

EclipseWise.com

*Website of
Eclipse Predictions*

Fred Espenak

Scientist Emeritus

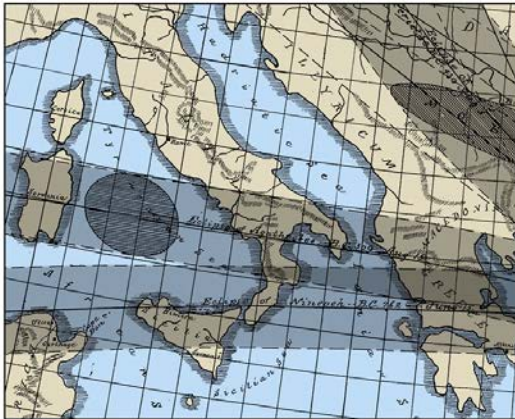
NASA's Goddard Space Flight Center



Canon of Eclipses

Five Millennium Canon of Solar Eclipses

-1999 to 3000

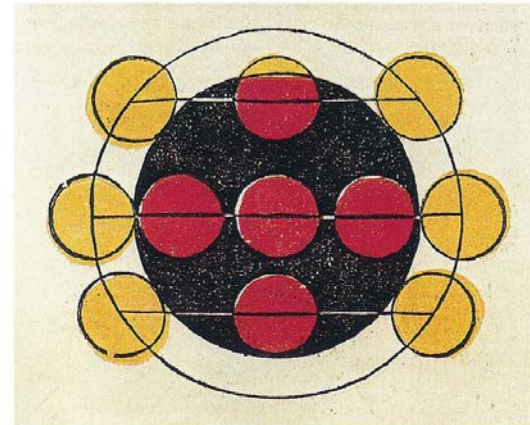


Fred Espenak and Jean Meeus

5,000 Years =
11,898
Solar Eclipses

Five Millennium Canon of Lunar Eclipses

-1999 to 3000



Fred Espenak and Jean Meeus

5,000 Years =
12,064
Lunar Eclipses



SOLAR ECLIPSES

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Introduction

Welcome to *EclipseWise's* main page for [Solar Eclipses](#). You can learn more about this website by visiting the [Introduction Page](#).

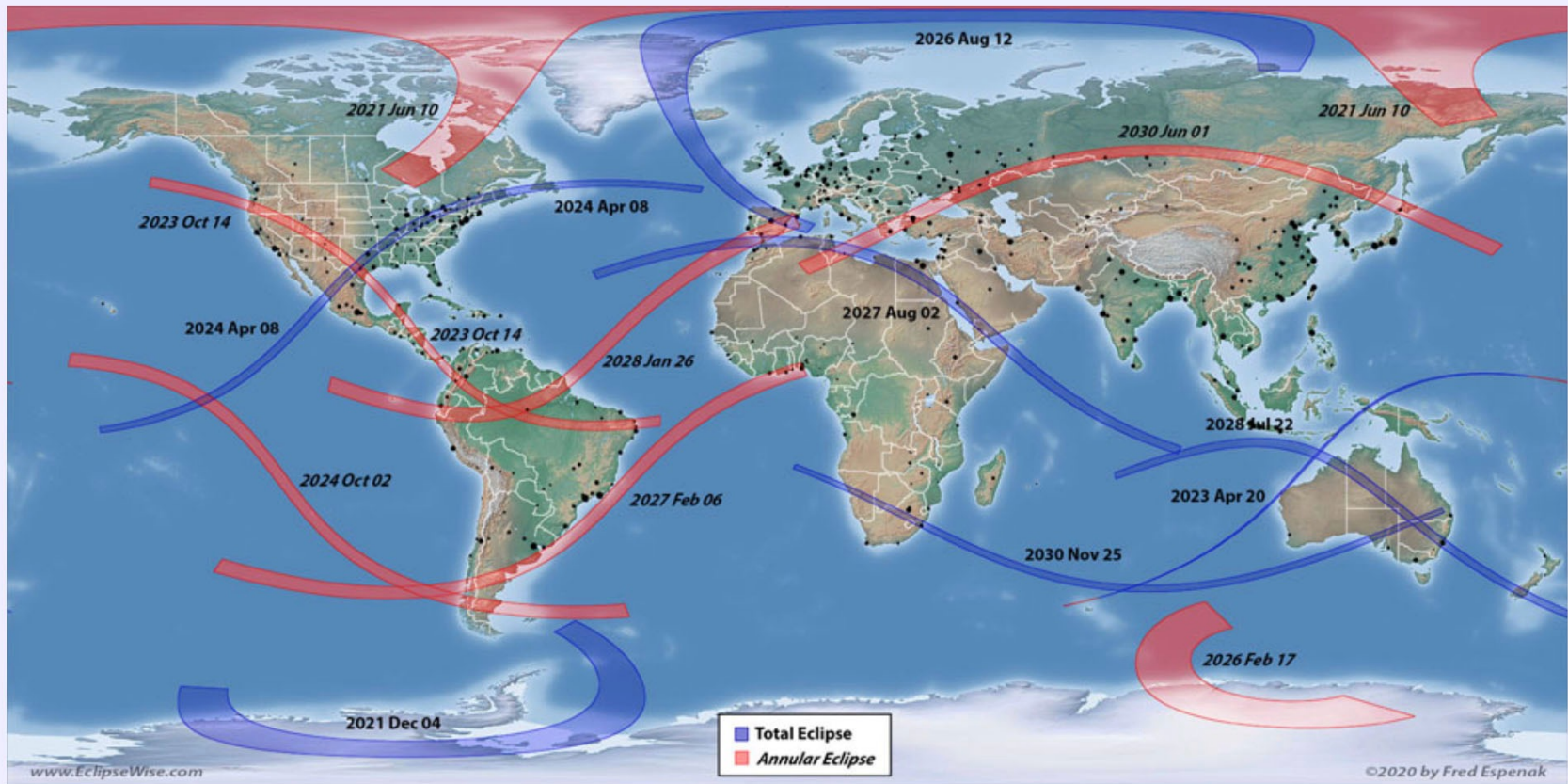
I welcome all comments, suggestions and corrections (via [Contact](#)) to make *EclipseWise.com* the very best resource on eclipses both past and future. Please help support this website by making a [donation](#).

Clear skies

EclipseWise.com/solar

Central Solar Eclipses: 2021 to 2030

The path of every central [solar eclipse \(total, annular, and hybrid\)](#) from 2021 to 2030 is plotted on the world map (equidistant cylindrical projection). The central paths of [total eclipses](#) are shaded blue, while [annular eclipses](#) are shaded red. For hybrid eclipses, part of the path is shaded blue (total), and part is shaded red (annular). Major cities are plotted as black dots, scaled by population size.



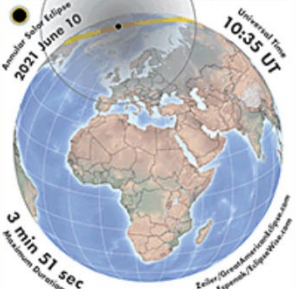
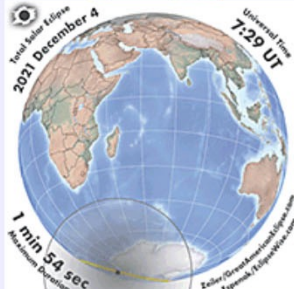

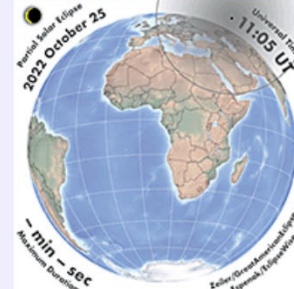

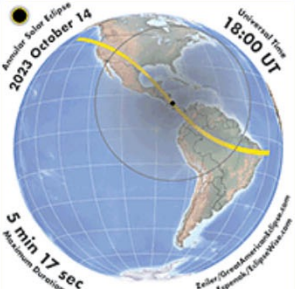
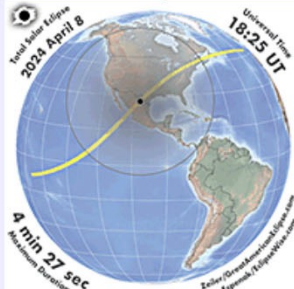
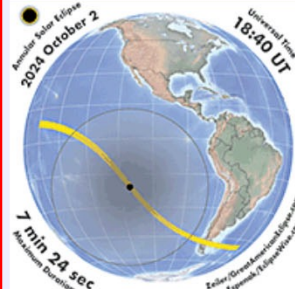
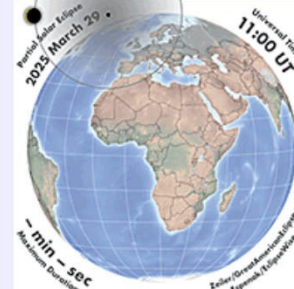
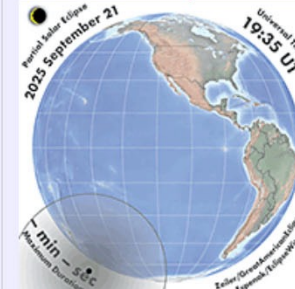
[Click HERE for a larger version of this map](#)

For more information about these eclipses, visit: [Decade of Solar Eclipses: 2021 to 2030](#)

For a World Map of other decades, visit: [21st Century World Atlas of Central Solar Eclipses](#)

Global Map Animations of Solar Eclipses: 2021 - 2025

Global Map Animations of Solar Eclipses: 2021 - 2025

<p>Prime Page for Annular Solar Eclipse 2021 Jun 10</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>	<p>Prime Page for Total Solar Eclipse 2021 Dec 04</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>	<p>Prime Page for Partial Solar Eclipse 2022 Apr 30</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>	<p>Prime Page for Partial Solar Eclipse 2022 Oct 25</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>	<p>Prime Page for Hybrid Solar Eclipse 2023 Apr 20</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>
<p>Prime Page for Annular Solar Eclipse 2023 Oct 14</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>	<p>Prime Page for Total Solar Eclipse 2024 Apr 08</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>	<p>Prime Page for Annular Solar Eclipse 2024 Oct 02</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>	<p>Prime Page for Partial Solar Eclipse 2025 Mar 29</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>	<p>Prime Page for Partial Solar Eclipse 2025 Sep 21</p>  <p><i>Small Animation: 300 px Medium Animation: 400 px Large Animation: 800 px</i></p>

- [Global Map Animations of Solar Eclipses: 2001 - 2100](#) - animated maps for every solar eclipse during the 21st Century



Solar Eclipse Preview: 2022 Through 2030

Solar Eclipse Preview: 2022 through 2030

<p>Prime Page for Partial Solar Eclipse 2022 Apr 30</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Partial Solar Eclipse 2022 Oct 25</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Hybrid Solar Eclipse 2023 Apr 20</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Annular Solar Eclipse 2023 Oct 14</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Total Solar Eclipse 2024 Apr 08</p> <p>Link: Google Eclipse Map</p>
<p>Prime Page for Annular Solar Eclipse 2024 Oct 02</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Partial Solar Eclipse 2025 Mar 29</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Partial Solar Eclipse 2025 Sep 21</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Annular Solar Eclipse 2026 Feb 17</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Total Solar Eclipse 2026 Aug 12</p> <p>Link: Google Eclipse Map</p>
<p>Prime Page for</p>	<p>Prime Page for</p>	<p>Prime Page for</p>	<p>Prime Page for</p>	<p>Prime Page for</p>

SOLAR ECLIPSE PRIME PAGE

TOTAL SOLAR ECLIPSE OF 2024 APR 08

Introduction

The **Total Solar Eclipse of 2024 Apr 08** is visible from the following geographic regions:

- **Partial Eclipse:** North America, Central America
- **Total Eclipse:** Mexico, central U.S., east Canada

The map to the right depicts the geographic regions of eclipse visibility. Click on the map to enlarge it. For an explanation of the features appearing in the map, see [Key to Solar Eclipse Maps](#).

The instant of *greatest eclipse* takes place on 2024 Apr 08 at 18:18:29 TD (18:17:18 UT1). This is 1.0 days after the Moon reaches perigee. During the eclipse, the Sun is in the constellation *Aries*. The *synodic month* in which the eclipse takes place has a *Brown Lunation Number* of 1253.

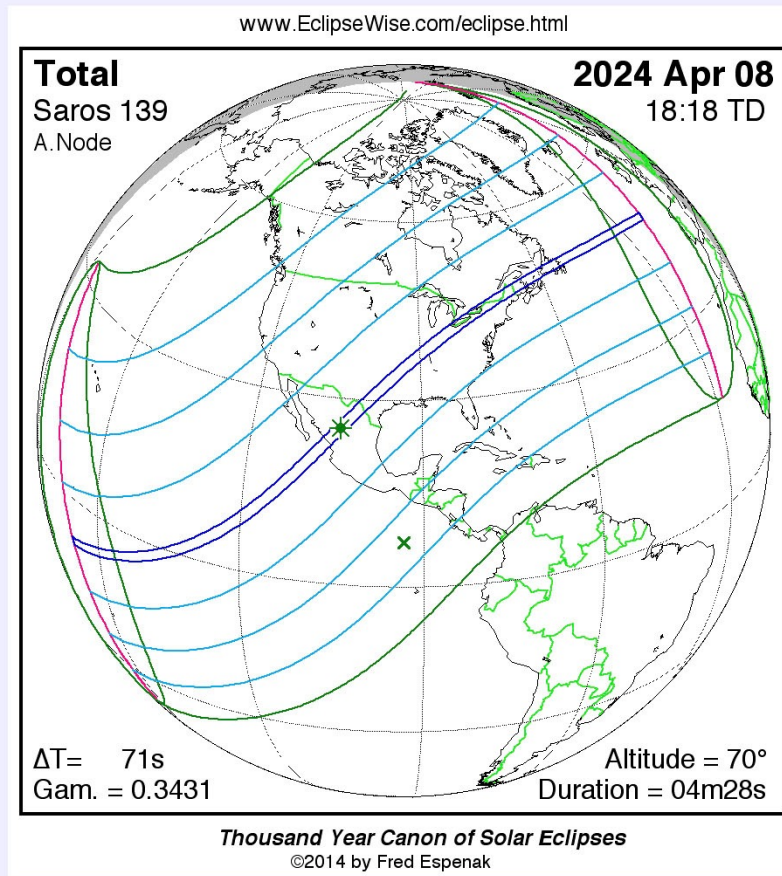
The eclipse belongs to [Saros 139](#) and is number 30 of 71 eclipses in the series. All eclipses in this series occur at the Moon's *ascending node*. The Moon moves southward with respect to the node with each succeeding eclipse in the series and *gamma* decreases.

The solar eclipse of 2024 Apr 08 is a relatively long *total* eclipse with a duration at *greatest eclipse* of 04m28s. It has an *eclipse magnitude* of 1.0566.

The total solar eclipse of 2024 Apr 08 is preceded two weeks earlier by a penumbral lunar eclipse on [2024 Mar 25](#).

These eclipses all take place during a single *eclipse season*.

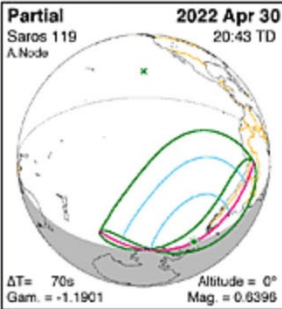
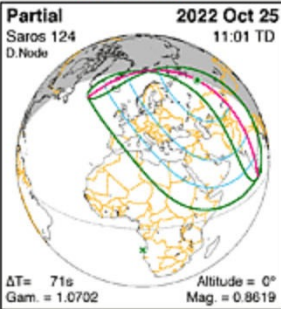
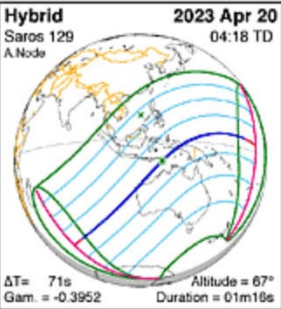
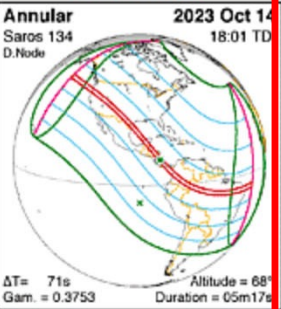
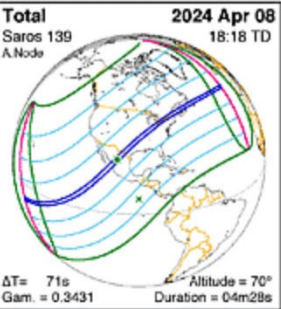
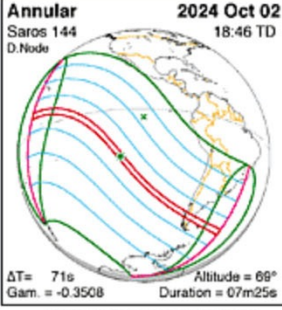
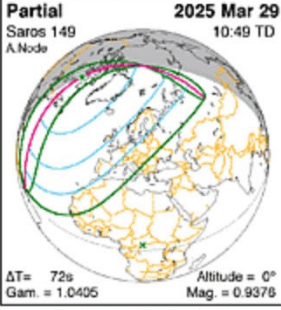
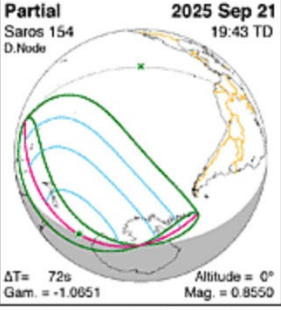
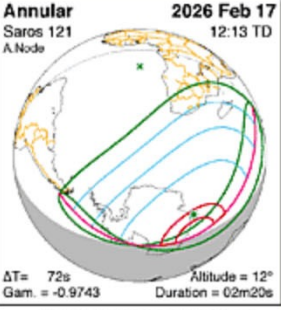
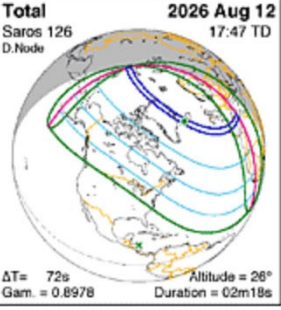
- [Orthographic Map: Total Solar Eclipse of 2024 Apr 08](#) - detailed global map of eclipse visibility ([Key to Figure](#))
- [Google Map: Total Solar Eclipse of 2024 Apr 08](#) - interactive map of the eclipse path
- [Path Table: Total Solar Eclipse of 2024 Apr 08](#) - coordinates of the central line and path limits
- [Circumstances Table: Total Solar Eclipse of 2024 Apr 08](#) - eclipse times for hundreds of cities
- [Saros 139 Table](#) - data for all eclipses in the Saros series



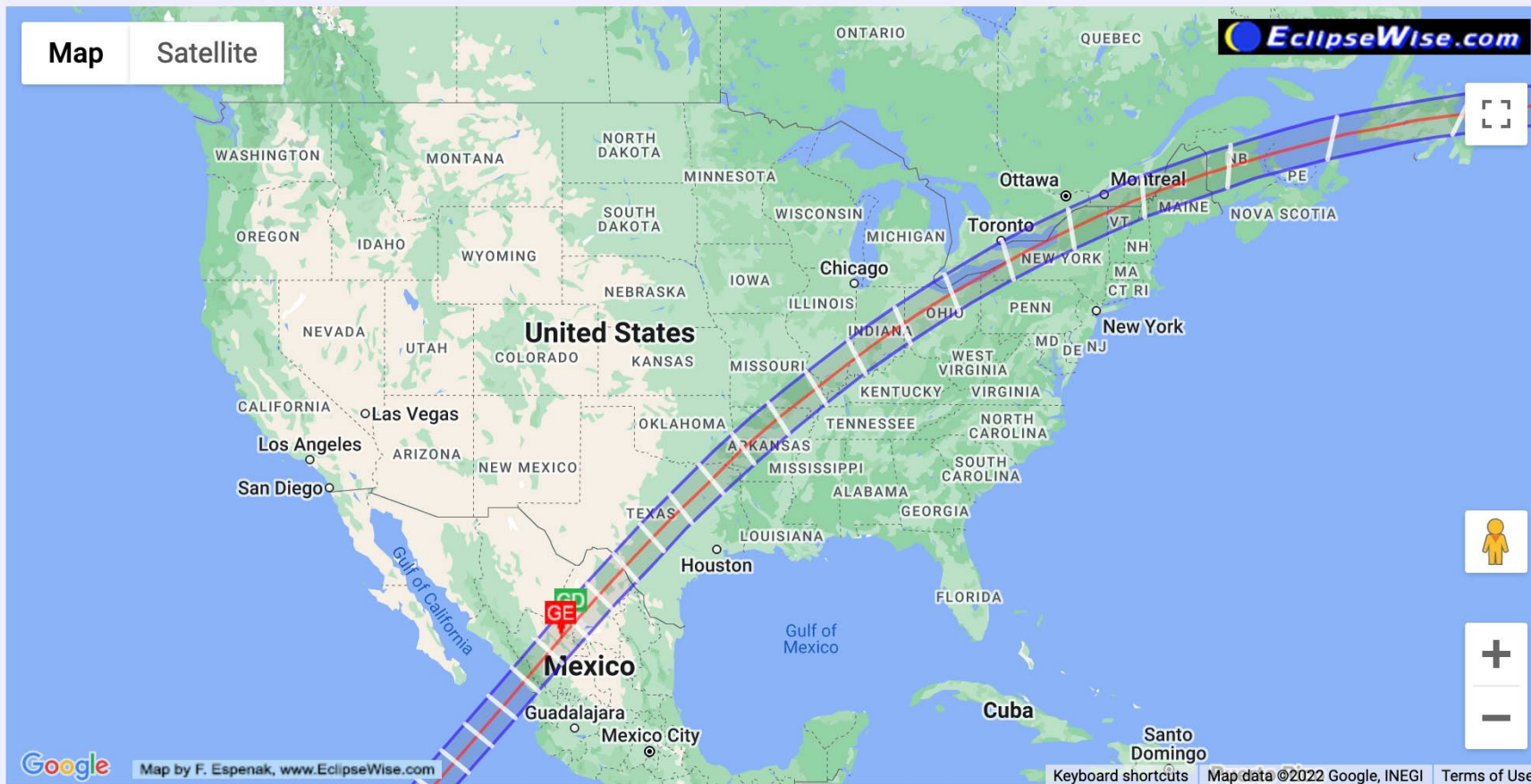


Solar Eclipse Preview: 2022 Through 2030

Solar Eclipse Preview: 2022 through 2030

<p>Prime Page for Partial Solar Eclipse 2022 Apr 30</p>  <p>Partial Saros 119 A.Node 2022 Apr 30 20:43 TD</p> <p>$\Delta T = 70s$ Altitude = 0° Gam. = -1.1901 Mag. = 0.6396</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Partial Solar Eclipse 2022 Oct 25</p>  <p>Partial Saros 124 D.Node 2022 Oct 25 11:01 TD</p> <p>$\Delta T = 71s$ Altitude = 0° Gam. = 1.0702 Mag. = 0.8619</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Hybrid Solar Eclipse 2023 Apr 20</p>  <p>Hybrid Saros 129 A.Node 2023 Apr 20 04:18 TD</p> <p>$\Delta T = 71s$ Altitude = 67° Gam. = -0.3952 Duration = 01m18s</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Annular Solar Eclipse 2023 Oct 14</p>  <p>Annular Saros 134 D.Node 2023 Oct 14 18:01 TD</p> <p>$\Delta T = 71s$ Altitude = 68° Gam. = 0.3753 Duration = 05m17s</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Total Solar Eclipse 2024 Apr 08</p>  <p>Total Saros 139 A.Node 2024 Apr 08 18:18 TD</p> <p>$\Delta T = 71s$ Altitude = 70° Gam. = 0.3431 Duration = 04m28s</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>
<p>Prime Page for Annular Solar Eclipse 2024 Oct 02</p>  <p>Annular Saros 144 D.Node 2024 Oct 02 18:46 TD</p> <p>$\Delta T = 71s$ Altitude = 69° Gam. = -0.3508 Duration = 07m25s</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Partial Solar Eclipse 2025 Mar 29</p>  <p>Partial Saros 149 A.Node 2025 Mar 29 10:49 TD</p> <p>$\Delta T = 72s$ Altitude = 0° Gam. = 1.0405 Mag. = 0.9376</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Partial Solar Eclipse 2025 Sep 21</p>  <p>Partial Saros 154 D.Node 2025 Sep 21 19:43 TD</p> <p>$\Delta T = 72s$ Altitude = 0° Gam. = -1.0651 Mag. = 0.8550</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Annular Solar Eclipse 2026 Feb 17</p>  <p>Annular Saros 121 A.Node 2026 Feb 17 12:13 TD</p> <p>$\Delta T = 72s$ Altitude = 12° Gam. = -0.9743 Duration = 02m20s</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>	<p>Prime Page for Total Solar Eclipse 2026 Aug 12</p>  <p>Total Saros 126 D.Node 2026 Aug 12 17:47 TD</p> <p>$\Delta T = 72s$ Altitude = 26° Gam. = 0.8978 Duration = 02m18s</p> <p>Thousand Year Canon of Solar Eclipses ©2014 by Fred Espenak</p> <p>Link: Google Eclipse Map</p>
<p>Prime Page for</p>	<p>Prime Page for</p>	<p>Prime Page for</p>	<p>Prime Page for</p>	<p>Prime Page for</p>

GOOGLE ECLIPSE MAP PAGE TOTAL SOLAR ECLIPSE OF 2024 APR 08



Map centered on (latitude, longitude): (36.9193° N, 92.1011° W)
Cursor position (latitude, longitude): (20.295° N, 132.355° W)
Distance from last marker: 4301.73km (2672.97 miles)

Time Zone: UT1 GMT/London

Show marker on click

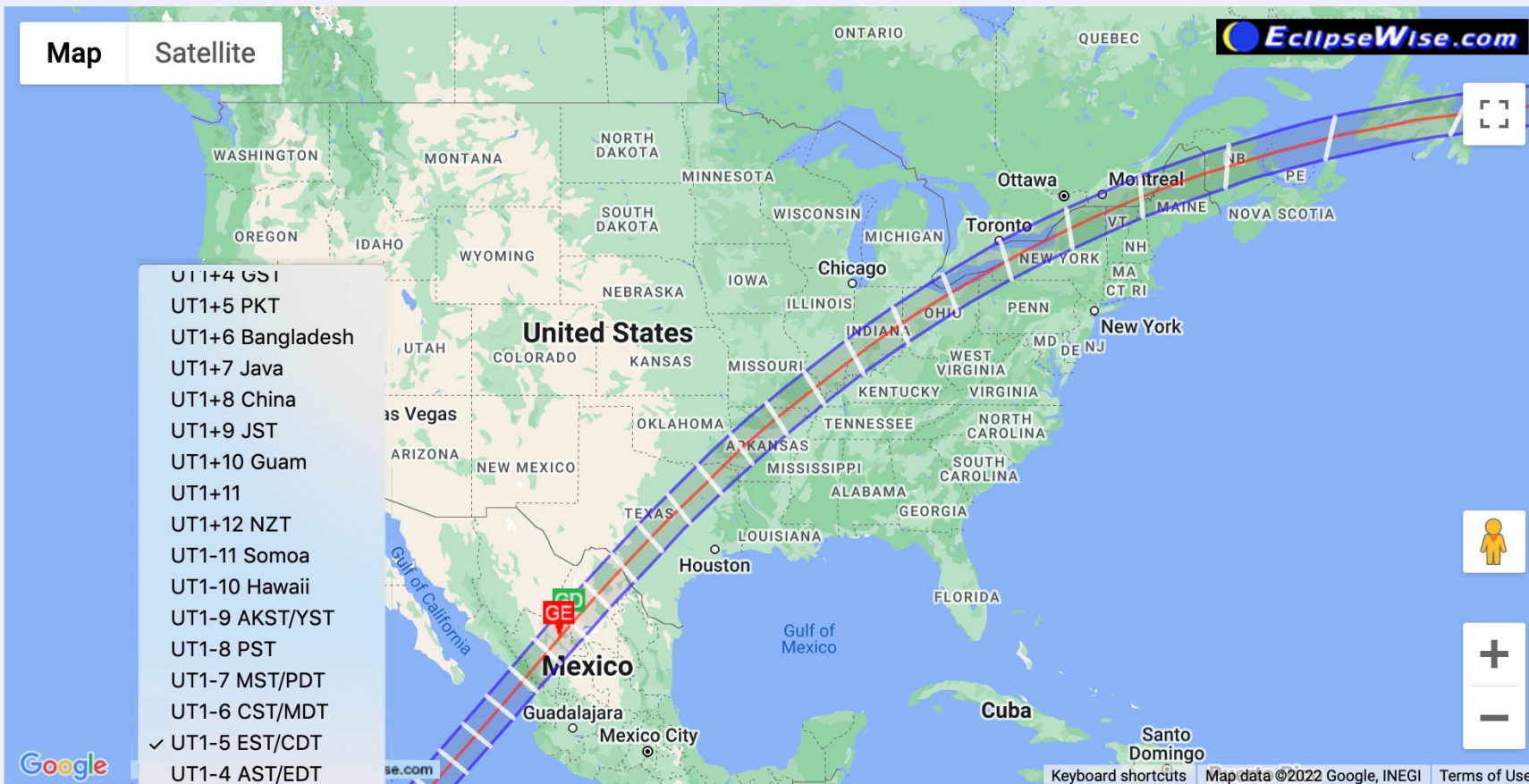
Clear Markers

Large map

Eclipse Times in Pop-up

GOOGLE ECLIPSE MAP PAGE

TOTAL SOLAR ECLIPSE OF 2024 APR 08



Map

Satellite



- UT1+4 GSI
- UT1+5 PKT
- UT1+6 Bangladesh
- UT1+7 Java
- UT1+8 China
- UT1+9 JST
- UT1+10 Guam
- UT1+11
- UT1+12 NZT
- UT1-11 Somoa
- UT1-10 Hawaii
- UT1-9 AKST/YST
- UT1-8 PST
- UT1-7 MST/PDT
- UT1-6 CST/MDT
- ✓ UT1-5 EST/CDT
- UT1-4 AST/EDT
- UT1-3 BST/ART
- UT1-2 VZT
- UT1-1 AT

Map centered on: (36.9193° N, 92.1011° W)
 Cursor position: (20.295° N, 132.355° W)
 Distance from center: 2672.97 miles

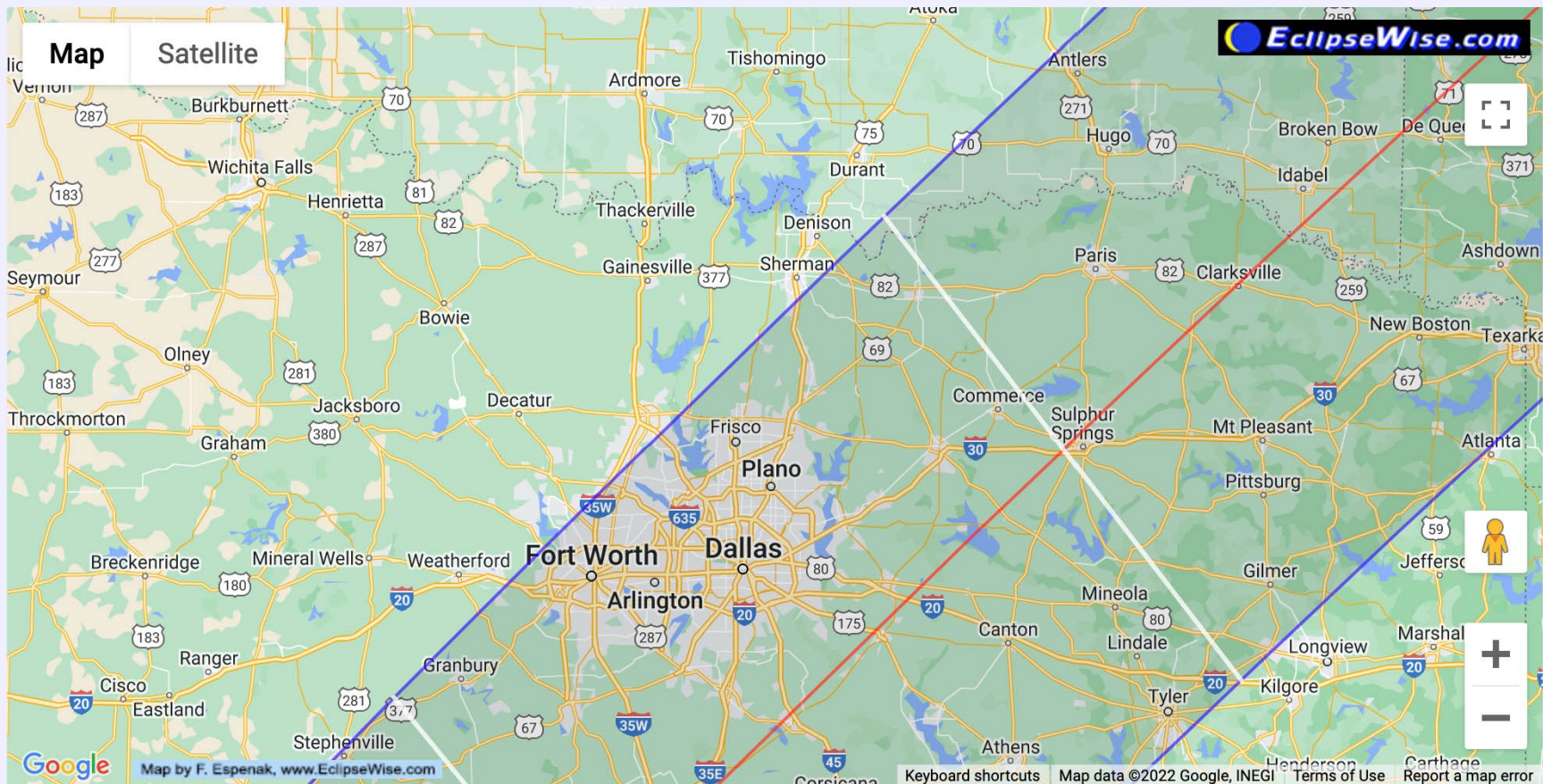
Time Zone: UT1 GMT/London

Show marker on click

Large map

GOOGLE ECLIPSE MAP PAGE

TOTAL SOLAR ECLIPSE OF 2024 APR 08



Map centered on (latitude, longitude): (33.2867° N, 96.684° W)
Cursor position (latitude, longitude): (32.2211° N, 96.2335° W)
Distance from last marker: 81.17km (50.44 miles)

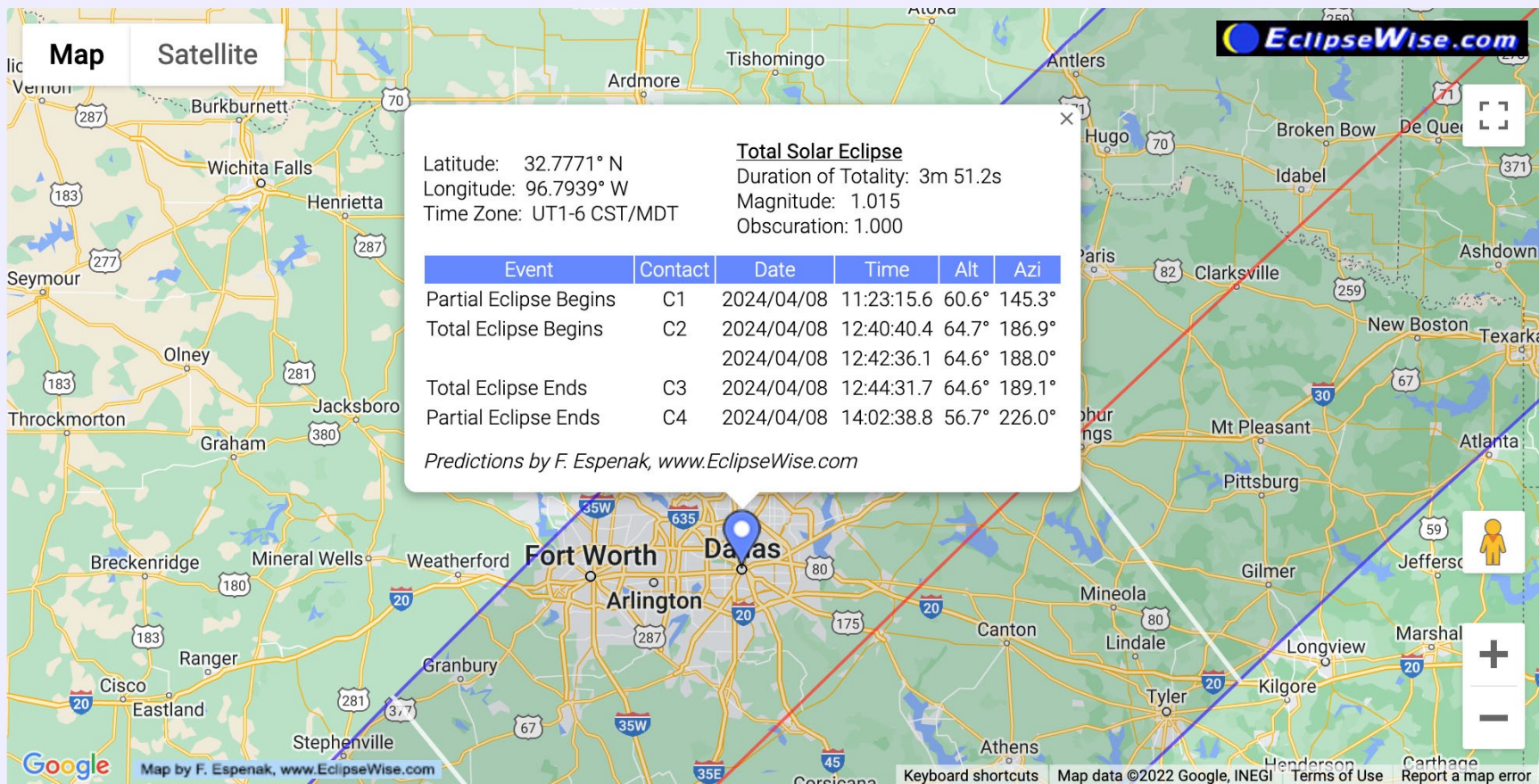
Time Zone:

Show marker on click

Large map

GOOGLE ECLIPSE MAP PAGE

TOTAL SOLAR ECLIPSE OF 2024 APR 08



Map centered on (latitude, longitude): (33.2867° N, 96.684° W)
 Cursor position (latitude, longitude): (32.2304° N, 94.4757° W)
 Distance from last marker: 225.97km (140.41 miles)

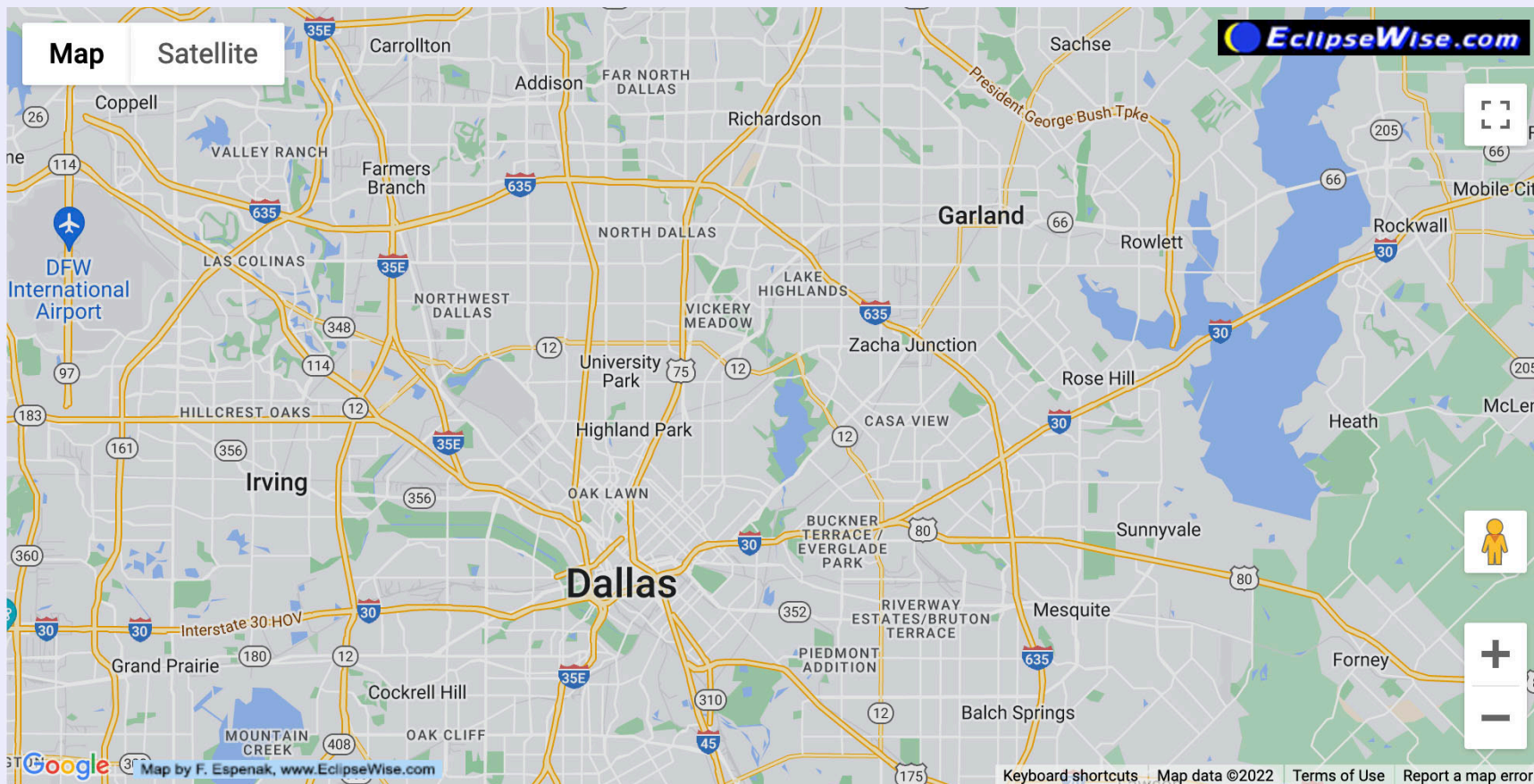
Time Zone: UT1-6 CST/MDT

Show marker on click

Large map

GOOGLE ECLIPSE MAP PAGE

TOTAL SOLAR ECLIPSE OF 2024 APR 08



Map centered on (latitude, longitude): (32.8456° N, 96.7298° W)

Cursor position (latitude, longitude): (32.7107° N, 96.5135° W)

Distance from last marker: 11.66km (7.24 miles)

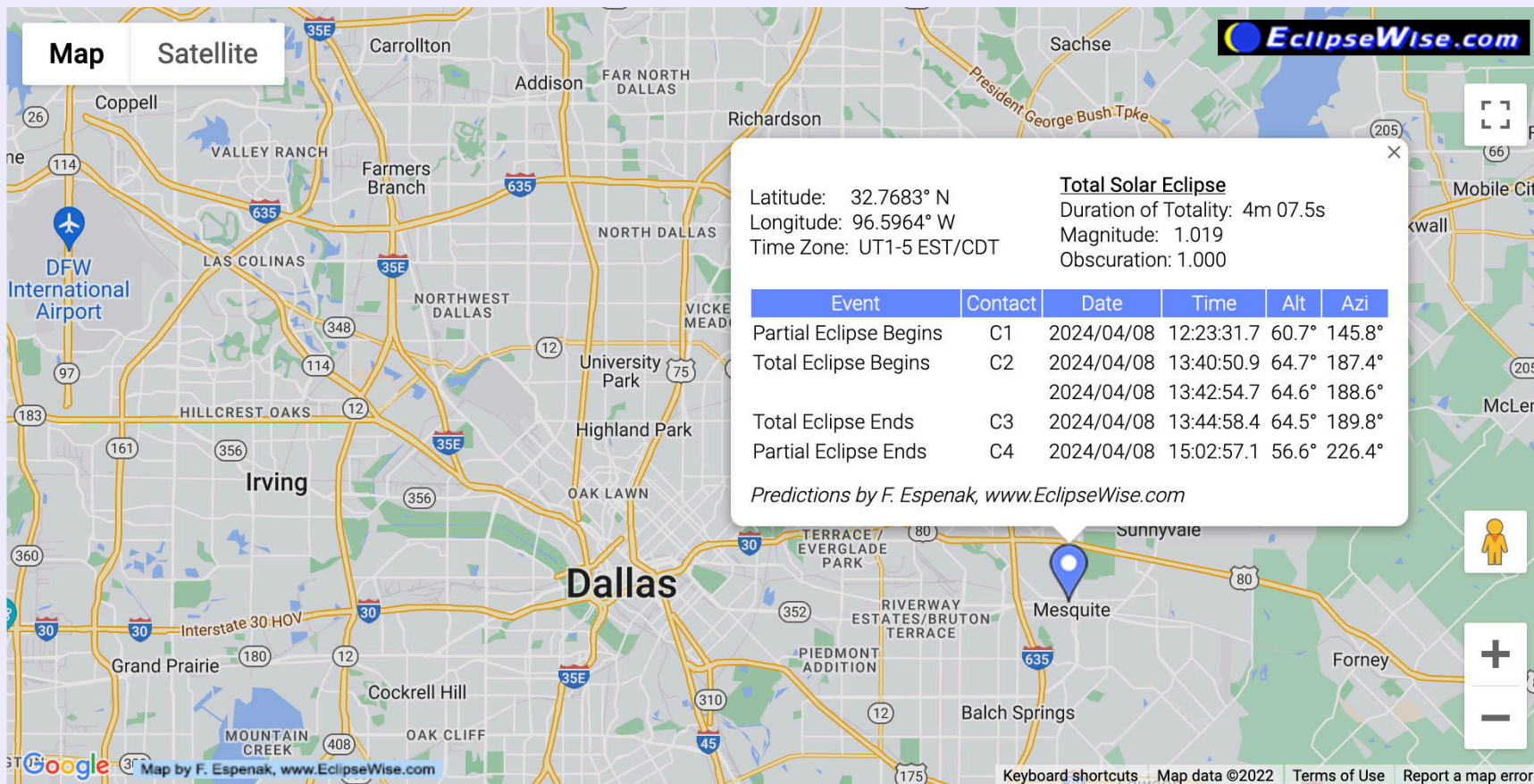
Time Zone: UT1-6 CST/MDT

Show marker on click

Large map

GOOGLE ECLIPSE MAP PAGE

TOTAL SOLAR ECLIPSE OF 2024 APR 08



Map centered on (latitude, longitude): (32.8456° N, 96.7298° W)

Cursor position (latitude, longitude): (32.976° N, 96.8541° W)

Distance from last marker: 33.05km (20.54 miles)

Time Zone: UT1-6 CST/MDT

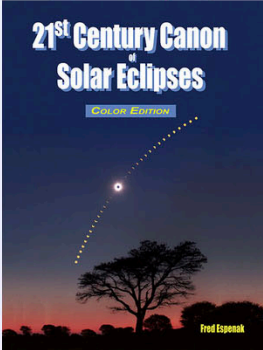
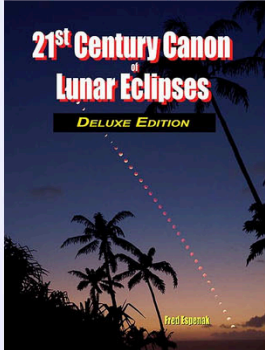
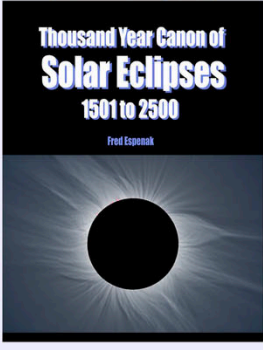
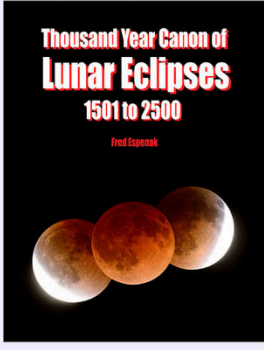
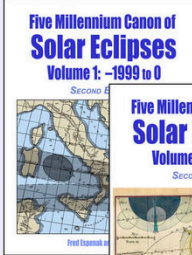
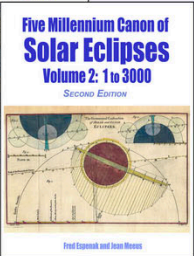
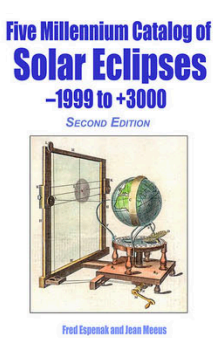

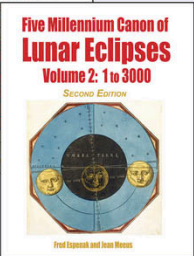
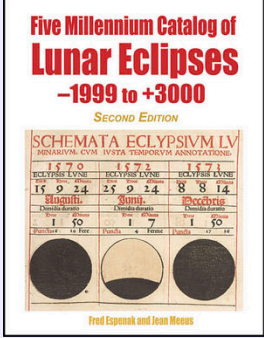

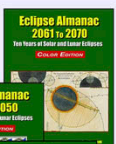



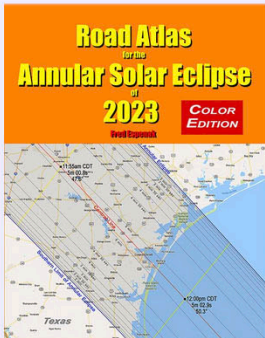
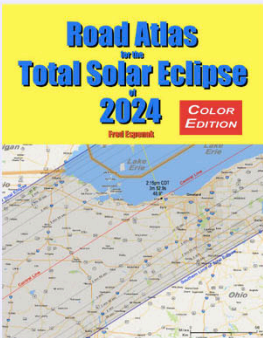
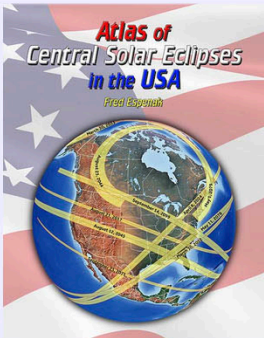
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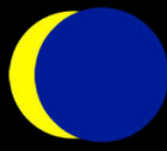
Large map

Clear Markers

Eclipse Times in Pop-up

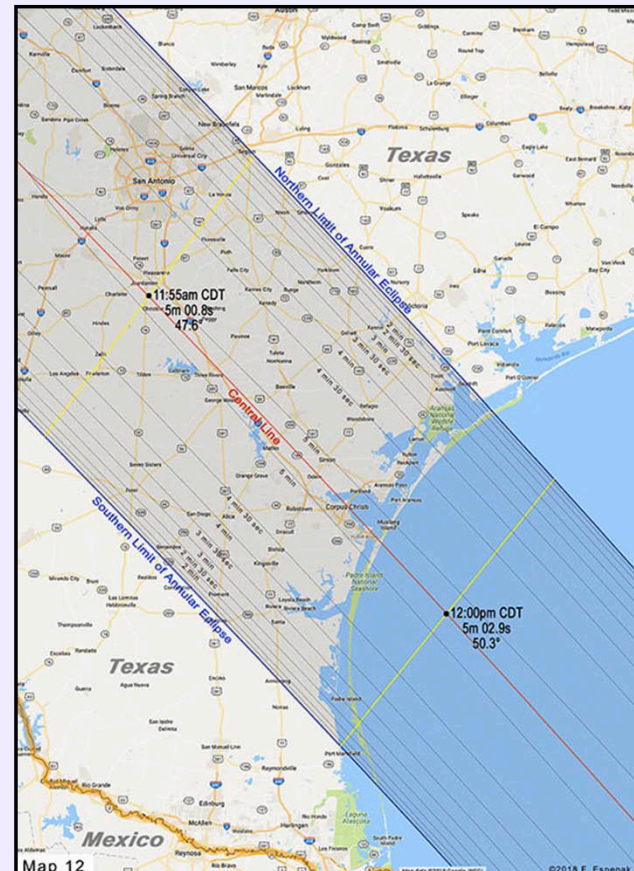
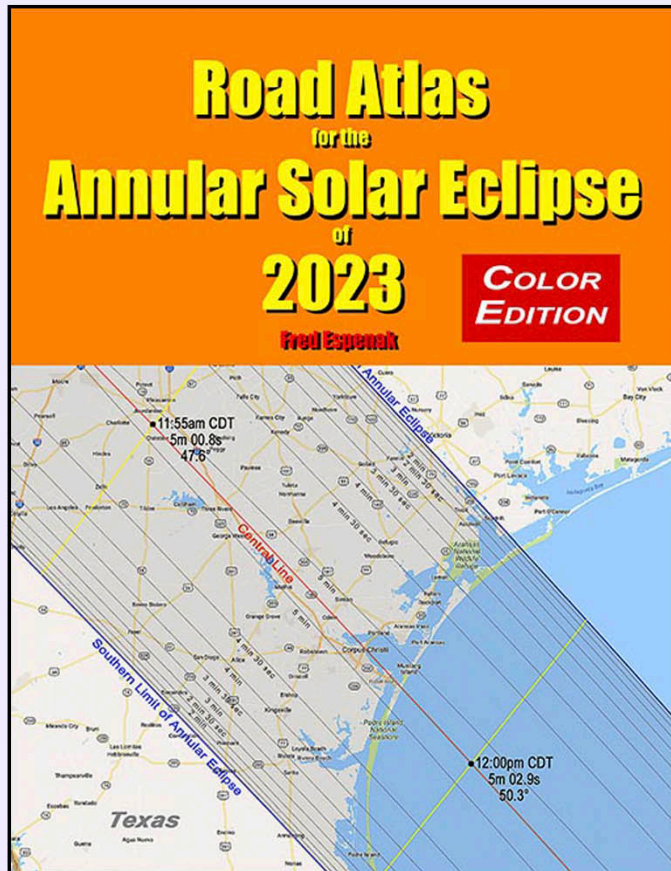
Eclipse Publications

 <p>21st Century Canon of Solar Eclipses Color Edition Fred Espenak</p>	 <p>21st Century Canon of Lunar Eclipses DELUXE EDITION Fred Espenak</p>	 <p>Thousand Year Canon of Solar Eclipses 1501 to 2500 Fred Espenak</p>	 <p>Thousand Year Canon of Lunar Eclipses 1501 to 2500 Fred Espenak</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
 <p>Five Millennium Canon of Solar Eclipses Volume 1: -1999 to 0 Second Edition Fred Espenak</p>  <p>Five Millennium Canon of Solar Eclipses Volume 2: 1 to 3000 Second Edition Fred Espenak and Jean Meeus</p>	 <p>Five Millennium Catalog of Solar Eclipses -1999 to +3000 SECOND EDITION Fred Espenak and Jean Meeus</p>	 <p>Five Millennium Canon of Lunar Eclipses Volume 1: -1999 to 0 Second Edition Fred Espenak</p>  <p>Five Millennium Canon of Lunar Eclipses Volume 2: 1 to 3000 Second Edition Fred Espenak and Jean Meeus</p>	 <p>Five Millennium Catalog of Lunar Eclipses -1999 to +3000 SECOND EDITION Fred Espenak and Jean Meeus</p> <table border="1" data-bbox="1400 829 1613 1006"> <thead> <tr> <th colspan="4">SCHEMATA ECLYPSIVM LV</th> </tr> <tr> <th colspan="4">HENALIVM CVM LVSTA TEMPORVM ANNOTATIONE</th> </tr> <tr> <th>1570</th> <th>1575</th> <th>1578</th> <th>1579</th> </tr> <tr> <th>1579</th> <th>1580</th> <th>1581</th> <th>1582</th> </tr> </thead> <tbody> <tr> <td>1570</td> <td>24</td> 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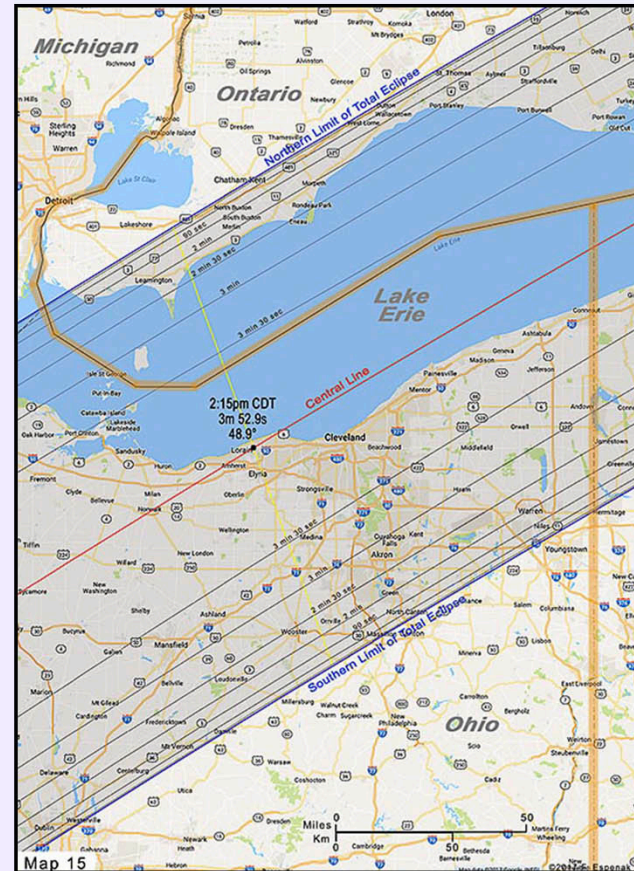
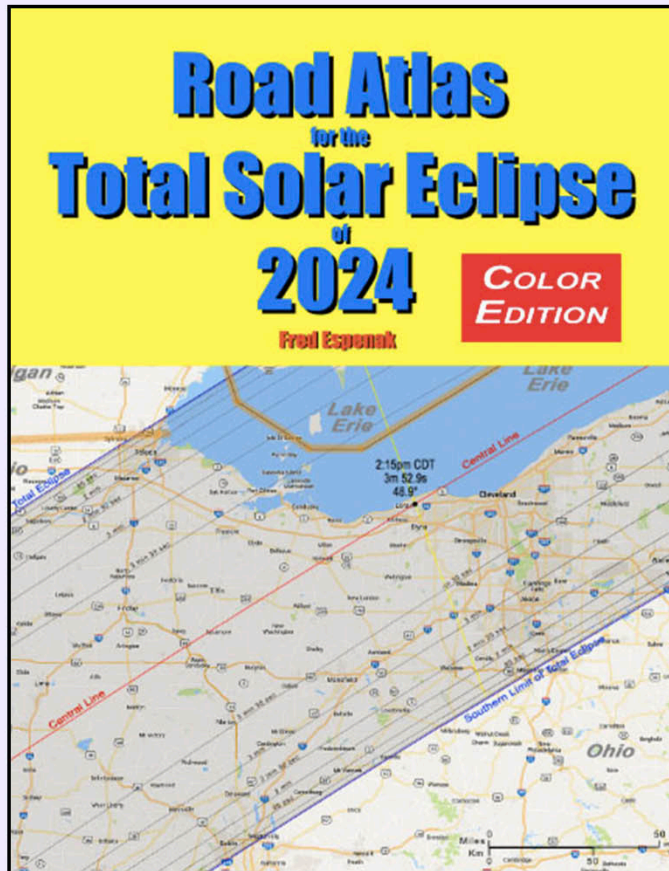
ROAD ATLAS FOR THE ANNULAR SOLAR ECLIPSE OF 2023

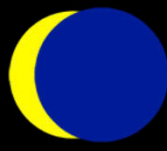
BY FRED ESPENAK



ROAD ATLAS FOR THE TOTAL SOLAR ECLIPSE OF 2024

BY FRED ESPENAK





ECLIPSE ALMANAC

BY FRED ESPENAK

Ten Years of Solar Eclipses

Ten Years of Lunar Eclipses

Total Solar Eclipse
2024 Apr 08

Greatest Eclipse = 18:17:18.1 UT1
Eclipse Magnitude = 1.0566
Eclipse Observation = 1.1163
Gamma = 0.3431
Saros = 139 [30 of 71]
Ascending Node

Geocentric Coordinates at Greatest Eclipse

Sun	Moon
R.A. = 02:11:03.8h	R.A. = 01:55:43.5h
Dec. = +07°19'29.4"	Dec. = +07°53'55.6"
S.D. = 00°19'54.2"	S.D. = 00°16'36.3"
H.P. = 00°00'58.8"	H.P. = 01°00'56.9"

External/Internal Contacts of Penumbra: P1 = 15:42:12.0 UT1, P2 = 17:44:37.9 UT1, P3 = 18:48:12.6 UT1, P4 = 20:52:19.1 UT1
External/Internal Contacts of Umbra: U1 = 16:38:49.5 UT1, U2 = 18:41:09.9 UT1, U3 = 19:53:19.1 UT1, U4 = 19:55:34.4 UT1

Circumstances at Greatest Eclipse
Lat. = 25°17.4'N Sun Alt. = 69.6°
Long. = 104°08.4'W Sun Azm. = 149.6°
Path Width = 197.5 km Duration = 04m28.1s

ΔT = 71.3 s
www.EclipseWise.com ©2020 F. Espenak

Annular Solar Eclipse
2024 Oct 02

Greatest Eclipse = 18:45:01.8 UT1
Eclipse Magnitude = 0.9320
Eclipse Observation = 0.9096
Gamma = -0.3509
Saros = 144 [17 of 73]
Descending Node

Geocentric Coordinates at Greatest Eclipse

Sun	Moon
R.A. = 19:54:58.5h	R.A. = 19:56:09.3h
Dec. = -08°59'03.8"	Dec. = -04°19'31.4"
S.D. = 00°19'58.9"	S.D. = 00°14'41.8"
H.P. = 00°00'58.8"	H.P. = 00°53'56.4"

External/Internal Contacts of Penumbra: P1 = 15:42:26.9 UT1, P2 = 18:15:39.7 UT1, P3 = 19:13:50.9 UT1, P4 = 21:48:58.2 UT1
External/Internal Contacts of Umbra: U1 = 16:55:34.4 UT1, U2 = 18:58:41.0 UT1, U3 = 20:33:08.0 UT1, U4 = 20:39:19.5 UT1

Circumstances at Greatest Eclipse
Lat. = 21°57.2'S Sun Alt. = 69.3°
Long. = 114°30.5'W Sun Azm. = 31.1°
Path Width = 206.5 km Duration = 07m25.1s

ΔT = 71.3 s
www.EclipseWise.com ©2020 F. Espenak

Eclipse Almanac
2021 To 2030

Ten Years of Solar and Lunar Eclipses

COLOR EDITION

Fred Espenak

Total Lunar Eclipse
2022 May 16

Greatest Eclipse = 04:11:31.2 UT1
Penumbral Eclipse Magnitude = 2.3743
Umbral Eclipse Magnitude = 1.4154
Gamma = -0.2532
Axis = 0.2555°
Saros = 131 [34 of 72]
Descending Node

Geocentric Coordinates at Greatest Eclipse

Sun	Moon
R.A. = 03:31m49.5s	R.A. = 19:31m27.8s
Dec. = +19°00'13.4"	Dec. = -19°19'40.4"
S.D. = 00°15'49.2"	S.D. = 00°18'29.9"
H.P. = 00°02'08.7"	H.P. = 01°00'33.1"

Eclipse Durations: Penumbra = 02h12m29s, Umbral = 03m27s75s, Total = 01h25m32s
Eclipse Contacts: P1 = 01:31:44 UT1, U1 = 02:37:31 UT1, U2 = 03:28:40 UT1, U3 = 04:54:11 UT1, U4 = 05:55:27 UT1, P4 = 06:51:11 UT1

Parameters: Eph. = JPL DE430, Rule = Herold-Sinnott, ΔT = 70 s

ΔT = 71.3 s
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Total Lunar Eclipse
2022 Nov 08

Greatest Eclipse = 10:59:11.3 UT1
Penumbral Eclipse Magnitude = 2.4161
Umbral Eclipse Magnitude = 1.3607
Gamma = 0.2570
Axis = 0.2404°
Saros = 136 [30 of 72]
Ascending Node

Geocentric Coordinates at Greatest Eclipse

Sun	Moon
R.A. = 14:54m11.2s	R.A. = 02:53m48.1s
Dec. = -19°17'47.0"	Dec. = +19°51'08.7"
S.D. = 00°18'08.5"	S.D. = 00°15'17.7"
H.P. = 00°02'08.9"	H.P. = 00°56'07.8"

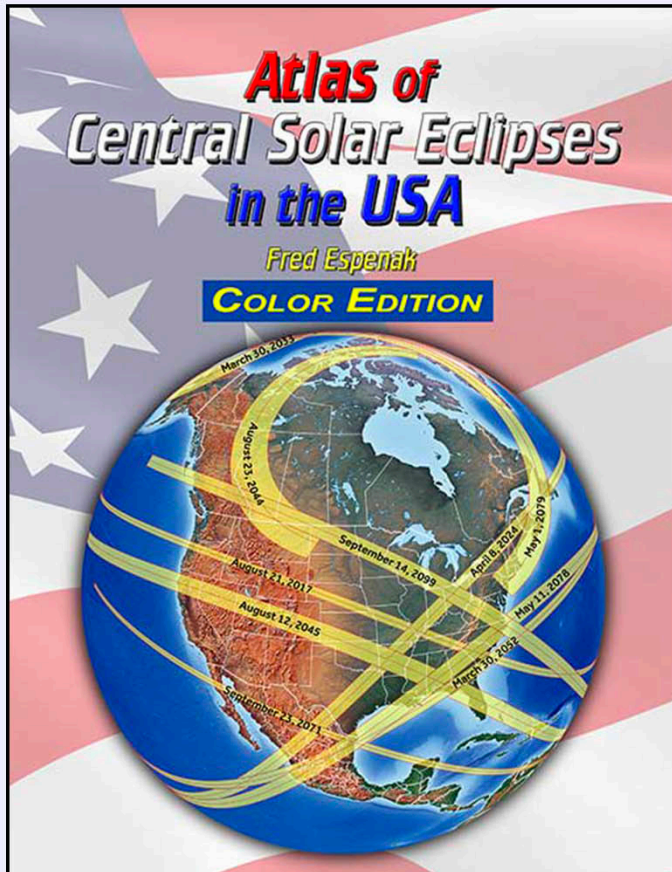
Eclipse Durations: Penumbra = 02h54m41s, Umbral = 03m40m35s, Total = 01h25m06s
Eclipse Contacts: P1 = 08:01:52 UT1, U1 = 09:08:49 UT1, U2 = 10:16:12 UT1, U3 = 11:41:52 UT1, U4 = 12:49:24 UT1, P4 = 13:56:32 UT1

Parameters: Eph. = JPL DE430, Rule = Herold-Sinnott, ΔT = 71 s

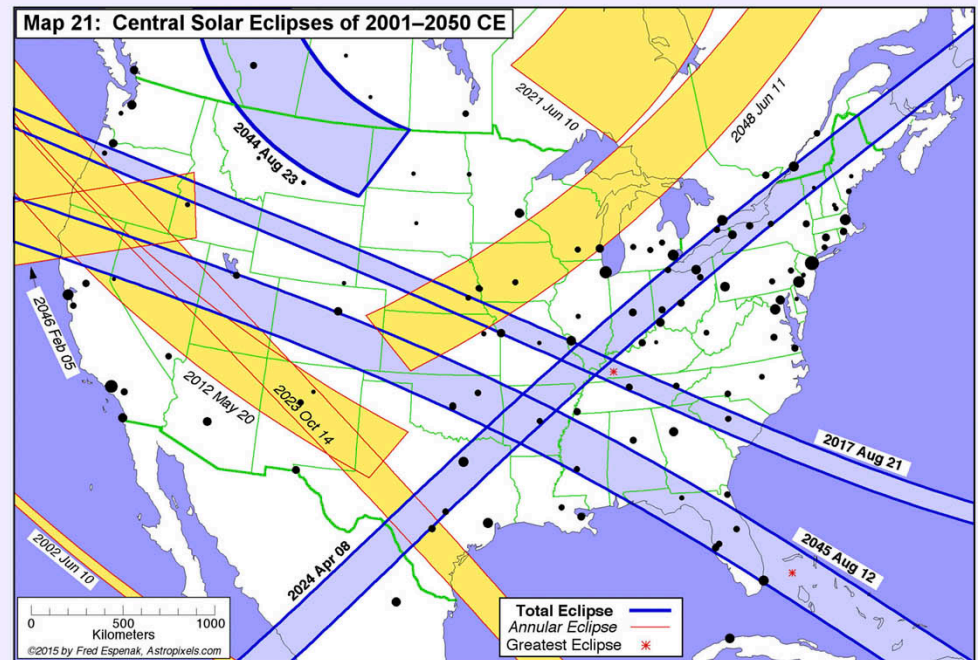
ΔT = 71.3 s
www.EclipseWise.com ©2020 F. Espenak

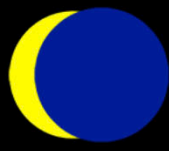
ATLAS OF CENTRAL SOLAR ECLIPSES IN THE USA

BY FRED ESPENAK



USA maps for the years 1001 through 3000





EclipseWise.com

Predictions for Solar and Lunar Eclipses

[Home](#) [Solar Eclipses](#) [Lunar Eclipses](#) [Transits of Mercury and Venus](#) [Contact](#)

Eclipse Publications

The grid displays the following publications:

- 21st Century Canon of Solar Eclipses** (Color Edition) by Fred Espenak
- 21st Century Canon of Lunar Eclipses** (Deluxe Edition) by Fred Espenak
- Thousand Year Canon of Solar Eclipses 1501 to 2500** by Fred Espenak
- Thousand Year Canon of Lunar Eclipses 1501 to 2500** by Fred Espenak
- Five Millennium Canon of Solar Eclipses Volume 1: -1999 to 0** by Fred Espenak
- Five Millennium Canon of Solar Eclipses Volume 2: 1 to 3000** (Second Edition) by Fred Espenak and Jean Meeus
- Five Millennium Catalog of Solar Eclipses -1999 to +3000** (Second Edition) by Fred Espenak and Jean Meeus
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- Road Atlas for the Annular Solar Eclipse**
- Road Atlas for the Total Solar Eclipse**
- Atlas of Central Solar Eclipses in the USA**

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Eclipse Photography

www.MrEclipse.com

Ultimate Eclipse Photography



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Fred Espenak, Casper, WY