



# Hands-on **STAR**net

Tested & Approved STEM Activities

## CLOUDS ABOVE

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# Activity Guide



Science-Technology Activities &  
Resources For Libraries

A product of the Science-Technology Activities and Resources for Libraries (*STAR\_Net*) program.  
Visit our website at [www.starnetlibraries.org](http://www.starnetlibraries.org) for more information on our educational programs.  
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# CLOUDS ABOVE

## Overview

Children observe Earth clouds and discover that there are different kinds of clouds at the upper, middle, and lower levels of our atmosphere.

## Type of Program

- Facilitated hands-on experience
- Station, presented in combination with related activities
- Passive program
- Demonstration by facilitator

## What's the Point?

- Changes to distant oceans and air moving freely around our globe have an influence on our regional environment.
- Clouds are related to weather and change with day-to-day fluctuations in temperature, wind, and pressure.
- Different types of clouds can be found at the low-level, mid-level, and high-level altitudes. Their shapes; colors; and whether they are made up of ice crystals, rain, or a mixture of both are distinct at these levels.

## Activity Time

15-30 minutes

## Intended Audience

**School-aged** children ages 8-9  
**Tweens** up to about age 13

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## Facility Needs

- An outdoor gathering space with a view of clouds
- OR
- A computer, projector, and access to online images of clouds
- AND
- Optional: 15–20 chairs arranged at the table(s) for the children to sit and view the images

## Materials

### For the Facilitator

- Brief Facilitation Outline* page

### For Each Group of 10-15 Children

- 10-15 copies of *Cloud Viewer*, double-sided and in color ([www.windows2universe.org/teacher\\_resources/cloud\\_viewer\\_web.pdf](http://www.windows2universe.org/teacher_resources/cloud_viewer_web.pdf))
- 3-5 copies of *Cloud Identification Guide: A Dichotomous Key*, in color (and preferably double-sided, to conserve paper) ([www.usc.edu/org/cosee-west/March06Resources/OtherResources/CloudID.pdf](http://www.usc.edu/org/cosee-west/March06Resources/OtherResources/CloudID.pdf))
- 3-5 pairs of kid-friendly scissors

## Supporting Media

### Visualizations

#### ***Clouds in Art Interactive and Gallery***

[www.windows2universe.org/art\\_and\\_music/cloud\\_art/cloud\\_art\\_main.html](http://www.windows2universe.org/art_and_music/cloud_art/cloud_art_main.html)

This interactive website identifies the types of clouds depicted in landscape paintings, and provides a side-by-side comparison with a photograph of that cloud type.

#### ***Gallery of Clouds***

<http://scijinks.nasa.gov/clouds-gallery>

View pictures of different cloud types. Appropriate for all ages, although younger children will require adult assistance with navigation.

### Books

#### ***The Everything Kids' Weather Book: From Tornadoes to Snowstorms, Puzzles, Games, and Facts that Make Weather for Kids Fun!***

Joe Snedeker, Adams Media, 2012, ISBN: 978-1440550362

Games, investigations, and engaging text bring aspects of weather and Earth's atmosphere — including air, water, clouds, the jet stream, weather stations, rainbows, and more — to life. Appropriate for ages 7-12.

#### ***National Geographic Kids Everything Weather: Facts, Photos, and Fun that Will Blow You Away***

Kathy Furgang, National Geographic Society, 2012, ISBN: 1426310587

This book about weather — including wild weather — is appropriate for ages 8-12.

#### ***Do You Know that Clouds Have Names?***

Becca Hatheway, Kerry Zarlengo, and Peggy LeMone, University Corporation for Atmospheric Research, 2006

<http://nasawavelength.org/resource/nw-000-000-002-804>

Readers explore the different types of clouds and their names through photographs, kid-friendly illustrations, and clear text. The book includes an explanation for how contrails can become human-made cirrus clouds. Appropriate for ages 8-12.

## Websites

### *Weather Wiz Kids*

[www.weatherwizkids.com/kids-questions.htm](http://www.weatherwizkids.com/kids-questions.htm)

Answers to questions submitted by children about weather are posted here. Children ages 8 and up, as well as younger children with the help of an adult, may enjoy looking for answers to their own questions on this list. Some examples include “Why does it rain?” and “Why do clouds float?”

### *The National Weather Service*

[www.nws.noaa.gov](http://www.nws.noaa.gov)

This site offers weather and climate data. Appropriate for adults.

## Handouts

### *Sky Watcher Chart (11”x17” size)*

[http://science-edu.larc.nasa.gov/cloud\\_chart](http://science-edu.larc.nasa.gov/cloud_chart)

### *CloudSpotter Wheel*

[http://www.srh.noaa.gov/srh/jetstream/downloads/cloudwheel\\_10.pdf](http://www.srh.noaa.gov/srh/jetstream/downloads/cloudwheel_10.pdf)

### *Atmospheric Explorers Hand-outs*

These one-page hand-outs were created by the University Corporation for Atmospheric Research. One side features colorful photographs, while the other describes four easy-to-do hands-on experiments. Appropriate for ages 8-13.

“Storms” (<http://eo.ucar.edu/kids/images/AtmoExp1.pdf>)

“Clouds” (<http://eo.ucar.edu/kids/images/AtmoExp2.pdf>)

### *Science Notebooks for Ongoing Weather Observations*

The Michigan Reach Out! “Keeping a Daily Weather Log” activity at [www.reachoutmichigan.org/funexperiments/agesubject/lessons/caps/log1.html](http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/caps/log1.html) includes a printable chart to record temperature, wind speed and direction, relative humidity, and other data. Alternatively, professional-grade journals, such as those manufactured by [www.riteintherain.com](http://www.riteintherain.com), may serve as a valuable memento for the children.

### *Daily Forecast Flyer*

[www.wunderground.com/printer/cityforecast.asp](http://www.wunderground.com/printer/cityforecast.asp)

Customize a flyer of the weather forecast at your location and print it out. Children will appreciate the easy-to-understand graphics, and adults will find a wealth of local, regional, and global information on this single page.

## Preparation

### **Beginning six months before the activity**

- Prepare and distribute publicity materials for programs based on this activity. If possible, build on the children's knowledge by offering multiple science, technology, engineering, art, and mathematics (STEAM) programs. See the STAR\_Net resources listed at <http://community.starnetlibraries.org/resources> for ideas.

## The day of the activity

- Shortly before the children arrive, observe the weather outdoors. Use the *Cloud Viewer* to match the visible cloud types to those shown on the *Cloud Viewer*.
- If there is inclement weather or no clouds in the sky, set up the computer, projector, and access to online images of clouds, or provide books and / or artwork that depict images of clouds, and conduct a modified version of the activity indoors.

## Activity

### 1. Share ideas and knowledge.

- Introduce yourself and the library. Help the children learn each other's names (if they don't already).
- Frame the activity with the main message: Changes to distant oceans and air moving freely around our globe have an influence on our regional environment — including the clouds that we see.
- Distribute a *Cloud Viewer* to each child and invite them to cut out their viewing windows by cutting along the dashed lines.
- Distribute the *Cloud Identification Guide: A Dichotomous Key* for small groups to share.

Clouds are related to weather and are influenced by the temperature, wind, and pressure changes.

### 2. Observe clouds and weather (preferably outdoors).

If there are no clouds or it is not possible to go outdoors, display images of clouds online, at a computer station, or in books or artwork for the children to observe. Guide the children to make general observations about the clouds in order to identify their type using questions such as:

- Is it raining?
- What colors do you see?
- Are the clouds more grey at their bottoms than at their tops, or are they more uniform in color?
- Do the clouds look bumpy or flat?
- Do they hang high or low in sky?

Clouds often appear white because the tiny water droplets or tiny ice crystals scatter light. Clouds may appear grey when they contain larger drops of water. Gently correct any ideas that the children may have about the different colors indicating different composition. The size of the water droplets or the reflection of sunlight makes clouds appear in different colors — at least on Earth. (On other planets, clouds may be made of substances other than water and appear in different colors as a result.)

Clouds don't always scatter all colors equally, however. During dawn and dusk, the Sun's rays strike the clouds at sharp angles. This causes red (and pink and orange) to be scattered more toward our eyes — giving us the beautifully colored clouds during sunrises and sunsets that are lauded by artists and poets.

- 3. Invite the children to estimate the altitude and composition of the clouds based on their types.** Encourage the children to use their best judgment and discuss which cloud type(s) they believe they are seeing; the process of identification is more important than having the “right” answer.

Different types of clouds can be found at the low-level, mid-level, and high-level altitudes. Their shapes; colors; and whether they are made up of ice crystals, rain, or a mixture of both are distinct at these levels. High-level clouds are usually made of ice crystals, and low-level clouds are usually made of water droplets. Mid-level clouds are usually made of water droplets, or if it is very cold, ice crystals.

- 4. Conclude.** Changes to distant oceans and the movement of air around the globe shape our region’s temperature, wind, and pressure — influencing the shapes, colors, and types of clouds that we see above us. Encourage the children to keep exploring the outdoors!

## Correlation to Standards

### **National Science Education Standards**

*Grades K–4*

Physical Science – Content Standard B

*Properties of Objects and Materials*

- Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances.

Earth and Space Science – Content Standard D

*Objects in the Sky*

- The sun, moon, stars, clouds, birds, and airplanes all have properties, locations, and movements that can be observed and described.

*Changes in the Earth and Sky*

- Weather changes from day to day and over the seasons. Weather can be described by measurable quantities, such as temperature, wind direction and speed, and precipitation.

*Grades 5–8*

Earth and Space Science – Content Standard D

*Structure of the Earth System*

- Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.
- The atmosphere has different properties at different elevations.
- Clouds, formed by the condensation of water vapor, affect weather and climate.

## **Extensions**

### ***Cloud Types and Formation of Clouds Scrapbooking Activity***

[www.cocorahs.org/Media/docs/LessonPlans/4h/4h-cloud-types-and-formation.pdf](http://www.cocorahs.org/Media/docs/LessonPlans/4h/4h-cloud-types-and-formation.pdf)

Over time, children collect photographs of clouds, and — noting the type of cloud, weather conditions, and other information — create a scrapbook.

### ***The Rain Game***

<http://www.life123.com/parenting/education/drama/drama-warm-up-games.shtml>

In this dramatic warm-up activity, children rub their palms together, snap their fingers, slap their hands on their laps, and stomp their feet to mimic the sounds of a storm.

### ***Make It Rain!***

Windows to the Universe Original (now stored at [www.windows2universe.org](http://www.windows2universe.org)), at the University Corporation for Atmospheric Research (UCAR), ©1995–1999, 2000

Demonstrate how water vapor (from boiling hot water) condenses on the cold metal lid of a jar.

Note: The condensation must collect on indentations in the lid (made beforehand with a hammer and nail) in order to “rain” back down into the cup. Alternatively, shape the aluminum foil over the top of a clear plastic tumbler so that it will hold three or four ice cubes and their melt water. Allow the foil to crinkle, but make sure it does not tear.

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### 2. Observe clouds and weather (preferably outdoors). If there are no clouds or it is not possible to go outdoors, display images of clouds online, at a computer station, or in books or artwork for the children to observe. Guide the children to make general observations about the clouds in order to identify their type using questions such as:

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### 3. Invite the children to estimate the altitude and composition of the clouds based on their types.

Encourage the children to use their best judgment and discuss which cloud type(s) they believe they are seeing; the process of identification is more important than having the “right” answer.

### 4. Conclude. Changes to distant oceans and the movement of air around the globe shape our region's temperature, wind, and pressure — influencing the shapes, colors, and types of clouds that we see above us.