

AIR MASSES AND FRONTS

Introduction

- Look outside the window.
- Is it warm or cold? Is it sunny or raining?
- The weather around you is controlled by the movement of air masses and fronts.
- The interaction of these air masses determines what the weather will be.

Types of Air Masses

- Air masses are defined as a large body of air that has similar temperature, humidity, and pressure.
- Scientists and weather forecasters categorize air masses by their temperature and humidity.
- There are four major types of air masses in the Northern Hemisphere: maritime tropical, maritime polar, continental tropical, and continental polar.

Maritime Tropical

- Warm, humid air masses form over tropical oceans such as the Gulf of Mexico and the Atlantic Ocean near the equator.
- These are known as maritime tropical air masses.
- These masses often form thunderstorms for the eastern U.S.
- The maritime tropical masses in the Pacific are often stopped by the Rocky Mountains.

Source of Moisture

Moist Air

Source of Moisture


Maritime Polar

- Maritime polar air masses are also humid since they form over oceans, but they are much cooler.
- These masses bring cool, humid air to the northern parts of the United States.




Continental Tropical

- Air masses also move north from the equator over land.
- This is known as a continental tropical air mass.
- These air masses are warm like the maritime tropical, but they are very dry.

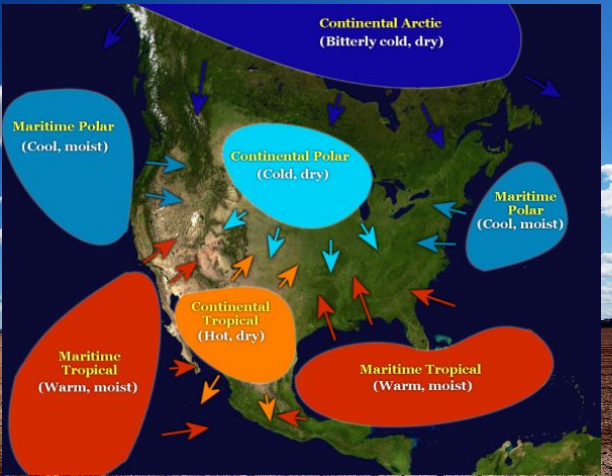


Continental Polar

- Continental Polar air masses also form over land and they are also very dry.
- The difference is that these masses are cooler than the ones coming from the south.
- These air masses are the ones that bring the bitter winter cold.



Credit: The UT at Austin

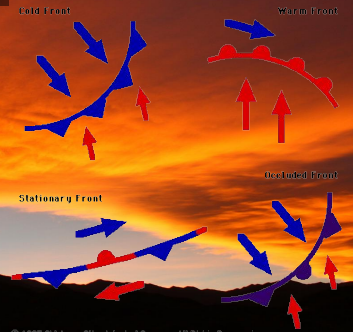


Air Masses Moving

- Air masses move about using the larger winds such as the prevailing westerlies and jet streams.
- These air masses often collide with one another on their **fronts**.
- A front is the boundary of an air mass.
- This is where storms and other severe weather develop.

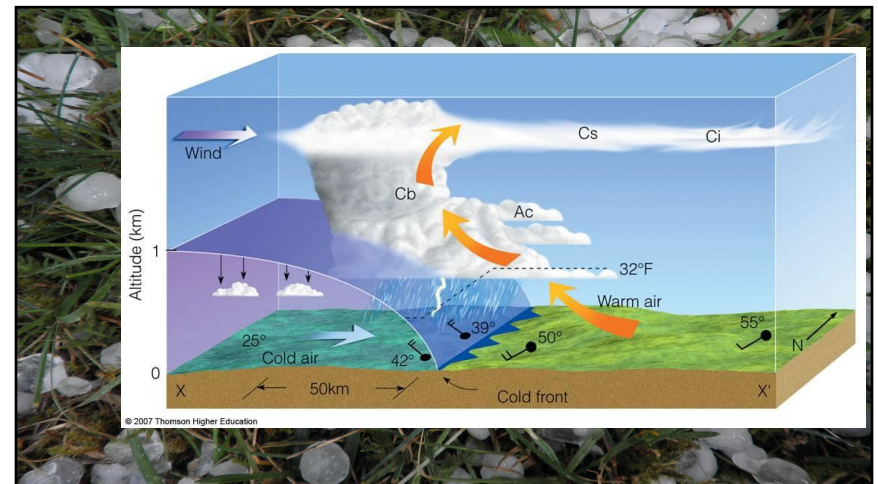
Types of Fronts

- Air masses can form different kinds of fronts such as a **cold front**, **warm front**, **stationary front**, and **occluded front**.
- Weather forecasters use different symbols for each kind of front.



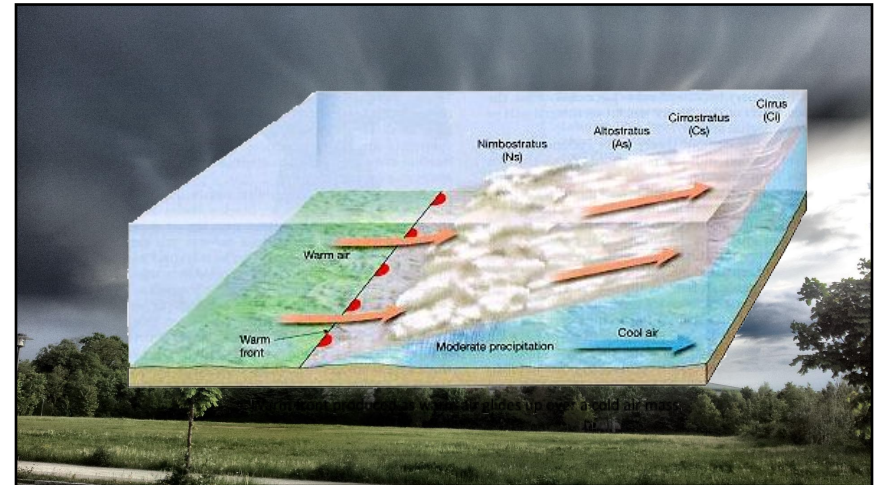
Cold Fronts

- As you have learned before cold air is dense and it sinks.
- Warm air is less dense and tends to rise.
- When a cold front meets a warm front it is often overtaken by the warm front.
- The warm front overtakes the quickly moving cold front and forces the cold front closer to the ground.



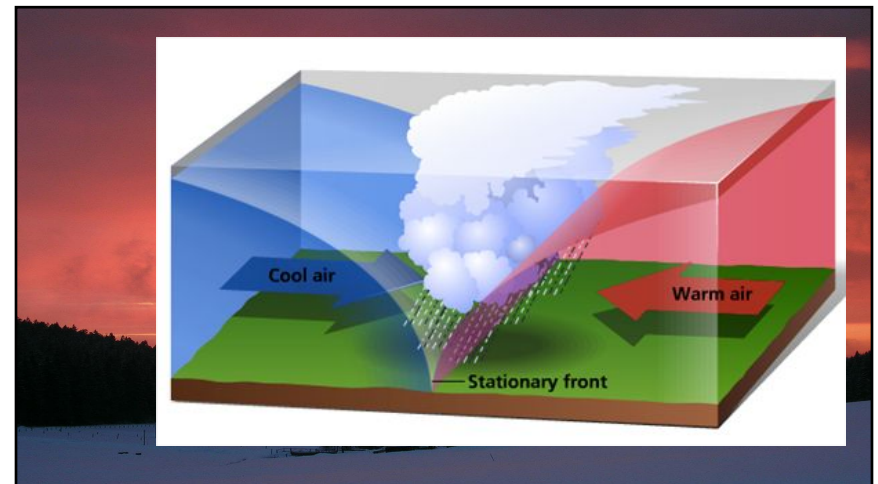
Warm Fronts

- A warm front occurs when a moving mass of warm air overtakes a slower moving cooler air.
- This front typically does not bring severe weather with it.
- It is likely to bring fair weather with higher humidity.



Stationary Fronts

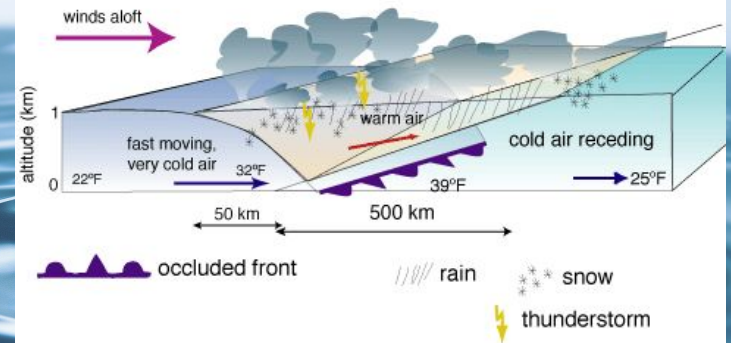
- Sometimes warm and cold fronts meet and they cannot pass each other.
- This puts the fronts at a stand still and neither can move.
- This is known as a stationary front.
- A stationary front can bring a lot of days of clouds and light rain.



Occluded Fronts

- Occluded fronts are the most complex type of front.
- This happens when a warm air mass is caught between two cooler fronts.
- The two cooler masses sink under the warm mass and sometimes mix.
- The warm air mass is occluded (or cut off) from the surface.

Principal Features of an Occluded Front

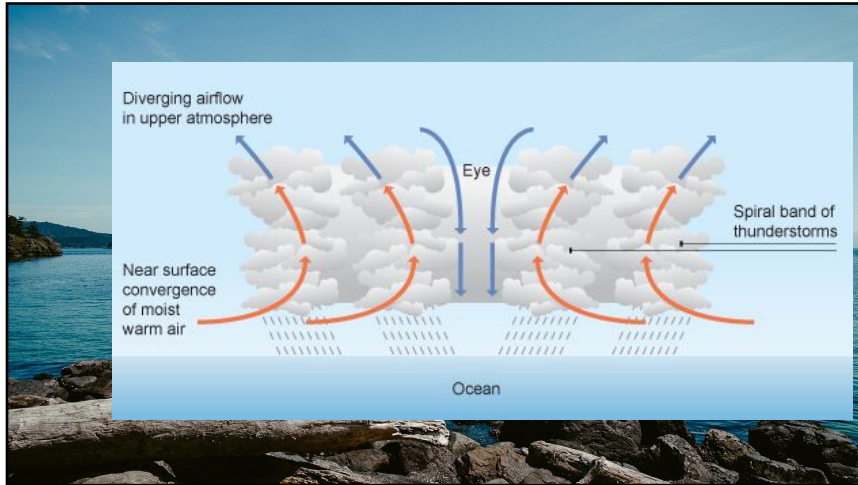


When Fronts Collide...

- When the fronts collide they can often become distorted.
- This distortion is often caused by jet streams or surface features like rivers and mountains.
- This causes bends to occur and in these bends winds can begin to swirl and cause cyclones.

Cyclones

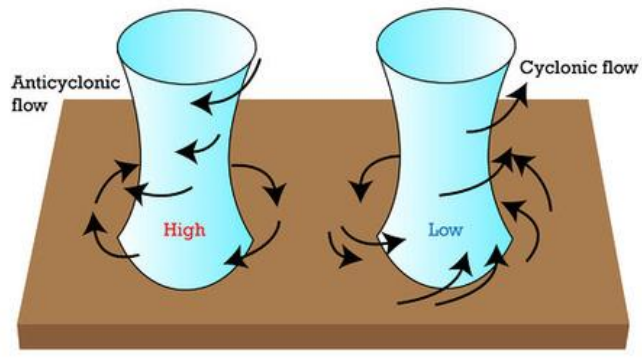
- A cyclone is a swirling center of lower air pressure.
- The warm air at the center of a cyclone rises while the air on the outside of the cyclone sinks.
- Cyclones in the upper hemisphere spin counterclockwise.
- Cyclones bring severe thunderstorms and possible tornadoes.



Anticyclones

- An anticyclone is the opposite of a cyclone.
- Anticyclones are areas of high pressure, dry air.
- Winds spiral outward from the center.
- The effects from an anticyclone cause dry, clearer weather.

Cyclone and Anticyclone



Review Questions

- What two factors do scientists use to describe air masses?
- What are the major types of air masses?
- What are the four major types of fronts?
- **Critical thinking:** What type of front(s) would be responsible for days and days of cloud cover?



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