Cloudscape

Purpose

- To help students identify some of the characteristics of clouds.
- To enable students to observe clouds, describe them in a common vocabulary, and compare their descriptions with the official cloud names.

Overview

Using information from both the *Elementary GLOBE* storybook *Do You Know that Clouds Have Names?* and their own observations, students construct a sky scene with trees and buildings as reference points on the ground and cloud types ordered by altitude in the sky. Students will describe clouds and then correlate their descriptions with the classification of cloud types used by The GLOBE Program.

Student Outcomes

Students will be able to identify cloud types using standard cloud classification. They will understand that the names used for the clouds are based on three factors: their *shape*, the *altitude* at which they occur, and whether they are *producing precipitation*.

Next Generation Science Standards

- DCI ESS-2C: The Roles of Water in Earth's Surface Processes
- Science Practice 6 Constructing Explanations
- Science Practice 8 Obtaining, Evaluating, and Communicating Information
- Crosscutting Concept 2 Cause and Effect
- Crosscutting Concept 3 Scale, Proportion, and Quantity

CCSS.ELA Anchor Standards

- W.4 Produce clear and coherant writing...
- W.8 Gather relevant information...

Geography Standards

- 4 The physical and human characteristics of places

Time

- Two 30-minute class periods (or 60 minutes total)

Level

Elementary (most appropriate for grades K-4)

Materials

- GLOBE Cloud Chart (globe.gov/globecloudchart)
- *Elementary GLOBE* storybook *Do You Know That Clouds Have Names?*
- *Cloudscape Student Activity Sheet*
- Blue poster board or rolled paper for a bulletin board
- Cloud materials: cotton pillow batting (the kind sold by the yard), wax paper, torn white bedsheets, sheer white fabric, white flannel, white pipe cleaners
- Yellow and white strips of paper (big enough to write labels for clouds)
- Crayons or markers (especially washable black and gray markers), white chalk
- Glue sticks
- Scissors
- Rulers

Preparation

- Read the *Elementary GLOBE* storybook *Do You Know That Clouds Have Names?* – either read it to the class or have students read it to themselves. The book can be downloaded from www.globe.gov/elementaryglobe.
- Make examples of the different types of clouds with the same materials the students will use. Having visual examples will help the students with this activity.

Teacher's Notes

Weather reporting and forecasting relies on careful and consistent observations. The human eye represents one of the best (and least expensive) weather instruments. Much of what we know about the weather is a result of direct human observation. Observing clouds and keeping track of the weather associated with certain kinds of clouds will show students the connection between cloud types and weather.

Recognizing cloud types can help you predict the kind of weather to expect in the near future. Those connections aren't described here, but there are numerous weather books that can help you and your students complete that task. Inviting a local meteorologist to visit your class and to talk with students is a great way to stimulate interest in the relationship between clouds and weather patterns.

In this activity, allow the students to be creative in describing different cloud types in their own words. Then, provide them with the following information so they can identify clouds with their official names. (The information below can also be found in the storybook *Do You Know That Clouds Have Names?)*

The names used for clouds are based on three factors:

1. their shape,
- cumulus (heaped and puffy)
- stratus (layered)
- cirrus (wispy)

2. the altitude of the cloud's base,
- high clouds (above 6,000 m at middle lattitudes and designated by "cirrus" or "cirro-" and made of ice)
- middle clouds (2,000 - 6,000 m at middle lattitudes and designated by "alto-" and made of water or ice (depending on the season)
- low clouds (below 2,000 m and made of water)

3. and whether they are producing precipitation.
- including clouds with names that incorporate the word "*nimbus*" or the prefix "*nimbo-*"

The *GLOBE Protocols* ask you to identify ten common types of clouds.

High clouds
- *Cirrus*
- *Cirrocumulus*
- *Cirrostratus*

Middle clouds
- *Altocumulus*
- *Altostratus*

Low clouds
- *Stratus*
- *Nimbostratus*
- *Cumulus*
- *Stratocumulus*
- *Cumulonimbus*

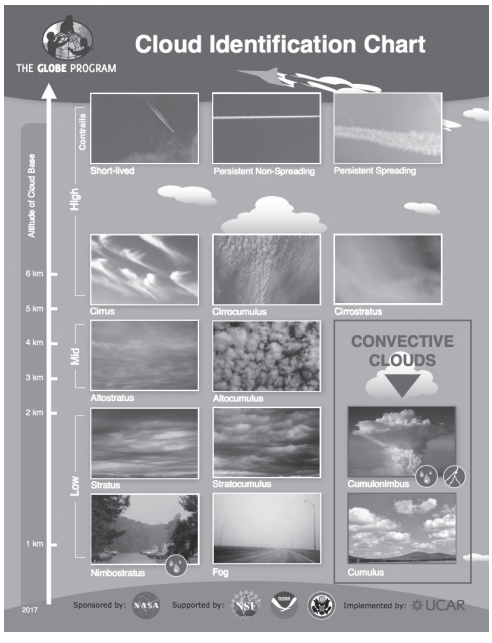
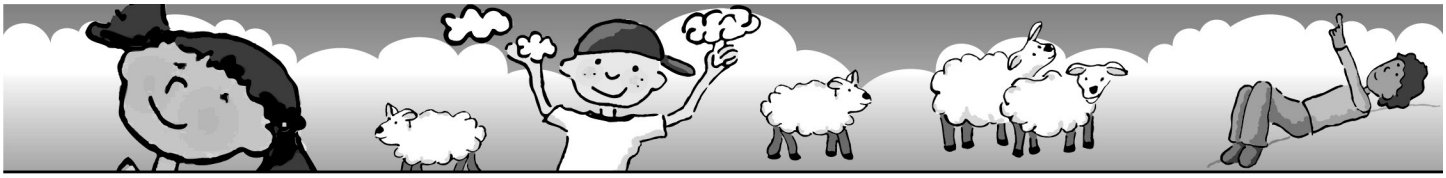


Figure 1. GLOBE Cloud Chart (globe.gov/globecloudchart)



Note: While the bases of both cumulus and cumulonimbus clouds may start below 2,000 m, they often grow thick enough to extend into the high range. Thus, they are often referred to as "clouds of vertical development." Only high clouds are wispy and so the term *cirrus* has become synonymous with the word wispy as well as referring to high clouds.

Contrails are linear clouds made of ice crystals formed around small particles in jet aircraft exhaust. The word "contrail" is an abbreviation of the term "condensation trail." These are indeed clouds, caused directly by human activity, and are of great interest to researchers. There are three subtypes of contrails:

- *Short-lived contrails*: obvious tail behind a plane doesn't remain after the plane passes

Figure 2. Short-lived contrail (Image: NASA)

- *Persistent, non-spreading contrails*: obvious contrails (linear, narrow features) that do not appear to dissipate significantly, or to show signs of spreading, and that remain long after the airplanes that created them have left the area

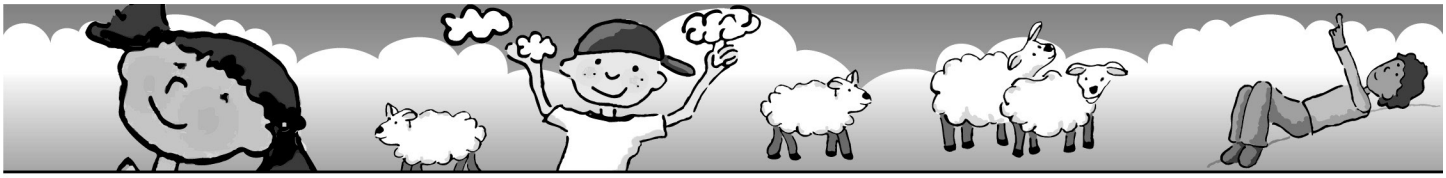
Figure 3. Persistent, non-spreading contrail (Image: NASA)

- *Persistent, spreading contrails*: obvious linear cirrocumulus or cirrus-type clouds with a diffuse appearance

Figure 4. Persistent, spreading contrail (Image: NASA)

What To Do and How To Do It

1. On a wall or a bulletin board, construct a sky scene (like a mural) with the class using poster board or a roll of paper. Be sure to include buildings and trees that are to scale at the bottom of the scene to provide a sense of horizon. This will serve as a reference to decide if the clouds are low, high, or someplace in between. On one side of the scene, label the different altitudes in the sky, from 0 meters to 8,000+ meters. For younger students, also add the words "Low", "Middle", and "High" by the altitudes.
2. Divide the students into groups (if you divide them into 11 groups, each group will complete one cloud type or contrails for the wall; otherwise you can divide them into fewer groups and have each group do more than one cloud type). Give each group a cloud type to work on. Share examples of different clouds made by the teacher.
3. Explain to the students what they need to do for each section of the *Cloudscape Student Activity Sheet.* They should use their own words to describe their cloud in each category:
   - Color: white, milky, grey, silvery, mixed, black, etc.
   - Height in sky: low, medium, high
   - Size: small, large, heavy, light, dense, thick, etc.



- Shape: patchy, fluffy, thin, thick, flat, etc.
- Other features: lets sunlight through, blocks sunlight, covers the whole sky, is in layers, is moving, etc.
- One-word description: thunderclouds, menacing, threatening, gloomy, enveloping, beautiful, streaked, foggy, bubbly, scattered, moving, swirling, scary, etc.

4. Once the students have completed their description, have them write the name of their cloud on the white label and the one-word description for their cloud type on the yellow label. Then, have them construct their cloud out of sections of cotton pillow batting or other materials provided. If their cloud isn't just white in color they can use washable gray or black markers to shade the cloud.

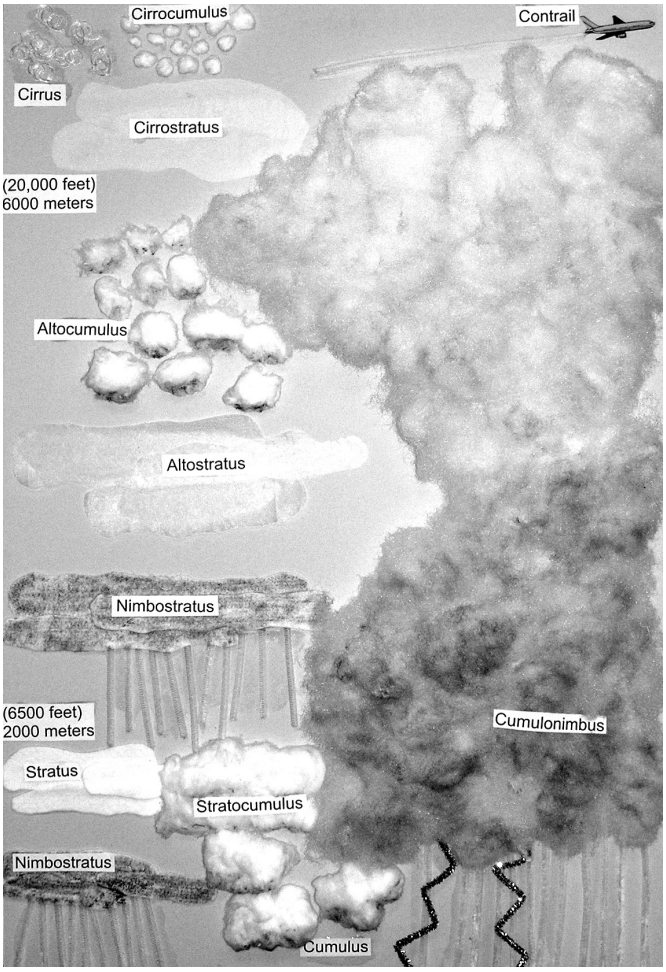


Figure 5. Example of Cloudscape sky scene

5. Once all groups have completed these tasks, have each group make a short presentation describing their cloud type and then have them place their cotton cloud and its labels on the sky scene (see Figure 5).
6. Keep the sky scene up in your classroom so the students can use it as a resource every day when making cloud observations.

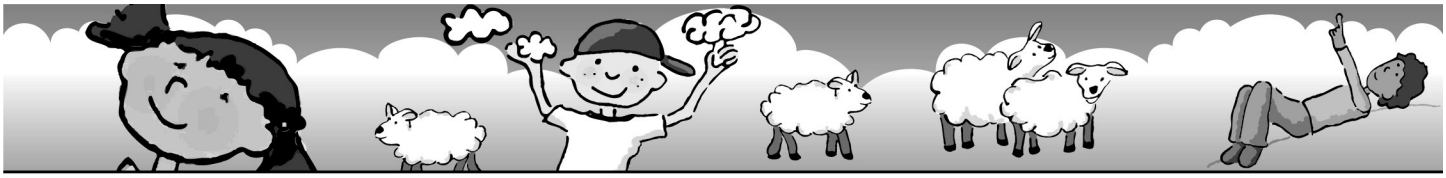
Adaptations for Younger and Older Students

Younger students can act out the traits of the different cloud types. Provide fabric, cotton, gauze, and other props for the students to use. Younger students might like to make individual clouds on their own small pieces of blue paper. They can add them to the class cloudscape or bring them home.

Older students can correlate cloud types with the appearance of certain types of weather. See the *Cloud Watch Learning Activity* in the *GLOBE Teacher's Guide*. Students can also pay attention to the sequence of cloud types over the course of several days and investigate the factors that cause clouds to form.

Further Investigations

- **Cloud Poetry:** Have your students write poetry about clouds. Use the list of descriptive words they created for this activity and ask the students if there are any other words they would like to include in the list. Then have them write poetry answering questions like the following: What does the cloud look like? What does it do? How does it make you feel? They can also draw an illustration to go with their poem.
- **Memory Game:** Create cloud "memory" games to practice identification skills. Have each student create a set of index cards that includes each of the ten cloud types. A second set of cards includes illustrations of each type. Have pairs



of students turn the cards face down. Partners alternate turning over two cards at a time, attempting to locate a match. A successful match results in another turn; play continues until all cards have been matched. The student with the most matched pairs wins.

- **GLOBE Cloud Protocol:** Start making cloud observations as a class to submit to GLOBE. See the *GLOBE Teacher's Guide* (www.globe.gov) for more information on the Cloud Protocols, formulating a research question, and collecting cloud data. Alternatively, you can use the *GLOBE Observer Clouds App* (observer.globe.gov) to help students collect cloud data. Some good research questions for grades K-2 are: Do clouds relate to the seasons? What is the relationship of rain to clouds? Do clouds always rain? Do clouds relate to air temperature?
- **Cloud Journal:** Have each student keep a weather journal and record cloud types as part of their daily observations.

Cloudscape Student Activity Sheet

Cloud Features

Name _____

Date _____

Color _____

My cloud is ☐ Low ☐ Middle ☐ High

Size _____

Shape _____

Other features _____

My cloud looks like this!

One word that
describes my cloud is...