

How the 2024 total solar eclipse is different than the 2017 eclipse

January 30 2024, by Abbey Interrante



The total solar eclipse on Aug. 21, 2017, was photographed from Madras, Oregon. The black circle in the middle is the Moon. Surrounding it are white streams of light belonging to the Sun's outer atmosphere, called the corona. Credit: NASA/Aubrey Gemignani

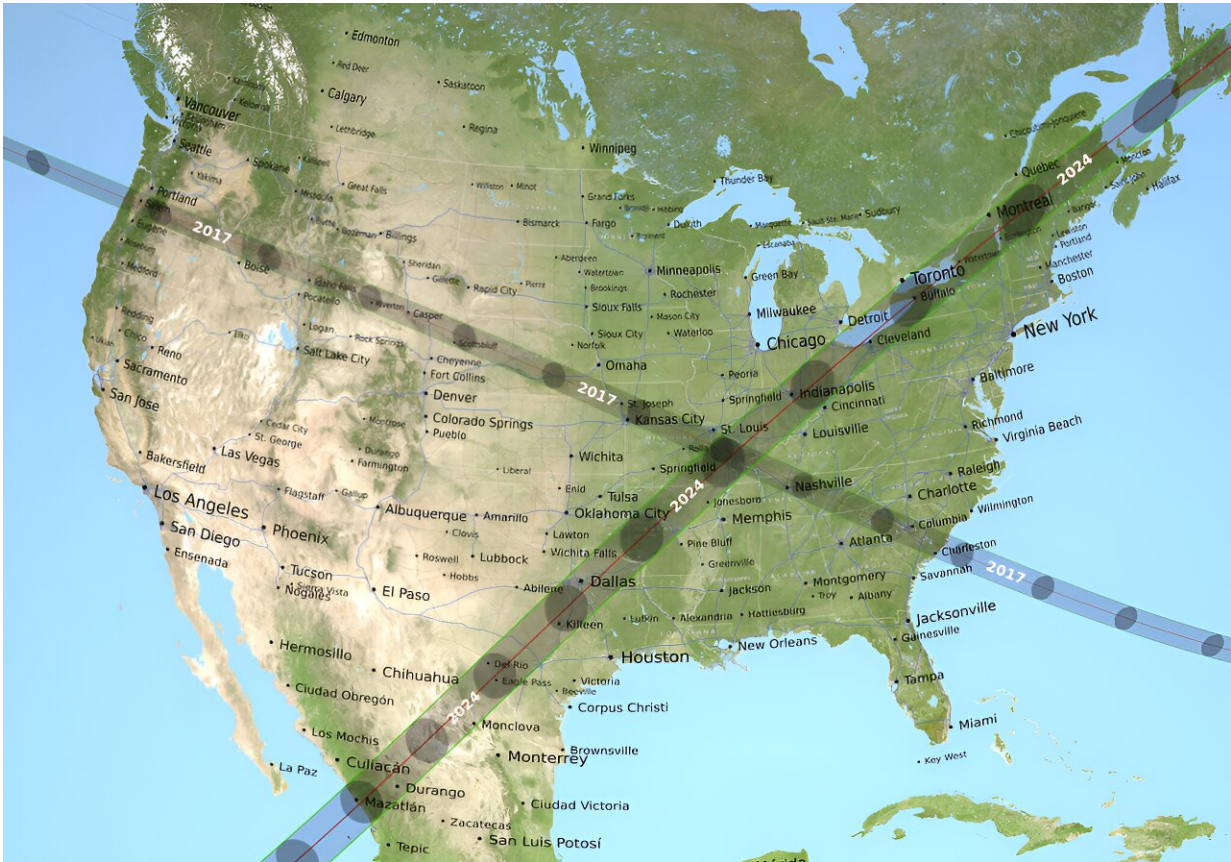
On April 8, the moon's shadow will sweep across the United States, as millions will view a total solar eclipse. For many, preparing for this event brings memories of the magnificent total solar eclipse on Aug. 21, 2017.

In 2017, an estimated 215 million U.S. adults (88% of U.S. adults) viewed the solar eclipse, either directly or electronically. They experienced the moon pass in front of the sun, blocking part or all of our closest star's bright face. The eclipse in 2024 could be even more exciting due to differences in the path, timing, and scientific research.

Wider, more populated path

The path of totality—where viewers can see the moon totally block the sun, revealing the star's outer atmosphere, called the corona—is much wider during the upcoming total solar eclipse than it was during the eclipse in 2017. As the moon orbits Earth, its distance from our planet varies.

During the 2017 total solar eclipse, the moon was a little bit farther away from Earth than it will be during the upcoming total solar eclipse, causing the path of that eclipse to be a little skinnier. In 2017, the path ranged from about 62 to 71 miles wide. During the April eclipse, the path over North America will range between 108 and 122 miles wide—meaning at any given moment, this eclipse covers more ground.



This map shows the path of the 2017 total solar eclipse, crossing from Oregon to South Carolina, and the 2024 total solar eclipse, crossing from Mexico into Texas, up to Maine, and exiting over Canada. Credit: Ernest Wright/NASA's Scientific Visualization Studio



This map illustrates the paths of the Moon’s shadow across the U.S. during the 2024 total solar eclipse. On April 8, 2024, a total solar eclipse will cross North and Central America creating a path of totality. During a total solar eclipse, the Moon completely blocks the Sun while it passes between the Sun and Earth. The sky will darken as if it were dawn or dusk and those standing in the path of totality may see the Sun’s outer atmosphere (the corona) if weather permits. Credit: NASA/Scientific Visualization Studio/Michala Garrison; Eclipse Calculations By Ernie Wright, NASA Goddard Space Flight Center

The 2024 eclipse path will also pass over more cities and densely populated areas than the 2017 path did. This will make it easier for more people to see totality. An estimated 31.6 million people live in the path of totality this year, compared to 12 million in 2017. An additional 150 million people live within 200 miles of the path of totality.

You don't need to live within the path of totality to see the eclipse—in April, 99% of people who reside in the United States will be able to see the partial or total eclipse from where they live. Every contiguous U.S.

state, plus parts of Alaska and Hawaii, will experience at least a [partial solar eclipse](#).

Longer time in totality

In April, totality will last longer than it did in 2017. Seven years ago, the longest period of totality was experienced near Carbondale, Illinois, at 2 minutes, 42 seconds.

For the upcoming eclipse, totality will last up to 4 minutes, 28 seconds, in an area about 25 minutes northwest of Torreón, Mexico. As the eclipse enters Texas, totality will last about 4 minutes, 26 seconds at the center of the eclipse's path. Durations longer than 4 minutes stretch as far north as Economy, Indiana. Even as the eclipse exits the U.S. and enters Canada, the eclipse will last up to 3 minutes, 21 seconds.

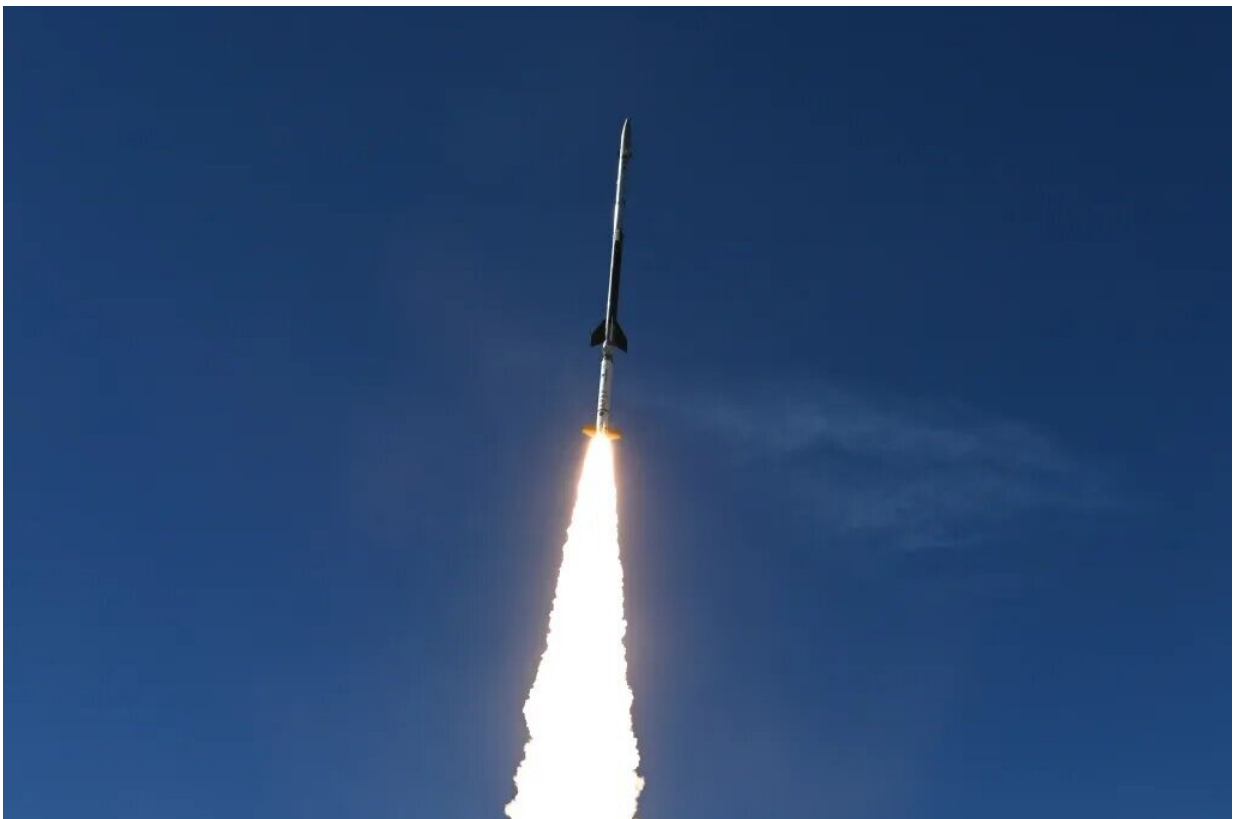
During any total solar eclipse, totality lasts the longest near the center of the [path](#), widthwise, and decreases toward the edge. But those seeking totality shouldn't worry that they need to be exactly at the center. The time in totality falls off pretty slowly until you get close to the edge.

Every 11 years or so, the sun's magnetic field flips, causing a cycle of increasing then decreasing [solar activity](#). During solar minimum, there are fewer giant eruptions from the sun, such as solar flares and [coronal mass ejections](#). But during solar maximum, the sun becomes more active.

In 2017, the sun was nearing solar minimum. Viewers of the total eclipse could see the breathtaking corona—but since the sun was quiet, streamers flowing into the solar atmosphere were restricted to just the equatorial regions of the star. The sun is more magnetically symmetrical during solar minimum, causing this simpler appearance. During the 2024 eclipse, the sun will be in or near solar maximum, when the magnetic

field is more like a tangled hairball. Streamers will likely be visible throughout the corona. In addition to that, viewers will have a better chance to see prominences—which appear as bright, pink curls or loops coming off the sun.

With lucky timing, there could even be a chance to see a coronal mass ejection—a large eruption of solar material—during the eclipse.



The third rocket launched on Oct. 14, 2023, during the annular solar eclipse leaves the launch pad. Credit: WSMR Army Photo

Expanded scientific research

During the total eclipse in 2024, several research initiatives will build on research done during the 2017 eclipse. The projects, which are led by researchers at different academic institutions, will study the sun and its influence on Earth with a variety of instruments, including cameras aboard high-altitude research planes, ham radios, and more. In addition to those projects, instruments that were launched during the 2023 [annular solar eclipse](#) on three sounding rockets will again be launched during the upcoming [total solar eclipse](#).

Two spacecraft designed to study the sun's corona—NASA's Parker Solar Probe and ESA (European Space Agency) and NASA's Solar Orbiter—have also launched since the 2017 solar eclipse. These missions will provide insights from the corona itself, while viewers on Earth see it with their own eyes, providing an exciting opportunity to combine and compare viewpoints.

More information: To learn more about the 2024 total solar eclipse and how you can safely watch it, visit [NASA's eclipse website](#).

Provided by NASA

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