NOAA/NWS AND NASA'S SKY WATCHER CHART

High Clouds

Typical Types: Cirrus (Ci), Cirrostratus (Cs), Cirrocumulus (Cc)

H1: Cirrus
In the form of filaments, strands, or hooks

H2: Cirrus
Dense, in patches or sheaves, not increasing, or with tufts

H3: Cirrus
Often anvil shaped remains of a cumulonimbus

H4: Cirrus
In hooks or filaments, increasing, becoming denser

H5: Cirrostratus
Cirrus bands, increasing, veil below 45° elevation

H6: Cirrostratus
Cirrus bands, increasing, veil above 45° elevation

H7: Cirrostratus
Translucent, completely covering the sky

H8: Cirrostratus
Not increasing, not covering the whole sky

H9: Cirrocumulus
Alone or with some cirrus or cirrostratus

Middle Clouds

Typical Types: Altostratus (As), Altocumulus (Ac), Nimbostratus (Ns)

M1: Altostratus
Mostly semi-transparent, sun or moon may be dimly visible

M2: Altostratus or Nimbostratus
Dense enough to hide the sun or moon

M3: Altocumulus
Semi-transparent, one level, cloud elements change slowly

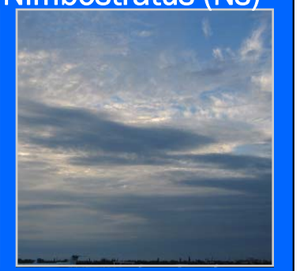
M4: Altocumulus
Lens-shaped, or continually changing shape and size^

M5: Altocumulus
One or more bands or layers, expanding, thickening

M6: Altocumulus
From the spreading of cumulus or cumulonimbus

M7: Altocumulus
One or more opaque layers, w/ altostratus or nimbostratus

M8: Altocumulus
With cumulus-like tufts or turrets



M9: Altocumulus
Chaotic sky, usually at several layers, maybe w/ dense cirrus

Low Clouds

Typical Types: Stratus (St), Stratocumulus (Sc), Cumulus (Cu), Cumulonimbus (Cb)

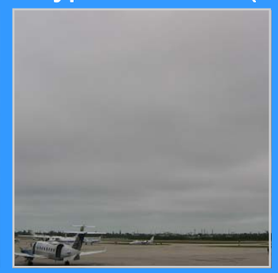
L1: Cumulus
With little vertical extent

L2: Cumulus
Moderate/strong vertical extent, or towering cumulus

L3: Cumulonimbus
Tops not fibrous, outline not completely sharp, no anvil

L4: Stratocumulus
From the spreading and flattening of cumulus*

L5: Stratocumulus
Not from the spreading and flattening of cumulus



L6: Stratus
In a continuous layer and/or ragged shreds

L7: Stratus Fractus and/or Cumulus Fractus
Of bad weather

L8: Cumulus & Stratocumulus
Not spreading, bases at different levels

L9: Cumulonimbus
With fibrous top, often with an anvil

Mammatus
Drooping underside of heavy, rain-saturated clouds

Tornado
Formed by rotation of up and down drafts within thunderstorm

Wall Cloud
Hanging from cumulus, possible tornado formation

Shelf Cloud
Leading edge of fast moving frontal system

Wave Cloud
Formed by strong horizontal winds over uneven terrain

The Cloud Cookery

Observe clouds and help NASA investigate our changing planet!

How to Make a Cloud

Have you ever wondered how clouds form? Well it's quite simple! Clouds form from the condensation or freezing of water vapor. Want to see for yourself? You'll need an adult for supervision and the following household items:

warm water metal tray ice see-through jar match

Condensation occurs when a gas (water vapor in this activity) changes into a liquid (the cloud). Water vapor condenses onto a surface when cooled. For instance, take a cold water bottle outside on a warm day, and notice that water droplets form on the surface. This is CONDENSATION and clouds form the same way. Here's how to make your own cloud.

Procedure:

1. Fill a jar with 2 inches (5cm) of warm water and stir.
2. Ask an adult to light a match, blow it out and drop it into the jar.
3. When the smoke clears, place an ice-filled metal tray on top.
4. Watch carefully and a cloud will form near the top of the jar.

So what exactly happens?

The warm liquid water forms water vapor. This process of changing liquid water to gas is called EVAPORATION. As the water vapor rises and nears the ice-filled tray, the vapor cools. The smoke particles provide a surface for the water to condense. Did you realize that evaporation is the opposite of condensation? If you remove the metal tray, the cloud will disappear as it mixes with the warmer surrounding air. The same events occur in our environment. Evaporated water condenses to form clouds which may later produce rain. The production of rain is referred to as PRECIPITATION. Together, EVAPORATION, CONDENSATION and PRECIPITATION play an important role in the WATER CYCLE.

Ever wonder how clouds got their names? Well you may be surprised to find out!

In 1803 Luke Howard used Latin terms to classify four main cloud types. Cumulus means pile and describes heaped, lumpy clouds. Cirrus, meaning hair, describes high level clouds that look wispy, like locks of hair. Featureless clouds that form sheets are called Stratus, meaning layer. The term Nimbus, which means cloud, refers to low, grey rain clouds. Alto is used to describe mid level clouds. Finally, convective clouds have a vertical development extending through large portions of the atmosphere.

Cloud Observation Basics

Cloud Type
There are specific cloud types associated with the low cloud levels. There are low, mid and high level cloud types.

Cloud Level
Three levels of clouds have been identified based on the altitude of a cloud's base.

Low Level

Cloud Type	Cloud Cover		Visual Opacity
☐ Fog	☐ Clear	(0% - 5%)	☐ Opaque
☐ Nimbostratus	☐ Partly Cloudy	(5% - 50%)	☐ Translucent
☐ Cumulonimbus	☐ Mostly Cloudy	(50% - 95%)	☐ Transparent
☐ Stratus	☐ Overcast	(95% - 100%)	
☐ Cumulus			
☐ Stratocumulus			

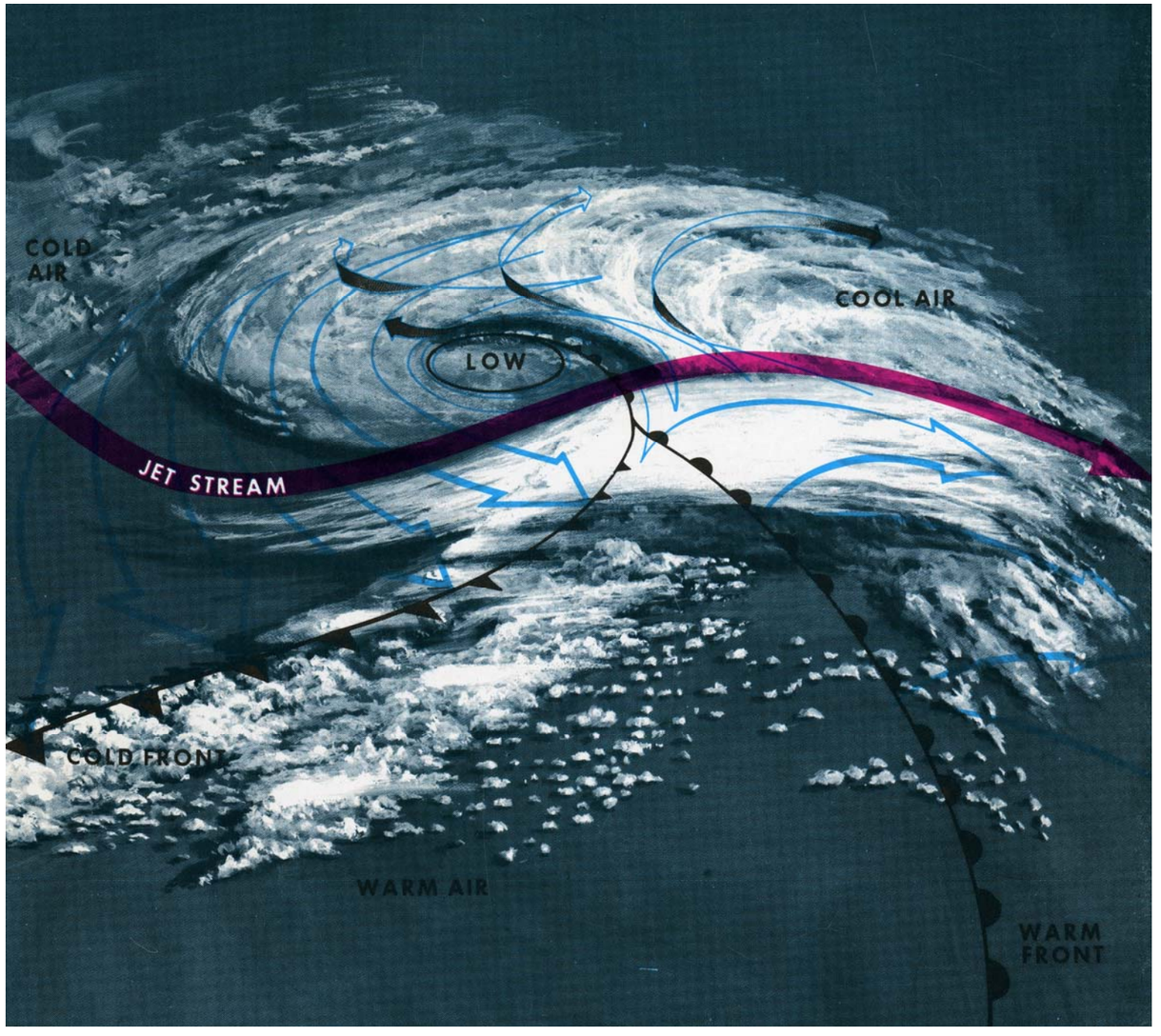
Cloud Cover
Determination of the amount of cloud cover is done by estimating the percentage of the sky covered with clouds.

Visual Opacity
The thickness of a cloud determines the amount of light being transmitted through the cloud. Shadows often provide a clue.

Ground Truth Data

Clouds are powerful agents of global change. They affect the temperature of the Earth and play a large role in controlling our climate. The study of clouds takes teamwork and NASA scientists need students all over the world making ground truth measurements. Ground truth measurements of clouds are land-based observations to compare with satellite retrieved data. Satellites are an important tool for cloud studies and making sure satellite instruments are accurate is very important. Ground truth observations made by S'COOL participants help NASA scientists test the accuracy of satellite instruments.

CERES S'COOL Project
http://scool.larc.nasa.gov



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