

Cloud

Basic cloud types

Clouds are generally classified into two groups: convective clouds and layer clouds. The distinction is based on the presence or absence of instability within the atmosphere in which they form.

Convective clouds (Cumuliform)

are the result of local ascent of warm buoyant parcels of air in a conditionally unstable environment. Such clouds show distinct spatial variability. Cloud diameters can be a few hundred m to 10 km or more. Updraft velocities within the clouds can be large of the order of a few m/s up to several 10's of m/s under strong convection. Clouds have life times from minutes to a few hours in extreme cases.

Layer clouds (stratiform)

are the result of forced lifting of stable air. Their horizontal extent can be very large (hundreds of km). Lifting velocities are much smaller and would be measured in cm/s. Layer clouds can persist for periods of hours or tens of hours.

Fogs (ground based cloud)

There are several mechanisms which can result in the formation of a fog.

- a) radiation fog - radiational cooling of the ground on clam clear nights
- b) advection fog - warm air advected (transported horizontally by the wind) over cold surfaces bringing the air to its dew point by cooling from below (e.g., coastal stratus and fog)
- c) warm frontal fog - warm rain falling through cold air evaporates and recondenses
- d) steam fog - cold air over warm water. Water evaporates and is cooled by mixing with cold air to recondense

The ten cloud “genera”

are basically classified by type (cumuliform or stratiform) and by height (high, middle, or low)

High clouds: (mostly ice particles)

C_i cirrus (wispy, mares tails)
C_s cirrostratus (light grey, 22° halo)
C_c cirrocumulus (patchy, thin high cloud)

Middle clouds: (mostly water droplets, some ice)

A_s altostratus (uniform grey, no halo)
A_c altocumulus (patchy, shows sign of vertical development)

Low clouds and clouds with low based and large vertical development: (mostly water droplets)

S_t Stratus
C_u Cumulus
S_c Stratocumulus
C_b Cumulonimbus (☩)
N_s Nimbostratus (stratiform cloud, deep, rain falling)

See cloud chart in room 124 for more extensive descriptions of the basic cloud "genera".