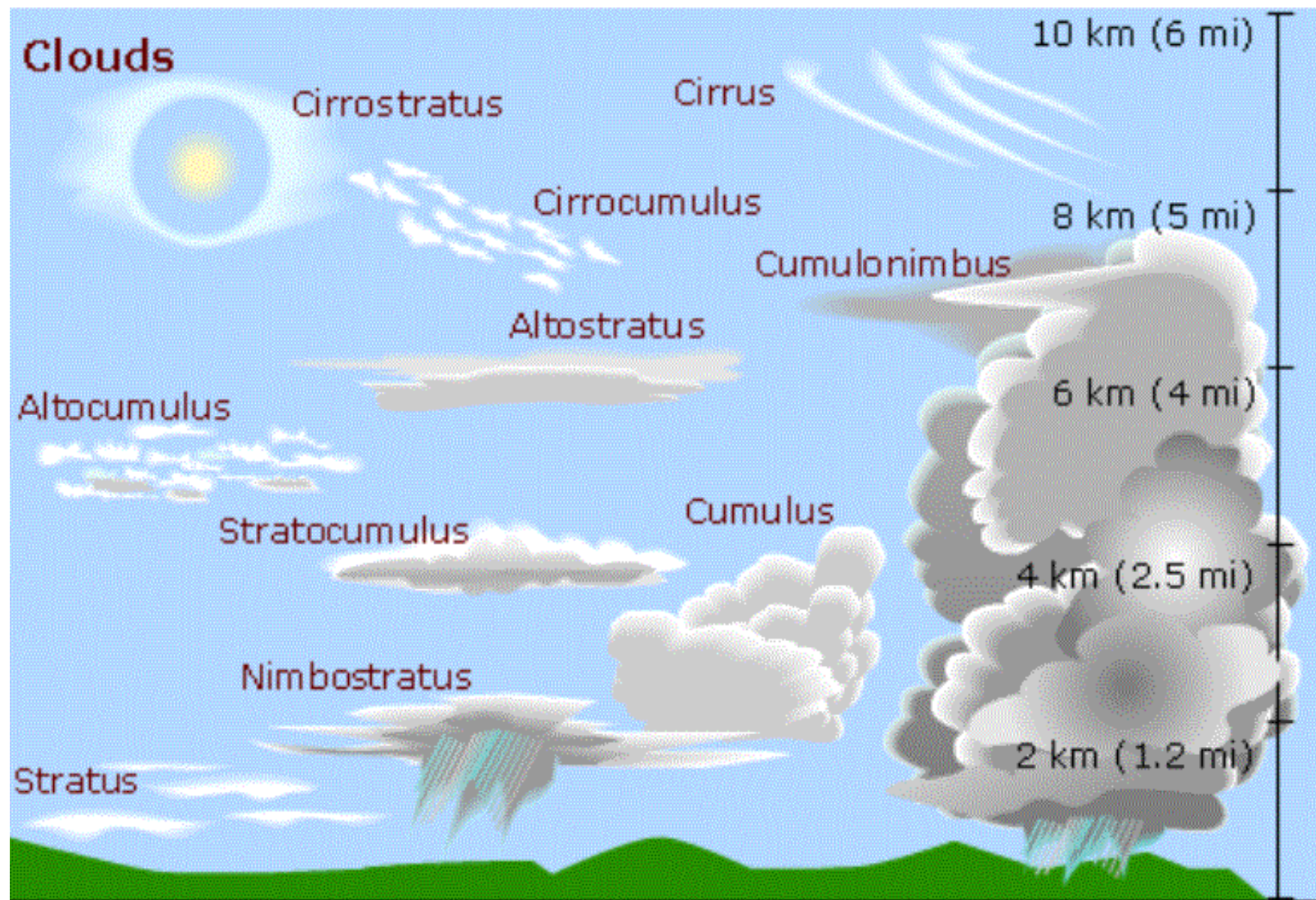
- Visibility





# Cloud

- Visible mass of liquid droplets or frozen crystals made of water or various chemicals suspended in the atmosphere.





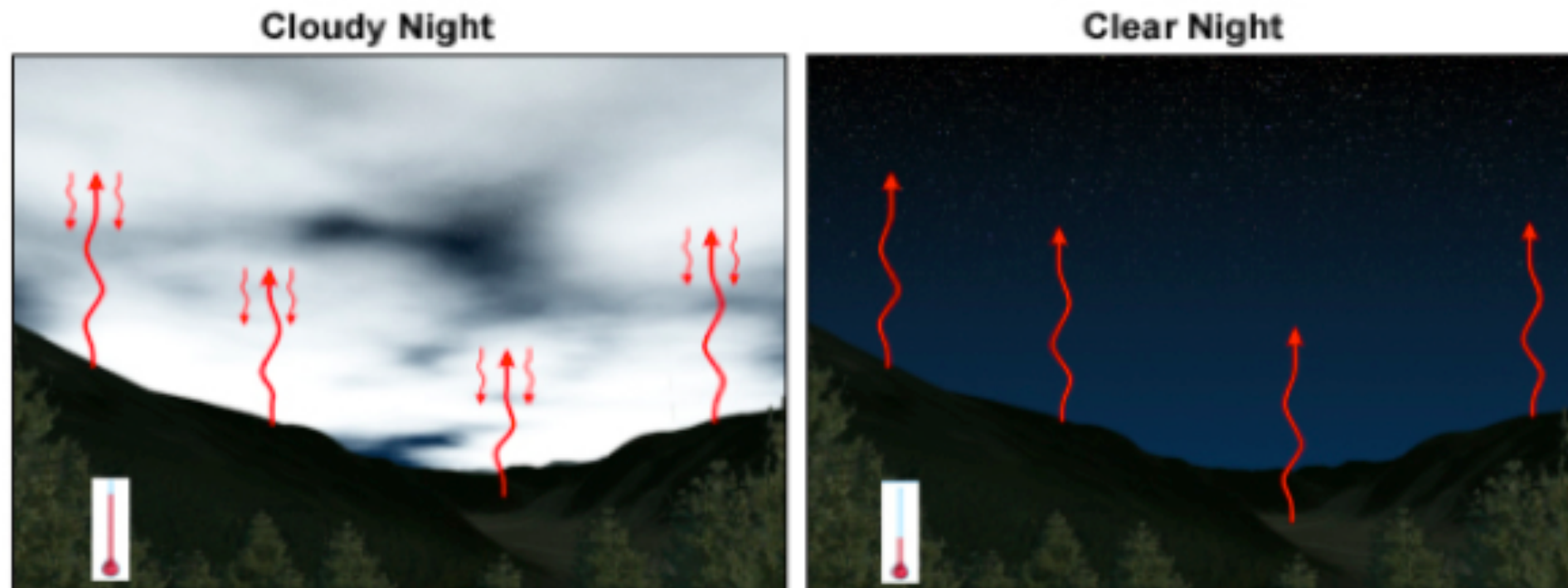
Cloud Type	Associated Weather
<b>Cirrus (Ci)</b>	Nil.
<b>Altostratus (As)</b>	Light rain which may or may not reach the ground.
<b>Altostratus (Ac)</b>	Nil.
<b>Nimbostratus (Ns)</b>	Heavy continuous rain or snow.
<b>Cumulus (Cu)</b>	Usually nil unless large formations which may be associated with showers of rain or snow.
<b>Cumulonimbus (Cb)</b>	Thunderstorms, lightning, showers of rain, snow or hail.
<b>Stratocumulus (Sc)</b>	May be drizzle; usually associated with reduced visibility.
<b>Stratus (St)</b>	May be drizzle; usually associated with reduced visibility.

Weather associated with cloud types



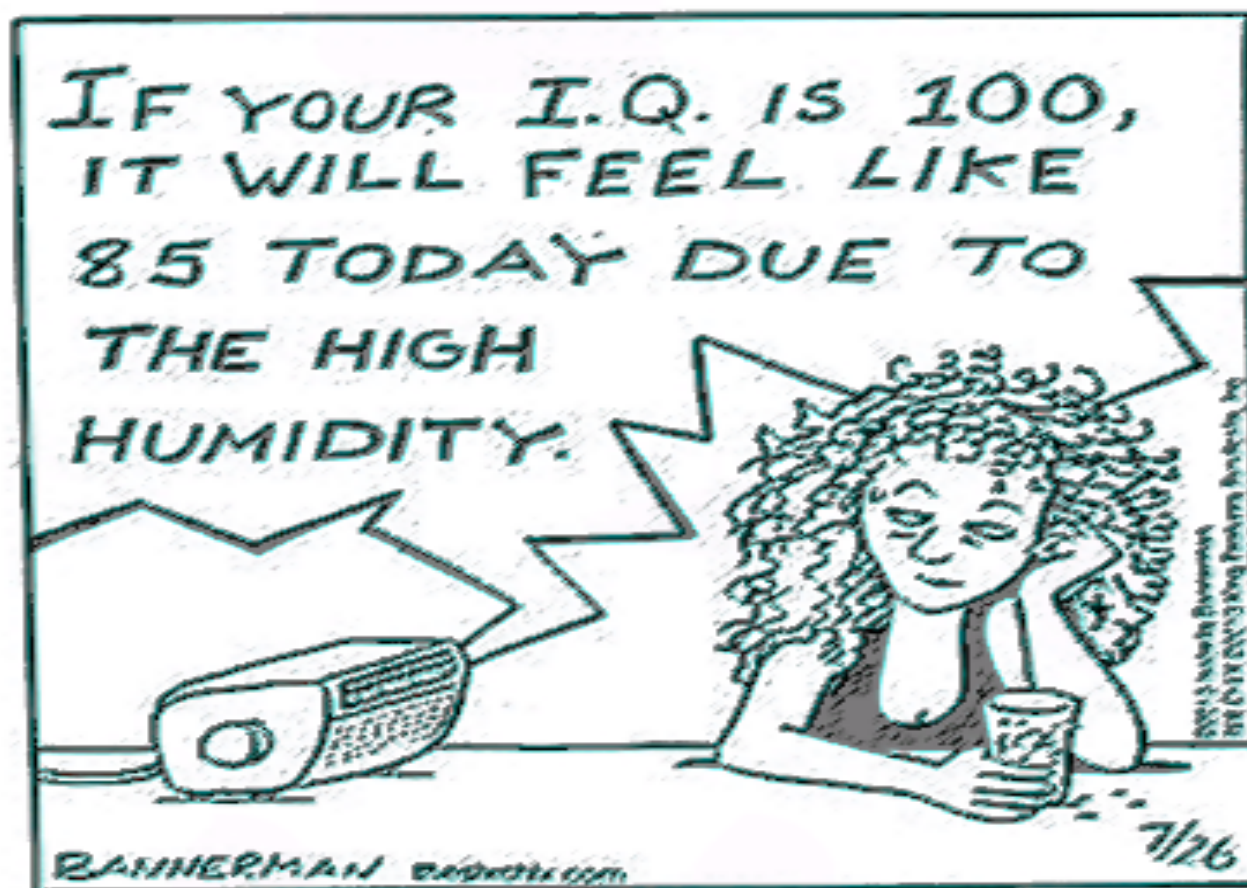
# Cloud Cover

- Cloud cover significantly influence air and surface temperatures.
- During the day, clouds reflect incoming sunlight, preventing a portion of this heat energy from reaching the Earth's surface, thereby reducing the day temperature.
- Cloudy nights are generally warmer than clear nights because cloud cover reduces the loss of terrestrial radiation to space.



# Humidity

- Amount of water vapor in the air.
- Indicates the likelihood of precipitation, dew, or fog.
- Higher humidity reduces the effectiveness of sweating in cooling the body by reducing the rate of evaporation of moisture from the skin.





# Temperature

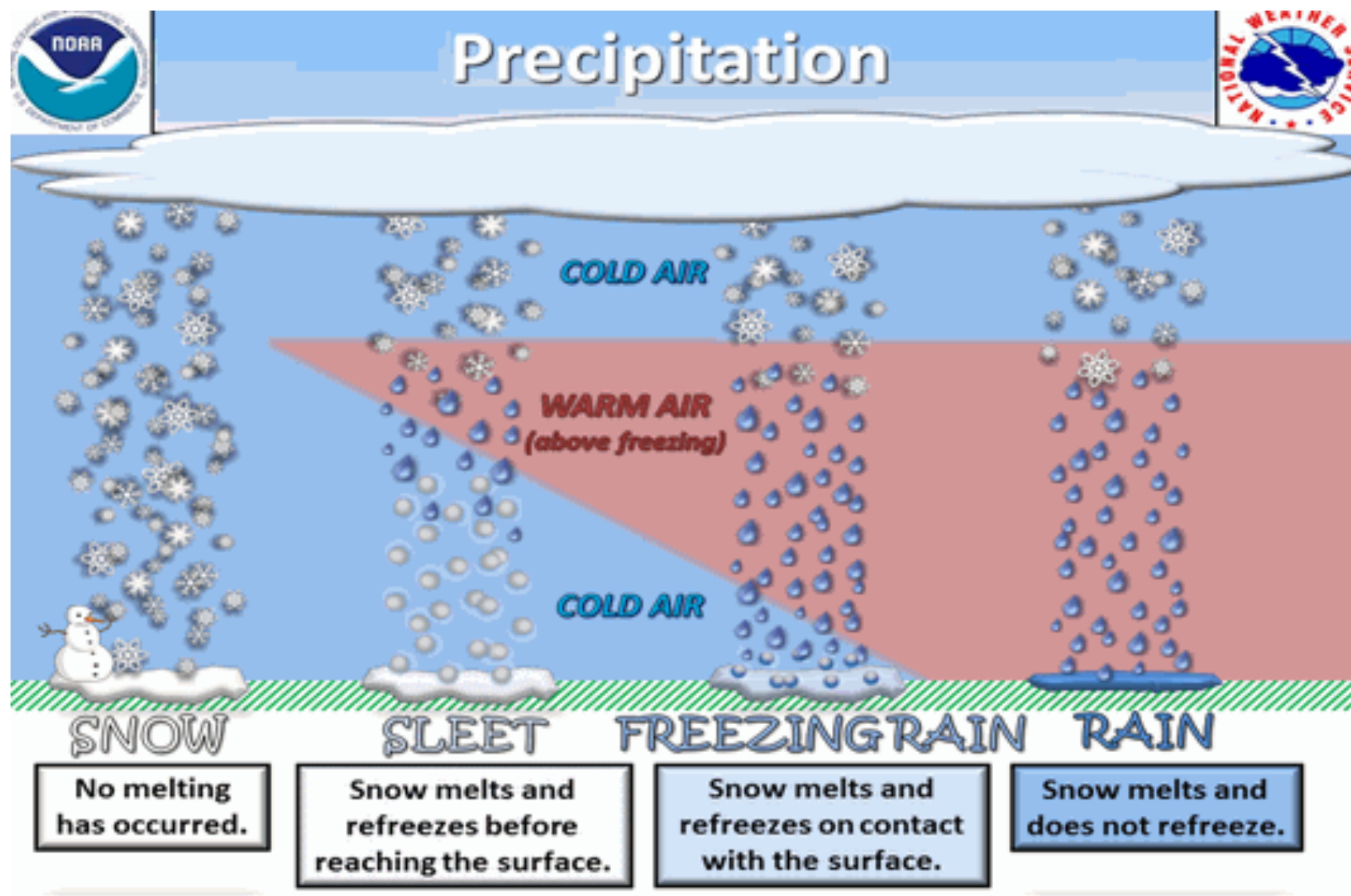
- degree of hotness or coldness of a body or environment.
- measure of the average kinetic energy or speed of the molecules of matter.
- expressed in degrees of ( $^{\circ}\text{C}$ ) or ( $^{\circ}\text{F}$ ).

$^{\circ}\text{C}$	$^{\circ}\text{F}$	Human
-20	-4	Extreme Cold
-10	14	Very Cold
0	32	Cold
10	50	Cool
20	68	Brisk
30	86	Warm
35	95	Hot
40	104	Very Hot
50	122	Exteme Heat

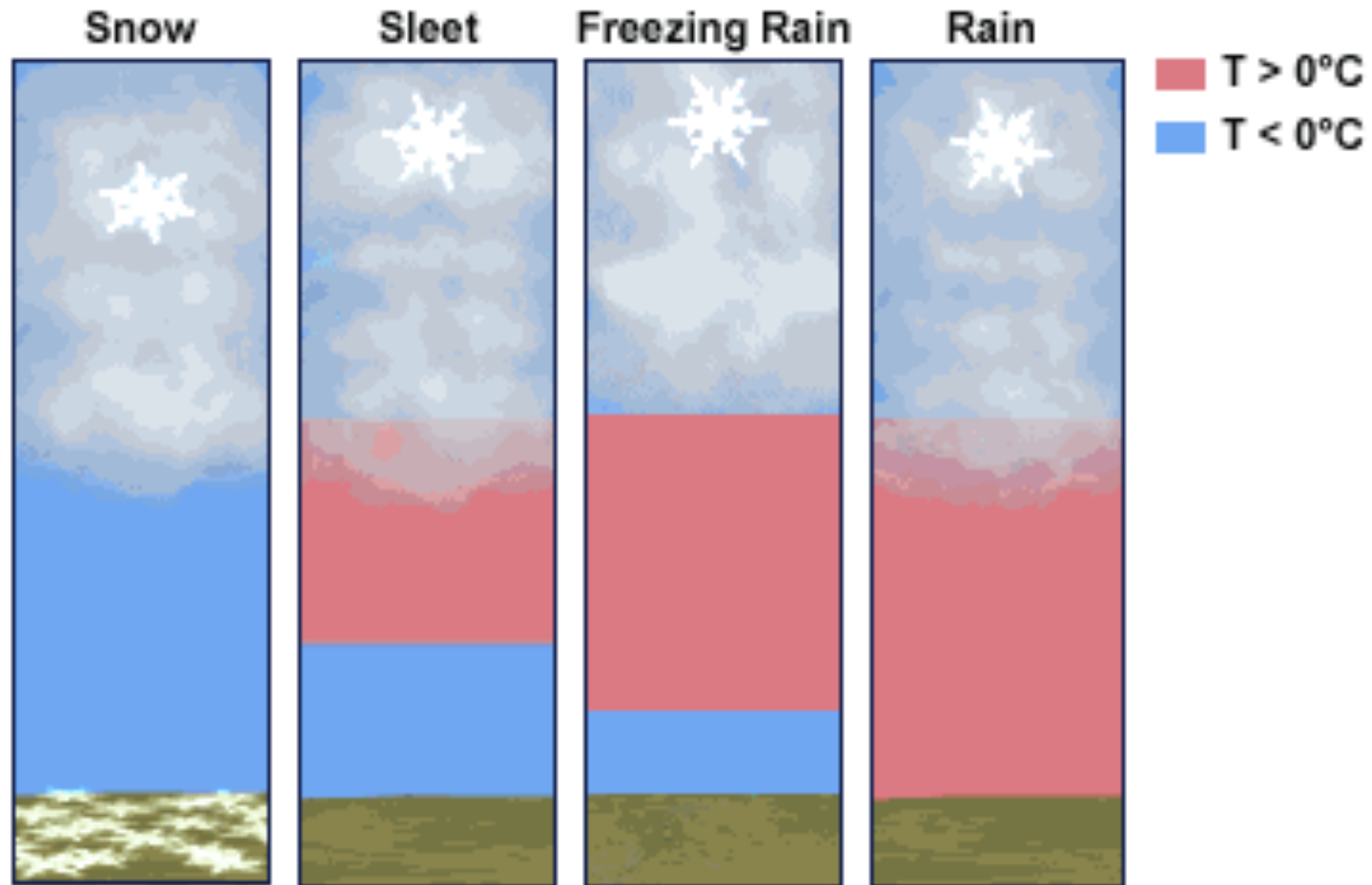


# Precipitation

- Any product of condensation of atmospheric water vapour that falls to the Earth's surface.



# Common types of precipitation:



The COMET Program





# Hail:



# Visibility

- Measure of the distance at which an object or light can be clearly discerned.



# Weather Disturbances

## Rain-Producing Weather Systems (Philippines)

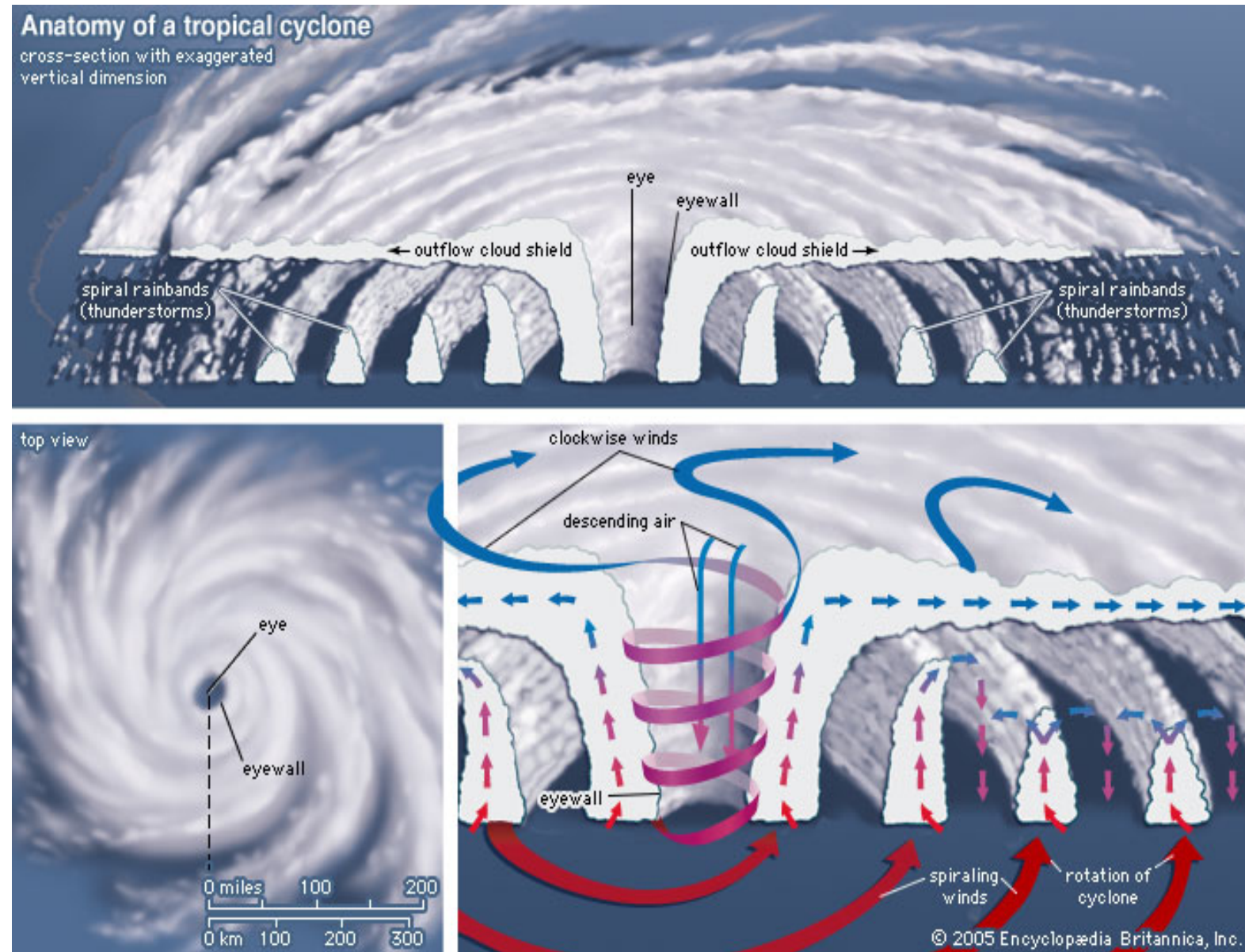




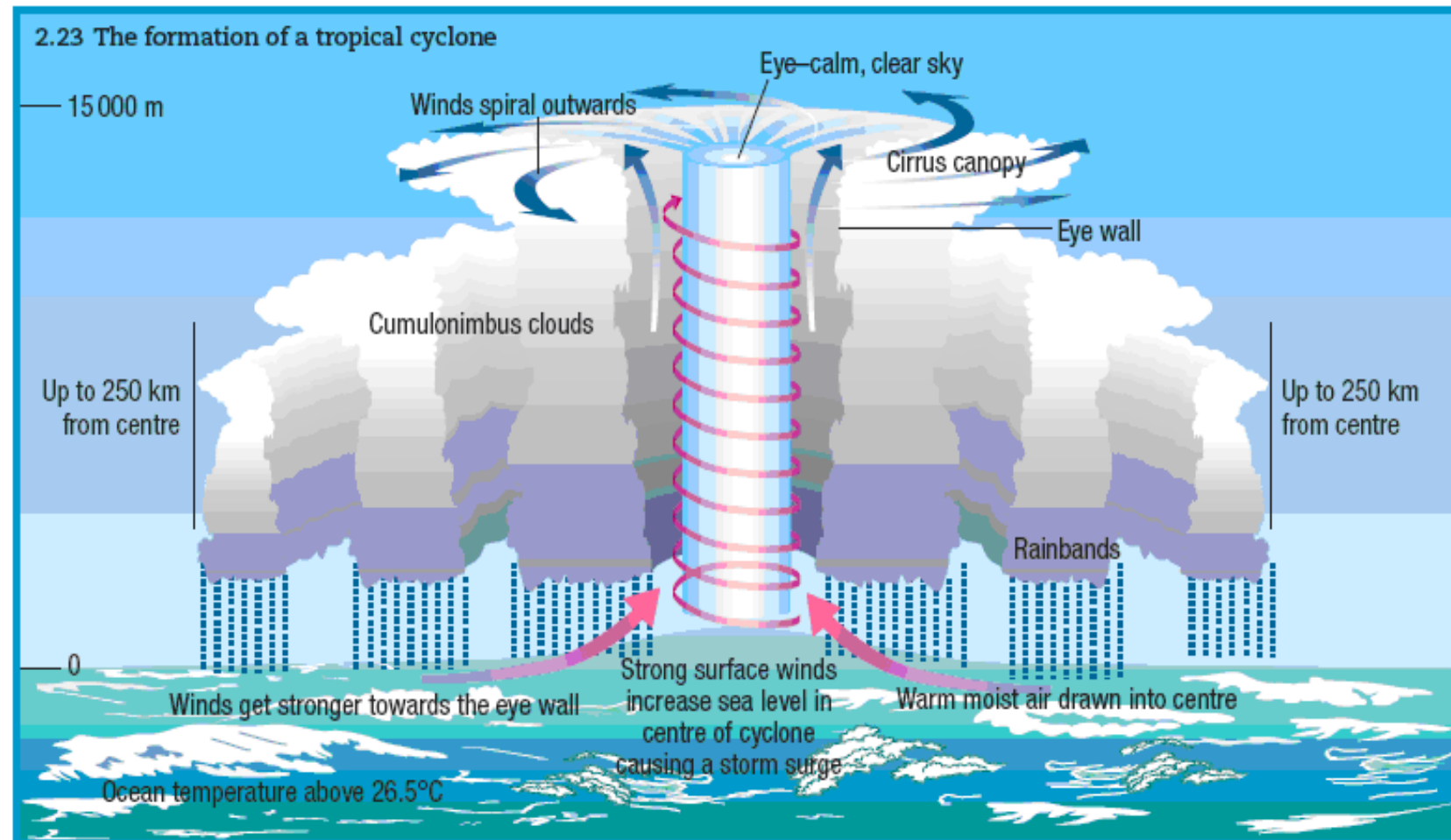
# Tropical Cyclone (Bagyo)

Rapidly-rotating storm system characterized by:

- Low-pressure center
- Strong winds
- Spiral arrangement of thunderstorms that produce heavy rain.



- Forms over large bodies of relatively warm water.
- Derives energy from the evaporation of water from the ocean surface, which ultimately recondenses into clouds when moist air rises and cools to saturation.



# Tropical Cyclone Classifications:

- **Tropical Depression (TD)** – maximum sustained winds of 45 to 61 kph
- **Tropical Storm (TS)** – maximum sustained winds of 62 to 117 kph
- **Typhoon (TY)** – maximum sustained winds of 118 kph to 219 kph
- **Super Typhoon (STY)** – maximum sustained winds of 220 kph or more



# Summary of Tropical Cyclone Classification

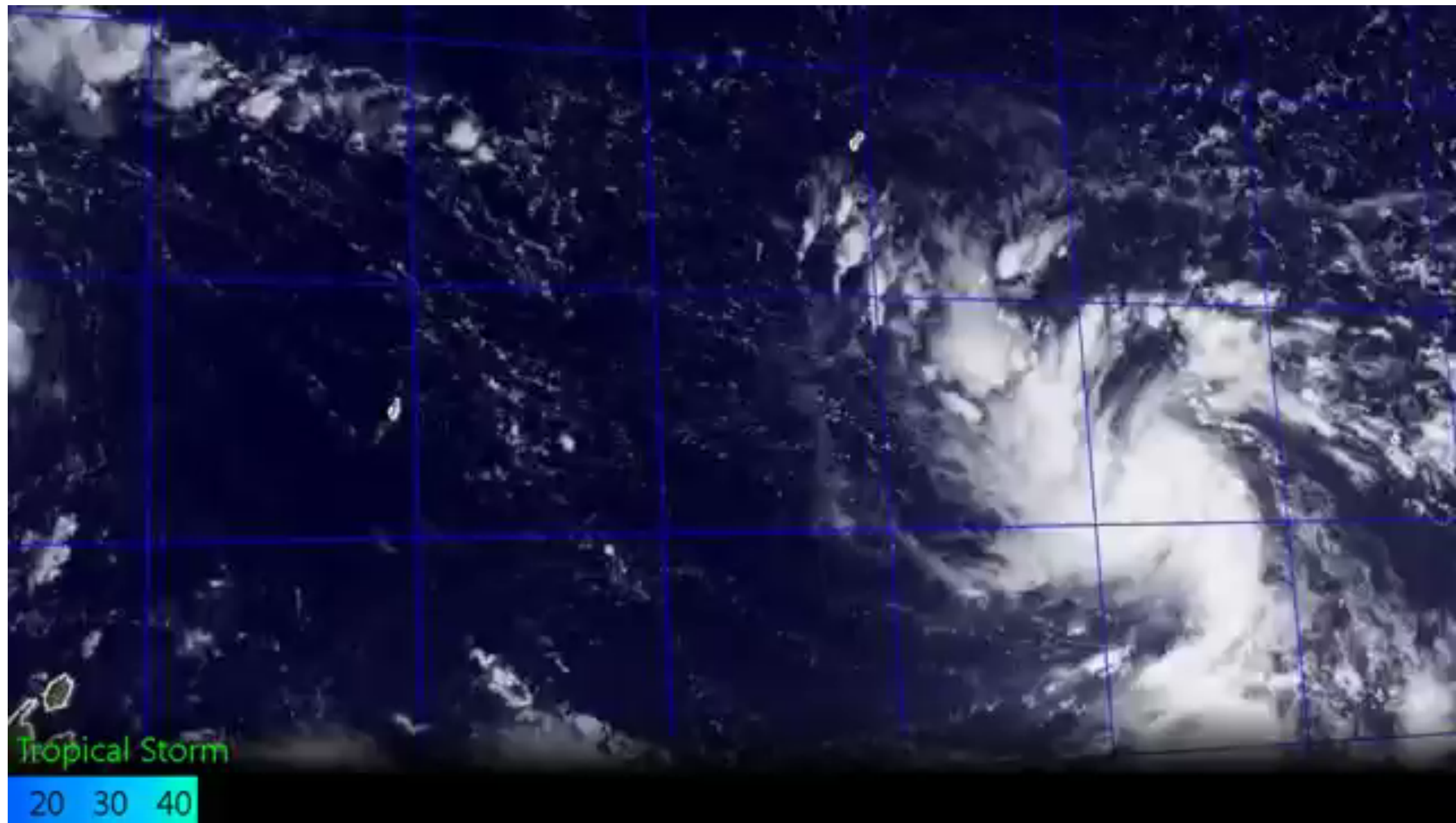


# The full life of Super Typhoon “Haiyan” (Yolanda):

November 3 - 11, 2013

Maximum Sustained Winds / Gusts: 315 kph / 380 kph

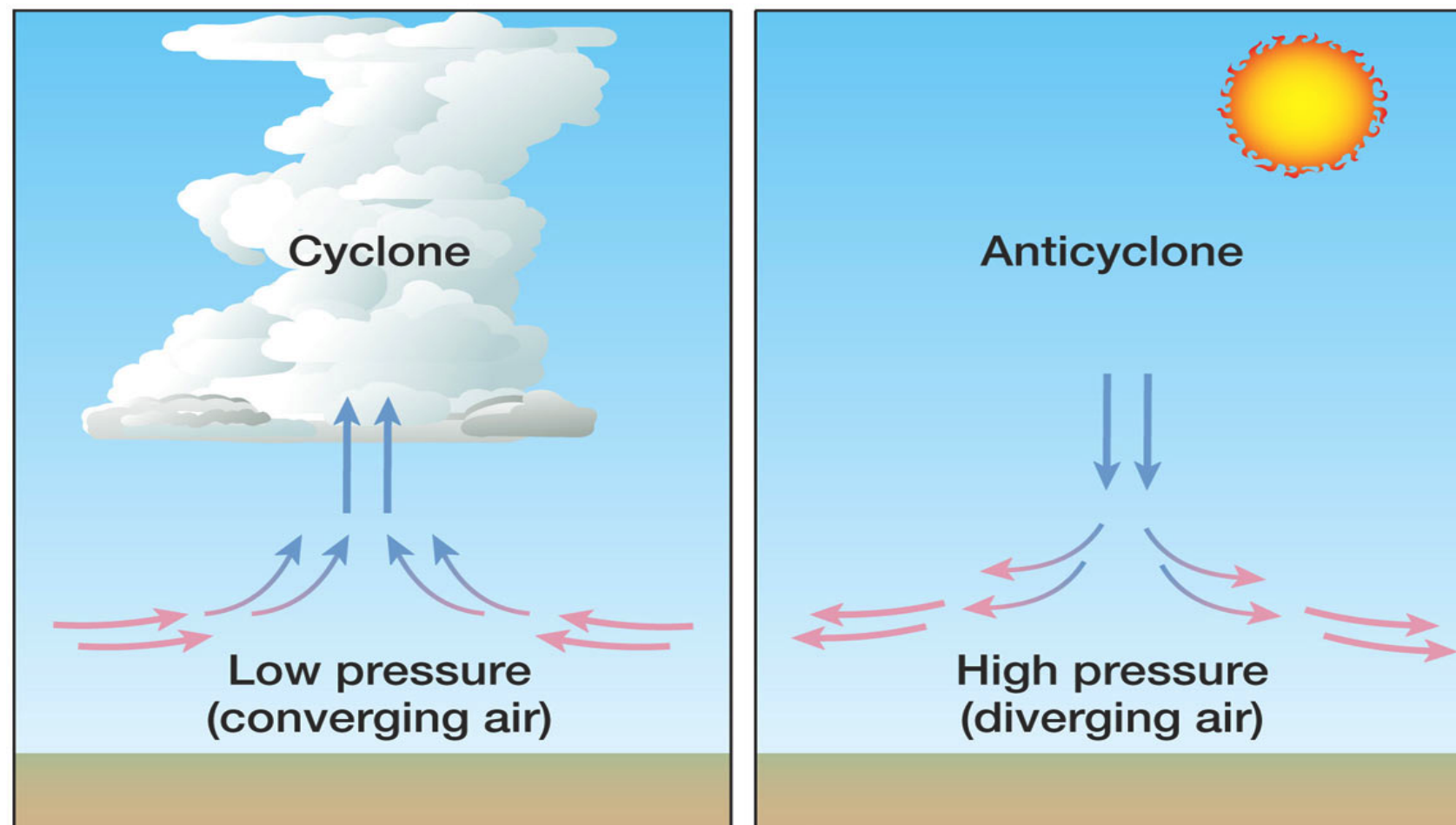
Average Speed: 34 kph (West to West-Northwest)





# Low Pressure Area (LPA)

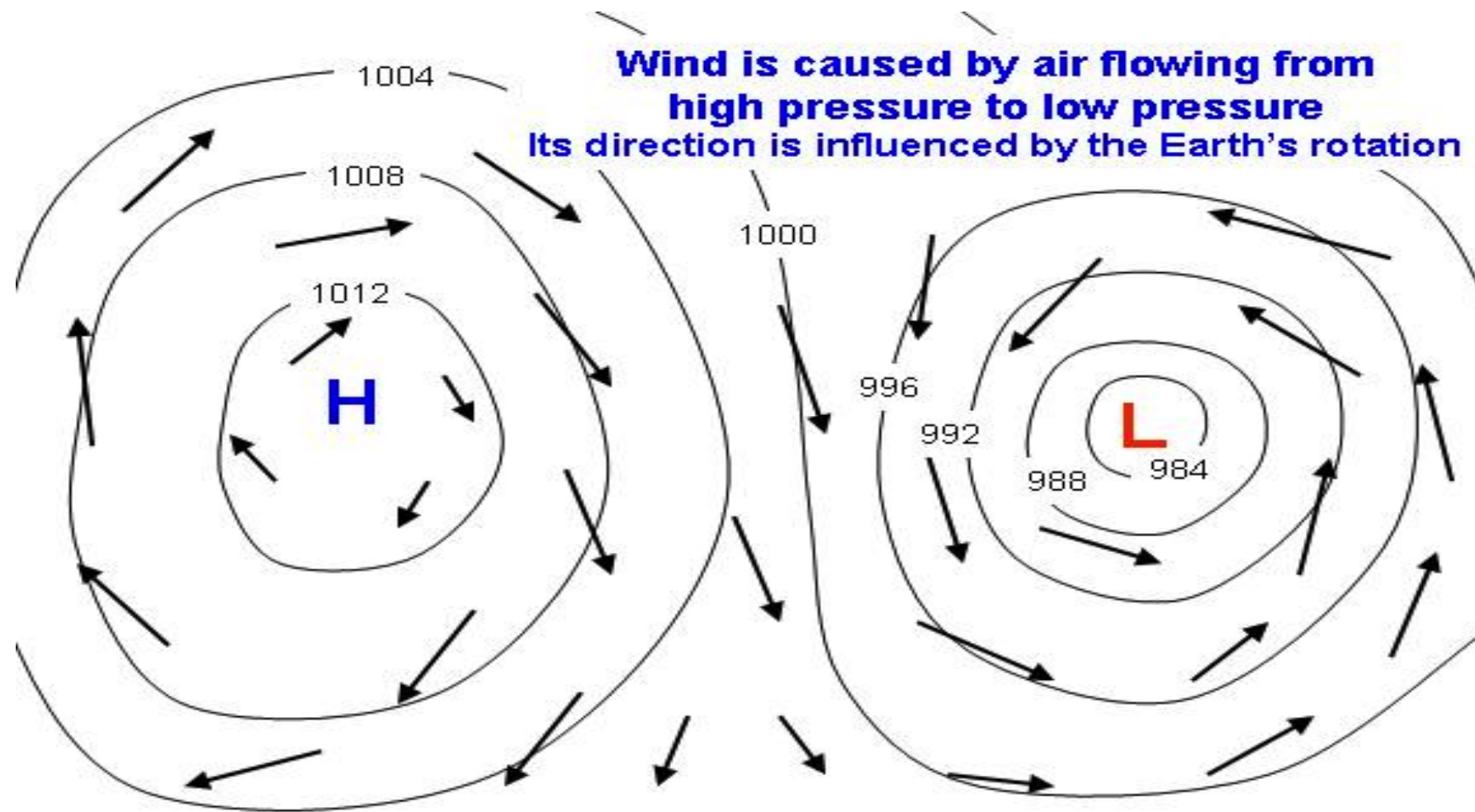
Characterized by clouds of precipitation caused by rising air.



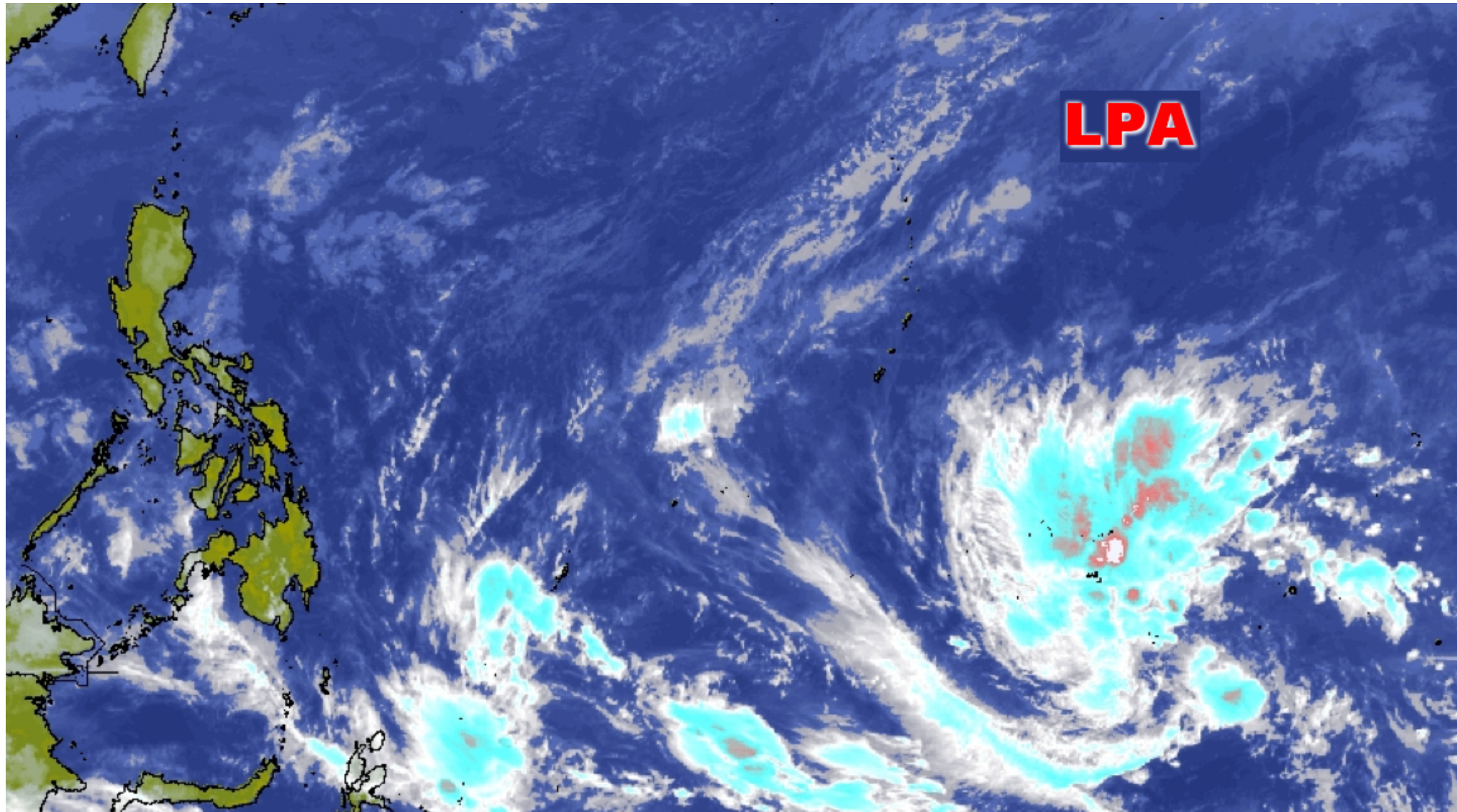
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Often related to inclement weather such as winds flowing counter clockwise and into the center of the low pressure.



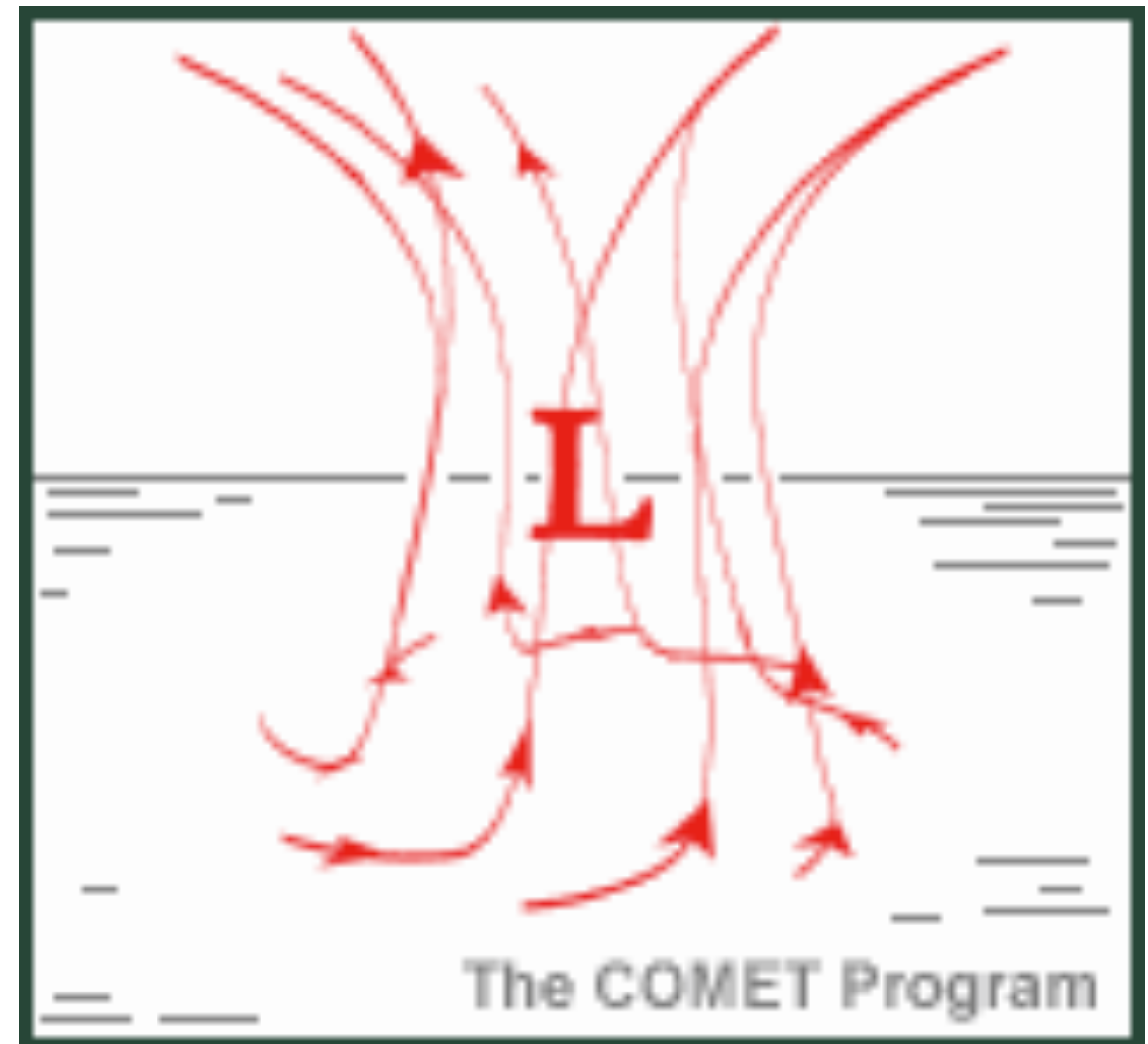
# Satellite Image of a Low Pressure Area:





## Around a Low Pressure System:

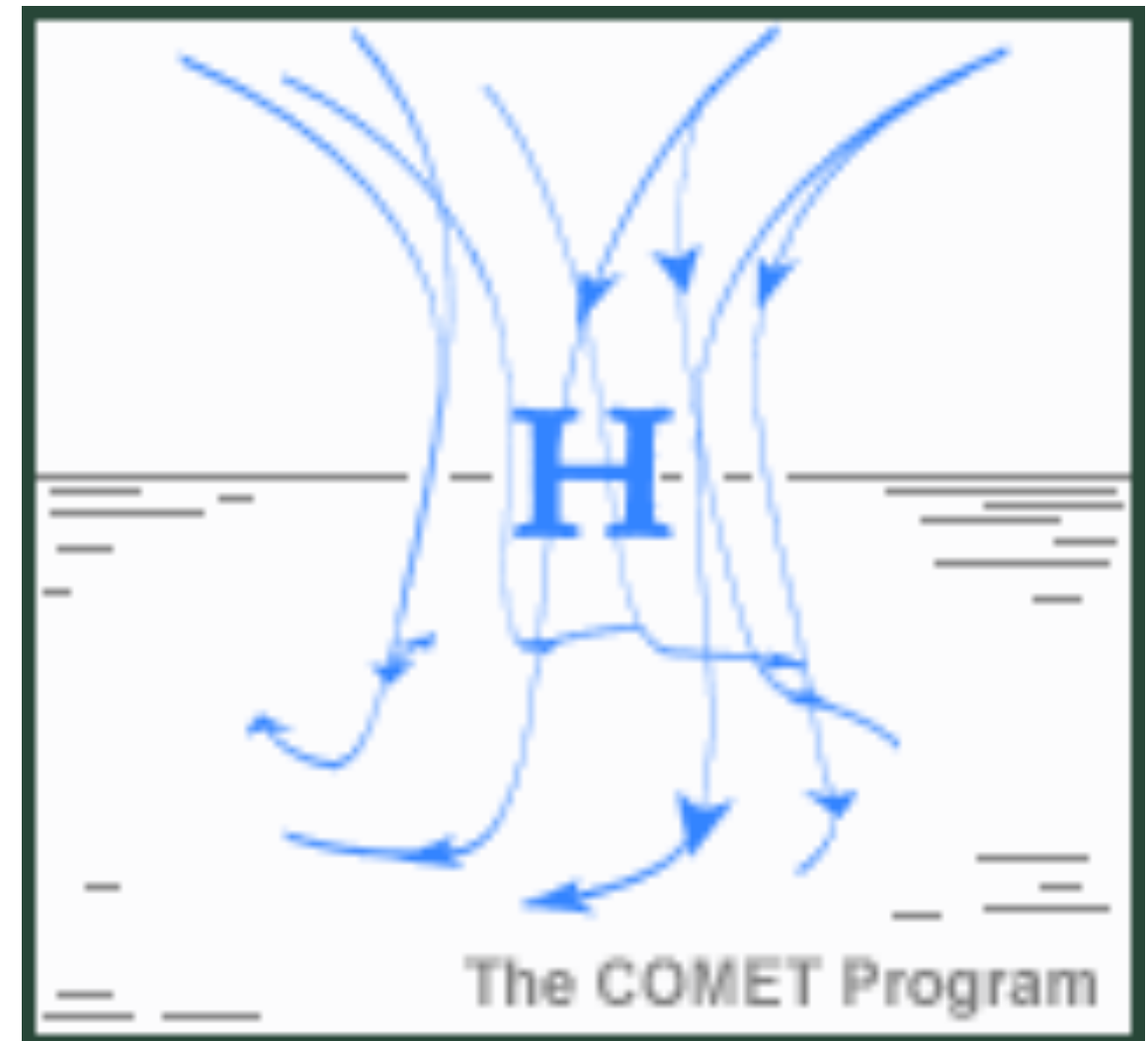
- the air gets warm
- becomes lighter
- rises
- cools to saturation point
- the water vapor within it condenses to form clouds
- air diverges aloft
- winds converge as it blow towards the low pressure
- flow counter-clockwise



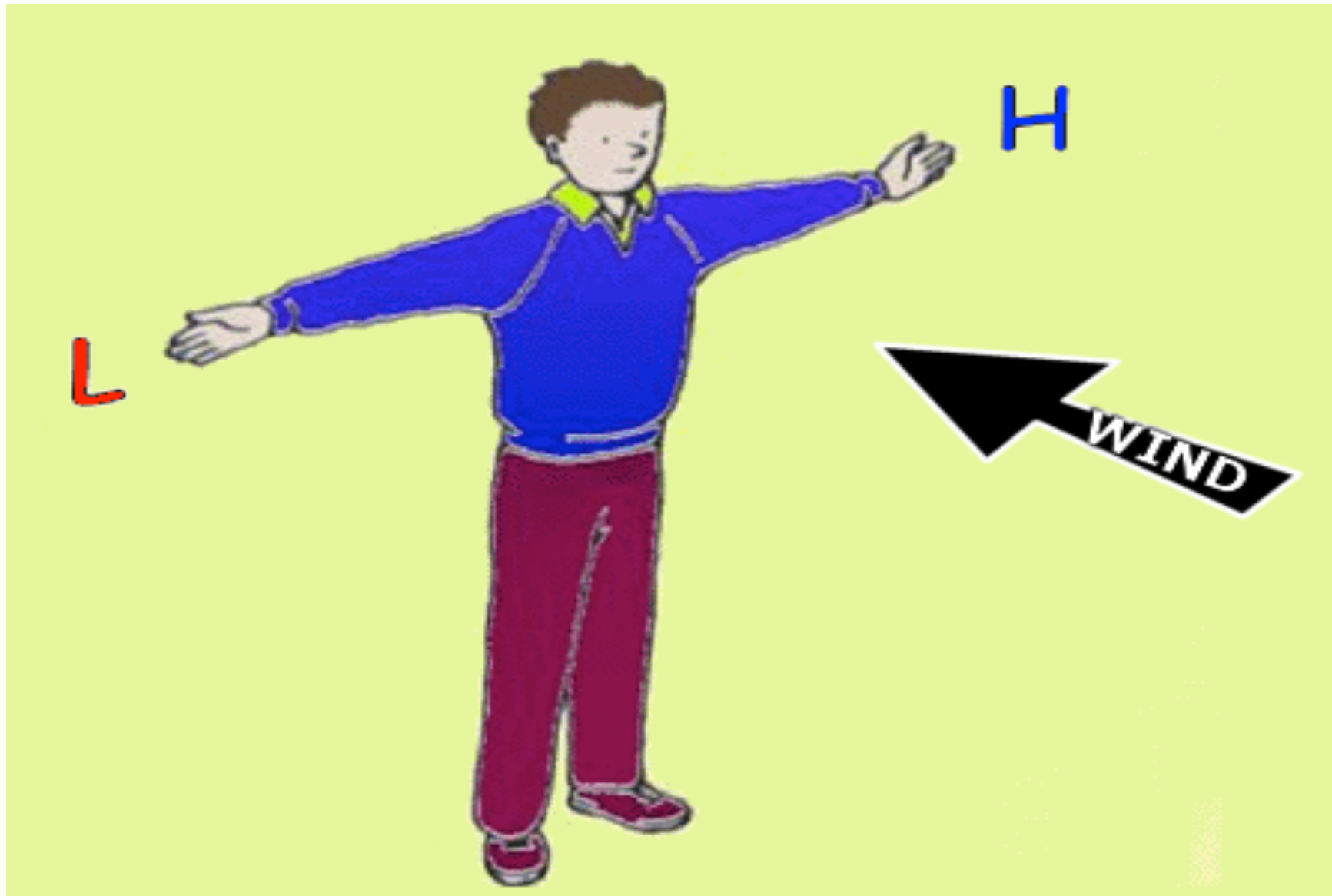


## Around a High Pressure System:

- cold air from above sinks down because it's heavier
- wind blows away from high pressure
- swirling clockwise



# Buys Ballot's Law:



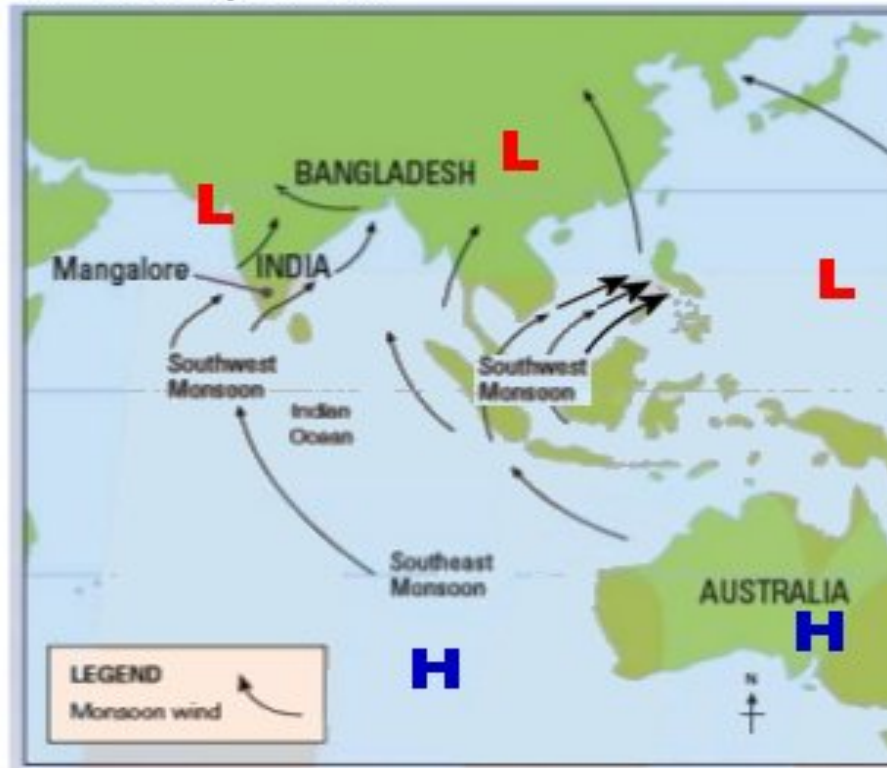
With one facing the wind, a low pressure center (L) will be to one's right; and a high pressure center (H) to one's left (in the Northern Hemisphere).



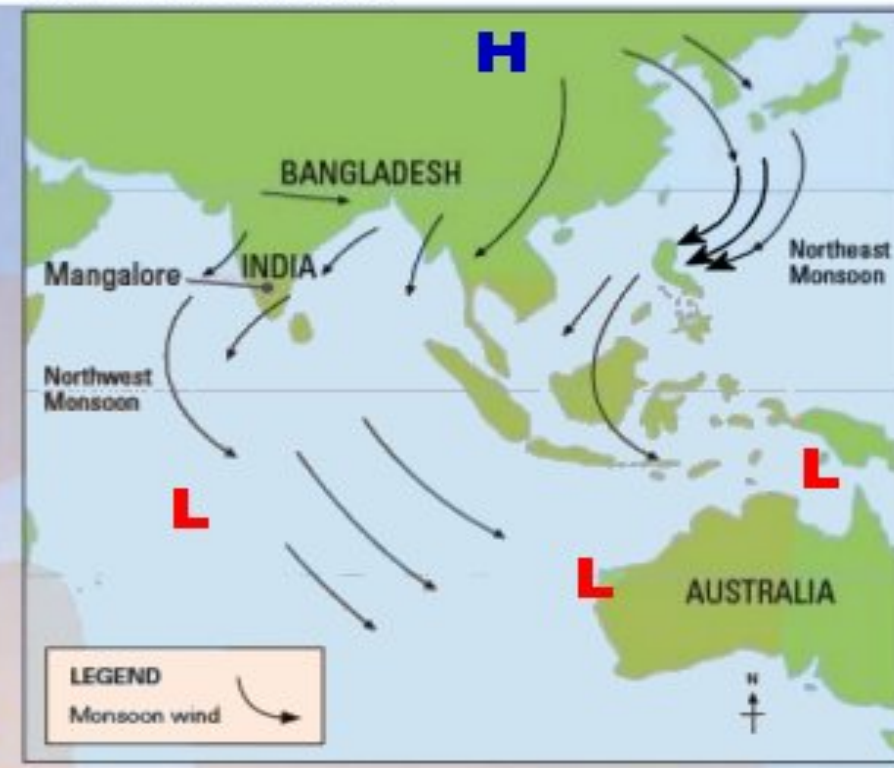
# Monsoons

- Major wind systems that seasonally reverse its direction.
- Caused by difference between annual temperature trends over land and sea.
- Blow from cold toward warm regions: from sea toward land (southwest) during summer in Northern Hemisphere and from land toward sea (northeast) during winter in Northern Hemisphere.

**SOUTHWEST MONSOON (HABAGAT)**  
June to September



**NORTHEAST MONSOON (AMIHAN)**  
November to March

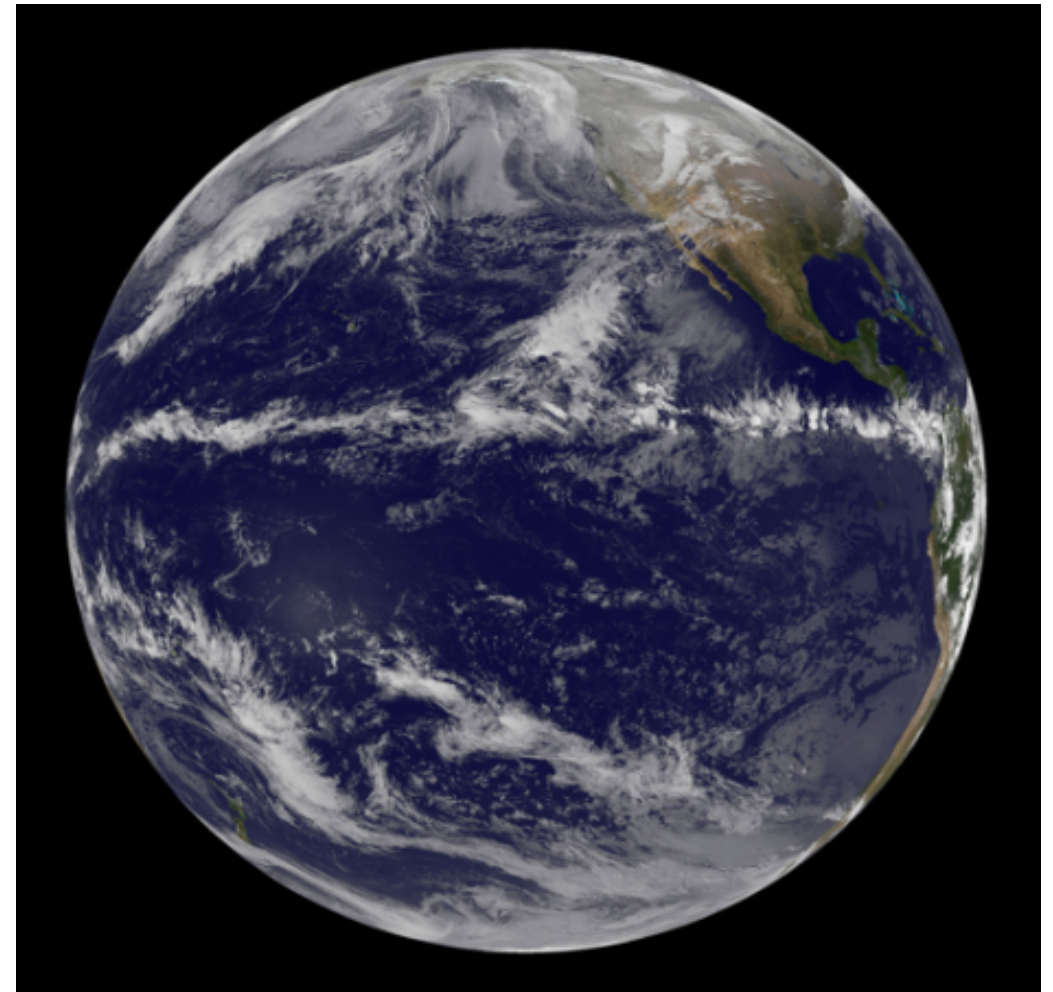




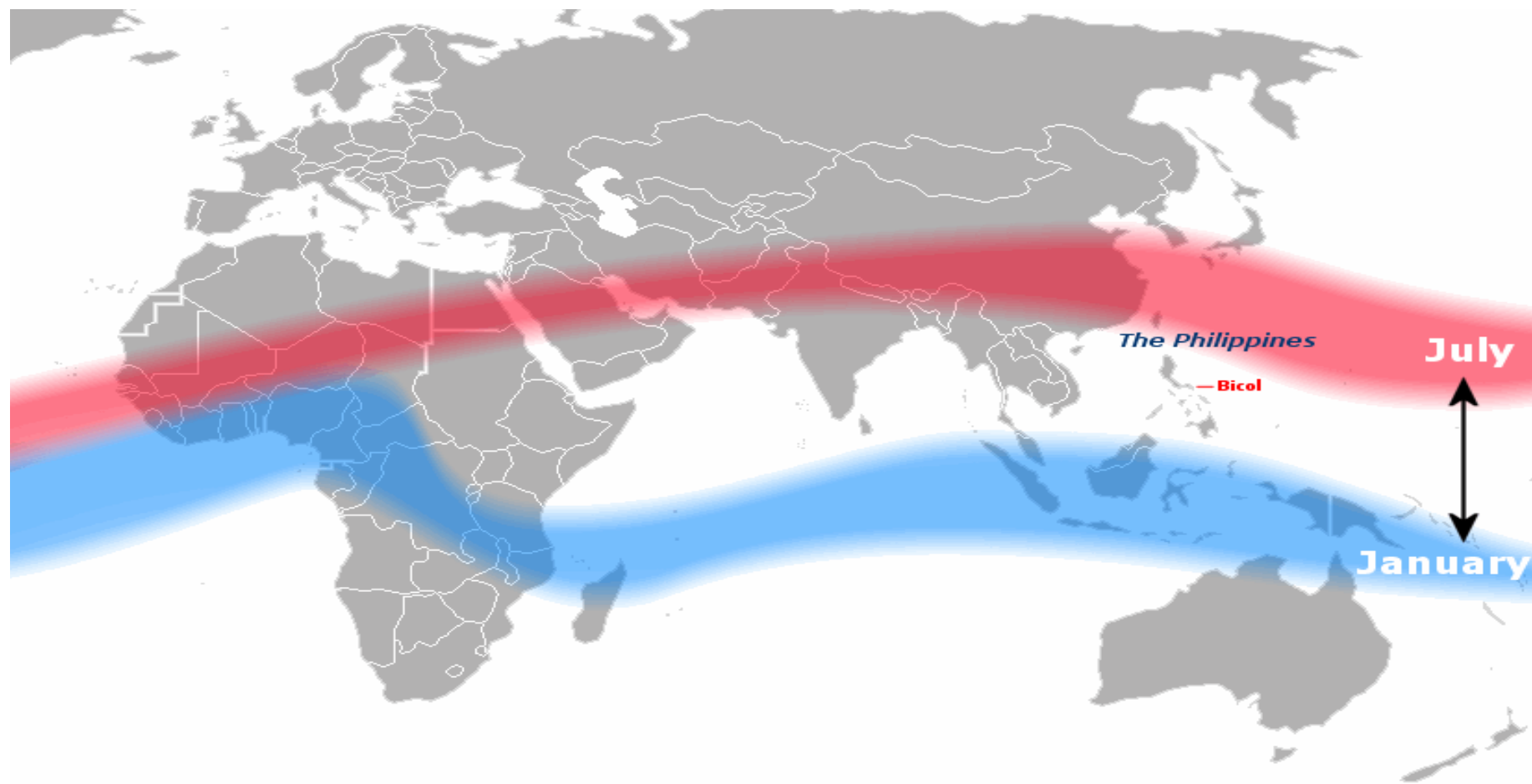
	<b>Southwest Monsoon</b>	<b>Northeast Monsoon</b>
Months	June – September	November - March
Winds	Warm and moist	Cold and relatively dry
Origin	South Indian Ocean / Australian Continent	Mainland China/ Siberia
Direction	From Southwest	From Northeast
Rains	Moderate to heavy rains along western sections; Can cause torrential rains if enhanced by tropical cyclone or low pressure system	Slight to moderate to sometimes heavy rains along eastern sections

# Intertropical Convergence Zone (ITCZ)

- Area encircling the earth near the equator where the Northeast (NE) and Southeast (SE) trade winds come together.
- Appears as a band of clouds, usually thunderstorms, that circle globe near the equator.
- Responsible for the wet and dry seasons in the tropics.
- Follows the sun in that the position varies seasonally.
- Moves north in the northern summer and south in the northern winter.



- Active during the month of May through October.
- Active over NCR during May-June & Sep-Oct.
- Mostly cloudy skies with strong thunderstorms & lightning.
- More frequent during the afternoon or early evening.

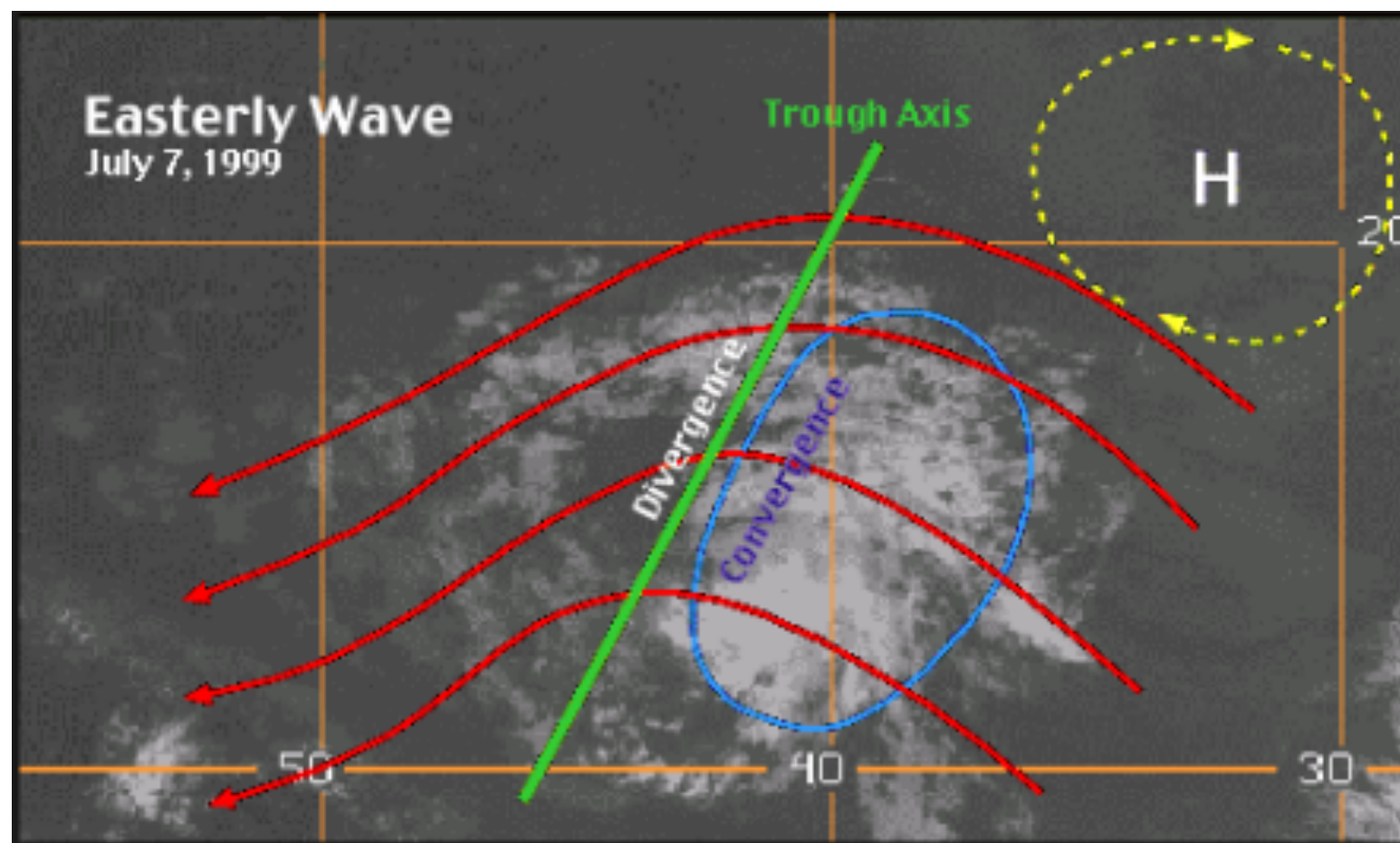


**Max Location of ITCZ**



# Easterly (Tropical) Wave

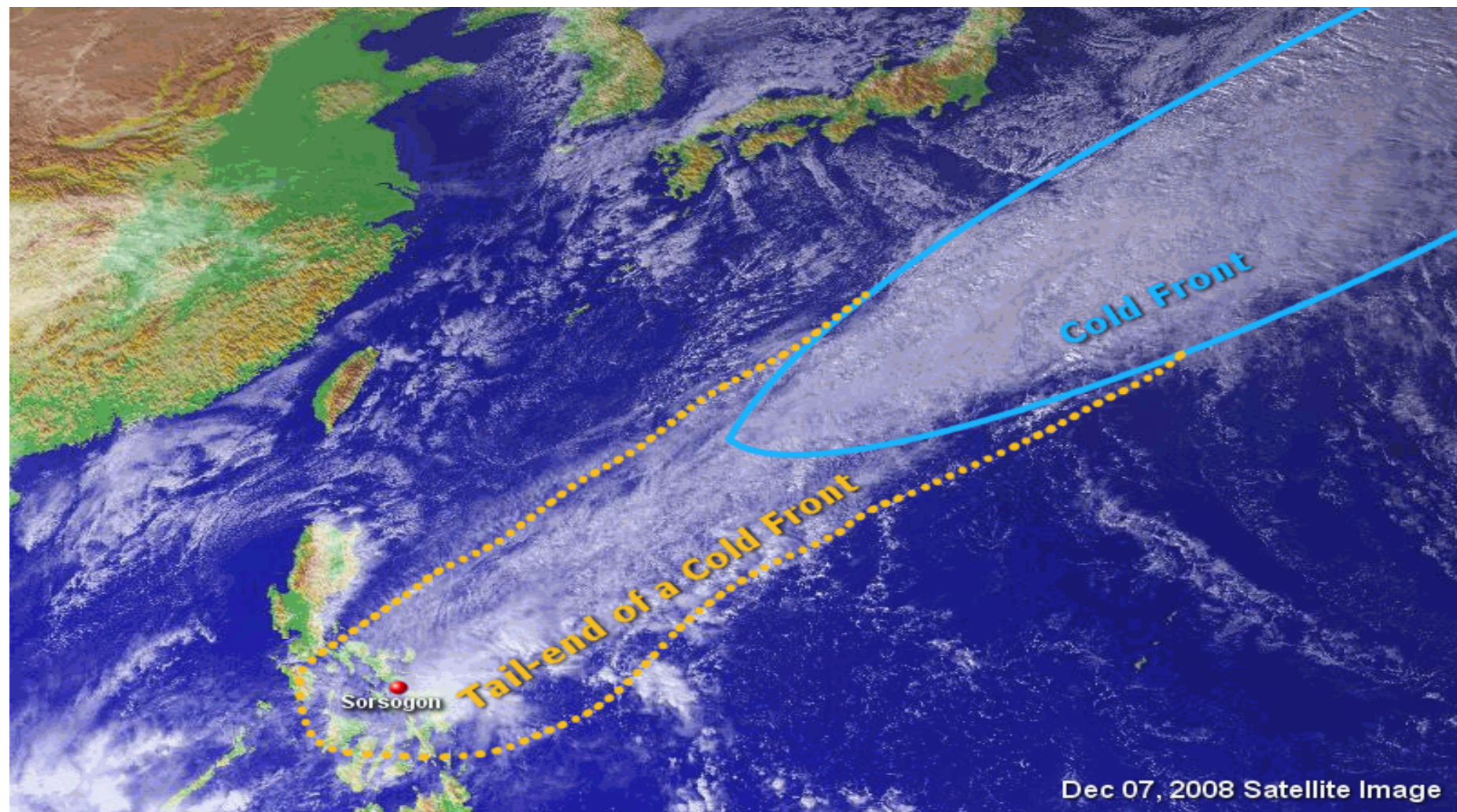
- an elongated area of relatively low air pressure
- oriented north to south
- moves from east to west across the tropics
- causing areas of cloudiness and thunderstorms.





# Tail-end of Cold Front

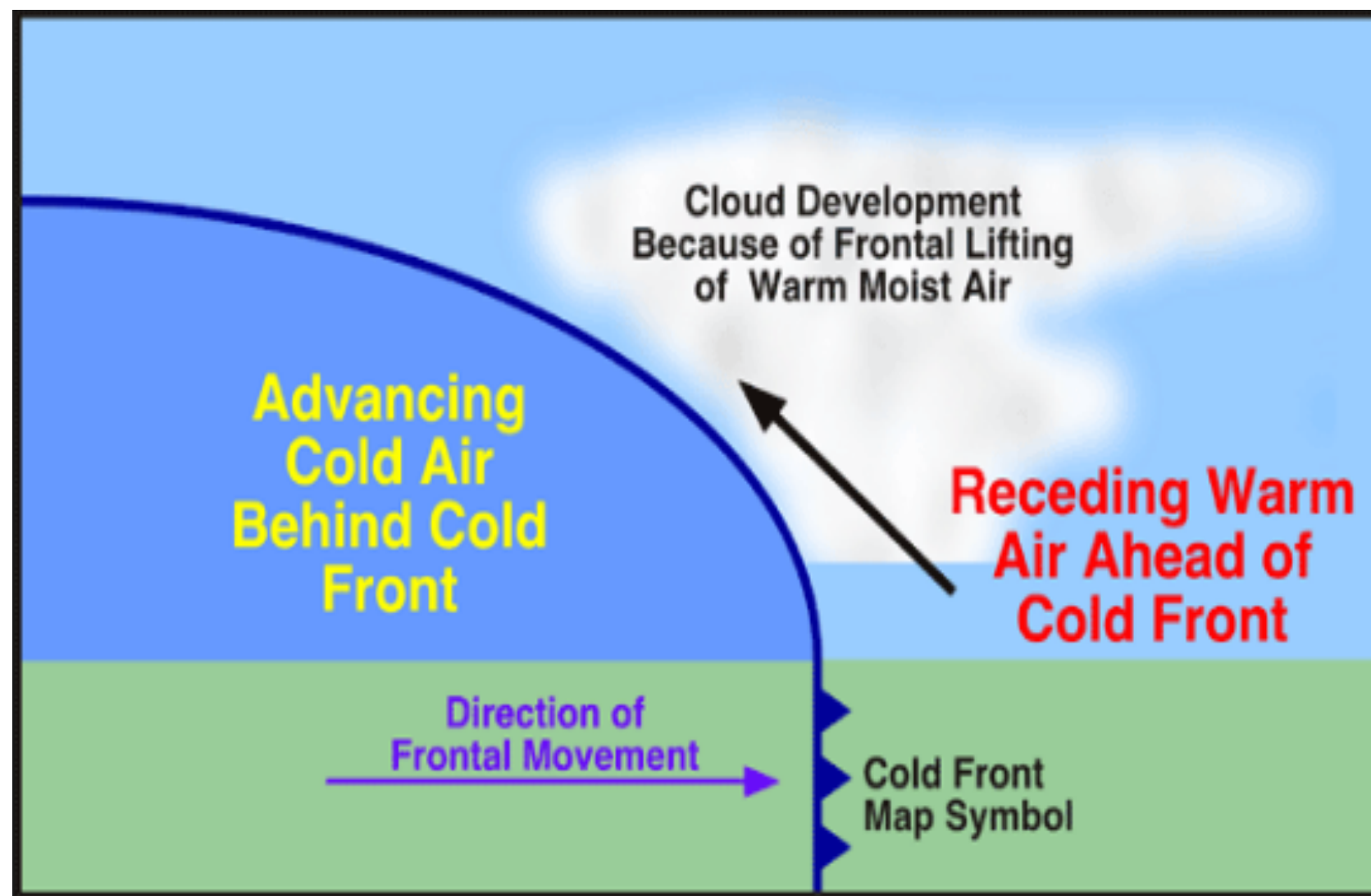
- The southern extent of a passing Cold Front over Taiwan or Japan.
- Producing cool Northeasterly winds with precipitation across Eastern Philippines.
- Occurs normally between November and April.





## Cold Front:

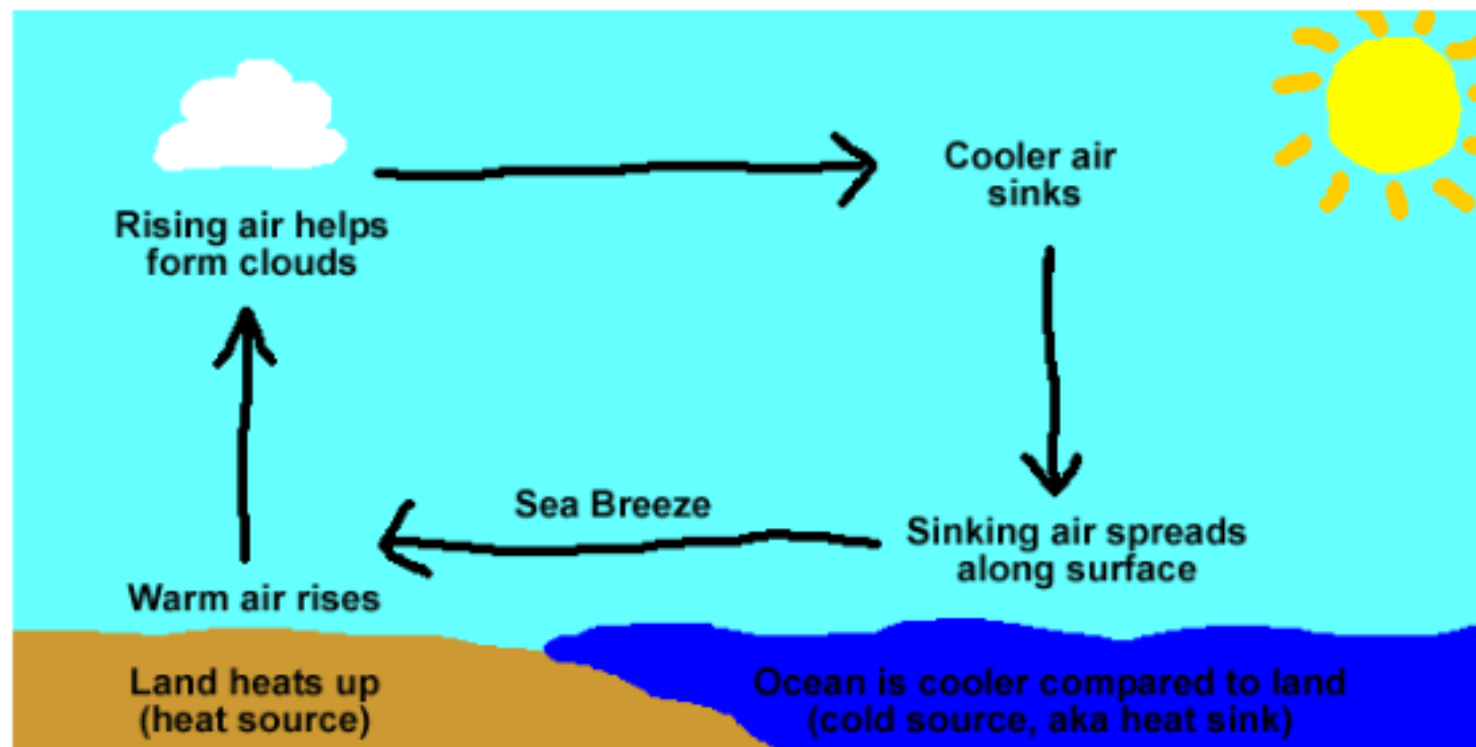
- the transition zone where a cold air mass is replacing a warmer air mass.
- normally occurs at temperate and subtropical areas.
- it's tail-end occasionally extends along the eastern sections of the country.





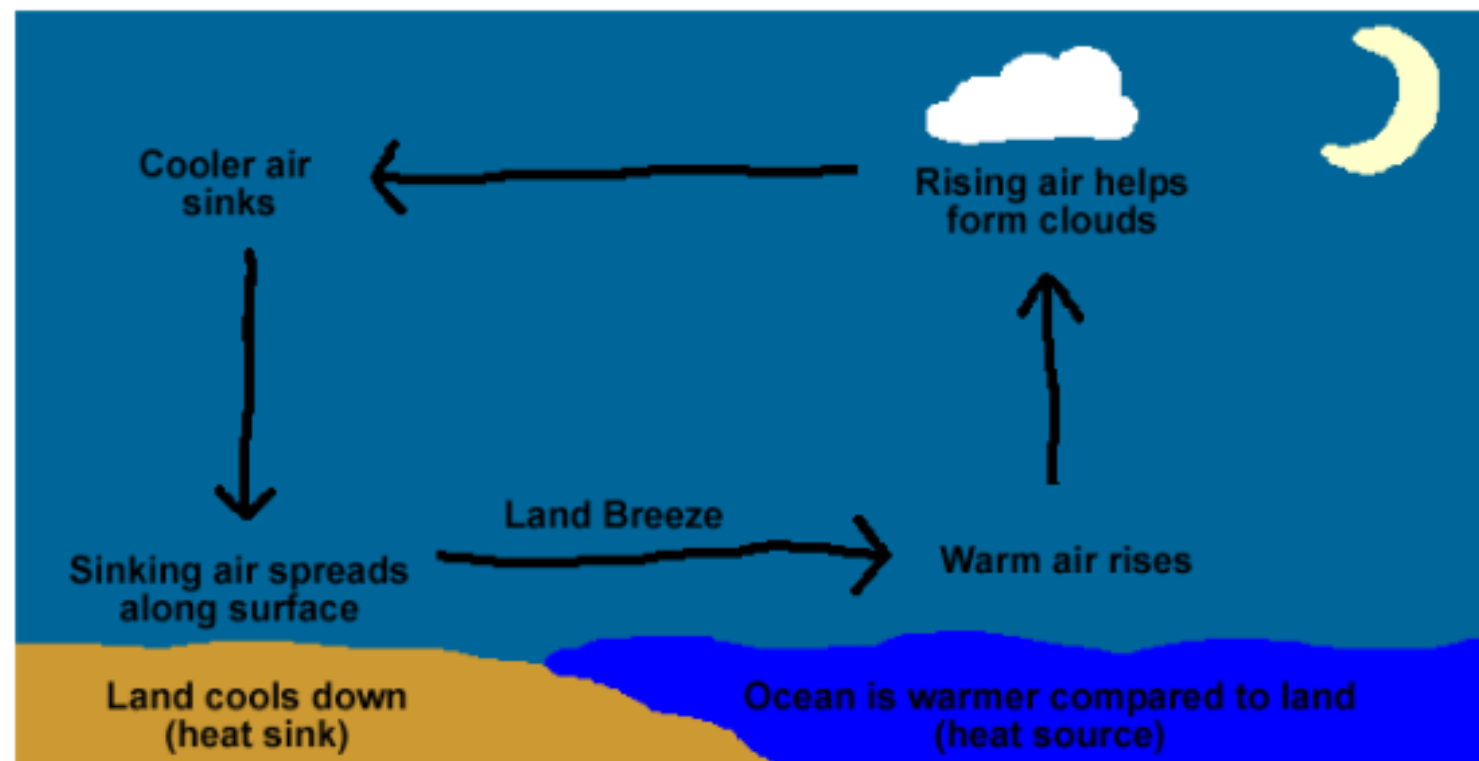
## Sea-breeze (onshore breeze)

- Wind from the sea that develops over land near the coasts during daytime.
- Formed by increasing temperature differences between land and water.
- Forces cooler air from a high pressure area over the sea to move to a low pressure area inland.

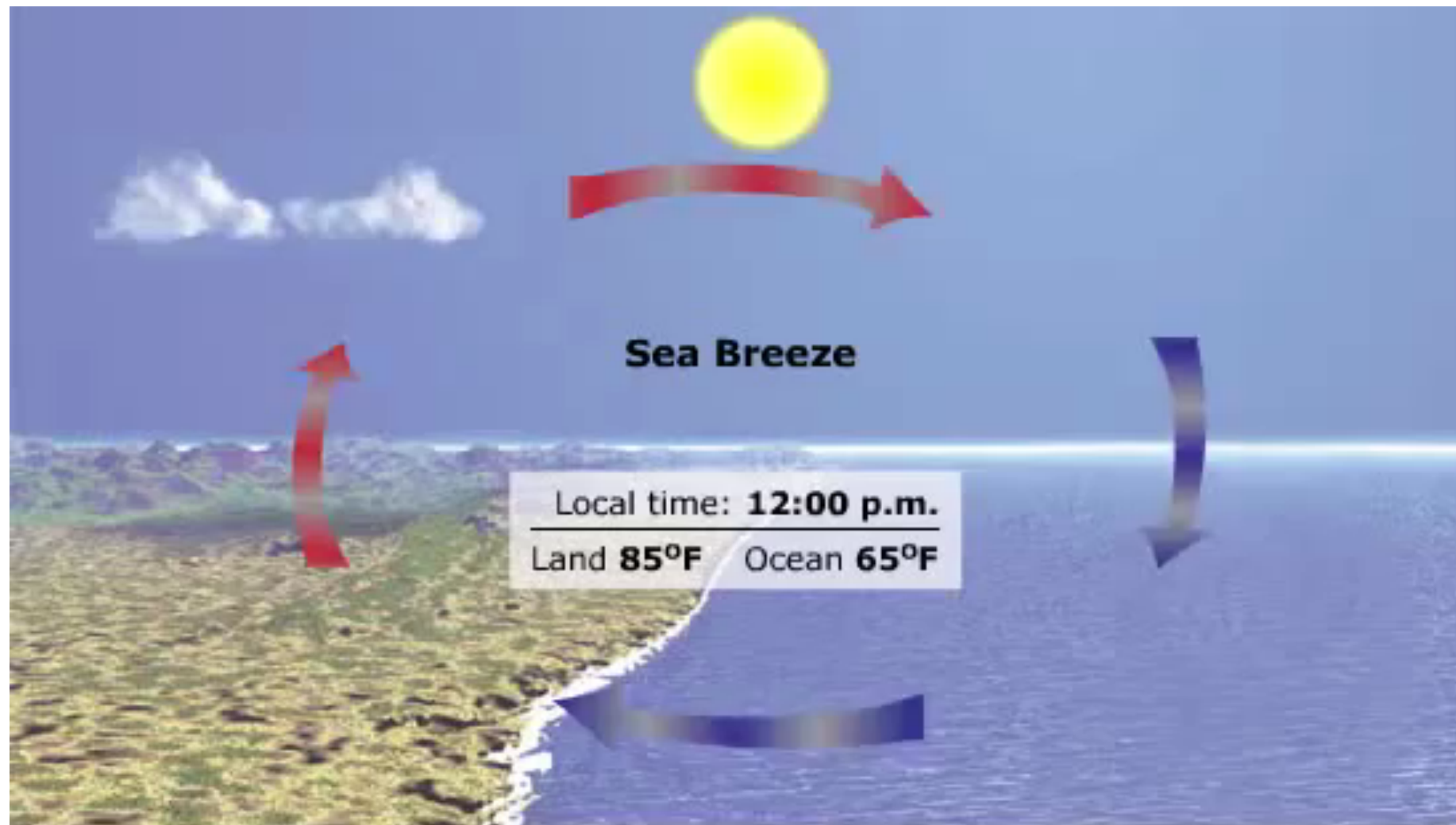


## Land-breeze (offshore breeze)

- At night, the land cools off faster than the ocean due to differences in their heat capacity.
- The pressure over the water will become lower than that of the land, setting up a land-breeze.



## Sea Breeze and Land Breeze:





# Thunderstorm

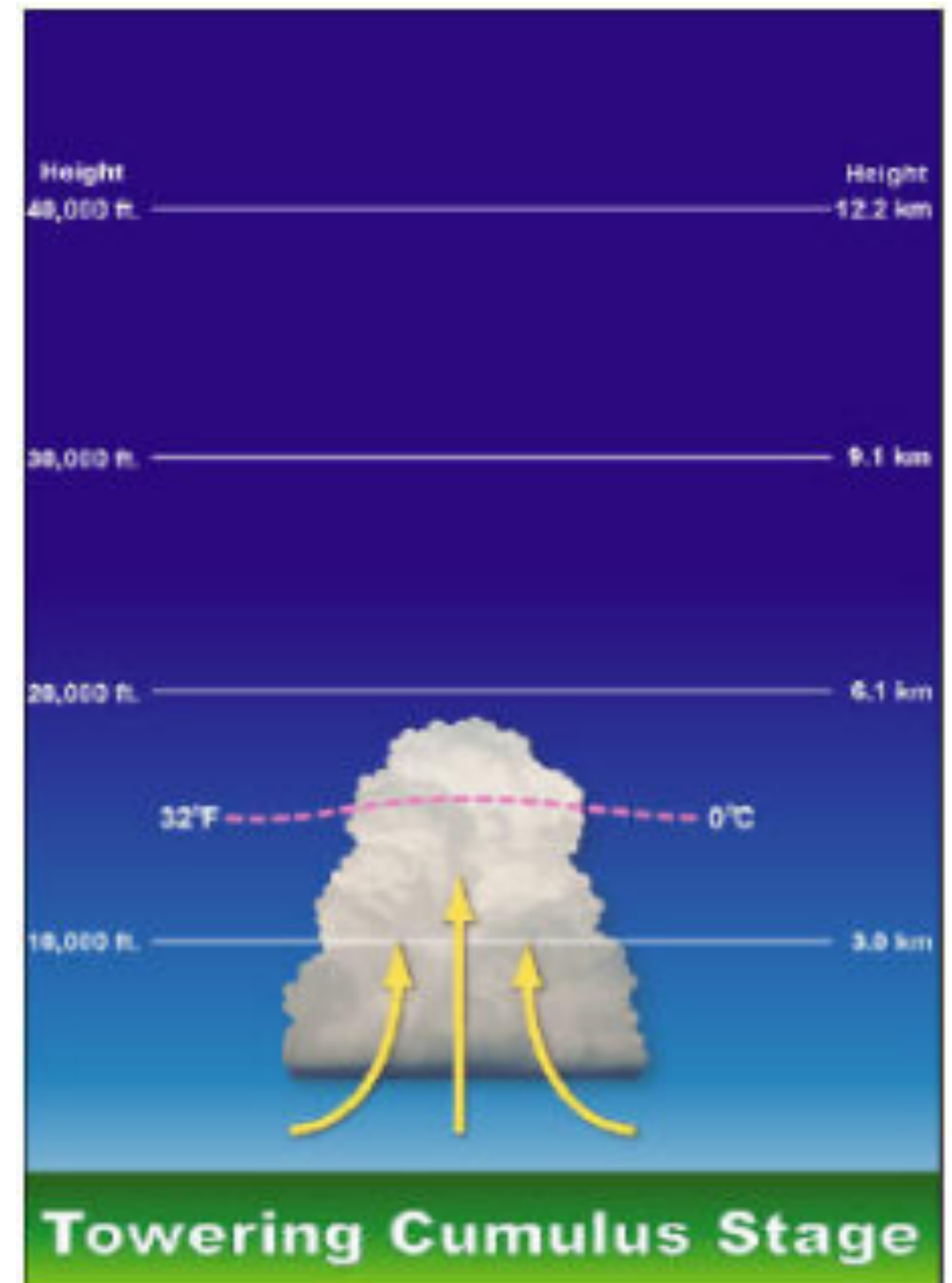
- A type of weather condition derived from a matured vertical cloud known as Cumulonimbus (Cb).



# The Life-cycle of a Thunderstorm:

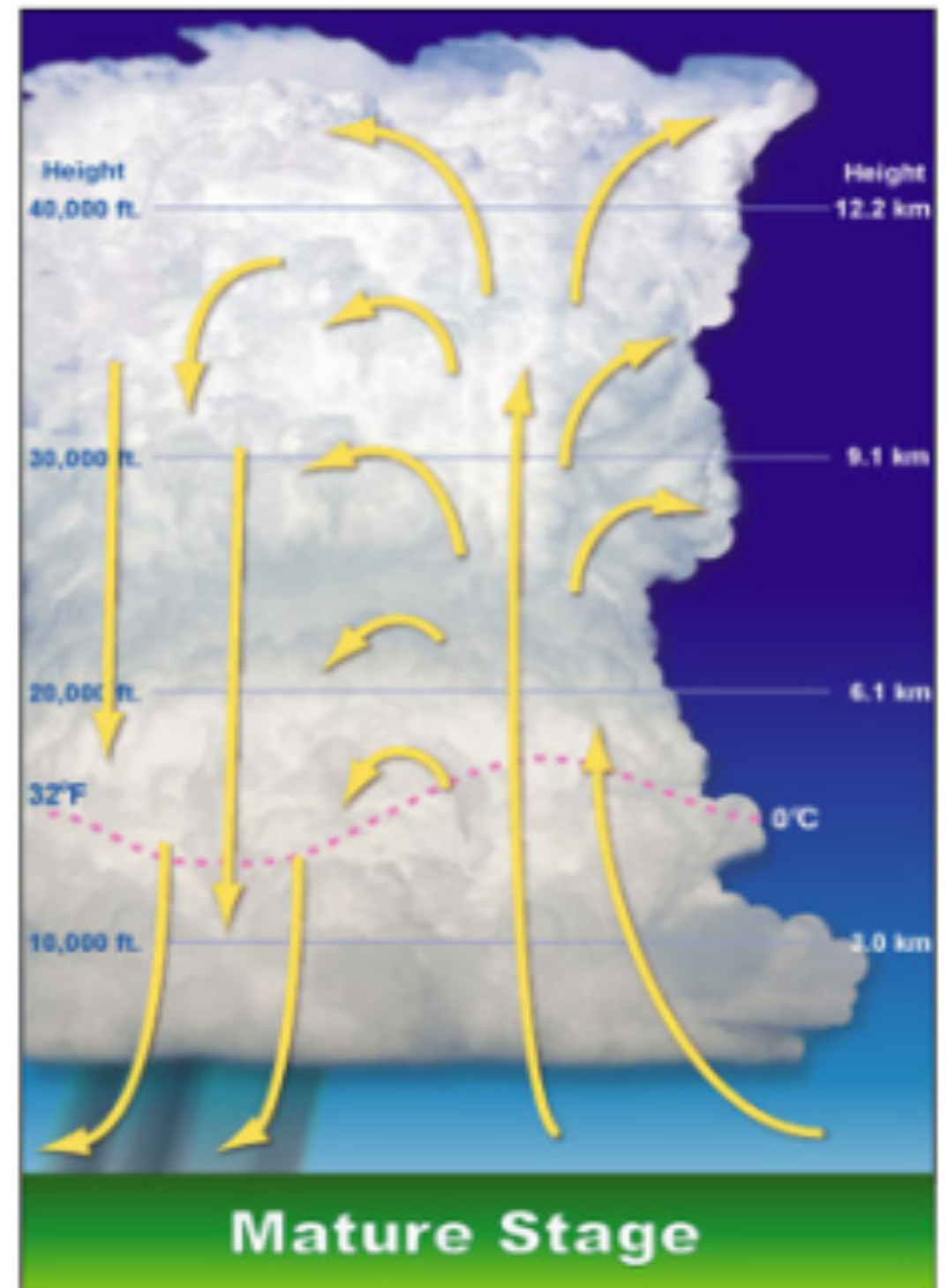
## 1) TOWERING CUMULUS STAGE

- The building block of all thunderstorms is the thunderstorm cell, which has a distinct life-cycle that lasts about 30 minutes.
- The Cumulus cloud begins to grow vertically, perhaps to a height of 20,000 feet (6 km).
- Air within the cloud is dominated by updraft with some turbulent eddies around the edges.



## 2) MATURE STAGE

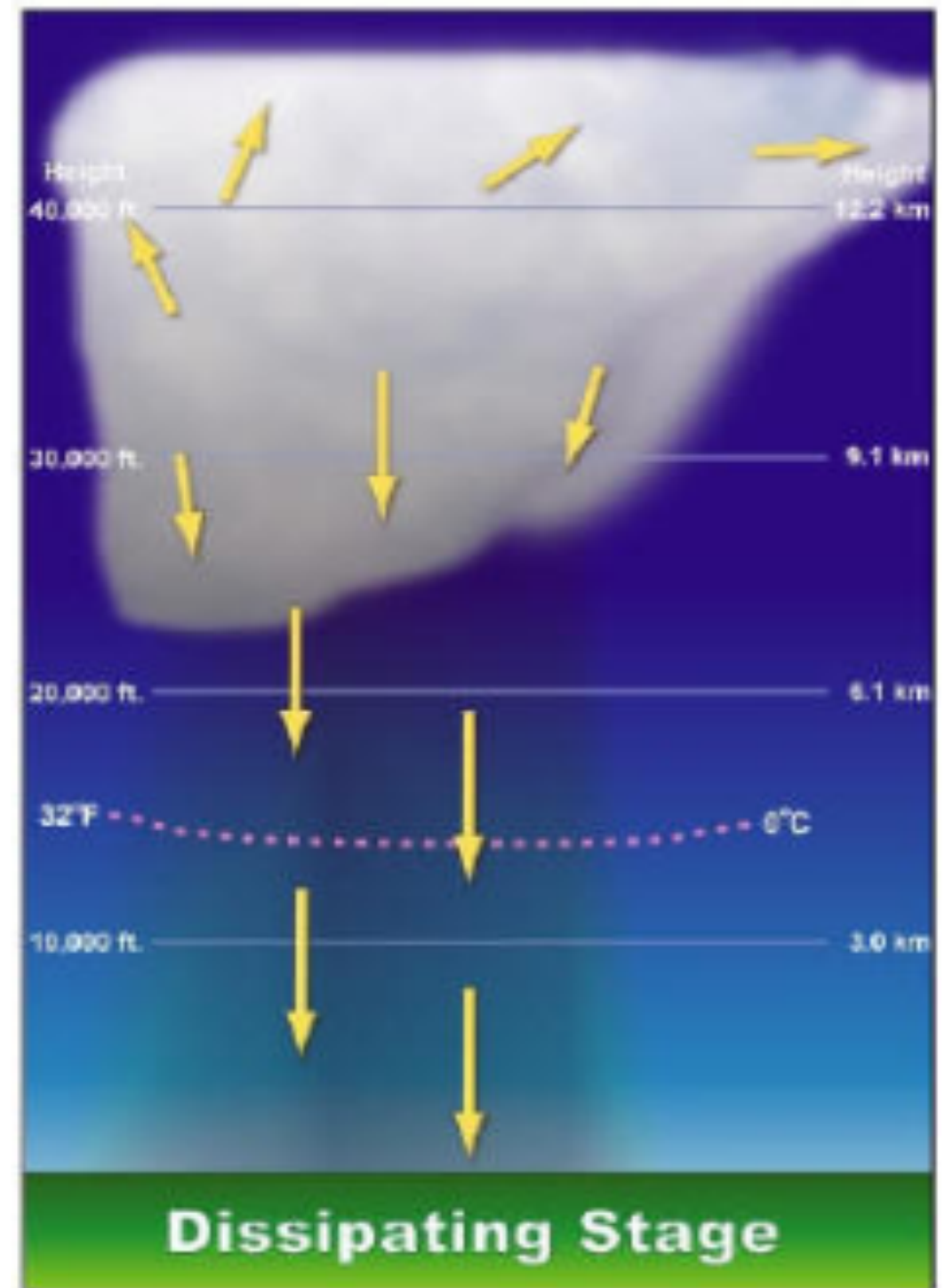
- The storm has considerable depth, often reaching 40,000 to 60,000 feet (12 to 18 km).
- Strong updrafts and downdrafts coexist.
- This is the most dangerous stage when large hail, damaging winds, and flash flooding may occur.





### 3) DISSIPATING STAGE

- The final stage where the downdraft cuts off the updraft.
- The storm no longer has a supply of warm moist air to maintain itself and therefore it dissipates.
- Light rain and weak outflow winds may remain for a while during this stage, before leaving behind just a remnant anvil top.



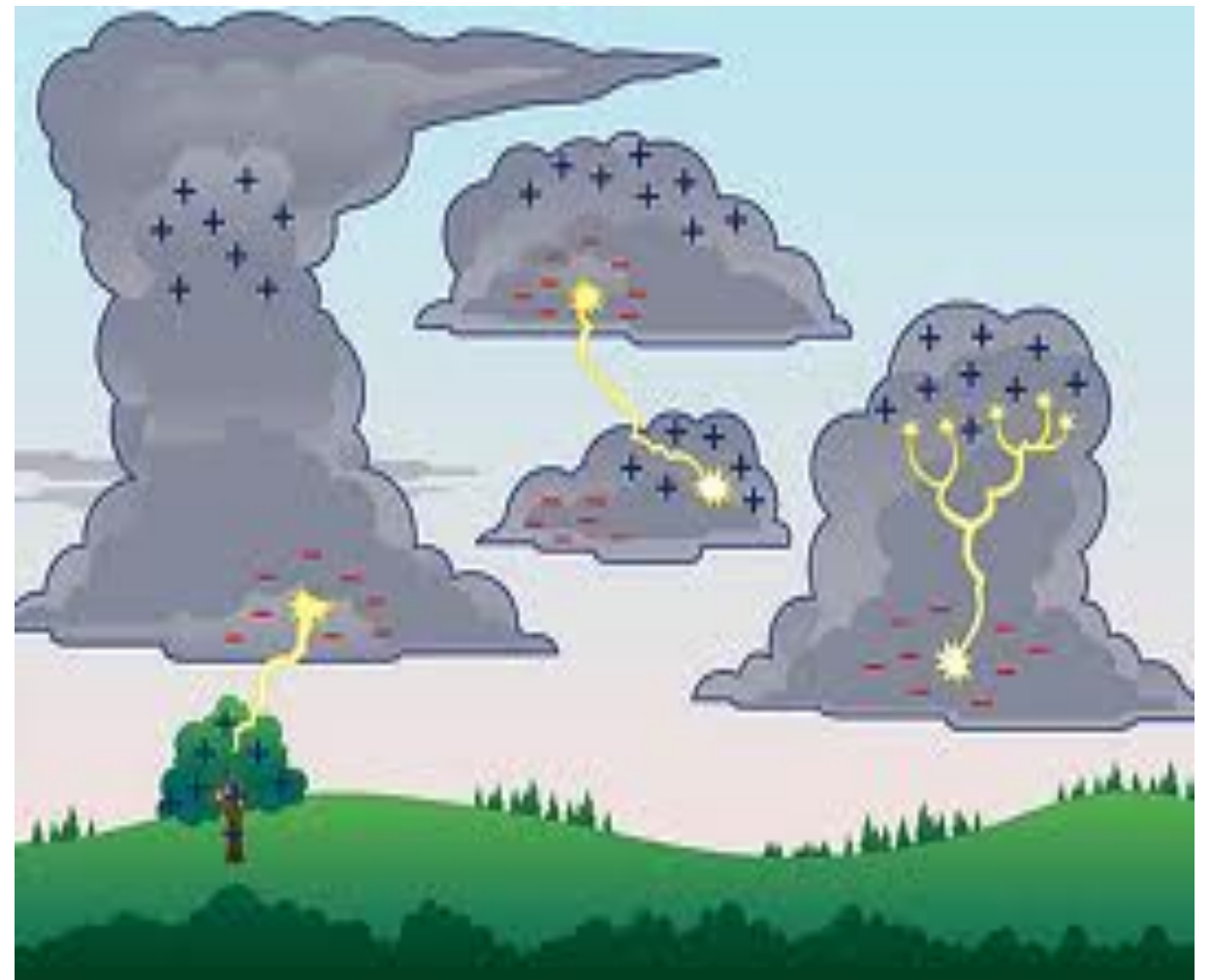
# Effects of a Thunderstorm

- Squall
- Thunder
- Lightning
- Localized flooding
- Gustnado
- Water spouts
- Small hail
- Moderate to severe rains (30 mins-2 hrs)



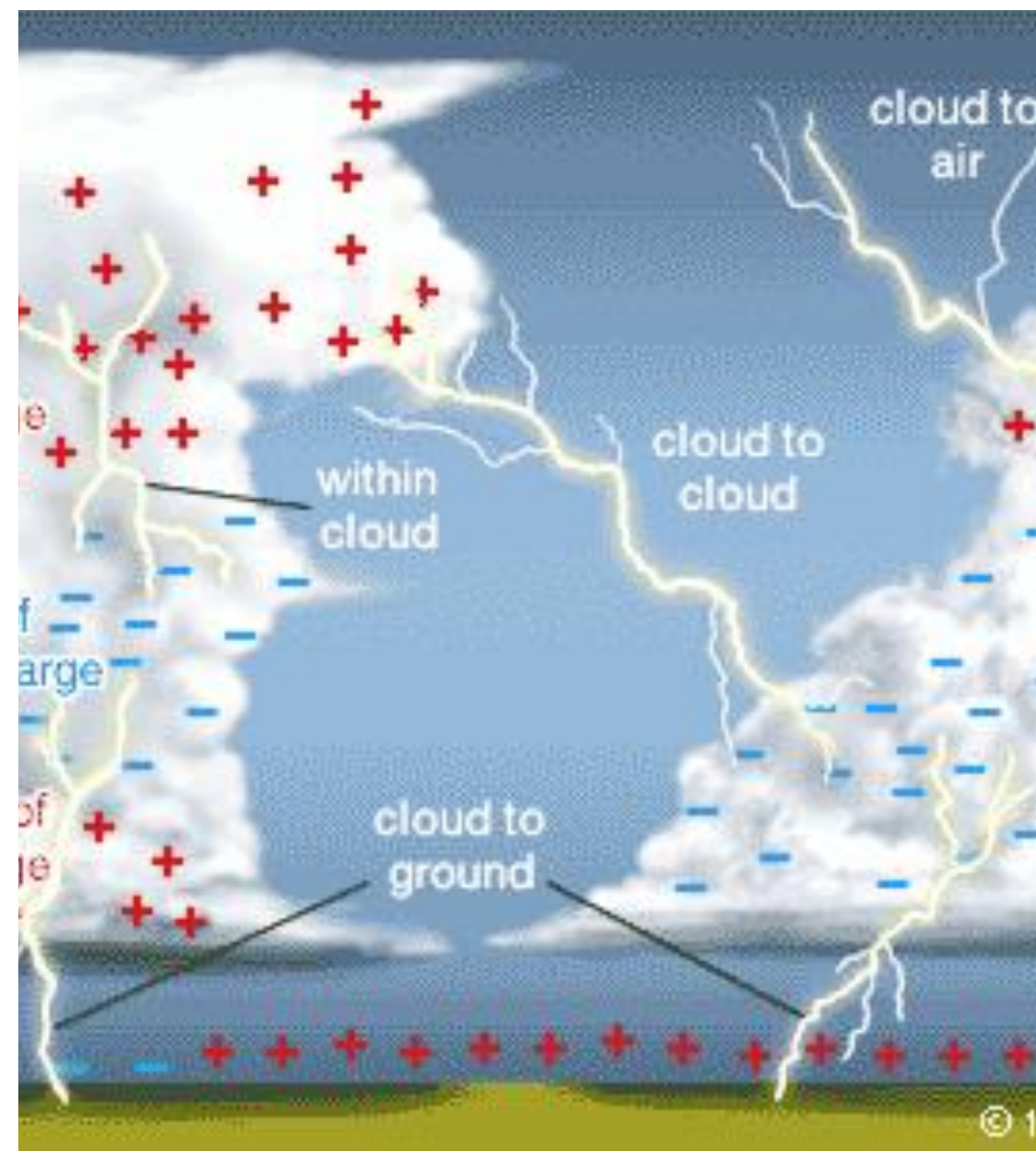
# How are Lightning and Thunder Produced

- The turbulence in the cumulonimbus causes the water droplets and ice crystals to break.
- It causes electrical charges
  - Upper portion - positively charged
  - Middle and Lower portions - negatively charged





- Electric voltage in clouds causes discharges within clouds or between clouds and Earth's surface (Lightning)
- Thunder results from rapid expansion in local air caused by large amount of heat from lightning discharge.

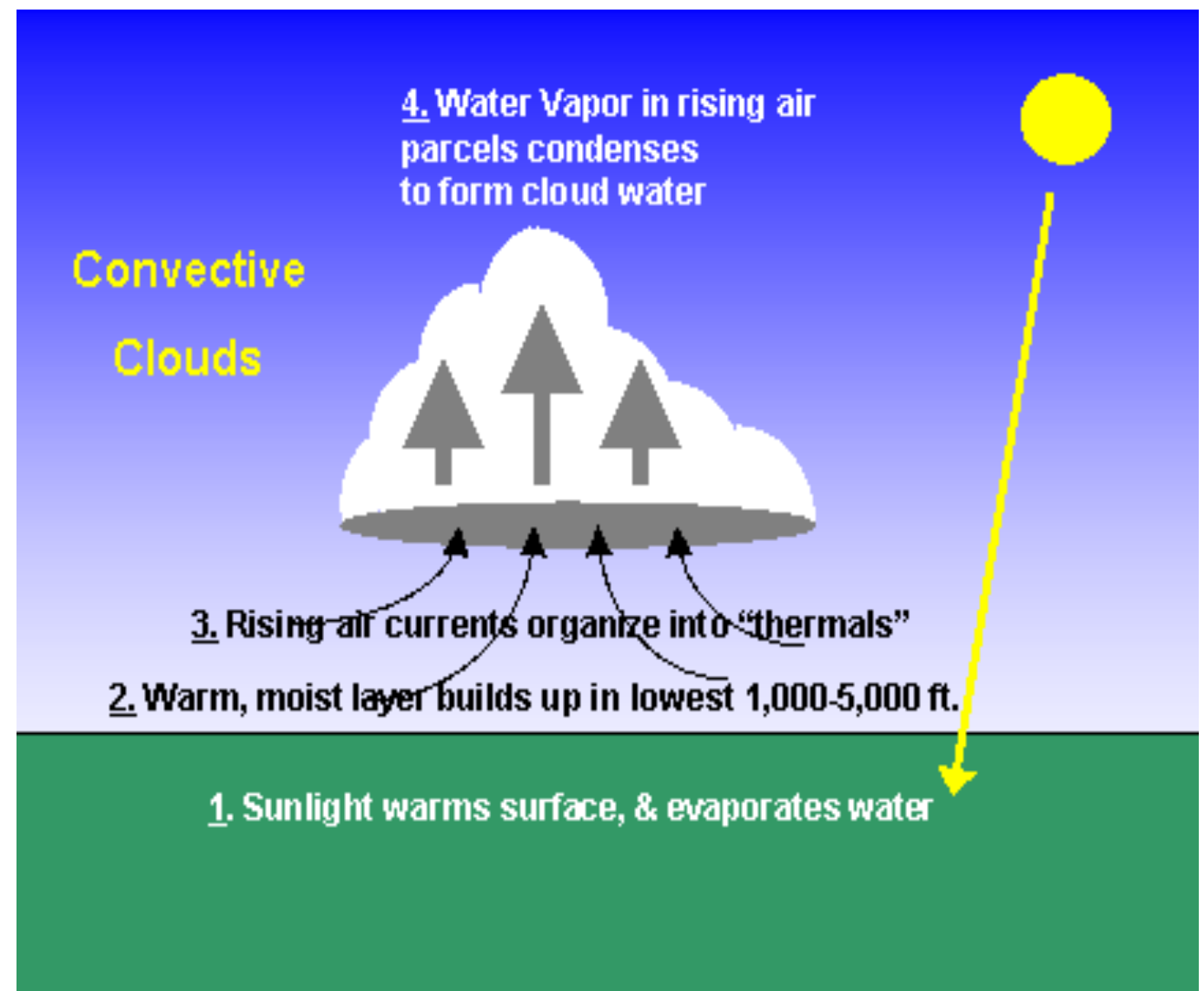


# Lightning:



# Process of Uplifting Air

- Lifted air is cooled and moisture is turned into a cloud.
- Further uplifting extends clouds, increases size of water droplets, forms ice crystals.
- Cumulonimbus cloud is produced upon reaching 10-20 kilometers.





# Cumulonimbus (Cb) Cloud produced from uplifted air:



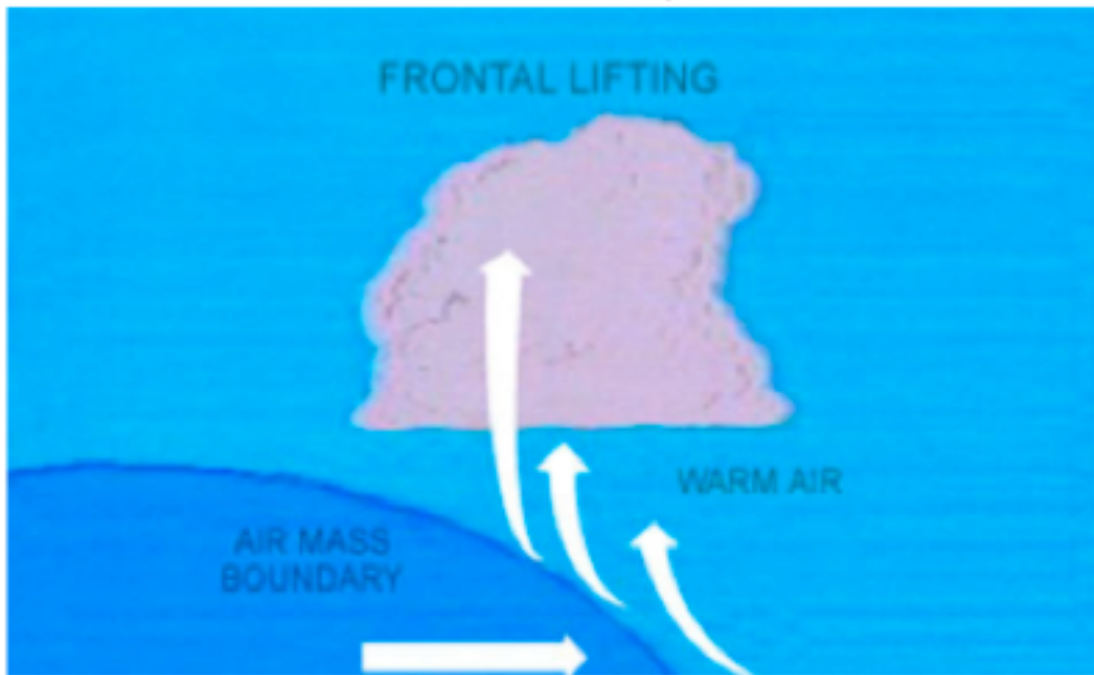
# 3 Common Types of Air Lifting Mechanism



Thermal lifting



Orographic lifting



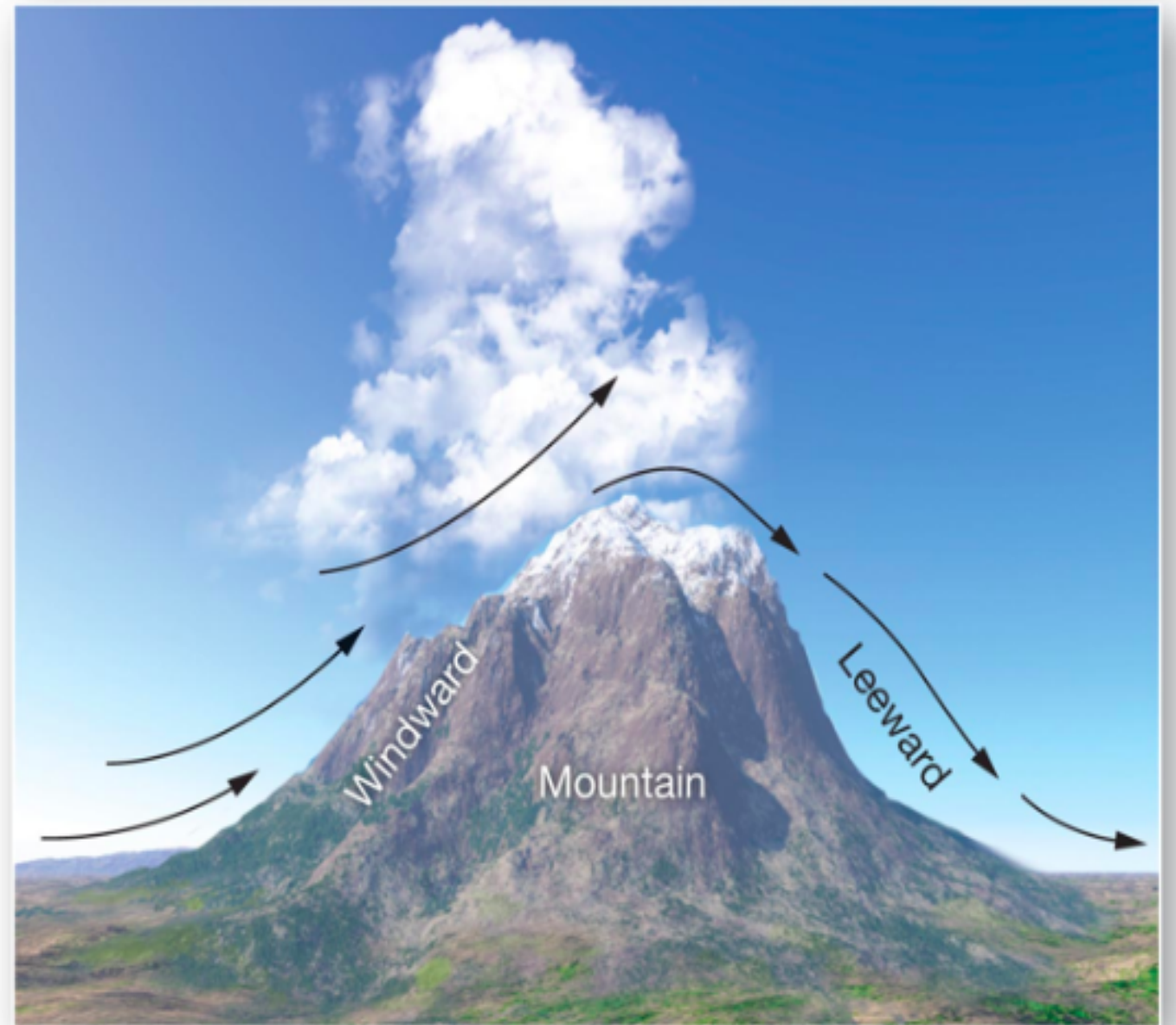
Frontal lifting





# Orographic Lifting

- Occurs in mountainous terrain when a mass of moving air is forced to rise because of the presence of slope.
- Air that is forced upward cools adiabatically (occurring without loss or gain of heat).
- If this air reaches its saturation point, clouds develop.
- Orographic lifting and thermal lifting often work together to produce cumulus clouds in mountainous areas.



(c) Orographic lifting

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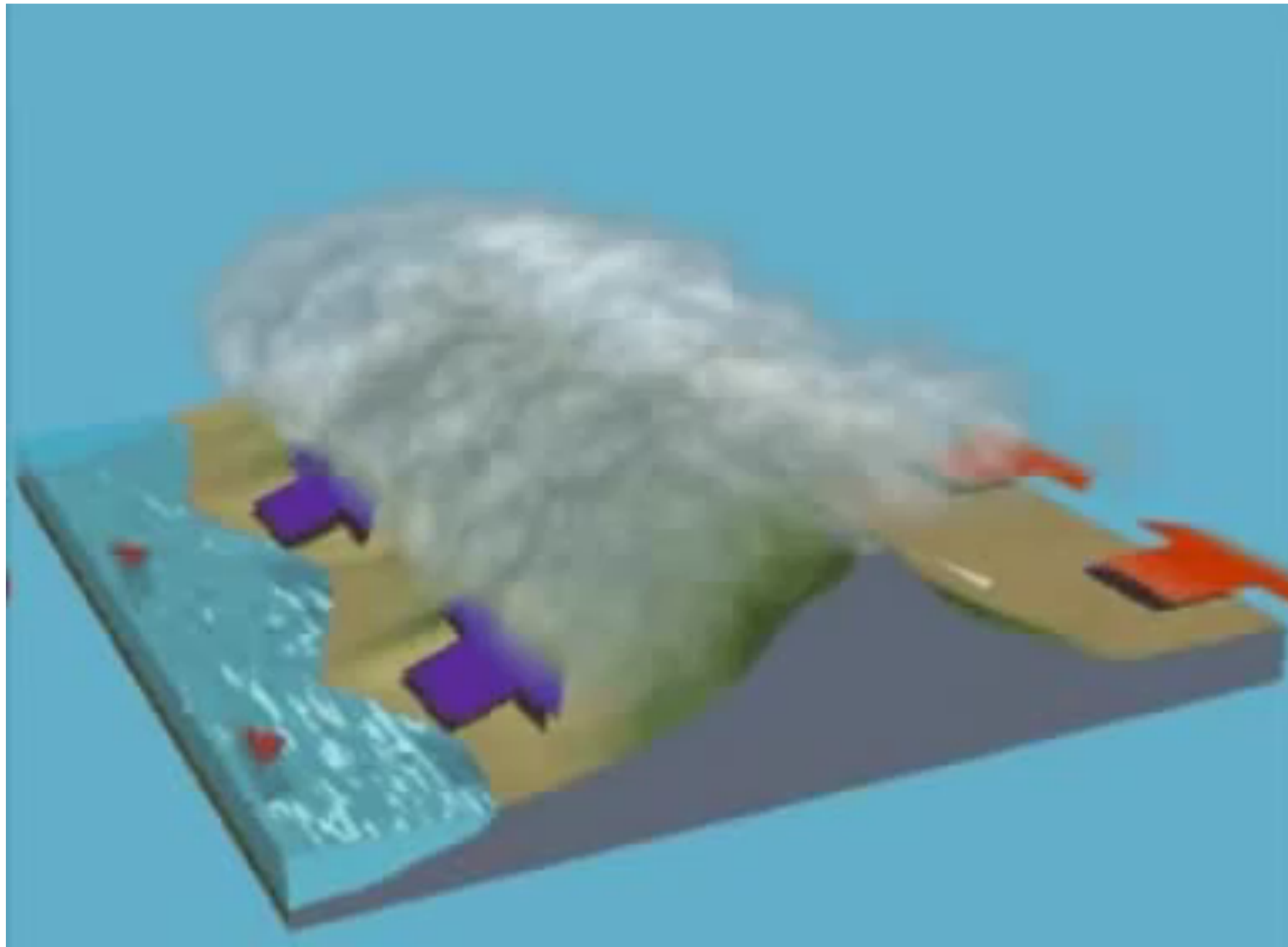


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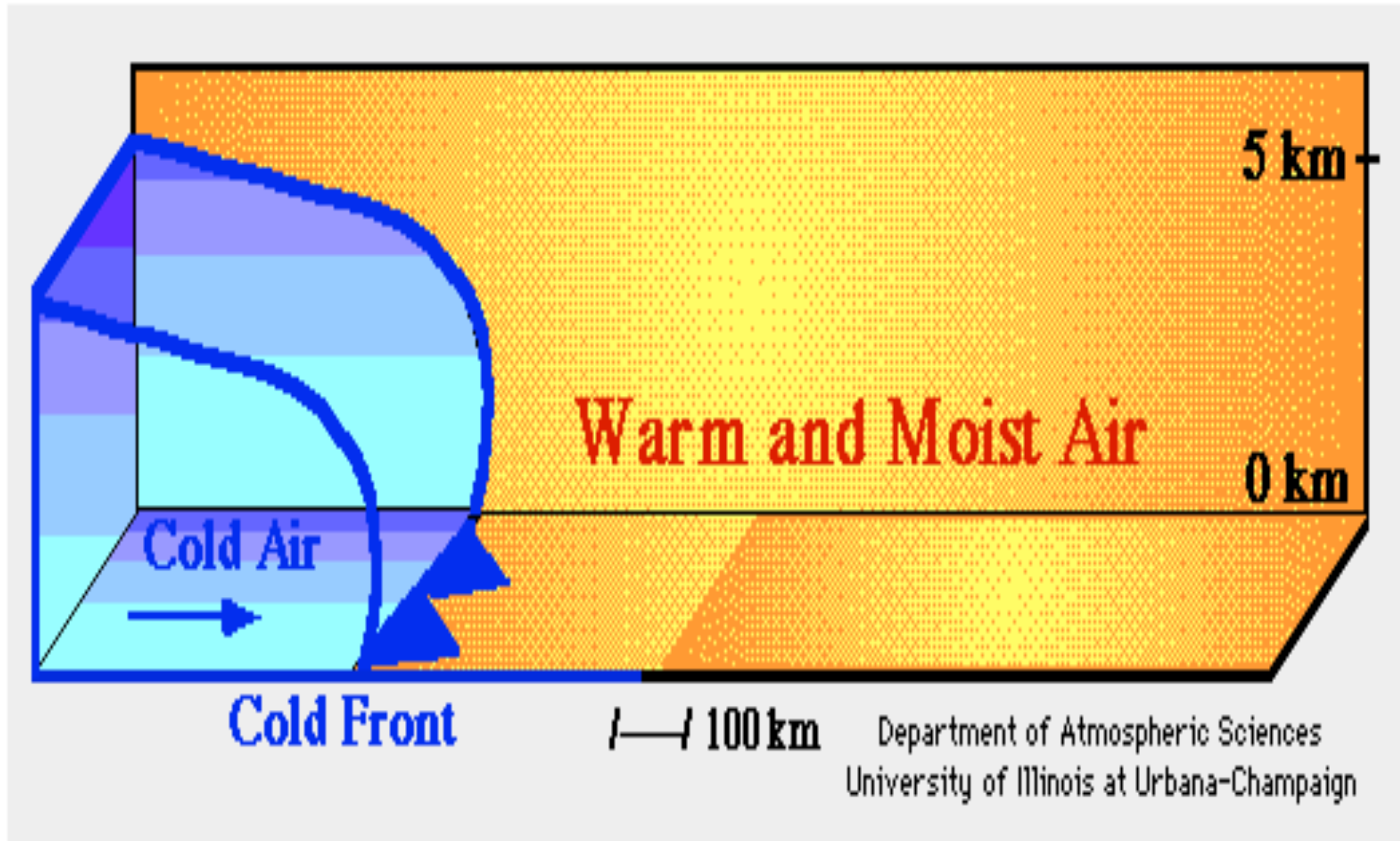
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# Orographic Precipitation:



# Frontal Lifting:



Thank You!

-End-