National Aeronautics and Space Administration

Federal STEM Resources for You and Your Students

NCTM Annual Meeting

Cindy Hasselbring, NASA

October 26, 2023

NASA STEM

Video Links from Presentation

- Opening NASA video https://www.youtube.com/watch?v=WeA7edXsU40
- 2017 solar eclipse map explanation https://svs.gsfc.nasa.gov/12412/
- NASA Next Gen STEM video https://youtu.be/tQkqa0FWydE
- NASA Educator Professional Development video https://www.youtube.com/watch?v=nUAUU19jY-0
- NASA SPARX video https://www.youtube.com/watch?v=gzBtU5ak9Z4

Cindy Hasselbring

NASA STEM

Integration Manager
Office of STEM Engagement
NASA Goddard Space Flight Center, Greenbelt, MD

Former roles:

- *Mathematics teacher*, Milan High School (MI)
- *Albert Einstein Distinguished Educator Fellow* @National Science Foundation
- *Special Assistant to the State Superintendent*, Maryland State Dept. of Education
- *Sr. Director*, High School Aviation Initiative, Aircraft Owners and Pilots Association
- *Assistant Director and Sr. Policy Advisor*, White House Office of Science and Technology Policy

Two Major Upcoming Eclipse Events

“Math Magic” in Map Making at NASA


August 21, 2017
10:16:19 a.m. PDT
Center
44°51'44"N, 124°33'56"W, 0m
Duration
1m 58.2s
Sun Alt, Az
38.7°, 115.1°
Moon L, B, C
5.28°, -0.16°, 21.87°
Moon Distance
367907.0 km
Seaside
Kalama
Trout Lake
Touchet
Vernonia
St. Helens
Battle Ground
Klickitat
Goldendale
Boardman
Hermiston
Athena
Bayside Gardens
Carson
Centerville
Hood River
Arlington
Pendleton
Rockaway Beach
Vancouver
Odell
The Dalles
Wasco
Bay City
Portland
Parkdale
Pilot Rock
Tillamook
Gaston
Dufur
Moro
Ione
Lexington
Heppner
Oregon City
Mount Hood Village
Grass Valley
Beaver
Pacific City
McMinnville
Pine Hollow
Condon
Neskowin
Maupin
Ukiah
Sheridan
Pine Grove
Mount Angel
Keizer
Fossil
Lincoln City
Dallas
Salem
Lincoln Beach
Monmouth
Spray
Monument
Depoe Bay
Warm Springs
Siletz
Mill City
Detroit
Jefferson
Long Creek
Newport
Madras
Corvallis
Mitchell
Culver
Shedd
Dayville
John Day
Waldport
Camp Sherman
Alsea
Sweet Home
Black Butte Ranch
Yachats
Sisters
Redmond
Junction City
Seneca
Coburg
Tumalo
Eugene
Bend
Florence
Deschutes River Woods
Dunes City
Creswell
OREGON
Three Rivers
Cottage Grove
Oakridge
Reedsport
La Pine
Drain
Elkton
Yoncalla
Lakeside
Burns
Crane
Coos Bay
Sutherlin

Answer the following…

On a scale of 1-5, how familiar are you with NASA STEM Engagement opportunities for educators?

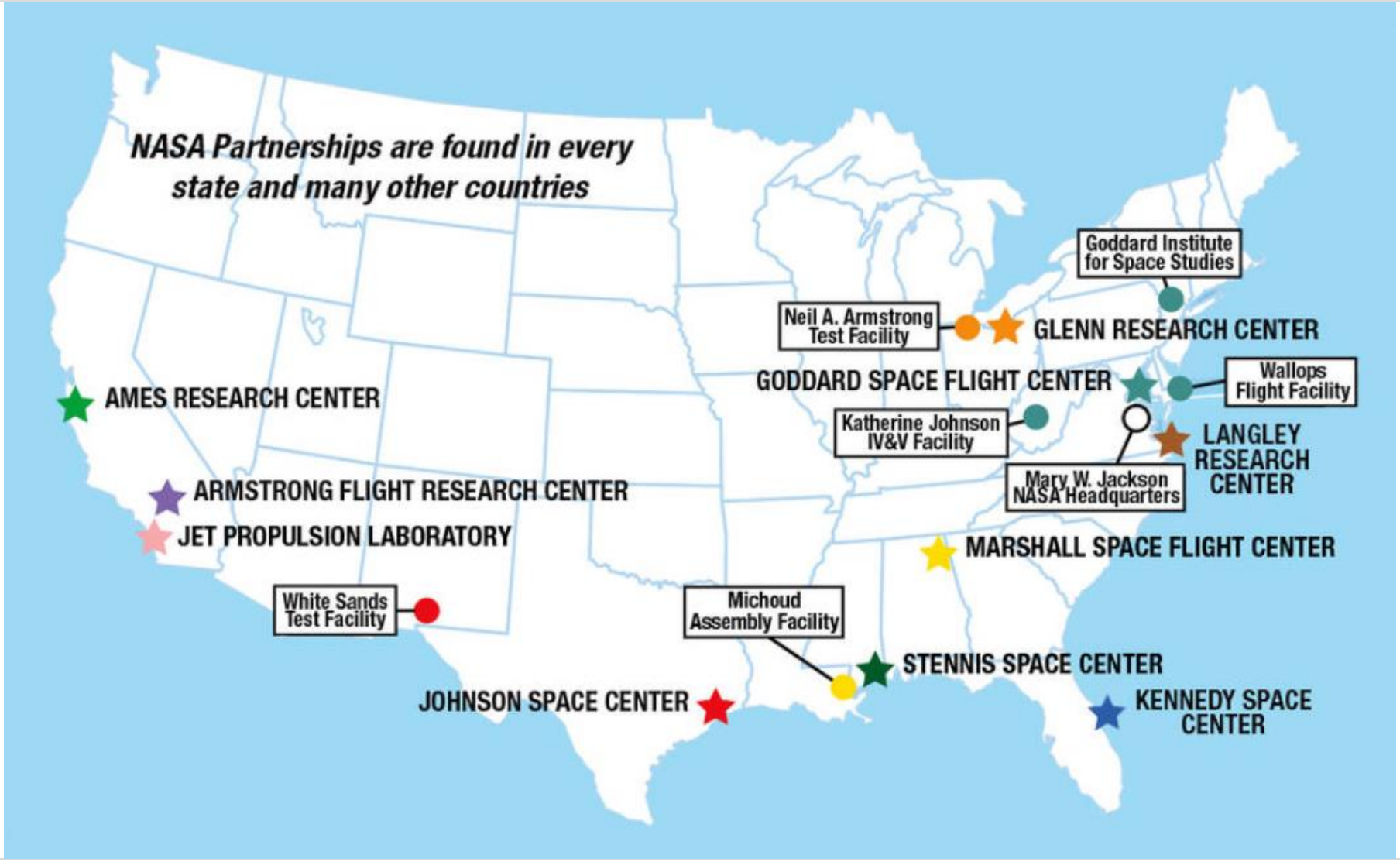
1 – Not at all familiar
3 – Somewhat familiar
5 – Extremely familiar

Agenda

NASA STEM Engagement

- Solar Eclipse Map
- Introduction to NASA and NASA STEM
- NASA's Next Gen STEM Project (K-12)
- NASA Resources for Educators
- NASA Resources: How to Stay Connected
- Student Opportunities
- Additional Federal STEM Resources

NASA Centers



NASA Mission Directorates

Aeronautics

For more than a century, NASA and its predecessor organization has been the global leader in aviation research.

Exploration Systems

The Exploration Systems Development Mission Directorate defines and manages systems development for programs critical to the NASA's Artemis program and planning for NASA's Moon to Mars exploration approach in an integrated manner.

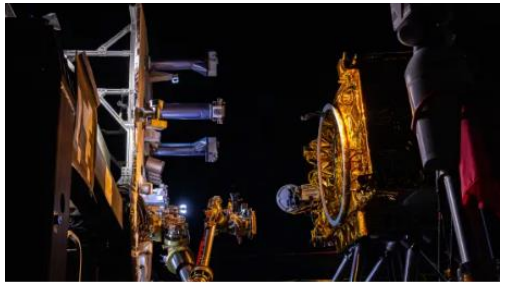
Science

The Science Mission Directorate is an organization where discoveries in one scientific discipline have a direct route to other areas of study. This flow is something extremely valuable and is rare in the scientific world.

Space Operations

NASA's Space Operations Mission Directorate is responsible for enabling sustained human exploration missions and operations in our solar system.

Space Technology



Technology drives exploration to the Moon, Mars, and beyond.

NASA STEM Engagement

VISION

We immerse students in NASA's work, enhance STEM literacy, and inspire the next generation to explore.

MISSION

We engage students in NASA's mission.

Strategic Goals

Create **unique opportunities** for a diverse set of students to contribute to NASA's work in exploration and discovery.

Build a **diverse future STEM workforce** by engaging students in authentic learning **experiences** with NASA's people, content, and facilities.

Attract diverse groups of students to STEM through learning opportunities that **spark interest** and **provide connections** to NASA's mission and work.

What is Next Gen STEM (NGS)?

Next Gen STEM,

NEXT GEN STEM

Moon – Lessons and activities to engage students in NASA's Artemis missions to the Moon, while inspiring them to become part of the Artemis Generation.

Solar System & Beyond – Engaging hands-on student activities and educator resources geared toward learning more about how NASA is uncovering new worlds, stars and cosmic mysteries near and far with a diverse set of space and ground-based missions.

Aeronaut-X – Activities focused on cutting-edge aeronautics content that will encourage our future aviation explorers to take a deep dive into the world of a new generation of flight.

Earth – Resources to help students learn about Earth and climate science missions, connect with the International Space Station and its crew, and learn new ways to contribute to NASA's Missions.

NASA STEM INSPIRE · ENGAGE · EDUCATE · EMPLOY
The Next Generation of Explorers

nasa.gov/stem/nextgenstem

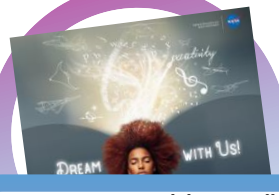
NASA Resources for Educators

New Content – FY23 Release

First Woman Camp Experience Guide

Artemis Camp Experience Guide

Advanced Air Mobility Toolkit

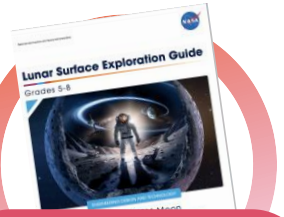


Dream With Us (in collaboration with ARMD)

Eclipse Toolkit

Artemis Generation Spacesuit Curriculum Guide

Earth Camp Guide



Lunar Surface Exploration Guide

Build, Launch, Recover Curriculum Guide

STEMonstrations:

Conservation of Mass

Space Art

Space Communication

Photosynthesis

Properties of Water

5E Lesson Plans

Solar System Scroll (12 total lessons)

Upcoming FY24 Releases:

-First Woman Camp Guide 2nd Edition
-AX Camp Guide
-NASA Exploration Experience

*FY23 Content Expert Review Panel Conducted

stem.nasa.gov

Educator Professional Development (EPD)

- Linking NASA K-12 content to NASA missions to spark student interest in STEM.
- Focus on cultural relevance, accessibility, and current pedagogy by utilizing active learning strategies and NASA activities, learning, and resources, etc.
- Strengthen educators' STEM content knowledge and STEM identity
- Focus on continuous improvement through ongoing collaboration and professional learning in NASA CONNECTS
- Open to all educators (STEM, pre-service, formal, informal)

Educator Professional Development Online Options

- **Webinars**
  Online sessions for teachers providing professional learning opportunities via an online platform.
  - NASA STEM 101 for Educators webinar – introduction to all things NASA Next Gen STEM (NGS).
  - Monthly webinars – Monthly webinars focused on one of the NGS mission focused areas.
  - Spanish language webinars – NGS mission focused area webinars presented in Spanish on a quarterly basis.
  - Requested webinars – NASA STEM requests submitted via hq-epd@nasa.gov.

Educator Professional Development In-Person Options

- **Workshops**
  Provides active learning such as a hands-on activity or engagement that can range from a few hours to multiple days.
- **Conferences**
  EPD proposes sessions or is requested to present on Next Gen STEM and mission-focused materials at targeted conferences.
- **Next Gen STEM 101 Workshop**
  A multi-day professional learning opportunity that is an immersive hands-on experience for educators.

All selections must go through the request process


NASA
NASA
SPARX
For Grades K-12

NASA SPARX

Next Gen STEM SPARX (Sparking Participation and Real-world eXperiences in STEM) offers an exciting opportunity for K-12 educators to provide students with hands-on, standards-aligned activities and live virtual connections with NASA scientists and engineers to help spark student interest in the endlessly fascinating world of STEM.

Students gain real-world experiences in STEM with NASA engineering design challenges

Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Storybook with engineering activities	Join the Artemis Generation	Graphic novel with engineering activities	NASA Technology Spinoff Challenge
5 modules	3 modules	5 modules	3 modules
5.5 hours of content	9 hours of content	12 hours of content	12 hours of content

SPARX registration is now open!

https://stemgateway.nasa.gov/public

Contact us with questions or to RSVP:

SPARX@mail.nasa.gov

NASA STEM INSPIRE - ENGAGE - EDUCATE - EMPLOY
The Next Generation of Explorers

stem.nasa.gov

In-Flight Downlinks

Connect your students with astronauts aboard the space station for live question-and-answer sessions about living and working in space.

Email jsc-downlinks@mail.nasa.gov for more information on hosting a downlink and how to apply.

Next Gen STEM

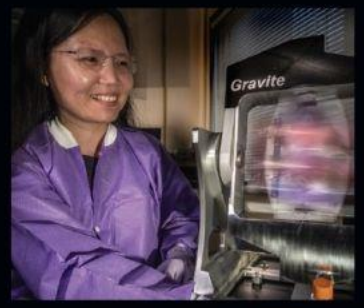
CAREER DAY

TODAY'S STUDENTS ARE THE FUTURE OF STEM – EVEN IF THEY DON'T KNOW IT JUST YET.

Thursday, Sept. 28th from 9:00 a.m. to 3:00 p.m. EDT

This virtual event is open to K-12 formal and informal education organizations. Scan the QR code for more information and to register your class in NASA STEM Gateway by Sept. 8th.

Reimagine the possibilities.
There is a place in space for everyone!



NASA Resources: How to Stay Connected

NASA CONNECTS Educator Community of Practice

NASA CONNECTS (Connecting Our NASA Network of Educators for Collaborating Together in STEM) is an online, professional learning community for educators to collaborate with each other and NASA.

- Join Discussions & Connect With Others
- Ask Questions & Get Answers
- Share & Discover New Best Practices
- Download Free STEM Products
- Learn About Upcoming Events
- See The Latest Opportunities
- Museum & Informal Education Alliance

NASA CONNECTS

Scan to Join CONNECTS!

Subscribe to NASA EXPRESS

nasa.gov/stem/express

Connect with us on social media!

Follow NASA STEM on social media

@NASASTEM

pinterest.com/nasa/nasa-stem/

@NASASTEM

NASA STEM

NASA STEM
INSPIRE · ENGAGE · EDUCATE · EMPLOY

Visit stem.nasa.gov

Student Opportunities

ARTEMIS STUDENT CHALLENGES

NASA is committed to landing the first woman and first person of color on the Moon using innovative technologies to explore more of the lunar surface than ever before! Discover the Artemis Student Challenges and explore how you can take part in one of NASA's mission-related challenges.

Student Launch

- Colleges, universities, high schools, and middle schools
- Research-based
- Provides research and development of rocket propulsion systems

HERC - Human Exploration Rover Challenge

- High school and college students worldwide
- Create a vehicle designed to traverse the simulated surface of another world

Micro-g NExT - Neutral Buoyancy Experiment Design Teams

- Undergraduate students
- Design, build, and test Addresses an authentic, space exploration challenge

First Nations Launch

- Native American college students
- Build and launch class K high-powered rockets
- Workshops teach concepts necessary for a successful launch

SUITS - Spacesuit User Interface Technologies for Students

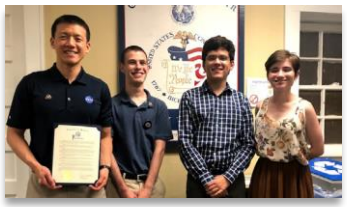
- Undergraduate and graduate teams
- Design and create spacesuit information displays within an augmented reality environment

Lunabotics

- University-level teams
- Design, build, and run autonomously operated robot, traverse the simulated off-world terrain, and excavate the simulated lunar regolith

Big Idea Challenge

- Student teams at Space Grant-affiliated colleges and universities
- Support the Space Technology Mission Directorate's work maturing high-impact technologies for a broad array of NASA missions



ADC - App Development Challenge

- Middle and high school students
- Coding-based challenge to solve technical problems provided by NASA as they relate to deep space exploration missions

To learn more about the Artemis Student Challenges visit stem.nasa.gov/artemis

NASA “Surprisingly STEM” Video Series

“NASA STEM” Channel

1. 

Surprisingly STEM: Space Tire Engineer

NASA STEM • 20K views • 3 months ago

2. 

Surprisingly STEM: Thermal Blanket Technician

NASA STEM • 12K views • 5 months ago

3. 

Surprisingly STEM: Wind Tunnel Engineers

NASA STEM • 41K views • 6 months ago

4. 

Surprisingly STEM: Dive Specialist

NASA STEM • 17K views • 6 months ago

NASA Internships Program – Intern Requirements

Spring, Summer, and Fall sessions offered

NASA offers paid internships across NASA facilities in fall, spring, and summer sessions. There is one application that is viewed agencywide.

Applicants for the intern internships must be:

- a full-time student (high school through graduate-level) or a part-time college-level student enrolled in a minimum of 6 semester hours.
  - Opportunities also available on the educator level.
- a U.S. Citizen with a 3.0 GPA minimum requirement.

Other Federal STEM Resources

What is PAEMST?

PAEMST | The Presidential Awards for Excellence in Mathematics and Science Teaching

- A White House Office of Science and Technology Policy (OSTP) award program administered by the National Science Foundation (NSF)
- Awards are given to science, technology, engineering, and/or mathematics (STEM) teachers from each of the U.S. states and jurisdictions
- PAEMST is the highest recognition a K-12 educator may receive for outstanding STEM teaching from the United States Government
- The award recognizes teachers with deep content knowledge of the subjects they teach and the ability to motivate and enable students to be successful in those areas

PAEMST HISTORY

- Enacted by Congress in 1983, this program authorizes the President a total of 110 awards each year
- Over 5,200 teachers have received the honor of a Presidential Award since its inception
- Many awardees have pursued leadership opportunities in their districts, states, and at the national level

What do awardees receive?

- A $10,000 award from NSF (used at the awardee's discretion)
- A certificate signed by the President of the United States
- An all-expenses paid trip for a recognition event, which may include:
  - an award ceremony;
  - professional development activities; and
  - discussions with policymakers on how to improve STEM education
- Awardees also join a cohort of over 5,200 award-winning teachers

"This award encourages me to continue guiding my students to explore their curiosities, use innovative thinking, and collaborate on both a national and global level to resolve global STEM issues."

Tiffany Pace
2020 Science Awardee
(West Virginia)

Receiving PAEMST can open doors

"PAEMST elevated my voice and impact to 'be the change' in education. Looking back nearly 20 years since my award, **PAEMST was the spark that has cultivated my confidence, servant leadership, and it created a platform** for me to inform and elevate the positive impacts of STEM around the world."

- JEFFREY REMINGTON, 2002 Awardee

"**The world opened to me when I received this award**. I grew through my contact with other teachers and colleagues across the United States. I was able to positively influence other teachers and educators… The opportunity to engage in more professional development was opened up to me as well."

- MARILYN PREDDY, 1996 Awardee

"Through this award, I discovered a new world of STEM education leadership. I served on a state teacher leader committee and participated on a round table with my governor. Additionally, this award encouraged me to serve other educators by sharing resources, provide professional development, and gave me a wonderful network of new STEM colleagues and friends. It has greatly enriched my life."

- CINDY HASSELBRING, 2005 Awardee

PAEMST awardees receive opportunities for professional development and leadership.

Here are some examples of what our awardees are up to:

- STEM Advocacy at the White House
- Albert Einstein Distinguished Educator Fellowships
- International teaching opportunities
- Textbook and journal authors
- Providing high-quality teaching in the classroom!

Learn more at

www.paemst.nsf.gov

Smithsonian: Resources for Kids

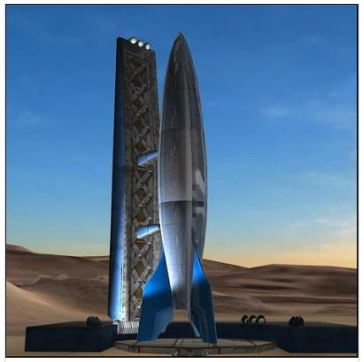
si.edu/kids

Q?rioso

Diviértete aprendiendo sobre la naturaleza con este juego de cartas.

Reach Across the Stars

Meet your female space science heroes (virtually) on a free augmented reality (AR) app that can be used on most AR-compatible devices.



Rocket Lab

With the Smithsonian's National Air and Space Museum's Rocket Lab, your job is to design a series of rockets and attempt suborbital, orbital, and escape velocity missions.

Showbiz Safari

Lights! Camera! Action! Our movie director needs your help! Help Walrus pick actors!

Shutterbugs: Wiggle and Stomp

Visiting rare animals at the National Zoo with this online game.

Skin & Bones

See skeletons in a new way with 3-D graphics, games, video, and more!

Smithsonian Megalodon

Explore a world under the sea. (*Explora un mundo bajo el mar.)*

Sugar Simulation

See what happens to particles when sugar dissolves in water and water evaporates.

MicroObservatory Robotic Telescope Network

Explore the universe with telescopes you control over the internet, provided by the Smithsonian Astrophysical Observatory.

Migratory Bird Center Games and Activities

Learn about bird migration, name that nest, online coloring book.

si.edu/educators

Smithsonian Learning Lab

Smithsonian Science Education Center

Smithsonian 3D

Free printable 3D datasets of iconic Smithsonian objects. Online viewing for classroom use.

Air and Space Museum

Information on educational activities as well as resources provided for classroom learning.

National Zoo

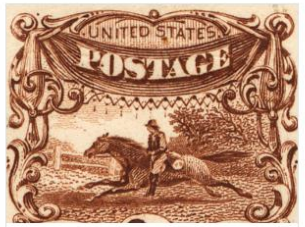
Educational programming for people of all ages. Undergraduate, graduate, and professional training are offered through the Smithsonian-Mason School of Conservation.

Natural History Museum

Teaching resources on topics in natural history from science to social studies.

Portrait Gallery

No matter what subject you teach—social studies, English, or visual arts—be inspired to use portraiture in your classroom.



Postal Museum

Curriculum guides offer standards-based lesson plans and materials to aid in the exploration of museum themes and skills.

Smithsonian Asian Pacific American Center

Resources for including Asian Pacific American narratives in the classroom.

Smithsonian Astrophysical Observatory

Participatory micro-observatory, science education research, professional development.

Smithsonian Early Enrichment Center

A model early childhood program that places children at the center of every experience.

Smithsonian Environmental Research Center

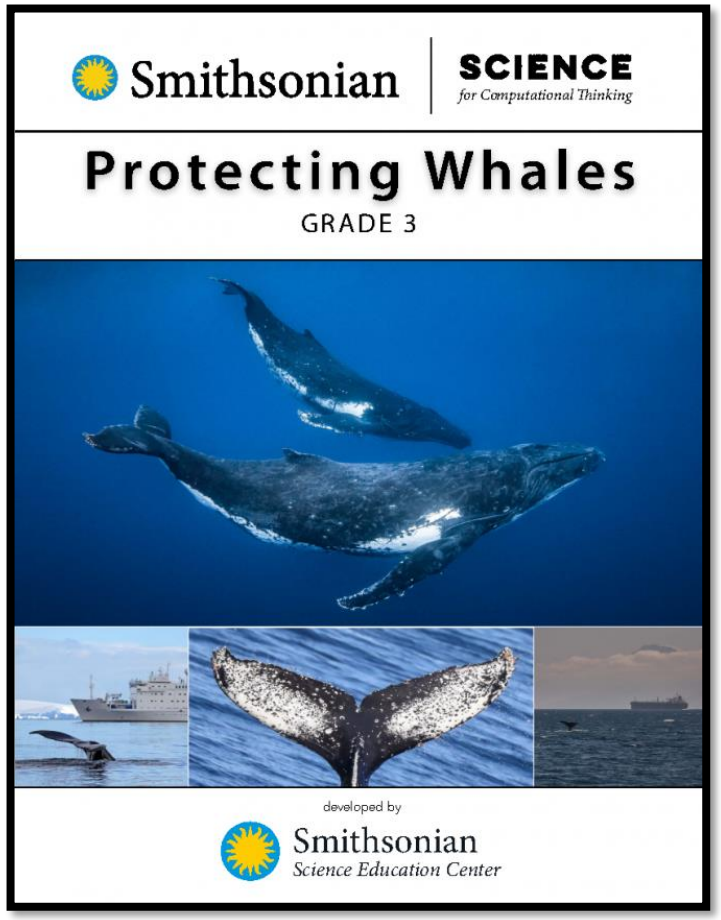
Hands-on and inquiry-based learning for grades K-12 and teacher professional development.

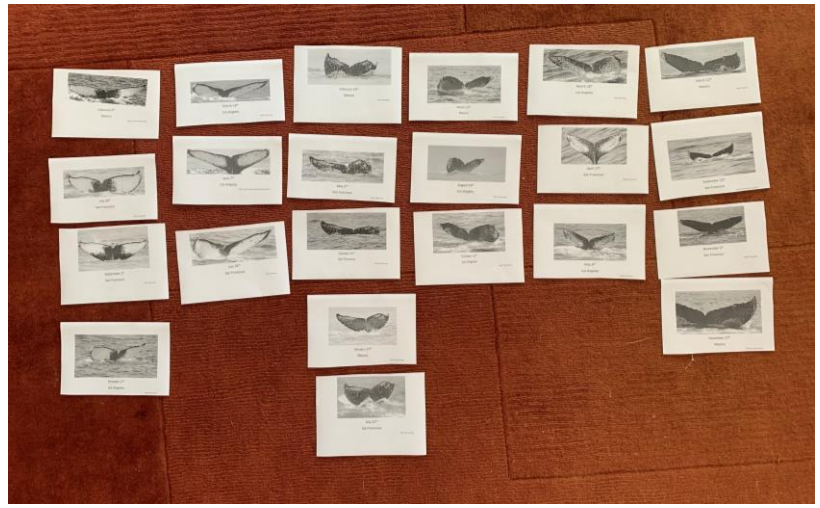
Smithsonian Center for Folklife and Cultural Heritage

Guides for oral history interviewing techniques and project ideas, video and photos from the Folklife Festivals, and more.

Smithsonian | SCIENCE for Computational Thinking

Department of Defense DoDSTEM
Science · Technology · Engineering · Mathematics





High-touch to high-tech

https://ssec.si.edu/computational-thinking

Transdisciplinary: Integrates STEM + CT + Literacy

What is NOAA?

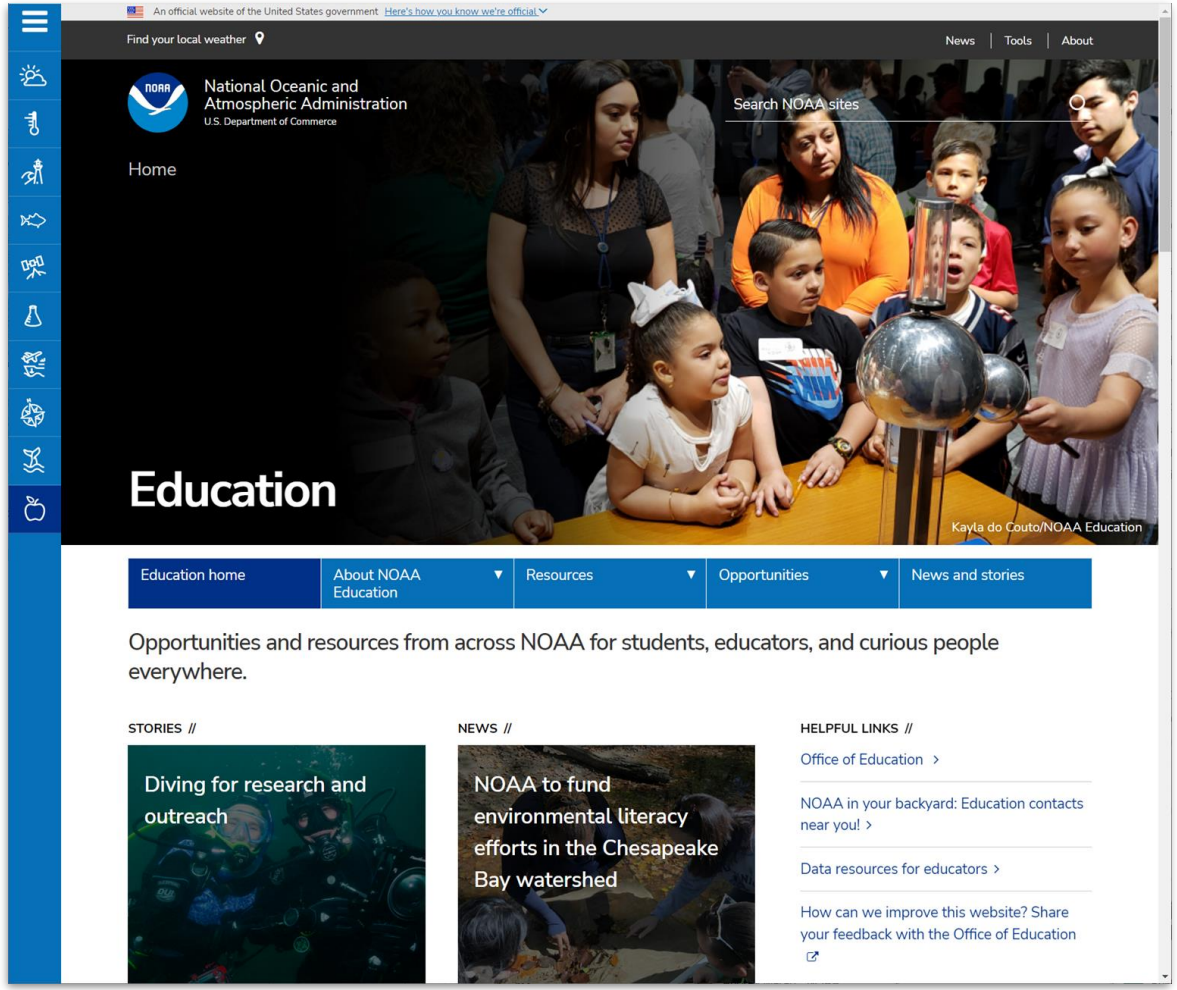
National Oceanic and Atmospheric Administration (NOAA)

Mission: **Science, Service, Stewardship**

Focus areas:

- Protects life & property from weather
- Protecting fisheries & marine life
- Studying and exploring the planet
- Collecting & sharing Earth science data
- Modeling climate data
- Mapping our waters
- Conserving natural resources
- Protecting the ocean, the Great Lakes, and our coasts

NOAA education portal: noaa.gov/education



Opportunities and resources from across NOAA for students, educators, and curious people everywhere.

Online Invention Education Hub

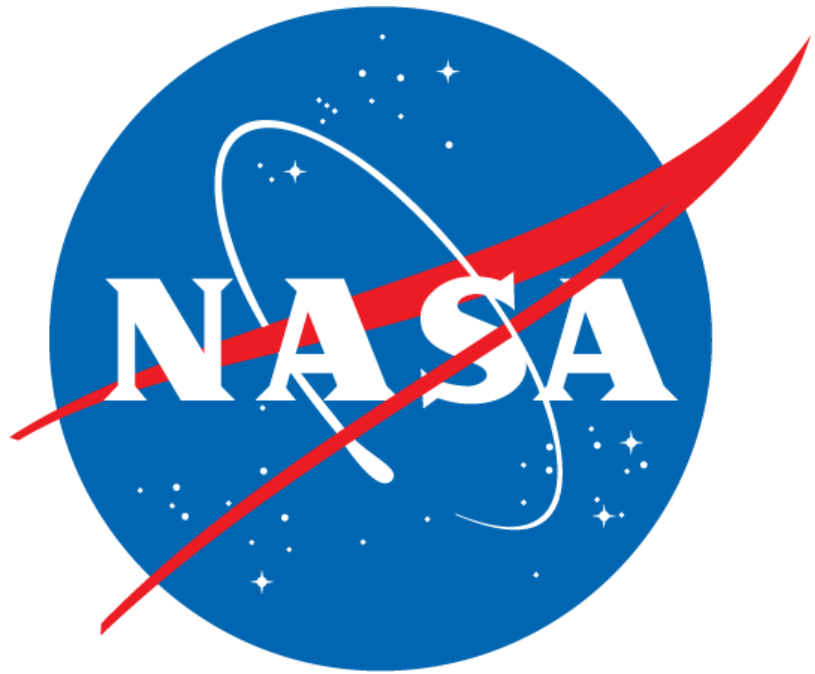
Thank you for attending this session!

Contact Information

Cindy Hasselbring
Cindy.L.Hasselbring@nasa.gov

Join CONNECTS!

NASA CONNECTS


NASA