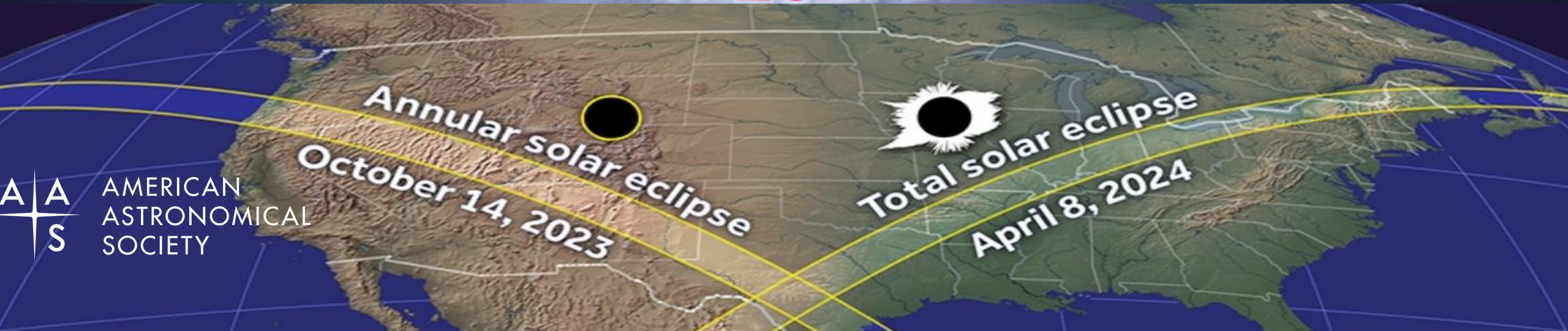


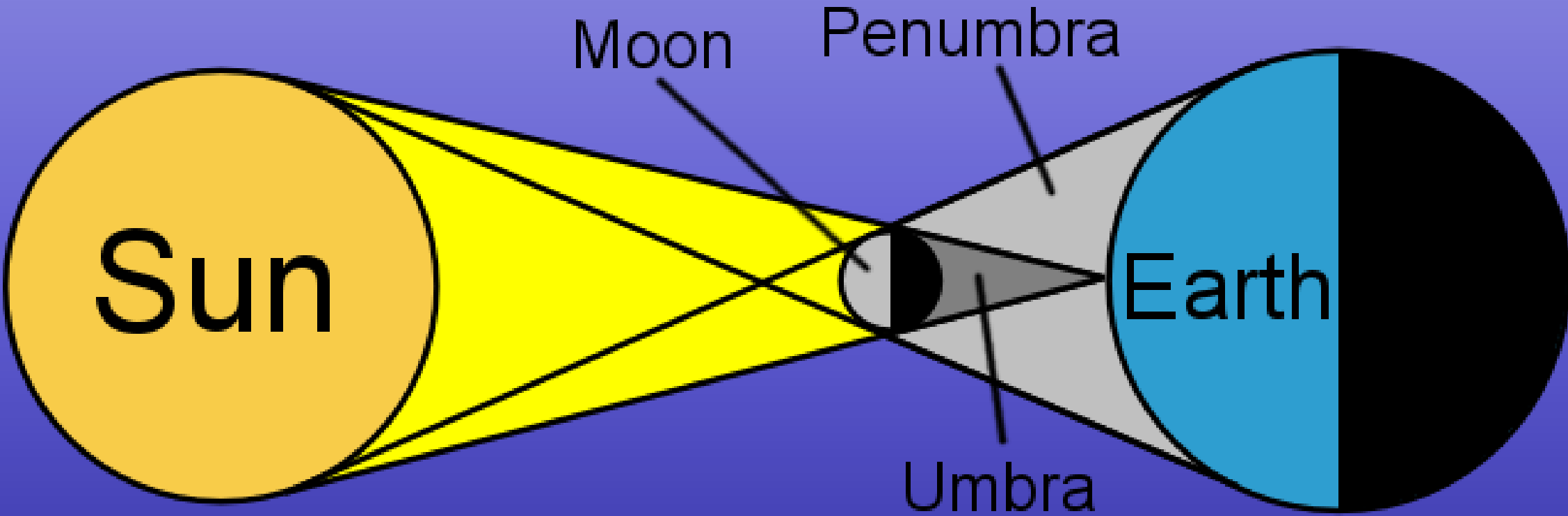
HERE WE GO AGAIN AND AGAIN:



THE GREAT AMERICAN ECLIPSES OF 2023 & 2024



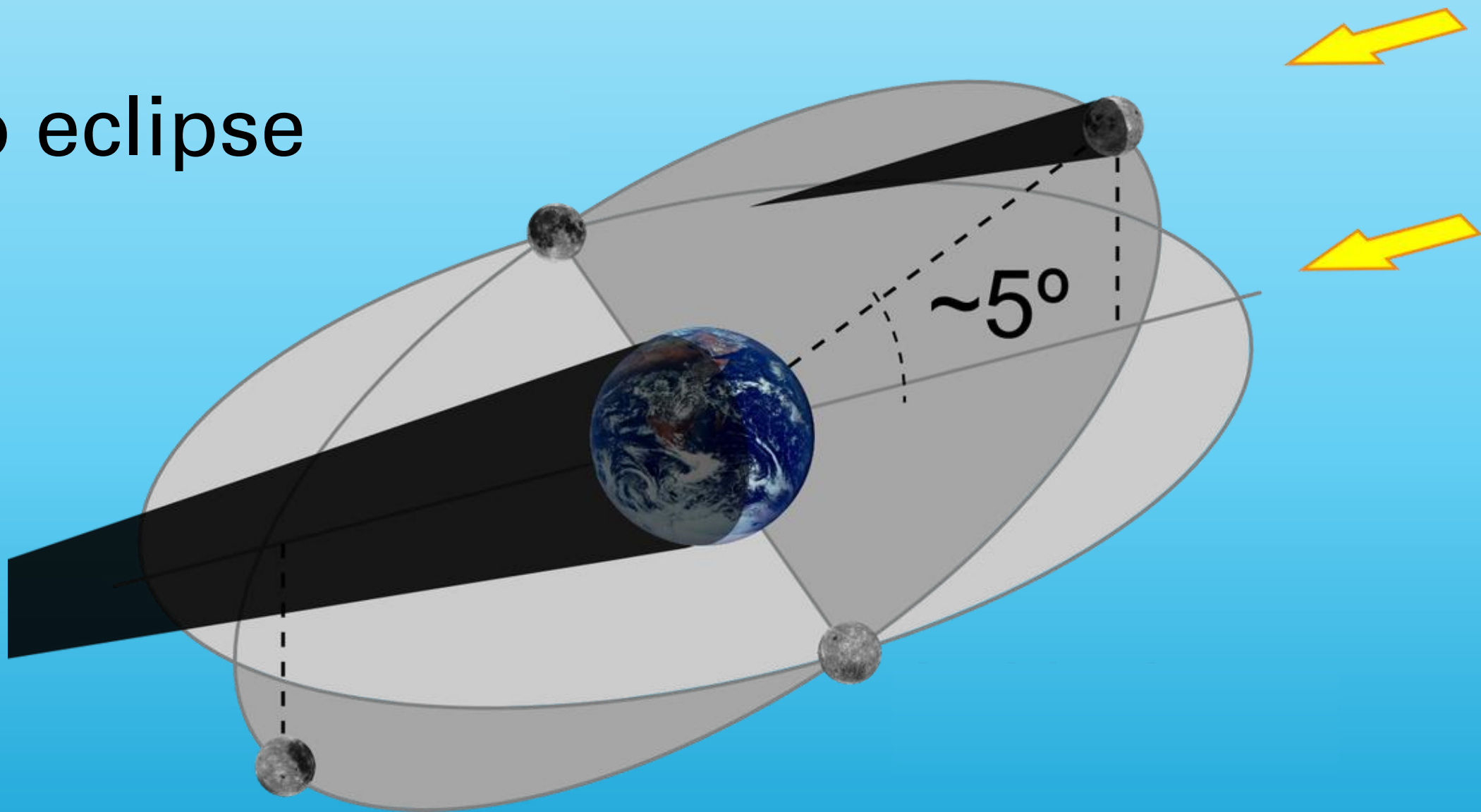
Solar eclipses occur when the Moon gets between the Sun and the Earth



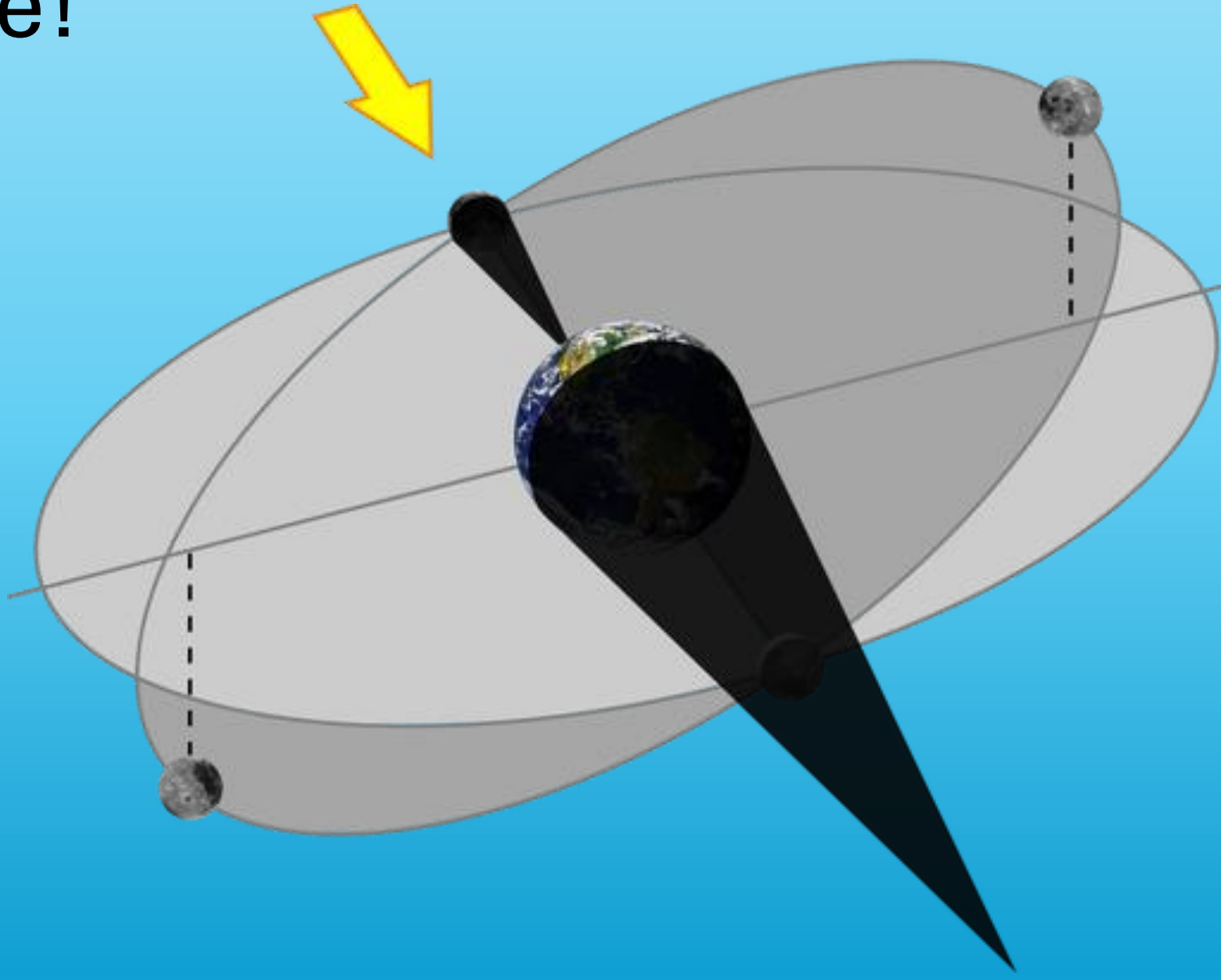
Lunar Phases



No eclipse



Eclipse!





No Solar Eclipse

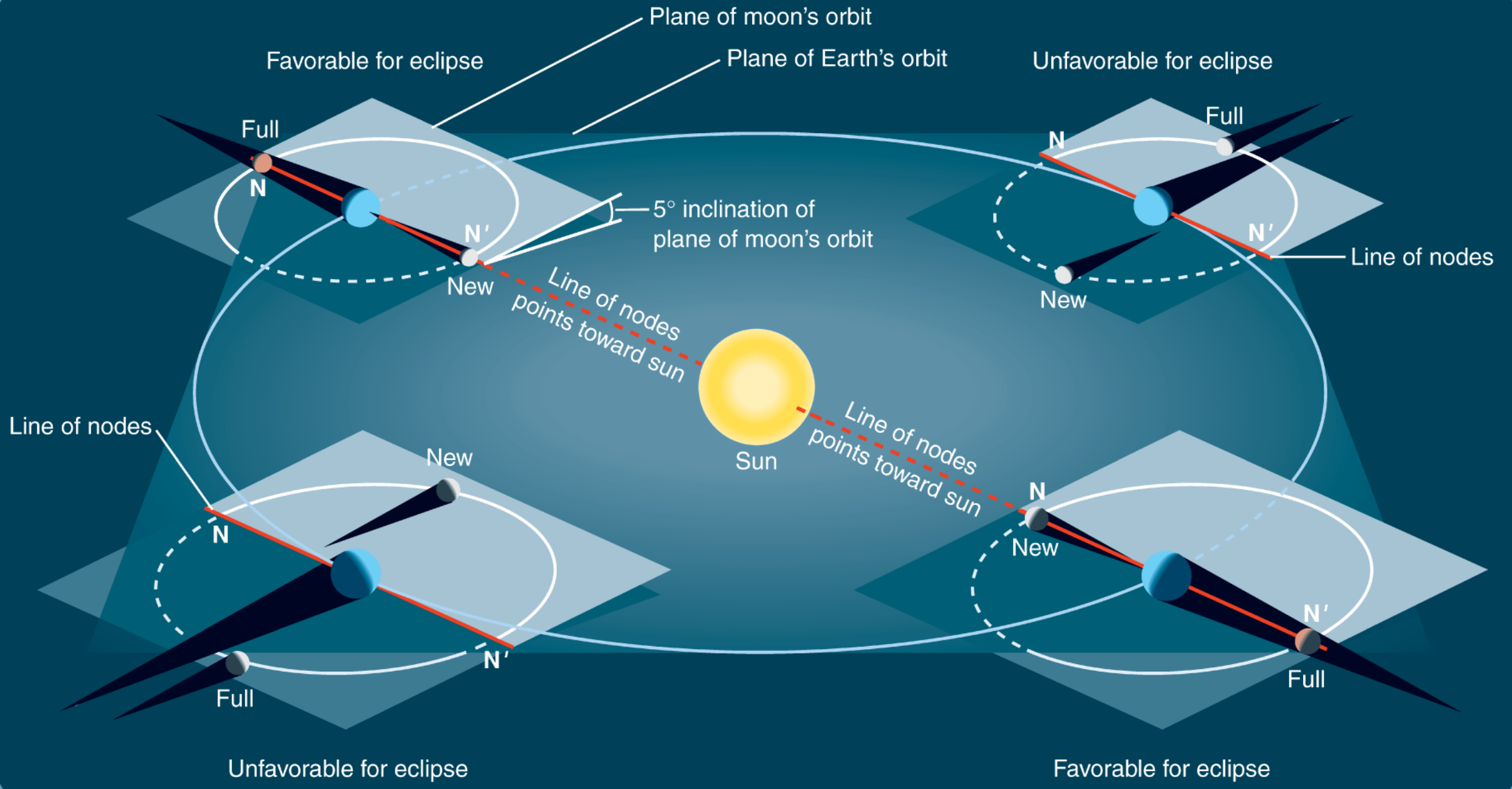
No Lunar Eclipse

Most Months

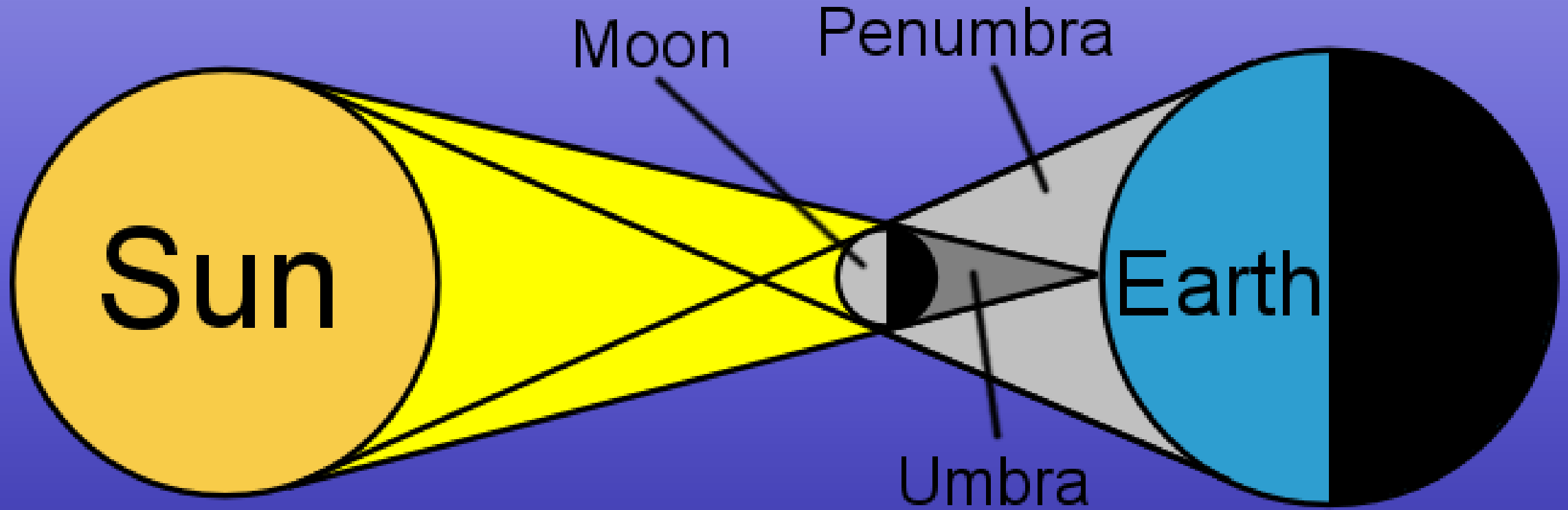


Solar Eclipse

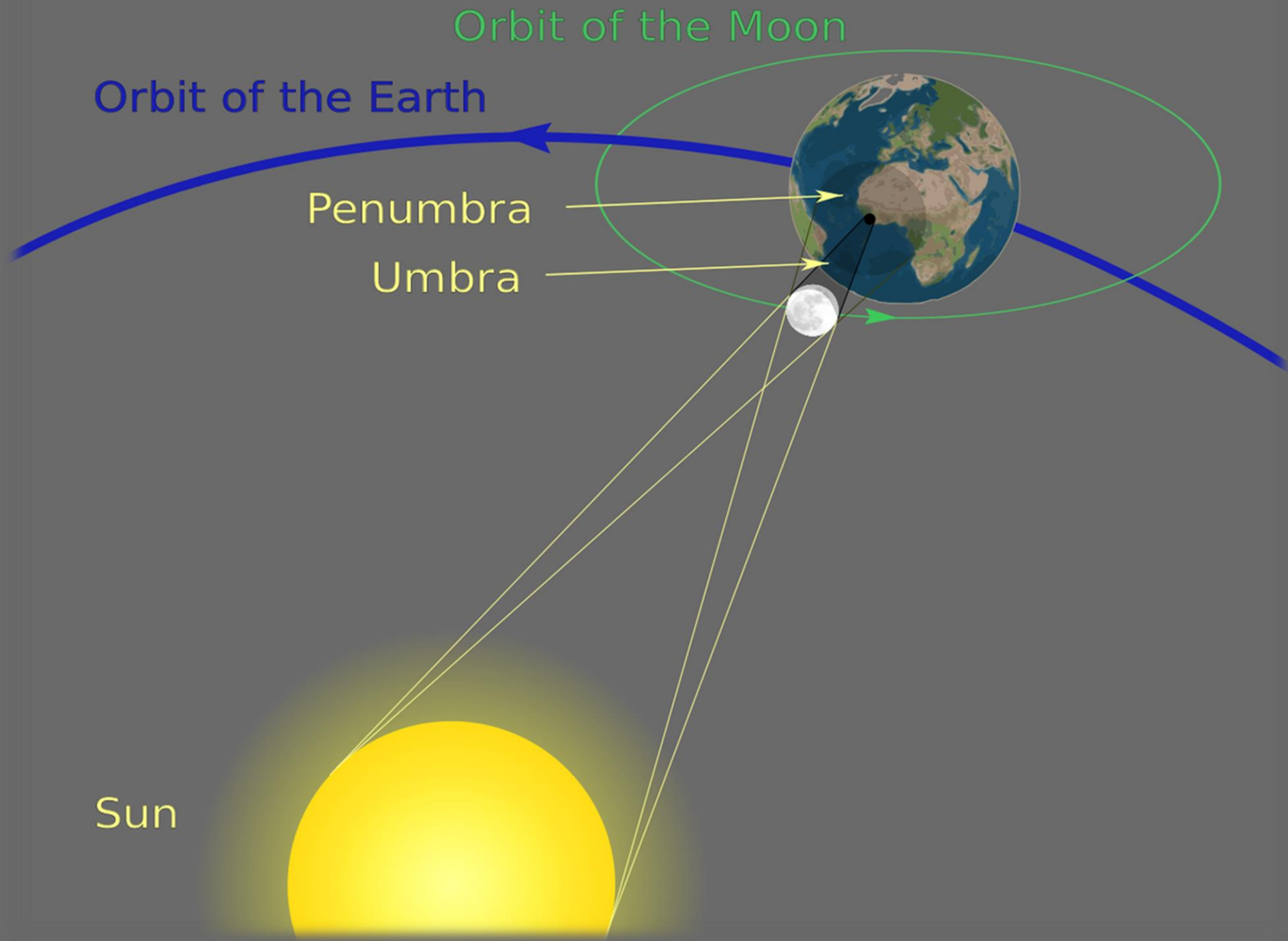
Lunar Eclipse



Solar eclipses occur when the Moon gets between the Sun and the Earth

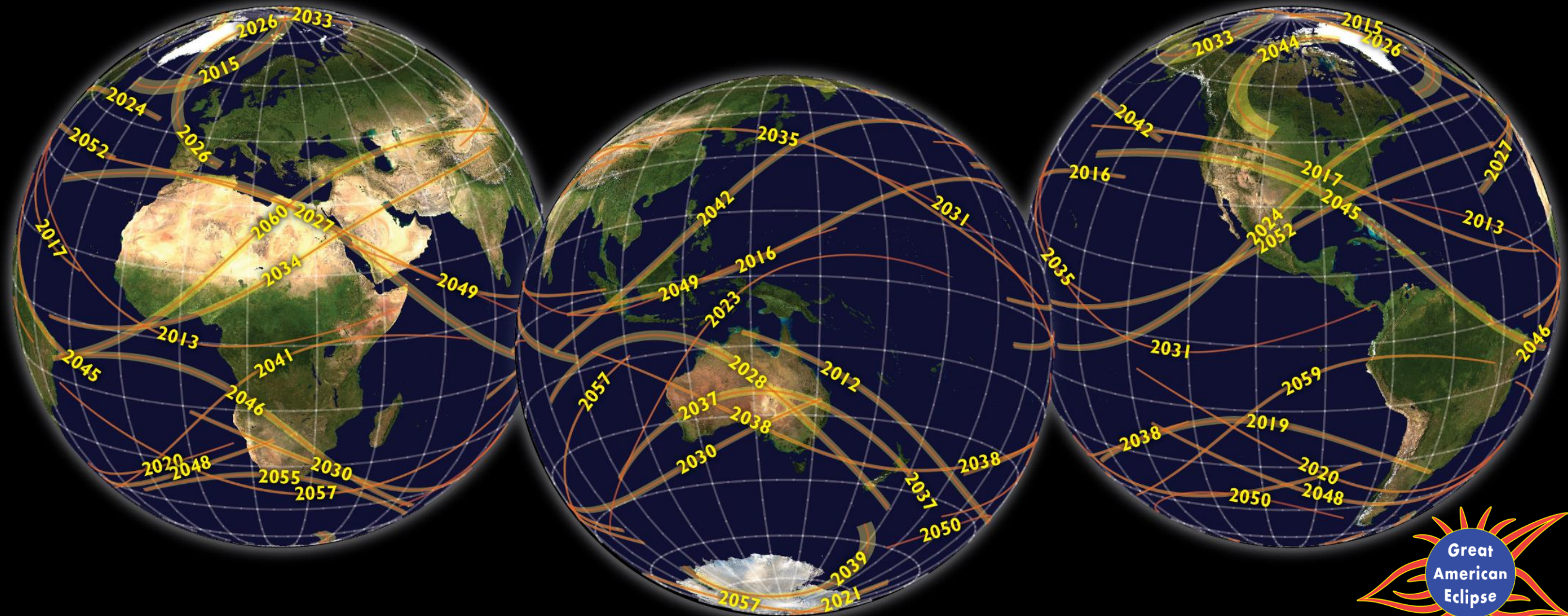


Although the moon orbits the earth ~once per month, an alignment like this only occurs about twice a year

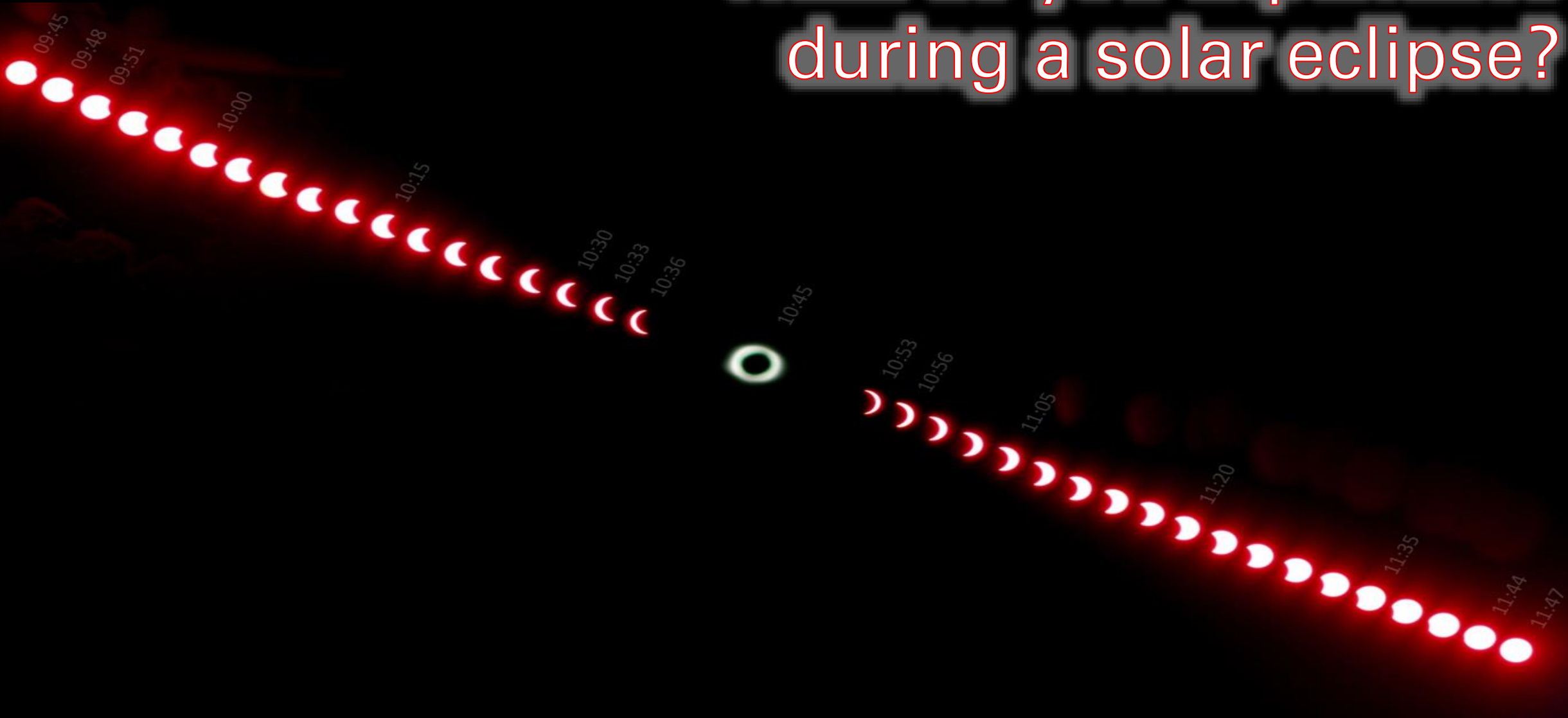



Every total eclipse on the planet in 50 years (2010-2060)

Each total eclipse is seen by one thousandth of the Earth's surface. Most of the planet does not see a total eclipse in 50 years.



What do you experience during a solar eclipse?

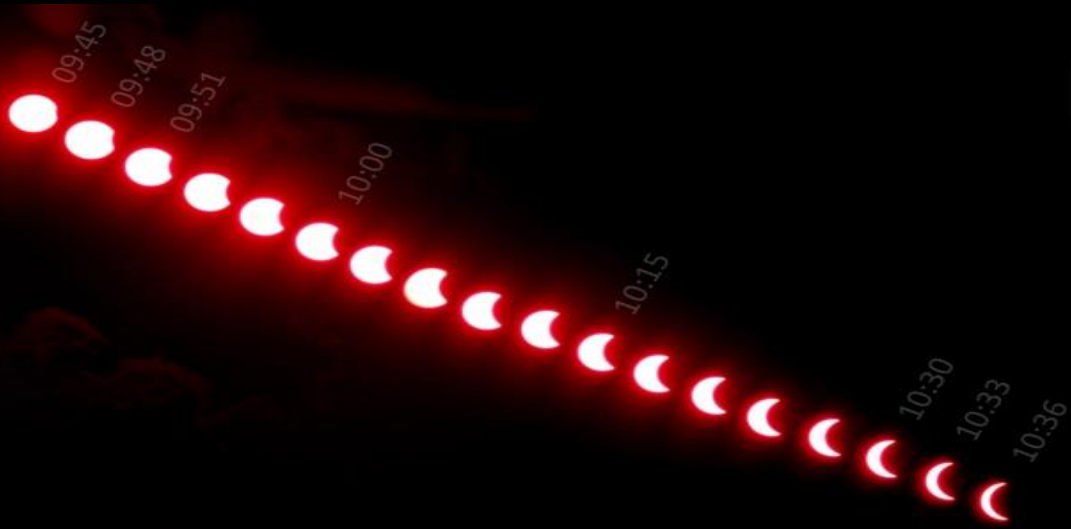


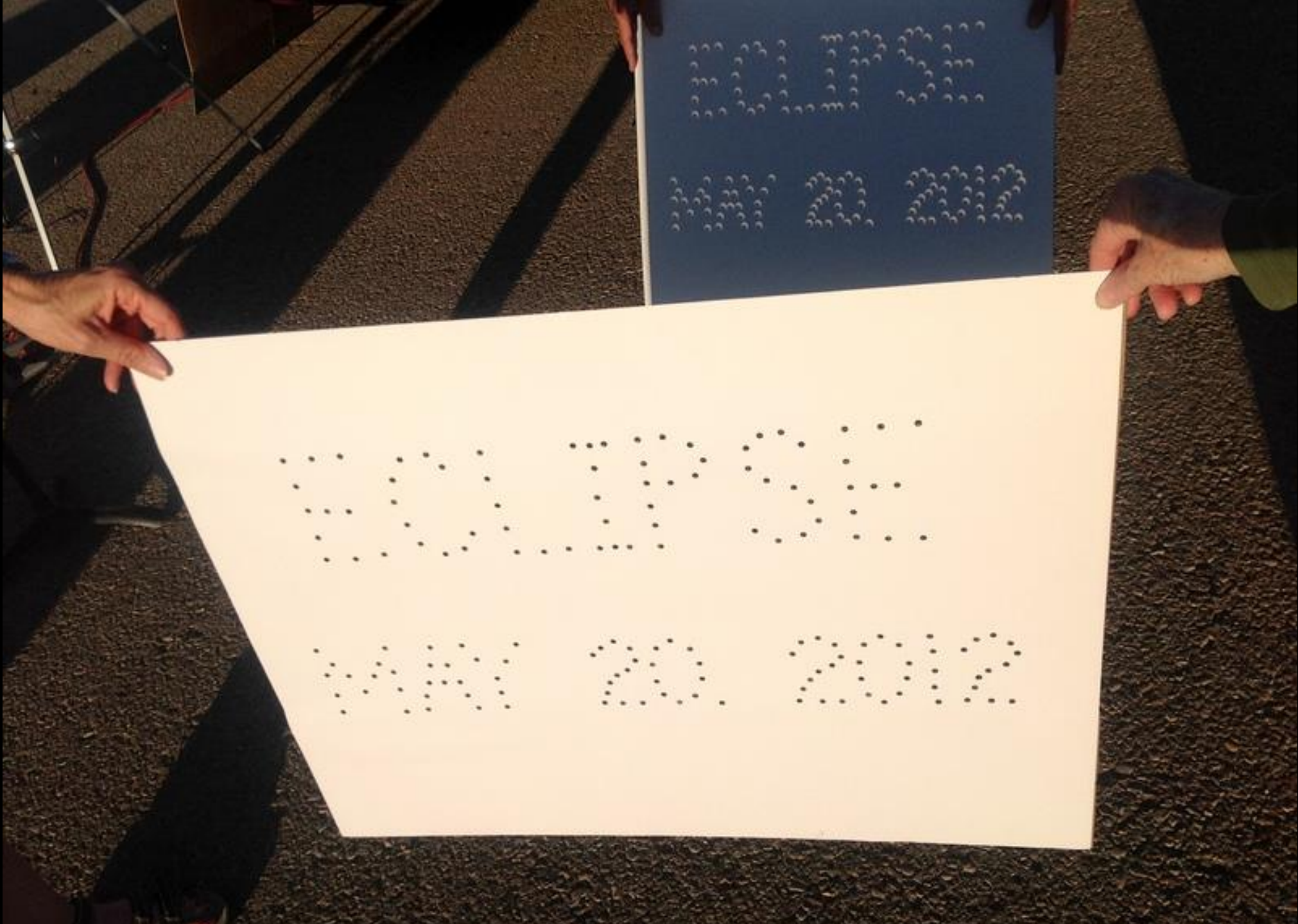


Before and after a total eclipse we see a partial eclipse, as the moon moves between us and the Sun and then out of alignment again



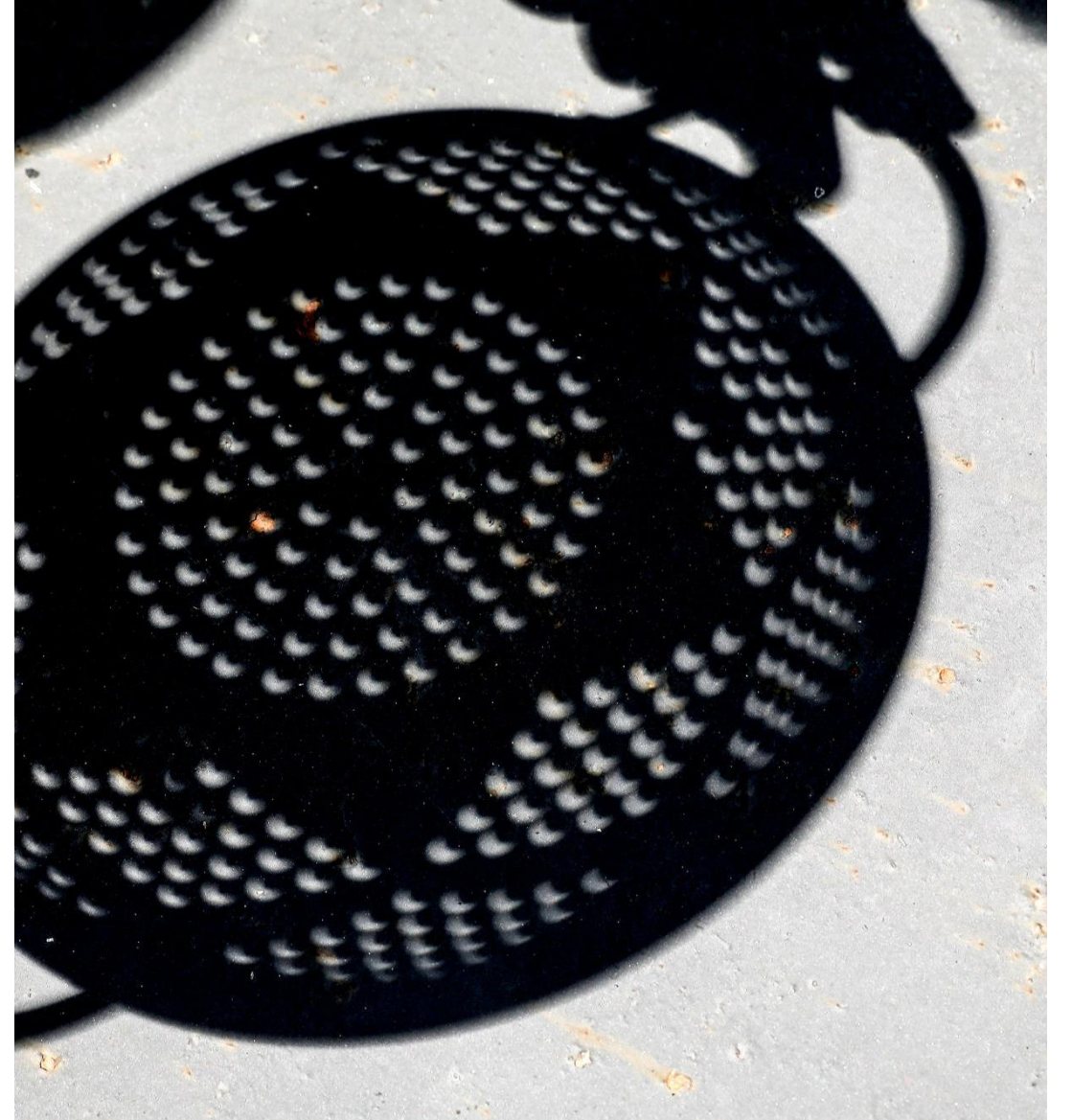
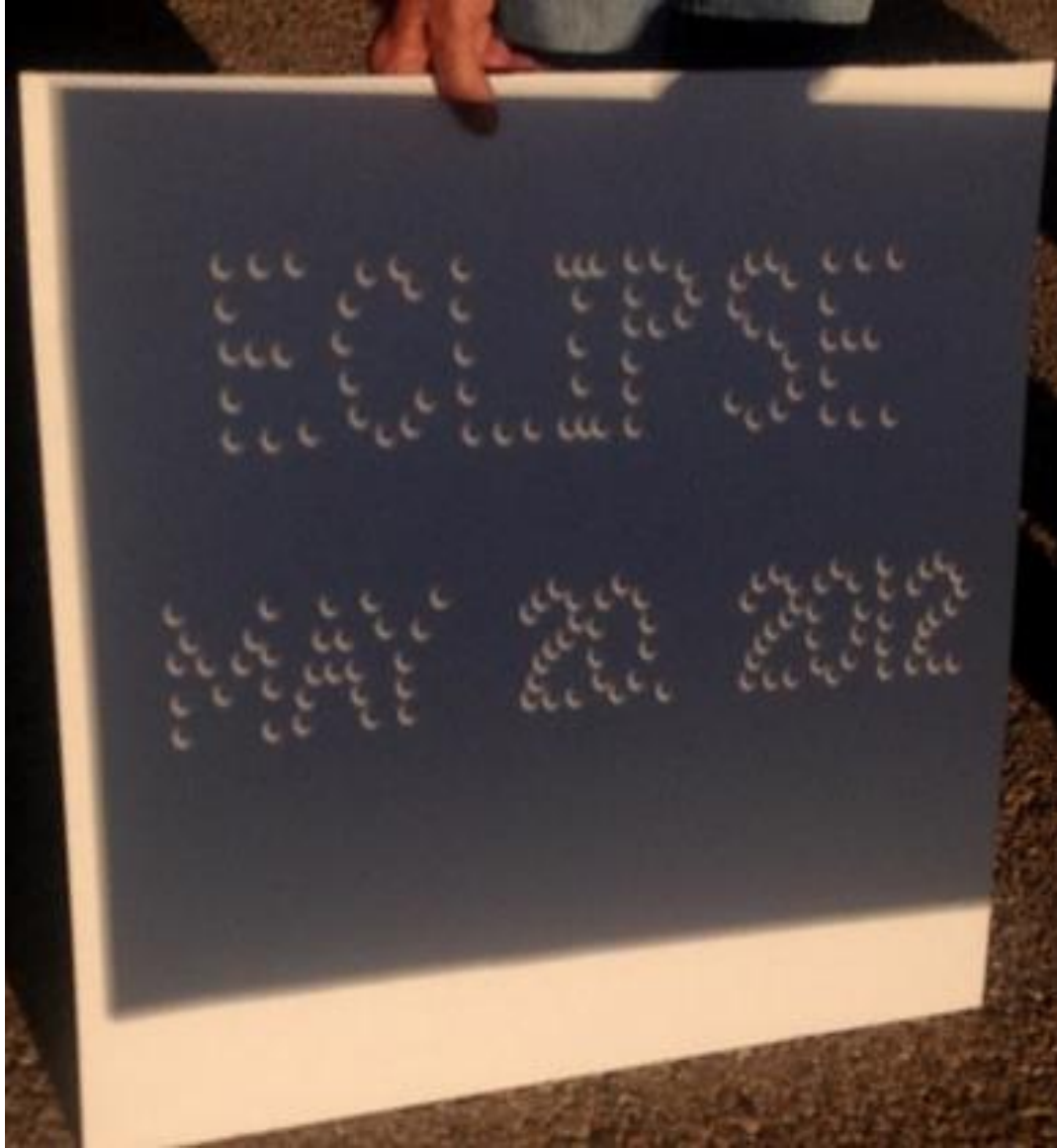
What do you experience during the partial phase?





WORLD
2012

WORLD
2012





Rick Fienberg / TravelQuest International / Wilderness Travel

Life and the eclipse



JANUARY 2019 - VOL 112 - NO1

PRINT ISSN 0013-8746 ONLINE ISSN 1938-2901

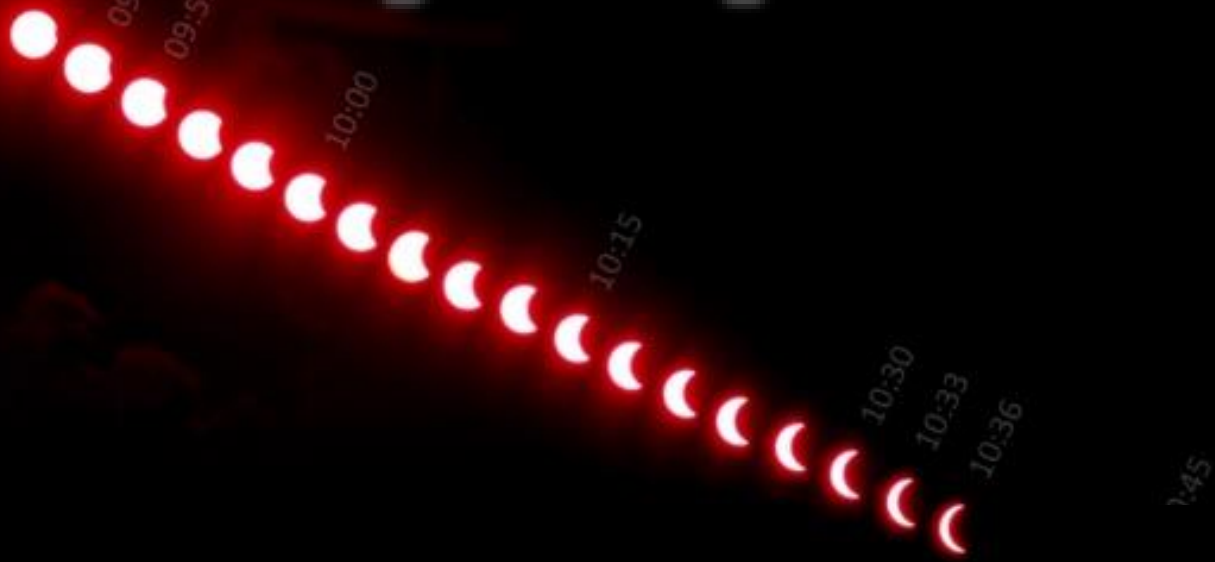
ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA



ACADEMIC.OUP.COM/AESA
INSECTSCIENCE.ORG

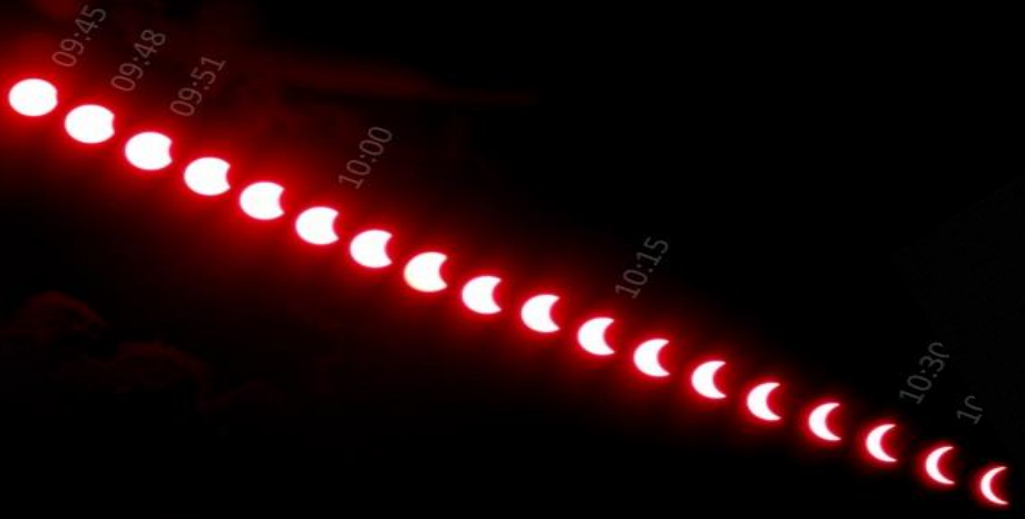
OXFORD
UNIVERSITY PRESS

What do you experience during a solar eclipse?



Baileys Beads





Diamond Ring

What do you experience during a solar eclipse?

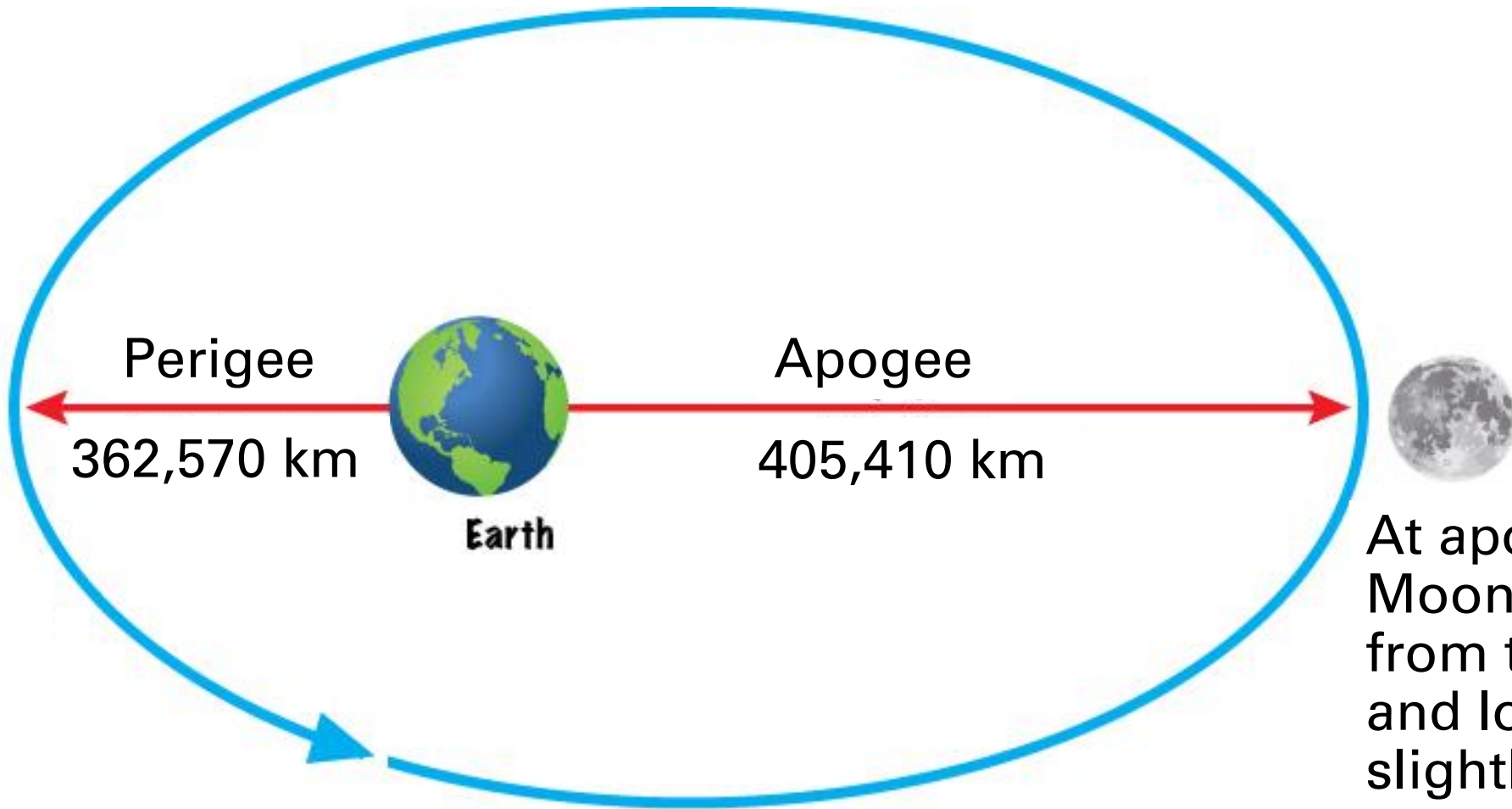
Total Solar Eclipse as seen from Madras, OR, August 21st 2017.



CREDIT: Rick Fienberg
(former AAS Press Officer)

Annular eclipses

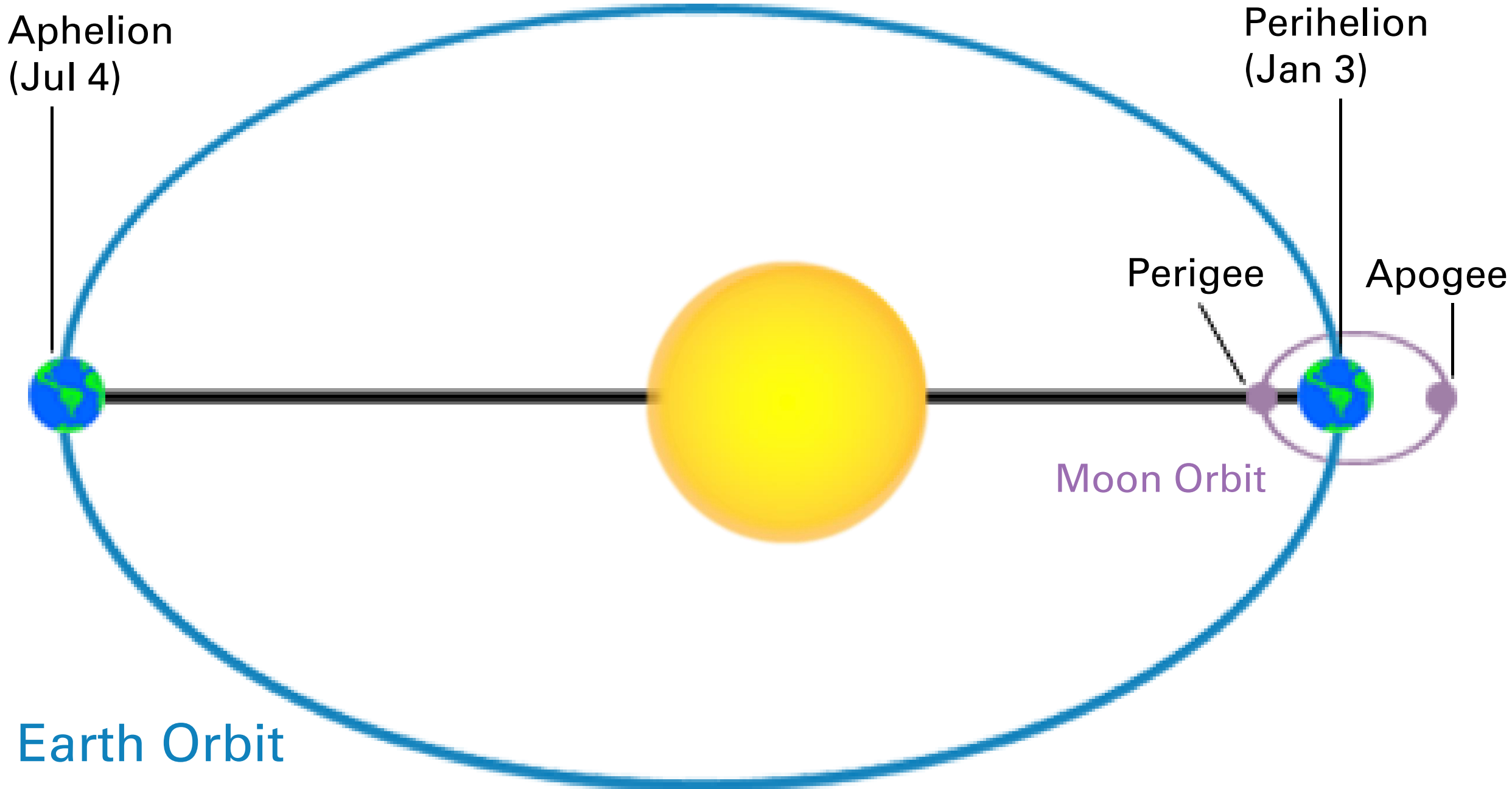




At perigee, the Moon is closer to the Earth and looks slightly larger

At apogee, the Moon is farther from the Earth and looks slightly smaller

Moon's Orbit is elliptical (greatly exaggerated here)



Aphelion
(Jul 4)

Perihelion
(Jan 3)

Perigee

Apogee

Moon Orbit

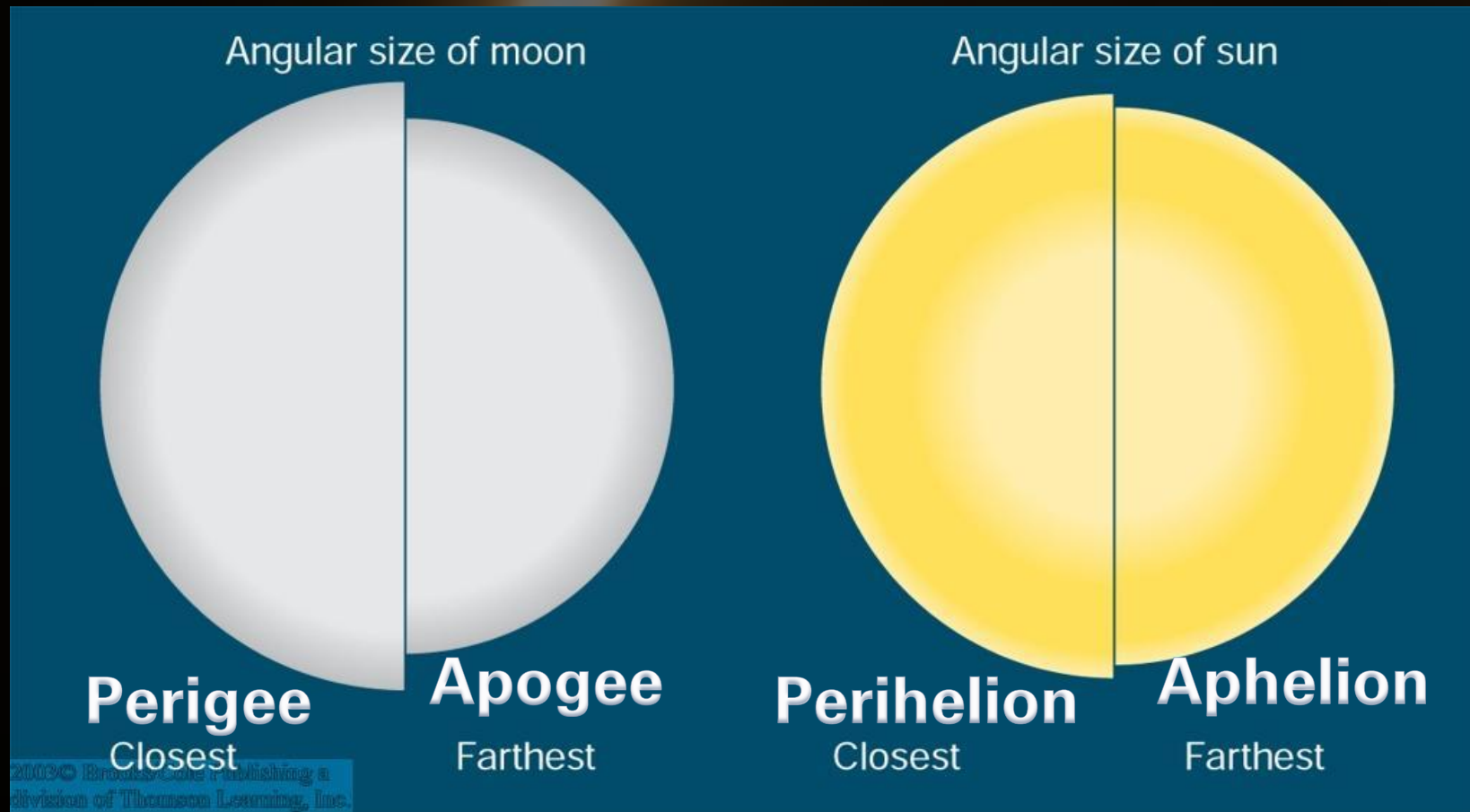
Earth Orbit

Annular Solar Eclipses

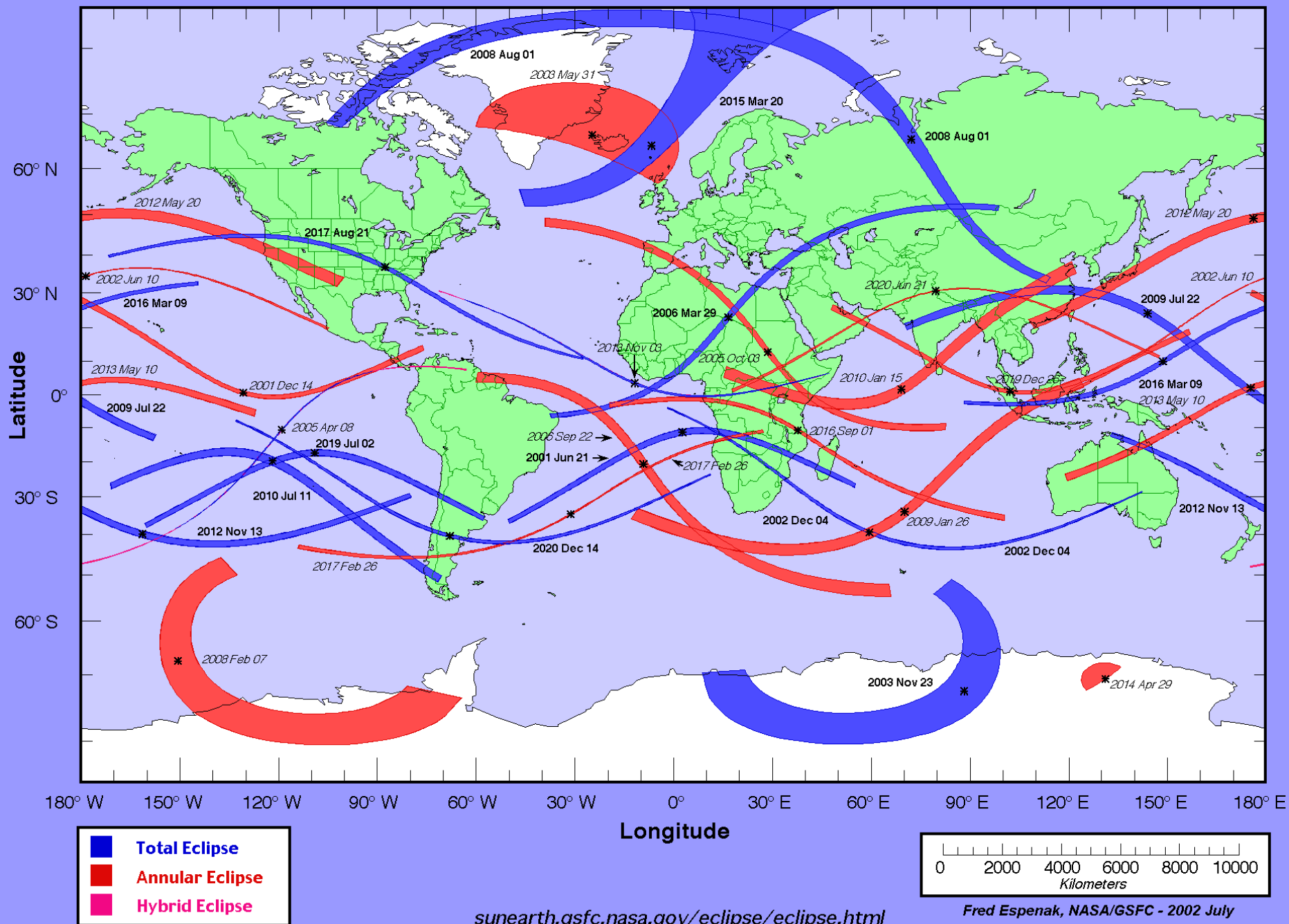
When Earth is near perihelion, and the moon is near apogee, we see an annular solar eclipse.



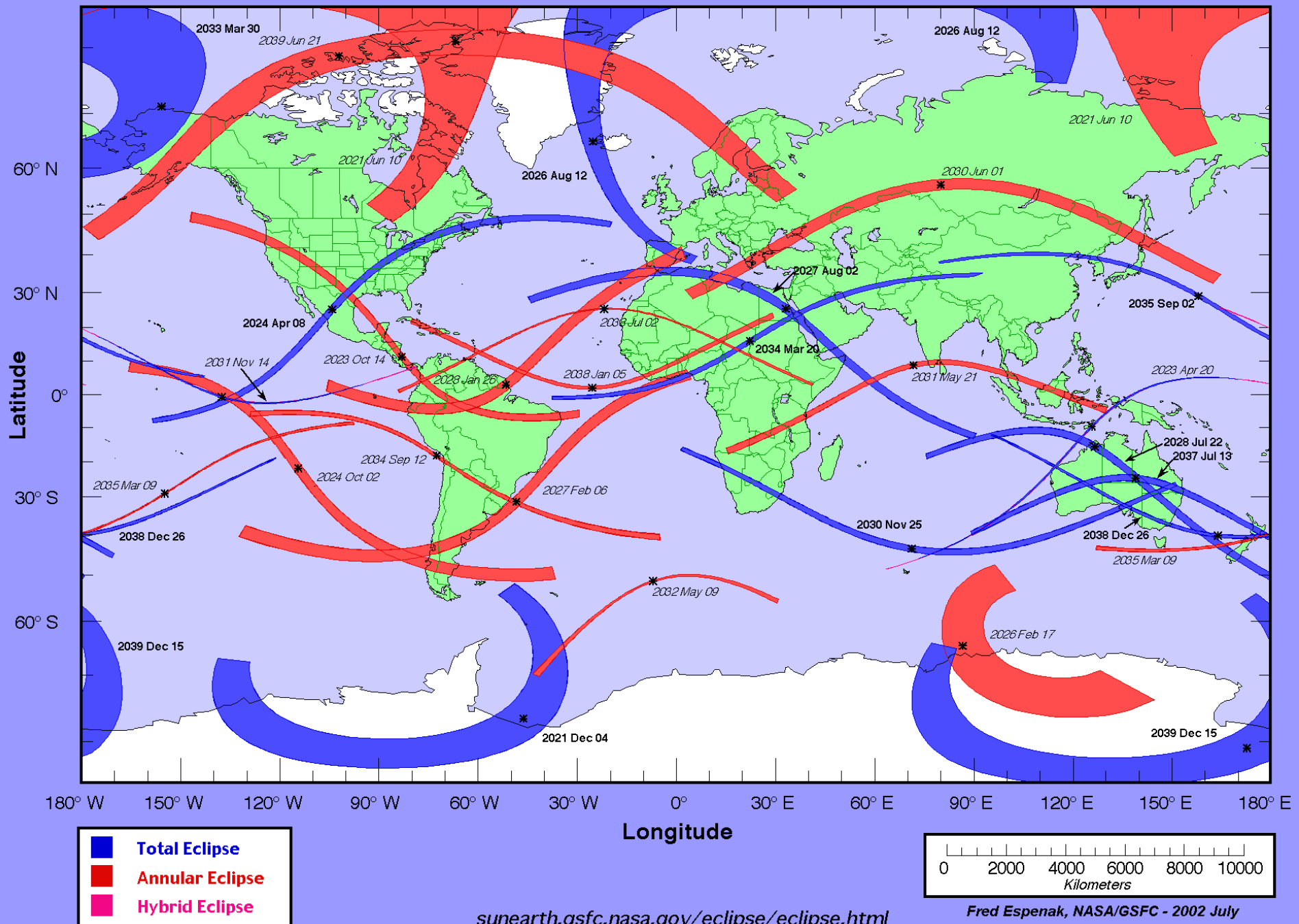
The angular sizes of the moon and the sun vary, depending on their distance from Earth.



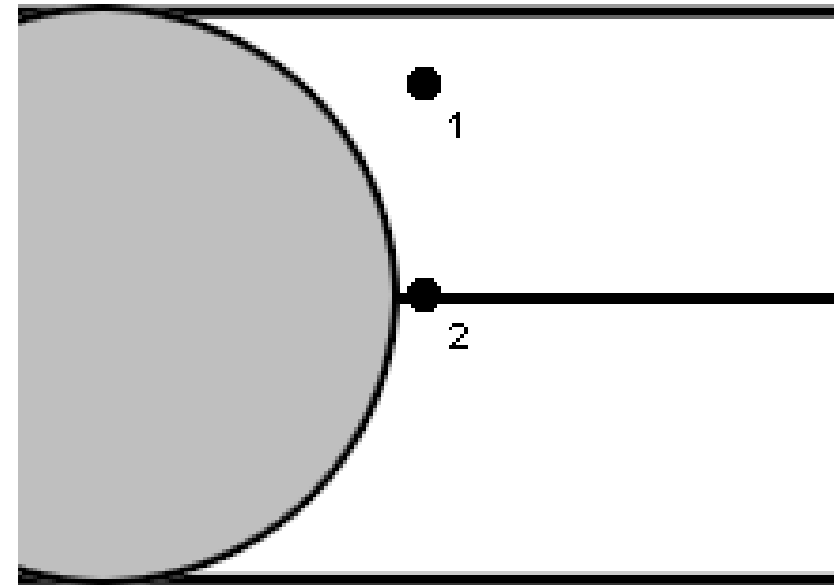
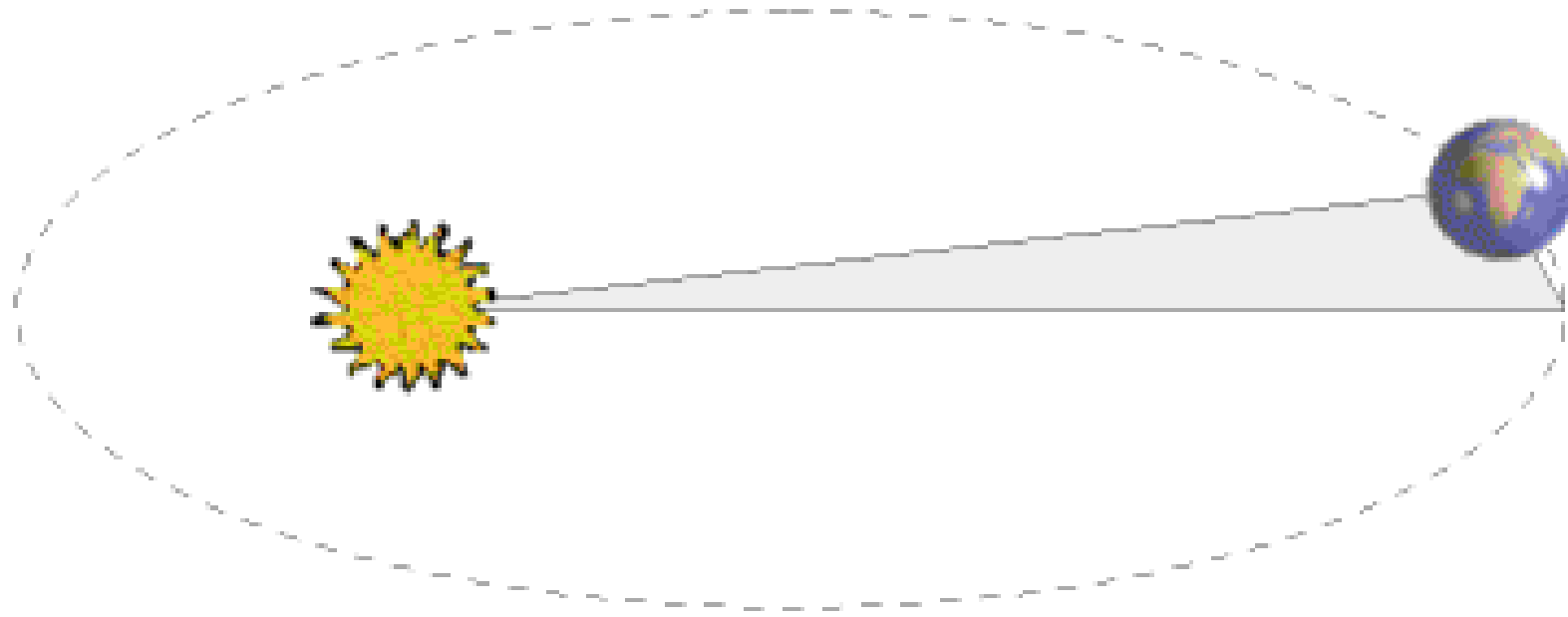
Total and Annular Solar Eclipse Paths: 2001 – 2020

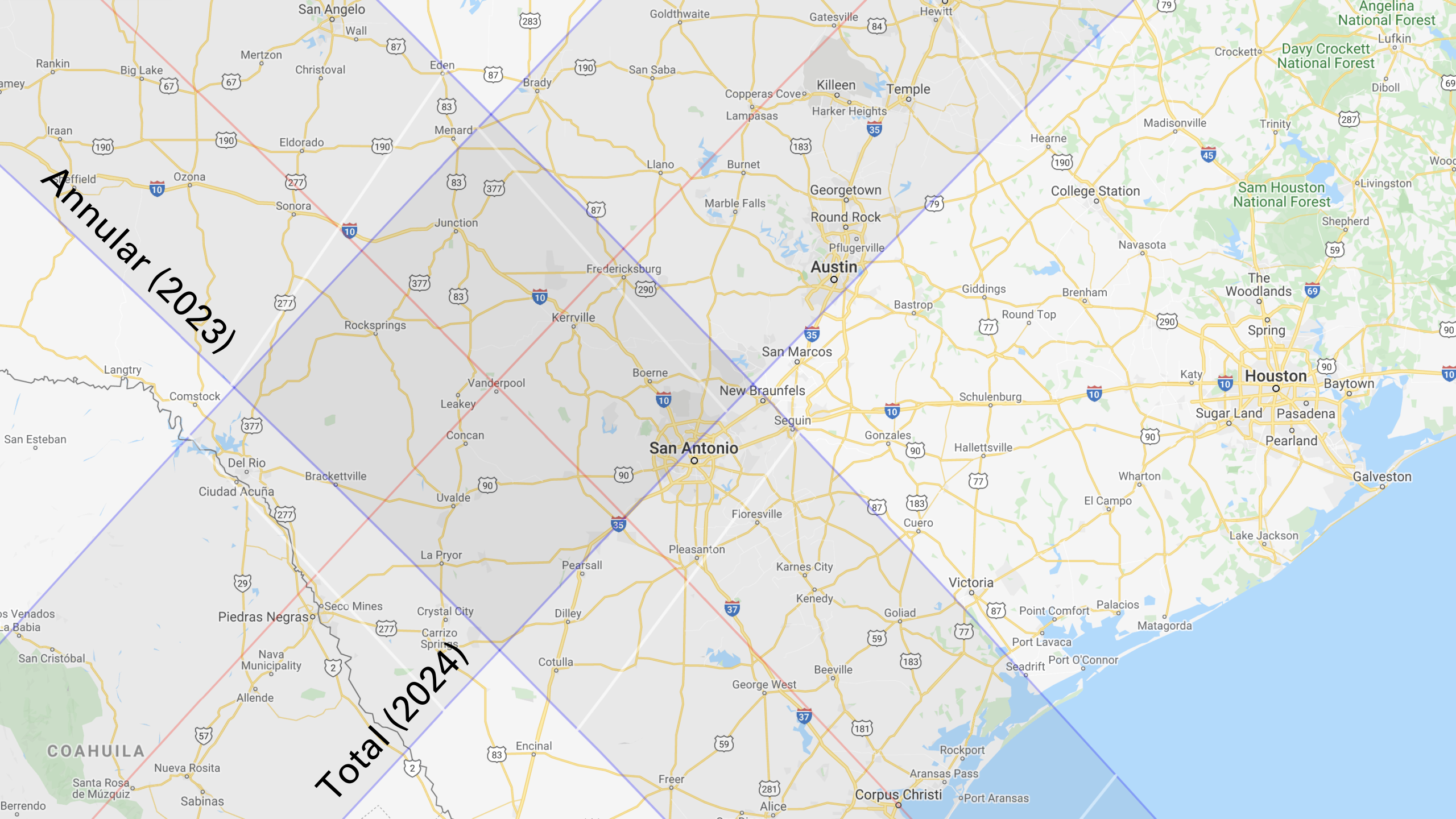


Total and Annular Solar Eclipse Paths: 2021 –2040



How long do eclipses last?





Annular (2023)

Total (2024)

COAHUILA

Houston

Austin

San Antonio

Corpus Christi

Sam Houston National Forest

Davy Crockett National Forest

Angelina National Forest

Berrendo

Nueva Rosita

Nava Municipality

Piedras Negras

San Cristóbal

Los Venados

La Babia

San Esteban

San Esteban

Langtry

Sheffield

Sheffield

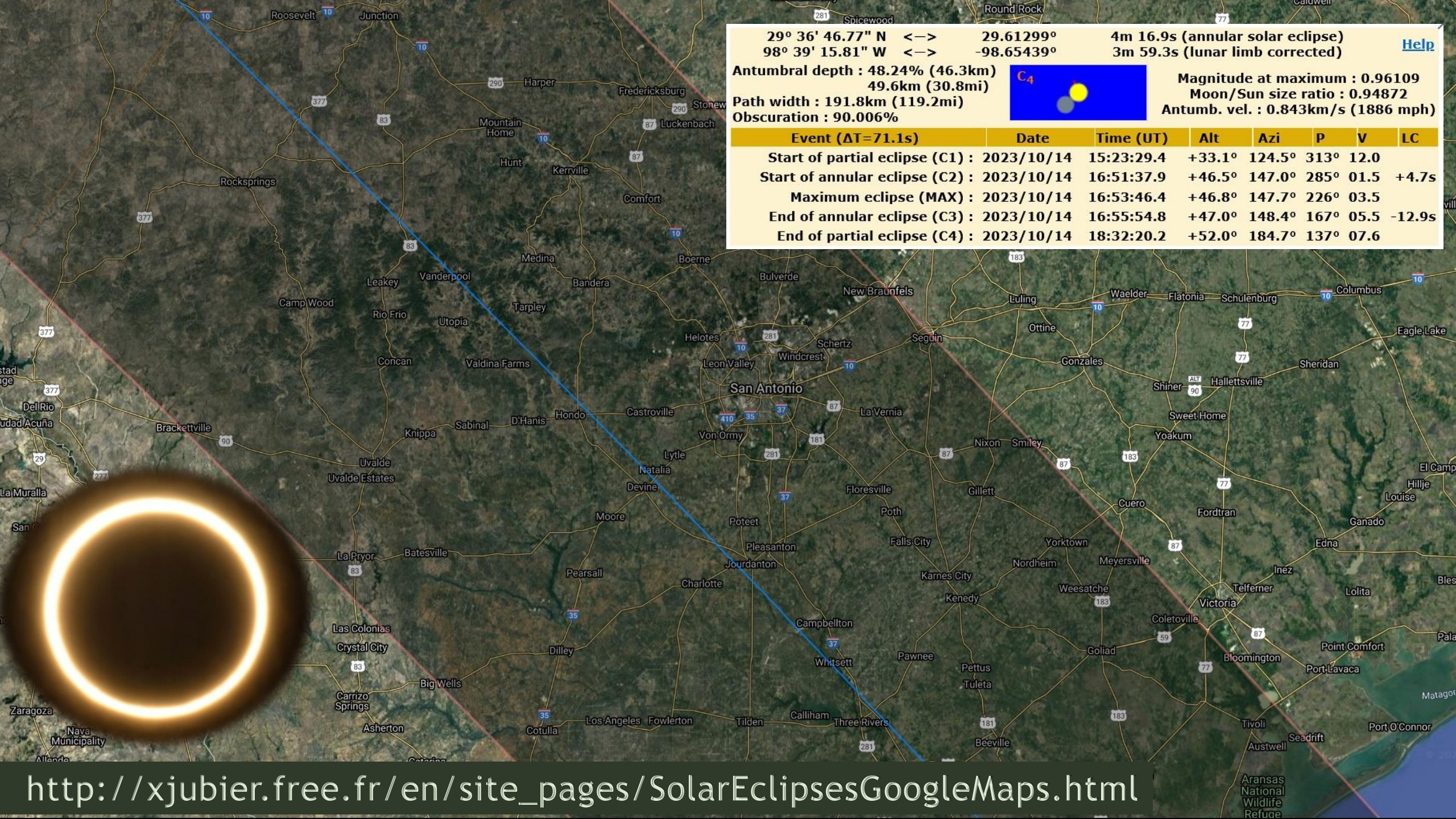
amey

amey

October
14th 2023







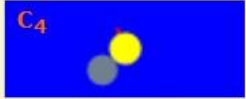
29° 36' 46.77" N <-> **29.61299°** **4m 16.9s** (annular solar eclipse) [Help](#)
98° 39' 15.81" W <-> **-98.65439°** **3m 59.3s** (lunar limb corrected)

Antumbral depth : 48.24% (46.3km)
49.6km (30.8mi)

Path width : 191.8km (119.2mi)

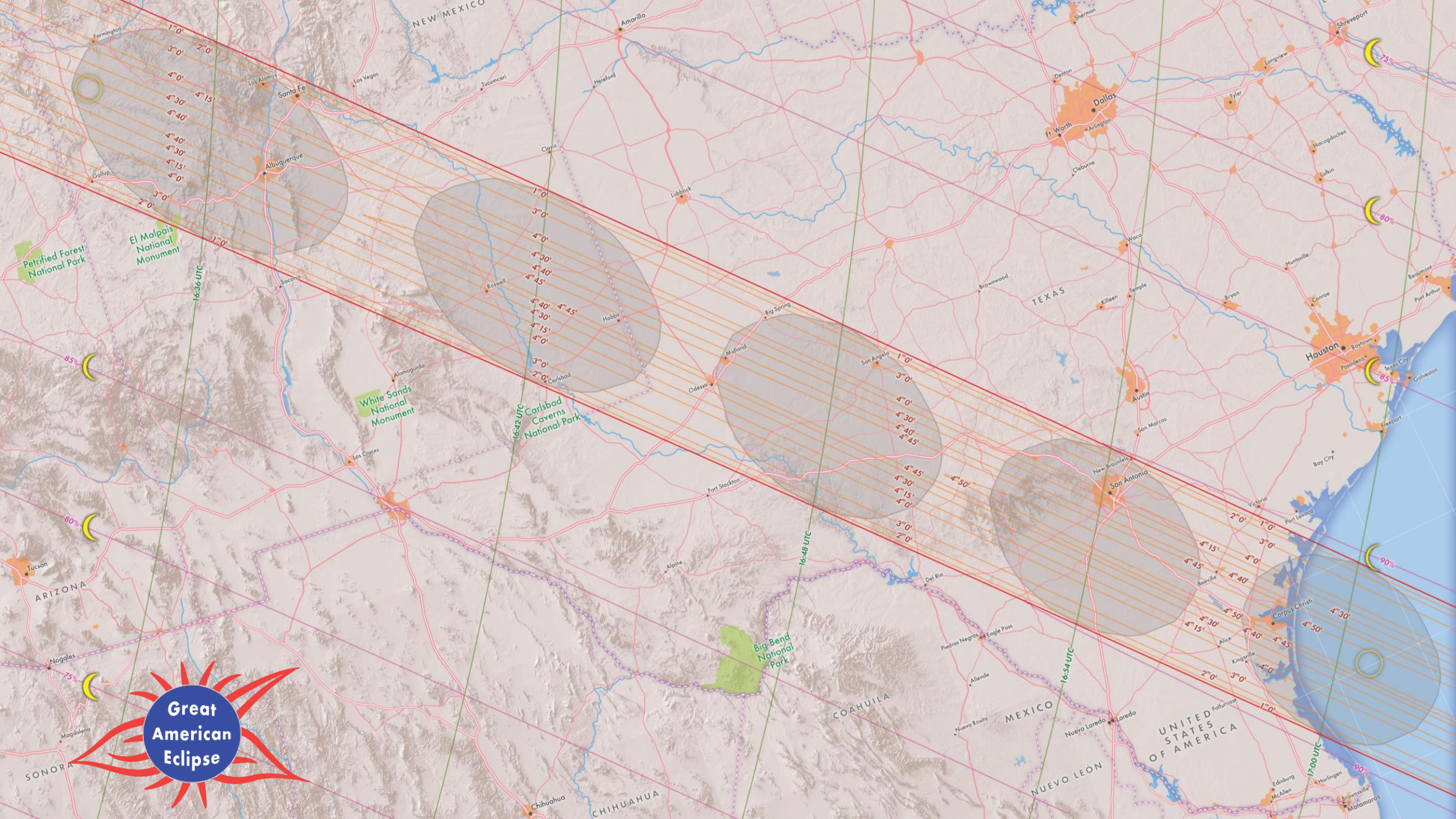
Obscuration : 90.006%

C₄



Magnitude at maximum : 0.96109
Moon/Sun size ratio : 0.94872
Antumb. vel. : 0.843km/s (1886 mph)

Event ($\Delta T=71.1s$)	Date	Time (UT)	Alt	Azi	P	V	LC
Start of partial eclipse (C1)	2023/10/14	15:23:29.4	+33.1°	124.5°	313°	12.0	
Start of annular eclipse (C2)	2023/10/14	16:51:37.9	+46.5°	147.0°	285°	01.5	+4.7s
Maximum eclipse (MAX)	2023/10/14	16:53:46.4	+46.8°	147.7°	226°	03.5	
End of annular eclipse (C3)	2023/10/14	16:55:54.8	+47.0°	148.4°	167°	05.5	-12.9s
End of partial eclipse (C4)	2023/10/14	18:32:20.2	+52.0°	184.7°	137°	07.6	



1°0' 2°0' 3°0' 4°0' 4°15' 4°30' 4°40' 4°45' 4°30' 4°15' 3°0' 2°0' 1°0'

Petrified Forest National Park

El Malpais National Monument

White Sands National Monument

Carlsbad Caverns National Park

Big Bend National Park

Great American Eclipse

SONORA

ARIZONA

NEW MEXICO

TEXAS

COAHUILA

MEXICO

NUEVO LEÓN

UNITED STATES OF AMERICA

Houston

Dallas

San Antonio

Austin

San Marcos

New Braunfels

Victoria

Port Lavaca

Corpus Christi

Alice

Kingville

Fallbrook

Edinburg

McAllen

Harlingen

Brownsville

Matamoros

San Angelo

Midland

Odessa

Alpine

Del Rio

Piedras Negras

Eagle Pass

Allamore

Nueva Rosita

Nuevo Laredo

Laredo

Amarillo

Hereford

Lubbock

Hobbs

Big Spring

Fort Stockton

Chihuahua

Tacumansi

Las Vegas

Santa Fe

Las Alamos

Albuquerque

Socorro

Los Cruces

Alamogordo

Tucson

Nogales

Mogdalena

Shreveport

Longview

Tyler

Naugatuck

Lufkin

Munster

Beaumont

Port Arthur

Baytown

Pasadena

Texas City

Galveston

Freeport

Boy City

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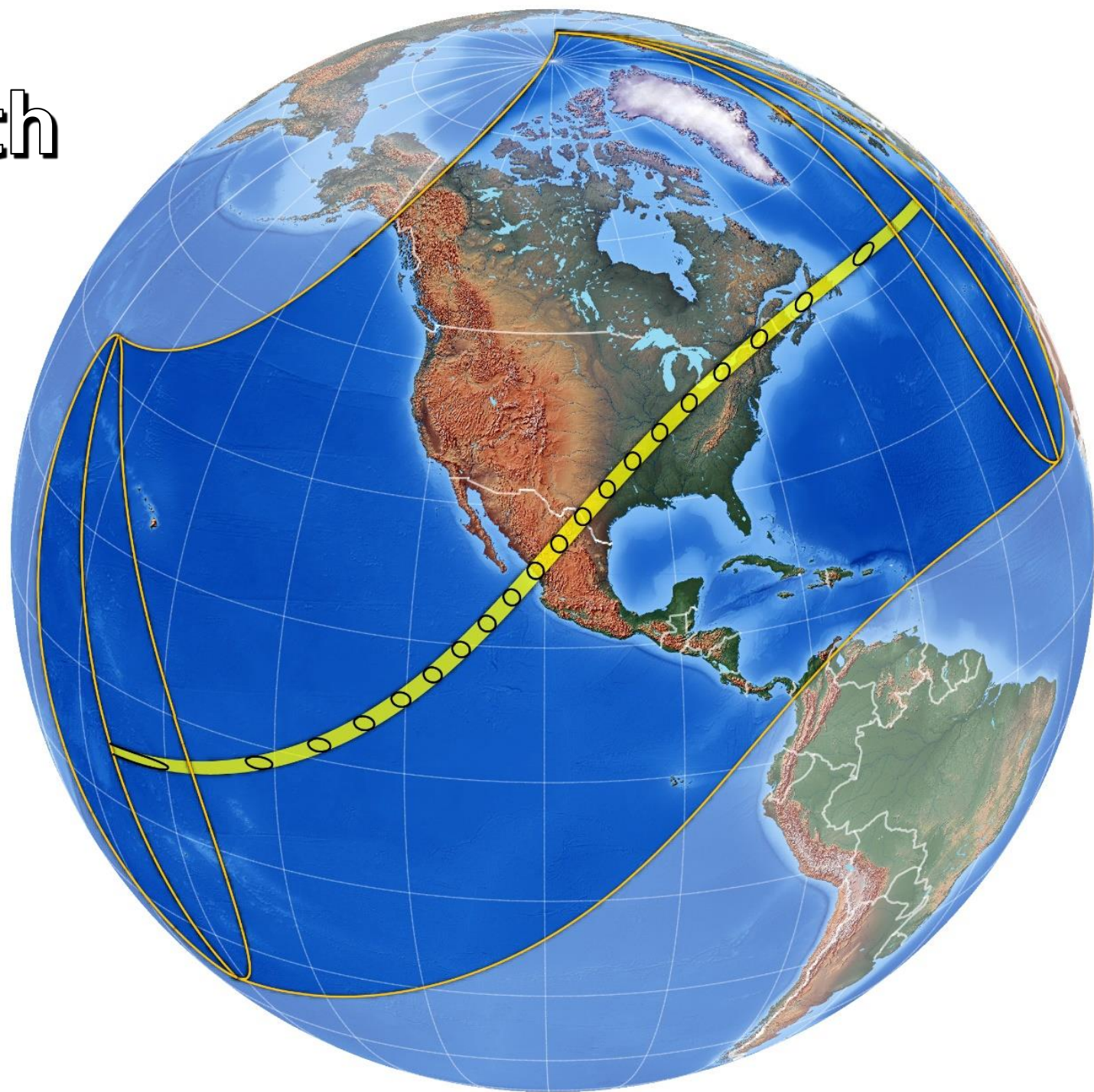
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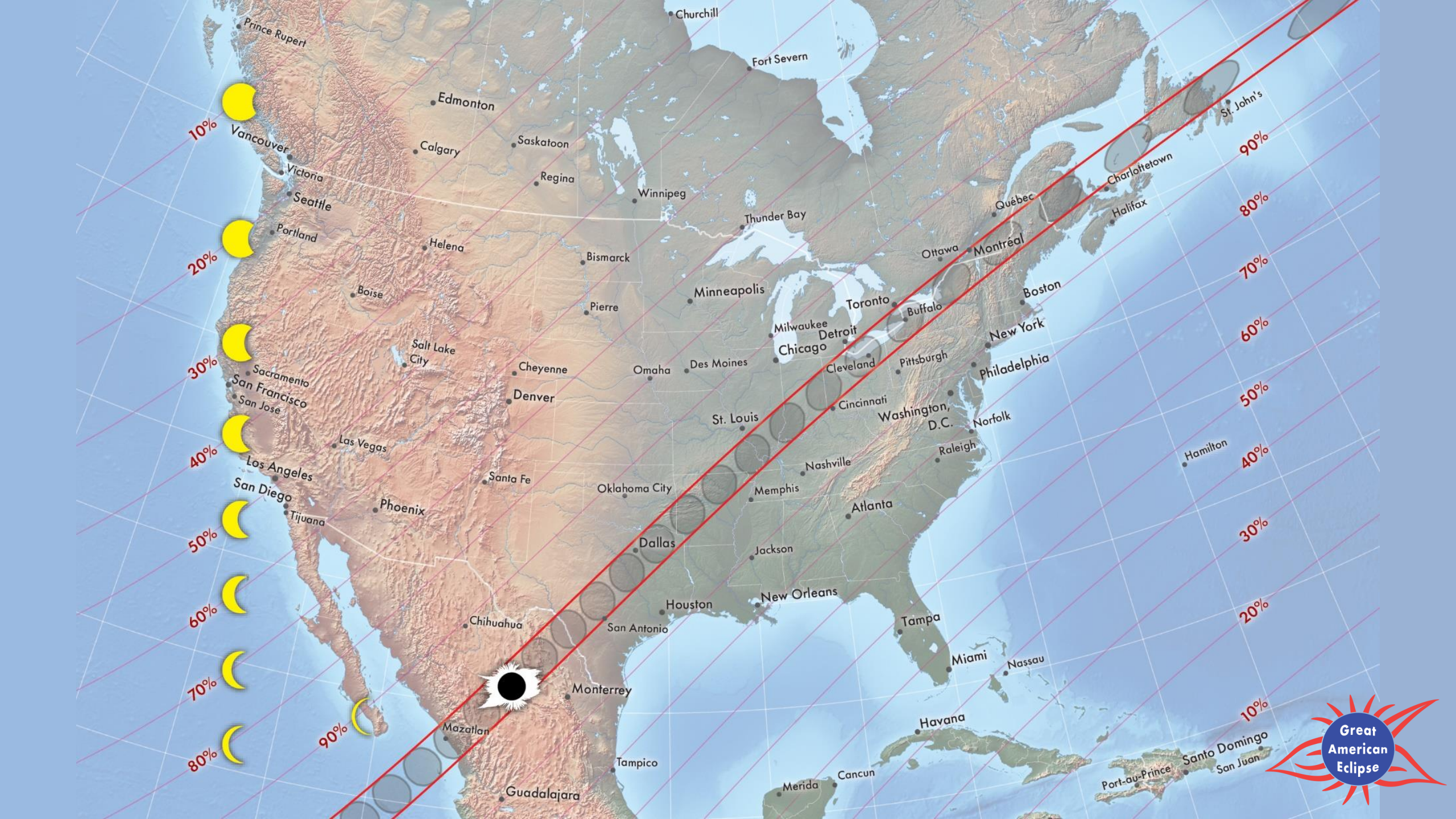
90%

90%

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April 8th
2024

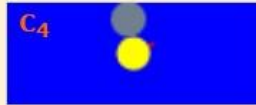




29° 36' 46.77" N <-> 29.61299° 2m 43.4s (total solar eclipse)
98° 39' 15.81" W <-> -98.65439° 2m 46.2s (lunar limb corrected)

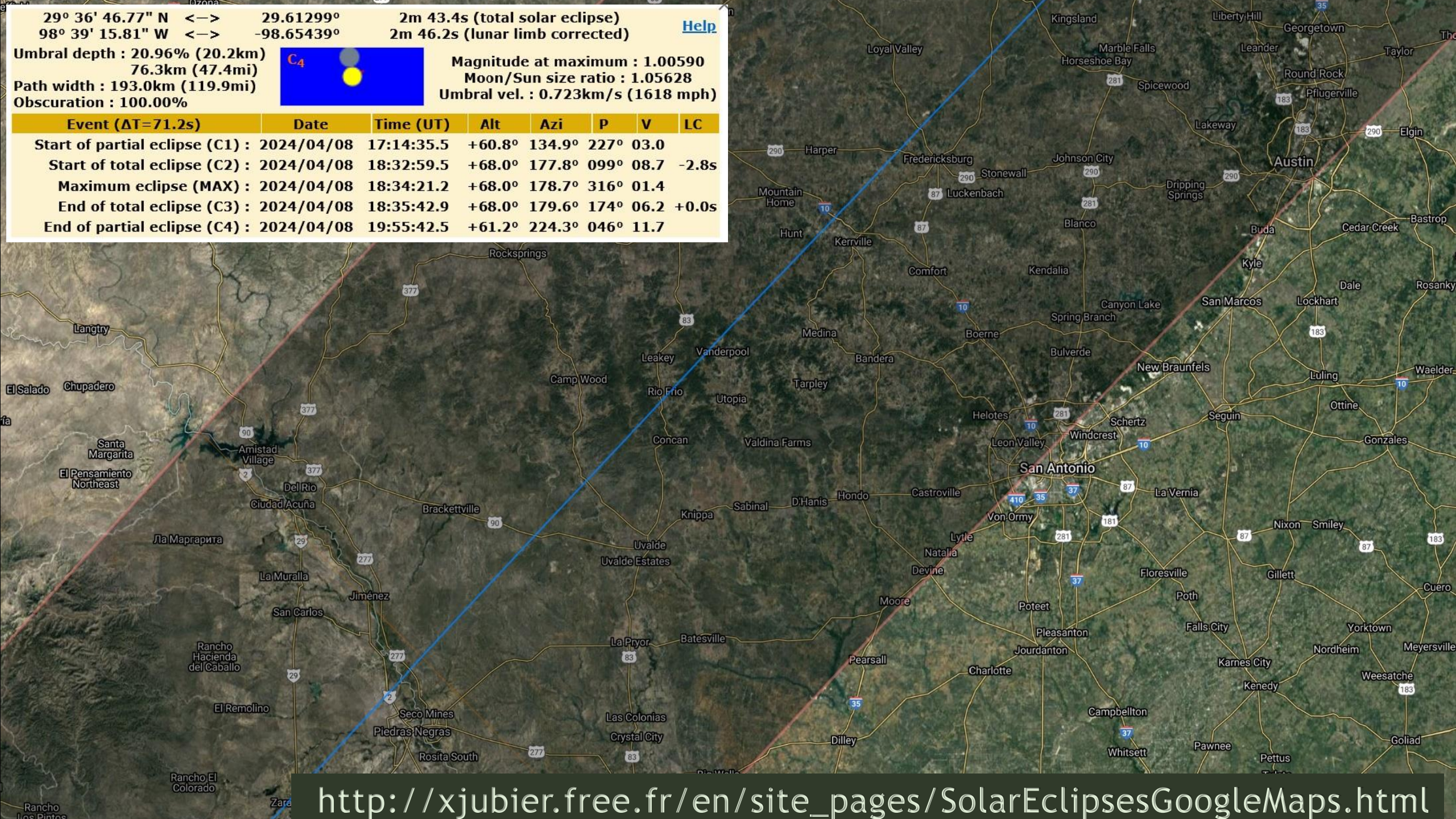
[Help](#)

Umbral depth : 20.96% (20.2km)
76.3km (47.4mi)
Path width : 193.0km (119.9mi)
Obscuration : 100.00%

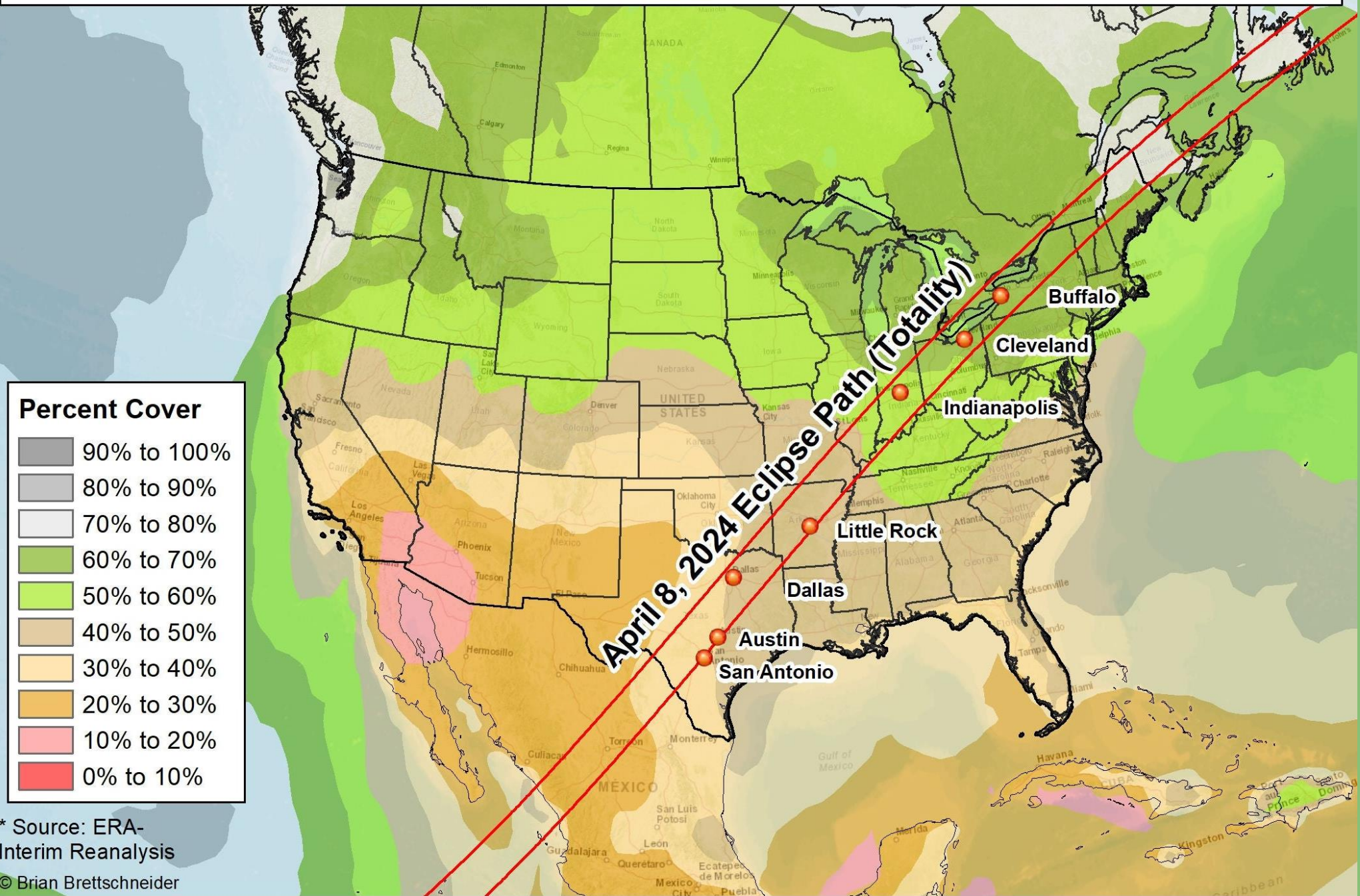


Magnitude at maximum : 1.00590
Moon/Sun size ratio : 1.05628
Umbral vel. : 0.723km/s (1618 mph)

Event ($\Delta T=71.2s$)	Date	Time (UT)	Alt	Azi	P	V	LC
Start of partial eclipse (C1) :	2024/04/08	17:14:35.5	+60.8°	134.9°	227°	03.0	
Start of total eclipse (C2) :	2024/04/08	18:32:59.5	+68.0°	177.8°	099°	08.7	-2.8s
Maximum eclipse (MAX) :	2024/04/08	18:34:21.2	+68.0°	178.7°	316°	01.4	
End of total eclipse (C3) :	2024/04/08	18:35:42.9	+68.0°	179.6°	174°	06.2	+0.0s
End of partial eclipse (C4) :	2024/04/08	19:55:42.5	+61.2°	224.3°	046°	11.7	



Cloud Coverage Climatology at 18 UTC Between April 3 and Apr 13 (1979-2016)*



* Source: ERA-Interim Reanalysis

© Brian Brettschneider

ANNULAR SOLAR ECLIPSE OF
Annular Eclipse: 554 days
ANNULAR SOLAR ECLIPSE OF
2023 OCTOBER 14

Total Eclipse: 731 days (2 years!)
TOTAL SOLAR ECLIPSE OF
2024 APRIL 8

**AMERICAN
SOLAR
ECLIPSES**

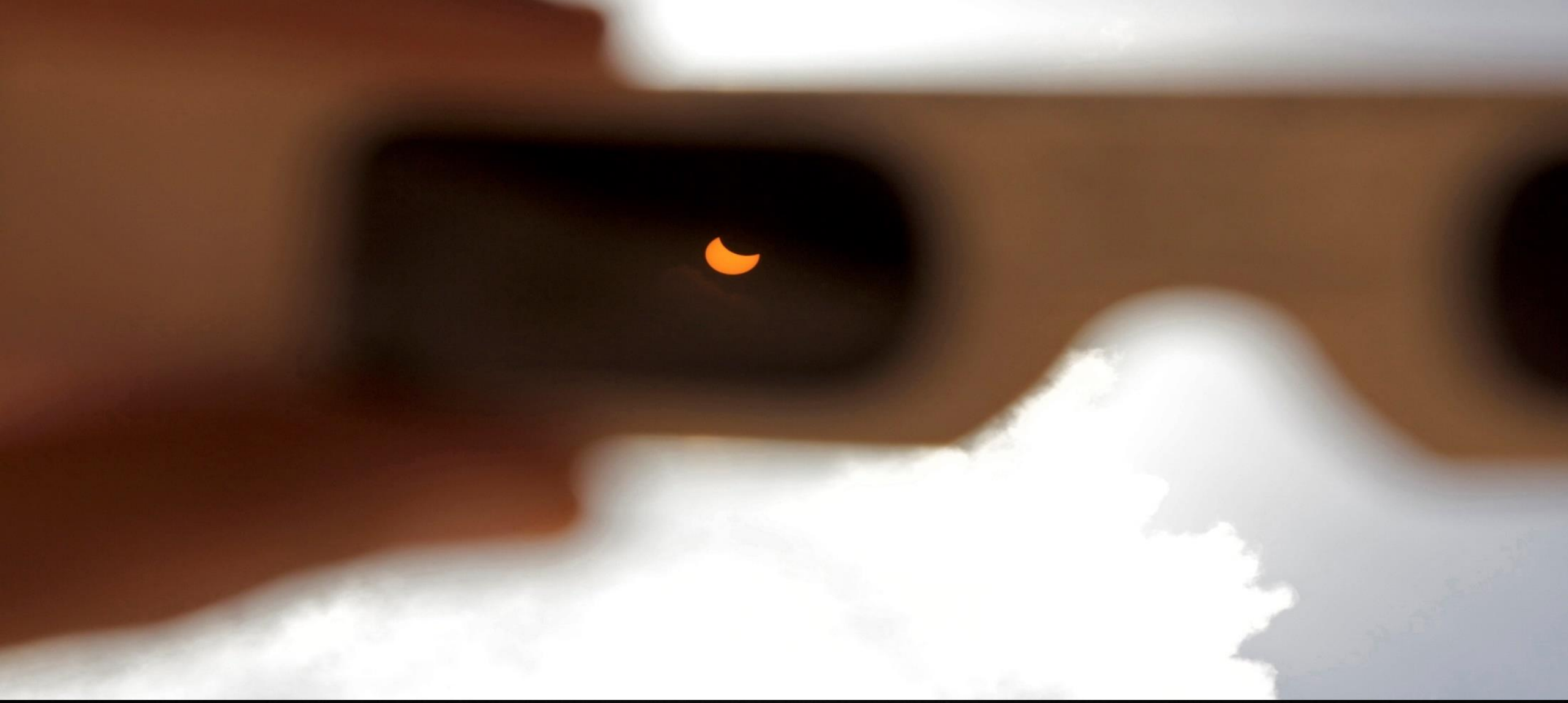
- TOTAL SOLAR ECLIPSE OF
2017 AUGUST 21
- ANNULAR SOLAR ECLIPSE OF
2021 JUNE 10
- ANNULAR SOLAR ECLIPSE OF
2023 OCTOBER 14
- TOTAL SOLAR ECLIPSE OF
2024 APRIL 8





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



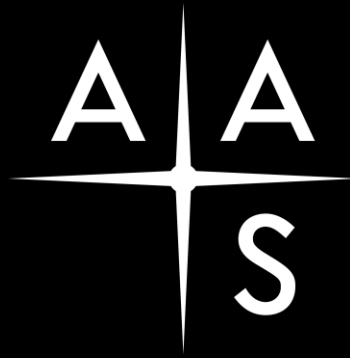
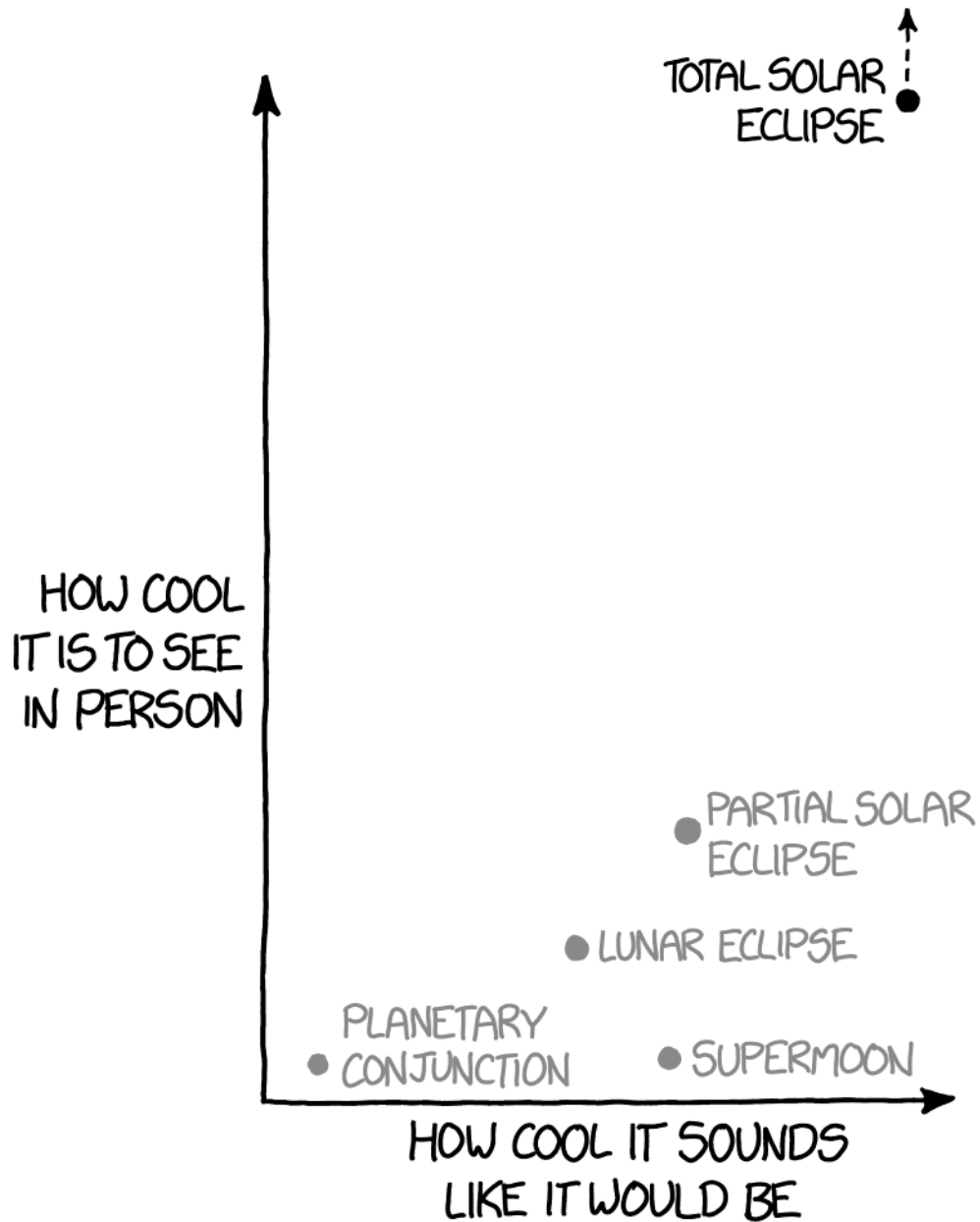




Post-eclipse in Wyoming



Pre-eclipse at the Tetons



AMERICAN
ASTRONOMICAL
SOCIETY

<https://eclipse.aas.org/>



KEEP YOUR PADDLE WET
LOGBOAT
BREWING CO.
BLACK ALE
ALL GRAIN
Brewed in the heart of the mountains of
North Carolina since 2011

LOGBOAT
BREWING CO.
BLACK ALE

LOGBOAT
BREWING CO.
BLACK ALE

LOGBOAT BREWING CO.
MOON
SPECK
BLACK ALE

LOGBOAT BREWING CO.
MOON
SPECK
BLACK ALE

LOGBOAT BREWING CO.
MOON
SPECK
BLACK ALE

