

Great America Eclipse of 2017 - Details

Summary

This summer, people in the St. Louis area will get to experience one of the most beautiful and rare sights they have ever seen in the sky - a total solar eclipse. On August 21st, the mid-day sky will go dark as the Moon passes in front of the Sun, blocking out its intense light in a narrow path all the way from Oregon to South Carolina. The path of the Moon's shadow will pass just south of St. Louis and will be the first total solar eclipse visible anywhere close to the St. Louis area in 100 years. This will be a spectacular event to experience and - since it is right in our own back yard - one that everyone should try to see it if at all possible - even if it means taking off work or taking children out of school. It is that big.

1) What's the big deal? Don't eclipses happen all the time?

There are different types of eclipses and, collectively, they occur fairly frequently - but not the type we will experience in August. This one is a rare total solar eclipse.

A solar eclipse occurs when the Moon passes between the Sun and the Earth, blocking out the Sun's light. These can take place up to 2 to 3 times a year worldwide. However, to witness a total solar eclipse, you must be directly in the narrow path of the Moon's shadow as it moves across the Earth. It is a VERY rare opportunity to witness a total solar eclipse and most people will never see one. People in a much wider band outside the path of totality will see only a partial eclipse.

A lunar eclipse occurs when the Moon passes through the Earth's shadow. These can take place up to 2 times a year. Depending on several factors, the Moon may disappear altogether, or it may turn a shade of grey, orange, or red (often referred to as a Blood Moon). To witness a lunar eclipse, you simply need to live on the half of the Earth that is facing the Moon as it passes through the Earth's shadow. Thus, half the world can witness any given lunar eclipse.

The Great American Eclipse of 2017 is a VERY rare total solar eclipse. The last total solar eclipse to take place directly over St. Louis was in the mid-1400s. The last one to pass anywhere close to the St. Louis area was in 1918, when it was as close as Arkansas. And the last total solar eclipse in the United States visible to significant parts of the population was in 1970, when the path of totality moved from the Florida panhandle up and, for the most part, just off the Atlantic Coast. Over the last 100 years, the mainland United States has seen only 7 total solar eclipses, most of which were in far corners of the country. During the same time period, St. Louis has experienced 34 partial solar eclipses, or 1 every 3 years or so - but again, these were only partial eclipses. So eclipses like the total solar eclipse coming in August do not happen frequently at all; rather, they are extremely rare.

2) What are the details about this eclipse?

The Great American Eclipse of 2017 occurs on Monday, August 21st. The Moon's 60-mile wide shadow will travel across the United States from Oregon to South Carolina, passing just south of downtown St. Louis. In the area south of St. Louis, totality occurs around 1:17pm; however, the partial phase begins shortly before noon, when the Moon first touches the edge of the Sun. In Missouri, the northern edge of the path of totality will run from about O'Fallon to Soulard. Downtown St. Louis and the Arch will not be in the path of totality. Across the river in Illinois, the northern edge of totality will be just south of downtown Belleville. The Fairview Heights Church of Christ will not be in the path of totality (it will see 99.9% of the Sun blocked by the Moon). The total phase of the solar eclipse will last approximately 2 1/2 minutes along the centerline of the Moon's shadow. The farther you get away from that centerline, the shorter the eclipse will be, with viewers along the edge of the path seeing only a few seconds of totality. A few of the larger cities in the St. Louis area near the center of the eclipse's path are St. Clair, DeSoto, and St. Genevieve in Missouri, and Chester in Illinois. Outside the path of totality, viewers across the entire country will see a partial eclipse in which at least 60% of the Sun will be blocked by the Moon.

3) What will we see?

That depends on whether you are inside or outside the path of totality. Viewers in the path of totality will see and experience fantastic sights, sounds, and feelings that those outside it will miss out on completely. Viewers should make every effort to get into the path of totality, whether that means taking off work, taking children out of school, etc.

Inside the path of totality:

The Moon will first touch the edge of the Sun's disc about 90 minutes before it completely blocks out the Sun. From this point all the way to totality, viewers must wear protective eclipse glasses or use a pinhole projection system (discussed later). For the first hour or so, the Moon's movement across the Sun will seem painfully slow and you probably won't notice any obvious changes to your surroundings. Somewhere around an hour or so into the eclipse, the sky will start to seem a little bluer or clearer, with crisp colors in the objects around you (sort of like a clear October day) and you may notice shadows becoming sharper. The Moon will seem to pick up speed as the Sun's crescent shape becomes noticeable thinner. The skies continue to darken and the shadows continue to get sharper - and all the more quickly as the Moon engulfs what's left of the Sun.

Just before the last thin sliver of Sun disappears, the sky will darken rapidly. If you have a clear view to the western horizon, you may see a column of darkness rising upward and you may even see the Moon's shadow actually moving across the sky. You will likely feel the temperature drop and possibly experience a cool breeze. Birds will quit singing and roosters in the area may crow. In those final seconds before totality occurs, you will witness a couple of the most beautiful phenomena you will ever see. First is something known as 'Bailey's Beads'. This is when the last little bit of Sun shines through valleys along the edge of the Moon. It will appear as sort of a string of beads, with a thin veil of

light around the rest of the Moon's perimeter. The second phenomena is called the 'Diamond Ring Effect'. For just a few seconds when only one of those 'beads' is left and that thin veil of light encircles the rest of Moon, it has the appearance of a brightly shining diamond ring.

When that last 'bead' of sunlight disappears, totality has begun! Any remaining shadows have disappeared and the sky has become nearly dark. If you were using solar eclipse glasses to view the partial portion of the eclipse, you can now take them off and safely view the eclipse. And what a view it will be! The Moon will appear as a pitch black disc surrounded by the Sun's corona, high in a very dark summer afternoon sky. Venus will beam brightly west of the Sun, with Mars between the two, and brighter stars scattered across the sky. Along the horizon in all directions, you may notice a reddish light, similar to what you might see at sunset. The total portion of the eclipse will go by quickly! Focus on the eclipse above you, but take time to enjoy everything else that's going on around you - sounds, the coolness, other sites in the sky, etc. Don't waste these precious moments trying to take pictures - let the professionals do that. Just enjoy the show!

As much as all of us will want time to stop so we can continue admiring the beautiful sight above us, the Sun will inevitably reappear on the opposite side of the Moon. Everything that we all just witnessed over the last 90 minutes will happen again, but in reverse. That first piece of sunlight will reappear and create an encore of the Diamond Ring Effect and Bailey's Beads - and require us all to don our eclipse glasses once again. Then, as a sliver of sunlight returns, shadows will reappear. The skies begin to lighten and the planets and stars will quickly disappear. After 10 or 15 more minutes or so, things will pretty much look normal again. Having just witnessed the most beautiful sight we've ever seen in the sky, most of us will experience an adrenalin crash and will have no interest in watching the Moon's 90-minute exit across the Sun's disc. Rather, we will likely be asking each other when the next one is going to happen!

Outside the path of totality

What those outside the path of totality will see depends on how close you are to the path of totality. But no matter how close you are, everyone outside the path of totality will have to view the eclipse with protective eclipse glasses or use a pinhole projection system (discussed later). The closer you are to the path of totality, the more dramatic the eclipse will be for you. For you who are very close, the sky should darken to some degree, along with the sharpening shadows. You may also feel the cooling of the air and possibly a breeze. As you move farther away from the path of totality, the degree to which you will experience these things falls off dramatically. You may notice it looks a little different outside, sort of like a pretty fall day - and that may be it. For people who don't know about the eclipse, most will never know one is taking place simply because there will be so little change.

The bottom line is this: those outside the path of totality will not experience the most dramatic aspects of a total solar eclipse. They will not see the sky grow dark during the middle of the day, they will not see the planets and stars, they will not see the Moon's black disc in front of the Sun, and they will not get to see Bailey's Beads, the Diamond

Ring Effect, or Sun's beautiful corona shining around the edge of the Moon. And they will not get to look directly at the eclipse. They will simply get to see a really good partial solar eclipse, and will have to use special protective glasses or a pinhole projection mechanism to watch it at all.

4) Viewing a total solar eclipse

WARNING. During the partial phase (which means any time the Moon is not completely blocking the Sun) **DO NOT** look directly at the eclipse without protective eyewear. Sunlight from even the thinnest sliver of Sun is so intense, it can permanently damage your eyes.

Total phase

During the total phase of the eclipse, you may safely look directly at it - in fact, you will want to look at it - from when the Moon completely covers the Sun until the Sun first peeks out from behind the other side of the Moon. The Sun's corona around the Moon will be approximately as bright as a Full Moon.

Partial phase

Direct viewing:

Any time the eclipse is in partial phase - whether you're in the path of totality or not - you **MUST** use protective eyewear to look directly at it. The cheapest protective eyewear is cardboard solar eclipse glasses made specifically for viewing solar eclipses. I have plenty of these available at cost (less than \$1). More expensive glasses are also available from several companies. The only other option is #14 or stronger welding glasses, but few of us have these around.

Indirect viewing:

The primary way to view a partial solar eclipse indirectly is with the pinhole projection method (this includes the old 'shoebox' method that many of you are familiar with). A hole is placed in what I call the pinhole screen (a piece of cardboard, thick plastic, etc) and held up so that the Sun shines through it and onto a projection surface (a piece of paper, the side of a house, the ground, etc). Thus, you view this cast light and not the eclipse, itself. The larger the hole in the pinhole screen, the larger and brighter the disc of light that is cast onto the projection surface. However, larger pinhole screen holes require a greater distance between it and the projection surface for this method to work correctly. A pushpin is a good object to use, or possibly a click-type ink pen. For holes this size, you would need to hold the projection surface 18 inches or so away from your projection screen. It's fun to experiment with different sized holes and distances. I suggest trying this out well before the day of the eclipse so you can have your pinhole projection system already figured out and ready to go.

Working on the same principle as the pinhole projection method is a phenomena you will see when the Sun shines through trees onto the ground. We don't often notice the 'little Suns' on the ground on any regular day, but they're there. This becomes very noticeable,

though, during a major solar eclipse, when you can see little crescents of sunlight all over the ground under the trees. It's quite a neat sight.

5) Preparing for a total solar eclipse

First and foremost, plan early! If you want to see the total eclipse, plan now where you will go to see it. And while you're at it, be sure to have a couple backup destinations in mind in case the weather forecast calls for clouds at your primary location. For all viewers, purchase some solar eclipse glasses for safely watching the partial portion of the eclipse. Make your pinhole projection viewing system if you want to watch it that way. On the day of the eclipse, plan to arrive at your viewing destination early. You don't want to wait until the last minute and then find yourself watching the eclipse from your car while stuck in traffic somewhere or get delayed for some other reason and totally miss it! Remember, the partial portion of the eclipse begins 90 minutes before totality. Why not arrive early enough that you can relax and take in the whole show from the beginning? Since you'll likely be out in the summer sun for a while, be sure to pack some sunscreen and some sun hats, along with your lawn chairs, bug spray, etc. And don't forget to pack a little patience, since it can be a pretty long event on a possibly hot August afternoon.

A Few Do's and Don'ts

Do enjoy, watch, listen, and feel. Do focus on the eclipse above you, but take in the whole event as thoroughly as you possibly can. Do try to burn into your memory everything you experience as this may very likely be the only total solar eclipse you will ever see. Do recognize God's majesty in the beautiful world He has created for us.

Don't spend precious viewing time taking pictures. Don't use anything with a bright light like cameras with a flash, flashlights, etc, especially if you are in a group of people. Don't use binoculars or a telescope. And don't bring your pets. You don't want Fido or Fifi's leash getting wrapped someone's camera tripod just as totality is beginning!

6) Some good eclipse websites to check out

Michael Zeiler's "Eclipse2017.org" website. My primary resource for the 2017 solar eclipse. Tons of great information, maps, descriptions, videos, etc.

- > Main page - <http://www.eclipse2017.org/2017/zeiler.htm#>
- > Close is not enough - http://www.eclipse2017.org/2017/close_enough.htm
- > What you will see (awesome) - http://www.eclipse2017.org/2017/what_you_see.htm
- > Eclipse blog and FAQ - <http://eclipse2017.org/blog/>
- > Interactive Google Map - http://xjubier.free.fr/en/site_pages/solar_eclipses/TSE_2017_GoogleMapFull.html
- > Eye safety - http://www.eclipse2017.org/eclipse2017_eye%20safety.htm

NASA's eclipse websites. Good alternate source for the 2017 solar eclipse. Lots of information and maps on past and future eclipses worldwide.

- > General eclipse page - <https://eclipse.gsfc.nasa.gov/solar.html>
- > Main 2017 eclipse page - <https://eclipse2017.nasa.gov/>