

Resources for Earth/Env. Science Teachers
from Anne Skinner, Cowan Museum of History and Science

Erosion Model:

NISE Net Land Cover Activity Guide

https://www.nisenet.org/sites/default/files/exsci_space_land_facilitator.pdf

NISE NET Land Cover Facilitator Guide

https://www.nisenet.org/sites/default/files/exsci_space_land_facilitator.pdf

NISE Net Land Cover description and all files

<https://www.nisenet.org/catalog/exploring-earth-land-cover>



[Exploring Earth: Land Cover | NISE Network](#)

This activity models some of the ways natural processes, such as erosion and sediment pollution, affect Earth's landscape. Data collected from satellites, such as the joint NASA/USGS Landsat satellites, help improve our understanding of Earth's land cover.

www.nisenet.org

Transpiration/pores in leaves:

"Leaf It to Me" – lesson on transpiration from the National Weather Service

https://www.weather.gov/jetstream/ll_leaf

The Story in the Stomata

https://evolution.berkeley.edu/evolibrary/article/mcelwain_03

[The story in the stomata - Understanding Evolution](#)

It works like this. Stomata control a tradeoff for the plant: they allow carbon dioxide in, but they also let precious water escape. A plant that could get enough carbon dioxide with fewer stomata would have an advantage since it would be better able to conserve its water.

evolution.berkeley.edu

Guard Cells - Quick Guide

[https://www.cell.com/current-biology/pdf/S0960-9822\(01\)00358-X.pdf](https://www.cell.com/current-biology/pdf/S0960-9822(01)00358-X.pdf)

[Alistair Hetherington - Cell](#)

R588 Current Biology Vol 11 No 15 What are guard cells? A pair of guard cells surrounds each stoma on the leaf surface. Stomata are important because they regulate the uptake of
www.cell.com

Water cycle/soil:

Sponge Model from Dr. Dirt

<https://www.doctordirt.org/teachingresources/sponge/>

[The Sponge Model | Dr. Dirt](#)

Models are representations of concepts, objects, or systems, some of which can be excellent teaching tools. A household sponge will be used to demonstrate several characteristics of the relations of soil and water.
www.doctordirt.org

Weather/Atmosphere:

Tips from the Cowan Museum of History and Science:

- Here are ways to make your own weather instruments.
 - You can follow these directions to make a home-made thermometer:
<https://www.wikihow.com/Make-a-Thermometer> (written directions with video clips)
or <https://www.youtube.com/watch?v=EbrVwQpgEmc> (video)
 - You can follow these directions to make a home-made rain-gauge:
<https://www.education.com/science-fair/article/DIY-rain-gauge/> (written directions)
or <https://www.youtube.com/watch?v=vkgvT8HrINg> (video)
 - You can follow these directions to make a home-made cup anemometer:
https://sercc.com/education_files/anemometer.pdf (written directions with precise steps and info on how to use anemometer to determine wind speed)
or <https://www.youtube.com/watch?v=Af0LB3abBsk> (video)
 - You can follow these directions to make a home-made wind vane:
<https://www.clearwaycommunitysolar.com/blog/science-center-home-experiments-for-kids/measuring-the-direction-of-wind-with-a-homemade-wind-vane/> (written directions)
or <https://www.youtube.com/watch?v=cnZ5LYI19Vo> (video)
 - You can follow these directions to make a home-made barometer:
http://www.stormthecastle.com/science_projects/how_to_make_a_barometer.htm (written directions)
or https://www.youtube.com/watch?v=m_VFqxM41EM (video)
- Here are workarounds if you don't have weather instruments or the supplies to make them:

- If you don't have a thermometer or supplies to make one, describe how hot or cold it feels. Perhaps you could compare the temperature today to some other day or time of year, like "cooler than any day last week" or "as warm as on Memorial Day".
 - Fun Fact: Did you know male crickets chirp faster when the temperature is rising? You can find the temperature by counting the number of chirps in 15 seconds and adding 37.
- If you don't have a rain gauge or supplies to make one, describe how much it rained recently (a lot, a little, etc.) and include some observations like whether the water level is higher or lower than usual in gutters, ponds, ditches, streams, rivers, etc.
- If you don't have an anemometer or supplies to make one, estimate the wind speed using the chart below.



0 mph	Smoke rises
1-3 mph	Smoke drifts
4-7 mph	Flags stir
8-12 mph	Leaves move
13-18 mph	Tree branches move
18-24 mph	Trees sway
25-31 mph	Flags beat
32-38 mph	Flags extend

From NeoSci "Exploring the Weather"



- If you don't have a wind vane or supplies to make one, use a piece of cloth, a scarf, or a tissue. Hold it up and see which way the wind blows it. The wind is blowing from the opposite direction, and that is the direction you'll want to record.]

- If you don't have a compass, you can use your body as one. Stand with your arms straight out with your right hand pointing to where the sun rises and your left hand pointing to where the sun sets. Your face will be



pointing toward the north.

The back of your head will be

facing south. Your right hand will be pointing east, and

your left hand will be pointing west.



- Use the following abbreviations for the direction from which the wind is blowing:

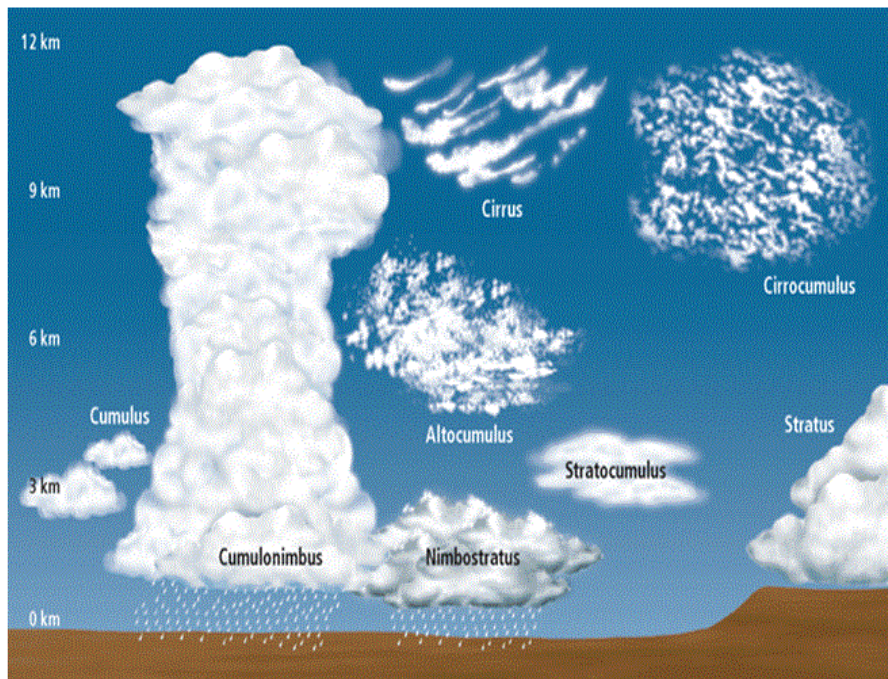
N = North
NE = Northeast
E = East
SE = Southeast
S = South
SW = Southwest
W = West
NW = Northwest



- If you don't have a barometer or supplies to make one, use plants to help you predict whether the air pressure is dropping, and stormy weather is likely to occur. If grass has dew on it in the morning, rain is less likely. If grass is dry at sunrise, then clouds, strong breezes, and rain are more likely. Winds bringing stormy weather often toss leaves on trees about, so the leaves show their lighter-colored undersides. In low pressure conditions before it rains, plants often release waste gases that smell like compost, swamps release more methane, and flowers release stronger fragrances.



- Here are ways to identify clouds and understand what they can tell us about the weather.
 - Here is a chart that shows different types of clouds.



- Clouds with “nimbus” in the name (cumulonimbus, nimbostratus) bring rain. Cumulus clouds are known as fair weather clouds. To find out what type of weather is associated with each type of cloud, click on this link:
<https://www.sciencelearn.org.nz/resources/628-observing-clouds-and-weather>
- “Cumulus” means pile or heap. “Stratus” means layered or spread out. “Cirrus” means curl and refers to curved, wispy clouds. “Nimbus” means rain-bearing.
- Watch the 7-minute video “Cool Clouds” by NASA to learn more about clouds and see a scientist make a cloud and some fog in the laboratory. Click on this link:
<https://www.youtube.com/embed/7MnxnOHCCic>

Make your own CloudSpotter Wheel by clicking on the link below from the National Weather Service, printing the pages, cutting along the lines, and fastening the two circles together with a brass fastener.



<https://www.weather.gov/media/jetstream/clouds/cloudwheel.pdf>

IMAGE SOURCES

Cricket – <https://www.premiumtpc.com/cricket-control>

Smoke rising from fire – <https://ecology.wa.gov/Air-Climate/Air-quality/Smoke-fire/Outdoor-residential-burning>

Flag beating in the wind – <https://abcnews4.com/news/local/south-carolina-town-honors-black-wwii-vet-7-decades-after-brutal-beating>

Compass – <http://www.nglish.com/spanish/en/compass>

Person with outstretched arms – <https://www.pxfuel.com/en/free-photo-qwmvk>

Compass directions - <https://www.pinterest.com/pin/561190803561428446/>

Dew on grass – <https://www.goodfon.com/download/trava-zelen-makro-rosa-na-trave-avtorskoe-foto-elena-anikina/1920x1080/>

Cloud chart -

<http://www.loving2learn.com/SuperSubjects/SuperScience/LifeScience/Weather/CloudChart.aspx>

CloudSpotter - https://www.weather.gov/jetstream/ll_headclouds

Inexpensive Magnifiers

Single 5X magnifiers

https://www.rainbowresource.com/product/000357/Private-Eye-Loupe-5X.html?trackcode=googleBase&utm_source=google&utm_medium=cpc&adpos=&scid=scplp000357&sc_intid=000357&gclid=Cj0KCQjwzYGGBhCTARIsAHdMTQwMV1KcXCBL7-SXu337y-TeoHGjK6x9Plw-ADAET_za_XLC5yKUAaAq

Set of 10 5X magnifiers

<https://www.rainbowresource.com/product/011034/Loupe-Only-set-of-10.html?>

Varied number of 5X magnifiers

<https://www.theprivateeyestore.com/products/the-private-eye-loupe>