NISE Net Online Workshop

Earth & Space Resource Roundup - an Overview of All the NISE Network has to Offer

May 3, 2022

Today's Presenters:

Darrell Porcello, Children's Creativity Museum, San Francisco, CA

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

NISE NETWORK
ONLINE WORKSHOPS

MAY THE 4TH BE WITH YOU!

Learn more at nisenet.org/sciencefiction

NISE
NATIONAL INFORMAL STEM EDUCATION NETWORK

Space and Earth Informal STEM Education Project

Toolkits

Explore Science: Earth & Space toolkits

Professional Development

Exhibitions

Sun, Earth, Universe exhibitions

Explore Science: Earth & Space Toolkits

2017 9 hands-on activities

2018 10 hands-on activities

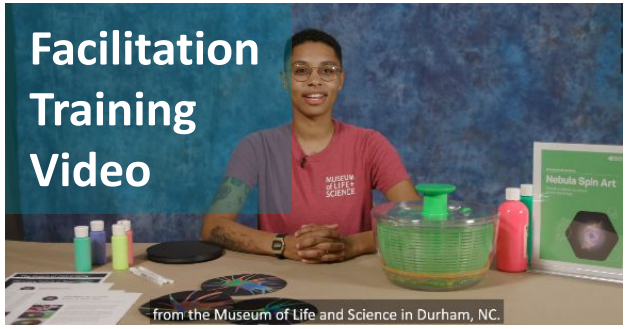
2019 11 hands-on activities

2020 15 hands-on activities

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



Training Materials

How to make it relevant?

Temperature Mapping

Star Formation

NISE
NATIONAL INFORMAL
STEM EDUCATION
NETWORK

What is Relevance?

Two-way Conversations

- Values
- Community Issues
- Relationships
- Societal Benefits
- Reflection Prompts
- Local Context
- Everyday Lives
- Emotions

Temperature Mapping Relevance (Part 1)

Everyday Lives

Community Issues

Local Context

Societal Benefits

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?

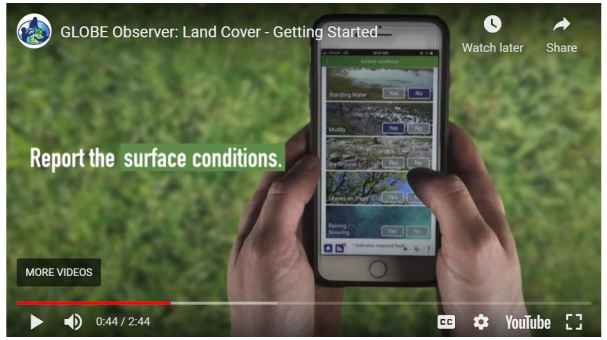
Find **local programs** or **municipal agencies** trying to address the issue. Consider combining the activity with community-centric information or examples (e.g. a popular parking lot, a specific stretch of sidewalk)

Temperature Mapping Relevance (Part 2)

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

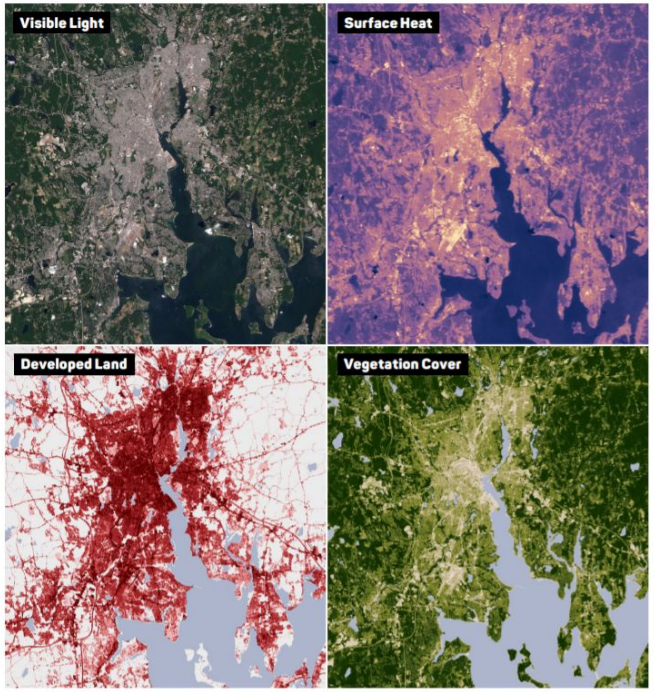
Local Context

*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.**

Emotions

Values

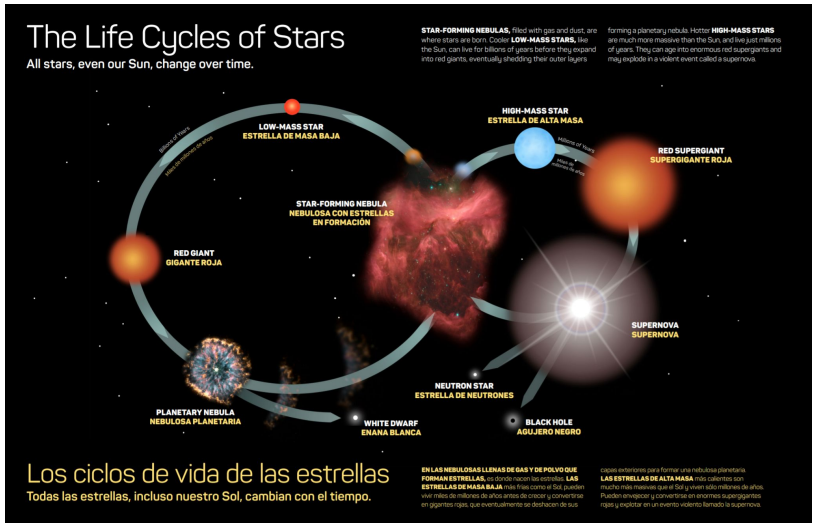
Reflection Prompts

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

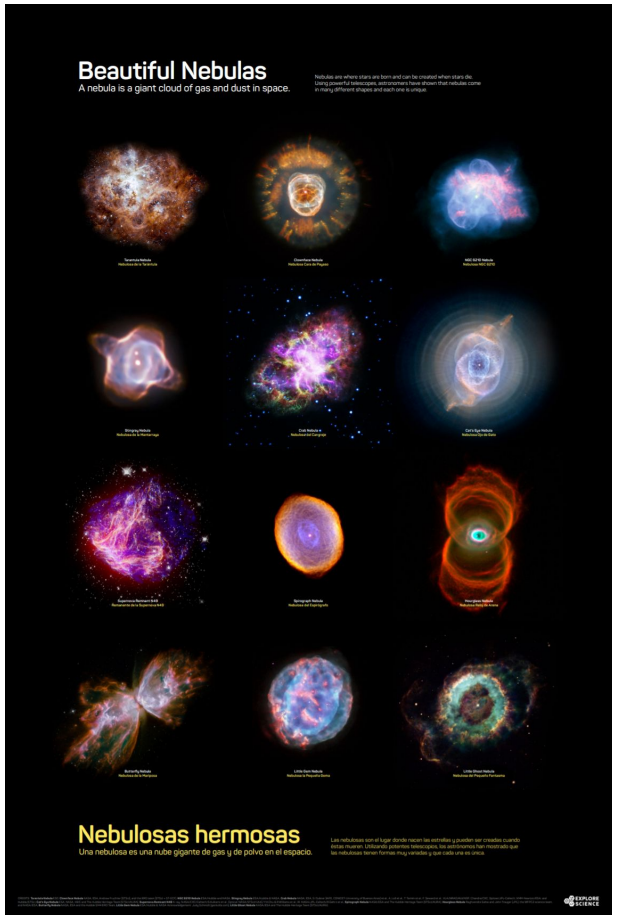


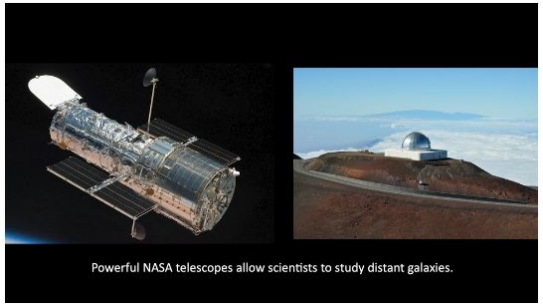
Reflection Prompts

*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.

Emotions

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





Values

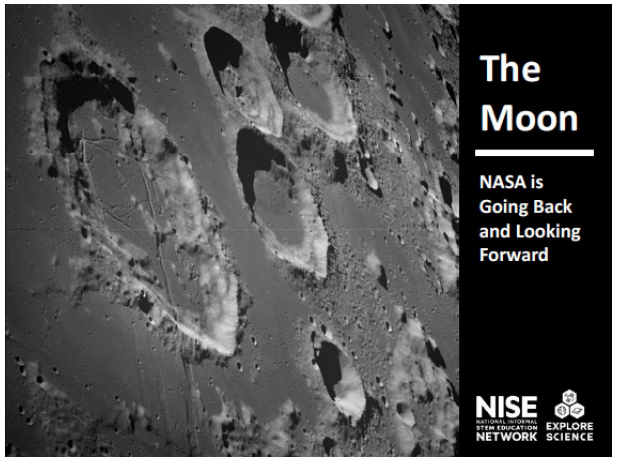
*Don’t forget about Content Training Videos for each activity. These videos bring up many relevant connections. Land and space-based telescopes are huge, expensive projects. How do these effort inspire us?

What's in that box?

	PRINCIPLES			TOOLKIT YEAR				CONTENT AREA					
	PHENOMENA	PROCESS	PARTICIPATE	2017	2018	2019	2020	SUN	EARTH	PLANETS	UNIVERSE	SOCIETY	FORCES + ENERGY
EXPLORING EARTH													
Exploring Earth: Bear's Shadow*	x			x			x	x	x				
Exploring Earth: Investigating Clouds	x	x	x	x			x		x			x	
Exploring Earth: Land Cover	x	x	x			x			x			x	x
Exploring Earth: Paper Mountains	x	x	x		x				x			x	x
Exploring Earth: Rising Sea		x	x	x		x			x			x	
Exploring Earth: Temperature Mapping	x	x				x		x	x			x	x
EXPLORING SCIENCE PRACTICES													
Exploring Science Practices: Early Explorations*	x	x					x		x				
Exploring Science Practices: Measure Up*	x	x					x		x				
EXPLORING THE SOLAR SYSTEM													
Exploring the Solar System: Asteroid Mining	x	x	x				x			x		x	
Exploring the Solar System: Big Sun, Small Moon	x	x		x				x	x				
Exploring the Solar System: Craters	x	x			x		x		x	x			x
Exploring the Solar System: Design, Build, Test		x	x				x					x	x
Exploring the Solar System: Hide and Seek Moon*	x	x	x		x	x			x			x	
Exploring the Solar System: Magnetic Fields	x	x			x			x	x	x			x
Exploring the Solar System: Mars Rovers		x	x		x					x		x	
Exploring the Solar System: Mission to Space New Game		x	x				x	x	x	x	x	x	
Exploring the Solar System: Moonquakes	x	x					x		x	x			x
Exploring the Solar System: Observe the Moon	x	x	x				x	x	x				
Exploring the Solar System: Observe the Sun	x	x	x			x		x	x				x
Exploring the Solar System: Pocket Solar System		x		x		x				x		x	
Exploring the Solar System: Solar Eclipse	x	x		x				x	x				
Exploring the Solar System: Stomp Rockets		x	x		x	x						x	x
Exploring the Solar System: Story Blocks*		x	x				x					x	
EXPLORING THE UNIVERSE													
Exploring the Universe: Exoplanet Transits	x	x			x					x	x	x	x
Exploring the Universe: Expanding Universe	x	x				x					x		x
Exploring the Universe: Filtered Light	x	x			x	x					x		x
Exploring the Universe: Ice Orbs	x	x		x						x			
Exploring the Universe: Imagining Life		x	x	x					x	x		x	
Exploring the Universe: Nebula Spin Art	x	x					x				x		x
Exploring the Universe: Objects in Motion	x	x			x				x	x	x		x
Exploring the Universe: Orbiting Objects	x	x		x			x	x		x	x		x
Exploring the Universe: Pack a Space Telescope		x			x						x	x	x
Exploring the Universe: Space Guess Quest Game		x				x	x			x	x		
Exploring the Universe: Star Formation	x	x					x				x		x
Exploring the Universe: Static Electricity	x	x				x			x	x			x
Sun, Earth, Universe Exhibition	x	x	x					x	x	x	x	x	x

** 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

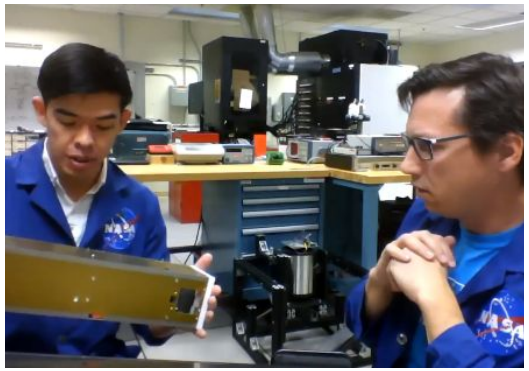
Strategies for addressing common misconceptions
nisenet.org/catalog/explore-science-earth-space-strategies-addressing-common-misconceptions-videos

Edu-Cathalon
nisenet.org/catalog/educathalon-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!

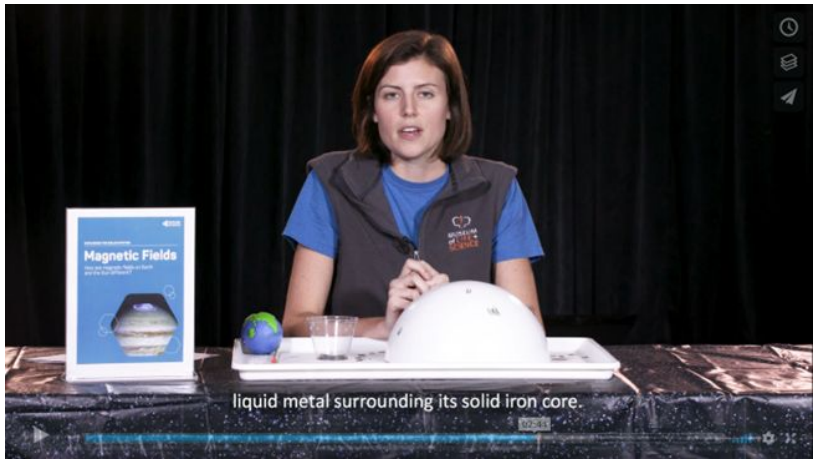


Science Behind Workshops

Using Your Toolkit to Present the Life Cycle of Stars
nisenet.org/catalog/online-workshop-recording-science-behind-2020-explore-science-earth-and-space-toolkit-using

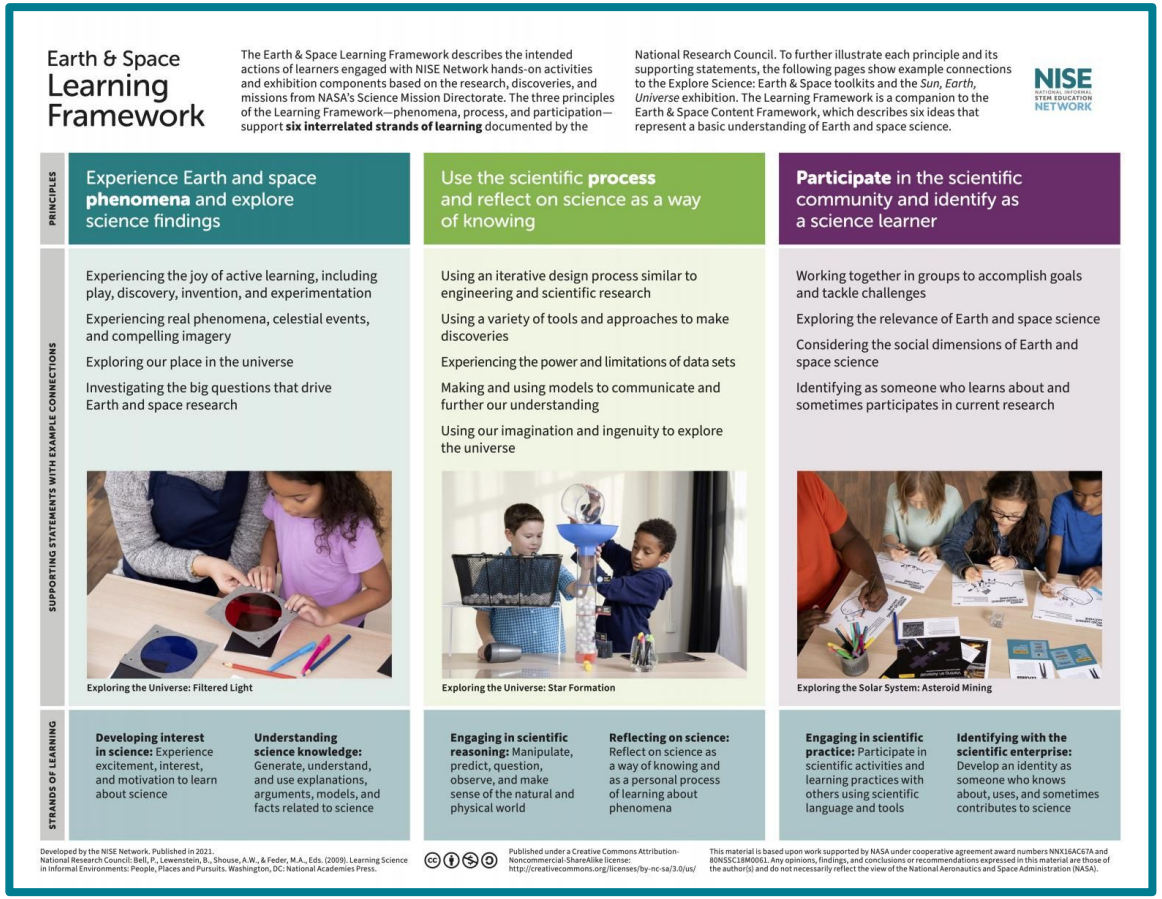
Virtual Tour of a NASA Mission Prototyping and Testing Lab
nisenet.org/events/online-workshop/online-workshop-science-behind-2020-explore-science-earth-and-space-toolkit

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 learners engaged with NISE Network hands-on activities and exhibition components based on the research, discoveries, and missions from NASA's Science Mission Directorate. The three principles of the Learning Framework—phenomena, process, and participation—support **six interrelated strands of learning** documented by the National Research Council. To further illustrate each principle and its supporting statements, the following pages show example connections to the Explore Science: Earth & Space toolkits and the *Sun, Earth, Universe* exhibition. The Learning Framework is a companion to the Earth & Space Content Framework, which describes six ideas that represent a basic understanding of Earth and space science.

NISE NETWORK

PRINCIPLES

Experience Earth and space **phenomena** and explore science findings	Use the scientific **process** and reflect on science as a way of knowing	**Participate** in the scientific community and identify as a science learner

SUPPORTING STATEMENTS WITH EXAMPLE CONNECTIONS

Experiencing the joy of active learning, including play, discovery, invention, and experimentation	Using an iterative design process similar to engineering and scientific research	Working together in groups to accomplish goals and tackle challenges
Experiencing real phenomena, celestial events, and compelling imagery	Using a variety of tools and approaches to make discoveries	Exploring the relevance of Earth and space science
Exploring our place in the universe	Experiencing the power and limitations of data sets	Considering the social dimensions of Earth and space science
Investigating the big questions that drive Earth and space research	Making and using models to communicate and further our understanding	Identifying as someone who learns about and sometimes participates in current research
	Using our imagination and ingenuity to explore the universe	

Exploring the Universe: Filtered Light

Exploring the Universe: Star Formation

Exploring the Solar System: Asteroid Mining

STRANDS OF LEARNING

Developing interest in science: Experience excitement, interest, and motivation to learn about science	**Engaging in scientific reasoning:** Manipulate, predict, question, observe, and make sense of the natural and physical world	**Engaging in scientific practice:** Participate in scientific activities and learning practices with others using scientific language and tools
Understanding science knowledge: Generate, understand, and use explanations, arguments, models, and facts related to science	**Reflecting on science:** Reflect on science as a way of knowing and as a personal process of learning about phenomena	**Identifying with the scientific enterprise:** Develop an identity as someone who knows about, uses, and sometimes contributes to science

Developed by the NISE Network. Published in 2021.
National Research Council: Bell, P., Lewenstein, B., Shouse, A.W., & Feder, M.A., Eds. (2009). Learning Science in Informal Environments: People, Places and Pursuits. Washington, DC: National Academies Press.

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Earth & Space Content Framework

The Earth & Space Content Framework presents six key science content ideas for informal educators engaging the public with research, discoveries, and missions from NASA's Science Mission Directorate. These six ideas 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: Earth & Space toolkits and the *Sun, Earth, Universe* exhibition. The Content Framework is a companion to the Earth & Space Learning Framework, which describes the kinds of learning experiences valued by the network when using Earth and space science content.

NISE NETWORK

The Sun powers Earth and our solar system.

Our nearest star emits a massive amount of energy across the electromagnetic spectrum and through a stream of charged particles.

Earth is a dynamic planet.

Interactions between air, water, rock, and life, including human activities, change our planet and its climate.

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.

The universe is very large, old, and mysterious.

Billions of galaxies, including countless stars, planets, and nebulas, fill a vast and expanding universe.

Our society chooses to explore Earth and space.

Our values influence how we ask questions, develop specialized tools and technology, and work together when exploring Earth and space.

Forces and energy connect everything in the universe.

Gravity, magnetism, and the energy transmitted by light shape all parts of the universe and help us learn more about Earth and space.

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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…

Change

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.

Exploring the Universe: Nebula Spin Art

Ice orbs

Rising sea

Paper mountains

Craters

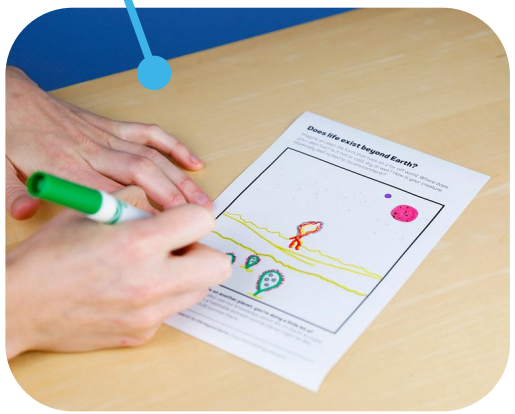
It is all about framing…

Life

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

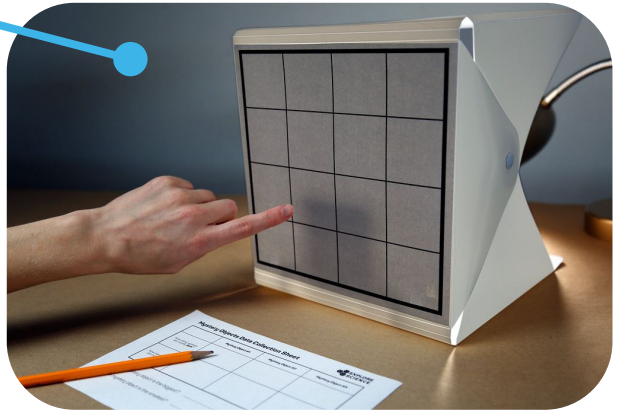
Exploring the variety of planets, moons, and smaller objects in and outside our solar system helps us to better understand life on Earth.

Pack a space telescope



Imagining life

Nebula spin art



Exoplanet transits

Explore Science: Earth & Space Toolkits

2017 9 hands-on activities

2018 10 hands-on activities

2019 11 hands-on activities

2020 15 hands-on activities

MOON ADVENTURE GAME | JUEGO AVENTURA EN LA LUNA

5 hands-on challenges*

nisenet.org/earthspacekit nisenet.org/moongame 👀

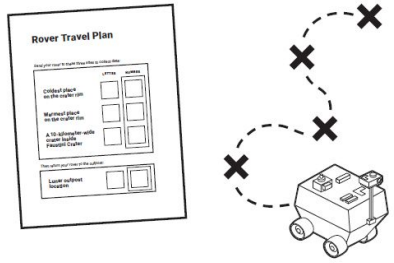
MOON ADVENTURE GAME | JUEGO AVENTURA EN LA LUNA

Living in an outpost on the Moon is dangerous!

Do you have the right stuff?

1 Make a travel plan for your rover

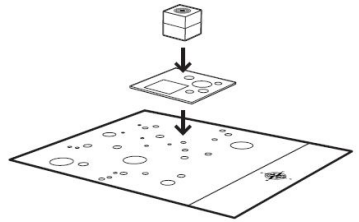
Identify the map coordinates for the locations you want to study at Faustini Crater.



☐ **Plan ready!**

2 Match rover data to locations on the map

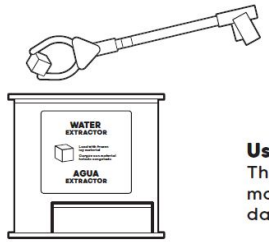
Unlock the rover's data bank to access the seismic data. Accurately position the data location overlays on the map. Then match the data blocks to reveal a message.



☐ **Message read!**

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.

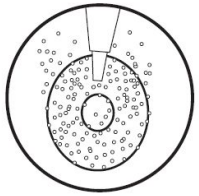


Use the grabbers
The frozen lunar material is dangerously cold!

☐ **Water extracted!**

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.



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

☐ **Oxygen observed!**

5 Reconnect the power supply

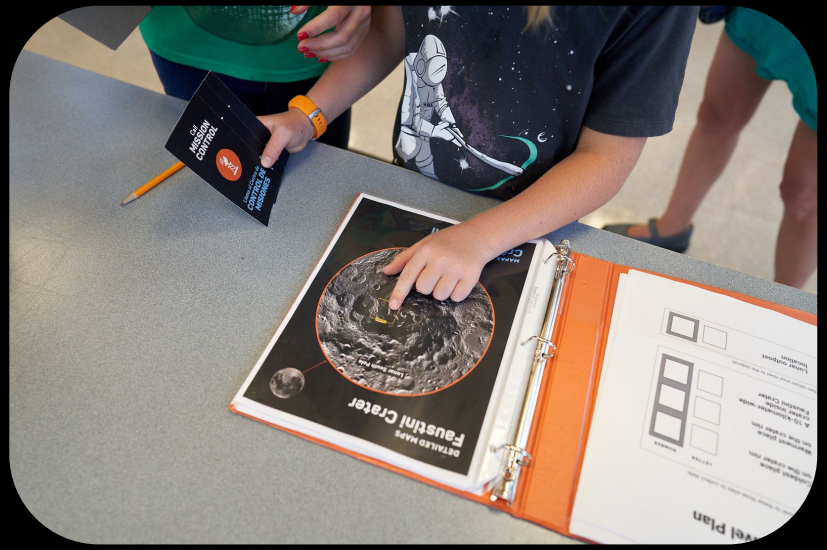
Use conductive materials to repair the circuit and restore power to the damaged outpost.

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

☐ **Power restored!**

nisenet.org/moongame

MOON ADVENTURE GAME | JUEGO AVENTURA EN LA LUNA



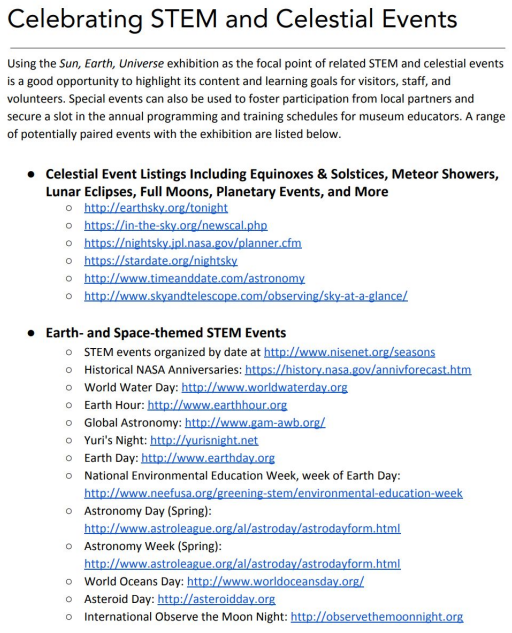
nisenet.org/moongame

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

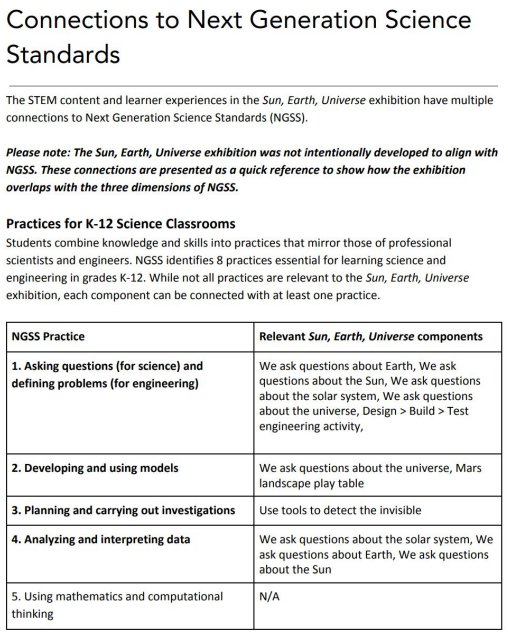
Using the *Sun, Earth, Universe* exhibition as the focal point of related STEM and celestial events is a good opportunity to highlight its content and learning goals for visitors, staff, and volunteers. Special events can also be used to foster participation from local partners and secure a slot in the 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 Eclipses, Full Moons, Planetary Events, and More**
  - 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-themed STEM Events**
  - STEM events organized by date at http://www.nisenet.org/seasons
  - Historical NASA Anniversaries: https://history.nasa.gov/annivforecast.htm
  - World Water Day: http://www.worldwaterday.org
  - Earth Hour: http://www.earthhour.org
  - Global Astronomy: http://www.gam-awb.org/
  - Yuri's Night: http://yurisnight.net
  - Earth Day: http://www.earthday.org
  - National Environmental Education Week, week of Earth Day: http://www.neefusa.org/greening-stem/environmental-education-week
  - Astronomy Day (Spring): http://www.astroleague.org/al/astroday/astrodayform.html
  - Astronomy Week (Spring): http://www.astroleague.org/al/astroday/astrodayform.html
  - World Oceans Day: http://www.worldoceansday.org/
  - Asteroid Day: http://asteroidday.org
  - International Observe the Moon Night: http://observethemoonnight.org

Museum educator guide

Promotional and marketing materials



Connections to Next Generation Science Standards

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

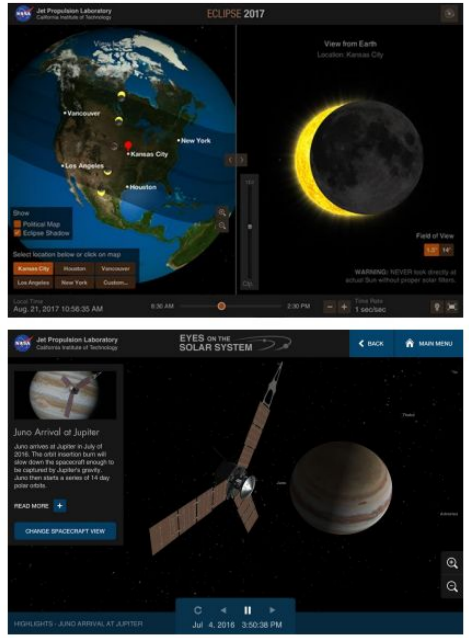
Please note: The Sun, Earth, Universe exhibition was not intentionally developed to align with NGSS. These connections are presented as a quick reference to show how the exhibition overlaps with the three dimensions of NGSS.

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* exhibition, each component can be connected with at least one practice.

NGSS Practice	Relevant *Sun, Earth, Universe* components
1. Asking questions (for science) and defining problems (for engineering)	We ask questions about Earth, We ask questions about the Sun, We ask questions about the solar system, We ask questions about the universe, Design > Build > Test engineering activity,
2. Developing and using models	We ask questions about the universe, Mars landscape play table
3. Planning and carrying out investigations	Use tools to detect the invisible
4. Analyzing and interpreting data	We ask questions about the solar system, We ask questions about Earth, We ask questions about the Sun
5. Using mathematics and computational thinking	N/A

K-12 Teacher Field Trip Guide

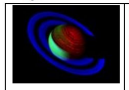


Exhibition Expansion Ideas

My Museum doesn’t have Sun, Earth, Universe

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

We ask questions about the solar system - Interior panel

Image	Credit	Permission	Source
	NASA Jet Propulsion Laboratory/University of Arizona	Subject to NASA Media Usage Guidelines https://www.nasa.gov/multimedia/guidelines/index.html	https://photojournal.jpl.nasa.gov/catalog/PIA09212
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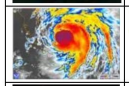
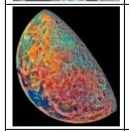
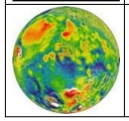
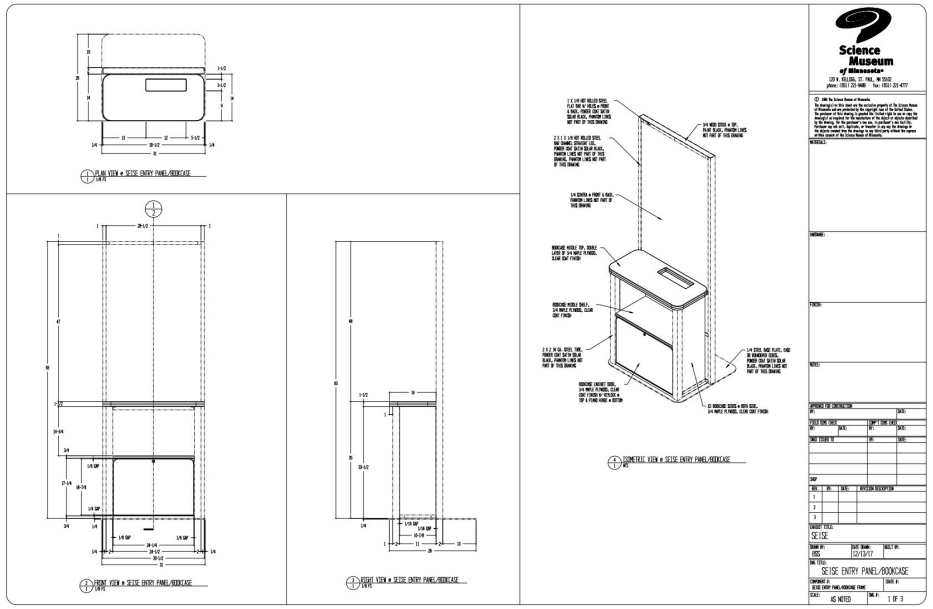
	NOAA / public domain	Public domain http://www.photolib.noaa.gov/about.html	https://www.ncdc.noaa.gov/wct/mediarss/index.php
	NASA Jet Propulsion Laboratory	Subject to NASA Media Usage Guidelines https://www.nasa.gov/multimedia/guidelines/index.html	https://photojournal.jpl.nasa.gov/catalog/PIA00131
	MIT/UMBC-CRESST/ NASA Goddard Space Flight Center	Subject to NASA Media Usage Guidelines https://www.nasa.gov/multimedia/guidelines/index.html	https://www.nasa.gov/feature/goddard/2016/mars-gravity-map

Signage and Graphics



Technical Drawings

Just one more PD resource!

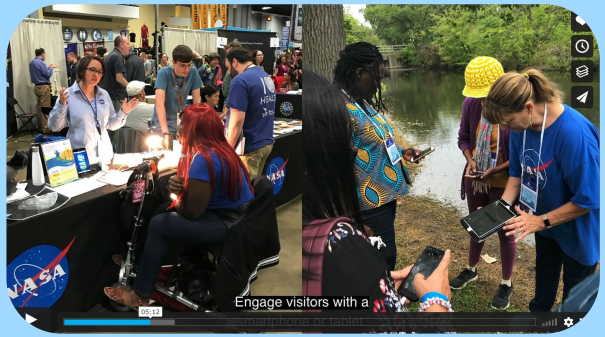
Earth & Space Project-Based Professional Learning Community Resources

- 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

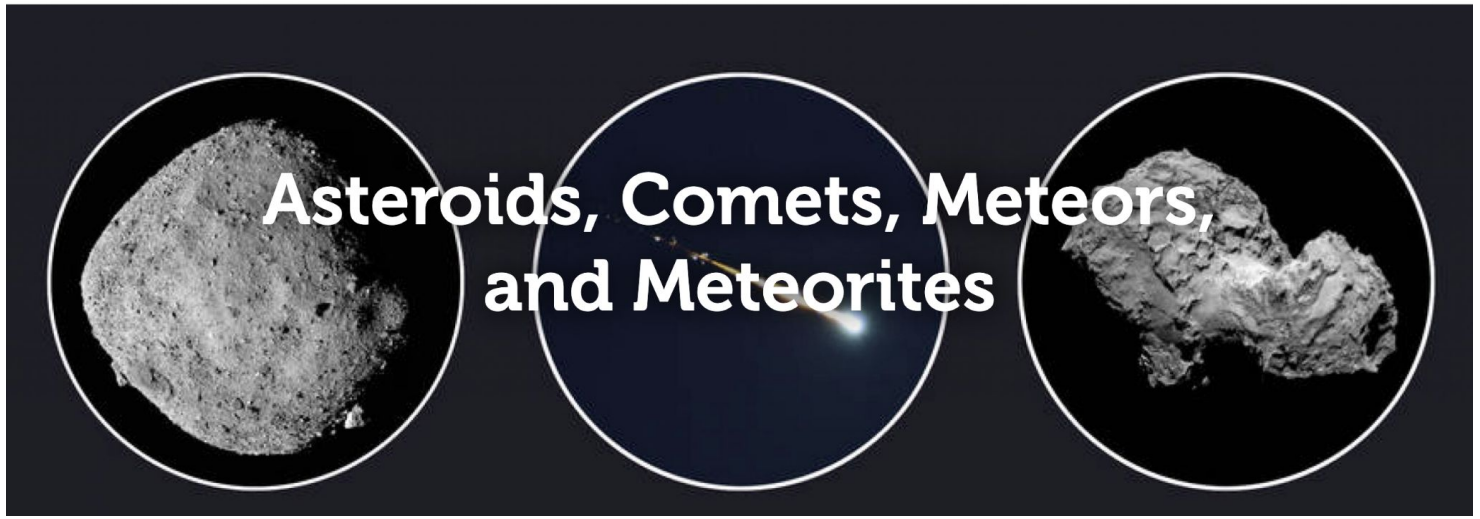


Resource reminder: nisenet.org topic pages

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

Q & A

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

Learn more at nisenet.org/events

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Thank You









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