

Clouds - Ground Lesson

Attention

See over there how you can see through the clouds to some blue? We could fly through that no problem. Now see the ones where they look like giant cotton balls? Those would toss the plane around. Avoid those if you can.

Objective

To understand the different types of clouds as well as the conditions surrounding them.

Schedule

Ground instruction – 30 minutes

Reference Material

NOAA.gov
sciencing.com

Material

Clouds are made up of very light water droplets or ice crystals. These particles can float in the air. When warm air rises, swells and cools, it forms clouds. Many water droplets formed together scatter reflect sunlight and you see a white cloud, but with a dark or gray cloud, the sunlight is scattered in all directions instead of reflected. The different types of clouds are cumulus, cirrus, stratus and nimbus.

Cirrus Clouds

Cirrus clouds are the thin, wispy clouds seen high in the sky. They look as if someone took a cloud, stretched it, pulling pieces off, like a cotton ball when it is pulled apart. They are thin because they are made of ice crystals instead of water droplets. A blue sky and a few cirrus clouds high in the sky, usually means it is going to be a nice day. See Figure 1.



Figure 1

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Cumulus Clouds

Cumulus clouds are the puffy clouds that are usually scattered throughout the sky. In Latin, the word cumulus means pile. Just like when we say “accumulate,” it means things pile up. This type of cloud is formed when warm air rises carrying water vapor with it by evaporation. Cumulus clouds can be white or gray. White fluffy clouds means no rain, but when they form into dark or gray clouds, it is going to rain. See Figure 2.



Figure 2

Associated conditions with cumulus clouds are:



Unstable turbulent air
Good visibility
(except snow or sand)
Showery precipitation

Status Clouds

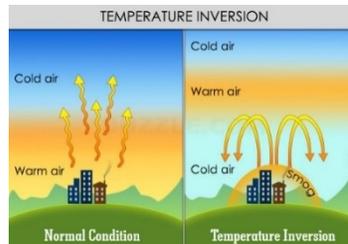
Stratus clouds look like a huge thick blanket covering the sky. These clouds are a sure sign of rain if it is warm and snow if it is cold. If stratus clouds are near the ground, they form fog. These clouds form when the weather has been cold and warmer moist air blows in. The amount of moisture in the air and the difference between warm and cold air determine how thick the cloud or fog is. See Figure 3.

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Figure 3

Associated conditions with stratus clouds are:



Stable air
Temperature Inversions
Smooth air
Poor visibility
Fog
Haze
Continuous precipitation
High humidity

Nimbus Clouds

The word nimbus means a cloud that already has rain or snow falling from it. These clouds are dark and seen during a thunderstorm along with thunder and lightning. They can be a combination of two clouds, like a cumulonimbus, which means a puffy black cloud with rain falling out of it, or a stratonimbus, which is a dark blanket with rain falling out of it. See Figure 4.

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Figure 4

The stages of rain:

- Cumulous
- Mature
- Dissipating

Low Level, Mid Level, and High Level Clouds in more detail

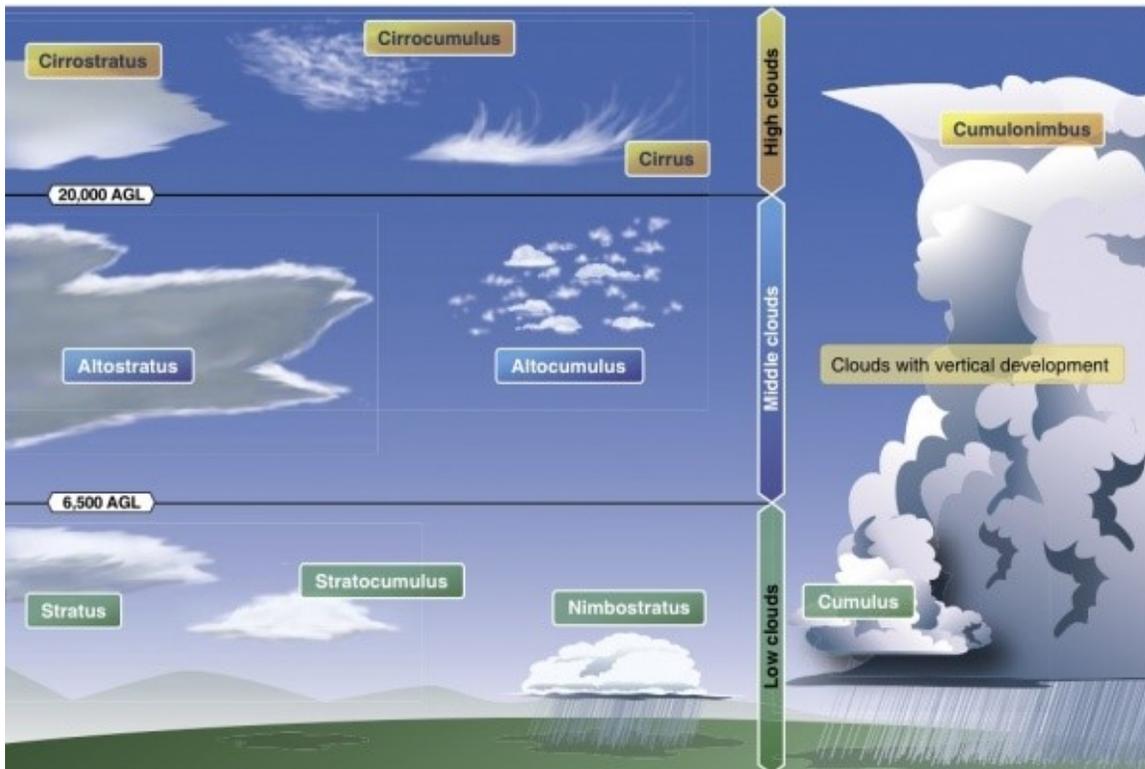


Figure 5

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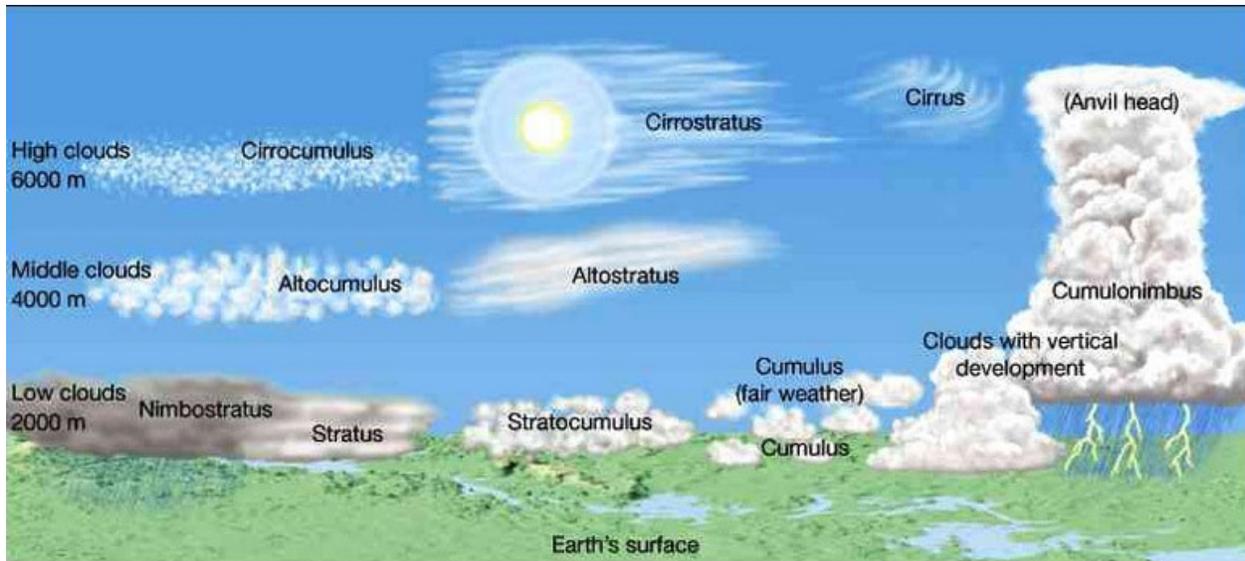


Figure 6

Cumulus (Low Level)

Detached, generally dense clouds and with sharp outlines that develop vertically in the form of rising mounds, domes or towers with bulging upper parts often resembling a cauliflower.

The sunlit parts of these clouds are mostly brilliant white while their bases are relatively dark and horizontal.

Over land cumulus develops on days of clear skies, and is due diurnal convection; it appears in the morning, grows, and then more or less dissolves again toward evening.



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Stratus (Low Level)

A generally gray cloud layer with a uniform base which may, if thick enough, produce drizzle, ice prisms, or snow grains. When the sun is visible through this cloud, its outline is clearly discernible.

Often when a layer of Stratus breaks up and dissipates blue sky is seen.



Cumulonimbus (Low Level)

The thunderstorm cloud, this is a heavy and dense cloud in the form of a mountain or huge tower. The upper portion is usually smoothed, fibrous or striated and nearly always flattened in the shape of an anvil or vast plume.

Under the base of this cloud which is often very dark, there are often low ragged clouds that may or may not merge with the base. They produce precipitation, which sometimes is in the form of virga.

Cumulonimbus clouds also produce hail and tornadoes.



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Stratocumulus (Low Level)

Gray or whitish patch, sheet, or layered clouds which almost always have dark tessellations (honeycomb appearance), rounded masses or rolls. Except for virga they are non-fibrous and may or may not be merged.

They also have regularly arranged small elements with an apparent width of more than five degrees (three fingers - at arm's length).



Altostratus (Mid Level)

Gray or bluish cloud sheets or layers of striated or fibrous clouds that totally or partially covers the sky. They are thin enough to regularly reveal the sun as if seen through ground glass.

Altostratus clouds do not produce a halo phenomenon nor are the shadows of objects on the ground visible. Sometime virga is seen hanging from Altostratus, and at times may even reach the ground causing very light precipitation.



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Altostratus (Mid Level)

White and/or gray patch, sheet or layered clouds, generally composed of laminae (plates), rounded masses or rolls. They may be partly fibrous or diffuse.

When the edge or a thin semitransparent patch of altostratus passes in front of the sun or moon a corona appears. This colored ring has red on the outside and blue inside and occurs within a few degrees of the sun or moon.

The most common mid cloud, more than one layer of Altostratus often appears at different levels at the same time. Many times Altostratus will appear with other cloud types.



Nimbostratus (Mid Level)

The continuous rain cloud. Resulting from thickening Altostratus, This is a dark gray cloud layer diffused by falling rain or snow. It is thick enough throughout to blot out the sun. The cloud base lowers into the low level of clouds as precipitation continues. Also, low, ragged clouds frequently occur beneath this cloud which sometimes merges with its base.



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Cirrus (High Level)

Detached clouds in the form of white, delicate filaments, mostly white patches or narrow bands. They may have a fibrous (hair-like) and/or silky sheen appearance.

Cirrus clouds are always composed of ice crystals, and their transparent character depends upon the degree of separation of the crystals.

As a rule when these clouds cross the sun's disk they hardly diminish its brightness. Before sunrise and after sunset, cirrus is often colored bright yellow or red. These clouds are lit up long before other clouds and fade out much later.



Cirrostratus (High Level)

Transparent, whitish veil clouds with a fibrous (hair-like) or smooth appearance. A sheet of cirrostratus which is very extensive, nearly always ends by covering the whole sky. A milky veil of fog (or thin Stratus) is distinguished from a veil of Cirrostratus of a similar appearance by the halo phenomena which the sun or the moon nearly always produces in a layer of cirrostratus.



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Cirrocumulus (High Level)

Thin, white patch, sheet, or layered of clouds without shading. They are composed of very small elements in the form of more or less regularly arranged grains or ripples.

In general Cirrocumulus represents a degraded state of cirrus and cirrostratus both of which may change into it and is an uncommon cloud. There will be a connection with cirrus or cirrostratus and will show some characteristics of ice crystal clouds.

