



BUBBLE & FIZZ

WEEK 5: CLOUDS & THUNDERSTORMS

EVER WONDER . . . WHAT CAUSES THUNDER?

What we learned this week:

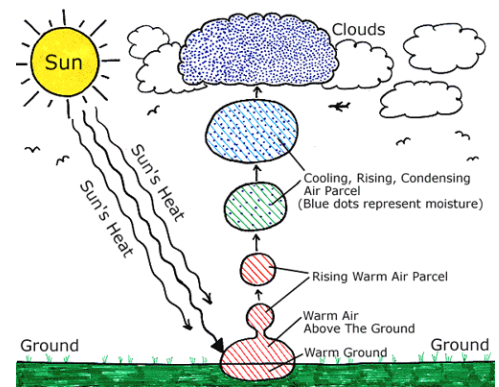
- ◆ What clouds are made of, and what some different types are called.
- ◆ What causes rain, lightning and thunder.

Today's Experiments

1. Observe convection currents.
2. Experiment with cloud shapes.
3. Experiment with an electrical charge.
4. Make a cloud finder.

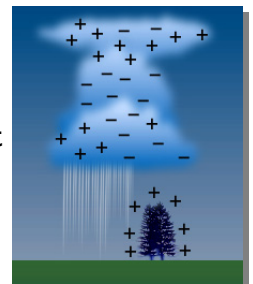
Did you know?

- ◆ Clouds are made up of tiny water droplets and ice crystals suspended in the air. In order for a cloud to form, three things are needed: 1) moisture in the air (water vapor), 2) cooler air above warmer air, and 3) particles, like dust, in the air. Water vapor is formed through evaporation. (Remember the steam we made in the geyser class? That is water vapor.) When the Sun heats lakes, streams and oceans, vapor is formed. The Earth also absorbs heat from the Sun, which then heats up the air closest to the Earth. This warm air rises (just like the warm water in our convection experiment) and starts to cool down. As it cools, the air can't hold as much vapor. This extra vapor begins to condense around dust particles in the air, forming tiny droplets of water. These droplets eventually form a cloud. When a cloud can't hold any more moisture, rain occurs. If the air is cold enough, the water will fall to the earth as sleet, hail or snow.



- ◆ Scientists have names for at least 100 different types of clouds. Today we studied the three main types: cirrus, cumulus, and stratus. Clouds are white because they reflect all the colors of light from the sun to the same degree. They change colors at sunrise and sunset because they are reflecting color changes in the sunlight itself. They appear gray when they are so thick with water that light cannot pass through them. This is when storms happen! Clouds close to the ground are called fog.

- ◆ Lightning occurs when positive and negative charges build up in a cloud and the negative charges are near the bottom. When the negative charges in the cloud move over a spot on Earth where there are positive charges, a spark called lightning connects the two charges! Lightning will always connect to the closest (highest) point. That's why tall towers and buildings get hit by lightning more often. We use lightning rods to attract the electricity from lightning bolts and channel it into the ground so that the building and the people in it don't get hurt.

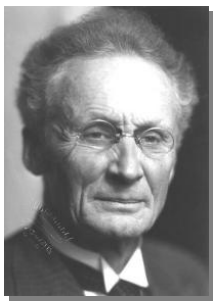


- ◆ A charge is created when electrons move from one object to another; this can happen when objects touch each other. In our experiment today, we created static electricity by rubbing a balloon against a wool sweater. (Static electricity is the accumulation of an electrical charge in an object.) The charge in the balloon then attracted the salt and pepper (more pepper than salt because pepper weighs less).



- ◆ Lightning is very hot: the air temperature along a bolt of lightning is about 18,000 degrees Fahrenheit! When this tremendous heat is released, it causes the air to explode out in waves of vibration, which we eventually hear as thunder. Light travels faster than sound, so we usually see the lightning before we hear the thunder. (If you see lightning and hear thunder simultaneously, the storm is directly overhead.)

Amazing Scientist



Tor Harold Bergeron, Ph.D. (1891-1977). Dr. Bergeron was a Swedish meteorologist and cloud physicist. A cloud physicist studies how clouds are formed and what's inside of them. In 1935, Dr. Bergeron wrote a paper titled *On the Physics of Clouds and Precipitation*. In this paper, Dr. Bergeron explained that both water and ice crystals are present in clouds. He said that after water evaporates and condenses into vapor, the vapor can turn into ice if the temperature inside the clouds is cold enough. These crystals then fall from the clouds and melt to create rain. Dr. Bergeron's research is very important and helps scientists today understand how clouds work.

Curiosity @ Home

Start a cloud journal. Use your cloud finder to determine what clouds you are seeing each day. Keep a journal, and watch the weather report each night. Can you see a connection between the clouds and the air temperature? The amount of water in the air (humidity)? The storms that hit?

Word Scramble

Can you unscramble these words from today's class?

MULUUSC

(a type of cloud)

RAVOP

(moisture in the air)

TINILGGHN

(occurs when positive and negative charges build up in a cloud)

NOERGERB

(a famous cloud physicist)

NETHDUR

(the sound that you hear with lightning)

GARECH

(created when electrons move from one object to another)

GOF

(clouds that are very close to the ground)

NOWS

(a type of precipitation)