

Activity 2.1 Creating Clouds

Teacher Background

More than 2,000 years ago people were already using the shape and color of clouds to predict the weather. In 300 B.C. the Greek philosopher, Theophrastus, published a *Book of Signs* which contained 100 types of clouds that supposedly foretold certain types of weather.

While clouds hold only about .001 percent of the world's water, they play a very important part in the water cycle and the distribution of water on Earth. (See Activity 1.3) Clouds are also an important factor in our climate. During the day, extensive cloud cover reflects the Sun's rays back into space preventing our planet from receiving its full warmth. At night an extensive cloud cover allows the planet to retain some of the heat it absorbed during the day.

In 1803, the English scientist, Luke Howard, devised the basic system of cloud classification still in use today. Howard, who became known as the "father of British meteorology", based his system on four major cloud types: *cirrus* (Latin for curly), *stratus* (layer), *cumulus* (puffy) and *nimbus* (rain-bearing).

Without particles of the right size in the air, clouds cannot form. Sand, dust, soot from fires, particles from volcanoes, sea salt and even air pollution all serve as "condensation nuclei" around which droplets can form.

These related Activities invite students first to create clouds through a simple but still impressive procedure and then TO venture outside to study clouds in the real world with a new appreciation for how they form.

Objectives

Students will observe how clouds form in the presence of condensation nuclei.

Students will practice identifying clouds using a cloud chart.

Students will test weather predictions based on the types of clouds observed against the actual weather.

Vocabulary

condensation nuclei

Materials

mayonnaise or pickle jar with lid (Do not use Mason type jars. The thickness makes it more difficult to see what's actually happening inside.)

2 ice cubes

hot water

match

WEATHERlogs

Student Worksheet 2.1.1, Creating Clouds

Student Worksheet 2.1.2, Cloud Types and Precipitation Possibilities (for an Expand option)

LFSTORM Standards Correlation sheet (for teacher reference)

Engage

Take the class outside on a cloudy or partly cloudy day and have them make as many observations as possible of what they actually see in the sky. Accept all comments—even the more fanciful that do not conform to the “right” answers, e.g., using conventional scientific/meteorological descriptions. They should include apparent height above the ground (low, high, intermediate), what percentage of the sky is covered in clouds and detailed descriptions of the clouds using words such as “puffy,” “layers” or “curly.” Their descriptions should be sufficiently detailed that they could e-mail their descriptions to a friend and have them accurately reproduce what they saw. (You might want to have pairs of students spend no more than 5 minutes testing this out in class.) Students could also take digital photos of the clouds and/or draw what they see in the sky. Discuss their observations. Ask students how they believe clouds are formed.

Explain/Explore

Procedure

Note to teachers: because of the use of matches this is presented as a teacher demonstration. Depending on the character of your class you may wish to have students undertake this activity themselves—in which case distribute the Worksheet, review the procedure, and emphasize the importance of responsible behavior.

Pour the hot water into the jar to a height of about 1 cm. Turn the jar lid upside down and place the ice cubes in the lid. Light the match and then blow it out so that it’s smoking (with minute particles of soot thereby providing condensation nuclei) and drop it into the jar. Place the inverted lid containing the ice cubes on top of the jar, with the top of the lid on the top rim of the jar and the ice still sitting in the lid. Have students carefully observe what happens.

Expand/Adapt/Connect

(Use the reverse of Worksheet 2.1.1 to record the data, and Worksheet 2.1.2 or printouts from online cloud charts as an additional reference.)

Have students observe the sky for one week. Using cloud charts (or Worksheet 2.1.B) they should record the cloud type and percentage of the sky that is covered with clouds. Encourage them to make weather predictions based on the clouds and the “Precipitation Possibilities” included on the Worksheet and then to check in the appropriate time frame to see how accurate their predictions were.

Find a class participating in PASSPORT TO WEATHER AND CLIMATE and e-mail them your cloud description and have them e-mail theirs to your class. (Or use the WRITE-STORM mail list to exchange such information as part of the “Writing Up a Storm” online collaboration.) Students receiving the descriptions will draw a picture of the sky based on the students’ descriptions. Classes will then exchange pictures either using snail mail or by scanning their pictures and saving them as jpg files and exchanging files. Students could also take digital photographs or use paint programs for their pictures.

Participate in “Follow that Storm!” (full details online at the LFSTORM website) and see how a storm changes as it travels across country or, in the case of a hurricane, up the East Coast. Post digital images of what the storm or weather system looked like as it passed over your location and follow the changes as it moves on across the country.

Suggested URLs

[http://www.globe.gov/sda-bin/wt/ghp/tg+L\(en\)+P\(atmosphere/ObservingCloudType\)](http://www.globe.gov/sda-bin/wt/ghp/tg+L(en)+P(atmosphere/ObservingCloudType))
from The GLOBE Project: pictures and descriptions of each cloud type. A full online Teacher’s Guide links to protocols for how to characterize cloud cover and an archive of cloud observations.

[http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/cld/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/cld/home.rxml)
The Weather World 2010 Module on “Clouds and Precipitation.” Comprehensive overview of cloud classifications, different types of precipitation and how they develop. For older students.

<http://www.usatoday.com/weather/wcloud0.htm>
“All About Clouds” Cloud types, how they form and how they influence weather.

<http://inspire.ospi.wednet.edu:8001/curric/weather/pricloud/index.html>
For younger students: how to observe clouds, with excellent graphics of different cloud types.

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