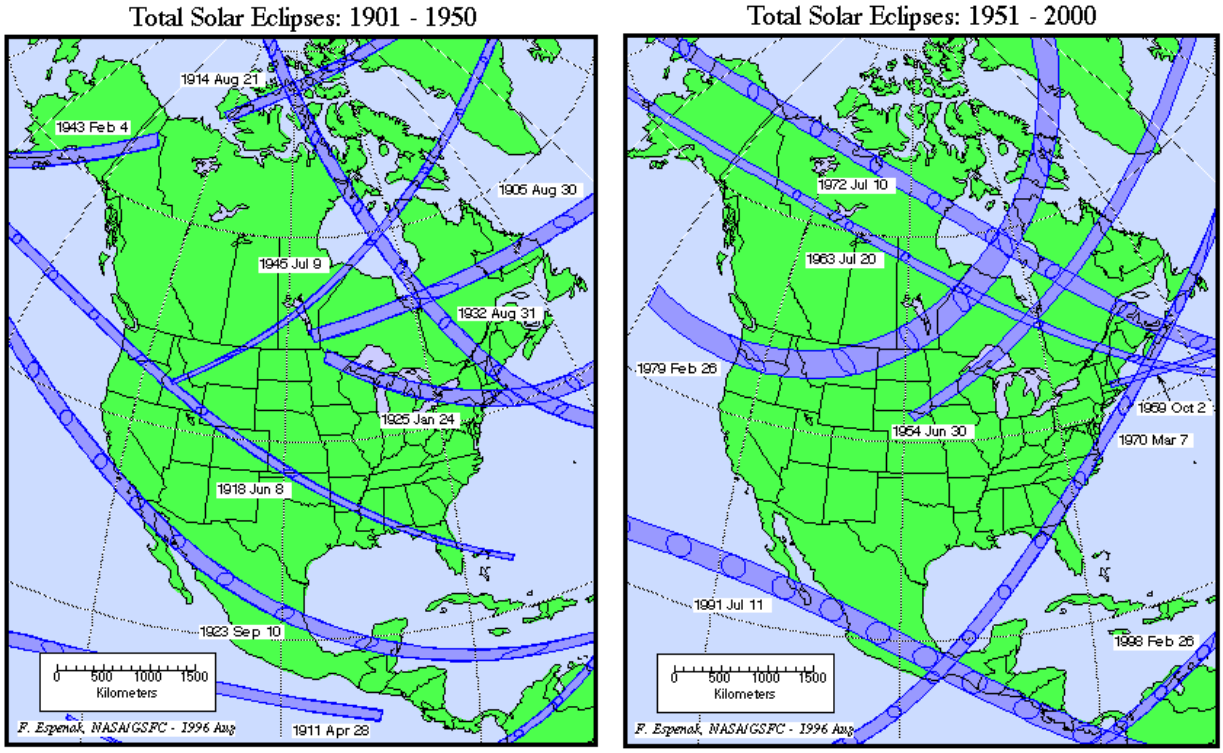
# ECLIPSE 2017

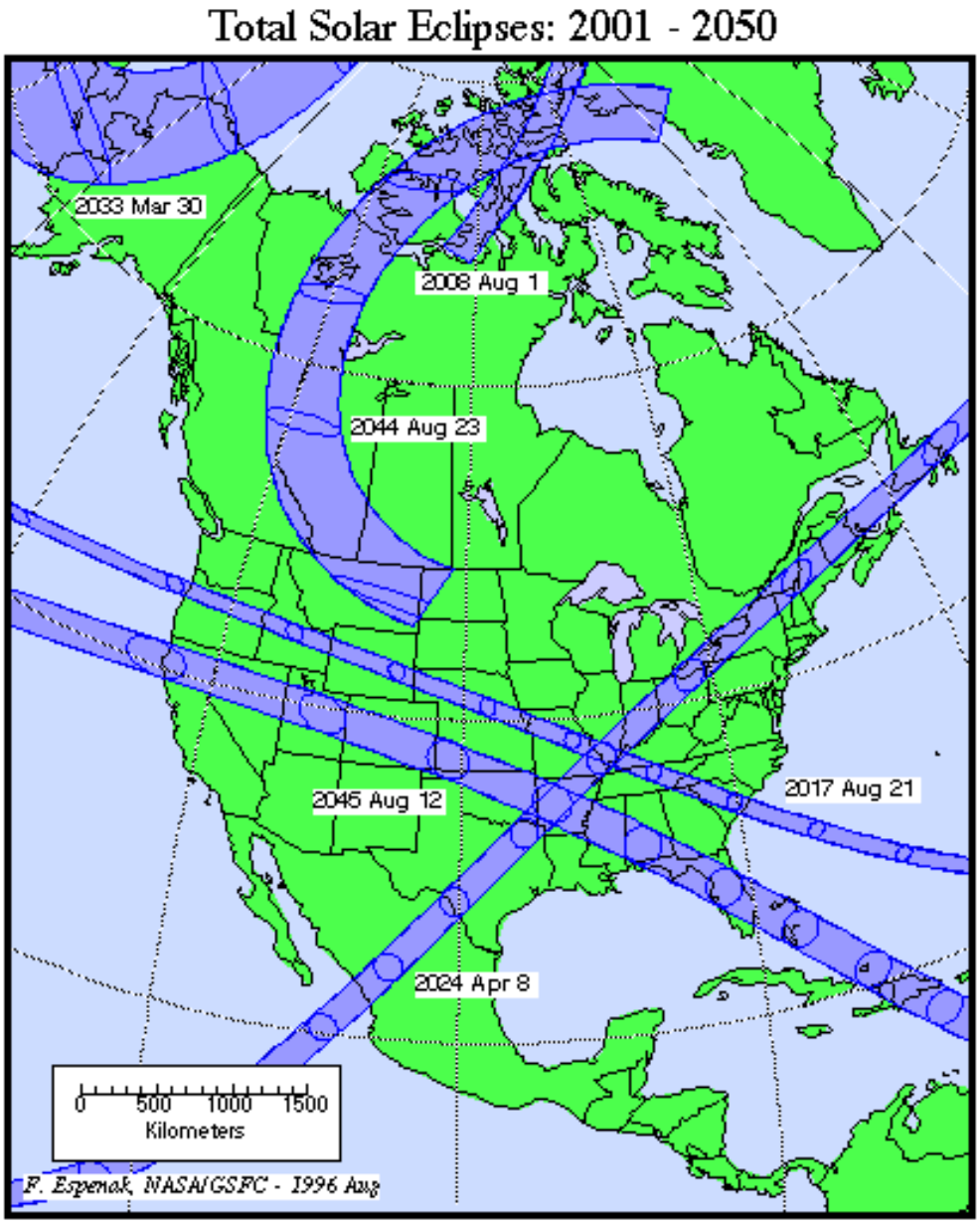
By Dick Suiter

There will be an eclipse of the sun in the contiguous United States during the middle of the day Aug 21, 2017. We have not had a solar eclipse over such a large fraction of the country since 1979. Indeed, we haven't had such a direct hit since 1918, with totality visible near Panama City, FL. It may be argued that the 1970 eclipse covered at least as many people, since it ripped up the eastern seaboard, tantalizingly missing New York City.




Historical plot of the areas of totality. (NASA/Fred Espenak)

The years 2001 to 2050 breaks the drought for the US, with bullseye hits in 2017, 2024, and 2045. If you are lucky enough to be born near Hot Springs, Arkansas, and after about 1965, you have a good chance of witnessing two enormous eclipses without leaving your birthplace. I'll be 91 going on 92, though, so I don't think I have a large chance of making it. The one in 2045 also goes right through Panama City, FL, although it is a bit more centered on a line that is slightly north. It should be a good one, though. *Stellarium* shows it as over 6 minutes long in Panama City. You can tell it is good from the figure because the totality path is both wide and the projection of the shadow is round.




Eclipses during 2001 to 2050. Same source.

With the invaluable help of my good buddy from graduate school and observing partner John Kerns, I traveled to the 1979 solar eclipse. The difference between a total solar eclipse and a partial one is profound. We stopped in the little town of Jordan, Montana, about daybreak after driving all night from clouded-in Helena. We set up John's 10-inch *f*/6 Cave Astrola telescope in an empty VFW hall parking lot. Soon, others showed up and it turned out that this was a gathering place for locals, serving donuts and coffee! Quite a crowd gathered and people were laughing and joking as if this were just another lark. They didn't quite realize how lucky they were, the one in 400-year lotto they had won.

One rancher marveled that all his cattle has eaten their morning ration of grain and hay, moseyed out to paw at the thin layer of snow for some winter grazing, and promptly returned to the barn for their evening meal. The chickens were all roosting for the night. In the growing darkness, the animals thought that dusk was nearing.

Then it got even darker and the crowd hushed. Out of the west the maximum shadow crossed the earth. A necklace of tiny sparkles appeared on the edge of the moon and suddenly the sun was completely eclipsed, no longer too bright to look at with unfiltered vision. It was surrounded with blood-red prominences, of which the photo below is a poor representation. The sky, normally considered as a shallow bowl, became three dimensional. The whole inner solar system was laid out before us, Mercury to the left, Venus far to the right, Mars twinkling far beyond the sun. We were at the pivot point of it all, and the crowd instinctively sensed it. John had the presence of mind to start a cassette tape recorder so we could quickly note our exposures into it rather than write them down. He fortunately got the crowd noises as well. There were all sorts of exclamations, during totality, but the most notable was one lady shouting over and over again "Oh … oh …!" It is no wonder that some people are addicted, taking cruises and traveling the world to see additional eclipses.

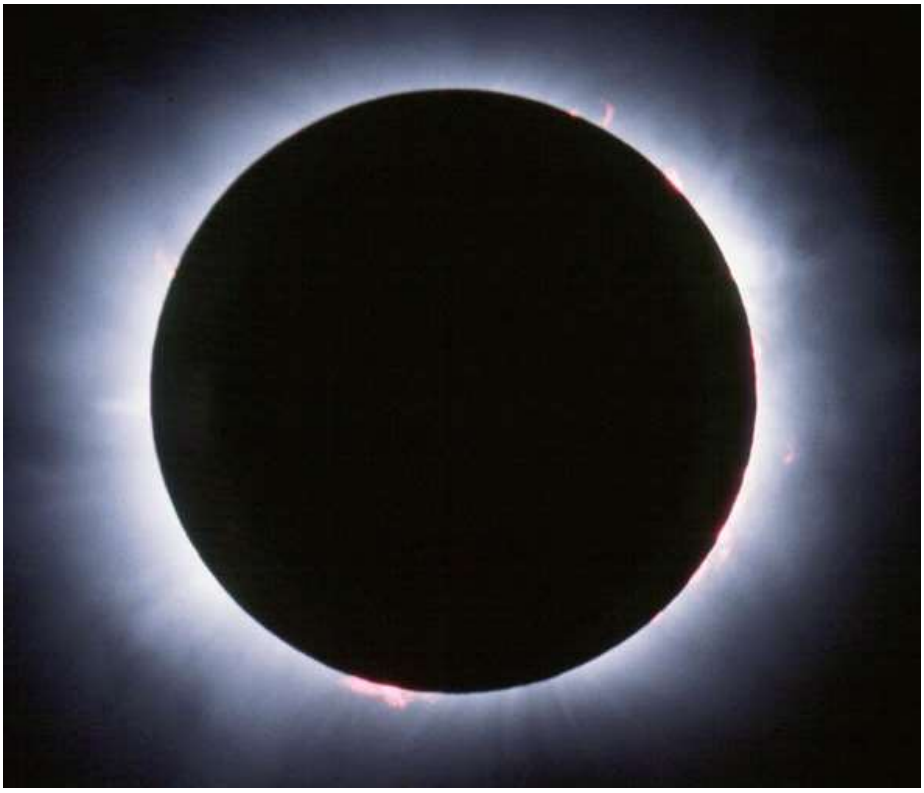


Photo taken about 9:28 AM, MST, February 26, 1979, Jordan MT. Photo by H. Suiter and J. Kerns.

Here are the details for the upcoming eclipse
http://www.skyandtelescope.com/free-2017-total-solar-eclipse-guide/

and here are the calculations for the Panama City area (centered at Gulf Coast College):

At indicated website, copyright map data by Google and calculations by Xavier M. Jubier.

## SOLAR ECLIPSE SAFETY

1) *Always observe the sun under the supervision of adults.*

2) *There is no such thing as a "deadly eclipse ray."* Looking at the sun is ALWAYS dangerous. It's just something that people are likelier to do during an eclipse. After the eclipse is over, do not look at the sun because you think the danger is gone. It is *still* dangerous.

3) *DO NOT USE any of the following filters*:

a) smoked glass

b) exposed old-style photographic film

c) crossed polarizers

d) undocumented welding filters (that have not been certified safe for solar viewing)

e) gel filters

f) undocumented aluminized mylar (that has not been certified safe for solar viewing)

g) any filter that appears damaged or worn

h) any sunglasses, either stacked or single

i) black plastic garbage bags.

We don't care that someone said it worked okay when they were young. They were either lucky or the filter-making technologies have changed.

4) DO NOT USE any optical device to look AT the sun. If you have one of those old department-store telescopes that has a small dark filter to screw into the bottom of the eyepiece, THROW THE FILTER AWAY. It is NOT safe. While safe optical filters have been made for solar viewing, they are ONLY made and used by specialists who know exactly what they are doing.

5) *The only completely safe way of observing a partial solar eclipse is by indirect means*. A favorite is the mirror viewer, which amounts to a flat mirror that is obscured until it is between an eighth-inch and a quarter-inch across and uses a reflector to project an image of the sun on the side of a building.

Materials: cheap flat hand mirror, piece of paper or cardboard (if the mirror is small enough, the paper or cardboard is not needed), masking tape, scissors.

- Cut the paper so that it is a little bigger than the mirror
- Cut a rough hole in the center of the paper about the size of your thumbnail.
- Put the paper on the mirror, and tape down the edges.
- Hold the hole down against the glass by taping the edges of the hole; don't completely cover it but leave a smaller hole less than about an eighth to a quarter-inch on a side.

When you want to observe the eclipse, go out into the sun and reflect the sun through the mirror hole on a uniform white area on the shaded sided of the building. If the image appears unusually fuzzy but bright, you are probably too close to the building. If it appears large and sharp, but dim, you are probably too far from the building. Move toward and away from the building until you have a good compromise (20 to 30 feet may be needed). Another good projection surface is through a window on the wall inside (prop the mirror up and go inside to view) or into an open garage. **Don't look through the hole at the sun**. That's not the right way. Below is a sketch of how to do it. **Note that the guy doesn't look at the sun, but its reflection!**

It is possible to use an optical instrument such as a telescope or binocular to project an enlarged indirect image (see the way it is done in in the *Sky & Telescope Total Solar Eclipse Guide* above), but you must be careful not to cook the optical cement out of your eyepiece. Another difficulty is that you can burn bits of plastic inside your telescope's focuser. The best way of using these instruments is to look for a few seconds and then cover the objective up with a towel. Then, when things have cooled down a minute, look again.

We accept no responsibility for use or misuse of these instructions. If you are confused by what you read here or are in any way unsure, do not try to observe the sun during the eclipse. Go inside and watch it on TV or the internet.