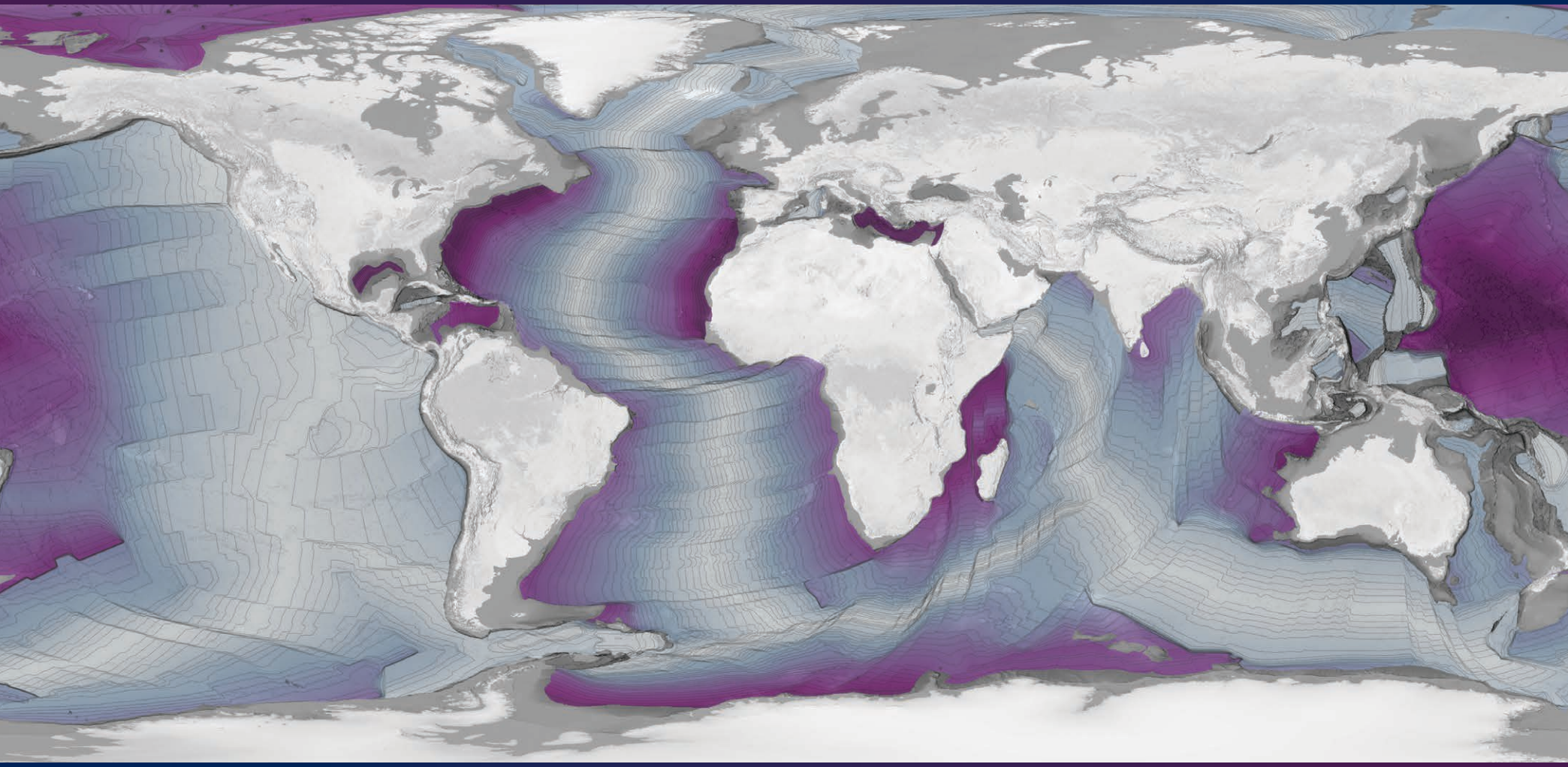
Earth Science Everywhere

Earth Science Activity Calendar, 2024–2025 School Year



EARTH SCIENCE WEEK

AGI american geosciences institute
connecting earth, science, and people

Earth Science Week 2024
American Geosciences Institute
www.americangeosciences.org

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Earth Science Everywhere

Earth science permeates every aspect of our lives, from the air we breathe to the ground beneath our feet, as well as the products that we use. Whether understanding the intricate processes shaping landscapes, navigating daily weather patterns, or grappling with the consequences of human impacts on the environment, the insights provided by earth science are ever-present. Through satellite imagery tracking deforestation, seismographs detecting tectonic shifts, or oceanographic data informing fisheries management, the influence of earth science is ubiquitous, guiding our decisions and shaping our interactions with the natural world.

In classrooms, laboratories, and field sites around the globe, the study of earth science serves as a way to understand and explain the interconnected systems on our planet. That's why Earth Science Week 2024 is celebrating the theme "Earth Science Everywhere." This calendar features activities from AGI's partners that highlight a wide variety of ways that earth science plays a role throughout society and the world. These activities can be conducted in the classroom, at home, or in any other place where people gather to explore the theme "Earth Science Everywhere" during Earth Science Week and all year long!

As part of AGI's ongoing *Geoscience for Sustainability* initiative, this year's celebration also relates earth science to sustainability initiatives by focusing attention on the United Nations 17 Sustainable Development Goals (SDGs, **https://sdgs.un.org/**). Each SDG outlines how issues related to energy, climate change, the environment, natural hazards, agriculture, industry, economic opportunity and other topics would be addressed in a sustainable world. Aligning educational activities to the SDGs connects student learning to real-world problems and potential solutions. Each activity in this calendar is tagged with the SDGs to which it most closely relates to help promote understanding of the vital role that earth science plays in informing, maintaining, and strengthening sustainability.

Each month, in addition to the highlighted earth science activity, you will also find a callout box that summarizes work conducted by a Geoscientists *without* Borders® (GWB) project team. These summaries describe how the work of geoscientists is being applied to reducing risks from natural disasters, increasing access to clean water, conserving resources, maintaining biodiversity, and other vital areas. Each GWB project connects directly to specific SDGs, earth science concepts, and activities that can be used to address these concepts in your classroom. For more information on all of GWB's funded projects, visit: **https://bit.ly/GWB_Projects**.

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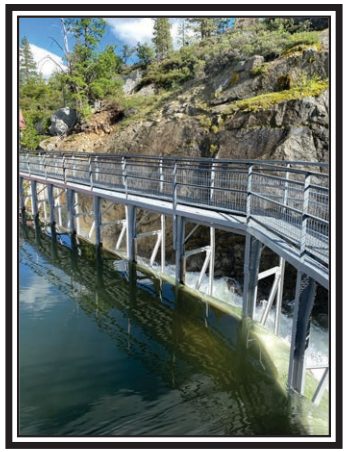
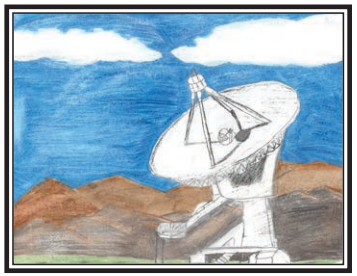
Earth Science Week Is for You



Credit: Mandy Roche*



Credit: Tracer Montoya*

This year, you're invited to join the millions of participants in all 50 states and many nations worldwide who are celebrating Earth Science Week from October 13-19, 2024. This exciting event has grown steadily in momentum and participation since the American Geosciences Institute facilitated the first Earth Science Week in 1998.

Every year, people in schools, workplaces, civic centers, and elsewhere celebrate Earth Science Week to help build public understanding and appreciation of the earth sciences. Earth Science Week serves the geoscience community by:

- giving students new opportunities to discover the earth sciences,
- highlighting the contributions made by the geosciences to society,
- publicizing the message that earth science is all around us,
- encouraging responsible stewardship of the planet through an understanding of Earth processes,
- providing a forum where geoscientists can share their knowledge and enthusiasm about the Earth and how it works, and
- making learning about earth science fun!

Formal and informal educators, students, geoscientists, and interested citizens can all play a leading role in Earth Science Week. Start with a visit to the Earth Science Week website (see sidebar). Send us an email at **info@earthsciweek.org** to let us know how you are planning to celebrate!

Credit: Shamim Al-Noor*

Credit: Jerry Nissley*

Credit: Vladislav Ventura*

*Earth Science Week 2023 Photography and Visual Arts Contest entries by listed artists.

EARTH SCIENCE WEEK

How can you get involved? Explore the Earth Science Week website to find a host of tools designed to make planning and attending events easy, fun, and rewarding! We have many resources to help you work with local geoscience professionals to engage young people and others in events that help them consider their role in earth science, innovation, and sustainability.

You'll also find links to educational materials and activities, many of which are also available in the 2024 Earth Science Week toolkit.

The website also includes a link to subscribe to our electronic newsletter so you can stay up-to-date on the latest developments and upcoming activities!

www.earthsciweek.org

LEARNING ACTIVITY:

Monitoring Sustainability: Land Cover Data

GRADES 6–12

MATERIALS

- Computer with internet access
- Phone or tablet with internet access

Almost every aspect of life — our homes, food and water sources, and outdoor activities — is connected to the land on which we live. Landsat satellites collect images of Earth's surface but cannot zoom in enough to monitor small-scale changes. The Global Learning and Observations to Benefit the Environment (GLOBE) program has created an app so you can help fill in the gaps in the global dataset. This data can help countries and stakeholders ensure that intervention and mitigation efforts align with the achievement of the UN's Sustainable Development Goals' (SDGs). Monitoring land cover specifically helps address indicators under SDG 15: Life on Land. The Earth Observations for the Sustainable Development Goals (EO4SDG) Initiative highlights uses of satellite and geospatial data that help calculate SDG progress. SDG 15 has been a primary focus for EO4SDG because of the variety of existing data and tools which help monitor and protect land ecosystems.

Credit: The GLOBE Program

PROCEDURE

1. Download the GLOBE Observer app and learn more about monitoring land cover at: **https://bit.ly/GLOBE-land-cover**.
   a. Watch this video tutorial on the GLOBE Observer Land Cover tool: **https://bit.ly/GLOBE-land-tutorial**.
   b. Locate an area to take land cover data and stand at the center of it.
   c. Take a land cover observation by recording surface conditions and pictures in the GLOBE Observer app.
   d. Collect land cover data at your site each season or more frequently depending upon changes that may be happening there.
2. To see how concerns related to land cover changes are monitored, visit the Sustainable Development Report at: **https://dashboards.sdgindex.org/map**.
   a. Study the legend to see the overall progress toward all SDGs.
   b. Click on the tile for SDG 15 at the bottom of the screen and notice how the map changes.
   c. Study the legend and analyze the map to determine global progress toward achieving SDG 15.
   d. On the left side of the screen, read the specific Indicators (sub-goals) for SDG 15.
   e. Click on countries of interest for more information on their given ratings.
   f. Click on each Indicator to see the level of performance toward it.

ANALYSIS

1. What other data might you collect or analyze to study factors that influence changes in land cover and/or how changes in land cover affect the environment or human life?
2. How does land cover data collected on the GLOBE Observer app relate to SDG 15's Indicators? What other data could be collected to monitor progress on SDG 15?
3. Explore the performance of other SDGs.
   a. How does progress toward SDG 15 compare to the other SDG progress?
   b. Choose a goal that interests you. What data could you collect or look for to help monitor progress toward this goal?

FURTHER STEPS

Explore national data at the USGS National Land Cover Database: **https://www.usgs.gov/centers/eros/science/national-land-cover-database**.

NGSS CONNECTIONS

SEP: Analyzing and Interpreting Data
DCI: ESS3.C: Human Impacts on Earth Systems
CCC: Cause and Effect; Stability and Change

SDG CONNECTIONS

15: Life on Land
17: Partnerships for the Goals

ESIP

INSTITUTE for GLOBAL ENVIRONMENTAL STRATEGIES

EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

Source: Earth Science Information Partners Education Committee based on material from the Institute for Global Environmental Strategies and Earth Observations for the Sustainable Development Goals.

Developed by Carla McAuliffe, Institute for Global Environmental Strategies, and Lindsay Mossa, AGI.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 National Water Quality Month	2	3
4	5	6	7	8	9	10 **Aug. 10–13, 2024: Geoscience Event:** AIPG National Conference, American Institute of Professional Geologists, Durango, Colorado
11	12 Mountain Day	13	14	15	16	17 International Geocaching Day
18	19 **Aug. 19–20, 2024: Geoscience Event:** 7th International Conference on Environmental Sustainability and Climate Change, Las Vegas, Nevada	20	21	22	23	24 Vesuvius Day
25 National Park Service Founders Day	26 **Aug. 26–29, 2024: Geoscience Event:** IMAGE 2024, American Association of Petroleum Geologists and Society of Exploration Geophysicists, Houston, Texas	27	28	29	30 National Beach Day	31

▶ The advancement of humanitarian geophysics in Southeast Asia: A student-based approach

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In this Geoscientists *without* Borders® project, a field-training program was developed by students, who wanted to learn how to use existing geophysical equipment to study groundwater, archaeology, and earthquake risks across Southeast Asia. Get your students asking questions and designing investigations using lessons from the collection of inquiry-based activities developed by the National Association of Geoscience Teachers: **https://bit.ly/NAGT_Inquiry**.

▶ SDG Connections:

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August 2024

LEARNING ACTIVITY:

Exploring Low-Temperature Geothermal Energy

GRADES 6–12

MATERIALS

- PVC pipe with end caps (6–10 ft length; 2 in diameter recommended)
- 2 liquid bulb thermometers (one with an attachment to hang it)
- Measuring stick or tape
- Post hole digger
- Heavy-duty string or twine
- Scissors
- Drill (optional)
- Duct or other heavy-duty tape

Geothermal energy harnesses Earth's internal heat to generate power. Typically, it involves tapping into high-temperature reservoirs of hot water deep beneath Earth's surface. However, as the demand for clean energy grows, researchers are developing innovative techniques to access common low-temperature geothermal sources found closer to Earth's surface. New technologies broaden the geographic reach of geothermal energy, making it a more accessible and sustainable energy option.

PROCEDURE

1. With approval, use a post hole digger to create a hole 2 ft shorter and slightly wider than your PVC pipe.
2. Cap one end of the pipe, and place that end into the hole. Pack soil around the pipe.
3. Drill a small hole in the middle of the second end cap.
   a. Cut a piece of string that is about 1 ft shorter than the pipe.
   b. Thread the string through the hole in the end cap and secure with duct tape.
   c. Tie the other end of the string to a thermometer.
   d. Gently slide the thermometer into the pipe and cap the top of the pipe.
4. Tape the second thermometer to the outside of the pipe so you are still able to read the temperature.
5. Wait at least 1 day.
6. Record weather conditions and the temperature from both thermometers. Work quickly to take the internal temperature to prevent heat exchange with the environment.
7. Repeat steps 5 and 6 for at least 10 days at approximately the same time each day.

ANALYSIS

1. Graph your data with both the interior and exterior temperatures on the same axes.
   a. Describe and compare the trend for both sets of data. Explain these trends.
   b. Read about and summarize the uses of low-temperature geothermal energy: **https://bit.ly/LowTemp_Geothermal**.
2. How might your results differ with a longer pipe? Explain your reasoning.
   a. Study Figure 1 at: **https://bit.ly/AAPG_blog_Geothermal**. How does this data compare to your hypothesis?
   b. Why do you think there is a different trend at different locations?
3. Study a map of geothermal potential across the U.S.: **https://bit.ly/Geothermal_Potential_Map**.
   a. What do the areas marked with high potential all have in common?
   b. This map considers areas with high temperature reservoirs. How would this map change if it showed low-temperature geothermal potential?

Steam escapes from a mud pit, showing the geothermal potential beneath the area.
Credit: Mark Kuiper on Unsplash

FURTHER STEPS

Read more about "New Geothermal Energy Directions" at: **https://bit.ly/AAPG_Geothermal**.

NGSS CONNECTIONS

SEP: Planning and Carrying Out Investigations
DCI: ESS3.A: Natural Resources
CCC: Energy and Matter

SDG CONNECTIONS

7: Affordable and Clean Energy
11: Sustainable Cities and Communities

AAPG
Advancing the World of Petroleum Geosciences™

Source: American Association of Petroleum Geologists.
Developed by Lindsay Mossa, AGI.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 **Federal Holiday: Labor Day**	3	4 **Protect Your Groundwater Day** **Sept. 4–7, 2024: Geoscience Event:** 43rd Annual NABG Technical Conference, National Association of Black Geoscientists, Atlanta, Georgia	5	6	7
8	9	10	11 **Patriot Day**	12	13	14 **International Observe the Moon Night**
15	16 **International Day for the Preservation of the Ozone Layer**	17	18 **World Water Monitoring Day**	19	20 **World Cleanup Day** **Sept. 20–29, 2024: Geoscience Event:** Flagstaff Festival of Science, Accelerating Innovation, Flagstaff, Arizona	21 **Zero Emissions Day** **International Coastal Cleanup Day**
22 **World Car-Free Day** **Autumnal Equinox** **World Rivers Day** **Sept. 22–25, 2024: Geoscience Event:** GSA Connects 2024, The Geological Society of America, Anaheim California	23 **Sept. 23–25, 2024: Geoscience Event:** SPE ATCE, Annual Technical Conference and Exhibition, Society of Petroleum Engineers, New Orleans, Louisiana	24	25	26 **World Environmental Health Day**	27	28 **International Day for the Universal Access to Information**
29	30					

▶ Geophysical habitat mapping for fisheries conservation at Nsumbu Tanganyika

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The fish populations in Lake Tanganyika, Zambia, were monitored using many technologies and sampling techniques in this Geoscientists *without* Borders® project. These technologies were used to create visual datasets that allowed scientists and the community to see data about the aquatic environment to determine what actions were needed to ensure the long-term sustainability of the local fish populations and fishing industry. Introduce students to some of these underwater mapping techniques by viewing a webinar featuring Erin Lyons, a seafloor mapper with the USGS: **https://bit.ly/seafloor-mapping-webinar**.

▶ SDG Connections:

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September 2024

LEARNING ACTIVITY:

Lasting Impressions: Making Molds

GRADES 3–6

MATERIALS

- 1 cup flour
- ½ cup salt
- 1 cup cold coffee (or water)
- 1 cup used coffee grounds (dried)
- Large bowl or container
- Spoon
- Wax paper or foil
- Leaves, sticks, shells, or other items to make fossils with
- Paint (optional)

Fossils are evidence of organisms that have lived in the past. A fossil can help us understand when and where organisms lived. Scientists can also use fossils to figure out what different environments were like in the past. One type of fossil is known as a mold fossil, which forms when an organism is buried, then decomposes, but the sediment keeps the shape (impression) of the organism. As organisms decompose, they sometimes leave a dark carbon imprint, like in the fossil image on this page. Think about the organisms that live in your area and what their mold fossils might look like.

PROCEDURE

1 Make the "sediment" in which your fossils will be formed:
   a. In a large container, mix 1 cup of flour, ½ cup of salt, and 1 cup dry, used coffee grounds.
   b. Stir in 1 cup of cold coffee.

2 Set up the "fossils":
   a. On wax paper, lay out a few leaves, sticks, shells, or other parts of once-living organisms that you think scientists might find fossils of.
   b. Use your sediment mixture to cover each item.

3 Let the sediment dry. Leaving it in the sunlight can help speed drying.

4 Once the sediment is dry, flip over the pieces and carefully remove the items to view their imprints.

5 Optional: Model Carbonization
   a. Study the image on this page and visit **https://bit.ly/NPS_Fossil_Gallery** to see more fossils that have carbonized.
   b. Use paint on your imprint to model a carbon layer.

ANALYSIS

1 Exchange fossils with a classmate. Make observations of their fossil, and describe what type of organism you think it is.

2 Look again at the image on this page. Why might it be darker in some areas?
   a. Scroll through the NPS gallery of fossil images linked in step 5a and make observations.
   b. Which are easier to see details on: dark or light fossils? Why do you think this is?

3 Look through the list of all National Park System units that have fossils: **www.nps.gov/subjects/fossils/fossil-parks-list.htm**.
   a. Find the park or unit nearest you and visit their website to learn about the types of fossils that have been found there.
   b. Another option is to visit a park known to have many fossils, such as Mammoth Cave (KY), Badlands (SD), John Day Fossil Beds (OR), Florissant Fossil Beds (CO), and Petrified Forest (AZ).

FURTHER STEPS

For more activities on fossils, visit: **https://bit.ly/NPS_Activities**.

Credit: NPS, Public Domain

NGSS CONNECTIONS

SEP: Developing and Using Models
DCI: ESS1.C: The History of Planet Earth; LS4.A: Evidence of Common Ancestry and Diversity
CCC: Cause and Effect

SDG CONNECTIONS

15: Life on Land

Source: National Park Service.
Developed by Lindsay Mossa, AGI.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 National Energy Action Month National Go on a Field Trip Month	2 Annular Solar Eclipse Oct. 2–4, 2024: Rosh Hashanah (Sundown to Sundown)	3 Oct. 3–5, 2024: Geoscience Event: AISES National Conference, American Indian Science and Engineering Society, San Antonio, Texas	4 Oct. 4–10, 2024: World Space Week	5 World Teachers' Day
6 International Geodiversity Day	7	8	9 Fire Prevention Day	10	11 Oct. 11–12, 2024: Yom Kippur (Sundown to Sundown)	12
13 Oct. 13–19, 2024: Earth Science Week International EarthCache Day	14 Minerals Day Federal Holiday: Indigenous Peoples' Day	15 No Child Left Inside Day Earth Observation Day	16 National Fossil Day	17 Geoscience for Everyone Day Great ShakeOut Earthquake Drill: 10:17 AM local time. Learn more at ShakeOut.org	18 Geologic Map Day Earth Science Week Contest Due Date	19 International Archaeology Day
20 Oct. 20–26, 2024: National Chemistry Week	21	22 Clean Up the Earth Day	23	24 International Day of Climate Action	25	26 Sustainability Day
27 Oct. 27–30, 2024: Geoscience Event: GRC Annual Meeting & Expo, Geothermal Rising, Waikoloa, Hawaii	28	29	30	31 Halloween Oct. 31–Nov. 2, 2024: Geoscience Event: SACNAS National Diversity in STEM Conference, Society for Advancement of Chicanos/ Hispanics and Native Americans in Science, Phoenix, Arizona		

Earth Science Week

▶ Geophysical investigation to improve the landslide susceptibility analysis, Kerala, India

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In Karala, India, a Geoscientists *without* Borders® project developed and installed a system to provide real-time data on rainfall, slope stability, and landslide risk — called a "nowcasting system". Use real-time datasets from NOAA (including a collection of classroom-ready resources) with your students to explore natural hazards and other geoscience phenomena: **https://bit.ly/NOAA_Data**.

▶ SDG Connections:

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October 2024

LEARNING ACTIVITY:

Exploring Meteor Impacts on Earth and Beyond

GRADES 9–12

MATERIALS

- Computer with Internet access

Terrestrial analogs is a field of planetary science that compares features on other planets to similar features on Earth. We study sites on Earth as representations of planetary sites because they are accessible and can be directly measured or observed. Impact craters are common on the Moon and Mars, but did you know there are also lots of impact craters on Earth? In this activity, you will explore how meteor impact sites on Earth compare to sites on the Moon and Mars.

Astronauts descending into Meteor Crater in Winslow Arizona.
Credit: Bill Stafford/NASA, Public Domain

USGS
science for a changing world

Source: U.S. Geological Survey

PROCEDURE

1 Go to Impact Earth to view craters formed by meteor impacts on Earth: **https://impact.uwo.ca/map/**.
   a. Find the crater closest to where you live. Zoom in to see an outline of the impact cater. Describe and draw it.
   b. Click "View Details" to read about this crater.
   c. Use the map to find Meteor Crater in Arizona, one of the best-preserved impact craters on Earth.
   d. Zoom in on Meteor Crater. Describe and draw it. How does it compare to the crater near you?
2 Open the Moon Quickmap: **https://tinyurl.com/custom-lroc**.
   a. Navigate around the map, zooming in and out. What kinds of things do you notice about the surface of the Moon? Are craters easy to see?
   b. In the "Draw and Query" panel (indicated by a magnifying glass), select the line segment tool. Click on the map to start a line then double-click where you want to finish it. A "Feature Inspector" will appear.
   c. Enter "Copernicus" in the Search bar and click on the top result to go to the Copernicus Crater.
   d. Use the line segment to measure its diameter. Suppose the Copernicus crater was centered where you live. How does its size compare to your city or state?
3 Open the Mars Quickmap: **https://tinyurl.com/custom-Mars**.
   a. The map opens on a crater about the size of Meteor Crater. The view will look like a lot of squares (called pixels). Zoom out. Why do you think when the view was zoomed in it was so pixelated?
   b. What do Mars craters look like? Are they more like craters on the Moon or on Earth? Why do you think this?

ANALYSIS

1 What other information would you want to know about the meteor impact closest to you?
2 We don't see quite as many craters on Earth as we can see on the Moon or Mars. Why do you think that is?
3 We have many artificial satellites orbiting the Earth, Moon, and Mars, all with different types of cameras. What other kinds of differences do you think satellites have?

FURTHER STEPS

The Meteor Crater impact site is used frequently for research and astronaut training. Use the Impact Earth website to zoom in on Meteor Crater and explore it from the surface. Drag the yellow person icon in the lower right corner onto the crater and see what it would look like to stand on the crater rim or hike down to the crater floor!

ADDITIONAL RESOURCES

QR Code: Planetary analogs SciEx page

NGSS CONNECTIONS

SEP: Analyzing and Interpreting Data
DCI: ESS1.B: Earth and the Solar System; ESS1.C: The History of Planet Earth
CCC: Stability and Change

SDG CONNECTIONS

4: Quality Education
9: Industry, Innovation, and Infrastructure

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 Observation of Diwali	2
3 Daylight Saving Time Ends	4	5	6 Nov. 6–9, 2024: Geoscience Event: NSTA National Conference on Science Education, National Science Teaching Association, New Orleans, Louisiana	7 International Day Against Violence and Bullying at School, Including Cyberbullying	8 National STEM/STEAM Day	9
10 World Science Day for Peace and Development Nov. 10–13, 2024: Geoscience Event: ASA-CSSA-SSSA International Annual Meeting, San Antonio, Texas and Limited Virtual	11 Federal Holiday: Veterans Day	12	13	14	15 America Recycles Day	16
17 National Hiking Day	18 International Day of LGBTQIA+ People in STEM Nov. 18–22, 2024: Geography Awareness Week	19 National Camp Day	20 GIS (Geographic Information Systems) Day	21	22	23
24	25	26	27	28 Federal Holiday: Thanksgiving	29	30

▶ Geophysical investigations in the polluted mining area of Zlatna, Romania

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Students in Romania used various technologies to map mines and understand their environmental impact as part of this Geoscientists *without* Borders® project. They measured heavy metal contamination in the soil and bodies of water nearby. Have students learn more about mining and its effects on the environment using this lesson from the National Park Service: **www.nps.gov/teachers/classrooms/uranium-mining.htm**.

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November 2024

LEARNING ACTIVITY:

My Mineral

GRADES 6–8

MATERIALS

- Computer with Internet access
- PowerPoint or other presentation software
- A pen or pencil
- Paper

Minerals are the naturally occurring solid materials that make up rocks and sands and are found in soil. You have probably heard of minerals such as diamond, halite (table salt), graphite, garnet, and quartz, but there are many others. New minerals are being discovered all the time. There are 6,017 minerals as of this writing, and you can learn about them online in the Handbook of Mineralogy (**https://handbookofmineralogy.org/**), Mineralogy4Kids (**https://min4kids.org/**), and on the Mindat website (**www.mindat.org**). Many people collect minerals, have favorite ones, and are always trying to learn as much as they can about them. In this activity, your job is to become a specialist in one mineral of your choice and share your knowledge with others. Hint: You may want to start with your birthstone.

PROCEDURE

1 Choose a presentation format to share about one special mineral. You can use PowerPoint or you may prefer to make a poster, or even a video to create an informative and interesting presentation for anyone who likes minerals.

2 One place you could start identifying your special mineral is the Mindat site's photo gallery. Take a tour and see what mineral(s) you find interesting.

3 Once you have chosen a mineral, find out as much as you can about it for your presentation.
   a. For example, its chemical formula, how it is formed, where it is found and how rare it is, its physical properties, how it is used, and anything else you can discover about it.
   b. Be sure to collect images from open-source sites, as well as their references, so that you can cite these.

4 As you do your research, visit the Minerals Day website's Resources section (**https://mineralsday.org/**). There are links there to help with this activity (virtual tours of museum mineral halls, resources from local and regional mineralogical societies, Gemological Institute of America, etc.)

5 When you complete your presentation, share it with family, friends, classmates, and anyone else who is interested. Be ready to answer questions and listen to any suggestions for improvement.

ANALYSIS

1 How easy was it to find information on the mineral you chose?
   a. How did the number of available resources affect your mineral choice?
   b. Look up common minerals, such as those listed in the introduction to this activity. Then, look up some extremely rare minerals like Painite or Fingerite. Does the number of resources available seem to be related to how common a mineral is?

2 View others' presentations. How does their mineral compare to yours?

Amethyst, a variety of quartz.
Credit: Image from Alamy

FURTHER STEPS

The Mineralogical Society of America would be delighted to see your presentation if you would care to share it with us. You can email your presentation to **business@minsocam.org** using the subject line "My Mineral Presentation".

NGSS CONNECTIONS

SEP: Obtaining, Evaluating, and Communicating Information
DCI: ESS2.A: Earth's Materials and Systems
CCC: Energy and Matter

SDG CONNECTIONS

12: Responsible Consumption and Production

Source: The Mineralogical Society of America.
Developed by Ann Benbow, MSA.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 ● Universal Human Rights Month	2	3 International Day of Persons with Disabilities	4	5 World Soil Day	6 National Miners' Day	7 Pearl Harbor Remembrance Day
8 ◐	9 **Dec. 9–13, 2024: Geoscience Event:** AGU Fall Meeting, American Geophysical Union, Washington, D.C.	10 International Animal Rights Day **Dec. 10–12, 2024:** Groundwater Week, Las Vegas, Nevada	11 International Mountain Day	12	13	14
15 ○	16	17	18	19	20	21 Winter Solstice
22 ◑	23	24	25 **Dec. 25–Jan. 2, 2025: Hanukkah** (Sundown to Sundown) **Federal Holiday: Christmas**	26 **Dec. 26–Jan. 1, 2025: Kwanzaa**	27	28
29	30 ●	31 New Year's Eve				

► Integration of geophysical, hydrogeological and geotechnical methods to aid monitoring landslides in Nordic countries

GEOSCIENTISTS without BORDERS®
SOCIETY OF EXPLORATION GEOPHYSICISTS

In this Geoscientists *without* Borders® project, many types of data — including seismic and hydrologic — were used to study quick-clay landslide sites that have affected communities in Nordic countries. Surface and sub-surface imagery were generated to help monitor landslide-prone areas, many of which had shallow slopes. Have students use the USDA Natural Resources Conservation Service (NRCS)'s Web Soil Survey to study maps of soil slippage potential and relate that to landslide monitoring: **https://bit.ly/NRCS_WSS**.

► **SDG Connections:**

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December 2024

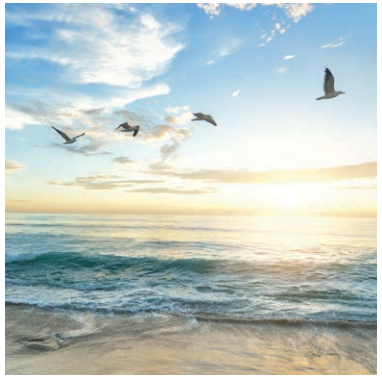
LEARNING ACTIVITY:

What Does Data Sound Like?

GRADES 8–12

MATERIALS

- Computer or tablet with internet access



Credit: Frank Mckenna on Unsplash

Look at the picture of the beach. What do you see? If you were there, what might you hear? What do those sounds tell you about the environment? How can sounds be used to convey information?

Data sonification is a technique that transforms numerical information into sound, allowing us to listen to data patterns instead of visualizing them. In the context of geologic data, this means converting geological information, such as seismic activity or rock formations, into audible tones. For example, variations in rock density might be represented by different pitches or tones. This method helps scientists and researchers identify trends and anomalies in the data by using their sense of hearing. Ultimately, data sonification provides an alternative way to explore and understand complex geological information beyond traditional visual representation.

PROCEDURE

1 Go to **https://bit.ly/Sonified_Climate_Data** to hear climate data that has been sonified. Listen to it without reading the description.
   a. Describe the trend of the consistent tone. How does it change over time?
   b. Describe the trend of the shorter notes. How do they change?
   c. Look at the description for more information on what factors have been sonified in this video.

2 Based on the sounds, sketch out what the graph (trend) of the two data sets would look like.
   a. What information is "missing" from this graph? (Consider what information is typically on a graphs' axes as well as what information you got from the video and its description rather than from the sound itself.)
   b. How else might you convey this missing information to someone who is listening to sonified data?

3 Choose a data set that you would like to sonify. Use this planning sheet to think about important considerations taken when sonifying data: **https://sonification.design/assets/resource/Data_sonification_canvas.pdf**.

ANALYSIS

1 Revisit the graph you made for the climate data (Procedure step 2).
   a. Compare the graph of CO_2 concentration (blue line) with your sketch: **www.climate.gov/media/14596**.
      - How are they similar? How are they different? Why might there be differences?
      - The grey line represents CO_2 emissions from humans. How would you add this to the data sonification?
   b. Compare the graph of average temperature with your sketch: **https://berkeleyearth.org/global-temperature-report-for-2023/**.
      - How are they similar? How are they different? Why might there be differences?

2 How can data sonification help to make data accessible to a greater audience versus only having a visualization (graph or table)?

FURTHER STEPS

Read more about data sonification at: **https://eos.org/science-updates/earth-is-noisy-why-should-its-data-be-silent**.

Download the "Sonification Sandbox" created by Bruce Walker of the Georgia Tech Sonification Lab at: **https://b.gatech.edu/3uhKFmN** to sonify your own data!

NGSS CONNECTIONS

SEP: Analyzing and Interpreting Data
DCI: ESS2.A: Earth Materials and Systems
CCC: Cause and Effect

SDG CONNECTIONS

4: Quality Education
10: Reduced Inequalities

ADVANCING EARTH AND SPACE SCIENCES

Source: The American Geophysical Union.
Developed by Lindsay Mossa, AGI.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 Federal Holiday: New Year's Day International Creativity Month Hawai'i Volcano Awareness Month	2	3	4
5	6	7 Old Rock Day	8 Earth's Rotation Day	9	10 Cut Your Energy Costs Day	11
12 Ed Roy Award for Excellence in K–8 Earth Science Teaching Applications Due Jan. 12–16, 2025: Geoscience Event: AMS Annual Meeting, American Meteorological Society, New Orleans, Louisiana	13	14	15	16	17	18
19	20 Federal Holiday: Martin Luther King Jr. Day	21	22	23	24 International Day of Education	25
26	27	28 International Reducing CO_2 Emissions Day	29	30	31	

GPS training and application to seismic hazards in Southern Haiti

GEOSCIENTISTS without BORDERS®
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In this Geoscientists *without* Borders® project, the tectonic setting of Haiti was studied using GPS to obtain precise measurements on earthquake risk in the area. Graduate students in the area were trained in GPS technologies and were provided equipment to continue monitoring the area even after the project was completed. Have students use National Geographic's Mapmaker to see how maps can be used in the study of geoscience processes such as natural hazard risk: **https://bit.ly/3HYUdGz**.

SDG Connections:

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January 2025

LEARNING ACTIVITY:

Beat the Uncertainty: Planning Climate-Resilient Cities

GRADES 5–9

MATERIALS

- Climate Events Booklet, Resilience Measures Checklist, Record Sheet, Educator's Guide from **https://oceanservice.noaa.gov/education/beat-uncertainty.html**
- Large plastic food container
- Small condiment container
- Water
- Craft materials for decorating
- Ruler
- 15 flat-bottomed glass floral beads
- 2 six-sided dice

In this game, you and your fellow players are the leaders (policymakers, business leaders, nonprofit leaders, and researchers) of a coastal city. You are excited about making your city a better place, but you also face many challenges — like climate change. One impact of climate change is rising sea level, putting your city at risk of flooding and saltwater getting into the soil and freshwater. Other effects of climate change include more severe hurricanes, more heat waves, and heavier rainfall. While you may not know the exact impacts climate change will have on your city, how severe they will be, or when they will occur, your job is to make smart decisions to increase resilience to these potential impacts.

PROCEDURE

SETUP

1. Use craft materials to decorate the outside of the large container to represent the city's "coastline." The bottom of the buildings should be in a straight line, about one inch above the container's midline (see image).
2. Pour water into the container until it is an inch below the coastline.
3. Assemble the Climate Events Booklet, but do not read until after step 1 of game play!

Credit: NOAA Ocean Service Education

GAME PLAY

1. Place the small condiment container in the water. This is your boat.
2. Design your climate-resilient city! Look over the Resilience Measure Checklist and mark which measures you will use to protect your city from climate change. You have a budget of 70 million credits to spend on resilience measures.
3. Roll 2 dice. Use the Booklet to identify the corresponding climate threat.
4. Look at the resilience measures listed with the threat you rolled. "The Good" are resilience measures you might have taken. Some pages also have "The Bad," which make your city less resilient!
5. Check the resilience measures you selected. Use the instructions on the card to determine how many beads to add to your boat.
6. Repeat steps 3-5 until your boat sinks.

ANALYSIS

1. What happened to the sea level as you added beads to your boat? What did this represent?
2. How resilient was your city? If possible, compare your results to other groups.
   - **12+ rolls:** You are Masters of Resilience!
   - **10–12 rolls:** You designed a very resilient city!
   - **7–9 rolls:** Your city withstood some climate impacts but not others.
   - **4–6 rolls:** Your city was very vulnerable to climate change.
   - **1–3 rolls:** Are you just trying to splash in the water?
3. If you were to repeat this activity, how would you change your choices of resilience measures? Why do you think these would help your city be more resilient than your initial choices?

FURTHER STEPS

Learn more about the ocean and explore all of NOAA's educational resources at **www.noaa.gov/education**.

NGSS CONNECTIONS

SEP: Developing and Using Models
DCI: ESS3.C: Human Impacts on Earth Systems
CCC: Systems and System Models

SDG CONNECTIONS

11: Sustainable Cities and Communities
13: Climate Action

Source: National Oceanic and Atmospheric Administration.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2 Groundhog Day World Wetlands Day	3	4	5	6	7	8
9	10	11 International Day of Women and Girls in Science	12	13	14 Valentine's Day	15
16 National Innovation Day Feb. 16–22, 2025: National Engineers Week	17 Federal Holiday: Presidents' Day National Public Science Day	18	19	20	21	22
23	24 Feb. 24–28, 2025: National Invasive Species Awareness Week	25	26	27	28 National Science Day Feb. 28–Mar. 30, 2025: Ramadan (Sundown to Sundown)	

▶ Training in multi-channel analysis of surface waves (MASW) and implementing seismic disaster mitigation strategies

GEOSCIENTISTS without BORDERS®
SOCIETY OF EXPLORATION GEOPHYSICISTS

In this Geoscientists *without* Borders® project, evidence of past tsunamis was used to determine seismic risks of cities throughout Indonesia. Results were communicated to the public, resulting in construction of earthquake resistant infrastructure in addition to development of an app to aid tsunami evacuation procedures. Have students investigate coastal processes and hazards and their impact on nearby populations using this unit from Interdisciplinary Teaching about Earth for a Sustainable Future (InTeGrate): **https://bit.ly/Coastal_Processes**.

▶ SDG Connections:

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February 2025

LEARNING ACTIVITY:

Cores for Kids

The *JOIDES Resolution*.
Credit: Shuhao Xie, IODP

Cores on board the *JOIDES Resolution*.
Credit: Maya Pincus, IODP

GRADES K–8

MATERIALS

- Student data sheet: **https://bit.ly/Cores-for-kids-handout**
- Activity poster: **https://bit.ly/Cores-for-kids**
- Colored pencils or crayons

The *JOIDES Resolution* is a ship that operates on behalf of the International Ocean Discovery Program and is one of a handful of vessels designed specifically to drill into the ocean floor for scientific research. The cylinders of sediment and rock that are recovered from the ocean floor — called "cores" — can be considered time machines, revealing secrets from Earth's past about geology, climate change, and the origins and extremes of life. Every time there is a new core on deck, scientists aboard the *JOIDES Resolution* rush to figure out the types and ages of sediments and rocks that make up the core. Knowing the sediment type allows scientists to infer the ocean environment that formed each of the core's layers. By identifying the age of the core, scientists can begin to tell the story of Earth's past, by describing what happened at different points in Earth's history. This activity will introduce students to the fundamental methods that scientists use to interpret the cores they recover from the ocean floor.

Connect with us!

SCIENTIFIC OCEAN DRILLING

U.S. SCIENCE SUPPORT PROGRAM

Source: International Ocean Discovery Program.

Developed by Maya Pincus, Carol Cotterill, and Sharon Cooper, USSSP. This work was funded by the U.S. National Science Foundation, Award #1450528.

PROCEDURE

1. Use the links in the materials section to download the station posters and to print a copy of the data sheet.
2. Station 1: Determine the age of fossils within a sediment core.
   a. View the fossils on the Station 1 poster.
   b. Use the FOSSIL KEY to find the age of each fossil.
   c. Write the age of each fossil on your data sheet.
3. Station 2: Describe your own core.
   a. Read about the different materials you can find in a core on the Station 2 poster.
   b. Design a core by deciding what you want each section of your core to be made of.
   c. Fill in the rectangle on your data sheet to represent the material you chose for each section of the core.
   d. Describe each section of your core.

ANALYSIS

1. How do the ages of fossils change with increasing depth within a core?
   a. Why do the ages of fossils change with depth?
   b. Why do you think fossils are not found in every layer of a core?
2. Why might the layers be different colors? What information might this give scientists studying the cores?
3. What else might scientists study about the cores?
4. Do all core layers have the same thickness? Why do you think this is?

FURTHER STEPS

Write a story to describe how the ocean changed over time, based on the core you created.

See the full activity: **https://joidesresolution.org/activities/cores-for-kids/**.

ADDITIONAL RESOURCES

Visit the *JOIDES Resolution* website for more free educational resources for learners of all ages! **https://joidesresolution.org**

Go to the IODP website to learn more about the science behind each ocean-drilling expedition. **https://iodp.tamu.edu**

Follow our adventures at sea on:

- **https://twitter.com/TheJR**
- **www.instagram.com/joides_resolution**
- **www.facebook.com/joidesresolution**

NGSS CONNECTIONS

SEP: Analyzing and Interpreting Data
DCI: ESS1.C The History of Planet Earth
CCC: Stability and Change

SDG CONNECTIONS

14: Life Below Water

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3 World Wildlife Day	4 World Engineering Day for Sustainable Development	5	6 World Energy Efficiency Day	7	8 International Women's Day
9 Daylight Saving Time Begins	10 Mar. 10–16, 2025: National Groundwater Awareness Week	11	12 National Plant a Flower Day	13 Total Lunar Eclipse	14	15
16	17 St. Patrick's Day	18 Global Recycling Day National Biodiesel Day	19	20 Vernal Equinox	21 International Day of Forests	22 World Water Day
23 World Meteorological Day Mar. 30–31, 2025: Eid-al-Fitr (Sundown to Sundown) 30	24 Mar. 24–28, 2025: Geoscience Event: AAG Annual Meeting, American Association of Geographers, Detroit, Michigan International Transgender Day of Visibility 31	25	26	27	28	29 Solar Eclipse

▶ Geophysics applied to geotechnical study in Ouro Preto, Minas Gerais, Brazil

GEOSCIENTISTS without BORDERS®
SOCIETY OF EXPLORATION GEOPHYSICISTS

In this Geoscientists *without* Borders® project, landslide risk near densely populated areas was studied using non-invasive technologies, such as drones and magnetometers. One goal this project achieved was the development of easily reproducible and low-cost methods that can be used to study landslide risk in many climates and environmental conditions. Have students review the 2023 Earth Science Week poster on drone use in the geosciences to learn how non-invasive technologies can be used to study natural hazards and Earth's processes: **https://bit.ly/AGI_Drone_Poster**.

▶ SDG Connections:

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March 2025

LEARNING ACTIVITY:

Soil Glue

Soil aggregate.
Credit: AdobeStock

GRADES 9–12

MATERIALS

- 2 tall, wide-mouth glasses/glass jars
- 2 pieces of ¼-in wire mesh (about 10 cm x 15 cm) or 2 two-mm sieves
- 2 soil aggregates (clods) about the size of an egg, of topsoil from areas with different surface conditions (examples of areas to sample are undisturbed lawn/forest/pasture/prairie and disturbed areas such as construction sites, dirt path, garden, farm field)

The health of soils is crucial in reducing soil degradation and supporting the systems of the underground life cycle. In healthy soils, sand, silt and clay particles are held together by "soil glues", or glomalin, a protein produced by fungi. Glomalin sticks to soil particles and holds them together, much like glue, to form stable aggregates (clods). This ability is called aggregate stability. When a soil is heavily disturbed during construction or cultivation (tillage), the uppermost layer (topsoil), is drastically changed. These changes decrease soil microbial activity which decreases the amount of glomalin produced. Soil aggregates that have not been disturbed for many years will have larger amounts of glomalin, resulting in more stable aggregates because the glomalin holds the soil particles together. This activity will demonstrate how these soil glues help aggregates hold together, especially when very wet.

PROCEDURE

1. Shape the wire mesh into a concave shape to sit about 4 cm below the rim of each glass/jar while resting on top.
2. Label each glass with the soil surface condition from which it was collected and fill each glass with water to within about 1 cm of the top.
3. Place both soil aggregates into the mesh of their corresponding glass at the same time, ensuring the aggregate is almost fully submerged in the water.
4. Observe the results and record observations.

ANALYSIS

1. How does each aggregate look? How are they the same? How are they different?
   a. Did the aggregates respond the same way (did the soil stay together or fall apart)?
   b. How does the water in each glass look? Does it look the same after 1 min, 5 min, etc.?
2. If the water became cloudy, did it later become clear again? How long did it take for most of the soil to settle to the bottom? Does any water stay cloudy even after a long time?

FURTHER STEPS

Slaking is a term that describes how soil aggregates fall apart when submerged in water. Conduct a more advanced experiment to determine aggregate stability using the Soil Health Institute's new app: **https://tinyurl.com/slakes-app**.

Visit **www.soils4teachers.org/esw** for more activities on soil properties, processes, and health.

NGSS CONNECTIONS

SEP: Obtaining, Evaluating, and Communicating Information; Asking Questions and Defining Problems
DCI: ESS2.A: Earth's Materials and Systems
CCC: Systems and Systems Models; Influence of Science, Engineering, and Technology on Society and the Natural World

SDG CONNECTIONS

15: Life on Land

Steps 1 and 2

Step 3 and 4

Activity images credits:
Clay Robinson

Soil Science Society of America

Source: Soil Science Society of America.
Developed by Dr. Clay Robinson and Melanie Cohen.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 National Garden Month	2	3 National Find a Rainbow Day	4	5 National Read a Road Map Day
6	7 Metric System Day	8	9	10	11	12 Big Wind Day Apr. 12–20, 2025: Passover (Sundown to Sundown)
13	14 National Gardening Day Look Up At The Sky Day	15	16	17	18 International Day for Monuments and Sites	19 Apr. 19–27, 2025: National Park Week
20	21 World Creativity and Innovation Day	22 Earth Day	23	24 Apr. 24–28, 2025: Geoscience Event: National Science Bowl, U.S. Department of Energy Office of Science, Washington D.C.	25 Arbor Day	26 National Richter Scale Day
27	28 Apr. 28–May 4: Air Quality Awareness Week	29	30			

▶ Building local capacities for monitoring eruptive and catastrophic landslide activity at Pacaya volcano (Guatemala)

GEOSCIENTISTS without BORDERS®
SOCIETY OF EXPLORATION GEOPHYSICISTS

Scientists studied the Pacaya volcano to understand how ash and lava flows from recent eruptions and subsequent avalanches affect nearby cities, infrastructure, and farms in this Geoscientists *without* Borders® project. This project resulted in the construction of additional seismic monitoring stations and the training and hiring of early career professionals and students who can continue to monitor volcanic activity in the area. Your students can read more about volcano monitoring in this article from the U.S. Geological Survey: **https://on.doi.gov/4bG3XDe**.

▶ SDG Connections:

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April 2025

LEARNING ACTIVITY:

Using Global Earth Science Data

GRADES 6–12

MATERIALS

- Computer with internet access

With the use of cutting-edge remote sensing technologies, NASA can collect a wealth of data that offers a comprehensive understanding of the dynamics of our planet. This data ranges from monitoring land cover changes and oceanic currents to deciphering climate patterns and atmospheric composition through an intricate network of satellites, ground-based sensors, and aerial platforms. The My NASA Data visualization tool, the Earth System Data Explorer (ESDE), helps learners visualize complex Earth System data sets over space and time. Using the tool, learners can select specific variables and explore data visually using customizable charts and comparison options.

NASA's Earth Science Satellite Fleet.
Credit: NASA illustration courtesy of Jenny Mottar

PROCEDURE

1 Go to the Earth System Data Explorer: **https://bit.ly/3TTHITi**.

2 Compare the same variable in different months:
   a. On the 'Dataset Selection' pane, select the 'Atmosphere' sphere, 'Temperature' category, and 'Monthly Surface Air Temperature' dataset for the date of January 2021 to load the data on the map. Make observations of what the map shows.
   b. Under the 'Analysis Tools' pane, select 'Compare Two' to see two different datasets side-by-side on the map.
   c. On the right 'Dataset Selection' pane, make the same selections, but for the date August 2021. The global monthly average surface air temperature from January 2021 will be on the left and August 2021 on the right.
   d. Move the slider left and right on the map to analyze the differences. Zoom in to your state. Compare the Monthly Surface Air Temperature data between January and August 2021 in your state.

3 Compare two variables for the month of August:
   a. Change the left map by selecting the 'Biosphere' sphere, 'Vegetation' category, and 'Monthly Normalized Difference Vegetation Index (NDVI)' dataset for August 2021. Look at the legend and read the description of NDVI.
   b. Compare the Monthly Surface Air Temperature and NDVI data for August 2021 in your state.

ANALYSIS

1 For Procedure step 2:
   a. How does Surface Air Temperature compare between January and August?
   b. What evidence do you observe that shows the differences between the two months? Explain.

2 For Procedure step 3:
   a. What differences, if any, do you find between variations of variables over the oceans versus variations in variables over the continents?
   b. How does your state compare to other areas you know to have different climates?
   c. How could you determine the impact of this variable on other Earth systems?

ADDITIONAL RESOURCES

- ESDE Tutorial: This tutorial will guide you through using the Earth System Data Explorer tool: **https://bit.ly/3TTk6hv**.
- Use the Data Literacy Cubes (in the kit or online) to further analyze the map(s): **https://bit.ly/3PzCSYD**.
- Find related lessons at: **https://go.nasa.gov/3PFooqx**.

NGSS CONNECTIONS

SEP: Analyzing and Interpreting Data
DCI: ESS2.A: Earth's Materials and Systems
CCC: Patterns

SDG CONNECTIONS

13: Climate Action

my NASA data

Source: NASA.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 National Inventors Month; American Wetlands Month	2 National Space Day	3 Wildfire Community Preparedness Day
4 May 4–10, 2025: International Compost Awareness Week	5 Cinco De Mayo	6 National Teachers' Day	7	8	9 National Public Gardens Day	10
11 Mother's Day	12	13	14	15	16 Endangered Species Day	17
18 International Museum Day	19	20	21	22 World Biodiversity Day	23	24
25	26 Federal Holiday: Memorial Day	27	28	29 Learn About Composting Day	30	31

▶ Managing water quality in Coastal Benin, Africa using open-source, low-cost geophysical hardware

GEOSCIENTISTS without BORDERS®
SOCIETY OF EXPLORATION GEOPHYSICISTS

In this Geoscientists *without* Borders® project, aquifers in Benin were studied with the purpose of not only monitoring water supply, but also as a tool to develop low-cost and open-source instruments that could continue to be available to hydrogeologists studying aquifer systems throughout the region. Have your students access and use real-time data from EarthData (NASA) to study the atmosphere, soil, and more: **https://go.nasa.gov/3wld0t2**.

▶ SDG Connections:

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May 2025

LEARNING ACTIVITY:

EarthCaches are Everywhere!

GRADES 3–12

MATERIALS

- Computer (or smartphone) with Internet connection and web browser
- Smartphone with free Geocaching® app or other mapping app; or a handheld GPS receiver (GPSr)
- Notepad and writing utensil (or other device for recording observations)

EarthCaches are part of the global adventure game of "geocaching" and represent an educational collaboration between the Geological Society of America (GSA) and Geocaching HQ. Unlike traditional geocaches, which involve finding hidden containers using GPS-enabled devices (GPSr), EarthCaches do not have physical containers. Instead, visitors engage in educational tasks related to the site's geoscience. This blend of education and outdoor adventure makes visiting an EarthCache an enriching experience suitable for students of any age. With over 70,000 EarthCache sites developed around the world, appearing on every continent, EarthCaches are a terrific embodiment of this year's Earth Science Week theme: "Earth Science Everywhere."

The procedure described below can be used to find EarthCaches anywhere in the world. There is a good chance there are EarthCaches in the vicinity of your school. If not, students can choose other areas to explore virtually by visiting various EarthCache listings online.

PROCEDURE

1. Open a web browser and go to **www.geocaching.com**, or, with permission, download the free Geocaching® app.
2. Create and validate a free or Premium account and then log-in.
3. Enter a postal code, city, and state, or use a specific latitude/longitude.
4. Filter for "EarthCache" and search via map or list.
5. Click on an EarthCache to see the cache page with full details.
6. Read the cache description and the logging tasks.
7. Print out the cache description and logging tasks or save to your smartphone or GPSr.
8. Prepare yourself to go out and find the EarthCache and solve the logging tasks.
9. Remember to "Cache In Trash Out® (CITO)" (**www.geocaching.com/cito/**) and to follow "Leave No Trace" guidelines (**https://Lnt.org/**).
10. Use your smartphone or GPSr to navigate to the EarthCache coordinates.
11. At the EarthCache, make observations and find solutions to the logging tasks.
12. Go back to geocaching.com to submit your solutions to the cache "owner" and "log" the cache.

Credit: Michael Kappel, Flickr, CC 2.0

ANALYSIS

1. Describe what you learned about the EarthCache site as you completed the logging tasks.
2. Visit another site, or talk with a student who visited a different EarthCache to compare the sites:
   a. How do they differ in terms of geology? Living organisms? Local climate? Ecosystem type?
   b. Consider another site you would want to visit that you think would be different from the ones you have learned about. How do you think it will differ?

ADDITIONAL RESOURCES

- EarthCache Home-Page: **www.geosociety.org/earthcache**
- Geocaching Home-Page: **www.geocaching.com**

NGSS CONNECTIONS

SEP: Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions
DCI: ESS2.A: Earth's Materials and Systems
CCC: Interdependence of Science, Engineering, and Technology

SDG CONNECTIONS

4: Quality Education
15: Life on Land

THE GEOLOGICAL SOCIETY OF AMERICA®

Source: The Geological Society of America.
Developed by Matt Dawson, GSA.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 World Reef Awareness Day National Great Outdoors Month National Rivers Month	2 June 2–8, 2025: Cave Week	3	4	5 World Environment Day	6 World Green Roof Day National Caves and Karst Day June 6–7, 2025: Eid al-Adha (Sundown to Sundown)	7 National Trails Day
8 World Oceans Day	9	10	11	12	13	14 Flag Day
15 Father's Day Global Wind Day	16	17 World Day to Combat Desertification and Drought	18 Sustainable Gastronomy Day	19 Federal Holiday: Juneteenth National Dump the Pump Day	20 Summer Solstice	21 World Hydrography Day
22 World Rainforest Day	23	24 National Upcycling Day	25	26	27	28 Armed Forces Day
29	30 International Asteroid Day National Meteor Watch Day					

▶ Geophysical mapping of aquifers in Bolivia

GEOSCIENTISTS without BORDERS®
SOCIETY OF EXPLORATION GEOPHYSICISTS

Aquifers in Bolivia were mapped as part of a Geoscientists *without* Borders® project to allow for better management of water resources, including volume and contamination levels. The data and analyses were shared with local authorities and communities to raise awareness of the need for improved water management practices. Have students use models to investigate aquifers and water withdrawal: **https://groundwater.org/lesson-plans/**.

▶ SDG Connections:

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June 2025

LEARNING ACTIVITY:

Mining Makes Life Possible

GRADES 7–12

MATERIALS

- Paper/pencil or computer for word processing
- Crayons/markers
- Internet access
- Printout of the mining-materials use diagram: **https://MineralsEducationCoalition.org/wp-content/uploads/MML-Worksheet.pdf**

Credit: C. Dale Elifrits

SME FOUNDATION
MEC
MINERALS EDUCATION COALITION

Source: Minerals Education Coalition.
Original from Pamela Wilkinson.

Think of items you use on a daily basis. Mining is necessary to obtain materials for transportation, lighting, heating/cooling and housing, as well as for food, clothing, health, and safety. Mining removes materials such as rocks, minerals, and metals from the Earth to make products we need in our everyday lives.

PROCEDURE

1 For each of the categories in the diagram, list your favorite thing or things that you use regularly. Example: Favorite clothing, medicines you take or healthy foods you eat, safety gear like bike helmets and smoke detectors, and more.

2 When you have completed the list, put your name in the middle circle, because the categories are all about YOU and your life.

3 What industry or business goes in the middle circle with your name? What industry makes it possible for you to live your life the way you do?

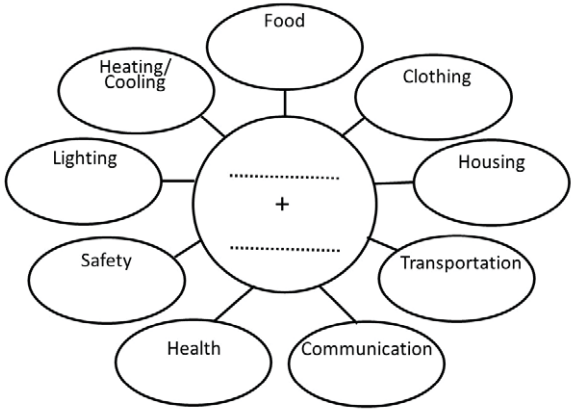
a. Industries are businesses that produce goods and/or services. There is only ONE industry that can be linked to every aspect of your life. Do you know what it is?

ANALYSIS

1 Go back through your examples and underline the ones that require mining in blue and ones that don't require mining in red.

a. Add examples to your diagram that do not require mining. For example: some foods come from plants that grow in nature that can be consumed raw, though almost all of our food has required mined items in its production.

b. Go to **https://MineralsEducationCoalition.org/wp-content/uploads/MML-Examples.pdf** for the accompanying example page.



Credit: Pamela Wilkinson

FURTHER STEPS

Write a story about what a day in your life would be like if you could NOT use any of the items you underlined in blue on your worksheet. Is there anything missing that is important to you? If you use electronics, machines, paved roads, manufactured items, or almost anything else in our modern world, you depend on mining!

For more ideas on this activity as well as additional activities, visit **https://MineralsEducationCoalition.org/esw** to see the "It All Starts with Mining" unit. Use the teacher search tool at **https://MineralsEducationCoalition.org/standards** to find detailed correlations to national and state standards for these activities.

NGSS CONNECTIONS

SEP: Asking Questions and Defining Problems
DCI: ESS2.A: Earth's Materials; ESS3.B: Natural Resources
CCC: Influence of Science, Engineering, and Technology on Society and the Natural World

SDG CONNECTIONS

9: Industry, Innovation, and Infrastructure
12: Responsible Consumption and Production

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 Plastic Free July	2	3	4 Federal Holiday: Independence Day	5
6	7	8	9	10	11	12
13 International Rock Day	14	15	16	17	18	19
20	21	22	23	24	25	26
27 Parents' Day	28 World Nature Conservation Day	29 Rain Day	30 International Friendship Day	31		

▶ Near-surface geophysics as a tool to help manage the southern hairy-nosed wombat in South Australia

GEOSCIENTISTS without BORDERS®
SOCIETY OF EXPLORATION GEOPHYSICISTS

In this Geoscientists *without* Borders® project, maps of wombat burrows were made in four areas in South Australia to study the effects of these animals on different soil types as well as the crops grown in these soils. Population size was also monitored for specific farms, regions, and states to determine the effects of humans on the potential for local extinction events. Use a lesson from the Soil Science Society of America to get your students to investigate the types of organisms commonly found in soil to consider how biodiversity can affect soil health: **https://bit.ly/Soil_Biology**.

▶ SDG Connections:

AGI american geosciences institute
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www.americangeosciences.org

July 2025

WHAT IS EARTH SCIENCE WEEK?

The American Geosciences Institute has organized this annual international event since 1998 to help people better understand and appreciate the earth sciences and to encourage responsible stewardship of the planet. Earth Science Week takes place October 13-19, 2024, celebrating the theme "Earth Science Everywhere".

Visit the Earth Science Week website — **www.earthsciweek.org** — to learn more about how you can become involved, events and opportunities in your community, the Earth Science Week newsletter, highlights of past Earth Science Weeks, and how you can order an Earth Science Week Toolkit.

You are invited to help keep the spirit of Earth Science Week alive all year long by posting this calendar in your classroom, office, or home. Whoever you are and wherever you go, you can celebrate earth science!

American Geosciences Institute
4220 King Street
Alexandria, VA 22302
(703) 379-2480
www.americangeosciences.org

AGI american geosciences institute
connecting earth, science, and people

AGI MEMBER SOCIETIES

AASP - The Palynological Society
American Association of Geographers
American Association of Petroleum Geologists
American Geophysical Union
American Institute of Hydrology
American Institute of Professional Geologists
American Meteorological Society
American Rock Mechanics Association
Association for the Sciences of Limnology and Oceanography
Association for Women Geoscientists
Association of American State Geologists
Association of Earth Science Editors
Association of Environmental & Engineering Geologists
Clay Minerals Society
Council on Undergraduate Research
Environmental and Engineering Geophysical Society
Geo-Institute of the American Society of Civil Engineers
Geochemical Society
Geological Association of Canada
Geological Society of America
Geological Society of London
Geoscience Information Society
History of Earth Sciences Society
International Association for Geoscience Diversity
International Association of Hydrogeologists/ U.S. National Chapter
International Medical Geology Association
Karst Waters Institute
Mineralogical Society of America
Mineralogical Society of Great Britain and Ireland
National Association of Black Geoscientists
National Association of Geoscience Teachers
National Association of State Boards of Geology
National Cave and Karst Research Institute
National Earth Science Teachers Association
National Speleological Society
North American Commission on Stratigraphic Nomenclature
Paleontological Research Institution
Paleontological Society
Petroleum History Institute
Seismological Society of America
Society for Sedimentary Geology
Society for Mining, Metallurgy & Exploration
Society of Economic Geologists
Society of Exploration Geophysicists
Society of Mineral Museum Professionals
Society of Vertebrate Paleontology
Soil Science Society of America
United States Permafrost Association

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THE GEOLOGICAL SOCIETY OF AMERICA®

AMS American Meteorological Society

SME Society for Mining, Metallurgy & Exploration

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EARTH SCIENCE WEEK
October 13–19, 2024

FUTURE DATES
October 12–18, 2025
October 11–17, 2026
October 10–16, 2027

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