



Commercial Pilot Ground School

Day 3
Meteorology



Agenda

- Weather Factors
- Weather Hazards
- Printed Weather Reports and Forecasts
- Graphic Weather Products
- Sources of Weather Information

Weather Theory

Weather is an important factor that influences aircraft performance and flying safety.



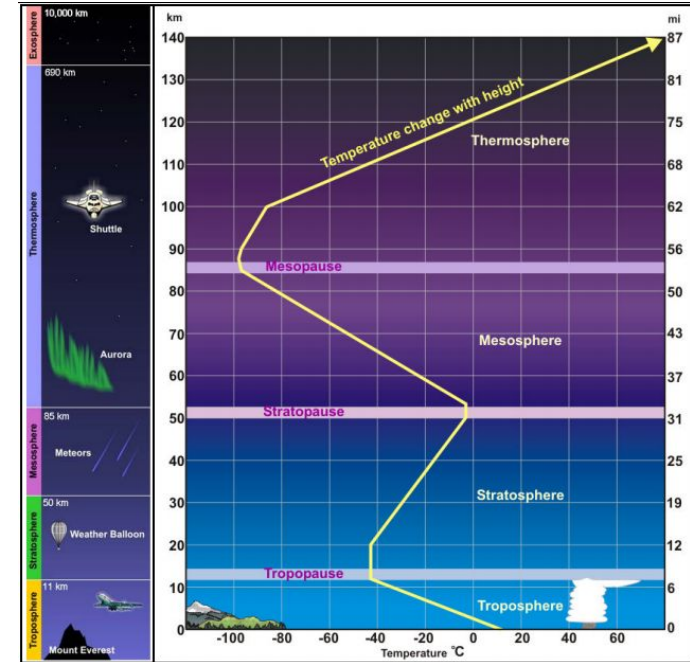
The Atmosphere

- The mixture of gases that support life on earth is atmosphere.
- Though this protective blanket is essential to life on earth, it is extraordinarily thin – nearly 99% of the atmosphere exists within 30 kilometers (about 100,000 feet) of the surface.



The Atmosphere: Layers

- The first layer, known as the troposphere, extends from 6 to 20 kilometers (km) (4 to 12 miles) over the northern and southern poles and up to 48,000 feet (14.5 km) over the equatorial regions.
- At the top of the troposphere is a boundary known as the tropopause, which traps moisture and the associated weather in the troposphere.
- Location of the tropopause is important because it is commonly associated with the location of the jet stream and possible clear air turbulence.
- Above the tropopause are three more atmospheric levels. The first is the stratosphere, mesosphere and thermosphere.



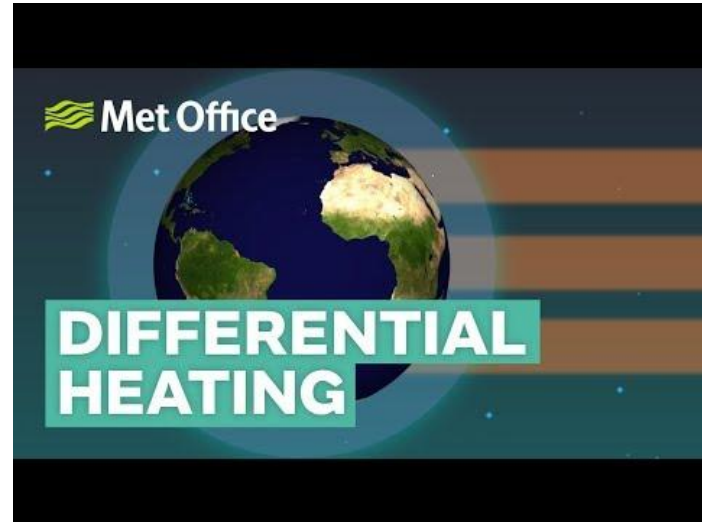
The Atmosphere: Composition

In any given volume of air, nitrogen accounts for 78 percent of the gases that comprise the atmosphere, while oxygen makes up 21 percent. Argon, carbon dioxide, and traces of other gases make up the remaining one percent. This volume of air also contains some water vapor, varying from zero to about five percent by volume. This small amount of water vapor is responsible for major changes in the weather.



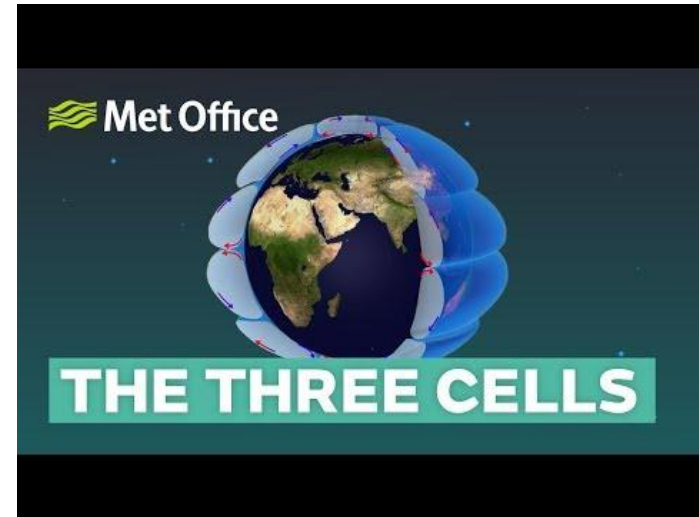
Differential Heating

- Before we understand atmospheric circulation, we need to know what is differential heating.
- The major source of all weather is the sun.
- Changes or variations of weather patterns are caused by the unequal heating of the Earth's surface.
- Every physical process of weather is accompanied by or is a result of unequal heating of the Earth's surface.



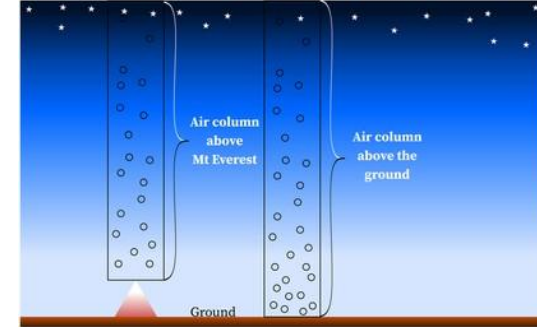
Atmospheric Circulation

- The warmer air has a tendency to rise (low pressure) and colder air has a tendency to settle or descend (high pressure) and replace the rising warmer air.
- The unequal heating of the Earth's atmosphere creates a large air-cell circulation pattern (wind), also known as the convection cycle.
- The simple convection cycle gets divided into 3 different cells: Hadley, Ferrel and Polar

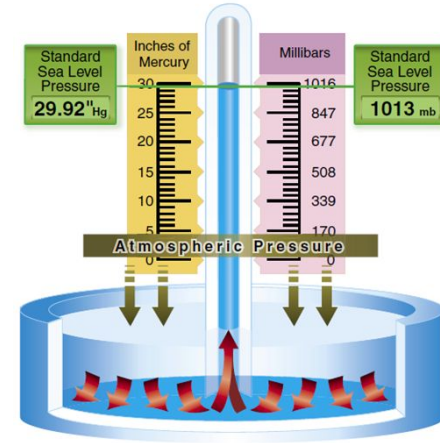


Atmospheric Pressure

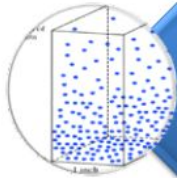
- The unequal heating of the surface not only modifies air density and creates circulation patterns, it also causes changes in pressure.
- Simply put, atmospheric pressure is the force exerted by atmosphere per unit area at a given point on earth.
- Atmospheric pressure is typically measured in inches of mercury ("Hg) by a mercurial barometer.
- To provide a common reference for temperature and pressure the ISA has been established.
- Standard sea level pressure is defined as 29.92 in. Hg at 15 C.
- Atmospheric pressure is also reported in millibars, with 1 inch of mercury equaling 34 millibars and standard sea level equaling 1013.2 millibars.



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Atmospheric Pressure



At sea level, the atmosphere exerts pressure on Earth at a force of 14.7 pound per square inch.

- Means a column of air 1 – inch square, extending from the surface up to the upper atmospheric limit, weights about 14.7 pounds.



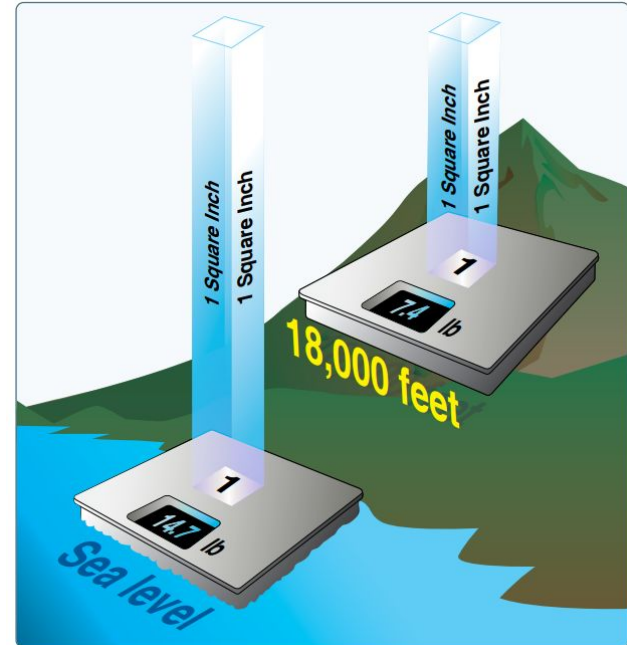
A person standing at sea level also experiences the pressure of the atmosphere

- The pressure is not a downward force, but rather a force of pressure over the entire surface of the skin.



The actual pressure at a given place and time will differ with altitude, temperature, and density of the air.

- These conditions affect aircraft performance, especially with regard to takeoff, rate of climb and landings.

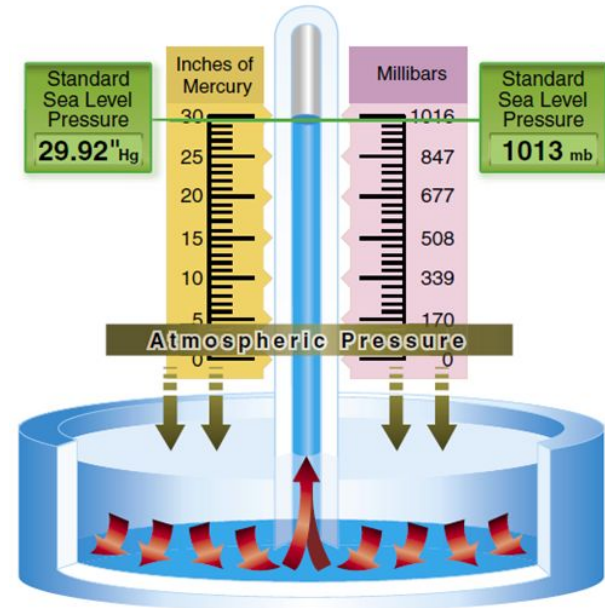


Atmospheric Pressure: How is it measured?

Atmospheric pressure is typically measured in inches of mercury ("Hg) by a mercurial barometer. The barometer measures the height of a column of mercury inside a glass tube.

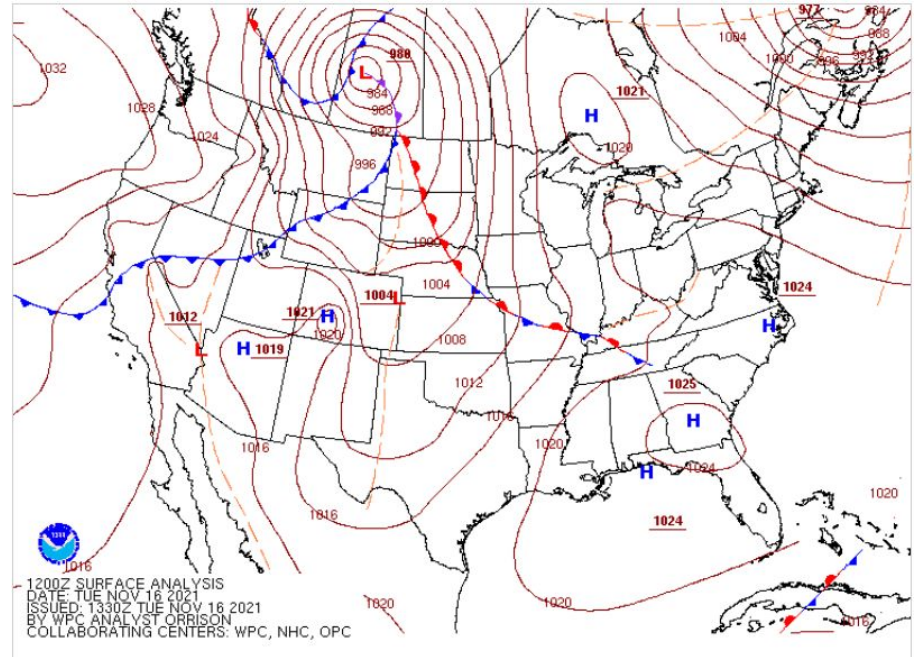
A section of the mercury is exposed to the pressure of the atmosphere, which exerts a force on the mercury. An increase in pressure forces the mercury to rise inside the tube.

When the pressure drops, mercury drains out of the tube, decreasing the height of the column. This type of barometer is typically used in a laboratory or weather observation station, is not easily transported, and difficult to read.



Atmospheric Pressure

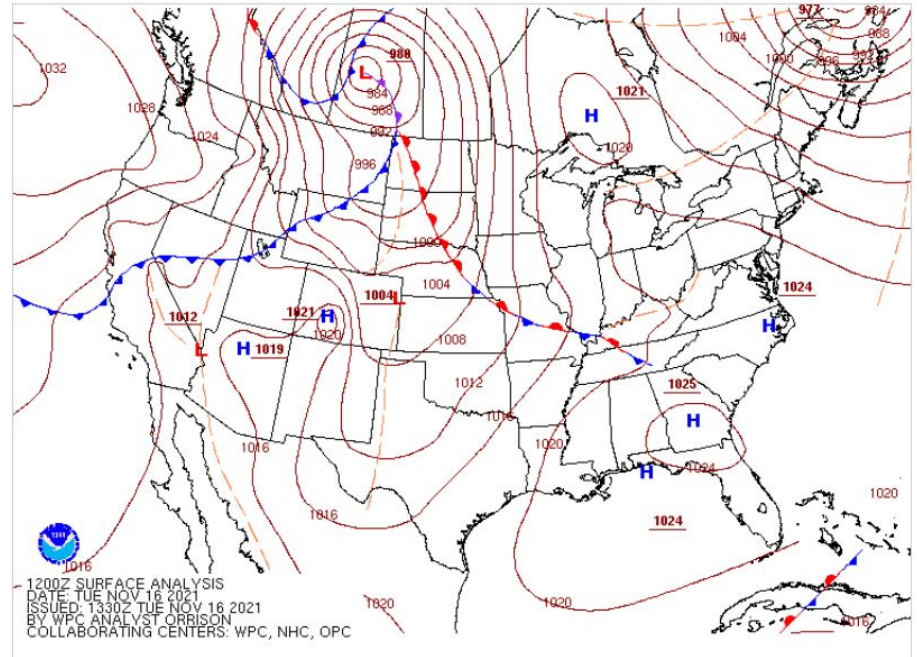
- **Isobar:** Isobars are lines drawn on the chart to depict lines of equal pressure. These lines result in a pattern that reveals the pressure gradient or change in pressure over distance
- **Pressure Gradient:** Slope of pressure change over distance
- **High and Low**
- **Ridge:** Elongated area of high pressure
- **Trough:** Elongated area of low pressure



Atmospheric Pressure

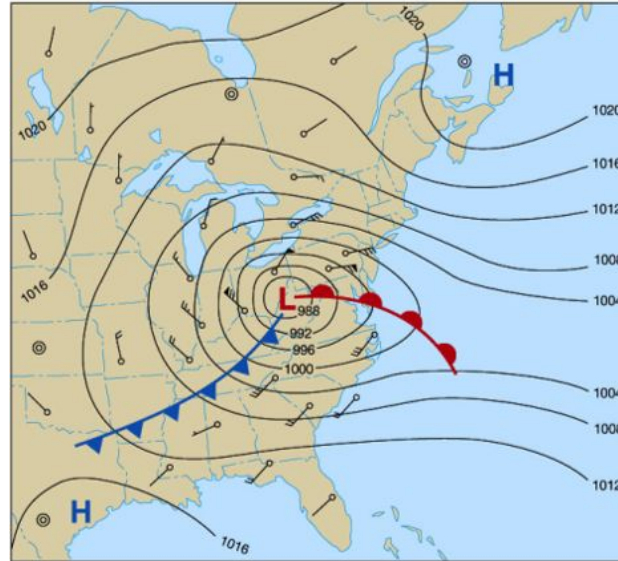
Pressure Gradient Force:

- The force created by the difference in pressure between the high pressure and low pressure.
- This force drive the winds.
- The strength of the pressure gradient force can be determined by looking at the proximity of the isobars on a surface analysis chart.



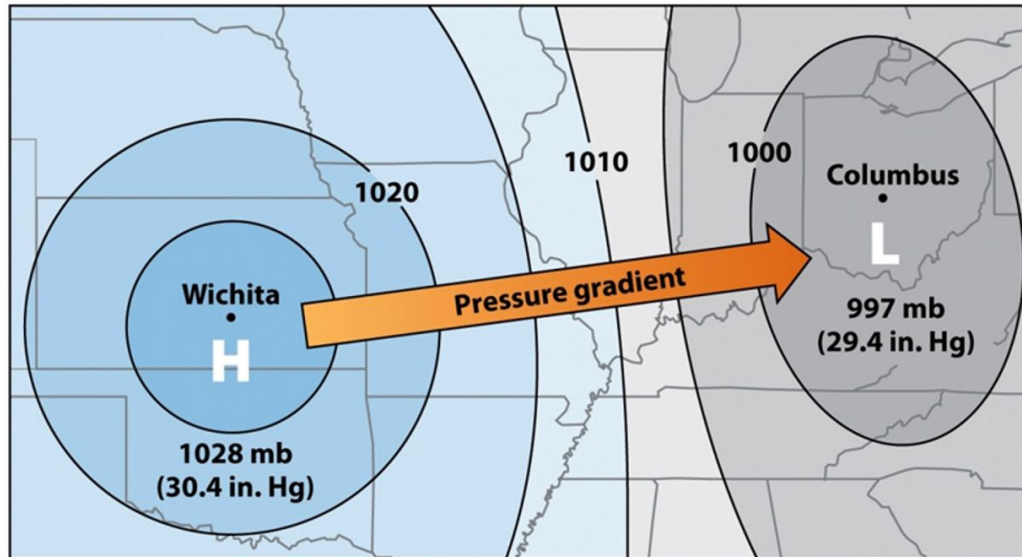
Weather Factors

Changes in *air density* result in changes in *air pressure* which forms a **pressure gradient**



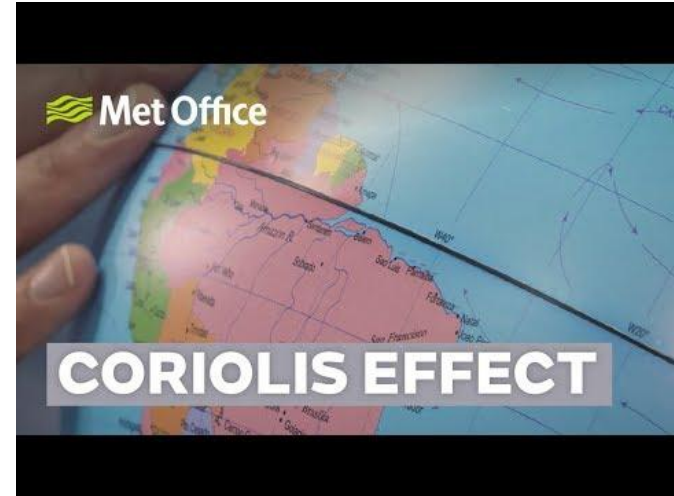
Weather Factors

- Pressure—in general—flows from areas of high pressure to low pressure
- If this was the *only* thing that was true about weather, where would the wind *always* blow?

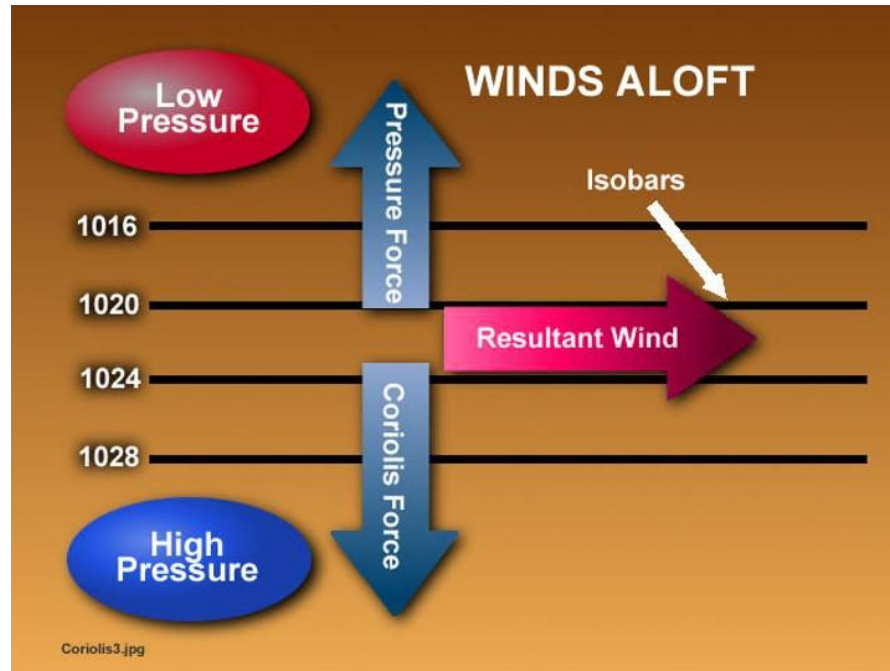


Winds: Coriolis Force And Frictional Force

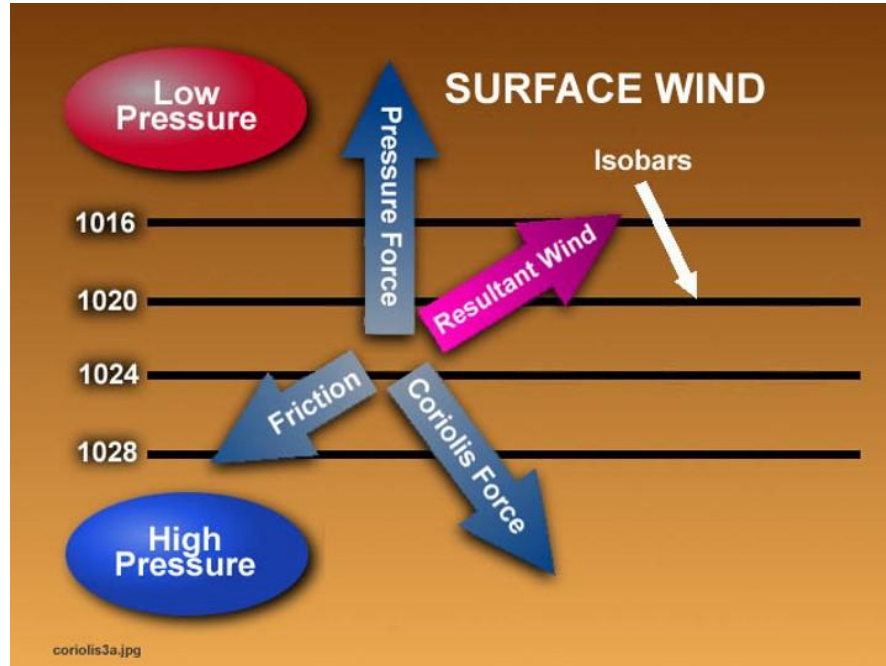
- The force created by the rotation of the Earth is known as the Coriolis force. This force is not perceptible to humans as they walk around because humans move slowly and travel relatively short distances compared to the size and rotation rate of the Earth.
- However, the Coriolis force significantly affects motion over large distances, such as an air mass or body of water. The Coriolis force deflects air to the right in the Northern Hemisphere, causing it to follow a curved path instead of a straight line. The amount of deflection differs depending on the latitude.
- **Frictional Force:** This force affects the movement of wind closer to the ground (within 2000 ft AGL). It slows down the winds.



Wind Forces

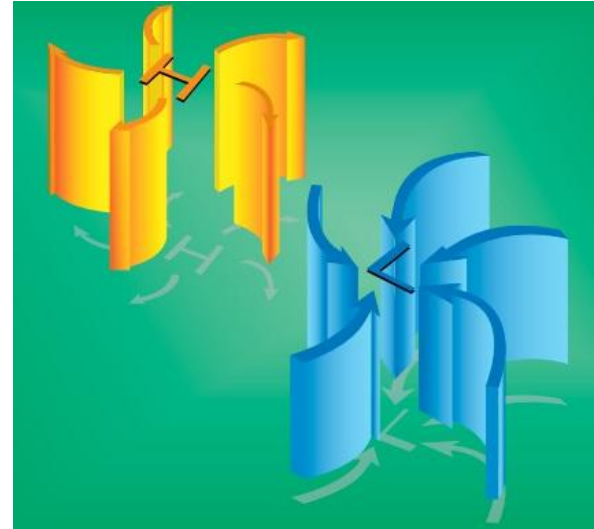


Wind Forces



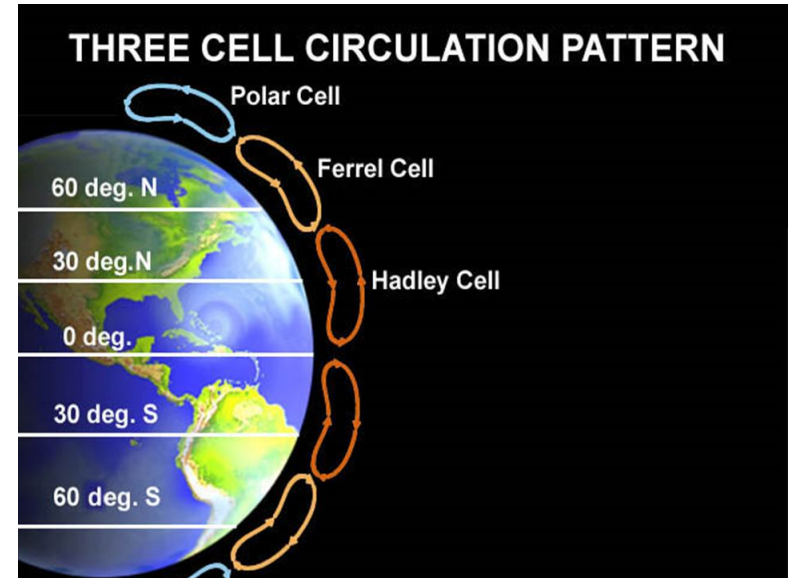
Wind and Currents

- In the Northern Hemisphere, the flow of air from areas of high to low pressure is deflected to the right and produces a clockwise circulation around an area of high pressure. This is known as anticyclonic circulation.
- The opposite is true of low-pressure areas; the air flows toward a low and is deflected to create a counterclockwise or cyclonic circulation.



Global Winds Patterns

- The Coriolis force causes the general flow to break up into three distinct cells in each hemisphere. In the Northern Hemisphere, the warm air at the equator rises upward from the surface, travels northward, and is deflected eastward by the rotation of the Earth. By the time it has traveled one-third of the distance from the equator to the North Pole, it is no longer moving northward, but eastward.
- This air cools and sinks in a belt-like area at about 30° latitude, creating an area of high pressure as it sinks toward the surface. Then, it flows southward along the surface back toward the equator. Coriolis force bends the flow to the right, thus creating the northeasterly trade winds that prevail from 30° latitude to the equator.
- Similar forces create circulation cells that encircle the Earth between 30° and 60° latitude and between 60° and the poles. This circulation pattern results in the prevailing upper level westerly winds in the conterminous United States.

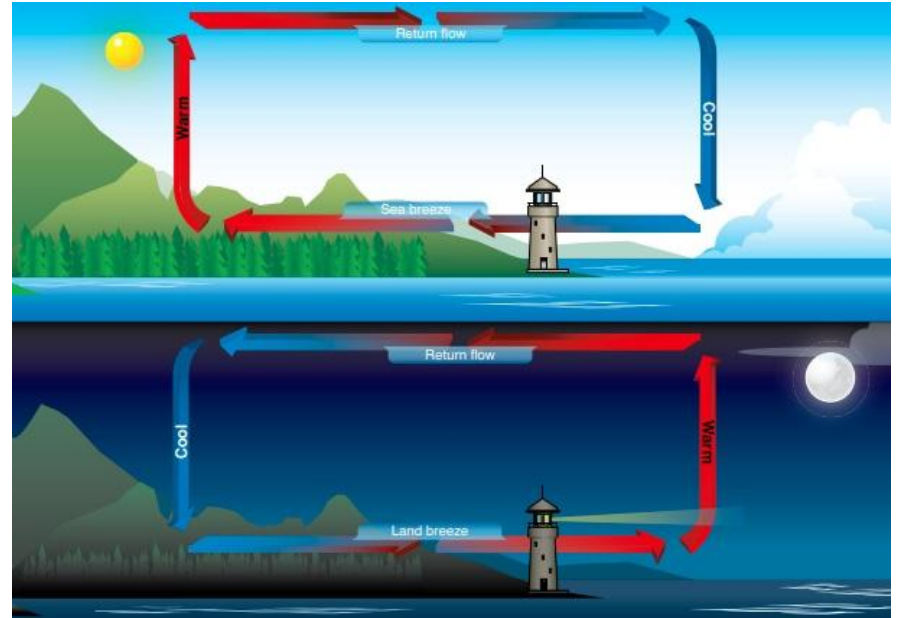


Local Wind Patterns

There are 4 types of local winds we have discussed in class.

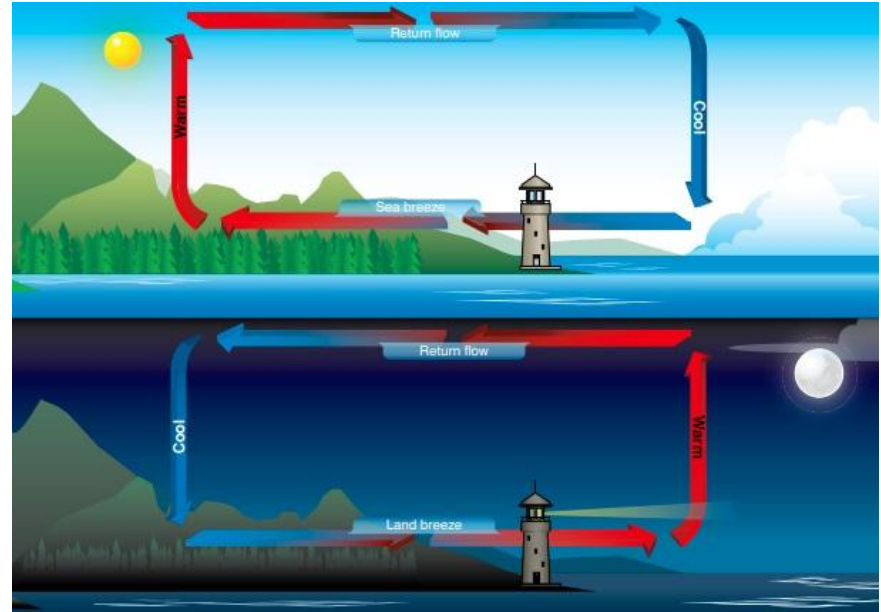
- Sea breezes
- Land breezes
- Mountain breezes
- Valley breezes

The same rule for naming applies to local winds. We name a breeze/wind after the source it originates from.



Sea Breeze And Land Breeze

- Convective currents are particularly noticeable in areas with a land mass directly adjacent to a large body of water, such as an ocean, large lake, or other appreciable area of water. During the day, land heats faster than water, so the air over the land becomes warmer and less dense. It rises and is replaced by cooler, denser air flowing in from over the water. This causes an onshore wind called a sea breeze.
- Conversely, at night land cools faster than water, as does the corresponding air. In this case, the warmer air over the water rises and is replaced by the cooler, denser air from the land, creating an offshore wind called a land breeze.
- Similar phenomenon is observed between mountains and valleys.



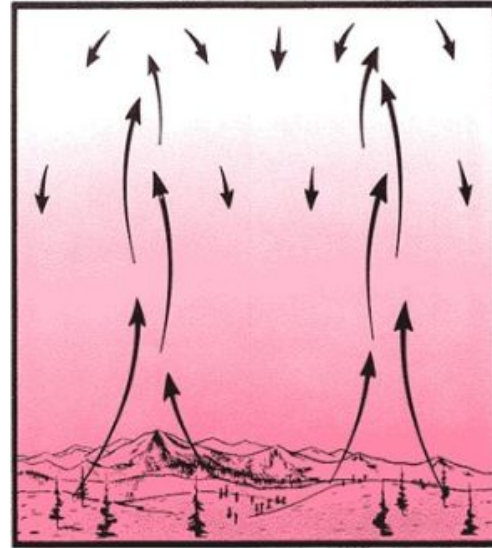
Weather Patterns

Weather is an important factor that influences aircraft performance and flying safety



Atmospheric Stability

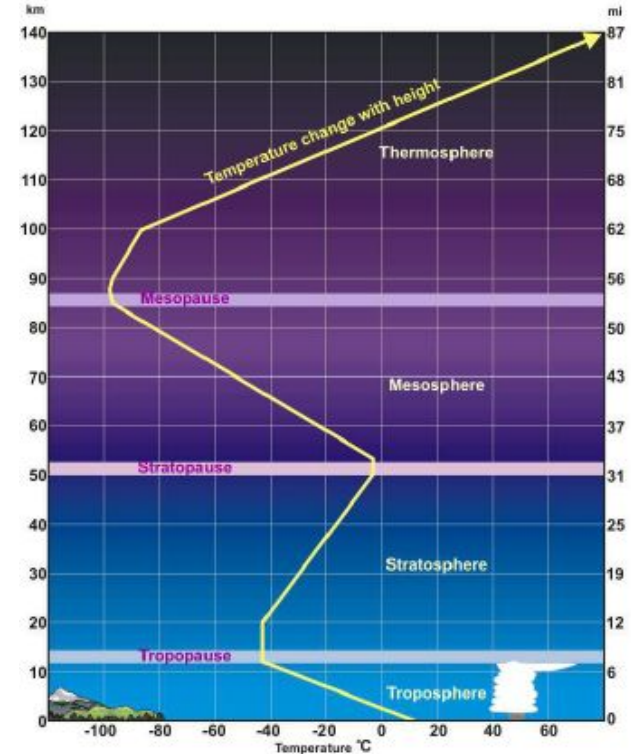
- Stability is the atmosphere's resistance to vertical motion. A stable atmosphere does not necessarily prevent air from moving vertically, but it does make that movement more difficult.
- In most cases, the vertical motions present in a stable environment are very small, resulting in a generally smooth airflow. In an unstable atmosphere, convection is the rule.
- Overall, the combined effects of temperature and moisture determine the stability of the air and, to a large extent, the type of weather produced.



Convection is a process by which air is lifted in the atmosphere. Surface heating during the daytime makes the surface layer of air unstable. After its initial inertia is overcome, the air is forced upward by the more dense surrounding air.

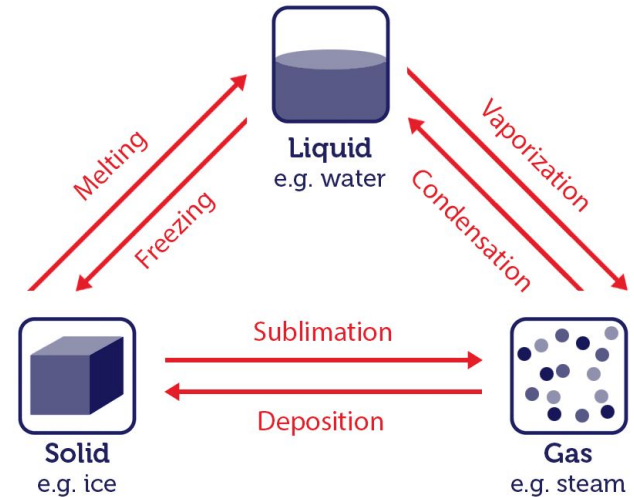
Temperature Inversions

- As air rises and expands in the atmosphere, the temperature decreases. There is an atmospheric anomaly that can occur; however, that changes this typical pattern of atmospheric behavior. When the temperature of the air rises with altitude, a temperature inversion exists.
- Inversions are usually confined to fairly shallow layers and may occur near the surface or at higher altitudes. They act as a lid for weather and pollutants.
- Temperature Lapse Rate
- Common reasons for inversions:
 - Cooling From Below
 - Cool Air Forced Under Warm Air
 - Warm Air Pushed Over Cool Air



Moisture

- The atmosphere, by nature, contains moisture in the form of water vapor. The amount of moisture present in the atmosphere is dependent upon the temperature of the air.
- **Three states of water:** water is present in the atmosphere in three states: solid, liquid, and gas. All three states are found within the temperature ranges normally encountered in the atmosphere, and the change from one to another happens readily. Changes in state occur through the processes of evaporation, condensation, sublimation, deposition, melting, and freezing. As water changes from one physical state to another, an exchange of heat takes place.



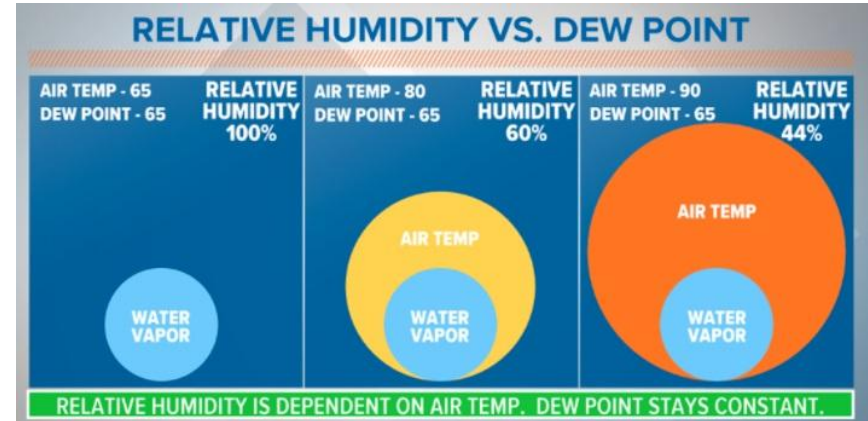
Moisture: Humidity And Relative Humidity

- **Humidity** simply refers to moisture in the air.
- **Relative humidity** is the actual amount of moisture in the air compared to the total amount that could be present at that temperature.
- **Saturation:** Condition of the atmosphere when the relative humidity becomes 100%.
- **Dewpoint:** Temperature at which the relative humidity becomes 100%.



Temperature/Dew Point Relationship

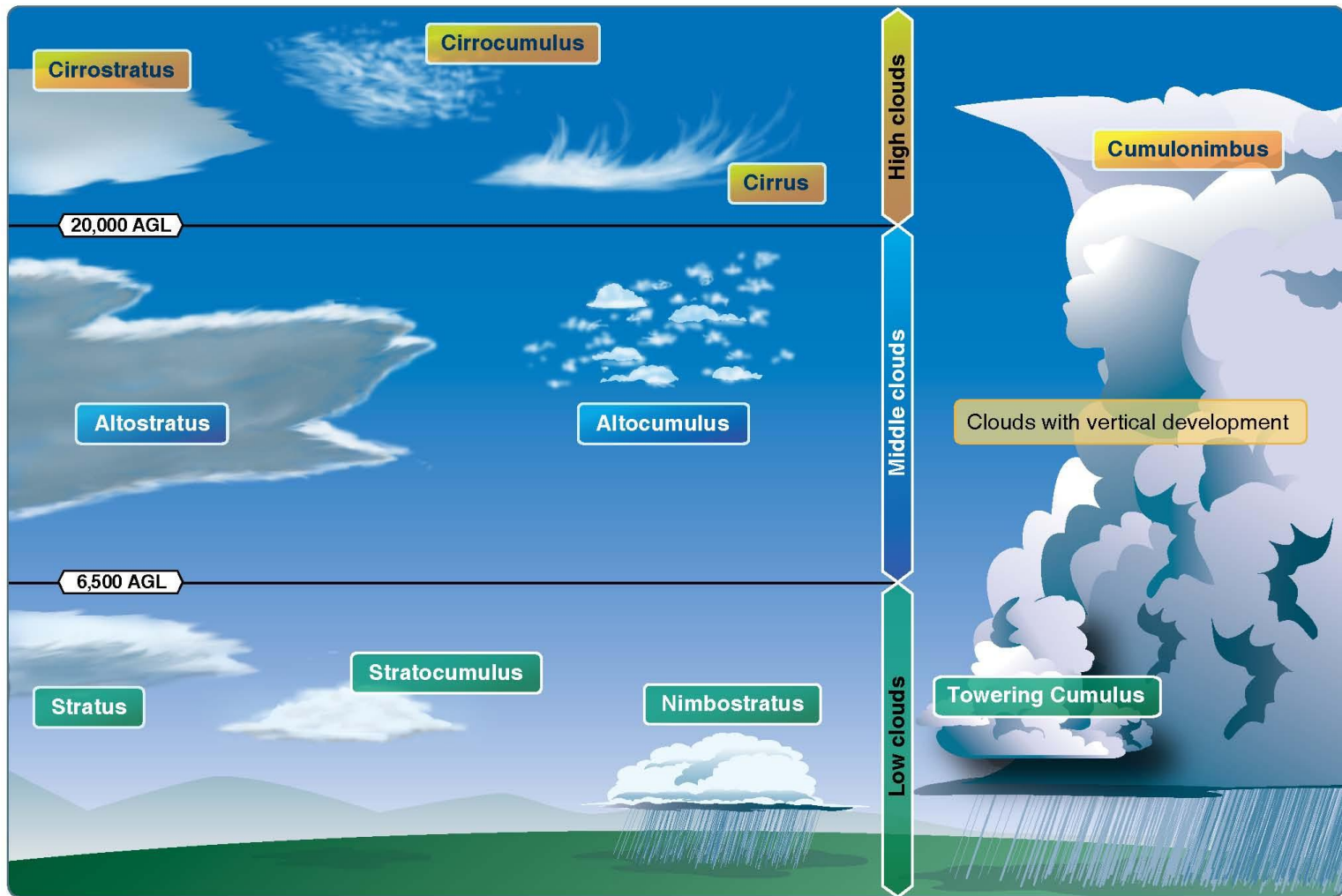
- The relationship between dewpoint and temperature defines the concept of relative humidity. The dew point, given in degrees, is the temperature at which the air can hold no more moisture.
- When the temperature of the air is reduced to the dew point, the air is completely saturated and moisture begins to condense out of the air in the form of fog, dew, frost, clouds, rain, or snow.



Dew And Frost

- On cool, clear, calm nights, the temperature of the ground and objects on the surface can cause temperatures of the surrounding air to drop below the dew point.
- When this occurs, the moisture in the air condenses and deposits itself on the ground, buildings, and other objects like cars and aircraft. This moisture is known as dew and sometimes can be seen on grass and other objects in the morning.
- If the temperature is below freezing, the moisture is deposited in the form of frost.

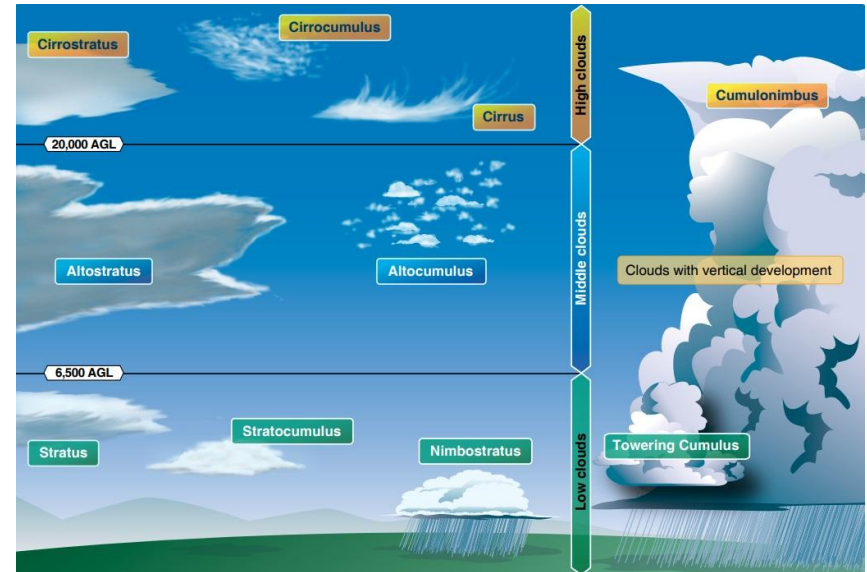




Clouds

As air cools to its saturation point, condensation changes invisible water vapor to a visible state. Most commonly, this visible moisture takes the form of clouds or fog.

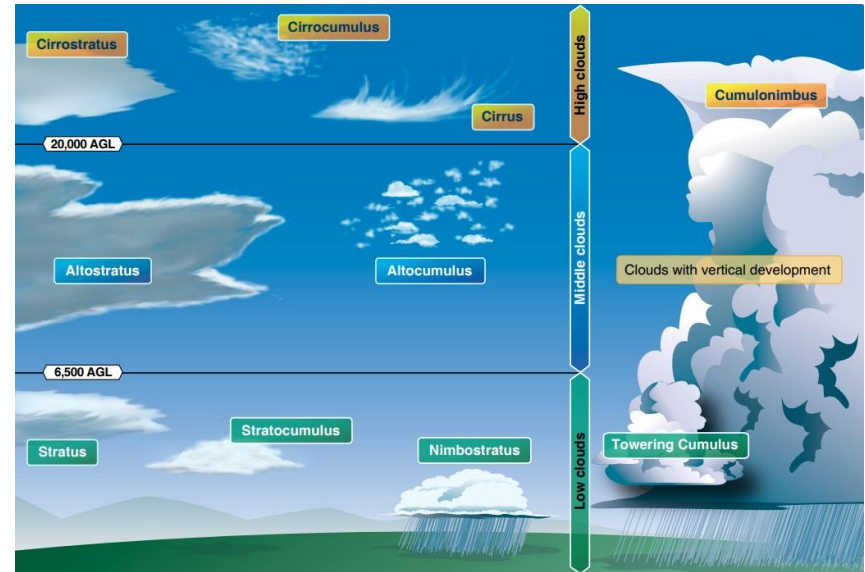
Clouds are composed of very small droplets of water or, if the temperature is low enough, ice crystals. Condensation is facilitated by condensation nuclei, which can be dust, salt from evaporating sea spray, or products of combustion.



Clouds: Types

Clouds are divided into four basic groups, or families, depending upon their characteristics and the altitudes where they occur. These are low, middle, high, and clouds with vertical development.

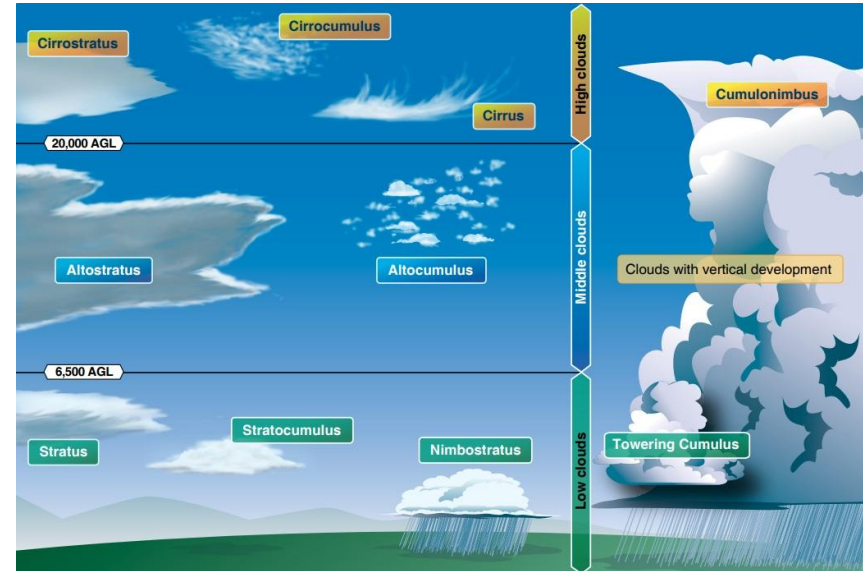
Cloud names are based on the terms, cumulus (heap), stratus (layer), nimbus (rain), and cirrus (ringlet). The prefixes alto and cirro denote cumulus and stratus clouds from the middle and high families, respectively. The prefix nimbo and the suffix nimbus denote clouds that produce rain.



Clouds: Types

Low Clouds

Low clouds are those that form near the Earth's surface and extend up to about 6,500 feet AGL. They are made primarily of water droplets but can include supercooled water droplets that induce hazardous aircraft icing. Typical low clouds are stratus, stratocumulus, and nimbostratus. Fog is also classified as a type of low cloud formation. Clouds in this family create low ceilings, hamper visibility, and can change rapidly. Because of this, they influence flight planning and can make visual flight rules (VFR) flight impossible.



Fog

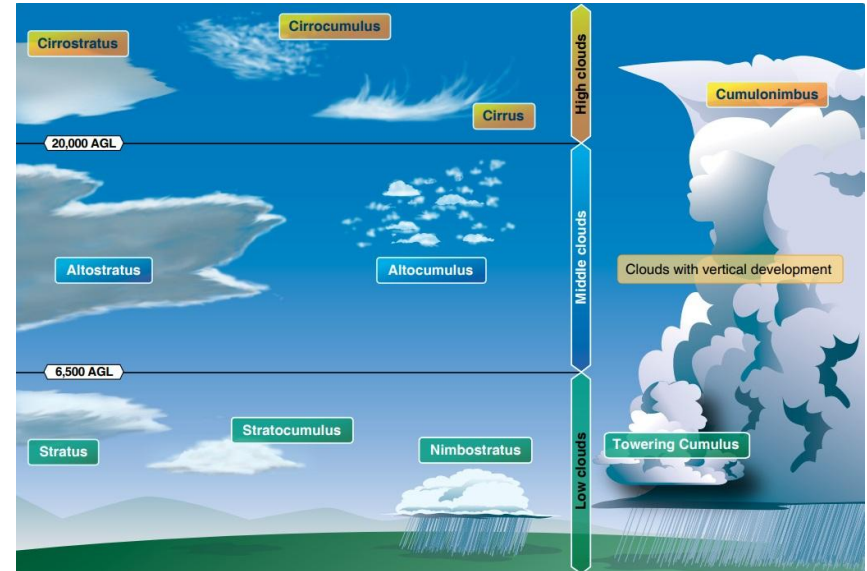
- Fog is a cloud that is on the surface.
- It typically occurs when the temperature of air near the ground is cooled below the dew point.
- At this point, water vapor in the air condenses and becomes visible in the form of fog.
- Types Of Fog:
 - Radiation
 - Steam
 - Upslope
 - Advection
 - Precipitation Induced



Clouds: Types

Middle Clouds

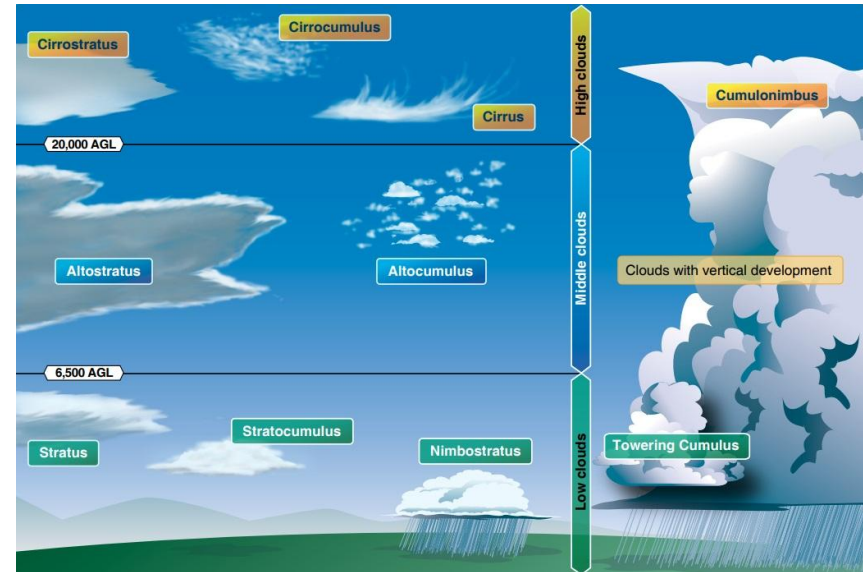
Middle clouds form around 6,500 feet AGL and extend up to 20,000 feet AGL. They are composed of water, ice crystals, and supercooled water droplets. Typical middle-level clouds include altostratus and altocumulus. These types of clouds may be encountered on cross-country flights at higher altitudes. Altostratus clouds can produce turbulence and may contain moderate icing. Altocumulus clouds, which usually form when altostratus clouds are breaking apart, also may contain light turbulence and icing.



Clouds: Types

High Clouds

High clouds form above 20,000 feet AGL and usually form only in stable air. They are made up of ice crystals and pose no real threat of turbulence or aircraft icing. Typical high level clouds are cirrus, cirrostratus, and cirrocumulus.

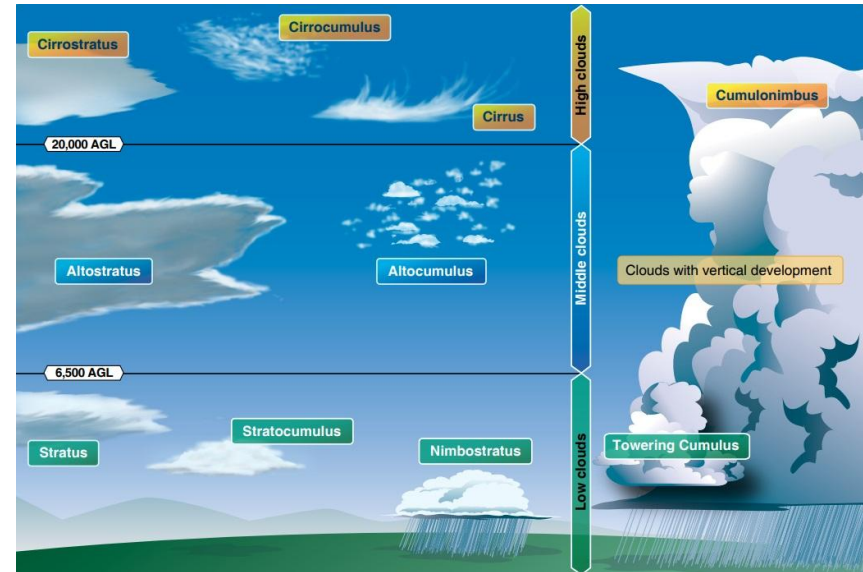


Clouds: Types

Clouds With Vertical Development

Clouds with extensive vertical development are cumulus clouds that build vertically into towering cumulus or cumulonimbus clouds. The bases of these clouds form in the low to middle cloud base region but can extend into high altitude cloud levels.

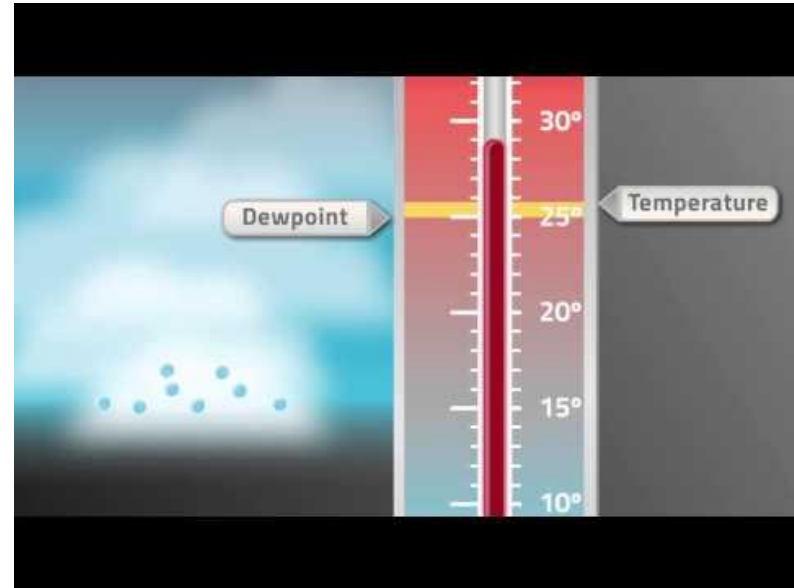
Towering cumulus clouds indicate areas of instability in the atmosphere, and the air around and inside them is turbulent. These types of clouds often develop into cumulonimbus clouds or thunderstorms. Cumulonimbus clouds contain large amounts of moisture and unstable air and usually produce hazardous weather phenomena, such as lightning, hail, tornadoes, gusty winds, and wind shear.



Cloud Bases

As moist, unstable air rises, clouds often form at the altitude where temperature and dew point reach the same value. When lifted, unsaturated air cools at a rate of 5.4°F per 1,000 feet and the dew point temperature decreases at a rate of 1°F per 1,000 feet. This results in a convergence of temperature and dew point at a rate of 4.4°F .

More: <https://e6bx.com/cloud-base/>



Precipitation

- Precipitation refers to any type of water drops that form in the atmosphere and fall to the ground. It has a profound impact on flight safety.
- Depending on the form of precipitation, it can reduce visibility, create icing conditions, and affect landing and takeoff performance of an aircraft.
- Precipitation occurs because water or ice particles in clouds grow in size until the atmosphere can no longer support them. It can occur in several forms as it falls toward the Earth, including drizzle, rain, ice pellets, hail, snow, and ice.



Precipitation: Drizzle and Rain

- Drizzle is classified as very small water droplets, smaller than 0.02 inches in diameter. Drizzle usually accompanies fog or low stratus clouds. Water droplets of larger size are referred to as rain. Rain that falls through the atmosphere but evaporates prior to striking the ground is known as virga.
- Freezing rain and freezing drizzle occur when the temperature of the surface is below freezing; the rain freezes on contact with the cooler surface.



Precipitation: Ice Pellets and Hail

- If rain falls through a temperature inversion, it may freeze as it passes through the underlying cold air and fall to the ground in the form of ice pellets.
- Ice pellets are an indication of a temperature inversion and that freezing rain exists at a higher altitude.
- In the case of hail, freezing water droplets are carried up and down by drafts inside cumulonimbus clouds, growing larger in size as they come in contact with more moisture. Once the updrafts can no longer hold the freezing water, it falls to the Earth in the form of hail.



Precipitation: Snow

Snow is precipitation in the form of ice crystals that falls at a steady rate or in snow showers that begin, change in intensity, and end rapidly.

Snow also varies in size, from very small grains to large flakes. Snow grains are the equivalent of drizzle in size.



Air Masses & Fronts

- Air masses are large bodies of air that take on the characteristics of the surrounding area or source region.
- As an air mass moves across bodies of water and land, it eventually comes in contact with another air mass with different characteristics.
- The boundary layer between two types of air masses is known as a front.
- An approaching front of any type always means changes to the weather are imminent.

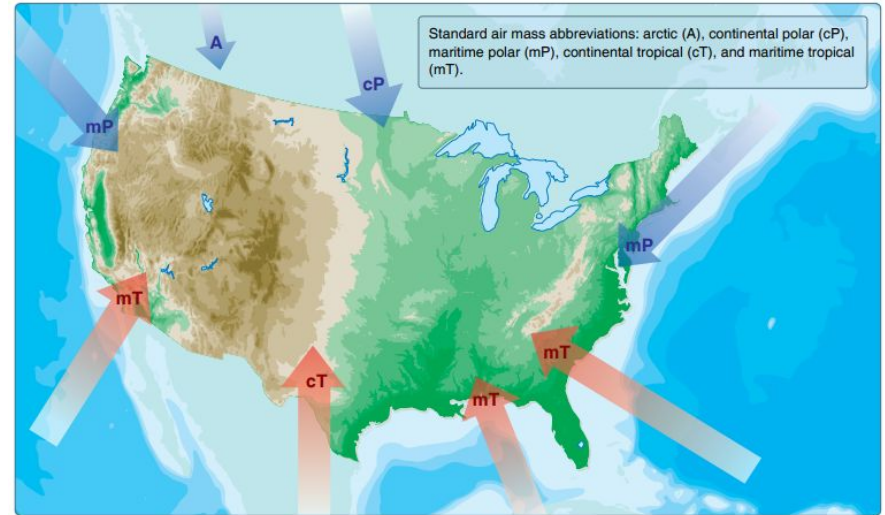
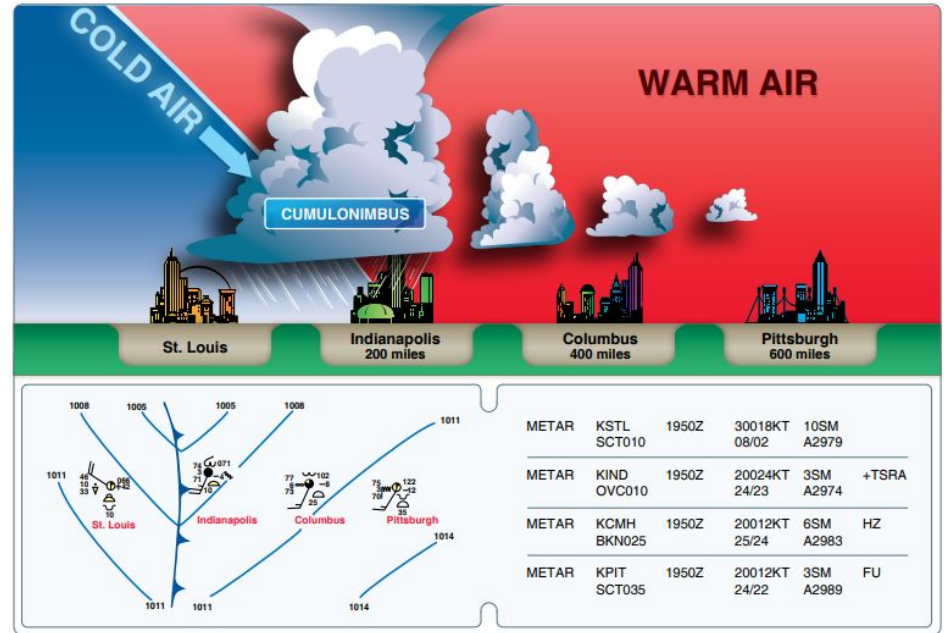


Figure 12-23. North American air mass source regions.

Fronts: Cold Front

- A cold front occurs when a mass of cold, dense, and stable air advances and replaces a body of warmer air.
- Cold fronts move more rapidly than warm fronts, progressing at a rate of 25 to 30 mph. However, extreme cold fronts have been recorded moving at speeds of up to 60 mph.
- A cold front in the Northern Hemisphere is normally oriented in a northeast to southwest manner and can be several hundred miles long, encompassing a large area of land.
- How does the weather change prior, during and after the passages of a cold front?

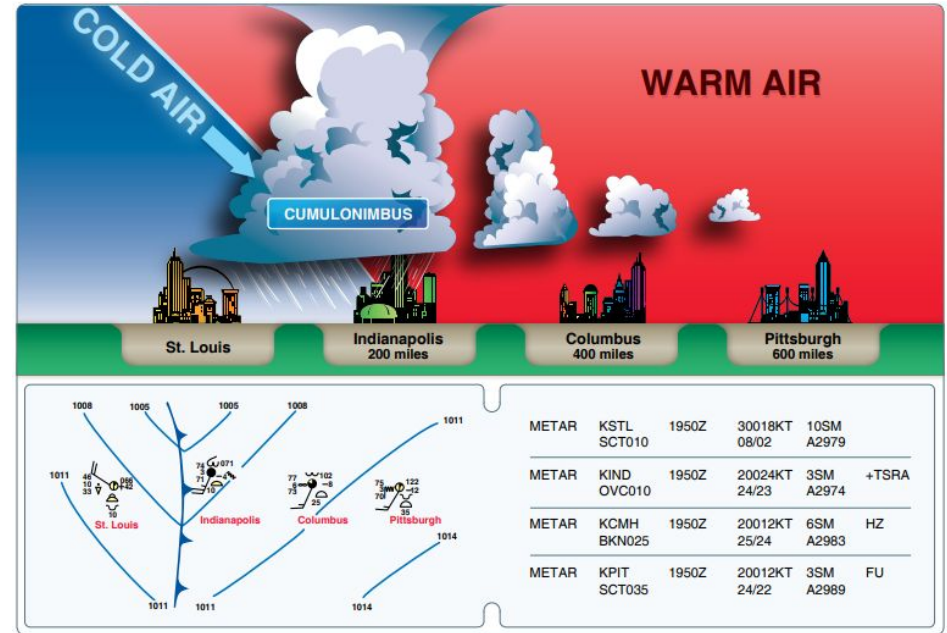


Fronts: Cold Front

Fast Moving Cold Front

Fast-moving cold fronts are pushed along by intense high pressure systems located well behind the front. Friction slows the movement at the surface, causing the front's leading edge to bulge out and steepen its slope. Because of the steep slope and wide differences in moisture and temperature between the two air masses, fast-moving cold fronts are particularly hazardous.

Fast-moving cold fronts rapidly force warmer air to rise, which can cause widespread vertical cloud development along a narrow frontal zone. If sufficient moisture is present, an area of severe weather forms well ahead of the front, and usually clears quickly as the front passes. You often notice reduced cloud cover, improved visibility, lower temperatures, and gusty surface winds following the passage of a fast-moving cold front.



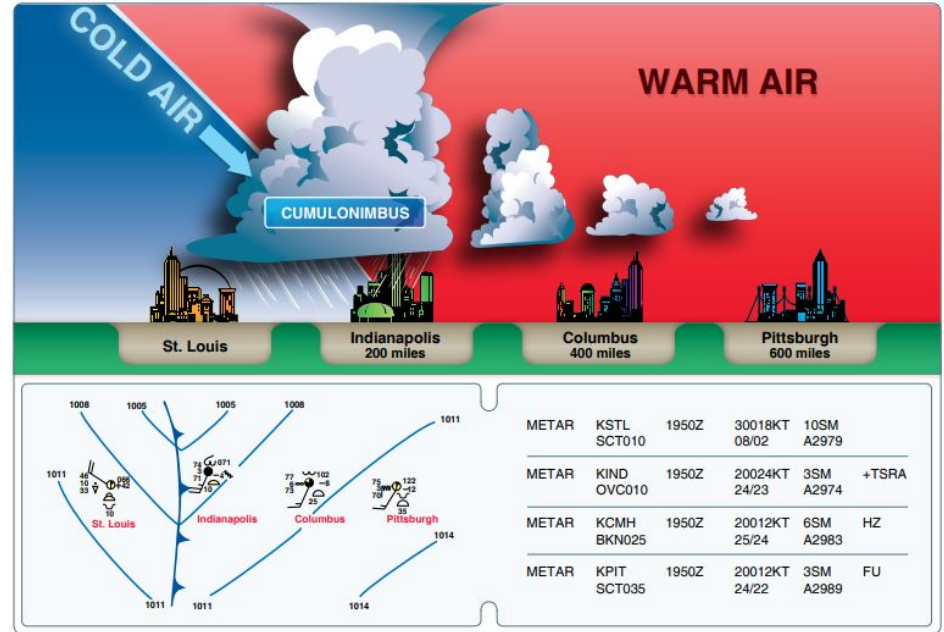
Fronts: Cold Front

Slow Moving Cold Front

The leading edge of a slow-moving cold front is much shallower than that of a fast-moving front. This produces clouds extending far behind the surface front. A slow-moving cold front meeting stable air usually causes a broad area of stratus clouds to form behind the front.

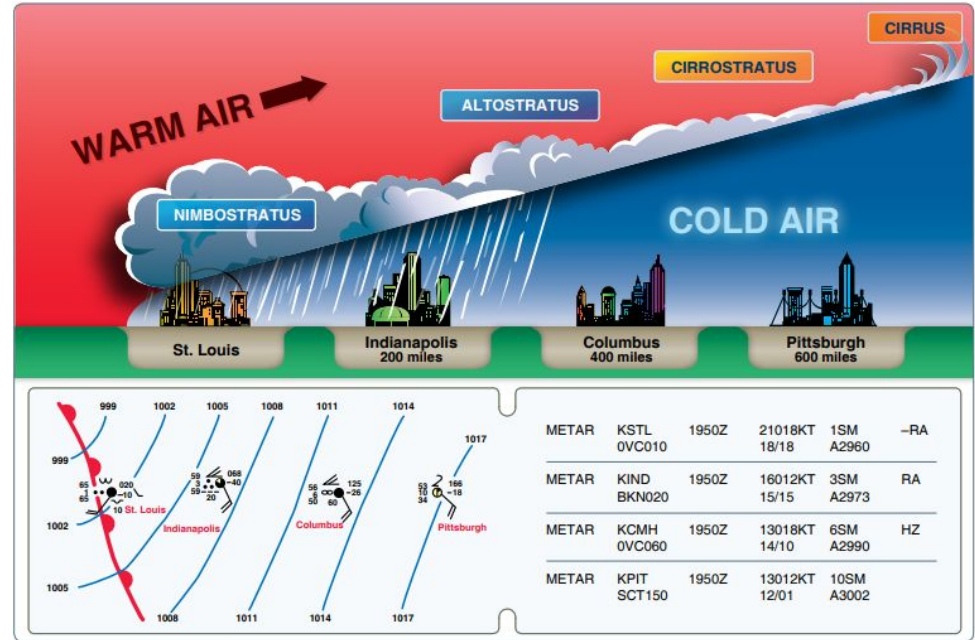
A slow-moving cold front meeting unstable air usually causes large numbers of vertical clouds to form at and just behind the front, creating hazards from icing and turbulence.

Fair weather cumulus clouds can extend well behind the surface front.



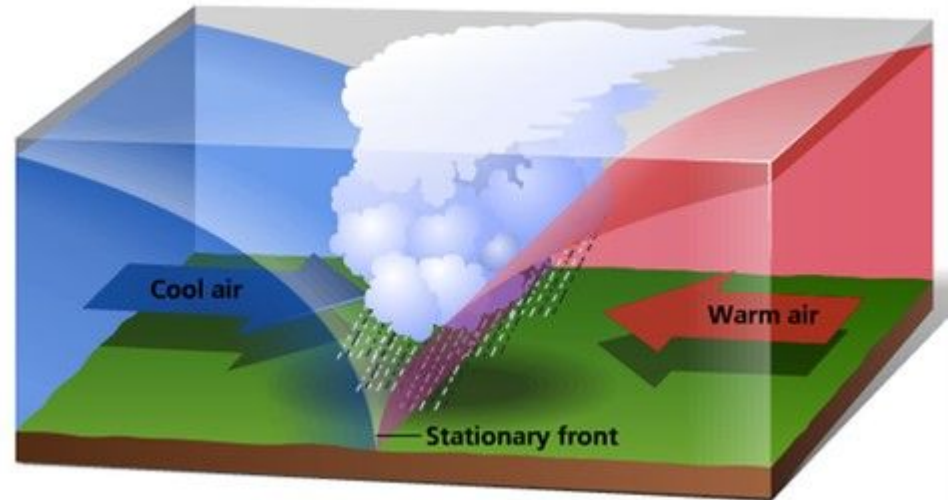
Fronts: Warm Front

- A warm front occurs when a warm mass of air advances and replaces a body of colder air. Warm fronts move slowly, typically 10 to 25 miles per hour (mph).
- The slope of the advancing front slides over the top of the cooler air and gradually pushes it out of the area.
- Warm fronts contain warm air that often has very high humidity. As the warm air is lifted, the temperature drops and condensation occurs.



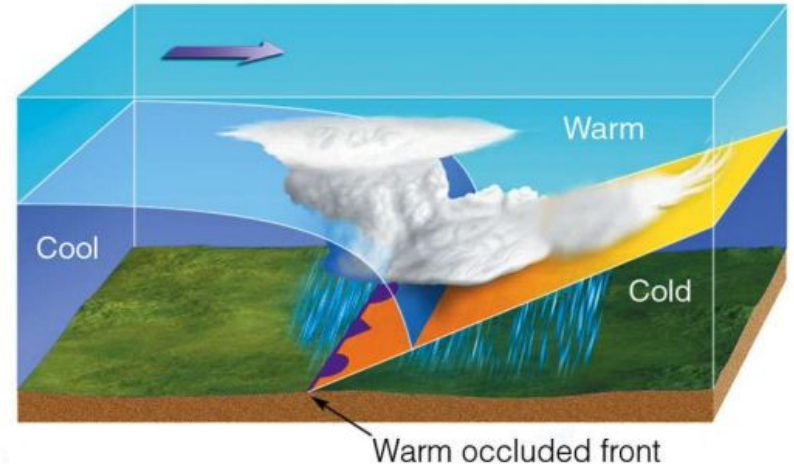
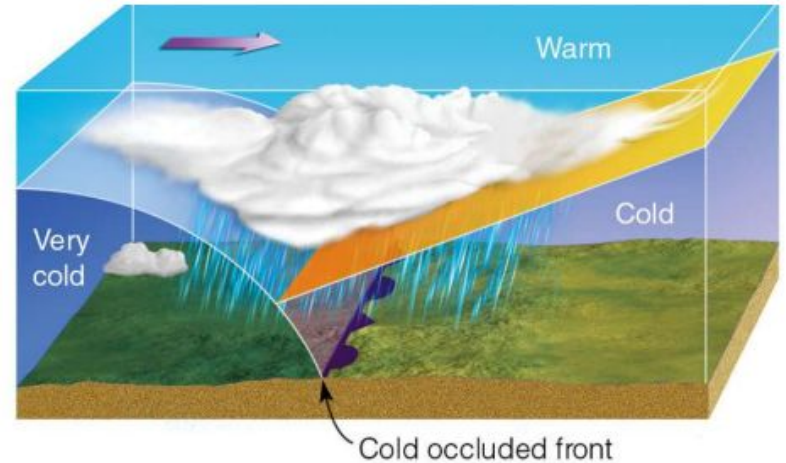
Fronts: Stationary Front

When the forces of two air masses are relatively equal, the boundary or front that separates them remains stationary and influences the local weather for days. This front is called a stationary front. The weather associated with a stationary front is typically a mixture that can be found in both warm and cold fronts.



Fronts: Occluded Front

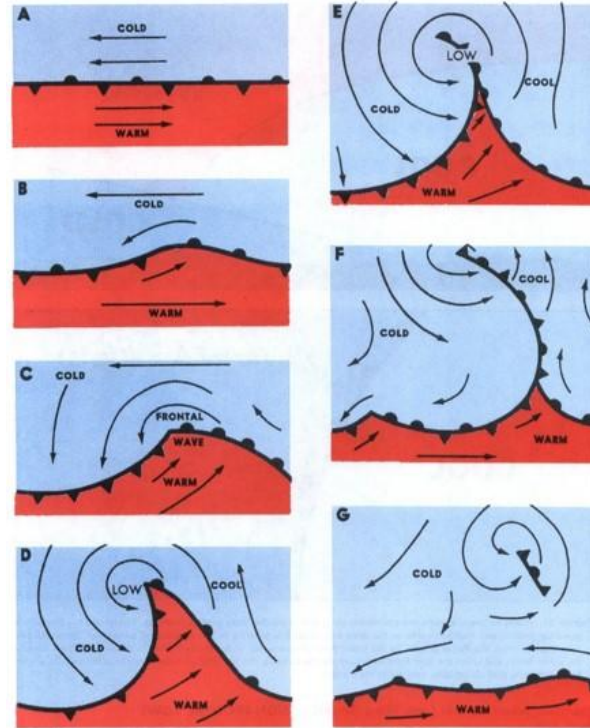
An occluded front occurs when a fast-moving cold front catches up with a slow-moving warm front. As the occluded front approaches, warm front weather prevails but is immediately followed by cold front weather. There are two types of occluded fronts that can occur, and the temperatures of the colliding frontal systems play a large part in defining the type of front and the resulting weather.



Weather Factors

Occluded Fronts

- Develop as a result of a frontal wave
- Fast-moving cold front catches up with a slow-moving warm front
- Difference in temperature influences the type of front and weather that is created



How To Predict The Weather By Looking At The Clouds



Weather Hazards

Weather is an important factor that influences aircraft performance and flying safety

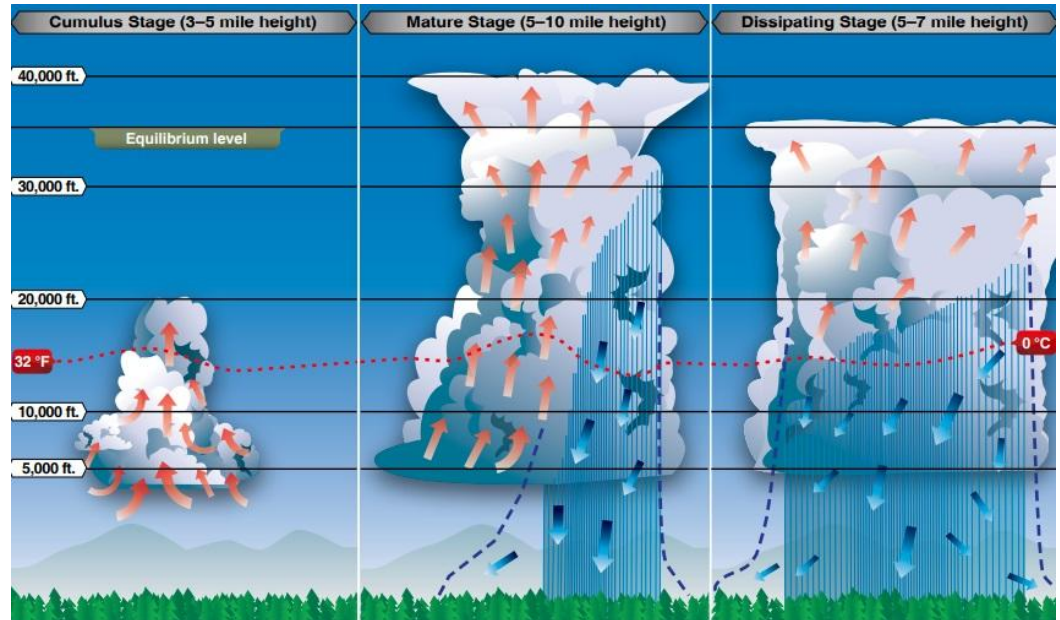


Thunderstorms

Knowledge of thunderstorms and the associated hazards with thunderstorms is critical to the safety of flight.

For a thunderstorm to form:

1. The air must have sufficient water vapor
2. The atmosphere must have an unstable lapse rate
3. Need an initial upward boost (lifting force)



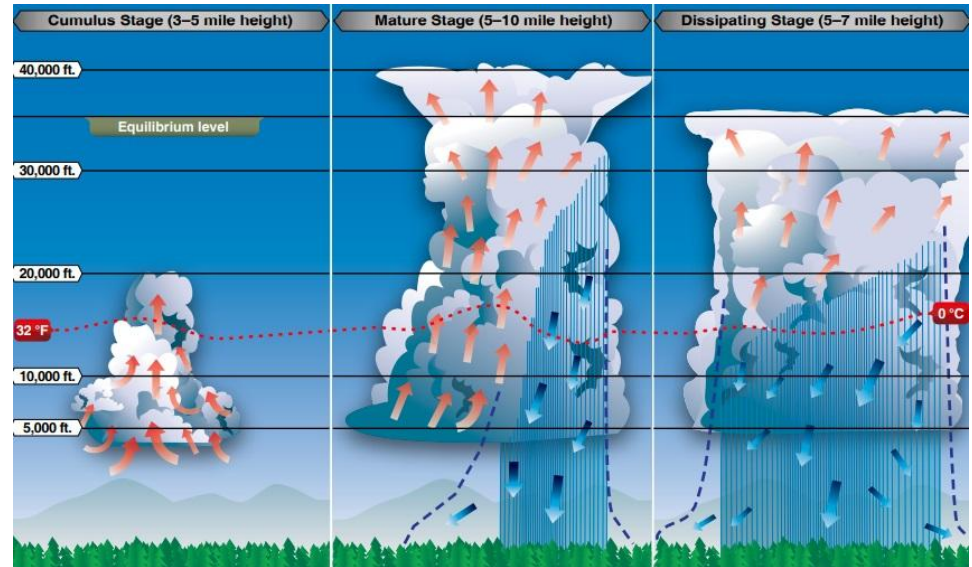
Thunderstorms: Types

- **Airmass TS:** The scattered thunderstorms which are common during summer afternoons, or in coastal areas at night, are frequently described as airmass thunderstorms.
- **Severe TS:** Heavy thunderstorms wind gusts of 50 knots or more, hail 3/4 inches in diameter or larger, and/or tornadoes
- **Single Cell, Supercell, Multicell and Squall Lines:** These are TS based on the number and type of cells and their relative positions.



Thunderstorms: Life Cycle

- In the cumulus stage, a lifting action initiates the vertical movement of air. This is the birth of the TS. All the three ingredients must be present for the TS to be formed.
- The mature stage is when the TS is fully developed. This stage produces the most hazards to aviation.
- The dissipating stage is the final stage in the life cycle of TS. The TS loses the ingredients and dies eventually.



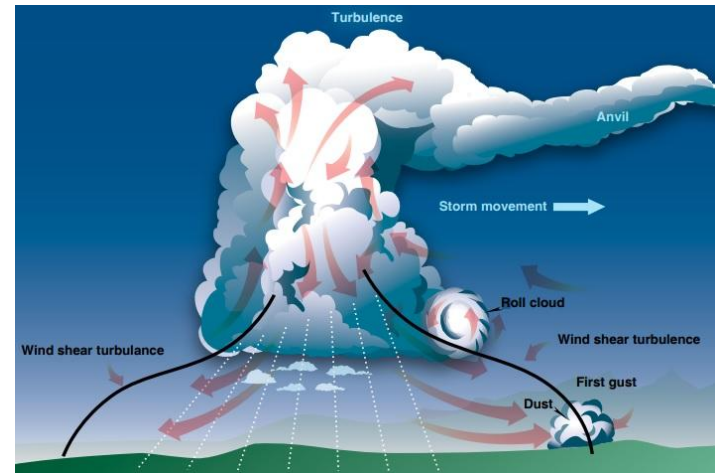
Thunderstorms Hazards

- Turbulence
- Icing
- Hail
- Ceiling and Visibility
- Lightning
- Squall Line
- Tornadoes



DOs and DON'Ts of Thunderstorm Avoidance

- **Don't** land or takeoff in the face of an approaching thunderstorm. A sudden gust front of low-level turbulence could cause loss of control.
- **Don't** attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and wind shear under the storm could be hazardous.
- **Don't** attempt to fly under the anvil of a thunderstorm. There is a potential for severe and extreme clear air turbulence
- **Do** avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo



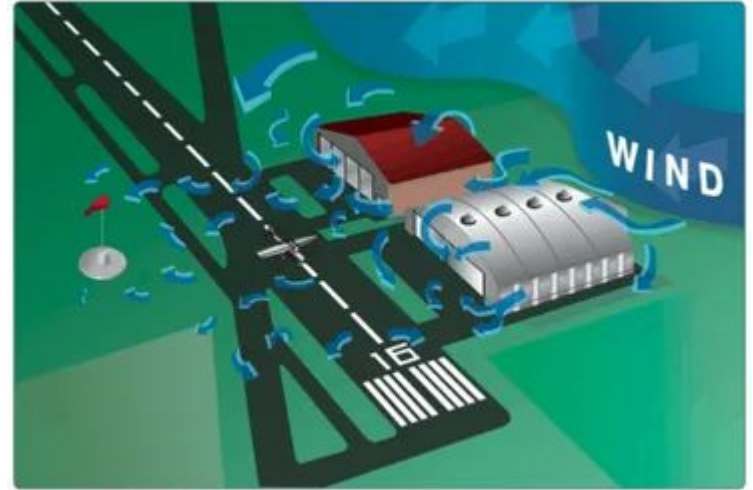
Turbulence

- In addition to turbulence in and near thunderstorms, three other categories of turbulence affect aviation operations: Low-level turbulence (LLT), clear air turbulence (CAT) and mountain wave turbulence.
- LLT occurs below 15,000 ft MSL and is of 4 types.
- Mountain Wave and CAT are higher altitude phenomenon.



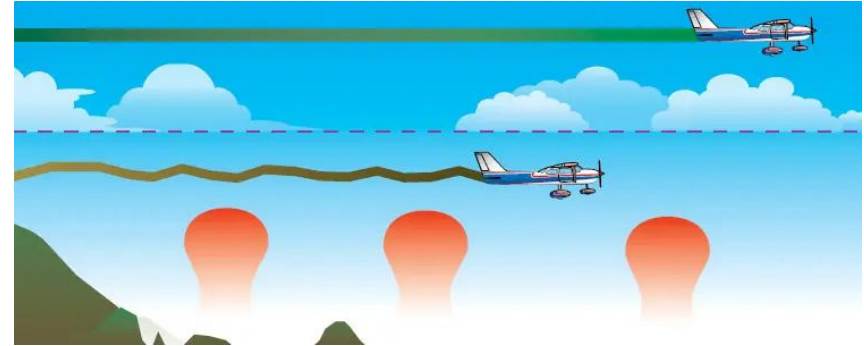
Low Level Turbulence: Mechanical Turbulence

Mechanical Turbulence: Friction between the air and the ground, especially irregular terrain and man-made obstacles, causes eddies and therefore turbulence in the lower levels. The intensity of this eddy motion depends on the strength of the surface wind, the nature of the surface and the stability of the air. The stronger the wind (generally, a surface wind of 20 knots or higher is required for significant turbulence), the rougher the terrain and the more unstable the air, the greater will be the turbulence.



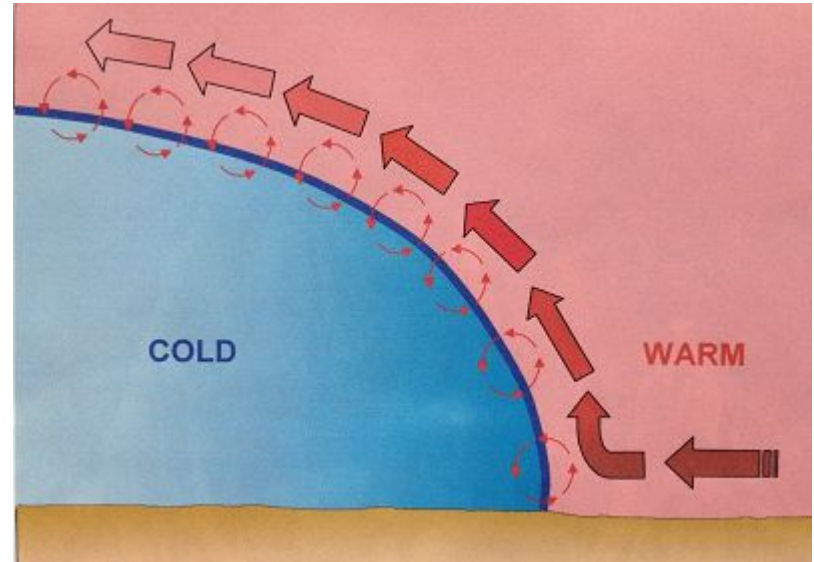
Low Level Turbulence: Thermal Turbulence

Thermal (Convective) Turbulence: Turbulence can also be expected on warm summer days when the sun heats the earth's surface unevenly. Certain surfaces, such as barren ground, rocky and sandy areas, are heated more rapidly than are grass covered fields and much more rapidly than is water. Isolated convective currents are therefore set in motion with warm air rising and cooler air descending, which are responsible for bumpy conditions as an airplane flies in and out of them.



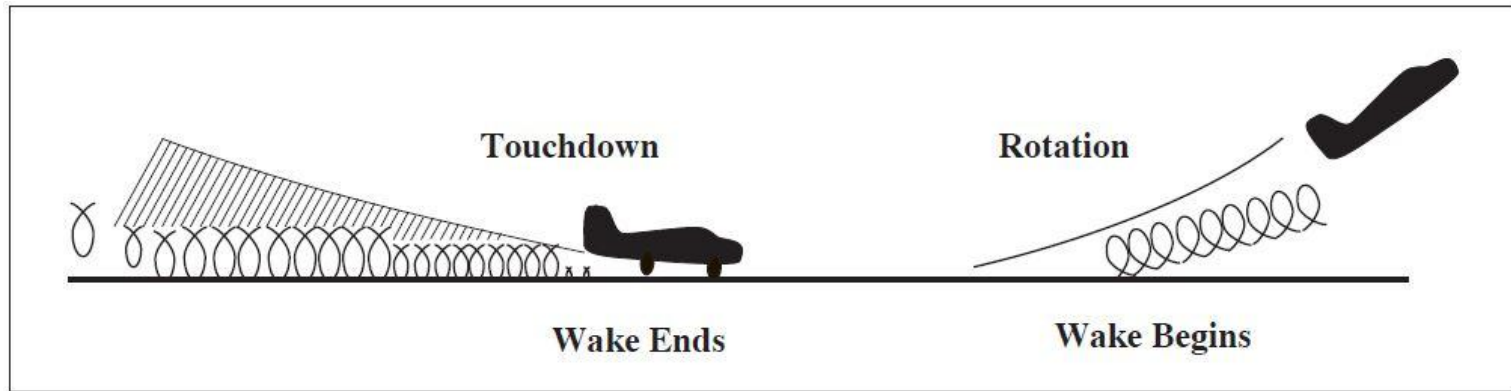
Low Level Turbulence: Thermal Turbulence

Frontal Turbulence. The lifting of the warm air by the sloping frontal surface and friction between the two opposing air masses produce turbulence in the frontal zone. This turbulence is most marked when the warm air is moist and unstable and will be extremely severe if thunderstorms develop. Turbulence is more commonly associated with cold fronts but can be present, to a lesser degree, in a warm front as well.



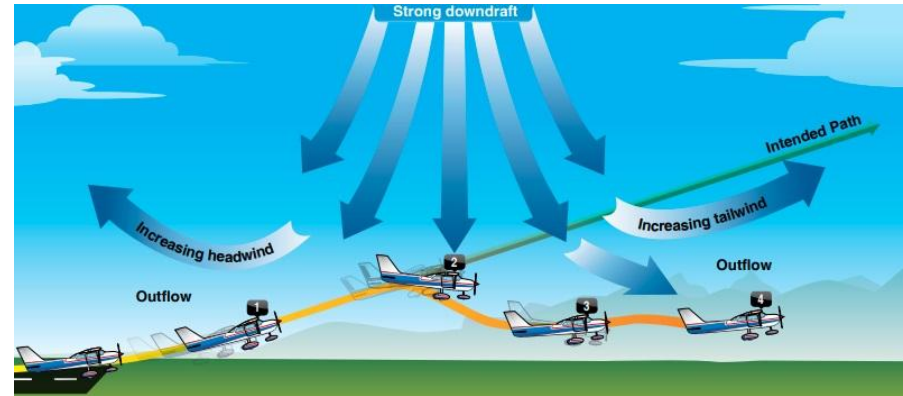
Low Level Turbulence: Wake Turbulence

Whenever an airplane generates lift, air spills over the wingtips from the high pressure areas below the wings to the low pressure areas above them. This flow causes rapidly rotating whirlpools of air called wingtip vortices, or wake turbulence. The intensity of the turbulence depends on aircraft weight, speed, and configuration.



Low-Level Wind Shear

- Wind shear is a sudden, drastic change in wind speed and/or direction over a very small area.
- Wind shear can subject an aircraft to violent updrafts and downdrafts, as well as abrupt changes to the horizontal movement of the aircraft
- While wind shear can occur at any altitude, low-level wind shear is especially hazardous due to the proximity of an aircraft to the ground. Low-level wind shear is commonly associated with passing frontal systems, thunderstorms, temperature inversions, and strong upper level winds



Microburst

- The most severe type of low-level wind shear
- It is associated with convective precipitation into dry air at cloud base.
- Microburst activity may be indicated by an intense rain shaft at the surface but virga at cloud base and a ring of blowing dust is often the only visible clue.
- A typical microburst has a horizontal diameter of 1–2 miles.
- The lifespan of a microburst is about 5–15 minutes during which time it can produce downdrafts of up to 6,000 feet per minute (fpm) and headwind losses of 30–90 knots



Icing

- Thunderstorms are not the only area where pilots could encounter icing conditions. Pilots should be alert for icing anytime the temperature approaches 0°C and visible moisture is present.
- **Rime ice** normally is encountered in stratus clouds and results from instantaneous freezing of tiny supercooled water droplets striking the aircraft surface. Rime ice normally forms in temperatures between -15°C and -20°C .
- **Clear ice** may develop in areas of large supercooled water droplets which are in cumulus clouds or in freezing rain beneath a warm front inversion. The formation of clear ice is likely when temperatures are between 0°C to -10°C .
- **Mixed ice** is possible in visible moisture between -10°C and -15°C .





Pop Quiz

1. What is main cause of most of the weather phenomenon on earth?
2. Standard Temperature and Pressure of the atmosphere are?
3. How do we know the strength of the pressure gradient force?
4. Explain Land Breeze.
5. What can cause atmosphere to be unstable?
6. What can you expect when the temperature and dewpoint are converging?
7. When can you experience steam fog?
8. What causes ice pellets to fall as precipitation?
9. Let's say a cold front is approaching Daytona Beach, what weather can you expect to experience before the front is here?
10. How far should you stay from a TS?
11. On a hot summer day, what type of low level turbulence can be expected? You can see a layer cumuliform clouds.
12. Temperature range for the formation of rime ice is ___ to ___?



THE END

Before the next class:

- Jeppesen Private Pilot Manual Chapter 6 **or** PHAK Chapter 12 (taught today)
- Jeppesen Private Pilot Manual Chapter 7 **or** PHAK Chapter 13 (for tomorrow)