



Drexel-SDP GK-12 ACTIVITY

Science

Weather and Aeronautics

Weather and Cloud Formations

Grade Level 5

Lesson # 1 of 1

Lesson Dependency

Time Required 1 Day

Summary

In this lesson, we look at basic weather patterns including cloud formations.

In previous lessons in this module, we talked about properties of air. Namely, that air takes up space and exerts pressure against surfaces. These pressures are different around the world because the sun heats the earth differently due to terrain like oceans, rivers, forests, deserts and grasslands, which all absorb and reflect solar energy differently. Think about the solar ovens we made in the fall - what kind of material did you use? You already know that the results would have been different if we had used different materials. Because air moves from high pressure areas to lower pressure areas as a result of this unequal heating, we have global weather and climate.

You also know that water evaporates into the air, and that the air "holds" that water. The amount of water in the air is referred to as humidity. But how much water can the air hold? It depends on the temperature of the air, for reasons you'll learn in Chemistry. But for now, let's see what effect temperature has on "saturation" of water in the air -- that is, how much water the air can hold.

First, let's talk about how we'll know when the air has held all the moisture that it can hold. Recall what happened on a cold day when you exhaled into the air. Steam formed, just like when we boil water into cool air. In the sky, the same kind of thing happens -- clouds form. Let's look at some cloud types.

Cloud Types:

Clouds form in 3 types and in 3 parts of the atmosphere. They can be:

Low Clouds: Up to 6000 feet (sounds high doesn't it?)

Middle Clouds: 6000-18000 feet (how many miles is this?)

High Clouds: 18000 feet to the top of our atmosphere ("troposphere") called the "tropopause" -- this is where the jet stream lives!

And the cloud types are based on their shape and structure:

Cirrus Clouds are mostly ice crystals and look like feathers.

Cumulus Clouds are the classic puffy clouds.

Stratus clouds are flat like long sheets of paper across the sky.

Clouds are also named based on other properties. For example, if I told you that this cloud was called a cumulonimbus cloud, and that nimbus is Latin for "rain," what do you think this cloud is?

Keywords

Air Pressure, Weather, Aeronautics, Properties of Air, Bernoulli's Principle

Educational Standards: 3.5.7, 3.6.7

Learning Objectives

- Unequal heating of the earth's heterogeneous surfaces result in weather, which is essentially a pressure difference in air masses that creates the weather we know. Students will learn that consistent and historical weather patterns are known as climate, and that basic weather patterns and formations occur as a result of topography, geography, and this unequal heating of the earth's surface. Students will identify the three basic cloud formation types, and learn that each forms due to different meteorological causes.

Image









Vocabulary / Definitions

Word	Definition
Cirrus	High clouds made primarily of ice crystals; they resemble “feathers” in the sky.
Cumulus	Towering, puffy clouds formed from rising moist air.
Stratus	Sheets of thin cloud formations
Cumulonimbus	From Latin, meaning “towering rain cloud.” This is a thunderstorm cloud.
Troposphere	The layer of the atmosphere in which we live.
Tropopause	The top of the troposphere, where the jet stream is located.

Associated Activities

- Record your hypothesis: Which type of air holds more water? Warm or cool? (Recall: Normally, as we go higher in the sky (as we gain altitude), does air get cooler or warmer?). What do you think will happen when the water in the teakettle boils? When the steam dissipates over the air cooled by the ice, what will happen? How is this like or unlike cloud formations in the sky? Hint: is it warmer or cooler there?
- Boil water in the teakettle until steam comes from the spout.

- Notice that the steam disappears into the air almost immediately.
- Fill the strainer full of ice cubes and hold it near the spout of the teakettle so the steam will go through it.
- Clouds form as the steam cools. Why?
- Fill the pan with ice cubes and hold it where the steam from the teakettle will hit the sides of the pan.
- When the hot vapor or steam hits the sides of the pan, little drops of water gather on the outside of the pan and drip like rain.

Lesson Closure

- Students should match cloud types to these pictures, and identify the cloud formations on the current day.

References

Cloud Types Reference (<http://seaborg.nmu.edu/clouds/types.html>)

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