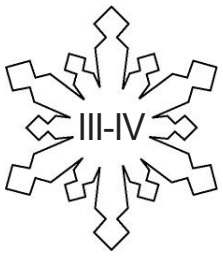
Cloud Types

Levels



Grades 5-8

Overview:

During this project, students learn about different types of clouds and determine which type of cloud is most commonly overhead in their area over a period of four weeks.

Objectives:

The student will:

- identify different types of clouds;
- observe the sky daily and record the type of clouds overhead; and
- determine the type of cloud most commonly overhead over the course of a month.

GLEs Addressed:

Science

- [5-8] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [6] SD3.1 The student demonstrates an understanding of cycles influences by energy from the sun and by Earth's position and motion in our solar system by connecting the water cycle to weather phenomena.
- [7] SD3.1 The student demonstrates an understanding of cycles influenced by energy from the sun and by Earth's position and motion in our solar system by describing the weather using accepted meteorological terms (e.g., pressure systems, fronts, precipitation).

Whole Picture:

Clouds are formed when water on Earth evaporates and forms water vapor held in the air. As warm air rises, cooling occurs. The cooler the air, the smaller the amount of water vapor it can hold, therefore some of the water vapor is forced to condense onto tiny particles (dust, pollution) floating in the atmosphere. A small drop of water forms around each particle. A cloud is a visible mass of such water in the form of small droplets or ice crystals that are small enough to stay suspended in the atmosphere.

Clouds can be categorized into three basic types: cirrus, cumulus, and stratus.

Cirrus clouds are characterized by thin, wispy strands that appear high in the sky, generally between 20,000 and 40,000 feet (6 to 12 kilometers) but may be much higher. This is the equivalent of several miles, as one mile equals 5,280 feet. Here the water droplets freeze and form ice crystals. High winds blow the clouds into long streamers thin enough for sunlight and moonlight to pass through. Airplanes traveling at such heights leave condensation trails that can turn into cirrus clouds. A thickening, or abundance, of cirrus clouds can be an indication of an approaching frontal system. In Latin cirrus means "curl of hair."

Cumulus clouds are characterized by puffy, billowing towers of white that can extend for thousands of feet, usually beginning with flat bases ranging from 4,000 to 8,000 feet (1.2 to 2.5 kilometers) in altitude. Such clouds are formed when warm, moist air rises. As it rises, the air cools and condensation occurs. The size of a cumulus cloud depends on the force of the upward movement of the air and the amount of moisture in the air.

The presence of cumulus clouds indicates fair weather, however when such clouds continue to grow

larger and taller, forming cumulonimbus clouds, they can produce heavy rain, lightning, winds, hail, and even tornadoes. In Latin, cumulus means “heap.”

Stratus clouds are characterized by their uniform look, blanketing the sky with white and grey. Such clouds are often formed when a layer of warm, moist air passes over a layer of cool air. As the two layers meet, the warm air cools to the point of condensation, forming a blanket-like cloud. These flat, featureless clouds are low in altitude (usually 2,000 to 7,000 ft.) and obscure the sun.

Stratus clouds can reach the ground. When this happens it is called fog. Above-ground, stratus clouds may bring light mist, drizzle, or light snow. In Latin, stratus means “layer.”

Terms such as altostratus, stratocumulus, and cirrostratus help further define cloud types based on a combination of structure and height. The term “nimbus” is added as a prefix or suffix to indicate the presence of precipitation. A nimbostratus cloud is a stratus cloud that is producing rain or snow. A cumulonimbus cloud is a cumulus cloud producing stormy, wet weather.

Clouds appear white because the water droplets and ice crystals reflect sunlight. Light is composed of a spectrum of colors that when added together appear white to the human eye. Clouds appear gray when the droplets begin to crowd together so the sunlight cannot pass through. This can also be an indication the cloud is becoming oversaturated and will produce rain, snow, or hail.

Materials:

- Chalk pastels
- Construction paper
- Pictures of cloud types (downloaded from the ACMP Web site)
- Tape
- STUDENT LAB PACKET: “Cloud Types”

Activity Procedure:

1. Go to the ACMP Web site, at www.ArcticClimateModeling.org, and click on “Tools and Data” to download and print cirrus, cumulus, and stratus cloud pictures for the lesson.
2. Distribute pastels and construction paper and ask each student to draw a cloud on their paper. Allow students time to complete their drawing.
3. Collect pastels then discuss the three primary types of clouds: cirrus, cumulus, and stratus.
   - **Cirrus:** Wispy white clouds made of ice crystals. They are found as high as 10 miles above Earth.
   - **Cumulus:** Fluffy white clouds that grow vertically between 700 and 12,200 meters above Earth. Cumulus clouds can increase in number and become larger in the afternoon.
   - **Stratus:** Thin-layered stratus clouds form close to the ground. Fog is a low-lying stratus cloud.
4. Draw three columns on the chalkboard and label them Cirrus, Cumulus and Stratus. Tape the correct downloaded pictures into each column. Ask students to work together to tape their pictures into the appropriate columns.
5. Distribute the STUDENT LAB PACKET: “Cloud Types” and introduce the testable question for this activity: What cloud type will be over our area most frequently this month?
6. Ask students to think about what types of clouds they have seen overhead lately and make a hypothesis.
7. Explain that students will test their hypotheses by observing cloud types at the same time each school day for the next 4 weeks. They will record their observations in their lab packets and on the ACMP Student Observation Network. Set aside a few minutes each day for students to complete this task.

8. After students have collected data for 4 weeks, ask them to graph and analyze their data. Discuss the validity of the data. What are the weaknesses of this data set? Discuss student conclusions.
9. Ask students to create a bulletin board illustrating their cloud type investigation.

Answers to Student Lab Packets:

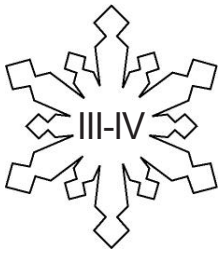
Hypothesis, Data, Analysis and Conslusions will vary. All sections, including the Cloud Type Data Chart and bar graph, should be completed. The bar graph should accurately represent the data recorded in the Cloud Type Data Chart.

Further Questions:

1. Cirrus
2. Stratus
3. Cumulus

Name:_____

Levels



Cloud Types

Student Lab Packet (page 1 of 3)

Testable Question:

What cloud type will be over our area most frequently this month?

Background Information and Activity:

Cirrus: Wispy white clouds made of ice crystals. They are found as high as 10 miles above Earth.

Cumulus: Fluffy white clouds that grow vertically between 700 and 12,200 meters above Earth. Cumulus clouds can increase in number and become larger in the afternoon.

Stratus: Thin-layered stratus clouds that form close to the ground. Fog is a low-lying stratus cloud.

Hypothesis:

Make a check mark next to the cloud type that you expect to find overhead most frequently this month.

_____Cirrus

_____Cumulus

_____Stratus

Procedure:

1. Select a time each school day to observe the clouds outside the classroom window.
2. Each school day for 4 weeks, look outside at this time. Record the cloud type that you see on the Cloud Type Data Chart. If you see more than one cloud type, place an “X” in more than one column on the chart.
3. Visit the Science Observation Network at http://www.arcticclimatemodeling.org, and record cloud information for your village on the network by clicking on the appropriate cloud type. If there are no clouds today, click on “Clear.”

Name:_____

Cloud Types

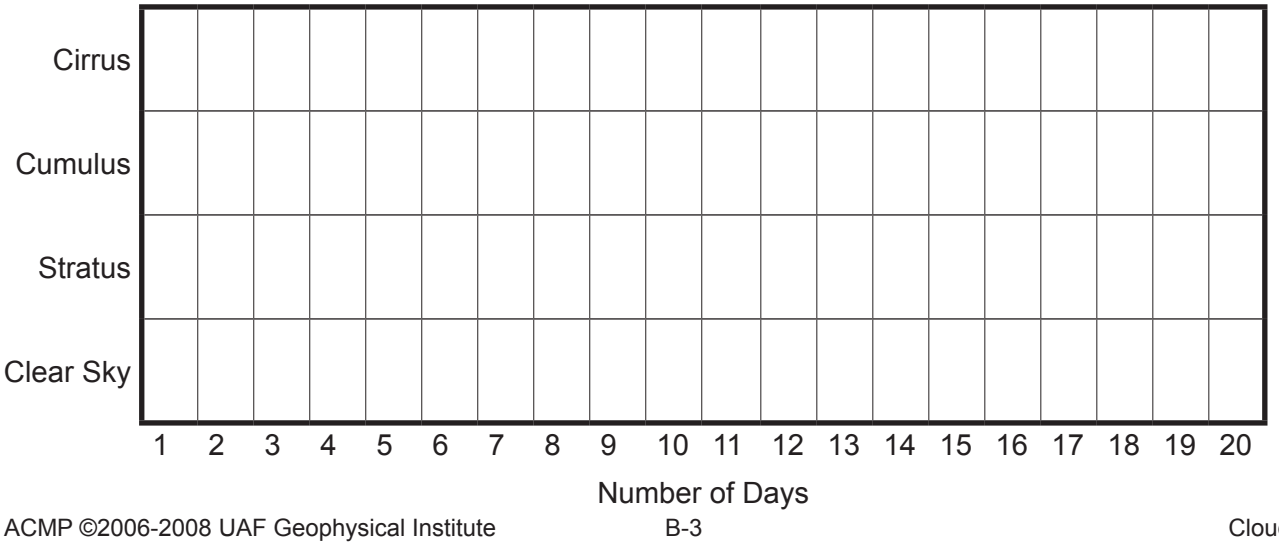
Student Lab Packet (page 2 of 3)

Cloud Type Data Chart

Day	Cirrus	Cumulus	Stratus	Clear Sky
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Analysis of Data:

Make a bar graph showing the number of school days that each cloud type was visible this month.



Name:_____

Cloud Types

Student Lab Packet (page 3 of 3)

Conclusion:

Make a check mark next to the cloud type that was overhead most frequently this month.

_____ Cirrus

_____ Cumulus

_____ Stratus

Was your hypothesis proved or disproved?_____

Briefly explain how you came to your conclusion:

_____

_____

_____

_____

_____

_____

_____

Further Questions:

Label each cloud type in the pictures below:

1. 

_____

2. 

_____

3. 

_____