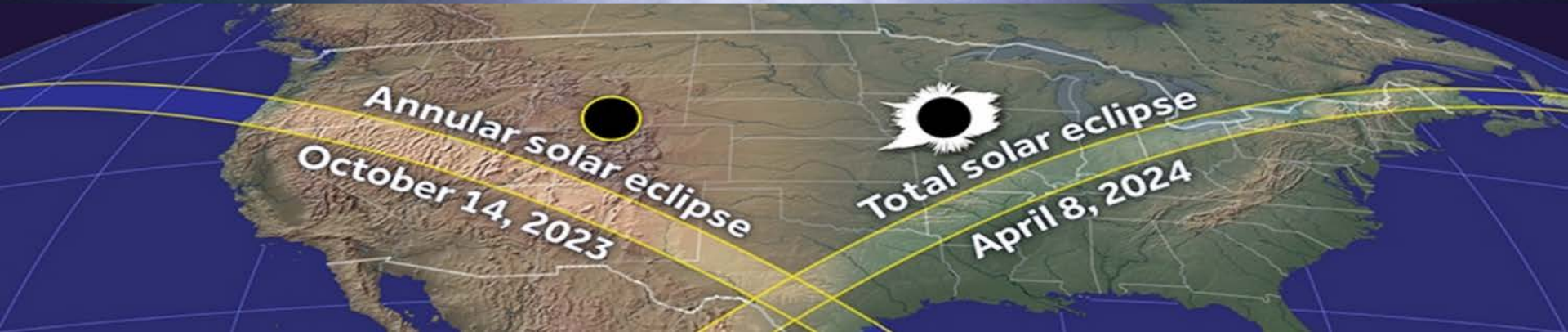
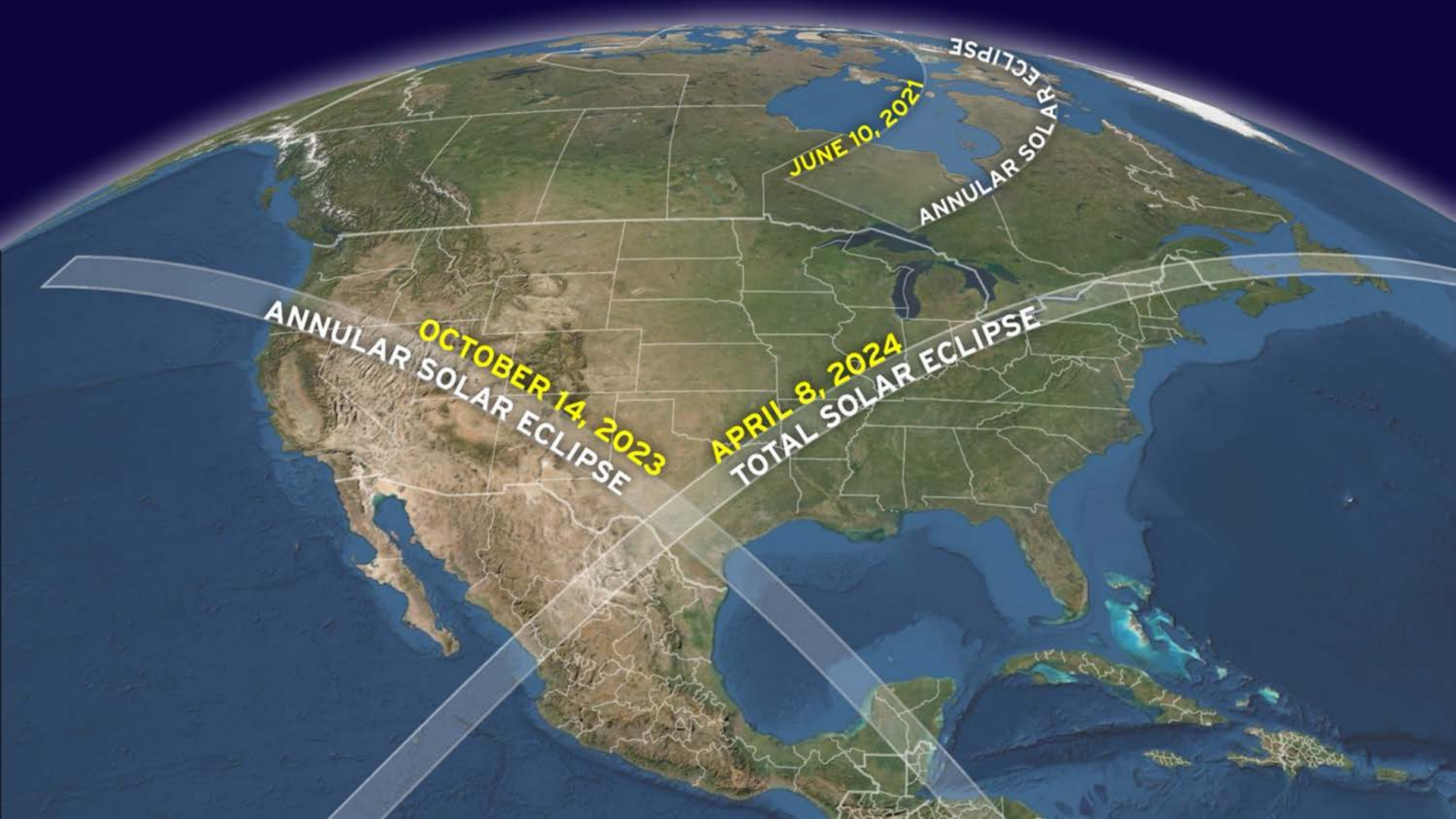


# Solar Eclipses in North America in the 2020s





ANNULAR SOLAR ECLIPSE

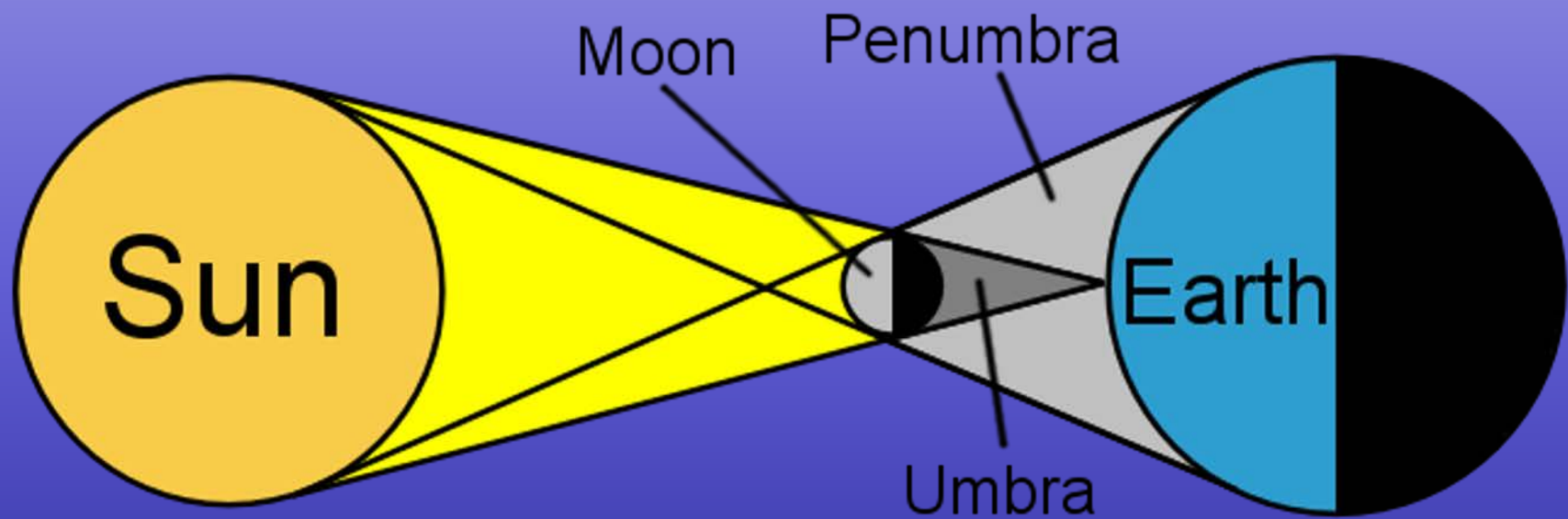
JUNE 10, 2021

ANNULAR SOLAR ECLIPSE

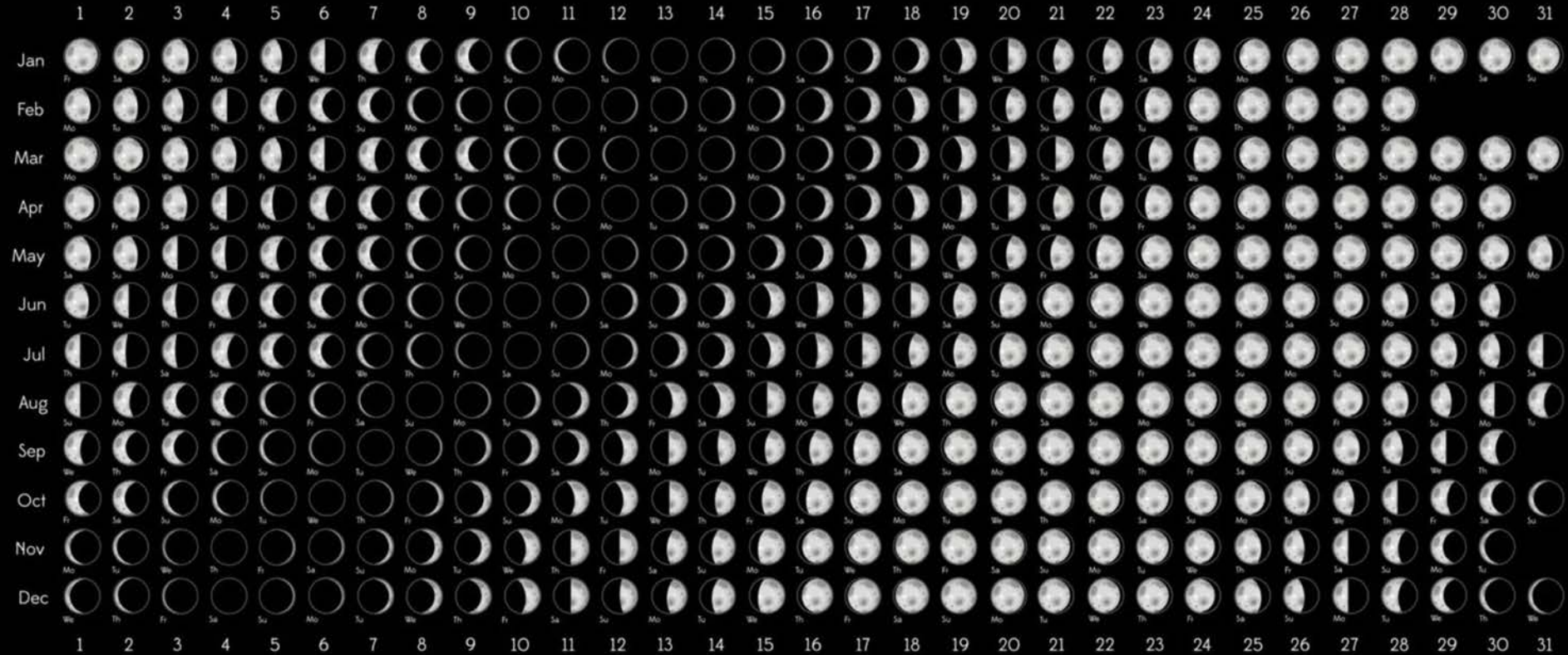
OCTOBER 14, 2023

TOTAL SOLAR ECLIPSE

APRIL 8, 2024



# MOON PHASES FOR 2021



# Lunar Phases



Not to scale



**NO SOLAR ECLIPSE**



**NO LUNAR ECLIPSE**

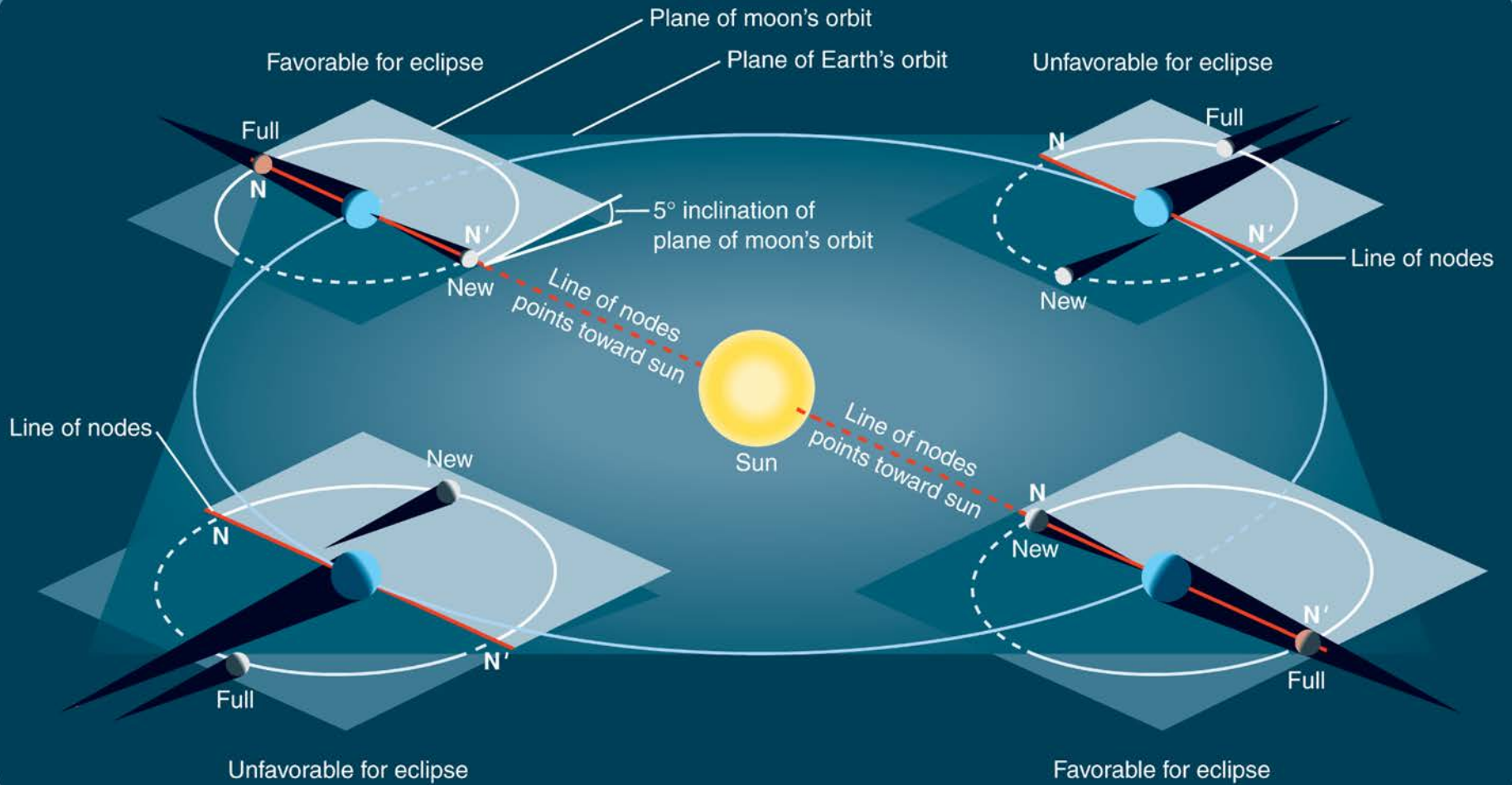
**MOST MONTHS**

**SOLAR ECLIPSE**



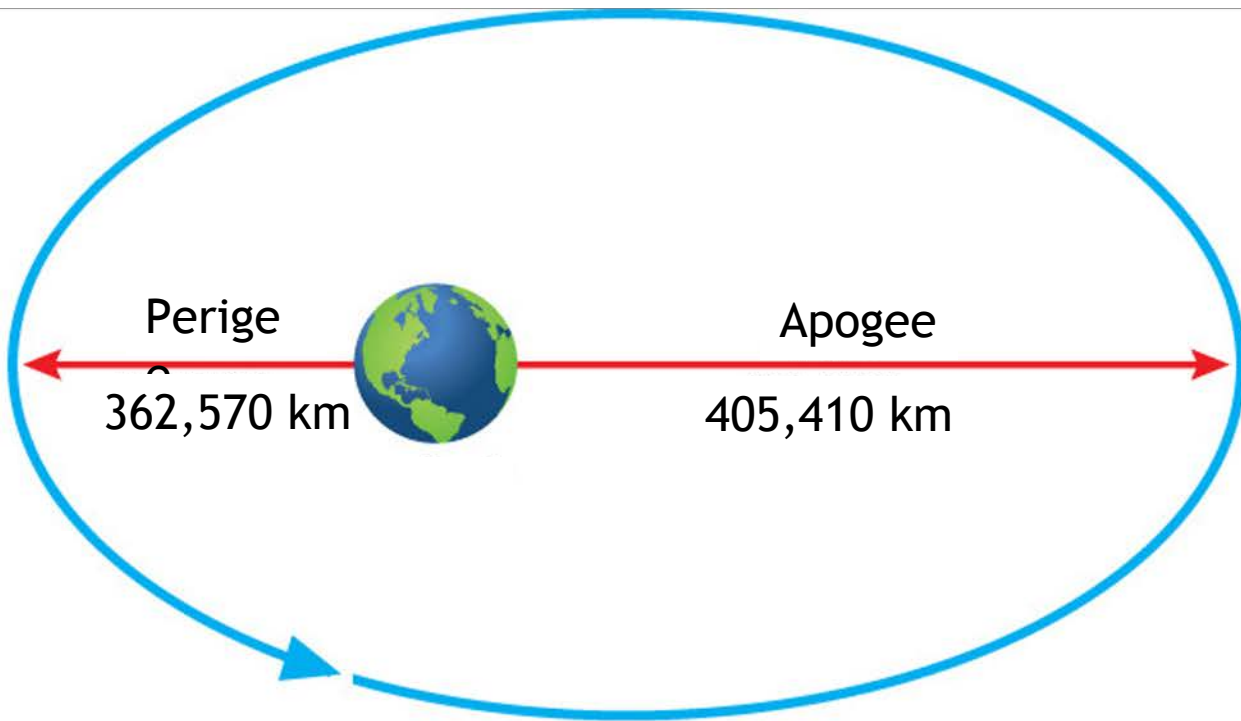
**LUNAR ECLIPSE**







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



Perigee  
362,570 km

Apogee  
405,410 km



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

Moon's Orbit is elliptical  
(greatly exaggerated here)



Aphelion  
(Jul 4)

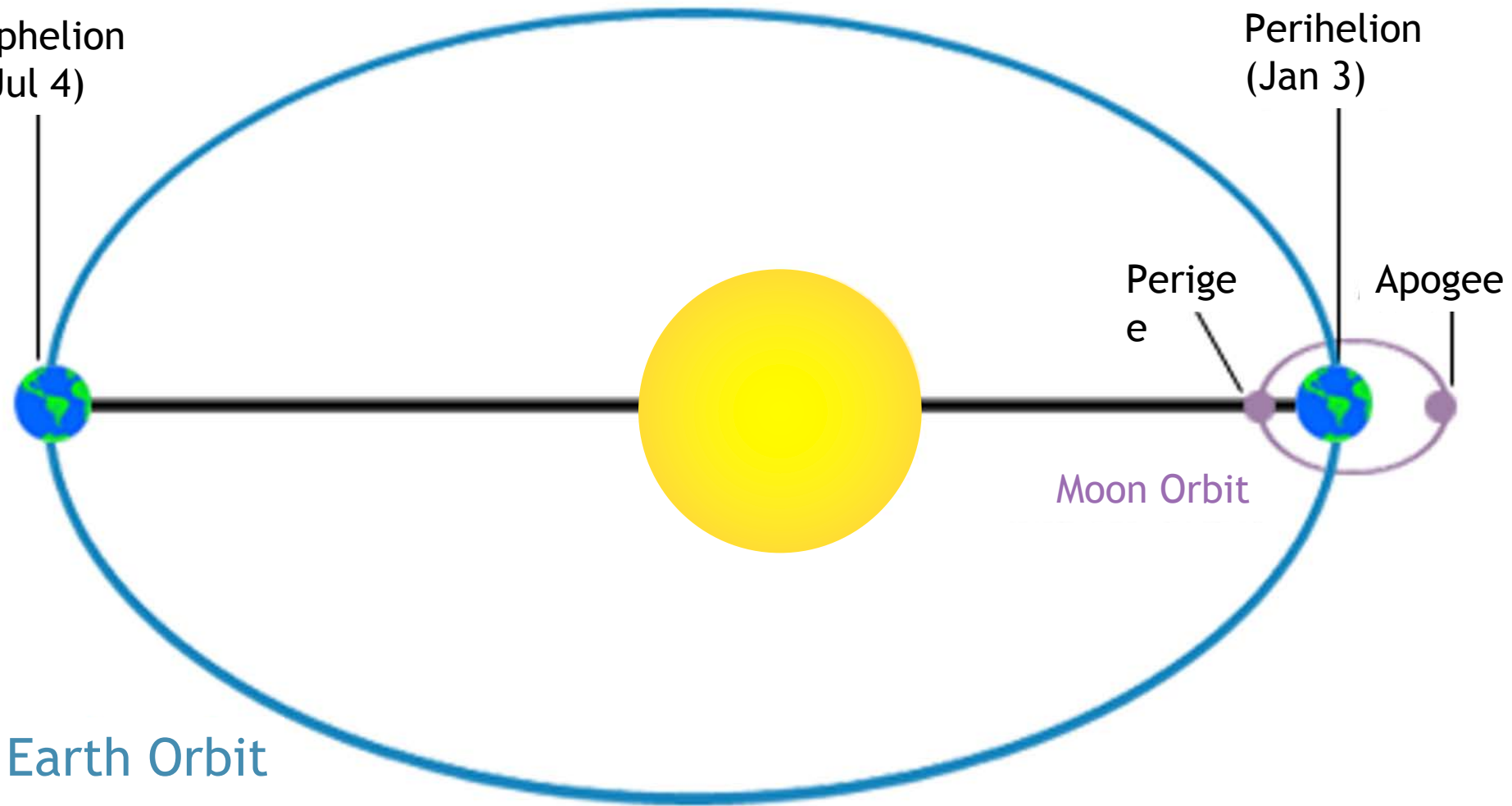
Perihelion  
(Jan 3)

Perige  
e

Apogee

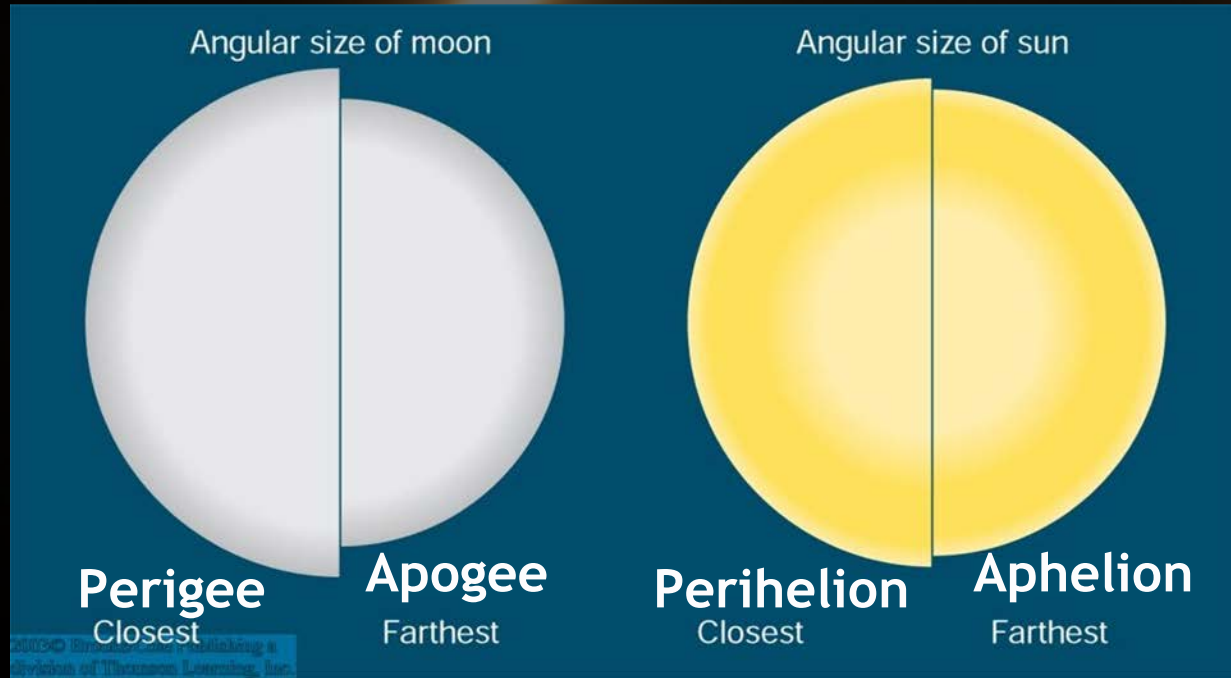
Moon Orbit

Earth Orbit

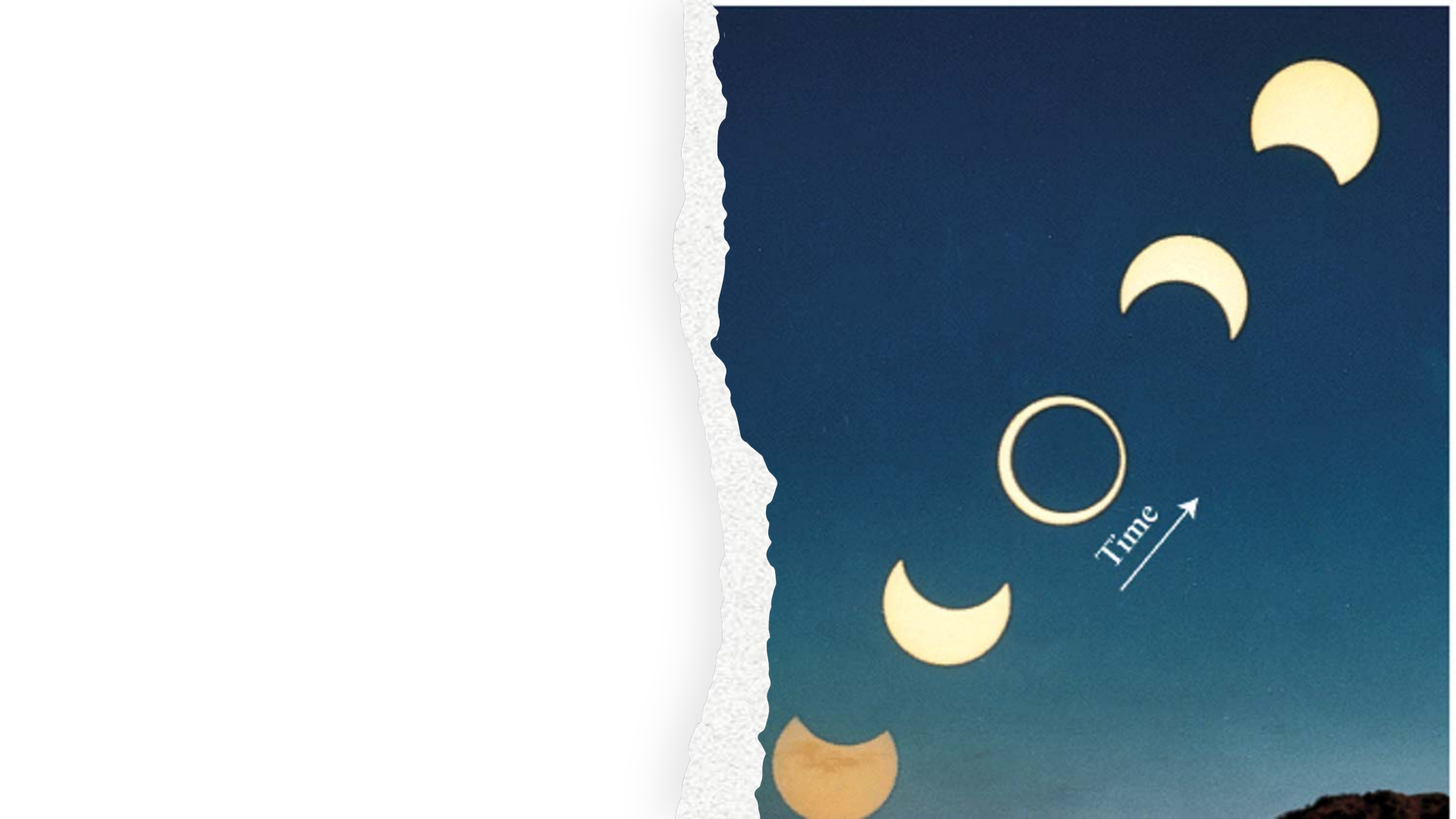


# Annular Solar Eclipses

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

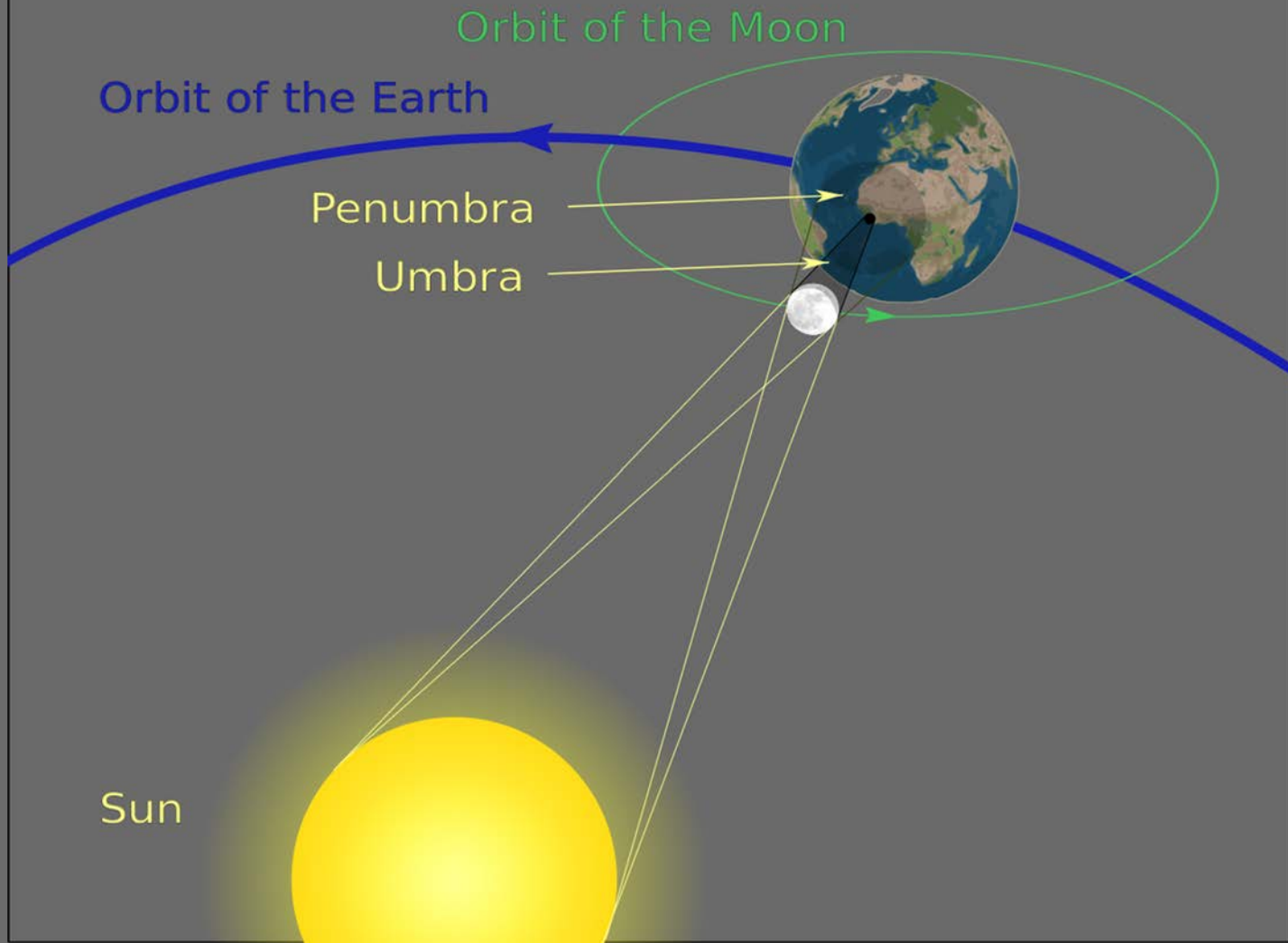


The angular sizes of the moon and the sun vary depending on their distance from Earth.



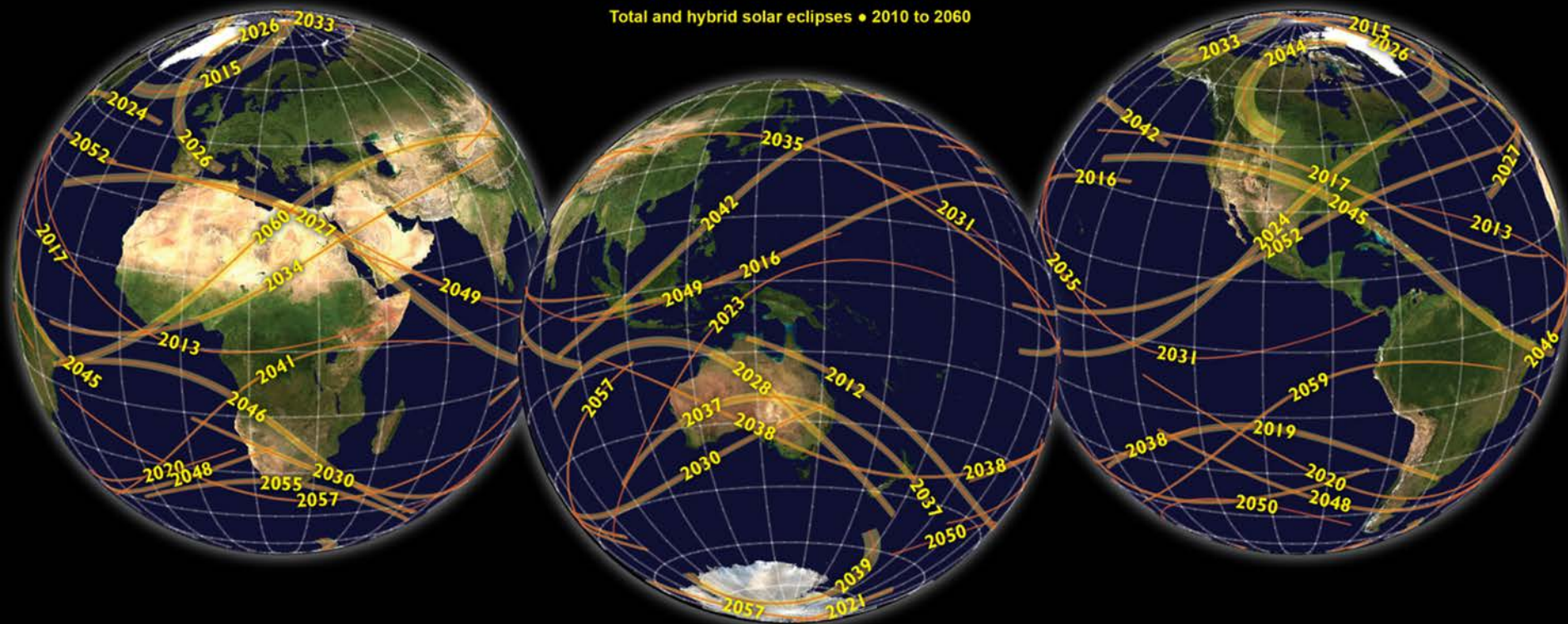


CREDIT: Rick Fienberg  
(AAS Press Officer)

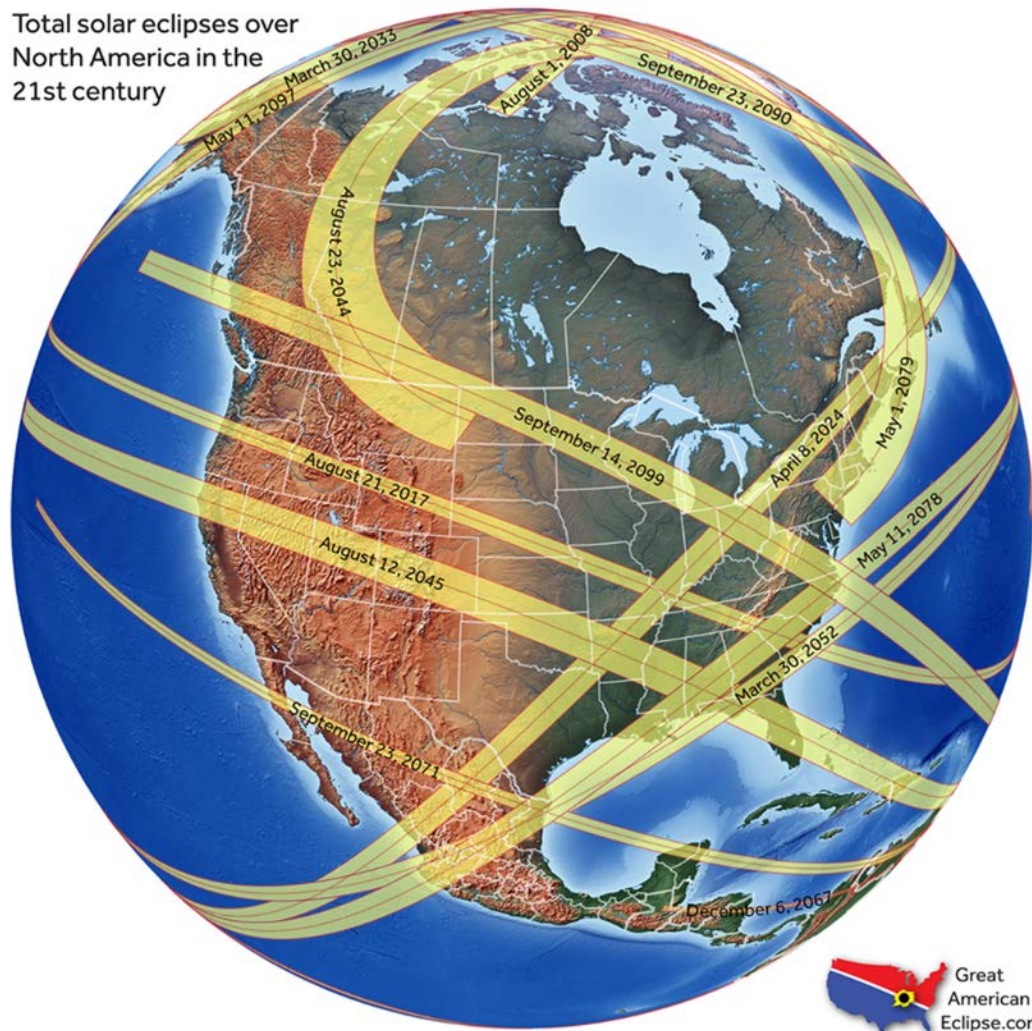


## Fifty years of solar eclipses

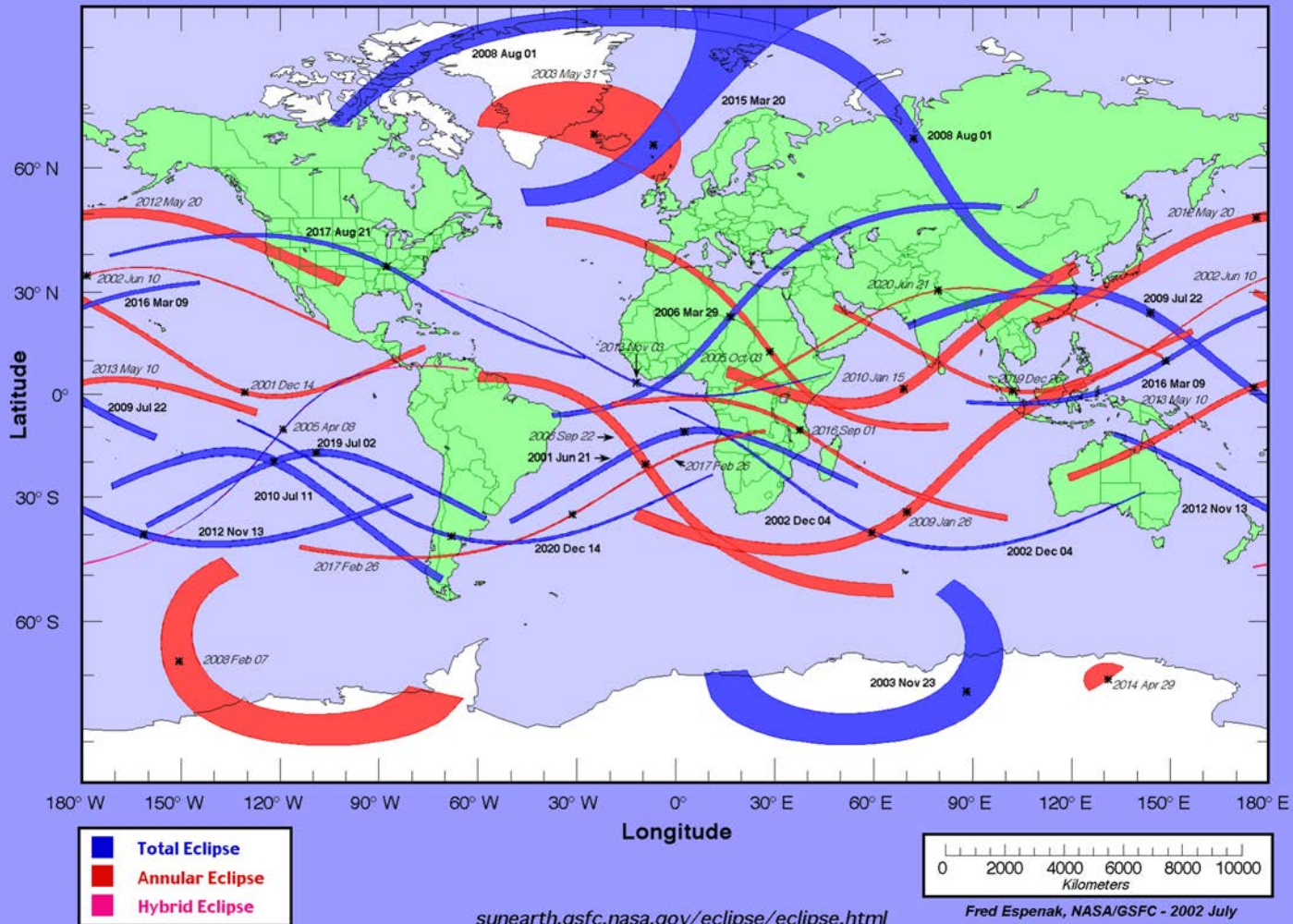
Total and hybrid solar eclipses • 2010 to 2060



Total solar eclipses over  
North America in the  
21st century

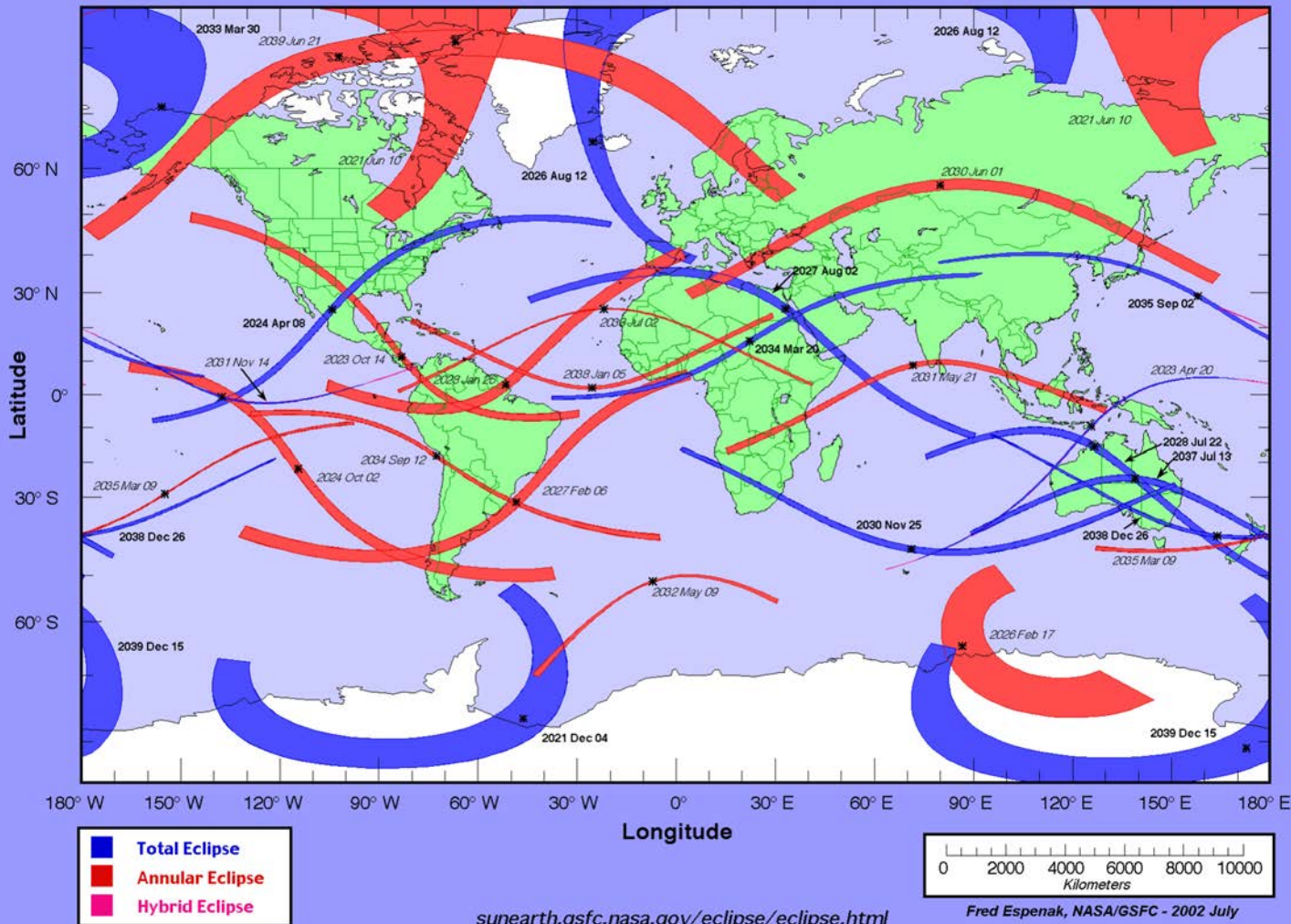


# Total and Annular Solar Eclipse Paths: 2001 – 2020



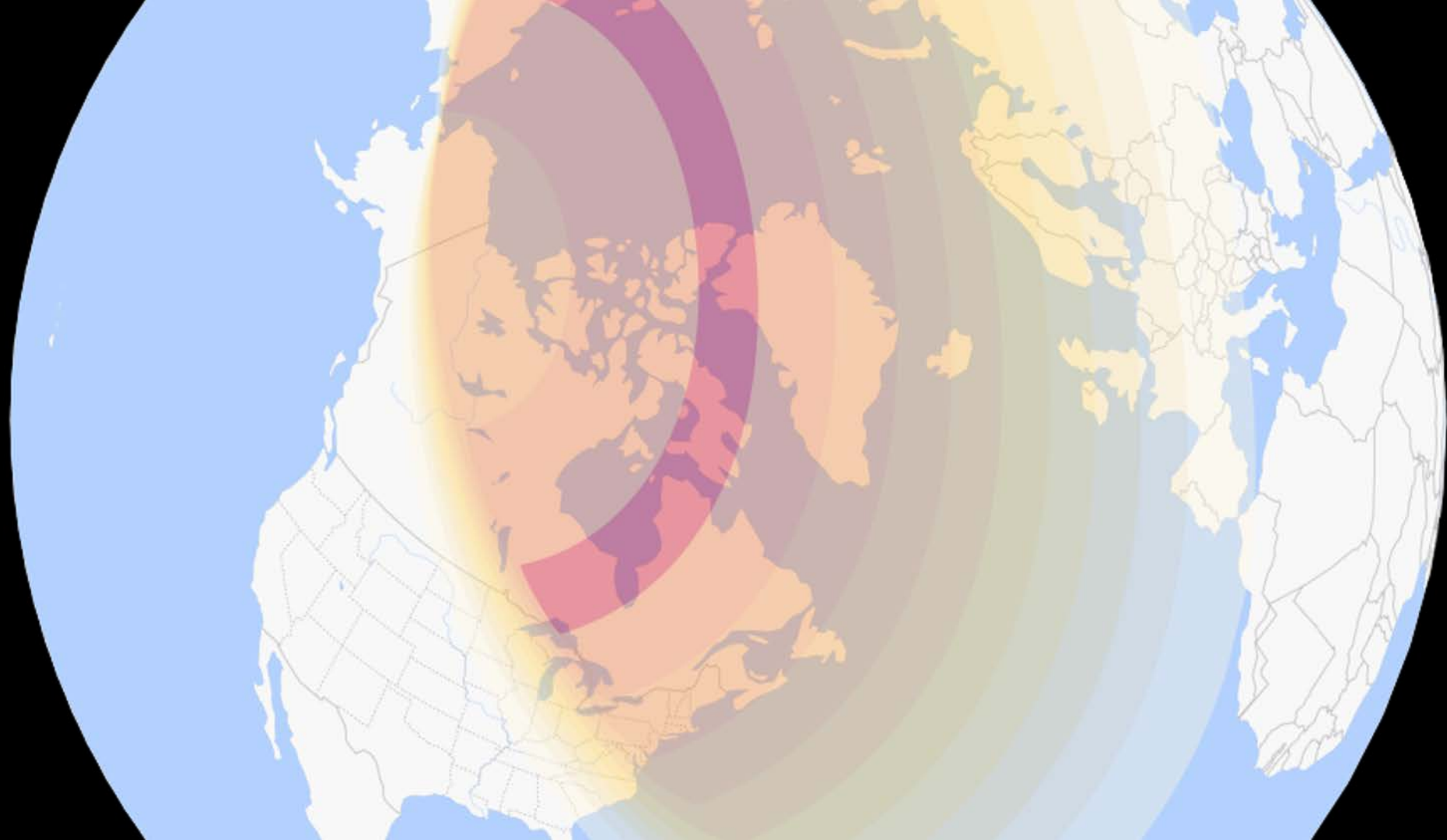


# Total and Annular Solar Eclipse Paths: 2021 – 2040

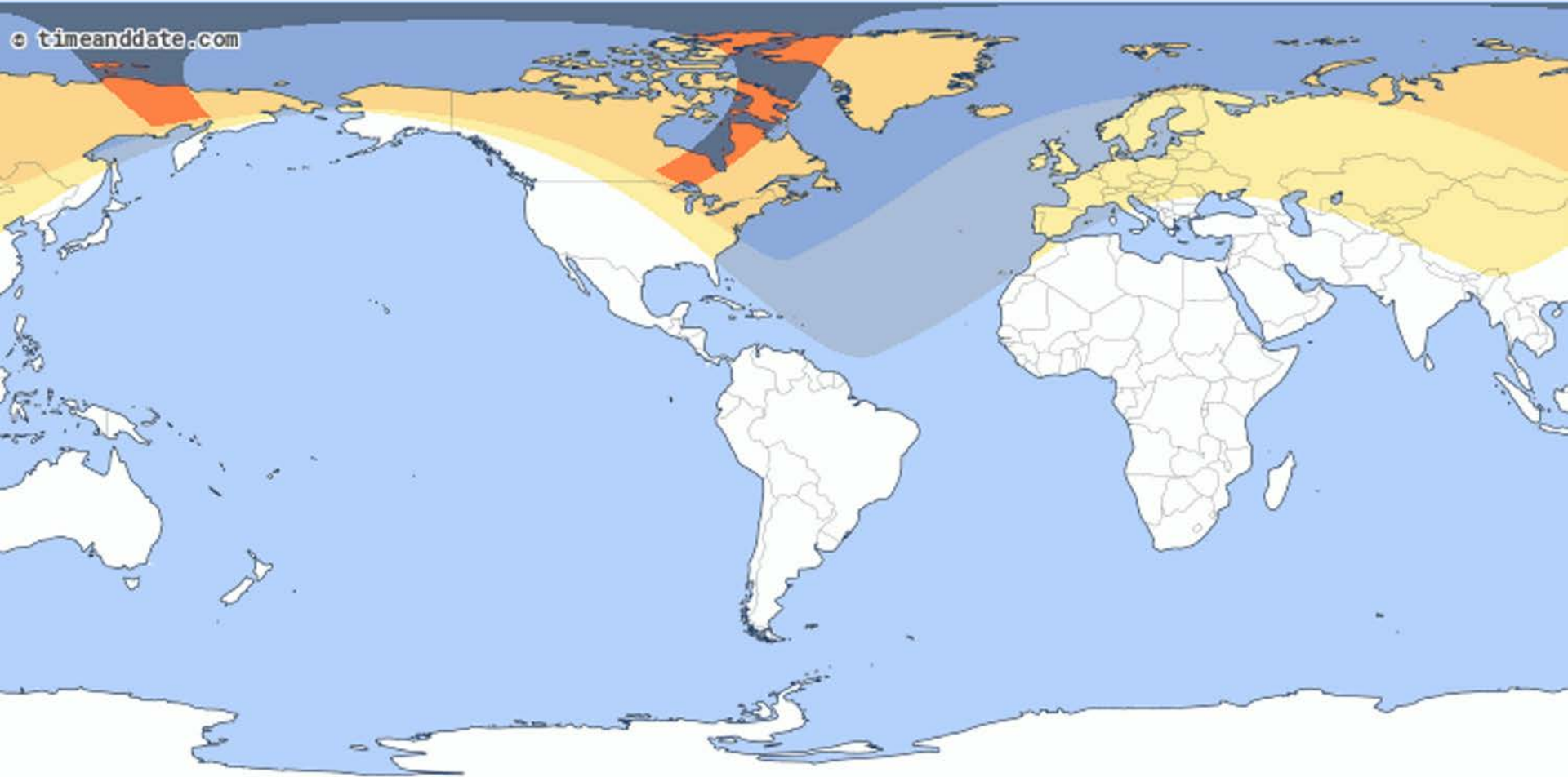


June 10<sup>th</sup>  
2021

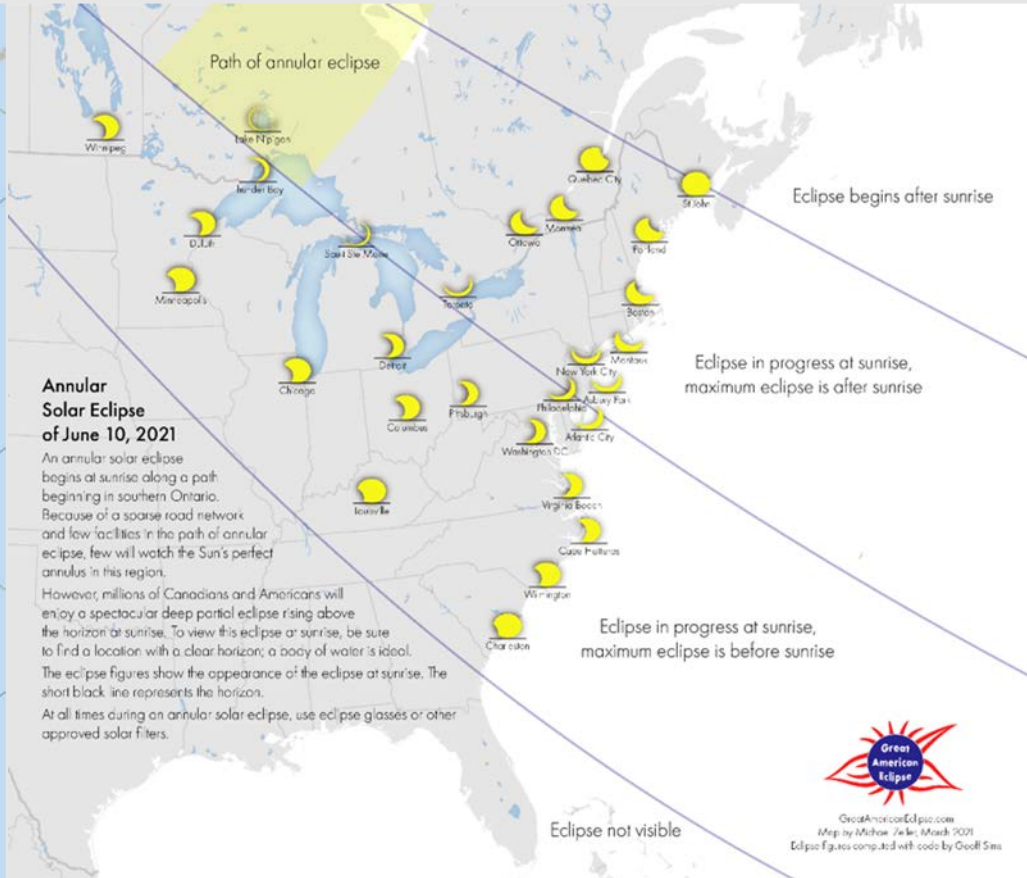
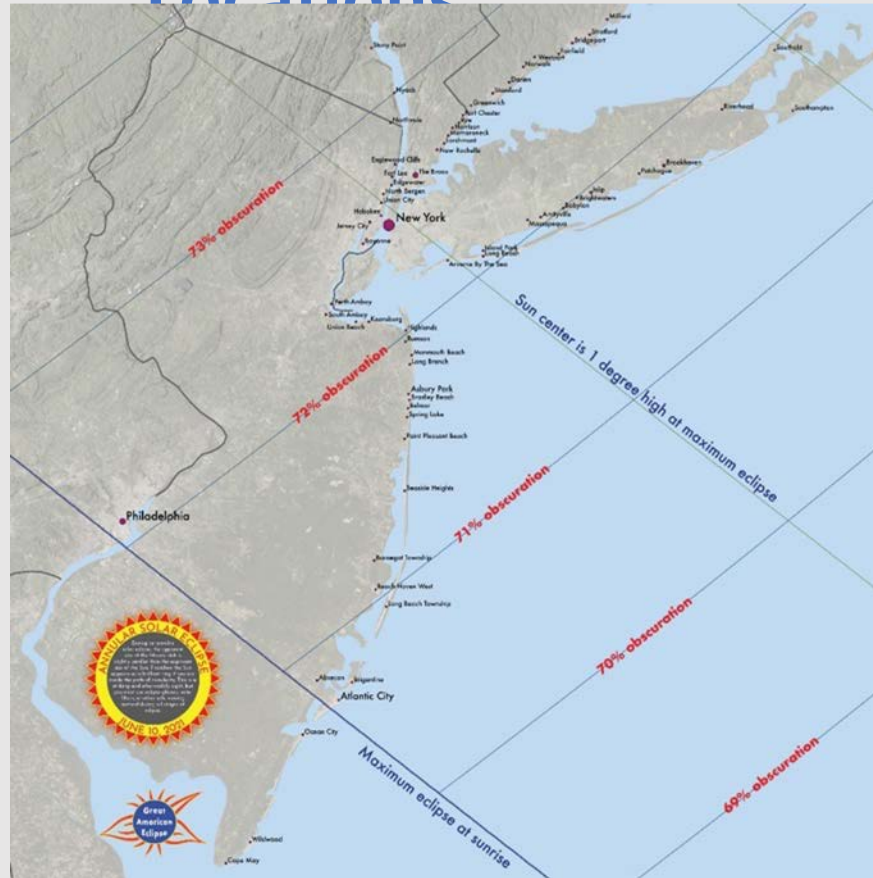




# Annular Eclipse – June 10<sup>th</sup> 2021



# June 10<sup>th</sup> 2021: Annular Eclipse Viewing Locations



October  
14<sup>th</sup> 2023





Vancouver  
Seattle

Minneapolis

Chicago

St. Louis

Washington, D.C.

Atlanta

Denver

Dallas

Houston

New Orleans

Tampa

Miami

80%

70%

Los Angeles

Phoenix

San Diego

60%

50%

40%

30%

20%

10%

Monterrey

Guadalajara

Mexico City

Puebla

Havana

Santo Domingo

Maracaibo

Caracas

Medellin

Bogota

Cali

Guayaquil

Belem

Fortaleza

Recife

Salvador

10%

20%

30%

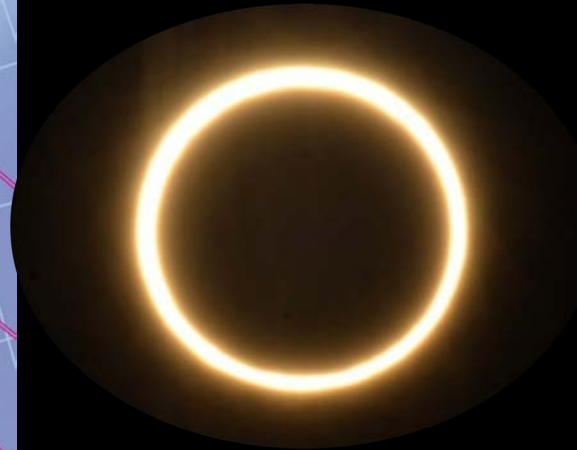
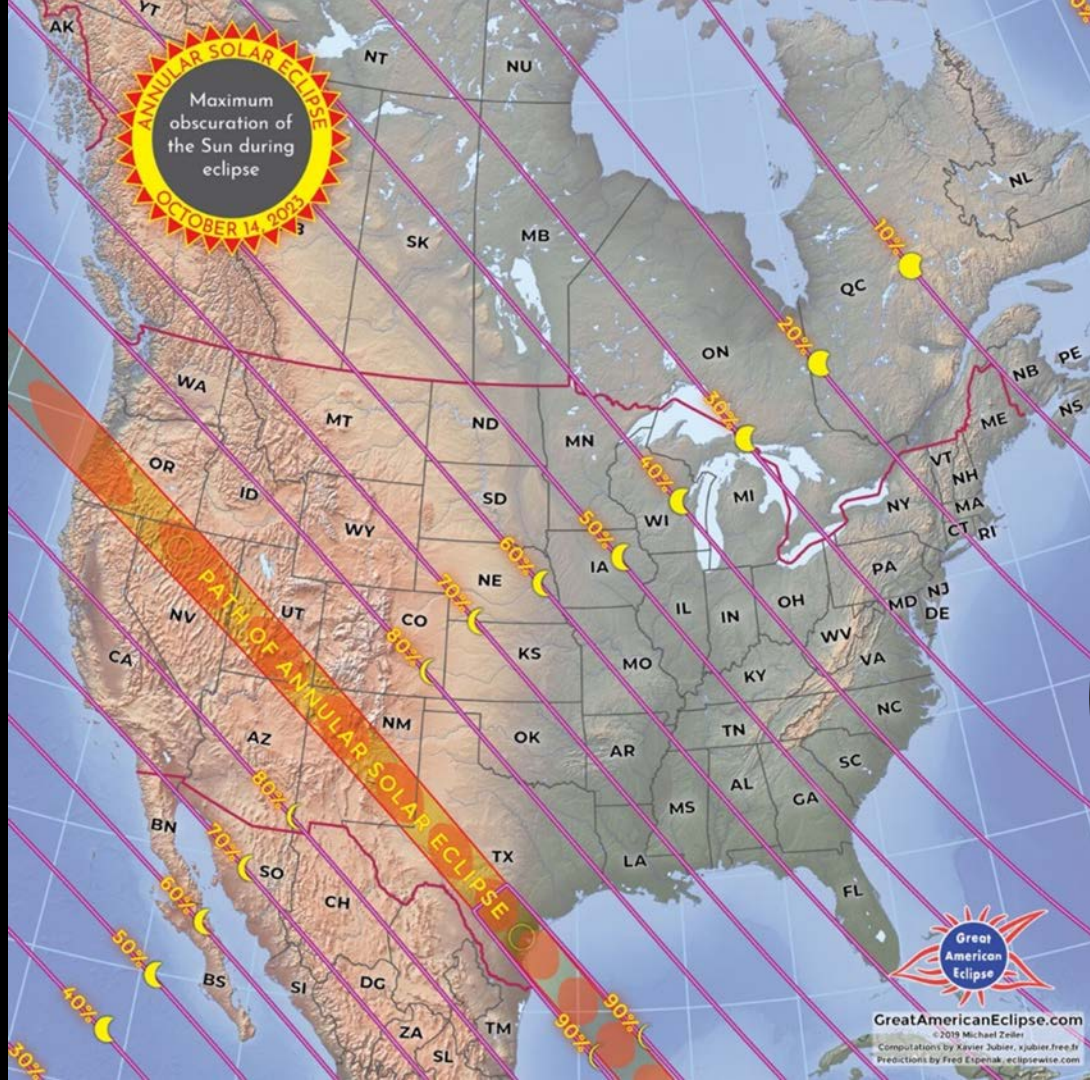
40%

50%

60%

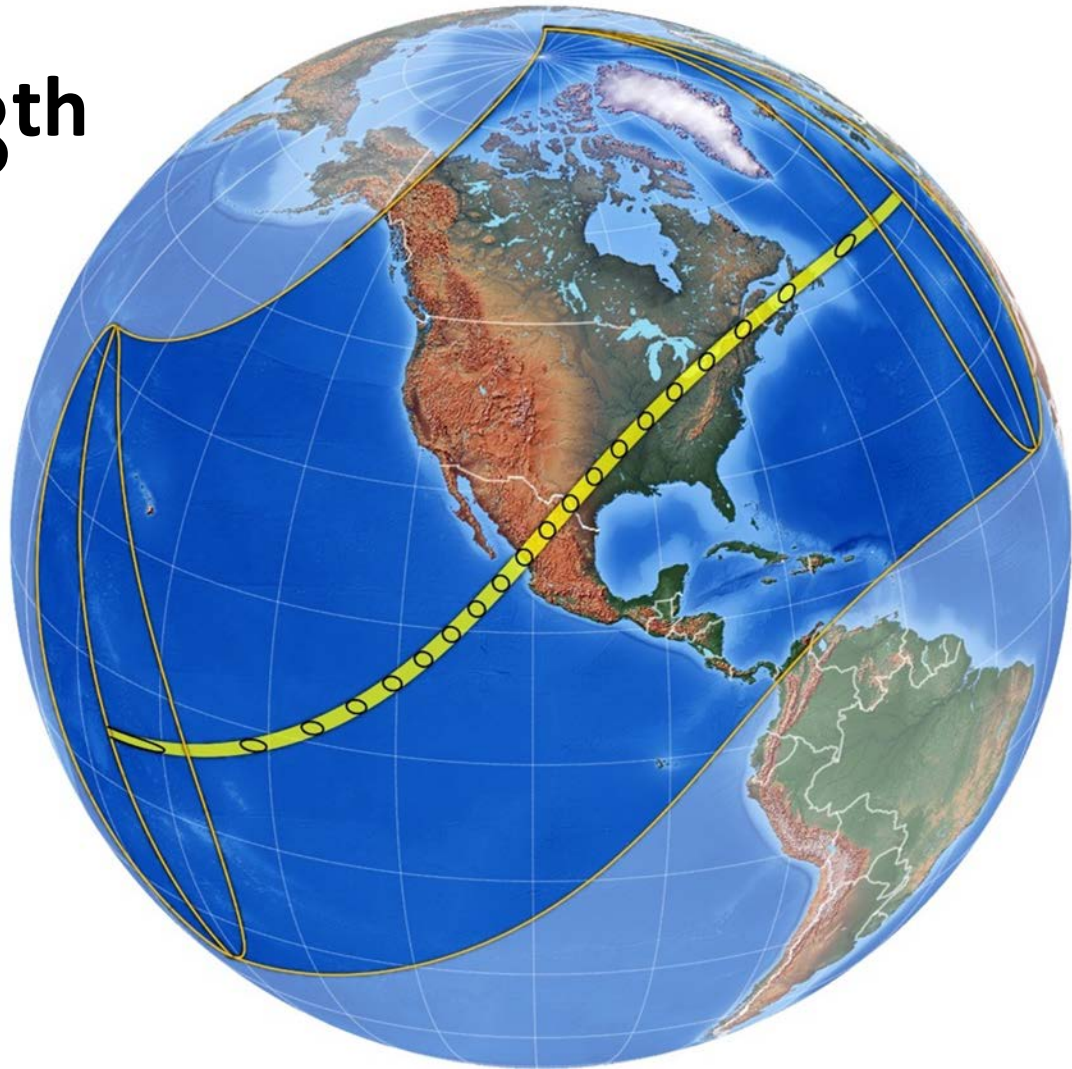
70%

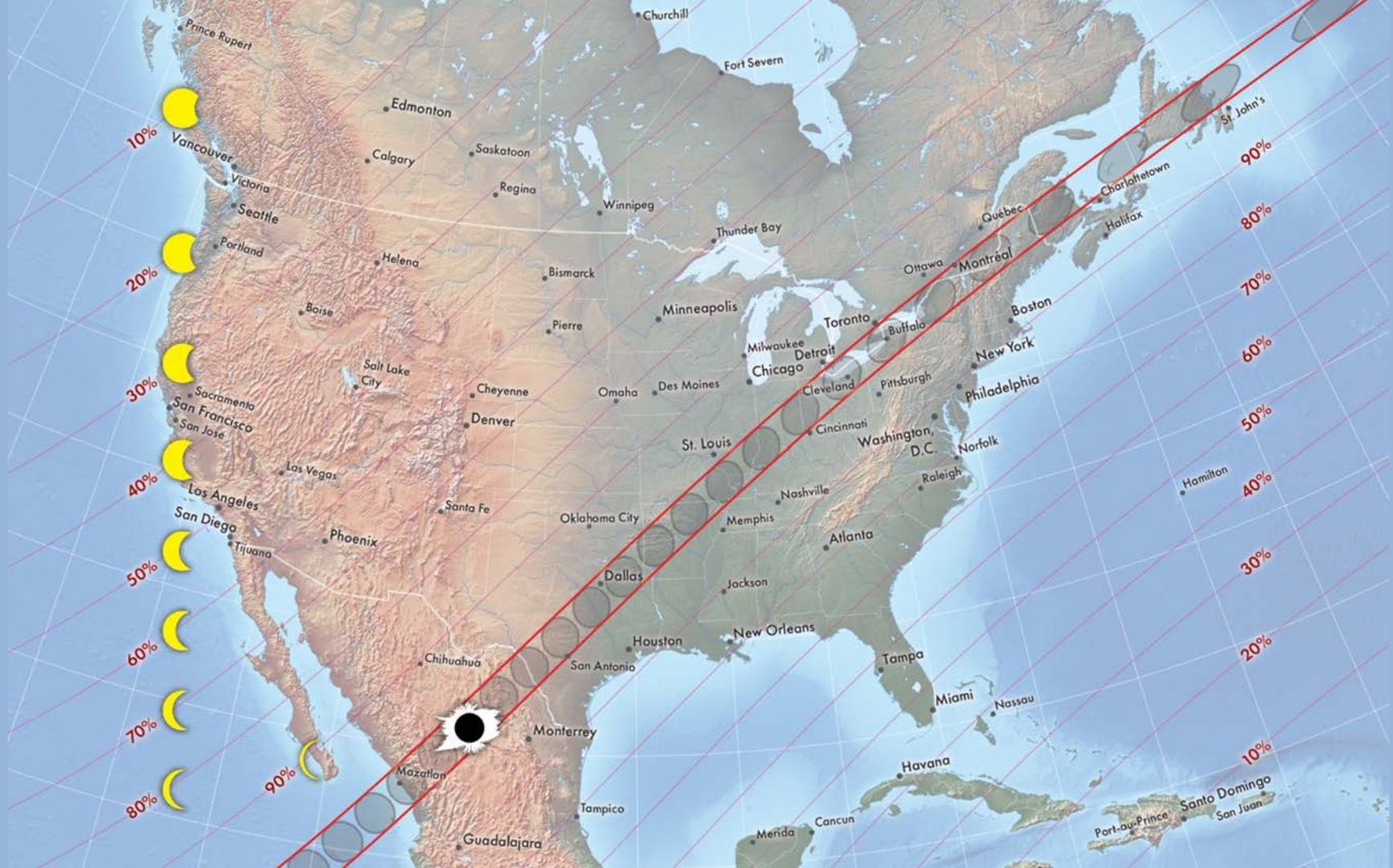
80%



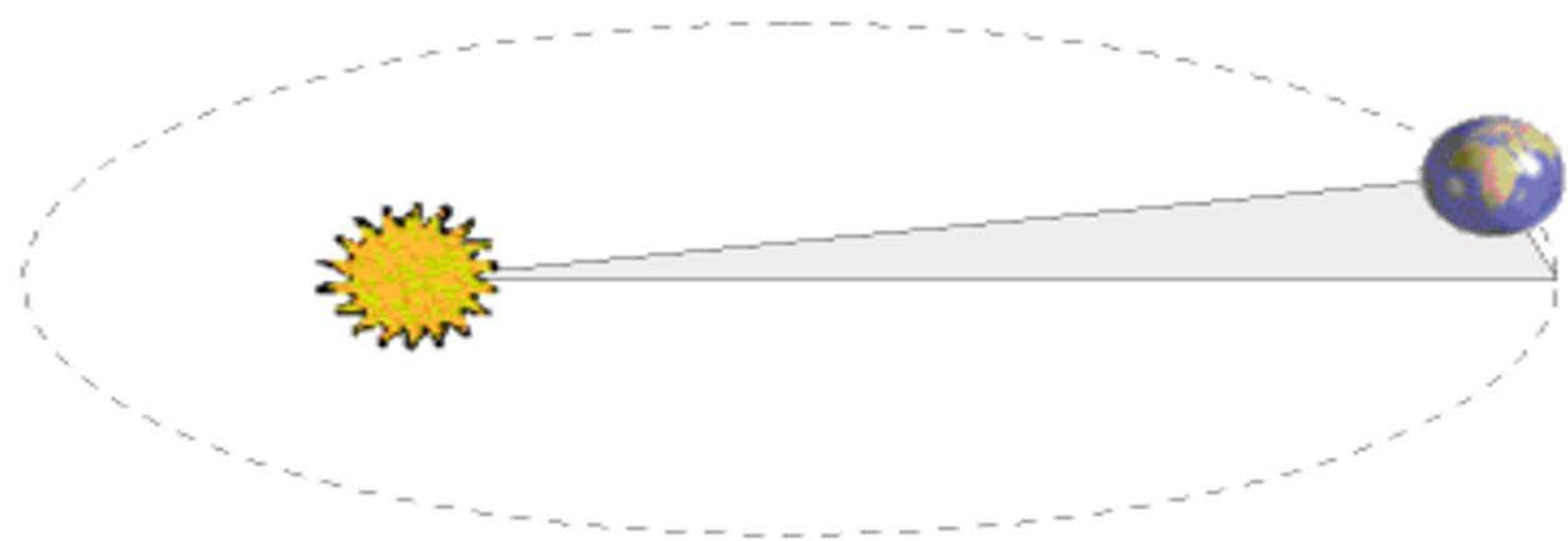


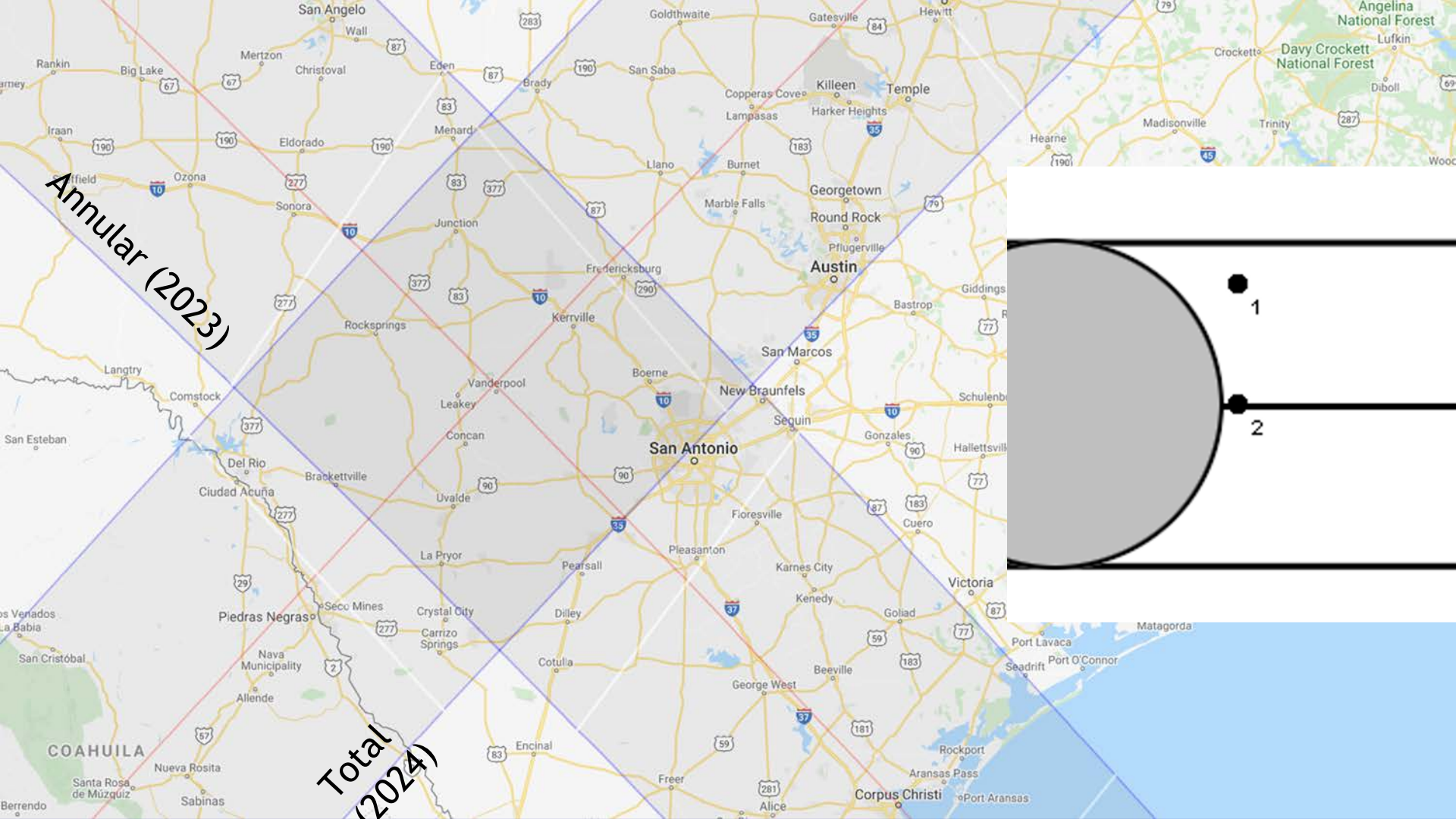
**April 8<sup>th</sup>**  
**2024**





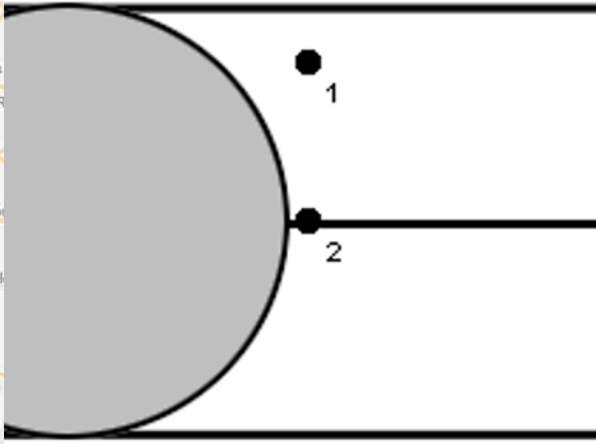
# How long do eclipses last?



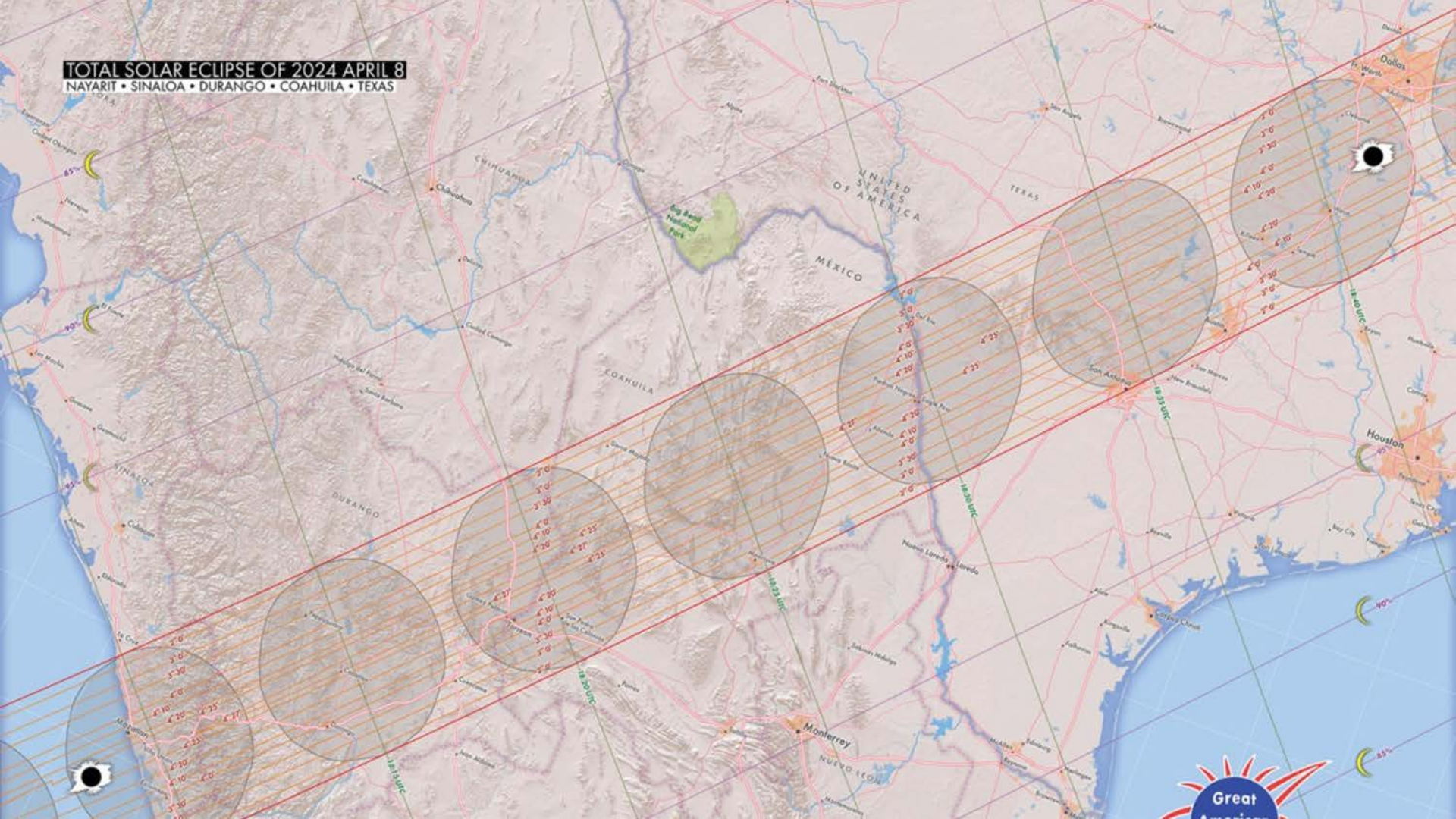


Annular (2023)

Total (2024)



**TOTAL SOLAR ECLIPSE OF 2024 APRIL 8**  
NAYARIT • SINALOA • DURANGO • COAHUILA • TEXAS



7:45



7:00  
7:30  
8:00  
8:10  
8:20  
8:30  
8:40  
8:50  
9:00

8:37  
8:40  
8:50  
9:00  
9:10  
9:20  
9:30  
9:40  
9:50

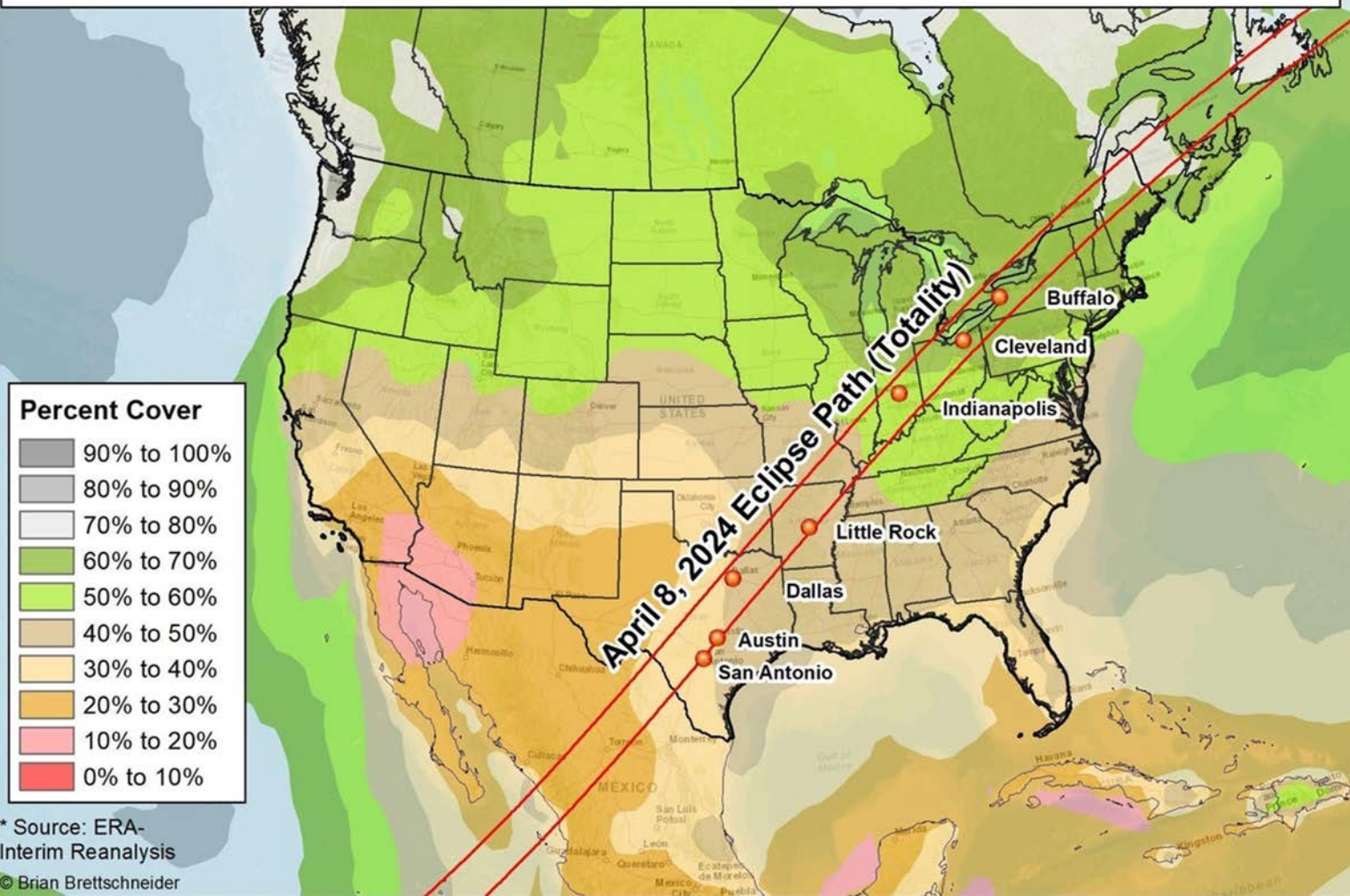
9:00  
9:10  
9:20  
9:30  
9:40  
9:50  
10:00  
10:10  
10:20

9:30  
9:40  
9:50  
10:00  
10:10  
10:20  
10:30  
10:40  
10:50

10:00  
10:10  
10:20  
10:30  
10:40  
10:50  
11:00  
11:10  
11:20

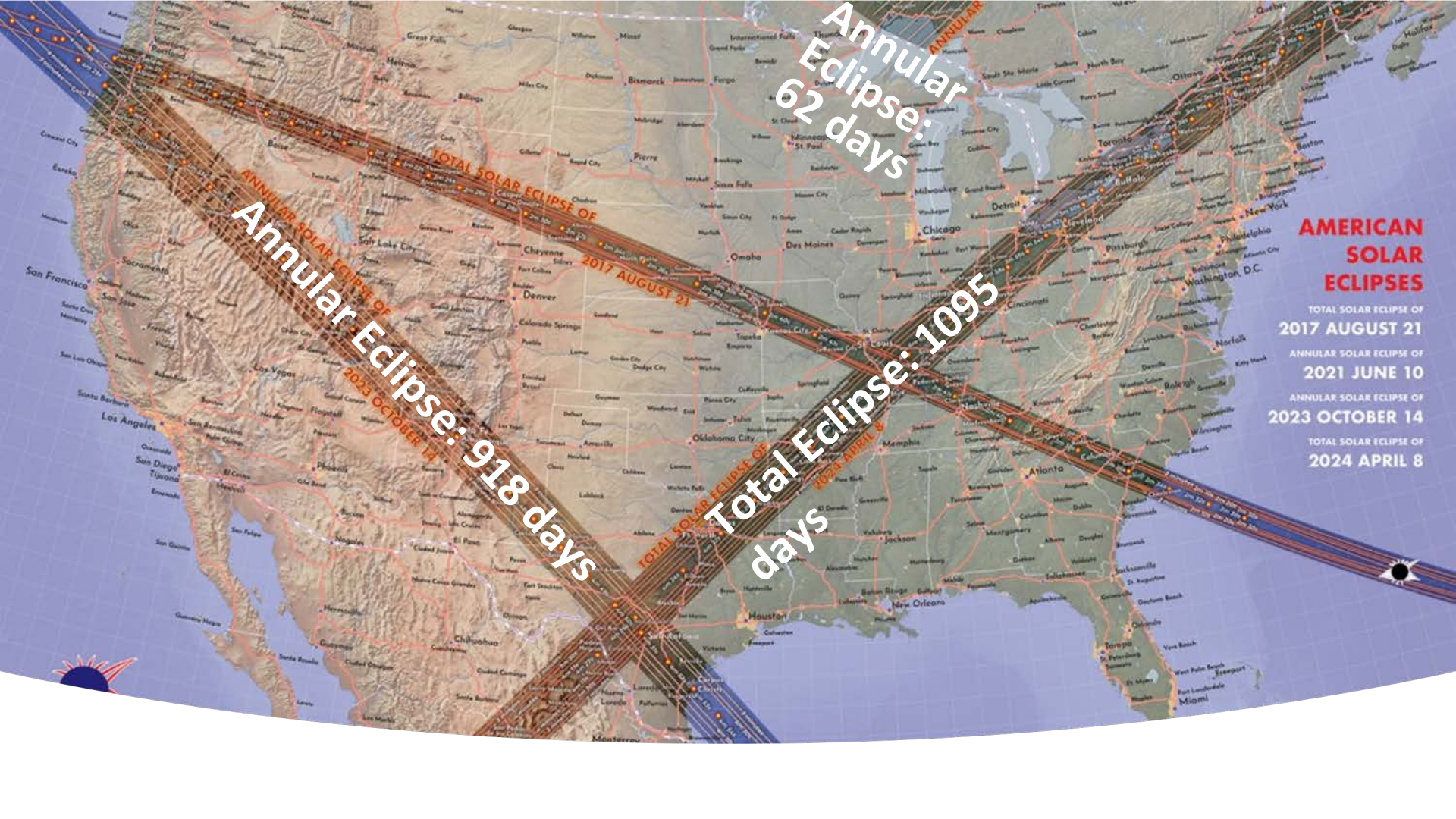


# Cloud Coverage Climatology at 18 UTC Between April 3 and Apr 13 (1979-2016)\*



\* Source: ERA-Interim Reanalysis

© Brian Brettschneider



Annular Eclipse: 62 days

Annular Eclipse of 2017 August 21  
Annular Eclipse of 2023 October 14  
Annular Eclipse: 918 days

Total Eclipse of 2021 June 10  
Total Eclipse of 2024 April 8  
Total Eclipse: 1095 days

### AMERICAN SOLAR ECLIPSES

TOTAL SOLAR ECLIPSE OF 2017 AUGUST 21

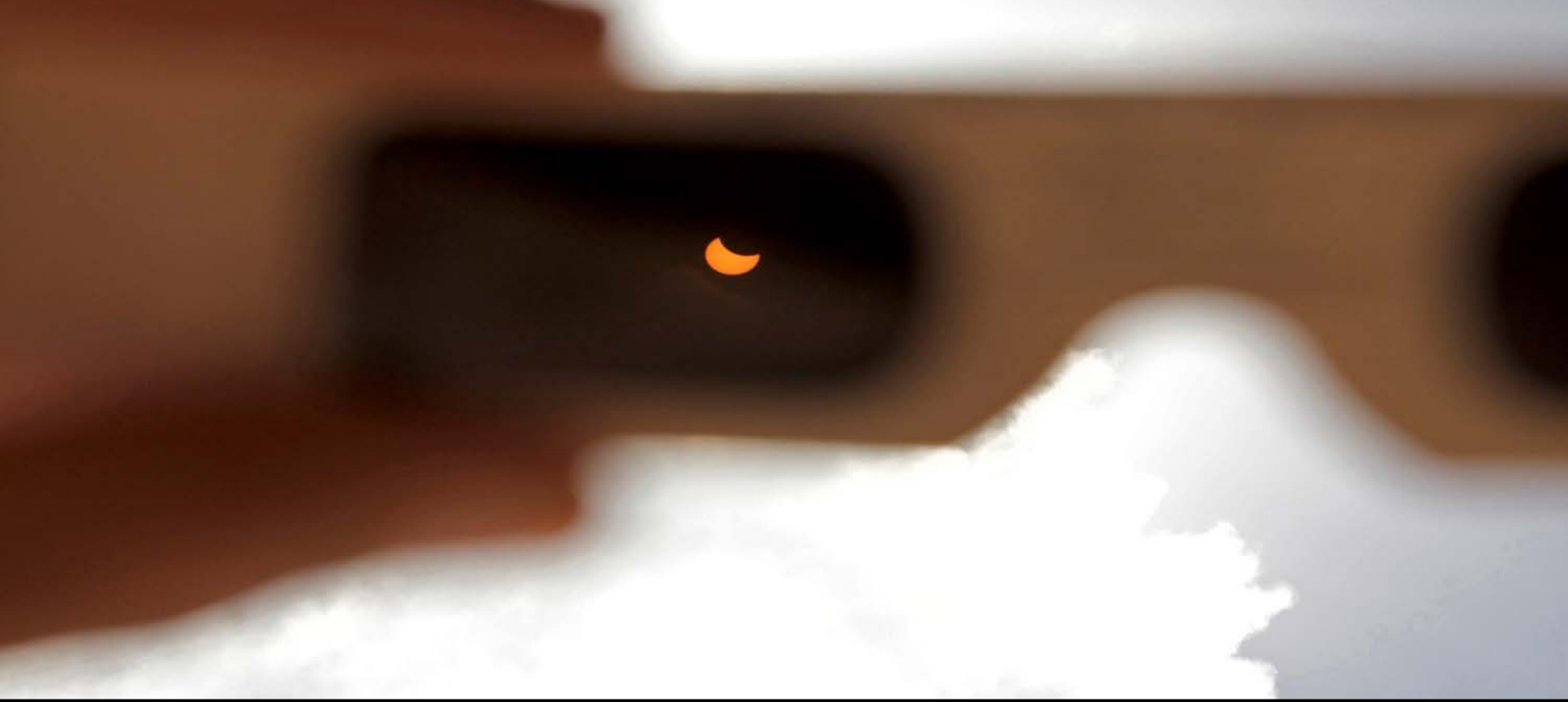
ANNULAR SOLAR ECLIPSE OF 2021 JUNE 10

ANNULAR SOLAR ECLIPSE OF 2023 OCTOBER 14

TOTAL SOLAR ECLIPSE OF 2024 APRIL 8









AMERICAN ASTRONOMICAL SOCIETY

National Science Foundation



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

