

# Precipitation & Types

Precipitation is the process where the local air becomes saturated with vapour and starts to pour as it no longer can maintain the water vapour in the gaseous form. There are various types of precipitation - Liquid, Freezing, and Frozen.

Rainfall can be defined as the precipitation in the liquid form.

## Types of Rainfall

Rainfall has been classified into three main types based on the origin -

- Convectional rainfall
- Orographic or relief rainfall
- Cyclonic or frontal rainfall

## Convectional Rainfall - Major Characteristics

- The air, on getting heated, becomes light and rises in convection currents.
- As the air rises, it expands and drops the temperature and subsequently, condensation takes place and cumulus clouds are formed.
- Heavy rainfall with lightning and thunder takes place which does not last long.
- Such rain is usually in the summer or the hotter part of the day.
- This type of rainfall generally takes place in the equatorial regions and internal parts of the continents, predominantly in the northern hemisphere.
- This rainfall is usually associated with hail and graupel

Cumulo-nimbus clouds are formed. Water droplets accumulate and fall as rain due to gravity

Air cools and condenses with height, forming clouds

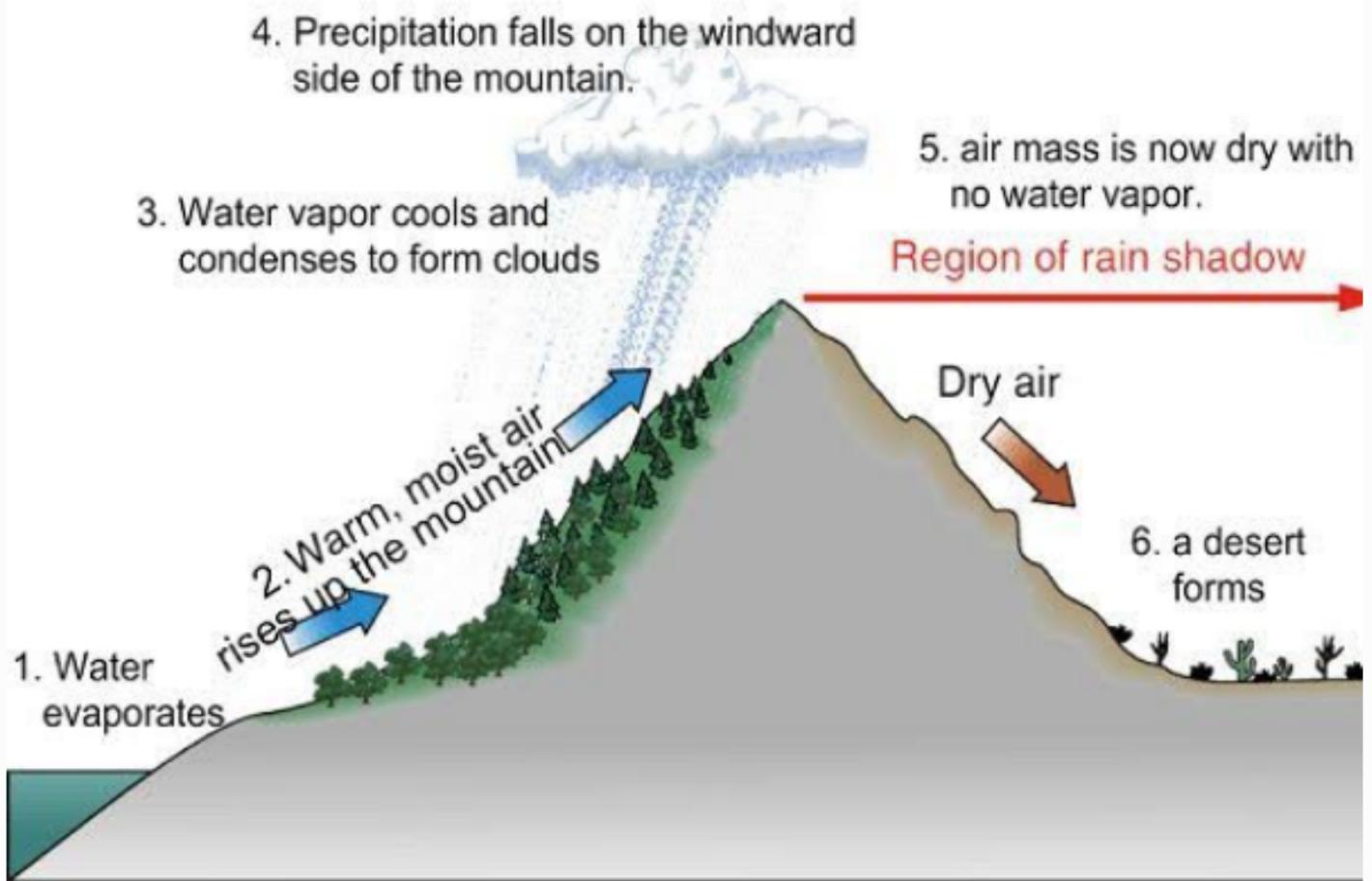
Dew point

The sun heats up the ground

Warmer air rises

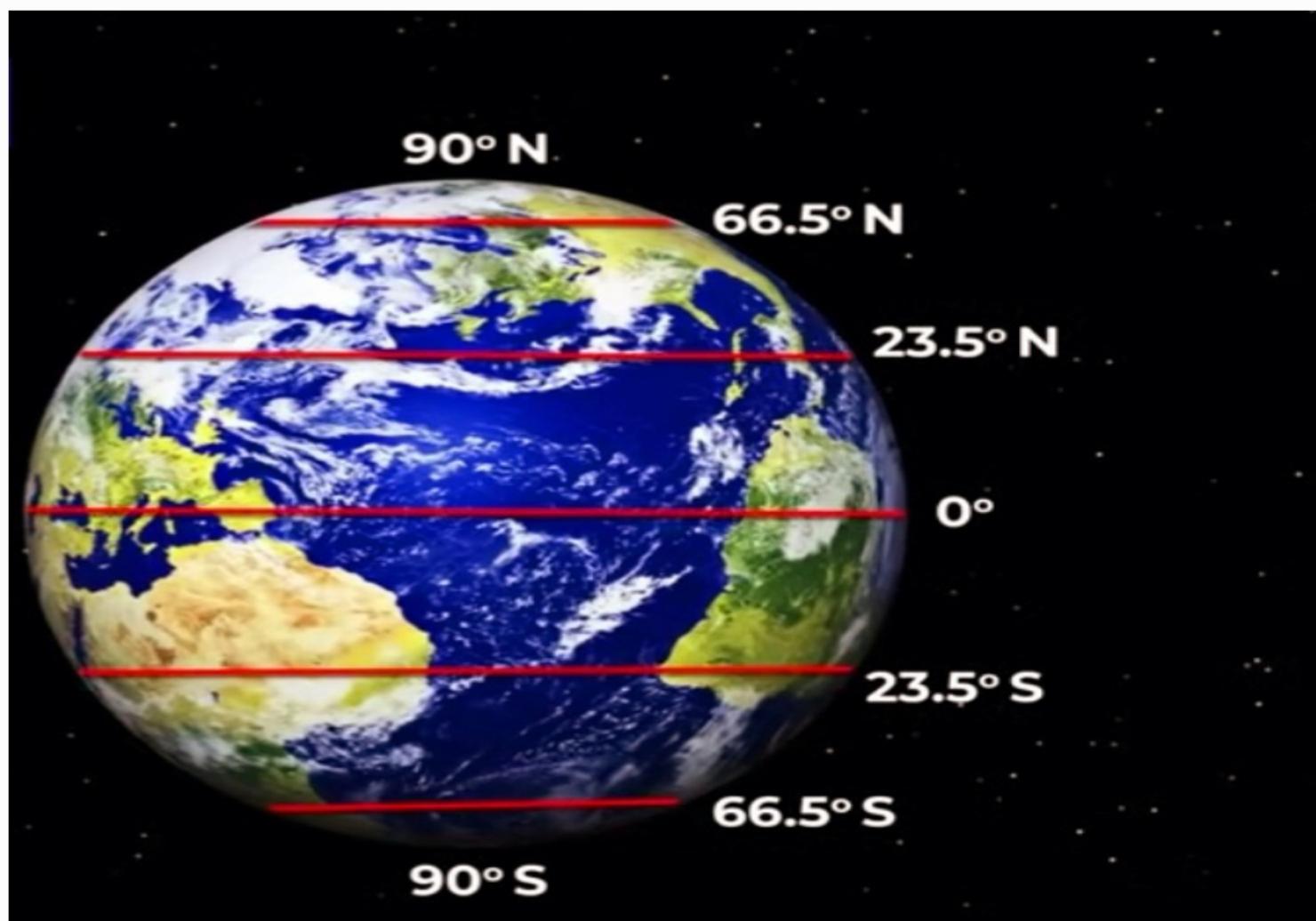
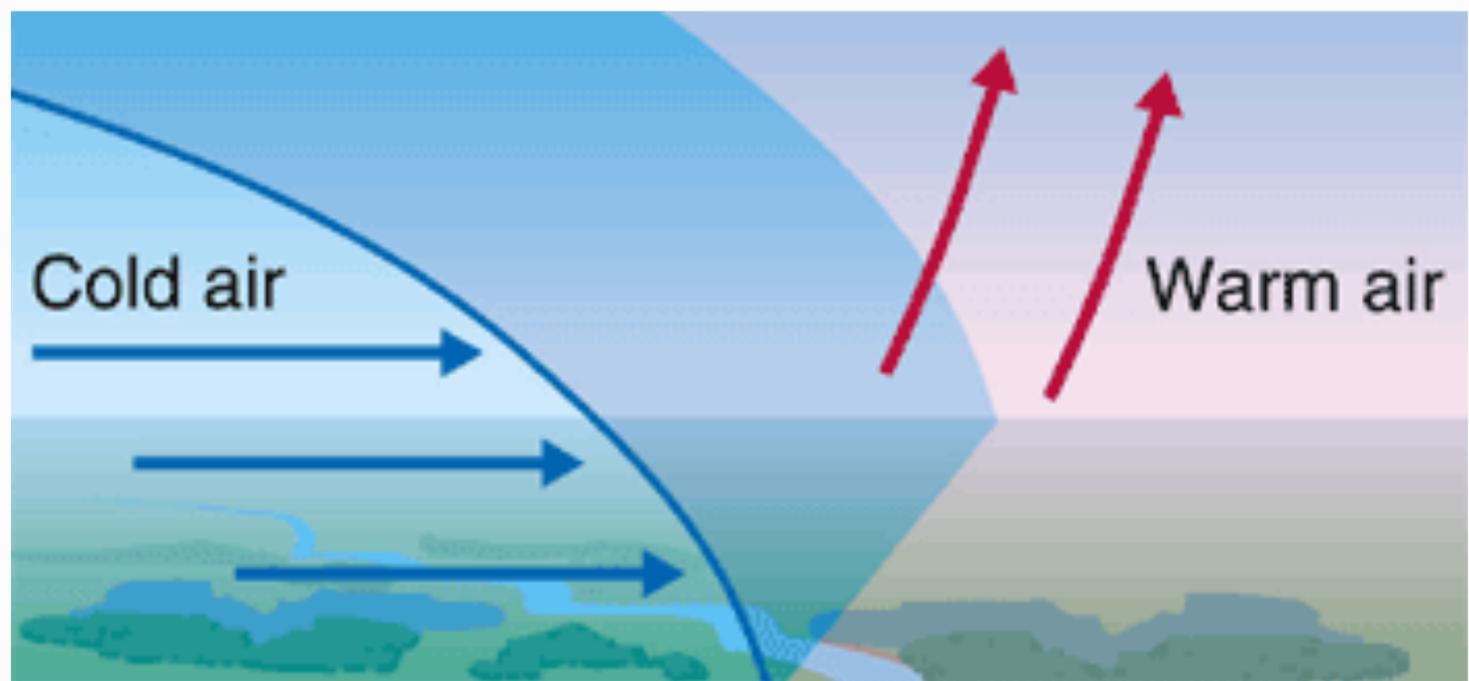
## Orographic Rainfall - Major Characteristics

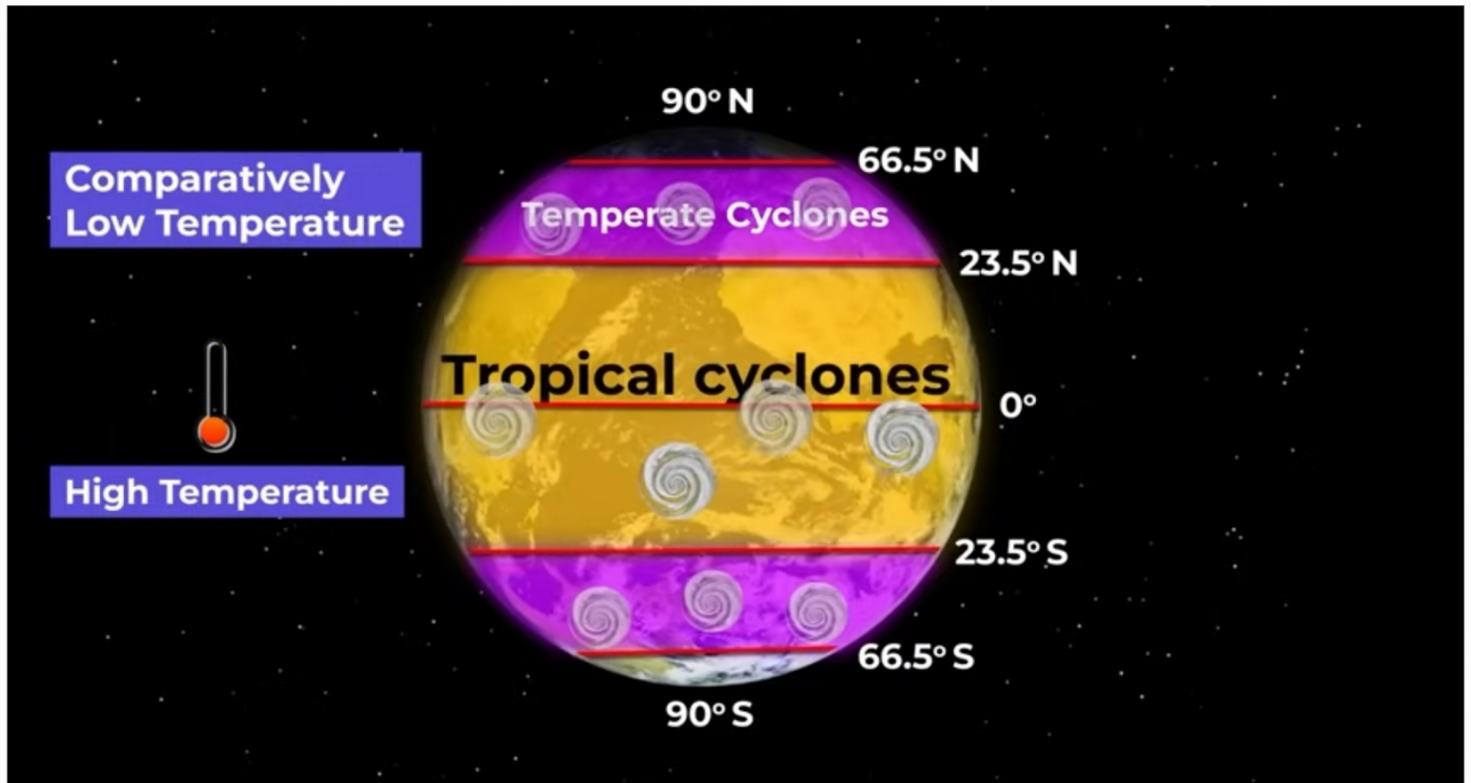
- When the saturated air mass comes across a mountain, it is forced to rise.
- The rising air expands, and eventually, the temperature falls, and the moisture gets condensed.
- The principal characteristic of this type of rain is that the windward slopes get more rainfall.
- After giving rain on the windward side, when these winds reach the other slope, they drop away, and their temperature increases. Then their ability to take in moisture increases and hence, these leeward slopes remain dry and rainless.
- The region situated on the leeward side is known as the rain-shadow area.



## Cyclonic Rainfall - Major Characteristics

- Cyclonic activity causes cyclonic rain and it occurs along the fronts of the cyclone.
- When two masses of air of unlike density, temperature, and humidity meet then it is formed.
- The layer that separates them is known as the front.
- A warm front and the cold front are the two parts of the front.
- At the warm front, the warm lighter wind increases slightly over the heavier cold air.
- As the warm air rises, it cools, and the moisture present in it condenses to form clouds
- This rain falls gradually for a few hours to a few days.



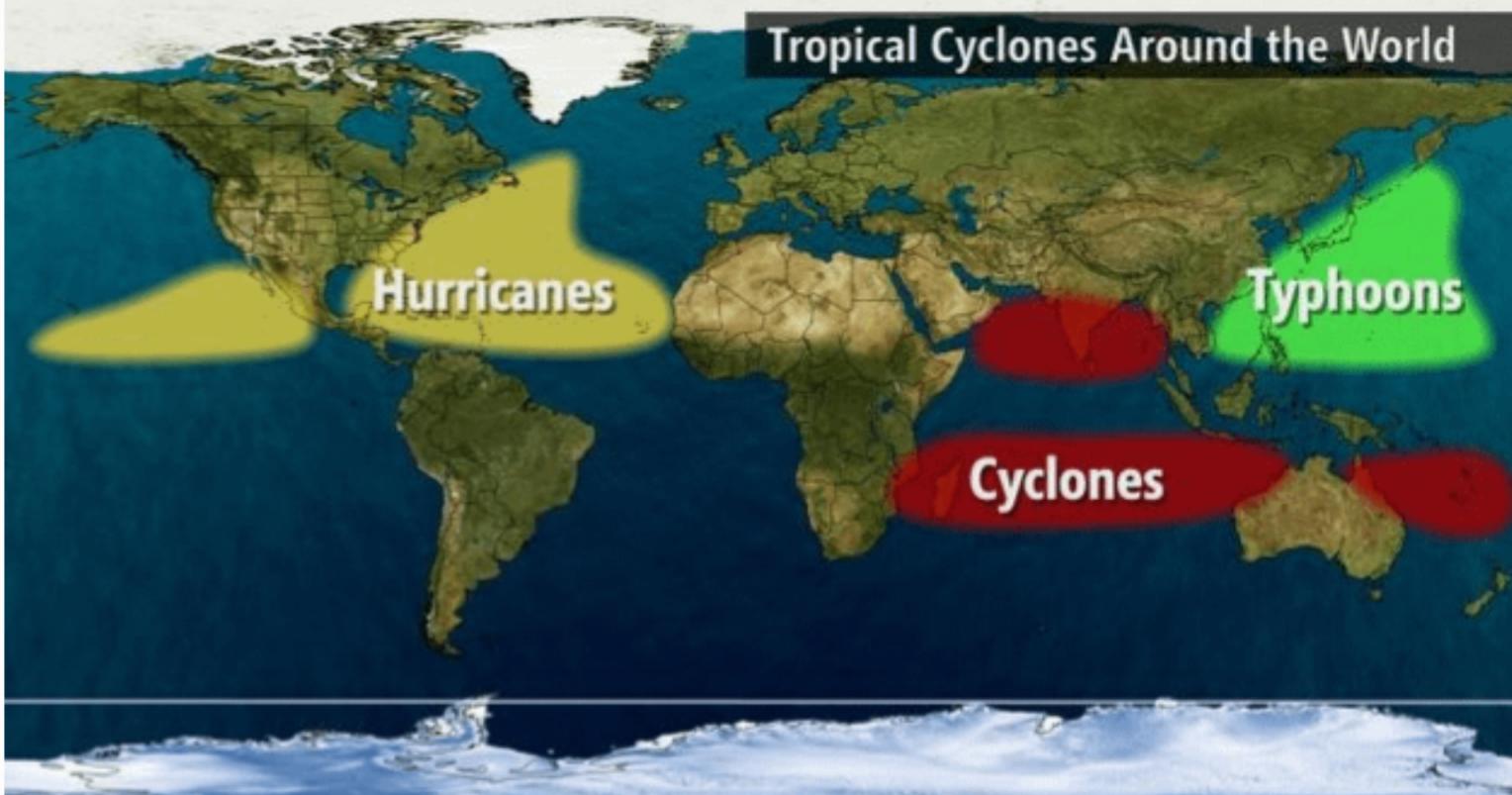


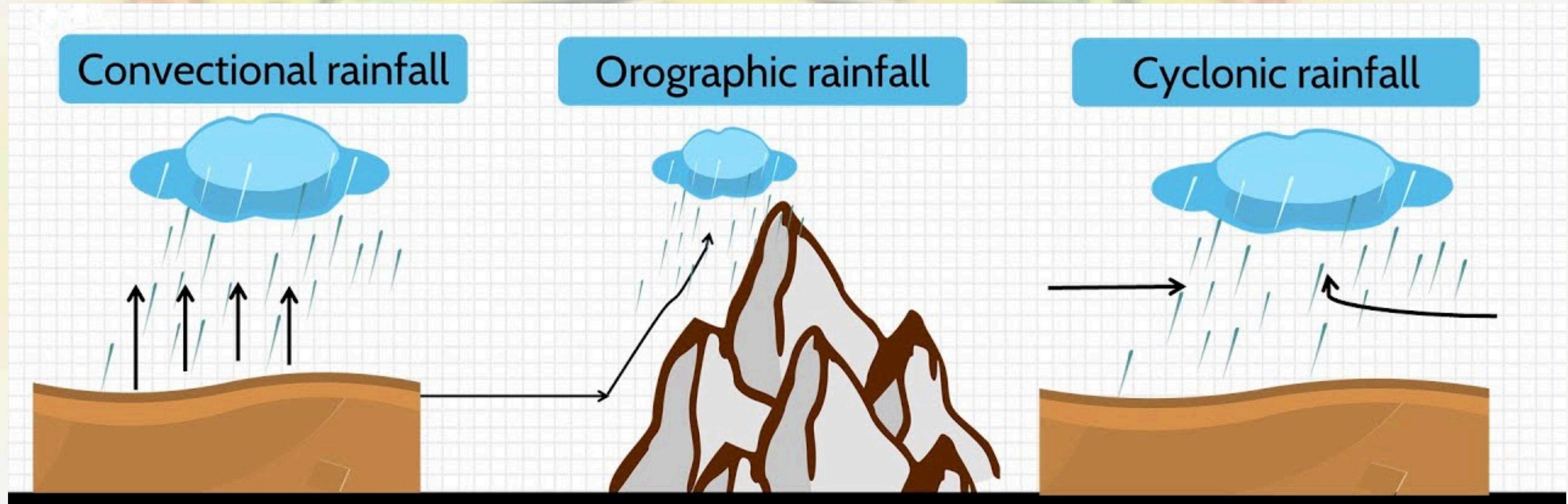
## Tropical Cyclones Around the World

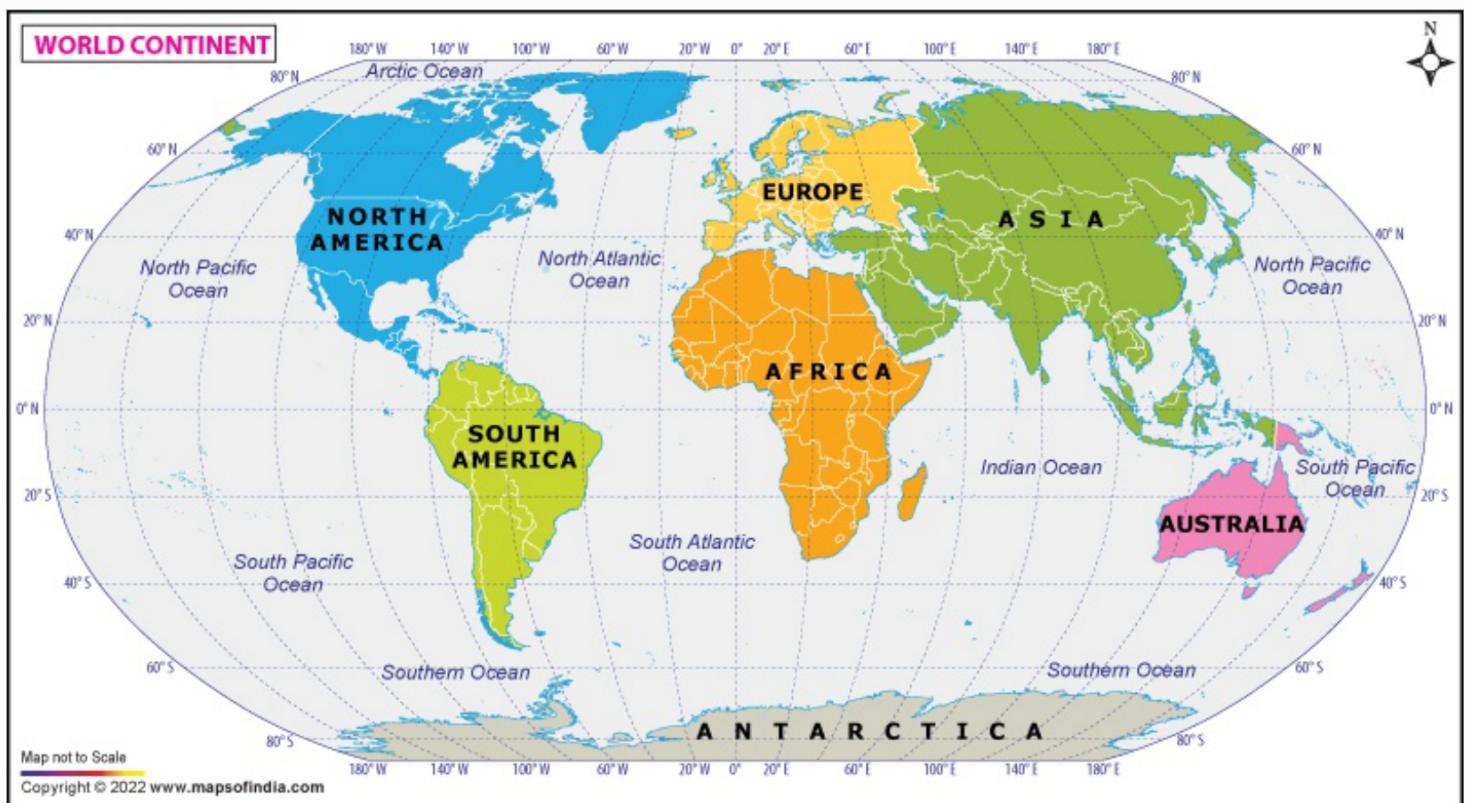
Hurricanes

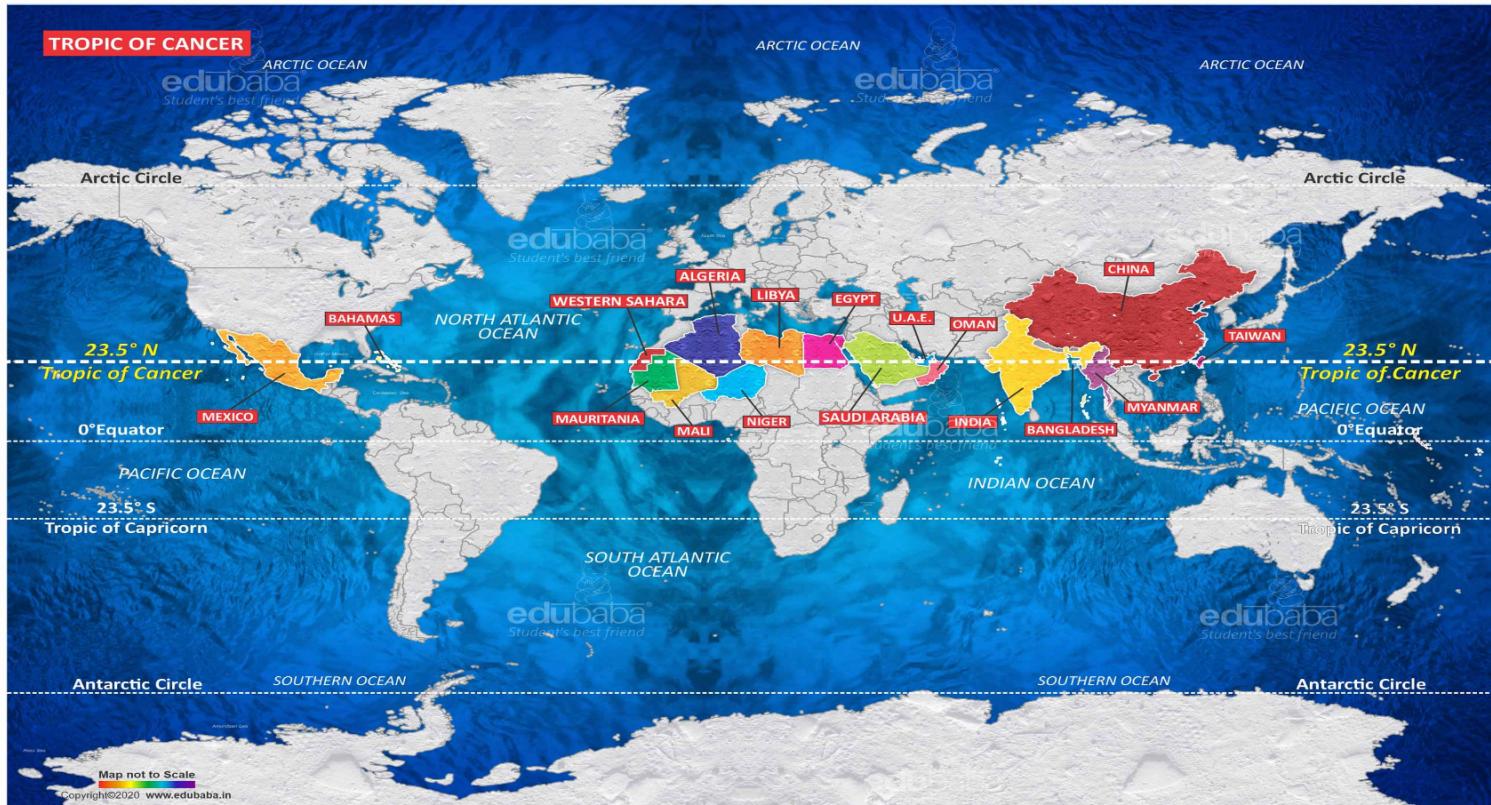
Typhoons

Cyclones

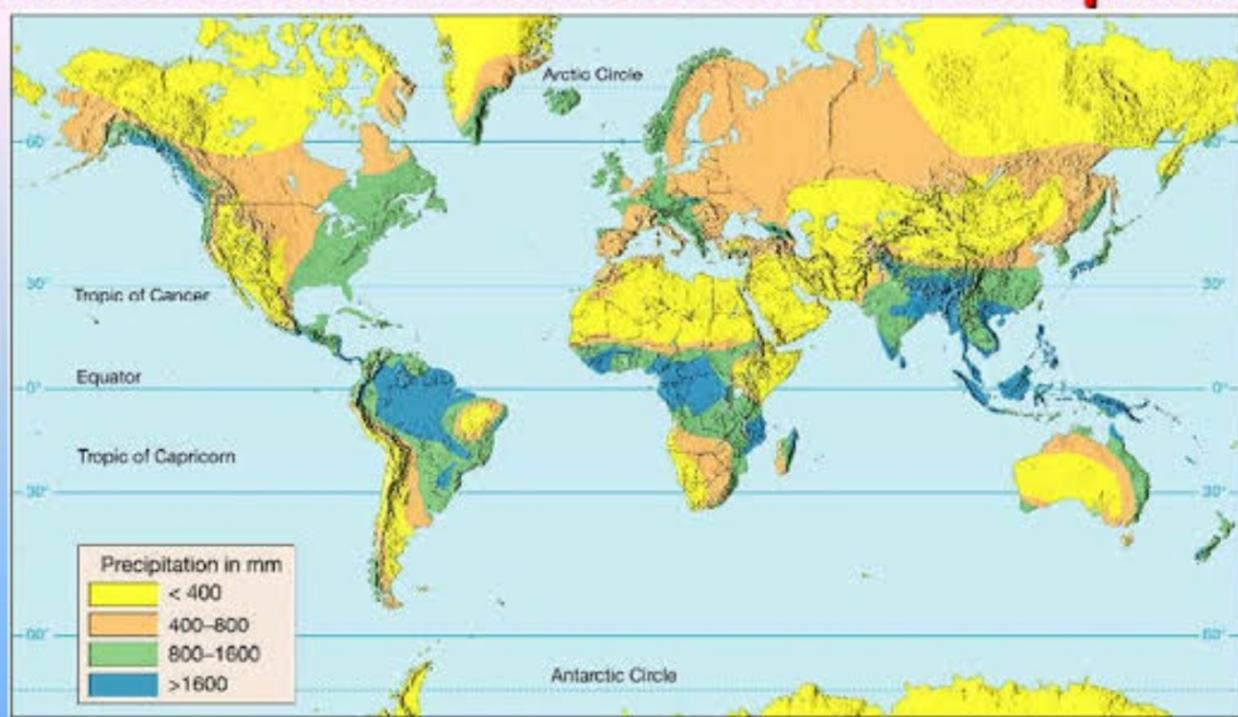


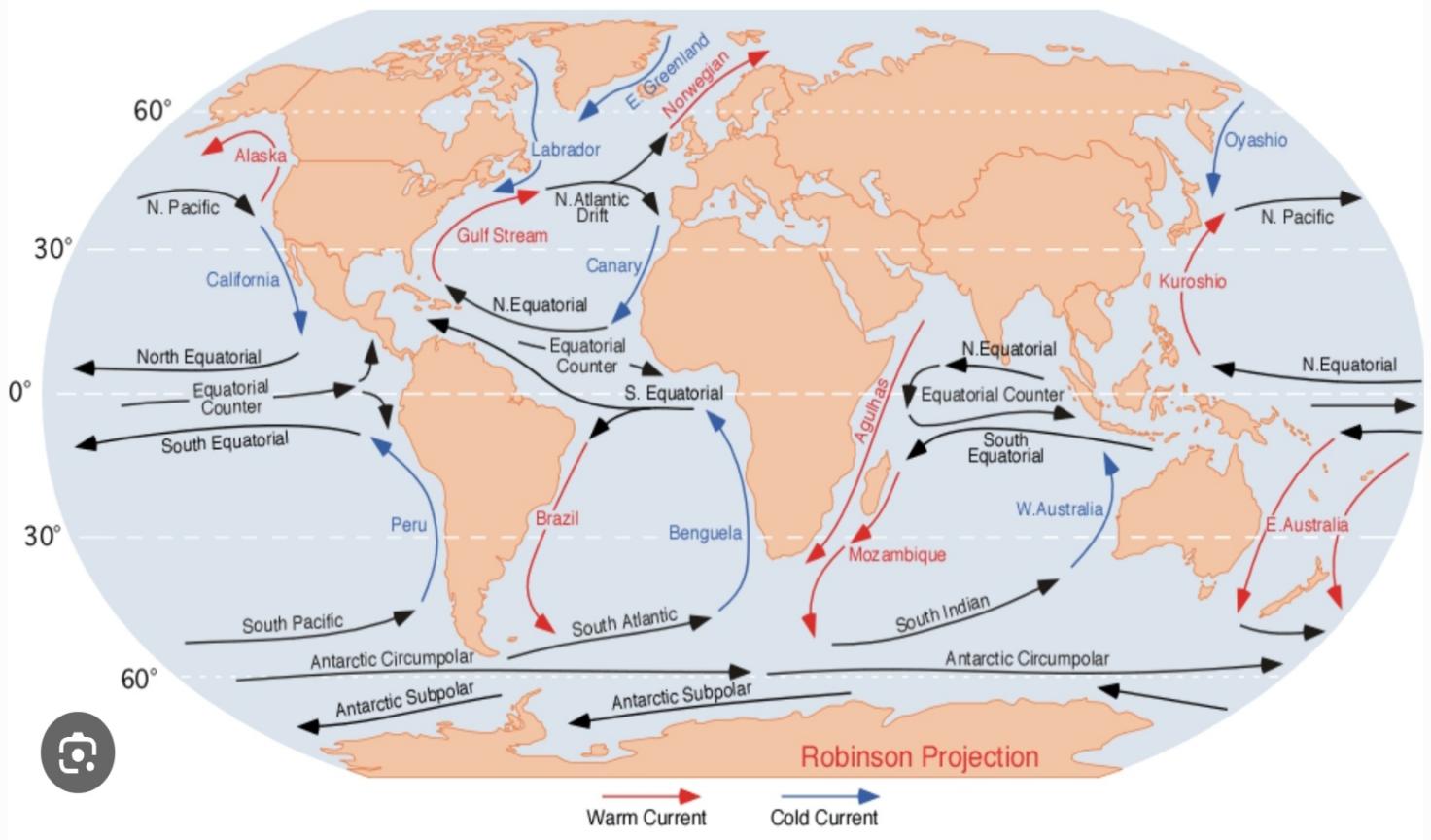






## Annual Global Distribution of Precipitation





## Major Deserts of the World





## Types of Rainfall based on Intensity

The types of rainfall based on intensity can be classified as:

1. Light rain - Rate of rain varies between 0 to 2.5 millimetres
2. Moderate rain - Rate of rain varies between 2.6 millimetres to 7.6 millimetres
3. Heavy rain - Rate of rain is beyond 7.6 millimetres

# Different types of precipitation

## Precipitation formed from the clouds

### Downpour (heavy rain)

Heavy torrential rain, which comes from cumulonimbus clouds

### Monsoon rain

Heavy rains that accompany the seasonal wind which blows from tropics to the Equator

### Drizzle

Light precipitation consisting of liquid water smaller than 0.5 mm (0.02 in) in diameter

### Acid rain

Rain with a high acidic oxide content caused by air pollution



### Snow on the top of the mountains

Precipitation that accumulates and does not have time to melt and evaporate

### Snow and ice pellets

Snowflakes that melt as they fall from the cloud, and then re-freeze into grain-like particles

### Hail

A hailstone is a piece of ice larger than 5 mm, that falls from a cumulonimbus cloud

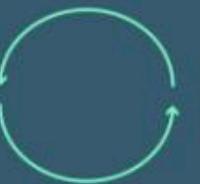
### Slush

Mixture of snow and water, usually formed when snow falls on the water's surface

## Precipitation formed from the air

### Dew point

Air temperature at which its relative humidity reaches 100% and water vapor begins to "precipitate", that is to condense



## Precipitation as colloidal suspensions



### Fog

Made up of small and light water droplets which remain suspended in the air. Often happens in the mountain valleys

# Lightning

1. Definition: A sudden electrostatic discharge during a thunderstorm.
2. Cause: Occurs due to the buildup of electrical charges in clouds, which can discharge between clouds, within the same cloud, or between a cloud and the ground.
3. Types:
4. Intra-cloud (IC): Discharge within a single cloud.
5. Cloud-to-cloud (CC): Discharge between two separate clouds.
6. Cloud-to-ground (CG): Discharge between a cloud and the ground, which is most dangerous.





## Thunder

1. Definition: The sound caused by the rapid expansion of air surrounding the path of a lightning bolt.
2. Cause: When lightning heats the air, it expands explosively and creates a shock wave that we hear as thunder.
3. Speed: Sound travels much slower than light, at about 343 meters per second (1,125 feet per second).
4. Time Delay: Because light travels faster than sound, we see lightning before we hear the thunder. The time delay can be used to estimate the distance of the lightning strike (roughly, every 5 seconds between flash and thunder equals about 1 mile).
5. Characteristics: Can vary in sound from a sharp crack to a long, low rumble depending on the distance and nature of the lightning strike.

**1. Question (2018):** Consider the following statements about clouds:

- a. Cirrus clouds are formed at high altitudes.
- b. Cumulonimbus clouds are associated with thunderstorms.

Which of the following is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

**2. Question (2020):** Which of the following cloud types is most commonly associated with heavy rainfall?

- (a) Cirrus
- (b) Cumulus
- (c) Stratus
- (d) Cumulonimbus

**2. Question (2015):** Consider the following statements regarding **frost**:

- a. Frost forms when the dew point is below freezing point.
- b. Frost is most likely to occur on clear and calm nights.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2













