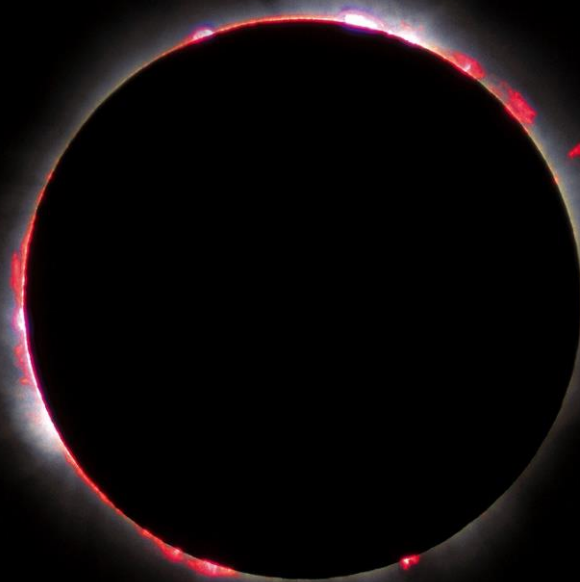
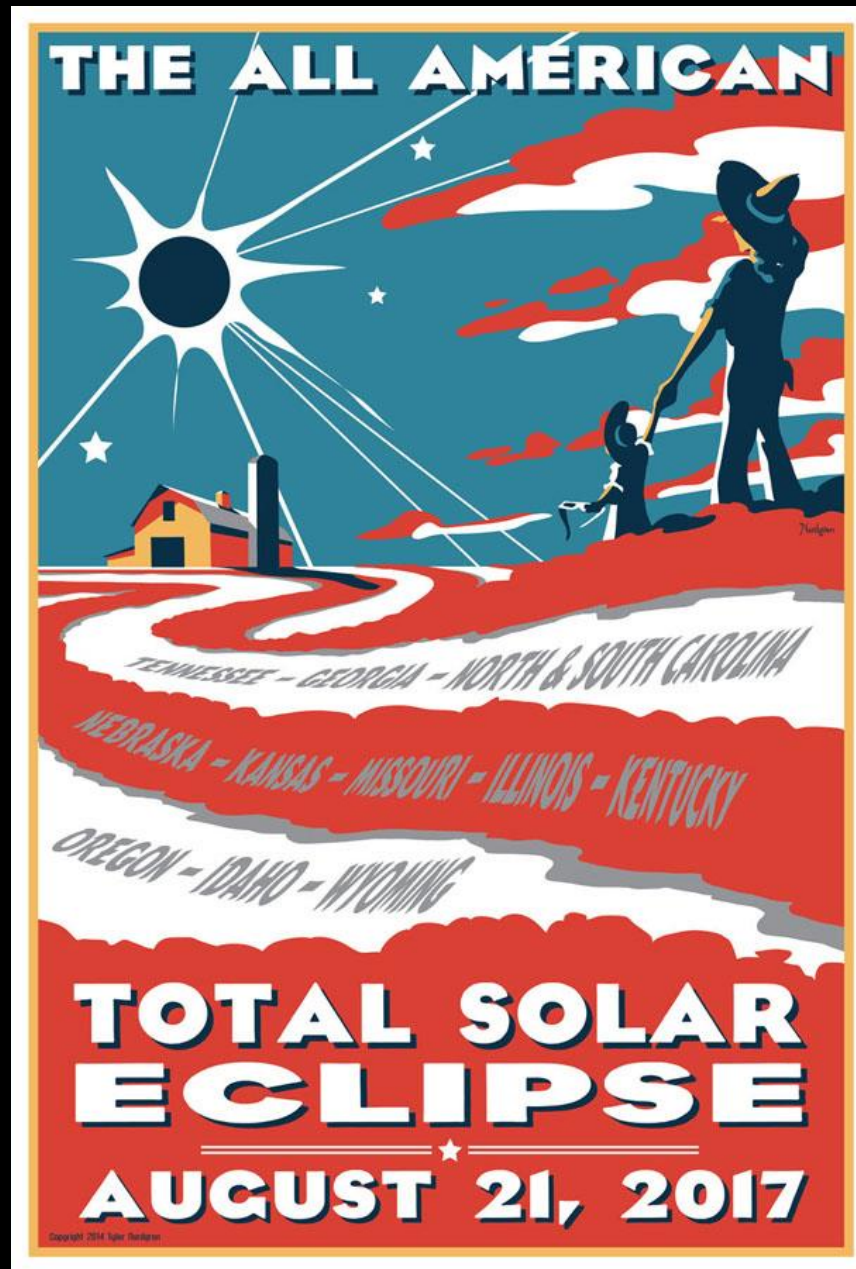


**Eclipse 2017:
Outreach Event of the Decade
A NISENet Webinar**



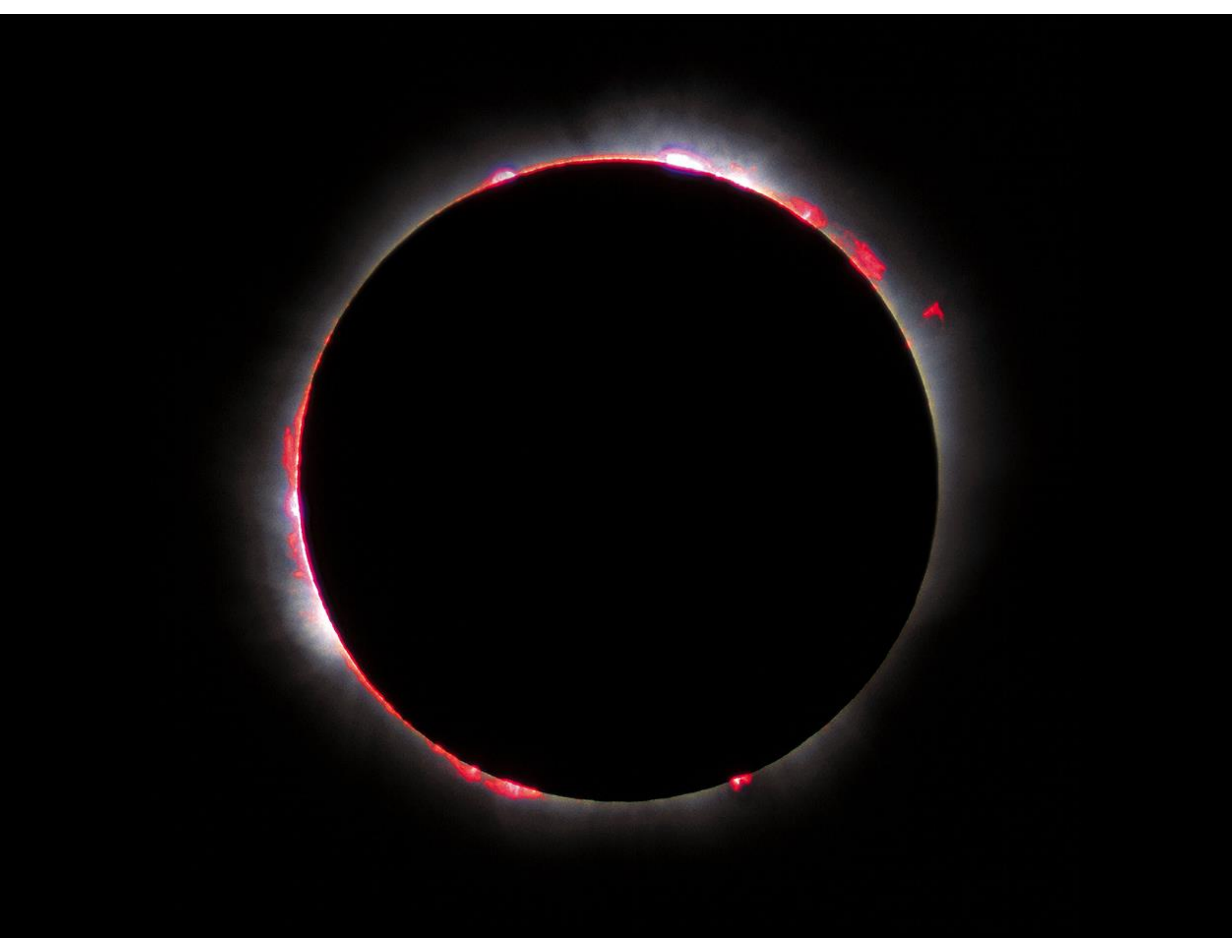
Andrew Fraknoi and Dennis Schatz



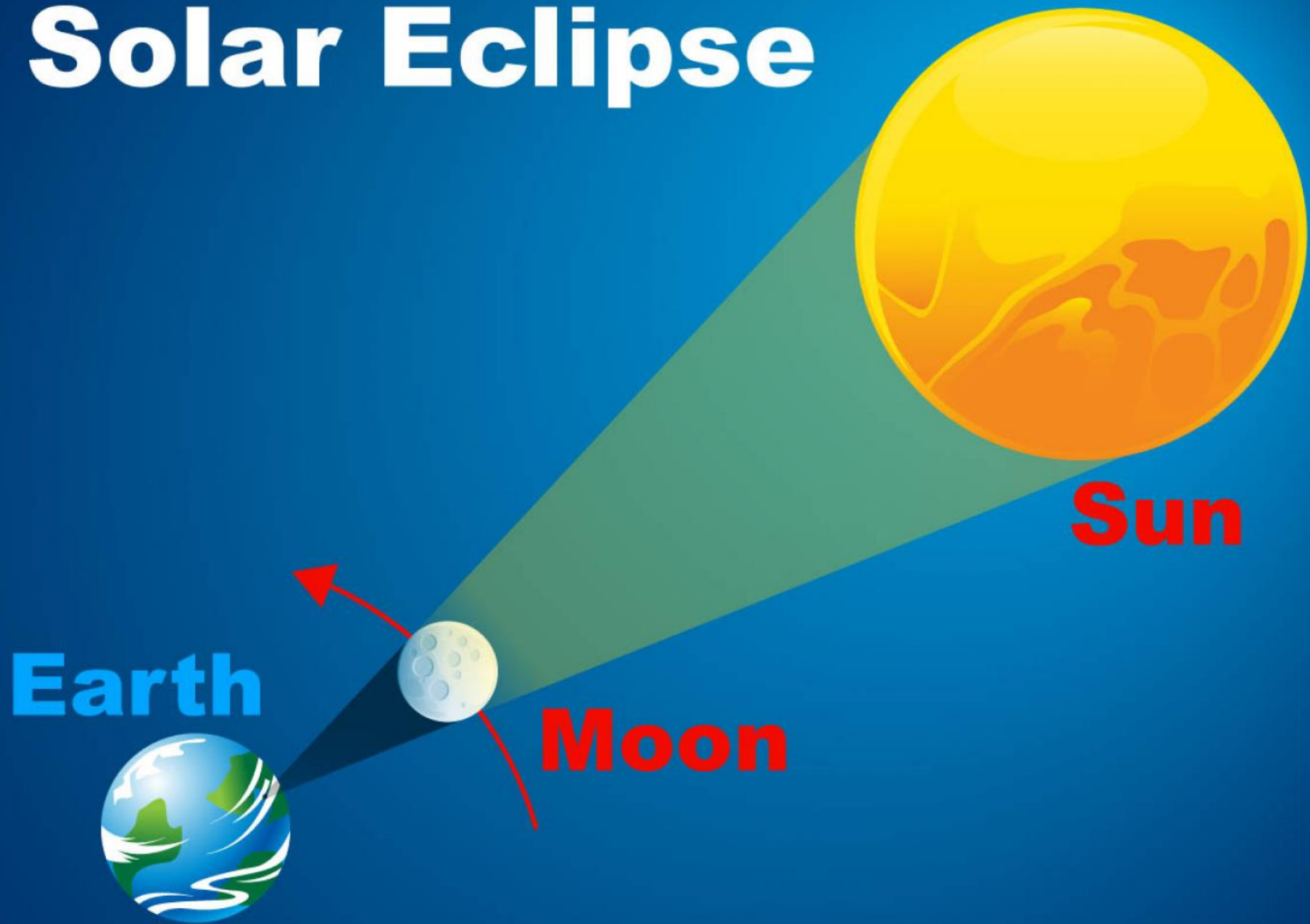
The All American Eclipse

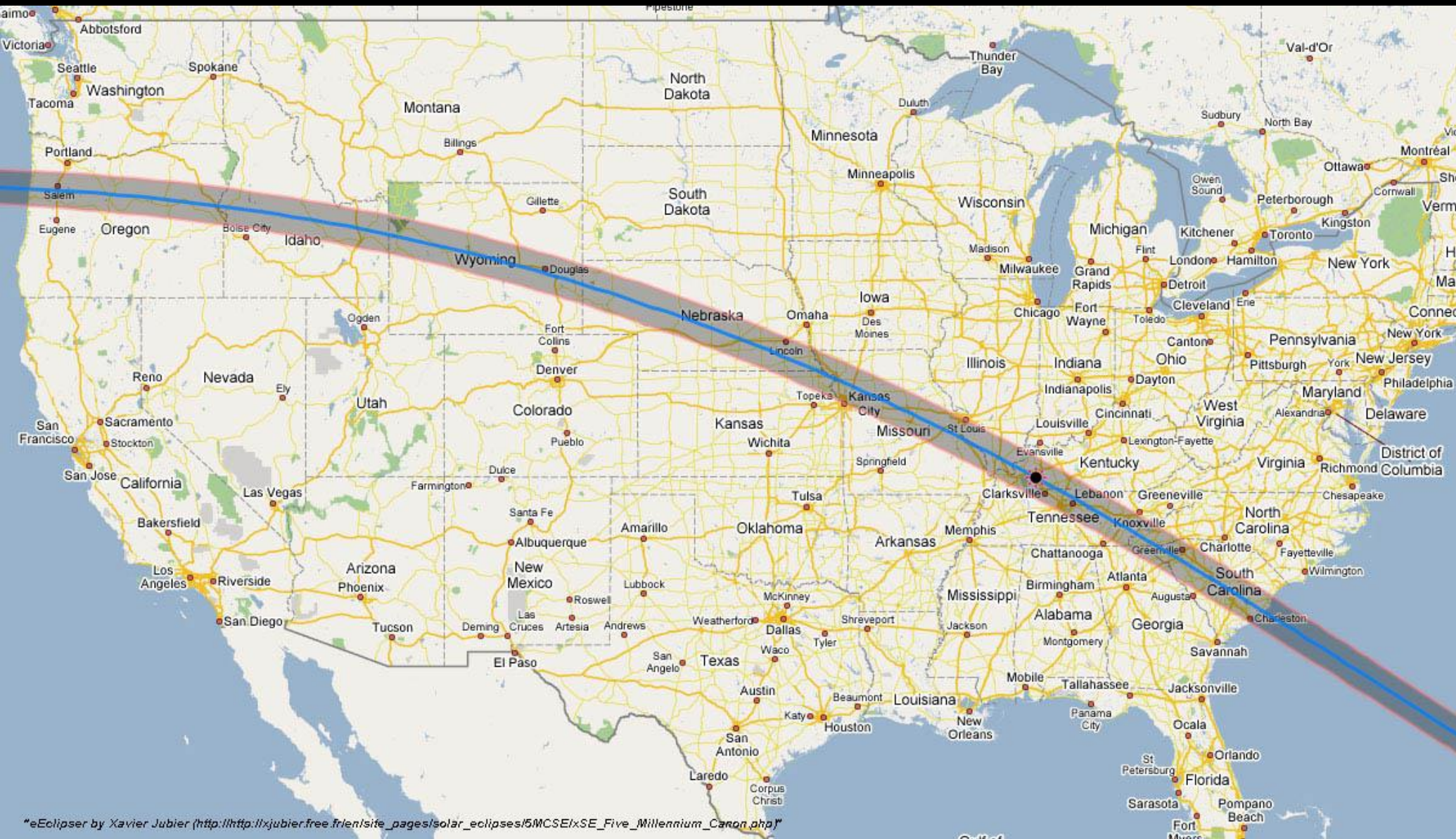


Mars' Moon Phobos Trying to Eclipse the Sun



Solar Eclipse





"eEclipses by Xavier Jubier (http://xjubier.free.fr/en/site_pages/solar_eclipses/5MCSEixSE_Five_Millennium_Canon.php)"

States Where the 2017 Eclipse is Total:

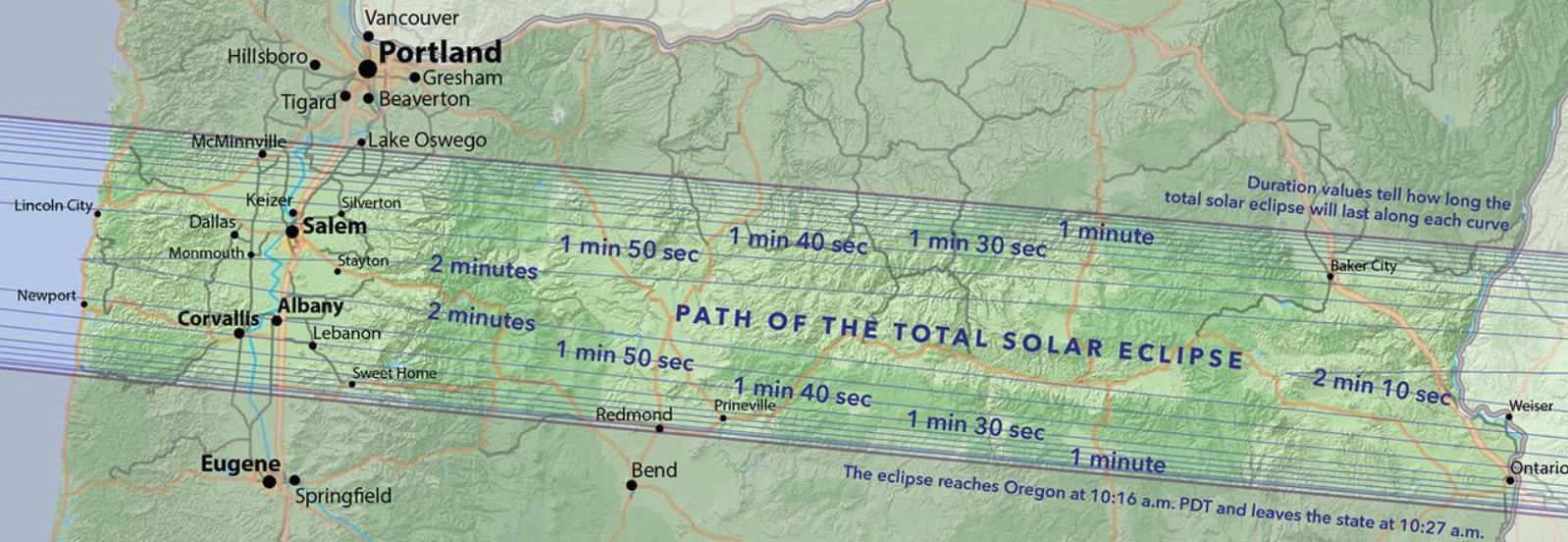


Oregon	Illinois
Idaho	Kentucky
Wyoming	Tennessee
Nebraska	Georgia
Kansas	North Carolina
Missouri	South Carolina

Total solar eclipse over Oregon

A total solar eclipse will cross the United States from Oregon to South Carolina on **August 21, 2017**. This is the grandest spectacle in the sky and you should see this at least once in your life. To see day turn to night and the majesty of the Sun's corona, travel to a location inside the path of the eclipse.

Learn more at GreatAmericanEclipse.com



Map by Michael Zeiler, eclipse-maps.com
Calculations by Xavier Jubier, xjubier.free.fr
Predictions by Fred Espenak, mreclipse.com



CHRIS COOK PHOTOGRAPHY

Population Statistics



U.S. = 319 million

Canada = 35 million

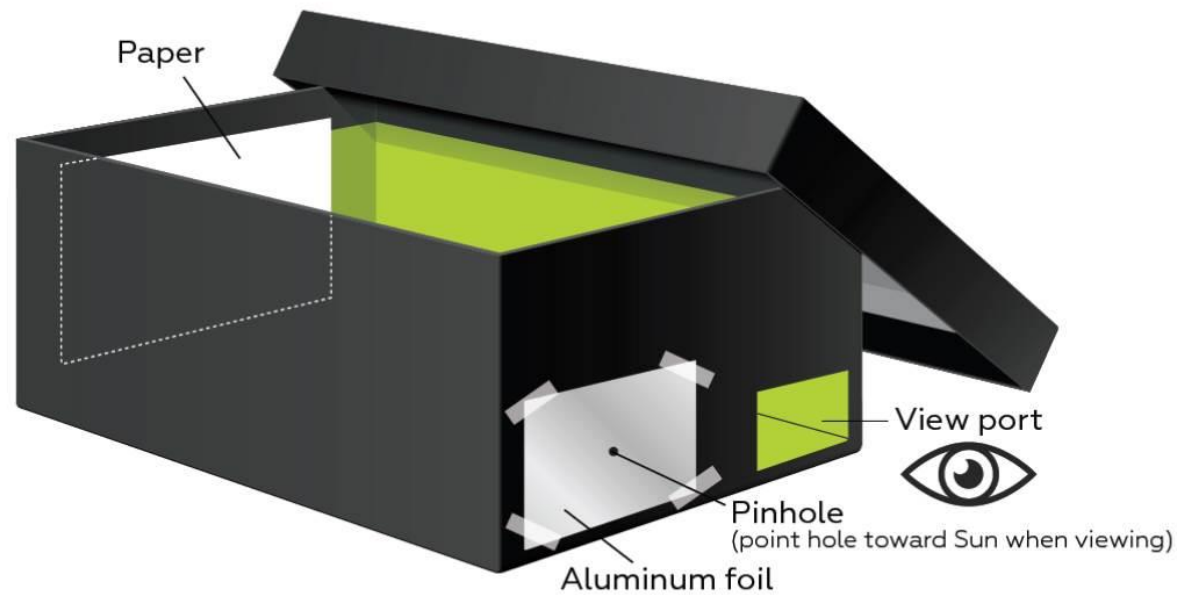
Mexico = 119 million

TOTAL = 473 million

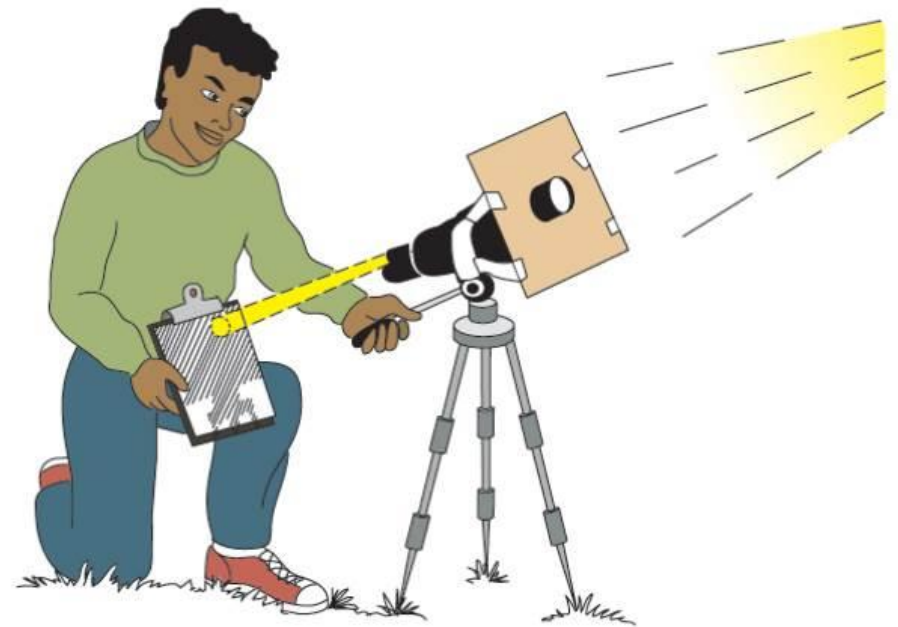




We'll need lots of eclipse glasses...



**Or other observing
strategies**



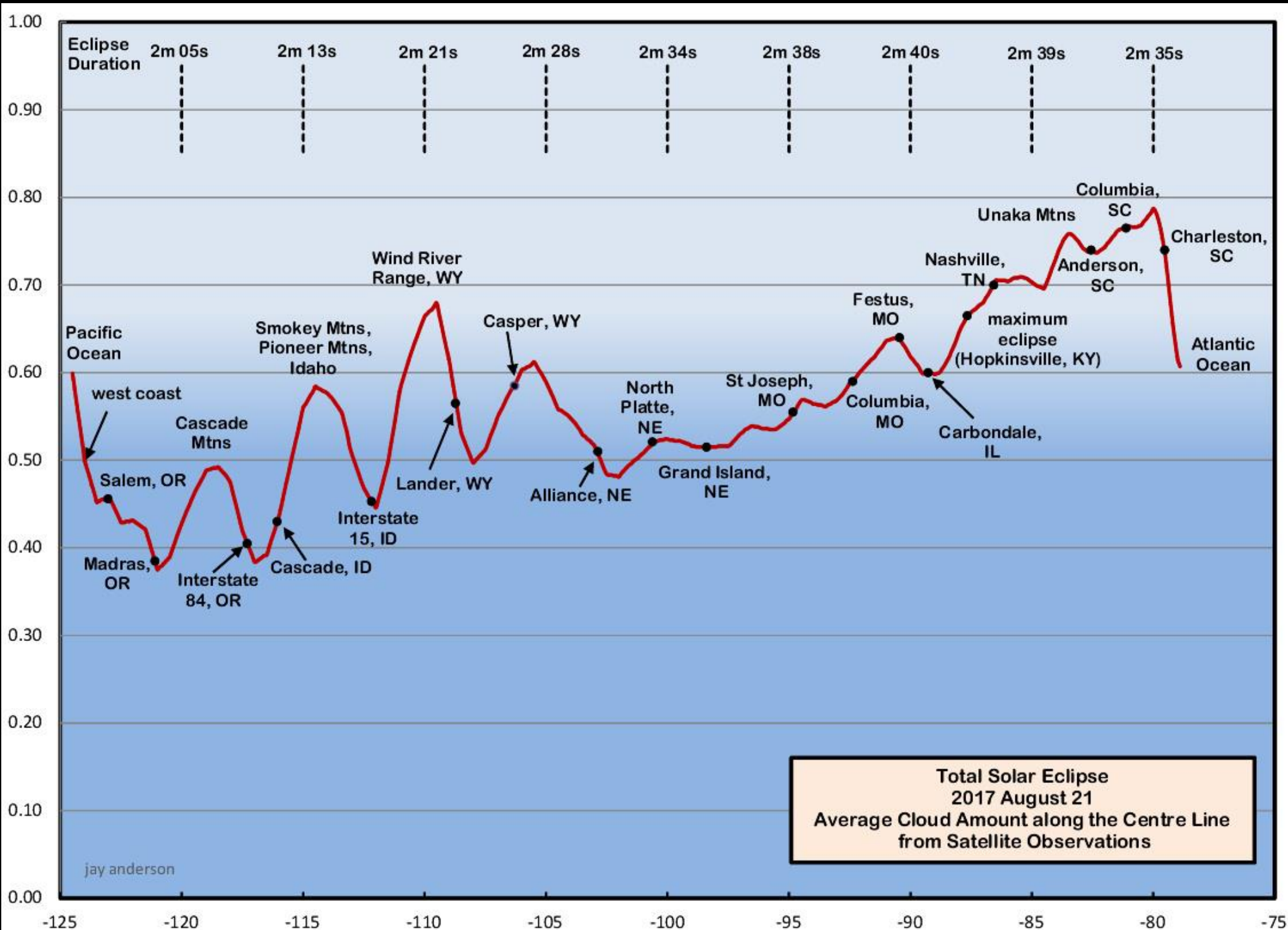
Source: Schatz, D., and P. Allen. 2003. *Astro adventures II: An activity-based astronomy curriculum*. Seattle, WA: Pacific Science Center, p. 52.

Circumstances of the Aug. 21, 2017 Partial Eclipse for the Largest Cities in the U.S.

City	Eclipse Starts	Max Eclipse	Eclipse Ends	Fraction of Sun's Diameter Covered	Percent of Sun's Area Covered
New York City	1:23 pm	2:45 pm	4:01 pm	0.77	71%
Los Angeles	9:06 am	10:21 am	11:45 am	0.69	62%
Chicago	11:54 am	1:20 pm	2:43 pm	0.89	87%
Houston	11:47 am	1:17 pm	2:46 pm	0.73	67%
Philadelphia	1:21 pm	2:44 pm	4:01 pm	0.8	75%
Phoenix	9:14 am	10:34 am	12:00 n	0.7	63%
San Antonio	11:41 am	1:09 pm	2:38 pm	0.69	61%
San Diego	9:07 am	10:23 am	11:47 am	0.66	58%
Dallas/Ft Worth	11:40 am	1:10 pm	2:39 pm	0.8	75%
San Francisco	9:01 am	10:15 am	11:37 am	0.8	76%
Indianapolis	12:58 pm	2:25 pm	3:49 pm	0.93	91%
Washington DC	1:18 pm	2:43 pm	4:02 pm	0.84	81%
Miami	1:27 pm	2:59 pm	4:21 pm	0.82	78%

Eclipse Information for Selected Cities Where the Eclipse Will be Total

City	Partial Eclipse Starts	Total Eclipse Starts	Total Eclipse Ends	Partial Eclipse Ends	Sun's Altitude At Totality
Salem, OR	9:05 am	10:17 am	10:19 am	11:38 am	40 degrees
Casper, WY	10:22 am	11:43 am	11:45 am	1:09 pm	54 degrees
St. Joseph, MO	11:41 am	1:06 pm	1:09 pm	2:34 pm	62 degrees
Carbondale, IL	11:52 am	1:20 pm	1:23 pm	2:48 pm	64 degrees
Nashville, TN	11:58 am	1:27 pm	1:29 pm	2:54 pm	64 degrees
Columbia, SC	1:13 pm	2:42 pm	2:44 pm	4:06 pm	62 degrees





© 2010 American Border Patrol



AN OBSERVER'S GUIDE TO VIEWING THE ECLIPSE

SOLAR SCIENCE

ALL-AMERICAN TOTAL SOLAR ECLIPSE

AUGUST 21, 2017

By Andrew Fraknoi and Dennis Schatz

On Monday, August 21, 2017, a total eclipse of the Sun will be visible in the continental United States for the first time in almost 40 years. A total eclipse is when the Sun is completely hidden by the Moon, the sky becomes dark, and the Sun's faint atmosphere (corona) becomes visible—looking like a beautiful halo (Figure 1). This total eclipse will only be visible on a narrow track stretching across the United States from Oregon to South Carolina. No other country will get to see the total eclipse this time.

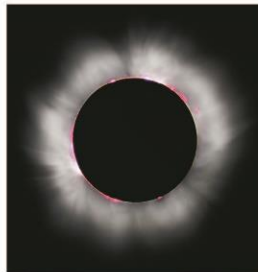
The rest of the United States and other parts of North and Central America will see a *partial* eclipse, in which the Moon covers only a portion of the Sun. A partial eclipse is interesting, but nowhere near as awe-inspiring and memorable as a total eclipse. A partial eclipse is also dangerous to look at without something to protect your eyes from the Sun's damaging rays.

What Exactly Is a Total Eclipse of the Sun?

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FIGURE 1

During a total eclipse, the Sun is covered by the Moon, and the faint light of its corona becomes visible.



Source: Luc Viatour, Wikimedia Commons, CC BY-SA 3.0. https://en.wikipedia.org/wiki/File:Solar_eclipse_1999_4_NR.jpg

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Science
Teachers
Association

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free
distribution
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An 8-page
summary of the
booklet in *Solar
Science*:

<http://bit.ly/2bkGSvA> or www.nsta.org/solarscience



SILLY ME, HANK!
I GOT IT BACKWARDS...
IT'S **CARDBOARD** FOR
A **SOLAR** ECLIPSE AND
BINOCULARS FOR A
LUNAR ECLIPSE!

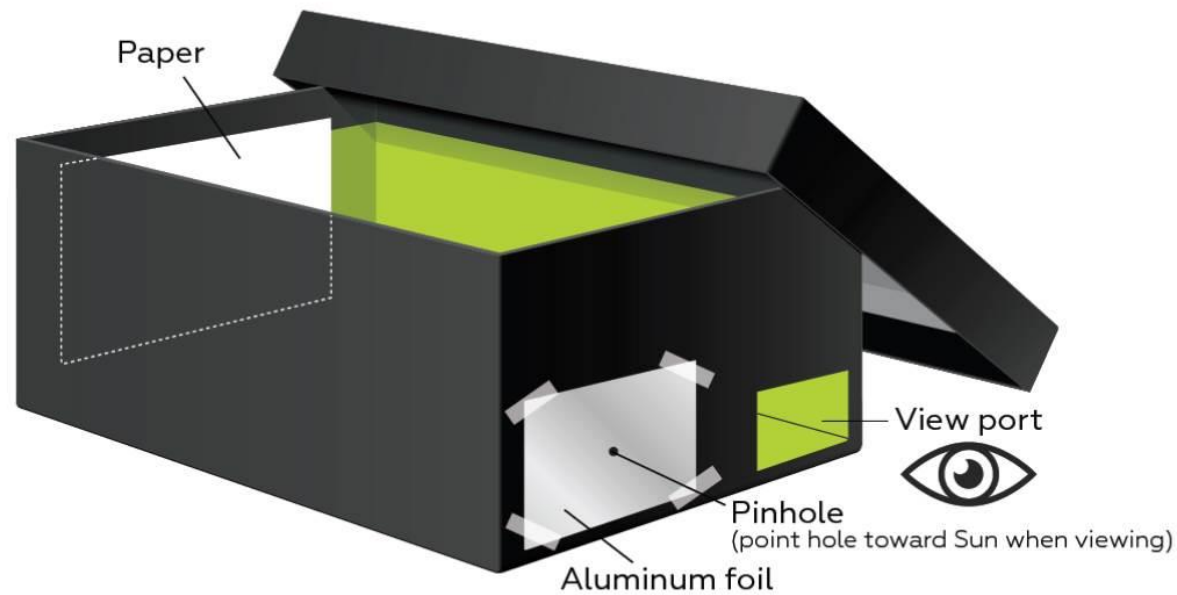
SOLAR
ECLIPSE
TODAY

5/20/12 Bryan WWW.CARTOONADAY.COM

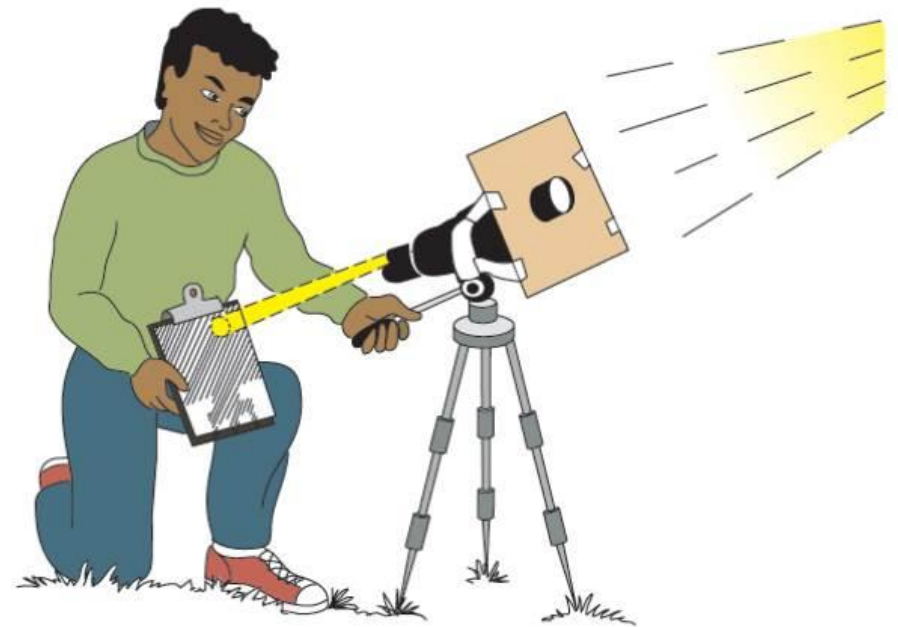
"RING OF FIRE" SOLAR ECLIPSE



We'll need lots of eclipse glasses...



Or other observing strategies



Source: Schatz, D., and P. Allen. 2003. *Astro adventures II: An activity-based astronomy curriculum*. Seattle, WA: Pacific Science Center, p. 52.



Eclipse Glasses:

www.eclipsediscount.com

American Paper Optics:

<http://www.eclipseglasses.com/>

Rainbow Symphony:

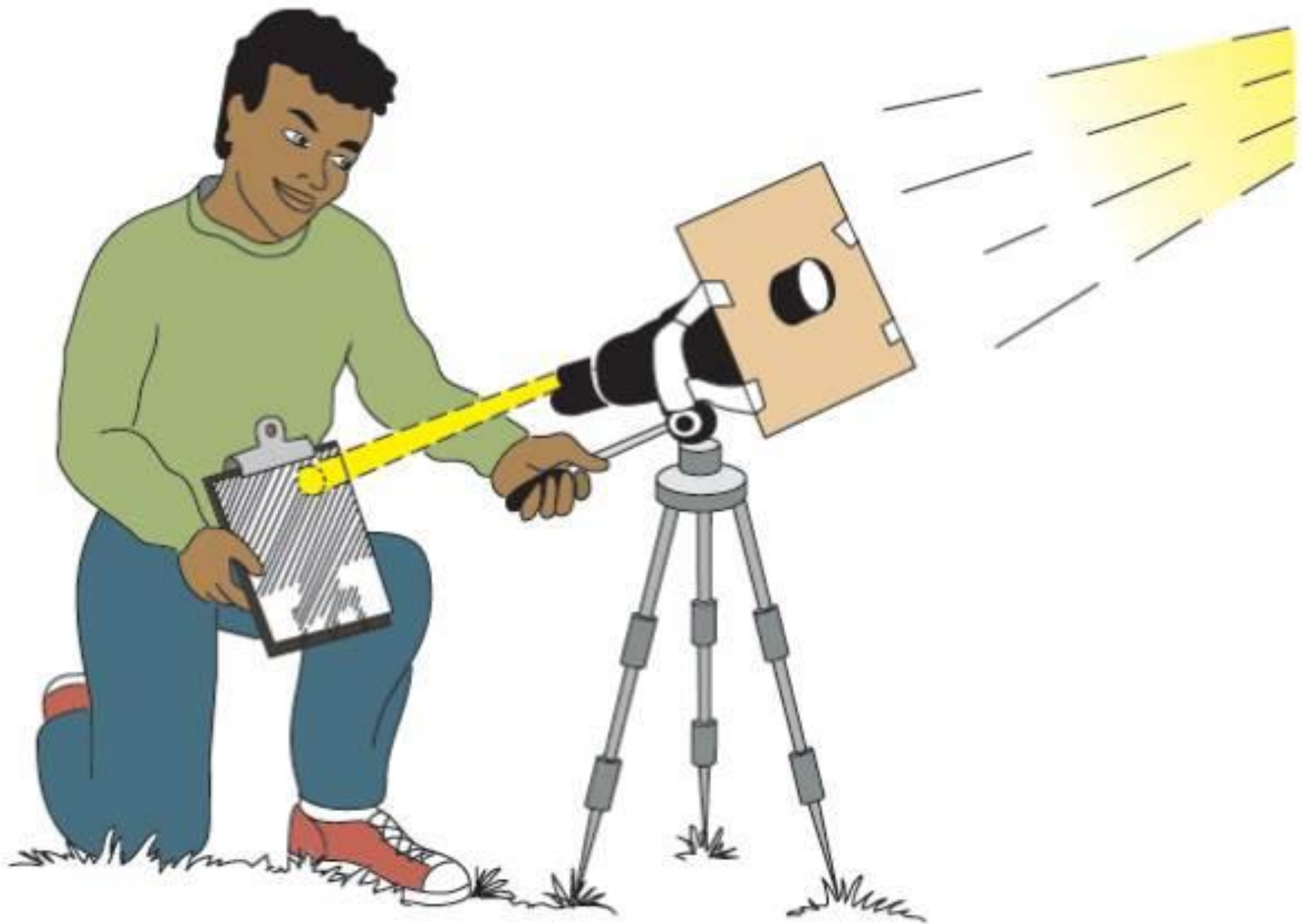
<http://www.rainbowsymphony.com/eclipse-glasses>

Bulk rates available on 100's and 1000's



Highly Discounted glasses are available at:

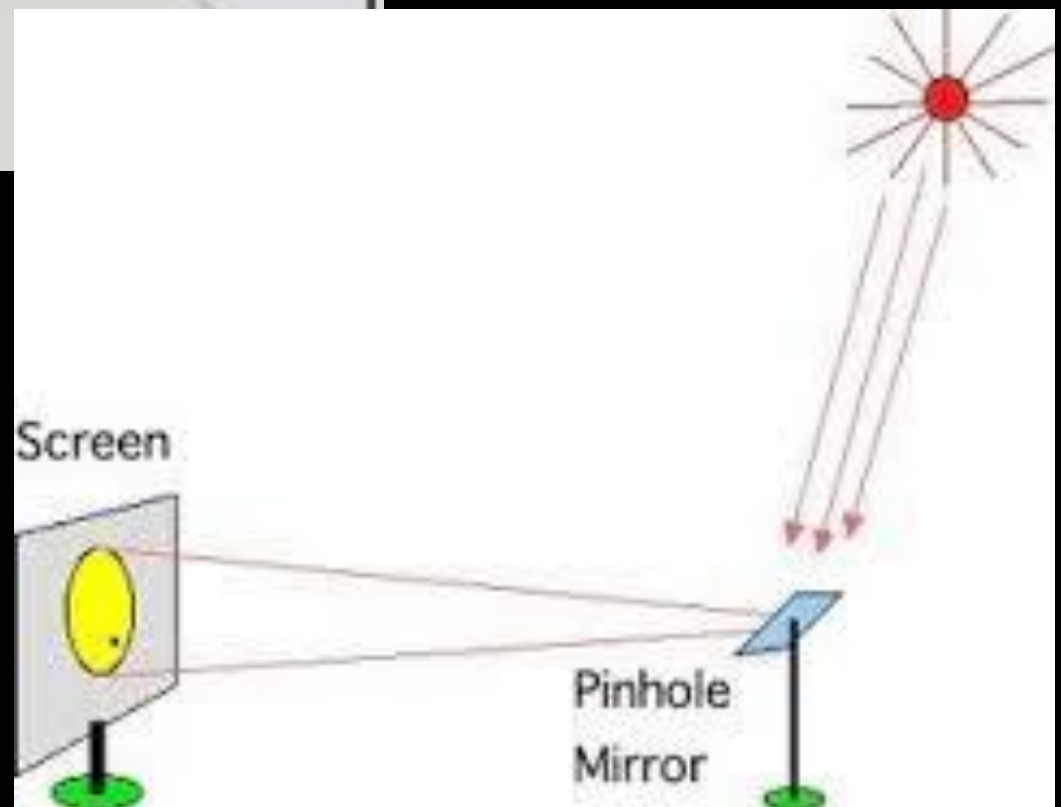
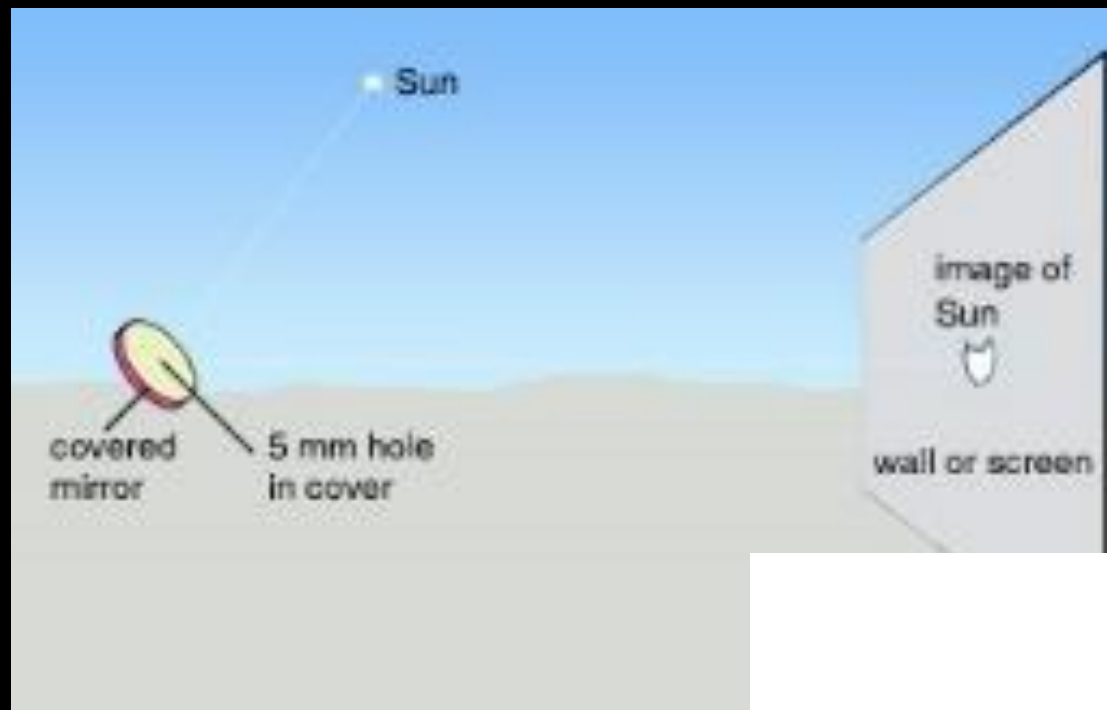
www.eclipsediscount.com



Source: Schatz, D., and P. Allen. 2003. *Astro adventures II: An activity-based astronomy curriculum*. Seattle, WA: Pacific Science Center, p. 52.







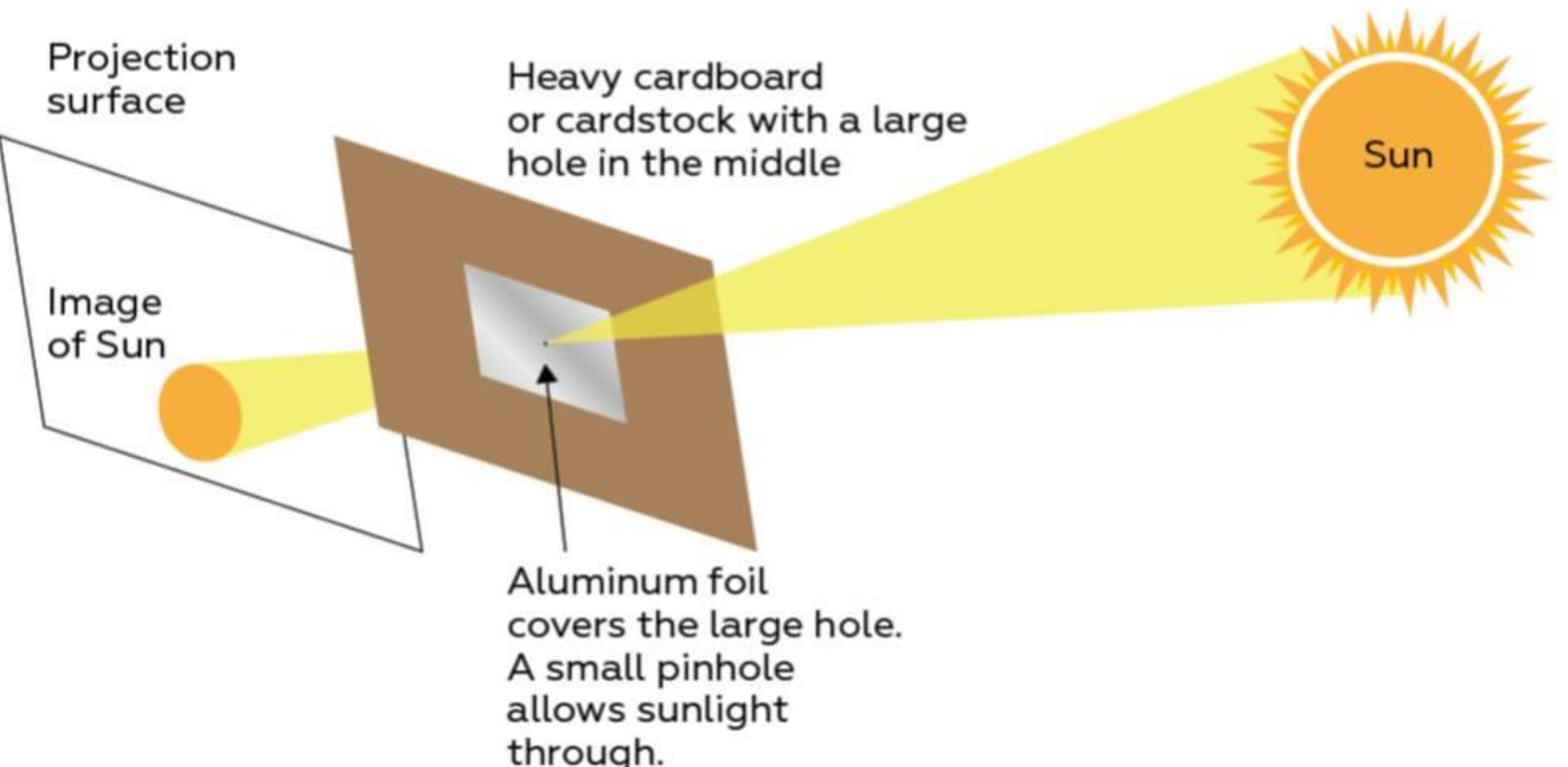
Projection
surface

Heavy cardboard
or cardstock with a large
hole in the middle

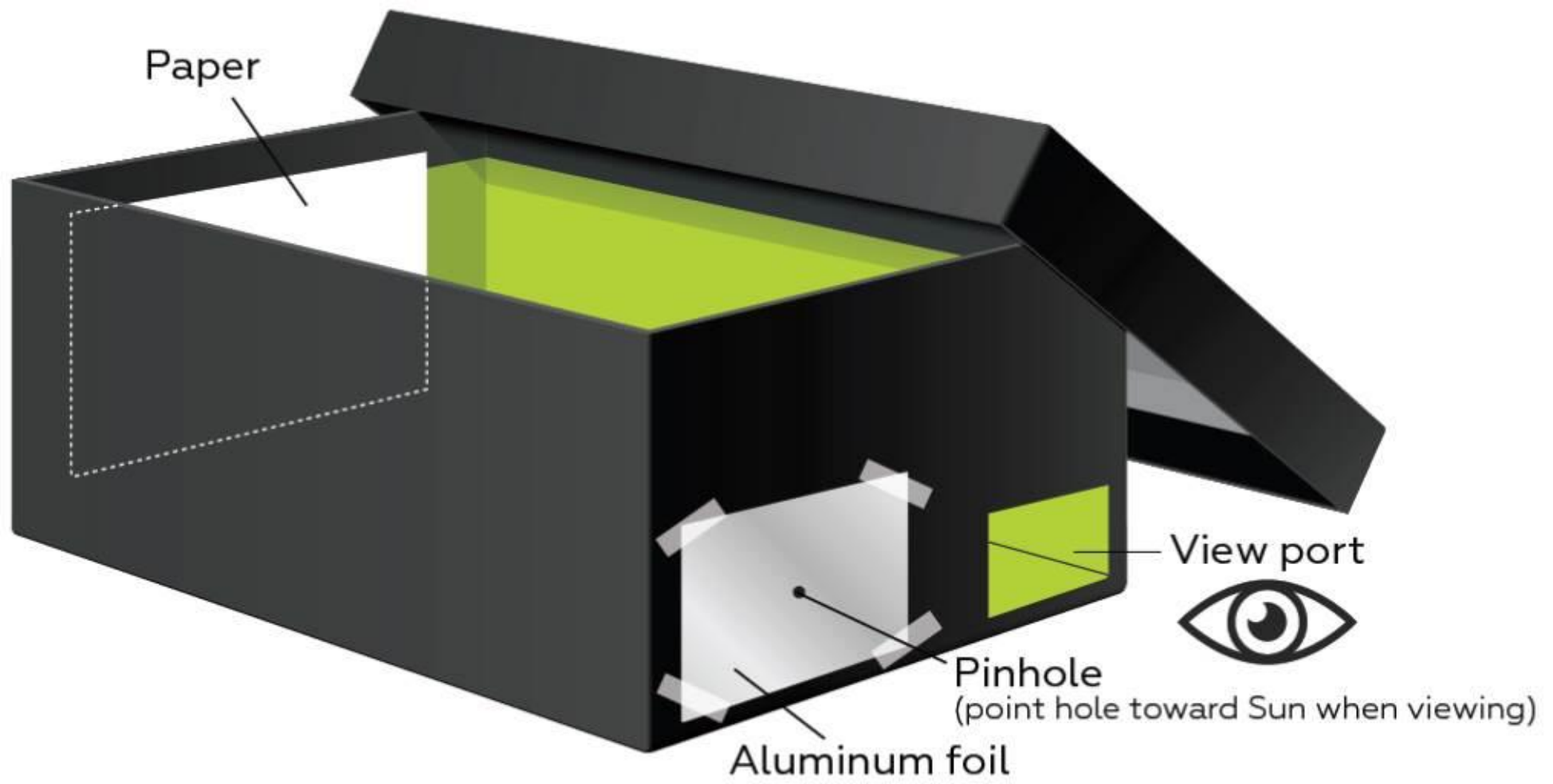
Image
of Sun

Sun

Aluminum foil
covers the large hole.
A small pinhole
allows sunlight
through.



The diagram illustrates a pinhole camera setup. On the right, a bright yellow sun with rays is labeled 'Sun'. A wide, yellow cone of light extends from the sun towards the left. In the center, a brown rectangular block represents 'Heavy cardboard or cardstock with a large hole in the middle'. A smaller, white rectangular piece of 'Aluminum foil' is placed over the hole. A small black dot on the foil represents a 'pinhole'. A narrow yellow cone of light passes through this pinhole. To the left of the cardboard, a white rectangular 'Projection surface' is shown. A small orange circle, labeled 'Image of Sun', is projected onto this surface. An arrow points from the text 'Aluminum foil covers the large hole. A small pinhole allows sunlight through.' to the foil.



Pinhole Projectors Come in Many Forms





SOLAR SCIENCE

EXPLORING SUNSPOTS, SEASONS, ECLIPSES, AND MORE

Dennis Schatz
Andrew Fraknoi

NTApress
National Science Teachers Association



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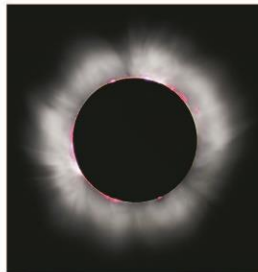
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Source: Luc Viatour, Wikimedia Commons, CC BY-SA 3.0. https://en.wikipedia.org/wiki/File:Solar_eclipse_1999_4_NR.jpg

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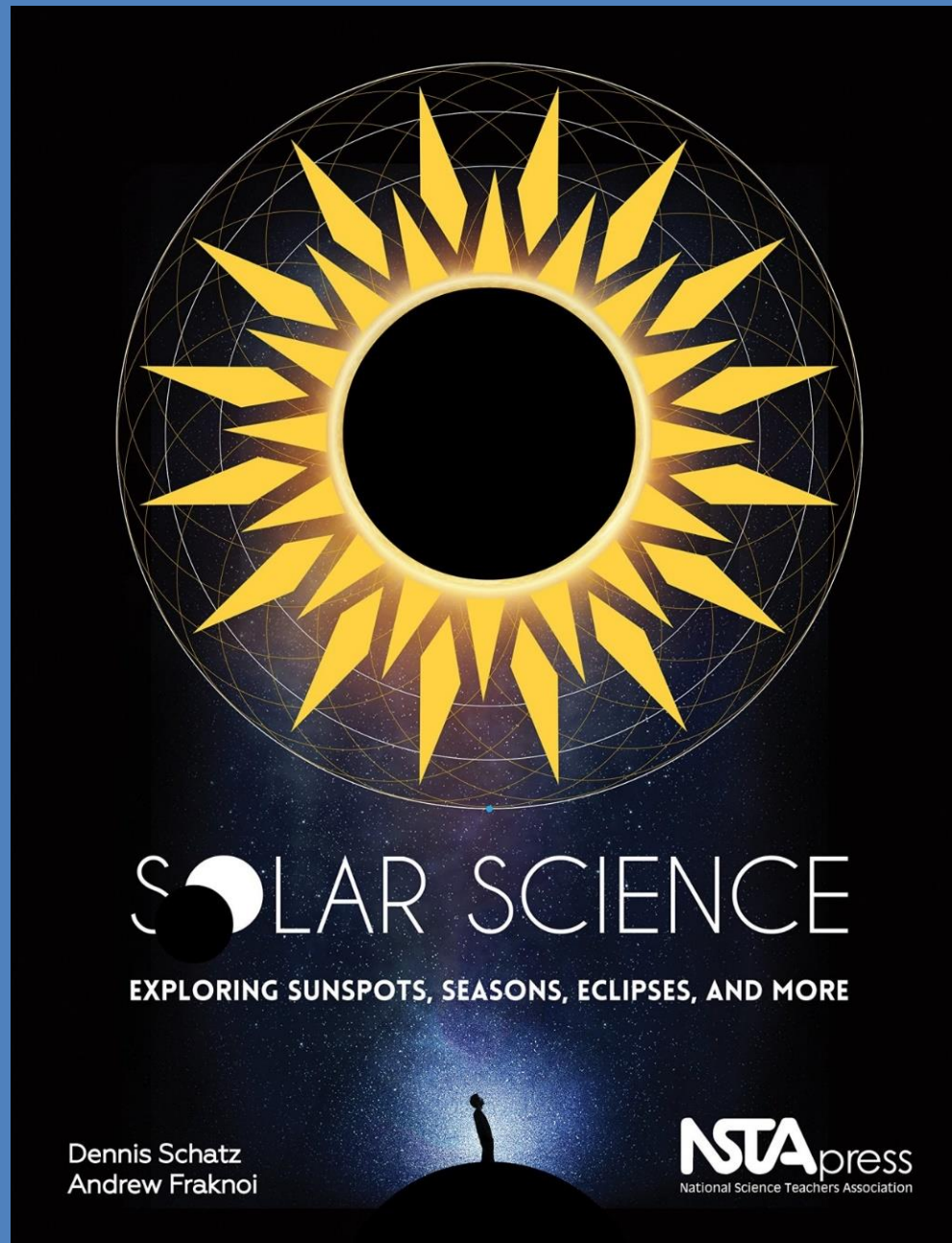
Eclipse Programs for Science Centers and Other Informal Education Settings

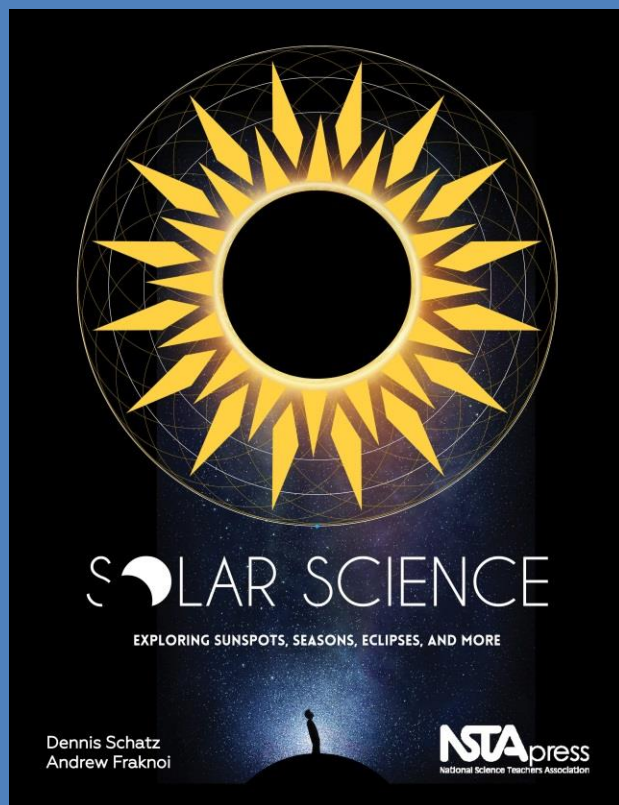




**Science Center Staff Contemplating
Eclipse Outreach Challenges**

Professional Development for Teachers





Eclipse Related Learning Experiences

4.1 – Predicting What the Moon Will Look Like

4.3 – Observing the Moon

4.4 -- Modeling the Moon

4.5 – Modeling Eclipses

CHAPTER 4 271

The Sun, the Moon, and the Earth Together: Phases, Eclipses, and More

Learning Goals of the Chapter	272
Overview of Student Experiences	272
Recommended Teaching Time for Each Experience	274
Connecting With Standards	274
Content Background	276



ENGAGE

4.1. Predicting What the Moon Will Look Like	288
4.2. What Do We Think We Know?	292



EXPLORE

4.3. Observing the Moon	294
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EXPLAIN

4.4. Modeling the Moon	304
4.5. Modeling Eclipses	311



ELABORATE

4.6. How Often Do Eclipses Occur?	313
4.7. Why Do People Spend \$10,000 to See a Total Solar Eclipse?	316
4.8. Does the Moon Rotate?	318
4.9. What Do Eclipses Look Like From a Space Colony on the Moon?	321



EVALUATE

4.10. Lunar Phases Revisited	324
4.11. What Causes Lunar Phases and Eclipses?	327

Video Connections	Math Connections	Literacy Connections	Cross-Curricular Connections	Resources for Teachers
331	331	332	332	334

Image Credits	337
Index	341

August 2017

Calendar

pedia

Your source for calendars

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2

© www.calendarpedia.com

Data provided as is without warranty

Professional Development Needs to Occur This School Year

Eclipse Programming Events In the Months Leading up to the Eclipse





**Programming in the weeks and months
leading up to the eclipse is
MORE IMPORTANT
than what you do on the day of the eclipse.**

Eclipse Display Area or Bulletin Board



Eclipse Flyer with Bulletin Board




HOW TO LOOK AT THE SUN AND NOT GO BLIND

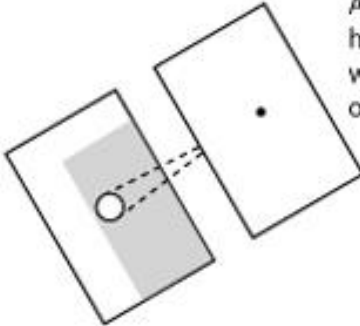
DO NOT look directly at the sun. Unfiltered sunlight will damage your eyes and could cause permanent blindness. Sunglasses will not provide sufficient protection. **ONLY** look at the sun through an approved solar filter. Even safer is to observe indirectly by projecting the sun's image with a pinhole or binoculars.

SAFE SOLAR VIEWING

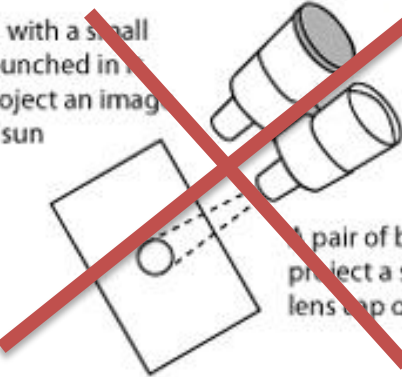
- "Eclipse" glasses or welder's goggles rated 14 or higher
- Specially designed solar telescopes or solar binoculars
- Telescopes, cameras and binoculars **WITH** approved solar filters
- Pinhole projector




"Eclipse" glasses



A card with a small hole punched in it will project an image of the sun



A pair of binoculars will also project a solar image. Leave the lens cap on the unused side.



SOURCES: NASA, U.S. NATIONAL PARK SERVICE

KARL TATE / © SPACE.com

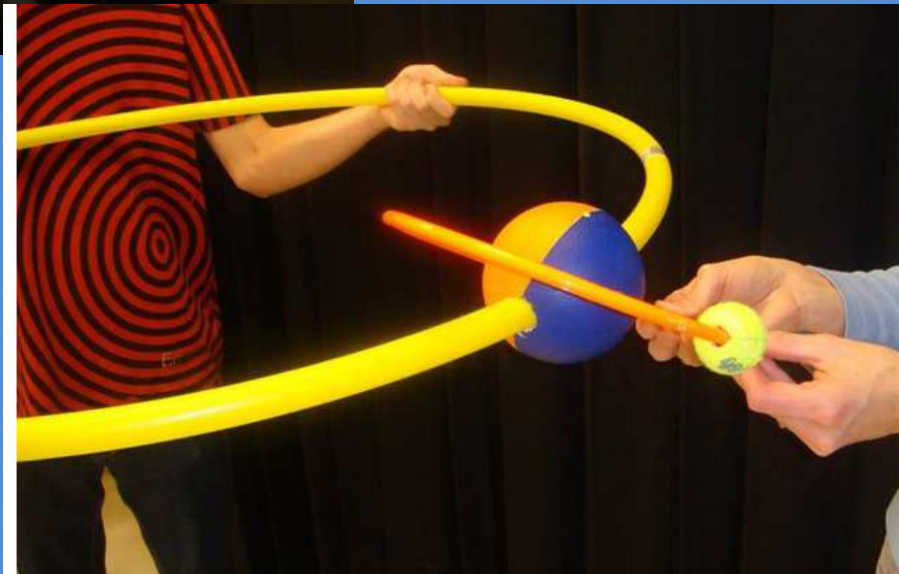
Big Dome Planetarium Show



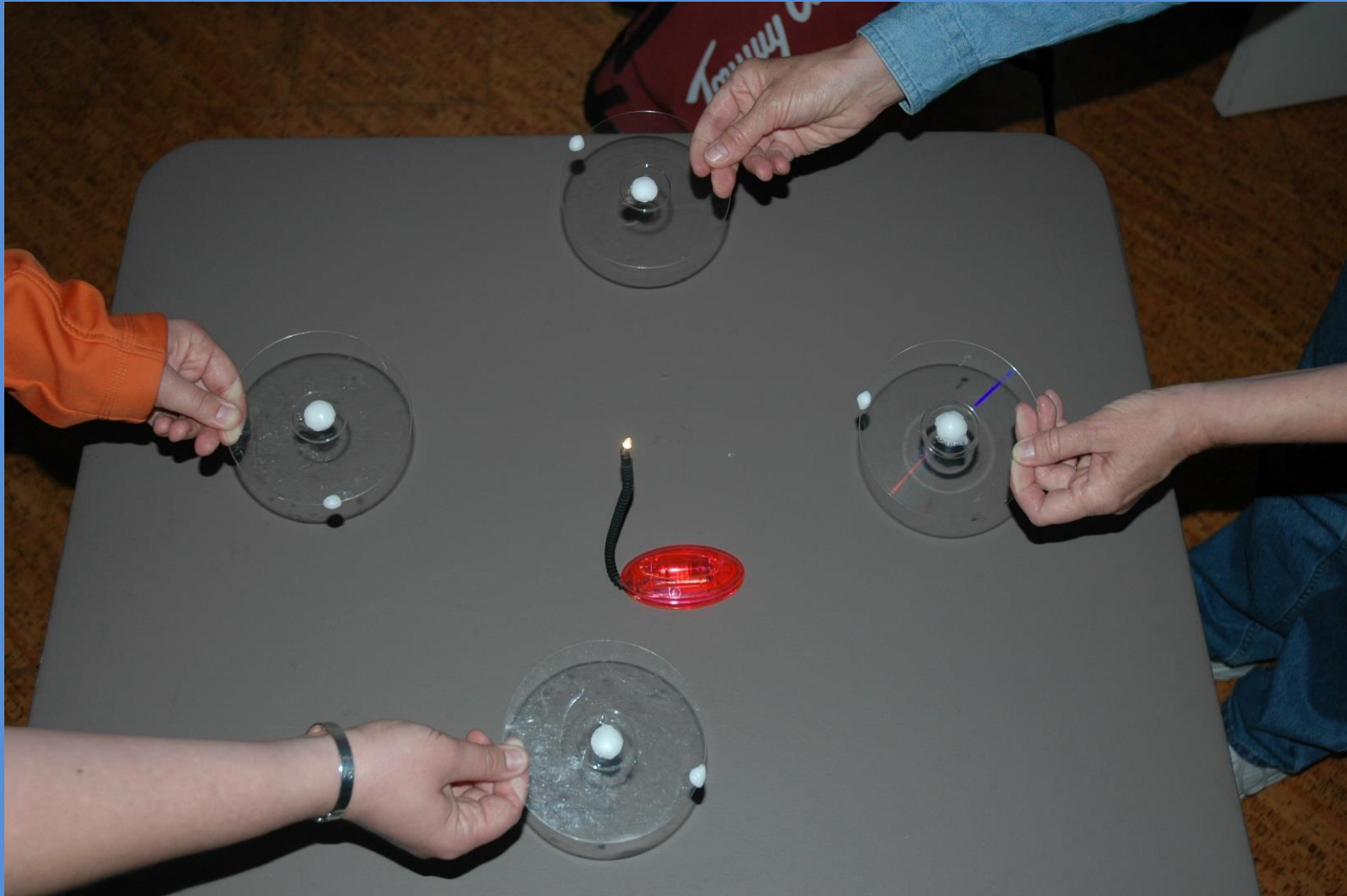
Inflatable Dome Planetarium Show



Eclipse Demonstration for Large Groups



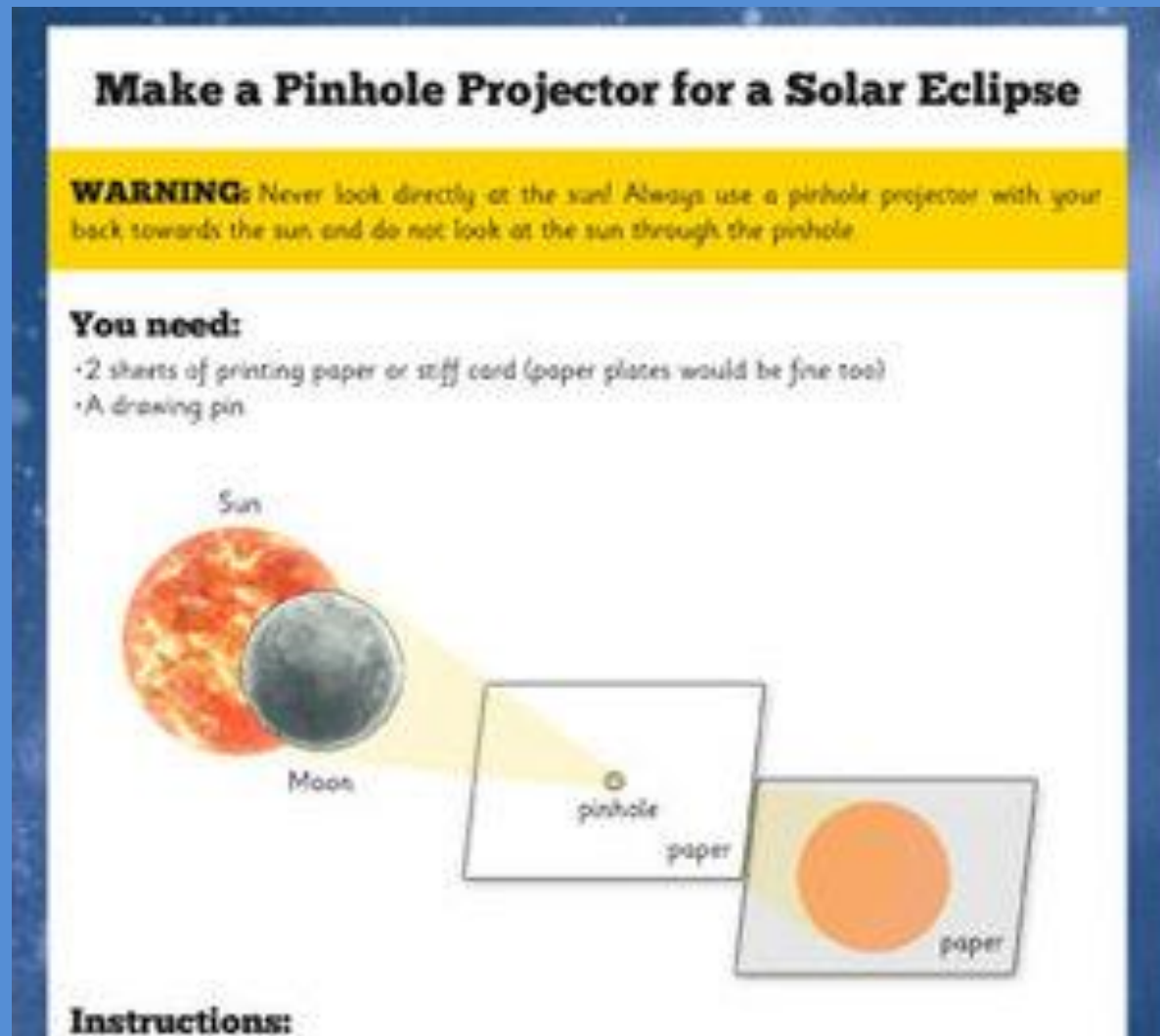
Eclipse Workshops for Kids on Weekends, During Camp-Ins or Summer Camps



Ongoing Pinhole Projector Construction In Maker Space or Craft Area



Distribute Pinhole Projector Cards



Pinhole Projectors Come in Many Forms



Sales of Certified Eclipse Observing Glasses in the Gift Shop



Sun Party Events



Evening or Weekend Eclipse Talks



Presentations at Service Clubs



Events on the Day of the Eclipse

- Eclipse Viewing Training Just Before the Eclipse Begins
- Hands-on Activities While Waiting for Maximum Coverage of the Sun
- Eclipse Party During the Time of the Eclipse

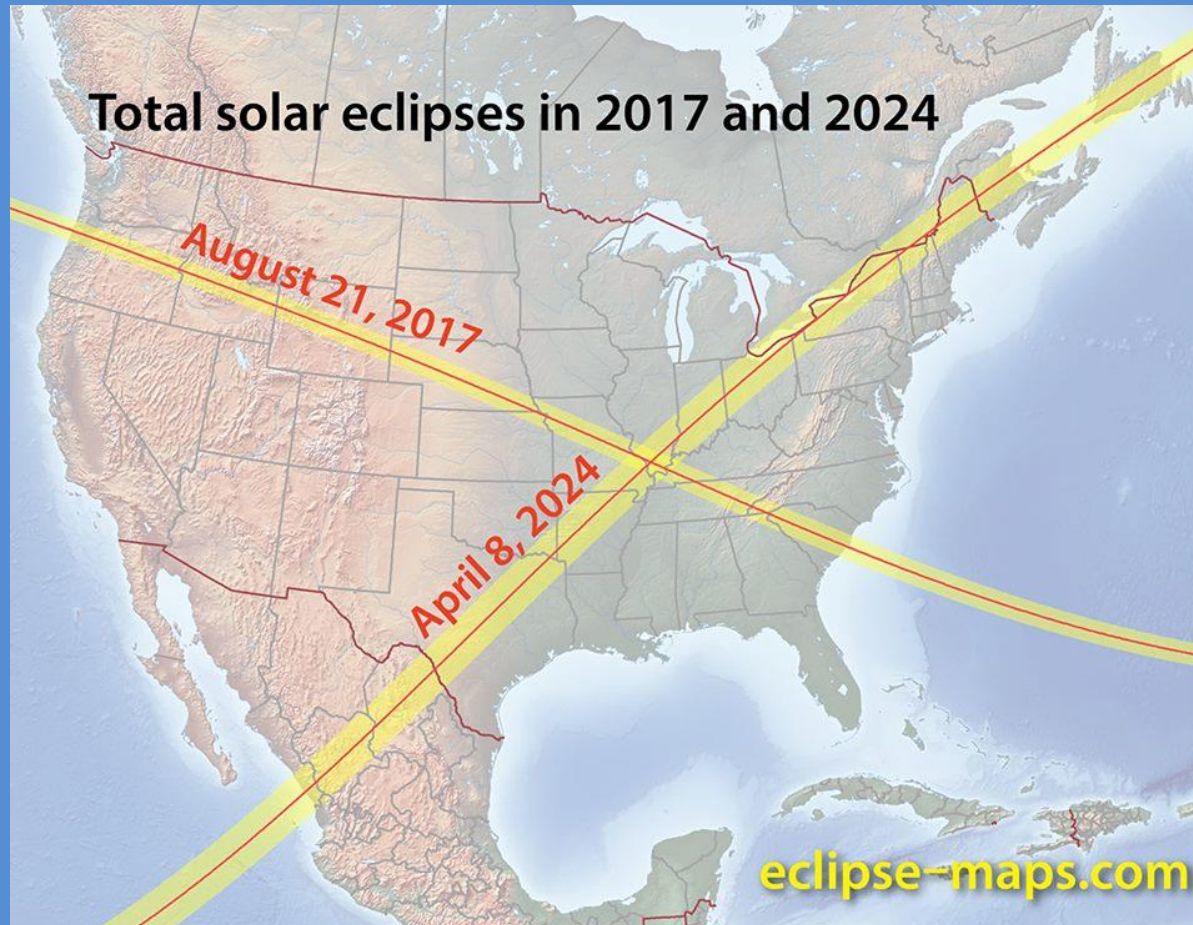


What to Do if it's Cloudy on Eclipse Day



- The partial eclipse lasts over two hours, so glimpses of the Sun may be possible as the cloud cover changes
- Hands-on Activities While Waiting for Maximum Coverage of the Sun
- Have a video setup ready to access TV and social media sources following the event

What to Do if it's Cloudy on Eclipse Day



Console them by noting the next eclipse going across the U.S. will be on April 8, 2024.



Possible Partners:

NASA

Libraries

Amateur Astronomy Clubs

Park Rangers

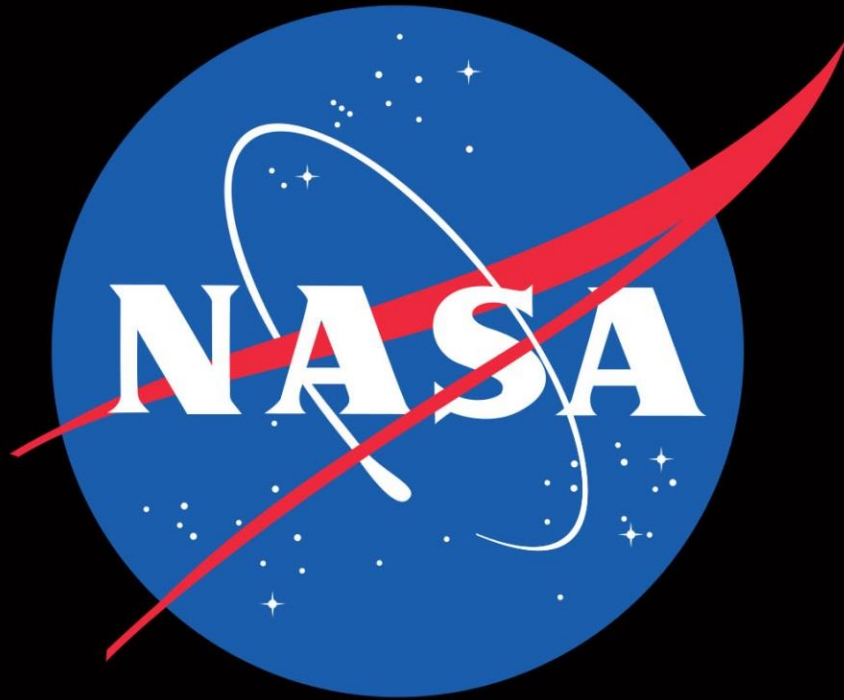
Community Colleges

**University astronomy
departments**

Planetariums

**American Astronomical
Society Ambassadors**

Girl Scouts



eclipse2017.nasa.gov/





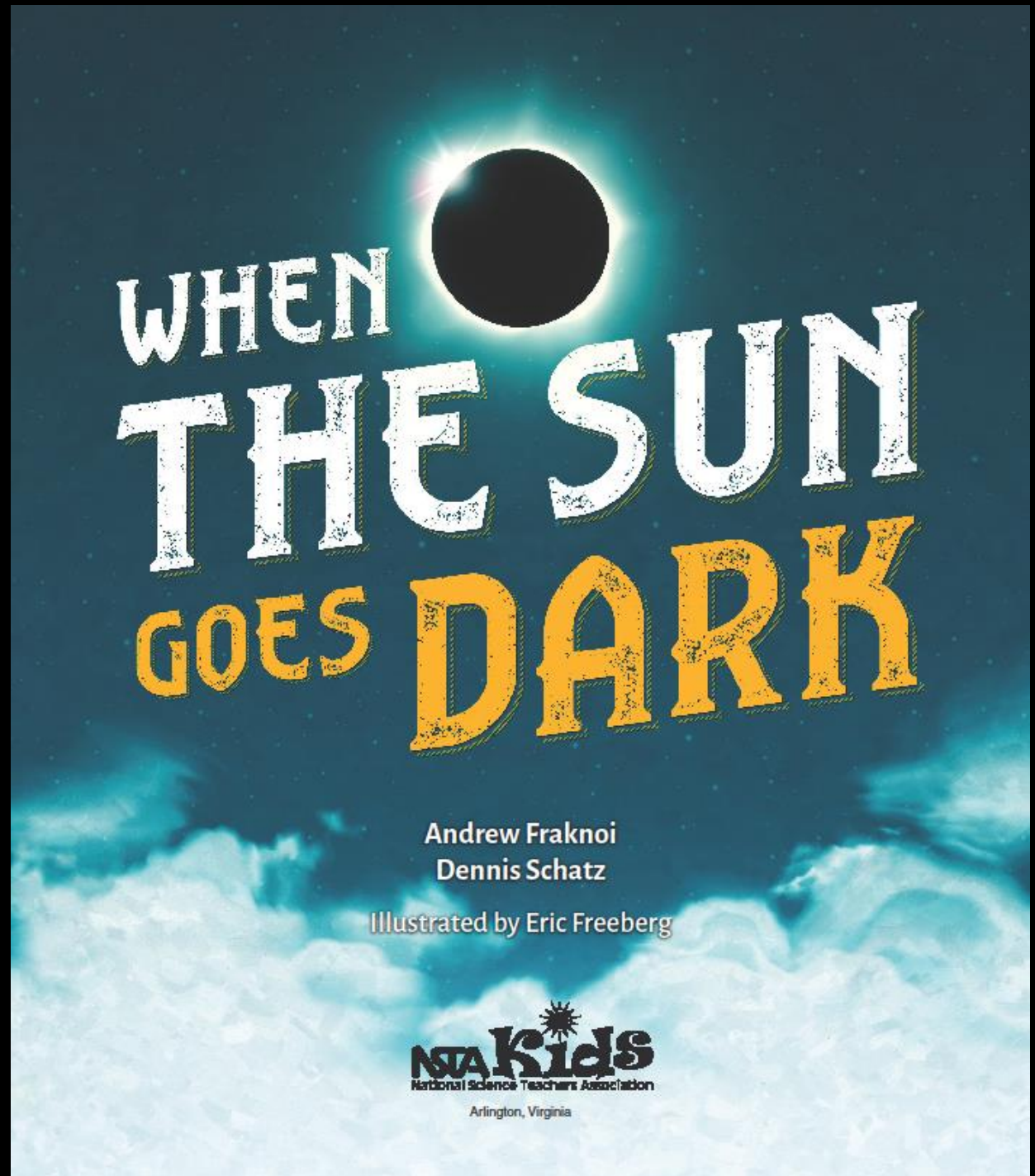
<https://informal.jpl.nasa.gov/museum/>

QUINCY PUBLIC LIBRARY

526

*Secondhand
Prose*
"Slightly Used" Book Store

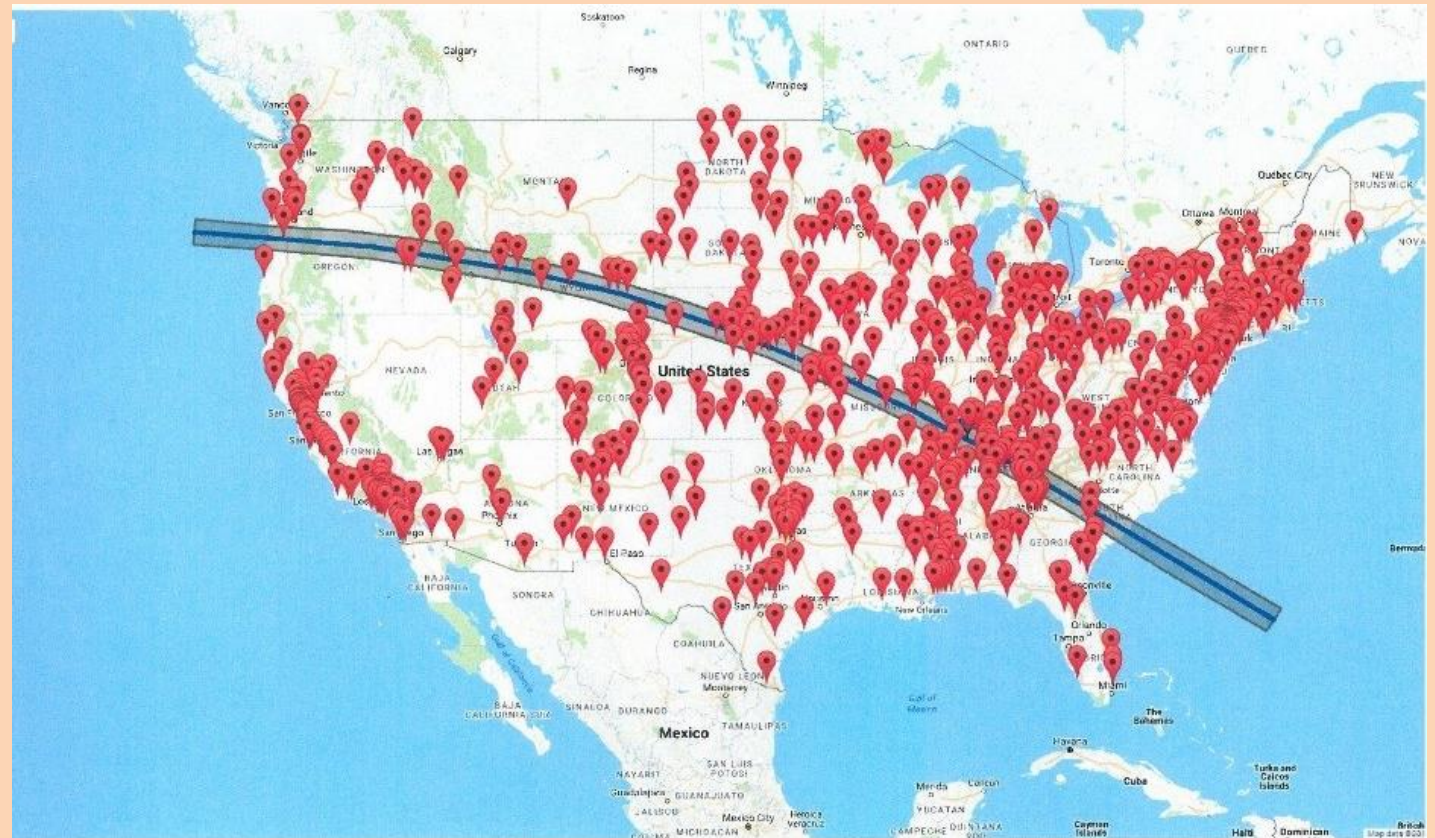
Coming
in
early
2017:





Science-Technology Activities &
Resources For Libraries

**More than 1400
libraries already**



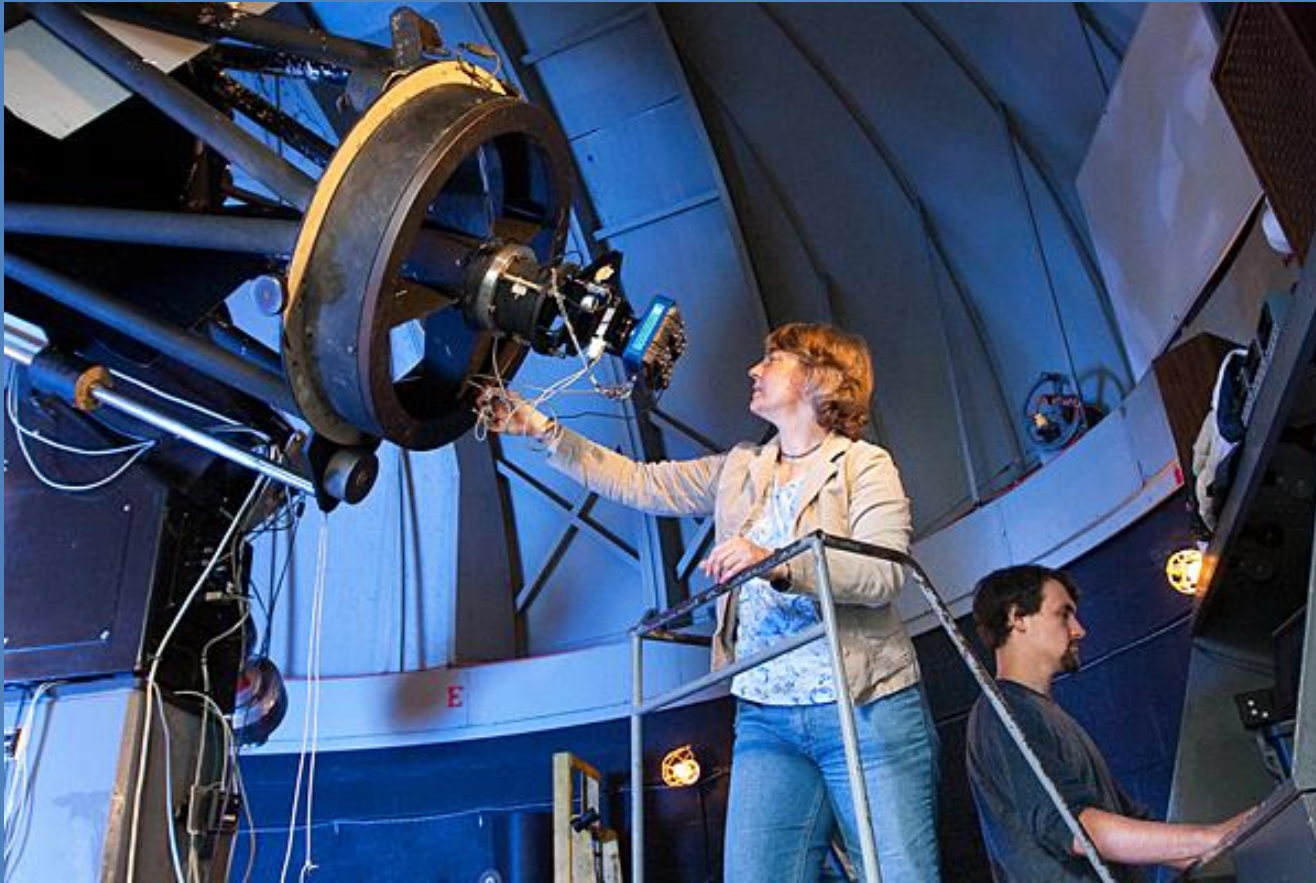
www.starnetlibraries.org



1.26 million glasses
Distributed free
Through public libraries



Plus 2 million glasses from google



**A Local College or University Astronomer
Might Be Able to Help**



<http://www.aacc.nche.edu/pages/ccfinder.aspx>

Community College Finder

Map Search
City Search
Zip Search
Attribute Search



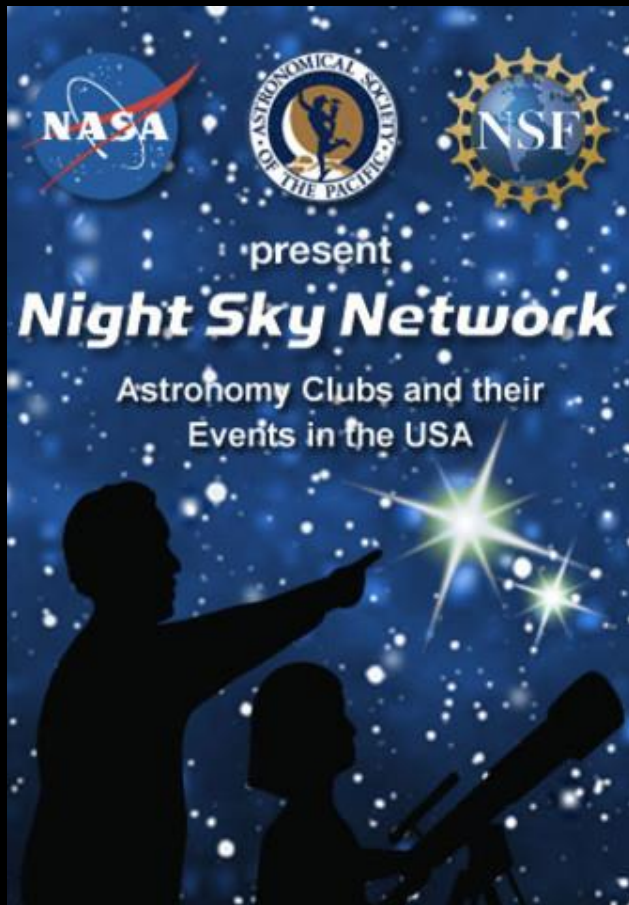
Astronomy Ambassadors



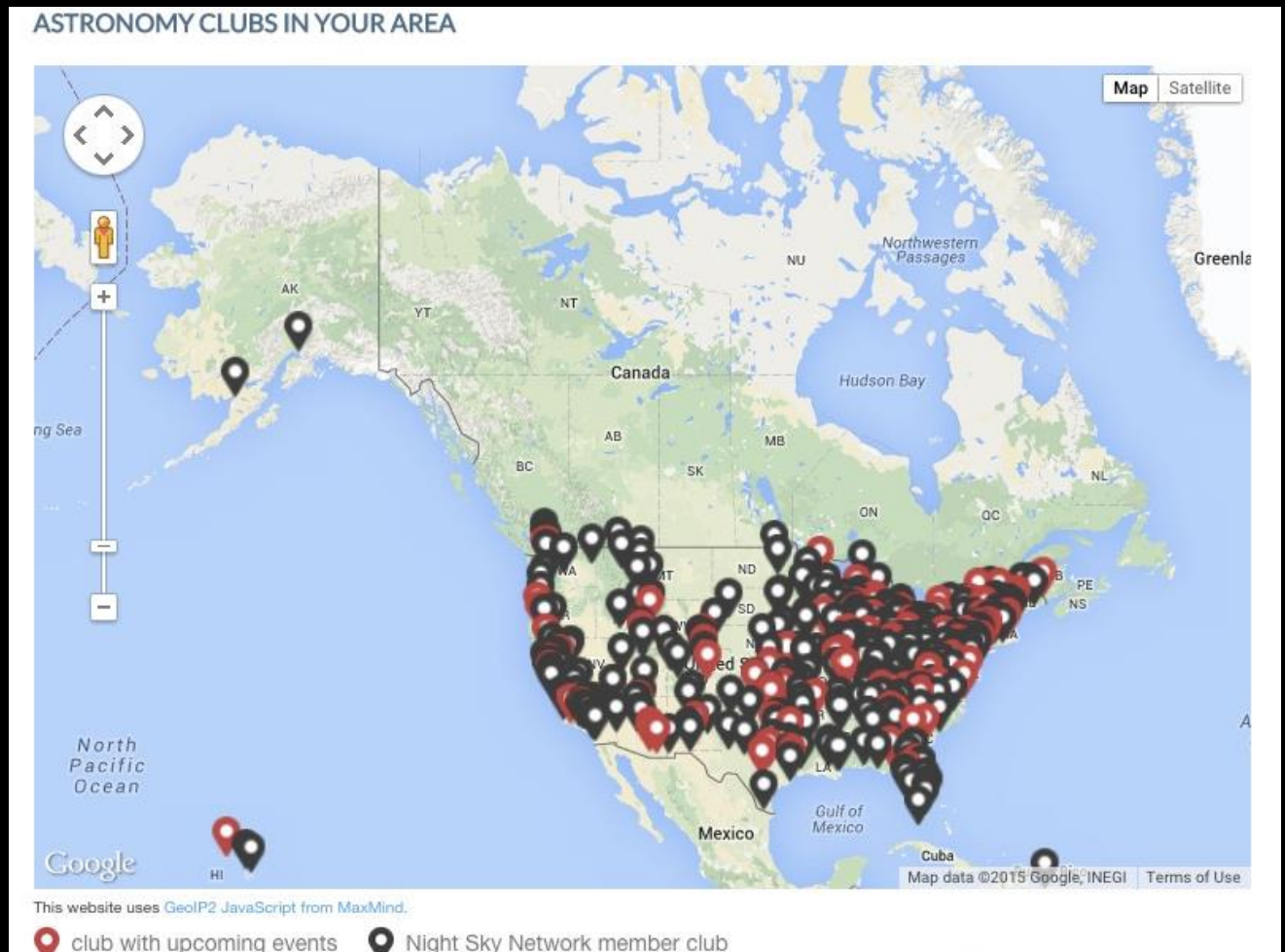
AMERICAN ASTRONOMICAL SOCIETY



<https://aas.org/outreach/roster-aas-astronomy-ambassadors>



Over 400 astronomy clubs around U.S.
doing community & school outreach





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SUPPORTED BY GOOGLE**

SEE: ECLIPSEMEGAMOVIE.ORG

NISE

NATIONAL INFORMAL
STEM EDUCATION

NETWORK



**We wish you clear skies
on August 21!**

QUESTIONS?

