Run a 2017 Eclipse Event for Friends, Neighbors, and Profit

Today is not too early to start planning outreach for the August 2017 solar eclipse.

By Douglas Duncan

On May 20, 2012, 10,000 people viewed the annular eclipse of the Sun from the University of Colorado football stadium. *[Courtesy University of Colorado Boulder]*

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Courtesy Astronomical Society of the Pacific

I can remember my first time as if it were yesterday: March 7, 1970, at a small village near Miahuatlán, in the vicinity of Oaxaca, Mexico. Two friends and I had driven for five days from Pasadena, California — in a Volkswagen Beetle not much larger than I am — in order to see a total eclipse of the Sun. We carried food, a 40-gallon metal water container, a 6-inch f/6 reflecting telescope, cameras, and sleeping bags. The total eclipse lasted 3 minutes and 20 seconds.

Was it worth 10 days in a cramped car? Absolutely! The sight of the total eclipse was so beautiful and profound that I've continued chasing them all over the world for the past 45 years. I lead groups of people to see eclipses, and many of them also get "hooked" and become eclipse chasers. I also experience great frustration at every total eclipse. At each eclipse I see so many (local) people realize at the last minute that there is something spectacular to see but, being unprepared, miss it.

This article is to help you prepare yourself, friends, and neighbors for the Great American Total Eclipse of August 20, 2017, so that more people can enjoy one of nature's most amazing spectacles. While doing so you can also make thousands of dollars profit, as hundreds of people give you money for providing safe eclipse-watching glasses that they did not know to order in advance, and thank you profusely for information and guidance about how to safely watch an eclipse and what to look for.

What's All the Fuss About?

It is nearly impossible to convey how spectacular a total eclipse of the Sun is to someone who has not seen one. Perhaps you, like many others, have seen a partial solar eclipse, and you may think that if you've seen half the Sun covered by Moon, then you've seen half of what a total eclipse offers. ***Wrong!*** Even a 99% partial eclipse misses out on the spectacular effects one sees during a *total* eclipse.

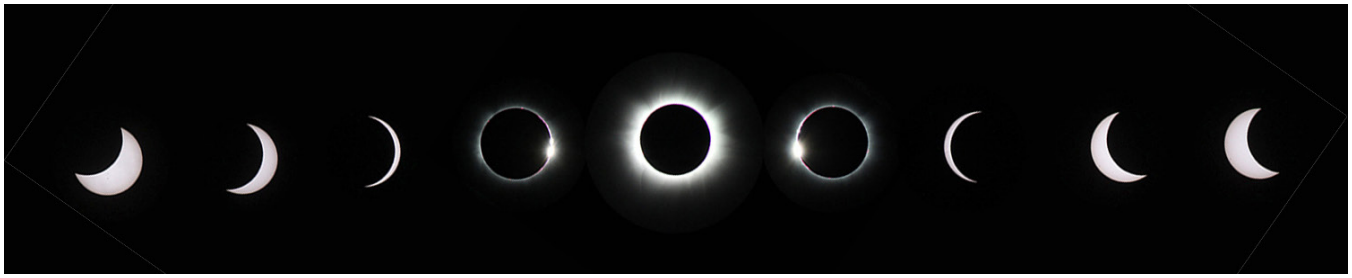
Road trip to Mexico for the 1970 total solar eclipse. *[Doug Duncan]*

The eclipse experience starts slowly. The partial phase, as the Moon slowly creeps in front of the Sun, takes more than an hour. You use safe eclipse-watching glasses to follow the progress. During the partial eclipse, if you are near any trees that let light filter through their leaves, you will see hundreds of little "crescent suns" on the ground under them. Each one is an image of the Moon covering the Sun. A colander or even a woven blanket will do the same. A small hole punched in a piece of paper will also project an image onto a piece of white paper held under it.

As the visible disk of the Sun becomes a sliver, the pace of the eclipse seems to accelerate. Perhaps 20 minutes before *totality* (the point at which the Moon completely covers the Sun), it starts to get cooler. When only a tiny bit of the Sun remains, the rate of darkening seems to accelerate even more. You may see bright planets such as Venus or Jupiter, as you would at dusk. (Know beforehand what planets will be in the sky and where.) The Moon's shadow is rushing toward you at about a half-mile per second. If you are someplace where there are mountains or clouds in the distance and you face west, you can actually see the mountains or clouds go dark as the lunar shadow envelops them perhaps 10 to 15 seconds before totality reaches you. It is eerie!

Stranger still is that the entire color palette of the landscape gradually begins to change to a more silvery hue. I often feel as if I'm in a

movie, or a dream. Suddenly totality hits. You see the long silver streamers of the Sun's corona stretch across the sky, making patterns shaped by the Sun's magnetic field. You see the pink flames of prominences at the Sun's edge. The Moon makes an incredibly black "hole" in the center of the picture. It is usually too dark to see a watch or the dials on a camera, but it's not like night — only the very brightest stars and planets are visible.



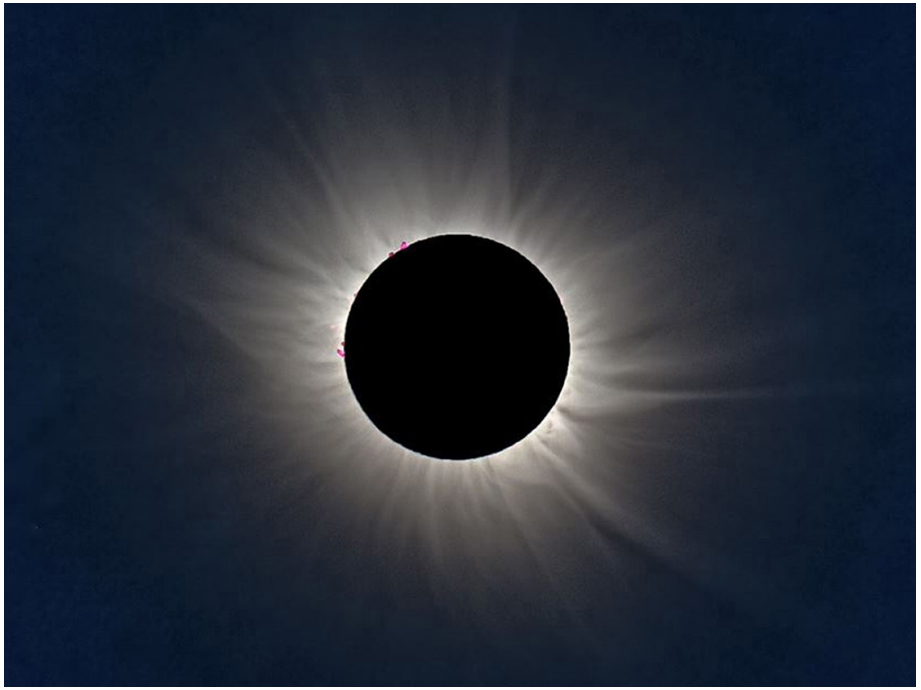
In this series of stills from 2013, the eclipse sequence runs from right to left. The center image shows totality; on either side are the 2nd contact (right) and 3rd contact (left) diamond rings that mark the beginning and end of totality respectively. *[Richard Tresch Fienberg]*

I always view the totally eclipsed Sun with a good pair of binoculars. This gives a wonderful view, and I recommend it strongly. Of course you can only use unfiltered binoculars during the *total* part of the eclipse — otherwise you could damage your eyes!

During totality, take time to look around. If there are any animals nearby, they will do strange things. In a Bolivian eclipse, llamas surrounded us. We didn't notice the llamas at all before totality; no one saw where they came from. They came down a trail towards us, then

Dr. Doug Duncan's Total Solar Eclipse Guidelines

- If a total eclipse passes within a day's drive of where you are, do whatever it takes to go see it! You will remember it vividly for the rest of your life.
- A partial eclipse of any percentage — even more than 95% — is not nearly as spectacular as a total eclipse. Don't settle for that unless you must.
- If this is your first total solar eclipse, *do not attempt to photograph totality!* Good eclipse photography is difficult, and the short duration of totality passes unbelievably quickly. You'll be able to find great shots of totality on the Web after the event.
- If you can record a "countdown" that you start to play at the beginning of totality, it can be helpful. You do not want to waste precious seconds trying to look at your watch in the dark. I record something that counts, "Two minutes left, one minute 50 seconds left, one minute 40 seconds left …etc."
- Observe the Sun during totality with a good pair of binoculars. ***But remember, you can use the binoculars only during totality, when the Moon completely covers the Sun***. The view of prominences and the Sun's corona is unbelievably beautiful in binoculars. When you see the diamond ring that marks the reappearance of the Sun, you must immediately stop using the binoculars.
- You will not see many stars during a total eclipse since it doesn't get fully dark, but you can see the brightest stars and planets. Look around for the circular sunrise in the distance. If you make a countdown recording, insert reminders to look for planets, look at the horizon-glow sunset, warn about the approaching end of totality, and so on.
- Totality goes by very, very fast! And if this is your first totality, you will spend much of it being gobsmacked.



Although this is a stunning photo of totality from Svalbard in 2015, no image can truly replicate the visual impact of seeing the completely eclipsed Sun. This post-eclipse composite of several shots, taken at different exposures, provides a reasonably good impression of how totality appears in low-power binoculars. *[Images by Judy Anderson; processing by Alson Wong]*

just milled around! In the 1999 Galapagos eclipse, dozens of whales and dolphins surfaced right next to our small ship, stayed for totality, and then swam away. We never saw them again.

Also look into the distance. The Moon's shadow during the 2017 eclipse will be roughly 50 miles in diameter. That means if you are in the middle of the path of totality, 25 miles away the ground and sky are still in sunlight. If you have a clear horizon, you can actually see a 360° sunset!

No still image or video can capture totality the way your eyes can. An in-person total solar eclipse is something you will never forget. But the audio of the total eclipse video I have posted on my website eclipse-watch.com will give you an idea of how people react. They scream and shout and cheer. The video labeled, "edited for use on radio and TV" shows the whales and dolphins. The unedited video shows how people react to something that looks like the end of the world. They do much more than say, "Holy Cow!"

You Need Protection to Look at the Sun

The Sun appears more than a billion times brighter than the brightest stars and 400,000 times brighter than the full Moon. Your eye can handle the enormous differences between day and night because it has a logarithmic response, so that what appears to be a brightness ratio of 1, 2, 3, 4, 5… is actually 2, 4, 8, 16, 32… in terms of energy.

However, here is the practical impact of those ratios on eclipses. Even a thin solar crescent exposing a mere 1% of the Sun is tremendously bright, bright enough to prevent you from seeing the corona and prominences. And that thin solar crescent has enough energy output to be dangerous — even if it's partially screen by clouds. *This is why you must watch the partial phases only with special viewers made for eclipse watching.* These are ***not*** sunglasses — these special viewers are 1,000 times darker than sunglasses! The frames are made of cardboard,

Even a skinny crescent shielded by clouds is unsafe to observe without eclipse-viewing glasses. *[Paul Deans]*

and the special black polymer in their lenses has been certified to pass only safe amounts of visible, infrared, and ultraviolet light.

Order Your Eclipse-Watching Glasses Early

At every eclipse I've been to in 45 years, there has been tremendous excitement, but it comes just a few days before the eclipse. That is too late to fully prepare. You can earn tremendous gratitude, and even a significant profit for your organization, if you work hard to prepare your local community for the coming eclipse.

I had success for the partial solar eclipse on Christmas Day, 2000, when I persuaded the *Chicago Sun-Times* to put 600,000 safe eclipse-watching glasses into their Sunday paper. For the 2012 annular eclipse, which was about 80% total in Boulder, I convinced the athletic department of the University of Colorado to allow us to use the football stadium as a viewing site. Ten thousand people came and turned it into a giant eclipse-watching party. We also broadcast from the stadium with ABC's World News Tonight.

Safe eclipse-watching glasses are an essential accessory when viewing the partial phases of a solar eclipse. *[Paul Deans x2]*

Useful Sites

Eclipse Watch: my 2017 eclipse website.
The Great American Eclipse: excellent eclipse maps and information.
Eclipse 2017.org: lots of good general eclipse information.
NASA Glossary of Solar Eclipse Terms
Rainbow Symphony: eclipse-watching glasses and viewers.
American Paper Optics: eclipse-watching glasses.
Eclipse weather: an excellent site for long-range and eclipse-day forecasts along the path of totality.

Fiske Planetarium, which I direct, ordered 25,000 safe eclipse-watching glasses well in advance. We sold them for $2 each, but the cost in quantity was only about 40 cents, so the planetarium made tens of thousands of dollars. Boulder has a great hardware store called McGuckin, and I convinced them to carry eclipse glasses. As one of their staff said, "In my 37 years, I can't think of any product that created this much excitement." People called, lined up, bought them for friends. This video captures that excitement. McGuckin sold 10,000 pairs of glasses and made nearly $20,000 in one week. We also worked with non-profit groups that raise money for schools. One donated enough money for us to purchase 20,000 more glasses and give them free to students throughout Boulder.

Approach hardware or other local stores that many people patronize. It is difficult to explain what a big event the eclipse will be, and stores will never have sold eclipse-watching glasses. Have them watch the video interview with the McGuckin Boulder hardware store employees. This video is extremely persuasive and explains how the store had to set purchase limits because of the rush for these glasses. And because McGuckin ordered well in advance, their glasses could carry store advertising printed on them — another selling point for local stores and/or your organization.

Prepare and order enough glasses at least six months in advance. As the eclipse nears, the small number of factories that specialize in producing eclipse-watching glasses will be overwhelmed, and last minute orders will be impossible to fulfill.

For the last 45 years I have used only two factories for eclipse-watching glasses (Rainbow Symphony and American Paper Optics), and I would not use any others. They have the most experience and a perfect safety record. The information on my eclipse website makes ordering easy, and you can always get in touch with me if you want advice and assistance with large orders. (I once advised NASA on ordering eclipse glasses, but at the last minute they turned the order over to a purchasing department with no eclipse experience, and 100,000 pairs of "bargain" glasses were ordered from China. They were of poor optical quality and unsafe. All had to be destroyed.)

Run an Eclipse-Watching Event

I encourage anyone who reads this article to prepare your neighborhood for eclipse watching! Plan an event in a park or schoolyard. Go to your local newspapers and radio and television stations. Local papers especially are short on reporters and good stories. Provide information and offer to write a draft story if they want. Impress on them how spectacular and rare the 2017 Great American Total Eclipse will be.

Tell them that *mis*information and rumors circulate at every eclipse, and they can help people enjoy safely a great spectacle. Explain there is no strange, dangerous radiation that appears only during an eclipse. It is the same Sun and the same solar radiation (a.k.a sunlight) pre-, during, and post-eclipse. The danger comes from watching the eclipse, and hence looking at the Sun, without proper, safe solar filters.

If you are fortunate to be within the path of totality, you do not need the eclipse-watching glasses to see *totality* — the *total* phase of the eclipse when the Moon totally covers the Sun. In fact, if you wear your eclipse-watching glasses during totality, you will see absolutely nothing! But you *do* need them to watch the partial phases before and after totality.

Talk to service clubs such as Kiwanis, Rotary, and others. Ask if they would provide financial assistance so you can supply eclipse-watching glasses, and correct information, to schools and school children in your town. Ask them to help publicize your event. Also talk to Boy and Girl Scout Troops, but do all this well in advance; don't start in June 2017!

If you're thinking of organizing an eclipse-viewing activity for 2017, now is the time to start planning. *[Casey Cass, University of Colorado]*

Guidelines for Running an Eclipse-Watching Event

- Prepare ***well*** in advance. A year ahead is not too soon.
- Find a venue with parking, bathrooms, water, shade, and possibly food (or arrange for options such as food trucks).
- Enlist groups such as Kiwanis, Rotary, and the Boy and Girl Scouts to help distribute information, and fund and distribute safe eclipse-watching glasses.
- Work with local media: newspapers, radio, and TV to highlight how wonderful a total eclipse is to see. Accentuate the positive. Publicize safe eclipse watching.
- Try to get local stores to sell (and advertise) safe eclipse-watching glasses. Tell them that the glasses can be printed with ads or coupons on them. This is also a great fundraiser for your local science center or planetarium
- Let me know via email how it goes.

Think about the logistics of your event: bathrooms, parking, food services, a public address system, etc. For instance, our 2012 annular eclipse event drew 10,000 people. Who will help you handle a crowd that size? If I'd spent one minute per person providing each with eclipse-watching glasses and a brief explanation of how to use them, it would have taken me 166 hours to deal with all those people! We used the ticket windows in the stadium to distribute glasses. McGuckin hardware sold them for more than a week prior, which lessened the crowding. I decided to order several thousand extra eclipse glasses months in advance and sold them to McGuckin when they ran out. If you have hundreds of glasses on eclipse day, trust me — they will all be used.

Take the Coursera Course

You may know that Coursera offers hundreds of free college courses online. I will be presenting "The Sun and the 2017 Eclipse" on Coursera starting in the autumn of 2015. Coursera is online and available to anyone. Taking it will prepare you to run an eclipse-watching program and answer questions about the Sun that you might get. Some of my Coursera presentation comes from the courses for which I received the ASP's Emmons Award for College Astronomy Teaching in 2011.

Earlier in my career, I was part of the research group at Mt. Wilson Observatory that first found sunspot cycles on many other stars. Since 1989 I have been taking groups in spring to watch and photograph the northern lights, and it is the solar wind that powers the lights. The Sun is fascinating, and the National Solar Observatory has just moved to my university in Boulder, Colorado, so I am very excited to present this course.

Good Luck

I served as "science guy" on National Public Radio station WBEZ Chicago for four years, and now I do commentary on Colorado Public Radio. I know that the public has a great appetite for cool science when it is well presented, and nothing is more dramatic than a total eclipse. Unfortunately, not all editors know this, so it isn't easy to get on radio and TV or into the newspapers.

Please use all the videos and materials found on the sites listed on page 21, and try your best to make this the most-watched total eclipse in US history! Please e-mail me and let me know what you are planning to do. ✪

DR. DOUGLAS DUNCAN is a faculty member in the Department of Astrophysical & Planetary Sciences of the University of Colorado, where he also directs the Fiske Planetarium. He is well known as a popularizer of astronomy. On August 20, 2017, he will be leading an eclipse-watching group in Grand Teton National Park.