Penumbral Lunar Eclipse of 2023 May 05

Ecliptic Conjunction = 17:35:12.7 TD (= 17:33:59.2 UT)
Greatest Eclipse = 17:24:05.1 TD (= 17:22:51.7 UT)

Penumbral Magnitude = 0.9636 P. Radius = 1.2375° Gamma = -1.0349
Umbral Magnitude = -0.0457 U. Radius = 0.7089° Axis = 0.9947°

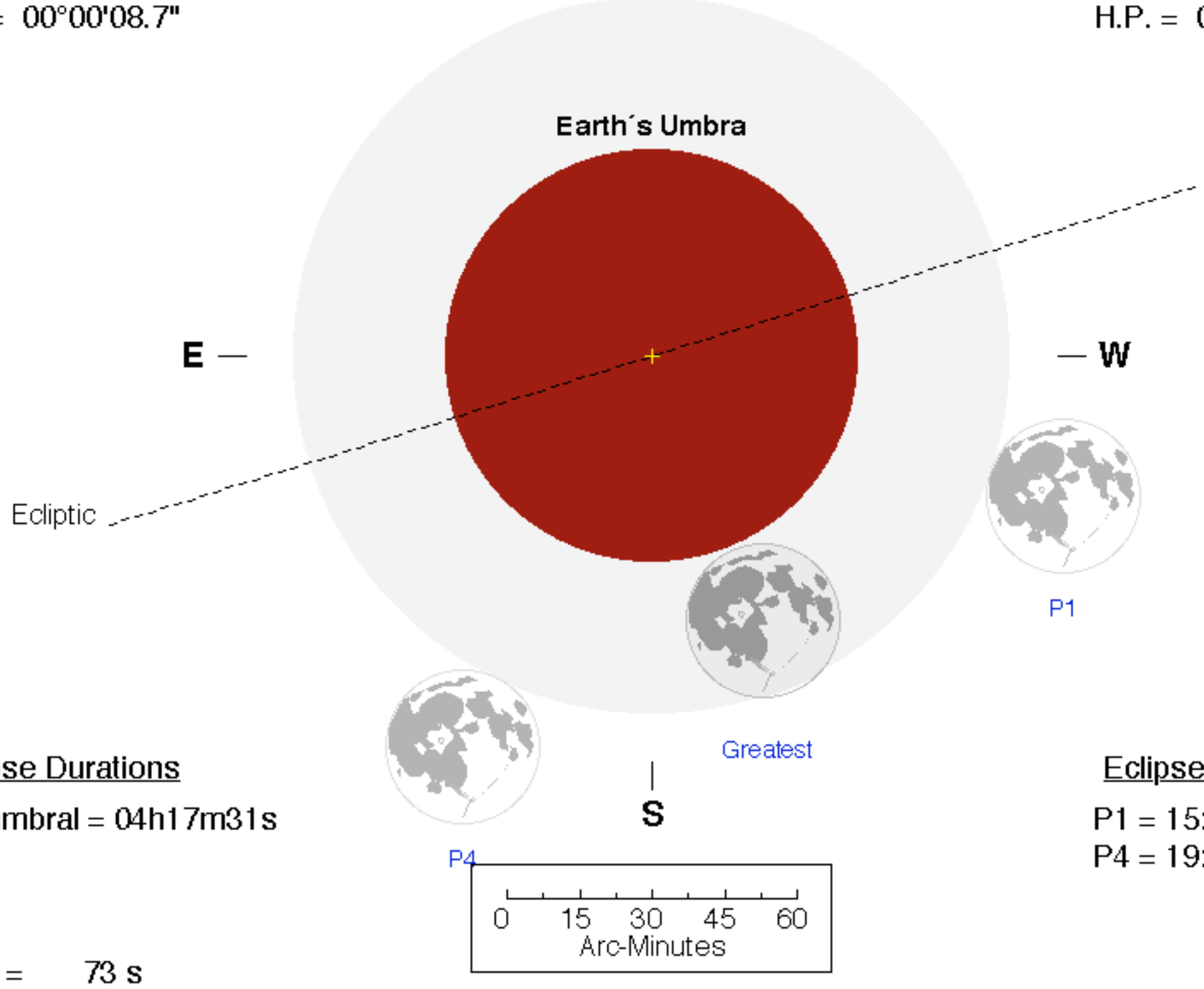
Saros Series = 141 Member = 24 of 73

<u>Sun at Greatest Eclipse</u>
(Geocentric Coordinates)

R.A. = 02h49m59.7s
Dec. = +16°19'27.9"
S.D. = 00°15'51.6"
H.P. = 00°00'08.7"

<u>Moon at Greatest Eclipse</u>
(Geocentric Coordinates)

R.A. = 14h48m23.5s
Dec. = -17°14'31.9"
S.D. = 00°15'42.8"
H.P. = 00°57'40.1"



<u>Eclipse Durations</u>

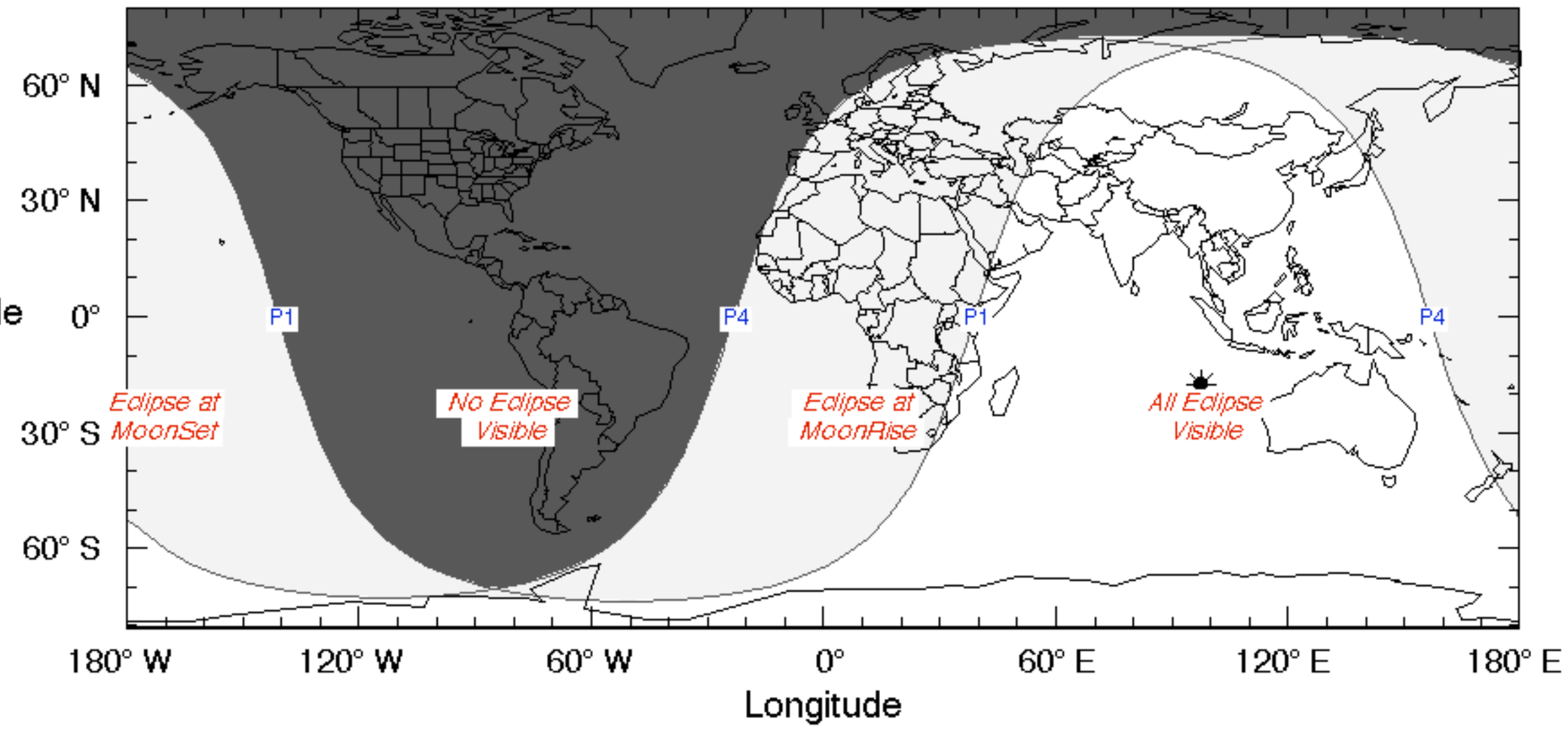
Penumbral = 04h17m31s

<u>Eclipse Contacts</u>

P1 = 15:14:10 UT
P4 = 19:31:41 UT

ΔT = 73 s
Rule = CdT (Danjon)
Eph. = VSOP87/ELP2000-85

F. Espenak, NASA's GSFC
eclipse.gsfc.nasa.gov/eclipse.html



2009 Apr 29

Partial Lunar Eclipse of 2023 Oct 28

Ecliptic Conjunction = 20:25:12.2 TD (= 20:23:58.5 UT)
Greatest Eclipse = 20:15:17.6 TD (= 20:14:03.9 UT)

Penumbral Magnitude = 1.1181 P. Radius = 1.2692° Gamma = 0.9471
Umbral Magnitude = 0.1220 U. Radius = 0.7326° Axis = 0.9363°

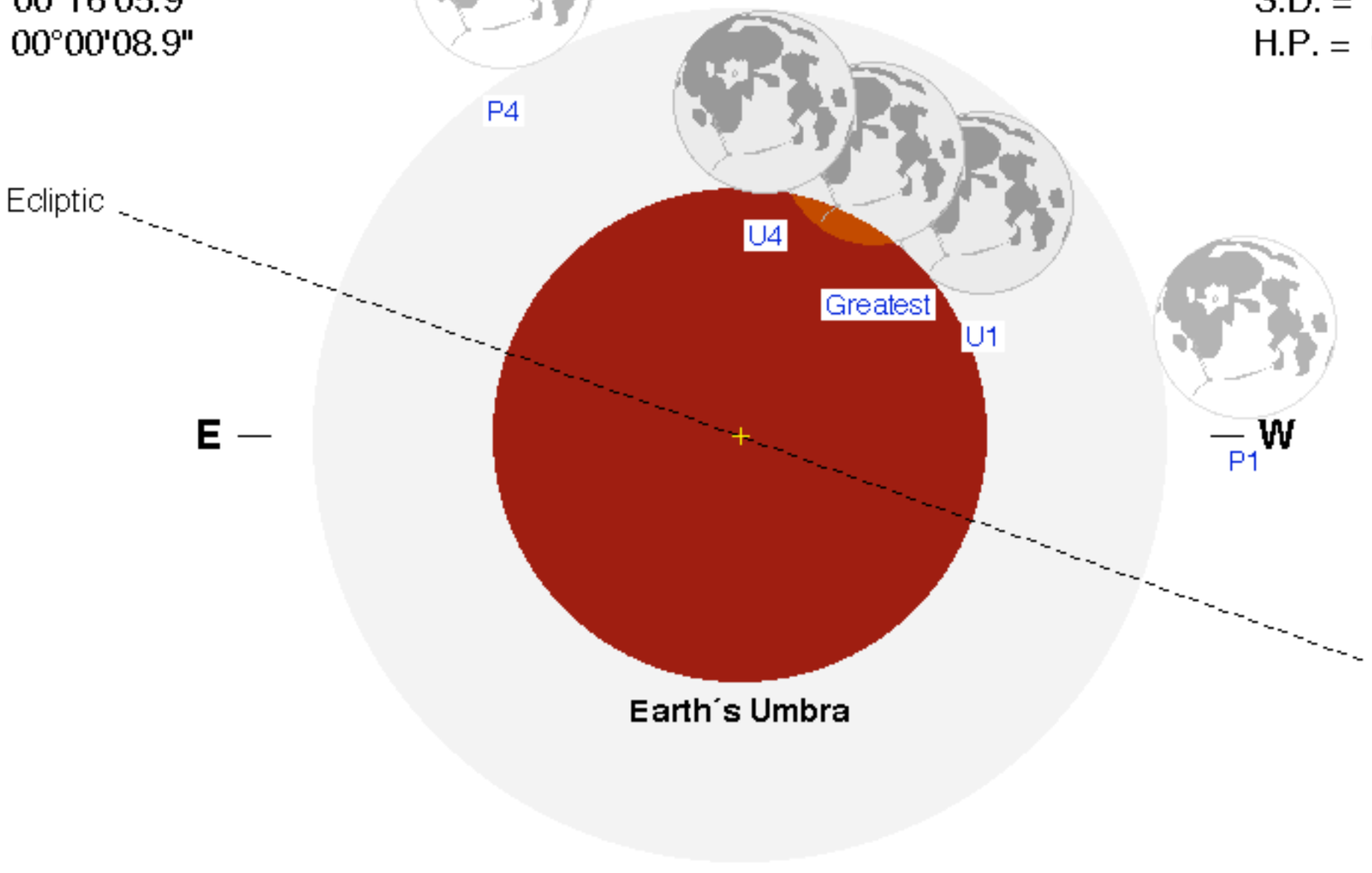
Saros Series = 146 Member = 11 of 72

<u>Sun at Greatest Eclipse</u>
(Geocentric Coordinates)

R.A. = 14h11m25.9s
Dec. = -13°14'10.6"
S.D. = 00°16'05.9"
H.P. = 00°00'08.9"

<u>Moon at Greatest Eclipse</u>
(Geocentric Coordinates)

R.A. = 02h09m47.6s
Dec. = +14°05'01.8"
S.D. = 00°16'09.7"
H.P. = 00°59'18.9"



<u>Eclipse Durations</u>

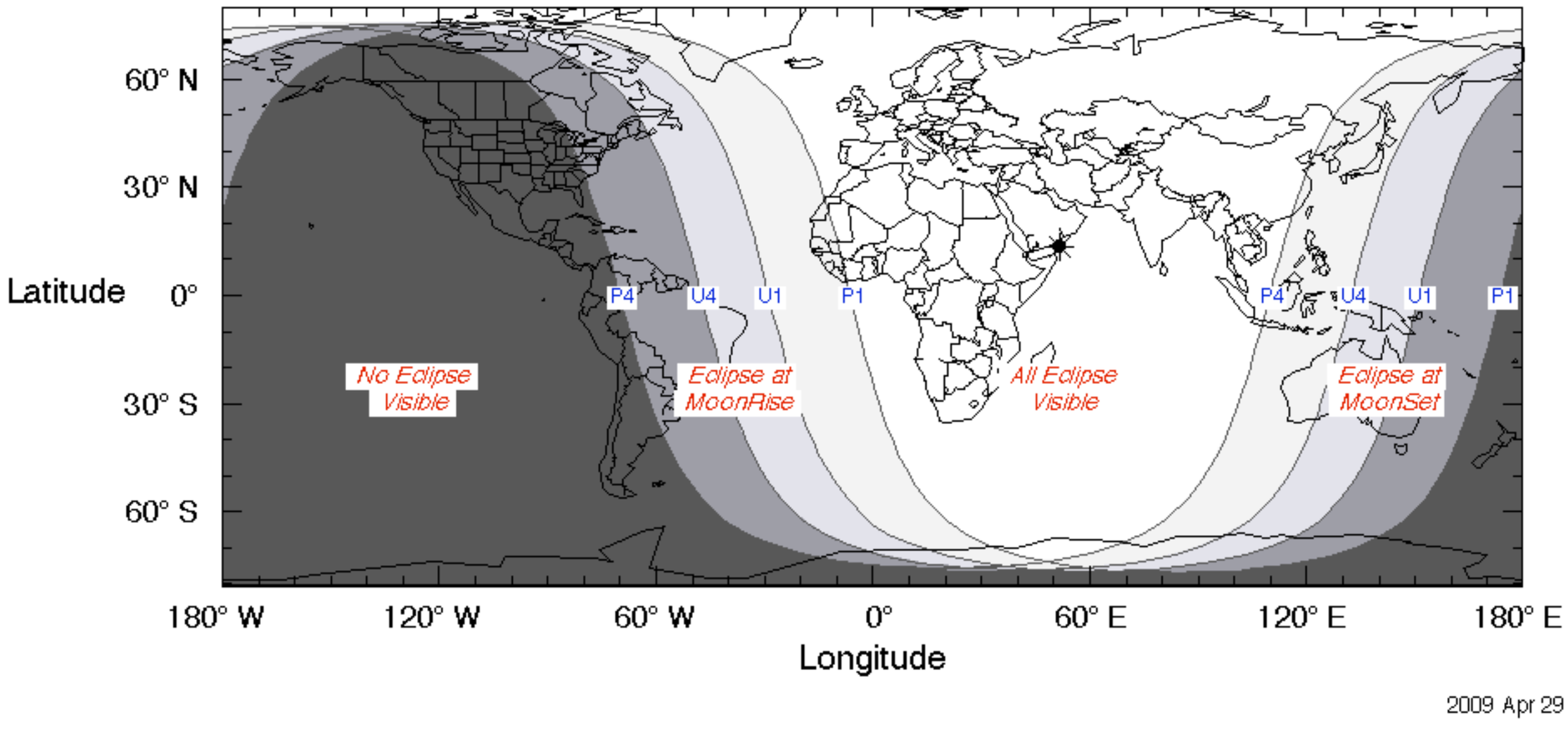
Penumbral = 04h24m34s
Umbral = 01h17m21s

ΔT = 74 s
Rule = CdT (Danjon)
Eph. = VSOP87/ELP2000-85

<u>Eclipse Contacts</u>

P1 = 18:01:47 UT
U1 = 19:35:18 UT
U4 = 20:52:39 UT
P4 = 22:26:20 UT

F. Espenak, NASA's GSFC
eclipse.gsfc.nasa.gov/eclipse.html



2009 Apr 29

Hybrid Solar Eclipse of 2023 Apr 20

Geocentric Conjunction = 03:55:26.5 UT J.D. = 2460054.663502
Greatest Eclipse = 04:16:37.5 UT J.D. = 2460054.678212

Eclipse Magnitude = 1.0132 Gamma = -0.3951

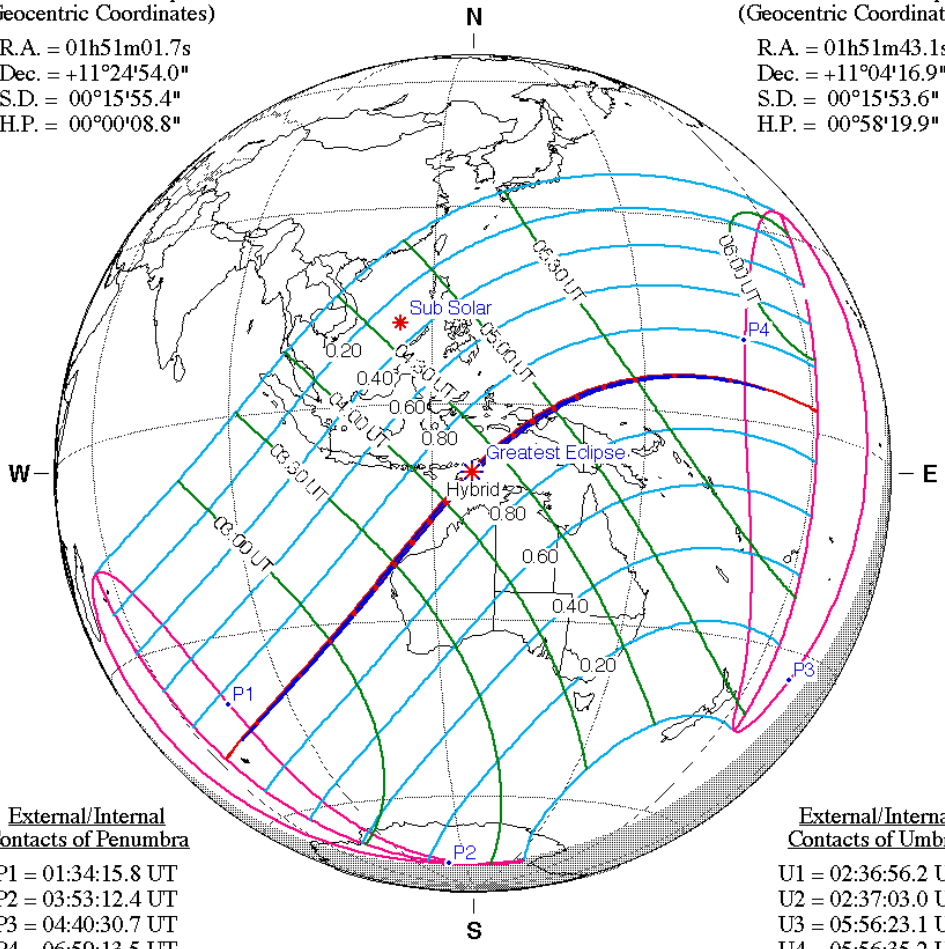
Saros Series = 129 Member = 52 of 80

Sun at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 01h51m01.7s
Dec. = +11°24'54.0"
S.D. = 00°15'55.4"
H.P. = 00°00'08.8"

Moon at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 01h51m43.1s
Dec. = +11°04'16.9"
S.D. = 00°15'53.6"
H.P. = 00°58'19.9"



External/Internal Contacts of Penumbra

P1 = 01:34:15.8 UT
P2 = 03:53:12.4 UT
P3 = 04:40:30.7 UT
P4 = 06:59:13.5 UT

External/Internal Contacts of Umbra

U1 = 02:36:56.2 UT
U2 = 02:37:03.0 UT
U3 = 05:56:23.1 UT
U4 = 05:56:35.2 UT

Local Circumstances at Greatest Eclipse

Lat. = 09°35.4'S Sun Alt. = 66.7°
Long. = 125°48.4'E Sun Azm. = 334.0°
Path Width = 49.0 km Duration = 01m16.1s

Ephemeris & Constants

Eph. = Newcomb/ILE
ΔT = 80.2 s
k1 = 0.2724880
k2 = 0.2722810
Δb = 0.0" Δl = 0.0"

Geocentric Libration
(Optical + Physical)

l = 4.67°
b = 0.46°
c = -19.05°
Brown Lun. No. = 1241

0 1000 2000 3000 4000 5000
Kilometers

F. Espenak, NASA's GSFC - Fri, Jul 2,
sunearth.gsfc.nasa.gov/eclipse/eclipse.html

Annular Solar Eclipse of 2023 Oct 14

Geocentric Conjunction = 17:36:28.8 UT J.D. = 2460232.233667
Greatest Eclipse = 17:59:21.0 UT J.D. = 2460232.249549

Eclipse Magnitude = 0.9520 Gamma = 0.3752

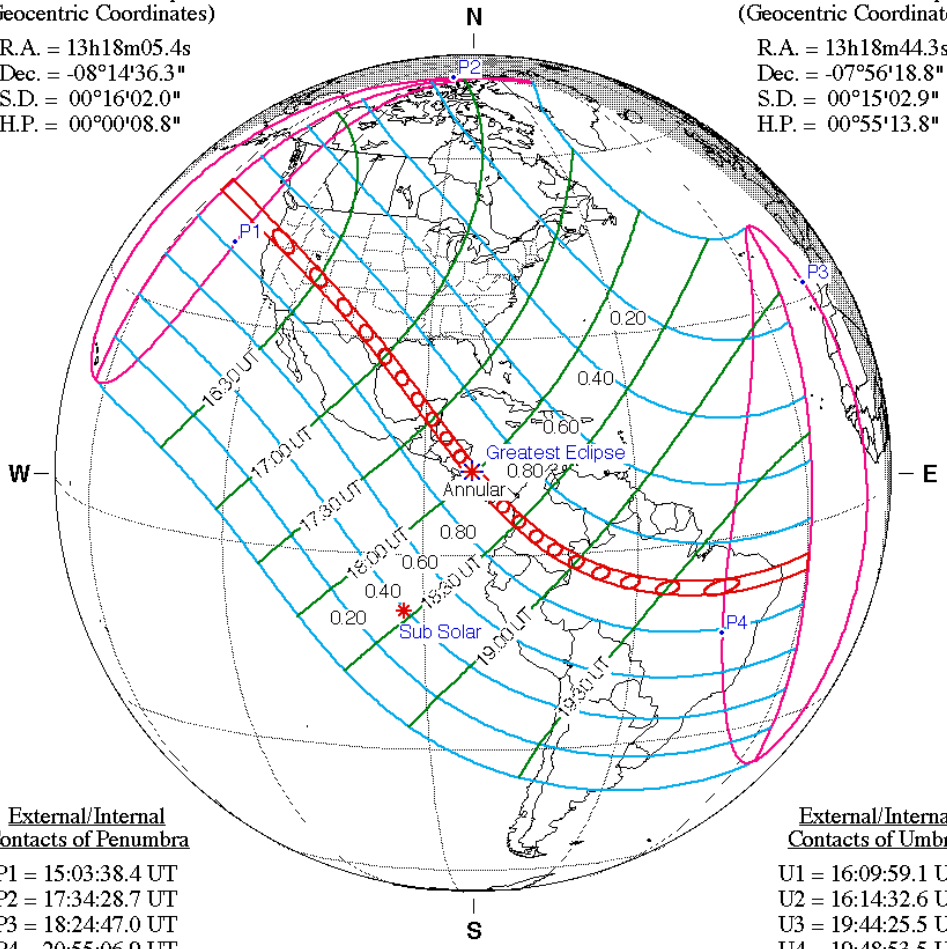
Saros Series = 134 Member = 44 of 71

Sun at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 13h18m05.4s
Dec. = -08°14'36.3"
S.D. = 00°16'02.0"
H.P. = 00°00'08.8"

Moon at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 13h18m44.3s
Dec. = -07°56'18.8"
S.D. = 00°15'02.9"
H.P. = 00°55'13.8"



External/Internal Contacts of Penumbra

P1 = 15:03:38.4 UT
P2 = 17:34:28.7 UT
P3 = 18:24:47.0 UT
P4 = 20:55:06.9 UT

External/Internal Contacts of Umbra

U1 = 16:09:59.1 UT
U2 = 16:14:32.6 UT
U3 = 19:44:25.5 UT
U4 = 19:48:53.5 UT

Local Circumstances at Greatest Eclipse

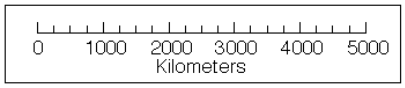
Lat. = 11°21.7'N Sun Alt. = 67.9°
Long. = 083°04.3'W Sun Azm. = 208.0°
Path Width = 187.4 km Duration = 05m17.2s

Ephemeris & Constants

Eph. = Newcomb/ILE
ΔT = 80.7 s
k1 = 0.2724880
k2 = 0.2722810
Δb = 0.0" Δl = 0.0"

Geocentric Libration
(Optical + Physical)

l = -3.80°
b = -0.48°
c = 20.45°
Brown Lun. No. = 1247



F. Espenak, NASA's GSFC - Fri, Jul 2,
sunearth.gsfc.nasa.gov/eclipse/eclipse.html