Eclipse 2017:
A Celestial Achievement for Public Libraries

A Final Report for the Gordon and Betty Moore Foundation, NASA, Google, and the National Science Foundation

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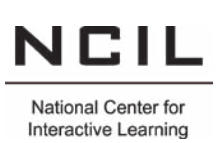

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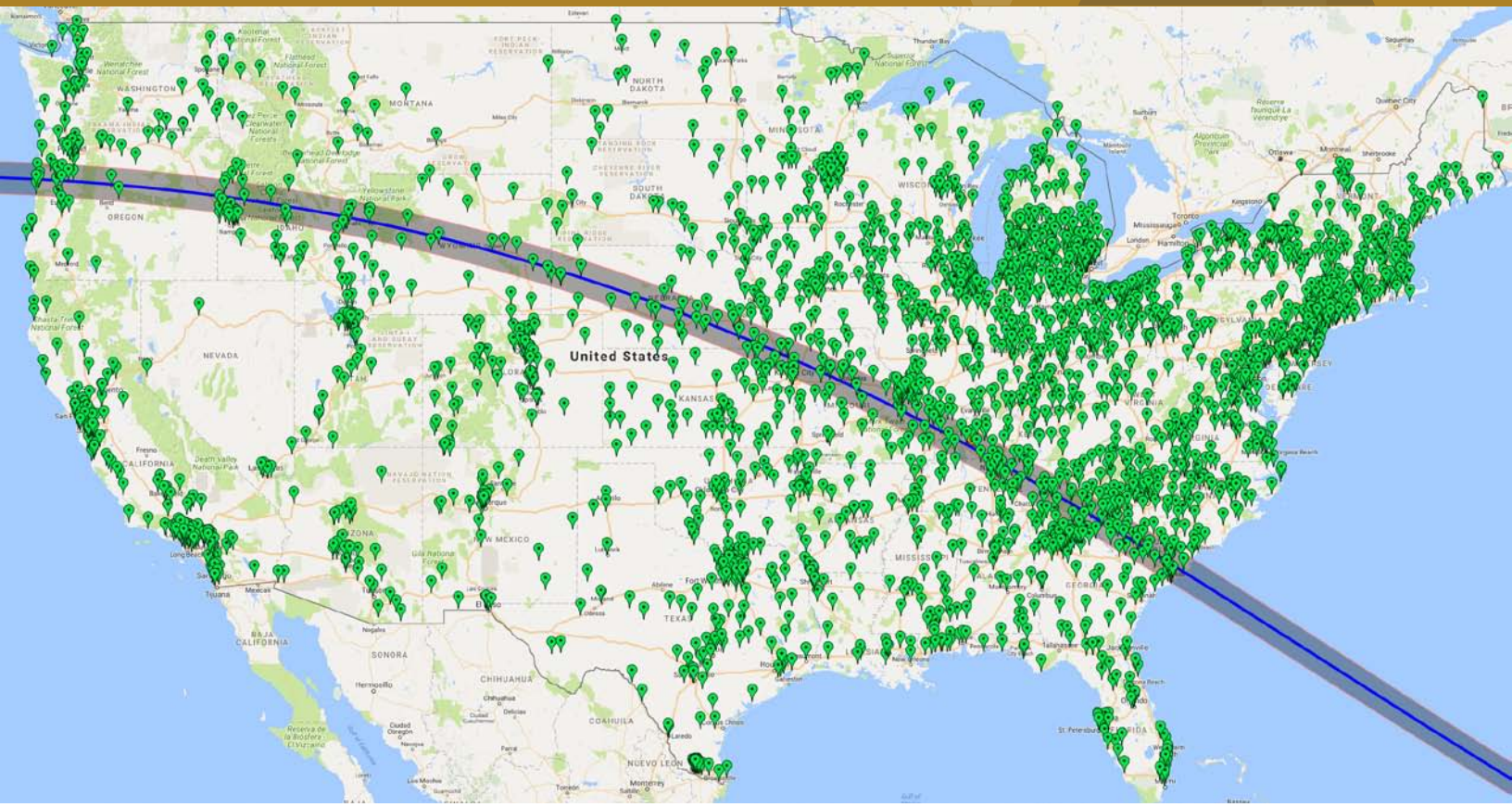
Overview



Final distribution map of libraries that participated in the 2017 Solar Eclipse. Credit: Space Science Institute / NCIL

On August 21, 2017, a spectacular total eclipse of the Sun was visible across the continental U.S. for the first time since 1918. Every state had at least 65% of the Sun covered by the Moon, and lucky people on a narrow path from Oregon to South Carolina saw the stunning beauty of totality that they will remember all their lives.

The Space Science Institute (SSI) was awarded a grant from the *Gordon and Betty Moore Foundation* that provided 1.26 million FREE solar viewing glasses and other resources for 1,500 public libraries across the nation. Dr. Robert Kirshner, Chief Program Officer, Science, at the Moore Foundation, said "The Moore Foundation is pleased to help two million eyes enjoy and understand this astronomical spectacle with astronomical spectacles." The Research Corporation, Google, and NASA also provided glasses and materials that added an additional 750,000 glasses, bringing the total to over 2.1 million glasses that were distributed to 4,000 library organizations (representing more than 7,000 individual library locations) across the country! They included public library branches, bookmobiles, tribal libraries, library consortia, and state libraries. Support for additional training, webinars and activity development was provided by the National Science Foundation, the Institute for Museum and Library Services, and the

2017 Total Solar Eclipse. Credit: Travis Holland

American Astronomical Society. SSI's National Center for Interactive Learning (NCIL) oversees the STAR Library Network (*STAR Net*) program (www.starnetlibraries.org) and its *NASA@ My Library* initiative and managed all facets of the library eclipse project. This was the largest single distribution of free glasses in the entire country and reached more people with glasses and information than any other educational effort for the 2017 eclipse.

An Eclipse Education Kit was developed that included a package of free safe-viewing glasses, plus a 24-page information booklet that combined background on eclipses with instructions on how best to do public outreach programs about the eclipse, along with other resources (such as material for demonstrations for groups). A printed version of the booklet was sent to the first 2,250 participating libraries. Education materials in the Kit were also made available in easily down-loadable form on the *STAR Net* website (www.starnetlibraries.org/2017eclipse), so that even libraries and organizations that applied later and could not receive a printed copy would get guidance on how to do public outreach before the eclipse, plus safe eclipse viewing techniques (some of which were not dependent on having a pair of solar viewing glasses, just in case glasses ran out).

The Moore-funded eclipse project was conceived by three astronomers, Andrew Fraknoi (Foothill College, Los Altos Hills, California), Dennis Schatz (Pacific Science Center, Seattle, WA), and Douglas Duncan (University of Colorado, Boulder, Colorado). Together they brought the idea to Paul Dusenbery, Director of the Space Science Institute's National Center for Interactive Learning (NCIL), located in Boulder, Colorado.

By The Numbers

It is estimated that the *STAR Net* Library Eclipse Project allowed 6 million people to observe the event safely.

Participating libraries were estimated to have conducted around 35,000 science programs before and during the eclipse, reaching approximately 1,750,000 people.

NASA's Science Mission Directorate (SMD) supports *NASA@ My Library* and was a valuable eclipse library partner. They played an important role in providing essential information about the eclipse as well as streaming the event live from several locations along the path of totality. NASA's solar eclipse coverage was one of the biggest internet events in recent history and by far the biggest online event NASA has ever measured.

More than 40 million views of their live broadcast on nasa.gov and multiple social platforms were recorded. This tops recent Super Bowl live streaming numbers and is in the realm of major news, sports and entertainment events. "The solar eclipse was truly the Super Bowl of Science" (Paul Dusenbery).

Many other partners were involved in the library eclipse project. Astronomers (including many members of the

A large group of patrons viewing the eclipse. Credit: Charles Abel, Chicopee Public Library

American Astronomical Society), astronomy hobbyists (e.g., members of NASA and the Astronomical Society of the Pacific's Night Sky Network – http://nightsky.jpl.nasa.gov) and NASA's Solar System Ambassadors – http://solarsystem.nasa.gov/ssa), museum educators, park rangers, and science teachers (contacted through the National Science Teachers Association) partnered with libraries in their own communities, helping to put on eclipse outreach events. For example, recent data from NASA's Solar System Ambassador program showed

that through the end of August, members had logged 394 programs at libraries that served 55,000 participants. This was a dramatic increase from 2016. The Night Sky Network logged 296 events in libraries that reached 18,800 participants.

Hundreds of thank-you letters have been received and photos of events have been posted to the *STAR Net* Flickr account. For example, Menomin Hawpetoss, Information and Training Specialist, Menominee County Library, wrote:

"We had one of the biggest events our Library has ever seen. So, in my language, we say Waewaenen (Thank You)!"

Many libraries had a response like this one from a librarian in Michigan:

"This event and your help attracted people who had never come to the library before, but more importantly, they got library cards, they checked out books, and they CAME BACK. This helped them see us for what we've become, not what we were when they were children."

By engaging the American Library Association (ALA), Association of Rural and Small Libraries (ARSL), Chief

Solar Eclipse Feedback Board. Credit: Space Science Institute / NCIL

Officers of State Library Agencies (COSLA) and other organizations that support libraries like *STAR Net*, we ensured that libraries throughout the country were aware of the eclipse well in advance to plan a successful event.

According to the American Library Association's Public Awareness Office:

"It was one of the largest science events that libraries have participated in."

KIds viewing a total solar eclipse video. Credit: Citizens Library

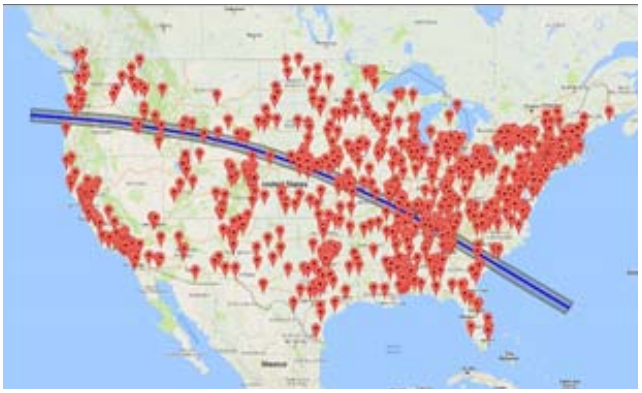
Patrons participating in the library's educational program. Credit: Carnegie Library of Midland

Library Selection Process

Patrons viewing event exhibit during the library's eclipse program. Credit: Cerritos Library

Participating libraries served as centers for eclipse education and viewing for their communities. They were selected through an application process managed by NCIL's *STAR Net* and its *NASA@ My Library* initiative.

NCIL's plans for facilitating library participation in the 2017 eclipse originally involved using existing grant funds (from the NASA-funded *NASA@ My Library*) to support up to 200 libraries. This included providing glasses, webinar training, and supplementary materials. Based on prior participation in *STAR Net* activities, and applications to *STAR Net* exhibition programs, this seemed a reasonable number. Almost instantly, after opening the opportunity to register interest in August 2016, more than 400 libraries had signed up. It became clear that more funding and support was needed. We created an interactive Google map that showed where registered libraries were located, the library name, and its website (see map to the right). Each library had its own red pin. The idea was to turn the pin green after the library had successfully applied for the glasses and Kit. This was our basic 2-step process but while it looked good on paper, it was anything but basic in execution, requiring much more staff support than anticipated.



Over 1,000 libraries had already registered to host 2017 eclipse events as of Ocober 2016. Credit: Space Science Institue / NCIL

Thankfully, this is when the Moore Foundation opportunity came through, in November 2016. With Moore funding, we made a new goal of reaching 1,500 public libraries with either 200 or 1000 glasses, and a Kit of eclipse activities and resources. Our goal was to make the registration process to receive glasses as straightforward as possible. Libraries were required to provide the team with basic demographic information, a description of at least 2 planned eclipse events, and a description of how they would reach underserved audiences, depending on a library's stated need. Again, our expectations were quickly surpassed, and we reached almost 2,000 registered libraries in early Spring 2017. At this point, funding from Google had been secured, allowing an additional 740,000 glasses and 750 additional Kits to be produced for a total of 2,250 Kits.

During this time, we had to develop and maintain an effective database system that was numbering in the thousands of entries as well as determine which libraries were eligible to receive this valuable resource. Both were not easy because interest kept on growing, increasing the number of libraries, as well as the number of glasses they wanted.

Many libraries, on and off the path of totality, were completely unprepared for the demand in their community. We began to notice this disconnect in the spring, but had no idea what lay ahead in the summer – the challenge for our team and our ability to service the demand that was lying like a sleeping giant. Public libraries didn't know what was coming either.

The Application Process

The second phase of the process was organizing the application and fulfillment process. Libraries who applied and were selected were then color-coded in our growing database. Their information was sent to one of the glasses factories (which had facilities to produce glasses in bulk, print mailing labels, and ship our Eclipse Education Kits.) There are two American factories that each have decades of experience producing safe, dependable eclipse-watching glasses (American Paper Optics and Rainbow Symphony). Team member Douglas Duncan, had spoken extensively with them and visited and audited their factories. Both agreed to pack and ship the educational materials we produced as part of the Eclipse Education Kit, along with the solar viewing glasses. These two factories were under contract with us by February 2017. Working with the factories this way meant that they would handle the bulk of the logistical burden, doing what they are good at, and leaving the project staff, librarians, astronomers and educators to develop and implement a memorable eclipse event for thousands of communities across the country.

We created an application website page that only registered libraries could access. It provided background information and suggestions for eclipse-related outreach programs and had a link to a Survey Monkey application form. The Application Form asked libraries more information than the earlier registration form. They were required to explain their promotion plans, outreach plans, and glasses distribution program they planned to use, along with partners they planned to work with. Every library designated a single librarian as the key point of contact for the program. We also requested information on how the library planned to engage groups that are underserved and underrepresented in STEM fields.

Dennis Schatz conducts a library eclipse program in Seattle.
Credit: Dennis Schatz

Another important part of the application process was to encourage partnerships between libraries and professional and amateur astronomers along with other community organizations. Library contact information (e.g., library name, website, contact person, phone number) were displayed on the "red pins" in the map above to facilitate such partnerships. Libraries that were approved had their red pin on the Library Eclipse Map turn green. The team engaged many organizations including the National Science Teachers Association (NSTA), Girl Scouts, American Astronomical Society (AAS), NASA's Night Sky Network and Solar System Ambassadors, and other volunteer organizations – asking their members to reach out to public libraries in their region. Such partnerships were not only important for eclipse outreach but will hopefully endure for future STEM events. This part of the project was very successful and exceeded our expectations.

The Library Eclipse Project Goes Viral

During the April/May 2017 timeframe, about 2,000 library organizations were being processed. Around mid-June, reports in the media about our project (including interviews with team members) spiked and our library eclipse project went viral. The primary cause was due to news reports from CNN, Space.com, Newsweek, Washington Post and other national outlets that were picked up by local stations across the country.

The *Library Eclipse Map* was a big reason for this surge in interest. It had contact information for all approved libraries and the public began to learn that FREE solar viewing glasses were now at their local library. Another factor that caused the eclipse frenzy was that many participating libraries were also very active in their local media.

The NCIL team was suddenly inundated with additional requests for glasses, ranging from just enough to host small programs, to requests in the thousands for large libraries or library systems along the path of totality. The Moore Foundation provided support for increased staff time and an additional supply of 35,000 glasses. When even these glasses ran out, NASA SMD came through with a last-minute donation of 100,000 glasses for libraries scrambling to replace the rumored "defective" glasses and filters ordered through Amazon. This surge in interest from the public in our eclipse resources overwhelmed our servers in July and August and libraries began to beg us to remove their contact information from the map, which we were happy to do.

Solar viewing glasses provided by the Eclipe Project Team

For one library's experience of the unexpected impact from the eclipse, what worked and the lessons they learned for 2024, read their blog at http://programminglibrarian.org/articles/lessons-totality-learning-2017-total-solar-eclipse.

NCIL ended up being able to fulfill more than 7,000 individual requests from public libraries, state libraries, tribal libraries, library consortia and military libraries. When all our glasses ran out, the NCIL team was able to refer librarians to the project website and the PDF version of our 24-page booklet, which helped libraries plan programs using indirect viewing methods. We also provided information on the fact that the project's glasses had been manufactured by the two reliable U.S. suppliers, and weren't the dubious fakes, about which rumors were running rampant on online sites.

All in all, more than 2.1 million glasses were distributed through this expanded effort. The request manager (Anne Holland) kept track of how many requests we were not able to fill (including requests for extra glasses and new requests), and this number was over 1 million.

Eclipse Resources

Patrons viewing the solar eclipse outside the library: St. Johns County Public Library System

Website

The *STAR Net* Eclipse website (www.starnetlibraries.org/2017eclipse/) provided an extensive online resource for public libraries to learn about the 2017 Eclipse, and in turn, educate their communities on one of the most exciting celestial events of the century.

STAR Net's Eclipse Resource Center or ERC (http://www.starnetlibraries.org/2017eclipse/eclipse-resource-center/) was home to a select group of vetted educational materials that included books and articles, videos, webinars and newsletters as well as FAQs and links to numerous eclipse-related resources. The ERC also presented information on Event Planning that discussed developing partnerships, outreach opportunities and eclipse safety as well as a Media Toolkit providing media templates, images, videos and animations, and other promotional materials.

The *STAR Net* Eclipse Website

In addition, the ERC supplied public libraries with curated hands-on activities through its STEM Activity Clearinghouse, (clearinghouse.starnetlibraries.org). Public library staff used these activities to facilitate learning on topics such as the scale of the Earth-Moon-Sun system, features of the Sun, and of course, safe solar viewing. The "2017 Solar Eclipse" collection on the Clearinghouse consisted of 19 activities. The collection includes resources from NASAWavelength.org and other repositories of NASA Science Mission Directorate's Science Activation Team resources. Each activity is paired with supporting resources, such as related books (e.g., When the Sun Goes Dark, by Andrew Fraknoi and Dennis Schatz). Library staff posted reviews of their experiences using the activities, and their feedback will help future Clearinghouse users identify and adapt the resources for their own use.

The Eclipse Resource Center

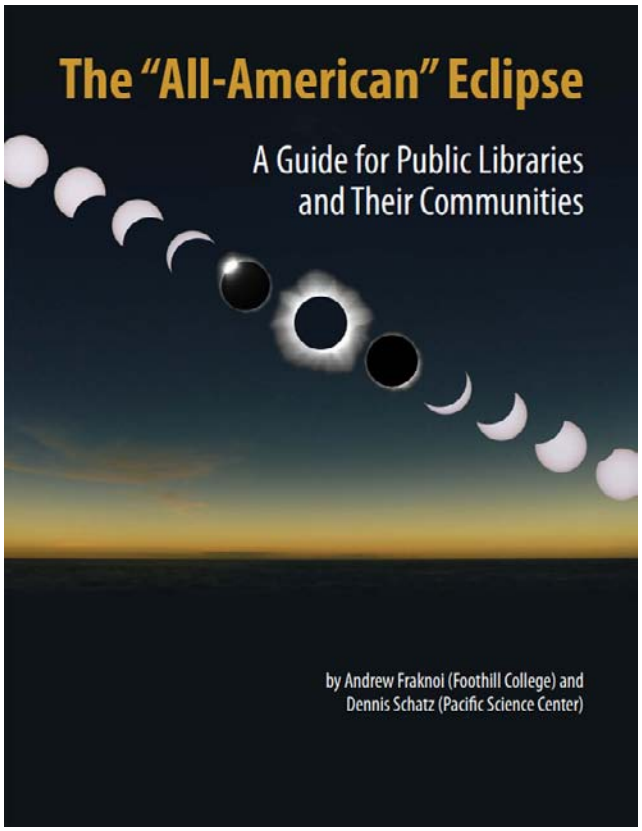
Eclipse Guide

Andrew Fraknoi (Foothill College) and Dennis Schatz (Pacific Science Center) co-authored the project's Eclipse Guide (http://www.starnetlibraries.org/EclipseGuide/). Guide development and printing was supported by the Moore Foundation.

The Guides were included in the Eclipse Education Kit that was mailed to 2,250 participating libraries. Each Kit included 200 or 1,000 solar viewing glasses depending on need, along with the Guide, The Astronomical Society of the Pacific's Eclipse on a Stick activity, and a pocket folder packed with *STAR Net* and NASA science materials.

The Guide's Table of Contents is below.

1. Introduction to Eclipses and the 2017 Eclipse
2. How to View the Eclipse Safely
3. Eclipse Glasses: Getting Them, Using Them
4. Ideas for Eclipse Events
5. Finding Partners
6. About the STAR Library Network (*STAR Net*)
7. About the Authors and Credits



The Eclipse Guide

Eclipse Outreach in the San Francisco Bay Area

As part of what we promised the Moore Foundation, one team member (Andrew Fraknoi) made a special effort to do outreach to librarians and libraries across the San Francisco Bay Area, where the Foundation is located. Starting in spring 2017, he began to contact local library systems, and with organizations (media, civic clubs) through which we could reach the public.

Ultimately, he was asked to give librarian training workshops and/or public talks at 7 community libraries:

- Oakland library system (training librarians system wide)
- Berkeley main library
- San Francisco main library (including electronic information sent to all system librarians)
- Milpetas library
- Santa Clara library
- Cupertino library
- Menlo Park library.

In addition, he gave talks about the eclipse and announced that libraries had glasses and information at:

- The Commonwealth Club of California
- The Silicon Valley Astronomy Lectures
- The Celebrity Forum in Cupertino
- The Carmel Authors and Ideas Festival
- The San Jose Rotary Club
- The Northern California Science Writers' Association
- Google (the talk was electronically sent through all the company's buildings)
- A number of news media outlets including the San Francisco Chronicle, KGO radio, CBS News

Libraries in the area reported high demand for glasses and record attendance at eclipse events. In Berkeley, the library reported all glasses being completely gone in just a couple of days after they were first announced (we were able to get them additional glasses through Google and the University of California.) In most of the libraries, the public eclipse lectures were standing-room only. In the small suburb of Santa Clara, the library reported that over 1,000 people came to the library on the day of the eclipse – to get glasses and viewing information, and to join with others in celebrating the celestial event. At each event, Fraknoi thanked (and showed slides about) the project sponsors, particularly the Moore Foundation, NASA and Google.

Crowds at the Menlo Park Library July 2017 for Eclipse Talk by Andrew Fraknoi

The Peninsula Symphony Orchestra wearing eclipse glasses during Eclipse Talk by Andrew Fraknoi

Eclipse-related Webinars

Library staff are interested in offering more STEM programming, but they face barriers such as limited resources and lack of confidence in teaching STEM topics. Training on a variety of topics is critical for their success, and for the eclipse, the project team provided not just the materials discussed above but also interactive webinars. Training was organized around meeting a clear need for library programs: instruction on facilitating active learning experiences for multiple age groups. Webinar presentations and Q&A with experts helped library staff gain confidence in hosting Sun-safe events. Project team members, Andrew Fraknoi and Dennis Schatz, helped with many webinars starting in June 2016. Dr. Isabel Hawkins (Exploratorium) shared her experience in engaging audiences underrepresented in STEM in the museum setting to the library field. Project team member, Douglas Duncan, led one in early August 2017 about eclipse safety. Webinars also offered a way for the project team to disseminate resources and respond to library staff questions and needs. The table below displays the 10 eclipse-related webinars that were conducted from June 2016 through August 2017.

Date	Title	Presenters	Attendees	Views	Downloads
6/15/2016	Solar Eclipse Webinar	Andrew Fraknoi (Foothill College), Lou Mayo (GSFC/NASA)	99	N/A	152
10/19/2016	Solar Eclipse Webinar	Andrew Fraknoi (Foothill College), Dennis Schatz (Pacific Science Center)	235	N/A	360
1/25/2017	Solar Eclipse Webinar	Andrew Fraknoi (Foothill College), Dennis Schatz (Pacific Science Center)	36	N/A	111
3/13/2017	Eclipse Pre-Application Webinar	Anne Holland, Keliann LaConte	212	8	453
5/9/2017	State Library Agency Eclipse Webinar w/ COSLA	Tim Cherubini (COSLA), Sarah Post (CoS), Keliann LaConte	N/A	N/A	N/A
5/22/2017	Earth-Moon-Sun Connections Kit (NASA@ My Library Partners)	Keliann LaConte, Anne Holland, Jaime Harold, Brooks Mitchell	67	N/A	N/A
6/7/2017	NASA Partnerships in Your Own Backyard	Anne Holland, Night Sky Network, Solar System Ambassadors	170	130	91
6/14/2017	Using Your Kit for Sun Celebrations (NASA@ My Library Partners)	Keliann LaConte, Anne Holland, James Harold, Brooks Mitchell	23	N/A	N/A
7/12/2017	Eclipse Cultural Connections	Brooks Mitchell and Isabel Hawkins (Exploratorium)	37	81	4
8/2/2017	Safe Eclipse Viewing	Brooks Mitchell and Doug Duncan (Fiske Planetarium)	101	374	9
TOTALS			**980**	**593**	**1180**

These webinars were archived on our web site and could be watched whenever a library staff member needed them.

NASA Partner Results

A NASA partner assisting a child in viewing the solar eclipse via a telescope. Credit: Cerritos Library

NASA's Official Eclipse Website

The project team collaborated throughout 2017 with staff at Goddard Space Flight Center/NASA who created a very useful website (https://eclipse2017.nasa.gov/) that organizations around the country could use to develop all sorts of programs. *STAR Net* and our Library Eclipse Project were featured on the informal education resource area on the NASA site.

NASA Eclipse Website - Homepage. Credit: NASA

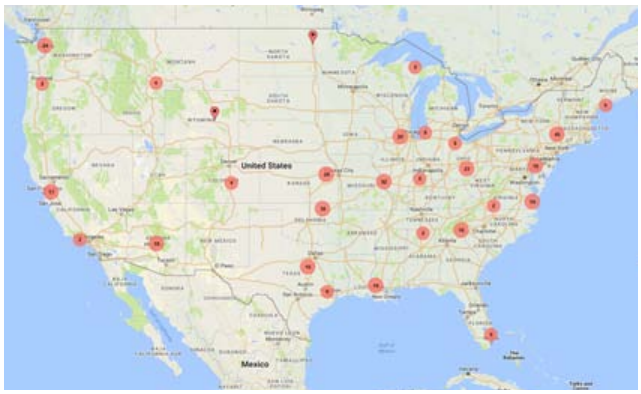
NASA Eclipse Website - Informal Education. Credit: NASA

NASA's Night Sky Network

The Night Sky Network (http://nightsky.jpl.nasa.gov) is managed by NASA's Jet Propulsion Laboratory in partnership with the Astronomical Society of the Pacific. It is a coalition of over 450 astronomy clubs across the U.S. They share their time and telescopes to provide unique astronomy outreach experiences both inside and under the real night sky. Many clubs partnered with public libraries leading up to and on the day of the solar eclipse.

Program Impacts:

- More than 460 events were held in libraries across the country.
- 312 events were logged, reaching 19,000 people
- Night Sky Network numbers are vastly under-reported so many more people were likely reached.



Geographical distribution of NSN events at libraries. Credit: NSN

Downtown Library (Tulsa)

Wamego Public Library (Kansas City)

Smith Wylie Public Library (Dallas)

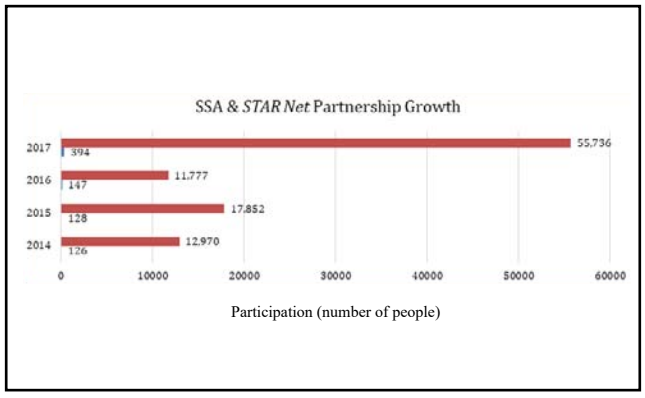
North Oak Cliff (Dallas)

Solar System Ambassadors

The Solar System Ambassadors Program (http://solar-system.nasa.gov/ssa) is a public outreach program designed to work with volunteers across the nation who communicate the excitement of NASA's space exploration missions and information about recent discoveries to people in their local communities.

The Solar System Ambassador Program Office reported that the number of their programs in libraries and attendance numbers increased dramatically in 2017 because of the eclipse event. A total of 394 events at libraries in 2017 had a direct reach of 55,736 with 278 of those being eclipse prep or day of events. Most of the eclipse events at libraries were prep events, which makes sense as Solar System Ambassadors mostly held events along the path of totality on August 21.

Geographical distribution of SSA events at libraries. Credit: SSA



SSA & *STAR Net* Partnership Growth. Credit: SSA

Lessons Learned

- This large, national eclipse event helped to create and solidify this partnership (SSA's & *STAR Net* Libraries) that hopefully is long-term and not just for the eclipse.
- Partnership creation was also greatly helped by the telecons we ran in advance of the eclipse (going back to 2016) that alerted libraries and Solar System Ambassadors about each other's programs.
- It was a huge help that the Solar System Ambassador program was mentioned frequently as part of the *NASA@ My Library* initiative.

Moving forward, the Solar System Ambassador Program Office will continue to track impact numbers and find ways to further cultivate this growing, and valuable, partnership. It is recommended that Solar System Ambassador and *STAR Net* teams continue to run a joint partnership telecon annually, with slightly different themes to keep it fresh but continuing to focus on making sure *STAR Net* libraries and Solar System Ambassadors know about each other and continue to connect.

American Astronomical Society

Although AAS was not able to track their members' participation in the eclipse and provide that information with the project team, members were actively encouraged to support library programs. AAS posted information about the project on their website and through their social media. The AAS Eclipse Task Force encouraged libraries around the country to apply, and spoke with media representatives about the program. Project partner, Andrew Fraknoi, is scheduled to give a presentation about *STAR Net*'s Library Eclipse Project at the Annual AAS meeting in January 2018.

Participating Library Results

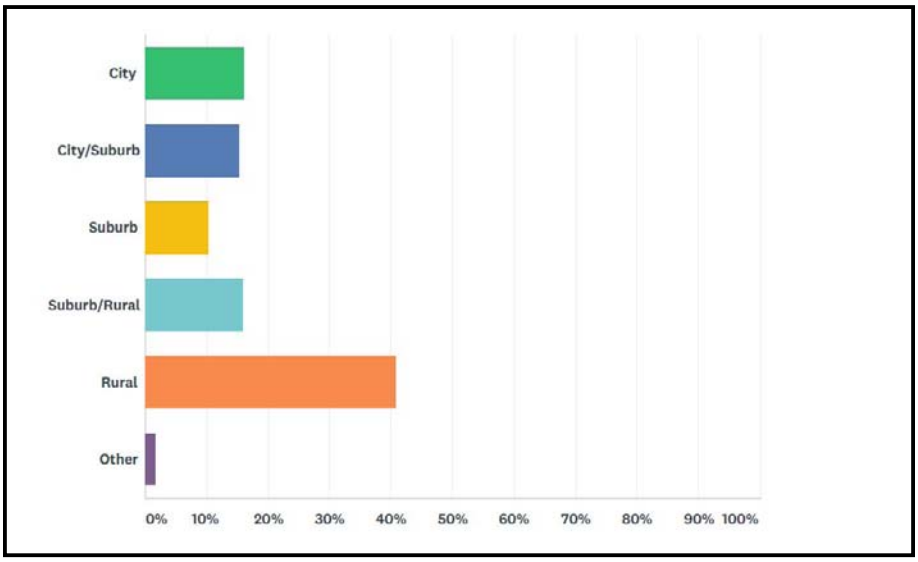
KIds viewing the Solar Eclipse. Credit: Georgetown County Library System

Summative evaluation was accomplished using Survey Monkey. Participating libraries were encouraged to fill out this survey as part of their application. The results gave the team information about the impact of this celestial event on libraries, their partners, and most importantly their communities. NCIL staff managed the project's evaluation (n=1,193). This number of respondents is statistically significant. Selected responses from participating libraries are in Appendix 2.

Children displaying their eclipse drawings. Credit: Henry County Library

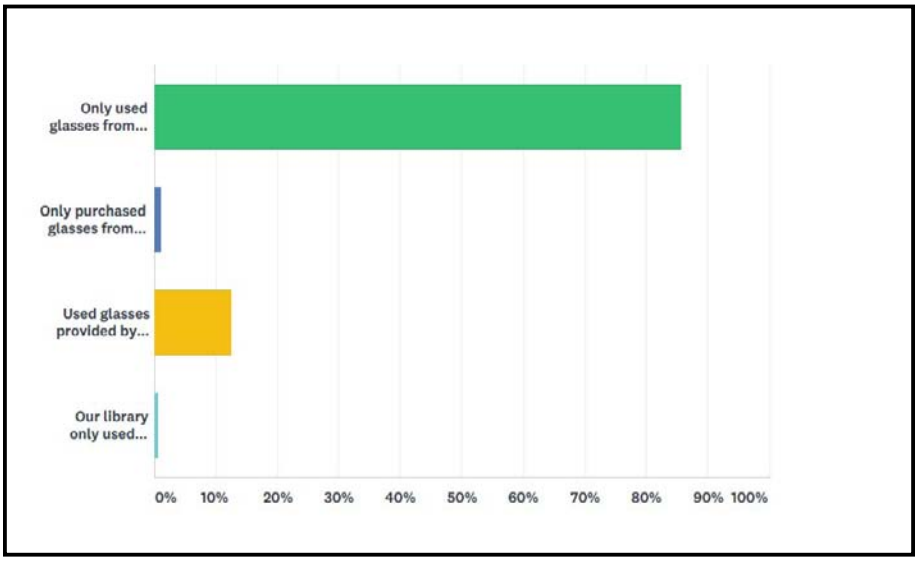
Older patrons viewing the solar eclipse. Credit: Indianola Public Library

Community Type



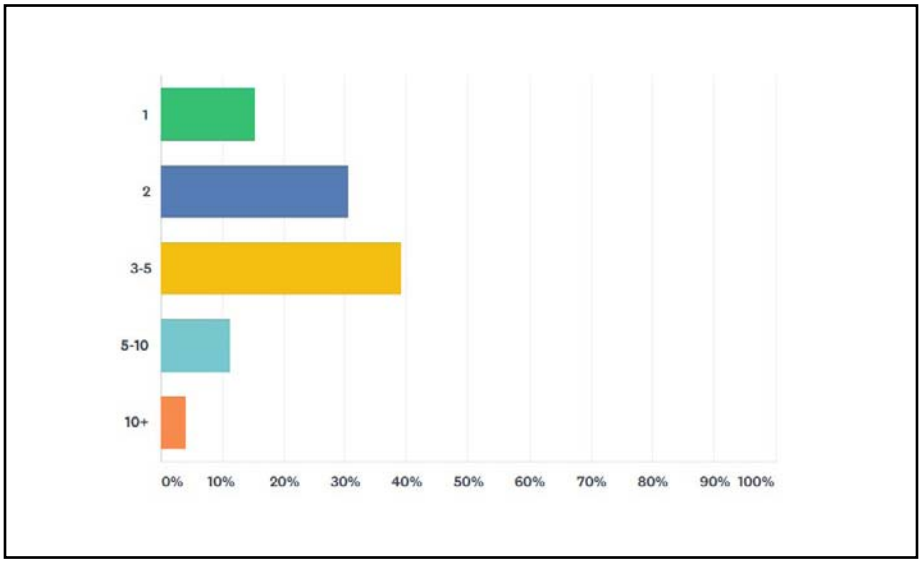
Result: Most libraries participating in the event were from rural communities.

Did your library receive glasses from the STAR Library Network (*STAR Net*), or did you purchase your own?



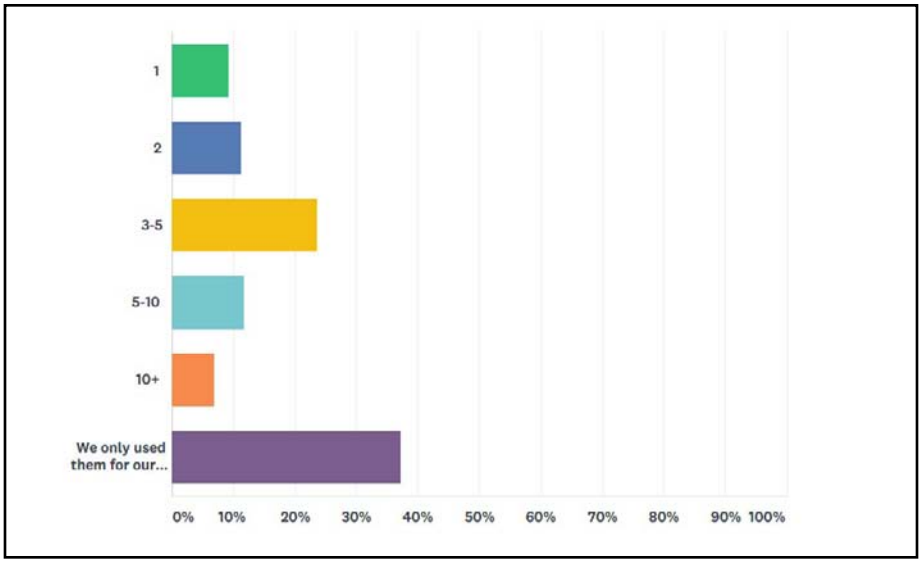
Result: Most libraries only used glasses provided by the Library Eclipse Project. Very few libraries used other channels.

How many programs around solar science, and/or the eclipse did your library conduct in 2017?



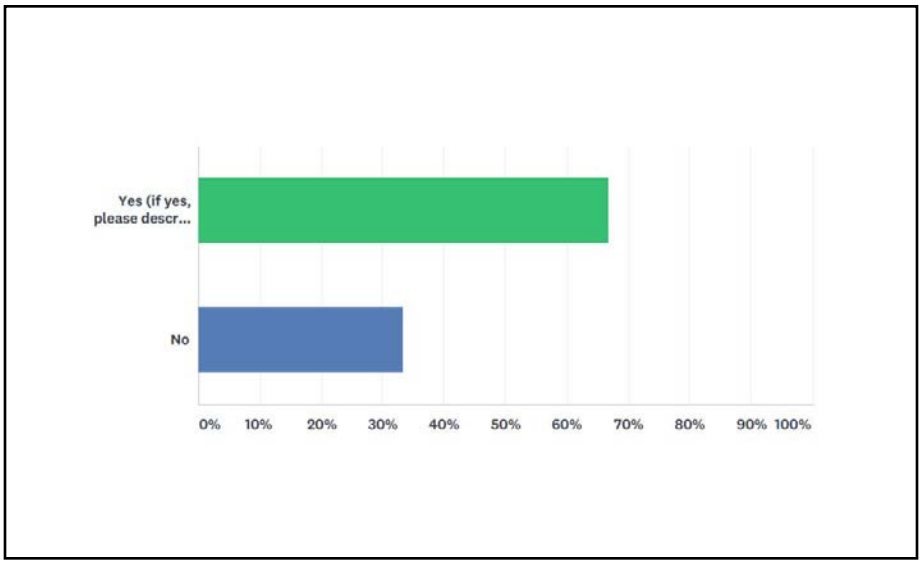
Result: The average number of programs conducted by participatig libraries was about 5.

If you received glasses from *STAR Net*, how many other libraries, schools or other non-profit/education venues did you share them with?



Result: Most libraries only used the glasses for their own programs though there was definitely evidence that libraries also shared their glasses with other organizations.

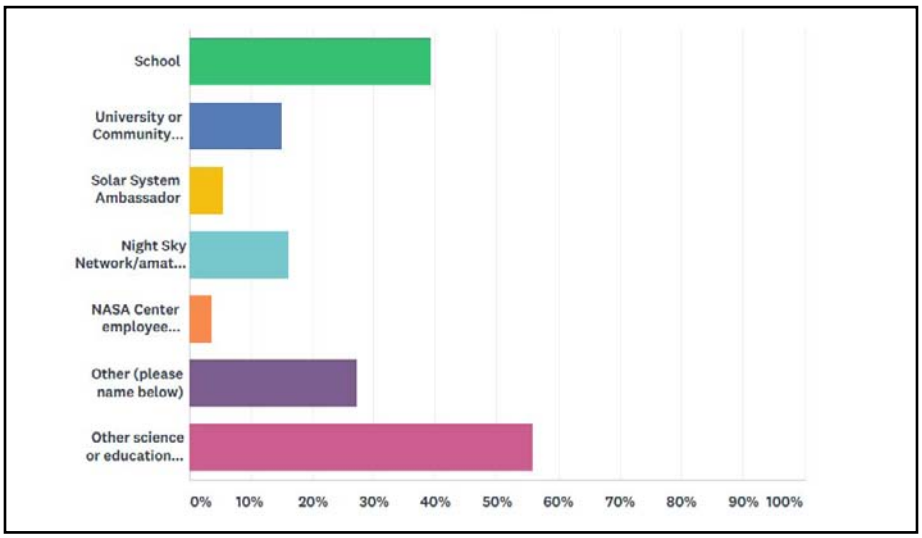
Did you purposefully distribute glasses to underserved and/or under-represented audiences? (Example, did you target promotion to these groups, or save a subset of glasses for them?) Underserved audiences may include rural audiences, economically challenged regions or urban audiences. If your community would be defined as underserved or underrepresented, please answer "Yes" to this question.



Sample Responses:

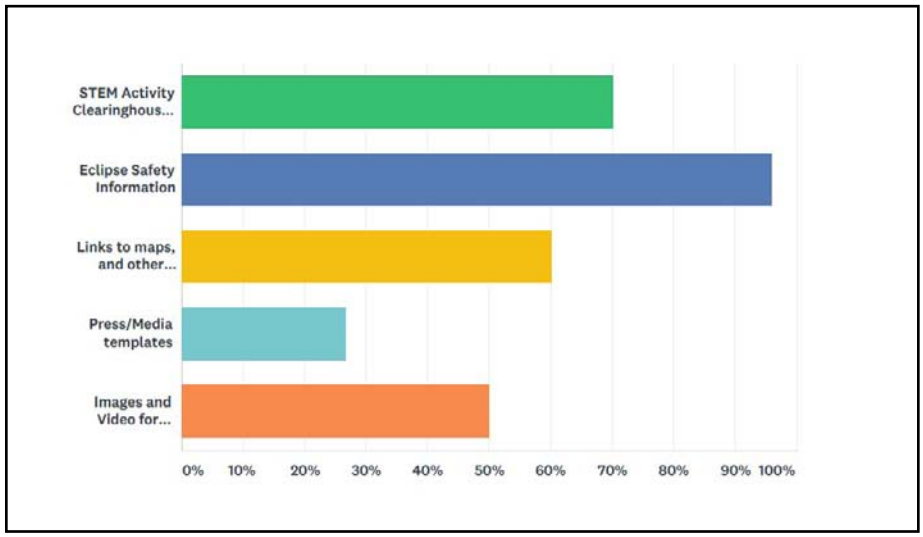
- We translated handouts into Spanish and targeted distribution to our east side locations.
- We are a small town/rural library (pop. 5,000). Glasses distributed to public - including women, girls, and all income levels, as well as the public schools.
- Our community would be defined as underserved - economically challenged - Appalachia.
- Our community is made up of a rural mix of many demographics including White, Hispanic, Native American, the elderly, and many others. With a high school dropout rate of between 20 and 35% and over 88% of all students in our district qualifying for free school lunches the entire community falls into the category of underserved and is a "focus zone" for Oregon Department of Education to increase access to quality STEM programing.
- We serve a very diverse community: Indian, African American, Hispanic.
- Rural, economically disadvantaged, American Indians, women, girls. Our community is geographically isolated and has a high poverty rate, especially for children.
- Our rural community library provides services to underserved African Americans as well as people that are economically disadvantaged. This is a close knit community and we were able to spread a lot of information by word of mouth and through other community services (churches, community and senior centers)
- Our city is comprised mostly of underserved populations. There was a large percentage of Latino/Hispanic patrons served with the program as well as elderly and low income.

Please tell us about any science or education organizations with which you partnered. (Check all that apply, and include organization names if possible in the comment box.)



It's worth noting here that the "other science or education professionals" group included quite a few Solar System Ambassadors, Night Sky Network members, and NASA staff that respondents didn't know what category to put them in.

Which resources from www.starnetlibraries.org did you use? Please check all that apply.



Result: Participating libraries used a number of eclipse education resources that were developed by the project team.

Concluding Remarks

A chalk drawing of the Sun by Samantha Comstock and her four children. Credit: Topeka & Shawnee County Public Library

Public libraries are transforming into accessible community centers that are excellent settings to provide free STEM resources and STEM programming to their communities. They are particularly well-suited for reaching underserved audiences, and serve people of all races, ages, and socio-economic backgrounds. This project stimulated widespread interest because it focused on an engaging STEM topic – a solar eclipse. The eclipse also attracted many community members to help plan and participate in this celestial event.

The public interest in the eclipse also allowed libraries to connect with local STEM experts and resources, including scientists, amateur astronomers, science teachers, museum staff and others. Such connections can be leveraged for future astronomical and terrestrial events that have opportunities for large-scale public engagement.

The Library Eclipse Project not only brought eclipse information and safe viewing to millions around the country, but greatly increased the number of libraries involved with the STAR Library Network (*STAR Net*) and its *NASA@ My Library* initiative. NCIL's initial plans to send solar viewing glasses to 200 libraries ballooned to more than 7,000 public libraries, state libraries, library associations and bookmobiles receiving eclipse glasses and our Eclipse

Patrons celebrating the eclipse in Driggs, Idaho. Credit: Anne Holland, Space Science Institute / NCIL

Education Kits! We and our many STEM partners want to build on this remarkable growth of interest in STEM and continue to share STEM activities, resources, and training opportunities with and through the public library community.

The project team acknowledges the support from the Gordon and Betty Moore Foundation along with Google, NASA, the Research Corporation, and NSF. Without their help and encouragement, we would never have been able to positively impact such a large fraction of public libraries in the U.S.

About the STAR Library Network (*STAR Net*)
Libraries across the country have been reimagining their community role to strengthen community-based learning and foster critical thinking, problem solving, and engagement in science, technology, engineering, and math (STEM). They are becoming "on-ramps" to STEM learning by creating environments that welcome newcomers to the community.

NCIL's Moore Foundation project and *NASA@ My Library* initiative leverage and expand upon *STAR Net*, a hands-on learning network for libraries and their communities across the country (www.starnetlibraries.org). *STAR Net* focuses on helping library professionals build their STEM skills by providing "science-technology activities and resources" (STAR) and training to use those resources. It includes a *STEM Activity Clearinghouse*, blogs, a webinar series, workshops at conferences, and a monthly e-newsletter. Partners include the American Library Association, Association of Rural and Small Libraries, Collaborative Summer Library Program, Chief Officers of State Library Agencies, Afterschool Alliance, Cornerstones of Science, and many others.

About the National Center for Interactive Learning (NCIL)
NCIL at the Space Science Institute is dedicated to expanding the understanding and participation of families, youth, teachers, and citizens in science and technology (www.nc4il.org). We foster collaboration between STEM professionals and educators to bring the wonder of science and engineering directly to people. Our programs span a range of audience needs and delivery methods, including traveling museum and public Library exhibitions; educational films, videos, and websites; hands-on resources and activities; and educator workshops. Our programs are designed to be accessible to all, and to inspire the next generation of STEM innovators. They have a positive impact on rural and urban communities nationwide and reach underserved audiences with inspirational, fun, and innovative STEM activities.

Kids viewing the solar eclipse. Credit: Addie Davis Memorial Library

A family trying on their solar viewing glasses. Credit: North Miami Beach Public Library

Appendices

Sample Night Sky Network Event Descriptions

The "Northern Constellations" presentation took several children volunteers to represent different constellations and instructed them on how to move around the North Star. The "What You Can See with a Small Telescope" presentation compared what objects may look like when photographed with an observatory telescope versus what they may look like visually with a backyard telescope. The "Safely Observing the Sun" presentation showed various methods to safely observe the sun; including the upcoming solar eclipse.

This was a training exercise with the librarians at the Manhattan Library in Kansas. I went over several ideas of how we can present to their public about the eclipse. I gave them several handouts and posters for their display to get them started. I brought many props about the sun, eclipse, moon phases, and even the pocket solar system. They loved everything I showed them. They really liked the "Where does the Energy Come From Cards" activity from the Magnetic Sun ToolKit. I have sent them a copy of the cards so they can make them for their use for their children programs. They felt this was a great way to engage the children on this activity. They are looking forward to the public outreach scheduled on August 8th and so am I. We even discussed extending our partnership for future outreach programs with their public.

This was a small community gathering at the Library getting them ready for the solar eclipse. I did set up my solar telescope but the clouds rolled in and kept the Sun from view. I did get a short glimpse and saw no sunspots. The kids liked the UV bead bracelets I made for them. They also enjoyed the activity using the energy cards. The Library won the grant for 1000 solar glasses. I explained why eclipses don't happen all the time using a ball representing the Sun and another ball covered with an Earth balloon, a hula-hoop with a tennis ball attached for the Moon and orbit of the Moon.

A librarian called and asked if I could stop by and give her an example of the activities I will present. I talked her into having an event at the school grounds to accommodate more visitors. The athletic director of the school allowed us to set up on the football field. I showed the librarian several activities I plan to use for the event. She thought they were pretty cool and wants to help present the activities. She won the grant of 200 solar glasses Kit. She was excited to see how the Solar Eclipse Yardstick activity worked after I demonstrated it for her. She received one in her Kit.

Rainy day did not dampen the spirit of the visitors to find out more about the solar eclipse. The rain kept me from setting up my solar telescope so we moved the event inside. I set up the Sun in a different light banner. I explained the Sun is actually white, not yellow. Showed them the different ways to look at the Sun with different filters to see the different features on the surface of the Sun. We talked about Sunspots and how they happen. We went over how to protect yourself from UV rays. I engaged the audience to help with the props and engaged them with questions and answers. Had a lot of participation with all ages. I used my hula hoop Moon orbit, Earth, and Sun ball to demonstrate why we don't have eclipses all the time; they all liked that one. The Q/A afterwards was very engaging. This library is one of eight in their district so they divided their grant of 1000 glasses between them. The library had exhausted their supply of solar glasses. It was a good thing I brought extra. I left them some extra glasses for the day of the event.

A nice turn out at the library. We went over solar viewing safety, and the path of totality. I demonstrated why eclipses don't happen all the time using my hula hoop moon orbit. We went outside where I had a telescope setup to show them the Sun and a way to project the sun. I had made a funnel solar projector to use on my small 4.5" reflector telescope stopped down, what was cool about it is 20 or more people can see it at the same time. I offered other ways to project the sun using a tube or box. We used the yardstick eclipse to make an eclipse. We talked about UV protection with the UV beads.

We were expecting around 10 tweens and teens to attend this program. There was so much community interest in the upcoming solar eclipse that 31 adults also showed up! We were able to do some solar viewing, although we could not use the PST with H-alpha filter due to smoke from the wildfires in British Columbia. The nebula in a bottle project was a big hit!

This was a fun event. The librarians were a great help to manage all those children. While I took half to the outdoor space where I had a telescope using a funnel projector so all could see the projection at the same time, the librarians kept them entertained making UV bracelets. They had some pony beads to add to the bracelets and made them pretty cool. I had the Sunspotter with me too to project the Sun. I showed them the DIY projector I made using a tube. They liked that. Using the yardstick eclipse really helped them understand the difference between a solar and a lunar eclipse.

Al Washburn presented information about the Solar eclipse including projecting the NASA Solar eclipse live feed. He distributed over 200 Solar eclipse viewing glasses to program participants and pin-hole eclipse projectors. Jeni presented the meteorite collection of the ASNH and then joined Al outside for the maximum coverage of the Sun.

Our eclipse event at the Porter Library in Stafford, VA, was certainly unprecedented with over 1,100 people attending. The line was huge when I arrived an hour before the event, with the local sheriff's department called for crowd control! The library distributed hundreds of eclipse glasses that they and I received, and The Free Lance-Star photographer and writer stayed for the entire event as well. I also distributed lots of NASA outreach materials which were quickly gone.

Eclipse Stories from Public Libraries & State Libraries

Menominee County Library (Michigan)

"I just wanted to take a moment to Thank you for your work in making sure we got our glasses. I didn't expect 1000 glasses but they all went!! We had one of the biggest events our Library has ever seen. So, in my language, we say Waewaenen (Thank You)! From myself, our Library staff and from the Menominee community we serve. "

– Menomin Hawpetoss, Information and Training Specialist, S. Verna Fowler Academic Library/Menominee County Library, College of Menominee Nation

Washington State Library

"The overwhelming thing that we heard across Washington State was exactly what we experienced here in Tumwater, WA. Everywhere, there were more people who came than glasses to hand out and it didn't matter at all. In fact, in a way it turned it into more of a community event. Not having enough glasses meant that people talked with each other and shared glasses as well as the experience. It was a fabulous day and here in cloudy Olympia the skies were clear blue. We felt united as a community all in awe of the skies. One of our employees, Joe Olayvar, made a video compiling just a few of the pictures we received. You'll find the video here. Make sure to watch till the end because the final scene was made by a drone flight. 1000 people turned out for the library event in a small town in W. Washington."

– Nono Burling, Outreach Librarian, Washington State Library

Alaska State Library

"Patience Frederiksen, Alaska State Librarian, asked me to share what we did for the eclipse. Heavy rain didn't stop Alaska's State Library from enjoying the eclipse! We were ready for a partial eclipse in Juneau, AK, with free eclipse glasses and supplies to make pinhole viewers, but the weather made us change our plans. We had NASA's livestream on view in our lecture hall, alternating with the Exploratorium's feed whenever NASA got disconnected. Nearly 90 people came by on a rainy Monday morning to have a communal eclipse experience and we enjoyed eclipse shots from Oregon, Idaho, and Wyoming. We also shared eclipse materials, had space stickers for giveaways, and showed solar and eclipse datasets on the Alaska State Museum's Science-On-A-Sphere."

Patrick Heath Public Library (Texas)

"My deepest gratitude to all your help these last few months in guiding me through the process of procuring glasses for our patrons. We had a huge attendance, and gave out all the glasses. Our event featured NASA astronaut Eileen Collins, planetary scientist Tracy Becker, musical entertainment from student musicians of San Antonio Camerata, and a STEM activity with educator Joan Labay-Marquez. We had over 600 people come! We also did some target programs prior to the actual eclipse, visiting underserved children at Meadowlands, and a program here at the library for special needs children and adults. Additionally, we did an eclipse themed STREAM program last month to get people excited about the eclipse. Your resources and support were of tremendous help to us in our endeavors. I am deeply grateful!"

Salmon Public Library (Idaho)

"First Thank the Space Science organization for the proper eclipse glasses. In our remote community, no one paid any attention to the year-long discussion about the eclipse coming until the week before. No one in town was selling eclipse glasses and we were so relieved to receive yours Tuesday afternoon before the eclipse. The 1,000 pairs you sent us were gone in twenty-four hours. We limited them to 2 pairs if they were not library patrons and 4 pairs if they had a library card. Your glasses were most important, as I was leaving work late one night the "Mountain Millers" as they call themselves were outside of the library using the WiFi. I overheard them mention the eclipse on Monday. I asked if they had glasses. They said no, they were going to

use sunglasses. I went back into the library and copied off the three-page informative safety handout and got 13 pairs of eclipse glasses for the family. These are the people you were targeting. They have no electricity or running water - live totally off the grid and had just heard about the eclipse and thought they would be okay just looking at it. Thanks for saving their eyes and for supporting everyone along the path of totality."

Auburn Public Library (Maine)

"A woman came to see me to tell me what happened when she shared her glasses with one of our Somali neighbors. She asked if the woman sitting in her car wanted to join them. She explained that it was her grandmother. She feared the eclipse and was praying. They finally persuaded the grandmother to get out and look at the eclipse. Once she did, she lost her fear and enjoyed the rest of the eclipse. As a side note, we were just about the only one in our area with glasses. We easily could have had triple the amount. We had about 500-600 calls alone the morning of the eclipse."

Monmouth County Library (Oregon)

"The days before the eclipse were harried and we feared that we are antagonizing patrons because they had been led to believe by stories on the radio and in newspapers that the glasses were available for everyone from the library. The day of was also difficult with some people being disappointed because they did not get glasses, but in other ways the day was a triumph. 1,200 people came to the library the day of the eclipse and while some people were upset that they did not get glasses, we encourage people to share. That took time for people to be comfortable with that but in the end the spirit of community won, and strangers were chatting, sharing and becoming friends all around science. So, it absolutely became a day to remember and treasure. All of the anxiety of the days up to the event were "eclipsed" by the sense of community that emerged on the day of our viewing party."

Kids participating in Eclipse Day craft activities. Credit: Audrey Pack Memorial Library

A family enjoying the Solar Eclipse Party activities. Credit: Scotland County Memorial Library

In what ways has the eclipse influenced your library's STEM programming?

"It was a wonderful opportunity to share STEM programming with the public - which is an area we do not offer a lot of programming in, especially with adult audiences"
– Eureka Public Library

"We programmed our entire summer reading program as space themed."
– Lebanon Public Library

"It focused community awareness on the types of programs we offer. It also forced us to look at our programming and see if we are touching on all aspects of STEM - which lead to including some math programming and a family STEM night this fall."
– Camden County Library/Bellmawr Branch

"Our eclipse programming has connected us with community collaborators for future programming and has created excitement from our patrons about future STEM programming."
– Fort Fairfield Public Library

"Our patrons really loved the activities we had at our eclipse program. We are planning to offer more STEM programs in the future."
– Marysville Public Library

"This was a great program to include in our library since it occurred the day before school started in our community. We were able to create excitement in learning and returning to school. The kids couldn't wait to get back to discuss how they view the eclipse at their local library."
– Horry County Memorial Library

"Over the last year we have made a strong push to incorporate STEM into most of our programming, especially for youth of all ages (2 and up). This was great way to offer more STEM programming to individuals that normally would not be able to participate."
– Amsterdam Free Library

"The success of our eclipse event and programming has encouraged me to offer STEM programming for all ages at our library. We had traditionally offered STEM programming for tweens and teens in partnership with our local high school STEM academy. Our program on space showed the interest from adults and expanded our base audience for this type of program."
– Plymouth District Library

"Providing eclipse glasses to our patrons encouraged visits to the library and increased circulation related to the eclipse and sun. In addition, the eclipse programs provided at our library brought many youth to the library to learn more about the eclipse."
– Ada Public Library

"With all the resources from STAR Net early in advanced, I felt prepared to help staff develop staff-led programming and find partners to present programs. When summer came and people started realizing that the Eclipse was coming - people were rushing to learn more and get their free glasses. Many places in Portland ran out of glasses and were happy to have them to give to patrons."
– Multnomah County Library

Family enjoying Eclipse Day activities. Credit: Keene Memorial Library

KIds creating pinhole viewers for solar viewing. Credit: Cerritos Library

Would you like to share with us any quotes from your patrons or staff that we could share with our funders?

"The participants loved the community feel of the event. They were happy to have a place to go so that they could share this awesome moment with others."
– Oneida Public Library

"This was one of the best programs the Library has had. All of the people came together as one and just had a great time in the interest of science."
– Lebanon Public Library

"The day of the eclipse we had a quiet, unannounced program where I shared the 3 pairs of glasses we had left to show multiple patrons. The smiles on their faces and the expressions of "that's SO neat" and "COOL!" and "thanks for sharing" were just great."
– Los Angeles Public Library

"Library staff and the greater community are so thankful to have been able to offer public eclipse programming with the viewing glasses. It was a wonderful opportunity to inspire curiosity, lifelong learning, and a sense of togetherness."
– Fort Fairfield Public Library

"Numerous adults and children were yelling in excitement when they were able to directly view the eclipse using the glasses. We would like your funders to know that this experience was something many of our young patrons will never forget and still talk about whenever they've visited, since. While I don't have exact quotes, this experience was a true game changer for some of them, we are so very grateful!"
– Amsterdam Free Library

"Thank you, thank you, thank you! "You really made this rare occurrence even more special with your generosity!"
– Sibley Public Library

"We gave away our glasses early and only kept 50 for ourselves and that was a blessed mistake. We had over 200 people show up. We had people circle up and form groups and share the glasses. The circle method formed friendships and conversations with diverse groups and several groups continued conversing long after the eclipse ended. The 2017 eclipse will be remembered for a long time, the advertising brought this astronomical phenomenon into public attention like we have never seen."
– Newton Public Library

"One of our staff members handed glasses to two patrons that only came in to the library to use the computers to look for jobs. The staff member told the patrons, "Come outside with us and view the Eclipse. You might not ever get to see something like this again." For a moment we were all kids again."
– Daleville Public Library

"We got many "thank yous" from people for providing the eclipse glasses. We were one of the few libraries in our area (Minneapolis-St. Paul) that had them and as a result we had people driving great distances to get a pair. On eclipse day itself, we set a record for the number of people coming to our small branch library! It was awesome to see families come with blankets and spend time together viewing the eclipse."
– Washington County Library - Valley Branch

"From our Mississippi State Representative Shane Barnett: Thank you for providing this program to the public. WDAM TV weather meteorologist Patrick Bigbie: Thanks for the solar glasses! Hurry and get yours before they are gone! (He did a segment on the local tv station about the grant and program)"
– Waynesboro-Wayne County Library

"Because of this opportunity you offered & the funding you provided, you now have introduced our little library to a whole new audience. Thank you all for believing in & trusting us to do great things with your support!"
– Elizabeth Steele, Youth Events Coordinator at East Lake County Library

"One of our patrons had mentioned that this was "one of the best library programs I've ever been to". A local teacher emailed and said, "If it hadn't been for your donation of eclipse glasses for our classroom use, we wouldn't have had a chance to include over 100 students to view the eclipse live".
– Morley Library

"Several patrons commented that they would not had the opportunity to obtain glasses if the library had not supplied them with a pair. Several patrons at our informative session expressed that they did not fully understand the import of the eclipse not how/when an eclipse occurred. This was an excellent opportunity to stimulate the minds of the public about what lies beyond our atmosphere."
– DeKalb County Public Library

"Many remarked how brilliant the event was and how grateful they were that STAR Net had long ago begun to plan the observation of the event with practical measures such as supplying viewing glasses, information, links to websites, etc."
– Butler University Science Library

Eclipse Event Photos

Eclipse Event Photos