## High Clouds

**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

**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, with altostratus or nimbostratus

**M8: Altocumulus**
- With cumulus-like tufts or turrets

**M9: Altocumulus**
- Chaotic sky, usually at several layers, maybe with dense cirrus

## Low Clouds

**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**
- Of bad weather

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

**L9: Cumulonimbus**
- With fibrous top, often with an anvil

## Typical Types

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

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

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

**Mammatus**
- Drooping undersides of heavy, rain-saturated clouds

**Tornado**
- Formed by rotation of up and down drafts within thunderstorm

**Wall Cloud**
- Hanging from cumulus, possible tornado formation

**Shell Cloud**
- Leading edge of fast moving frontal system

**Wave Cloud**
- Formed by strong horizontal winds over uneven terrain
The Cloud Cookery

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
- Two 3-inch mirrors
- A jar
- A candle

Procedure:
1. Heat the water until it reaches a boiling point.
2. Pour the water into the jar.
3. Place the jar on a stable surface.
4. Light the candle and observe the formation of clouds.

So what exactly happens?

The warm liquid water turns into water vapor. This process of changing liquid water to gas is called VAPORIZATION. As the water vapor rises and cools below the dew point, the water vapor condenses into liquid water, which forms into a cloud. This is known as the condensation process. The two processes, evaporation and condensation, work together to form clouds.

Cloud Observation Basics

In 1803, Luke Howard used Latin terms to classify four main cloud types. Cumulus means pillar and describes the puffy, fluffy clouds. Cirrus, meaning hair, describes high level clouds that look wispy, like locks of hair. Fractocumulus clouds that look like sheets are called Stratus, meaning layer. The term Nimbostratus, which means cloud, refers to low, gray 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 Level

Low Level
- Stratus
- Cirrus
- Nimbustatus

High Level
- Altocumulus
- Altocirrus
- Altocumulus (Properly Cloudy)

Visual Opacity
- Clear
- Overcast
- Transparent

Visual Opacity
- Dark
- Light
- Moderate

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 imagination and NASA scientists need students all over the world using ground truth measurements. Ground truth measurements of clouds are land-based observations to compare with satellite-retrieved data. Calibrations are an important tool for cloud studies and making sure satellite instruments are accurate is very important. Ground truth observations made by SCiOOL participants help NASA scientists test the accuracy of satellite instruments.

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