National Aeronautics and Space Administration

ECLIPSE

2023 THROUGH THE EYES OF **NASA**

www.nasa.gov

EXPERIENCE THE 2023 ANNULAR SOLAR ECLIPSE

THROUGH THE EYES OF NASA ▸ solarsystem.nasa.gov/eclipses/2023

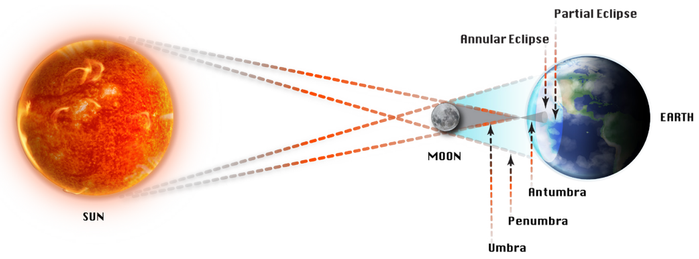
SATURDAY • OCTOBER 14, 2023

ECLIPSE

2023 THROUGH THE EYES OF NASA

WHAT IS AN ANNULAR SOLAR ECLIPSE?

An annular solar eclipse happens when the Moon is lined up between the Sun and Earth, but at its farthest point from Earth. Because the Moon is farther away from Earth than usual, it seems smaller. It does not block the entire view of the Sun. When it is in front of the Sun, the Moon will look like a dark disk on top of a larger, bright disk. This creates what looks like a ring around the Moon.



During an annular solar eclipse, the Moon's inner shadow cone (the "umbra") does not reach Earth's surface. Observers in the "antumbra" will see a ring of sunlight around the Moon. Diagram not to scale: If drawn to scale, the Moon would be 30 Earth diameters away from Earth. The Sun would be 400 times that distance.

WHAT IS A PARTIAL SOLAR ECLIPSE?

A partial solar eclipse happens when the Sun, Moon, and Earth are not exactly lined up. Only a part of the Sun will appear to be covered. During a total or annular solar eclipse, people outside the Moon's inner shadow see a partial solar eclipse.

Where to Watch

To find out what's happening in your area, go to: **solarsystem.nasa.gov/eclipses/2023**

How to Watch

You can see the Sun and an eclipse with special eclipse or solar viewing glasses. NEVER look directly at the uneclipsed or partially eclipsed Sun without appropriate eye wear. Sunglasses are not safe to view an eclipse. **Find More: go.nasa.gov/EclipseEyeSafety**

How Long Will It Last

The length of the eclipse will depend on your viewing location. The partial phases will last 1 to 2 hours both before and after annularity. For most locations, annularity will last between 2 and 5 minutes, but it will be longer or shorter in some places.

WHERE WILL YOU BE?

An annular solar eclipse on Saturday, October 14, 2023, and a total solar eclipse on Monday, April 8, 2024, cross the nation. You can access more exciting information about these eclipses, including downloadable activities, information about our Sun, and alternative ways to view the eclipse at **solarsystem.nasa.gov/eclipses.**

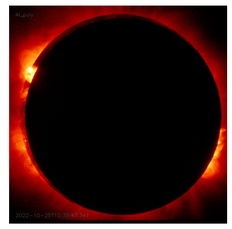
Credit: Michala Garrison and the Scientific Visualization Studio (SVS), in collaboration with the NASA Heliophysics Activation Team (NASA HEAT), part of NASA's Science Activation portfolio. Eclipse Calculations by Ernie Wright, NASA Goddard Space Flight Center.

This product is supported by the NASA Heliophysics Education Activation Team (NASA HEAT), part of NASA's Science Activation portfolio.

WHY NASA STUDIES ECLIPSES?

Eclipses aren't just beautiful – they're great for science. In addition to inspiring artists and musicians, eclipses have driven numerous scientific discoveries. For over a century, solar eclipses helped scientists decipher the Sun's structure and explosive events, find evidence for the theory of general relativity, and discover the element helium, among other things.

Credit: Stefan Seip



Credit: JAXA/NASA

Left: A telescope captured this view of an annular eclipse. Right: The Hinode spacecraft saw an annular eclipse from orbit in 2022.

Suborbital sounding rockets and high-altitude scientific balloons are just a few ways NASA studies eclipses. They carry instruments to study a variety of phenomena including the Sun's impact on Earth's upper atmosphere. Both will be launched during upcoming eclipses.

Credit: Keith Koehler, NASA's Wallops Flight Facility

Credit: NASA/Balloon Program Office

HELIOPHYSICS BIG YEAR

October 2023 - December 2024: A global celebration of heliophysics science.
Find More: go.nasa.gov/HelioBigYear

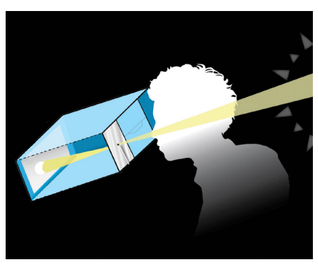
HELIOPHYSICS BIG YEAR

SAFE ECLIPSE VIEWING

The Sun is never completely blocked by the Moon during an annular solar eclipse. When watching a partial or annular solar eclipse directly with your eyes, you must look through safe solar viewing glasses ("eclipse glasses") or other safe solar filters at all times.

Eclipse Projector

You can make this simple eclipse projector with almost any cardboard box, paper, tape, and foil. The longer the distance from the pinhole to screen, the larger the image of the Sun will be.



Credit: NASA

Eclipse Glasses

When watching a partial or annular solar eclipse directly with your eyes, you must look through safe solar viewing glasses ("eclipse glasses"), a safe handheld solar viewer, or other safe solar filter at all times. Safe solar viewers must comply with the ISO 12312-2 international standard.

Credit: NASA/Shannon Reed

Colander Projector

Do you have a colander at home? The circular holes of a colander project crescent images of the Sun onto the ground during the partial phases of a solar eclipse.

Credit: NASA/Joy Ng

Pinhole Projectors

Pinhole projectors allowed early scientists to view the shapes of illuminated objects, like the Sun, by shining the light from the object through a very small hole, projecting the image of the object onto the ground, wall, or other flat surface. Explore the 2D paper cut and 3D printed versions of the annular eclipse pinhole projectors and activity. These are a great method for safe solar viewing. Be sure that when using, the Sun is always behind you. **Find More: nasa3d.arc.nasa.gov/detail/usa-eclipse-2023**

Credit: NASA HEAT/J. Patrick Haas

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