

# Quick Facts

## for Informal Educators



### What is a cloud?

A cloud is a mass of tiny water drops or ice crystals that floats in the air above Earth. Water on land or in the ocean evaporates, turning from a liquid to a gas called water vapor. The water vapor rises, cools, and then turns back into a liquid, forming tiny droplets. Enough of these droplets make a cloud.

### How do clouds form?

Clouds form from water in the sky. The water may evaporate from the ground or move from other areas. Water vapor is always in the sky in some amount but is invisible. Clouds form when an area of air becomes cooler until the water vapor there condenses to liquid form. At that point, the air is said to be "saturated" with water vapor. The air where the cloud forms must be cool enough for the water vapor to condense. The water will condense around things like dust, ice or sea salt - all known as condensation nuclei. The temperature, wind and other conditions where a cloud forms determine what type of cloud it will be.

### What types of clouds are there?

Cirrus clouds are thin and wispy and often curve with the wind. Cumulus clouds tend to be big and fluffy. These clouds look kind of like giant cotton balls or other shapes in the sky. As a middle-level cloud, this type also can form parallel stripes of clouds. Stratus clouds form sheets of clouds that cover the sky.

### How do clouds get their names?

Clouds are categorized primarily by two major factors - location and shape. High clouds form several kilometers up in the sky, with the exact height depending on the temperatures where they form. Low clouds generally form within a kilometer or two of Earth's surface. In fact, low clouds can even form touching the ground, when they are called fog. Middle-level clouds form between low and high clouds.

### What do clouds do?

Clouds are important for many reasons. Rain and snow are two of those reasons. At night, clouds reflect heat and keep the ground warmer. During the day, clouds make shade that can keep us cooler.

## What causes rain?

Most of the water in clouds is in very small droplets. The droplets are so light they float in the air. Sometimes those droplets join with other droplets. Then they turn into larger drops. When that happens, gravity causes them to fall to Earth. We call the falling water drops "rain." When the air is colder, the water may form snowflakes instead. Freezing rain, sleet or even hail can fall from clouds.

## Do all clouds make rain?

Not all clouds produce rain or other types of precipitation (snow, sleet, freezing rain). The latin word "nimbus" means rain and is added as a prefix or suffix to the two clouds that produce precipitation: nimbostratus clouds or cumulonimbus clouds.

## How do clouds affect the weather?

Tune in to the evening weather report on any given day, and you'll no doubt see satellite images of clouds. For years, experts have used cloud observations to predict the weather, from forecasting extreme weather events, such as tornadoes and hurricanes, to simply telling people whether they need to take an umbrella or sunscreen on their afternoon picnic. Weather experts monitor clouds with the help of satellite data, and they use cloud height and motion data to calculate wind speed and height. Although these calculations have proven useful in predicting the path and severity of developing storms, existing satellite instruments are limited in their coverage of vast ocean expanses and higher latitude regions, the common birthplaces of many storms.

## How do clouds affect the climate?

Low, thick clouds primarily reflect solar radiation and cool the surface of the Earth. High, thin clouds primarily transmit incoming solar radiation; at the same time, they trap some of the outgoing infrared radiation emitted by the Earth and radiate it back downward, thereby warming the surface of the Earth. Whether a given cloud will heat or cool the surface depends on several factors, including the cloud's altitude, its size, and the makeup of the particles that form the cloud.

## How do they affect my life?

Clouds are part of the water cycle assisting in the movement of water from place to place which is very important for the survival of life on Earth. In addition to producing rain, sleet or snow, clouds can provide shade on a warm day. Some clouds help to cool the surface of the Earth while others keep it warm, both work to help maintain balance of the energy coming from the Sun.

## Why do scientists study clouds?

Clouds are important for many reasons. Precipitation, like rain or snow, is one of those reasons. At night, clouds reflect heat back to the surface and keep it warmer. During the day, clouds can shade us from the sun and keep Earth cooler. Studying clouds helps NASA better understand Earth's weather and climate.

## How do scientists study clouds?

NASA uses satellites in space as well as computers to study clouds. NASA also studies clouds on other planets. Mars has clouds that are like the clouds on Earth. But other planets have clouds that aren't made of water. For example, Jupiter has clouds made of a gas called ammonia.

## Why do they need my observations? Do they actually use my observations?

The existing long-term collection of cloud measurements made by surface observers provides an important baseline record of cloud phenomena. These historical observations provide a useful context in which to study clouds. Observations collected by surface observers provide information that can be observed by the human eye that might be missed by the satellite, for example whether or not there is snow on the ground is something that satellites cannot distinguish from cloud cover. Through the GLOBE program, participants have the opportunity to submit their cloud observations to provide scientists with validation for satellite observations.

## What would the Earth be like without clouds?

Clouds are very important and help make the Earth habitable. Clouds can cool the planet by reflecting the sun's rays, or warming the planet especially on cold cloudy nights. Clouds are also important at how water moves around the Earth, and where it rains most or very little.

