

A Peek Skyward in 2021

Elnath

Aldebaran

Alhena

Bellatrix

Betelgeuse

Anilam
Anitak

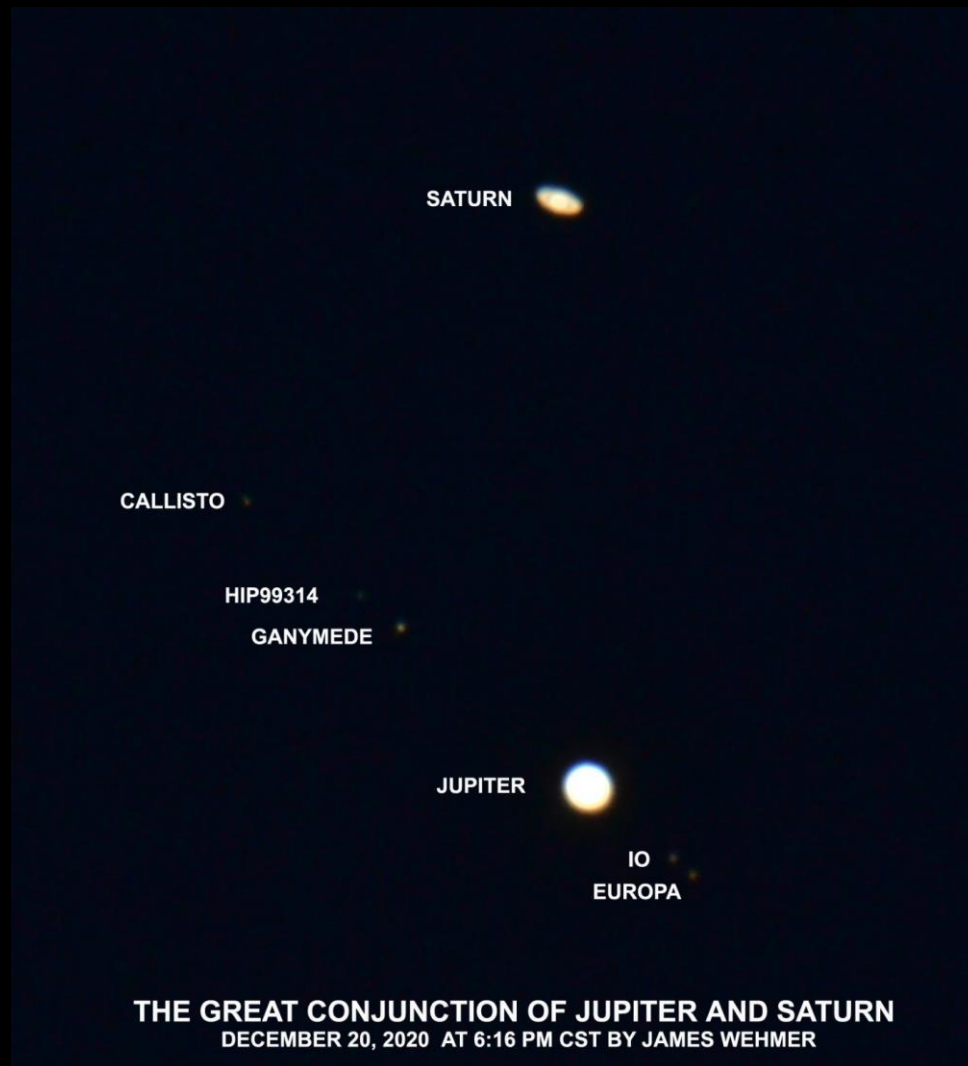
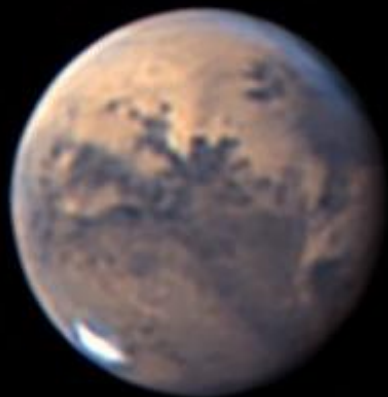
Rigel

Procyon

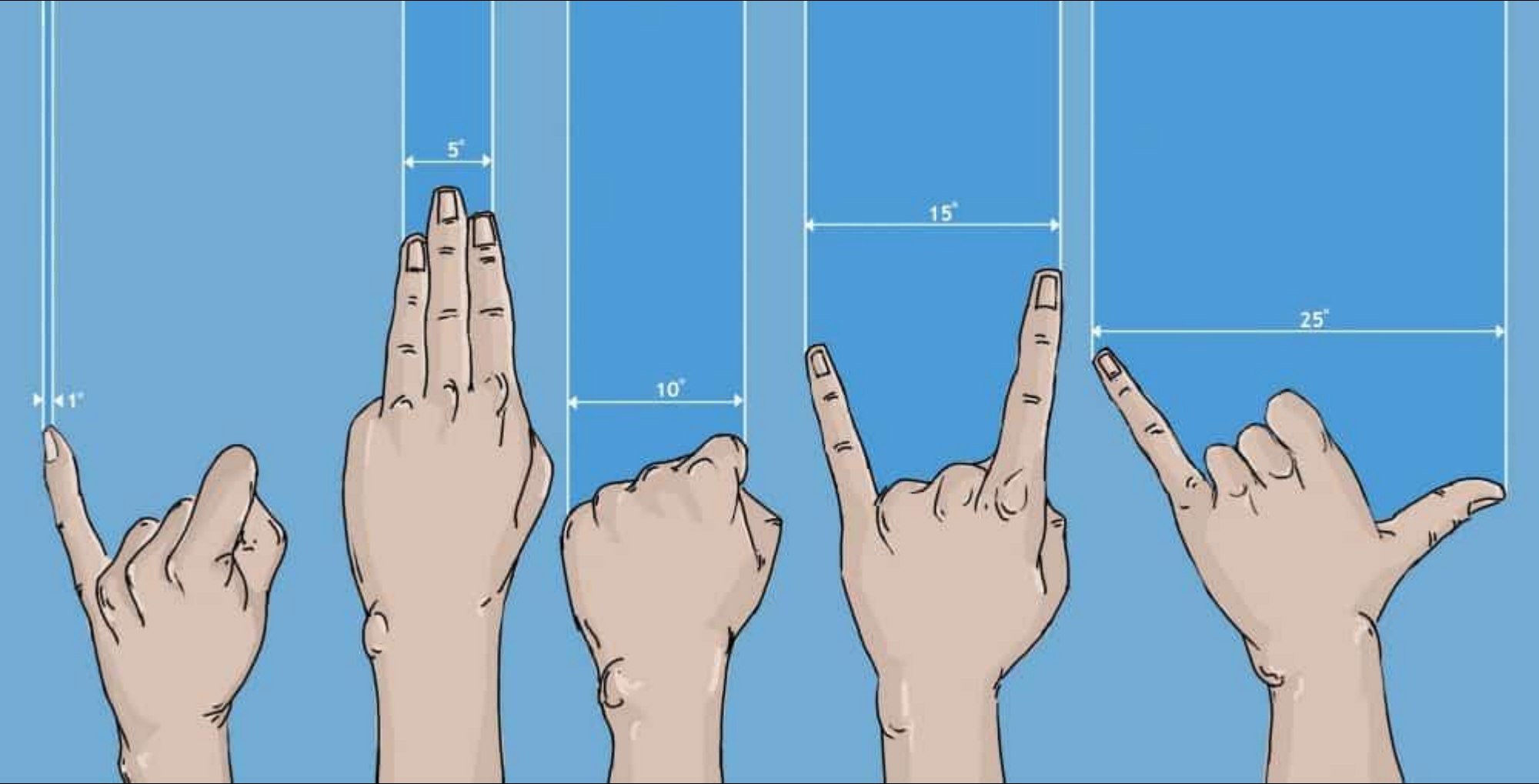
Sirius

Mirzam

A look back at 2020 (or maybe not)

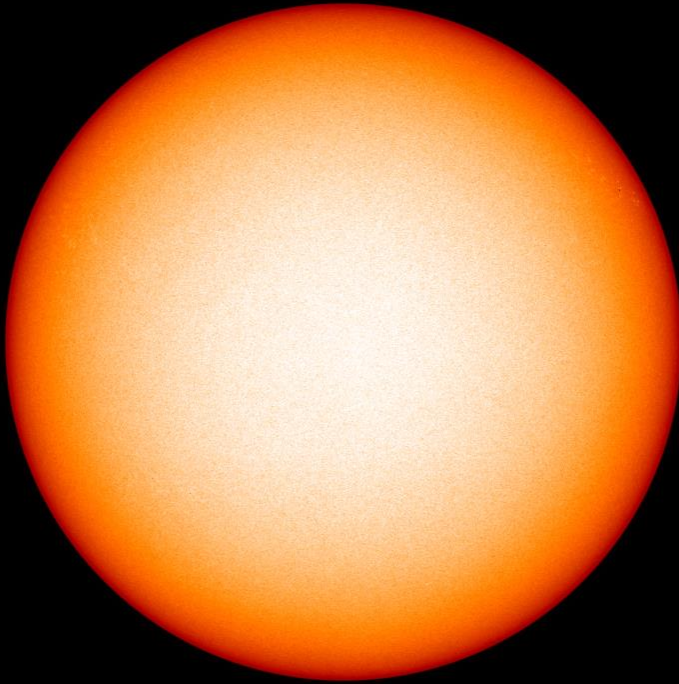


A note about angles

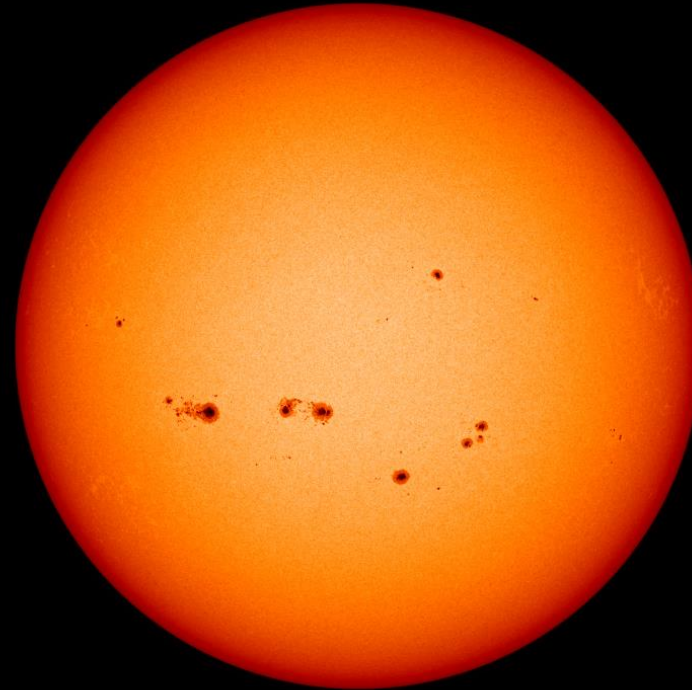


Solar Cycle #25 begins

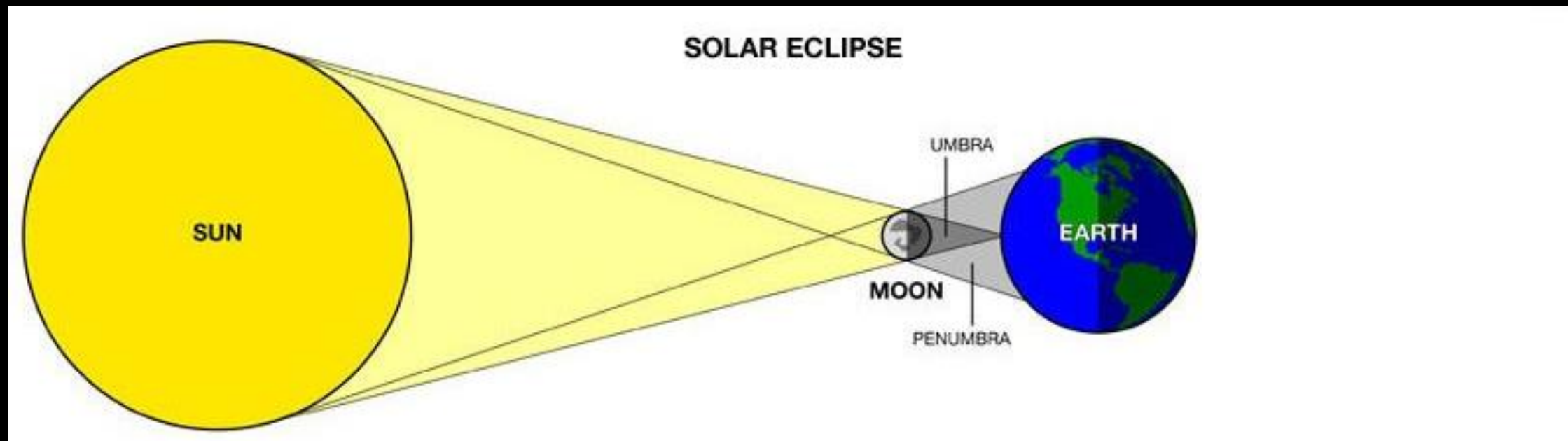
SOLAR MINIMUM



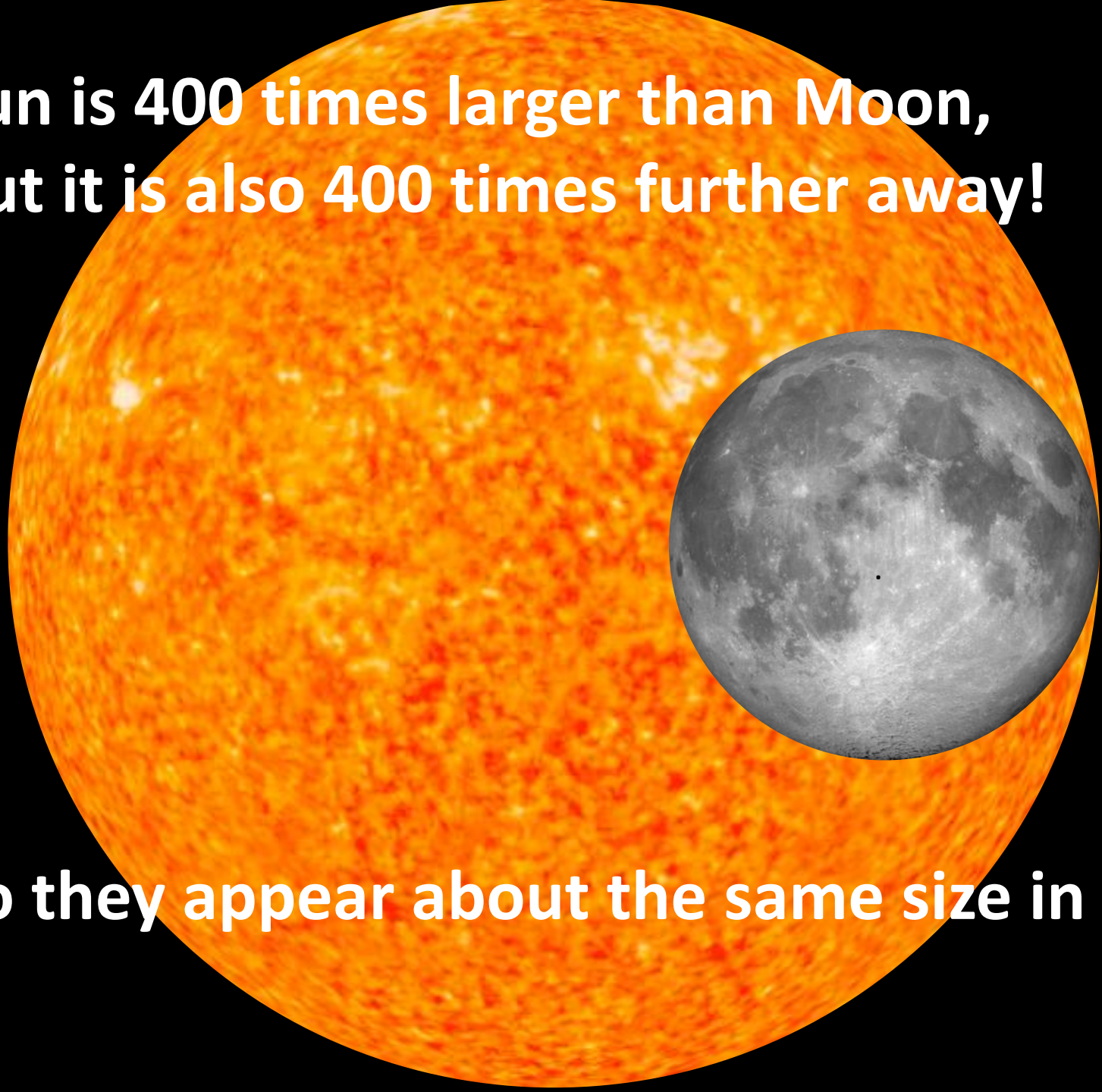
SOLAR MAXIMUM



Solar Eclipses



**Sun is 400 times larger than Moon,
but it is also 400 times further away!**

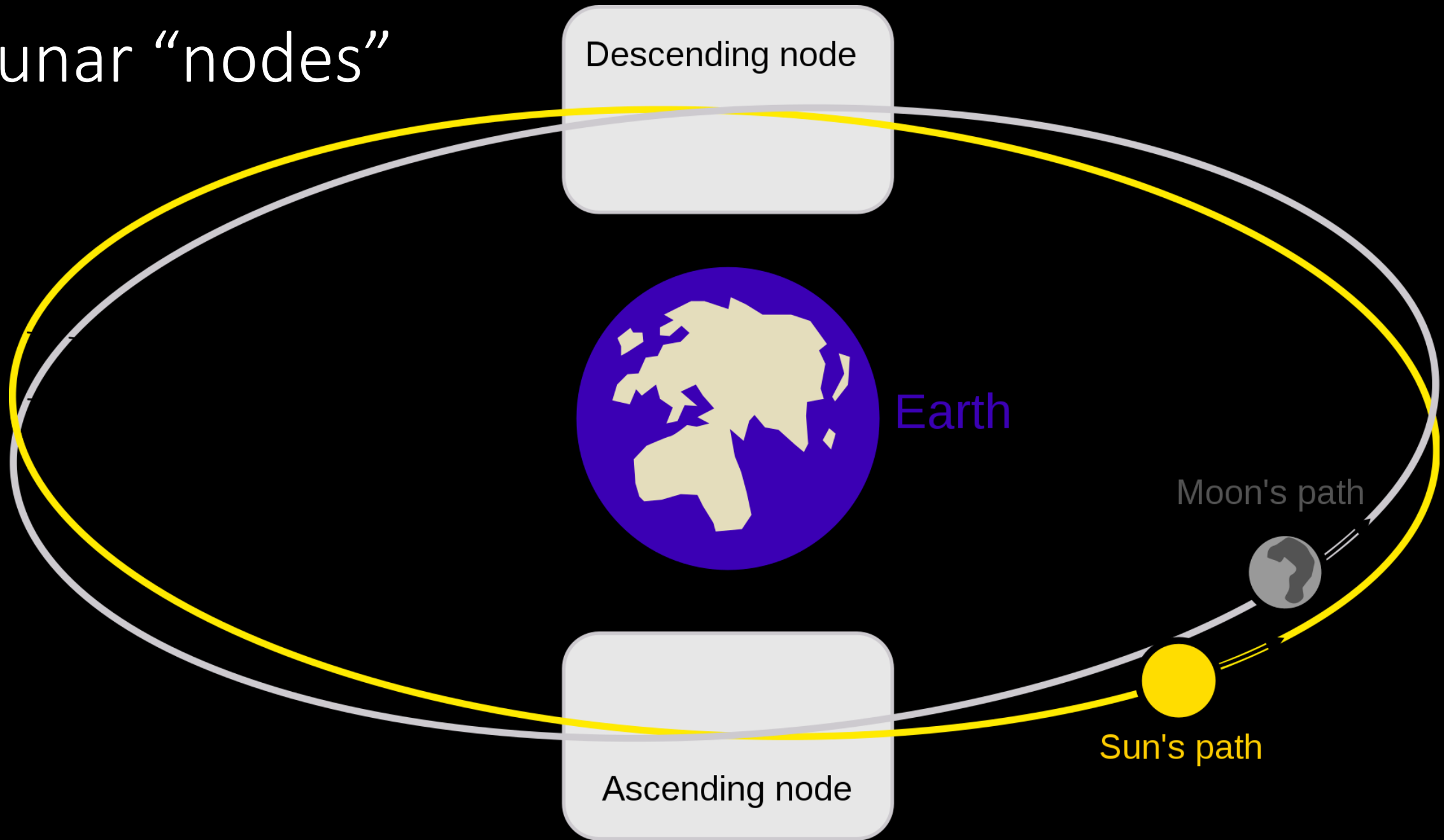


So they appear about the same size in the sky

The moon's orbit is tilted.

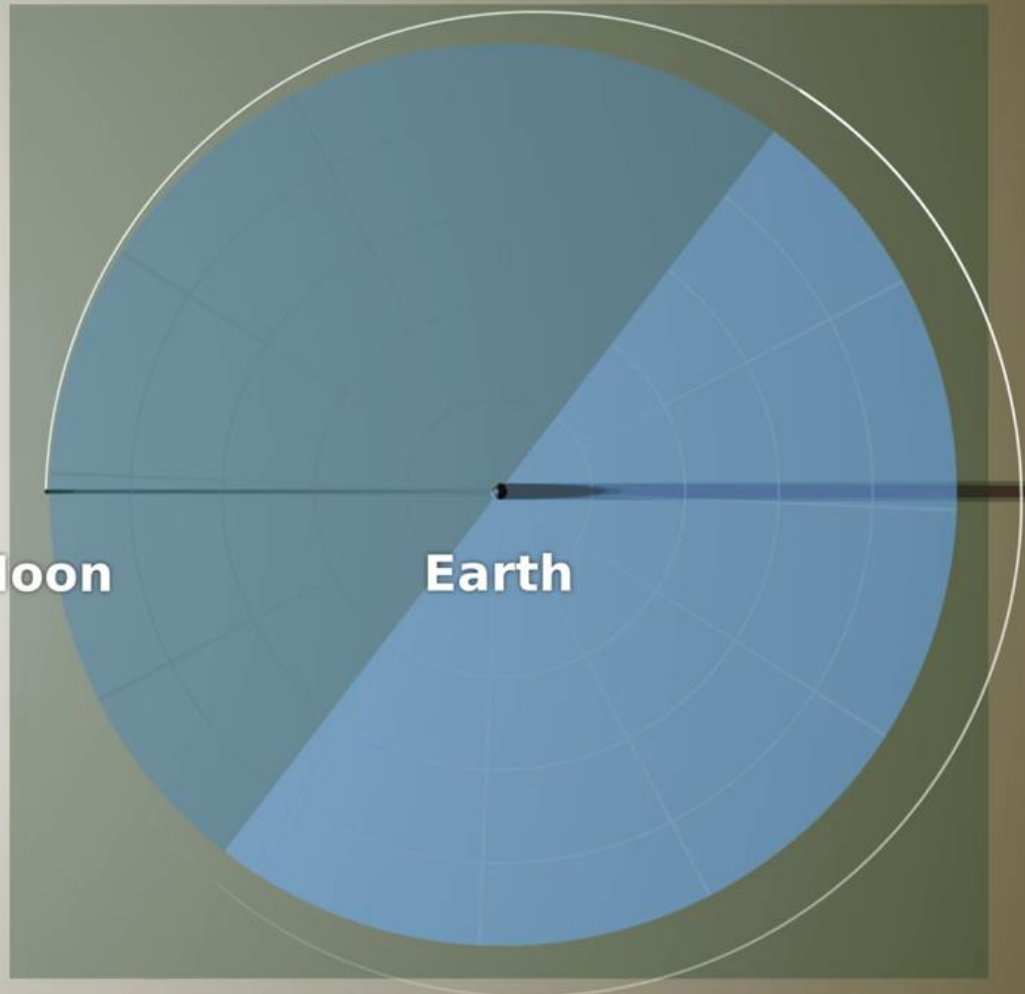


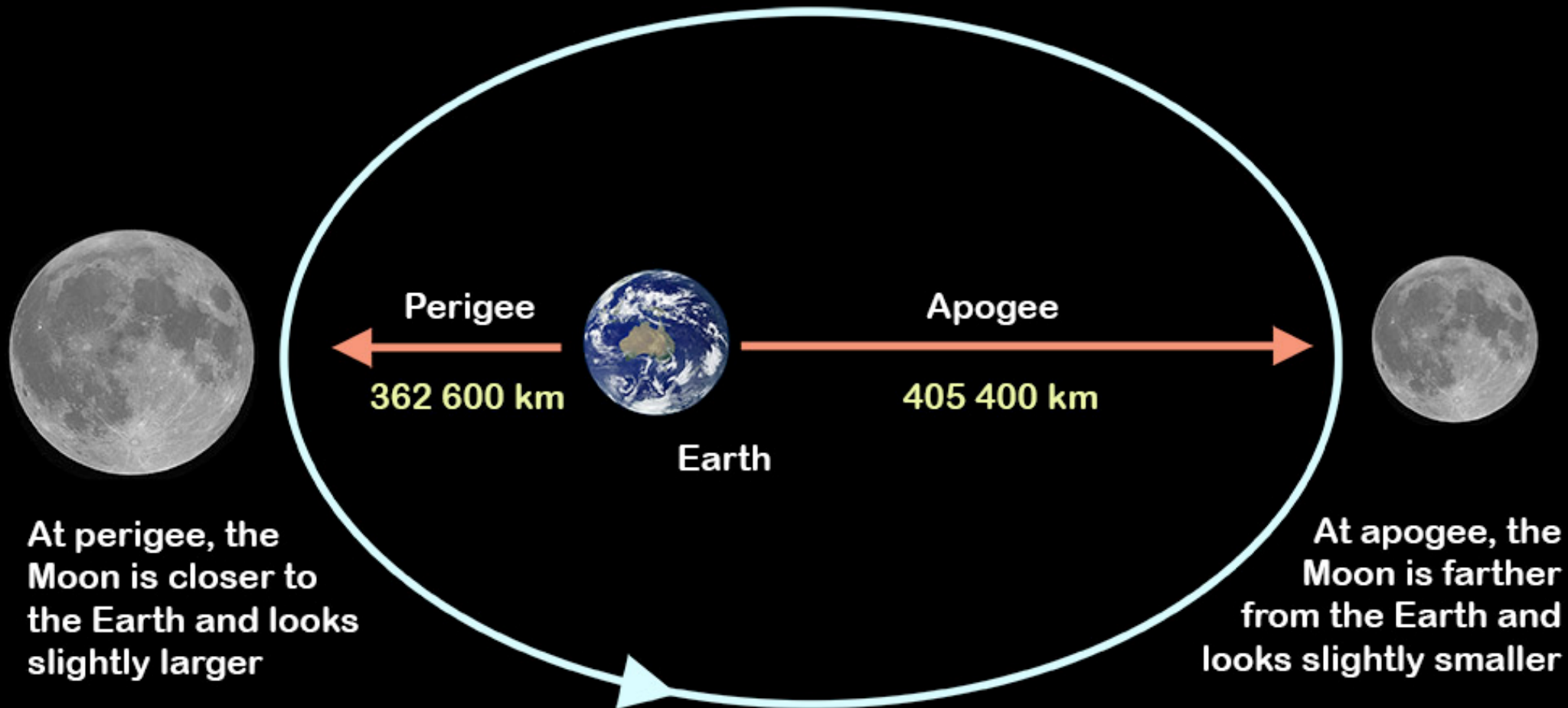
Lunar "nodes"



Moon

Earth





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)

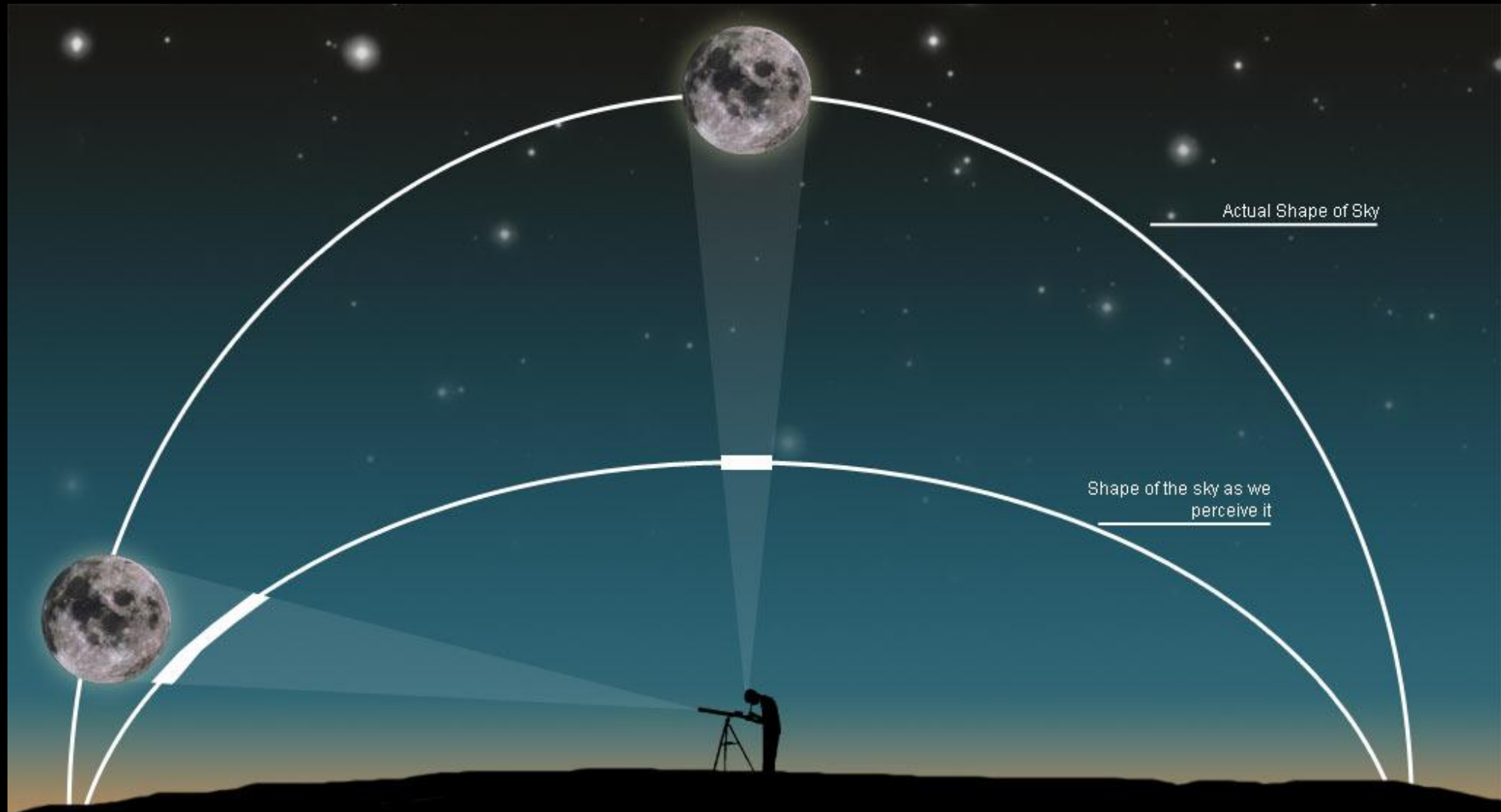
“Supermoons?”



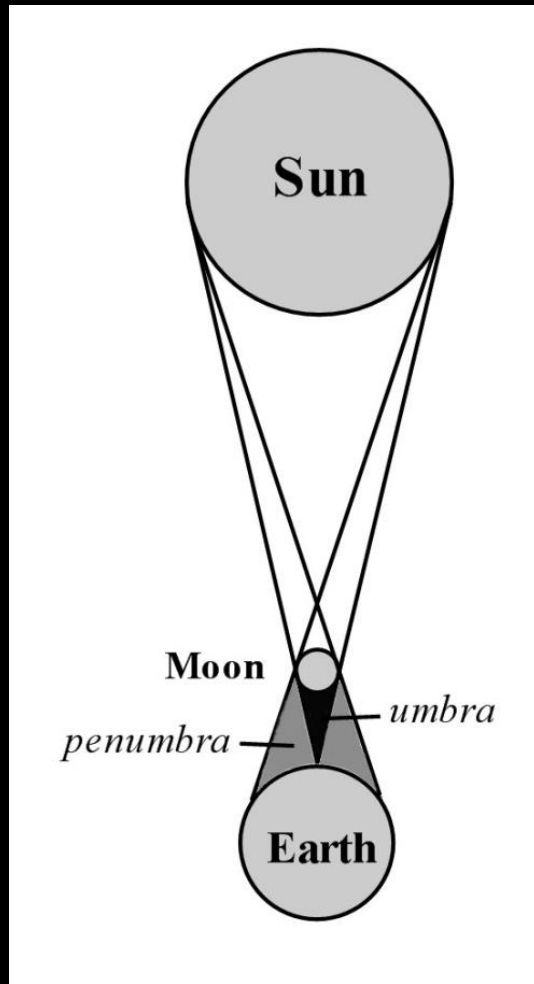
20 Dec 2010

19 Mar 2011

“Moon illusion?”



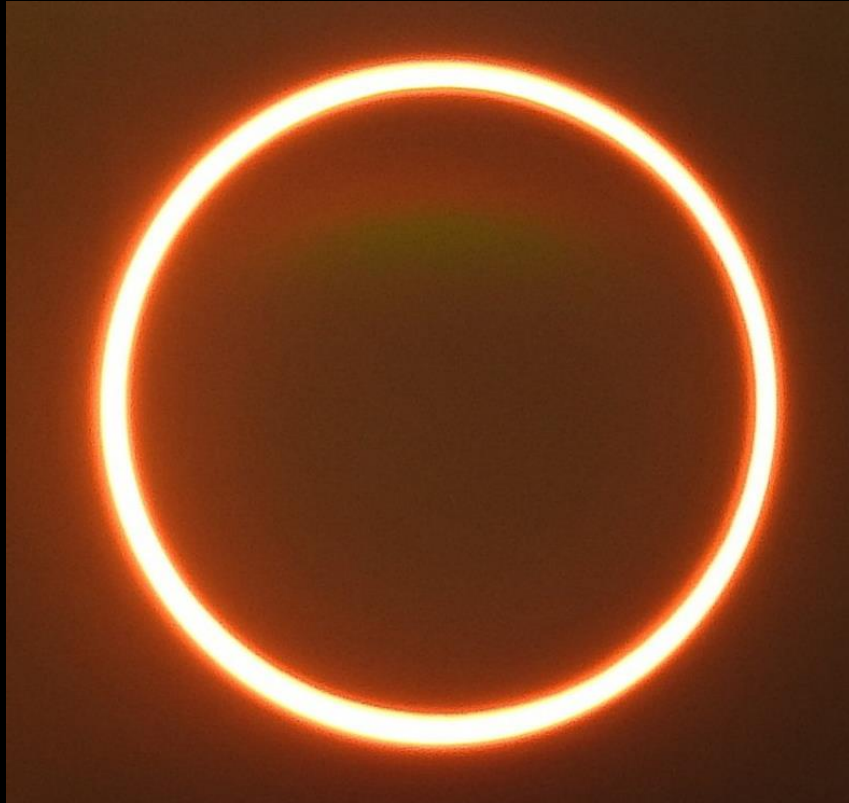
Solar Eclipses



Total Solar Eclipse of 1999 August 11



June 10 – Annular Solar Eclipse



Annular Solar Eclipse of 2021 Jun 10

Geocentric Conjunction = 11:00:58.7 UT J.D. = 2459375.959013

Greatest Eclipse = 10:41:51.0 UT J.D. = 2459375.945730

Eclipse Magnitude = 0.9435 Gamma = 0.9152

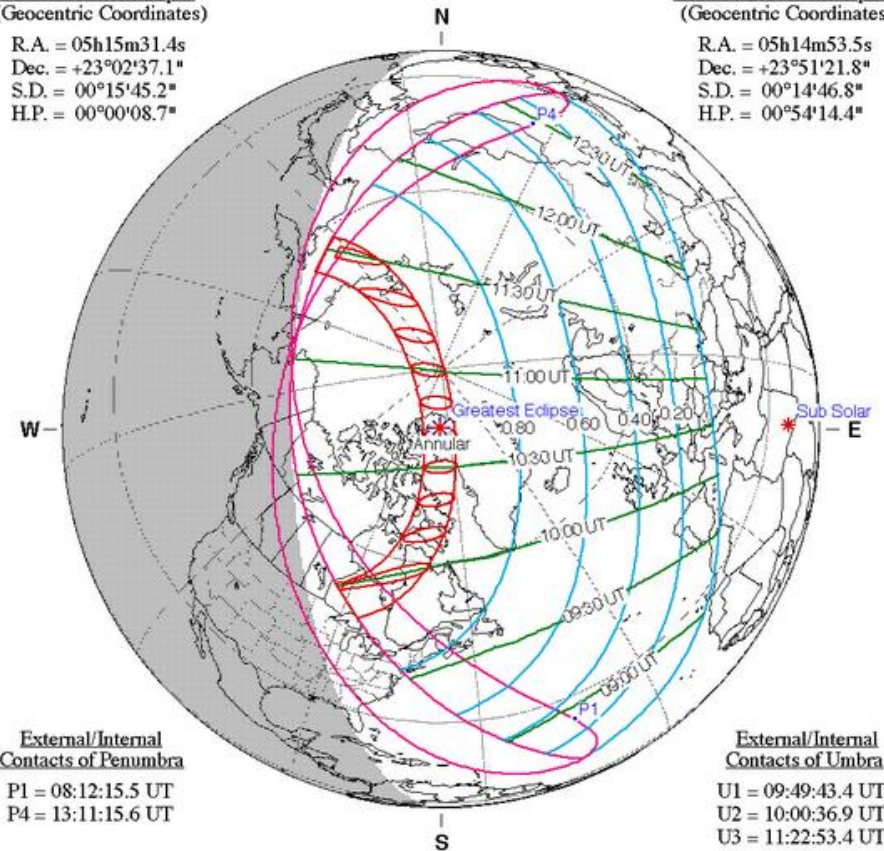
Saros Series = 147 Member = 23 of 80

Sun at Greatest Eclipse
(Geocentric Coordinates)

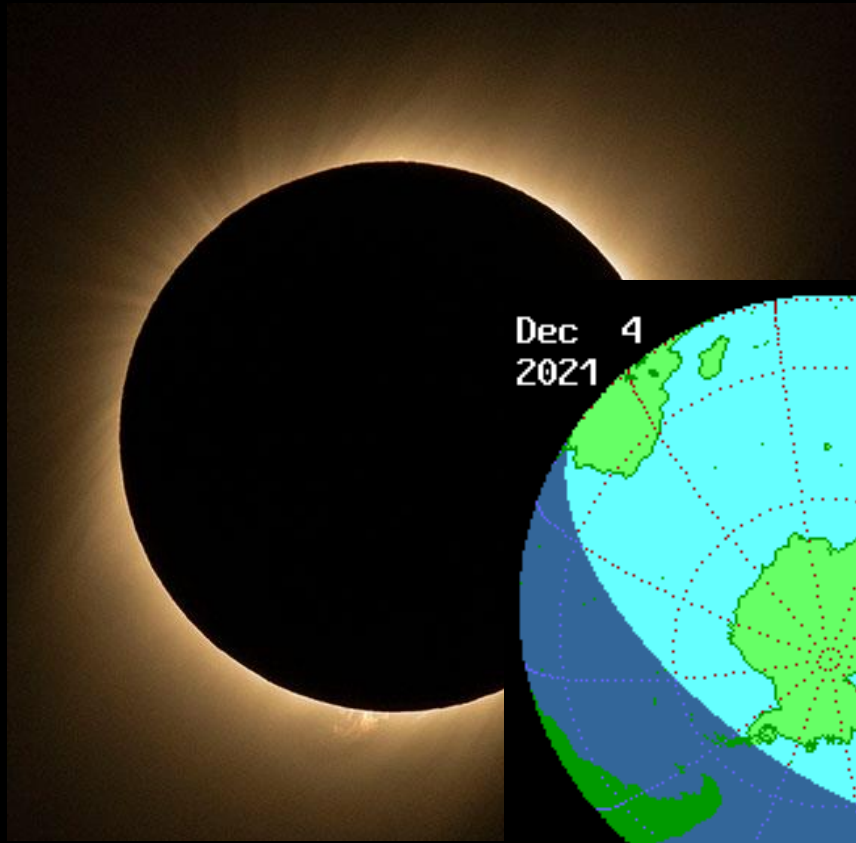
R.A. = 05h15m31.4s
Dec. = +23°02'37.1"
S.D. = 00°15'45.2"
H.P. = 00°00'08.7"

Moon at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 05h14m53.5s
Dec. = +23°51'21.8"
S.D. = 00°14'46.8"
H.P. = 00°54'14.4"



December 4 – Total Solar Eclipse

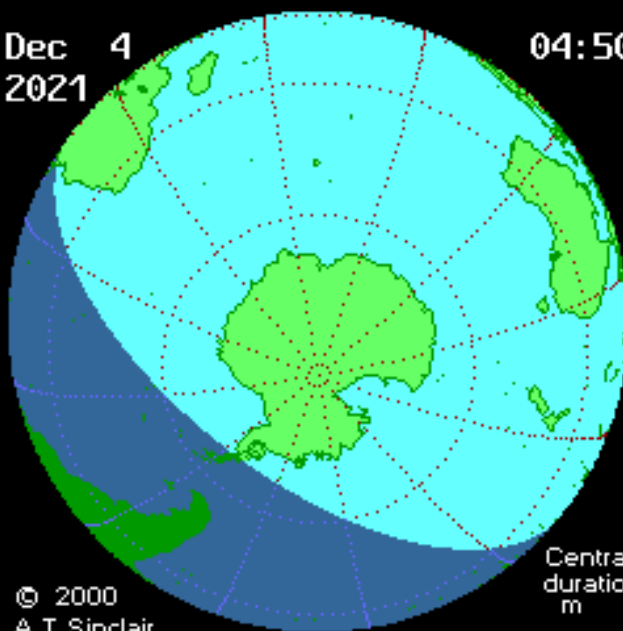


Dec 4
2021

04:50

© 2000
A. T. Sinclair

sunearth.gsfc.nasa.gov/eclipse



Central
duration
m s

Total Solar Eclipse of 2021 Dec 04

Geocentric Conjunction = 07:56:04.9 UT J.D. = 2459552.830612
 Greatest Eclipse = 07:33:22.5 UT J.D. = 2459552.814844
 Eclipse Magnitude = 1.0367 Gamma = -0.9526

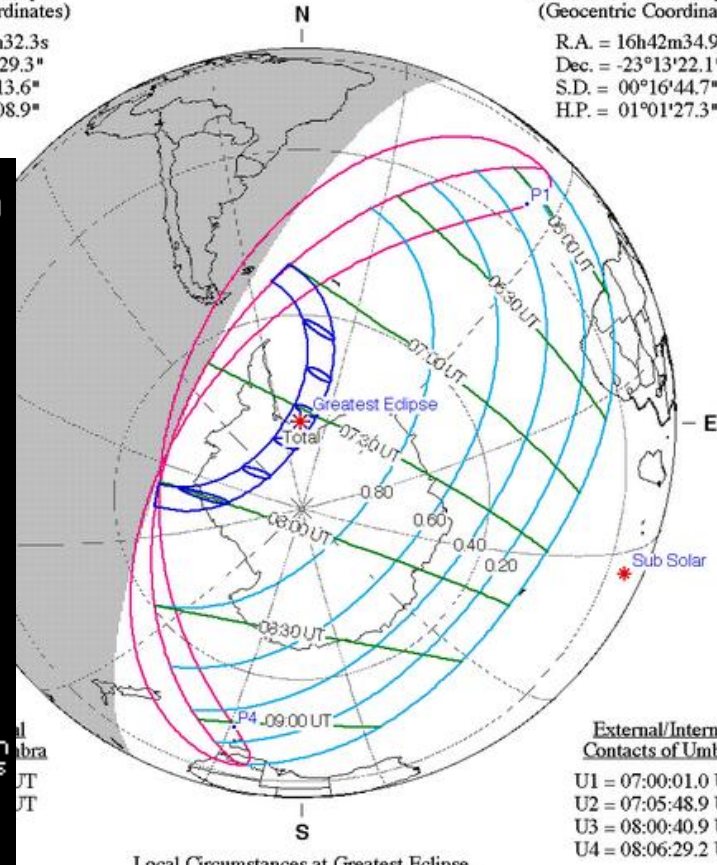
Saros Series = 152 Member = 13 of 70

Sun at Greatest Eclipse (Geocentric Coordinates)

R.A. = 16h43m32.3s
 Dec. = -22°16'29.3"
 S.D. = 00°16'13.6"
 H.P. = 00°00'08.9"

Moon at Greatest Eclipse (Geocentric Coordinates)

R.A. = 16h42m34.9s
 Dec. = -23°13'22.1"
 S.D. = 00°16'44.7"
 H.P. = 01°01'27.3"



External/Internal Contacts of Umbra

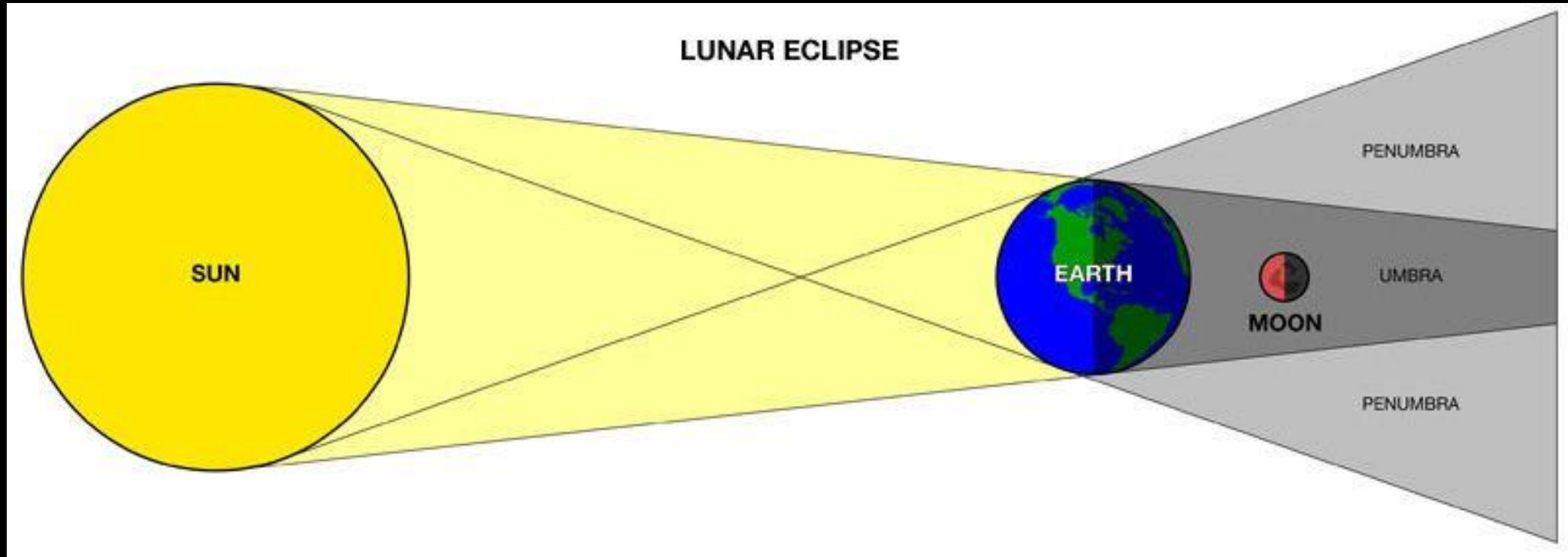
U1 = 07:00:01.0 UT
 U2 = 07:05:48.9 UT
 U3 = 08:00:40.9 UT
 U4 = 08:06:29.2 UT

Local Circumstances at Greatest Eclipse

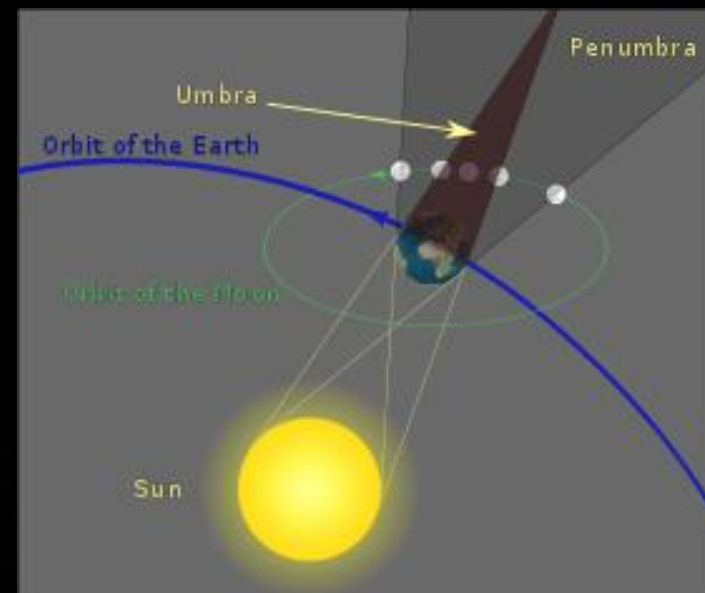
April 8, 2024



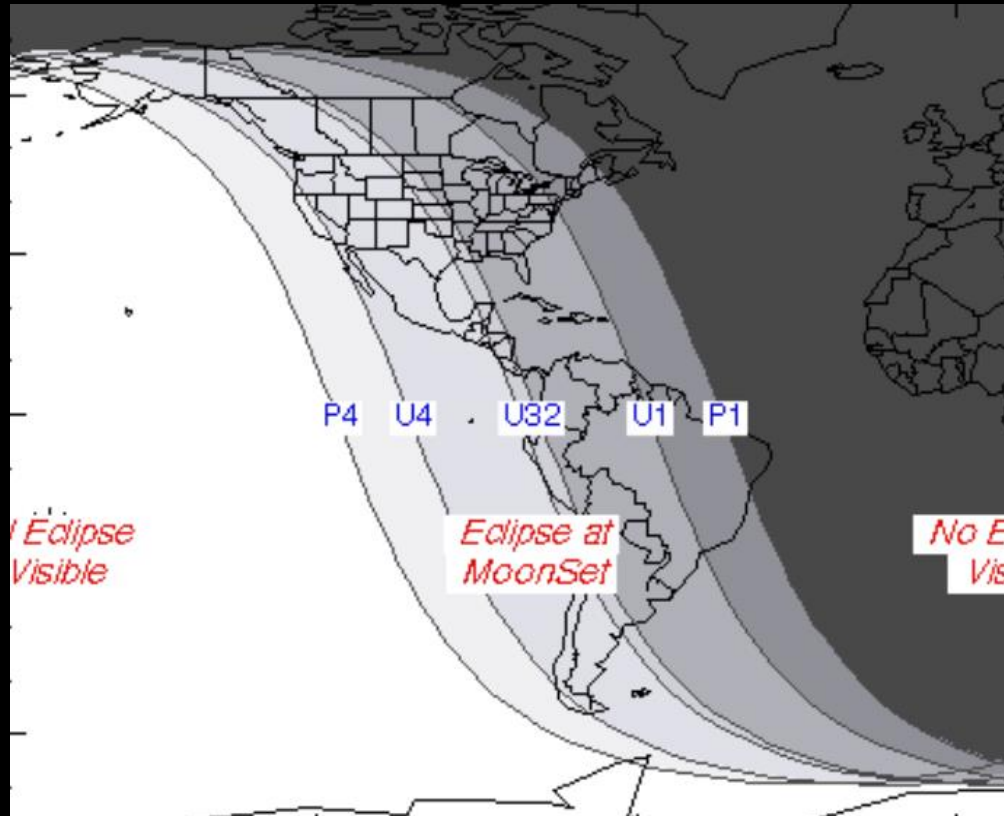
Lunar Eclipses



Lunar Eclipses



May 26 – Total Lunar Eclipse



Total Lunar Eclipse of 2021 May 26

Ecliptic Conjunction = 11:15:02.4 TD (= 11:13:50.1 UT)

Greatest Eclipse = 11:19:52.7 TD (= 11:18:40.3 UT)

Penumbral Magnitude = 1.9540

P. Radius = 1.2981°

Gamma = 0.4774

Umbral Magnitude = 1.0095

U. Radius = 0.7719°

Axis = 0.4880°

Saros Series = 121 Member = 56 of 84

Sun at Greatest Eclipse (Geocentric Coordinates)

R.A. = 04h14m03.6s

Dec. = +21°12'25.4"

S.D. = 00°15'47.3"

H.P. = 00°00'08.7"

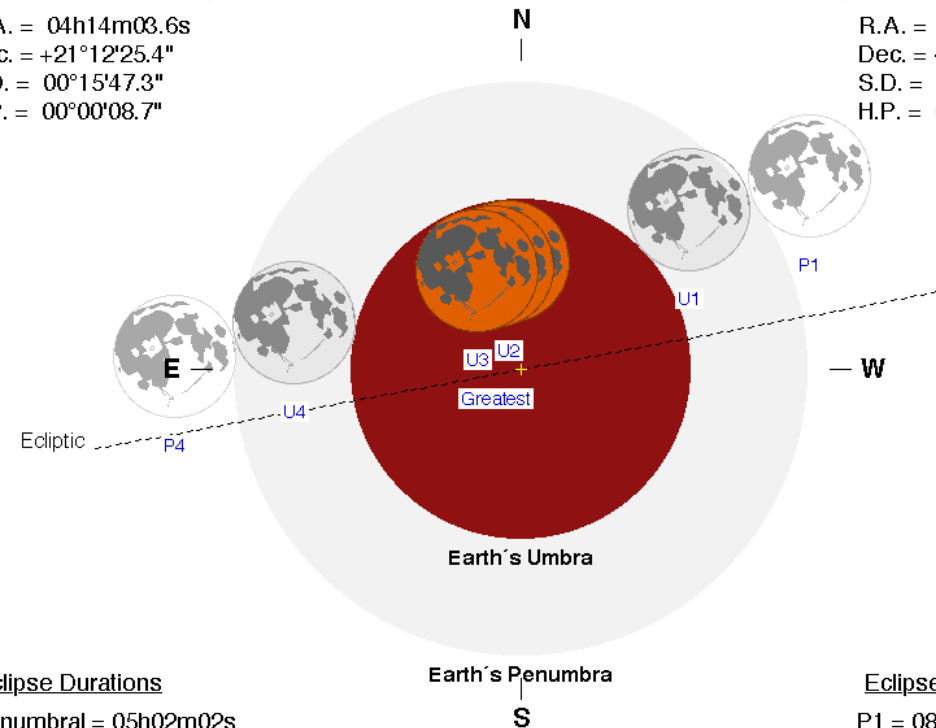
Moon at Greatest Eclipse (Geocentric Coordinates)

R.A. = 16h14m37.8s

Dec. = -20°44'14.9"

S.D. = 00°16'42.9"

H.P. = 01°01'20.5"



Eclipse Durations

Penumbral = 05h02m02s

Eclipse Contacts

P1 = 08:47:39 UT

November 19 – Partial Lunar Eclipse

Partial Lunar Eclipse of 2021 Nov 19

Ecliptic Conjunction = 08:58:37.0 TD (= 08:57:24.4 UT)

Greatest Eclipse = 09:04:05.7 TD (= 09:02:53.1 UT)

Penumbral Magnitude = 2.0720 P. Radius = 1.1829° Gamma = -0.4552

Umbral Magnitude = 0.9742 U. Radius = 0.6434° Axis = 0.4104°

Saros Series = 126 Member = 46 of 72

Sun at Greatest Eclipse (Geocentric Coordinates)

R.A. = 15h39m50.9s

Dec. = -19°32'33.1"

S.D. = 00°16'11.0"

H.P. = 00°00'08.9"

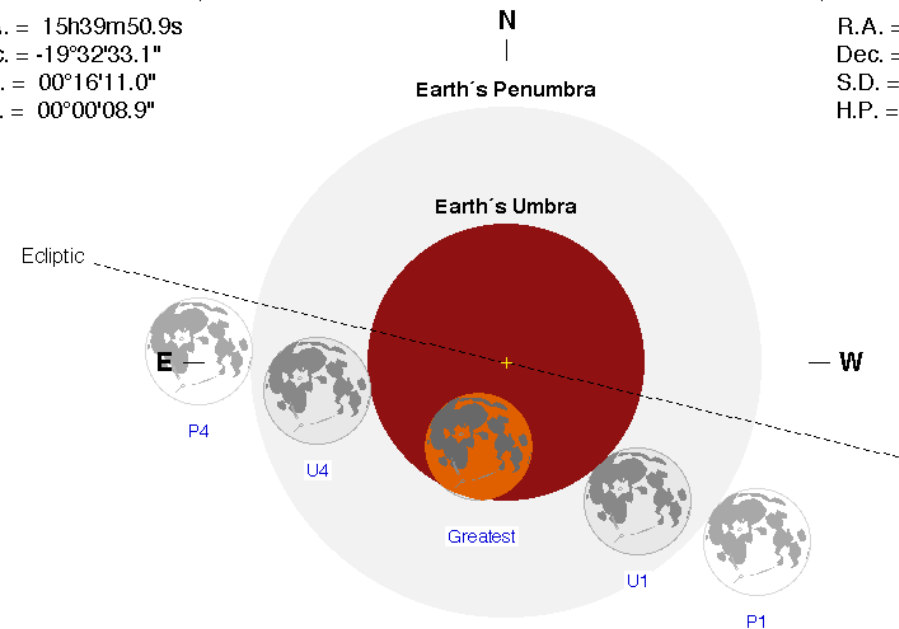
Moon at Greatest Eclipse (Geocentric Coordinates)

R.A. = 03h40m24.8s

Dec. = +19°09'15.5"

S.D. = 00°14'44.5"

H.P. = 00°54'06.1"

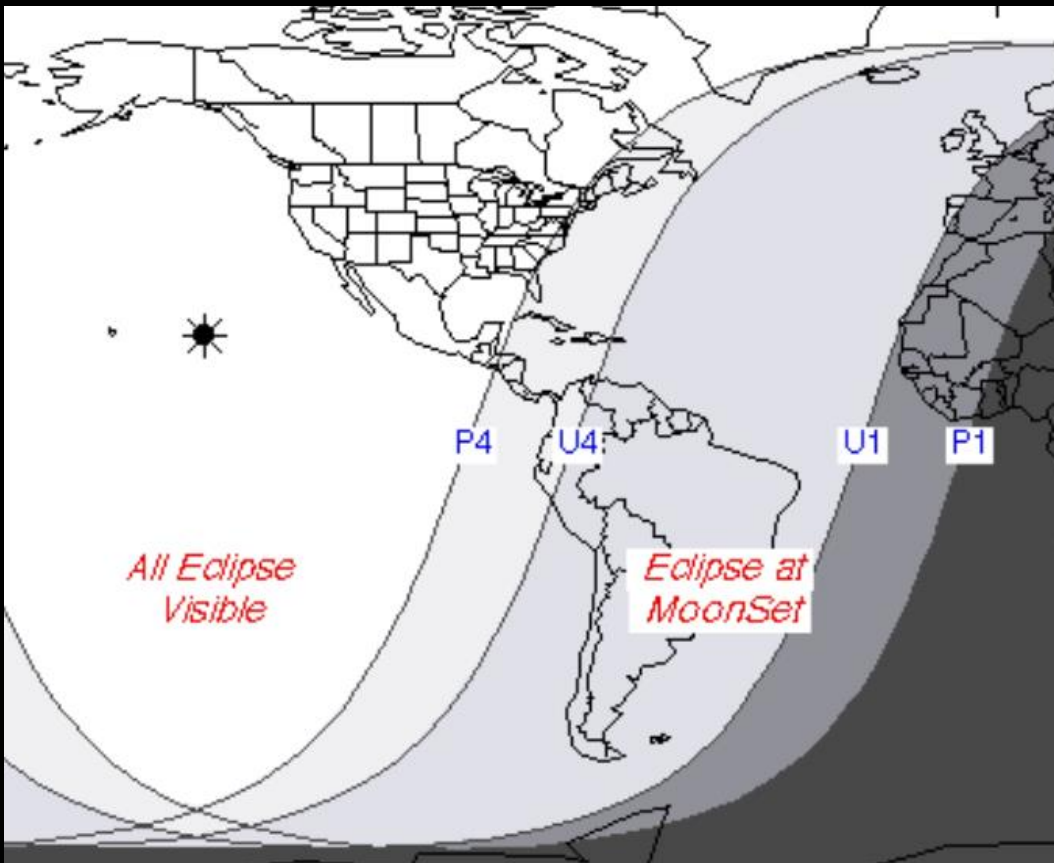


Eclipse Durations

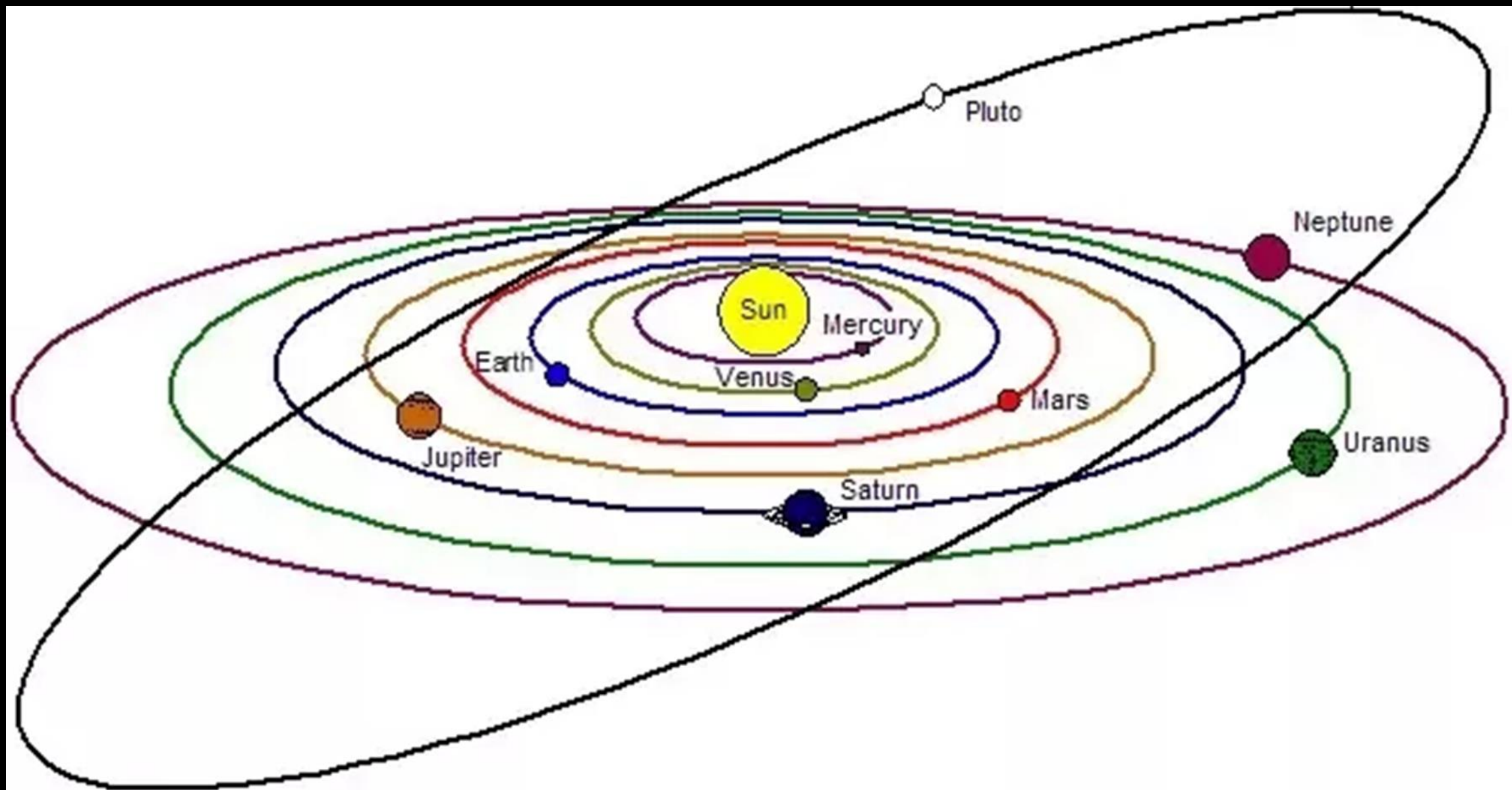
Penumbral = 06h01m29s

Eclipse Contacts

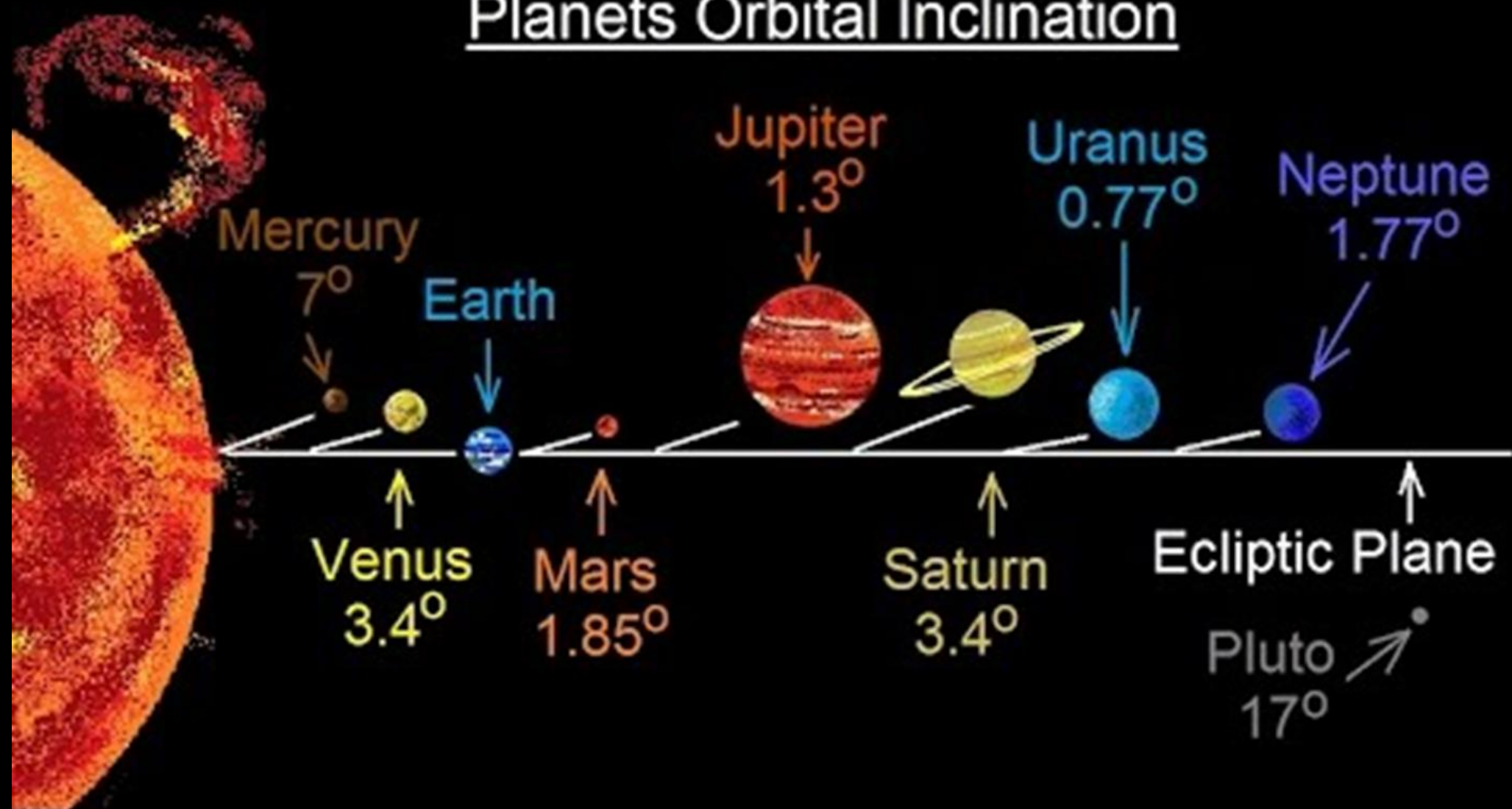
P1 = 06:02:09 UT

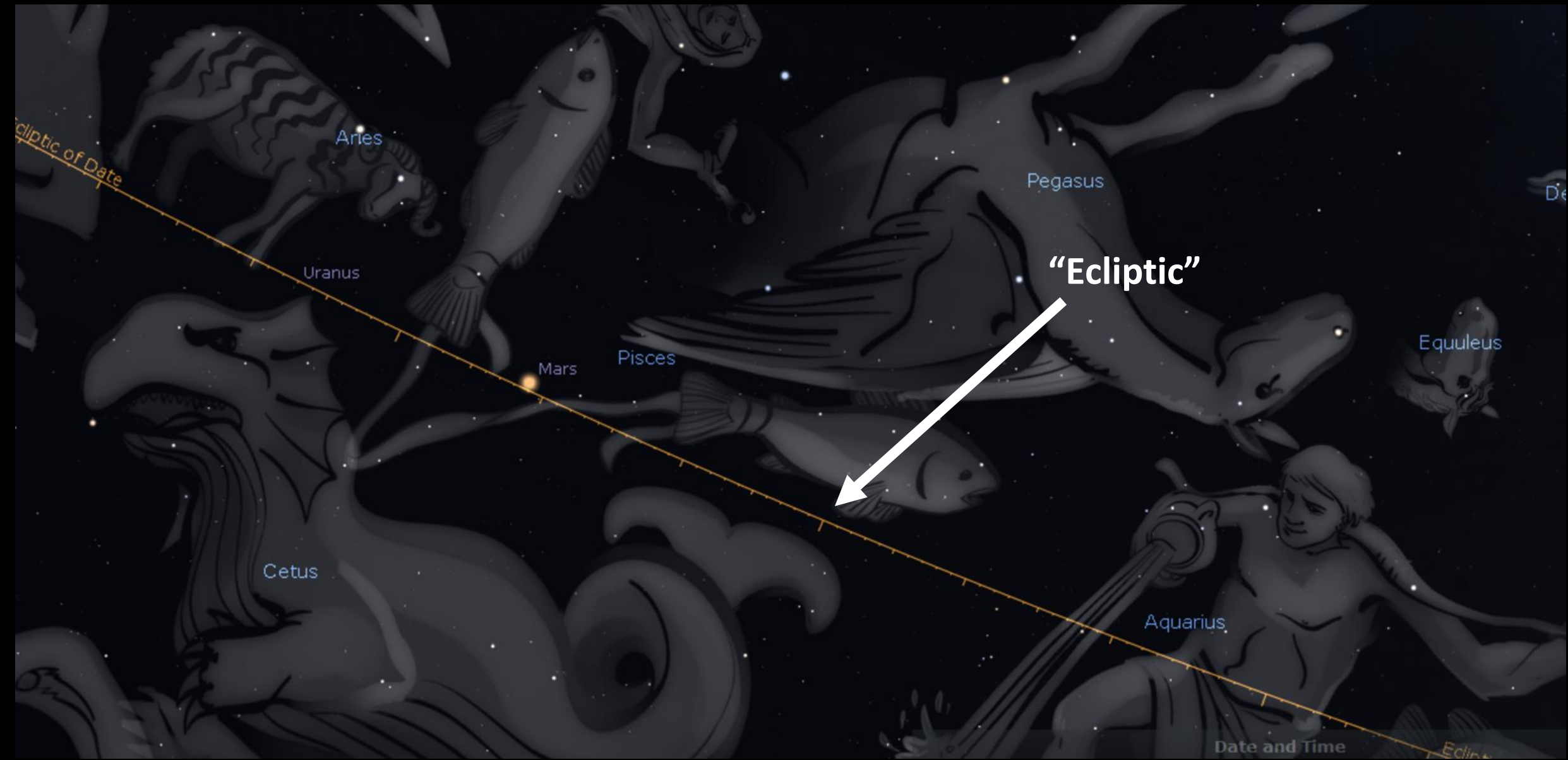






Planets Orbital Inclination





"Ecliptic"



Aries

Uranus

Pegasus

Mars

Pisces

Equuleus

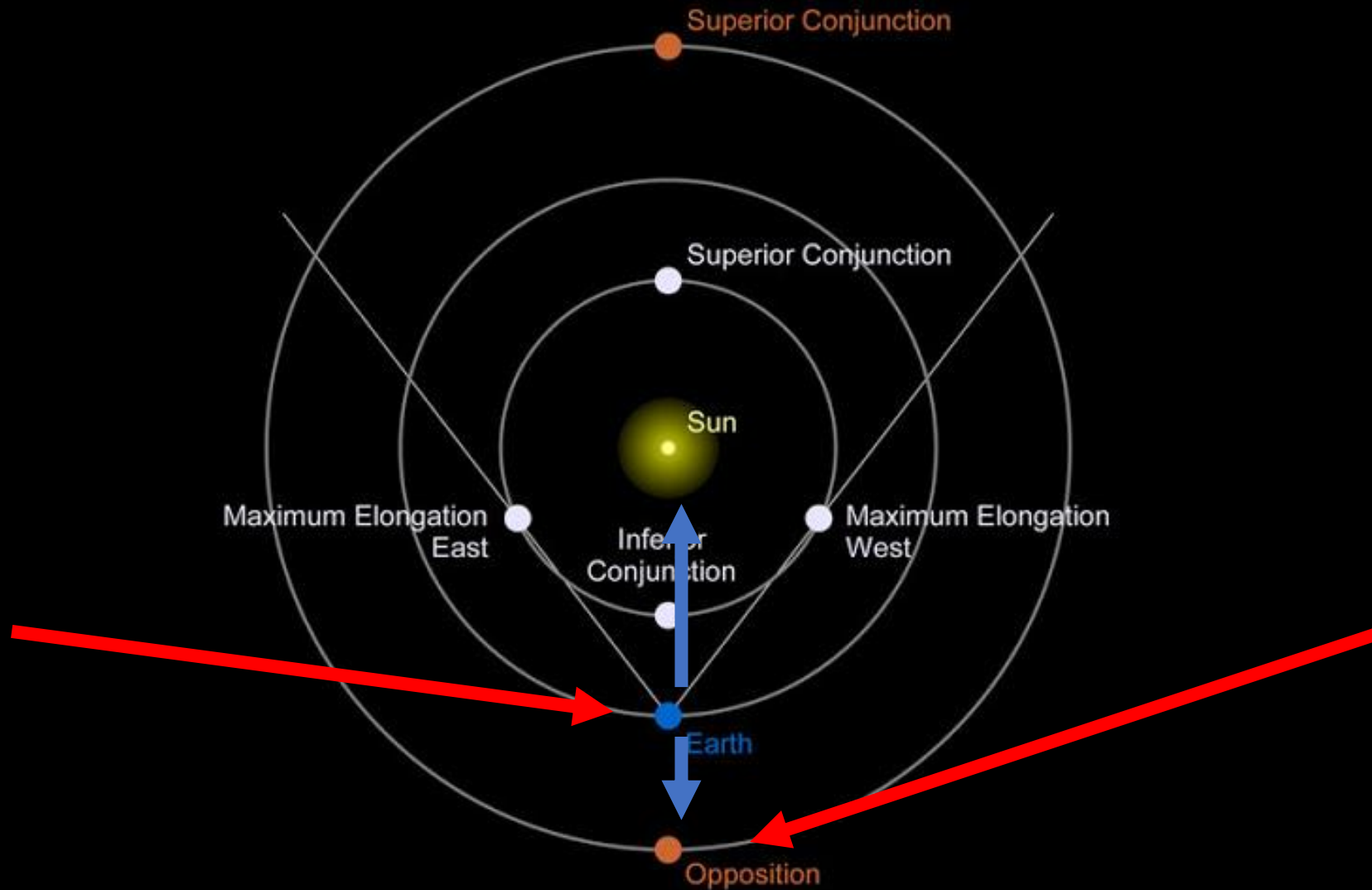
Cetus

Aquarius

Date and Time

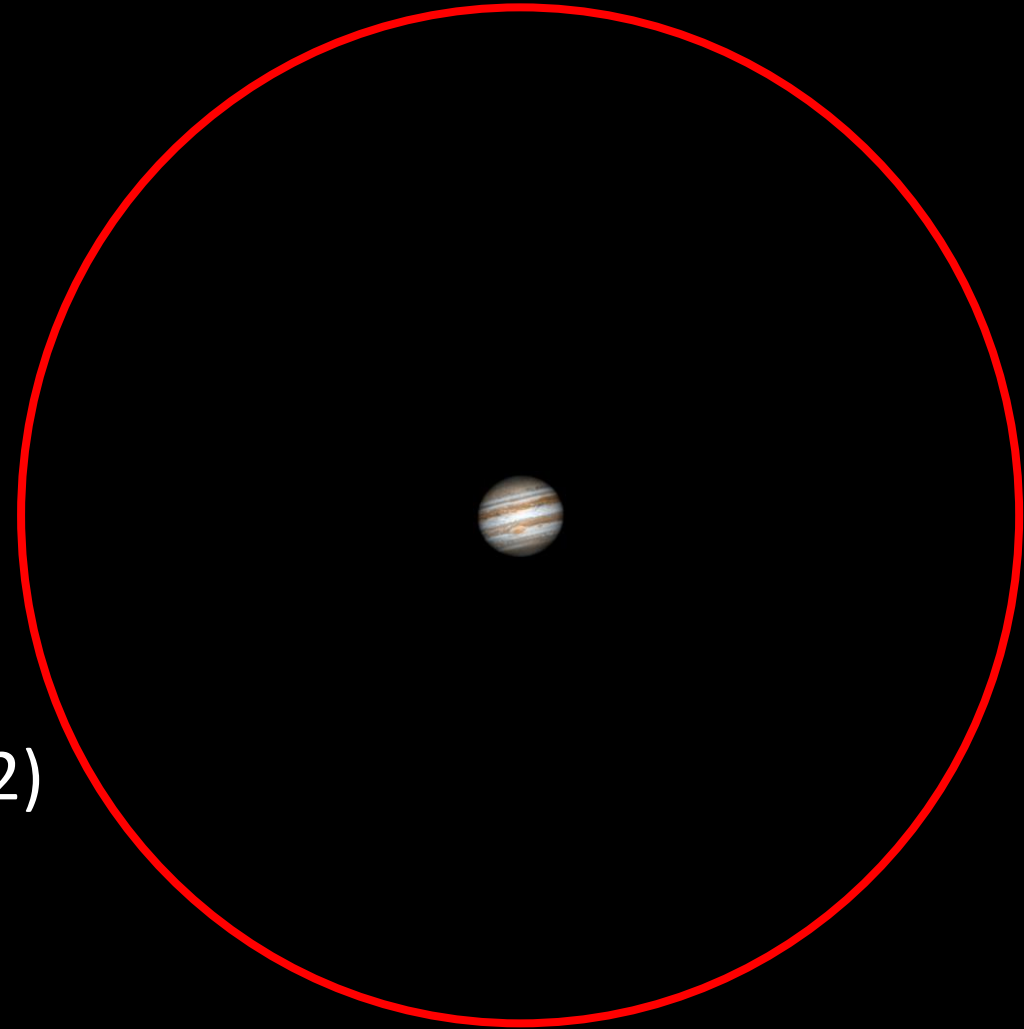
Ecliptic

Planetary orbit configurations – outer planets

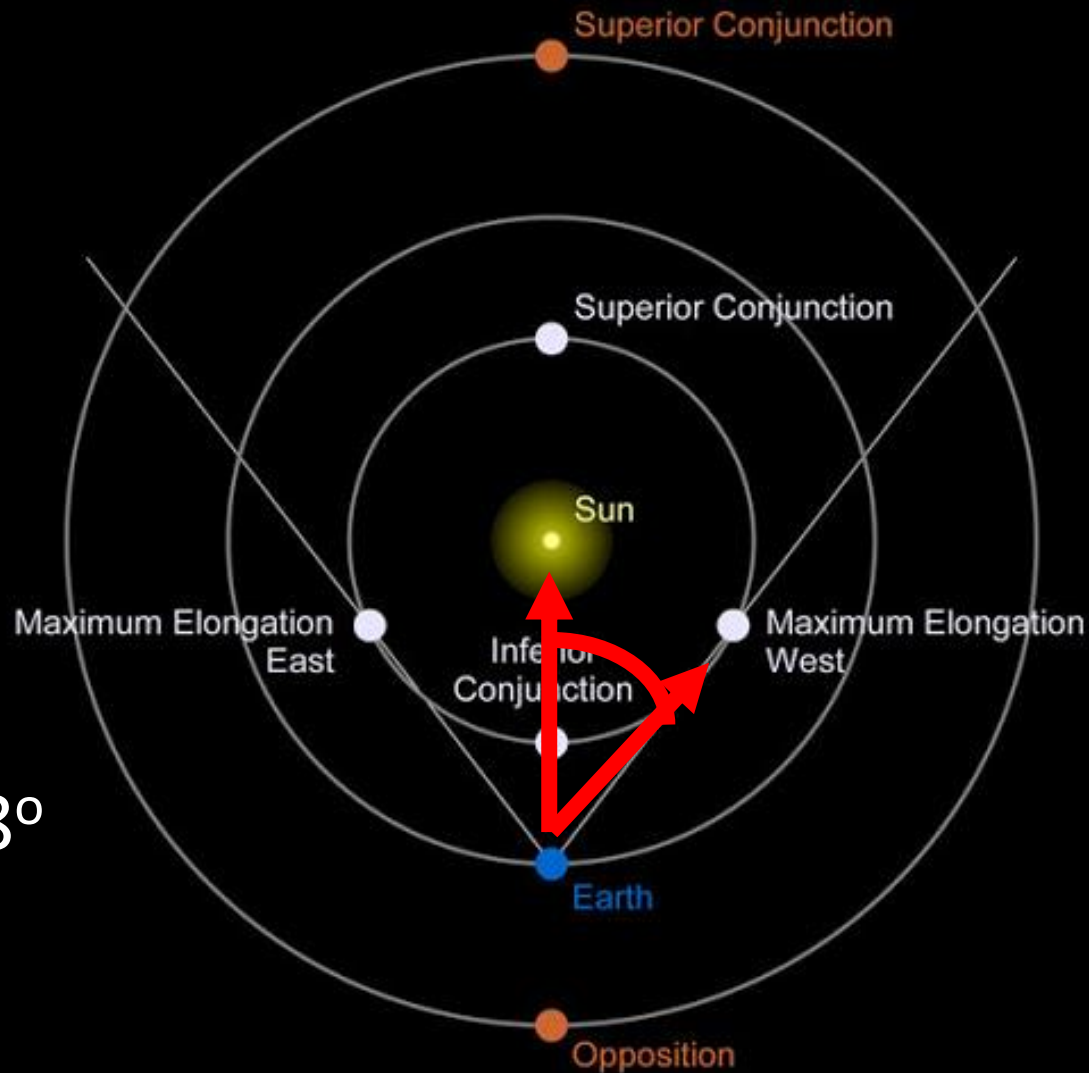


Oppositions in 2021:

- Saturn – August 2
- Jupiter – August 19
- Neptune – September 14
- Uranus – November 4
- (Next Mars opposition – December 8, 2022)



Planetary orbit configurations – inner planets



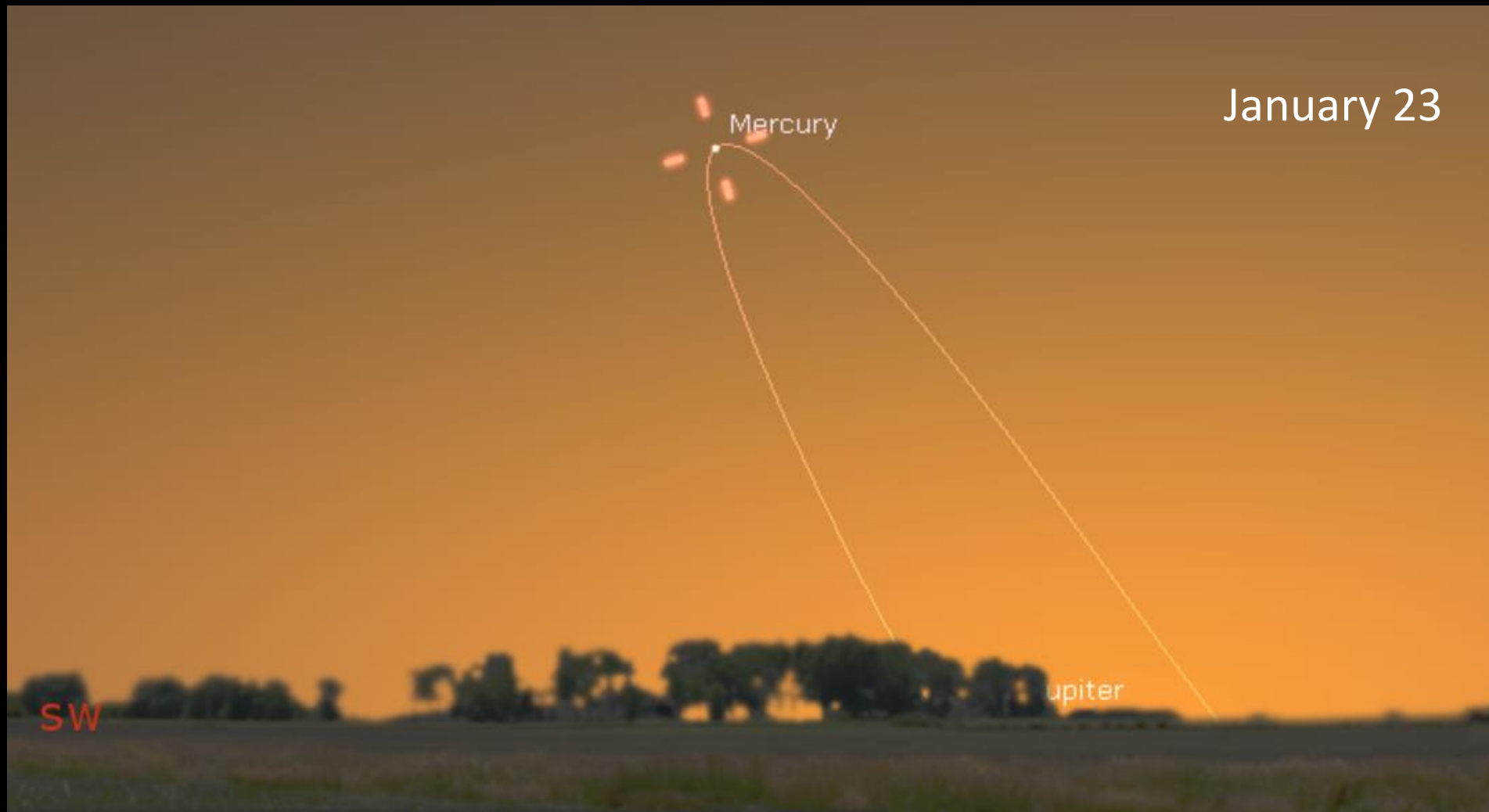
Mercury – 28°

Venus – 47°

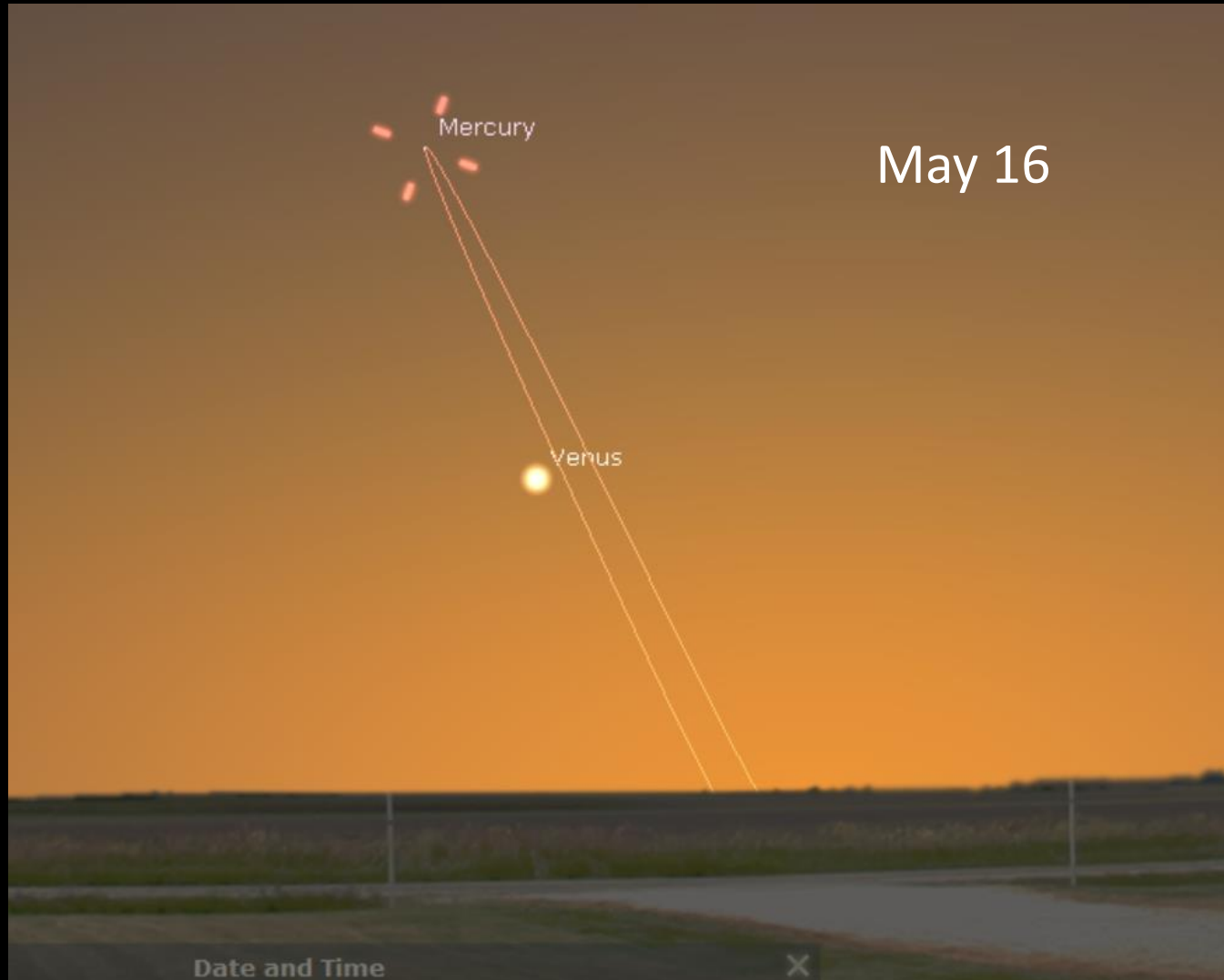
Ecliptic vs Horizon



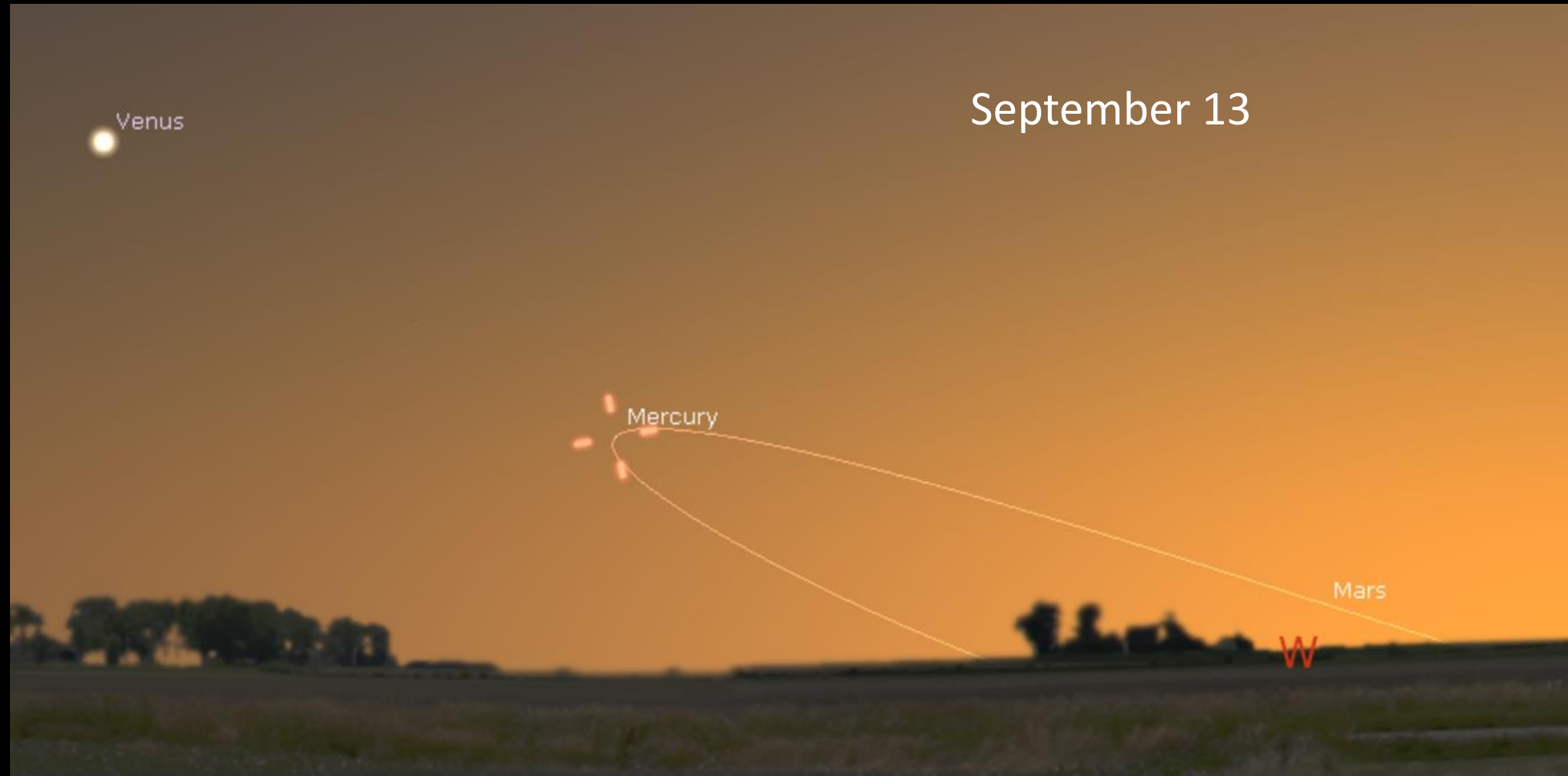
Mercury in 2021 (evening)



Mercury in 2021 (evening)



Mercury in 2021 (evening)



Mercury in 2021 (morning)



Mercury in 2021 (morning)

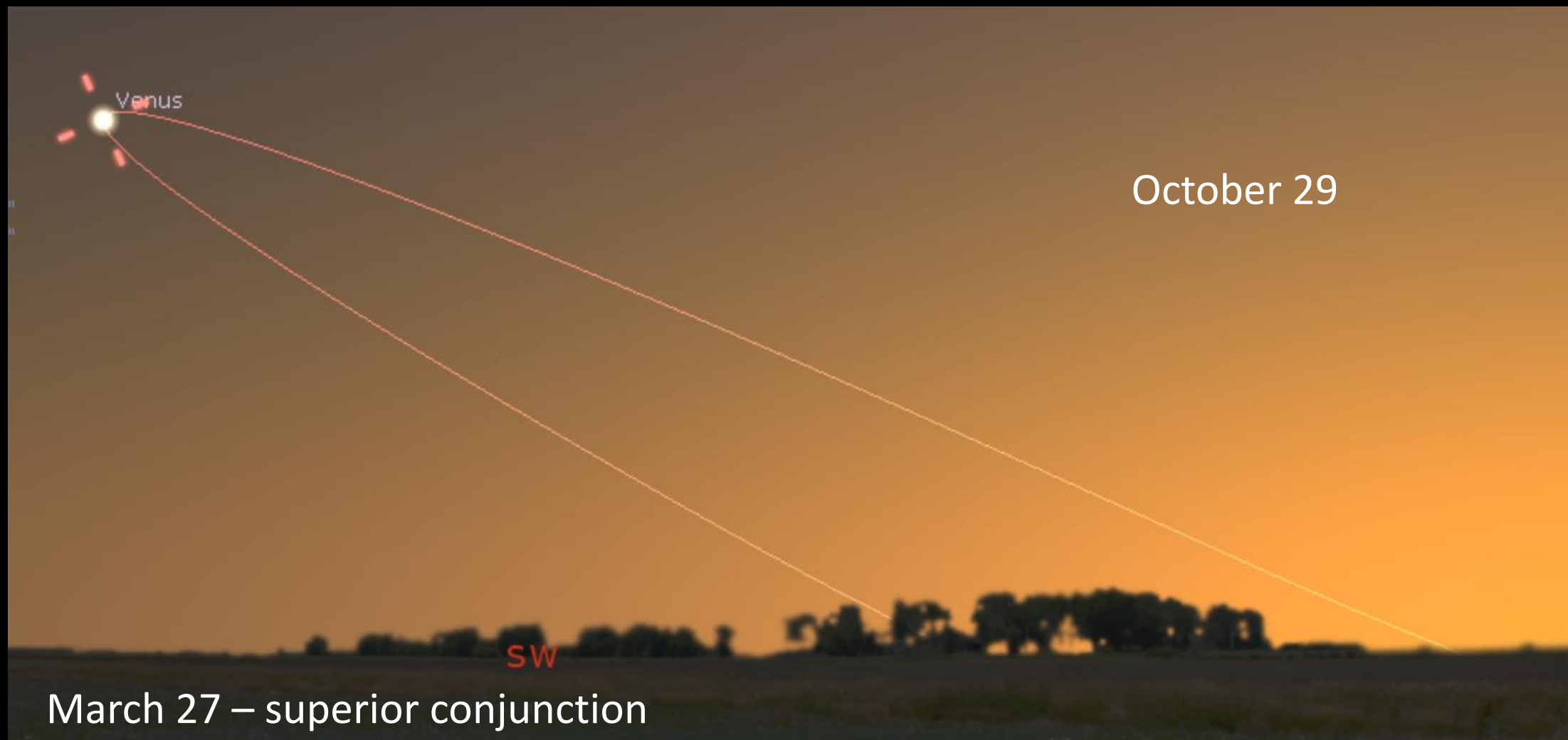
4th of July



Mercury in 2021 (morning)



Venus in 2021 (evening)



Planetary gatherings and other stuff

January 11 - pm



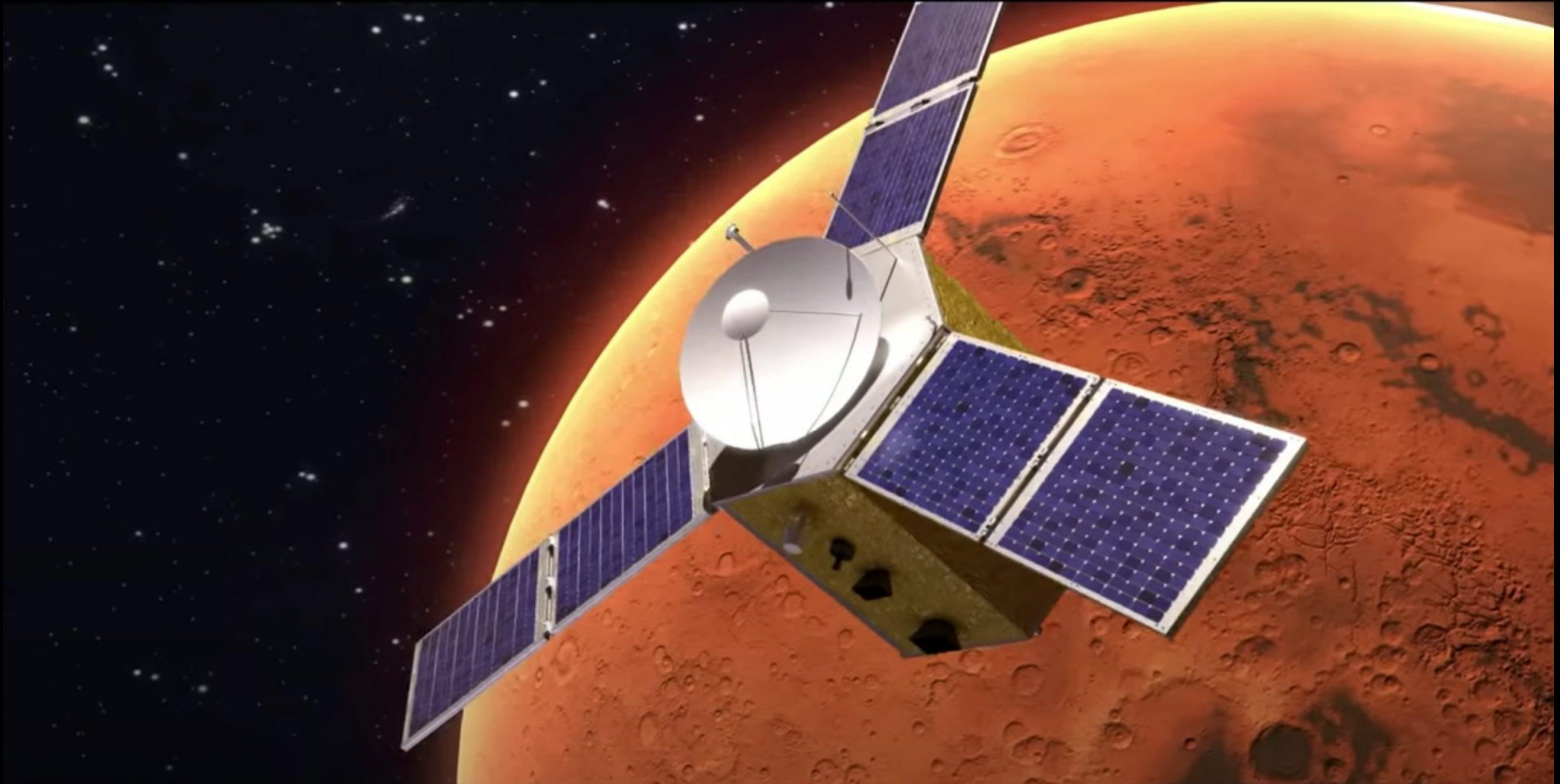
January 21 – Mars/Uranus (binoculars)



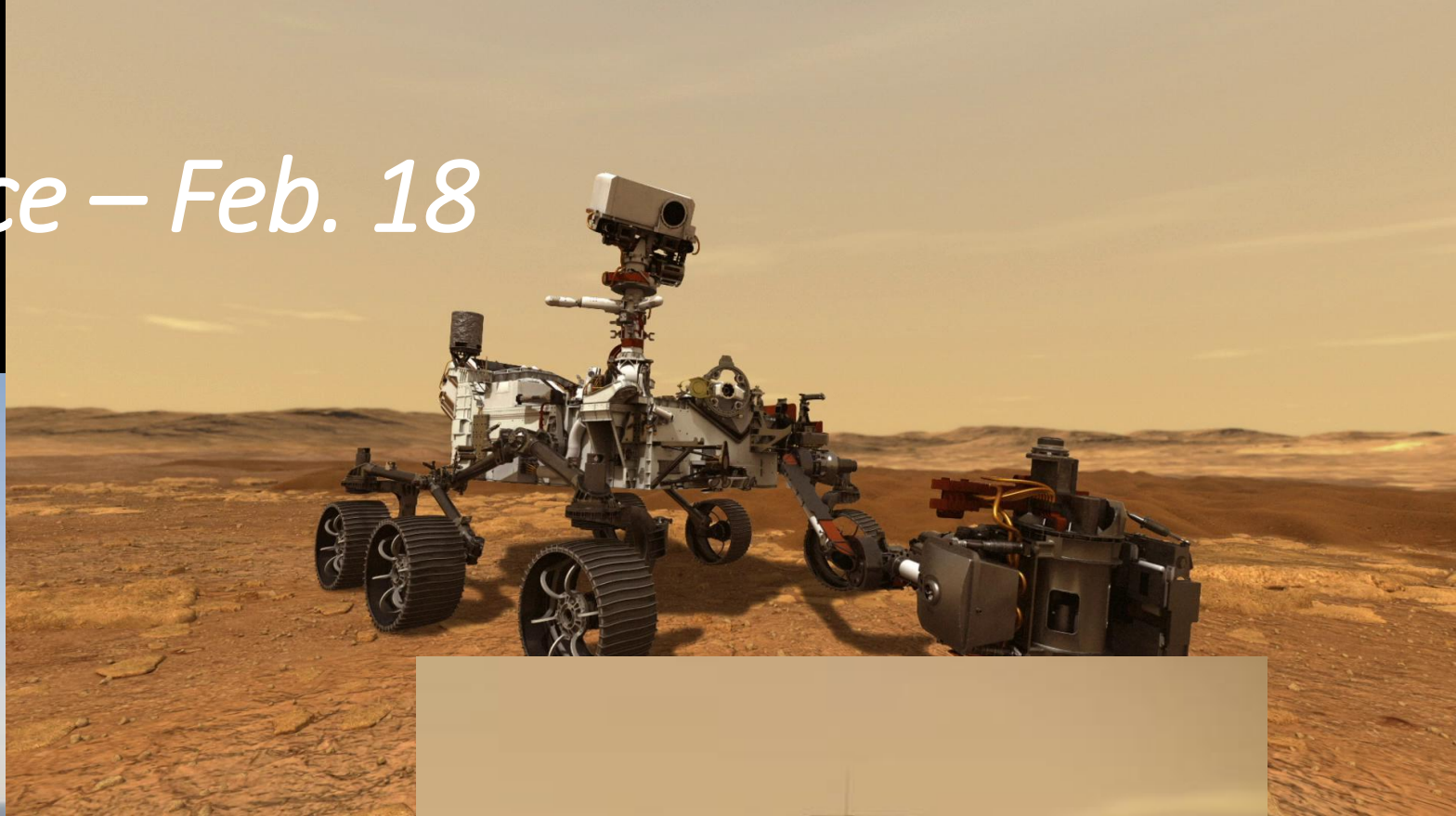
Boeing "Starliner"

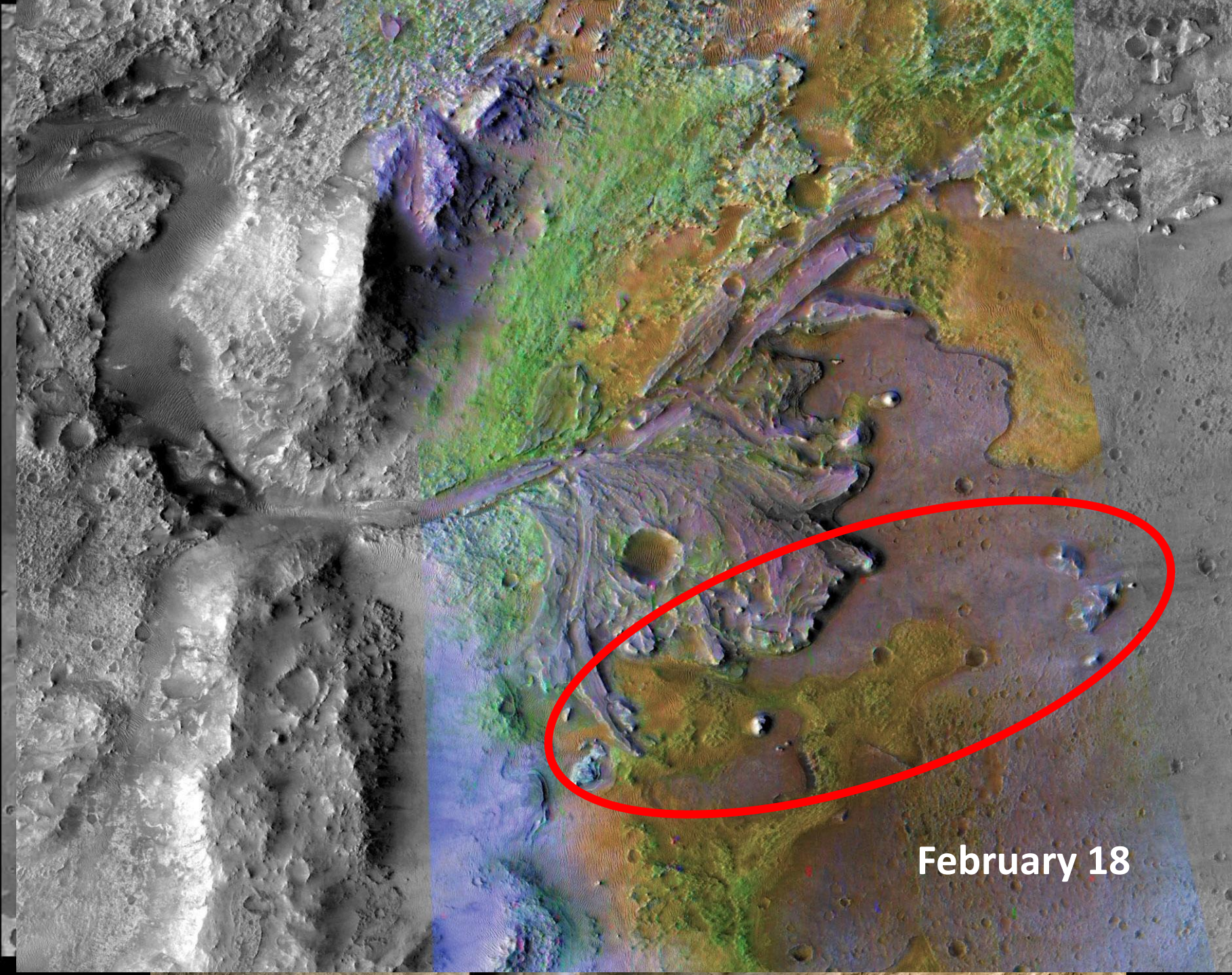


February 9 – “Hope” arrives at Mars



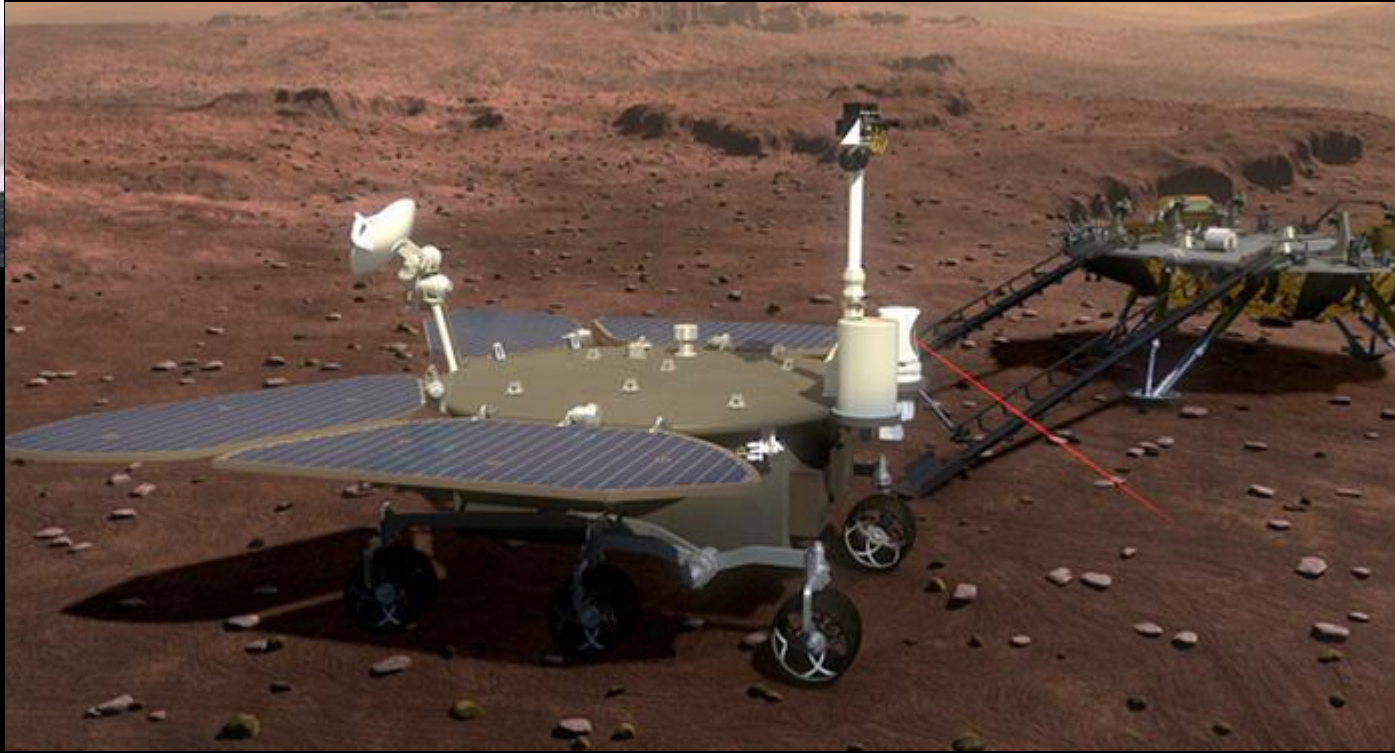
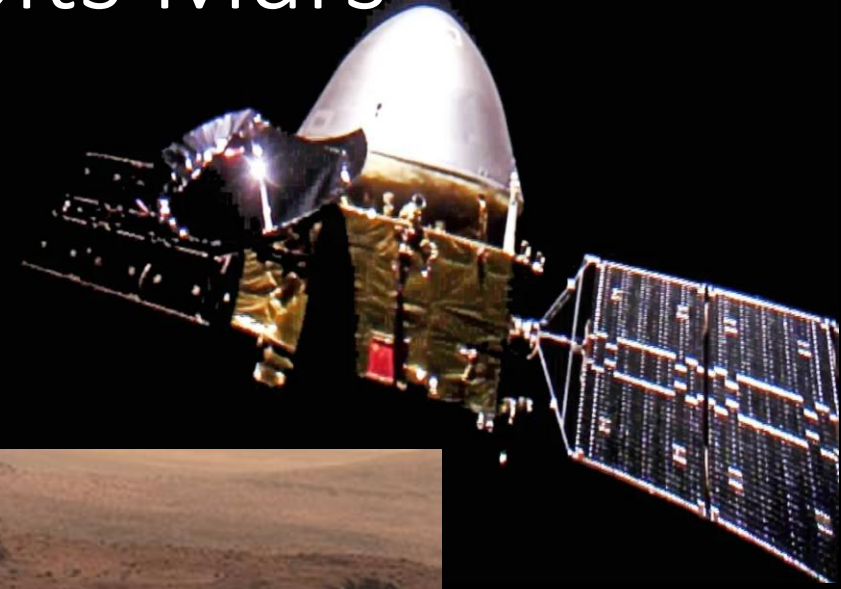
Mars *Perseverance* – Feb. 18



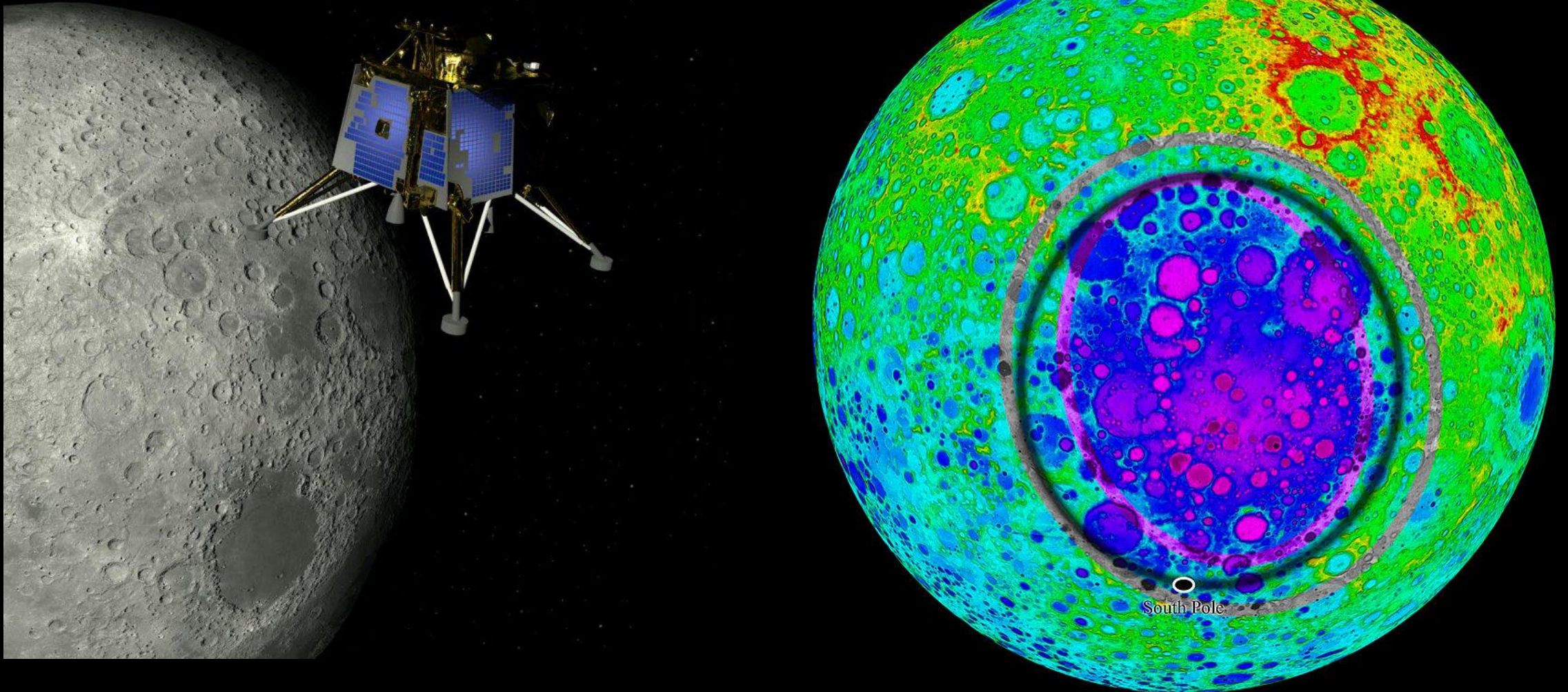


February 18

February 23 (?) – Tianwen-1 orbits Mars



March ? – launch of Chandrayaan-3



1st week of March – Mars/”Seven Sisters”



March 4 – Vesta opposition



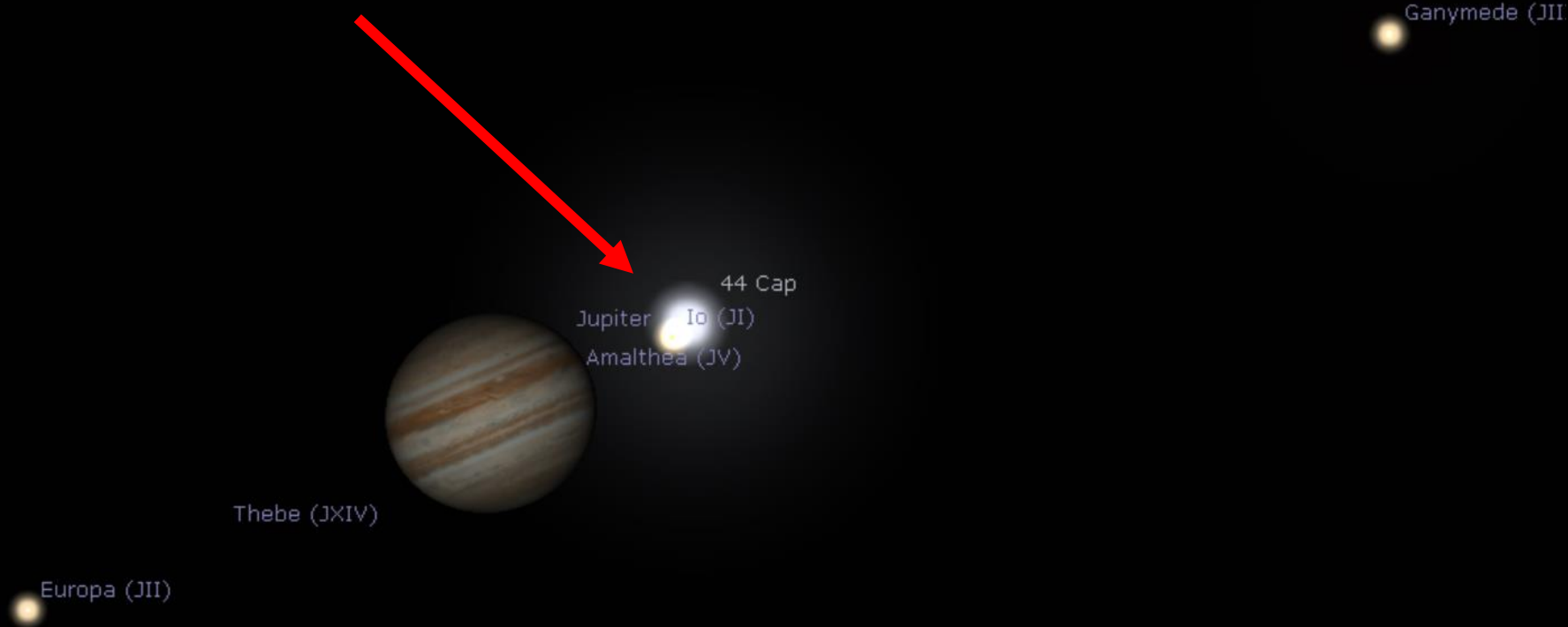
March 5 – Mercury/Jupiter (am)



March 10 – Mercury/Jupiter/Saturn (am)



April 2 – Jupiter & 44 Cap (am)





INTERNATIONAL DARK-SKY ASSOCIATION

DISCOVER THE NIGHT

International Dark Sky Week 2021

April 5-12

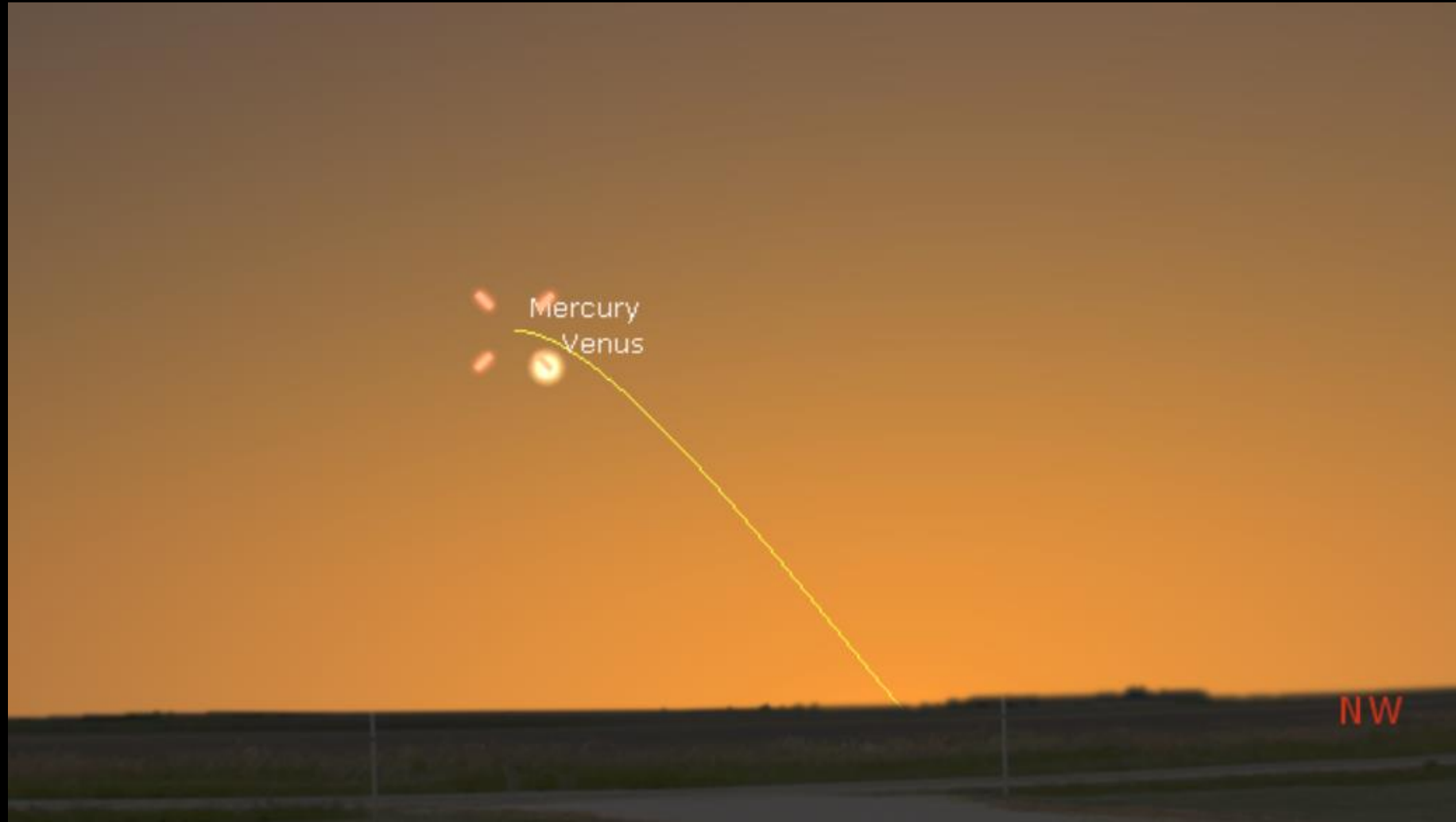
~~April 17 – occultation of Mars~~



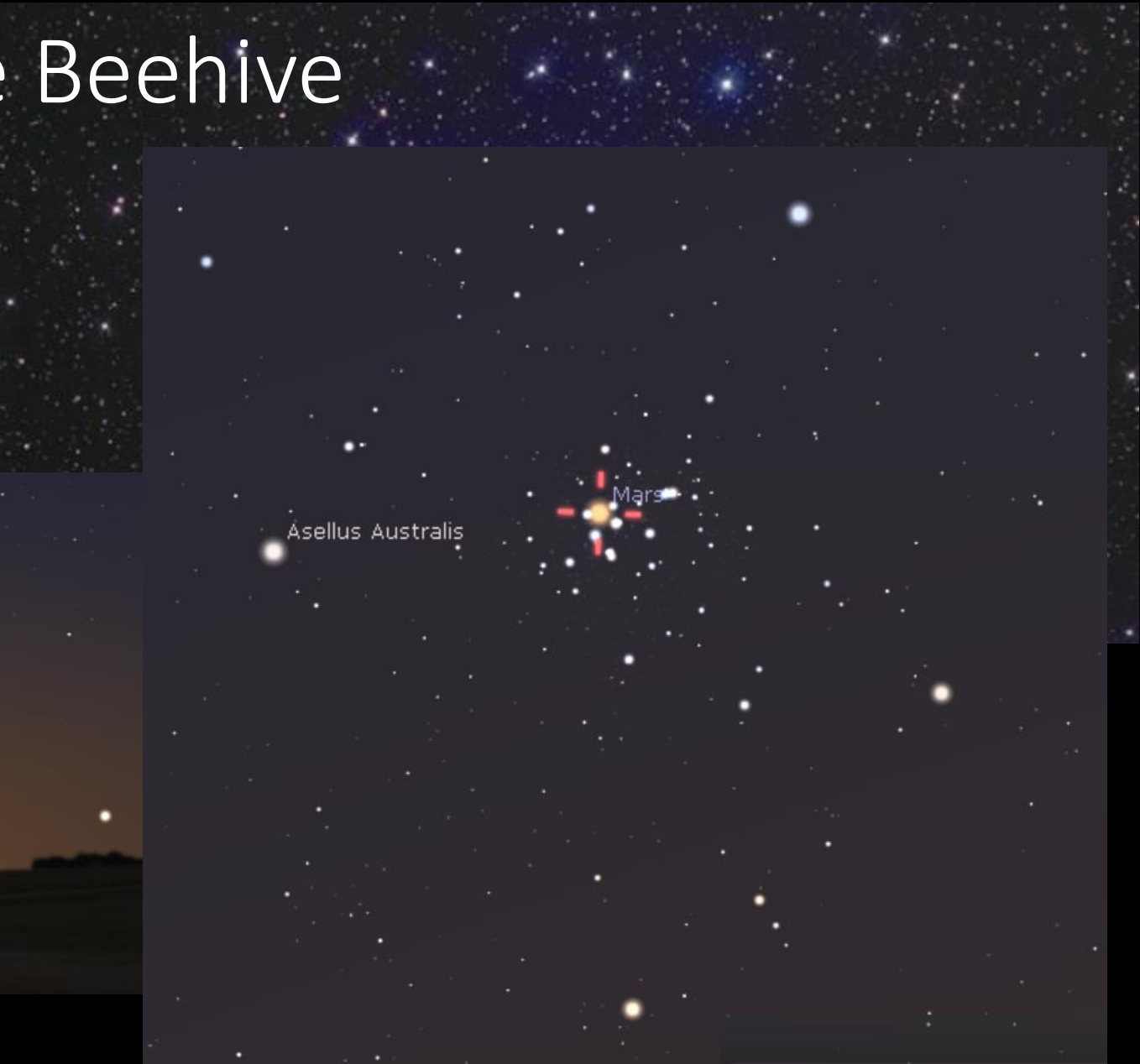
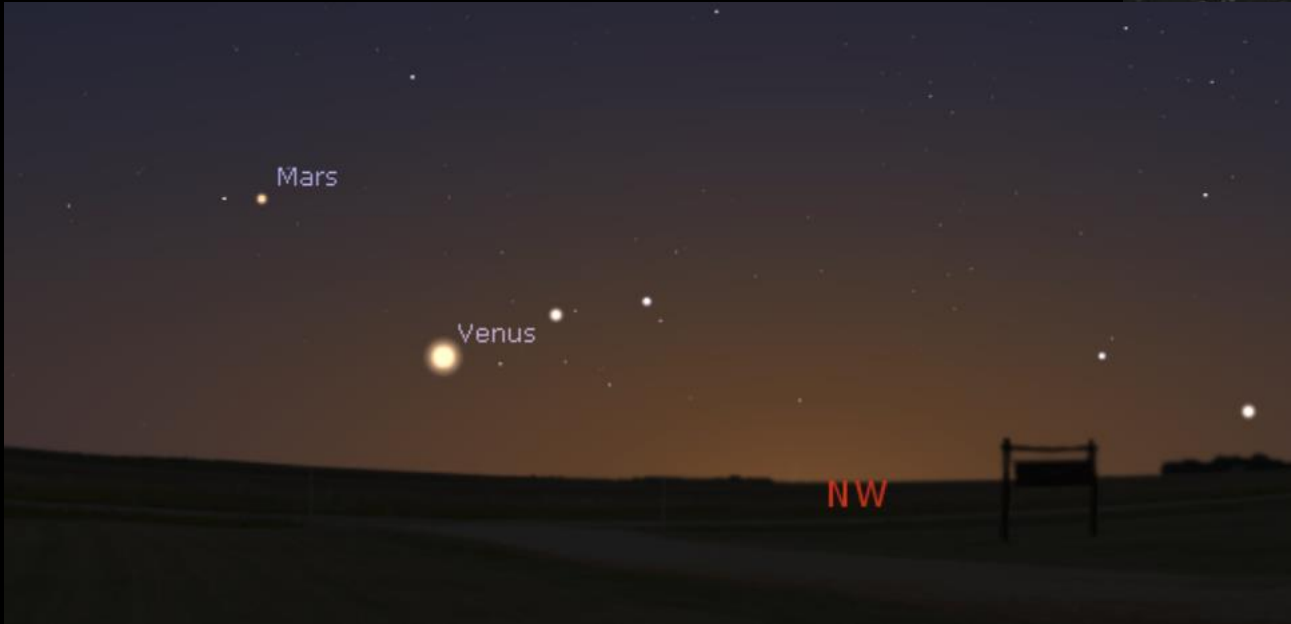
May 12 – Venus/Mercury/Moon (pm)



May 27 – Mercury/Venus (pm)



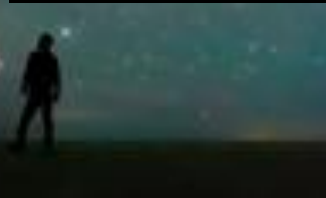
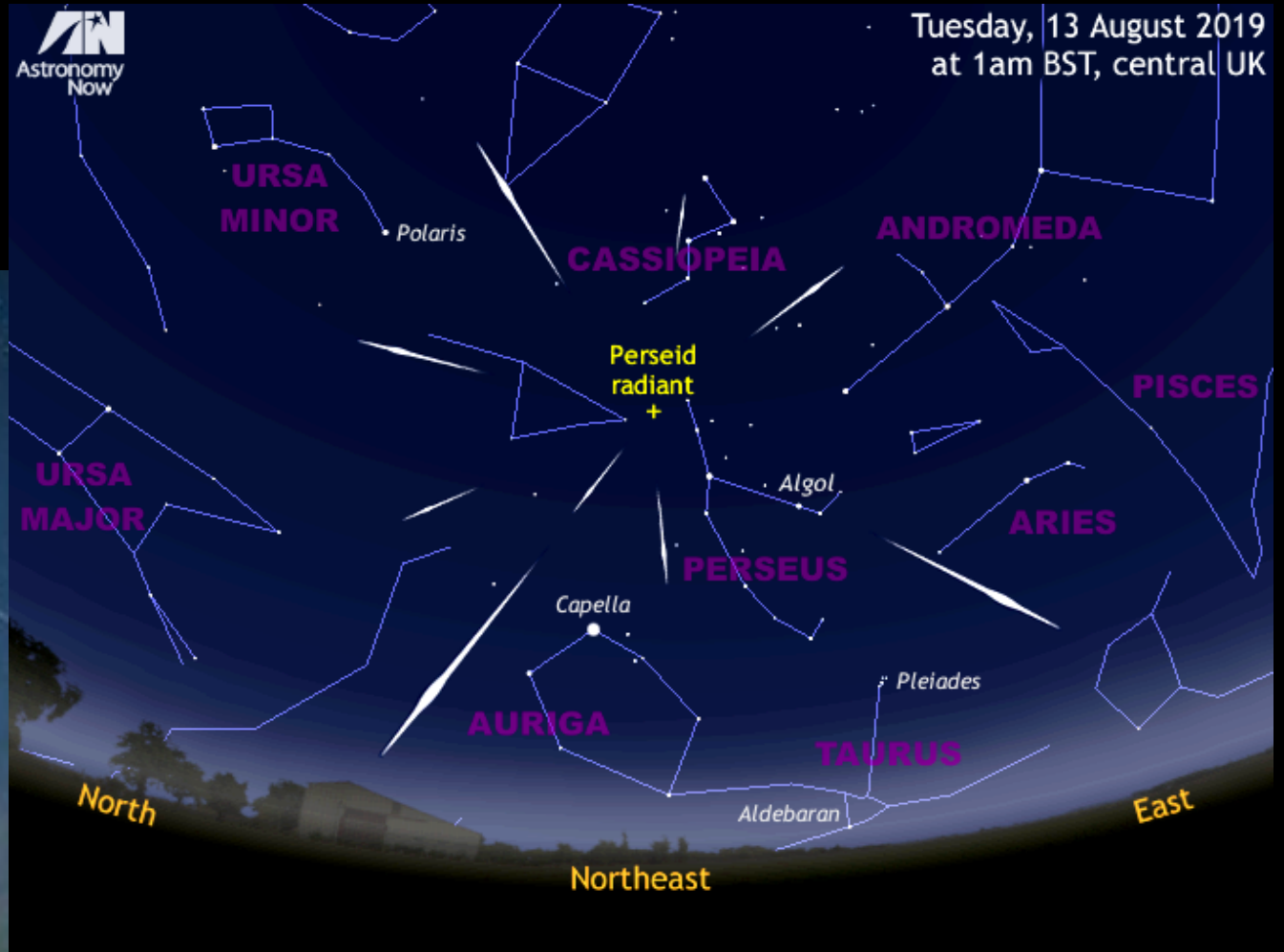
June 23 - Mars in the Beehive



July 11 – Venus/Mars (pm)



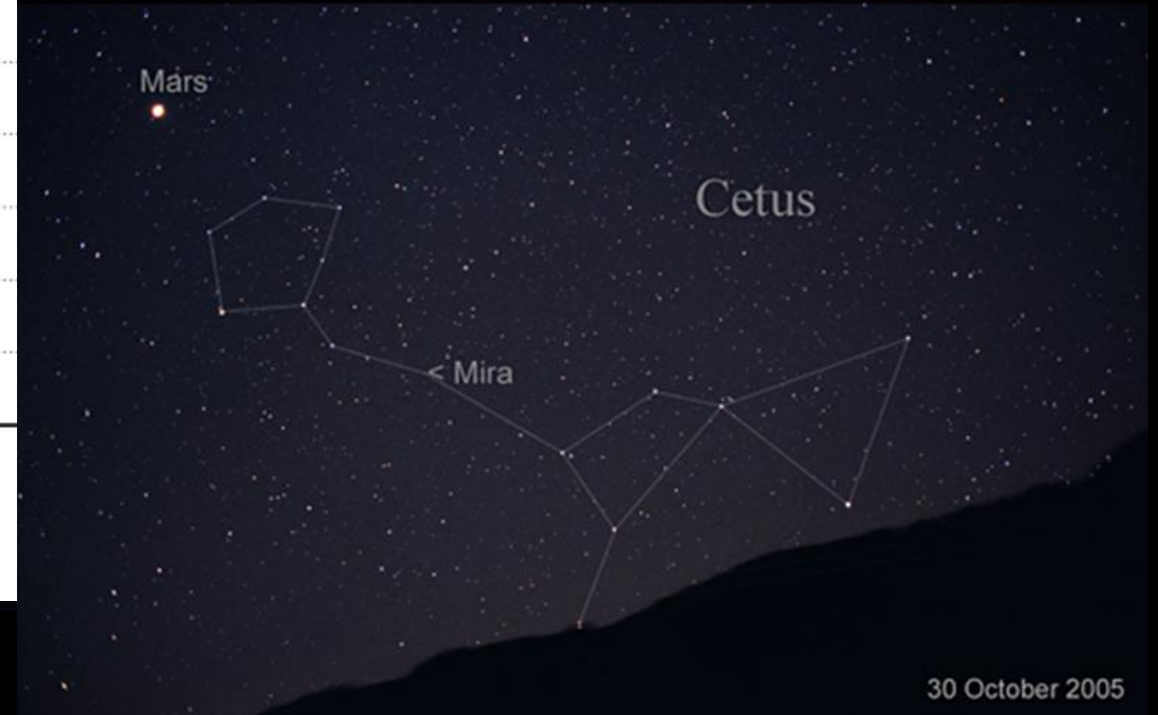
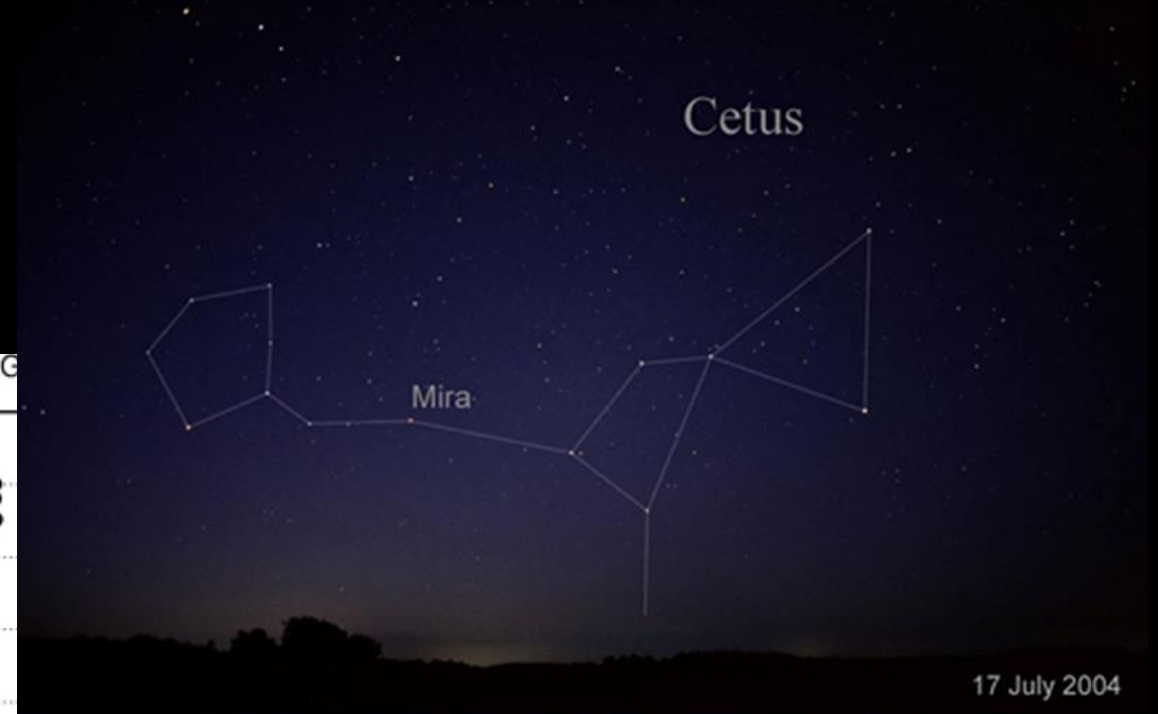
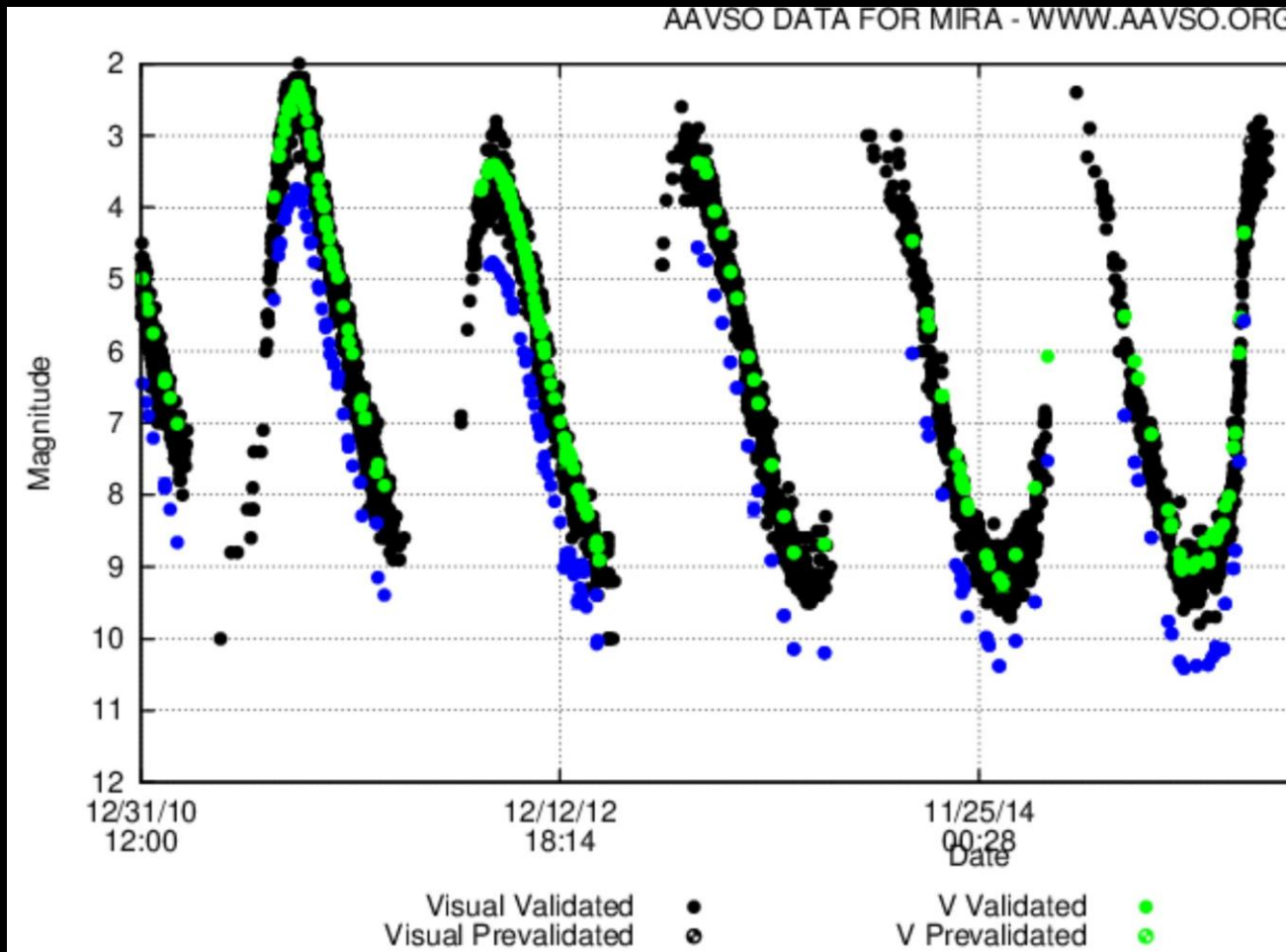
Meteor Showers



August 18 – Mercury/Mars (pm)



August 18 – Mira max



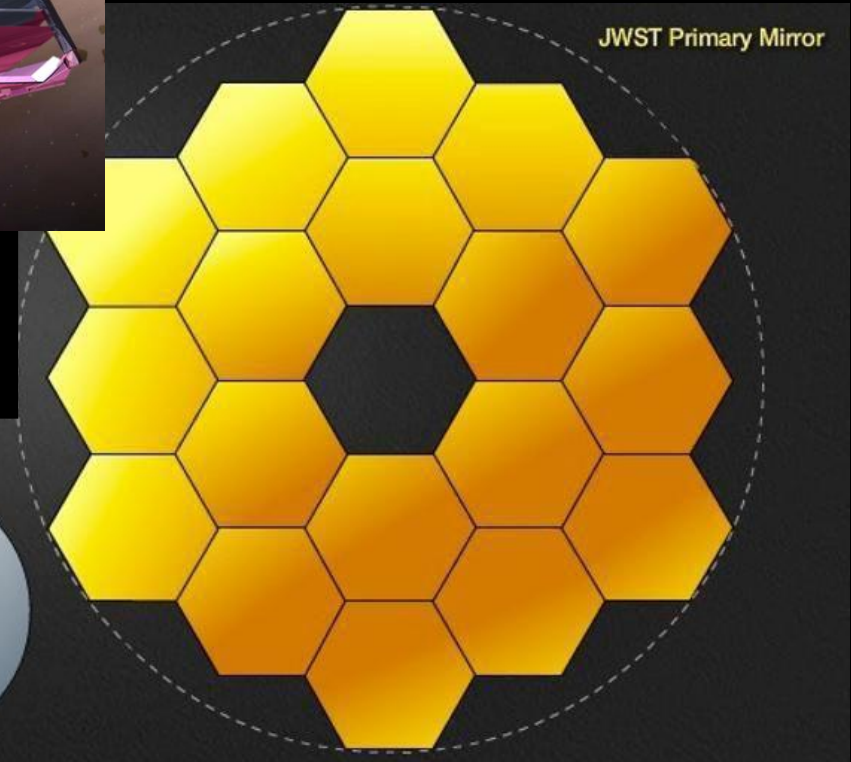
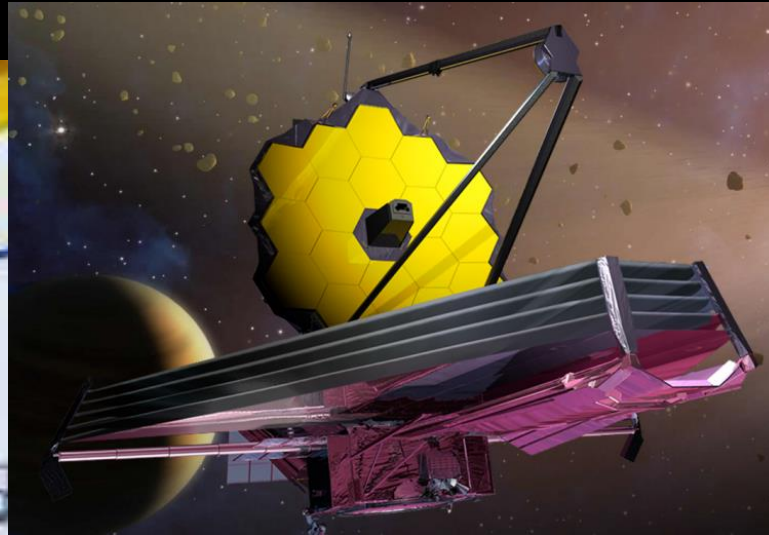
“Blue Moon?”



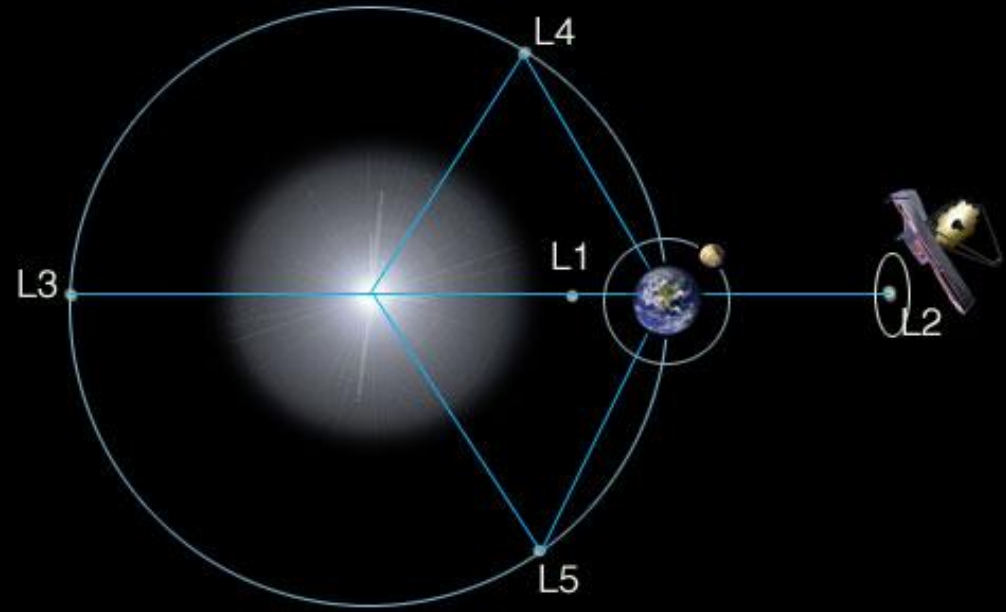
October 16 – Venus/Antares (pm)



Halloween - James Webb Telescope launch (?)



James Webb Telescope



1990

Ground-based observatories

1995

Hubble Deep Field

2004

Hubble Ultra Deep Field

2010

Hubble Ultra Deep Field-IR

FUTURE

James Webb Space Telescope

Redshift (z):

Time after the Big Bang

Present

1

6 billion years

4

1.5 billion years

5

6

7

800 million years

8

10

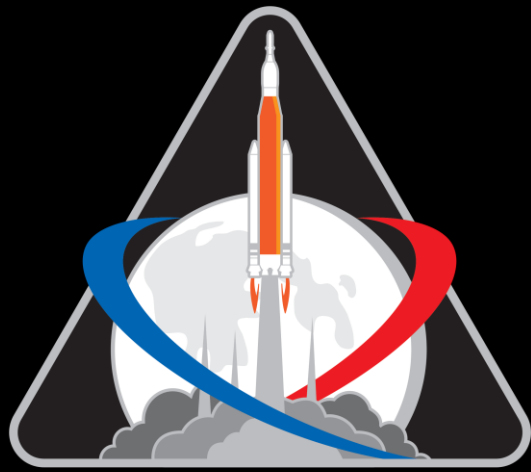
480 million years

>20

200 million years

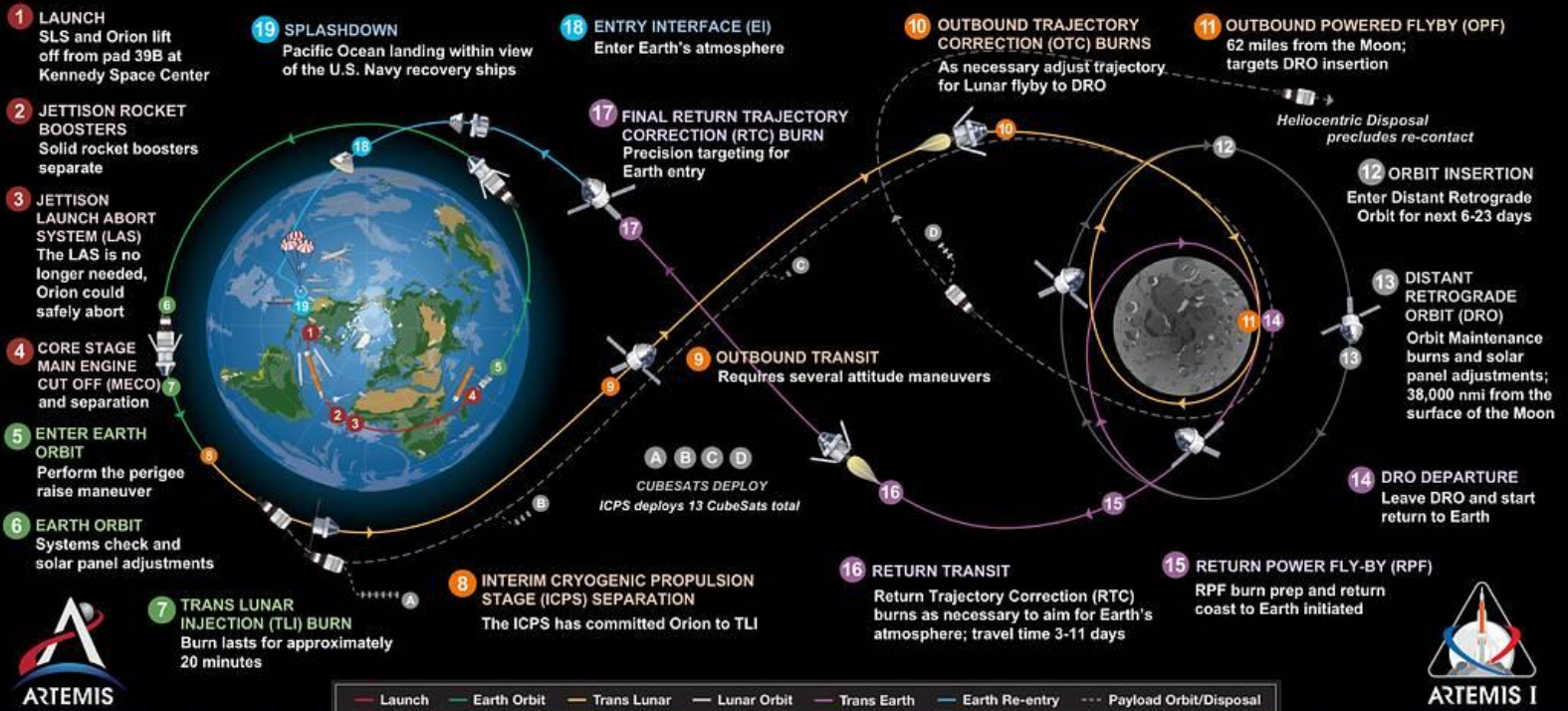
November 4 – Ceres/Aldebaran





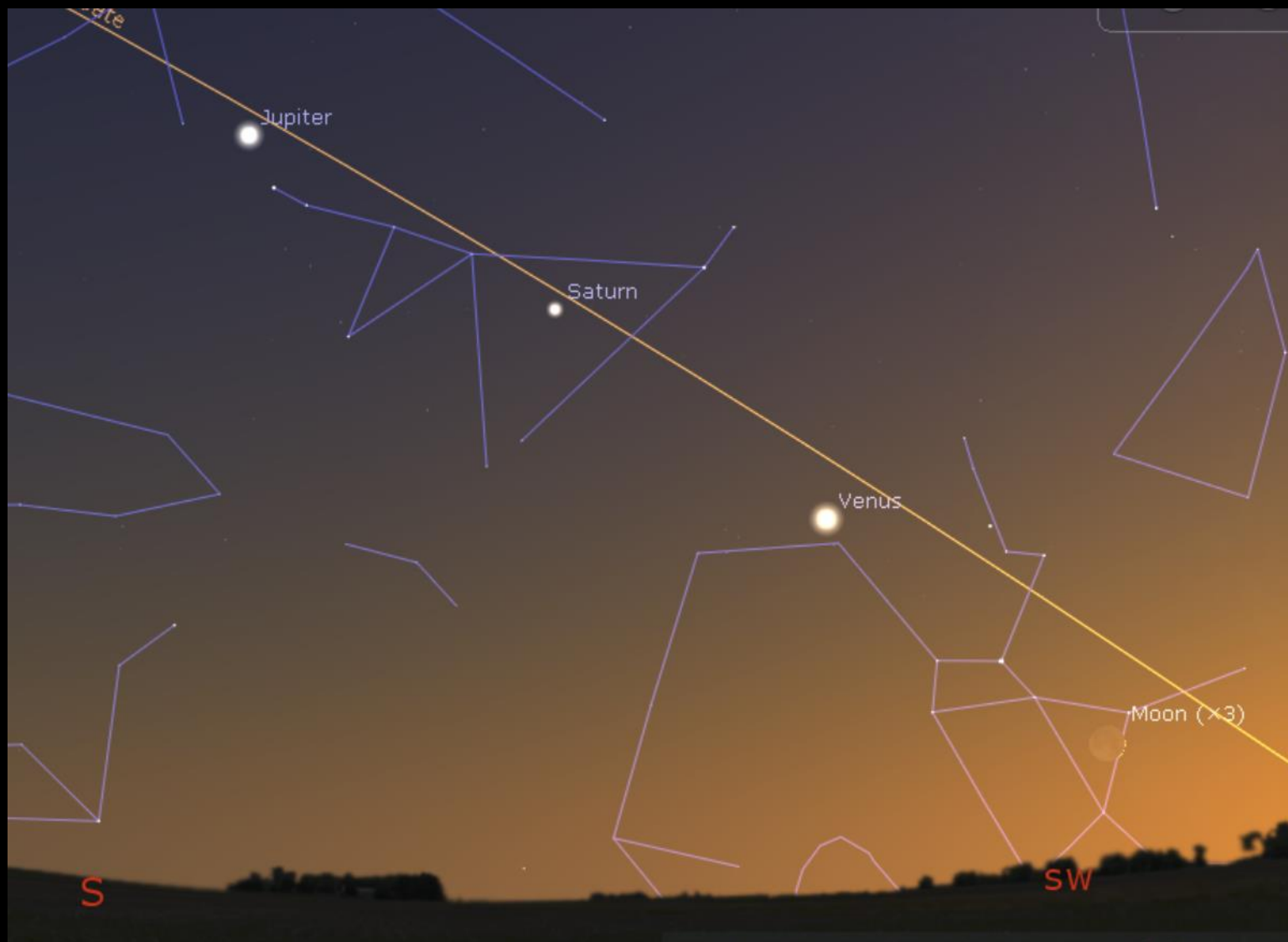
ARTEMIS I

The first uncrewed, integrated flight test of NASA's Orion spacecraft and Space Launch System rocket, launching from a modernized Kennedy spaceport



Total distance traveled: 1.3 million miles – Mission duration: 26-42 days – Re-entry speed: 24,500 mph (Mach 32) – 13 CubeSats deployed

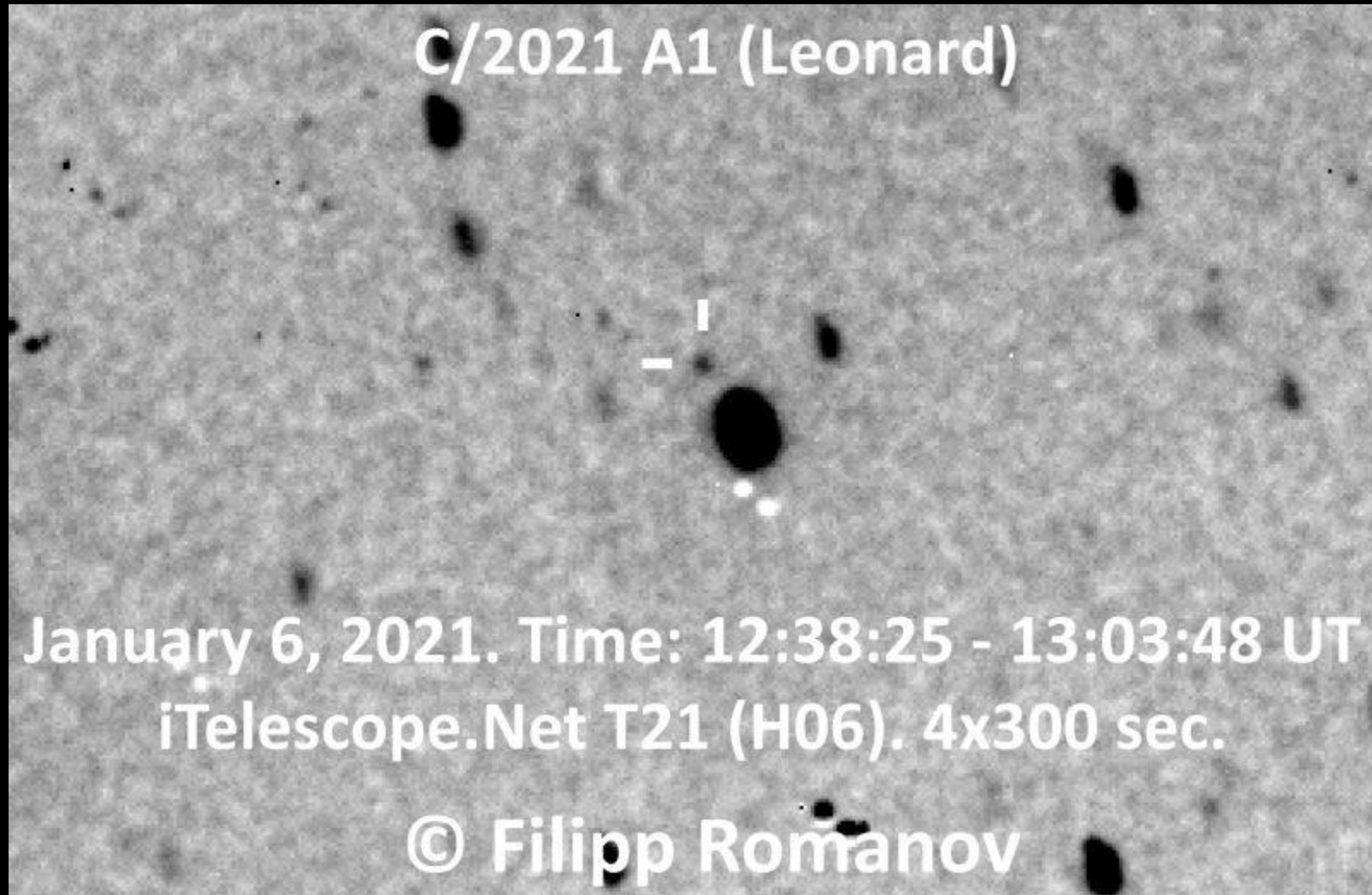
December 5 - pm



December 17 – Mars & Antares (am)



This just in



C/2021 A1 (Leonard)

January 6, 2021. Time: 12:38:25 - 13:03:48 UT
iTelescope.Net T21 (H06). 4x300 sec.

© Filipp Romanov

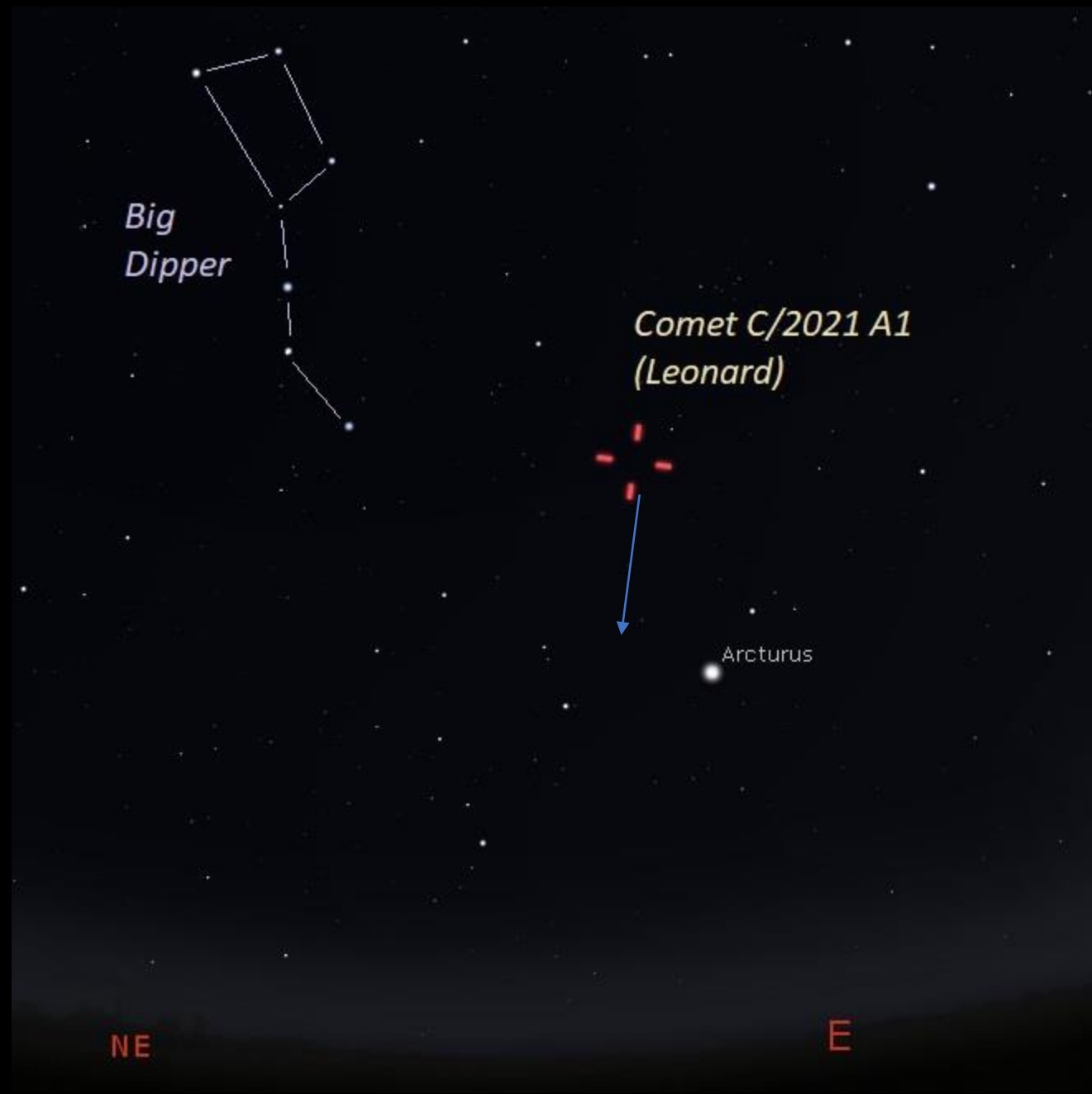
*Big
Dipper*

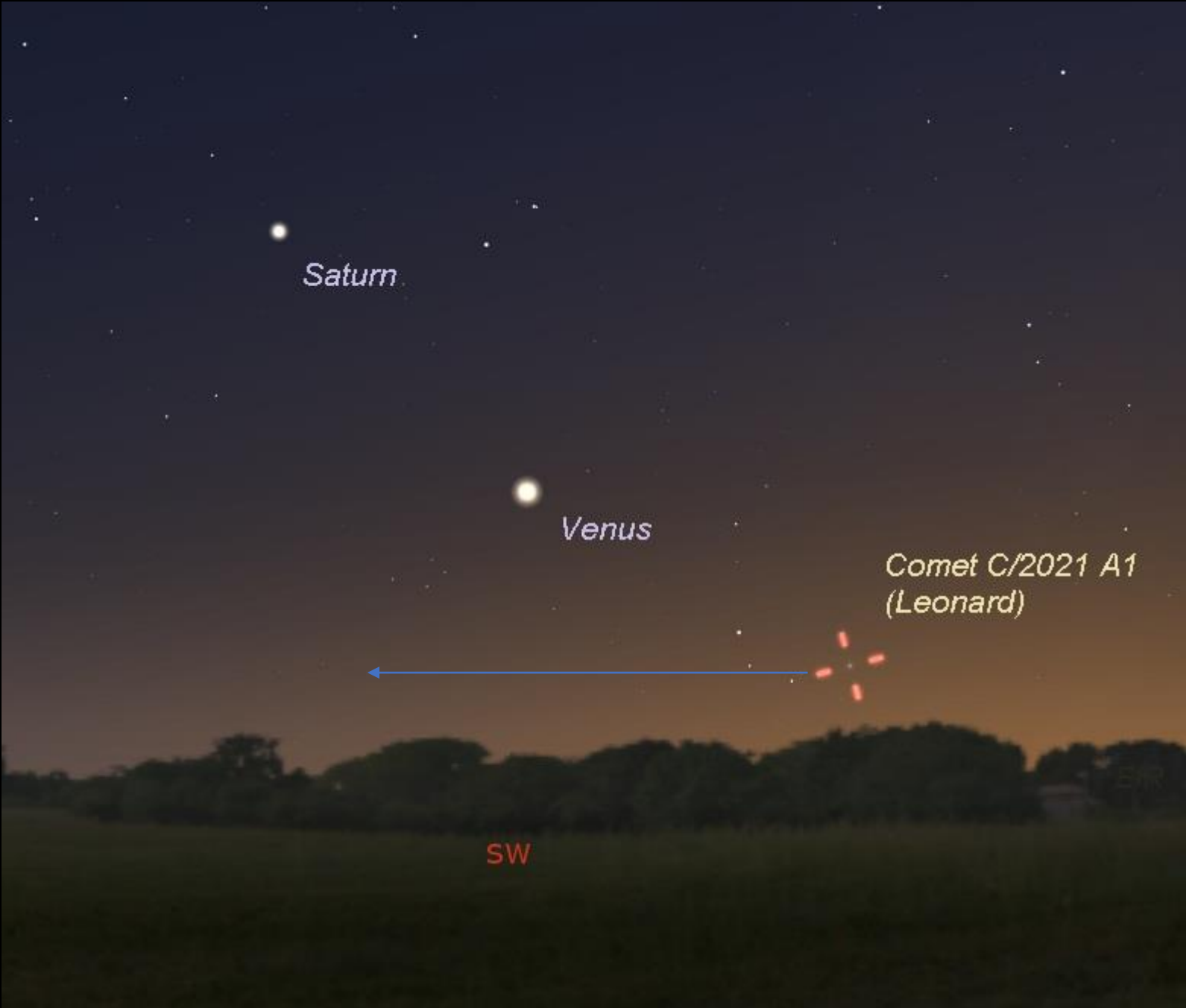
*Comet C/2021 A1
(Leonard)*

Arcturus

NE

E





Saturn

Venus

Comet C/2021 A1
(Leonard)

SW

Hopefully???





Thanks . . .

dleake@parkland.edu

Since someone asked about it – this is a photo I took from Colorado . . .