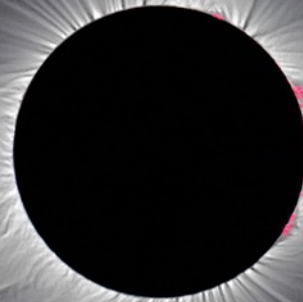


Resources from the AAS Solar Eclipse Task Force



Rick Fienberg



AMERICAN
ASTRONOMICAL
SOCIETY

SKY & TELESCOPE
THE ESSENTIAL GUIDE TO ASTRONOMY

AAS Solar Eclipse Task Force

Purpose: To function as a think tank, coordinating body, and communication gateway/hub.

Principal activities:

- Website: eclipse.aas.org
- Planning workshops
- Encourage people to get into path of totality
- Promote eye safety



SOLAR ECLIPSE ACROSS AMERICA

Monday, April 8, 2024: Sun ... Moon ... You!



AMERICAN ASTRONOMICAL SOCIETY

National Science Foundation



Search



ECLIPSE AMERICA ▾

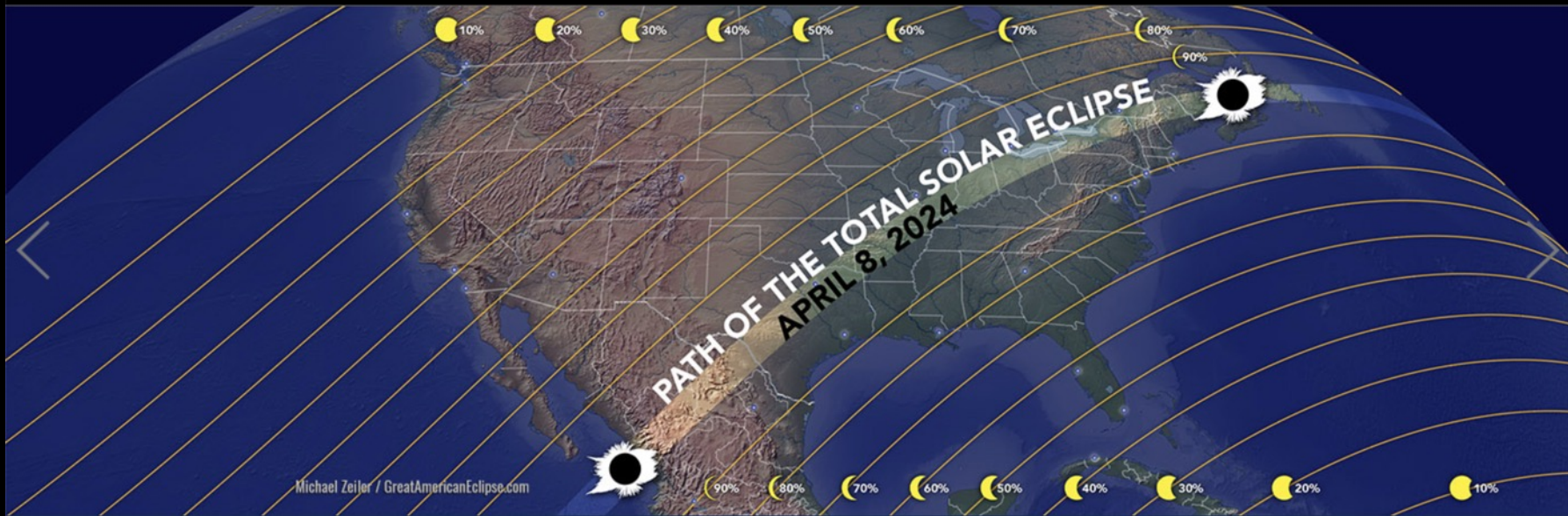
EYE SAFETY ▾

IMAGING & VIDEO ▾

RESOURCES ▾

SOLAR ECLIPSE TASK FORCE ▾

PLANNING WORKSHOPS ▾



490

Days to the Next
U.S. Solar Eclipse

Two major solar eclipses are coming to North America! On Saturday, October 14, 2023, an annular ("ring of fire") eclipse sweeps from Oregon to Texas in a 125-mile-wide path that continues to the Yucatán peninsula and northern South America. Six months later, on Monday, April 8, 2024, a total solar eclipse darkens a 115-mile-wide swath from Mexico to the Canadian maritimes, traversing the U.S. from Texas to Maine in the process. In both cases all of North America will have at least a partial solar eclipse.



SOLAR ECLIPSE ACROSS AMERICA

Monday, April 8, 2024: Sun ... Moon ... You!



AMERICAN ASTRONOMICAL SOCIETY
National Science Foundation



ECLIPSE AMERICA ▲

EYE SAFETY ▼

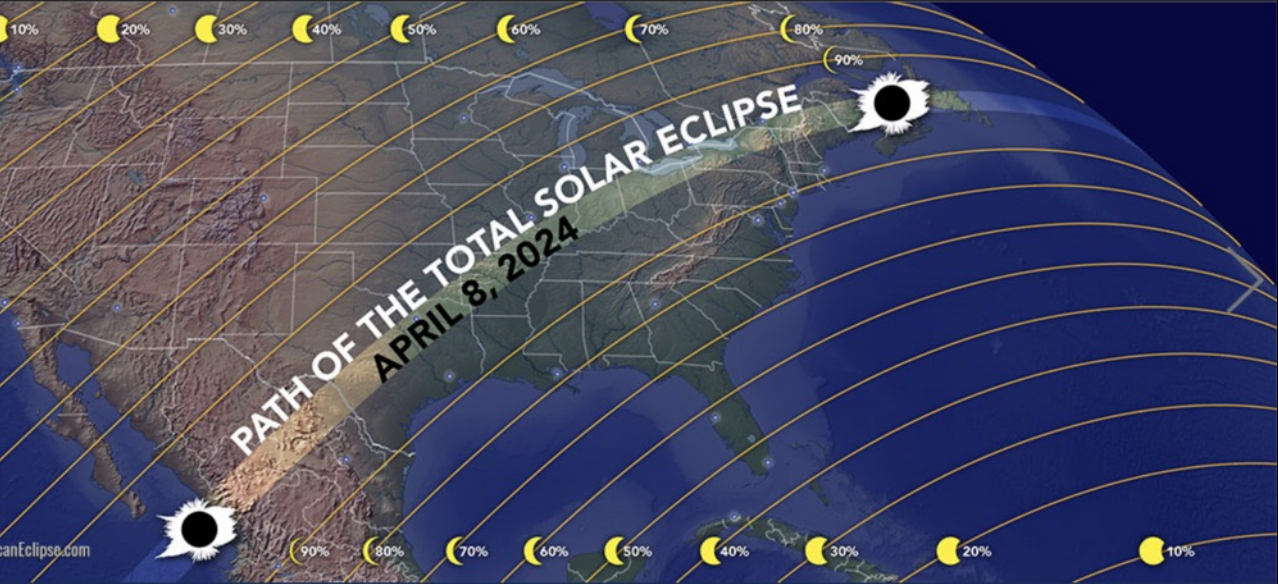
IMAGING & VIDEO ▼

RESOURCES ▼

SOLAR ECLIPSE TASK FORCE ▼

PLANNING WORKSHOPS ▼

- ECLIPSE AMERICA 2023-2024
- OCTOBER 2023 SOLAR ECLIPSE
- APRIL 2024 SOLAR ECLIPSE
- HOW & WHY ECLIPSES HAPPEN
- THE SOLAR ECLIPSE EXPERIENCE
- A SOLAR ECLIPSE GLOSSARY



Michael Zeiler / GreatAmericanEclipse.com

490

Days to the Next
U.S. Solar Eclipse

Two major solar eclipses are coming to North America! On Saturday, October 14, 2023, an annular ("ring of fire") eclipse sweeps from Oregon to Texas in a 125-mile-wide path that continues to the Yucatán peninsula and northern South America. Six months later, on Monday, April 8, 2024, a total solar eclipse darkens a 115-mile-wide swath from Mexico to the Canadian maritimes, traversing the U.S. from Texas to Maine in the process. In both cases all of North America will have at least a partial solar eclipse.

SOLAR ECLIPSE ACROSS AMERICA

Sat., October 14, 2023: Sun ... Moon ... You!



AMERICAN ASTRONOMICAL SOCIETY
National Science Foundation



ECLIPSE AMERICA ▾

EYE SAFETY ▲

IMAGING & VIDEO ▾

RESOURCES ▾

SOLAR ECLIPSE TASK FORCE ▾

PLANNING WORKSHOPS ▾

HOW TO VIEW A SOLAR ECLIPSE SAFELY

EYEWEAR & HANDHELD VIEWERS

ARE MY SOLAR VIEWERS SAFE?

REPUTABLE VENDORS OF SOLAR VIEWERS

PROJECTION: PINHOLE & OPTICAL

SOLAR FILTERS FOR OPTICS



490

Days to the Next
U.S. Solar Eclipse

Two major solar eclipses are coming to North America! On Saturday, October 14, 2023, an annular ("ring of fire") eclipse sweeps from Oregon to Texas in a 125-mile-wide path that continues to the Yucatán peninsula and northern South America. Six months later, on Monday, April 8, 2024, a total solar eclipse darkens a 115-mile-wide swath from Mexico to the Canadian maritimes, traversing the U.S. from Texas to Maine in the process. In both cases all of North America will have at least a partial solar eclipse.

If your eclipse glasses or viewers are compliant with the transmission requirements of the ISO 12312-2 safety standard, and if their filters aren't scratched, punctured, torn, coming loose from the frame, or otherwise damaged, you may reuse them indefinitely. Furthermore, you may look at the uneclipsed or partially eclipsed Sun through them for as long as you wish. Some glasses/viewers are printed with warnings stating that you shouldn't look through them for more than 3 minutes at a time and that you should discard them if they are more than 3 years old. *Such warnings are outdated and do not apply to eclipse viewers compliant with the ISO 12312-2 standard and in excellent condition.* To make sure you get (or got) your eclipse glasses/viewers from a supplier of ISO-compliant products, see our [Reputable Vendors of Solar Filters & Viewers](#) page.

Is It Safe to Clean Eclipse Glasses and Handheld Solar Viewers?

Manufacturers of hard plastic eclipse glasses often supply a microfiber pouch that you may use to wipe the lenses clean. The same pouch may be used on the lenses of cardboard eclipse glasses and handheld solar viewers. You may also wipe them clean with any soft, nonabrasive tissue or cloth; Kimwipes are also suitable, but *baby wipes and other wet wipes are not suitable*. Cardboard must be kept dry; if it gets wet, it will swell and likely detach from the lenses. *Do not use water, glass cleaner, or any other solvents or liquids to clean cardboard eclipse glasses and handheld solar viewers.*

Are Welding Filters Safe for Solar Viewing?

The ISO 12312-2 standard was based, in part, on decades of experience using welding filters for observing the Sun. A welding filter with a shade number of 12 or higher transmits a safely tiny percentage of the Sun's light across the spectrum, whether made of tempered glass or metal-coated polycarbonate. Most observers find the view through a shade 12 welding filter uncomfortably bright and the view through a shade 15 or higher-numbered welding filter unattractively dark. The "sweet spot" is shade 13, which best matches the view in purpose-made eclipse glasses and handheld solar viewers, though shade 14 works well too. Shade 13 (and 14) welding filters are rarely stocked in welders' supply stores, though, so you'll probably have better luck finding them by shopping online.

You should *not* use adjustable and/or auto-darkening welding helmets or similar products to view the Sun. Many don't go as dark as shade 13 or 14, and even those that do pose a grave risk to your eyesight, either because you accidentally adjust them to an unsafe setting or because they don't auto-darken fast enough when you look at the Sun with them.

What If You Don't Have a Safe Solar Filter/Viewer?

An alternative method for safe viewing of the partially eclipsed Sun is *indirectly* via **pinhole projection**. For example, cross the outstretched, slightly open fingers of one hand over the outstretched, slightly open fingers of the other, creating a waffle pattern. *With your back to the Sun*, look at your hands' shadow on the ground. The little spaces between your fingers will project a grid of small images on the ground, showing the Sun as a crescent during the partial phases of any solar eclipse or as a ring during the annular phase of an annular eclipse. Or just look at the shadow of a leafy tree during a partial or annular eclipse; you'll see the ground dappled with crescent or ring-shaped Suns projected by the tiny spaces between the leaves.

"Build a Sun Funnel for Group Viewing of the Great American Solar Eclipse of August 21, 2017" is a step-by-step illustrated guide to constructing a simple, inexpensive rear-screen-projection device that enables multiple people to observe an optically projected image of the Sun simultaneously and safely. *The document is intended for knowledgeable amateur and professional astronomers who know how to operate a telescope for solar observing.*

- [Instructions for Building a Sun Funnel \(PDF\)](#)

The Sunspotter & Solarscope

Originally developed at Learning Technologies, the company that invented the Starlab inflatable planetarium, the Sunspotter is billed as "the safer solar telescope." Like the Sun Funnel, the Sunspotter uses optical projection to produce a magnified image of the Sun that can be viewed by many people at once without risk of anyone looking into a bright beam of sunlight. Its price, around \$400, may be more than many individuals would care to spend, but the Sunspotter wasn't really designed for individuals; it was designed for astronomy clubs, schools, museums, and planetariums.

A similar but less expensive alternative is the Solarscope, which comes in several versions (some made of wood, like the Sunspotter, and some made of cardboard) priced from a little over \$100 to a little less than \$300.

If your school or organization is planning to hold an eclipse-watching event for students or the public on August 21, 2017, a Sunspotter or Solarscope is worth considering.

- [Learn more about the Sunspotter](#) (Starlab / Science First)
- [Learn more about the Solarscope](#) (Solarscope USA)

A less expensive device of similar design is available in kit form: the [Solar Projector](#) from Astromedia in the United Kingdom. It costs only \$25 or so, but it requires assembly by someone who's handy with tape, glue, and sharp knives and willing to follow the 34-step instructions (available as a [6-page PDF](#)).





SOLAR ECLIPSE ACROSS AMERICA

Sat., October 14, 2023: Sun ... Moon ... You!



AMERICAN ASTRONOMICAL SOCIETY
National Science Foundation

[ECLIPSE AMERICA](#)[EYE SAFETY](#)[IMAGING & VIDEO](#)[RESOURCES](#)[SOLAR ECLIPSE TASK FORCE](#)[PLANNING WORKSHOPS](#)[HOW TO VIEW A SOLAR ECLIPSE SAFELY](#)[EYEWEAR & HANDHELD VIEWERS](#)[ARE MY SOLAR VIEWERS SAFE?](#)[REPUTABLE VENDORS OF SOLAR VIEWERS](#)[PROJECTION: PINHOLE & OPTICAL](#)[SOLAR FILTERS FOR OPTICS](#)

490

Days to the Next
U.S. Solar Eclipse

Two major solar eclipses are coming to North America! On Saturday, October 14, 2023, an annular ("ring of fire") eclipse sweeps from Oregon to Texas in a 125-mile-wide path that continues to the Yucatán peninsula and northern South America. Six months later, on Monday, April 8, 2024, a total solar eclipse darkens a 115-mile-wide swath from Mexico to the Canadian maritimes, traversing the U.S. from Texas to Maine in the process. In both cases all of North America will have at least a partial solar eclipse.

Get your eclipse glasses/viewers *early*...



...from *reputable* (mainly American) vendors.



SOLAR ECLIPSE ACROSS AMERICA

Sat., October 14, 2023: Sun ... Moon ... You!



AMERICAN ASTRONOMICAL SOCIETY
National Science Foundation

[ECLIPSE AMERICA](#)[EYE SAFETY](#)[IMAGING & VIDEO](#)[RESOURCES](#)[SOLAR ECLIPSE TASK FORCE](#)[PLANNING WORKSHOPS](#)[HOW TO VIEW A SOLAR ECLIPSE SAFELY](#)[EYEWEAR & HANDHELD VIEWERS](#)[ARE MY SOLAR VIEWERS SAFE?](#)[REPUTABLE VENDORS OF SOLAR VIEWERS](#)[PROJECTION: PINHOLE & OPTICAL](#)[SOLAR FILTERS FOR OPTICS](#)

490

Days to the Next
U.S. Solar Eclipse

Two major solar eclipses are coming to North America! On Saturday, October 14, 2023, an annular ("ring of fire") eclipse sweeps from Oregon to Texas in a 125-mile-wide path that continues to the Yucatán peninsula and northern South America. Six months later, on Monday, April 8, 2024, a total solar eclipse darkens a 115-mile-wide swath from Mexico to the Canadian maritimes, traversing the U.S. from Texas to Maine in the process. In both cases all of North America will have at least a partial solar eclipse.

Authorized Resellers

The following resellers offer eclipse glasses made by one or more of the companies listed above. If you buy from any of the following businesses, you know you are getting ISO-compliant safe solar viewers:

- [American Solar Eclipse Company](#)
- [Big Kid Science](#)
- [Eclipse2024.org](#)
- [GreatAmericanEclipse.com](#)
- [ICSTARS Astronomy](#)
- [Mt. Lemmon Science Center \(University of Arizona Science\)](#)
- [My Science Shop \(Astronomy & Discover Magazines\)](#)
- [NationalEclipse.com](#)
- [Soluna \(GSM Sales\)](#)

Free Eclipse Glasses for Libraries

Calling all public librarians! The STAR Library Network (STAR Net), managed by the Space Science Institute, is offering free eclipse glasses along with supporting information, training, and ideas for activities to conduct at eclipse events at U.S. public libraries. Learn more, and register to participate, on the [Solar Eclipse Activities for Libraries \(SEAL\) website](#).



Solar Filters for Telescopes, Binoculars & Camera Lenses

Solar filters for optics are meant to go over the aperture, i.e., the front opening, and should be used only by experienced observers. Some of the sources listed below sell aperture filters made from Baader AstroSolar Safety Film. While this material, unlike the newer AstroSolar Silver/Gold Film (see [above](#)), does not meet the ISO 12312-2 international standard for eyes-only direct viewing of the Sun — it transmits slightly more ultraviolet light than the standard allows — it has been safely used by amateur and professional astronomers for several decades for observing and/or imaging the Sun through telescopes, binoculars, and camera lenses (whose glass elements filter out the excess ultraviolet light). *Be sure to read our [safety tips](#) before using solar filters with optics!*

- [Alpine Astronomical \(Filter Sheets / Mounted Filters\)](#)
- [Astro-Physics, Inc.](#)
- [Astronomics](#)



SOLAR ECLIPSE ACROSS AMERICA

Monday, April 8, 2024: Sun ... Moon ... You!



AMERICAN ASTRONOMICAL SOCIETY

National Science Foundation



ECLIPSE AMERICA ▾

EYE SAFETY ▾

IMAGING & VIDEO ▾

RESOURCES ▲

SOLAR ECLIPSE TASK FORCE ▾

PLANNING WORKSHOPS ▾

APPS & SOFTWARE

BOOKS & ARTICLES

DOWNLOADS

IMAGES & VIDEOS (ROYALTY-FREE)

MAPS, GLOBES & CALCULATORS

SOLAR FILTERS & VIEWERS

TELESCOPES & BINOCULARS

WEBSITES

Michael Zeiler / GreatAmericanEclipse.com

490

Days to the Next
U.S. Solar Eclipse

Two major solar eclipses are coming to North America! On Saturday, October 14, 2023, an annular ("ring of fire") eclipse sweeps from Oregon to Texas in a 125-mile-wide path that continues to the Yucatán peninsula and northern South America. Six months later, on Monday, April 8, 2024, a total solar eclipse darkens a 115-mile-wide swath from Mexico to the Canadian maritimes, traversing the U.S. from Texas to Maine in the process. In both cases all of North America will have at least a partial solar eclipse.



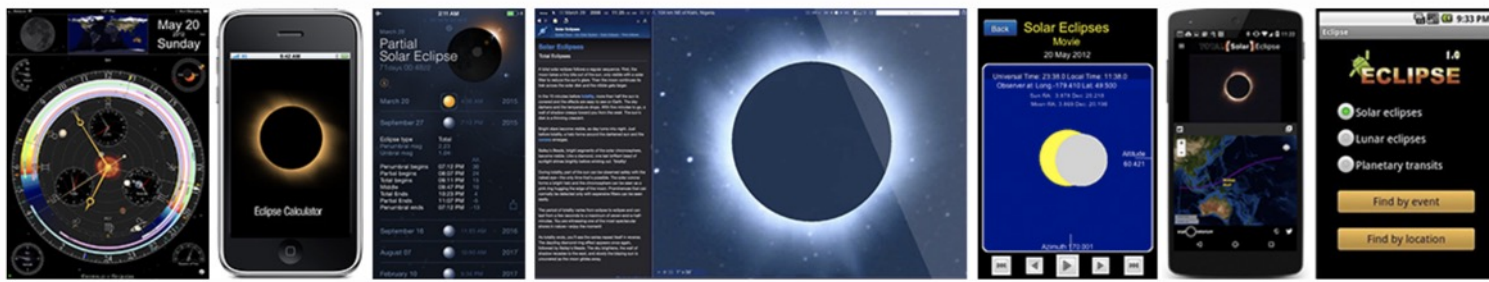
AMERICAN ASTRONOMICAL SOCIETY
National Science Foundation



- ECLIPSE AMERICA ▾
- EYE SAFETY ▾
- IMAGING & VIDEO ▾
- RESOURCES ▾
- SOLAR ECLIPSE TASK FORCE ▾
- PLANNING WORKSHOPS ▾

Resources / Apps & Software

Apps & Software



Here you'll find some of the best eclipse-related apps and software available, as judged by members of the AAS Solar Eclipse Task Force. To avoid overwhelming you with too much information, we've intentionally weighted our listings toward resources that are relatively new, up to date, and/or especially relevant to the October 2023 and April 2024 American solar eclipses. We've also considered quality, of course; if an app or software is listed here, we think it's of high quality. If it's not listed here, that doesn't mean it's not of high quality — it just means we can't list everything (or haven't heard of it). If you have, or know of, a resource that you think belongs here, please [contact us](#); we can't guarantee that we'll add the item to our website, but we will consider it.

Apps for iOS Devices (iPhone and/or iPad)

Eclipse-Specific Apps



AMERICAN ASTRONOMICAL SOCIETY
National Science Foundation

 🔍

- ECLIPSE AMERICA ▾
- EYE SAFETY ▾
- IMAGING & VIDEO ▾
- RESOURCES ▾
- SOLAR ECLIPSE TASK FORCE ▾
- PLANNING WORKSHOPS ▾

Resources / Books & Articles

Books & Articles



Here you'll find some of the best eclipse-related books and articles available, as judged by members of the [AAS Solar Eclipse Task Force](#). To avoid overwhelming you with too much information, we've intentionally weighted our listings toward resources that are relatively new, up to date, and/or especially relevant to the October 14, 2023, and/or April 8, 2024, American solar eclipses. Some titles date back to the August 21, 2017, solar eclipse across America. We've also considered quality, of course; if a book or article is listed here, we think it's of high quality. If it's not listed here, that doesn't mean it's not of high quality — it just means we can't list everything (or we've simply never heard of it). If you have, or know of, a resource that you think belongs here, please [contact us](#); we can't guarantee that we'll add the item to our website, but we will consider it.

Books



Downloads

The resources linked below are intended for broad distribution and may be freely reproduced, printed, and disseminated as long as no changes are made to them.

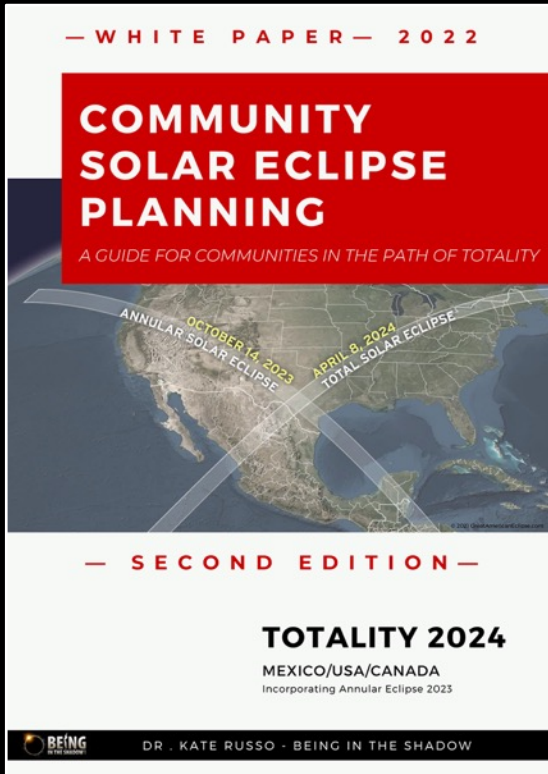
- [Book on Lessons Learned from the 2017 Eclipse](#)
- [Technical Report on Solar Eclipse Eye Safety](#)
- [Journal Article on Solar Filters and the ISO 12312-2 Standard](#)
- [White Paper on Community Solar Eclipse Planning](#)
- [TR News Article on Eclipse-Related Traffic](#)
- [Instructions for Building a Sun Funnel](#)
- [Sun...Moon...You! Postcard](#)
- [Eclipse.aas.org Business Card](#)

Also, see our [Royalty-free Images & Videos](#) page.

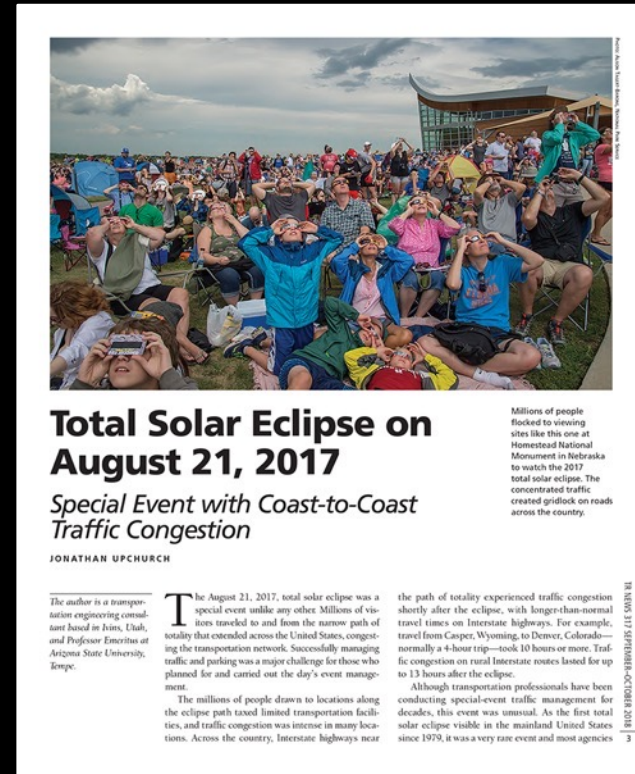


"Celebrating the 2017 Great American Eclipse: Lessons Learned from the Path of Totality" is Vol. 516 of the Astronomical Society of the Pacific Conference Series. Having sold out of the printed book, the ASP has kindly made its 60 contributed articles freely available as PDFs. Whatever your role in preparing for the coming American solar eclipses, you'll find many valuable tips on these pages. Our links point to a list of the articles on the NASA/SAO Astrophysics Data System (ADS). Click on any article title to go to its corresponding abstract page; from there you can download the PDF.

- [Book on Lessons Learned from the 2017 Eclipse](#)



Fail to plan = Plan to fail!



Arrive early, leave late!





ECLIPSE AMERICA ▾

EYE SAFETY ▾

IMAGING & VIDEO ▾

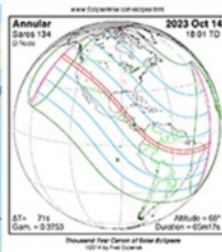
RESOURCES ▾

SOLAR ECLIPSE TASK FORCE ▾

PLANNING WORKSHOPS ▾

Resources / Maps, Globes & Calculators

Maps, Globes & Calculators



Here you'll find some of the best eclipse maps, globes, and calculators available, as judged by members of the [AAS Solar Eclipse Task Force](#). To avoid overwhelming you with too much information, we've intentionally weighted our listings toward resources that are relatively new, up to date, and/or especially relevant to the October 14, 2023, and/or April 8, 2024, American solar eclipses. We've also considered quality, of course; if something is listed here, we think it's of high quality. If it's not listed here, that doesn't mean it's not of high quality — it just means we can't list everything (or we haven't heard of it). If you have, or know of, a resource that you think belongs here, please [contact us](#); we can't guarantee that we'll add the item to our website, but we will consider it.

Maps by Fred Espenak, known worldwide as "Mr. Eclipse." Now retired from NASA's Goddard Space Flight Center, Fred is longtime author of the *NASA Eclipse Bulletin* and the world's leading expert in the science of eclipse prediction. The following maps are on his [EclipseWise.com](#) website; the animated global maps were created in partnership with Michael Zeiler of [GreatAmericanEclipse.com](#).

- [Hermit Eclipse](#) (Ian Cameron Smith)
- [NASA Science: Eclipses](#)
- [National Eclipse](#) (Dave Clark)
- [Shadow & Substance](#) (Larry Koehn)
- [U.S. Naval Observatory](#)

Local/Regional/State Websites for 2023-24 Eclipse Visitors

- [Enjoy Illinois: Makanda Solar Eclipse](#)
- [Experience the Eclipse in Arkansas](#)
- [Hill Country Eclipse Portal](#) (Texas)
- [MO Eclipse](#) (Missouri)
- [New Hampshire Total Solar Eclipse](#)
- [Ohio Total Solar Eclipse](#)
- [Ozark Gateway Region Total Eclipse](#) (Arkansas)
- [Poplar Bluff Total Solar Eclipse](#) (Missouri)
- [Rochester Total Solar Eclipse](#) (New York)
- [Southern Illinois University: Solar Eclipse Crossroads](#)
- [West Plains Total Solar Eclipse](#) (Missouri)

Websites About Solar Eclipses More Generally

- [Being in the Shadow](#) (Kate Russo)
- [Eclipses: Rice Space Institute](#) (Patricia Reiff et al., Rice University)
- [Eclipses: TimeandDate.com](#)
- [EclipseWise.com: Predictions for Solar Eclipses](#) (Fred Espenak)
- [Eclipsophile: Climatology & Weather for Celestial Events](#) (Jay Anderson & Jennifer West)
- [Hermit Eclipse](#) (Ian Cameron Smith)
- [International Astronomical Union Working Group on Solar Eclipses](#) (Jay Pasachoff et al.)
- [MrEclipse.com: The Ultimate Resource For Eclipse Photography](#) (Fred Espenak)
- [Solar Eclipse](#) (Exploratorium, San Francisco, California)
- [Solar Eclipses](#) (Xavier Jubier)
- [WhenIsTheNextEclipse.com](#) (Jamie Carter)

Resources from the AAS Solar Eclipse Task Force



Rick Fienberg • rick.fienberg@aaas.org



SKY & TELESCOPE
THE ESSENTIAL GUIDE TO ASTRONOMY