Welcome!

As we wait to get started with today’s discussion, please:

**Introduce yourself!** Type your name, institution, and location into the Chat Box.

**Questions?** Feel free to type your questions into the Chat Box at any time throughout the webinar or use the raise your hand function in the participants list and we’ll unmute your microphone.

Today’s discussion will be recorded and shared on nisenet.org at: nisenet.org/events/online-workshop
Future Online Workshops

Tuesday, June 15, 2022
Reconnect and Re-engage with the NISE Network

Tuesday, July 19, 2022
Tools for Engaging Communities and Incorporating Diversity, Equity, Access, and Inclusion Practices

Learn more at nisenet.org/events
MAY THE 4TH BE WITH YOU!

Learn more at nisenet.org/sciencefiction
Explore Science: Earth & Space Toolkits

- **2017**: 9 hands-on activities
  - Observe the Sun
  - Stomp Rockets
- **2018**: 10 hands-on activities
  - Static Electricity
  - Solar Eclipse
- **2019**: 11 hands-on activities
  - Early Explorations
  - Temperature Mapping
- **2020**: 15 hands-on activities
  - Design, Build, Test
  - Asteroid Mining

nisenet.org/earthspacekit

All toolkit activities have digital version available on the nisenet.org
What’s in a Toolkit Activity?

- Inviting bilingual stand-up signs
- Take home experiences to extend learning
- Tools to keep activity area clean & organized
- Activity guides for visitors
- Low-cost consumables
- All fits in a box
- Colorful and fun materials that fit with science and children’s museums
- Accessible STEM connections in beautiful media & posters
How to make it relevant?

Temperature Mapping

Star Formation
What is Relevance?

Two-way Conversations

Values
Reflection Prompts
Community Issues
Local Context
Relationships
Everyday Lives
Societal Benefits
Emotions
Temperature Mapping Relevance (Part 1)

Connected topic with everyday relevance: Urban Heat Islands

Talk and listen to groups representing your intended audiences or individuals from those audiences in your community. How does the issue affect them? What solutions are there?

Find local programs or municipal agencies trying to address the issue. Consider combining the activity with community-centric information or examples (e.g. a popular parking lot, a specific stretch of sidewalk)
Temperature Mapping Relevance (Part 2)

Don’t forget other components of the activity in your toolkit or on nisenet.org

**Local Context**
*Globe Observer app connection lets learners record data in their local area and learn about the important factors of land cover.

**Societal Benefits**
*Info sheets like this one on Urban Heat Islands showcase real world topics and history that can be used in conversations with partners and learners.

**Everyday Lives**
*Check activity extension in the facilitation guides for ideas on additional activities that could bridge to relevant topics and experiences.

Optional extensions
Provide participants with simple materials to create roofs for a small cardboard box (e.g., white felt and black felt) and challenge them to choose a roof that reflects the most light and therefore keeps the roof cool.
Star Formation Relevance (Part 1)

Stars and emotions: All the people, pets, and objects you love are made up of matter from stars.

There is a lot of beauty in space images. This is a great way to evoke emotions in your learners. Ask your intended audience to explore space images with you. What are their reactions? How do they relate to the image? Discuss creative projects you can do together with community partners.

Why should we study stars? Ask learners to reflect on our very own star, the Sun. How does the Sun impact their lives? Reflect on the important role it plays in our lives and society.
Star Formation Relevance (Part 2)

Don’t forget other **components** of the activity (and related ones) in your toolkit or on nisenet.org

*Stars don’t last forever and their life cycle is why we have such a variety of elements in the universe. Use The Life Cycle of Stars to tell this story and connect with other activities.*

*Don’t forget the Beautiful Nebulas poster with Nebula Spin Art. How can these images connect to the emotions and imagination of your learners?*

*Don’t forget about Content Training Videos for each activity. These videos bring up many relevant connections. Land and space-based telescopes are huge, expensive projects. How do these effort inspire us?*
### What’s in that box?

<table>
<thead>
<tr>
<th>PRINCIPLES</th>
<th>TOOLKIT YEAR</th>
<th>CONTENT AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2017</td>
<td>2018</td>
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<tr>
<td>Exploring Earth: Bear’s Shadow*</td>
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<td>Exploring Earth: Investigating Clouds</td>
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<td>Exploring Earth: Land Cover</td>
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<td>Exploring Earth: Paper Mountains</td>
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<td>Exploring Earth: Phang Nga Bay</td>
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<td>Exploring Earth: Temperature Mapping</td>
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<tr>
<td>Exploring Science Practices: Early Explorations*</td>
<td>x</td>
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<tr>
<td>Exploring Science Practices: Measure Up*</td>
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<tr>
<td>Exploring the Solar System: Asteroid Mining</td>
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<td>Exploring the Solar System: Big Sun, Small Moon</td>
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<td>Exploring the Solar System: Craters</td>
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<td>Exploring the Solar System: Design, Build, Test</td>
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<td>Exploring the Solar System: Hide and Seek Moon*</td>
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<td>Exploring the Solar System: Magnetic Fields</td>
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<td>Exploring the Solar System: Mars Rover</td>
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<td>Exploring the Solar System: Mission to Space New Game</td>
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<td>Exploring the Solar System: Moonsquakes</td>
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<td>Exploring the Solar System: Observe the Moon</td>
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<td>Exploring the Solar System: Observe the Sun</td>
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<td>Exploring the Solar System: Observe the Solar Eclipse</td>
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<td>Exploring the Solar System: Pocket Solar System</td>
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<td>Exploring the Solar System: Solar Eclipse</td>
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<td>Exploring the Solar System: Spaceship Game</td>
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<tr>
<td>Exploring the Solar System: Story Blocks*</td>
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<tr>
<td>Exploring the Universe: Exoplanet Transits</td>
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<td>Exploring the Universe: Expanding Universe</td>
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<td>Exploring the Universe: Filtered Light</td>
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<td>Exploring the Universe: Ice Orbs</td>
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<td>Exploring the Universe: Imagining Life</td>
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<td>Exploring the Universe: Nebula Spin Art</td>
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<td>Exploring the Universe: Objects in Motion</td>
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<td>Exploring the Universe: Drifting Objects</td>
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<tr>
<td>Exploring the Universe: Pack a Space Telescope</td>
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<td>Exploring the Universe: Space Guess Quest Game</td>
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<td>Exploring the Universe: Space Station</td>
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<tr>
<td>Exploring the Universe: Static Electricity</td>
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</tbody>
</table>

* These activities were specially designed for young learners.
Wait, there is more…PD

Special Earth & Space Event Planning
Apollo 11/Moon Landing Anniversary Presentation
nisenet.org/catalog/moon-nasa-going-back-and-looking-forward-presentation

Solar Eclipse Presentation
nisenet.org/catalog/preparing-partial-eclipse-event-remember-slides-presenter-notes

Training Games for Staff & Volunteers
Earth & Space Solar System Trading Cards Training Games
nisenet.org/catalog/earth-space-solar-system-trading-cards-training-games
Wait, there is even more…PD

General Purpose Video Training

Strategies for addressing common misconceptions
nisenet.org/catalog/explore-science-earth-space-strategies-addressing-common-misconceptions-videos

Edu-Cathalon
nisenet.org/catalog/educathlon-facilitation-strategies

General Tips Sheets

Tips for leading hands-on activities
Tips for interacting with young learners
Tips for guest speakers
nisenet.org/catalog/explore-science-tips-leading-hands-activities
Please just stop with all this PD!

Science Behind Workshops

Using Your Toolkit to Present the Life Cycle of Stars

Virtual Tour of a NASA Mission Prototyping and Testing Lab
-nisenet.org/events/online-workshop/online-workshop-science-behind-2020-explore-science-earth-and-space-toolkit

All 15 Science Behind Workshops here!
-nisenet.org/search/topics/earth-and-space-science-2630/product_type/online-workshop-recordings-31?keys=science%20behind&items_per_page=10

All Earth & Space facilitation and content training videos*
nisenet.org/catalog/explore-science-earth-space-activity-and-content-training-videos
Earth & Space Learning and Content Frameworks

Earth & Space Learning Framework

The Earth & Space Learning Framework describes the intended actions of science engaged with NISE Network educational activities and exhibition components based on the research, discoveries, and missions from NASA Science Missions Directorate. The three principles of the learning framework—phenomena, process, and participation—support a traditional strands of learning documented by the National Research Council. To further illustrate such principles and its supporting instruments, the following pages show example connections to the Explore Science and Earth & Space Traditions and the Out, Earth, Inside exhibition. The Learning Framework is a companion to the Earth & Space Content Framework, which describes the major ideas that represent a basic understanding of Earth and space science. To further illustrate each main idea, the following pages show suggested content connections using NISE Network examples from the Explore Science and Earth & Space Traditions and the Out, Earth, Inside exhibition.

Earth & Space Content Framework

The Earth & Space Content Framework presents six key stories in content ideas for informal educators engaging with the public with research, discovery, and missions from NASA Science Missions Directorate. These six ideas represent a basic understanding of Earth and space science. In further illustrating each main idea, the following pages show suggested content connections using NISE Network examples from the Explore Science and Earth & Space Traditions and the Out, Earth, Inside exhibition.

Posted at: https://www.nisenet.org/earth-space-frameworks
It is all about framing...

For those of you creating new events, kits for community partners, or other experiences, can materials be grouped by:

- Content messages or themes
- Learning goals
- Engagement styles
- Popular subjects
- Local interest

What framing strategy do you want to use?
It is all about framing…

Understanding that the universe is always changing: galaxies are colliding, stars are forming and dying, and Earth and the solar system are hurtling through space.

In Exploring the Universe: Nebula Spin Art, learners spin paint to simulate a dying star’s transformation into a nebula.
It is all about framing...

Planets and moons beyond our home world may contain water and life.

Exploring the variety of planets, moons, and smaller objects in and outside our solar system helps us to better understand life on Earth.

Life

Pack a space telescope

Imagining life

Nebula spin art

Exoplanet transits
Explore Science: Earth & Space Toolkits

2017
9 hands-on activities
- Observe the Sun
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15 hands-on activities
- Design, Build, Test
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- Craters

5 hands-on challenges*

nisenet.org/earthspacekit  nisenet.org/moongame
Living in an outpost on the Moon is dangerous! Do you have the right stuff?

1. Make a travel plan for your rover
   Identify the map coordinates for the locations you want to study at Faustini Crater.

2. Match rover data to locations on the map
   Unlock the rover’s data bank to access the seismic data. Accurately position the data location overlays on the map. Then match the data blocks to reveal a message.

3. Extract water from frozen lunar material
   You need water to produce oxygen to breathe. Use the grabber tools to move the ice—not the rock—into the water extractor.

4. Fill your oxygen tanks
   Water is made of hydrogen and oxygen. Electrolysis uses electricity to split water molecules into hydrogen and oxygen. Use the Emergency Oxygen Supply Kit to create breathable air.

5. Reconnect the power supply
   Use conductive materials to repair the circuit and restore power to the damaged outpost.

- Water extracted!
- Oxygen observed!
- Power restored!

Use the grabbers: The frozen lunar material is dangerously cold!

Look closely! Tiny bubbles mean oxygen molecules are being released from the water.

You’ll hear the equipment restart if you are successful.

nisenet.org/moongame
SUN EARTH UNIVERSE SOL TIERRA UNIVERSO

An engaging and interactive museum exhibition about Earth and space science for family audiences.
My Museum has Sun, Earth, Universe

nisenet.org/catalog/sun-earth-universe-exhibition-host-resources

Celebrating STEM and Celestial Events

Using the Sun, Earth, Universe exhibition as the focal point of related STEM and celestial events is a great opportunity to highlight its content and learning goals for visitors, staff, and volunteers. Special events can also be used to foster participation from local partners and secure a spot in the annual programming and training schedules for museum educators. A range of potentially paired events with the exhibition are listed below.

- Celestial Event Listings including Equinoxes & Solstices, Meteor Showers, Lunar Eclipse, Full Moons, Planetary Events, and More
  - http://www.timeanddate.com/sun
  - http://www.timeanddate.com/lunar
  - http://www.timeanddate.com/moon
  - http://www.timeanddate.com/sun

- Earth- and Space-themed STEM Events
  - STEM Events organized by date at: http://www.nisnet.org/education
  - World Water Day: http://www.worldwaterday.org
  - Earth Day: http://www.earthday.org
  - National Environmental Education Week, week of Earth Day: http://www.nreew.org
  - Astronomy Day: Spring: http://www.astronomy.org/Events/AstronomyDay.html
  - Astronomy Week (Spring): http://www.astronomy.org/Events/AstronomyWeek.html
  - World Oceans Day: http://www.worldoceansday.org/
  - International Observe the Moon Night: http://observeonthemoon.org

Connections to Next Generation Science Standards

The STEM content and linear experiences in the Sun, Earth, Universe exhibition have multiple connections to Next Generation Science Standards (NGSS).

Practices for K-12 Science Classrooms

Students combine knowledge and skills into practices that mirror those of professional scientists and engineers. NGSS identifies 8 practices essential for learning science and engineering in grades K-12. While not all practices are relevant to the Sun, Earth, Universe exhibitions, each component can be connected to at least one practice.

<table>
<thead>
<tr>
<th>NGSS Practice</th>
<th>Relevant Sun, Earth, Universe components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Asking questions (for science) and defining problems (for engineering)</td>
<td>We ask questions about Earth, We ask questions about the Sun, We are questions about the stars, We are questions about the universe, Design your experiment, Test engineering activity,</td>
</tr>
<tr>
<td>2. Developing and using models</td>
<td>We ask questions about the universe, We are questions about the stars, We ask questions about the Sun, We are questions about the Moon,</td>
</tr>
<tr>
<td>3. Planning and carrying out investigations</td>
<td>Use tools to detect the invisible</td>
</tr>
<tr>
<td>4. Analyzing and interpreting data</td>
<td>We ask questions about the solar system, We ask questions about Earth, We ask questions about the Sun,</td>
</tr>
<tr>
<td>5. Using mathematics and computational thinking</td>
<td></td>
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</tbody>
</table>

Museum educator guide

Promotional and marketing materials

K-12 Teacher Field Trip Guide

Exhibition Expansion Ideas
My Museum doesn’t have Sun, Earth, Universe

nisenet.org/catalog/sun-earth-universe-exhibition-host-resources
Just one more PD resource!

Earth & Space Project-Based Professional Learning Community Resources

- Relevance
- DEAI Tools
- Collaboration Guidance
- Exemplar Earth & Space projects from the community
- NASA Resources

Coming soon to nisenet.org!

vimeo.com/nisenet/nasaresourceshowcase2022

NASA Resources Showcase for NISE Net Partners
Resource reminder: nisenet.org topic pages

Curated collections of resources & media on:

- Earth Day
- Air Quality
- Climate change
- Water
- Mars
- Moon
- Solar & Lunar Eclipses
- Asteroids & friends
- James Webb Space Telescope
- Light activities

nisenet.org/browse-topic
Resource reminder: nisenet.org audience pages

Curated collections for resources on audiences:

- Girl Scouts
- Early Learners

nisenet.org/Audiences
Coming soon...more Earth & Space

EXPLORE SCIENCE
Voyage through the Solar System

Build a Mars Habitat
Get Involved

Learn more and access the NISE Network’s online digital resources
nisenet.org

Subscribe to the monthly newsletter
nisenet.org/newsletter

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nisenet.org/social
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