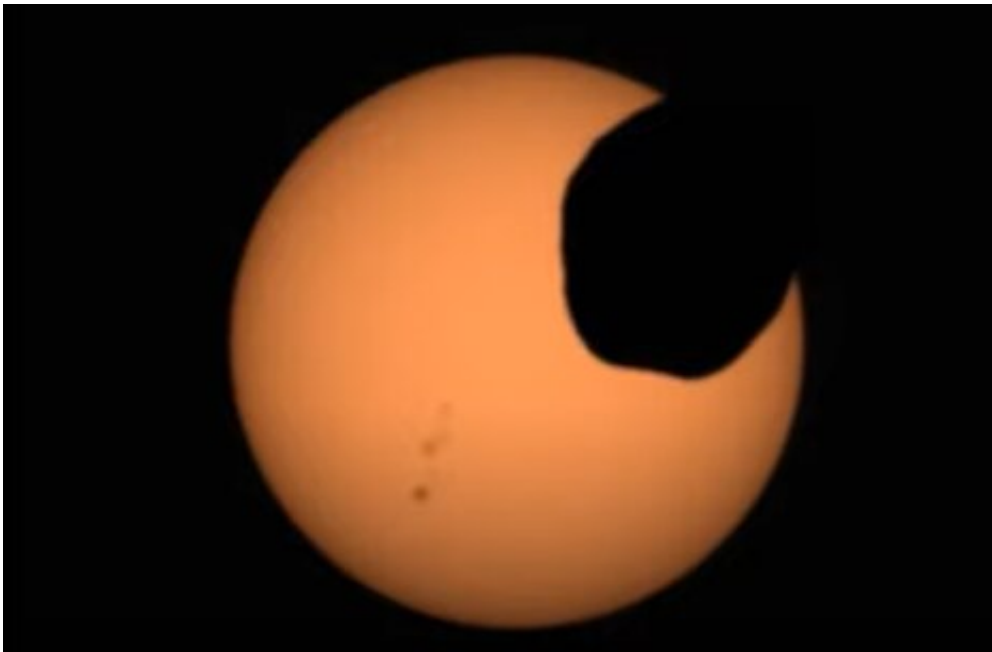


# NASA's Perseverance rover captures video of solar eclipse on Mars

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Phobos solar eclipse taken from the Martian surface. Credit: NASA/JPL-Caltech/ASU/MSSS/SSI

NASA's Perseverance Mars rover has captured dramatic footage of Phobos, Mars' potato-shaped moon, crossing the face of the Sun. These observations can help scientists better understand the moon's orbit and how its gravity pulls on the Martian surface, ultimately shaping the Red Planet's crust and mantle.

Captured with Perseverance's next-generation Mastcam-Z camera on

April 2, the 397th Martian day, or sol, of the mission, the eclipse lasted a little over 40 seconds—much shorter than a typical [solar eclipse](#) involving Earth's Moon. (Phobos is about 157 times smaller than Earth's Moon. Mars' other [moon](#), Deimos, is even smaller.)

The images are the latest in a long history of NASA spacecraft capturing solar eclipses on Mars. Back in 2004, the twin NASA rovers Spirit and Opportunity took the first time-lapse photos of Phobos during a solar eclipse. Curiosity continued the trend with videos shot by its Mastcam camera system.

But Perseverance, which landed in February 2021, has provided the most zoomed-in video of a Phobos solar eclipse yet—and at the highest-frame rate ever. That's thanks to Perseverance's next-generation Mastcam-Z camera system, a zoomable upgrade from Curiosity's Mastcam.

"I knew it was going to be good, but I didn't expect it to be this amazing," said Rachel Howson of Malin Space Science Systems in San Diego, one of the Mastcam-Z team members who operates the camera.

Howson noted that although Perseverance first sends lower-resolution thumbnails that offer a glimpse of the images to come, she was stunned by the full-resolution versions: "It feels like a birthday or holiday when they arrive. You know what's coming, but there is still an element of surprise when you get to see the final product."

Color also sets this version of a Phobos solar eclipse apart. Mastcam-Z has a solar filter that acts like sunglasses to reduce light intensity. "You can see details in the shape of Phobos' shadow, like ridges and bumps on the moon's landscape," said Mark Lemmon, a planetary astronomer with the Space Science Institute in Boulder, Colorado, who has orchestrated most of the Phobos observations by Mars rovers. "You can also see sunspots. And it's cool that you can see this eclipse exactly as the rover

saw it from Mars."

As Phobos circles Mars, its gravity exerts small tidal forces on the Red Planet's interior, slightly deforming rock in the planet's crust and mantle. These forces also slowly change Phobos' orbit. As a result, geophysicists can use those changes to better understand how pliable the interior of Mars is, revealing more about the materials within the crust and mantle.

Scientists already know that Phobos is doomed: The moon is getting closer to the Martian surface and is destined to crash into the planet in tens of millions of years. But eclipse observations from the surface of Mars over the last two decades have also allowed scientists to refine their understanding of Phobos' slow death spiral.

**More information:** For more about Perseverance:  
[mars.nasa.gov/mars2020/](https://mars.nasa.gov/mars2020/)

Provided by NASA

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