EXPLORE SCIENCE

2020

Explore Science: Earth & Space

Planning, Partnership, and Program Guide

www.nisenet.org/earthspacekit

Credits and Rights

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Introduction

Welcome to Explore Science: Earth & Space! The National Informal STEM Education Network (NISE Network) has assembled a new set of engaging, hands-on Earth and space science experiences with connections to science, technology, and society. We have developed this guide to help you plan successful Earth and space-themed events, develop and cultivate local partnerships, and explore ways to use the toolkit materials in your programs throughout the year. In addition, this guide highlights professional development opportunities within this project, and can point you and your colleagues toward additional, non-NISE Network resources related to the topics of Earth and space science.

NISE Network

The National Informal STEM Education Network (NISE Network) advances learning opportunities across the United States by bringing cutting-edge STEM research to museum exhibits and programs, improving the practices of educators and scientists, and creating lasting, valuable relationships among individuals and organizations. Hundreds of partner organizations use Network resources to engage diverse audiences in their communities, including groups that are traditionally underserved by STEM institutions and underrepresented in STEM fields.

Our products are created through an iterative, collaborative process that involves scientists, informal science educators, and targeted public audiences. As Network partners participate in project activities, they adapt and improve NISE Network materials, generating new ideas and learning. The nisenet.org website is an online digital library of public educational products and tools designed for educators and scientists.

Explore Science: Earth & Space Toolkit

Three hundred and fifty Explore Science: Earth & Space 2020 physical toolkits were awarded to successful applicants from eligible organizations across the country, and consist of hands-on activities, professional development materials, and marketing and promotional resources. The activities work best for family audiences, with a range of experiences appropriate for participants ages four through adult.

The 2020 Explore Science: Earth & Space toolkit will ship in two parts this year!

- Part A will ship in January 2020 and will include a set of hands-on activities.
- Part B will ship in August 2020 and will include a hands-on collaborative Moon game as well as science activities about the Moon.

There was one application for the 2020 toolkit—all successful applicants will receive both Part A and Part B of the toolkit. Each part of the toolkit will require a report; please see the requirements section of the overview for further details.

Content & Target Audiences

The Explore Science: Earth & Space toolkit materials have been designed to engage participants in Earth and space phenomena, encourage reflection around science as a way of knowing, and promote visitors to identify as science learners. Through the lens of Earth and space science, the hands-on activities in this toolkit will allow learners to understand science as a process and as something that people just like them do. Activities are designed for use in multiple venues of

informal STEM learning with a target audience of families with young children. The 2020 toolkit has one activity that is designed specifically for early childhood audiences (ages 0–4).

Toolkit Use

The activities can be used throughout the year during any number of STEM-themed annual events and celestial events (see the Year-Round section in the timeline), but an important event in 2020 that we want toolkit recipients to be aware is the 50th anniversary of Earth Day (April 22, 2020). Several activities in this toolkit—for example, the Early Explorations and Investigating Clouds activities—and previous toolkits directly relate to this special event.

Digital Toolkits

In addition to the physical toolkits, digital versions of the toolkit will be available online as a free download. Part A will be available in February 2020, Part B will be available in August 2020. Digital versions of past toolkits for 2017, 2018, and 2019 are available online at: *http://www.nisenet.org/earthspacekit*

Requirements

Host your events and use the materials, and then tell us how it went!

Organizations receiving the 2020 Explore Science: Earth & Space toolkit are required to:

- **TOOLKIT PART A: Spring 2020 event**
  Hold a public engagement event using **Part A of the toolkit**. Public events can be stand-alone events OR toolkit activities can be incorporated into an existing STEM public engagement event during March–May 2020. A list of example STEM events is included in the "Upcoming Special Events and Celebrations" section.
- **TOOLKIT PART B: Fall 2020 public engagement**
  Engage the public using **Part B of the toolkit, including the immersive Moon game**. Public engagement offerings can be stand-alone OR you can incorporate them into existing regular STEM programming on-site or off-site during September 2020–January 2021. Examples could include after-school programming, birthday parties, homeschool programs, youth-serving organization outreach, regular museum floor programming, etc.
- **Report on the use of the toolkit**
  Physical toolkit recipients are required to complete **two online reports** describing their experiences with toolkit Part A and Part B. Toolkit recipients will be provided with a link to these online reports. Reports will include optional evaluation questions to capture the impacts of the project activities on the public.

> **Kit recipients are required to submit reports by:**
> **June 15, 2020** for Part A of the 2020 toolkit
> **February 1, 2021** for Part B of the 2020 toolkit (this will be a shorter report)

Additional suggestions (not required but encouraged):

- **Attending Professional Development online workshops for informal science educators:**
  The NISE Network will offer a variety of free, one-hour online workshops featuring a variety of topics. All online workshops will be recorded and archived. More information will be available through the NISE Network newsletter.

  https://www.nisenet.org/newsletter
  https://www.nisenet.org/event-type/online-workshop
- **Collaborating with local experts:**
  We encourage you to collaborate with both local scientists (Earth and space science professionals) and local enthusiasts (e.g., amateur astronomy clubs). Please see the section of this overview entitled "Collaborations and Finding Local Experts."
- **Collaborating locally to reach underserved audiences:**
  Partnerships with K–12 schools, after-school programs, local chapters of national youth-serving organizations, libraries, and local community groups can help your event reach underserved audiences. Tips for collaboration can be found here:

  https://www.nisenet.org/collaboration-guide

- **Annual partner survey:**
  In additional to the required reports, we encourage you to participate in the NISE Network annual partner survey conducted by project evaluators. We use the information collected in this survey when we report to our funders. We also use the survey as a way to gather feedback to understand and enhance the NISE Network partner experience.

How to participate if you weren't awarded a physical toolkit

Even if you weren't awarded a physical toolkit, you can still download and use the digital materials to engage public audiences in Earth and space science.

https://www.nisenet.org/earthspacekit

If you download the digital materials, you're not required to fill out a report, but we'd still love to hear from you!

Hosting an Earth and Space Public Engagement Event

Physical toolkit recipients are required to:

- Engage the public at an event during March–May 2020 using Part A of the 2020 toolkit.
- Engage the public using Part B of the toolkit, including the immersive Moon game, on-site or off-site during September 2020–January 2021.

Public engagement offerings can be stand-alone OR you can incorporate them into existing regular STEM programming. A list of example STEM events is included below. We also encourage you to use your toolkit all year round, during celestial events, STEM educational events, and other programming for public audiences.

Celestial Events

Toolkits activities serve as a great addition to regularly scheduled day or nighttime programming to celebrate celestial events like meteor showers, eclipses, full moons, planetary events, and more. Look for dates and descriptions using these resources:

- *http://earthsky.org/tonight*
- *https://in-the-sky.org/newscal.php*
- *https://nightsky.jpl.nasa.gov/planner.cfm*
- *https://stardate.org/nightsky*
- *http://www.timeanddate.com/astronomy*
- *http://www.skyandtelescope.com/observing/sky-at-a-glance/*

Earth and Space Science Events in 2020

- World Water Day, March 22, 2020: *http://worldwaterday.org*
- Earth Hour, March 28, 2020: *https://www.earthhour.org*
- Global Astronomy Month, April: *http://www.gam-awb.org*
- Yuri's Night, April 12, 2020: *https://yurisnight.net*
- Earth Day, April 22, 2020: *http://www.earthday.org*
- National Environmental Education Week, week of Earth Day: *https://www.neefusa.org/greening-stem/environmental-education-week*
- Astronomy Day (Spring), May 2, 2020: *https://www.astroleague.org/al/astroday/astrodayform.html*
- Astronomy Week (Spring), April 27-May 3, 2020: *https://www.astroleague.org/astronomyday/facts*
- World Oceans Day, June 8, 2020: *http://www.worldoceansday.org*
- Asteroid Day, June 30, 2020: *http://asteroidday.org*
- International Observe the Moon Night, September 26, 2020 (the date is selected to enhance visibility of lunar topography): *http://observethemoonnight.org*
- Astronomy Day (Fall), September 26, 2020: *https://www.astroleague.org/al/astroday/astrodayform.html*

- Astronomy Week (Fall), September 21–27, 2020: *https://www.astroleague.org/astronomyday/facts*
- World Space Week, October 4–10, 2020: *http://www.worldspaceweek.org*
- Earth Science Week, October 11–17, 2020: *http://www.earthsciweek.org*

More STEM Related-Events
http://www.nisenet.org/seasons

Planning Timeline

One to three months before your event

- ☐ Make contact with the individuals and institutions that might be interested in organizing an Earth & Space event in your community. Please see the sections in this guide on collaborating and finding local experts.
- ☐ Schedule a kickoff meeting to organize your event. Include both museum staff and collaborating experts. Topics for the agenda include:
    - What are your goals for holding an Explore Science: Earth & Space event?
    - Who is your target audience?
    - What kinds of events and activities would reach this audience and meet your goals?
    - Who will lead the planning of the event? Who else will be involved?
    - How will you communicate with your collaborators?
    - What dates will you hold your event?
    - Do you need funding to support the event? If so, where will it come from?
- ☐ Choose a date and add your event to your institutional calendars. Be sure to keep celestial events and annual STEM events in mind when choosing an event date.
- ☐ Plan your event. Your planning process might include creating:
    - A brief description of the event (type of activities, dates, times, location, collaborators)
    - A budget (and local fundraising plan, if necessary)
    - An outline of the event goals (and a plan for evaluating how well the event meets the goals)
    - A list of tasks and notes of who is responsible for each task
    - A schedule with the major milestones for preparation
    - A marketing strategy
- ☐ Become familiar with the materials in the Explore Science: Earth & Space toolkit.
- ☐ Begin promoting your event. Coordinate efforts between your own institution and your collaborators.
- ☐ Talk with collaborators about potential sources of staff and volunteers for the event.
- ☐ Choose a date and location for your training session(s) for staff, volunteers, and collaborators, and invite all appropriate event participants. You may want to hold a training session roughly a week in advance and offer another session immediately before your event for volunteers who may attend that day.
- ☐ Let volunteers and collaborators know in advance about available training materials, such as online activity training videos and online workshop opportunities. A summary email including a list of all resources can be a valuable reference for participants leading up to and immediately before the event.

At least one month before your event

☐ Review your plans with your facility manager and/or health and safety officer. Many facilities have guidelines or restrictions that could affect the logistics of your event or the demonstrations and activities you can include. You might ask about:

- Restrictions related to use of water, open flames, chemicals, or hanging or suspended objects if you are hoping to include any of these in your events
- Parking for visitors and your volunteers/collaborators
- Cleaning and sanitation service schedules
- Security needs
- Outdoor activity needs

☐ Ensure you have adequate staff and volunteers for your event.

☐ Draft an activity floor plan. Keep in mind that some activities need water, some can be messy, some work best in a dimmer space, and some are better with a place for visitors to sit down.

A few weeks before your event

☐ Continue to promote your event.

☐ Consider creating signs or handouts listing the activities you're offering, as well as their times and locations.

☐ Create additional tabletop signs for activities that you may offer alongside the activities contained in the toolkit.

☐ Do a test run of the activities.

☐ Prepare for staff and volunteer training session(s).

☐ Make final preparations for your event (staffing, supplies, floor plan, schedule, and evaluation). Some activities may require advance preparation so be sure to allow enough time to prepare materials prior to your event.

The week of your event

☐ Hold staff/volunteer training session(s).

☐ Continue to promote your event.

☐ Hold your Explore Science: Earth & Space event!

After your event

☐ Debrief on your event with your planning team. Identify elements of your event that were successful, as well as things you might want to change next time.

☐ Fill out your online Explore Science: Earth & Space event report form. Part A reports are due by June 15, 2020. Part B reports are due by February 1, 2021.

☐ Document your event for your future use. Save copies of programs, posters, and any newspaper or media coverage of your event.

☐ Thank your collaborators, sponsors, and volunteers.

☐ Discuss future plans with collaborators and colleagues. Choose an event date for next year and get the date on relevant community and organizational calendars.

Year-round

☐ Incorporate Explore Science: Earth & Space toolkit activities into other events. See “Using Your Toolkit All Year Long” for details regarding additional formats, audiences, and events where Explore Science: Earth & Space can be applied.

Using Your Toolkit All Year Long

We encourage you to use your toolkit all year long, during celestial events, STEM events, and other programming for public audiences (such as scout programs, camps, after-school clubs, science festivals, etc.). Events like those described above may be a better way to engage large and diverse groups of museum visitors. Camps, after-school programming, field trips, and similar program formats are great ways to engage learners more deeply. This section includes some examples of how you might use and adapt toolkit materials to these different kinds of formats.

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We love to hear stories about how you've used NISE Network activities! To share your success with us, please contact your regional hub leader: *http://www.nisenet.org/contact*

Activity Extensions
In addition to the full suite of Explore Science: Earth & Space toolkits, we have provided a curated and annotated list of additional resources that connect to activities in the toolkits. These resources can be used to expand the visitor experience if you want to go into more depth or extend the length of your program. Toolkit activity extensions are available here: *https://www.nisenet.org/earthspacekitextensions*

Camps and After-school Programs with Suggested Content Themes

The sequential, longer (45–90 minutes each) format typical of a camp or afterschool program can encourage participants to immerse themselves in the activity and contextual information and ideas. This allows them the opportunity to develop a richer understanding of the concepts and connections provided by the activity materials and facilitation. Camps and workshops can begin with an overview of Earth and Space content and then, depending on time, you can plan to theme each week or cover the content more broadly. More intensive programming does have more constraints, however, and will require more resources for planning, promotion, preparation, and delivery. They work best in a separate space, require a specific start and end time, and often can accommodate fewer participants.

The following are some examples of daily themes and suggested activities you could use during a summer camp or elementary after-school program.

Theme:

Mad About Mars

This collection of activities encourages participants to consider many interesting features of our nearest planetary neighbor, including “dry ice” polar caps and the planet’s potential for life. Activities like Exploring the Solar System: Craters and Sublimation Bubbles (from NISE Network’s Let’s Do Chemistry kit) allow participants to interact with the physical properties of Mars, while Exploring the Solar System: Mars Rovers, Exploring Earth: Rising Sea, and Exploring the Universe: Imagining Life engage participants in the processes and tools that scientists use to learn about planetary bodies. Exploring the Solar System: Pocket Solar System can serve as an introductory activity, to give participants context for Mars’s location in our solar system. In a summer camp setting, this topic pairs well with dramatic play activities related to human space exploration.

- **Exploring the Solar System: Mars Rovers**

  Players acting as "Mission Control" and a "Rover" must work together to navigate a large obstacle course. **> 20 minutes, Active, Indoor/Outdoor**

  Scale it up: Engage campers who are waiting for a turn in rearranging the felt squares to create a new course for the rover.

  http://www.nisenet.org/catalog/exploring-solar-system-mars-rovers

- **Exploring the Solar System: Craters**

  Simulate the formation of meteorite craters, and then study the craters using special tools. **> 20 minutes, Exciting, Outdoor.**

  Scale it up: Replace the materials with a large flat under-bed style box, flour, and cocoa powder. Bring the fun outdoors, and be ready to get messy! Use a sturdy step-stool to drop items into the “planetary surface” from different heights.

  http://www.nisenet.org/catalog/exploring-solar-system-craters-2018

- **Exploring the Solar System: Pocket Solar System**

  Participants make a scale model of the distances between objects in our solar system.

  > 20 minutes, Exciting, Indoor/Outdoor.

  Get creative: Have participants draw the named objects on their receipt paper rather than using stickers.

  http://www.nisenet.org/catalog/exploring-solar-system-pocket-solar-system

- **Exploring the Universe: Imagining Life**

  Imagine and draw an extreme environment here on Earth or in a far-off solar system, then invent a living thing that could thrive in it. **< 20 minutes, Calming, Indoor.**

  Get creative: Use recycled materials to engage participants in constructing "habitats" for the organisms featured on the extremophile cards.

  http://www.nisenet.org/catalog/exploring-universe-imagining-life

- **Exploring Earth: Rising Sea**

  Use topographical mapping techniques to track changes in sea level. **< 20 minutes, Calming, Indoor.**

  Make connections: Invite campers to create landforms using oil-based modeling clay, and to add small toys to represent houses, people, animals, farms, etc. Engage in discussions about planning for large weather events and the changing climate.

  http://www.nisenet.org/catalog/exploring-earth-rising-sea

- **Exploring Science Practice Skills: Early Explorations**

  Open-ended exploration of water and the way it moves over a landscape. **< 20 minutes, Calming, Indoor.**

  Make connections: Invite campers to create more complex topography and use more age-appropriate scientific tools, such as small eyedroppers or pipettes. Engage in discussions about the impact of water on a planetary landscape.

  https://www.nisenet.org/catalog/science-practices-early-explorations

- **Let's Do Chemistry: Sublimation Bubbles**

  Use water to observe dry ice sublimating into gaseous carbon dioxide, and then capture the gas in soapy bubbles. **> 20 minutes, Exciting, Indoor.**

  Make connections: Mars's seasonal polar caps are composed primarily of carbon-dioxide frost. This frost sublimates (changes from solid directly to gas) in the spring, boosting the pressure of Mars's thin atmosphere.

  http://nisenet.org/catalog/sublimation-bubbles

Theme:

Invent, Build, and Blast Off!

This collection of activities encourages participants to design tools, experiment with variables, and practice their creative problem solving. Exploring the Universe: Pack a Space Telescope, Let's Do Chemistry: Rocket Reactions, and Exploring the Solar System: Stomp Rockets allow for building, crafting, and iterative design, and can spark conversations about everything from aerodynamics to effective teamwork. Exploring the Universe: Orbiting Objects and Exploring Earth: Static Electricity can serve as a break between building and crafting activities, and give participants the opportunity to consider challenges and constraints that engineers face when building and deploying spacecraft. In a summer camp setting, this topic pairs well with other engineering and design activities, such as building Rube Goldberg machines.

- **Exploring the Universe: Pack a Space Telescope**

  Design, build, pack, and deploy model space telescopes. **> 20 minutes. Exciting. Indoor.**

  Get creative: Provide campers with a variety of craft supplies and invite them to work in pairs or groups to design a space telescope. Encourage conversation about the many designs that NASA engineers imagined before choosing the final form.

  http://www.nisenet.org/catalog/exploring-universe-pack-space-telescope-2018

- **Exploring the Universe: Orbiting Objects**

  Experiment with different sized and weighted balls on a stretchy fabric gravity well. **< 20 minutes, Exciting, Indoor**.

  Dig deeper: If using as a drop-in activity, challenge participants who have already witnessed the activity to explain the phenomena to newcomers.

  http://www.nisenet.org/catalog/exploring-universe-orbiting-objects

- **Exploring the Solar System: Stomp Rockets**

  Participants build and launch their own air rockets to help imagine the challenges and triumphs of engineering spacecraft and launching them into a specific region of the space above our planet. **> 20 minutes, Active, Indoor/Outdoor.**

  Get creative: Spend time decorating rockets, and experimenting with differently shaped fins and nose cones. *http://www.nisenet.org/catalog/exploring-solar-system-stomp-rockets*

- **Exploring the Solar System: Design, Build, Test**

  Participants design, build, and test their own spacecraft to explore the solar system. **> 20 minutes, Active, Indoor/Outdoor.**

  Get creative: Before building (or if you don't have the physical materials) encourage campers to use paper and markers to illustrate their design and describe the mission questions and goals.

  https://www.nisenet.org/catalog/design-build-test-activity

- **Exploring the Solar System: Mission to Space**

  Play a board game to explore the various components of a mission to space. **> 20 minutes, Calming, Indoor/Outdoor.**

  Scale it up: This game works well with a smaller group during quiet periods of the day (early drop off, aftercare) or you can just use the challenge cards on their own to encourage creative thinking and problem solving.

  https://www.nisenet.org/catalog/mission-to-space-board-game

- **Exploring the Universe: Static Electricity**

  Make your own electroscope to detect static electricity. **> 20 minutes, Precise, Indoor.**

  Get creative: Use recycled materials to construct many versions of the basic electroscope outlined in the toolkit materials. Explore a variety of ways to produce static electricity.

  https://www.nisenet.org/catalog/exploring-universe-static-electricity-2019

- **Let's Do Chemistry: Rocket Reactions**

  Experiment with a mix of fuel for baking soda & vinegar "rockets." **< 20 minutes, Exciting, Indoor.**

  Making connections: The core stage of NASA's Space Launch System will store over 700,000 gallons of super-cooled liquid hydrogen and liquid oxygen that will fuel the 4 giant rocket engines.

  http://nisenet.org/catalog/rocket-reactions

Theme:

The Marvelous Moon

This collection of activities celebrates Earth's one and only moon. In a summer camp setting, this topic is a perfect way to continue to celebrate the pioneering Apollo missions to the Moon! Round out the day by interviewing someone who witnessed the first Moon landing, or by constructing an imaginary lunar landscape to explore.

- **Exploring the Solar System: Big Sun, Small Moon**

  A hands-on activity that explores the concept of apparent size and allows visitors to experience this phenomenon using familiar objects—a tennis ball and a beach ball. **< 20 minutes, Active, Indoor/Outdoor.**

  Scale it up: Provide participants with various sizes of smaller balls, and invite them to spread out around the room. Discuss: "How far away do you think you will have to be before your ball looks the same size as this beach ball? Will your friend have to be the same distance away?"

  http://www.nisenet.org/catalog/exploring-solar-system-big-sun-small-moon

- **Exploring the Solar System: Hide and Seek Moon**

  Binoculars, a hidden-object Moon poster, and the *Moon Rope* storybook let participants discover how some tools can make distant objects appear closer and brighter and learn about how cultures around the world have viewed the Moon. **> 20 minutes, Calming, Indoor.**

  Make Connections: Begin this activity by reading *Moon Rope* aloud together and discussing cultural connections to the Moon.

  http://www.nisenet.org/catalog/exploring-solar-system-hide-and-seek-moon

- **Exploring the Solar System: Solar Eclipse**

  Participants investigate the positions of the Sun, Earth, and the Moon to create shadows and learn about solar eclipses. **< 20 minutes, Calming, Outdoor.**

  Dig deeper: Look at an astronomical calendar to predict when the next solar eclipse will be visible from your location. *http://www.nisenet.org/catalog/exploring-solar-system-solar-eclipse*

- **Exploring the Universe: Objects in Motion**

  Participants in this activity use "orbiting" clay balls to make simple, functioning models of interacting objects in space. **< 20 minutes, Exciting, Indoor/Outdoor.**

  Dig deeper: Challenge campers to weigh the clay as they use it and model real space objects using the Exploring Ratios info sheet. *http://www.nisenet.org/catalog/exploring-universe-objects-motion-2018*

- **Exploring the Solar System: Craters**

  Simulate the formation of meteorite craters, and then study the craters using special tools. **> 20 minutes, Exciting, Outdoor**.

  Scale it up: Replace the materials with a large flat under-bed style box, flour, and cocoa powder. Bring the fun outdoors, and be ready to get messy! Use a sturdy step-stool to drop items into the "planetary surface" from different heights. *http://www.nisenet.org/catalog/exploring-solar-system-craters-2018*

- **Exploring the Solar System: Design, Build, Test**

  Participants design, build, and test their own spacecraft to explore the solar system. **> 20 minutes, Active, Indoor/Outdoor.**

Get creative: Before building (or if you don't have the physical materials) encourage campers to use paper and markers to illustrate their design and describe the mission questions and goals.

https://www.nisenet.org/catalog/design-build-test-activity

- **Exploring Nano & Society: Space Elevator**

  An open-ended conversational experience in which visitors imagine and draw what a space elevator might look like, what support systems would surround it, and what other technologies it might enable. **< 20 minutes, Calming, Indoor.**

  Get creative: A space elevator is just the beginning of the story. Ask participants to imagine and draw what they would build on the Moon and throughout the Solar System if a new space elevator allowed for transporting more people and larger cargo from Earth.

  http://www.nisenet.org/catalog/exploring-nano-society-space-elevator

Theme:

Solar Splendor

This collection of activities focuses on using real tools to safely observe our Sun and the way it behaves and interacts with Earth so we can develop a better understanding of other stars throughout the galaxy. In a summer camp setting, this topic pairs well with an outdoor setting and other outdoor activities.

- **Exploring the Solar System: Magnetic Fields**

  This activity shows participants how scientists can use tools to study the invisible magnetic fields of Earth, the Sun, and other objects in the universe. **< 20 minutes, Exciting, Indoor.**

  Dig deeper: Pair this with a longer, free exploration of magnets and materials with magnetic properties.

  https://www.nisenet.org/catalog/exploring-solar-system-magnetic-fields-2018

- **Exploring the Solar System: Observe the Sun**

  Participants use a real solar scope to safely observe the Sun outdoors. **< 20 minutes, Exciting, Outdoor.**

  Dig deeper: Track the Sun's motion throughout the day, or trace the Sun and any notable features at the same time each day throughout the week.

  https://www.nisenet.org/catalog/exploring-solar-system-observe-sun-2019

- **Exploring Earth: Temperature Mapping**

  In this activity, participants use an infrared thermometer to test the temperature of different materials under a heat lamp to learn about how different types of land cover reflect or absorb energy. **< 20 minutes, Calming, Indoor.**

  Make connections: Use an infrared thermometer to measure the temperature of objects and spaces within your facility. Compare the asphalt of a parking lot to the mulch around trees. Compare a sunny windowsill to a shady reading corner. Get messy: Add ice cubes to the first portion of the activity involving the liquid crystal sheet to observe how the cold ice changes the colors compared to a warm hand.

  https://www.nisenet.org/catalog/exploring-earth-temperature-mapping-2019

- **Exploring the Universe: Exoplanet Transits**

  Participants simulate one of the methods scientists use to discover planets orbiting

distant stars, seeing what they can learn about a hidden object by studying its shadow. **< 20 minutes, Calming, Indoor.**

Get creative: Build a larger shadow theater and challenge campers to explore the question, "What can we learn from limited information?" by playing shadow charades. Dig deeper: Set up a digital light meter and use graphing software to measure the dimming caused by objects passing in front of a light bulb.

http://www.nisenet.org/catalog/exploring-universe-exoplanet-transits-2018

- **Exploring Earth: Bear's Shadow**

  Participants move a flashlight around an object to make and experiment with shadows. **< 20 minutes, Calming, Indoor.**

  Make connections: Trace campers' shadows outdoors throughout the day. Notice how the placement and length of their shadows change.

  http://www.nisenet.org/catalog/exploring-earth-bears-shadow

- **Exploring the Universe: Star Formation**

  Make a model to explore how different kinds of stars are born. **> 20 minutes, Active, Indoor.**

  Challenge: Can the campers make only one kind of star? Can they do it in less or more time?

  https://www.nisenet.org/catalog/star-formation

Theme:

Earth's Water Systems

This collection of activities encourages participants to think about the many ways water on Earth moves, changes, and supports life. In a summer camp setting, this topic pairs well with a field trip to the swimming pool or a local body of water.

- **Exploring Earth: Paper Mountains**

  Make unique mountain models from crumpled paper and watch how water moves across them. **> 20 minutes, Calming, Indoor.**

  Scale it up: Replace the copy paper with butcher or easel pad paper. Invite a few participants to work together on one "landscape," each choosing one mountain ridge to observe. Dig deeper: Choose a valley on the paper, and challenge participants to experiment to find all of the mountain ranges from which water will flow into that valley.

  http://www.nisenet.org/catalog/exploring-earth-paper-mountains-2018

- **Exploring Earth: Investigating Clouds**

  Create a cloud in a bottle and explore it with laser light. **< 20 minutes, Exciting, Indoor/Outdoor.**

  Dig deeper: Make observations of the sky over multiple days. Log observations in the GLOBE Observer app.

  https://www.nisenet.org/catalog/exploring-earth-investigating-clouds

- **Exploring Earth: Rising Sea**

  Use topographical mapping techniques to track changes in sea level. **< 20 minutes, Calming, Indoor.**

  Make connections: Invite campers to create landforms using oil-based modeling clay, and to add small toys to represent houses, people, animals, farms, etc. Engage in discussions about planning for large weather events and the changing climate.

  http://www.nisenet.org/catalog/exploring-earth-rising-sea

- **Exploring Earth: Land Cover**

  Experiment with different materials to see how plants and other ground cover affects water runoff. **< 20 minutes, Calming, Indoor/Outdoor.**

  Scale it up: Replace the materials with a large flat under-bed style box, soil, water, and various plant matter. Discover what arrangement of plants, soil, gravel, etc. offers the best protection against runoff and erosion.

  https://www.nisenet.org/catalog/exploring-earth-land-cover-2019

- **Exploring Science Practice Skills: Early Explorations**

  Visitors participate in open-ended exploration of water and the way it moves over a landscape. **< 20 minutes, Calming, Indoor.**

  Make connections: Invite campers to create more complex topography and use more age-appropriate scientific tools like small eyedroppers. They can also create barriers with representative toys. Engage in discussions about the impact of water on a planetary landscape.

  https://www.nisenet.org/catalog/science-practices-early-explorations

- **Systems Scramble**

  Participants play a game meant to promote conversation about how systems work and how we can work together to better understand systems and work toward creating a more sustainable future. **> 20 minutes, Active, Indoor/ Outdoor.**

  http://www.nisenet.org/catalog/systems-scramble

Theme:

Deep Space Discoveries

This collection of activities encourages participants to wonder about phenomena and processes beyond Earth orbit. The activities support discussion about what humans have already learned about these distant wonders, and the many questions that scientists are still seeking answers for. In a summer camp setting, this topic nicely complements a visit to a planetarium, or a nighttime stargazing event.

- **Exploring the Universe: Filtered Light**

  Participants discover how colored filters can help reveal more about an image. **< 20 minutes, Calming, Indoor.**

  Get creative: Invite campers to write secret messages to each other using the activity materials.

  http://www.nisenet.org/catalog/exploring-universe-filtered-light-2018

- **Exploring the Universe: Ice Orbs**

  Participants investigate a frozen sphere, trying to learn about objects hidden inside, just as planetary scientists at NASA are investigating "icy worlds" in the outer solar system. **> 20 minutes, Exciting, Indoor/Outdoor.**

  Get creative: After exploring the orbs for a little while, darken the room to invite more imagination and immersion.

  http://www.nisenet.org/catalog/exploring-universe-ice-orbs

- **Exploring the Universe: Expanding Universe**

  Work together to make predictions and use a model to demonstrate how the universe is expanding. **> 20 minutes, Exciting, Indoor.**

Make connections: Bake raisin bread to demonstrate this common analogy in person!

https://www.nisenet.org/catalog/exploring-universe-expanding-universe-2019

- **Exploring the Universe: Space Guess Quest**

  Play a fun card game (similar to Guess Who™) to sort and classify objects in the universe. **< 20 minutes, Exciting, Indoor.**

  Dig deeper: Invite each camper to choose a space object and become an expert on that object's features and "fun facts."

  https://www.nisenet.org/catalog/exploring-universe-space-guess-quest-game-2019

- **Exploring the Universe: Star Formation**

  Make a model to explore how different kinds of stars are born. **> 20 minutes, Active, Indoor.**

  Challenge: Can the campers make only one kind of star? Can they do it in less or more time?

  https://www.nisenet.org/catalog/star-formation

- **Exploring the Universe: Nebula Spin Art**

  Participants create their own unique nebula art! **> 20 minutes, Exciting, Indoor.**

  Get creative: Name the nebulas. Punch a hole on one side and add a ribbon to create a space bookmark or wall hanging. Compare their artwork with fellow campers and discuss similarities and differences.

  https://www.nisenet.org/catalog/nebula-spin-art

- **Exploring Size: Get in Order**

  Participants compete to organize themselves from largest to smallest, based on the card that each is holding. **> 20 minutes, Active, Indoor/Outdoor.**

  Scale it up: Replace the playing cards with the images printed on sheets of paper.

  http://www.nisenet.org/sites/default/files/unmanaged/ExSci_GetInOrder.pdf

Theme:

Engineering

Another option to extend the content of the Explore Science: Earth & Space toolkit is to use the PLANETS after-school modules developed in partnership with Engineering is Elementary Engineering Everywhere. These materials are better suited to older, middle school aged audiences and are available for download from *https://planets-stem.org*. They can also be downloaded from the Museum of Science, Boston website.

- **Worlds Apart: Engineering Remote Sensing Devices**

  An engineering and science unit in which youth are introduced to engineering and the engineering design process as the group works together to engineer a solution to a remote sensing engineering challenge. The unit is set in a real-world context of scientists exploring a newly discovered moon. As part of the unit, the youth learn how mirrors are used to see around objects, how light is filtered to provide specific information about minerals, and how LiDAR is used to determine topography. Youth work with teammates to use these technologies to engineer a remote sensing device that is able to gather information about the surface of a model "mystery moon." Near the end of their design process, youth invite parents, family, and other guests to join them in a showcase of what they have learned.

  https://www.eie.org/engineering-everywhere/curriculum-units/worlds-apart

- **Testing the Waters: Engineering a Water Reuse Process**

  A middle school engineering and science unit in which youth are introduced to engineering and the engineering design process as the group works together to engineer a solution to an engineering challenge focused on the design of a water filtration process for grey water. The unit is set in a real-world context of scientists developing grey water filtration systems for extreme environments. As part of the unit, the youth explore water quality, different types of filter materials, and how they can be combined to filter different types of grey water. Youth work with teammates to use these technologies to engineer a process for reusing water in extreme environments. Near the end of their design process, youth invite parents, family, and other guests to join them in a showcase of what they have learned.

  https://www.eie.org/engineering-everywhere/curriculum-units/testing-waters

Create a Reading Area: Book Resources

Another way to supplement your Explore Science: Earth & Space toolkit year-round is to create a public reading area at your organization. Reading areas gives visitors the chance to learn more on their own about topics covered in your toolkit. The following list of book resources contains a wealth of information about Earth, the Moon, our solar system, and the universe.

BOOK TITLE	AUTHOR	GRADE LEVEL, DESCRIPTION	ISBN-10	ISBN-13	PUBLISHER
Here We Are: Notes for living on Planet Earth	Oliver Jeffers	Pre-K–2, Creative Nonfiction	399167897	978-0399167898	Philomel Books
Cosmos: The Infographic Book of Space	Stewart Lowe	7–Adult, Non-Fiction	1781314500	978-1781314500	Aurum Press
Hello World: Solar System	Jill McDonald	Pre-K and up, Creative Nonfiction	553521039	978-0553521030	Doubleday Books for Young Readers
Earth and Space Photographs from the Archives of NASA	Nirmala Nataraj	Adult, Nonfiction	1452134359	978-1452134352	Chronicle Books
Light: The Visible Spectrum and Beyond	Megan Watzke	8–Adult, Nonfiction	163191006X	978-1631910067	Black Dog & Leventhal
Pluto's Secret: An Icy World's Tale of Discovery	Margaret A. Weitekamp	8–Adult, Non-Fiction	1419715267	978-1419715266	Abrams Books for Young Readers
Max and the Tag-Along Moon	Floyd Cooper	Pre-K–2, Fiction	399233423	978-0399-233425	Philomel Books
How Many Stars in the Sky?	L. Hort & J.E. Ransome	K–3, Fiction	068815218X	978-0688152185	HarperCollins
Little Kids' First Big Book of Space	Catherine Hughes	Pre-K–3, Nonfiction	1426310145	978-1426310140	National Geographic Children's Books
Breakfast Moon	Meg Gower	Pre-K–3, Fiction	1583819185	978-1583819180	Astronomical Society of the Pacific
Hidden Figures: The True Story of Four Black Women and the Space Race	Margot Lee Shetterly	PreK–3, Nonfiction	0062742469	978-0062742469	HarperCollins
Awesome Engineering Spacecraft	Sally Spray	3–6, Nonfiction	1543513433	978-1543513431	Capstone Press
What are Stars?	Katie Daynes	Pre-K and up, Creative Nonfiction	1474924255	978-1474924252	Usborne Publishing Ltd
National Geographic Readers: Meteors	Melissa Stewart	2–4, Non-Fiction	1430129646	978-1430129646	National Geographic Children's Books
Oh No Astro!	Matt Roeser	PreK–3, Creative Nonfiction	1481439766	978-1481439763	Simon & Schuster

More book lists

Books about the Moon: *http://www.starnetlibraries.org/docs/books-our-moon/*

Books about Earth and space science: *http://www.starnetlibraries.org/docs/books/*

Earth & Space School Field Trip Programs at a Museum

Many of the activities in the Explore Science: Earth & Space toolkits can be adapted to work well in a classroom workshop or field trip setting. The longer engagement period encourages a deeper dive into the ideas and concepts related to the activities. Similar to camps and after-school programs, these programs can be resource-intensive to plan, prepare for, promote, and deliver. Compared to other programming formats, they will likely require gathering more materials. They also require the facilitator to have a good understanding of Earth and space content and how it connects to exhibitions elsewhere in the museum and to content the group may be studying outside of the visit. The number of participants is limited by available space and facilitators.

Field Trip:

Overview

This field trip lesson is designed to provide a broad overview of the ways in which NASA scientists study Earth and outer space. Through a series of three activities, students discover facts about the size and scale of our solar system, practice making observations and predictions, and imagine the many ways that scientists use tools to answer questions about Earth and space. Grades 1 & 2.

Suggested Explore Science: Earth & Space Toolkit Activities:

- **Exploring Earth: Paper Mountains**

  https://www.nisenet.org/catalog/exploring-earth-paper-mountains-2018

- **Exploring the Solar System: Stomp Rockets**

  https://www.nisenet.org/catalog/exploring-solar-system-stomp-rockets-2018

- **Exploring the Solar System: Big Sun, Small Moon**

  https://www.nisenet.org/catalog/exploring-solar-system-big-sun-small-moon

- **(alternative) Exploring the Solar System: Pocket Solar System**

  http://www.nisenet.org/catalog/exploring-solar-system-pocket-solar-system

Next Generation Science Standards Addressed

- **NGSS 1-ESS1: Space Systems: Patterns and Cycles**

  1-ESS1-1. Use observations of the Sun, Moon, and stars to describe patterns that can be predicted.

- **NGSS 2-ESS2: Earth's Systems: Processes that Shape the Earth**

  2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.

- **NGSS 3-PS2: Forces and Interactions**

  3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

- **NGSS K-2-ETS1: Engineering Design**

  K-2-ETS1-1. Ask questions, make observations and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

  K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

  K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Field Trip: Vocabulary

Apparent size, sounding rocket, watershed, erosion, observation, prediction, mission, communication, tools, launch, engineering, pattern

Field Trip: Learning Objectives

- Earth is a constantly changing and dynamic system.
- The shape of the land and the pull of gravity influence how water moves over Earth.
- NASA scientists use observations to make predictions about the future of our planet.
- Some rockets carry science tools—not scientists—into space!
- Sounding rockets take quick, low-flying trips into space.
- Scientists use many different kinds of spacecraft to make new discoveries
- The further away an object is, the smaller it appears.

Field Trip: Materials

- Various multi-sized small balls (e.g., tennis ball, ping pong ball, golf ball, marble)
- Beach ball
- Air pump
- Plastic 2-liter bottle (plus additional for backup)
- Flexible tubing with tornado-maker attachment
- Rigid PVC pipe (rocket rolling guides)
- Colored copy paper
- Scissors
- Clear tape
- Copy paper, or large easel pad paper
- Washable markers
- Dropper bottles
- Microfiber towel
- Bowls for water
- Sounding Rockets target poster
- Make your own Sounding Rocket instructions sheet
- Communication and science tool stickers and info sheet
- Activity and facilitator guides for all activities, available on *https://www.nisenet.org/earthspacekit*

Field Trip: Classroom Setup

- Arrange carpet squares around chalkboard
- Prepare stations at tables with materials for Exploring Earth: Paper Mountains
- Arrange cafeteria trays with all materials needed for Exploring the Solar System: Stomp Rockets
- Prepare various sized balls by the chalkboard for Exploring the Solar System: Big Sun, Small Moon

INTRODUCTION

Today we are going to explore Earth and space, and how scientists learn about them. What do you know about the Earth? What do you know about space? How did you learn those things? Scientists learn in lots of different ways—by asking questions, using their senses, using tools, communicating with each other—and they always pay close attention to what they're observing.

ACTIVITIES

We'll start by making observations with our eyes, and exploring one of the ways they can play tricks on us! Lead students through the Exploring the Solar System: Big Sun, Small Moon activity.
http://www.nisenet.org/catalog/exploring-solar-system-big-sun-small-moon

To modify Exploring the Solar System: Big Sun, Small Moon for the classroom, provide students many sizes of smaller balls, and invite them to spread out around the room. Discuss: *"How far away do you think you will have to be before your ball looks the same size as this beach ball? Will your friend have to be the same distance away?"*

Alternative for 3rd grade

We'll start by mapping out our solar system to get a sense of the shape and structure of the system around us and what we might like to know more about. Lead students through the Exploring the Solar System: Pocket Solar System activity.
http://www.nisenet.org/catalog/exploring-solar-system-pocket-solar-system

This is an activity where students create a map of the solar system using a long strip of paper. In this model, the distances between solar system objects are to scale, but the sizes of objects are not.

To modify Exploring the Solar System: Pocket Solar System for the classroom, have students draw the named objects on their receipt paper rather than using stickers. Discuss: *"Our map shows the relative distance between objects in the solar system. It doesn't show the relative size of the Sun and its planets."* and *"After making your map, what are you curious about? If you could send a spacecraft to explore any one of these places, which would you choose? Why?"*

There are lots of interesting worlds to explore in our solar system. One of the ways that scientists learn about other worlds is by studying our own—Earth! Learning about processes on Earth can give us clues about how those same processes might happen farther out in the solar system, or even in solar systems around other stars. Lead students through the Exploring Earth: Paper Mountains activity.
http://www.nisenet.org/catalog/exploring-earth-paper-mountains-2018

To modify Exploring Earth: Paper Mountains for the classroom, try replacing the copy paper with larger-sized paper (e.g., butcher or easel pad paper). Invite a few participants to work together on one "landscape," each choosing one mountain ridge to observe. Participants may also draw buildings, farms, plants, and more on their landscape. Discuss: *"How might your life be different if you knew exactly what the weather would be like tomorrow? Next week? Next year? Can you think of anyone for whom weather has an even bigger effect on their life than it does on yours?"*

Sometimes, NASA scientists need to send their tools way up high to get the best information. One way they do this is by launching a sounding rocket—a rocket used especially for conducting research and answering science questions. Lead students through the Exploring the Solar System: Stomp Rockets activity.
http://www.nisenet.org/catalog/exploring-solar-system-stomp-rockets-2018

To modify Exploring the Solar System: Stomp Rockets for the classroom, provide students with a mission planning worksheet. Encourage them to think through their design, their mission, and the tools their rocket will carry before they build their rocket. Discuss: *"If you could learn more about anything on Earth or in space, what would you want to learn about? How could these tools help you learn more? Can they see more than your eyes can see, or hear very soft sounds?"*

WRAP-UP

Thank you for participating in today's activities. You may even have more questions about Earth and space than you had before doing these activities. That's fine! There is always more to learn—just like us, scientists learn something new every day, and have lots of questions for which they are always hoping to find an answer. Hopefully you have learned a little bit about how scientists learn more about Earth and space by asking questions, using tools, and working together.

Earth & Space Birthday Party

The expectations and interest level of a birthday party audience at a children's or science museum can vary widely. Some families are eager to explore science content and draw on the expertise of the facilitator, while others are happy to enjoy the company of family and friends, and engage lightly in the planned activities. You can plan for either scenario by choosing an activity that is easy to scale up or down based on the party attendees' level of engagement. An activity should be fun for participants to complete even if they minimally interact with the science content, and should also allow for deeper exploration and extended learning if participants want that. Example Earth & Space toolkit activities that are easy to adjust for birthday party audiences include:

- Exploring the Solar System: Stomp Rockets
  http://www.nisenet.org/catalog/exploring-solar-system-stomp-rockets-2018
- Exploring the Solar System: Craters
  http://www.nisenet.org/catalog/exploring-solar-system-craters-2018

If arrival time is staggered for the birthday party you are hosting, it can be helpful to offer a drop-in activity for some children to participate in as they wait for others. Here are some example Earth & Space toolkit activities that can serve this purpose:

- Exploring Earth: Paper Mountains
  http://www.nisenet.org/catalog/exploring-earth-paper-mountains-2018 (Hint: Try using large-format easel paper to engage many participants in exploring one landscape.)
- Exploring the Universe: Imagining Life
  http://www.nisenet.org/catalog/exploring-universe-imagining-life
- Exploring the Universe: Orbiting Objects
  http://www.nisenet.org/catalog/exploring-universe-orbiting-objects

You can also try setting out a large sheet of paper and markers and invite guests to create their own Earth and space themed poster. This can serve later as the target for Stomp Rockets, or a memorable gift for the birthday child.

Other things to think about:

- Party host should be more knowledgeable about content than the activity requires (read all accompanying documents!) so that they can tailor the information they share to the guests' interests.
- Marketing matters. Often, the adults who booked the birthday party are the ones in the room who are most invested in the science content. It is important to set clear expectations during the event booking process about the level of science engagement being offered. For example, will children explore the materials freely or be led through a step-by-step process? Will the facilitator deliver a brief, engaging lecture or ask families to work together at activity stations?
- Have a few "tricks" up your sleeve for when you need to draw participants' attention. A short "get up and move" activity can ease the transition from one activity to the next, as can an impressive demonstration like, Exploring Earth: Investigating Clouds: *http://www.nisenet.org/catalog/exploring-earth-investigating-clouds*

Collaborations & Partnerships

Why collaborate? To achieve something you can't do on your own! Collaboration occurs when organizations and individuals make a commitment to work together and contribute resources and expertise to achieve a common, long-term goal.

There are many reasons to collaborate, but they can be boiled down to just a few points:

1. To share resources, expertise, and connections
2. To build upon existing strengths
3. To reach new audiences

Communities face a variety of challenging and complex problems that can be addressed through collaborative public, private, and nonprofit partnerships. Many of these challenges simply cannot be addressed effectively by one organization acting alone, and require the diverse resources and expertise of government agencies, community-based organizations, state and national organizations, businesses, schools, and individuals. When surveying case studies of local communities who have successfully addressed complex problems, collaborative strategic partnerships are almost always a key ingredient in these success stories. Partnerships can ultimately improve the health and welfare of children, families, and communities.

https://www.nisenet.org/collaboration-guide

Key Characteristics of Successful Partnerships

Building a successful collaboration requires commitment, planning, and foresight. The following is a summary of key characteristics of successful partnerships.

Be patient! Collaboration takes time.

- Start small; developing a relationship and building trust takes time.
- Communicating takes time—organizations have different cultures and terminology.
- Always keep the long-term relationship in mind while working on shorter-term projects.
- Start early; your partner's schedule will vary from your own, so be sure to include enough lead time so that you both can be prepared for the work of the collaboration.

Be clear about your goals and expectations.

- What: Decide on your common goals and be sure your partnership is mutually beneficial.
- How: Agree upon activities to meet your shared goals and missions.
- Who: Clarify your roles and responsibilities for all project activities.
- Where: Decide on the locations of activities.
- When: Agree on a timeline and key dates, and check in regularly.

Get to know each other. Each partner has a lot to learn and a lot to offer.

- Familiarize yourself with your partner organization through websites, newsletters, events, and other opportunities.
- The more you understand about each other's purpose, activities, audiences, and culture, the easier your partnership will be.
- Individuals come to a partnership with different strengths and experiences; every group needs dreamers, developers, and doers.

Communication is critical!

- Strive to achieve a flexible, trusting atmosphere. Be open and honest while still being tactful and supportive.
- Things may not always go smoothly, so don't hesitate to pick up the phone and have an honest conversation to work things out.
- Involve more than one contact person at each organization at different levels to ensure a deeper relationship that can survive changing circumstances and turnover.

Stay focused on your goals, and don't forget to celebrate your successes!

- Reflect on the original goals of your partnership and project, and consider how you want to improve, change course, or evolve the relationship.
- As you work together, keep your long-term relationship in mind; by leveraging your combined resources and strengths, you can each do much more for your community.

Finding Local Experts

We strongly encourage you to collaborate with local experts consisting of both Earth and space science professionals and science enthusiasts in your area. Volunteer experts are a key ingredient to many successful public engagement efforts.

It is up to your organization to choose your local collaborators. Regional hub leaders can assist you in finding local partners in your geographic area. Toolkits will include training and orientation materials to help prepare your event volunteers and staff for using the activities.

Volunteer networks focused on astronomy and space include: 1) The Solar System Ambassadors Program (SSA), 2) The Night Sky Network, and 3) AAS Astronomy Ambassadors. These volunteer networks can be searched by state and city to find potential volunteers near you. Local colleges and universities can also provide expertise in Earth and space sciences.

1. **The Solar System Ambassadors Program (SSA)** is a public outreach program designed to work with motivated volunteers across the nation. These volunteers communicate the excitement of the Jet Propulsion Lab's (JPL) space exploration missions and information about recent discoveries to people in their local communities. There are 700 Ambassadors in 50 states, Washington DC, Puerto Rico, US Virgin Islands, and Guam. Volunteer ambassadors bring the excitement of space to the public. Ambassadors are space enthusiasts from various walks of life who are interested in providing greater service and inspiration to the community at large.
   https://solarsystem.nasa.gov/ssa/home.cfm
2. **The Night Sky Network** is a nationwide coalition of amateur astronomy clubs bringing the science, technology, and inspiration of NASA's missions to the general public. Night Sky Network members share their time and telescopes to provide you with unique astronomy experiences at science museums, observatories, classrooms, and under the real night sky.
   https://nightsky.jpl.nasa.gov/index.cfm
3. **AAS Astronomy Ambassadors: The American Astronomical Society (AAS)**, in partnership with the Astronomical Society of the Pacific (ASP), members of the Center for Astronomy Education (CAE), and other organizations active in science education and public outreach (EPO), has launched a series of professional development workshops and a community of practice designed to help improve early-career astronomers' ability to effectively communicate with students and the public. Called "Astronomy Ambassadors," the program provides mentoring and training experiences for young astronomers, from

advanced undergraduates to new faculty. It also provides access to resources and a network of contacts within the astronomy EPO community. *https://aas.org/outreach/roster-aas-astronomy-ambassadors*

4. **Colleges and Universities:** Many colleges and universities have astronomy and Earth science departments. Others may have clubs or local chapters of professional societies. Once you connect with a faculty or staff member they should be able to also suggest undergraduate and graduate students who could volunteer at your event.

Finding Additional Volunteers

In addition to finding subject matter experts, you will probably need to recruit other volunteers to help with your event. Potential sources of volunteers may include:

- College students, classes, or clubs with community service requirements
- High school science clubs, or students suggested by local high school science teachers
- Local chapters of professional science and engineering groups that are often associated with local colleges, such as:
    - American Indian Science and Engineering Society: *http://www.aises.org/*
    - National Action Council for Minorities in Engineering: *http://www.nacme.org*
    - National Society of Black Engineers (NSBE): *http://www.nsbe.org/home.aspx*
    - National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE): *http://www.nobcche.org/*
    - National Organization of Gay and Lesbian Scientists and Technical Professionals: *http://www.noglstp.org*
    - Society for Advancement of Chicanos and Native Americans in Science (SACNAS): *http://sacnas.org*
    - Society of Asian Scientists and Engineers: *http://www.saseconnect.org*
    - MAES - Latinos in Science and Engineering: *http://mymaes.org*
    - Society of Hispanic Professional Engineers: *http://shpe.org*
    - Society of Women Engineers (SWE): *https://swe.org*
- Drama and theater students
- Local industry staff and retirees

Tips for Collaborating with Local Organizations

Collaborating with existing local organizations on STEM activities is an effective way for museums, planetariums, and university outreach programs to connect their audiences with science experts and Earth and space enthusiasts in a way that regular programming may not. The following profiles are intended to provide a brief introduction to a few types of organizations that may partner well with a museum.

Astronomy Department at a Local College or University

About: The primary responsibility of an astronomy department is to provide educational opportunities to undergraduate and graduate students enrolled at the college or university. The department may have an additional mission to conduct cutting-edge astronomy research.

Resources: Astronomy faculty and staff can bring a wealth of knowledge about Earth and space concepts to a partnership. For the purposes of a single event, they may enjoy giving a brief presentation about emerging science and technology, or being available for visitors to "Ask a Scientist" questions they may have about the science behind the interactive activities. In the context of a longer partnership, a faculty member in astronomy can provide invaluable insight as a science advisor on museum/planetarium projects such as creating exhibitions or planning future celestial and STEM events.

Tips for Initiating Collaboration: When approaching a partnership with your local astronomy department, communicate the value that a partnership will bring to students involved with the department. Collaborating could provide faculty and graduate students a chance to share stories about their research with the general public, which can satisfy the Broader Impacts requirement of any grant from the National Science Foundation. Additionally, experiences in STEM outreach can help to motivate undergraduates in their studies. Sharing Earth and space activities with visitor groups may give students an opportunity to teach material that they have learned in class, and a chance to discuss with visitors what excites them about their studies.

Apollo & Moon Celebrations! Faculty and students in your local astronomy department may have worked with rock samples from the Moon landings, or have access to photographs, models, maps, etc. that would otherwise be hard to find.

Amateur Astronomy Clubs

About: Amateur astronomy clubs can be found across the United States. These clubs are made up of people with a passion for observing the skies, exploring space science concepts, and sharing it all with their communities.

Resources: Each club is different, so their resources and knowledge will be as well. Some clubs have many dedicated volunteers and lots of experience working with the public, while others have very few members and lots of technical expertise. A group may focus their efforts on a specific discipline, like astrophotography or sunspot observing. Get to know your local amateur astronomy club to determine what resources they are excited to bring to a partnership with your organization.

Tips for Initiating Collaboration: You can easily find a club by searching the NSAS Night Sky Network website at *http://nightsky.jpl.nasa.gov*. Just put in your local address in the "clubs and events" section to see who is near you! Get in touch with them by clicking on the club name and then on the contact link for that club. Be sure to communicate with the club well in advance of your event. Many clubs depend on only a handful of volunteers for outreach events, and will need to be sure their members are available before committing. Set clear expectations about event responsibilities, and be prepared to be flexible with your own plans—clubs often have favorite hands-on activities and preferred telescope viewing procedures that they would like to use when working with public audiences.

Apollo & Moon Celebrations! Invite your local amateur astronomy club to help your visitors observe features on the Moon through real telescopes and binoculars. Club members often know facts and anecdotes that participants will find especially interesting.

Collaborating with the Girl Scouts

The NISE Network supports the Girl Scout goals of increasing science interest, confidence, competence, and value for the girls. Many of these girls may have heard the message that science is not for them; together we can be a voice that tells them they are welcome and encouraged to reach for the stars. Our Earth and Space toolkit activities are a great way to promote a sense of self-efficacy in STEM concepts, as well as support Space Science badge requirements.

- **About**: Girl Scouting builds girls of courage, confidence, and character, who make the world a better place. Founded in 1912, Girl Scouts is a leading development organization for girls from coast to coast and across the globe.
- **Audience and Geographic Reach:** There are 3.2 million Girl Scouts, including 2.3 million girl members and 890,000 adult members working primarily as volunteers through over 100 local Girl Scout Councils. Units are organized into Troops and regional Councils. Girls progress through Daisies (grades K–1), Brownies (grades 2–3), Juniors (grades 4–5), Cadettes (grades 6–8), Seniors (grades 9–10), Ambassadors (grades 10–12), and then to Adults.
- **Earth and Space Focus:** Girl Scout Badge programs have been recently refreshed to better reflect girls' interests and to focus on twenty-first-century skills; several badge categories make special use of STEM activities including Earth and space science. New Girl Scout Space Science badges have recently been released for kindergarten–5th-grade girls. (In late 2020, new Space Science badges will be released for 6th–12th-grade girls.) Each badge encourages girls to learn more about space science through a combination of astronomical observation and hands-on activities. We have shared descriptions of the newly available badges in the physical 2020 Explore Science: Earth and Space toolkit. Activities from the Explore Science: Earth and Space toolkit can aid you in creating programming to satisfy Girl Scout Space Science badge requirements. For more information about Girl Scout badges and their requirements, the Girl Scouts have provided a complete list at *https://www.girlscouts.org/badgeexplorer*.
- **Find a Girl Scout contact near you. Girl Scout Council Finder:** *https://www.girlscouts.org/en/about-girl-scouts/join/council-finder.html*
- **Girl Scouts Space Sciences Badge Resources:**
    - Girls Scouts of the USA Badge Explorer: *https://www.girlscouts.org/badgeexplorer*
    - SETI Institute Girl Scout Stars: *https://www.seti.org/girlscoutstars*
    - The Night Sky Network in partnership with the Astronomical Society of the Pacific has compiled a list of resources to support the Girl Scout Space Science badges to make meaningful connections with girls: *https://nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=618*
- **Tips for Collaboration:** The Girl Scouts offers many ways to engage with their organization:
    - Join: Become an official member of the organization to familiarize yourself with the structure and local units in your area.
    - Volunteer: Girl Scouts relies on volunteers to achieve its mission.
    - Badges: Learn how you can help Girl Scouts earn badges through partnerships and

programming with a local troop and regional council. Many museums offer special programming to help local groups fulfill their badge requirements, such as camp-ins and special events.

- Gather the Community: The observing component of each badge encourages troops to reach out to their local astronomy club. Museums and visitor centers can serve as conveners of organizations, partnering with both a local Girl Scout troop and a local Astronomy club to host an observing event.

- **Girl Scout Space Science Badge Requirements:** Activities from the NISE Network's Explore Science: Earth and Space toolkits can supplement some of the requirements for a Girl Scout to earn a Space Science badge. As of Fall 2019, Space Science badges have been added for Cadettes, Seniors, and Ambassadors. Below, you will find suggestions of activities from the NISE Network's Explore Science: Earth & Space toolkits that are relevant to the content highlighted in a given "Step" of the badge process.

  Although none of the Explore Science: Earth & Space toolkit activities directly fulfill the requirements badges, these activities are a great way to contribute towards earning the badge. Encourage Scouts who are seeking these badges to reach out to local schools, libraries, or museums for opportunities to facilitate Explore Science: Earth and Space activities with others.

Possible Explore Science: Earth & Space toolkit connections to Girl Scout Space Science Badges

Daisy (Grades K–1)—Space Science Explorer

Badge Requirements:

Explore and observe the sky like a real space scientist.

1. Explore the Sun
2. Observe the Moon
3. Meet the stars

When you've earned this badge, you'll have explored and observed the Sun, Moon, and stars.

https://www.girlscoutshop.com/Daisy-Space-Science-Explorer-Requirement-Pamphlet

Earth & Space Toolkit Extensions:

1: Explore the Sun
Exploring Earth: Bear's Shadow *http://www.nisenet.org/catalog/exploring-earth-bears-shadow*

2: Observe the Moon
Exploring the Solar System: Hide and Seek Moon *https://www.nisenet.org/catalog/exploring-solar-system-hide-and-seek-moon-2018*

3: Meet the stars
Exploring the Universe: Filtered Light *http://www.nisenet.org/catalog/exploring-universe-filtered-light-2018*

Junior (Grades 4–5)—Space Science Investigator

Badge Requirements:

Venture through the solar system and beyond, and see that space is even bigger than you may have imagined.

1. Model the solar system
2. Circle the Sun
3. Discover the stars
4. Use the tools to explore
5. Share your sky

When you've earned this badge, you'll understand that Earth orbits the Sun, and how far away the Sun, Moon, planets, and stars are from our home planet, Earth.

https://www.girlscoutshop.com/Junior-Space-Science-Investigator-Badge-Requirment-Pamphlet

Earth & Space Toolkit Extensions:

1. Model the solar system
Exploring the Universe: Objects in Motion *http://www.nisenet.org/catalog/exploring-universe-objects-motion-2018*
Exploring the Solar System: Pocket Solar System *https://www.nisenet.org/catalog/exploring-solar-system-pocket-solar-system*

2. Circle the Sun
Exploring the Universe: Orbiting Objects
http://www.nisenet.org/catalog/exploring-universe-orbiting-objects

4. Use tools to explore
Exploring the Solar System: Mars Rovers *http://www.nisenet.org/catalog/exploring-solar-system-mars-rovers-2018*
Exploring the Universe: Space Guess Quest Game *https://www.nisenet.org/catalog/exploring-universe-space-guess-quest-game-2019*
Exploring the Universe: Nebula Spin Art *https://www.nisenet.org/catalog/nebula-spin-art*

Cadette (Grades 6–8)—Space Science Researcher

Badge Requirements:

Observe and explore light, deepening your understanding of the Sun, stars, and other objects in space.

1. What more can you see?
2. Explore "invisible" light
3. See the stars in a new way
4. Expand your vision
5. Conserve the night sky

When you've earned this badge, you'll understand more about the amazing properties of light and how you use it to make discoveries about the universe and space science.

https://www.girlscoutshop.com/cadette-space-science-researcher-badge-requirements

Earth & Space Toolkit Extensions:

1. What more can you see?
Exploring the Universe: Filtered Light *https://www.nisenet.org/catalog/exploring-universe-filtered-light-2018*
Exploring the Universe: Exoplanet Transits *https://www.nisenet.org/catalog/exploring-universe-exoplanet-transits-2018*

2. Explore "invisible" light
Exploring the Universe: Filtered Light *https://www.nisenet.org/catalog/exploring-universe-filtered-light-2018*

3. See the stars in a new way
Exploring the Solar System: Observe the Sun *https://www.nisenet.org/catalog/exploring-solar-system-observe-sun-2019*
Exploring the Universe: Star Formation *https://www.nisenet.org/catalog/star-formation*

Senior (Grades 9–10)—Space Science Expert	
Badge Requirements: Explore light and discover what it teaches us about the universe! 1. Uncover the stuff you're made of 2. Explore the brilliance of the stars 3. Discover telescopes as light collectors 4. Find the light in the darkness 5. Share your knowledge When you've earned this badge, you'll understand more about the universe—your place in it and how light is used to make discoveries about it. *https://www.girlscoutshop.com/senior-space-science-expert-badge-requirements*	**Earth & Space Toolkit Extensions:** 1. Uncover the stuff you're made of **Exploring the Universe: Expanding Universe** *https://www.nisenet.org/catalog/exploring-universe-expanding-universe-2019* **Exploring the Universe: Nebula Spin Art** *https://www.nisenet.org/catalog/nebula-spin-art* 2. Explore the brilliance of the stars **Exploring the Universe: Star Formation** *https://www.nisenet.org/catalog/star-formation* 3. Discover telescopes as light collectors **Exploring the Universe: Pack a Space Telescope** *https://www.nisenet.org/catalog/exploring-universe-pack-space-telescope-2018* **Exploring the Universe: Filtered Light** *http://www.nisenet.org/catalog/exploring-universe-filtered-light-2018*
Ambassador (Grades 11–12)—Space Science Master	
Badge Requirements: Explore, observe, design, and communicate your space science discoveries—just like scientists and engineers. 1. Discover worlds beyond Earth 2. Dive into NASA science 3. Explore your interests 4. Dig deeper 5. Share what you've learned When you've earned this badge, you'll understand more about space science and how you can be a part of NASA now and in the future. *https://www.girlscoutshop.com/ambassador-space-science-master-badge-requirements*	**Earth & Space Toolkit Extensions:** 1. Discover worlds beyond Earth **Exploring the Universe: Exoplanet Transits** *https://www.nisenet.org/catalog/exploring-universe-exoplanet-transits-2018* 2. Dive into NASA science **Exploring the Solar System: Design Build Test** *https://www.nisenet.org/catalog/design-build-test-activity* **Exploring the Solar System: Mission to Space** *https://www.nisenet.org/catalog/exploring-universe-mission-space* 4. Dig deeper **Exploring the Solar System: Asteroid Mining** *https://www.nisenet.org/catalog/exploring-solar-system-asteroid-mining-2020*

Girl Scouts Themed Online Workshops (Recorded)

- Online Workshop: Empowering Girls in Science Through Growth Mindset and the New Girl Scout Space Science Badges (Recorded) October 8, 2019
  https://www.nisenet.org/catalog/online-workshop-empowering-girls-science-through-growth-mindset-and-new-girl-scout-space
- Online Workshop: Girl Scouts and STEM—New Space Science Badges and Opportunities to Connect with the Explore Science: Earth & Space Toolkits (Recorded) Aug 21, 2018
  https://www.nisenet.org/catalog/online-workshop-girl-scouts-and-stem-new-space-science-badges-and-opportunities-connect
- Online Workshop: Museum Community Partnerships—Part 2: Girl Scouts (Recorded) Nov 14, 2017
  https://www.nisenet.org/catalog/online-workshop-museum-community-partnerships-part-2-girl-scouts-recorded

Upcoming Special Events and Celebrations

Calendar of STEM Events All Year Long

The NISE Network maintains a calendar of STEM-related seasonal events and holidays along with ideas for incorporating current science, engineering, and technology content into holidays, seasons, annual events, and special events.
https://www.nisenet.org/seasons

Earth Day: 50th Anniversary, April 22, 2020

April 22, 2020 marks the 50th anniversary of Earth Day. Since 1970, Earth Day has increased awareness of the planet we live on, pollution, climate change, endangered species, and many other environmental issues. The NISE Network has many resources, in addition to your toolkit, to help you plan for your Earth Day celebration. Earth Week takes place on the week around Earth Day.

As we get closer to Earth Day, NISE Network will be updating a list of online resources here: *https://www.nisenet.org/earth50*

NASA Earth Science Education Collaborative Celebrates Earth Day!
The NASA Earth Science Education Collaborative (NESEC) is a partnership among four organizations: the Institute for Global Environmental Strategies and Earth science divisions at three NASA Centers: Goddard Space Flight Center, Jet Propulsion Laboratory, and Langley Research Center. This year your physical toolkit has several connections to NESEC resources that will support your facilitation of Earth themed activities before, during, and after Earth Day.

- **GLOBE Observer** is an international network of citizen scientists and scientists working together to learn more about our shared environment and changing climate. Your visitors, camps, or colleagues can participate by downloading the GLOBE Observer app and submitting observations. Giveaway rack cards are included with the Exploring Earth: Investigating Clouds activity and showcase the four data observations experiences in the app.
    - **Clouds—**By photographing clouds, recording sky observations, and comparing them with NASA satellite data, you can help scientists gain a new perspective on clouds that satellites can't provide: from the ground looking up!
    - **Mosquito Habitat Mapper**—By identifying potential breeding sites for mosquitoes, sampling and counting mosquito larvae, and using optional equipment to examine, photograph and identify the genus of your specimens, you will be enabling scientists to verify predictive models of mosquito population dynamics.
    - **Land Cover**—By photographing and classifying the land cover over an area the size of a soccer field, you will be assisting those scientists working to enhance global maps of land cover use.
    - **Trees—**The trees observation allows citizen scientists to measure tree height (and optionally tree circumference) to track the growth of trees over time.

During the month of April 2020, the GLOBE Observer team is hosting a Trees challenge for Earth Day. You can learn more and find resources for informal educators at *https://observer.globe.gov/do-globe-observer/trees*.

Download the GLOBE Observer app: *https://observer.globe.gov/about/get-the-app*

- **Zika Zine** is a graphic story about how *Aedes* mosquitoes live and how to reduce the number of places where mosquitoes can survive. Readers will also find out how citizen scientists are helping NASA by documenting mosquito habitats with GLOBE Observer. The Zika Zine is an outreach resource of the GLOBE Zika Education and Prevention Project. A sample zine is included in your physical toolkit but a digital version can also be downloaded in multiple languages. You can also download the coloring pages and make your own comic guide.
    - Digital Zika Zine: *https://scied.ucar.edu/zikazine*
    - GLOBE Mission Mosquito Project: *https://www.globe.gov/web/globe-mosquito-project*
- **Elementary GLOBE** is designed to introduce students in grades K–4 to the study of Earth system science. Each module of Elementary GLOBE includes a science-based fictional storybook, three learning activities, and educator notes and glossary. Elementary GLOBE is a great option to extend your Earth science engagement efforts with young learners. Modules include: Air Quality, Climate, Clouds, Earth System, Season, Soils, and Water. A sample of the *Do You Know That Clouds Have Names?* storybook from the Clouds module is included in your physical toolkit and can be used with visitor groups before or after Exploring Earth: Investigating Clouds activity. Digital versions of all the modules, available in multiple languages, can be downloaded for free at the GLOBE website.
    - Elementary GLOBE Modules: *https://www.globe.gov/web/elementary-globe/overview*

Earth-Themed Activities from the Explore Science: Earth & Space toolkits

When hosting an Earth Day event, you may want to incorporate the following Earth-related hands-on activities and resources found in the Earth and Space toolkits.

- Exploring Earth: Paper Mountains: *https://www.nisenet.org/catalog/exploring-earth-paper-mountains-2018*
- Exploring Earth: Rising Sea: *https://www.nisenet.org/catalog/exploring-earth-rising-sea*
- Exploring Earth: Land Cover: *https://www.nisenet.org/catalog/exploring-earth-land-cover-2019*
- Exploring Earth: Temperature Mapping: *https://www.nisenet.org/catalog/exploring-earth-temperature-mapping-2019*
- Exploring Earth: Investigating Clouds: *https://www.nisenet.org/catalog/exploring-earth-investigating-clouds*

Additional Resources

- Earth Day 50th Anniversary: *https://www.earthday.org/earthday/countdown-to-2020/*

- Earth Day Event Toolkit:
  https://www.earthday.org/earthdayinabox/
- National Environmental Education Week:
  https://www.neefusa.org/environmental-education-week
- NASA Museum Alliance Earth Day Resources for Informal Education:
  https://informal.jpl.nasa.gov/museum/earth-day
- NASA Earth Day Posters:
  https://www.science.nasa.gov/toolkits/earth-day-posters
- NASA Earth Overview:
  https://solarsystem.nasa.gov/planets/earth/overview/
- NASA Space Place:
  https://spaceplace.nasa.gov/all-about-earth/en/
- NASA Earth Day Gallery:
  https://www.nasa.gov/content/earth-day-image-gallery-celebrating-earths-beauty
- Explore! Earth's Climate:
  https://www.lpi.usra.edu/education/explore/earth-climate/
- NASA citizen science projects with GLOBE Observer:
  https://observer.globe.gov
- Environmental Protection Agency Educational Resources:
  https://www.epa.gov/students/lesson-plans-teacher-guides-and-online-environmental-resources-educators
- Chemists Celebrate Earth Week:
  https://www.acs.org/content/acs/en/education/outreach/ccew.html
- Explore Science: Let's Do Chemistry Activities: Cleaning Oil Spills with Chemistry (longer program) *https://www.nisenet.org/catalog/cleaning-oil-spills-chemistry*

  What's in the Water (longer program)
  https://www.nisenet.org/catalog/whats-water
- More NISE Network suggestions:
  https://www.nisenet.org/seasons

Earth-Themed Online Workshops (Recorded)

- Online Workshop: Celebrate Earth Day with NISE Net: Activity Connections and How Visitors Can Contribute Local Environmental Observations to NASA Science
  https://www.nisenet.org/events/online-workshop/online-workshop-celebrate-earth-day-nise-net-activity-connections-and-how
- Online Workshop: Changing the Conversation About Climate
  https://www.nisenet.org/catalog/online-workshop-changing-conversation-about-climate-recorded

Celebrating Apollo Moon Missions

During the Apollo program of the 1960s and '70s, NASA sent nine missions to the Moon. Six of them landed astronauts safely on the surface, the only times humans have visited another world. Every Apollo mission helped scientists around the world better understand the Moon and the challenges of space travel. 2020 and 2021 mark the 50th anniversaries of Apollo 13 and 14.

50th Anniversary Resources for Apollo 11's Historic Moon Landing

In 2019, the NISE Network compiled a list of links to the Moon and Apollo 11's 50th anniversary resources, including promotional materials, logos, pictures and images, posters, and multimedia and interactive resources. Many of these resources will continue to be helpful in future Moon-themed events or programming. *http://www.nisenet.org/moon50*

Moon-Themed Activities from the Explore Science: Earth & Space toolkit

When hosting a Moon event, you may want to facilitate the following Moon–related hands-on activities and resources found in the Earth & Space toolkits:

- Exploring Earth: Big Sun, Small Moon
  https://www.nisenet.org/catalog/exploring-solar-system-big-sun-small-moon
- Exploring Earth: Rising Sea
  https://www.nisenet.org/catalog/exploring-earth-rising-sea
- Exploring the Solar System: Pocket Solar System
  https://www.nisenet.org/catalog/exploring-solar-system-pocket-solar-system
- Exploring the Solar System: Hide and Seek Moon *https://www.nisenet.org/catalog/exploring-solar-system-hide-and-seek-moon-2018*

More Moon-themed activities and a Moon collaborative game will be included in Part B of the 2020 Explore Science: Earth& Space toolkit

NASA Moon and Apollo Program Resources

- NASA Space STEM Forum anniversary resources:
  https://spacestem.nasa.gov
- NASA Apollo anniversary resources:
  https://www.nasa.gov/specials/apollo50th/media.html
- NASA Apollo anniversary resources:
  https://science.nasa.gov/toolkits/apollo-anniversary
- Lunar Planetary Institute resources:
  https://www.lpi.usra.edu/apollo50/
- NASA Museum Alliance resources:
  https://informal.jpl.nasa.gov/museum/apollo-50th-resources
  (You must register to access NASA Museum Alliance resources)
- NASA Science—Earth's Moon
  https://www.nasa.gov/moon
  In depth: *https://moon.nasa.gov/about/in-depth/*
- NASA Science Solar System Explore—Earth's Moon
  https://solarsystem.nasa.gov/moons/earths-moon/overview/

- International Observe the Moon Night resources: *https://moon.nasa.gov/observe*
- Solar System Treks: *https://trek.nasa.gov/*
- More resources: *http://www.nisenet.org/moon50*

Moon-Themed Online Workshops

- The NISE Network will be hosting online workshops on the Moon and NASA's Apollo program in 2020. For more information on these workshops you can visit: *http://www.nisenet.org/events/online-workshop*
- Online workshop: Celebrating the Moon, Our Nearest Neighbor in Space (Recorded): *http://www.nisenet.org/events/online-workshop/online-workshop-celebrating-moon-our-nearest-neighbor-space-recorded*

Additional NASA Resources

NASA Online Resources for Educators

NASA has a rich set of resources for educators that can be used in combination with the Explore Science: Earth & Space toolkit.

- **NASA Museum Alliance**
  NASA Museum Alliance is a community of practice comprising informal science educators at museums, science centers, planetariums, NASA Visitor Centers, Challenger Learning Centers, observatories, zoos, aquariums, parks, and nature centers who wish to share NASA information with their visitors. It is intended to bring current NASA science and technology to visitors through professional development of the museums' staff, advance notice of NASA events, and provision of materials such as visualizations, access to NASA experts, educational materials, etc.
  http://informal.jpl.nasa.gov/museum/

  NASA Museum Alliance is hosting an online discussion platform using Ryver—learn more and join to chat with other NISE Network and Museum Alliance partners:
  https://www.nisenet.org/blog/post/chat-online-other-nise-network-partners-using-explore-science-earth-space-toolkits-online

- **NASA eClips**
  NASA eClips is a NASA-supported project that brings together exciting video segments and resources with educational best practices to inspire and educate students to become 21st-Century explorers. NASA eClips serves the national K–12 educational community by introducing students to science, technology, engineering, and mathematics (STEM) concepts and providing teachers with engaging resources and tools to support teaching and learning. NASA eClips offers free educational resources for teachers to use to complement their curriculum. Educational material for this program is selected based on national curriculum standards identified by the Common Core State Standards—Mathematics (CCSS-M), the Next Generation Science Standards (NGSS), the Standards for Technological Literacy (defined by the International Technology Engineering Education Association (ITEEA), and the International Society for Technology in Education (ISTE).
  https://nasaeclips.arc.nasa.gov/

- **NASA Science Mission Directorate's Science Activation Community**
  Explore a national-level community that supports learning of current NASA Science Mission Directorate research and discoveries. This page contains introductions to each project and helpful links for educators.
  https://science.nasa.gov/learners

- **NASA Resources for Educators**
  Search hundreds of resources by subject, grade level, type, and keyword. These lesson plans and teaching materials support your STEM curriculum.
  https://www.nasa.gov/audience/foreducators/index.html

- **NASA's BEST Educator's Guide to the Engineering Design Process**
  https://www.nasa.gov/audience/foreducators/best/edp.html

- **Educator guides are available for Grades K–2, Grades 3–5, and Grades 6–8**
  https://www.nasa.gov/audience/foreducators/best/activities.html

- **NASA EXPRESS Newsletter**
  The NASA EXPRESS message features updates from NASA and STEM associates about workshops, internships, and fellowships; applications for grants or collaborations; promotions for student and educator opportunities; online professional development; and other announcements.
  https://www.nasa.gov/audience/foreducators/Express_Landing.html

- **NASA Space Place**
  NASA's Space Place website engages upper-elementary-aged children in space and Earth science through interactive games, hands-on activities, fun articles, and short videos.
  https://spaceplace.nasa.gov

NASA Images, Videos, and Visualizations

NASA and its partners offer a wide variety of different types of media. The following resources may be helpful if you are considering adding imagery, videography, or multimedia experiences to your toolkit programming.

- **AstroPix**
  A one-stop shopping experience that makes finding the right astronomy image easier than ever. AstroPix offers access to the public image galleries of many of the leading astronomical observatories under a single unified interface. Images are organized by featured topics, image type, telescope, subject, and electromagnetic spectrum band. This site is supported by NASA under NASA's Universe of Learning program. Content is curated and supplied solely by the partnering institutions.
  https://astropix.ipac.caltech.edu

- **NASA Image and Video Library**
  A simple search interface drives discovery across images, videos, and audio clips from decades of the agency's history. Browse famous historical and up-to-date mission photos along with beautiful Earth and space images. The recently revised website is a good place to start any media search associated with space exploration. The "Most Popular" tab is a great way to browse some of NASA's most iconic images.
  https://images.nasa.gov/

- **NASA's Scientific Visualization Studio (SVS)**
  Located at the NASA Goddard Space Flight Center, SVS works closely with scientists to create data visualization products that promote a greater understanding of NASA Earth and space science. Thousands of visualizations are available—with new ones added frequently—and include images, animations, and short movies on topics as wide-ranging as NASA science. Browse the collection by theme, as well as search by keyword, mission, instrument, etc. Visualizations can be downloaded in a variety of formats and resolutions.
  https://svs.gsfc.nasa.gov

- **NASA Jet Propulsion Laboratory (JPL) Media Galleries and Interactives**
  A wide range of media from NASA missions, research, and educational efforts connected to JPL. This collection is heavily weighted towards planets, dwarf planets, and moons in the solar system, including amazingly detailed surface imagery of rocky bodies and dynamic swirling clouds of gas giants.
    - Images: *https://www.jpl.nasa.gov/spaceimages*
    - Videos: *https://www.jpl.nasa.gov/videos*

- Infographics: *https://www.jpl.nasa.gov/infographics/*

- **Solar System Treks**
  Solar System Treks are online, browser-based portals that allow you to visualize, explore, and analyze the surfaces of other worlds using real data returned from a growing fleet of spacecraft. You can view the worlds through the eyes of many different instruments, pilot real-time 3D flyovers above mountains and into craters, and conduct measurements of surface features. The portals provide exciting capabilities for mission planning, planetary science, and public outreach. The Solar System Treks include Moon Trek, Mars Trek, Vesta Trek, and Phobos Trek.

  Mars Trek is a unified viewing experience for all NASA data about the surface of Earth's closest planetary neighbor. Mars Trek provides easy-to-use tools for browsing, data layering and feature search, including detailed information on the source of each assembled data product. Using Mars Trek, many hundreds of Martian data products can be visualized, stacked, blended, and downloaded including 3D maps.
  - All Solar System Treks: *https://trek.nasa.gov/*
  - MoonTrek: *https://trek.nasa.gov/moon/*
  - Mars Trek: *https://trek.nasa.gov/mars/*
  - Vesta Trek: *https://trek.nasa.gov/vesta/*

- **OpenSpace** is a NASA-supported, open-source, non-commercial, and freely available software. The software works on multiple operating systems on planetarium domes and high-resolution tiled displays.
  https://www.openspaceproject.com

ViewSpace

ViewSpace is a free, web-based, interactive exhibit of astronomy and Earth science, developed by the Space Telescope Science Institute, in collaboration with NASA's Universe of Learning, Earth Observing System, Hubble Space Telescope Project, and the James Webb Space Telescope Project.

With little setup, ViewSpace provides a dynamic window into the latest discoveries in our quest to understand the universe. Topics range from the search for evidence of life beyond Earth to the fundamental understanding of how the universe works and its ultimate fate. Its beautiful imagery and captivating stories help ViewSpace engage visitors of varying backgrounds and experiences.

ViewSpace can be a wonderful addition to a reflective and quiet space at your museum. It also provides immediate context to visitors that may be queueing or waiting for Earth & space science related programming.

Basic Requirements

ViewSpace is a flexible product that consists of dozens of digital interactives and hundreds of videos used in many types of museum spaces. Some of our partners build dedicated mini-theaters, while others integrate ViewSpace directly into exhibits. Its low cost and quick setup make it a good multimedia companion piece for the *Sun, Earth, Universe* exhibition. Sites can install just video content, just interactive content, or both. The interactive content can alternatively be used as a facilitated experience.

- **Cost:** All content is supplied via the internet at no cost, but museums need to supply their own display equipment

- **Software requirements:** Modern internet browser (e.g., Chrome, Firefox, Safari, Edge)
- **Internet:** Persistent internet access that supports streaming video is required
- **Video Content Specific Equipment:** Computer with a monitor or projector, or alternatively a Smart TV display
- **Audio:** Audio is optional, but low-cost computer speakers or TV speaker would be adequate
- **Interactives Content Specific Equipment:** Tablet or computer with touchscreen or mouse

Technical Setup and Tech Support

- Current locations and content from ViewSpace: *https://www.universe-of-learning.org/viewspace/*
- Request a free account for your institution: *https://viewspace.org/support/message/new*
- ViewSpace technical setup guide: *https://viewspace.org/support/guide*
- ViewSpace Tech Support: Contact: support@viewspace.org

Video Component

ViewSpace videos tell the stories of the planets, stars, galaxies, and the universe, giving viewers the opportunity to experience space and Earth as seen with satellites and telescopes. A wide array of videos share accurate and up-to-date science and imagery from Earth and space, making astronomy, astrophysics, and Earth science engaging, accessible, and relevant.
https://viewspace.org/resources/videos

Interactive Component: Unveiling the Invisible Universe

ViewSpace interactives let visitors manipulate sliders on images to explore objects and materials in space and on Earth from different perspectives. Visitors can shift their view from images of the visible universe to images captured in wavelengths that the human eye cannot detect. Visitors can choose a number of objects to explore and can interact with the images at their own pace. Using the interactive component requires an additional interface device such as a touchscreen or keyboard and mouse.
https://viewspace.org/resources/invisible_universe

Exhibit Labels and Signage

ViewSpace.org now includes a set of downloadable exhibit labels and banners that can be downloaded and printed for use in orienting viewers to ViewSpace and helping them access the content. The materials are available in a number of different sizes and aspect ratios for both a standard home or business printer or a professional printing house. The images, text, and fonts used to make the signs are also available for sites that prefer to design their own labels.
https://viewspace.org/resources/exhibit_labels

Training Staff and Volunteers

Training Resources

The Explore Science: Earth & Space toolkit includes many training resources that will help your staff and volunteers feel comfortable engaging public audiences in the topic of Earth and space science. All of the resources listed below are also available online at *http://www.nisenet.org/earthspacekit*.

- Activity overview presentation and notes for staff and volunteers including a project orientation and details about the educational products
- Facilitator guides for each activity
- Training and content videos for all activities
  https://www.nisenet.org/catalog/explore-science-earth-space-activity-and-content-training-videos
- Edu-Cathalon: Facilitation training video
  https://www.nisenet.org/catalog/educathalon-facilitation-strategies
- Strategies for Approaching Common Misconceptions Around Difficult Scientific Concepts training videos
  https://www.nisenet.org/catalog/explore-science-earth-space-strategies-addressing-common-misconceptions-videos
- Tips for leading hands-on activities
  https://www.nisenet.org/catalog/explore-science-tips-leading-hands-activities
- The NISE Network has created a wide variety of professional development tools, guides, workshops, and training materials as resources designed for educators and scientists to improve their capacity to engage the public in current science and technology
  http://www.nisenet.org/About_Professional_Development

Online Workshops

In addition to the resources listed above, the NISE Network will also offer a variety of free online workshops that your staff and volunteers are welcome and encouraged to participate in. There will be multiple one-hour workshops featuring training on a variety of topics, and one four-week online training about engaging participants in Earth and space programming using the toolkit materials. All online workshops will be recorded and archived.

- Upcoming online workshops:
  http://www.nisenet.org/events/online-workshop
- Recordings of past online workshops:
  http://www.nisenet.org/search/product_category/online-workshops-31

Preparing Guest Presentations

Expert speakers can be a wonderful addition to your event. With extra preparation and support, guest presentations can provide a great experience for both the speaker and the audience. Here are some suggestions to help make things go smoothly.

- When inviting scientists to participate, be clear about their role and type of experience you're seeking.

- Familiarize invited guest speakers with your expected audience, including anticipated ages and the level of background knowledge.
- Let speakers know about any expectations you may have related to audience involvement.
- Discuss the content and length of the planned presentation.
- Share the "Tips for Guest Speakers" document with your presenter. You might also share some of the other training materials.
- Encourage your invited speaker to use plain language, avoiding jargon and technical terms.
- Discuss details about your facility, including room size, seating style, and audio-visual equipment.
- Ask to review a draft slideshow or notes in advance and discuss the planned presentation together.
- Schedule time before the presentation to work out any audio-visual or logistical issues.
- Prepare questions that may help stimulate audience discussion.

Additional Handouts

Additional training handouts at the end of this planning guide include:

Tips for Guest Speakers

Tips for Leading Hands-On Activities

Tips for Interacting with Young Learners

Safety for Event Planning

Consideration for safety and safe practices has been integral to the development of the Explore Science: Earth and Space toolkit activities and facilitation materials. By understanding and following the instructions and protocols embedded in the activities, demonstrated in the training videos, and called out in the facilitator guides, you will minimize risk to participants, staff, and volunteers.

Event Planning

The policies and practices for what is allowable in a given setting will vary by institution and location. It is better to engage the right people well ahead of time so that they know you are using vetted protocols and thinking about safety proactively. You don't want to bring these issues up when you are in the last phases of your planning. You know your institution or the facility that will host your event best, but here are some suggestions of people you may want to talk with when planning your event.

- **Safety committee or officer.** Contact them and let them know you'll be doing the event and which activities you are planning to use.
- **Security or public safety staff.** Let them know what is happening in the event from a safety perspective. Have them help you consider a physical floor plan. How will you structure your event setup so that people can enter, exit, and move through the space safely? Be sure to think about access to emergency exits, where electrical outlets or cords might be an issue, and how you will ensure accessible pathways and routes for visitors to move around during your event.
- **Facilities or custodial staff.** Coordinate and planning for cleaning up after your event.

More Safety Resources

Although the safety information provided in your toolkit is specific to each activity, we have provided a list of resources on general safety practices below.

- Online Workshop: Be Prepared: Safety Tips and Reminders for Museums Running Public Events, Including National Chemistry Week and Earth and Space Events (Recorded) *https://www.nisenet.org/catalog/online-workshop-be-prepared-safety-tips-and-reminders-museums-running-public-events*
- AAM Facilities and Risk Management Standards: *https://www.aam-us.org/programs/ethics-standards-and-professional-practices/facilities-and-risk-management-standards/*
- ICOM Guidelines for Disaster Preparedness in Museums: *http://archives.icom.museum/disaster_preparedness.html*
- Department of Homeland Security Preparedness Planning: *https://www.ready.gov/business*

Evaluating Your Event

The activities and materials included in your Explore Science: Earth & Space toolkit have been evaluated with public audiences, and reviewed by scientists and informal science educators. The NISE Network also evaluates the national impact of Explore Science: Earth & Space events. The findings from these evaluation studies are used to improve future toolkit materials, and to inform the Network of its impact on the public.

Additionally, you may want to evaluate your local Explore Science: Earth & Space event against your own event goals. Evaluating your local event has several benefits. It can help clarify your goals, provide information that you can use to improve your event next year, gain funding or sponsorship for projects, and inform your understanding of your audience and the impact of your work. If you're interested in learning more about evaluation, the following is a selection of resources to help you get started.

Team-Based Inquiry
Team-Based Inquiry (TBI) is a practical approach to empowering education professionals to get the data they need, when they need it, to improve their products and practices and, ultimately, more effectively engage public and professional audiences. The TBI process involves an ongoing cycle of inquiry: question, investigate, reflect, and improve. The Team-Based Inquiry guide explains each step of the TBI process and features ways TBI is used in the NISE Network to improve educational experiences and professional practice. Resources include templates, forms, training materials, and training videos.

- **Team-Based Inquiry Guide**
  http://www.nisenet.org/catalog/team-based-inquiry-guide
- **NISE Network Program Evaluation Tools and Templates**
  http://www.nisenet.org/catalog/nise-network-program-evaluation-tools-package
- **NISE Network Evaluation Efforts**
  http://www.nisenet.org/About_Evaluation_Research

Additional Resources

- Informalscience.org Informal education resources:
  http://www.informalscience.org
- The National Science Foundation Guidebook on project evaluation for researchers:
  https://www.purdue.edu/research/docs/pdf/2010NSFuser-friendlyhandbookforprojectevaluation.pdf
- The University of Wisconsin Extension Guides to planning and implementing evaluation:
  http://www.uwex.edu/ces/pdande/evaluation/evaldocs.html

Staying in Touch

- **NISE Network Monthly E-Newsletter**
  The NISE Network sends a monthly electronic newsletter. Subscribe here: *https://www.nisenet.org/newsletter-subscribe-form*

  If you have subscribed to the newsletter, but you are not receiving it via email, please see our FAQ page for assistance: *http://www.nisenet.org/faqs*

- **NISE Network Social Networking**
  In addition to the monthly NISE Network electronic monthly newsletter, the NISE Network has many ways to get updates and connect with other professionals in the NISE Network through social networking sites that you already use: *http://www.nisenet.org/social*

  If you are posting about your events and experiences, we encourage you to use these hashtags on your social network platforms:
  #nisenet
  #explorescience

- **NASA Social Media**
  Follow, share, and be a part of the conversation on popular social media sites with NASA: *https://science.nasa.gov/get-involved/connect*

- **NISE Network Regional Hub Leaders**

  The NISE Network community within the United States is organized around four "regional hubs" based on geographic proximity. Regional hubs facilitate partner interaction in the Network, help museum educators connect with scientists and each other, and provide support to institutions in their region. To find your region and contact your regional hub leader, please see the section on regional hub leaders earlier in this guide, or visit: *http://www.nisenet.org/contact*

- **NASA Museum Alliance News**
  Informal education professionals are invited to apply for free membership to the NASA Museum Alliance. You can receive regular news from NASA Museum Alliance by joining at: *https://informal.jpl.nasa.gov/museum/About/Application*

Promotional and Marketing Materials

We've put together a collection of resources to help you promote and market your Explore Science: Earth & Space event. We've designed everything to be as easy to use as possible by creating templates, common software platforms, and simple instructions for adding your information and logos to generate attractive posters, banners, and other marketing materials.

All of the artwork and images shown on the following pages are available in electronic format on the USB thumb drive included in your toolkit, or online. We've provided Spanish and English options to help promote bilingual events. You can find materials online at: *http://www.nisenet.org/earthspacekit*

NASA Acknowledgment of Support

The Explore Science: Earth & Space toolkits are part of the Space and Earth Informal STEM Education project, led by Arizona State University, funded by the National Aeronautics and Space Administration under cooperative agreement award numbers NNX16AC67A and 80NSSC18M0061.

Although your event might not receive direct NASA funding, if you use our toolkit materials or produce deliverables based on the toolkit materials, you should follow NASA guidelines for acknowledging NASA support.

- **Statement for deliverables and publications:** *This material is based upon work supported by NASA under cooperative agreement award numbers NNX16AC67A and 80NSSC18M0061. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Aeronautics and Space Administration (NASA).*
- **Use of the NASA seal logo, program identifiers, or flags is restricted by NASA and should not be added to your press release or event promotional materials.** The NASA insignia logo (the blue "meatball" insignia), the retired NASA logotype (the red "worm" logo), and the NASA seal may not be used for any purpose without explicit permission. These images may not be used by persons who are not NASA employees or on products, publications, or web pages that are not NASA-sponsored. These images may not be used to imply endorsement or support of any external organization, program, effort, or persons. For more information, please visit: *http://www.nasa.gov/multimedia/guidelines*.

Photo Release Form and Sharing Your Event Photos

Most institutions require that some kind of photo release form be signed in order for you to circulate photos from your event in any way. Whether or not this is a formal policy in your institution, you should always ask for permission before photographing participants, especially children. Getting signed releases gives you the flexibility to use your photos in newsletters, reports, and other settings.

We welcome you to share photos from your event with us by sending them to us at the postal or email addresses listed below. However, we do have the following caveat: in order to be able to use and share photos of local events, we must have a release form signed by each person in the photo. We understand that for many of our partners, it is not possible to get release forms from every person photographed or recorded. For this reason, we do not require or expect photographs of your events.

The National Informal STEM Education Network (NISE Network) photo release form is included at the end of this guide. Fill in your organization's name in the second blank on the first line, then copy the form to use at your event. When you are asking visitors to fill out the form, be sure to explain that they can choose not to have their photograph or their child's photograph taken and still participate in the activity.

Here are a few tips to ensure you get a release from every person you photograph:

- If you are using a photographer for your Explore Science: Earth & Space event, be sure to explain to them that they will need to get consent before taking photographs.
- It's helpful to have the releases and pens on a clipboard or two that you can hand to the visitor.
- In larger settings, or spaces with a lot of activity, consider assigning a staff person to join the photographer and ask visitors to sign the release before the photographer takes pictures. This person can ensure that no photographs are taken without consent, and can also ask the photographer to delete any pictures from their camera of visitors who did not consent.
- Jot down a description of the person on their release form (for example, "young girl, brown hair, yellow shirt"). This can help you match releases to photos later on.
- If you are hosting an event with nametags and registration, you can ask visitors to fill out the release when they register. If they have consented to have their photo taken, give them a sticker for their nametag. Then the photographer can take photos only of people with the stickers.

If you are able to get signed releases, please share those photos with us! You may send a USB with photos along with a scan of the photo releases to Arizona State University at:

Deron Ash
School for the Future of Innovation in Society (SFIS)
Arizona State University
Interdisciplinary B 366
1120 S. Cady Mall
Tempe, AZ 85287-5603

Alternatively, you can email them to Deron Ash at *deron.ash@asu.edu*.
Questions regarding acknowledgments or credits can be directed to deron.ash@asu.edu as well.

Additional Materials

Additional materials at the end of this planning guide include:

Sample Press Release

Photo Release Form

Logos, Colors and Fonts

Explore Science: Earth & Space logos
You are very welcome to use the Explore Science: Earth & Space logos on your press release or event promotional materials. There are many variations and formats for the Explore Science: Earth & Space logos available for use in graphic materials. All Explore Science: Earth & Space logos are included on the USB thumb drive, and all the promotional materials are available on the website at: *http://www.nisenet.org/earthspacekit*

You can find the logos at: *https://www.nisenet.org/catalog/explore-science-earth-space-logos-0*

NISE Network logos
You can find logos and promotional materials for all the NISE Network promotional materials and logos here: *http://nisenet.org/prmaterials*

NASA seal, logo, program identifiers
Use of the NASA seal, logo, program identifiers, or flags is restricted by NASA; please do not add the NASA logo to your press release or event promotion materials.

> *The NASA insignia logo (the blue "meatball" insignia), the retired NASA logotype (the red "worm" logo), and the NASA seal may not be used for any purpose without explicit permission. These images may not be used by persons who are not NASA employees, or on products, publications or web pages that are not NASA-sponsored. These images may not be used to imply endorsement or support of any external organization, program, effort, or persons. For more information, please visit http://www.nasa.gov/multimedia/guidelines.*

Horizontal logo

Vertical logo

Explore Science mark

English logo versions

Logo mark versions

Bilingual logo versions

Colors

Green, teal, and purple are the primary colors of the Explore Science: Earth & Space color palette.

Color specifications

CMYK	60/00/100/00
RGB	114/191/68
PMS	360
#	72bf44

CMYK	100/11/39/15
RGB	0/137/45
PMS	7713
#	008991

CMYK	56/100/17/0
RGB	138/41/126
PMS	513
#	8a297e

Fonts

The Explore Science: Earth & Space project uses two fonts: Panton and Calibri.

PANTON LIGHT

ABCDEFGHIJKLMN
OPQRSTUVWXYZ &
abcdefghijklmnopqrst
uvwxyz 1234567890

CALIBRI LIGHT

ABCDEFGHIJKLMN
OPQRSTUVWXYZ &
abcdefghijklmnopqrst
uvwxyz 1234567890

PANTON REGULAR

ABCDEFGHIJKLMN
OPQRSTUVWXYZ &
abcdefghijklmnopqrst
uvwxyz 1234567890

CALIBRI REGULAR

ABCDEFGHIJKLMN
OPQRSTUVWXYZ &
abcdefghijklmnopqrst
uvwxyz 1234567890

PANTON EXTRA BOLD

ABCDEFGHIJKLMN
OPQRSTUVWXYZ &
abcdefghijklmnopqrst
uvwxyz 1234567890

CALIBRI BOLD

ABCDEFGHIJKLMN
OPQRSTUVWXYZ &
abcdefghijklmnopqrst
uvwxyz 1234567890

PANTON FONT FAMILY

The Explore Science logo was based on the Panton typeface. Panton is used throughout Explore Science materials. The versatile font family includes ten different weights. Free download is not available, but the font can be purchased online from various sources.

CALIBRI FONT FAMILY

Calibri is also used in Explore Science materials. Calibri Regular and Bold come with the Windows operating system and also with Microsoft Word for Mac. Calibri Light can be purchased online from various sources.

Social Media

We encourage you to use these hashtags on your social networks to promote your event:

#nisenet
#explorescience

Banners

Two large Explore Science: Earth & Space banners are included in your toolkit (English and bilingual Spanish-English). You can use adhesive vinyl lettering to customize the banner with your event date, times, location, and other information.

If you would like to print additional banners with your customized event information, it's easy to do. Use the banner template on the USB thumb drive, then send your art to one of the many online banner-printing companies or take it to your local printer. A similar large vinyl banner with grommets should cost about $100.

64 x 24 inches

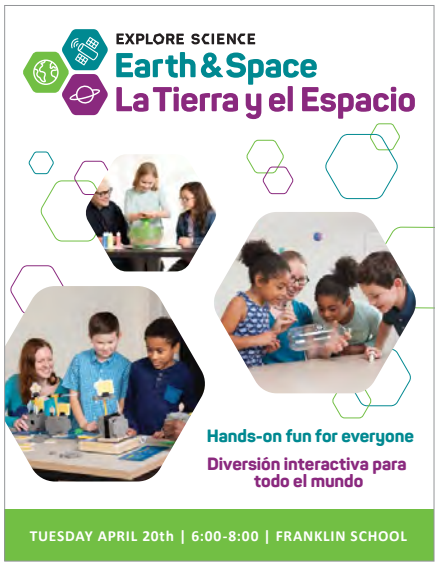
Ads and Posters

Customizable Ads and Posters

To help you promote your event, PDF, JPEG, and Adobe Illustrator files are provided.

Each ad layout is provided in both English and bilingual format

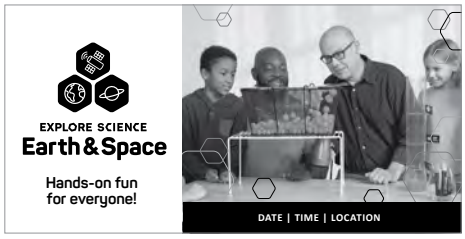
11 x 17 posters



Each poster layout is provided in both English and bilingual format

8.5 x 11 posters

Each ad and poster is also provided in black and white



EXPLORE SCIENCE
Earth & Space

EXPLORE SCIENCE
Earth & Space

EXPLORE SCIENCE
Earth & Space

Hands-on fun for everyone!

EXPLORE SCIENCE
Earth & Space

Hands-on fun for everyone!

Press Photos

We have provided a selection of press photos that you can use to market your Explore Science: Earth & Space events.

ExSci_Space_Promo_2016_1027.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1031.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1066.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1069.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1079.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1093.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1099.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1102.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1122.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1133.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1136_edit.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1152.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1163_edit.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1170.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1179.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1215.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1265_edit.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1325.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1344.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1355.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1361.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1366.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1410.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1414.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1425.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1453.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1491.jpg
Credit: Emily Maletz

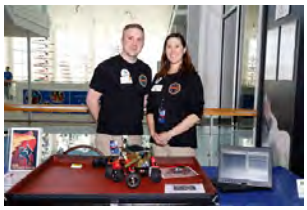
ExSci_Space_Promo_2016_1495_edit.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1592.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2016_1608.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2017_Eclipse1.jpg
Credit: Science Museum of Minnesota

ExSci_Space_Promo_2017_Eclipse3.jpg
Credit: Science Museum of Minnesota



ExSci_Space_Promo_2018_0001.jpg
Credit: Science Museum of Minnesota

ExSci_Space_Promo_2018_0002.jpg
Credit: Science Museum of Minnesota

ExSci_Space_Promo_2018_0003.jpg
Credit: Dave Burbank

ExSci_Space_Promo_2018_0004.jpg
Credit: Dave Burbank

ExSci_Space_Promo_2018_0005.jpg
Credit: Dave Burbank

ExSci_Space_Promo_2018_0006.jpg
Credit: Dave Burbank

ExSci_Space_Promo_2018_0007.jpg
Credit: Fort Worth Museum of Science and History

ExSci_Space_Promo_2018_0008.jpg
Credit: Science Museum of Minnesota

ExSci_Space_Promo_2018_0009.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2018_0010.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2018_0011.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2018_0012.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_1032.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_1084.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_1180.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_1190_e...
Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_1265.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_1481.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_1598.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_1650.jpg
Credit: Emily Maletz

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Credit: Emily Maletz

ExSci_Space_Promo_2019_20180929_2014.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2019_20181018_1032_e...
Credit: Emily Maletz

ExSci_Space_Promo_2019_20181018_1042.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20190420GH_040....
Credit: Gary Hodges

ExSci_Space_Promo_2020_20190420GH_066....
Credit: Gary Hodges

ExSci_Space_Promo_2020_20190420GH_249....
Credit: Gary Hodges

ExSci_Space_Promo_2020_20191111_0013_e...
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0069.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0144.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0150.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0161.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0369.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0435.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0446.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0477.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0497.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0533.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0598.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0607.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0687.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0699_e...
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0732.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0841.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0843.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_0876.jpg
Credit: Emily Maletz

ExSci_Space_Promo_2020_20191111_1002.jpg
Credit: Emily Maletz

We encourage you to use the provided publicity photos in marketing your event, and in creating related materials. Please see image thumbnails for credit information.

Appendix

Tips for Guest Speakers

Know your audience
The more you know about your audience, the better you can adapt your presentation to their interests. Keep in mind the diversity of your audience's experience and backgrounds. Remember that many visitors attend in family groups, which can include a wide range of ages.

Keep the message simple
Come up with one "big idea" you want the audience to take away from the experience, and make sure your presentation reiterates and reinforces this idea in different ways. Define your terms, avoiding jargon and acronyms as much as possible. Check in with your audience periodically to see if they're following you.

Use familiar analogies
Use comparisons to everyday experiences. Explain how the topic relates to something that's been in the news or in popular culture.

Use relative size and scale
Focus on relative size and scale rather than exact measurements. Consider using parts of the human body to explain relative scale.

Use visuals
Simple images and models will reinforce and clarify your message.

Use several modes of presentation
In addition to talking, you can include demonstrations, videos, and pictures. You can involve the audience by providing objects to pass around, asking questions, doing brief experiments, providing hands-on activities, and playing games.

Involve the audience in the processes of science
Encourage your audience to observe, predict, and explore by asking them questions: *"What do you think will happen when . . . ?" "Were you surprised?" "Why do you think that happened?" "What if you tried . . .?" "Can you think of any practical uses for this?" "What about unintended consequences?"*

Be friendly and approachable
Remember to make eye contact, smile, and let the audience know who you are. If you're a scientist, consider including personal stories about your work life and your career decisions.

Be prepared to answer common questions
But don't be afraid to let your audience know if you don't know the answer to their question.

Share ways to learn more
Remember that your presentation is only one exposure that people will have to this topic—it's not the end of their learning. Help the audience connect to other opportunities for more exploration.

Tips for Leading Hands-On Activities

Greet your guests
Say “hello,” make eye contact, and smile. People will come over if you look welcoming, available, and friendly. As much as possible, let your guests do the hands-on parts of the activity, and let them discover what happens. (If your activity has a surprise, don’t give it away!)

Encourage exploration
Provide positive feedback and assistance when people need it, but let them experiment and learn for themselves. Don’t insist people do things the “right” way—sometimes learning how something doesn’t work is just as valuable as learning how it does work.

Ask open-ended questions
Help people observe and think about the activity. Try to use questions that have more than one answer, such as: “What do you see happening?”, “Why do you think that happened?”, “What surprised you about what you saw?”, and “Does this remind you of anything you’ve seen before?”

Be a good listener
Be interested in what your guests tell you, and let their curiosity and responses drive your conversation forward.

Share what you know
Use clear, simple language. Focus on one main idea—you don’t need to explain everything at once! Start with very basic information, and then share more with interested learners.

Use examples from everyday life
Familiar examples can help explain abstract concepts. Be aware of different abilities, keeping in mind that children do not have the same skills or vocabulary as adults.

Offer positive responses
If people haven’t quite grasped a concept, you might say, “That’s a good guess!” or, “Very close, any other ideas?” Don’t say “No” or “Wrong.” You can offer hints or suggestions for things to think about or watch carefully.

Share accurate information
If you aren’t sure about something, it’s ok to say, “I don’t know. That’s a great question!” Suggest ways that people can learn more, either by trying another activity or looking up information at the library or online.

Remain positive
Maintain an inviting facial expression, positive tone, and open body language throughout the interaction.

Thank your guests
As your interaction ends, suggest other activities that you think your guests might enjoy.

Have fun!
A positive experience will encourage learning.

Tips for Interacting with Young Learners

Young children are natural scientists. Educators can encourage scientific behaviors in children ages 0-5 by recognizing natural scientific tendencies and engaging them in developmentally appropriate ways. Approach activities as opportunities for children to investigate their world. Exposure to a scientific phenomenon, concept, or skill is very valuable for a young child, but you shouldn't expect mastery or be too focused on very specific learning goals. You are providing the stepping stones to later scientific understanding and skills. Consider the following approaches when working with young children.

Interacting with a real phenomenon

Whenever possible, engage children with science phenomena through real experiences, photos, video, and/or models. Provide physical materials that extend children's ability to make sense of the phenomenon they are exploring.

Connect at their level

Kneel down so that you can make eye contact and interact with children at their level. Tell them your name and ask them theirs. Try to remark on something that might be personally interesting to the child (for example: "I see a butterfly on your shirt - I love to watch the butterflies in the museum's garden!") before launching into the topic you want to discuss. If a child seems shy, don't force them to talk to you; let the adult caregiver take the lead.

New experiences and skills

Young children are experiencing many things in their world for the first time, so leave plenty of time for them to fully enjoy novel experiences. Let them exercise and show off their newly developing skills (e.g. counting, recognizing letters and shapes). They are just developing their fine motor skills, so they may need more time for detailed tasks such as cutting, taping, or drawing.

Non-verbal communication

Children may not yet have the vocabulary to verbally articulate a concept, so rather than asking them to do so, encourage them to demonstrate their understanding non-verbally by manipulating the materials in front of them or by asking them to complete a task.

Ask questions

Ask open-ended questions and validate children's answers by acknowledging or repeating what they say and then rephrasing it as needed. Ask questions that guide children toward comparing and making sense of observations. For example: "How did the water move when you tipped the tray?"

Sportscasting

Avoid non-specific praise, such as "good job!" Instead, try simply narrating ("sportscasting") the child's actions. This shows them that you are noticing and taking interest in their efforts, and allows them to verbally elaborate if they choose to. For example: "I see that you are pouring that water very carefully."

Have fun!

A positive, playful experience will encourage learning.

Learn more about working with young children

The **My Sky Tonight** program from the Astronomical Society of the Pacific provides a collection of hands-on activities and educator resources for engaging pre-K children in astronomy: *http://www.astrosociety.org/MySkyTonight*

The **National Association for the Education of Young Children** provides guidance and resources for working with young children through Developmentally Appropriate Practice (DAP). A good starting point is their ”10 Effective DAP Teaching Strategies”: *https://www.naeyc.org/resources/topics/dap/10-effective-dap-teaching-strategies*

For more comprehensive guidance on engaging young children in science, we recommend the book **Preschool Pathways to Science: Facilitating Scientific Ways of Thinking, Talking, Doing, and Understanding** by Rochel Gelman Ph.D., Kimberly Brenneman Ph.D., Gay Macdonald M.A., and Moises Roman, published by Brookes Publishing and recommended by the National Science Teachers Association. *https://products.brookespublishing.com/Preschool-Pathways-to-Science-PrePS-P573.aspx*

These recommendations are based on materials and resources developed for My Sky Tonight from the Astronomical Society of the Pacific. For more activities and resources for engaging young children in the science of astronomy, visit *http://wwww.astrosociety.org/MySkyTonight*.

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Your logo here

Date:
Contact:
Phone:
Email:

Explore Earth and space science at [name of your organization]!

[Insert your local Explore Science: Earth & Space location, dates, and specific activity information here].

The Explore Science: Earth & Space event at [name of your organization] is part of a nationwide celebration of educational programs designed to engage audiences in the awe-inspiring fields of Earth and space science. This exciting event is an opportunity to connect with current NASA science research and explore Earth and space phenomena.

The Explore Science: Earth & Space event will include exciting science, take-home materials, and engaging discussion about science and society. Participants will have a chance to make their own spin art nebula, play the Mission to Space game, explore star formation, discuss what it might be like to mine an asteroid, and much more! These fun activities introduce guests to the ongoing research happening at NASA in the fields of heliophysics, Earth science, planetary science, and astrophysics, and allow them hands-on interaction with Earth and space science concepts.

[Insert information or edit the above about other special activities that your location may host, information about local partnerships and collaborations, and any other event-specific information.]

The Explore Science: Earth & Space project is led by Arizona State University, in collaboration with the National Aeronautics and Space Administration (NASA). Explore Science: Earth & Space toolkits are developed and distributed nationwide by the National Informal STEM Education Network (NISE Net). Throughout spring and summer of 2020, events are taking place at 350 museums and institutions throughout the country.

The National Informal STEM Education Network (NISE Network) is a national community of informal educators and scientists dedicated to fostering public awareness, engagement, and understanding of current science, technology, engineering, and math (STEM). For more information about NISE Net and to download a digital Explore Science: Earth & Space toolkit please visit: www.nisenet.org.

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I am the parent or legal guardian of the individual named above, and I hereby sign this Media Consent and Release on behalf of such individual in accordance with the statements above.

Name: _____ Date: _____

Signature: _____

Address: _____

Phone Number: _____