

# THE GREATEST SHOW ON EARTH

By: *Trudy E. Bell* ©2023 Trudy E. Bell

*E-Day is Monday, April 8, 2024, mid-afternoon. Here are tips for full appreciation of the upcoming total eclipse of the sun.*

By the time you read this, you'll likely have heard about the upcoming April 8 total solar eclipse—last one to be visible from the contiguous U.S. states until the back-to-back August eclipses of 2044 and 2045. You'll likely also have heard explanations of the phenomenon's cause (the moon's coming exactly between the earth and the sun). So rather than repeating those basics, here are first-hand tips for enjoying the solar system's greatest show on earth.

## GET THEE TO TOTALITY

The difference between a 99-percent partial eclipse and a total solar eclipse may be just 1 percent of the sun's surface, but it's essentially 100 percent of the experience. That difference is what makes some people repeatedly travel thousands of miles to stand in the right place on earth for a few minutes of totality. I'm one of them — I've chased the moon's shadow six times. Amazingly, despite clouds, I've seen the totally eclipsed sun all six times.

In 2024, the path of totality will be a swath less than 125 miles wide within the umbra, the densest part of the moon's shadow, as it sweeps northeast from Mexico through Texas, across Ohio and Maine into Canada. The closer you get to the center line of the path of totality, the longer the duration of totality—up to over four minutes in 2024, much longer than in 2017.

## STAY MOBILE

Stay flexible and mobile. For all but my first solar eclipse in Mexico in 1970, weather predictions were dicey.



The eclipsed sun above silhouettes of the author's daughter (center) and two Nebraska hosts was photographed by lying back on the ground in Wyoming in 2017. (Hump at bottom left is the author's knee.) Credit: Trudy E. Bell

In the Arctic (Tuktoyaktuk, in Canada's Northwest Territories) in 1972, thick fog kept our chartered plane grounded, but the clouds opened just for a few minutes right before totality. In 2017, predictions for Crete, Nebraska, were for thunderstorms; so based on satellite images, our professor host made a 3 a.m. call for us to hightail it 500 miles west to clearer skies in eastern Wyoming.

## WATCH PARTIAL PHASES SAFELY

The classic apparatus for watching the hour or so of partial phases of the eclipse—from so-called “first contact” (when the moon first starts covering the sun) until “second contact” (the beginning of totality)—is a pinhole projector. Humble though it is, it works, it is safe, and it's easy for kids to build. You can improvise a pinhole projector with your hands: curl thumb and forefinger of one hand to create a tiny hole and project the image of the sun on the palm of your other hand.

Engineers wishing to build a projector giving a larger and sharper image of the sun (including sunspots) can find plans for Safe Solar Viewers using one or two lenses from dollar-store reading glasses [see “DIY Resources” sidebar].

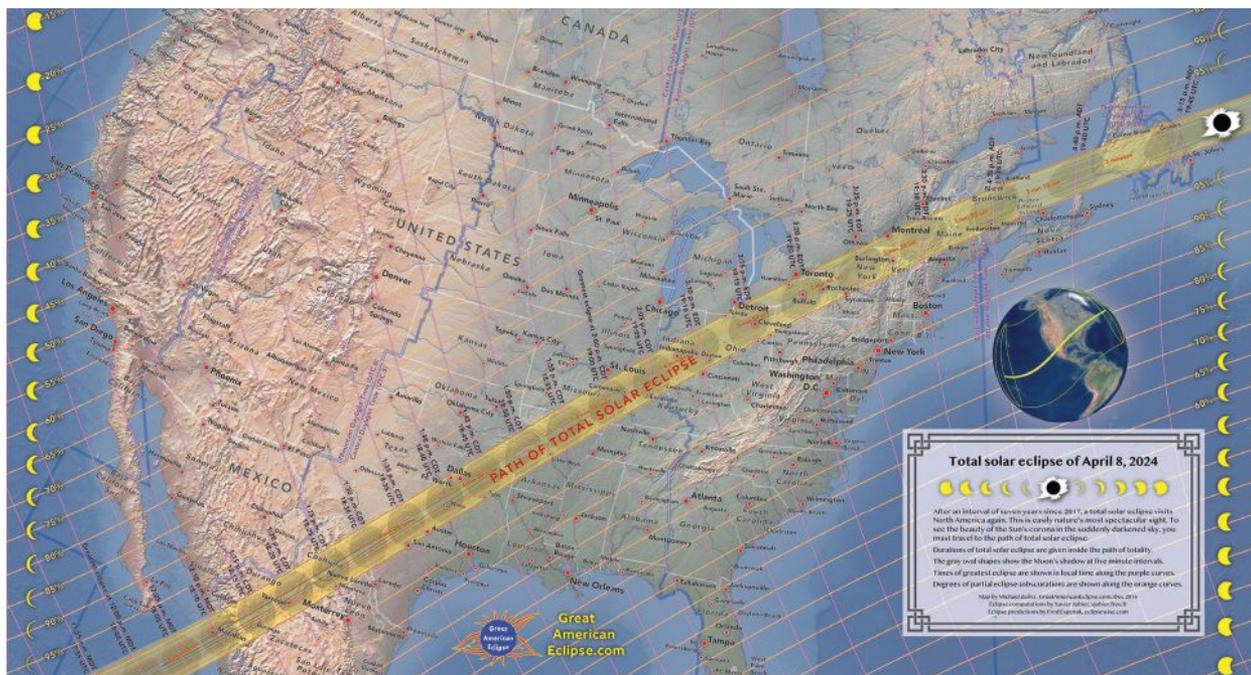
Many people like to watch the moon advance across the sun directly through ultra-dark eclipse shades [details in “DIY Resources”]. Personally, I find it exhausting to look directly at the sun's face, even through the shades, and prefer watching events unfold on a projection screen. Try both.

## MONITOR LANDSCAPE AND SKY

Although the sun is the star attraction, keep an eye on the rest of the sky and on the landscape to behold phenomena never seen at any other time.

Several minutes just before or after totality, shadow bands may start flickering across the ground. Shadow bands are long, faint, low-contrast, irregular stripes of shadow that scurry over people and trees, somewhat resembling the ever-moving shadows of ripples on the bottom of a swimming pool. They are believed to be refraction or diffraction of sunlight through fine atmospheric turbulence, when the sun's crescent becomes so narrow it behaves like a slit. In 1970, under ideally clear skies, shadow bands were unmistakable, especially on plain white surfaces; during later eclipses seen through airborne dust or haze, they were only weakly visible or even absent.

Then there is the engulfing lunar shadow, which in April will approach from the southwest, almost directly below the sun itself. You may see the southwestern horizon darken and the darkness spread rapidly, thrilling, and inexorable as an approaching tidal wave.



Major U.S. cities that will be within the path of totality on April 8, 2024, include Dallas, Indianapolis, Cleveland, Buffalo, and Rochester. Other major cities on the edge or just outside the path include San Antonio, Austin, Fort Worth, Louisville, Fort Wayne, Ann Arbor, Detroit, Cincinnati, and Columbus, plus Toronto and Montreal in Canada. Map credit: Michael Zeiler, [GreatAmericanEclipse.com](http://GreatAmericanEclipse.com)

## SEE THE SUN BLACKED OUT

Totality drops with astonishing suddenness, the sky darkening to a steely blue or teal green—a shade never seen in any other natural setting; the entire horizon may be ringed with soft yellows, oranges, and reds. Remove any eclipse shades and gaze upward. Above, the sun’s silvery corona (outer atmosphere) glows forth in feathery soft glory, its exact shape and structure depending on solar activity. Through binoculars, you may see flame-like ruby or magenta solar prominences suspended a small distance away from the moon’s edge.

Look around the rest of the sky—away from the eclipsed sun, several planets or even one or two bright stars may gleam. Watch and listen how birds, cows, or insects may react to the unexpected deep velvet blue midday twilight. Feel how the air temperature may have dropped. Note your own and others’ emotional responses to the celestial event.

The minutes fly. All too soon, the southwestern edge of the eclipsed sun brightens—a warning to get ready to resume wearing eclipse shades as the lunar shadow continues racing northeast. Totality may end with “Baily’s beads” as the first bits of sun show themselves in valleys between profiled lunar mountains, and one bead may grow into

the classic “diamond ring effect.” The last of the shadow bands fade away as wildlife resumes daytime behaviors.

## ONE LAST THOUGHT ...

More than 135 years ago, astronomy writer Mabel Loomis Todd asked Hamilton College astronomer C. H. F. Peters what single instrument he would select for observing a total solar eclipse. His reply: “A pillow.” Despite all the eclipses he had observed as a scientist, he regretted never taking time simply to appreciate the rare and stunning event as a poetic soul.

So, don’t miss totality on April 8. And just give yourself time—a few minutes free of earthly appointments to behold a majestic celestial appointment of earth, moon, and sun.

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## DIY RESOURCES

Directions for building a simple pinhole projector from an empty cereal box are given in a one-minute animated tutorial from NASA: [www.youtube.com/watch?v=vWMf5rYDgpc](http://www.youtube.com/watch?v=vWMf5rYDgpc). Late in the partial phases, a straw hat or anything with small holes will project multiple images of the crescent sun.

Instructions for building Safe Solar Viewers that project a larger and sharper solar image are at [http://richardson.people.cofc.edu/safe\\_solar\\_folder/index.html](http://richardson.people.cofc.edu/safe_solar_folder/index.html).

Ultra-dark eclipse shades may be available from local science centers and astronomical societies. **Beware cheap knock-off imitations; they may not block all harmful solar radiation.** Use only those shades that conform to the international standard ISO 12312-2. The American Astronomical Society offers information and reputable sources at <https://eclipse.aas.org/resources/solar-filters>.

For planning where to be in the path of totality based on detailed discussions of regional weather odds, two essential resources are *Road Atlas for the Total Solar Eclipse of 2024* by Fred Espenak (NASA’s long-time “Mr. Eclipse” guru) and *Eclipse Bulletin: Total Solar Eclipse of 2024 April 08* by Fred Espenak and Jay Anderson. Both large-format paperback books are available from Amazon in either digital or hard copy forms. Spring for the color editions. The two complementary references are vital if at the last minute you need to outrun clouds.

Many people find a total solar eclipse to be an unexpectedly emotional experience. This aspect is explored by British clinical psychologist and dedicated eclipse chaser Kate Russo in her book *Total Addiction* (Springer, 2012).