



# S'COOL Cloud Identification Chart

Altitude of Cloud Base

6 km

5 km

4 km

3 km

2 km

1 km

High

Mid

Low



Cirrus



Cirrostratus



Cirrocumulus



Contrails



Altostratus



Alto cumulus

CONVECTIVE CLOUDS



Stratus



Stratocumulus



Cumulonimbus



Nimbostratus



Fog



Cumulus



# 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!

Clouds are named based on their appearance and the altitude at which they form. The term 'nimbus' means rain-bearing, and is used in the names of clouds that produce rain. The term 'stratus' means layered, and is used in the names of clouds that form in layers. The term 'cumulus' means piled up, and is used in the names of clouds that form in rounded, billowing masses. The term 'cirrus' means hair-like, and is used in the names of clouds that form in thin, wispy layers. The term 'alto' means middle, and is used in the names of clouds that form at middle altitudes. The term 'cirro' means hair-like, and is used in the names of clouds that form at high altitudes. The term 'nimbo' means rain-bearing, and is used in the names of clouds that produce rain. The term 'stratus' means layered, and is used in the names of clouds that form in layers. The term 'cumulus' means piled up, and is used in the names of clouds that form in rounded, billowing masses. The term 'cirrus' means hair-like, and is used in the names of clouds that form in thin, wispy layers. The term 'alto' means middle, and is used in the names of clouds that form at middle altitudes. The term 'cirro' means hair-like, and is used in the names of clouds that form at high altitudes.

## Cloud Type

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

# Cloud Observation Basics

## Cloud Level

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

| Cloud Type                            |  | Low Level Cloud Cover                              |                                      | Visual Opacity |  |
|---------------------------------------|--|--|--------------------------------------|----------------|--|
| <input type="checkbox"/> Fog          | <input type="checkbox"/> Stratus       | <input type="checkbox"/> Clear (0% - 5%)           | <input type="checkbox"/> Opaque      |                |  |
| <input type="checkbox"/> Nimbostratus | <input type="checkbox"/> Cumulus       | <input type="checkbox"/> Partly Cloudy (5% - 50%)  | <input type="checkbox"/> Translucent |                |  |
| <input type="checkbox"/> Cumulonimbus | <input type="checkbox"/> Stratocumulus | <input type="checkbox"/> Mostly Cloudy (50% - 95%) | <input type="checkbox"/> Transparent |                |  |
|                                       |  | <input type="checkbox"/> Overcast (95% - 100%)     |                                      |                |  |

## 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.