National Aeronautics and Space Administration

2024 | NASA SCIENCE ACTIVATION

IMPACT REPORT

https://science.nasa.gov/learn/

Image Credits

Front and back cover:
- Map shows the locations of SciAct projects and some of the interactions.

Front cover photos:
- *Photo top left:* NESEC
- *Photo top right:* LENE
- *Photo bottom right:* NASA HEAT

Back cover photo:
- *Photo top left:* NESEC
- *Photo top right:* LENE
- *Photo bottom right:* Arctic SIGNS

* *See pages 12–13 to learn more about each Science Activation Team.*

DASHBOARD

WE COLLABORATE
48
TEAMS
We are a cooperative network of competitively selected teams across the nation connecting communities with NASA science experts and experiences to activate minds and together expand what we know about our world and the universe.

WE LEVERAGE
1,102
PARTNERS
We extend our reach through strategic partnerships with community- and topically focused organizations to support local, state, and institutional efforts. These partnerships quadrupled since 2016.

SCoPE

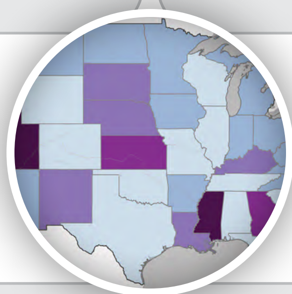
WE CONNECT
1,014
SCIENTISTS INVOLVED
NASA scientists work with Science Activation both behind the scenes and directly with learners to share the story and adventure of NASA science results. The number of scientists involved has doubled since 2016.

N3

WE INNOVATE
144
PAPERS PUBLISHED
Science Activation teams use evidence-based solutions to reach and motivate learners of all ages, publishing those innovative solutions for the benefit of all. Our work has been cited more than 1,450 times to date.

GROWING BEYOND EARTH

WE ENGAGE
119 M
INTERACTIONS WITH PEOPLE
In 2024, SciAct teams facilitated more than 119 million interactions with people across the globe, 97% of which occurred in the United States. This represents a total 57% increase over 2023.



WE REACH
55
STATES & TERRITORIES
In 2024, the SciAct program reached learners in all U.S. states; Washington, DC; and four U.S. territories, as well as more than 170 countries around the world.

WE EMPOWER
100%
OF AUDIENCES
SciAct projects work together to ensure that people of all ages and backgrounds are empowered to discover and participate in the wonder of NASA science.

INTRODUCTION

In 2016, NASA launched the Science Activation Program (SciAct) to inspire people of all ages and backgrounds to actively participate in science through projects developed by a collaborative network of project teams drawing on NASA Science Mission Directorate assets (science content, experts, data, etc.).

SciAct is a rigorous, scientifically driven, nationwide program to connect learners of all ages with NASA science effectively and efficiently.

This report summarizes the SciAct program's approach to date, provides a snapshot of the program's 2024 impacts, and illustrates how this program creates impact and value that far exceed its annual expenditures. It improves coordination across NASA Science activities and allows for the increasingly efficient, effective, and sustainable use of SMD Science discoveries and experts for engaging learners.

In 2024, SciAct was selected to receive the American Geophysical Union (AGU) 2024 Excellence in Earth and Space Science Education Award. This prestigious annual award, established in 1995, honored SciAct for demonstrating a sustained commitment to broad, positive impacts on Earth and space science education at education levels from kindergarten through lifelong learning.

CONTENTS

THE SCIENCE ACTIVATION PROGRAM

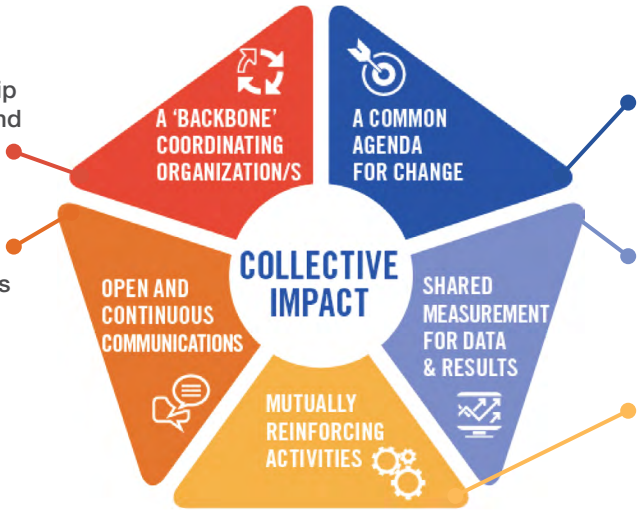
We Collaborate
A Collective Impact Approach

The hallmark of SciAct is its collaborative approach, inspired by the Collective Impact Framework developed by Kania and Kramer (2011).* SciAct has developed and consistently implements intentional activities that build and nurture the trusted relationships necessary for this approach. The illustration below models the Collective Impact Approach and its five key pillars. The surrounding text boxes provide examples of how SciAct addresses and supports each pillar.

Interventions Supporting Collective Impact*

- NASA Science Leadership
- Principal Investigators and Team Leads
- Science Division Leads
- Educator Fellow

- Annual/Monthly Meetings
- Collaboration Support (Chat)
- Shared Folders
- SMD Learners Website
- Digital Communications



- Vision Statement
- Top-Level Outcomes
- Mid-Level Objectives

- Independent Evaluators
- Collective Impact
- Common Tools
- Data Dashboard

- Cross-Collaborations (internal)
- Leveraged External Partnerships
- Action and Affinity Groups

*Kania J., Kramer M. (2011) Collective impact. *Stanford Social Innovation Review* 9(4): 36–41. Retrieved from ***https://ssir.org/articles/entry/collective_impact***.

NASA VALUES
2022 NASA Strategic Plan

- Safety
- Integrity
- Inclusion
- Teamwork
- Excellence

GROUP NORMS

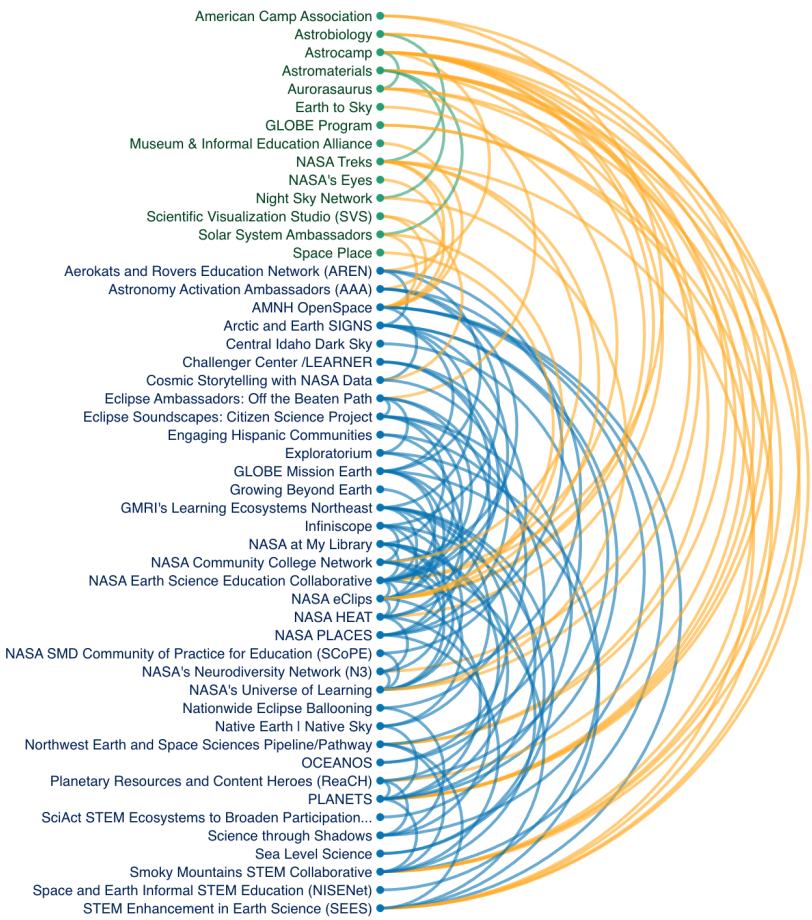
- **Mutual Respect**—*We respect each other and value each other's perspective*
- **Reciprocity**—*We take care of ourselves so we can also care for others*
- **Openness**—*We listen first and assume positive intent from others*
- **Accountability**—*We take full responsibility for our words/actions*
- **Humility**—*We own our limitations of perspective and seek others' viewpoints*
- **Kindness**—*We are kind to each other, even when we disagree*
- **Collaboration** —*We work together to achieve common goals and objectives*

VALUE-BASED DECISION MAKING

SciAct models value-based decision making. This has been critical to success in adapting to community needs during the annular and total solar eclipses, as well as other events.

Project teams, made up of community-based learning providers, educators, and experts, along with teams based in the science communities at NASA Centers, uphold a shared set of NASA values and SciAct group norms as they work together to connect diverse learners of all ages with NASA Science experts, exciting NASA content, and authentic science experiences. Through values-based decision making, relationship and community building, intentional and independent evaluation, efficient coordination of mutually reinforcing activities, and open and continuous communication, SciAct helps create multiple pathways to science, technology, engineering, and mathematics (STEM) careers and a more STEM-informed public.

With support from the small NASA "backbone" team at NASA Headquarters, SciAct project teams formally cross-collaborate to eliminate duplication of effort, promote efficiency, and optimally leverage their collective expertise, as illustrated in the diagram on the right. In 2024, the teams engaged in a total of 116 formal cross-collaborations. As one measure of the importance of relationship building over time, teams that have been involved in SciAct since 2016 entered into twice as many (7) such agreements on average compared to teams that joined in 2020 or 2021 (3.5 on average). Teams also collaborate with each other informally in countless ways that lead to more effective engagement with learners and more extensive reach for the program.



*NASA SciAct supports dynamic and deep collaborations among and across competitively selected SciAct project teams (shown in **blue** text) and NASA-based activities (shown in **green** text).*

Joining Forces!

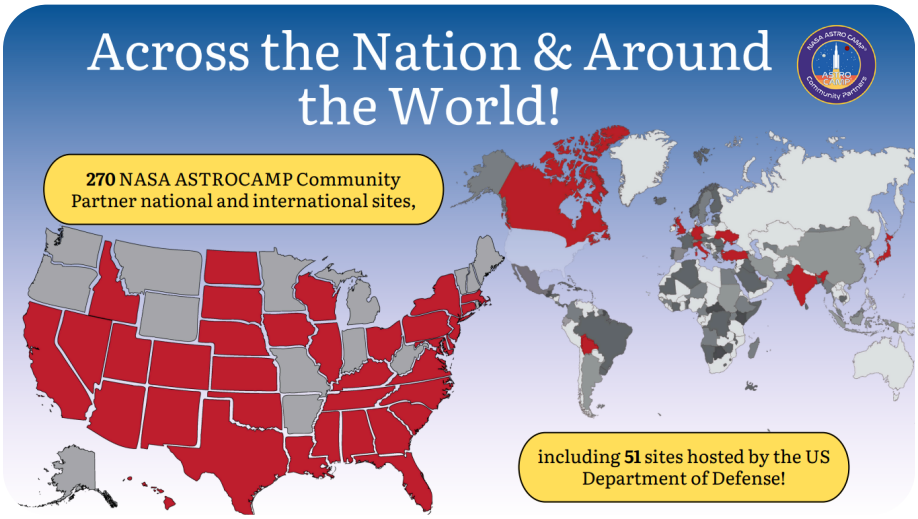
This year, for the second time, the NASA Citizen Science community met concurrently with the Science Activation Program during their annual program review, with the intent of fostering collaboration. The invitation to participate in NASA research that citizen science projects offer to anyone is a rich NASA asset ready to be leveraged by SciAct teams. SciAct teams' expertise in constructing engaging learning experiences around science investigations is of enormous interest to many citizen science teams, who tend to be scientific subject matter experts. Both SciAct and NASA Citizen Science look forward to ongoing collaboration in the future.

We Leverage
1,102 Partners

SciAct achieves its impressive reach and engagement goals through the internal collaborations described above, as well as through strategic partnerships with community-based and audience-based organizations outside the SciAct program that support existing institutional, regional, state, and local efforts. Leveraging partnerships and collaborating externally amplifies SciAct's reach and impact for learners across the nation. Each awardee selects and develops those relationships that help them best achieve their objectives and meet the needs of their audiences.

An emerging relationship between a SciAct project, NASA Earth Science Education Collaborative (NESEC), and Civil Air Patrol (CAP) blossomed after the 2023 annular solar eclipse. On April 8, 2024, approximately 4,000 CAP members nationwide worked together in teams to collect air temperature, clouds, wind speed/direction, and precipitation data in all 50 states, the District of Columbia, Puerto Rico, and two Canadian provinces; this partnership is represented by a single dot, in Utah, in the map on the next page. This made the total solar eclipse the largest one-day mission in CAP history. Participants ranged in age from 12 to 93. As a result of the CAP Solar Eclipse Classroom, a related effort, just over 41,500 K–12 students (and 600 educators) also contributed observations in support of solar eclipse research using the Global Learning & Observations to Benefit the Environment (GLOBE) Observer app.

SciAct has also systematically expanded program reach in 2024 by forging innovative program-level partnerships. In particular, an effort to support U.S. military members and their families with SciAct resources and teams is now underway. The Office of Military Family and Community Policy (MCF&P) and NASA SMD are piloting a partnership that connects military service members, veterans, and military dependents all over the world with NASA science resources, some of which are now featured on the MCF&P website. Jack and Jill of America is another new partnership that creates crosscutting access points for untapped populations with varied science interests, significantly amplifying SciAct's impact across previously unreached communities.

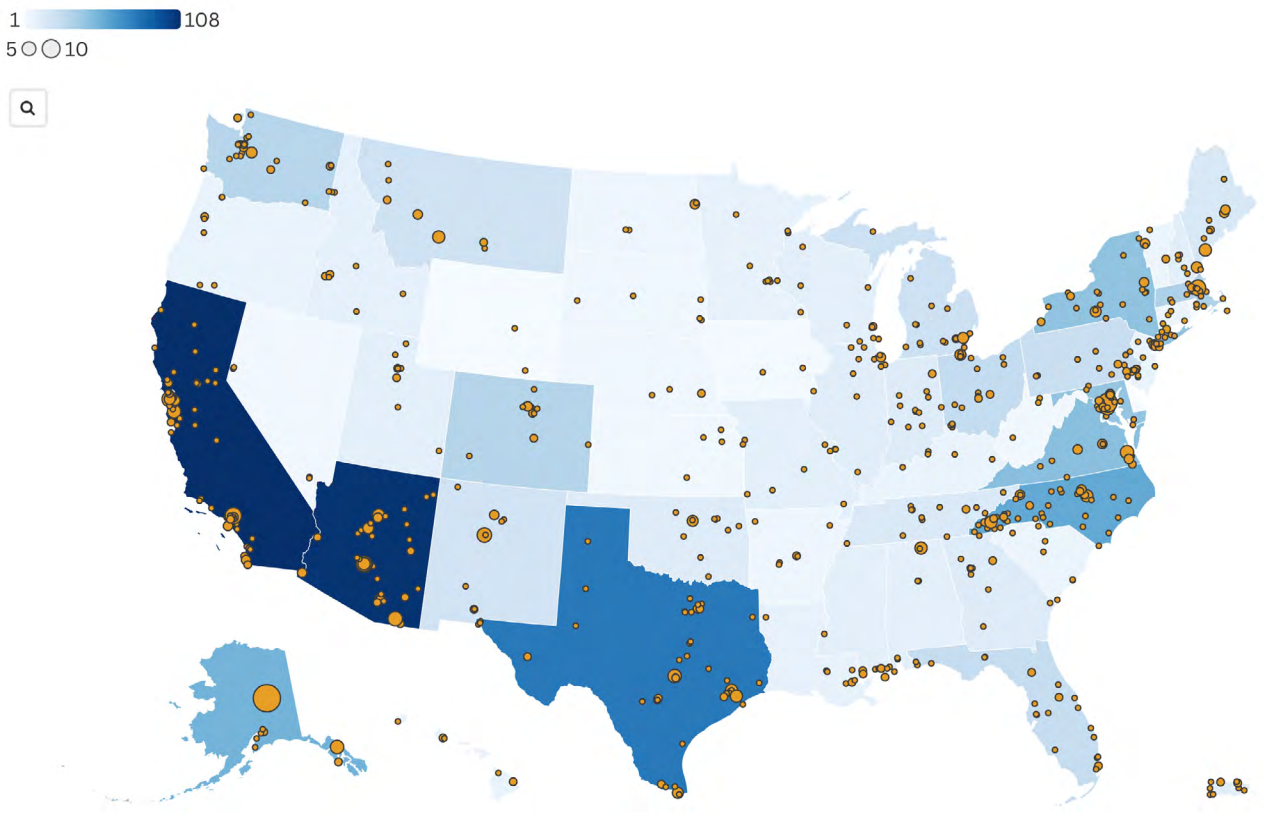


A new connection was made in 2024 between interested Department of Defense sites and a SciAct team that works with after-school/out-of-school audiences. So far, Astrocamp has trained 167 DOD facilitators from 51 sites to effectively incorporate NASA science content into their existing activities with military families around the world.

We Leverage (cont.)

1,102 Partners

Since the beginning of the SciAct program in 2016, its partnerships have increased by almost a factor of 5, with over 1,100 active external partners in 2024. A substantial portion of this increase resulted from one SciAct team's maturing relationships with a network of science centers. The map below shows the locations (dots) and total number (shading) of SciAct partners across the United States. Larger dots mean more than one partner in the same ZIP code. There was at least one SciAct partner in every state in 2024.

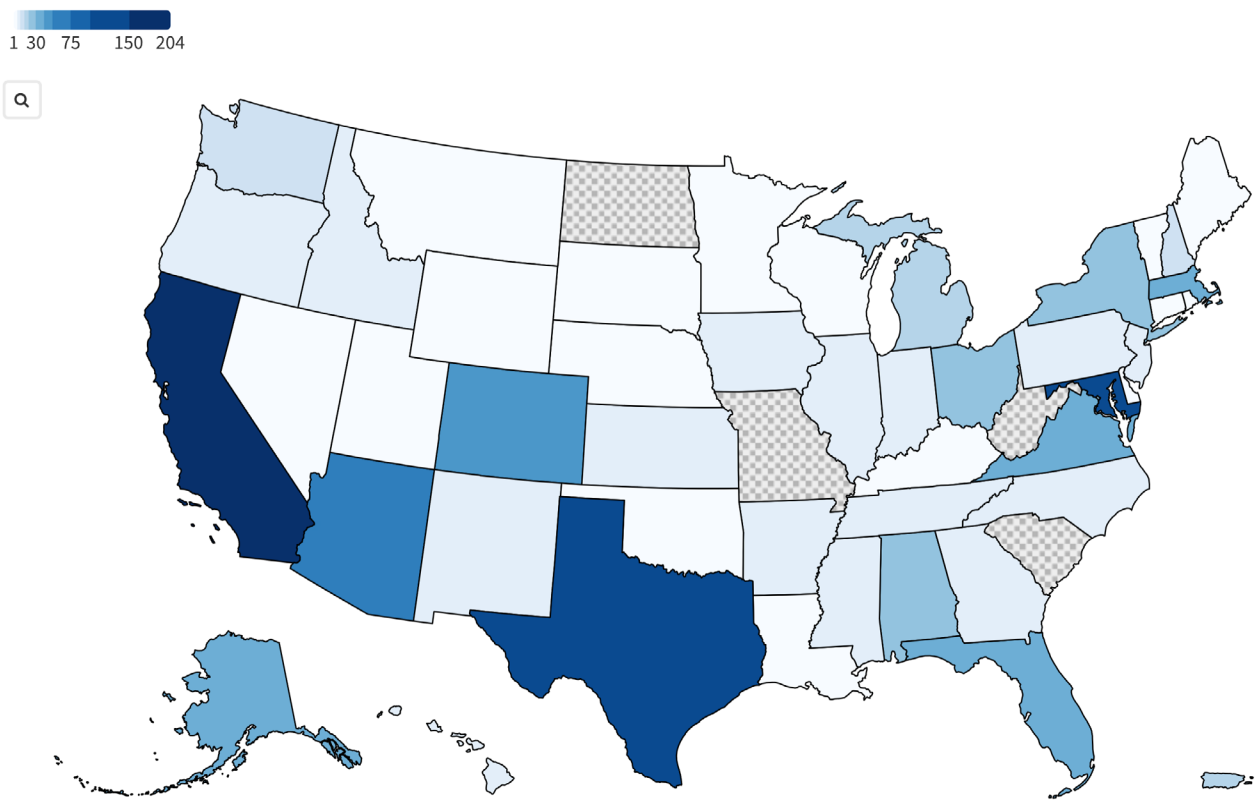


Source: U.S. Census Bureau 2021 boundaries , summitpost.org

Since the beginning of the SciAct program in 2016, its partnerships have increased by almost a factor of 5, with over 1,100 active external partners in 2024. View this interactive map online: ***https://bit.ly/4iLDlmO****.*

We Connect
Audiences and Scientists

NASA and NASA-funded scientists and other subject matter experts work with SciAct teams, both behind the scenes and interacting directly with audiences, to share the story and adventure of NASA Science. Throughout 2024, more than 1,000 subject matter experts (SMEs) from across the United States and around the world participated in and helped produce accurate, compelling, and innovative SciAct events and products—giving audiences the opportunity to learn from and work hand-in-hand with scientists in inspiring and engaging ways. The SciAct teams and SMEs serve as the face of NASA for communities across the country as shown in the map below. SciAct SMEs include a wide range of experts, from early-career to senior scientists, and across disciplines, to effectively share NASA science with many types of audiences. Some SMEs work with several SciAct teams, further making connections and leveraging resources for maximum impact.



Source: U.S. Census Bureau 2021 boundaries , summitpost.org

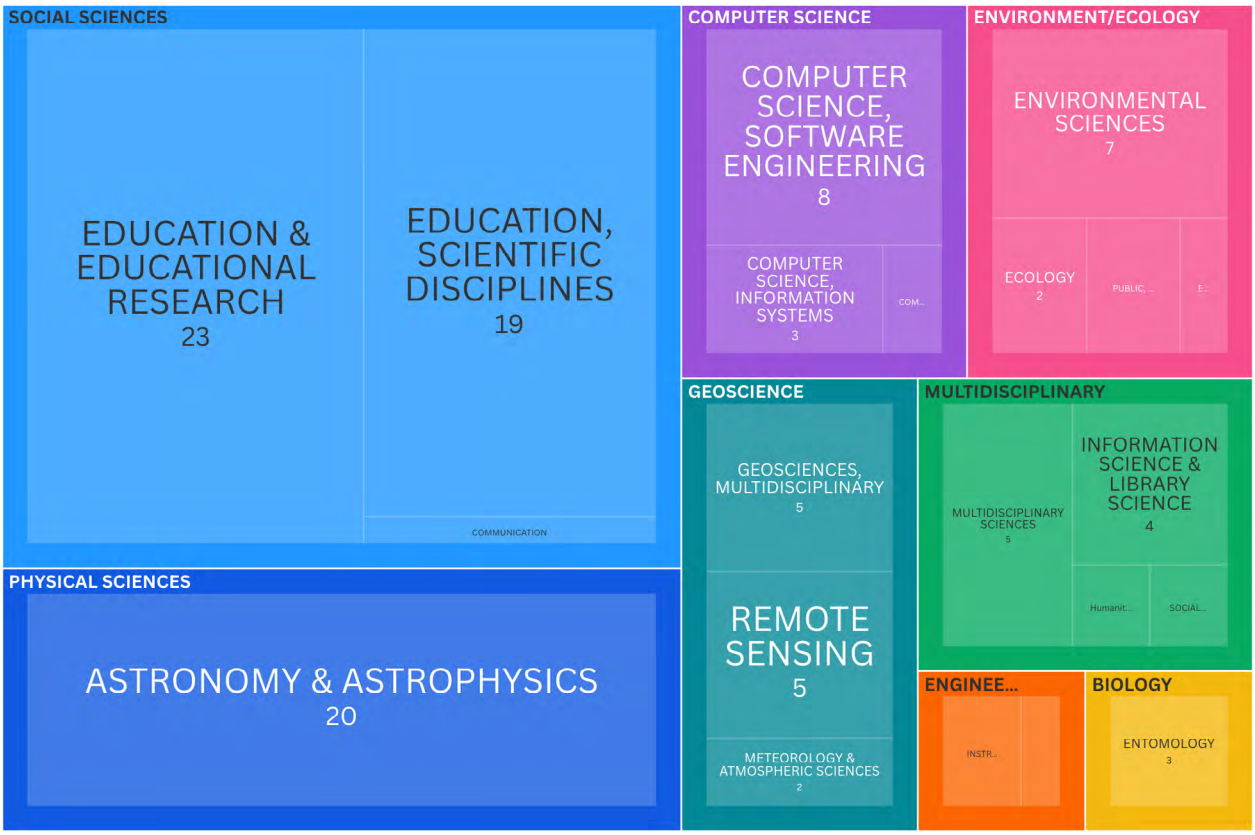
Distribution of SMEs across 46 U.S. states, DC, and PR, supporting SciAct throughout 2024. 32 SMEs from 17 other countries around the world also were involved. An interactive version of the map is available online at ***https://bit.ly/3DIT3An****.*

SciAct works to meet the specific needs and interests of regional and local audiences with our community-based teams, but it also leverages major celestial and NASA events, like the total solar eclipse in April 2024 and NASA's Europa Clipper launch in October 2024, to engage people of all ages in the advancement of science. Indeed, in 2024, 55% of SciAct interactions were associated with the April 8 total solar eclipse, visible across the entire North American continent, with a path of totality crossing 15 states. A range of opportunities were offered around the eclipse, but, notably, about 90,000 interactions involved participatory science activities where audiences were able to contribute important data and observations toward understanding various aspects of eclipse science.

We Innovate

Documenting Evidence-Based Solutions

As of December 2024, SciAct teams reported a total of 144 peer-reviewed publications—20 of which were published in 2024 alone—documenting evidence-based solutions for reaching and motivating people of all ages so that others can benefit from our lessons learned. These publications have been cited more than 1,450 times, and the portfolio now has an h-index of 19—meaning that 19 of those publications have been cited at least 19 times. One paper on digital field trips has been cited more than 150 times already. To explore the range of SciAct peer-reviewed publications, visit ***https://science.nasa.gov/learn/publications***.



A visual representation of the number of peer-reviewed research articles that SciAct has contributed to fields across science, technology, engineering, and education.

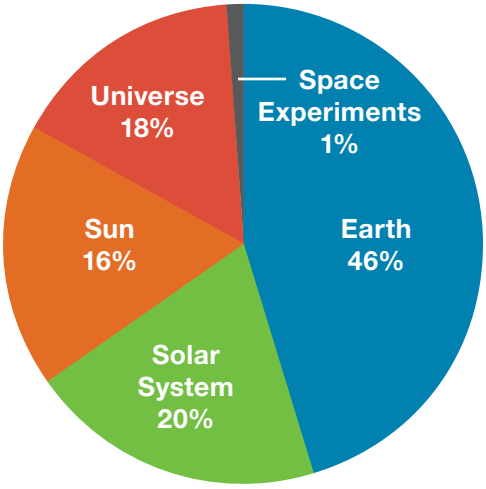
SciAct is a learning community that seeks to both share and benefit from relevant expertise arising from many interdisciplinary communities. The graphic above shows the wide range of both education and STEM fields across which SciAct teams have published. In 2024, SciAct teams also both contributed to and learned from an ever-growing body of knowledge at more than 30 conferences and expert community convenings conducting research at the cutting edge of formal and informal learning, information science, broadening participation, and the Earth and space sciences.

We Provide
Learning Resources

In September 2023, NASA launched a new website, which includes an updated presence for Science Activation: ***https://science.nasa.gov/learn***. As part of that update, a revitalized, searchable catalog of learning resources was made available: ***https://science.nasa.gov/learn/catalog***. It currently offers more than 1,000 learning resources developed by Science Activation teams, as well as high-quality and evergreen resources from prior NASA science learning projects. The graphic below summarizes the current holdings.

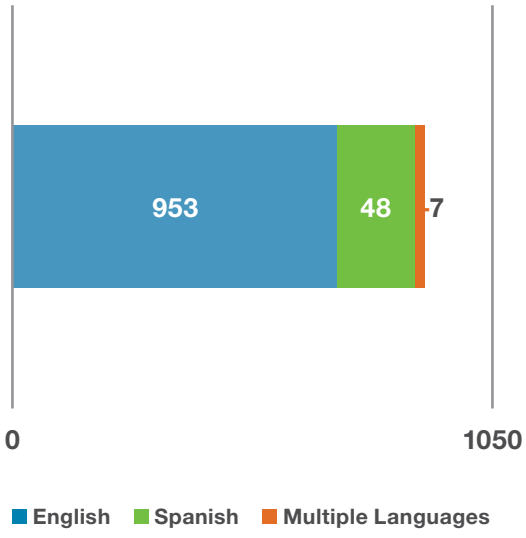
Total Resources in Catalog	Catalog Contributors	Contributing Institutions
1,004	84	55

Resources by Division



Catalog Resources by NASA SMD Division

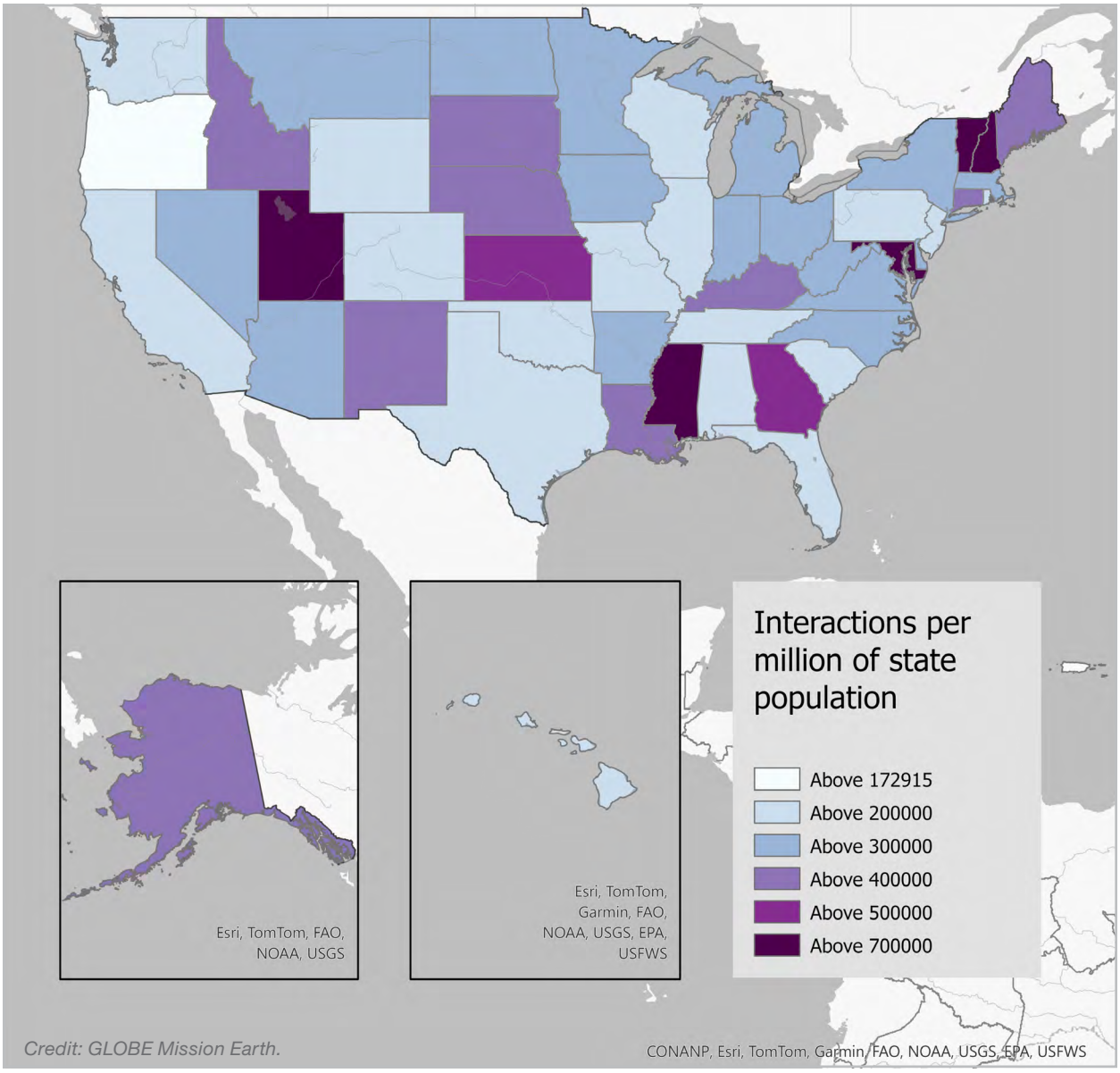
Resources by Language



Summary statistics of the learning resources catalog at the end of 2024 by division, contributors, and language.

We Reach and Engage

Across the Nation and Beyond

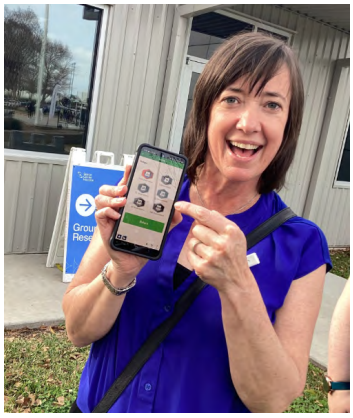


As shown in the reach map above, in 2024, SciAct facilitated ~119 million interactions with people, including 3 million that occurred across 171 countries outside the United States. SciAct project teams reached and engaged learners in all 50 states, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, and American Samoa. SciAct interactions occurred across more than 20% of U.S. ZIP codes (ZIP code information is not available for all reach data). Fifty-five percent of these interactions can be attributed to activities related to the April 2024 total solar eclipse, but this 157% increase in learner interactions over 2023 also reflects the strengthened engagement with and growing number of SciAct's community-based partners.

In addition to the place-based reach shown on the map, several web-based projects reported a total of nearly 44 million distinct users of their learning resources during 2024.

We Empower
Striving to Reach Everyone

Broadening participation to people of all ages and backgrounds—not just those who are already enthused about NASA and NASA science—is a critical goal that underscores SciAct's programs. Nearly half of the SciAct teams, selected through peer review, are intentionally focused on developing best practices for effectively reaching a variety of audiences or communities. Within the collaborative SciAct network, their lessons learned and best practices are regularly shared with the entire SciAct community such that all teams are able to leverage that deep work and benefit from their knowledge and experience. In 2024, teams shared effective practices for producing materials for the blind and those with low vision, co-creating authentic experiences with communities, preparing audiences for celestial events, serving community college students, meeting accessibility standards, applying Universal Design for Learning, and other topics. Several of these topics were intentionally timed to improve all teams' work during the 2024 total solar eclipse.



Astronaut Megan McArthur inviting people to do science with their mobile device. [Credit NESEC]

Thermal image of a group gathered to learn about the solar eclipse. [Credit SCoPE and Eclipse Soundscapes]

Students participate intently in the Northwest Earth and Space Sciences Pathways project Artemis ROADS II National Challenge, working on one of eight mission objectives inspired by the Artemis mission to return to the Moon. [Credit NESSP]

SciAct also leverages SMD's attendance at targeted meetings and conferences to further enhance its reach to a variety of communities.

One important lesson learned in 2024: in order to reach everyone, it is crucial to develop tools for effectively reaching specific audiences. In most cases, approaches developed for those audiences also help many other teams more effectively reach both specific and broad audiences, further improving the reach and effectiveness of the entire portfolio.

Formal and informal educators gather in Maine to build knowledge and confidence. [Credit LENE]

THE SCIENCE ACTIVATION PROJECT TEAMS

You can discover more about the Science Activation projects listed below at ***https://science.nasa.gov/learn/science-activation-team/*** and in the 2023 Science Activation Impact Report: ***https://science.nasa.gov/learn/impact-reports/***.

PROJECT NAME	NASA SCIENCE MISSION DIRECTORATE DIVISION SUPPORTED
AEROKATS and ROVER Education Network (AREN)	Earth Science
Astronomy Activation Ambassadors (AAA)	Astrophysics
American Museum of Natural History (OpenSpace)	Crosscutting
Arctic and Earth STEM Integrating GLOBE & NASA (Arctic SIGNS)	Earth Science
Astro Camp® Community Partners (ACCP)	Crosscutting
Astromaterials	Planetary Science
Astronomy Picture of the Day (APOD)	Astrophysics
Aurorasaurus	Heliophysics
Central Idaho Dark Sky Reserve STEM Network	Crosscutting
Cosmic Storytelling with NASA Data (CosmicDS)	Astrophysics
Earth to Sky	Crosscutting
Eclipse Ambassadors Off the Paths	Heliophysics
Eclipse Soundscapes: Citizen Science Project (ES:CSP)	Crosscutting
Engaging Hispanic Communities	Crosscutting
GLOBE Mission EARTH (GME)	Earth Science
Growing Beyond Earth (GBE)	Biological and Physical Science
Learner Engagement Accessing Real-world NASA SMD Expert Resources (LEARNER)	Earth Science
Learning Ecosystems Northeast (LENE)	Earth Science
MIT Media Lab: Supporting NASA Science Activation	Crosscutting
NASA Community College Network (NCCN)	Crosscutting
NASA Earth Science Education Collaborative (NESEC)	Earth Science
NASA eClips 4D	Crosscutting
NASA Heliophysics Education Activation Team (NASA HEAT)	Heliophysics
NASA Infiniscope	Planetary Science

PROJECT NAME	NASA SCIENCE MISSION DIRECTORATE DIVISION SUPPORTED
NASA Inspires Futures for Tomorrow's Youth (NIFTY)	Crosscutting
NASA SMD Community of Practice for Education (SCoPE)	Crosscutting
NASA Solar System Treks	Planetary Science
NASA's Eyes 3D Visualization Products	Crosscutting
NASA's Neurodiversity Network (N3)	Crosscutting
NASA's Universe of Learning	Astrophysics
NASA@ My Library	Crosscutting
National Informal STEM Education (NISE) Network Space and Earth Informal STEM Education (SEISE) Project	Crosscutting
Nationwide Eclipse Ballooning Project (NEBP)	Crosscutting
Native Earth | Native Sky (NENS)	Crosscutting
Navigating the Path of Totality	Heliophysics
Night Sky Network (NSN)	Crosscutting
Northwest Earth and Space Science Pathways (NESSP)	Crosscutting
Ocean Community Engagement and Awareness Using NASA Observations and Science for Hispanic/Latino Students (OCEANOS)	Earth Science
Place-Based Learning to Advance Connections, Education, and Stewardship (PLACES)	Earth Science
Planetary Learning that Advances the Nexus of Engineering, Technology, and Science (PLANETS)	Planetary Science
Planetary Resources and Content Heroes (ReaCH)	Planetary Science
SciAct STEM Ecosystems	Crosscutting
Science Through Shadows (StS)	Heliophysics
Sea Level Education, Awareness, and Literacy (SEAL)	Earth Science
Smoky Mountains STEM Collaborative (SMSC)	Crosscutting
Solar System Ambassadors (SSA)	Crosscutting
Space Place	Crosscutting
STEM Enhancement in Earth Science (SEES)	Earth Science

EVALUATING PROGRESS

SciAct seeks to actively engage people of all ages and backgrounds with NASA science. The program has focused on four top-level objectives since its inception (left column below). In 2020, to better guide project-level activities and identify measurable steps toward assessing progress on these top-level objectives, SciAct—with support from the National Academies—developed a set of nine Mid-Level Objectives (MLOs) that add specificity to these objectives (center column below). In 2021, evaluation activities led by SciAct's portfolio-level independent evaluator, Pacific Research & Evaluation (PRE), provided crucial insights into how diverse SciAct projects operationalize these MLOs through a variety of constructs (right column below) that best address the needs of their particular audience.

GUIDING OBJECTIVES AND MEASURABLE CONSTRUCTS

TOP-LEVEL OBJECTIVES *Provides collective vision*	**MID-LEVEL OBJECTIVES** *Guides program design and evaluation activities*	**CONSTRUCTS** *Organize Portfolio-Level evaluation activities*
Enable STEM Education	1a. Inspire participants' interest in STEM and the development of their identities as science learners. 1b. Provide opportunities for participants to engage with the disciplinary content related to NASA science and engineering. 1c. Increase number of and frequency with which NASA SMD assets are used by learners across the U.S.	• STEM interest • STEM identity • Interest in STEM-related careers • Awareness of the range of SciAct activities, generally • Awareness of SciAct activities as distinct or unique from other STEM offerings
Improve U.S. Scientific Literacy	2a. Advance participants' understanding of the process of science using NASA SMD assets.	• Knowledge of science process • Expression of science knowledge • Application of science process
Advance National Education Goals	3a. Increase participation in learner-centered experiences based on NASA SMD assets. 3b. Increase the diversity of participants reached by Science Activation through intentional, inclusive programming. 3c. Engage participants in learning experiences that promote development of skills for STEM careers.	• Confidence using SMD Assets in scientific processes • Performance of STEM skills • Confidence using STEM skills • Awareness of STEM skills use as they relate to a profession • Intent to apply STEM skills in a professional setting
Leverage Efforts Through Partnerships	4a. Leverage internal mechanisms to support sharing and learning across the SciAct portfolio. 4b: Utilize external partners to leverage reach and effectiveness of the SciAct portfolio.	• Awareness of SciAct Resources/SMD Assets to inform practice • Intent to use SciAct Resources/ SMD Assets in practice

Top-level SciAct objectives (left) with associated mid-level objectives (center) operating in 2024 as well as related constructs that emerged from the portfolio evaluation work (right). Blue text represents project-level activities, while red text indicates objectives and constructs at the portfolio level.

In recent years, SciAct portfolio evaluation work has sought to identify assessments that can be used as shared measurement tools of these constructs across the projects to report collective progress toward these MLOs. Given the diversity of the SciAct portfolio, effective shared measures are scarce. Therefore, in late 2024, PRE conducted the first systematic, portfolio-wide data call to compile projects' emerging evidence of progress toward the nine MLOs, in whatever form that might take. Inputs from the projects were compiled collaboratively by the project Principal Investigator, independent evaluator, and team. Projects were encouraged to pull evidence from existing documents, such as their required annual report, to facilitate the action.

A total of 38 SciAct projects provided inputs to the MLO outcomes report. That included all the competitively selected projects as well as a few NASA-based activities. While each project is expected to focus on at least three of the MLOs (the SciAct portfolio collectively addresses all the MLOs), they provided evidence supporting twice that many, on average. The top row of the table below shows the number of teams that provided evidence of progress toward each of the MLOs. A substantial amount of evidence was submitted for each.

Review and coding of the evidence submitted by the 38 projects resulted in the identification of 19 types of strategies, activities, and interventions across 6 thematic areas that projects are using to activate MLOs. A short summary of each is given in Appendix A, illustrating the wide range of approaches SciAct teams are using to meet their audience needs. The table below summarizes the application of each of these 19 strategies to the 9 SciAct Mid-level Objectives (MLO). Between 2 and 19 (for the outcome MLO 1c) were used to activate each MLO (bottom row of table), with an average of 7 strategies applied to a given MLO across the teams. Each strategy was used across two to seven MLOs (right column of table), with an average of three.

In the pages that follow, you will find a high-level summary of evidence of progress toward achieving each MLO in 2024, aligned to the constructs shown in the table on the previous page. Each page also highlights some lessons learned along the way.

	1a	***1b***	***1c***	***2a***	***3a***	***3b***	***3c***	***4a***	***4b***	***# MLOs***
Number of Teams Providing Evidence	25	31	19	21	18	27	18	26	26	
Strategy/Activity/Intervention										
DEVELOPMENT OF STEM SKILLS										
Hands-on Research Experiences	X		X		X		X			*4*
Data Collection and Analysis			X	X						*2*
Data Skills Development			X				X			*2*
ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES										
Direct Science Engagement			X	X						*2*
Interactive Learning Experiences		X	X		X		X			*4*
Interactions with Experts	X	X	X	X					X	*5*
Scientific Communication	X		X	X			X	X		*5*
EFFORTS TO REACH EVERYONE										
Inclusive Learning	X		X	X	X	X				*5*
Community-Based Programming	X		X			X			X	*4*
Place-Based Learning	X		X						X	*3*
Cultural Integration			X		X					*2*
EFFORTS TO MAXIMIZE REACH										
Public Outreach & Events		X	X							*2*
Special Event Programming	X		X						X	*3*
DEVELOPMENT OF PRODUCTS & RESOURCES										
Resource Development and Sharing	X	X	X	X				X	X	*6*
Multimedia Resources		X	X							*2*
Digital and Mobile Access			X		X					*2*
Personalized Support			X		X				X	*3*
PROFESSIONAL LEARNING ACTIVITIES										
Professional Development & Training	X	X	X	X			X	X	X	*7*
Collaborative Learning Communities			X		X			X	X	*4*
# Strategies	*9*	*6*	*19*	*7*	*7*	*2*	*5*	*4*	*8*	

MLO 1a

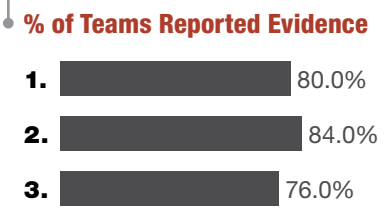
ENABLE STEM EDUCATION

Inspire participants' interest in STEM and the development of their identities as science learners.

25/38
# of projects with evidence of progress toward MLO 1a

Evidence of Progress Aligned to Constructs

1. **Inspiring Learner Interest in STEM:** Following project activities, surveyed youth program attendees reported new jobs they might be interested in doing someday, including astronomer, astronaut, and working at NASA.
2. **Development of STEM Identity:** Survey results showed that students had significantly higher levels of STEM identification after experiencing a SciAct learning experience.
3. **Increased Interest in STEM:** In a feedback survey, parents all "agreed" or "strongly agreed" with statements that their child is more enthusiastic about science and more confident in science as a result of their program experience.



Lessons Learned

The collective lessons learned from SciAct projects reveal several interconnected themes that contribute to program success. Across all their efforts, the most successful approaches create supportive learning environments that allow participants to build confidence and see themselves as capable STEM practitioners.

> ***"My students were thrilled to be part of something bigger than our classroom. They now see themselves as scientists."***

PROMISING PRACTICES SUPPORTIVE OF MLO 1A

- At the heart of effective STEM engagement lies the power of personal connections, particularly when activity facilitators can share first-hand experiences with NASA Subject Matter Experts, and learners can interact with diverse role models who make STEM careers feel attainable.
- Strong partnerships and community-building are crucial. Regional pods of community partners emerged as particularly valuable, allowing for collaboration with organizations that have established community ties.
- Cultural/contextual responsiveness plays a vital role in inspiring learners, with programs finding the most success when they bridge cultural connections to STEM topics and implement universal design principles to ensure accessibility.
- The most effective programs maintain flexibility in their implementation while incorporating hands-on activities and real-world applications that demonstrate STEM's relevance to students' lives.

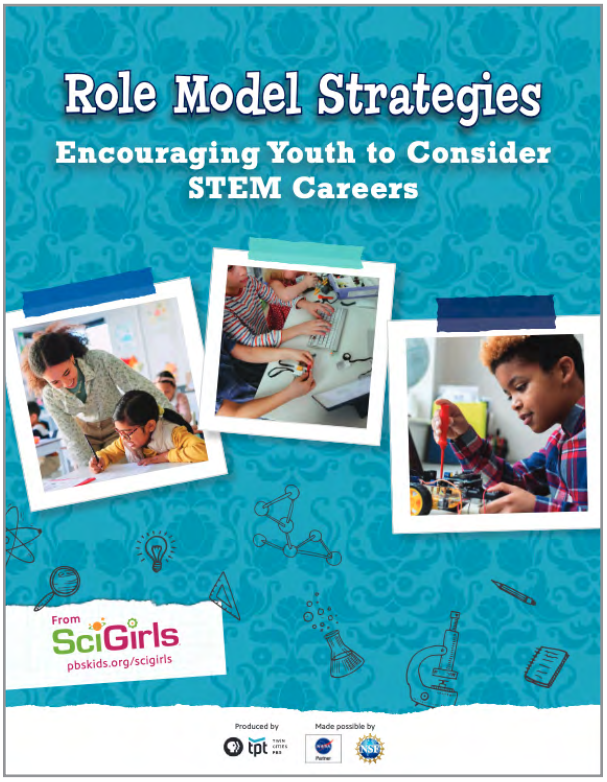
The bar below notes which categories of Strategies/Activities/Interventions were reported in support of this MLO. Any that were not used will be grayed out.

DEVELOPMENT OF STEM SKILLS	ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES	EFFORTS TO REACH EVERYONE	EFFORTS TO MAXIMIZE REACH	DEVELOPMENT OF PRODUCTS & RESOURCES	PROFESSIONAL LEARNING ACTIVITIES

5 Examples supporting MLO 1a

Arctic SIGNS project alumna leads Youth for Habitat Program in Fairbanks, AK, using GLOBE Program protocols. Her work documented the return of salmon to Cripple Creek.

Smoky Mountain STEM Collaborative worked with Dr. Alissa Bans, a NASA SCoPE SME, to create exoplanet activities for this year's Astro Camp at a local school.



The completed NIFTY project has made available the latest, research-based, role model strategies to help subject matter experts and others interest youth in STEM.

AAA Teachers attend a curriculum teaching workshop, learn about current infrared astronomy research from NASA Jet Propulsion Laboratory scientists, and receive guided visits to an Infrared Observatory.

Universe of Learning launched a new set of "Did You Know?" videos that illustrates how discovery and technology advance together; the videos can be seen at venues across the country or online at ***ViewSpace.org****.*

MLO 1b

ENABLE STEM EDUCATION

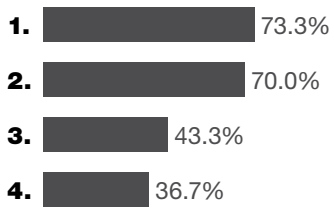
Provide opportunities for participants to engage with the disciplinary content related to NASA science and engineering.

31/38
# of projects with evidence of progress toward MLO 1b

Evidence of Progress Aligned to Constructs

1. **Change in Knowledge:** One project both reported positive increases in learner knowledge and observed that the percentage of students that showed knowledge improvement depended on the specific topics covered.
2. **Increased Awareness of Activities:** In a pre-post survey, workshop participants reported an increase in awareness of pathways for interacting with NASA planetary science, astrobiology, and engineering content.
3. **Change in Behavior:** Survey data indicate that, because of project activities, participants plan to use a place-based approach in their science instruction. Further, 97% of educators agreed that they now feel more confident in their ability to cultivate a culture of connection, stewardship, belonging, and agency in science learning.
4. **Efficacy of Using NASA SMD Assets:** Educators report that the training materials associated with the project's community of practice are effective. Engagement with the project was somewhat higher than in prior years, including increased use of lessons produced by the project and an increase in respondents who attended multiple trainings.

% of Teams Reported Evidence



Lessons Learned

Projects emphasized the importance of balancing standardized content with local adaptation, maintaining strong support systems, and ensuring accessibility, while highlighting the continued value of hands-on, experiential learning approaches.

> ***"We have billions of people in the world that can provide us with data through their cellphones, and we can use those data to do a different kind of science than we've ever been able to do before."***

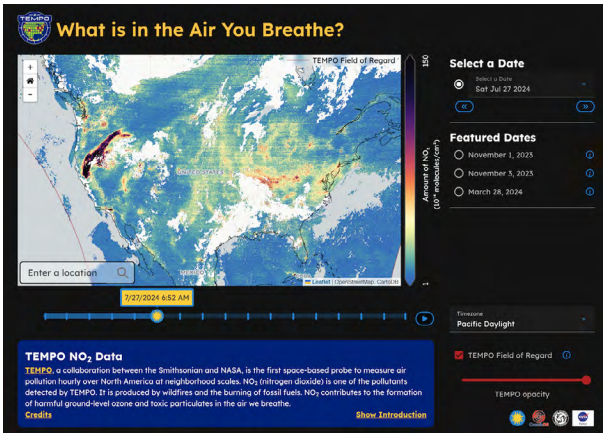
PROMISING PRACTICES SUPPORTIVE OF MLO 1B

- Projects report that hands-on learning is often the most effective approach for engaging learners.
- Project activities revealed that learner needs vary, requiring flexible and adaptable approaches. For example, local context and place-based learning require significant adaptation of materials, emphasizing the importance of customization over one-size-fits-all solutions.
- While the NASA brand inspires excitement and engagement, building meaningful relationships with local communities requires time and patience. Programs found that clear communication about expectations and support needs, combined with multiple formats and accessibility options, improves overall program effectiveness. Professional development requires ongoing support and resources to maintain momentum.

The bar below notes which categories of Strategies/Activities/Interventions were reported in support of this MLO. Any that were not used will be grayed out.

DEVELOPMENT OF STEM SKILLS | **ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES** | EFFORTS TO REACH EVERYONE | **EFFORTS TO MAXIMIZE REACH** | **DEVELOPMENT OF PRODUCTS & RESOURCES** | **PROFESSIONAL LEARNING ACTIVITIES**

5 Examples supporting MLO 1b

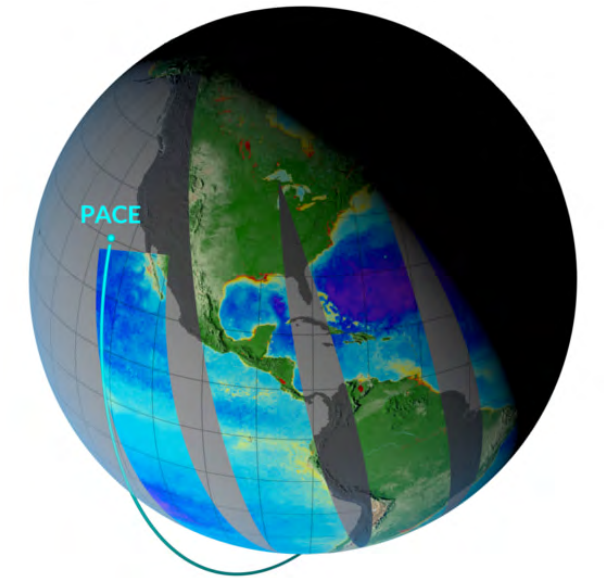


New Cosmic Data Story makes TEMPO air quality data accessible to the public through an intuitive and responsive interactive tool that supports easy data exploration.

For the launch of Europa Clipper, NASA's Solar System Treks Project released exciting enhancements to its online Europa Trek portal allowing users to explore high-resolution imagery of Europa's surface.

The American Museum of Natural History (AMNH) planetarium uses its OpenSpace software to offer attendees insightful programs such as the mission of the Parker Solar Probe.

The GLOBE Observer team activated the Eclipse tool to support the total solar eclipse in April 2024. This tool supports interested people in collecting and reporting the eclipse impact on the atmosphere.



The Scientific Visualization Studio at NASA's Goddard Space Center creates high-quality visuals of NASA science data, including this ocean color visual from the new PACE mission.

MLO 1c

ENABLE STEM EDUCATION

Increase number of and frequency with which NASA SMD assets are used by learners across the United States.

19/38
# of projects indicating intentional pursuit of MLO 1c

Evidence of Progress

This MLO is focused on outputs rather than outcomes, so evidence was gathered through a separate Reach Map data call (see page 10). All but four SciAct teams reported a notable increase in reach in 2024 over 2023, ranging from just 1% to a factor of 100x! Eighteen teams more than doubled their reach. Overall portfolio reach increased by 57% in calendar year 2024 over 2023. In addition, three SciAct teams whose main products are digital reported more than 42 million distinct users on their websites in 2024.

1. **Celestial Events Drive Interest:** The primary factor for this objective was the total solar eclipse on April 8, 2024, which closely followed the annular eclipse the previous October. This major event had a substantial impact on project activities in terms of both supply (creation of materials and experiences by SciAct teams) and demand (interest in the eclipse and related NASA science from all segments of the public). About 55% of SciAct's 2024 activities were related to the total solar eclipse.
2. **Networks Multiply Impact:** Many teams created materials for the eclipse based on NASA Science Mission Directorate assets and also participated in a variety of open and public events leading up to and during the eclipse. While some teams planned and conducted their own events, many worked with partners to share resources at already-planned community events—sometimes reaching dozens or even hundreds of locations through those networks.
3. **"Regular" NASA Science Is Still of Interest:** Non-eclipse-related SciAct activities also continued effectively throughout the year, building on relationships and lessons learned in prior years.

Lessons Learned

> ***"I feel more confident and excited about immersing my students in place-based data!"***

Projects report that early and consistent coordination with NASA and partner organizations was critical for achieving reach and impact. Further, they found that successful implementation of MLO 1c depended on the ability to provide accessible, well-organized training and resources. Event-specific programming (e.g., around eclipses) was found to be supportive of goals to broaden reach, as it creates organic engagement opportunities. Projects shared that tracking impact requires a balance between collecting meaningful metrics and avoiding unnecessary administrative burden on participants.

PROMISING PRACTICES SUPPORTIVE OF MLO 1C

- Establish dedicated coordination roles and maintain regular communication channels with project partners to align local community needs with available resources.
- Design user-friendly, searchable resource databases with multiple access points, but keep user time limitations in mind (particularly for educators) when developing distribution strategies.
- Build programming around major events (e.g., eclipses) while focusing on preparation and resource dissemination through established partner networks to maximize reach and impact.

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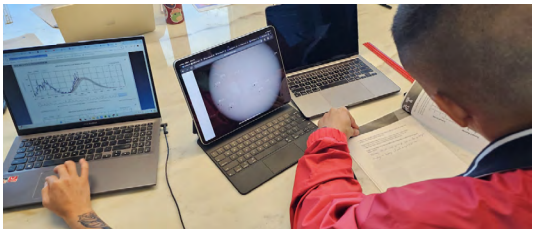
DEVELOPMENT OF STEM SKILLS	ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES	EFFORTS TO REACH EVERYONE	EFFORTS TO MAXIMIZE REACH	DEVELOPMENT OF PRODUCTS & RESOURCES	PROFESSIONAL LEARNING ACTIVITIES

5 Examples supporting MLO 1c

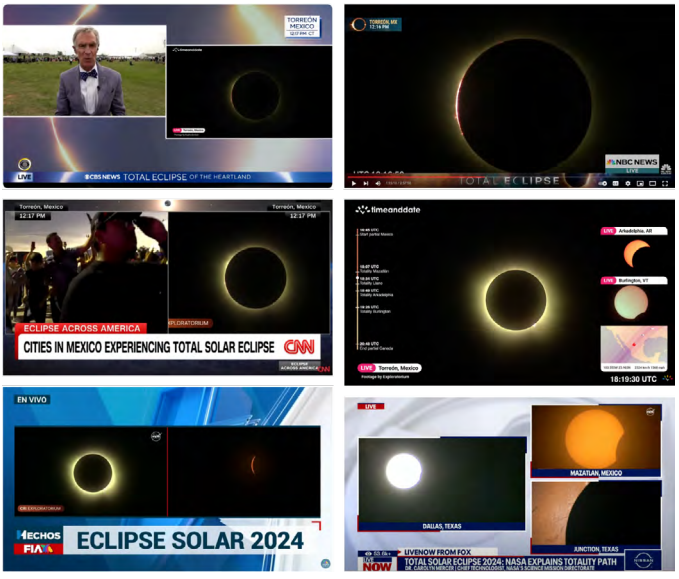
Native Earth | Native Sky hosted 110 K–12 teachers and administrators to learn about solar eclipses and prepare to engage their students with this major celestial event.

Teachers, librarians, and out-of-school educators gathered for a two-day retreat with Learning Ecosystems Northeast featuring hands-on activities, reflection time to activate their learning, and collaborative planning time.



NASA HEAT worked with the American Association of Physics Teachers to train eight educator leaders in space science. Following a three-day workshop, each shared with approximately 20 other educators.

NASA@My Library welcomed over 2,000 in-person workshop attendees at 78 in-person solar science workshops in almost every state and territory to prepare libraries for the solar eclipse.



The Exploratorium team reached millions—possibly billions!—as a result of their multiple live streams of the eclipse, which were picked up across multiple media outlets around the world.

MLO 2a

IMPROVE U.S. SCIENTIFIC LITERACY

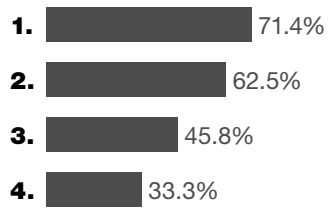
Advance participants' understanding of the process of science using NASA SMD assets.

21/38
# of projects with evidence of progress toward MLO 2a

Evidence of Progress Aligned to Constructs

1. **Knowledge of Science Process:** A majority of surveyed student team members indicated that the project supported them in increasing their competence in undertaking scientific ballooning missions, carrying out STEM research, tackling practical engineering problems, and communicating STEM concepts.
2. **Changes in Learner Understanding:** Student participants reported that the experience broadened their understanding of how science can be conducted using multiple senses. Educators reported that, after participating, students felt more connected to the scientific community and more confident in their abilities as science learners.
3. **Communicating Scientific Process:** In post-workshop informal surveys, teachers shared that they felt much more at ease discussing astronomical topics and using astronomical equipment.
4. **Evidence of STEM Practices/Skills in Problem Solving:** One participant stated, "[This project] is truly unique; not only do we learn aurora science, but we also learn best practices to communicate it to the public. Having a resource that is reliable, scientific, and written in plain language is absolutely critical!"

% of Teams Reported Evidence



Lessons Learned

Key lessons learned convey that hands-on engagement with scientific processes enhances participant understanding. Combining authentic data collection experiences with direct expert interaction was found to be particularly effective at advancing MLO 2a. Differentiating instruction to accommodate differing levels of data literacy is also crucial during program development.

> ***"Collecting data and making observations about data helped me better understand how I can use these practices with my students."***

PROMISING PRACTICES SUPPORTIVE OF MLO 2A

- Provide comprehensive technical support while developing inclusive approaches that accommodate diverse needs.
- Build strategic partnerships, maintain transparency about scientific processes (sharing how data are collected, processed, analyzed, and used in reporting), and allow adequate exploration time with tools.
- Create opportunities for peer knowledge-sharing and design flexible instruction methods that account for varying data literacy levels.

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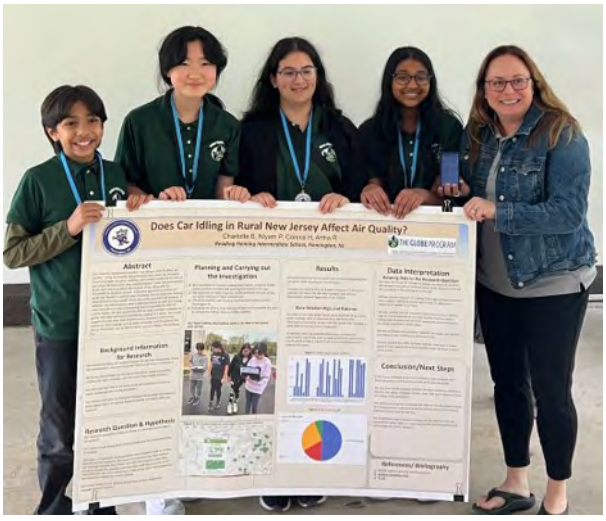
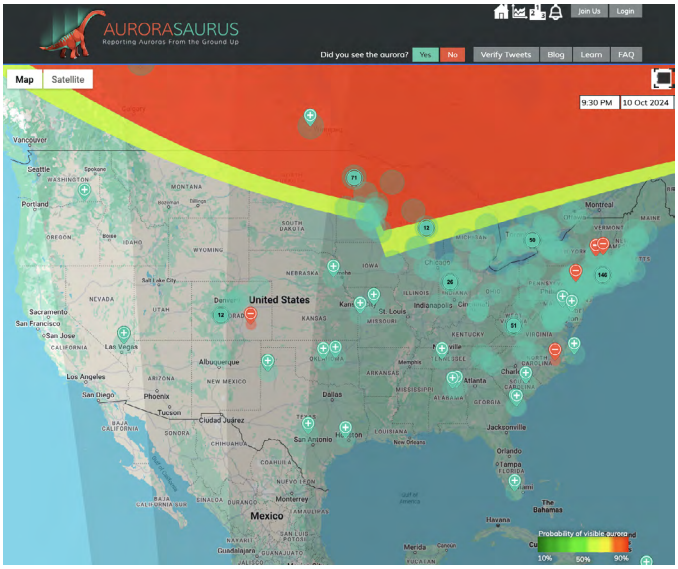
DEVELOPMENT OF STEM SKILLS	ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES	EFFORTS TO REACH EVERYONE	EFFORTS TO MAXIMIZE REACH	DEVELOPMENT OF PRODUCTS & RESOURCES	PROFESSIONAL LEARNING ACTIVITIES

4 Examples supporting MLO 2a



A yearlong Mission Earth professional development experience for teachers, ENGAGE (Earth, NASA, GLOBE, and Guided Explorations), resulted in 10 student teams participating at GLOBE student research symposia.

Students from 75 schools across the nation participated in the Growing Beyond Earth Student Research Symposium and presented their original ISS-analogue space crop research to a panel of judges.



Aurorasaurus engages thousands of aurora chasers and enthusiasts to report sightings, including during a major event on October 10–11, when it was visible across much of the country.

ACCP facilitated the GLOBE Southeast Student Research Symposium for students from AL, LA, and MS to present environmental research conducted using GLOBE protocols to each other and STEM professionals.

MLO 3a

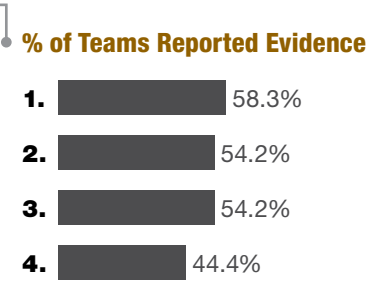
ADVANCE NATIONAL EDUCATION GOALS

Increase participation in learner-centered experiences based on NASA SMD assets.

18/38
# of projects with evidence of progress toward MLO 3a

Evidence of Progress Aligned to Constructs

1. **Learner Engagement and Change in Knowledge:** Integrating [project] protocols into science content fostered student engagement. Observations tracked that students use the protocols to make sense of data and the process of science.
2. **Increased Interest in STEM Due to Learner-Centered Experiences and/or NASA SMD Assets:** Student feedback indicated that after working with the [project] team and SMEs, they felt enlightened through hands-on experiences. Further, community partner facilitators reported an increase in interest in the program, prompting them to offer more sessions and expand participant numbers.
3. **Value of Learner-Centered Experiences and/or NASA SMD Assets:** Interview data collected from educators highlight the sharing of resources, ideas, and learning from each other. The new connections and collaborations that emerged enabled them to implement new activities or programming, learn about new resources, gain ideas, and learn new information, such as new science concepts or other community organizations' priorities. As a result, educators report an increased commitment to relevant and place-based activities.
4. **Change in Learner Understanding of the Scientific Process:** Learners reported statistically significant changes in their own science knowledge from 2.2 before their experience to 3.9 after (on a scale of 1 to 4). There were also statistically significant changes in their understanding of how to use video to help facilitate learning (2.6 to 3.8) and confidence (2.5 to 3.8).



Lessons Learned

Projects balanced activity reach and depth through personalized learning experiences and leveraging local connections. Multi-channel distribution and partnerships expanded impact, while data-driven approaches informed improvements to experiences. Success for MLO 3a often relied on active learning experiences and strong implementation support.

> ***"This internship has been of great benefit to me. I have gained a lot of knowledge, many new experiences, and a lot of learning. Without a doubt, it helped me to organize myself better for university life; I have a clearer vision."***

PROMISING PRACTICES SUPPORTIVE OF MLO 3A

- Design flexible activities that connect to local interests and industries, allowing partners to adapt resources for their specific audiences.
- Offer multiple engagement levels and support structures to accommodate diverse participant needs and capabilities.
- Prioritize active learning experiences where participants can directly engage with NASA resources and receive ongoing support.

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DEVELOPMENT OF STEM SKILLS	ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES	EFFORTS TO REACH EVERYONE	EFFORTS TO MAXIMIZE REACH	DEVELOPMENT OF PRODUCTS & RESOURCES	PROFESSIONAL LEARNING ACTIVITIES

5 Examples
supporting
MLO 3a

The PLANETS team shared three STEM units at national Out-of-School-Time (OST) conferences, including co-design workshops with 26 OST educators and leaders to further improve the resources.

Engaging Hispanic Communities advances NASA's vision for STEM by co-creating experiences with communities across the Southwest. Partners work to reflect the people, priorities, and assets of each community.

Infiniscope empowers educators to design and build virtual tours focused on making the benefits of place-based education more accessible through digital means, using free and user-friendly software.

Planetary ReaCH held an event at a Boys & Girls Club in Brighton, CO, where SMEs who had just attended a training workshop facilitated a variety of hands-on planetary activities for approximately 120 children.

Challenger Centers are designing new missions based on NASA science content for middle school field trips and have used Infiniscope tools to create virtual tours to prepare students.

MLO 3b

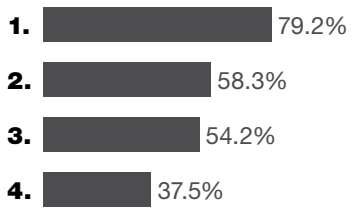
ADVANCE NATIONAL EDUCATION GOALS

Increase the diversity of participants reached by Science Activation through intentional, inclusive programming.

26/38
# of projects with evidence of progress toward MLO 3b

Evidence of Progress Aligned to Constructs

% of Teams Reported Evidence



1. **Consideration of Broadening Participation in Resource/Programming Development:** The co-development process allowed for a variety of perspectives to inform the project. Project team members brought subject matter expertise, while advisor libraries were able to provide input on what worked well in a library context. Advisor libraries helped to ensure that materials were accessible and relevant to library settings.
2. **Efficacy of Processes to Broaden Participation:** Participating SMEs were asked a subset of questions about the usefulness of the training for their future work with [Project] mentees. Most SMEs learned specific tips and techniques and felt better prepared to support their mentees following the training (92%).
3. **Learner Perception/Reaction to Inclusivity Activities:** A total of 79% of learners felt that "the facilitator made a personal and/or cultural connection" with them, and 74% of learners felt "inspired to share something about eclipses" with others or their communities.
4. **Impact of Multilingual Resources:** All [Project] materials have been translated into Spanish, increasing access by non-English speakers.

Lessons Learned

Key lessons learned emphasize the importance of building authentic relationships with communities through in-person connections and co-development approaches. Success in inclusive programming requires significant time investment, cultural sensitivity, and flexibility in adapting to community needs.

> ***"[The presenter] was fantastic! The models she used were helpful for the kids to understand the eclipse. She involved the students, and she presented on a level that the kids understood."***

PROMISING PRACTICES SUPPORTIVE OF MLO 3B

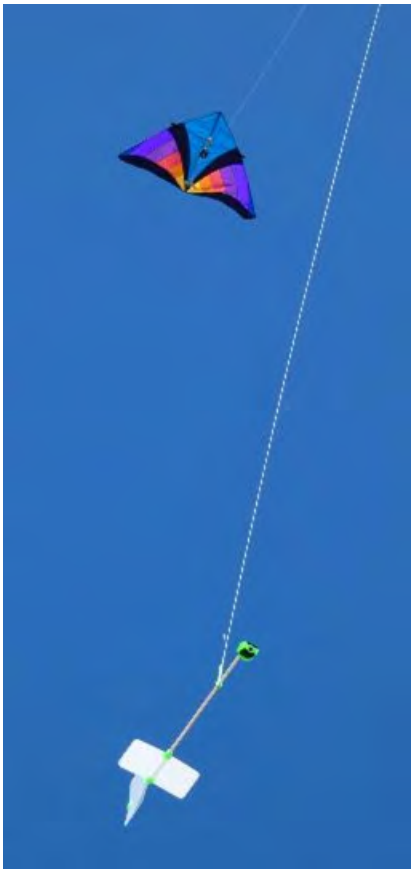
- Design programs collaboratively with target communities from the start, ensuring relevance and addressing local priorities and needs.
- Invest in in-person relationship community-building, demonstrating genuine commitment rather than treating engagement as a checkbox.

The bar below notes which categories of Strategies/Activities/Interventions were reported in support of this MLO. Any that were not used will be grayed out.

DEVELOPMENT OF STEM SKILLS | ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES | **EFFORTS TO REACH EVERYONE** | EFFORTS TO MAXIMIZE REACH | DEVELOPMENT OF PRODUCTS & RESOURCES | PROFESSIONAL LEARNING ACTIVITIES

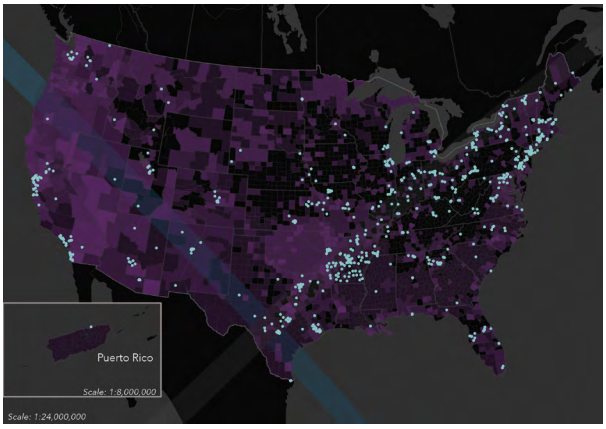
4 Examples supporting MLO 3b

Eclipse Soundscapes approached the eclipses with the blind and low-vision community specifically in mind. They developed tools, resources, and observing opportunities that worked for them—and for all.



The AREN project provides low-cost, user-friendly opportunities to engage in hands-on experiential education using the NASA patented AeroPod platform and kites for near-surface remote sensing.

The NASA Community College (CC) Network curates resources to help Astro 101 instructors at CCs around the country effectively introduce NASA content and research into their courses.



From Hawaii to Maine, 700+ Eclipse Ambassadors held more than 1,200 events in places ranging from senior centers to churches to food pantries, to reach communities that otherwise might miss the excitement.

MLO 3c

ADVANCE NATIONAL EDUCATION GOALS

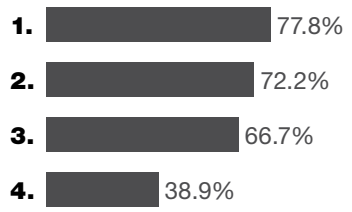
Engage participants in learning experiences that promote development of skills for STEM careers.

18/38
# of projects with evidence of progress toward MLO 3c

Evidence of Progress Aligned to Constructs

1. **Confidence Using STEM Skills:** Workshop participants demonstrated increased awareness of the tools available and steps involved in creating effective astronomy visualizations. In addition, 83% of respondents were highly likely to adopt a new strategy or practice what they learned about at the workshop.
2. **STEM Skills Level:** [Project] used an end-of-internship survey of students' perceptions of how the experience affected their skills and intentions. More than 7 in 10 interns responded above the midpoint on scales of [Project] impact on their STEM skills and intentions.
3. **Interest in STEM Careers:** Interns reported that their experiences broadened their understanding of where different areas of space science intersect, increasing their knowledge regarding the different roles possible within a STEM career. They gained a sense of plausible career pathways and felt motivated to continue STEM trajectories in their studies.
4. **Awareness of How Interpersonal Skills, Executive Functioning, and Self-Advocacy Skills Contribute to STEM Careers:** [Project's] approach to immersive roleplay in an authentic STEM experience gives students a chance to practice key skills, including teamwork, leadership, communication, and problem solving. Flight directors (informal and formal educators who facilitate [Project] missions at independent community organizations) provided a great deal of input on the development of [Experience] to ensure that it offered multiple opportunities for inter- and intra-team development of those skills through a variety of learning engagements.

% of Teams Reported Evidence



> ***"Compared to previous missions, kids can see jobs across the board, vs. the math and science jobs that are so easy to see. There are so many careers, and this does a better job of highlighting those that may not immediately come to mind like coding or engineering."***

Lessons Learned

Projects reported that flexible, real-world experiences, strong partnerships, and hands-on activities are essential for fostering STEM skills and career interest among learners.

PROMISING PRACTICES SUPPORTIVE OF MLO 3C

- Incorporate real-world challenges and hands-on experiences that allow participants to practice authentic STEM skills while seeing tangible impacts of their work.
- Build strong partnerships with universities and industry experts to provide mentorship, while ensuring activities are sufficiently challenging and time-appropriate for meaningful skill development.

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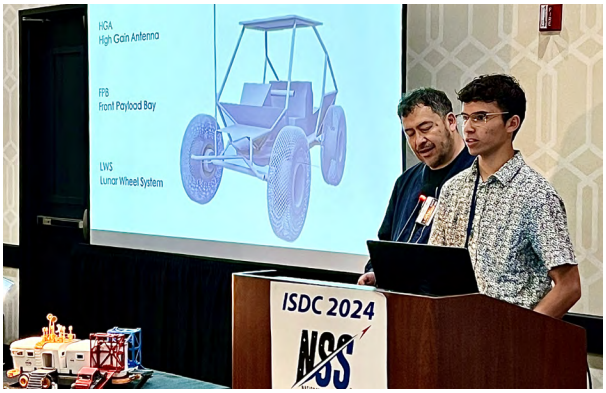
DEVELOPMENT OF STEM SKILLS	ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES	EFFORTS TO REACH EVERYONE	EFFORTS TO MAXIMIZE REACH	DEVELOPMENT OF PRODUCTS & RESOURCES	PROFESSIONAL LEARNING ACTIVITIES

5 Examples supporting MLO 3c

The Nationwide Eclipse Ballooning Project engaged hundreds of students to study the solar eclipse by launching coordinated instrumented balloons, resulting in new science on gravity waves.



Two NASA's Neurodiversity Network (N3) high school interns presented their work with a SME Mentor at the International Space Development Conference (ISDC-2024) in Los Angeles, CA.

Four SEES high school student interns put their research projects to a microgravity test on a Zero-G G-Force One aircraft after extensive planning and integration with the flight team.

NASA eClips released the most recent Ask SME: Close-up with a NASA Subject Matter Expert Featuring Astronaut Strength and Conditioning Specialist Corey Twine from NASA's Johnson Space Center.

OCEANOS conducted a summer workshop introducing high school and college students—and local educators—in Puerto Rico to the tools and methods of coastal ocean science.

MLO 4a

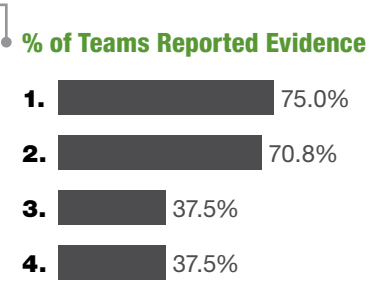
LEVERAGE EFFORTS THROUGH PARTNERSHIPS

Leverage internal mechanisms to support sharing and learning across the Science Activation portfolio.

26/38
# of projects with evidence of progress toward MLO 4a

Evidence of Progress Aligned to Constructs

1. **Intent to Use SciAct Resources/SMD Assets:** All [Project] sites are thinking about how to incorporate NASA SMD assets but have been intentional in putting community priorities first. At the end of this year, the teams are now working toward identifying ways in which SMD assets might be integrated into engagement materials that align with these community priorities.
2. **Awareness of SciAct Resources/SMD Assets:** Surveys of SMEs have revealed that the [Project] activities have resulted in increased awareness of SciAct assets to inform practice and increased intent to use SciAct assets.
3. **Monitoring Use of Developed SciAct Resources/SMD Assets (Additional):** Analysis of the annual partner survey results shows that partners would like to stay connected with [Project] for access to NASA missions and SMEs, lessons and resources, and an open communication space. Partners also completed a subset of the Wilder Collaboration Factors questions focused on partnerships. The partners were asked to rate statements about how [Project] supports partnerships and gave it high marks.
4. **Cross-Project Collaborative Activity and Shared Learning (Additional):** [Project] team has utilized the SciAct resources of various communities of practice (e.g., rural affinity group) to amplify new knowledge about collaboration. The team has also been better informed on how to address different aspects of broadening participation goals through monthly presentations by different SciAct projects.



> ***"[At the meeting] I was able to have an open-ended catch-up conversation with someone. We identified some collaboration ideas that we later followed up on."***

Lessons Learned

Projects find that successful collaboration requires clear communication, diverse engagement strategies, and structured meeting formats. Partnerships within SciAct can be best leveraged when the network is used to share resources and time is invested in understanding tools and building relationships.

PROMISING PRACTICES SUPPORTIVE OF MLO 4A

- Establish regular, structured communication channels while offering multiple engagement formats to accommodate diverse partner needs and schedules.
- Build partnerships around shared goals and interests, allowing adequate time for partners to understand available tools and resources before implementation.
- Leverage advisory boards and cross-collaboration opportunities to enhance both content development and network expansion.

The bar below notes which categories of Strategies/Activities/Interventions were reported in support of this MLO. Any that were not used will be grayed out.

DEVELOPMENT OF STEM SKILLS | **ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES** | EFFORTS TO REACH EVERYONE | EFFORTS TO MAXIMIZE REACH | **DEVELOPMENT OF PRODUCTS & RESOURCES** | **PROFESSIONAL LEARNING ACTIVITIES**

4 Examples supporting MLO 4a

PLACES, with support from Mission Earth, GLOBE, and PLANETS, led a Professional Learning Summer Institute in Arizona sharing powerful place-based data-rich (PBDR) experiences with a dozen educators.

Science Through Shadows shared portable planetarium shows through ACCP to reach hundreds of young students in the Gulf Coast region with STEM activities.

SciAct teams shared a variety of Earth and space activities and resources at the American Camp Association's national conference in New Orleans in February, including chalk art to depict the Sun's corona.

The Astromaterials team shares their expertise from multiple in-person and virtual events with both the Diversability and Subject Matter Expert Working Groups within SciAct.

MLO 4b

LEVERAGE EFFORTS THROUGH PARTNERSHIPS

Utilize external partners to leverage reach and effectiveness of the Science Activation portfolio.

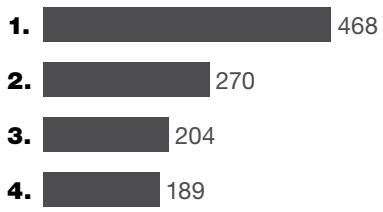
26/38
# of projects indicating intentional pursuit of MLO 4b

Evidence of Progress

This MLO is focused on outputs rather than outcomes, so evidence was gathered through a separate partner data call (see pages 5–6). The number of partners working with SciAct doubled from 2016 to 2023 and then doubled again in 2024 because of the eclipse. Teams identified their external partners in 2024 as contributing in the following ways:

1. **Last Mile Reach (Local):** Partners help project teams reach into specific local (geographic) communities and customize products and activities for local needs.
2. **Dissemination/Increase:** Partners help with broad dissemination and generally increase reach with common products and activities.
3. **Broadening Participation:** Partners help projects reach specific interest communities (e.g., Civil Air Patrol, Upward Bound, Flying Clubs, Camps) and may customize products and activities for their needs.
4. **Content/Program Creation:** Partners work closely with projects to develop products and activities, bringing additional expertise to the table.

Number of Partnerships



> ***"The relationship between the [Organization] and [Project] Education Team is the best it has ever been. They came to the table with ideas, but they really let the ideas about the jobs, the tools, come from the meetings…. They didn't [already] know what they wanted to do and include us [just] to check a box. It was a true collaboration."***

Lessons Learned

Projects shared that successful activation of MLO 4b is dependent on developing multiple points of contact within partner organizations to ensure sustainability. Strong relationships should be built on clear communication, mutual goals, and understanding of partner capabilities. Collaborative programs are considered most effective when they include mentorship opportunities or leverage a co-design approach. Partners' local expertise and networks were crucial for broadening reach to meet underserved communities, while regular communication and flexibility helped maintain engagement.

PROMISING PRACTICES SUPPORTIVE OF MLO 4B

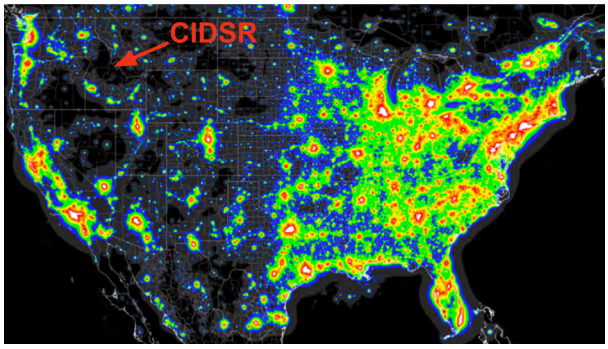
- Establish multiple contact points within partner organizations to reduce dependency on single individuals and build sustainable relationships.
- Invest time in understanding each partner's unique strengths, goals, and audience needs before developing collaborative programs.
- Implement co-design approaches with educators and community partners to ensure programs meet local needs and build genuine buy-in.
- Create clear timelines, roles, and expectations at the beginning of the partnership, including regular check-ins and feedback mechanisms.

The bar below notes which categories of Strategies/Activities/Interventions were reported in support of this MLO. Any that were not used will be grayed out.

DEVELOPMENT OF STEM SKILLS | ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES | EFFORTS TO REACH EVERYONE | EFFORTS TO MAXIMIZE REACH | DEVELOPMENT OF PRODUCTS & RESOURCES | PROFESSIONAL LEARNING ACTIVITIES

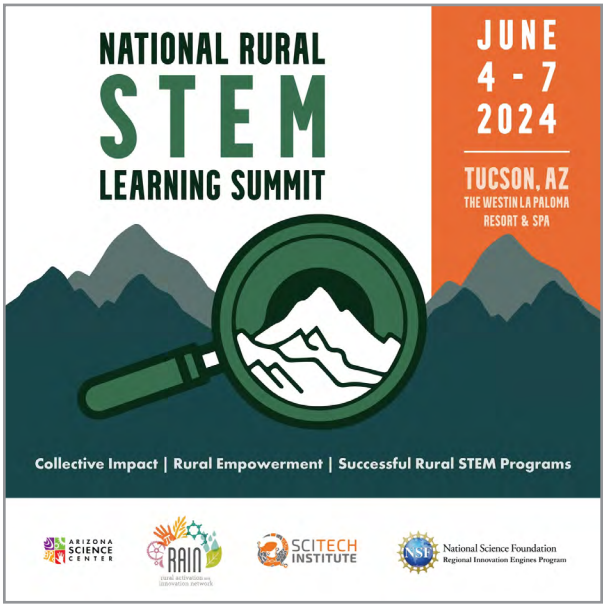
5 Examples
supporting
MLO 4b

NESSP invites students to participate actively in NASA science-themed missions and mini-missions through a variety of after-school and informal venues.



Central Idaho Dark Sky Reserve, with Planetary ReaCH, NESSP, and U of Learning, conducted a joint workshop at the Division of Planetary Sciences Conference to share resources with SMEs.

NASA SCoPE offers small Seed Grant funding and Event Facilitation Grants to early-career scientists and engineers to work with SciAct teams and participate in educational outreach opportunities.



SciAct teams participated in a summit fostering learning and sharing among organizations dedicated to creating partnerships and pathways for authentic STEM learning in rural communities.

The SEAL project partners with NOAA Sea Grant to host weeklong Sea Level Changemakers Summer Camps that introduce middle school students to how coastal areas are changing due to sea level rise.

APPENDIX A: MID-LEVEL OBJECTIVES

MLO Strategies and Interventions

DEVELOPMENT OF STEM SKILLS

- **Hands-On Research Experiences:** Authentic scientific research opportunities including internships with NASA scientists, data collection projects, and participation in real scientific investigations.
- **Data Collection and Analysis:** Engagement in authentic data gathering using specialized equipment and NASA databases, including environmental monitoring and atmospheric data analysis.
- **Data Skills Development:** Provision of interactive tools and activities focusing on analyzing various scientific data alongside STEM professionals.

ENGAGEMENT WITH CAREER-ORIENTED STEM ACTIVITIES

- **Direct Science Engagement:** Hands-on experimentation using NASA-inspired equipment and protocols for activities like plant growth studies and citizen science observations.
- **Interactive Learning Experiences:** Hands-on, experiential learning opportunities including simulated space missions, experiments, and summer programs that encourage active learning and problem-solving.
- **Interactions with Experts:** Direct connections between learners and NASA scientists, engineers, and STEM professionals through mentorship programs, speaker series, and Q&A sessions.
- **Scientific Communication:** Support for STEM identity development through opportunities to present research at conferences, symposiums, and technical meetings.

EFFORTS TO REACH EVERYONE

- **Inclusive Learning:** Creation of accessible materials through multilingual resources, Universal Design principles, and specialized resources for neurodivergent learners and the blind/low-vision community.
- **Community-Based Programming:** Development of locally relevant, culturally responsive programs through partnerships with community organizations to make STEM education more accessible and meaningful.
- **Place-Based Learning:** Connection of scientific concepts to local environments and community interests to enhance relevance and meaning for students.
- **Cultural Integration:** Incorporation of diverse perspectives and ways of knowing, featuring traditions from different cultures alongside scientific explanations.

EFFORTS TO MAXIMIZE REACH

- **Public Outreach and Events:** Organization of large-scale events and programs that bring NASA science to broader audiences through symposiums, demonstrations, and community events.
- **Special Event Programming:** Leveraging major scientific events like solar eclipses to spark interest in STEM through specialized activities, observation events, and educational programs.

DEVELOPMENT OF PRODUCTS AND RESOURCES

- **Resource Development and Sharing:** Developing educational videos, digital content, and interactive materials that showcase diverse STEM professionals while aligning with NASA content and learning standards.
- **Multimedia Resources:** Developing various media forms and online digital tools designed to explain complex NASA science concepts in accessible ways.
- **Digital and Mobile Access:** Developing and leveraging of multiple platforms for content delivery, including mobile apps, social media, and on-demand video optimized for diverse user access.
- **Personalized Support:** Offering differentiated learning approaches, customized mentoring, flexible project timelines, and ongoing technical assistance to meet distinct learner needs.

PROFESSIONAL LEARNING ACTIVITIES

- **Professional Development and Training:** Comprehensive trainings delivered through virtual webinars, in-person workshops, and immersive research facility experiences that focus on curriculum, scientific equipment, and research methodologies.
- **Collaborative Learning Communities:** Formation of intentional communities for educators to develop and test data-rich, place-based activities with peer support and expert guidance.

APPENDIX B: ECLIPSE 2024

Eclipse 2024 Wrap-Up

The 2024 total solar eclipse was the single most impactful event during this reporting cycle. This appendix documents the extent of SciAct's impact across the country from this celestial event alone.

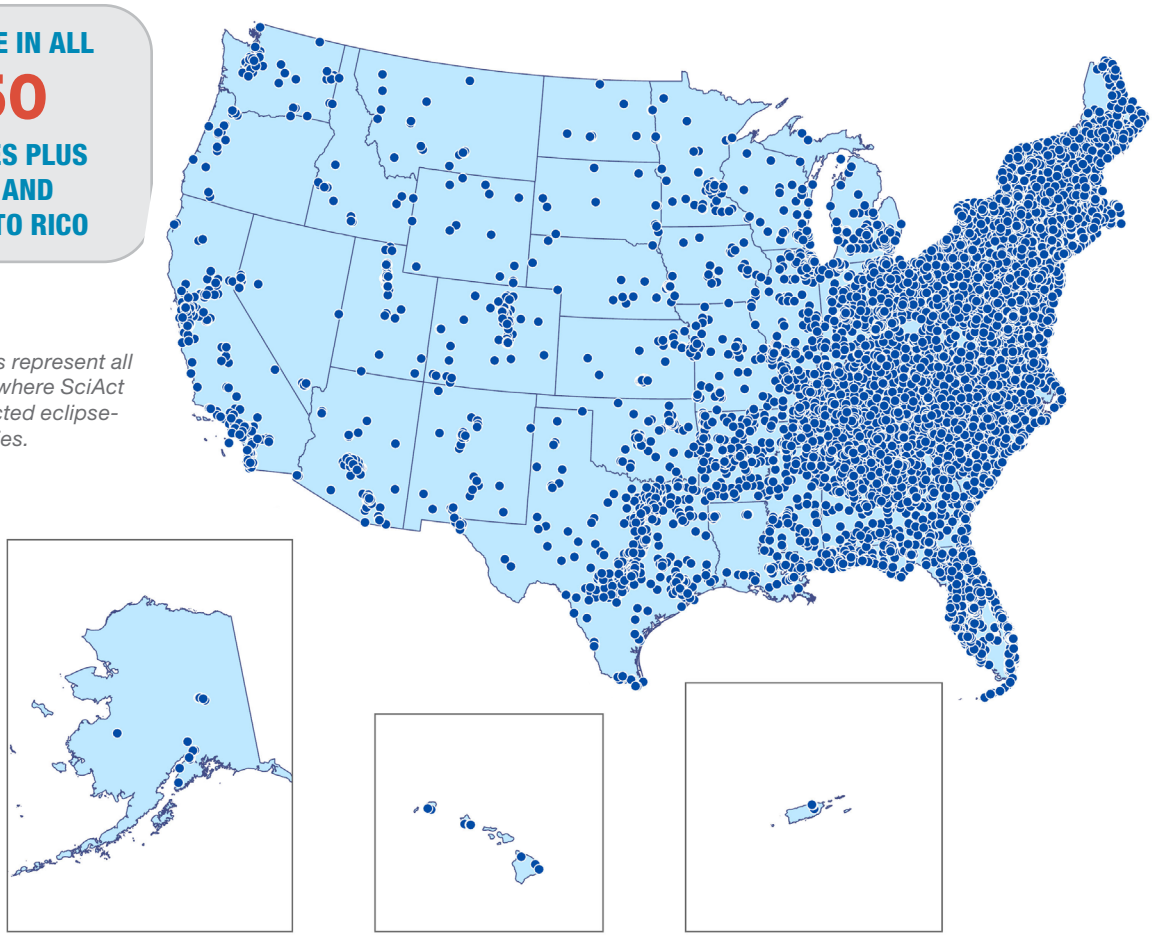
THERE WERE
66
MILLION
INTERACTIONS
WITH PEOPLE

A total solar eclipse is seen in Dallas on Monday, April 8, 2024. A total solar eclipse swept across a narrow portion of the North American continent from Mexico's Pacific coast to the Atlantic coast of Newfoundland, Canada. A partial solar eclipse was visible across the entire North American continent along with parts of Central America and Europe. [Credit NASA/Keegan Barber]

This photo of kindergarten students at Myers Elementary School in Grand Blanc, MI, was featured as one of TIME Magazine's Top 100 Photos of 2024. The students used an activity from the SciAct NASA HEAT project to create, decorate, and use safe solar viewing masks.

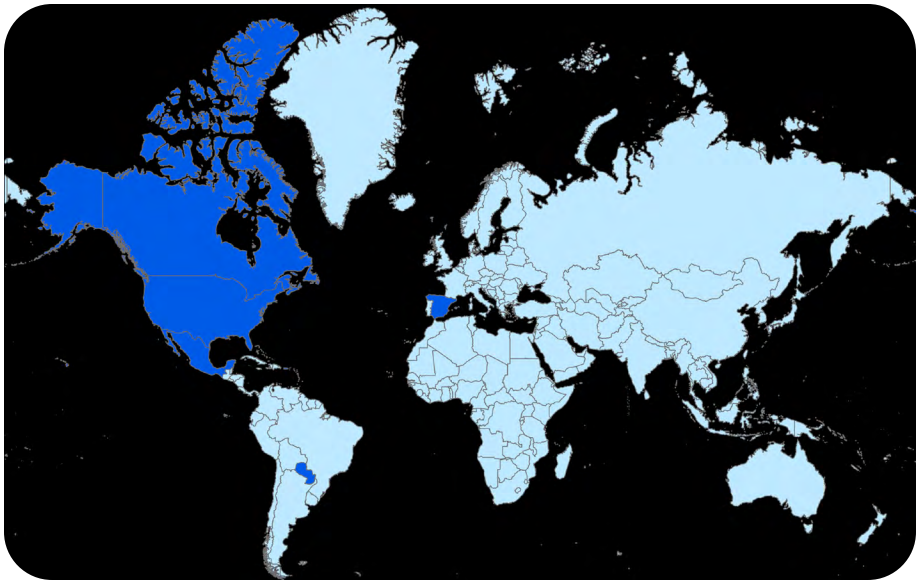
Also featured on the report cover, this image is of Civil Air Patrol cadets who participated in a nationwide mission to observe the impact of the eclipse. *See page 5 for more details.*

ACTIVE IN ALL
50
STATES PLUS DC AND PUERTO RICO



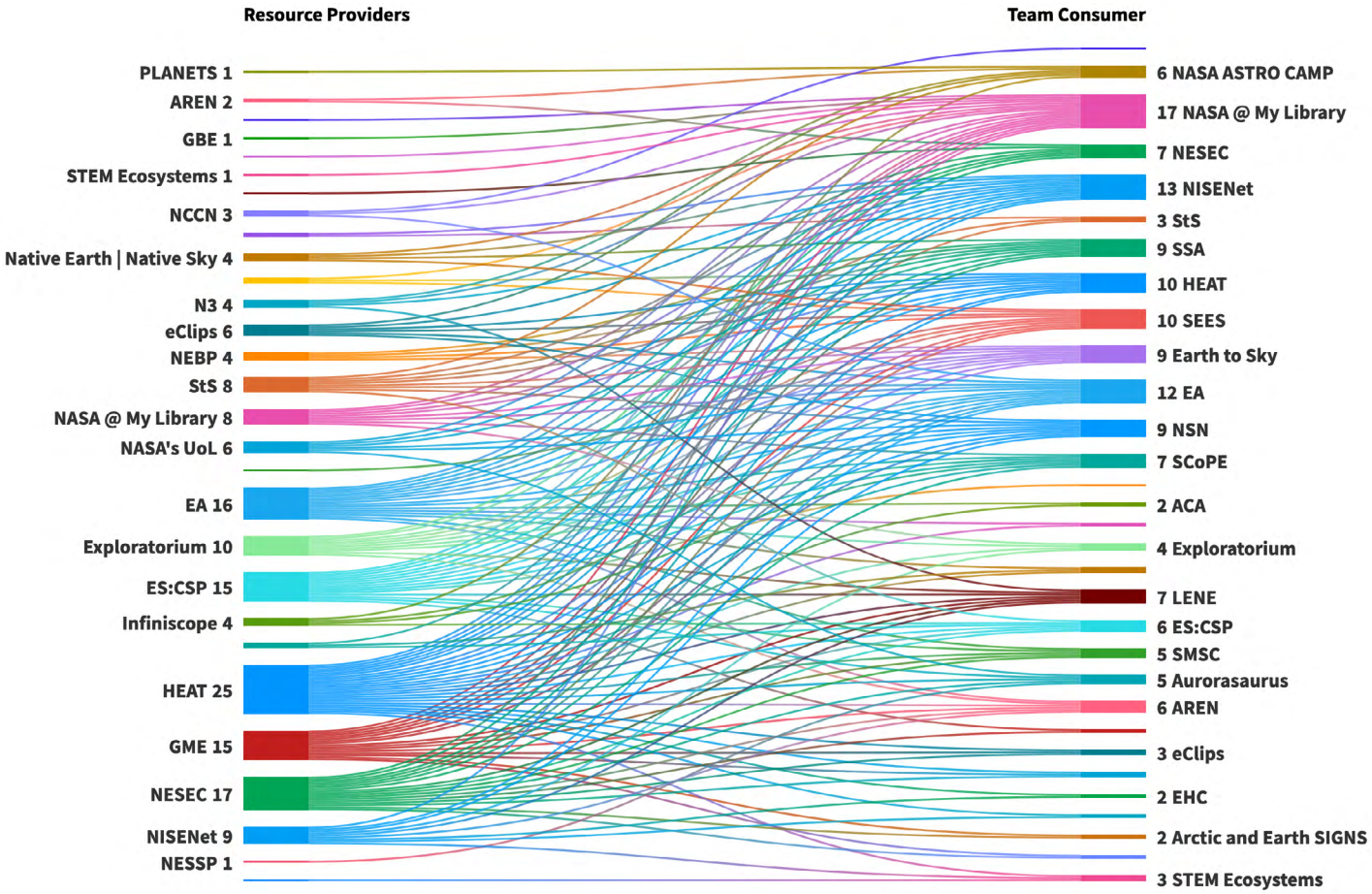
Dark blue dots represent all the locations where SciAct teams conducted eclipse-related activities.

PEOPLE REACHED IN
4
COUNTRIES PLUS THE PACIFIC OCEAN



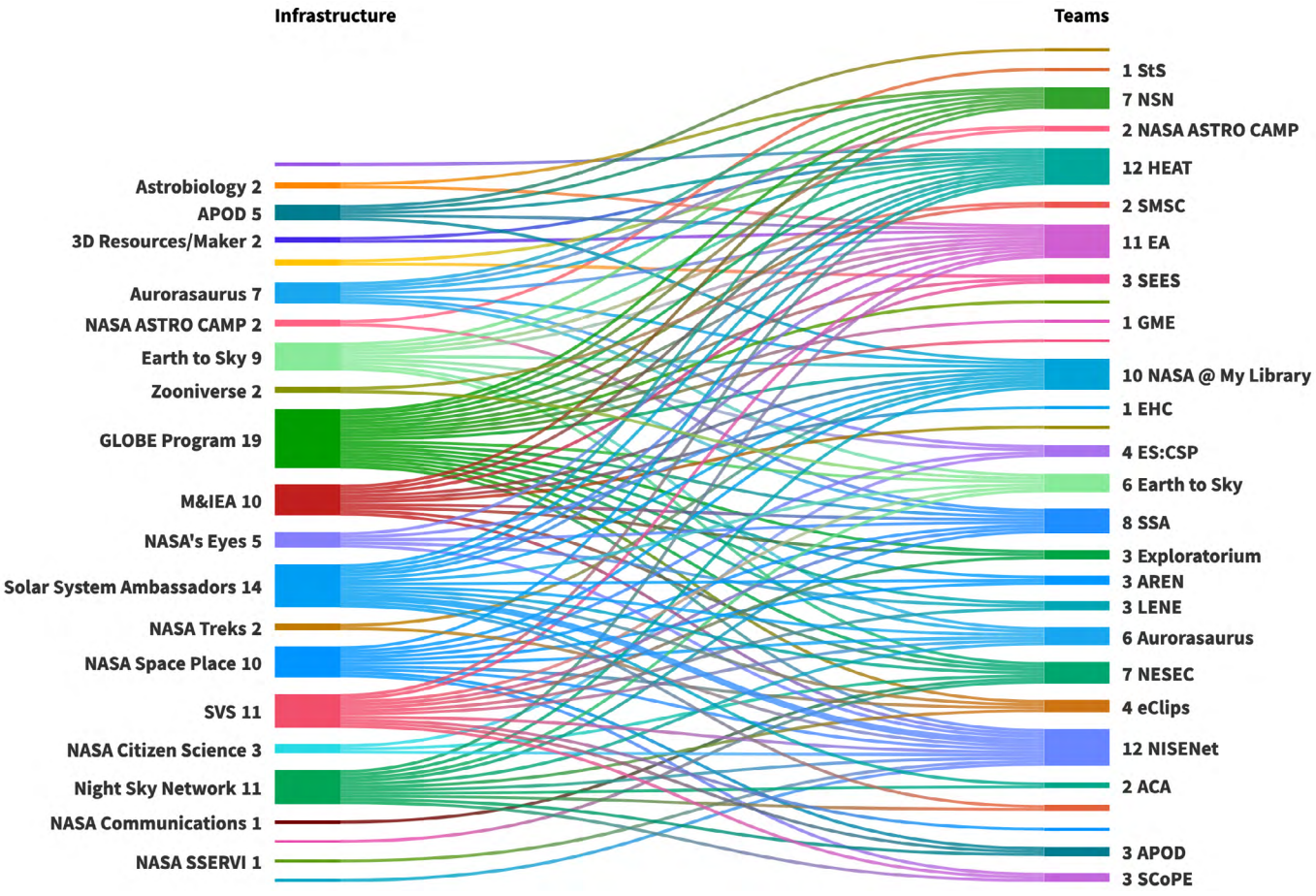
Bright blue countries are those where specific SciAct interactions were reported for the eclipse. SciAct solar system ambassadors also participated in events on ships off the west coast of Mexico, where the eclipse was first visible.

The cluster of recent solar eclipses across North America offered a unique opportunity for the SciAct collaborative network to work together to effectively reach diverse audiences across the entire nation—and beyond. The diagrams on these pages capture the myriad interactions between SciAct teams that operated in the lead-up to the eclipse to maximize the use of all eclipse-related resources and to reach a multitude of audiences across the country.



This diagram shows the flow of products/resources from 29 provider teams to 31 consumer teams and indicates that a substantial leveraging of assets occurred to support audiences in experiencing the eclipse. An interactive version of this diagram is available at ***https://public.flourish.studio/visualisation/18635480/****.*

Much more detail about SciAct eclipse interactions and their impact is captured in a paper that has been accepted to the Eclipse Special Issue of the Bulletin of the American Astronomical Society (Chambers et al. 2025, *Uniting Under the Eclipse: A Mega-Collaboration to Activate Science Learning Across the Penumbra and Beyond*). A Zenodo community (***https://zenodo.org/communities/sciact_eclipse***) is also being populated to archive all these SciAct eclipse resources for reference for the next U.S. total solar eclipse that will happen in 2044.



This diagram shows the flow of products and resources from 22 NASA infrastructure activities to 29 competitively funded SciAct teams. An interactive version of this diagram is available at ***https://public.flourish.studio/visualisation/17705867/****.*

THANK YOU

We hope you have enjoyed this brief snapshot of the Science Activation program and its 2024 impacts. It is our goal to provide every person of any age or background with the opportunity not only to experience the excitement of scientific discovery, but to become active participants in the advancement of knowledge well into the future. Keep up with our ongoing activities and explore Science Activation resources on our website: ***https://science.nasa.gov/learn/.***

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