NISE Network Online Workshop

Solar Eclipse Event Planning for October 14, 2023

A Review of the Newest Resources for Engaging the Public

Tuesday, September 12, 2023

Today's Presenters:

Catherine McCarthy, NISE Network

Kristen Weaver, NASA Goddard Space Flight Center, Science Systems and Applications, Inc.

Carolyn Ng, NASA Goddard Space Flight Center, NASA Heliophysics Education Activation Team (HEAT)

MaryKay Severino, ARISA Lab LLC, Eclipse Soundscapes Project

Dennis Schatz, National Science Teaching Association (NSTA), Solar Eclipse Activities for Libraries (SEAL)

Robyn Higdon, Exploratorium, Eclipse Live Streams

Vivian White, Astronomical Society of the Pacific, Night Sky Network, Eclipse Ambassadors

Welcome! As we wait to get started with today's discussion, please:

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

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

Today's discussion will be recorded and shared on nisenet.org at: nisenet.org/events/online-workshop

Two Upcoming Solar Eclipses!

Saturday
October 14 2023

Monday
April 8 2024

North American locations not on the path will still experience a partial solar eclipse!

Annular

Credit: NASA/Bill Dunford

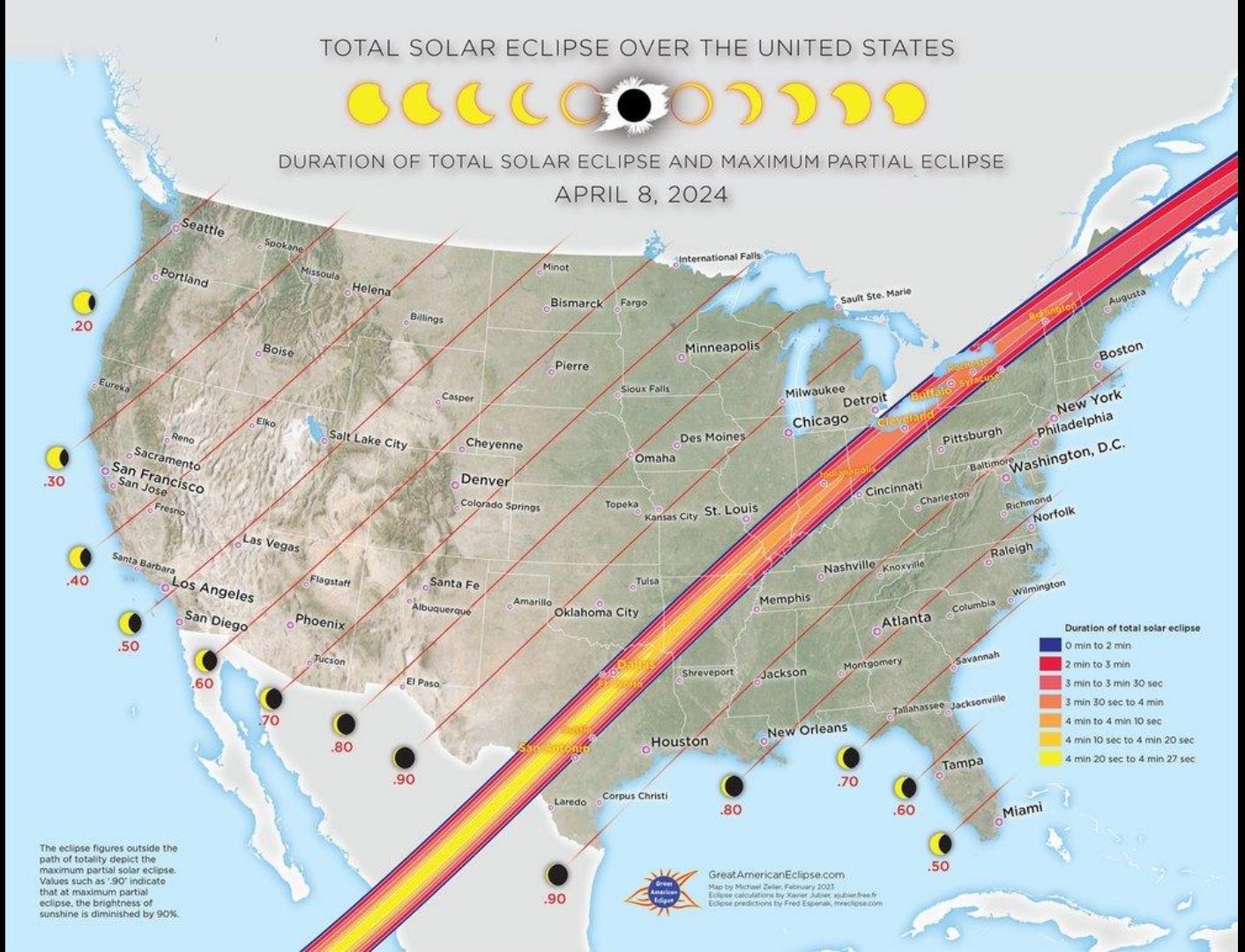
Total

Credit: NASA/MSFC/Joseph Matus

Partial

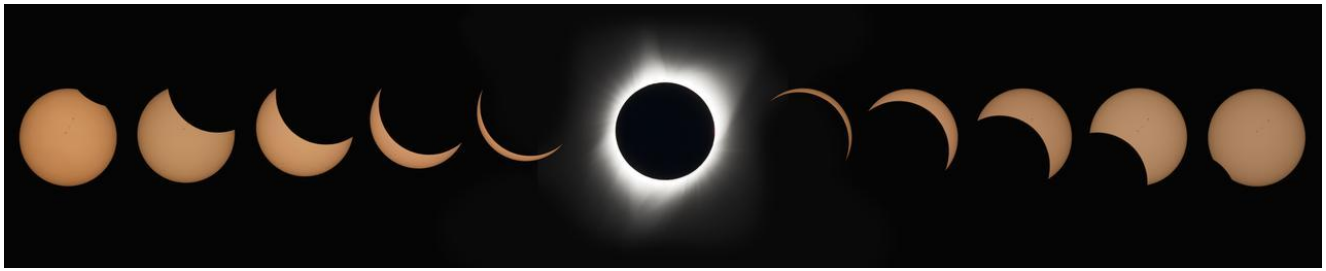
Credit: NASA/Bill Ingalls

Credit:
Michael Zeiler
GreatAmericanEclipse.com



Credit:
Michael Zeiler
GreatAmericanEclipse.com

NISE Network Solar Eclipse Resources



Compilation of Eclipse public engagement resources:

- Hands-on activities
- Maps and images
- Safe viewing
- Cultural connections and more!

nisenet.org/solareclipse

NISE Network Solar Eclipse Activities

Exploring the Solar System: **Big Sun, Small Moon**

Exploring the Solar System: **Solar Eclipse**

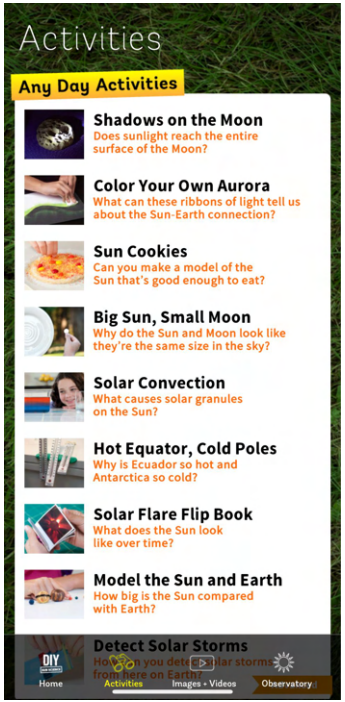
Exploring Earth: **Bear's Shadow**

Exploring the Solar System: **Observe the Sun**

Apps with Hands-on Activities

DIY Sun Science

English & Spanish



DIY Solar System

English (Spanish coming soon)

Both available for iPhones & iPads

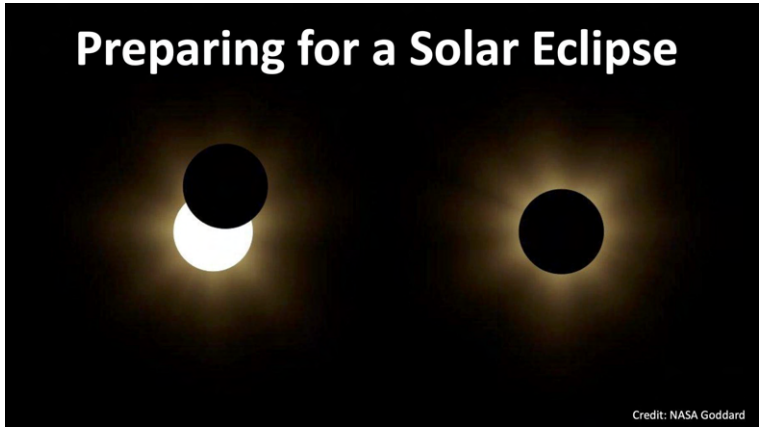
Download on the App Store

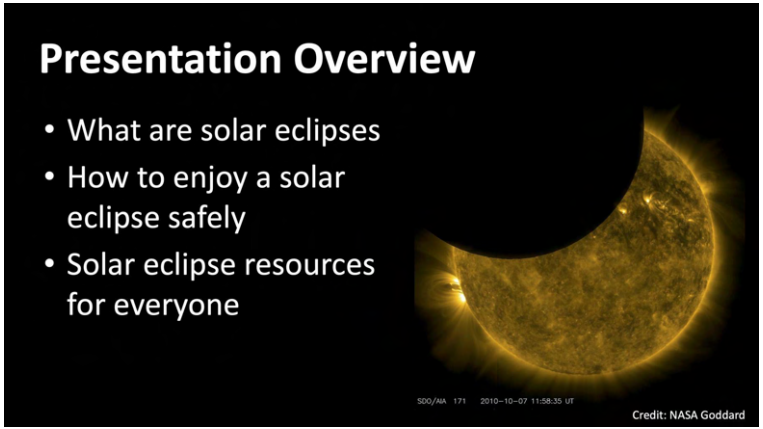
DIY Sun Science available for Android

DIY Solar System for **Android** Coming Soon!

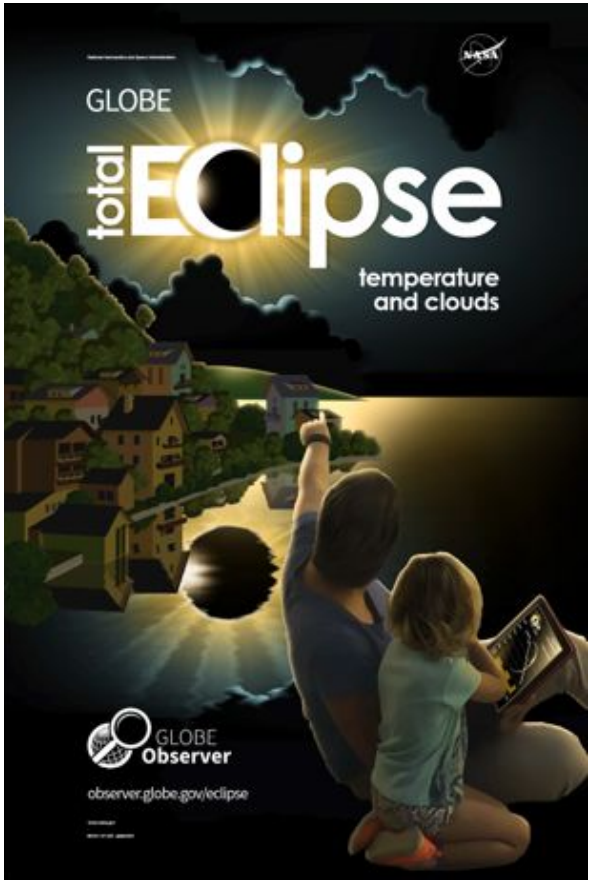
nisenet.org/diy-solar-system-app | **nisenet.org/diy-sun-science-app**

NEW - Preparing for a Solar Eclipse Presentation





nisenet.org/solareclipseslides



GLOBE Eclipse poster, available in the Resource Library.

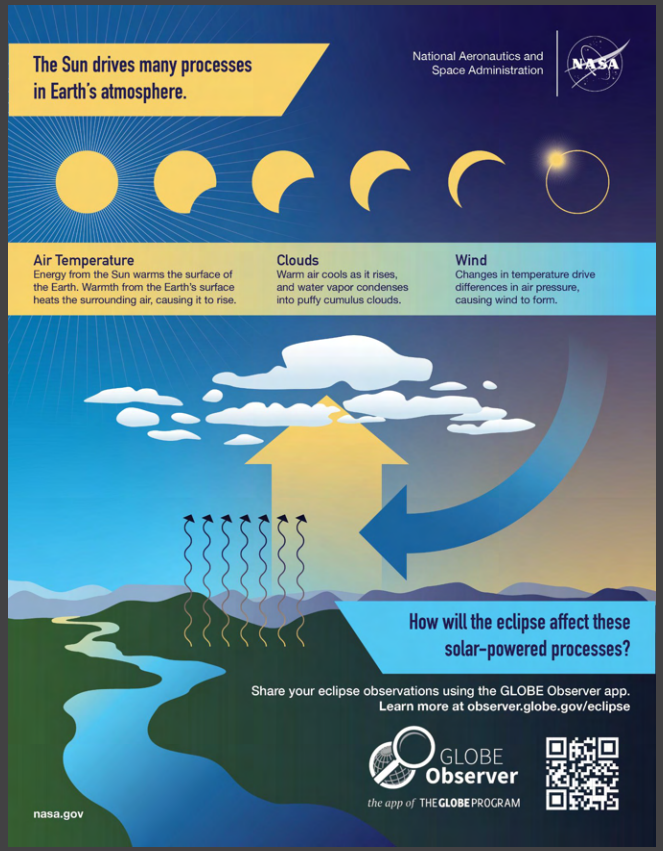
GLOBE Eclipse: Preparing for 2023 & 2024

Kristen Weaver
Deputy Coordinator, GLOBE Observer

NASA's Goddard Space Flight Center &
Science Systems and Applications, Inc

Last updated 12 July 2023

The Earth Science Angle: Study eclipses as a volunteer observer with GLOBE



Energy from the Sun warms our planet, and changes in sunlight can also cause changes in temperature, clouds, and wind. What happens when the Sun is blocked by the Moon during an eclipse? How will the eclipse affect these solar-powered processes?

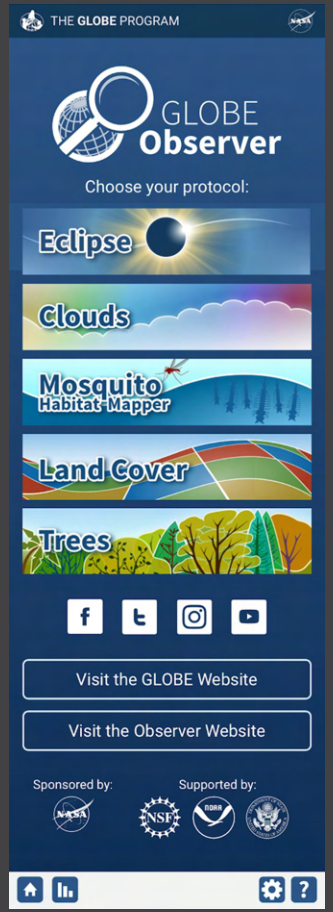
Diagram from the front side of a one-page document outlining the changes that might be observed during a solar eclipse, which is available on the GLOBE Observer Eclipse website.

Using the GLOBE Eclipse tool, volunteer scientists are able to:

- Observe how the eclipse changes atmospheric conditions near you by reporting on clouds and air temperature

Taking clouds observations using the Clouds tool is always available in the GLOBE Observer app, and is incorporated into the observation prompts for the Eclipse tool. Credit: GLOBE Clouds Team, NASA LaRC

Above: A simple thermometer that can be used to take air temperature measurements. Credit: GLOBE
Right: An example of what the home screen of the GLOBE Observer app will look like when the Eclipse tool is available. Credits: GLOBE

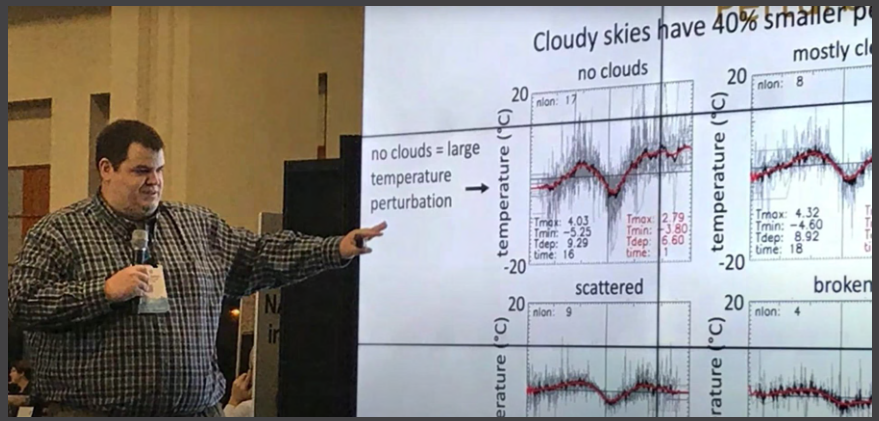


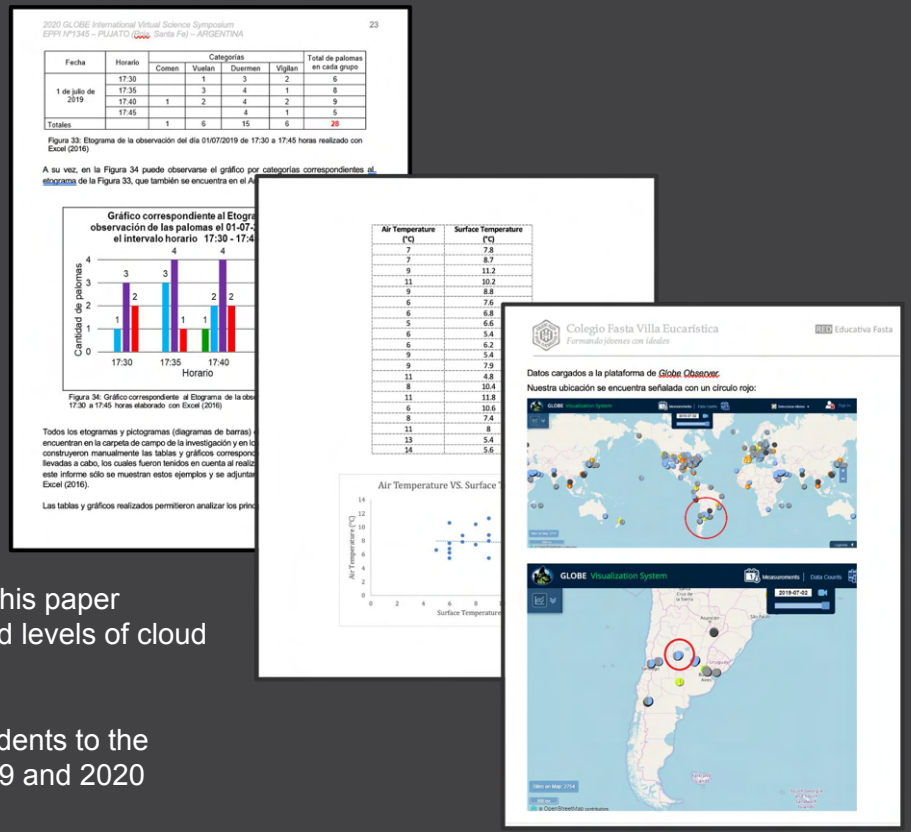
- Report surface conditions (photograph and describe the landscape) that may have an impact on differences in the atmospheric effects in varying locations

A participant using the GLOBE Observer app Land Cover tool to take photos of the surrounding landscape. Credit: GLOBE

A screenshot from the GLOBE Visualization System, https://vis.globe.gov, showing images of land cover taken around the United States. Credit: GLOBE

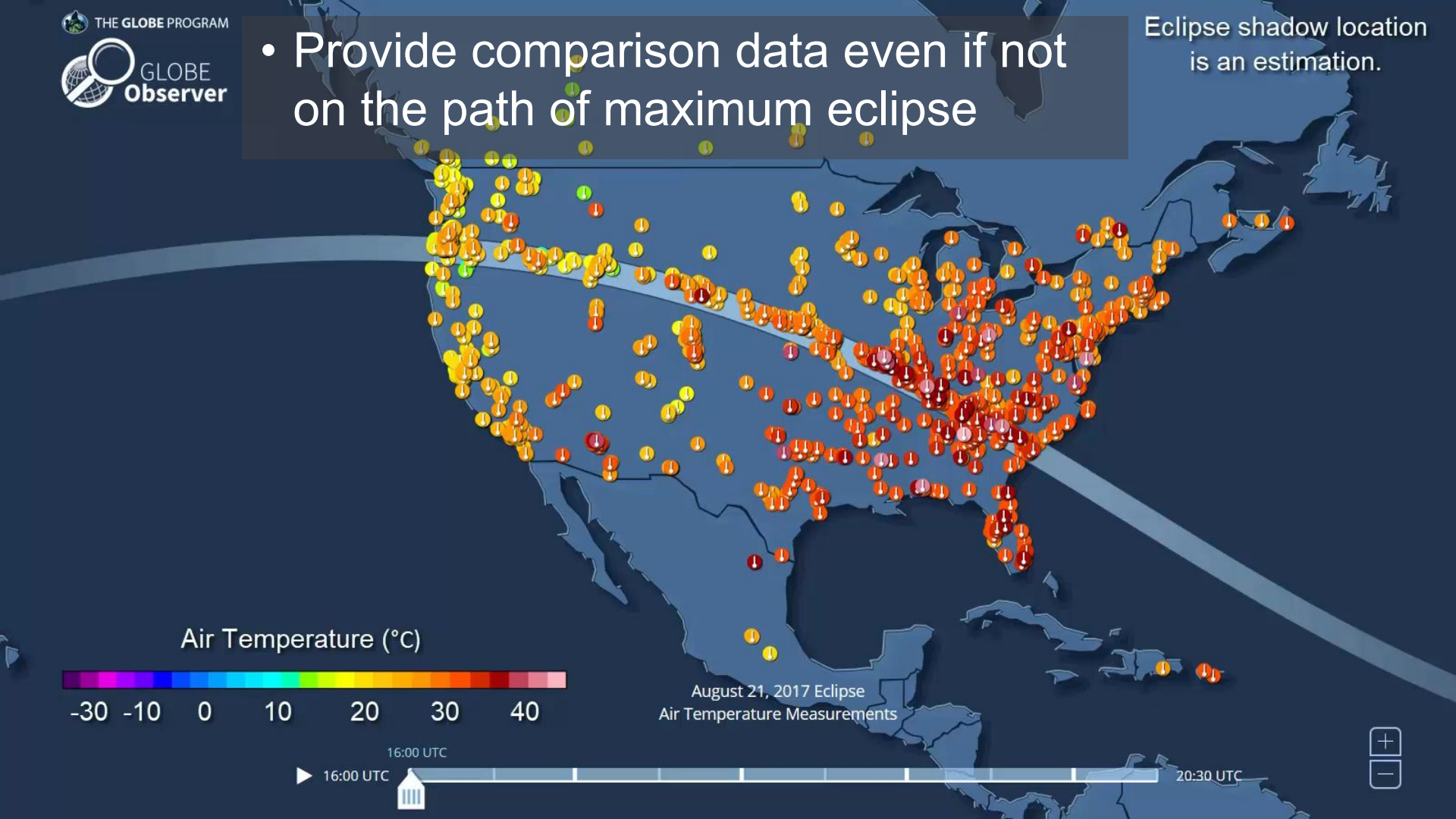
- Contribute to a citizen science database used by scientists and students to study the effects of eclipses on the atmosphere





Left: Dr. Brant Dodson (NASA Langley Research Center) presents his paper comparing the citizen science temperature data at different reported levels of cloud cover, doi.org/10.1175/JAMC-D-18-0297.1

Right: Pages from several of the research reports submitted by students to the GLOBE International Virtual Science Symposia after the 2017, 2019 and 2020 eclipses, observer.globe.gov/eclipses#studentresearch


THE GLOBE PROGRAM
GLOBE Observer
• Provide comparison data even if not on the path of maximum eclipse
Eclipse shadow location is an estimation.
Air Temperature (°C)
-30 -10 0 10 20 30 40
August 21, 2017 Eclipse
Air Temperature Measurements
16:00 UTC
16:00 UTC
20:30 UTC

Eye Safety During an Annular Eclipse

A solar eclipse watcher in Argentina in December 2020. Credit: Marta Kingsland

The Sun is never completely blocked by the Moon during an annular solar eclipse. Therefore, during an annular eclipse, it is never safe to look directly at the Sun without specialized eye protection designed for solar viewing.

A crowd uses handheld solar viewers and solar eclipse glasses to safely view a solar eclipse. Credit: National Park Service

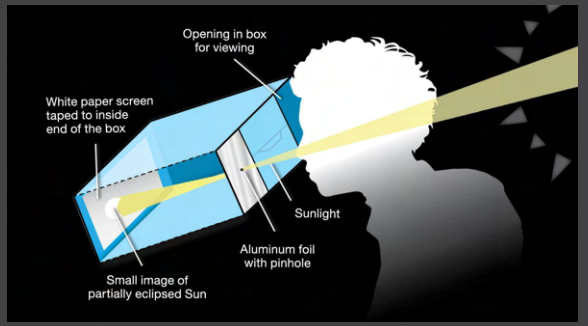
View the eclipse with special solar viewing glasses

Regular sunglasses are not safe to view the eclipse

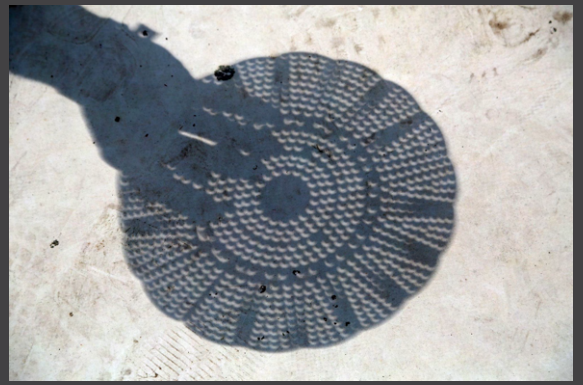
Indirect viewing methods

If you don’t have eclipse glasses or a handheld solar viewer, you can use an indirect viewing method, which does not involve looking directly at the Sun. For example, a pinhole projector or a colander or other object with circular holes. The GLOBE Eclipse cards also have a place where a hole can be punched to serve as an indirect viewer.

Read more on [NASA’s Eclipse Safety page.]

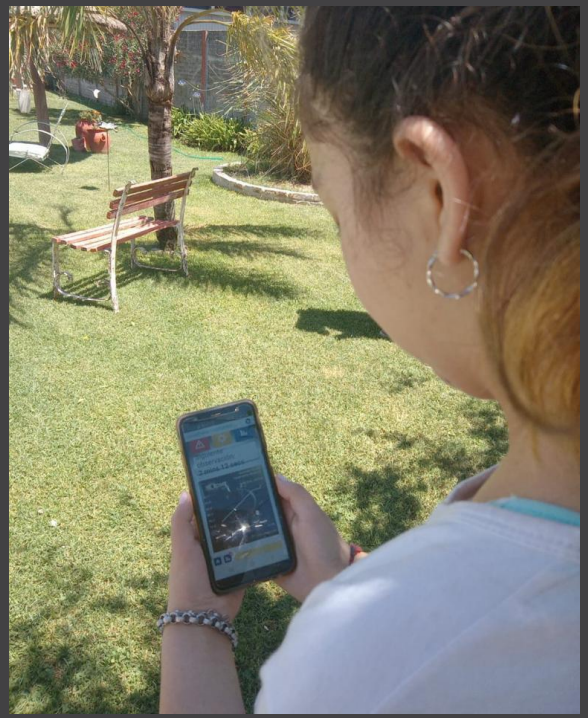


You can make your own eclipse projector using a cardboard box, a white sheet of paper, tape, scissors, and aluminum foil. Credit: NASA

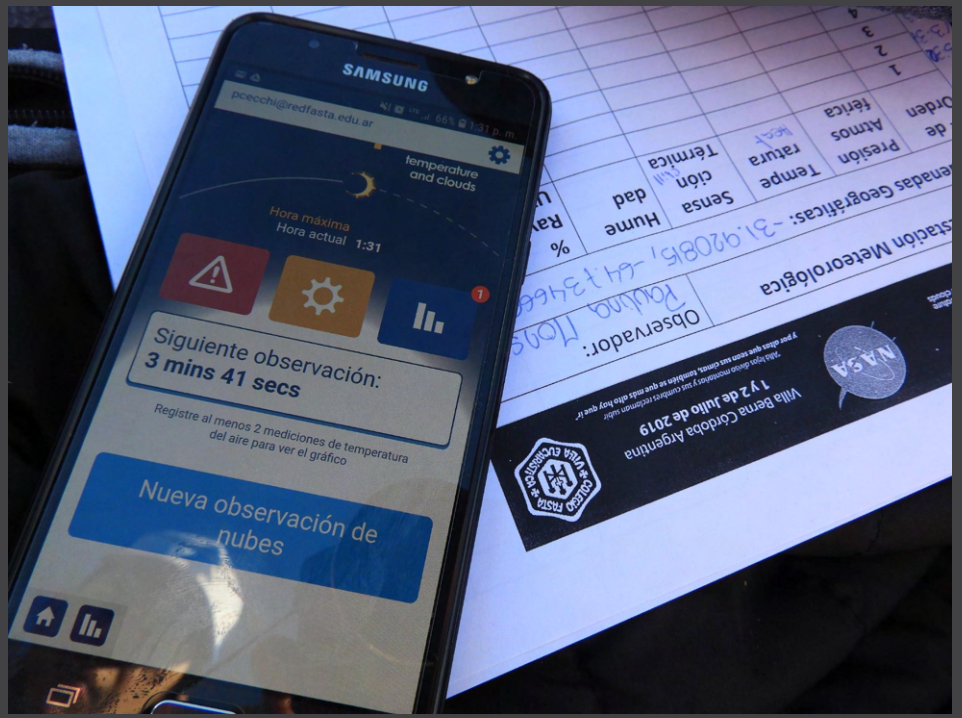


Left: A GLOBE Eclipse card used to project the Sun onto the ground. Credit: GLOBE Above: The circular holes of a colander project crescent shapes onto the ground during the partial phases of a solar eclipse. Credit: Joy Ng

Using the GLOBE Eclipse tool

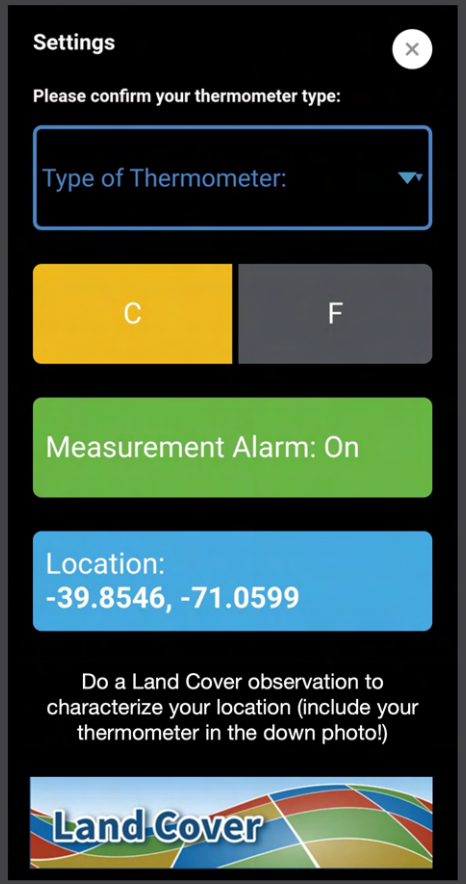


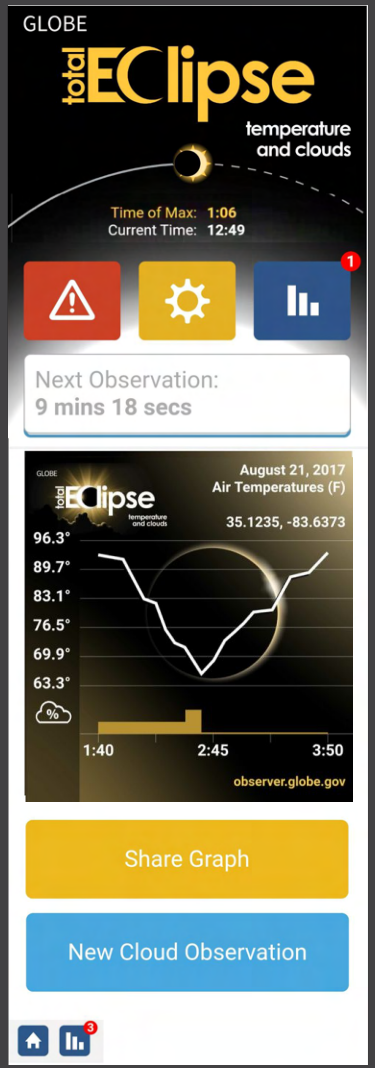
Observer using the GLOBE Eclipse tool during the total eclipse in Argentina on 14 Dec 2020. Credit: Marta Kingsland



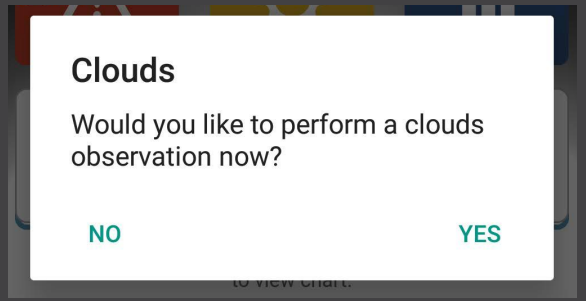
The app screen showing the countdown to the next observation, as well as an (optional) paper data sheet. Credit: Pablo Cecchi

Using the App



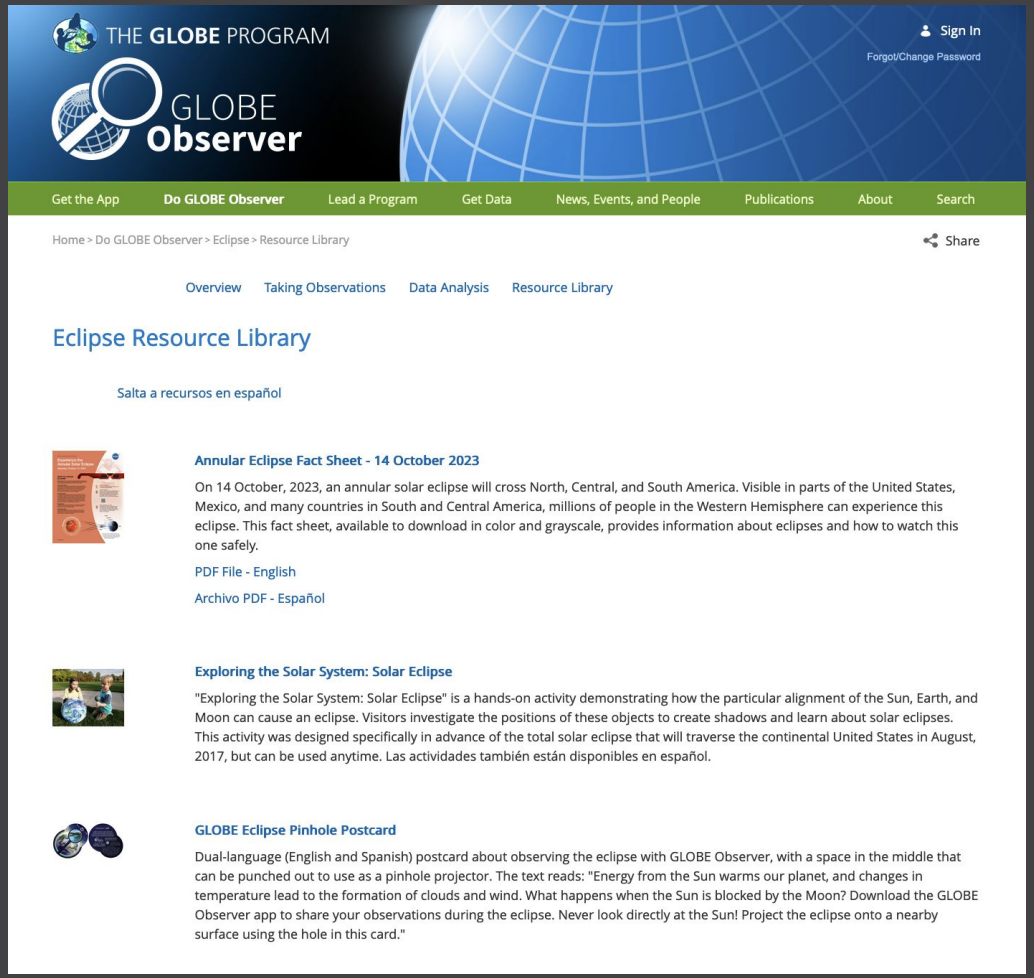


Example thermometers. Credit: GLOBE
NOTE: A weather app does not count as "other" - you should have a separate physical thermometer.



Learn More

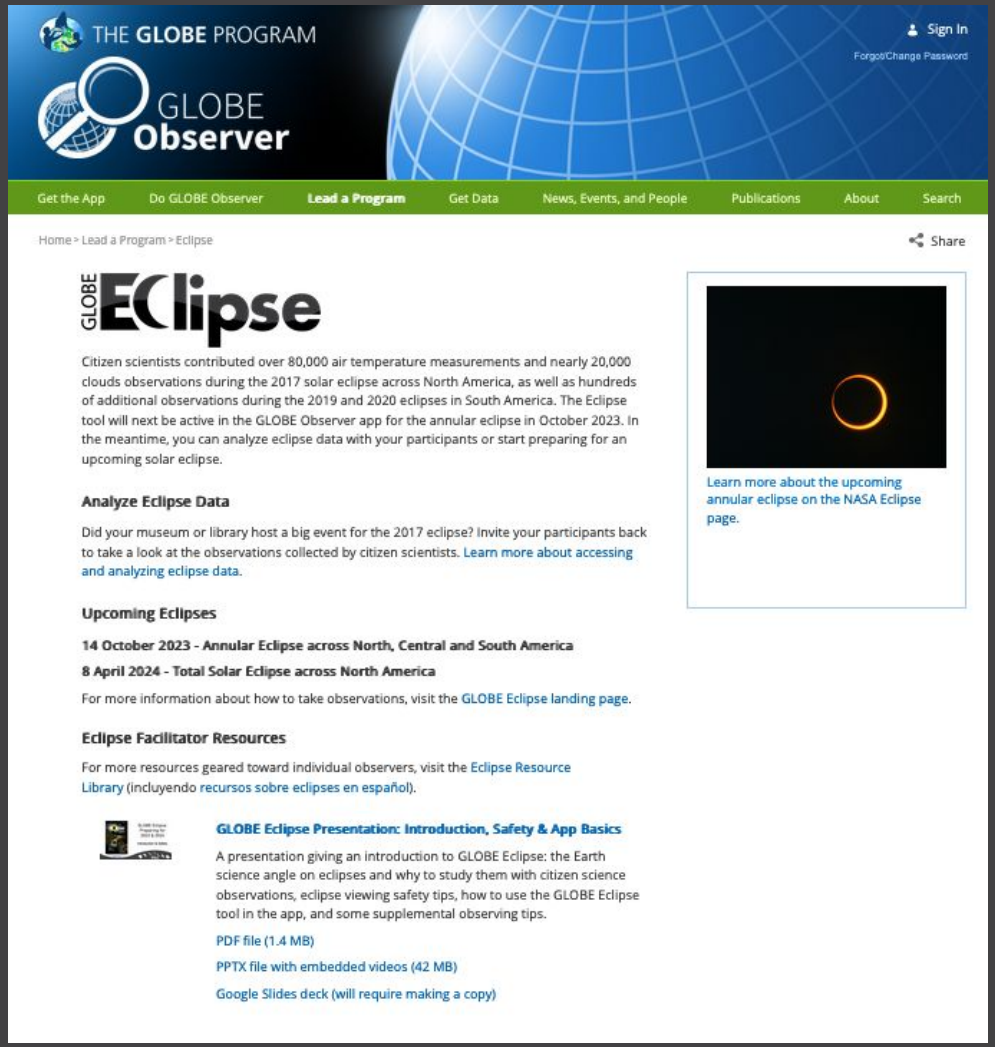
Find more details, including activity guides and extended opportunities for data collection, on the Eclipse page of the GLOBE Observer website, observer.globe.gov/eclipse



Additional Resources

The Eclipse Resource Library has a number of useful resources aimed at individual observers, and we will add more as they are developed.

También hay una sección de recursos en español.



Lead a Program

The Eclipse Toolkit for Informal Educators has resources specifically for facilitators, and more are coming.

Download the app from the Apple App Store or Google Play.

Download on the App Store

GET IT ON Google Play

Get the latest information as the eclipses approach by following us on social media:

- facebook.com/TheGLOBEProgram
- twitter.com/GLOBEProgram
- instagram.com/globeprogram

Contact the GLOBE Observer team with any questions.

Eclipses

Through the Eyes of NASA

Dr. Michael Kirk, NASA HEAT's Principal Investigator

Carolyn Ng, Informal Education Specialist

Plans for 2023

Albuquerque, NM:
- NASA tent at the Balloon Fiesta grounds
- NASA agency broadcast
- NOAA inter-agency eclipse event
- NASA Helio SME engagement support

Continuing to produce eclipse and helio lessons and activities for learners of all ages.

Plans for 2024

Texas (most likely):
- Support for Sunspots
- NASA Agency Broadcast support
- NASA SME engagement Support

Even more helio lessons and activities for learners of all ages!

Eclipse-Focused NASA Science Activation Projects

https://science.nasa.gov/learners/science-activation-teams

NASA Priorities for 2024 Total Solar Eclipse

- Safety
- Broadening Participation
- Science
- Public Engagement
- Science Activation
- Citizen Science

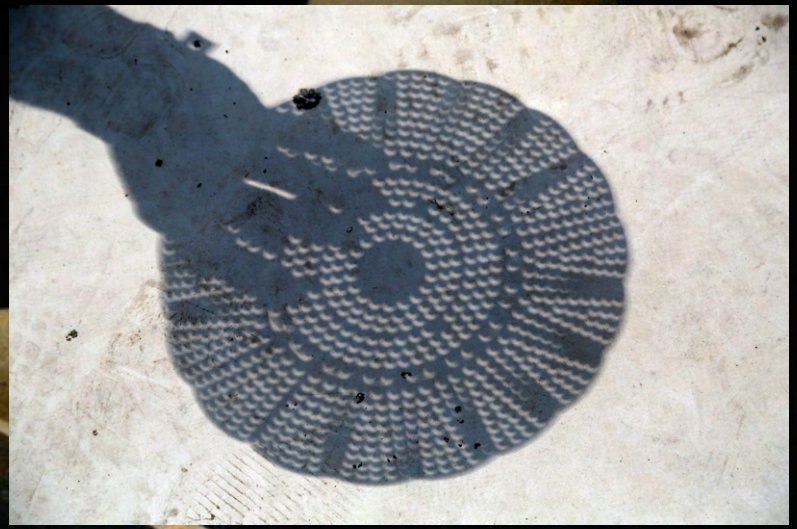
Safe Direct Viewing

A huge group of sunspots, about the size of Jupiter, appeared on the Sun during a partial solar eclipse over Santa Cruz, California on October 25, 2014. *Credit: Astronomy Picture of the Day, Michael Bolte (UCSC)*

This glass accessory activity is in our database!

Safe Indirect Viewing

Build a box pinhole projector
Credit: NASA



Allow light to filter through a colander to project many partial solar eclipse images on the ground. Credit: NASA/Joy Ng

Safe Indirect Viewing

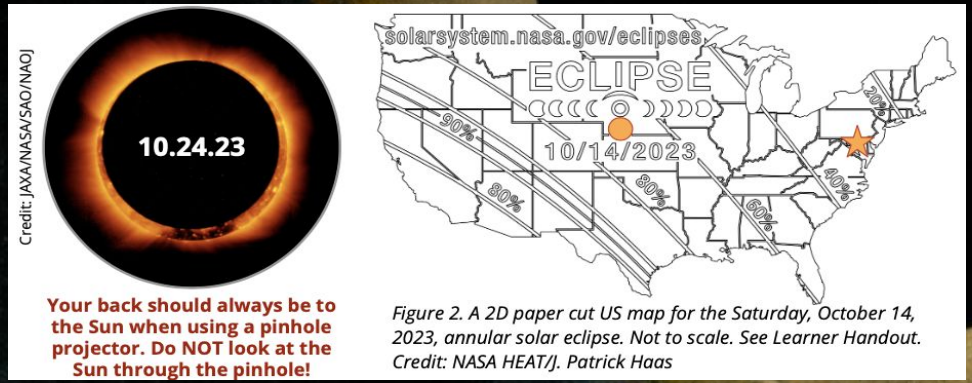
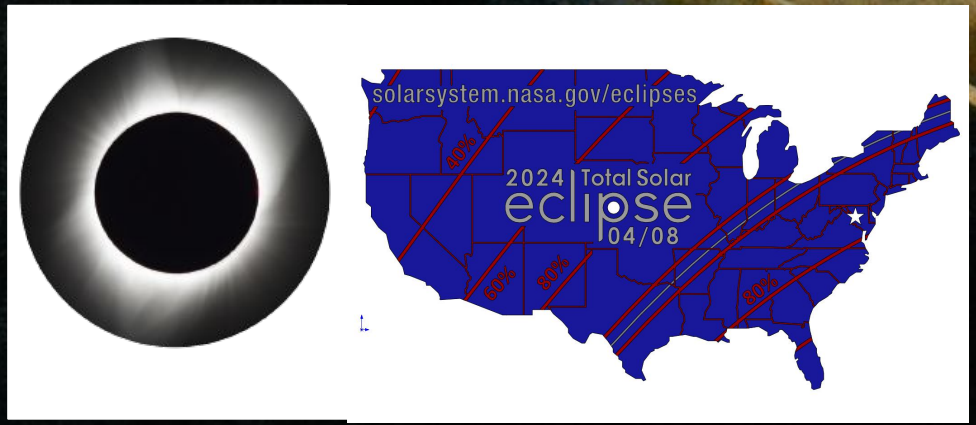


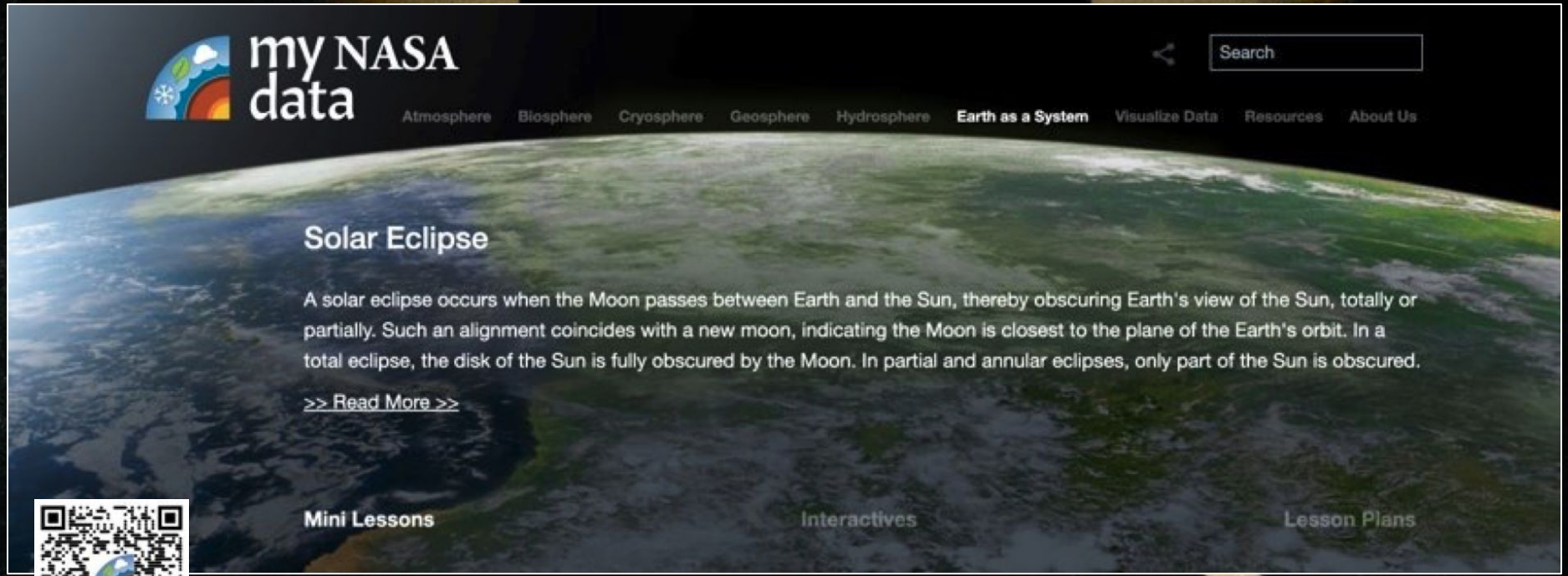
Figure 2. A 2D paper cut US map for the Saturday, October 14, 2023, annular solar eclipse. Not to scale. See Learner Handout. Credit: NASA HEAT/J. Patrick Haas

https://nasa3d.arc.nasa.gov/detail/usa-eclipse-2023

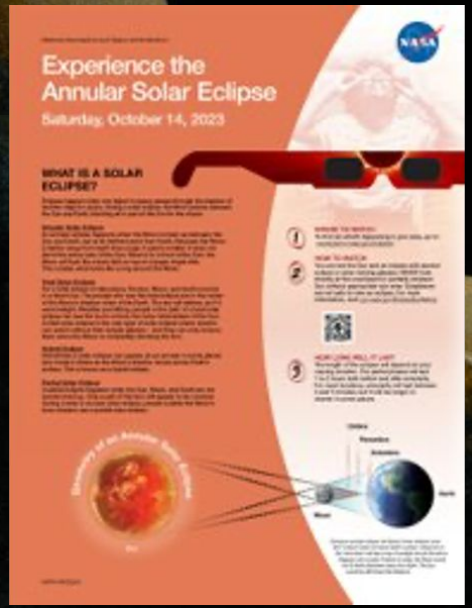


https://nasa3d.arc.nasa.gov/detail/usa-eclipse-2024

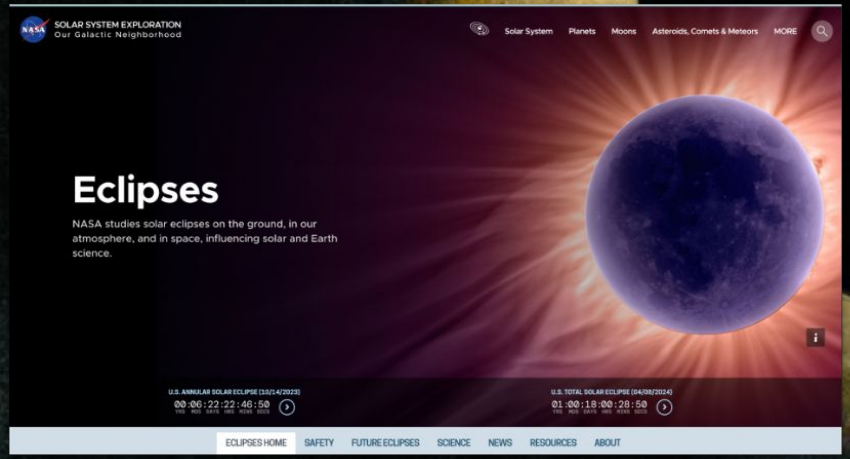
My NASA Data: Interactive Lessons



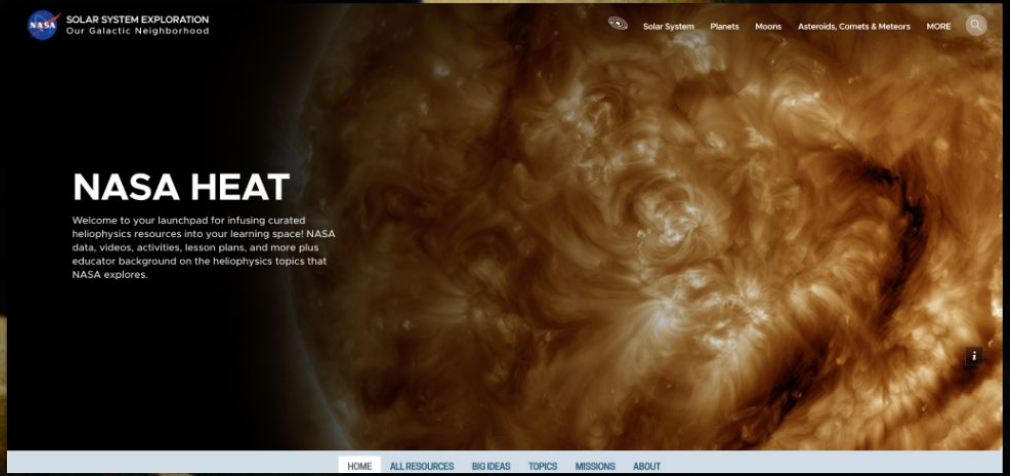
Map, Flyers, and Posters



Websites



https://solarsystem.nasa.gov/eclipses/home/



https://solarsystem.nasa.gov/heat/home/

Heliophysics Missions

Exploring our Sun and its interactions with Earth is possible through innovative NASA missions.

Heliophysics Mission Fleet

Heliophysics missions are strategically placed throughout our solar system, working together to provide a holistic view of our Sun and space weather, along with their impacts on Earth, the other planets, and space in general.

NASA's heliophysics mission fleet includes 19 operating missions using 26 spacecraft, 13 missions in development, a robust sounding rocket program, and a variety of CubeSat missions.

- ESA = European Space Agency
- JAXA = Japan Aerospace Exploration Agency

UNDER DEVELOPMENT

- AWE (ISS)
- Carruthers Geocorona Observatory
- ESCAPADE (2)
- EUVST (JAXA)
- EZIE (3)
- GDC (6)
- HelioSwarm (9)
- HERMES (Gateway)
- IMAP
- MUSE
- PUNCH (4)
- SunRISE (6)
- TRACERS (2)

PRIMARY OPERATION

- Parker Solar Probe
- Solar Orbiter (ESA)

EXTENDED OPERATION

- ACE
- AIM
- GOLD (SES-14)
- Hinode (JAXA)
- IBEX
- ICON
- IRIS
- MMS (4)
- SDO
- SOHO (ESA)
- STEREO
- THEMIS-ARTEMIS (2)
- THEMIS (3)
- TIMED
- Wind
- Voyager (2)

science.nasa.gov/heliophysics

NASA Heliophysics Big Year

The Sun will have a very Big Year from **Oct 2023 – Dec 2024**!

HELIOPHYSICS
BIG YEAR

We want you to **bring your joy and curiosity to this opportunity of a lifetime** to participate with NASA Heliophysics! Learn more at **go.nasa.gov/HelioBigYear**

MONTHLY THEMES

October 2023: Annular Eclipse

November 2023: Citizen Science

December 2023: Mission Fleet

January 2024: The Sun Touches Everything

February 2024: Fashion

March 2024: Experiencing the Sun

April 2024: Total Solar Eclipse

May 2024: Visual Art

June 2024: Performance Art

July 2024: Physical Health

August 2024: Kids

September 2024: Environment/ Sustainability

October 2024: Solar Cycle/Solar Max

November 2024: Bonus Science

December 2024: Parker's Perihelion

HELIOPHYSICS BIG YEAR

Resources

Public Annular Eclipse training slides:
https://solarsystem.nasa.gov/resources/2968/annular-solar-eclipse-training/?category=heat

Sign up for the eclipse newsletter:
go.nasa.gov/3oObEDI

My NASA Data / HEAT Formal Education Resources:
https://mynasadata.larc.nasa.gov/phenomenon/solar-eclipse

HEAT-developed Eclipse Resources (continually updated with new materials; e.g., helio-club for out of school time):
https://solarsystem.nasa.gov/heat/all-resources/?order=pub_date+desc&per_page=50&page=0&search=Eclipse&filter_categories%5B0%5D%5B%5D=469&fs=&fc=&ft=&dp=&category=469

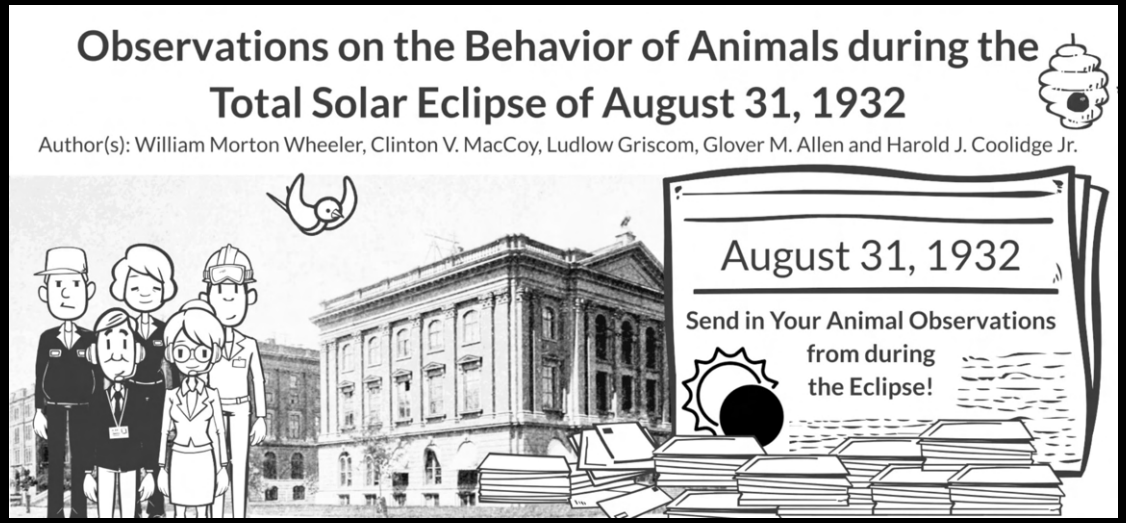
Eclipse Website for all updates (resources, events, announcements, etc.): https://solarsystem.nasa.gov/eclipses/home/

ECLIPSE SOUNDSCAPES.ORG

Science Question:
How does life on Earth, specifically wildlife, respond to solar eclipses?

Map Courtesy of: GreatAmericanEclipse.com

Recreating a Study from ~ 100 years ago!



MaryKay Severino

EclipseSoundscapes.org @EclipseSoundscapes @EclipseSoundUDL

Eclipse Soundscapes is supported by NASA award No. 80NSSC21M0008

NASA Partner

ARISA

Previous Studies Demonstrate that Solar Eclipses are Multi Sensory Events

Watch the Moon slowly creep in front of the Sun until it blocks the Sun from view.

Listen to animals, insects and people change their behavior as day suddenly becomes night.

Feel the temperature change as the Sun's warm rays are briefly blocked from reaching the Earth.

ECLIPSE SOUNDSCAPES.ORG

Invites you to:

Work Alongside Subject Matter Experts

Learn about Solar Eclipses

Collect Sound Data

Submit Observations

Analyze Sound Data

Focuses on inclusion:

Accessibility

Universal Design for Learning

Information shared in multiple formats:

Revisits previous eclipse studies:

"Observations on the Behavior of Animals during the Total Solar Eclipse of August 31,1932" Wheeler et al., 1935

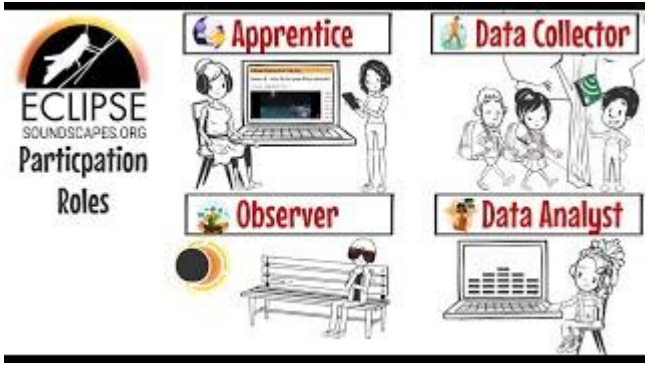
2017 NPS eclipse recordings & "Listening to the Eclipse," produced by Dr. Megan McKenna of NPS

NASA Partner

Eclipse Soundscapes: Citizen Science Project is supported by NASA award No. 80NSSC21M0008

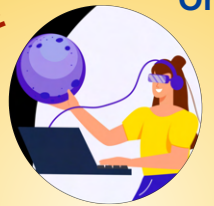
How to Participate?

Collect & analyze observations and sound data from the October 14, 2023, annular eclipse and the April 8, 2024, total solar eclipse to help us understand the impact of solar eclipses on various U.S. ecosystems.



FREE

Online



APPRENTICE
(Online Eclipse Learning)

Learn about solar eclipses via free online learning and earn a certificate of completion.

FREE

ANY Location

OBSERVER
(Eclipse Day Activity)

During the 2023 annular eclipse or the 2024 total eclipse path, go outside and observe with all of the senses available to you. Then share these observations with the ES team via the ES website!

Equipment Required

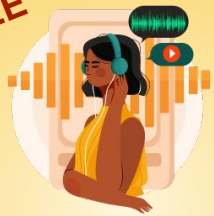
70%+ Eclipse Path

DATA COLLECTOR
(Eclipse Week Activity)

Collect data using an AudioMoth Recorder along or near (70%+) the 2023 annular eclipse path or the 2024 total eclipse path. Then share the data with the ES team by mailing the MicroSD card!

FREE

Online



DATA ANALYST
(Online Data Activity)

Analyze sound data in 2024 and 2025 alongside scientists on the ES website. (**Coming 2024**)

Partner

Eclipse Soundscapes is supported by NASA award No. 80NSSC21M0008

ES Programming Ideas for Libraries, Facilitators, Educators

Guide your community in becoming ES Apprentices!

Utilize Apprentice Training resources to host eclipse learning events. Each person can take the Apprentice Training quiz and earn their own Apprentice certificate afterwards!

Invite Patrons to be ES Observers!

- If you are handing out eclipse glasses, provide them with an Eclipse Soundscapes flyer and invite them to be Observers.
- Meet before and after with your community to talk about and submit observations on the ES website together.

Be an ES Data Collector in 2024!

- Put out AudioMoth on display several weeks before for patrons to look and touch.
- Choose a recording location together.
- Hang up a poster explaining that eclipse soundscapes are being collected and why. Then ask your community/group to write their ideas on what animal & insect changes they think will happen on the bottom of the poster.
- Sign up for Updates to be alerted of next free Data Collection Kit application!

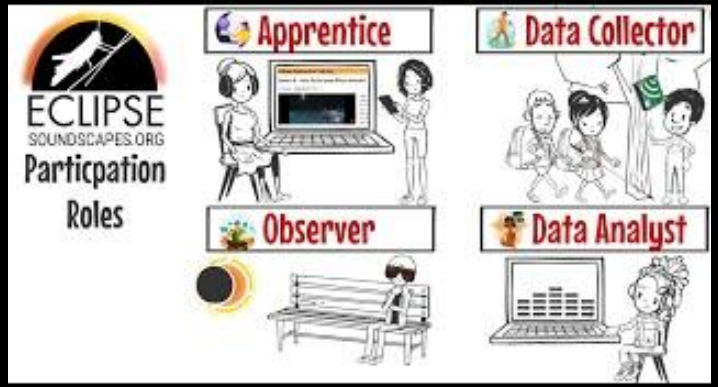
Kit Cost: ~$150

EclipseSoundscapes.org @EclipseSoundscapes @EclipseSoundUDL

More info…

ECLIPSE SOUNDSCAPES.ORG

Participation Roles



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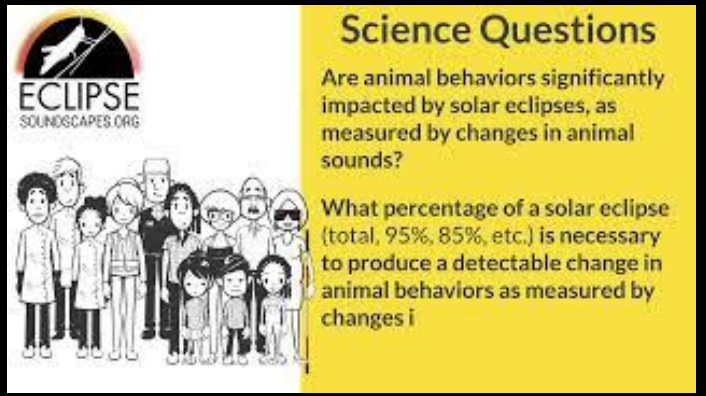
The Science



Time: 3:26

NASA Partner

EclipseSoundscapes.org @EclipseSoundscapes @EclipseSoundUDL

ARISA

Eclipse Soundscapes is supported by NASA award No. 80NSSC21M0008

SEAL

Solar Eclipse Activities for Libraries

6 million glasses
distributed free
through 13,000+ public libraries

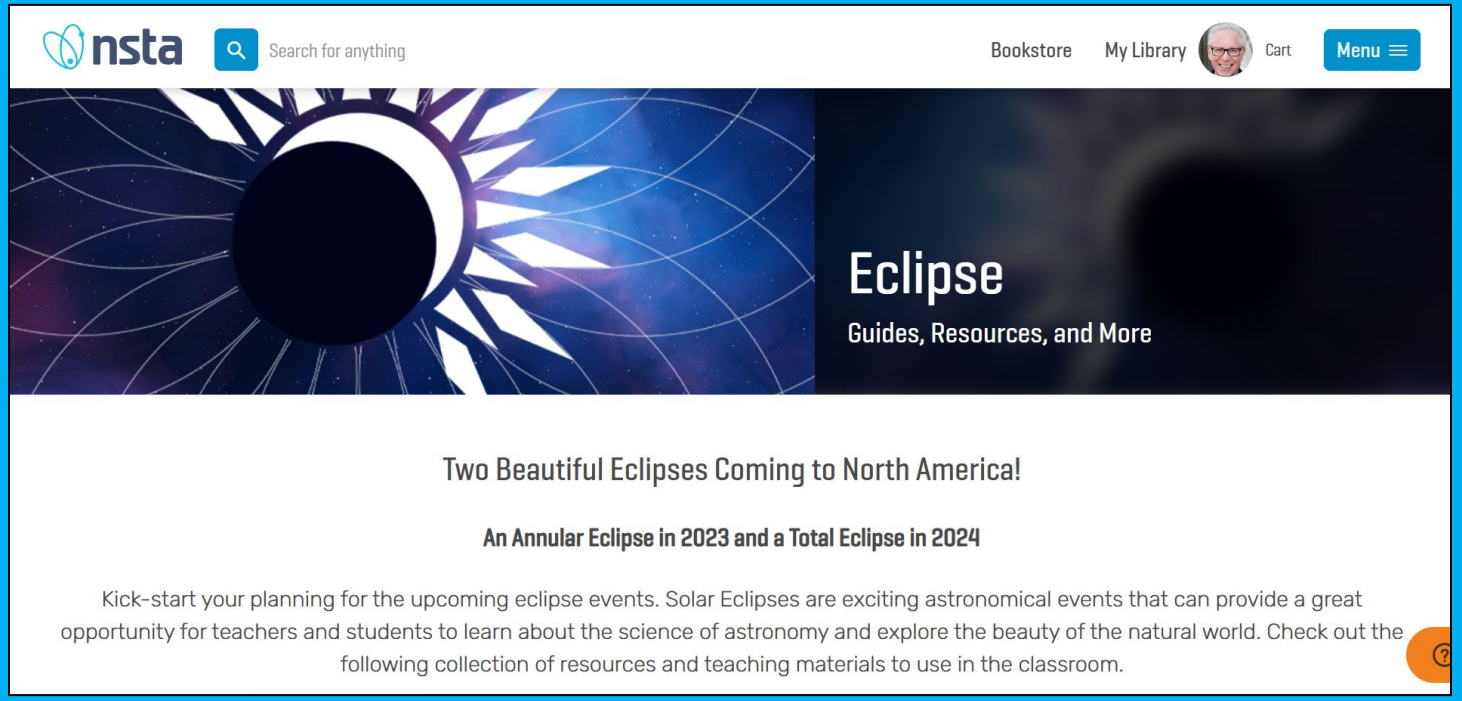
Dennis Schatz
National Science Teaching Association (NSTA)
Solar Eclipse Activities for Libraries (SEAL)

NSF National Science Foundation

Gordon and Betty MOORE FOUNDATION

https://www.starnetlibraries.org/about/our-projects/solar-eclipse-activities-libraries-seal/

NSTA Solar Eclipse Resource Website



https://www.nsta.org/eclipse

Educator and Administrator Guides
Family/Friends Handout

The Great American Annular Eclipse of the Sun

Saturday, October 14, 2023

An Information Sheet by astronomers/educators Dennis Schatz & Andrew Fraknoi

Distributed courtesy of the National Science Teaching Association

On Oct. 14, 2023, there will be a dramatic annular eclipse visible to people on a narrow path from Oregon going southeast to Texas (see map below). A partial eclipse of the Sun will be visible to everyone in North and Central America, with a bigger "bite" taken out of the Sun the closer you are to the path of the annular eclipse.

In this kind of eclipse, the Moon gets in front of the Sun, but it is too far away and, therefore, too small to cover it completely, leaving an annulus (or "ring of fire") around the dark disk of the Moon.

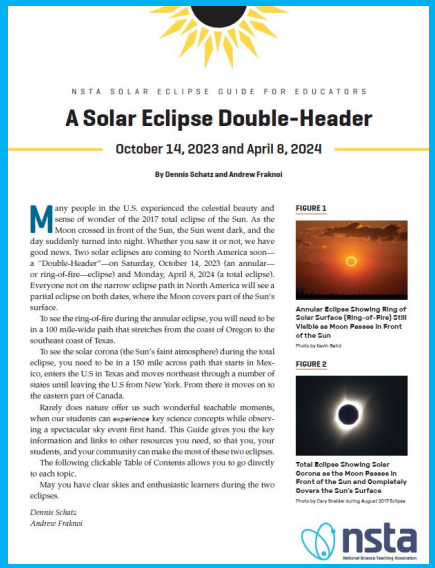
We talked about the annular eclipse in class, so your child should be able to tell you more about what to expect. On the next page is the information for what will happen in our location.

Most people in North America will see a partial eclipse.

Only those people in the narrow path of annularity will see the annular eclipse.

The path of the annular eclipse. (Credit: Xavier Jubier)

25



NSTA SOLAR ECLIPSE GUIDE FOR EDUCATORS

A Solar Eclipse Double-Header

October 14, 2023 and April 8, 2024

By Dennis Schatz and Andrew Fraknoi

Many people in the U.S. experienced the celestial beauty and sense of wonder of the 2017 total eclipse of the Sun. As the Moon crossed in front of the Sun, the Sun went dark, and the day suddenly turned into night. Whether you saw it or not, we have good news. Two solar eclipses are coming to North America soon—a "Double-Header"—on Saturday, October 14, 2023 (an annular—or ring-of-fire—eclipse) and Monday, April 8, 2024 (a total eclipse). Everyone not on the narrow eclipse path in North America will see a partial eclipse on both dates, where the Moon covers part of the Sun's surface.

To see the ring-of-fire during the annular eclipse, you will need to be in a 100 mile-wide path that stretches from the coast of Oregon to the southeast coast of Texas.

To see the solar corona (the Sun's faint atmosphere) during the total eclipse, you need to be in a 150 mile across path that starts in Mexico, enters the U.S in Texas and moves northeast through a number of states until leaving the U.S from New York. From there it moves on to the eastern part of Canada.

Rarely does nature offer us such wonderful teachable moments, when our students can *experience* key science concepts while observing a spectacular sky event first hand. This Guide gives you the key information and links to other resources you need, so that you, your students, and your community can make the most of these two eclipses.

The following clickable Table of Contents allows you to go directly to each topic.

May you have clear skies and enthusiastic learners during the two eclipses.

Dennis Schatz
Andrew Fraknoi

FIGURE 1

Annular Eclipse Showing Ring of Solar Surface (Ring-of-Fire) Still Visible as Moon Passes In Front of the Sun

Photo by Kevin Baird

FIGURE 2

Total Eclipse Showing Solar Corona as the Moon Passes In Front of the Sun and Completely Covers the Sun's Surface

Photo by Cary Snabler during August 2017 Eclipse

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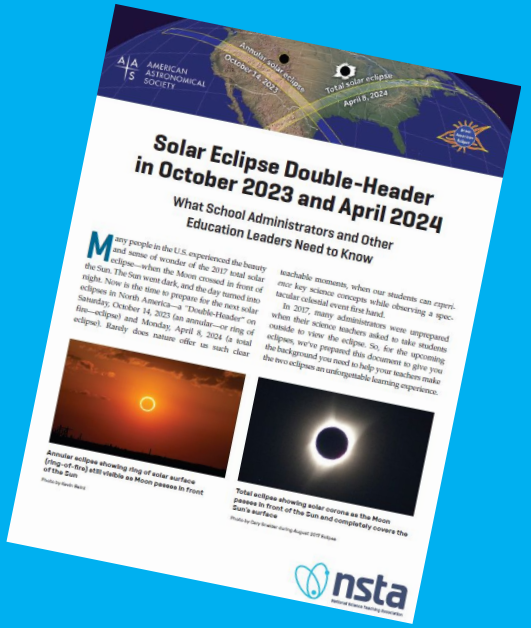

AAS AMERICAN ASTRONOMICAL SOCIETY

Annular solar eclipse October 14, 2023

Total solar eclipse April 8, 2024

Solar Eclipse Double-Header in October 2023 and April 2024

What School Administrators and Other Education Leaders Need to Know

Many people in the U.S. experienced the beauty and sense of wonder of the 2017 total solar eclipse—when the Moon crossed in front of the Sun. The Sun went dark, and the day turned into night. Now is the time to prepare for the next solar eclipses in North America—a "Double-Header" on Saturday, October 14, 2023 (an annular—or ring of fire—eclipse) and Monday, April 8, 2024 (a total eclipse). Rarely does nature offer us such clear teachable moments, when our students can experience key science concepts while observing a spectacular celestial event first hand.

In 2017, many administrators were unprepared when their science teachers asked to take students outside to view the eclipse. So, for the upcoming eclipses, we've prepared this document to give you the background you need to help your teachers make the two eclipses an unforgettable learning experience.

Annular eclipse showing ring of solar surface (ring-of-fire) still visible as Moon passes in front of the Sun

Photo by Kevin Baird

Total eclipse showing solar corona as the Moon passes in front of the Sun and completely covers the Sun's surface

Photo by Cary Snabler during August 2017 Eclipse

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Free Web Seminars

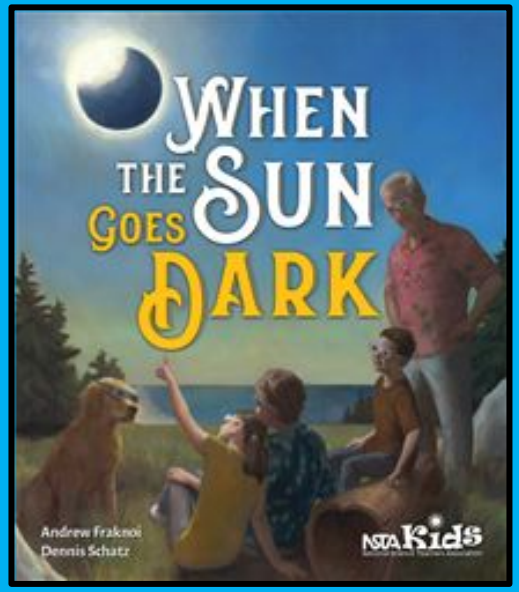
Recordings of the web seminars will be available post-event.

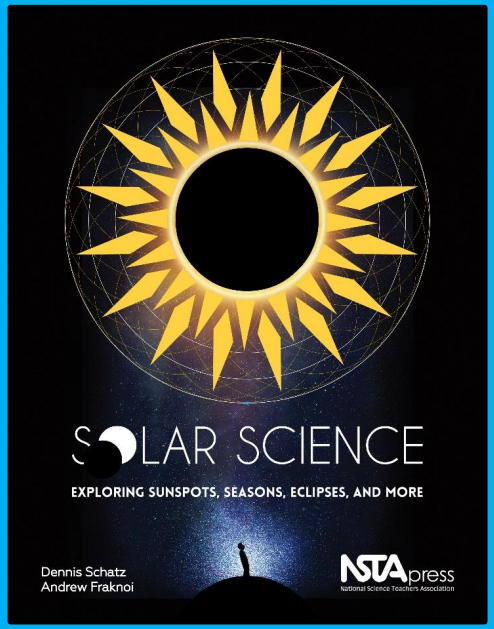
Safe Solar Eclipse Viewing Techniques and What School Administrators Need to Know
Thursday, September 14, 2023 • 7:30 PM ET

A Solar Eclipse 'Double-Header: The Perfect Way to Engage Your Preservice Teachers in Capitalizing on These Teachable Moments
Thursday April 27, 2023 • 7:00 PM ET

An Eclipse 'Double-Header' is Coming this School Year!
Thursday August 31, 2023 • 7:00 PM ET

Getting Ready for Two Spectacular Solar Eclipses in North America
October 20, 2022





FOR CHILDREN

FOR TEACHERS

Journal Articles

Science & Children · Elementary

Preparing for the Eclipse: How to safely observe the Sun with young children

Science Scope · Middle School

July/August 2023 • Volume 46 • Issue 6

- Hurrah for Teachable Moments
- Preparing for the Great American Eclipse of 2024
- The 2023 and 2024 Solar Eclipse Double-Header
- Transitioning from Partial to Total Understanding
- Making the Most of the Upcoming Solar Eclipse Double-Header October 14, 2023, and April 8, 2024
- Megamovie 2024: A Project to Eclipse All Others

The Science Teacher · High School

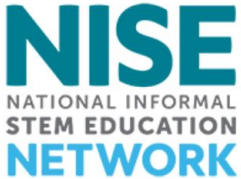
Total_Eclipse: The solar eclipse this August is an ideal opportunity to practice three-dimensional science learning

NSTA Collection

A Collection of external links curated by NSTA with additional resources related to solar eclipses.

View Collection

See what our fellow science friends have to offer.



Future Eclipse Resources from NSTA

1. Fall 2023 issue of NSTA's K-12 Journals dedicated to the eclipses

2. Sessions at the NSTA Conference in Kansas City (October 26 – 29, 2023)

3. Future NSTA web seminars

Administrator Guide

Solar Eclipse Double-Header in October 2023 and April 2024

What School Administrators and Other Education Leaders Need to Know

Many people in the U.S. experienced the beauty and sense of wonder of the 2017 total solar eclipse—when the Moon crossed in front of the Sun. The Sun went dark, and the day turned into night. Now is the time to prepare for the next solar eclipses in North America—a "Double-Header" on Saturday, October 14, 2023 (an annular—or ring of fire—eclipse) and Monday, April 8, 2024 (a total eclipse). Rarely does nature offer us such clear teachable moments, when our students can *experience* key science concepts while observing a spectacular celestial event first hand.

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Annular eclipse showing ring of solar surface (ring-of-fire) still visible as Moon passes in front of the Sun

Photo by Kevin Baird

Total eclipse showing solar corona as the Moon passes in front of the Sun and completely covers the Sun's surface

Photo by Cary Sneider during August 2017 Eclipse

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National Science Teaching Association

What to Tell Administrators

It is important to inform your school administrators EARLY and OFTEN regarding plans related to the eclipses. Share the NSTA Administrators Guide and emphasize three things:

Eclipses are a Wonderful Learning Experience

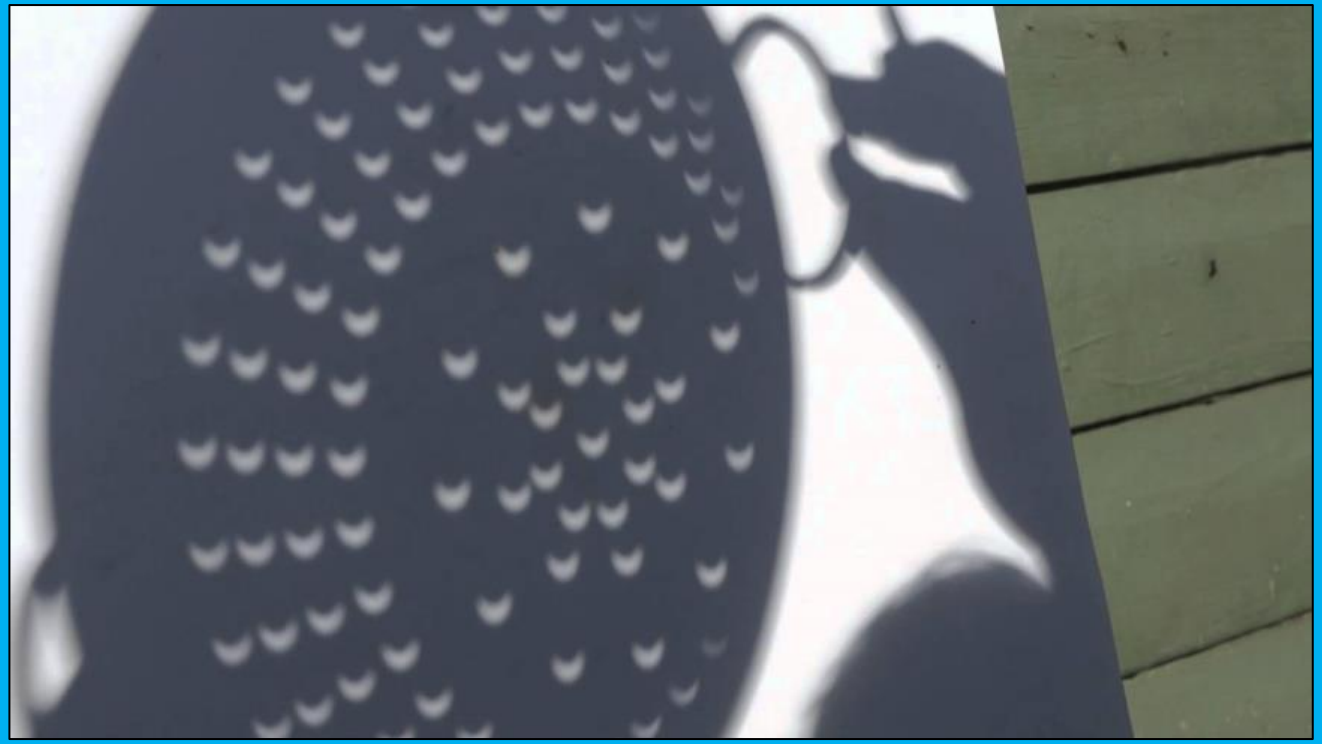
Eclipses are Safe to View

Article in *Eclipse Retinopathy* in the journal *Eye* (2001) 15,148-151 © 2001 Royal College of Ophthalmologist

Research during the 1999 solar eclipse in the United Kingdom found:

“There were no recorded cases of permanent visual loss.”

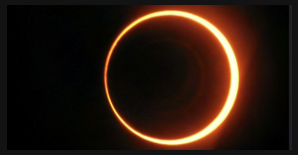
Safe Eclipse-Viewing Techniques are Easy to Find and Use



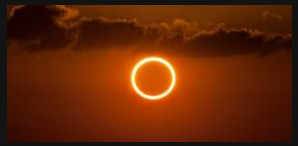
Eclipse Live Streams

Robyn Higdon, Exploratorium
September 12, 2023

Annular Eclipse: October 14, 2023



Live Stream from Ely, NV: Entire 3 hours of eclipse
Only images from telescopes: no commentary, interruptions, or audio
Close-ups (1/4 disc) and full disc in H-Alpha and white light



From Valley of the Gods, UT: Entire 3 hours of eclipse with Live Sonification
Only images from telescopes: no commentary or interruptions
Close-ups (1/4 disc) and full disc in H-Alpha and white light

From Valley of the Gods, UT: One Hour ‘Show’
ENGLISH Educational Program with Educators, NASA scientists, Navajo knowledge holders, and live imagery from the telescopes

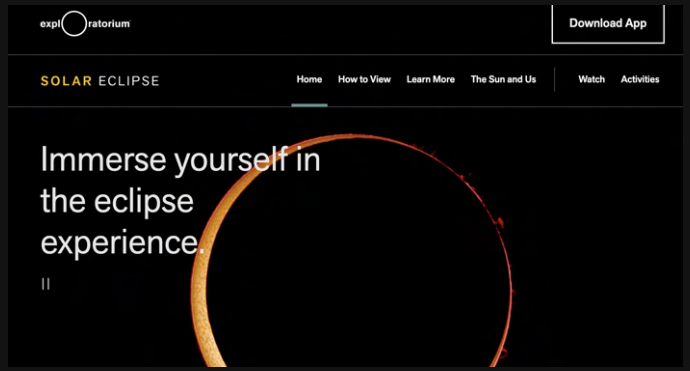
From Valley of the Gods, UT: One Hour ‘Show’
SPANISH Educational Program with Educators, NASA scientists, Navajo knowledge holders, and live imagery from the telescopes

exploratorium®

When do the streams start?

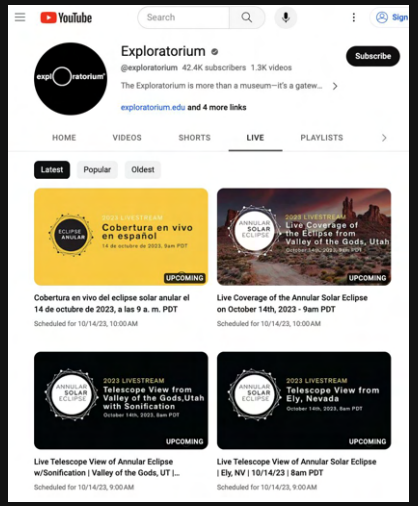
	PDT	MDT	CDT	EDT
Telescope Start	8:00 AM	9:00 AM	10:00 AM	11:00 AM
Program Start	9:00 AM	10:00 AM	11:00 AM	Noon
Annularity	9:24 (NV), 9:29 (UT)	10:24 (NV), 10:29 (UT)	11:24 (NV), 11:29 (UT)	12:24 (NV), 12:29 (UT)
Program Ends	10:00 AM	11:00 AM	Noon	1:00 PM
Telescope Ends	11:00 AM	Noon	1:00 PM	2:00 PM

How to access the streams:



www.exploratorium.edu/eclipse

Total Solar Eclipse App for iOS and Android



Exploratorium's
YouTube Channel

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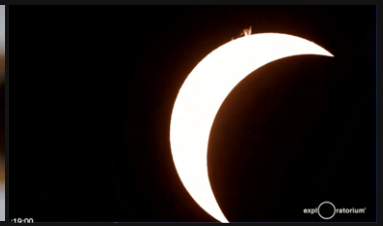
Ideas for Use:

The Telescope Feeds: Use on Museum Screens

- Use as a backdrop for your educators to speak about the eclipse
- Send to screens at admissions or in galleries to create excitement
- Take screen captures and post on social media
- Play on monitors outdoors to give visitors a chance to see close ups



The App: Use it while observing outdoors!

- Watch stunning close-ups of the sun
- Watch annularity in places where is may be partial
- Watch it before/after annularity in your location

The Programs: Stand Alone Programs

- Screen in your theater for a turnkey public program
- Show the Spanish show to increase access

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In partnership with the Indigenous Education Institute, we have developed content about the unique way the Navajo (Diné) experience the eclipse.

Ts'aa – Navajo Basket

For generations, Navajo (Diné) people have studied the sky and passed down its stories.

"Navajo star knowledge is based on a world view and cosmology significantly differ from western academic astronomy. Navajo astronomy can best be understood with much larger context of Navajo philosophy. The Navajo world view includes a holisti ordered universe where everything is interrelated and all the pieces of the universe enfolded within the whole. At the same time every piece contains the entire univers creating a network of relationships and processes in constant flux. Unlike western astronomy, traditional Navajo astronomy is highly spiritual in accordance with a wor view where everything is considered living and sacred."

- Nancy C. Maryboy, Ph.D.,Indigenous Education Institute (IEI)

A Time for Renewal - Navajo (Diné) Knowledge of Eclipses

Navajo (Diné) Eclipse Phrases

In Navajo (Diné) tradition, the eclipse marks a sacred time.

Solar eclipses are compelling astronomical events that connect us to the Sun and the Moon in powerful ways. Annular or total solar eclipses, and even partial ones, can leave lasting memories of the phenomenon as well as the people and places where we experience the celestial alignment. The 2023 annular solar eclipse will pass through Indigenous lands in the United States "four corners" region. In collaboration with Navajo (Diné) astronomers of the Indigenous Education Institute, the Exploratorium will create resources that feature solar eclipses from the Navajo worldview. Learn about the cultural significance and scientific understandings of eclipses as told by Navajo educators, astronomers, and elders.

Credit: Elsie Holiday

Traditional Navajo (Diné) knowledge teaches us that eclipses have always been a part of the human experience.

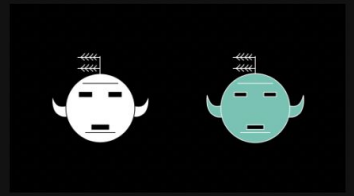
"When an eclipse begins, Navajo elders strongly instruct their community to go inside the *hogan* (their traditional dwelling) to ensure they don't look up at the Sun. It is considered a time of interaction between the Sun and the moon. They sit quietly and in contemplation, or recount traditional teachings about the origins of the Sun and moon. These practices are grounded in their deeply held respect for the cosmic order."

- Nancy C. Maryboy, Ph.D. and David Begay, Ph.D., Indigenous Education Institute (IEI)

"Annular Solar Eclipse" - poster

This poster was developed in collaboration with the Indigenous Education Institute. This educational "Annular Solar Eclipse" poster gives voice to Navajo knowledge of solar eclipses and features the Diné language and descriptions of eclipses from the Navajo worldview.

We invite you to download this beautiful poster!



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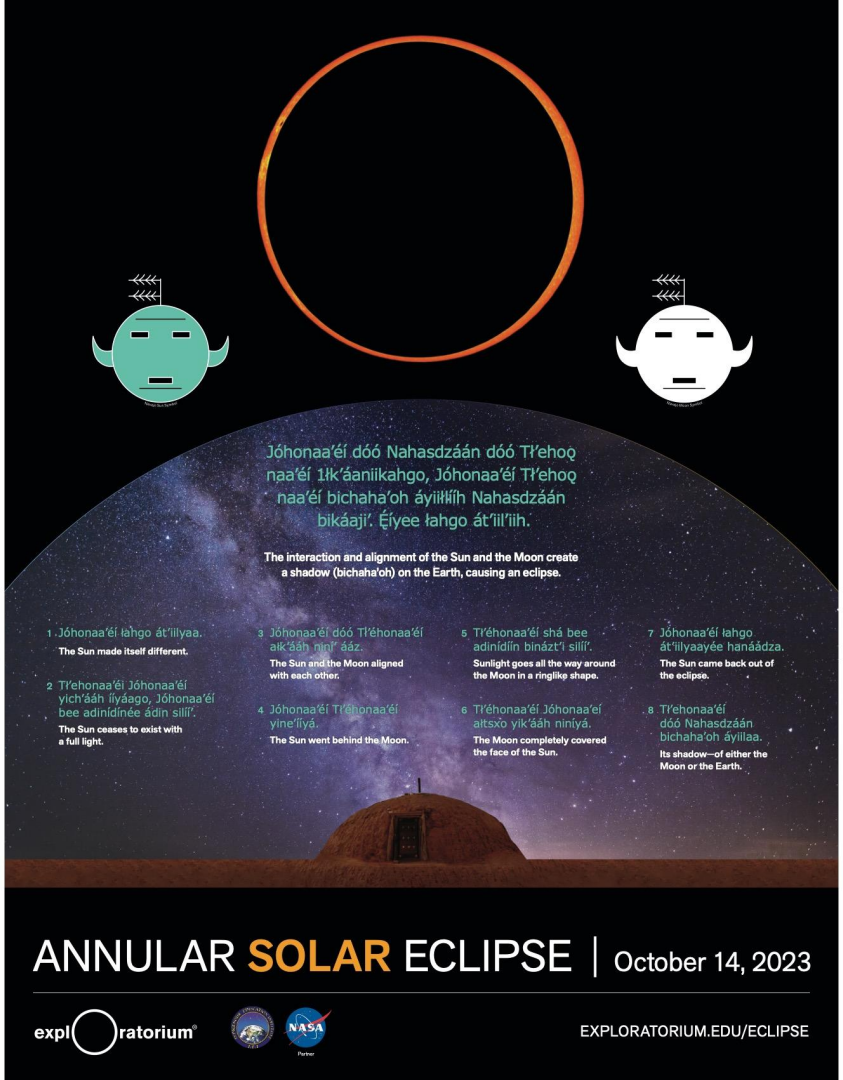
Please download, print, and share our beautiful poster

exploratorium®



Thank You.

Contact: Robyn Higdon rhigdon@exploratorium.edu

Two Moon Shadows You Won't Want to Miss

October 14, 2023
&
April 8, 2024

Vivian White
Astronomical Society of the Pacific,
Night Sky Network, Eclipse Ambassadors

solarsystem.nasa.gov/eclipses

The Whole US Sees a Partial Eclipse

And if not, don’t worry - we have you covered!

exploratorium.edu/eclipse

Involve Your Community

Plan a Partial Eclipse Party

bit.ly/partialeclipseparty

This is a *Total Eclipse*

PARTNER undergraduates and eclipse enthusiasts
DISCOVER eclipse outreach opportunities together
INSPIRE your community with awe - *in advance*!*

**No eclipse-day commitments*

Apply today!

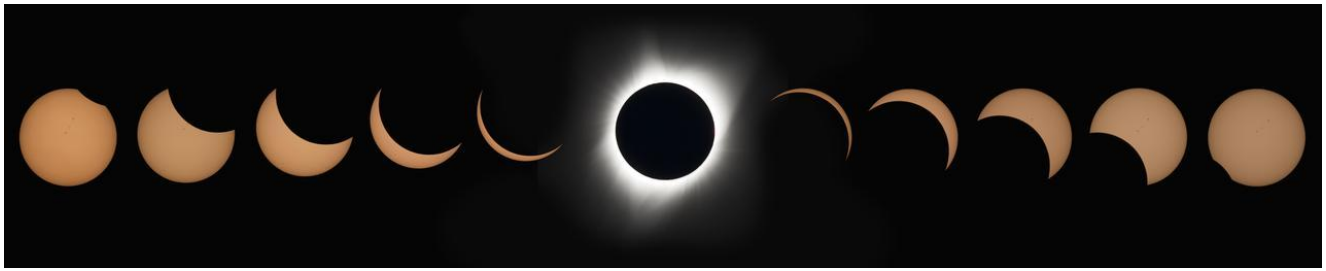
ECLIPSE AMBASSADORS

eclipseambassadors.org

NASA Partner

ASP ASTRONOMICAL SOCIETY of the PACIFIC

NISE Network Solar Eclipse Resources



Compilation of Eclipse public engagement resources:

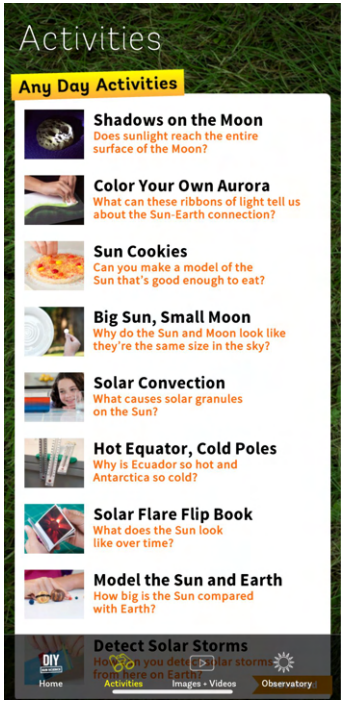
- Hands-on activities
- Maps and images
- Safe viewing
- NASA's Solar Eclipse Tactile book
- Cultural connections and more!

nisenet.org/solareclipse

Companion Apps with Hands-on Activities

DIY Sun Science

English & Spanish



DIY Solar System

English (Spanish coming soon)

Both available for iPhones & iPads

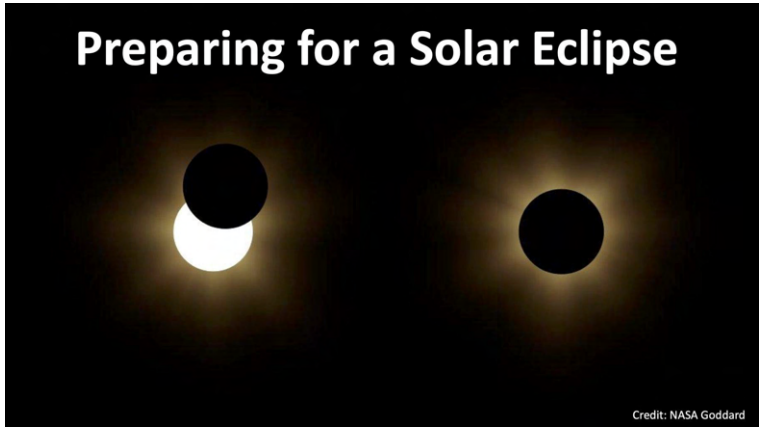
Download on the App Store

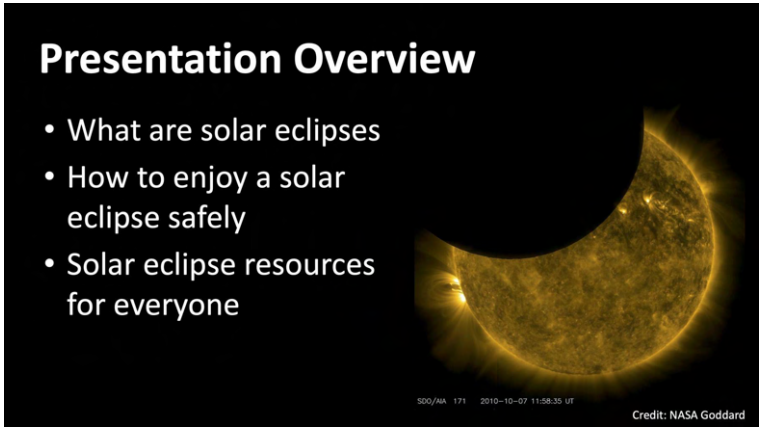
DIY Sun Science available for Android

DIY Solar System for **Android** Coming Soon!

nisenet.org/diy-solar-system-app | **nisenet.org/diy-sun-science-app**

NEW - Preparing for a Solar Eclipse Presentation





nisenet.org/solareclipseslides

Resources & Opportunities

Learn more and access the NISE Network's online digital resources:
nisenet.org/browse-topic

Read our monthly newsletter
nisenet.org/newsletter

Past Recordings & Future Online Workshops
nisenet.org/events-all

Follow NISE Net on social networking
nisenet.org/social

Thank You

NISE NATIONAL INFORMAL STEM EDUCATION NETWORK

This material is based upon work supported by NASA under award number 80NSSC21M0082. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Aeronautics and Space Administration (NASA).

Q&A

Use the raise hand feature or type your question in the chat