

AIR MASSES:DEFINITIONS

- Air masses is A body of air with more-or-less uniform physical properties over horizontal distances of hundreds of kilometres
- Large unit of air in which temperature and moisture conditions are uniform at a given altitude.
- The air with distinctive characteristics in terms of temperature and humidity is called an air mass. It is a large body of air having little horizontal variation in temperature and moisture.
- An air mass is a large mass of air that has similar characteristics of temperature and humidity within it

AIR MASSES CHARACTERISTICS

- They may cover hundreds or thousands of squares miles
- It adopt the characteristic of the surface below them.
- The region from where the air masses is origination is known as source region.
- Air masses are slowly pushed along by high-level winds
- when an air mass moves over a new region, it shares its temperature and humidity with that region.

Air Mass Classification System

First Lowercase Letter:

Indicates whether air originates over an ocean or continent

m = Maritime
c = Continental

Second Uppercase Letter

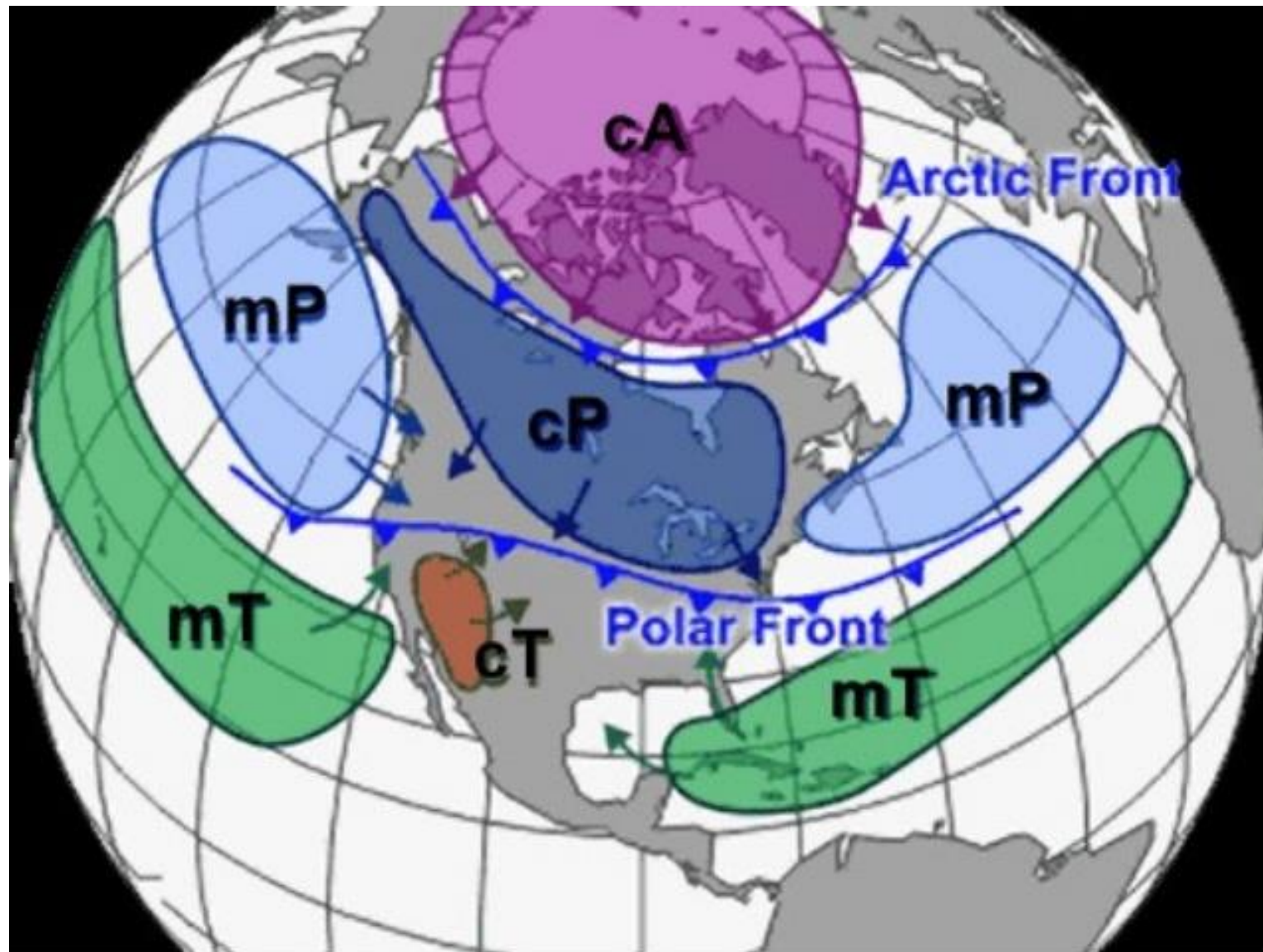
Indicates whether air originates over tropical or polar latitudes.

T = Tropics
P = Poles

From combining these four, all the air masses can be described.

Classifying Air Masses

- Using this classification scheme, there are four basic types of air masses.
 - **Continental Polar** (cP) = Dry and cool.
 - **Continental Tropical** (cT) = Dry and warm or hot.
 - **Maritime Polar** (mP) = humid and cold.
 - **Maritime Tropical** (mT) = Humid and warm.



Continental Polar Air Masses (CP)

- Source regions of these air masses are the Arctic basin, northern North America, Eurasia and Antarctica.
- These air masses are characterized by dry, cold and stable conditions.
- The weather during winter is frigid, clear and stable.

Maritime Polar Air Masses (MP)

- The source region of these air masses are the oceans between 40° and 60° latitudes.
- These are actually those continental polar air masses which have moved over the warmer oceans, got heated up and have collected moisture.
- The conditions over the source regions are cool, moist and unstable. These are the regions which cannot lie stagnant for long.
- The weather during winters is characterized by high humidity, overcast skies and occasional fog and precipitation.

Continental Tropical Air Masses (CT)

- The source-regions of the air masses include tropical and sub-tropical deserts of Sahara in Africa, and of West Asia and Australia.
- These air masses are dry, hot and stable and do not extend beyond the source.
- They are dry throughout the year.

Maritime Tropical Air Masses (MT)

- The source regions of these air masses include the oceans in tropics and sub-tropics such as Mexican Gulf, the Pacific and the Atlantic oceans.
- These air masses are warm, humid and unstable.
- The weather during winter has mild temperatures, overcast skies with fog.
- During summer, the weather is characterized by high temperatures, high humidity, cumulous clouds and convectional rainfall.

FRONTS

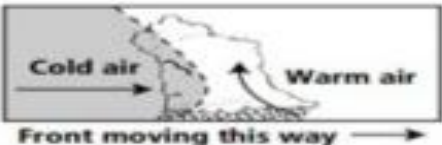

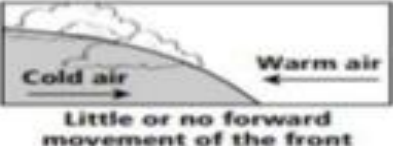



FRONT

- A weather front is a boundary separating two masses of air of different densities
- Fronts occur at the boundaries of converging air masses which come together from different parts of the world
- The two air masses don't merge readily due to the effect of the converging atmospheric circulation, relatively low diffusion coefficient and a low thermal conductivity.

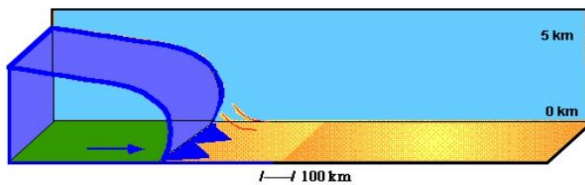
- The process of formation of a front is known as Frontogenesis
- dissipation of a front is known as Frontolysis
- Mid-latitude cyclones or temperate cyclones or extra-tropical cyclones occur due to frontogenesis.

Classification of Fronts

Type of Front	How It Forms	Weather It Brings
<p data-bbox="494 168 715 197">Cold front</p> 	<p data-bbox="927 168 1516 297">Forms when a cold air mass pushes under a warm air mass, forcing the warm air to rise.</p>	<p data-bbox="1546 168 2135 368">Thunderheads can form as the moisture in the warm air mass rises, cools, and condenses. As the front moves through, cool, fair weather is likely to follow.</p>
<p data-bbox="476 434 738 462">Warm front</p> 	<p data-bbox="927 434 1516 534">Forms when a moist, warm air mass slides up and over a cold air mass.</p>	<p data-bbox="1546 434 2135 634">As the warm air mass rises, it condenses into a broad area of clouds. A warm front brings gentle rain or light snow, followed by warmer, milder weather.</p>
<p data-bbox="430 699 784 728">Stationary front</p> 	<p data-bbox="927 699 1516 899">Forms when warm and cold air meet and neither air mass has the force to move the other. They remain <i>stationary</i>, or "standing still."</p>	<p data-bbox="1546 699 2135 899">Where the warm and cold air meet, clouds and fog form, and it may rain or snow. Can bring many days of clouds and precipitation.</p>
<p data-bbox="440 965 774 993">Occluded Front</p> 	<p data-bbox="927 965 1516 1165">Forms when a warm air mass gets caught between two cold air masses. The warm air mass rises as the cool air masses push and meet in the middle.</p>	<p data-bbox="1546 965 2135 1193">The temperature drops as the warm air mass is <i>occluded</i>, or "cut off," from the ground and pushed upward. Can bring strong winds and heavy precipitation.</p>

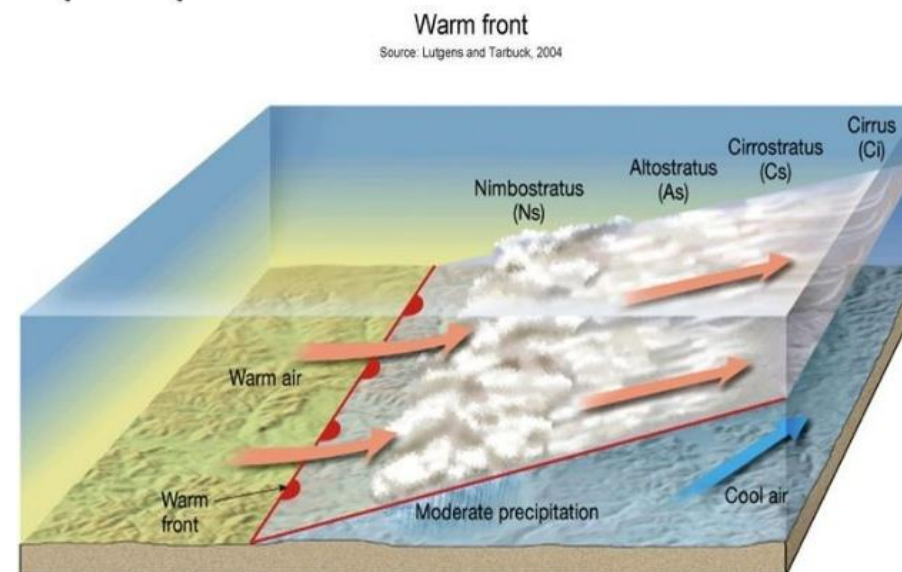
1) Cold Front

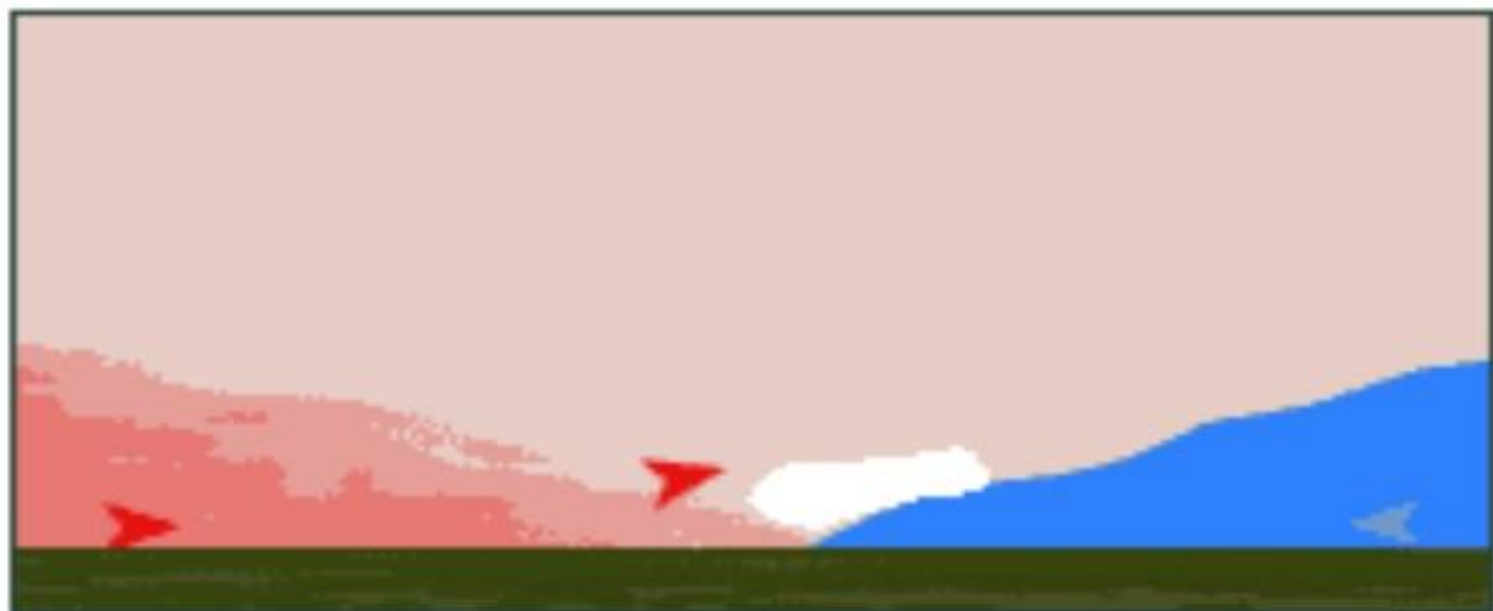
- A **cold front** occurs when a cold air mass meets and forces a warm air mass to move upward.
- Because the moving cold air is more dense, it moves under the less-dense warm air..
- Associated with cumulus & cumulonimbus
- Slopes of 1/50 to 1/150
- Cold fronts can move very fast, producing thunderstorms, heavy rain, or snow.
- Symbol -



2) Warm Front

- A **warm front** occurs when a warm air mass meets and overrides a cold air mass.
- The warm air gradually replaces the cold air.
- Slope ranges from 1/100 to 1/300.
- Generally associated with stratus type clouds, overcast skies, fog, and general rain or snow.
- This lifting is generally much more smooth and slow than a cold front.
- Warm fronts generally bring drizzly precipitation.





Warm Front

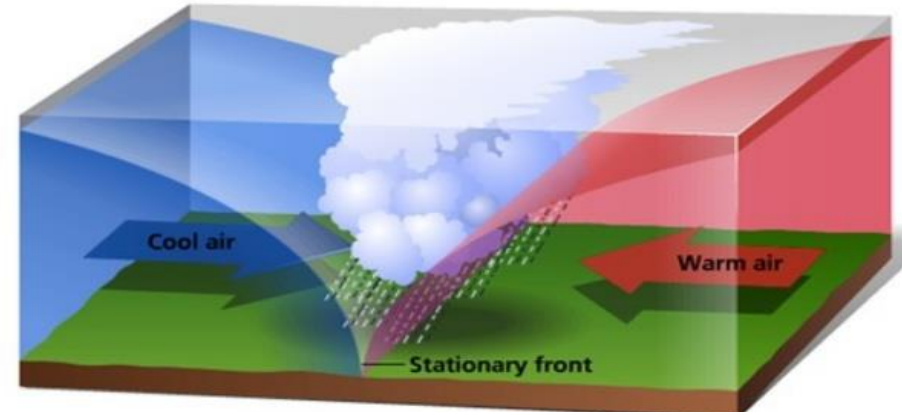
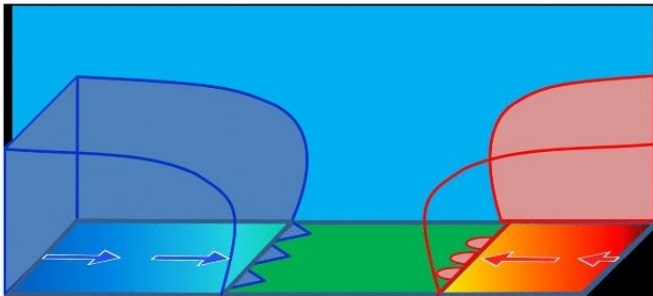
-  Cold Air
-  Warm Air
-  Warmer Air

The COMET Program

3) Stationary Front

- Sometimes cold and warm air masses meet, but neither air mass moves over or under the other. This is known as a **stationary front**.
- The wind motion on both sides of the front is parallel to the front.
- Warm or cold front stops moving, so the name stationary front.
- A stationary front can bring many days of clouds and precipitation.

• Symbol -

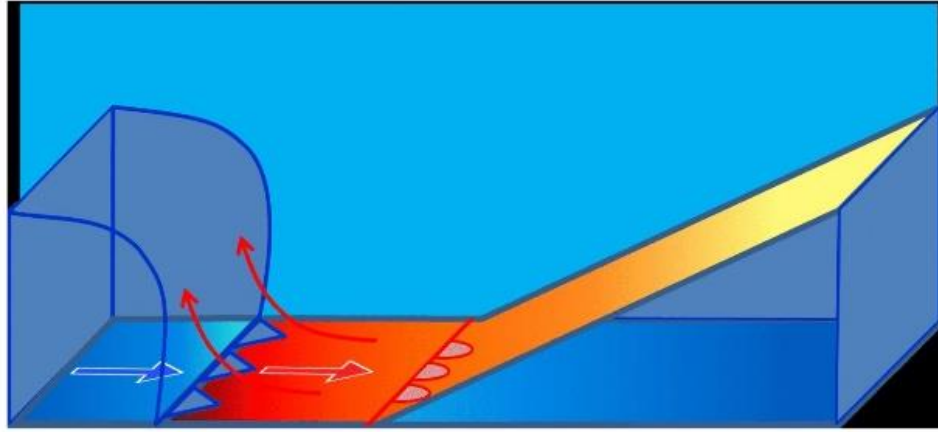


4) OCCLUDED FRONT

- A warm air mass sometimes is caught between two cooler air masses. OR a cold front catches up to a slower-moving warm front. This forms an occluded front.
- In an occluded front, the warm air mass is cut off from the ground as it is lifted above the two other air masses.
- This produces cool temperatures and large amounts of precipitation.

• Symbol -







THANK YOU