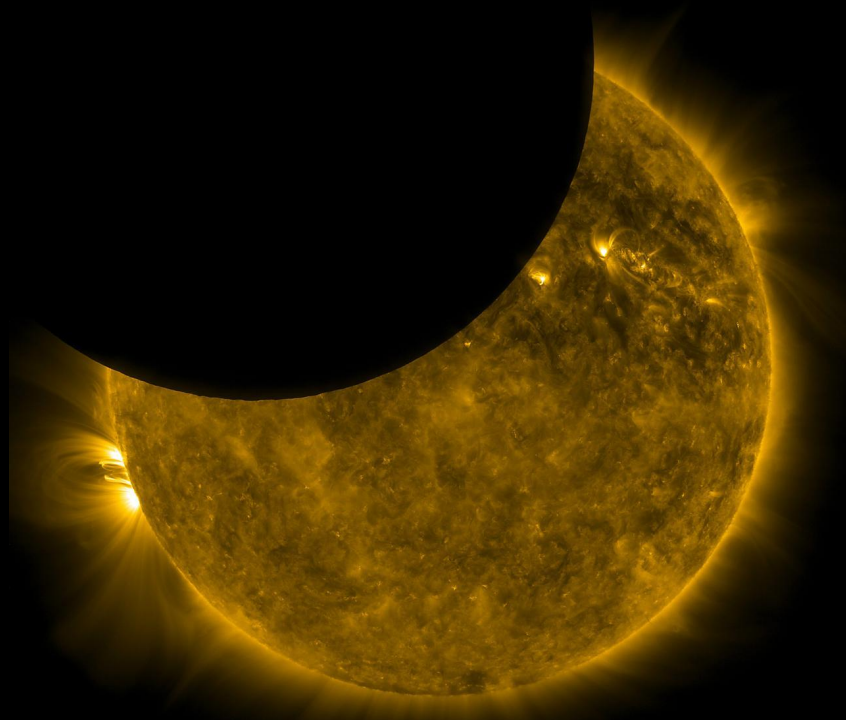


Preparing for a Solar Eclipse



Presentation Overview

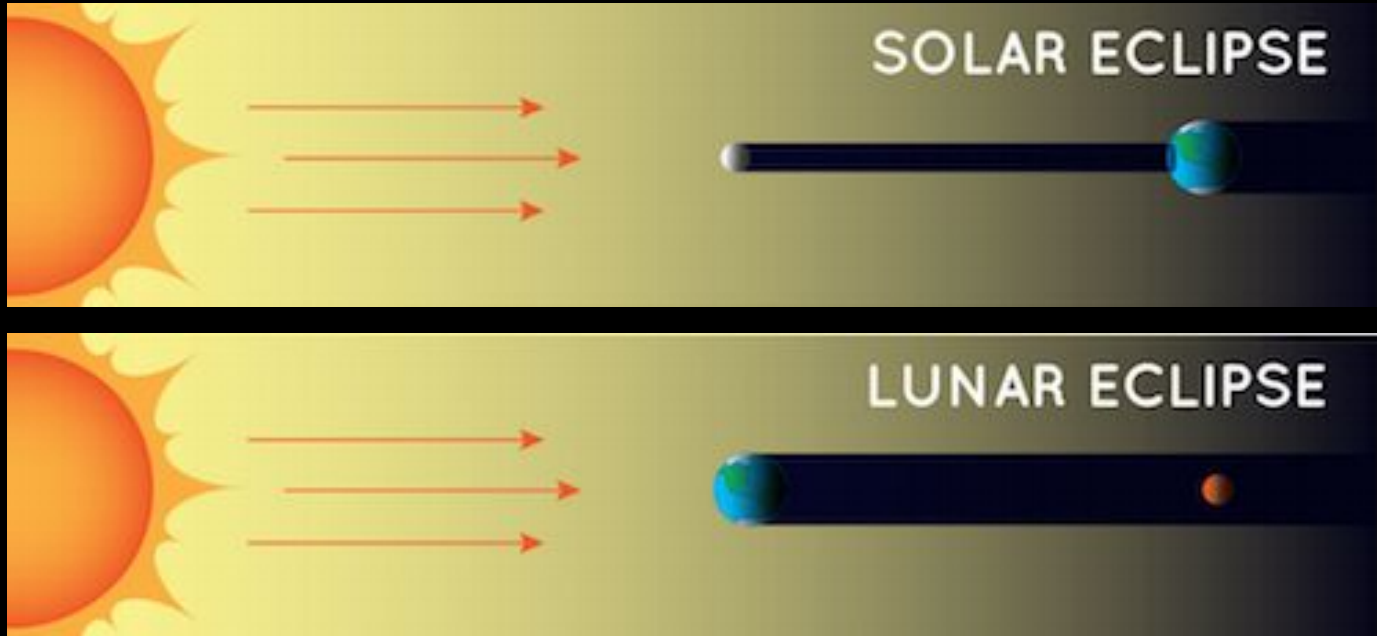
- What are solar eclipses
- How to enjoy a solar eclipse safely
- Solar eclipse resources for everyone



Have You Ever Seen a Solar Eclipse?



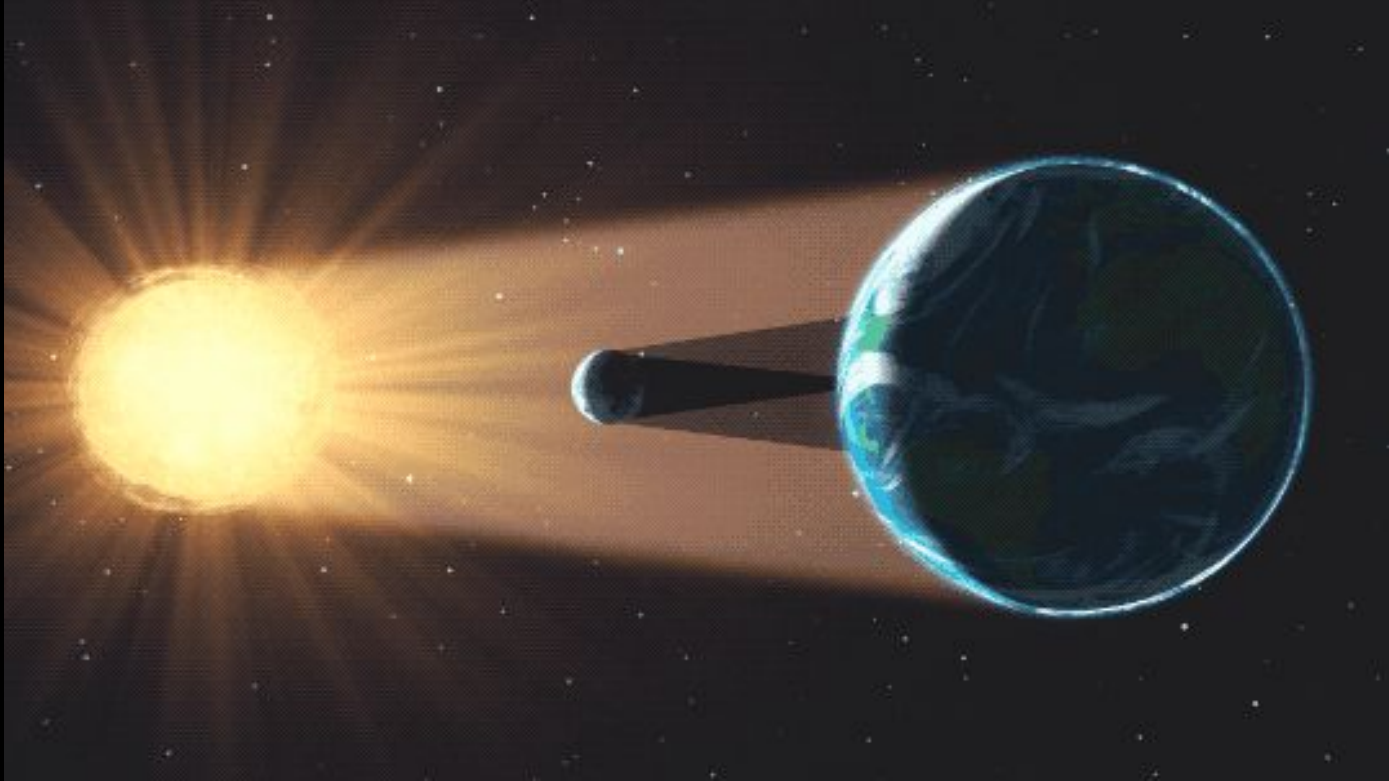
What is the Difference Between a Solar and Lunar Eclipse?



Illustrations not to scale

Credit: NASA Space Place

What is a Solar Eclipse?



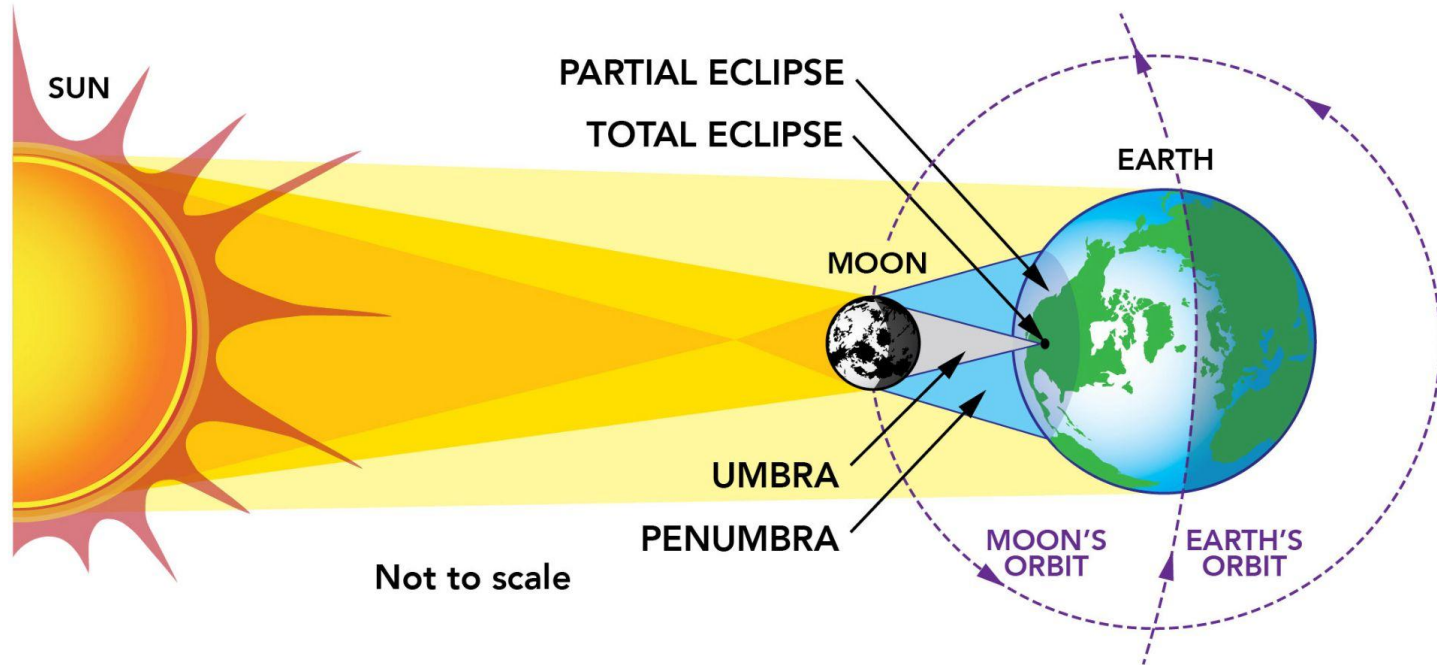
Solar Eclipse from Space: the Moon's Shadow Moves Across Earth



Credit: NASA Earth Observatory animation by Joshua Stevens

Moon's Shadow: Umbra & Penumbra

TOTAL SOLAR ECLIPSE



Different Types of Solar Eclipses

Total



Credit: NASA/MSFC/Joseph Matus

Annular



Credit: NASA/Bill Dunford

Partial



Credit: NASA/Bill Ingalls

Total vs Annular Solar Eclipse?

Due to the Elliptical Orbit of the Moon

Different Distance between the Moon and the Earth



Solar eclipses are possible because the Sun and the Moon have the same *apparent size* in the sky.

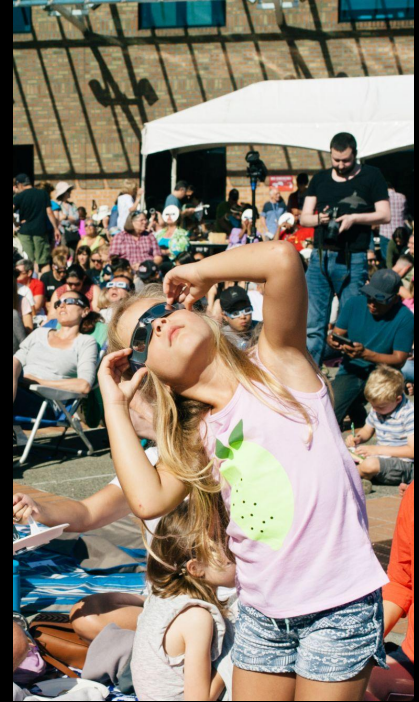


The Sun's diameter is about 400 times wider than that of the Moon, but the Sun is also about 400 times farther away from Earth.

How Often Do Eclipses Happen?



Everyone Can Participate in a Solar Eclipse!



Credits: Science Museum of Minnesota and Emily Maletz for NISE Network

The 2023 & 2024 Solar Eclipses through the eyes of NASA

Lunar topography data from NASA's Lunar Reconnaissance Orbiter and the Japan Aerospace Exploration Agency's SELENE lunar orbiter were used to precisely calculate the location of the Moon's shadow for the 2023 and 2024 solar eclipses. The planetary positions are from NASA's Jet Propulsion Laboratory Development Ephemeris 421. Earth imagery from NASA's Blue Marble Next Generation series were used to create the terrain and Earth at night imagery from NASA's Black Marble were used under the eclipse paths.

2023 Annual Solar Eclipse	2024 Total Solar Eclipse
Saturday, October 14, 2023	Monday, April 8, 2024

Credit: Michael Gershon and the Scientific Visualization Studio (SVS), in collaboration with the NASA Heliophysics Activation Team (NASA HAT), part of NASA's Science Activation portfolio
Eclipse calculations by Emily Wright, NASA Goddard Space Flight Center

Find more solar system.nasa.gov/eclipses

NP-2023-11-004-GSFC

Credit: NASA's Scientific Visualization Studio

ANNULAR SOLAR ECLIPSE OVER THE UNITED STATES



DURATION OF ANNULAR SOLAR ECLIPSE AND MAXIMUM PARTIAL ECLIPSE OCTOBER 14, 2023



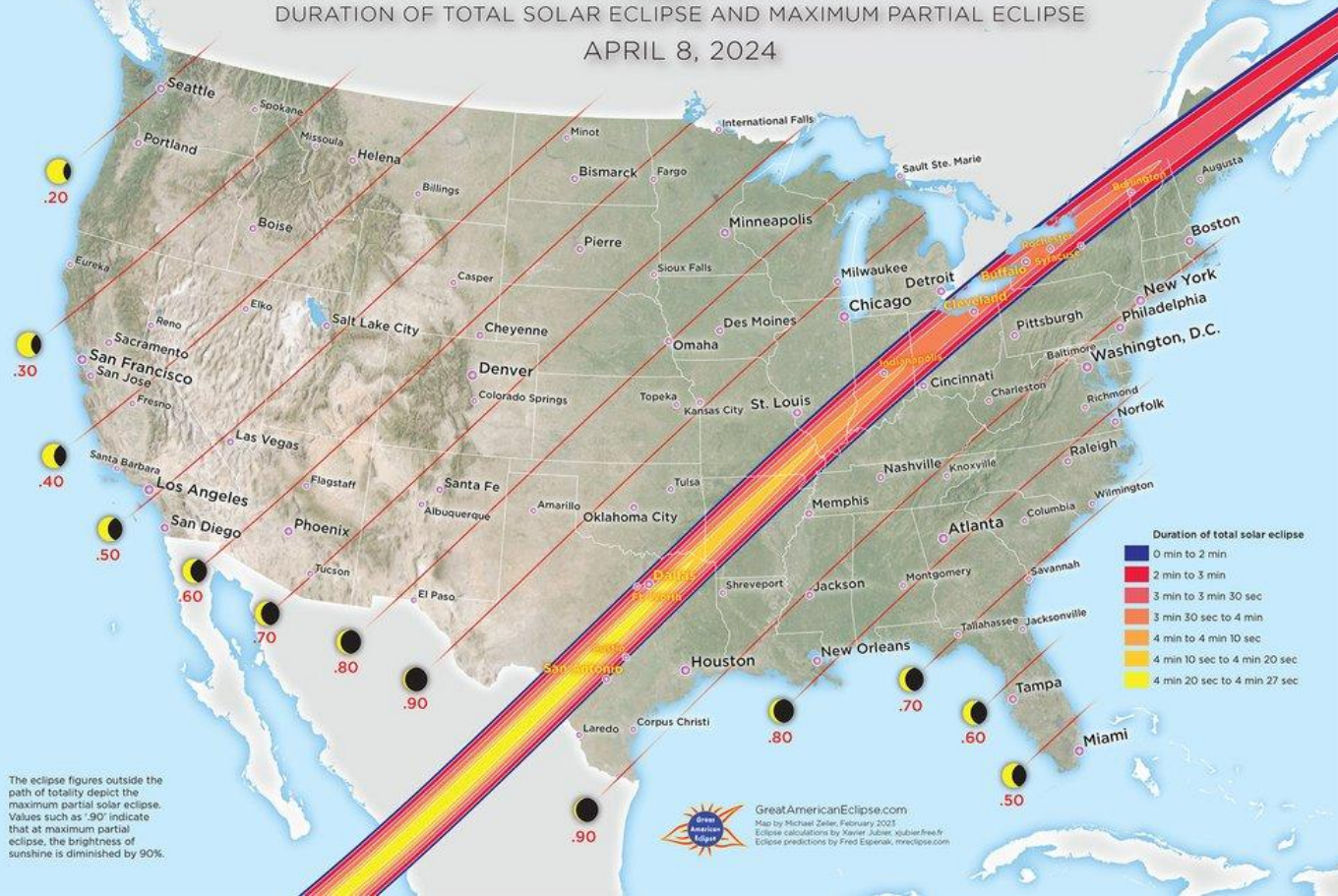
Credit:
Michael Zeiler
GreatAmericanEclipse.com

TOTAL SOLAR ECLIPSE OVER THE UNITED STATES



DURATION OF TOTAL SOLAR ECLIPSE AND MAXIMUM PARTIAL ECLIPSE

APRIL 8, 2024



GreatAmericanEclipse.com
Map by Michael Zeiler, February 2023
Eclipse calculations by Xavier Jubier, xjubier.free.fr
Eclipse predictions by Fred Espenak, mmeclipse.com

Credit:
Michael Zeiler
GreatAmericanEclipse.com

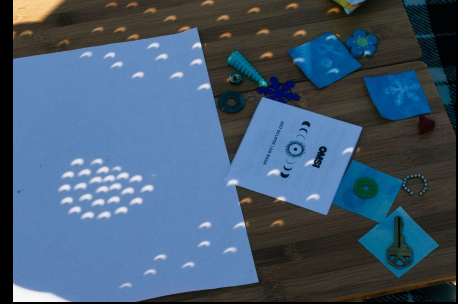
Everyone in North American Should See at Least a Partial Eclipse...



If It's Clear Out!

Safe Eclipse Viewing

- Safety glasses
- Projection of images
 - Shadows
 - Pinhole projector
- Live streaming the event



Safe Eclipse Viewing: Safety Glasses



Always use proper safety equipment to observe the Sun at any time!

Safe Eclipse Viewing: Shadows



Credit: Emily Maletz for the NISE Network

Safe Eclipse Viewing: Pinhole Viewer



Credit: NASA/Mary Pat Hrybyk-Keith

Safe Eclipse Viewing: Live Streaming



Find the app and
livestream info at
exploratorium.edu/eclipse

Resources: Citizen Science Projects

Eclipse Soundscapes

What are the effects of a solar eclipse on animals, insects, and other living creatures on Earth?



Find more info at EclipseSoundscapes.org

Resources: Citizen Science Projects

GLOBE EClipse

GLOBE Observer

What happens on Earth to temperature, clouds, and wind, when the Sun is blocked by the Moon during an eclipse?



Find the app & info at observer.globe.gov/eclipse

Credit: NASA GLOBE Observer

Resources: Local Expertise



Credit: Science Museum of Minnesota for NISE Network

Resources: Event Planning

Compilation of Solar Eclipse public engagement resources:

- Hands-on activities
- Maps and images
- Safe viewing
- NASA's Solar Eclipse Tactile book
- Cultural connections and more!



nisenet.org/solareclipse

NISE Network Solar Eclipse Activities

Exploring the
Solar System:
**Big Sun,
Small Moon**



Exploring the
Solar System:
Solar Eclipse



Exploring
Earth:
Bear's Shadow



Exploring the
Solar System:
**Observe the
Sun**



Explore Science: Voyage through the Solar System Activities

Build a Moon Base



Space Souvenir



Breath of Fresh Air



nisenet.org/solarsystem-kit

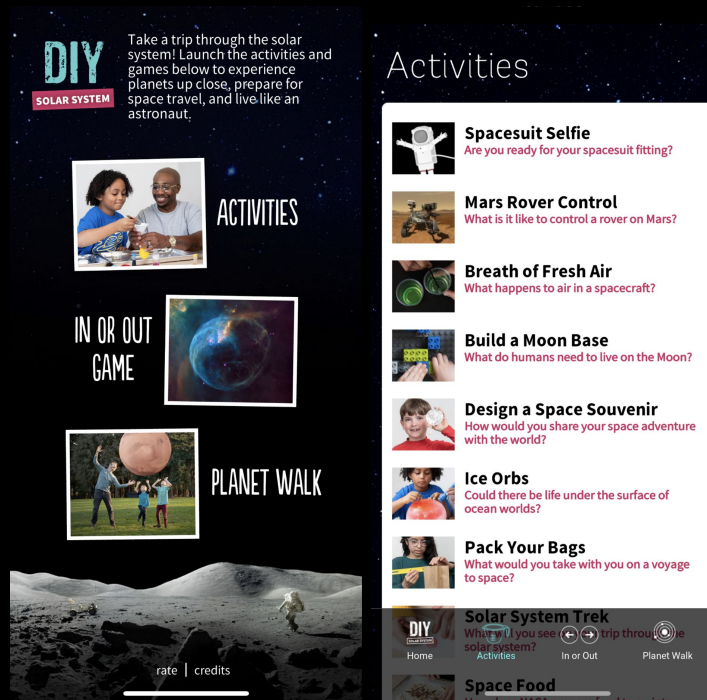
Credit: Emily Maletz for the NISE Network

Companion Apps with Hands-on Activities

DIY Sun Science



DIY Solar System



Download from the App Store!

Tips for Hosting Solar Eclipse Events

- Plan ahead!
- Spacious location
- Staff and volunteers
- Safe viewing
- Live stream
- Hands-on Activities



Tips for Taking Photos

- **Treat your camera like your eyes - use safe solar viewing practices!**
- Use the right solar filter for your specific model of camera
- If it is cloudy, you can still get some great photos of the event by just observing the people and environment around you.
- More advice:
<https://eclipse.aas.org/imaging-video/images-videos>



Questions?

ANNULAR SOLAR ECLIPSE



10.14.2023

ECLIPSE
●●●●●○●●●●●
2023 THROUGH THE EYES OF NASA

TOTAL SOLAR ECLIPSE



04.08.2024

 **2024 Total Solar**
eclipse
THROUGH THE EYES OF NASA

Find More: solarsystem.nasa.gov/eclipses

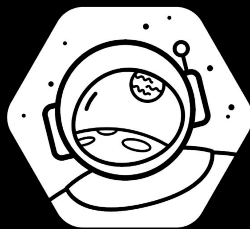
Thank you!

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- American Astronomical Society: <https://eclipse.aas.org>
- Astronomical Society of the Pacific: astro.society.org
- Eclipse Soundscapes: <https://eclipsesoundscapes.org/>
- Exploratorium: [exploratorium.edu/eclipse](https://www.exploratorium.edu/eclipse)
- Great American Eclipse: greatamericaneclipse.com/
- NASA: solarsystem.nasa.gov/eclipses
- NASA Eclipse Ambassadors: eclipseambassadors.org
- NASA GLOBE Observer: observer.globe.gov/eclipse
- NASA Night Sky Network: nightskynetwork.org
- NASA Science Activation: science.nasa.gov/learners
- Space Science Institute: space.science.org
- STAR Net Solar Eclipse Activities for Libraries (SEAL):
starnetlibraries.org/about/our-projects/solar-eclipse-activities-libraries-seal/

NISE

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STEM EDUCATION
NETWORK



EXPLORE SCIENCE

Voyage through the Solar System



EXPLORE SCIENCE

Earth & Space



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