

Unit IV:

Precipitation – forms, types and distribution. Air masses: Types – Fronts: Types. Cyclones : Tropical and Temperate.

Precipitation:

Precipitation occurs when a part of the atmosphere saturates itself with water vapour and when the right temperature comes its condenses and precipitates. The two processes which make the air saturated are the cooling of air molecules and the addition of water vapour.

### **Raindrop**

When water droplets combine each other to form bigger water droplets and when water droplets freeze onto a crystal of ice, this process is known as coalescence. The rate of the fall is considered to be negligible, that is the reason behind the clouds not falling of the sky.

### **2. Snowflakes**

Snow crystals form when the temperature freezes the tiny cloud droplets and because water droplets are more in number than ice crystals, the crystals can grow in size at the expense of water droplets as the water vapour causes the droplets to evaporate. These droplets fall from the atmosphere due to their mass as snowflakes.

### **3. Hail**

Like other precipitation techniques, hail forms in the storm clouds when supercooled droplets come in contact with dust and dirt. The storm's up draft blows the hailstones up and lifted again after the updraft dissipates.

Air masses:

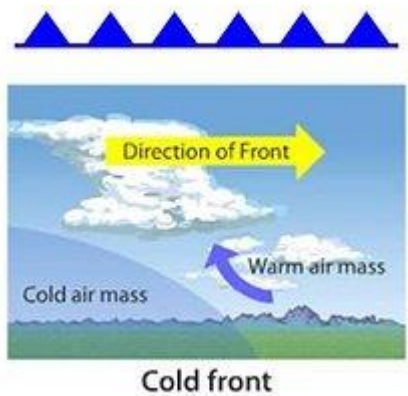
An air mass is a large volume of air in the atmosphere that is mostly uniform in temperature and moisture. Air masses can extend thousands of kilometers in any direction, and can reach from ground level to the stratosphere—16 kilometers into the atmosphere.

4 types of air masses

There are **four** categories for **air masses**: arctic, tropical, polar and equatorial. Arctic **air masses** form in the Arctic region and are very cold.

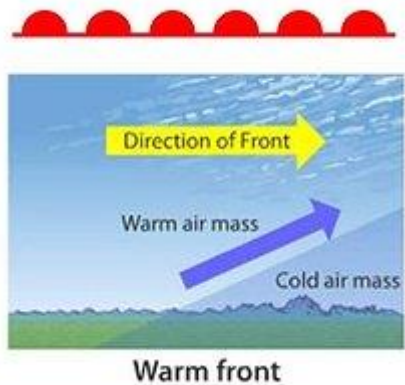
Air masses are always in motion, bringing with them, different types of weather conditions. The transition between two different types of air masses is called a front. There are four basic types of fronts, and the weather associated with them varies.

### **1. Cold Front**



A cold front is the leading edge of a colder air mass. Temperatures will usually change rapidly over a short distance. Also, there is a sharp change in moisture content; higher moisture content ahead of the front and lower moisture content behind it. Shifts in wind direction are significant in identifying a cold front. Ahead of a cold front, winds will be southerly before turning toward the west as the front approaches. After the cold front arrives, winds will become northerly. Thunderstorms sometimes develop ahead of these fronts as the warm air ahead of the front rises over the colder air.

## 2. Warm Front



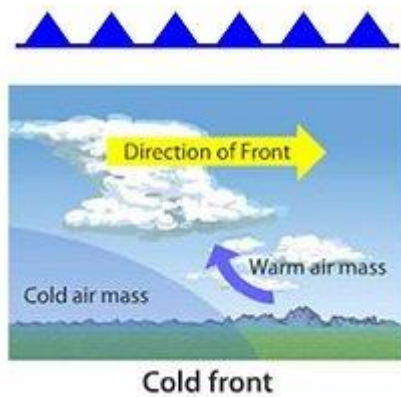
Warm fronts tend to move slower than cold fronts and are the leading edge of warm air moving northward. Before the front passes, winds are easterly. Cloud cover may be heavy ahead of the front with rainfall chances increasing as it approaches. Afterwards, winds will usually remain southerly or become southwesterly, and temperatures will warm rapidly with clouds clearing. With the warm air comes higher humidity too.

## 3. Stationary Front

## There Are Four Basic Types of Fronts – Can You Name Them?

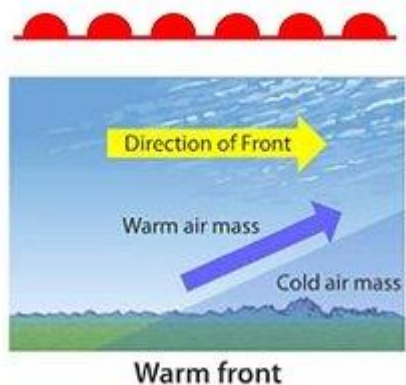
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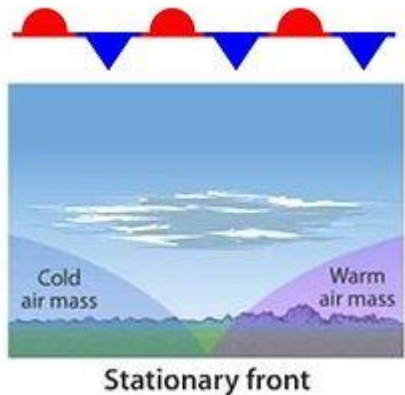
### 2. Warm Front



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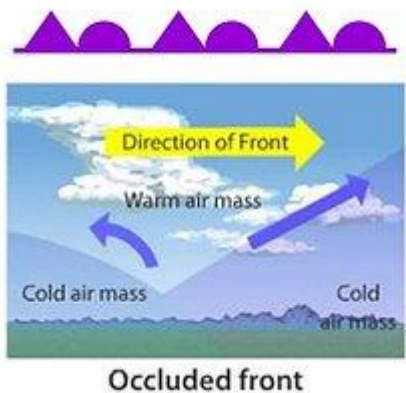
southerly or become southwesterly, and temperatures will warm rapidly with clouds clearing. With the warm air comes higher humidity too.

### 3. Stationary Front



Another type of front that can be found on a weather map is stationary in nature. In a front of this kind, neither the cold air mass nor the warm air mass is moving. Winds tend to blow along it in opposing directions on each side. Conditions along the front are clear and dry, however, if moisture is available near the front, clouds and light precipitation may develop.

### 4. Occluded Front



An occluded front occurs when a cold front overtakes a warm front. There are both cold and warm occlusions. In a cold occlusion, the colder air is found behind the front. Conversely, a warm occlusion is characterized by warmer air located behind the front. Winds are either from the east or south before the front passes. After the front, winds shift from the west or northwest.

Understanding the various types of fronts can help you know what kind of weather to expect when looking at a weather map. This knowledge can help predict where they may go and how areas near the front will be impacted regarding temperatures, winds, and precipitation.

Cyclones : Tropical and Temperate.

### Characteristics of Temperate Cyclone (Extra-Tropical Cyclones)

- The Extra-Tropical Cyclones are storm systems emerging in the mid and high latitudes, away from the tropics.
- They are low-pressure systems with associated cold fronts, warm fronts, and occluded fronts.
- These cyclones are formed along the polar front.
- In the beginning, the front is stationary.
- Extra-tropical cyclones are also known as mid-latitude storms or baroclinic storms.
- In the Northern hemisphere, cold air blows from the north of the front and warm air blows from the south.
- When the pressure descends along the front, the cold air move towards the south, and the warm air moves northwards setting in motion an anticlockwise cyclonic circulation.
- The cyclonic circulation results in a well-built extratropical cyclone, with a cold front and a warm front.
- There are pockets of warm air compressed between the forward and the rear cold air.
- The warm air climbs over the cold air and a series of clouds appear over the sky ahead of the warm front and cause rainfall.

### Major Differences between Temperate Cyclone and Tropical Cyclone

Tropical Cyclone	Temperate Cyclone
tropical cyclones, move from east to west.	These cyclones move from west to east
A tropical cyclone has an effect on a comparatively smaller area than a Temperate cyclone.	Temperate cyclone affect a much larger area
The velocity of wind in a tropical cyclone is much higher and it is more damaging.	The velocity of air is comparatively lower
Tropical Cyclone forms only on seas with temperature more than 26-27degree C and dissipate on reaching the land.	Temperate cyclones can be formed on both land and sea
A tropical cyclone doesn't last for more than 7 days	Temperate cyclone can last for a duration of 15 to 20 days

