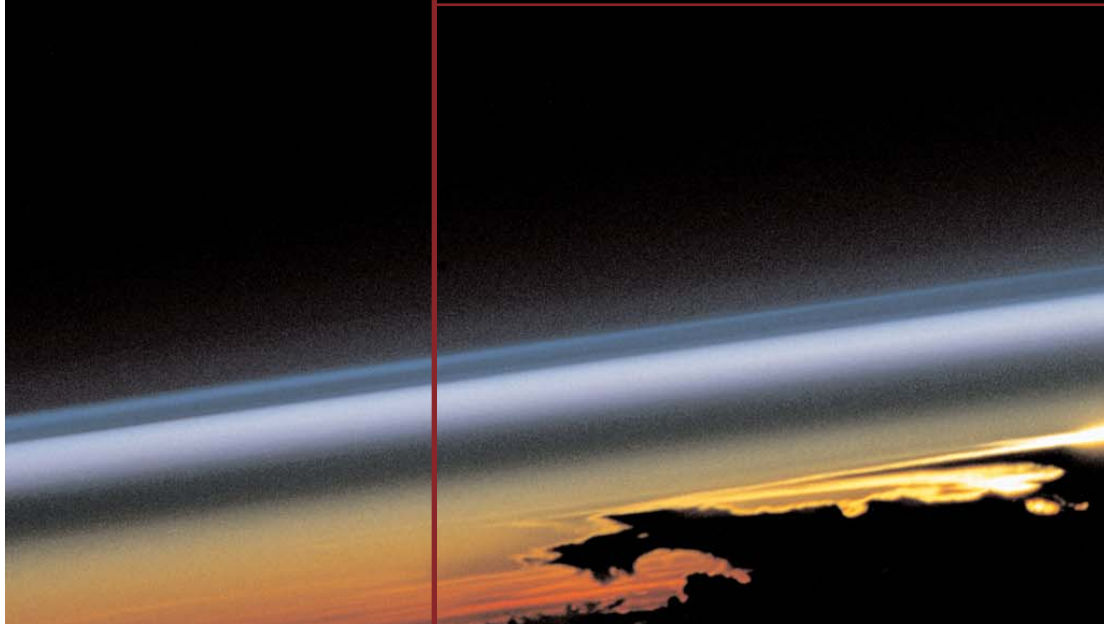


Activity 5
Swoosh! Atmosphere Transports



Atmosphere

CHANGE IS IN THE AIR



Smithsonian
National Museum of Natural History

ACTIVITY 5

Swoosh!

Atmosphere Transports

Overview

Students will learn how scientists measure small particles called aerosols in Earth's atmosphere and make their own measurements of atmospheric aerosols.

Suggested Grade Level

K–8

National Standards Alignment*National Science Education Standards*

Science as Inquiry Standards: Students at all grade levels and in every domain of science should have the opportunity to use scientific inquiry and develop the ability to think and act in ways associated with inquiry, including asking questions, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, constructing and analyzing alternative explanations, and communicating scientific arguments.

Earth and Space Science, Content Standard D: As a result of their activities in grades K–4, all students should develop an understanding of properties of earth materials, objects in the sky, changes in earth and sky. As a result of their activities in grades 5–8, all students should develop an understanding of structure of the earth system.

Science in Personal and Social Perspectives, Content Standard F: As a result of activities in grades K–4, all students should develop understanding of changes in environments. As a result of activities in grades 5–8, all students should develop understanding of natural hazards.

Time

One class period (40–50 minutes)

Materials

- Petroleum jelly
- Permanent marker
- Ruler
- 4 x 6-inch index cards
- Magnifying glass or microscope
- Daily newspaper weather report

Vocabulary

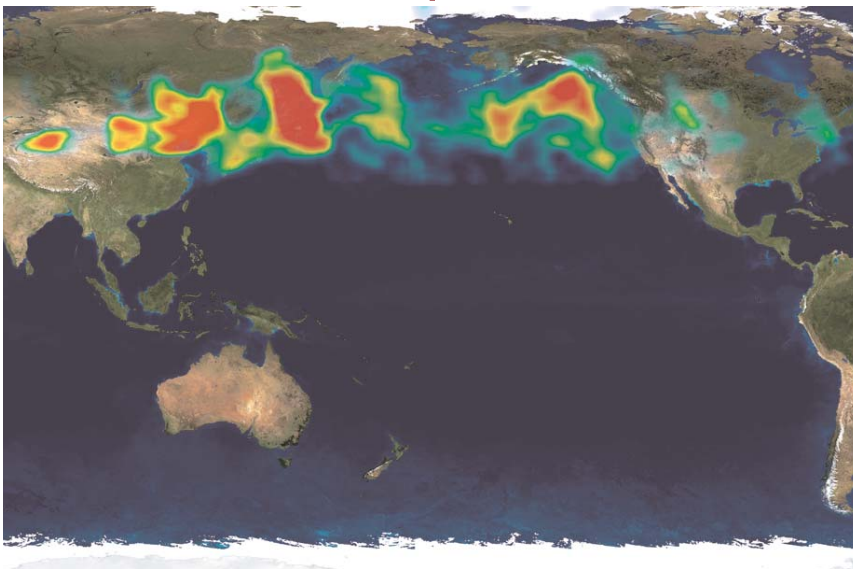
AEROSOL — tiny droplets or particles in the air such as dust or smoke

ACTIVITY 5

OBJECTIVES

Students will be able to:

- 1 Define and describe aerosols.
- 2 Explain that aerosols move with the air, and the speed of their movement depends on the rate at which the air is moving.



NASA's TOMS (total ozone mapping spectrometer) detects dust traveling through the atmosphere from Northern China to the United States (red is highest concentration; green is lowest).

Photo © Colin Seftor (Raytheon) and
Christina Hsu (UMBC)

Background

The air is never still. Stirred by the sun's heat, air moves across the globe in vast currents. In its travels, air picks up intriguing baggage, from small amounts of gases or chemicals to particles of dust, smoke, or bacteria and other microscopic organisms. Anything that is in the air moves with it. Atmosphere's hitchhikers can travel thousands of miles, altering air quality and transforming life across continents.

Activity

1. With the ruler and permanent marker, draw thin perpendicular lines 2.5 cm (1 in) apart on the index cards, to create a grid of 24 one-inch squares. (Adaptation for younger grades: use scissors to cut out 2.5 cm (1 in) squares from graph paper and glue them onto together.)
2. With the plastic knife, spread a thin layer of petroleum jelly over the grids. Leave a half-inch border uncoated to allow for handling of the cards.
3. Place the cards in several places indoors and out where they will not be disturbed, including the classroom, the playground, and students' homes or garages. Record each card's location on a corner of the card, itself. Hang up the cards in a location where air will move past them and leave them undisturbed for one or two days.
4. Record the amount of wind for each day.

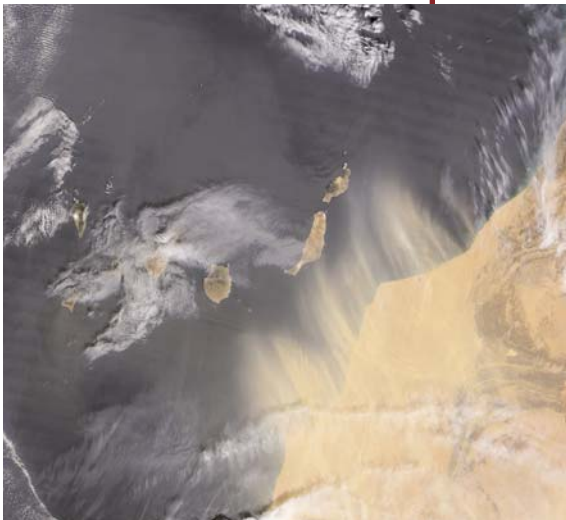
ACTIVITY 5

TOP: As much as one million tons of fine, brown grit blow into Beijing from Mongolia every March. It's called shachenbao, or dust cloud tempest.

Photo © Paul Ostapuk

BOTTOM: A TOMS satellite image captures a cloud of Saharan dust as it heads for the Canary Islands on its way to the Caribbean.

TOMS photo courtesy of NASA/Modis Rapid Response Team



Activity (continued)

5. After two days, gather the cards carefully, being sure not to disturb the jelly surface.
6. Examine each card with a magnifying glass or microscope, and record the number of particles in one square.
7. Create a new set of cards and return them to the same locations as before. Leave them for the same amount of time as before, and record wind reports.
8. Gather the second set of cards and repeat your observations.
9. Is there a difference in the aerosol count you observe? Why?
10. Create a third set of cards and record the amount of wind. Before you look at the cards, predict what you will find. How do you think this set of cards will compare with the first two? Why?
11. Look at the third set of cards. How closely did your predictions match what you found?

Extensions

For more sophisticated activities to monitor aerosol content in the air, visit NASA and the US Geological Survey at:

http://connect.larc.nasa.gov/connect_bak/pdf/measure_detect.guides.pdf

<http://erg.usgs.gov/isb/pubs/teachers-packets/volcanoes/lesson3/lesson3.html> (activity 1)

References

<http://oea.larc.nasa.gov/PAIS/Aerosols.html>