Interesting Astronomical Events for 2023

Our sky is always changing, most changes are predictable and follow patterns, known since ancient times.

Here are some of the more interesting astronomical events visible from St Louis in 2023

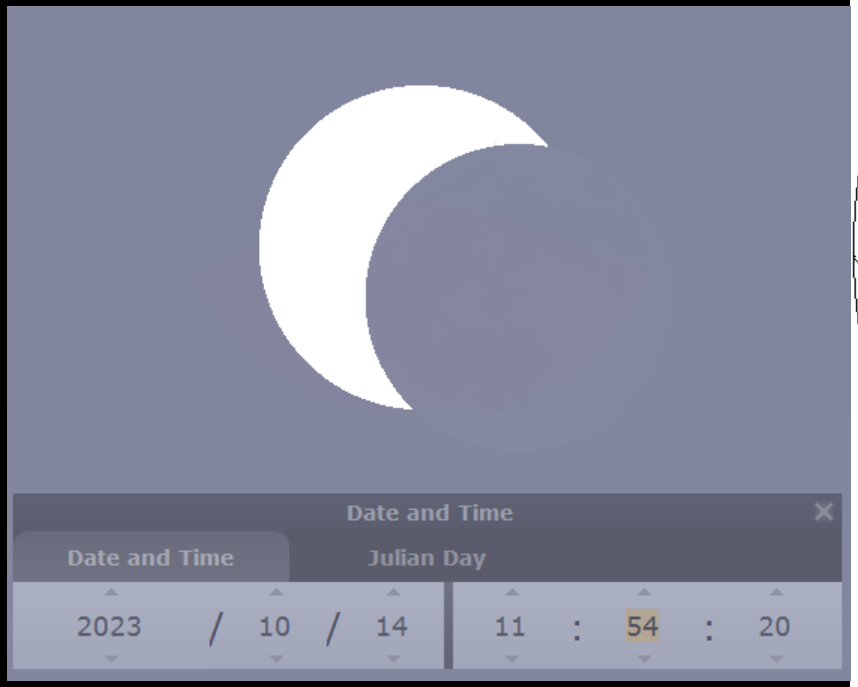
Happy observing

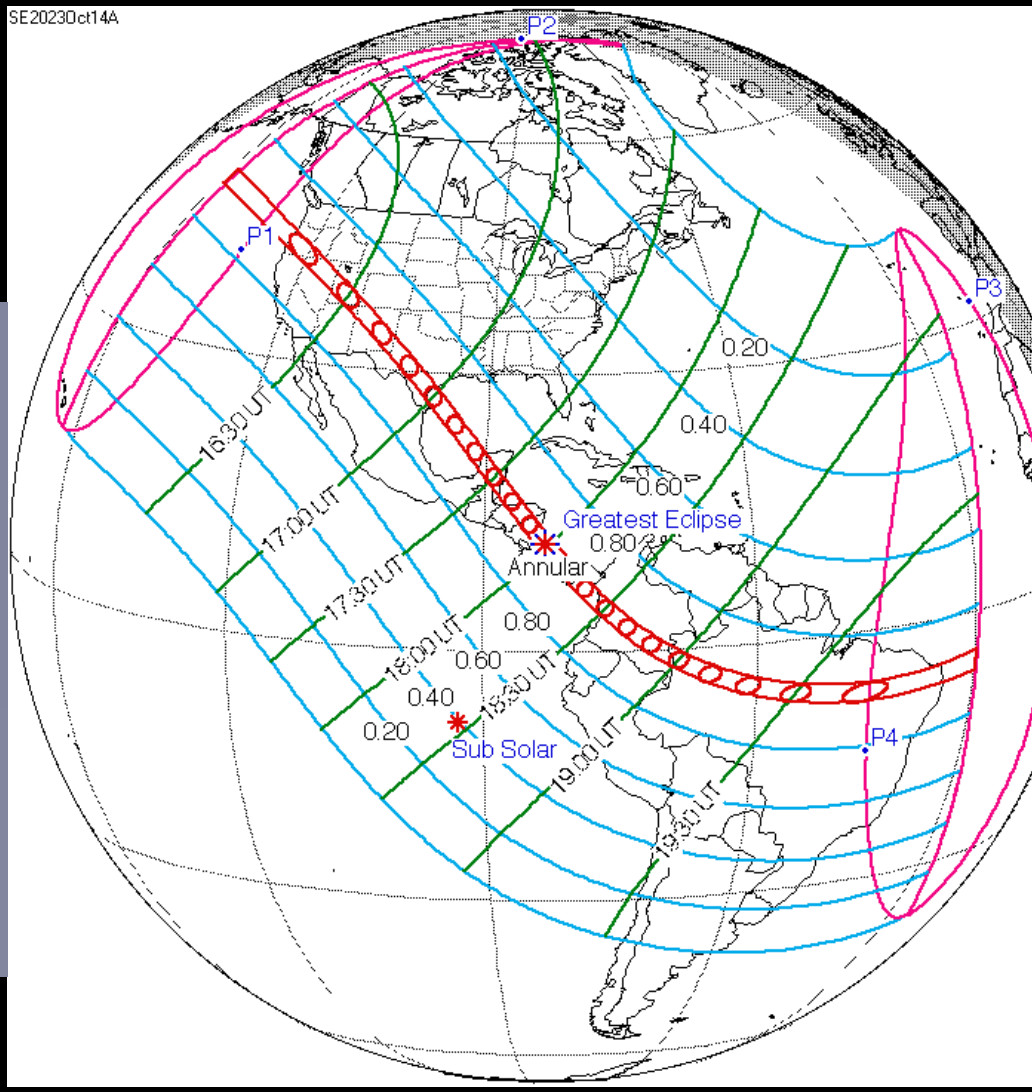
Babler State Park

Aug 13, 2022

Solar Eclipse 2023

10-14-2023 - Annular
Max eclipse as seen from STL



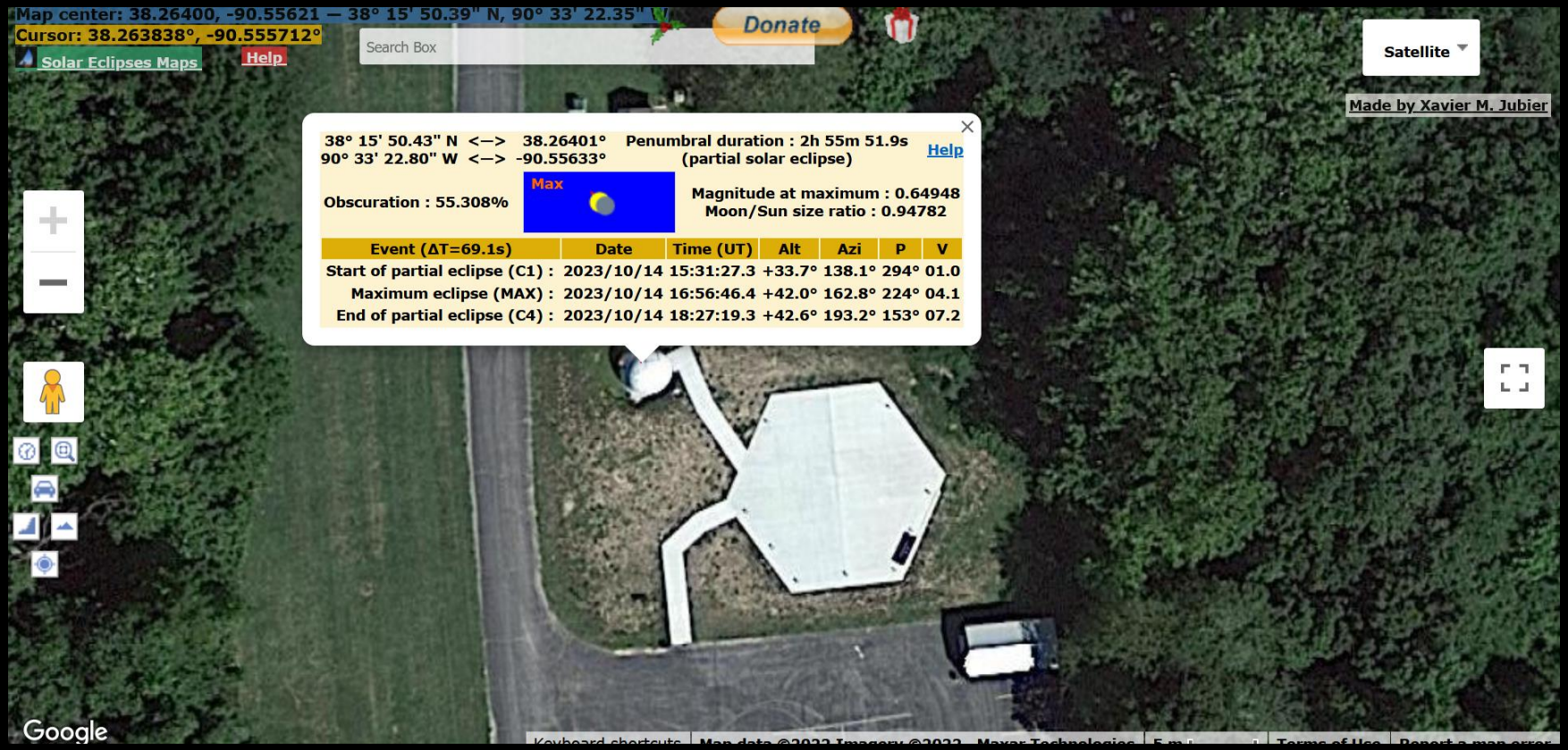


Eclipse Predictions by Fred Espenak, NASA's GSFC Eclipse Sim by Stellarium 0.14.2

Solar Eclipse 2023

Eclipse times from Jefferson College Observatory

- **Partial Eclipse Begins: 10:31am**
- **Maximum Eclipse: 11:56am**
- **Partial Eclipse Ends: 1:27pm**



Full Moon Events 2023

Largest Full Moons of 2023 (SuperMoon)

Aug 1: diameter: 33’ 32”; 356,214km

Aug 30: diameter: 33’ 38”; 355,136km (also “Blue Moon”)

Smallest Full Moons of 2023 (MiniMoon)

Feb 5: diameter: 29’ 33”; 404,024km

Mar 7: diameter: 29’ 58”; 398,558 km

Image below shows the apparent size difference between largest and smallest dates

Apogee Moon
Jan 15, 2014
406,532 km

Perigee Moon
Nov 13, 2016
350,853 km

No telescope Required

Canon DSLR FL=300mm

Other Moon Events 2023

V

Lunar-X on the Moon (Start Times)

- Jan 28 – 7:51pm Alt=58°
- Mar 28– 11:12pm Alt=42°

Lunar V also seen at same Sun angles

Yellow=Favorable Moon Conditions are always near First Quarter phase

X

Telescope Required

VIPER Landing Area

The Moon's libration or axial tilt can be simulated using the Virtual Moon Atlas.

https://www.ap-i.net/avl/en/start

Here is an atlas image showing the Nobile crater region for Mar 3, 2023

Key landmark craters are labeled

Moretus

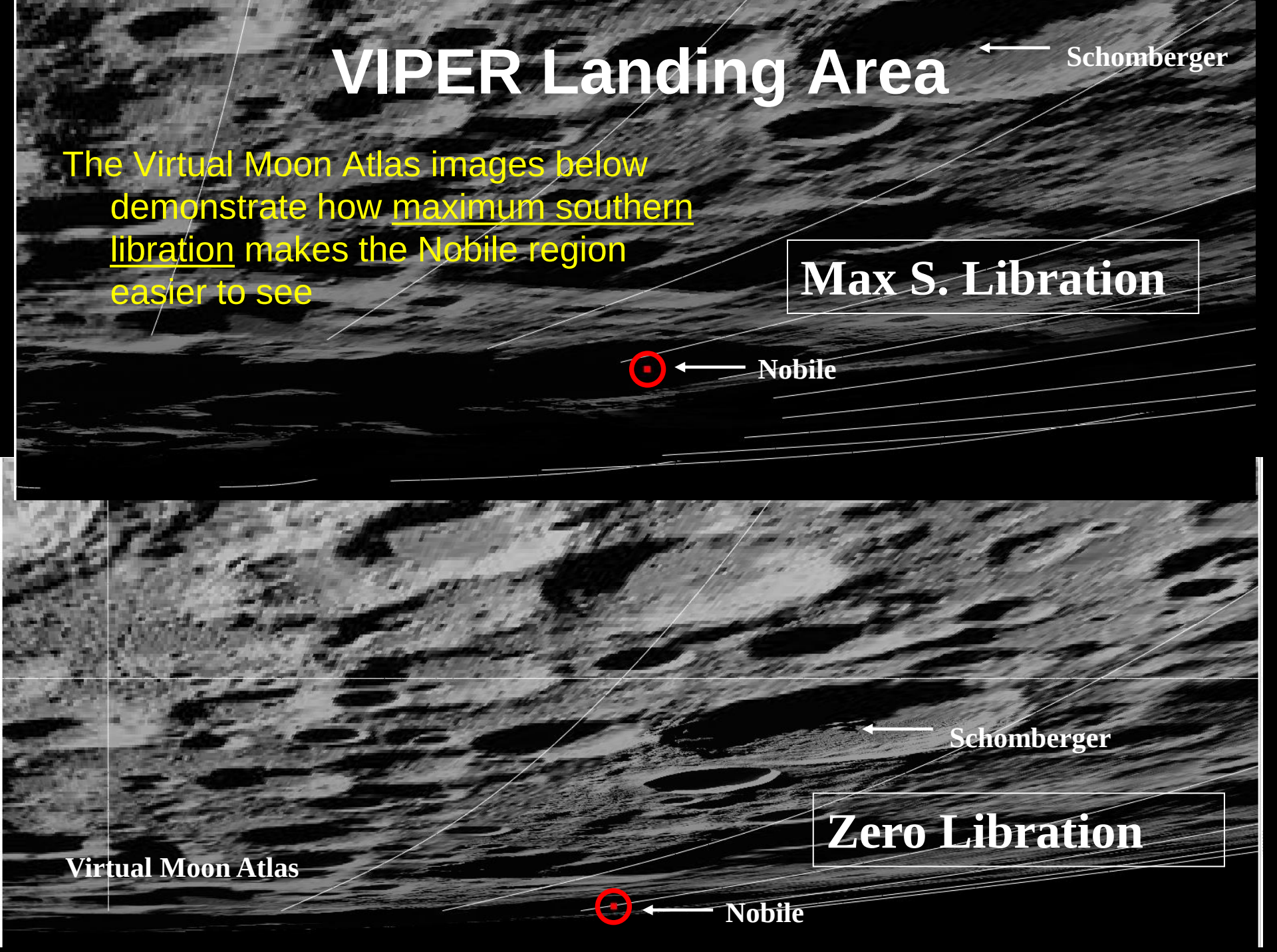
Schomberger

Nobile

Virtual Moon Atlas
3-3-22

VIPER Landing Area

The Virtual Moon Atlas images below demonstrate how maximum southern libration makes the Nobile region easier to see



VIPER Landing Area

Schomberger

The Virtual Moon Atlas images below demonstrate how maximum southern libration makes the Nobile region easier to see

Max S. Libration

Nobile

Viper rover is scheduled to land on Moon in late 2024 for a 100 day mission

2023 Dates of Maximum Southern Lunar Libration

Jan 9, Feb 5, Mar 4 and 31, April 27, May 24, June 21, July 18, Aug 14, Sep 9, Oct 7 Nov 3, Dec 1 and 28

Telescope Required

2023 Meteor Showers

- January 3 Quadrantids; ZHR=40 (FQ+4days)
- April 22 Lyrids; ZHR=20 (NM+3days)
- May 5 Eta Aquarids; ZHR=60 (FM)
- July 28 Delta Aquarids; ZHR=20 (FQ+3days)
- Aug 12 Perseids; ZHR=60 (LQ+4days)
- Oct 21 Orionids; ZHR=20 (FQ)
- Nov 17 Leonids; ZHR=20 (FQ-3days)
- Dec 13 Geminids; ZHR=120 (NM+1day)

No telescope Required

Yellow=Favorable Moon Conditions are before Full Moon(FM) and closest to New Moon (NM)

Planet Oppositions 2023

- Pluto – July 22 (dia=0.1 arc-sec)
- Jupiter – Nov 2 (dia=49.5 arc-sec)
- Saturn – Aug 27 (dia=18.97arc-sec)
- Uranus – Nov 13 (dia=3.75 arc-sec)
- Neptune – Sep 19 (dia=2.36 arc-sec)
- Venus GEE – Jun 4 (23.5 arc-sec)
- Venus GWE – Oct 23 (24.2 arc-sec)
- Venus IC – Aug 13 (57.8 arc-sec)
- Mars – (dia=14.6 to 3.9 arc-sec)
- Yellow=Favorable Conditions
- SC= Superior Conjunction
- QEE= Greatest Elongation East

Planet Oppositions 2023

Relative sizes as seen thru telescope

Mercury

Venus

Mars

Jupiter

Saturn

Uranus

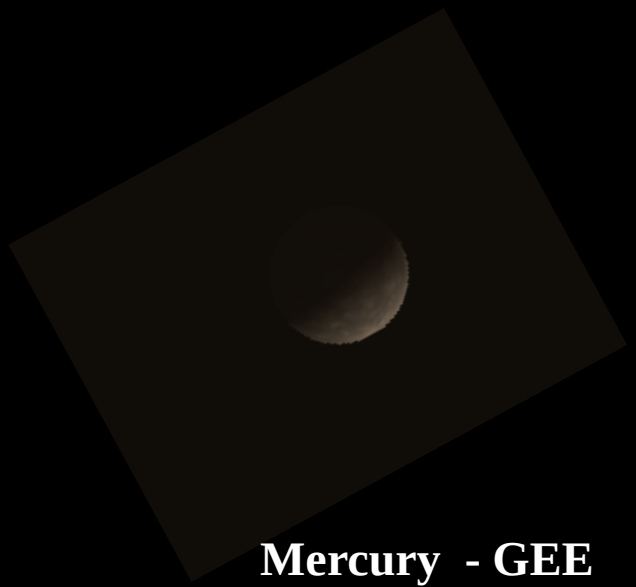
Neptune

Images from Stellarium

023-07-23 21:55:35 UTC-05:00

Mercury 2023

- Mercury GEE – Apr 11 (7.7 arc-sec, mag = +0.09)
- Mercury GEE – Aug 9 (7.55 arc-sec, mag = + 0.39)
- Mercury GEE – Dec 4 (6.7 arc-sec, mag = - 0.35)
- GEE= Greatest Eastern Elongation (evening sky object)



Mercury - GEE

Venus - GEE

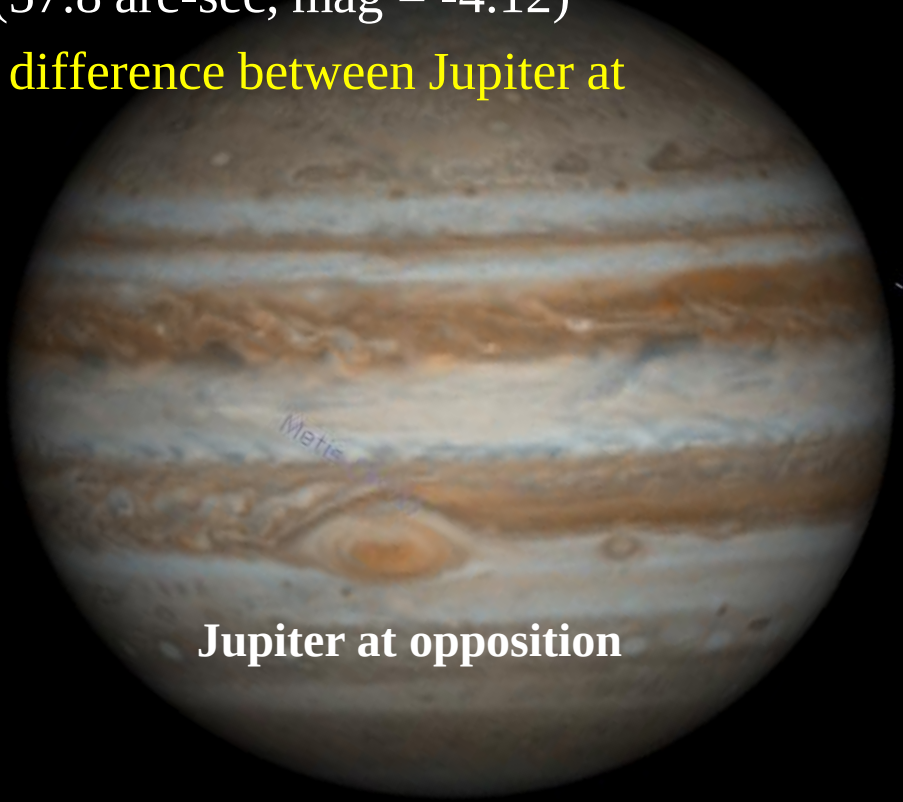
Telescope Required

Images from Stellarium

Venus 2023

- Venus GEE (evening) – Jun 4 (23.7 arc-sec, mag = - 4.41)
- Venus GWE (morning) – Oct 23 (24.0 arc-sec, mag = -4.47)
- Venus IC (in front of Sun) – Aug 13 (57.8 arc-sec, mag = -4.12)
- Images below show the apparent size difference between Jupiter at opposition date and Venus

Venus - GEE



Jupiter at opposition

Telescope Required

Images from Stellarium

Mars 2023

- Jan 1 – 14.5 arc-seconds, mag = -1.24
- Nov 17 – Mars Superior Conjunction (Behind Sun), 3.7 arc-seconds, mag= +1.32
- Images below show the apparent size difference between January 1st and the Superior Conjunction with Sun.

Jan 1

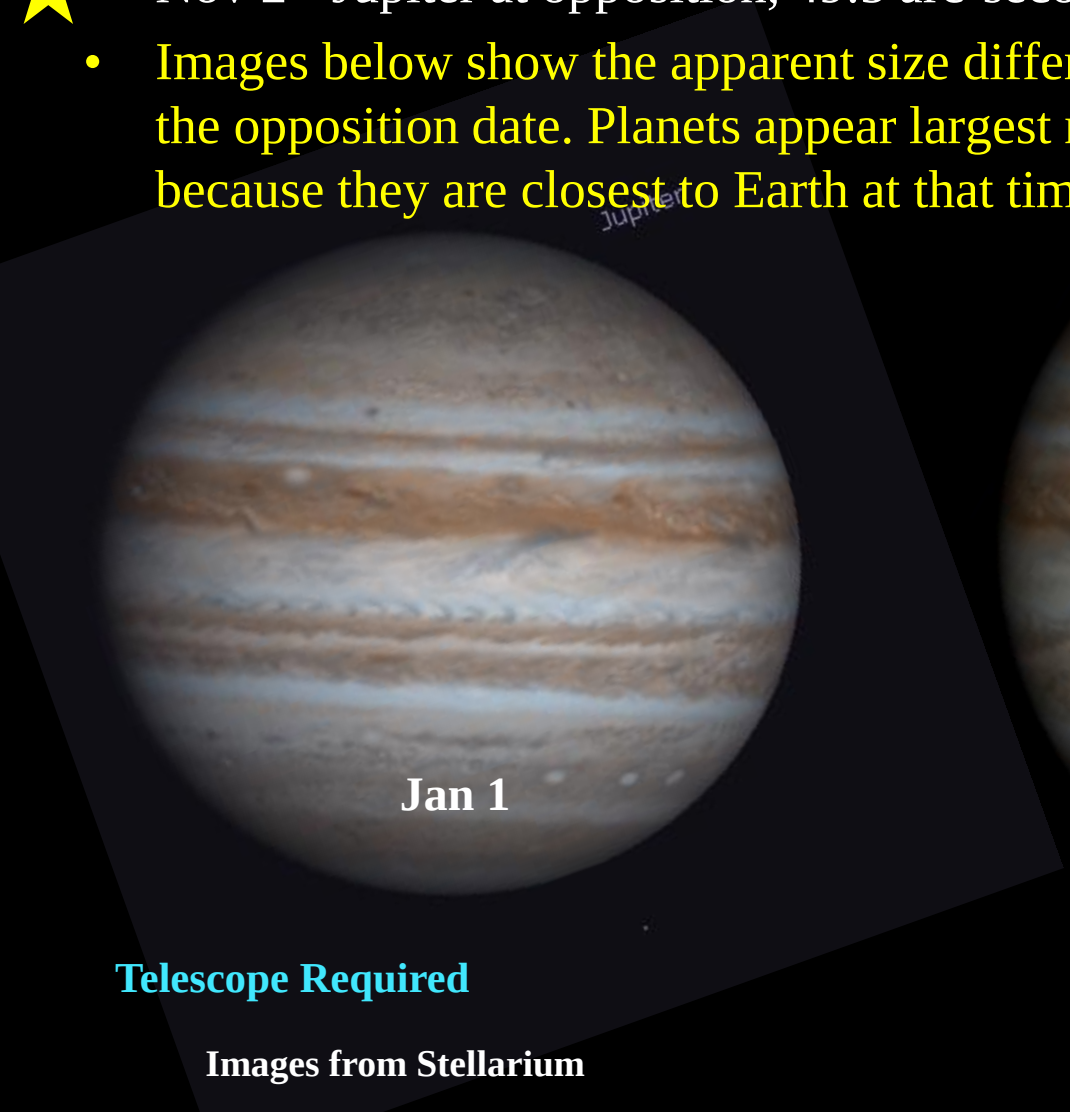
Nov 17 (SC)

Telescope Required

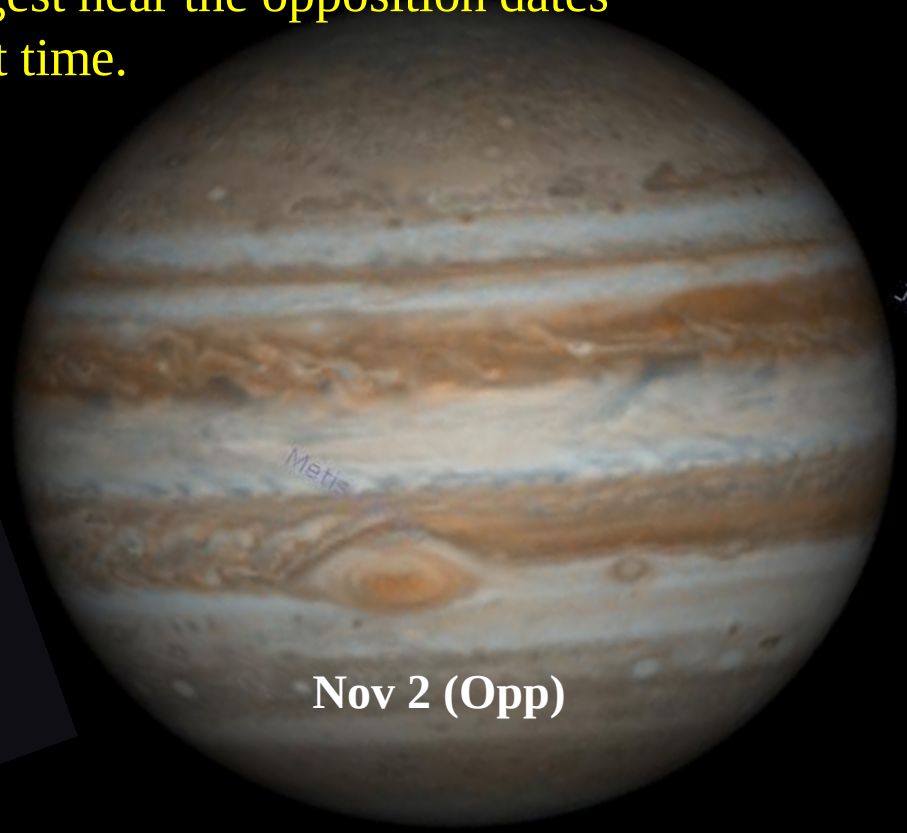
Images from Stellarium

Jupiter 2023

- Jan 1 – 39.2 arc-seconds, mag = -2.34
- Nov 2 - Jupiter at opposition, 49.5 arc-seconds, mag= -2.91
- Images below show the apparent size difference between January 1st and the opposition date. Planets appear largest near the opposition dates because they are closest to Earth at that time.



Jan 1



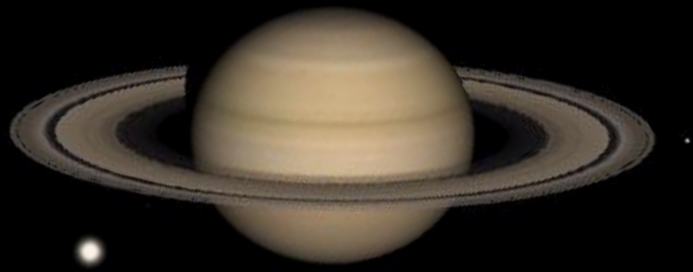
Nov 2 (Opp)

Telescope Required

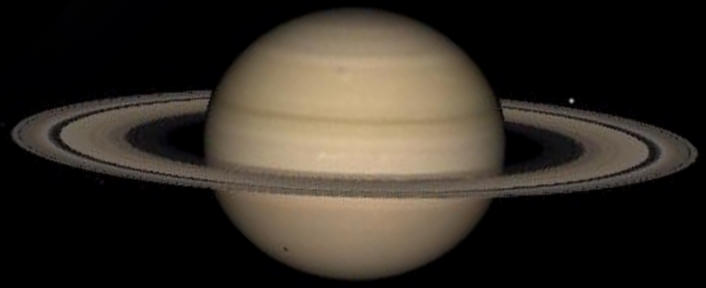
Images from Stellarium

Saturn 2023

- Jan 1 – 15.7 arc-seconds (36.7 arc-sec rings), mag = + 0.86
- Aug 27 - Saturn Opposition – 18.9 arc-seconds (44.2 arc-sec rings), mag = + 0.43
- Rings are closing until edge-on in 2025
- Images below show the apparent size difference between January 1st and the opposition date. Planets appear largest near the opposition dates because they are closest to Earth at that time.



Jan 1



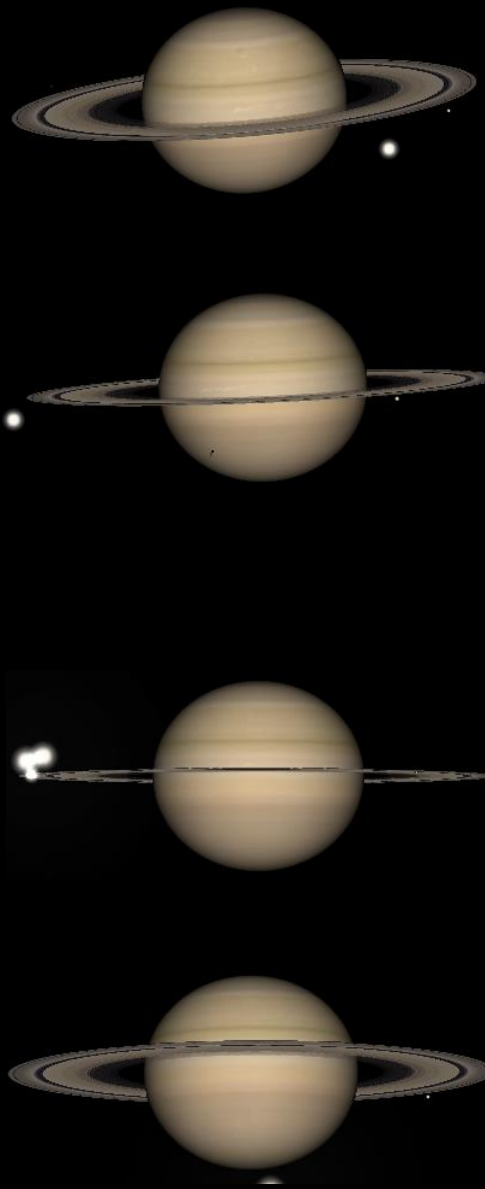
Aug 27 (Opp)

Telescope Required

Images from Stellarium

Saturn Ring Tilt 2023-2026

- 8-27-2023 (+9^{o} 8’ 40”)
- 6-23-2024 (+1^{o} 57’ 44”)
- 9-8-2024 (+3^{o} 43’ 28”)
- 3-23-2025 (0 deg)
- 9-21-2025 (-1^{o} 49’ 0”)
- 11-25-2025 (-0^{o} 22’ 18”)
- 10-4-2026 (-7^{o} 30’ 22”)

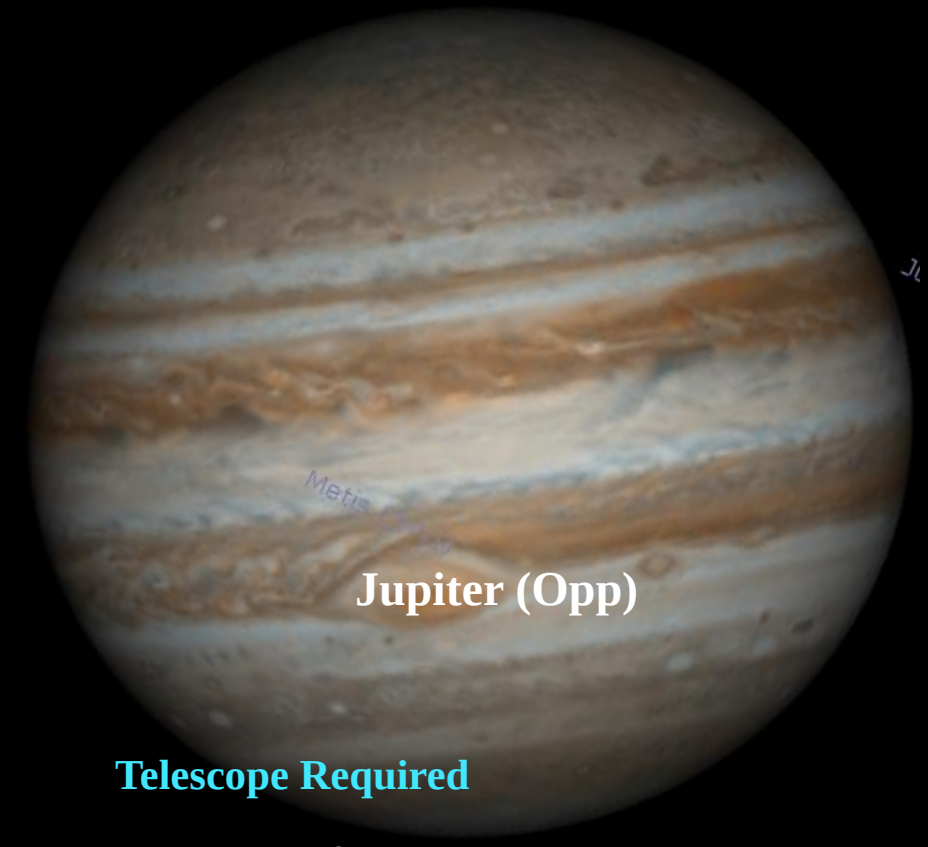


Telescope Required

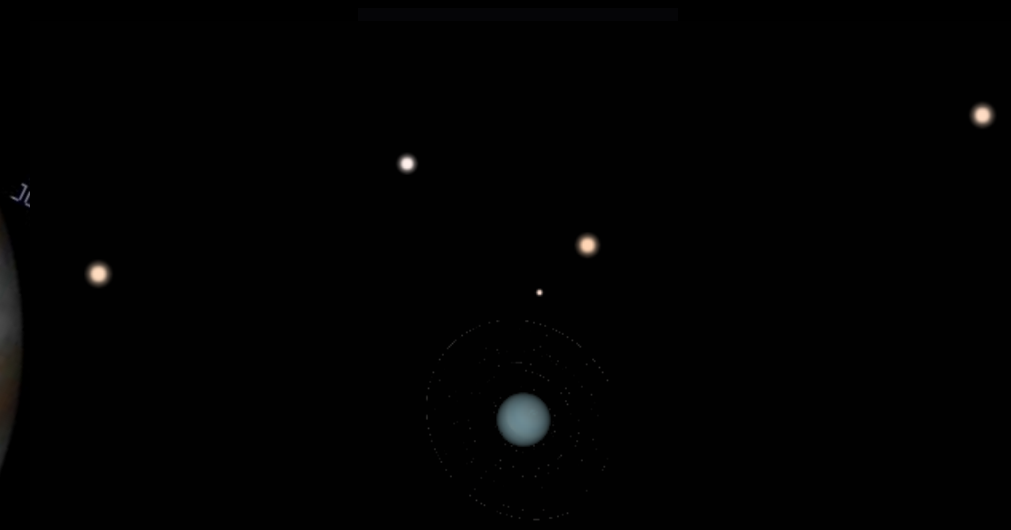
Images from Stellarium

Uranus 2023

- **Nov 9 - Uranus opposition, 3.8 arc-seconds, mag = + 5.65**
- Images below show the apparent size difference between Jupiter at opposition date and Uranus' opposition. Planets appear largest near the opposition dates because they are closest to Earth at that time.



Jupiter (Opp)



Uranus and its moons

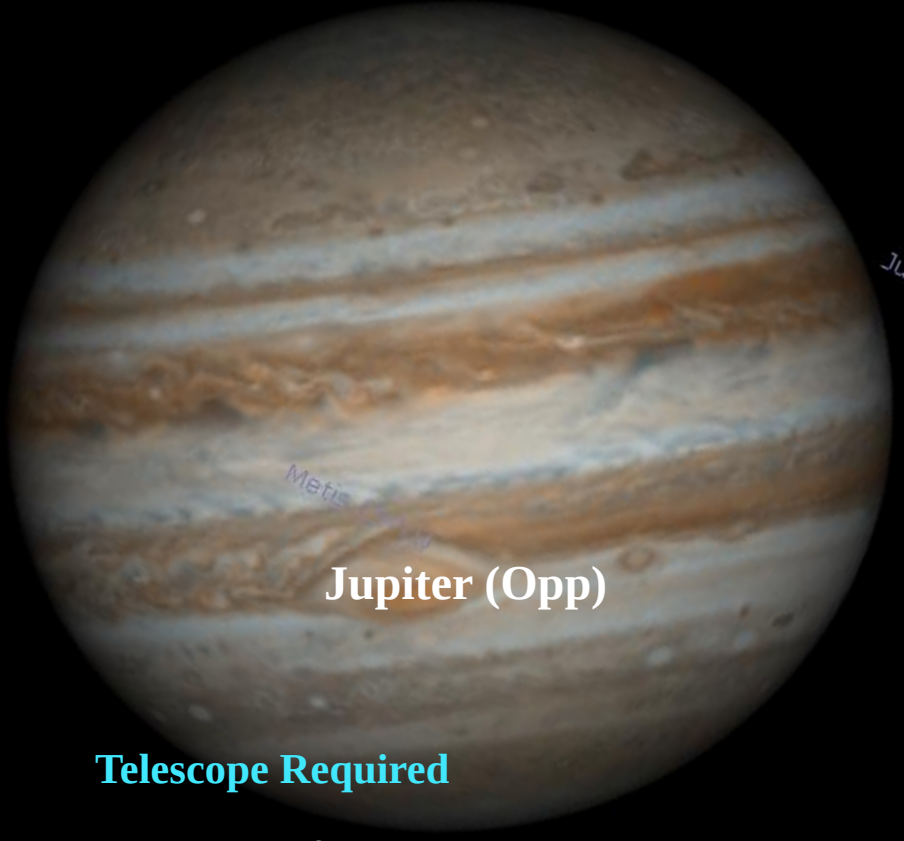
Nov 9 (Opp)

Telescope Required

Images from Stellarium

Neptune 2023

- **Sep 16 - Neptune opposition, 2.4 arc-sec, mag = +7.68**
- Images below show the apparent size difference between Jupiter at opposition date and Neptune's opposition. Planets appear largest near the opposition dates because they are closest to Earth at that time.



Jupiter (Opp)

Telescope Required

Neptune and its moons

Sep 16 (Opp)

Images from Stellarium

Lunar and Planetary Conjunctions 2023

Mon	Day	Event	Quality of Event	visible from STL
1	22	22 16 Venus 0.3°S of Saturn	H	EVENING
1	30	30 22:24 Mars 0.1°N of Moon: Occn.	H	EVENING**
1	30	Close approach of the Moon and Mars The Moon and Mars pass within 0°06' of each other. Mon, 30 Jan 2023 at 22:27 CDT (87 days away) in Taurus	H	EVENING**
		Close approach of the Moon and Venus The Moon and Venus pass within 1°50' of each other. Wed, 22 Feb 2023 at 03:41 CDT (110 days away) in Pisces		
		Close approach of the Moon and Jupiter The Moon and Jupiter pass within 1°03' of		MORNING**
2	22	each other. Wed, 22 Feb 2023 at 16:57 CDT (110 days away) in Pisces	M	EVENING**
2	27	Close approach of the Moon and Mars The Moon and Mars pass within 1°03' of each other. Mon, 27 Feb 2023 at 22:11 CDT (115 days away) in Taurus	M	EVENING**
3	1	Close approach of Venus and Jupiter Venus and Jupiter pass within 0°29' of each other. Wed, 01 Mar 2023 at 23:05 CDT (118 days away) in Pisces	M	EVENING
3	22	22 13:54 Jupiter 0.5°N of Moon: Occn.	M	EVENING**
3	24	Close approach of the Moon and Venus The Moon and Venus pass within 0°05' of each other. Fri, 24 Mar 2023 at 05:32 CDT (140 days away) in Aries	H	EVENING**
11	9	Close approach of the Moon and Venus The Moon and Venus pass within 0°53' of each other. Thu, 09 Nov 2023 at 04:34 CDT (370 days away) in Virgo	M	MORNING**

No telescope Required

**** no occultation will be visible from St. Louis**

Planetary Conjunctions 2023

Close approach of Venus and Saturn

22 Jan 2023 at 6:30pm

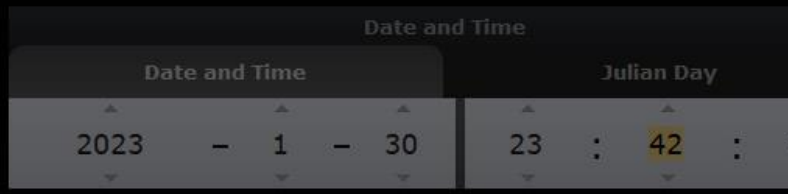
Images from Stellarium

Lunar and Planetary Conjunctions 2023

Close approach of the Moon and Mars

30 Jan 2023 at 11:40pm

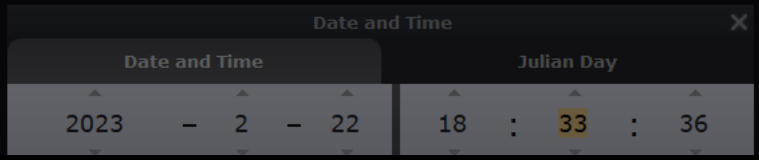
Images from Stellarium



Lunar and Planetary Conjunctions 2023

Close approach of the Moon and Jupiter and its moons

22 Feb 2023 at 6:30pm



Images from Stellarium

Lunar and Planetary Conjunctions 2023

Close approach of the Moon, Jupiter and Venus

22 Feb 2023 at 7:00pm

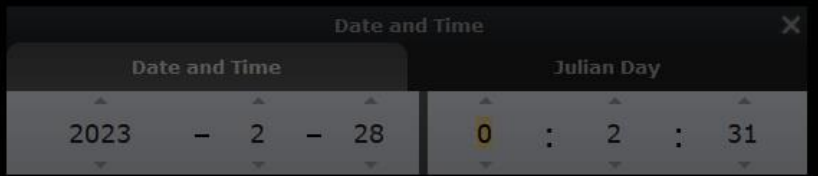
Images from Stellarium

Lunar and Planetary Conjunctions 2023

Close approach of the Moon and Mars

27 Feb 2023 at 11:55pm

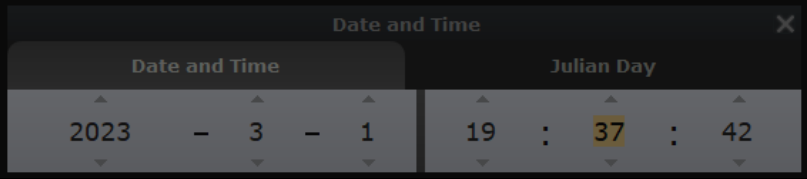
Images from Stellarium



Planetary Conjunctions 2023

Close approach of Venus and Jupiter

1 Mar 2023 at 7:30pm



Images from Stellarium

Lunar and Planetary Conjunctions 2023

Close approach of the Moon and Jupiter

22 Mar 2023 at 7:55pm

Images from Stellarium

Lunar and Planetary Conjunctions 2023

Close approach of the Moon and Venus

24 Mar 2023 at 9:00pm

Images from Stellarium

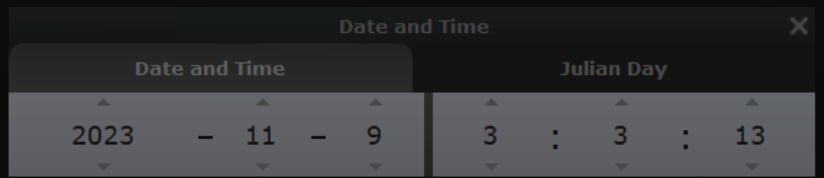
Lunar and Planetary Conjunctions 2023

Close approach of the Moon and Venus

The Moon and Venus pass within 0°53' of each other.

9 Nov 2023 at 03:00am

E



Images from Stellarium

Other Conjunctions 2023

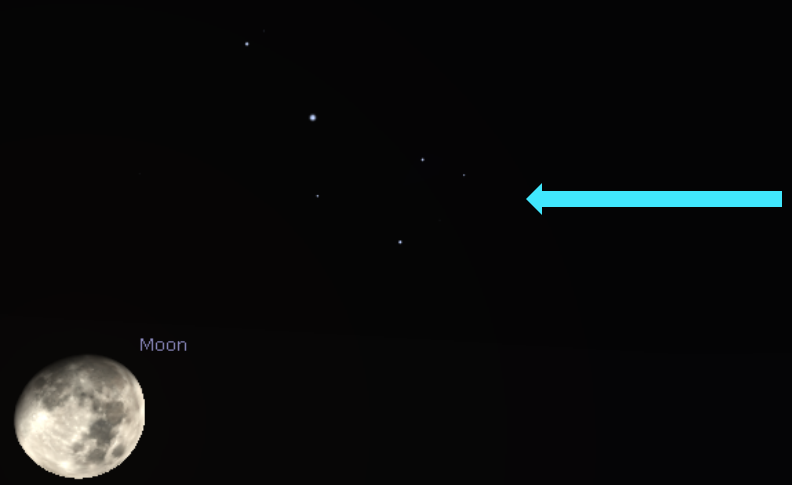
Mon	Day	Event	Quality of Event	visible from STL
6	2	Close approach of Mars and M44 Mars and M44 pass within 0°10' of each other. Fri, 02 Jun 2023 at 18:06 CDT (210 days away) in Cancer	H	EVENING
6	13	Close approach of Venus and M44 Venus and M44 pass within 0°47' of each other. Tue, 13 Jun 2023 at 19:30 CDT (221 days away) in Cancer	H	EVENING
7	9	09 23:21 Mars 0.6°N of Regulus	M	EVENING
7	28	28 12:21 Mercury 0.1°S of Regulus	H	EVENING
10	2	Close approach of the Moon and M45 The Moon and M45 pass within 0°59' of each other. Tue, 03 Oct 2023 at 00:45 CDT (333 days away) in Taurus	M	EVENING
11	14	14 13:42 Antares 0.9°S of Moon	M	
11	26	Close approach of the Moon and M45 The Moon and M45 pass within 1°00' of each other. Sun, 26 Nov 2023 at 19:21 CDT (387 days away) in Taurus	M	EVENING
12	24	Close approach of the Moon and M45 The Moon and M45 pass within 0°57' of each other. Sun, 24 Dec 2023 at 02:56 CDT (415 days away) in Taurus	H	MORNING

**** no occultation will be visible from St. Louis**

Other Conjunctions 2023

Close approach of the Moon and M45

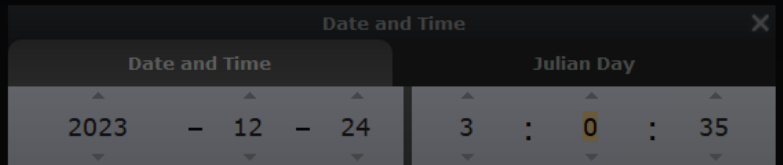
M45= Pleaides Cluster



The Moon and M45 pass within 0°57' of each other.

24 Dec 2023 at 03:00am

Images from Stellarium



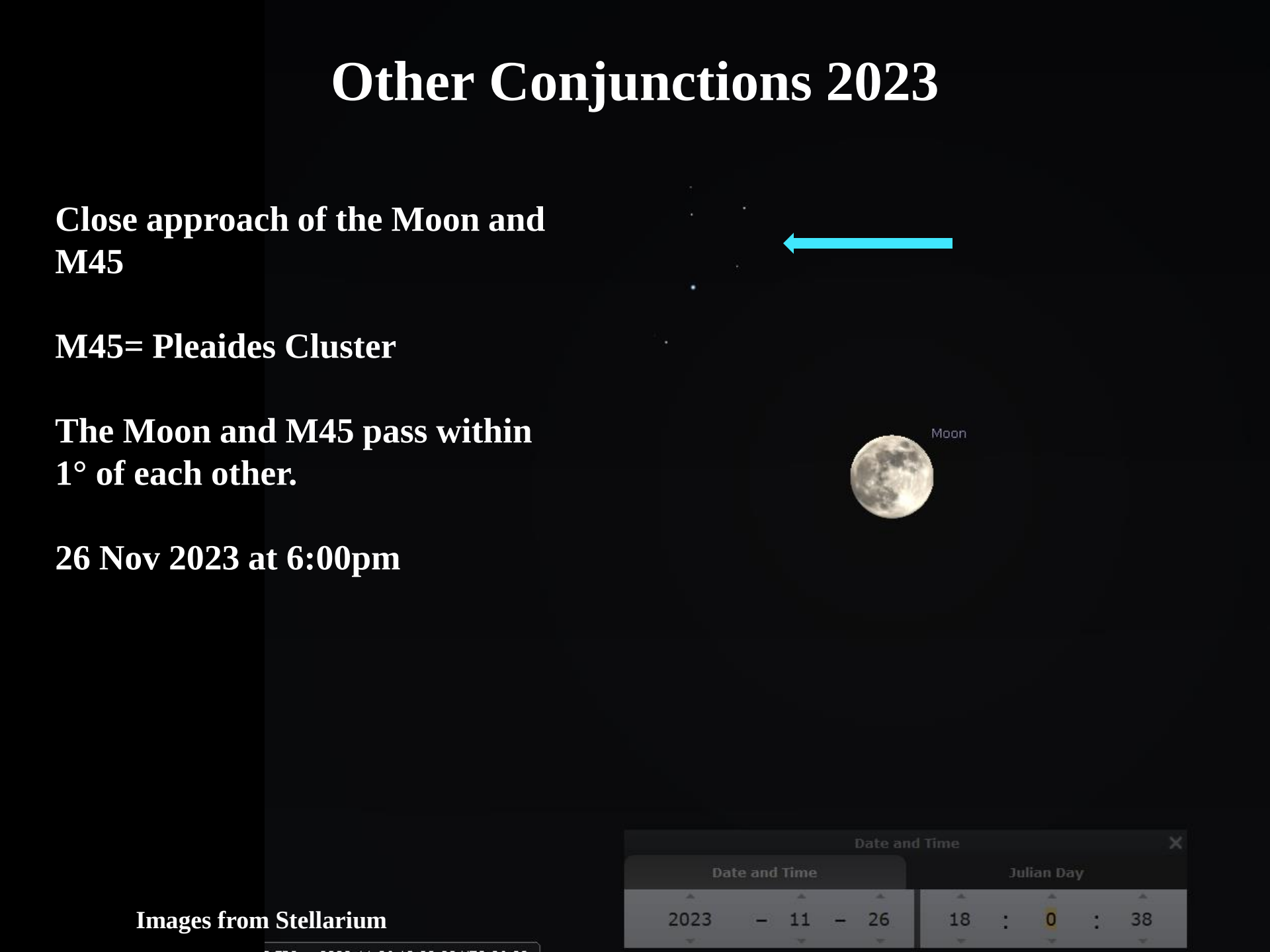
Other Conjunctions 2023

Close approach of the Moon and M45

M45= Pleaides Cluster

The Moon and M45 pass within 1° of each other.

26 Nov 2023 at 6:00pm



Images from Stellarium

Other Conjunctions 2023

Close approach of the Moon and Antares with Mercury to right

The Moon and Antares pass within 1° of each other.

14 Nov 2023 at 5:20pm

Images from Stellarium

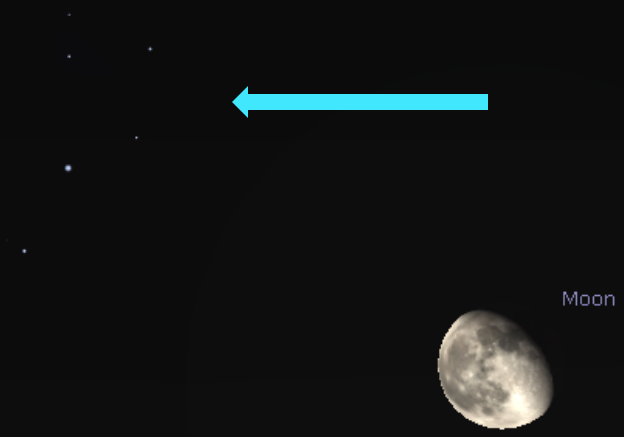
Other Conjunctions 2023

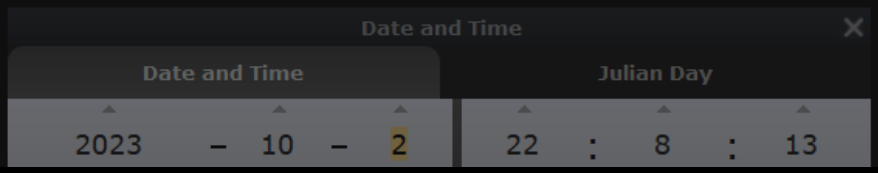
Close approach of the Moon and M45

M45= Pleaides Cluster

The Moon and M45 pass within 1° of each other.

2 Oct 2023 at 10:00pm





Images from Stellarium

Other Conjunctions 2023

Close approach of Mars and Regulus

The Mars and Regukus pass within 1° of each other.

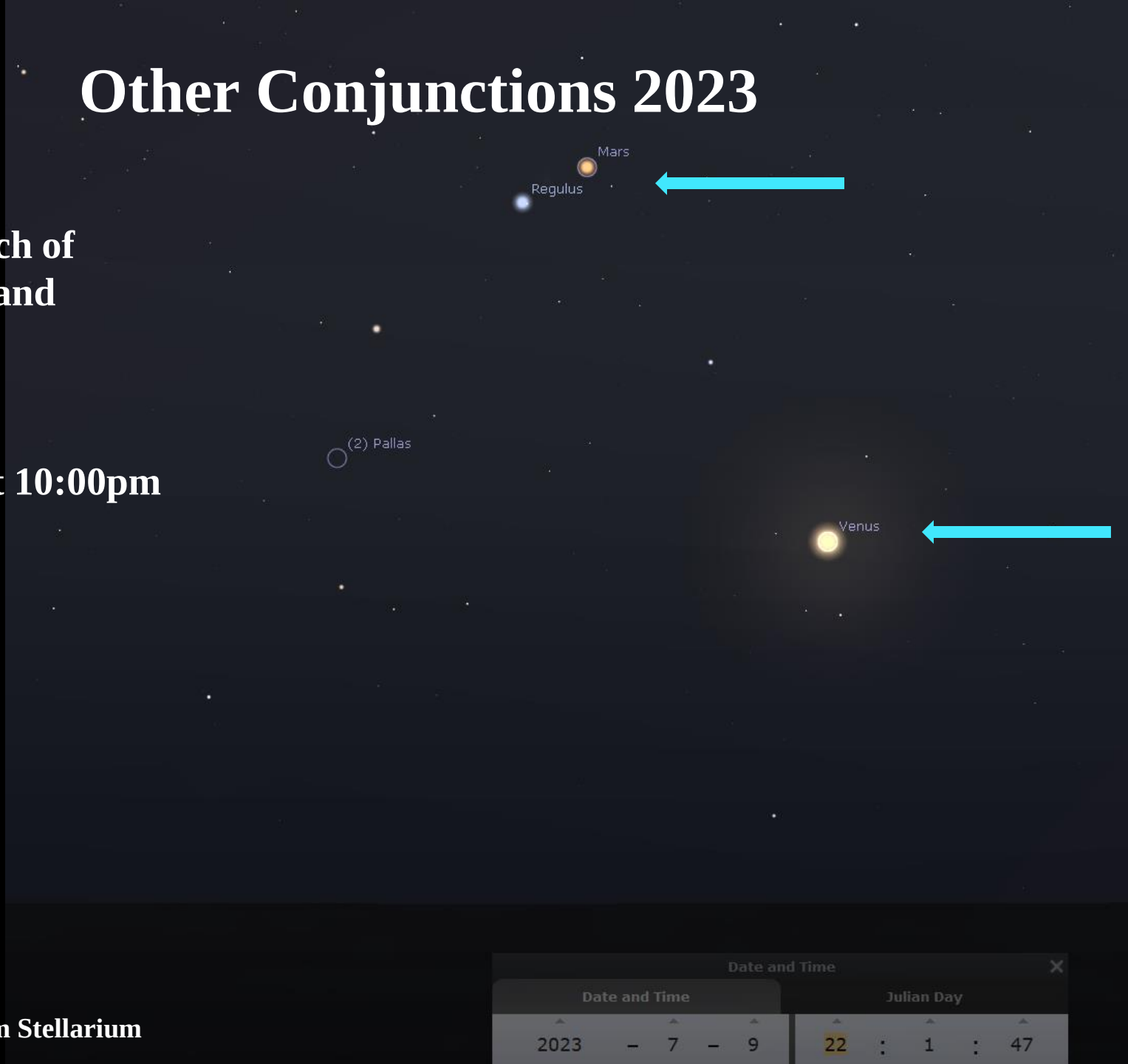
28 July 2023 at 9:00pm

Images from Stellarium

Other Conjunctions 2023

Close approach of Venus, Mars and Regulus

9 July 2023 at 10:00pm



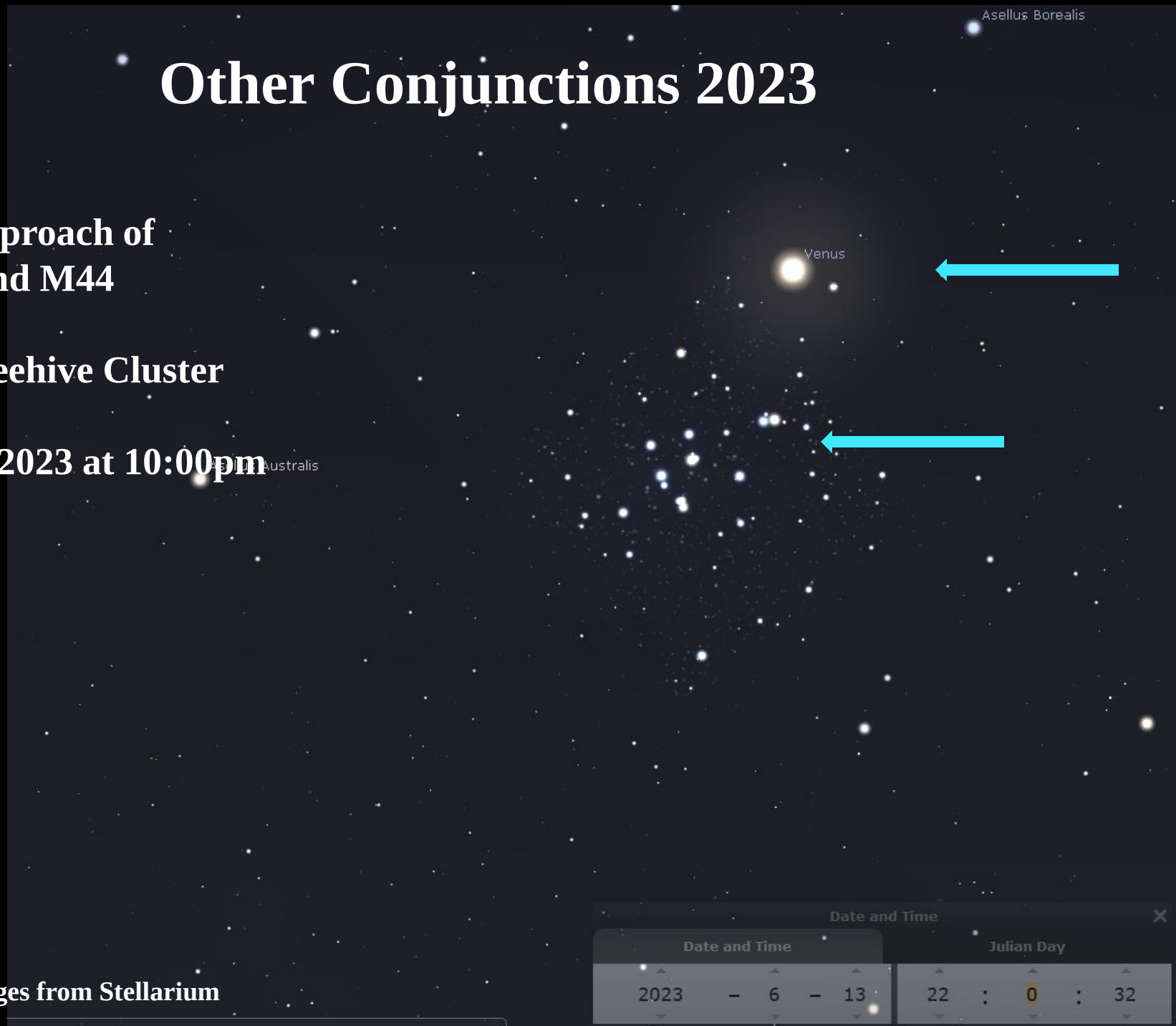
Images from Stellarium

Other Conjunctions 2023

Close approach of Venus and M44

M44= Beehive Cluster

13 June 2023 at 10:00pm



Images from Stellarium

Occultations for 2023

Mon	Day	Event	Quality of Event	visible from STL	NOTES
5	17	Lunar occultation of Jupiter The Moon will pass in front of Jupiter, creating a lunar occultation visible from parts of the Americas and Europe. Wed, 17 May 2023 at 07:40 CDT (194 days away) in Pisces	M	MORNING	the occultation will be visible from St. Louis. It will begin with the disappearance of Jupiter behind the Moon at 06:30 CDT, though In daylight. Its reappearance will be visible at 07:34 CDT, though In daylight.
8	24	Lunar occultation of Antares The Moon will pass in front of Antares, creating a lunar occultation visible from parts of the Americas. Thu, 24 Aug 2023 at 21:29 CDT (293 days away) in Scorpius	H	EVENING	the occultation will be visible from St. Louis. It will begin with the disappearance of Antares behind the Moon at 21:28 CDTin the south-western sky at an altitude of 18.1 degrees. Its reappearance will be visible at 22:33 CDT at an altitude of 10.4 degrees.

Occultations for 2023

Occultation of Antares by Moon
24 Aug 2023 evening sky

Disappear: 9:30pm
(alt=18deg, az=210deg)

Reappear: 10:32pm
(alt=10deg, az=222deg)

Telescope Required

Images from Stellarium

Occultations for 2023

Occultation of Jupiter by Moon
17 May 2023 morning sky

Disappear: 6:28am
(alt=20deg, az=93deg)

Reappear: 7:31am
(alt=33deg, az=103deg)

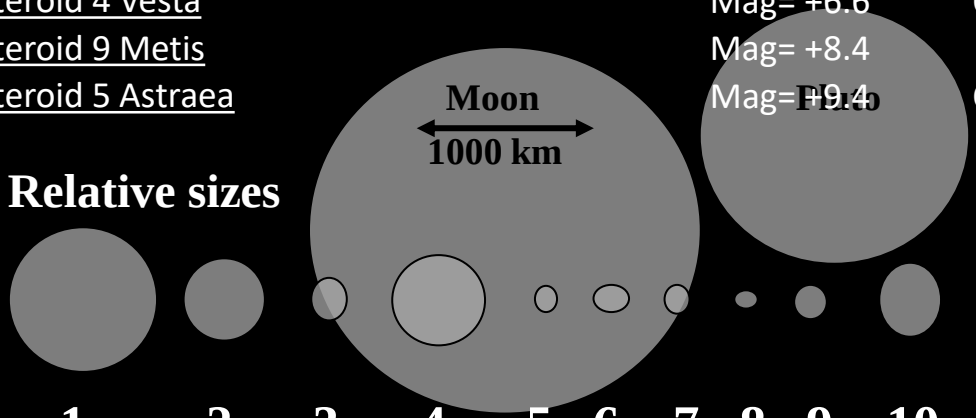
Telescope Required

Images from Stellarium

Asteroid Oppositions 2023

Jan	15	Asteroid 2 Pallas	Mag= +7.7	Cma
Jan	26	Asteroid 6 Hebe	Mag= +8.7	Can
Mar	21	1 Ceres	Mag= +7.1	CmBr
Mar	29	136472 Makemake	Mag= +17.2	CmBr
Apr	20	136108 Haumea	Mag= +17.3	Boot
Apr	30	Asteroid 7 Iris	Mag= +9.6	Lib
June	6	Asteroid 11 Parthenope	Mag= +9.3	Oph
July	7	Asteroid 15 Eunomia	Mag= +8.8	Sag
Aug	10	Asteroid 10 Hygiea	Mag= +9.7	Aq
Aug	26	Asteroid 8 Flora	Mag= +8.4	Aq
Oct	1	Asteroid 29 Amphitrite	Mag= +8.9	Pisces
Oct	18	136199 Eris	Mag= +18.7	Cetus
Nov	5	Asteroid 18 Melpomene	Mag= +8.2	Eridanus
Dec	18	Asteroid 37 Fides	Mag= +9.8	Auriga
Dec	21	Asteroid 4 Vesta	Mag= +6.6	Orion
Dec	22	Asteroid 9 Metis	Mag= +8.4	Gem
Dec	28	Asteroid 5 Astraea	Mag= +9.4	Orion

Relative sizes



Telescope Required

1 2 3 4 5 6 7 8 9 10

Asteroid Occultations 2023

Date/Time (UT)	Minor Planet	Star Name	Star Mag	Delta Mag	Max Dur (s)	Uncertainty	Map	Details
Jan 09, 02:59	(814) Tauris	UCAC4 625-041432	12.1	1.19	7.1	0.33	[Map]	[SteveP]
Jan 17, 00:50	(469) Argentina	TYC 0594-00338-1	12	3.43	5.4	0.27	[Map]	[SteveP]
Jan 17, 07:16	(1977) Shura	TYC 2424-00475-1	11.3	4.91	1.5	0.75	[Map]	[SteveP]
Feb 04, 01:39	(15094) Polymele	UCAC4 631-037227	13.3	5.48	2	1.75	[Map]	[SteveP]
Feb 17, 04:05	(1023) Thomana	UCAC4 482-044126	12.2	2.8	4.7	0.25	[Map]	[SteveP]
Jul 06, 08:01	(1010) Marlene	TYC 5259-00244-1	9.7	5.93	4.7	0.22	[Map]	[SteveP]

Source: http://www.asteroidoccultation.com/

Telescope Required

Asteroid Occultations 2023

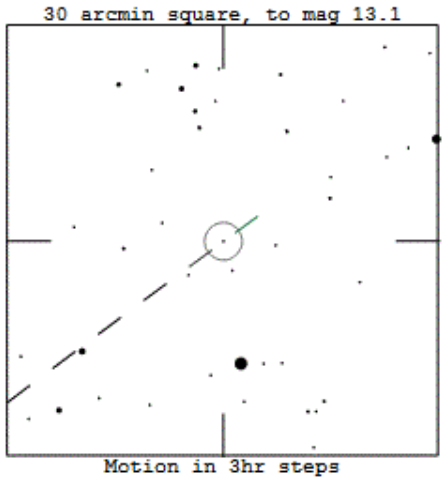
Jan 09, 02:59 (814) Tauris UCAC4 625-041432 12.1 1.19 7.1 0.33 [Map] [SteveP]

814 Tauris occults UCAC4 625-041432 on 2023 Jan 9 from 2h 52m to 3h 6m UT

Star: (Dia < 0.1 mas)
Mv 12.1
RA = 7 59 31.0004 (astrometric)
Dec = 34 49 16.725 ...
[of Date: 8 1 1, 34 45 28]
Prediction of 2022 Dec 1.1
Reliable not available

Durations: Max = 7.1 secs
1km = 0.067 secs, 1mas = 0.092 secs
Mag Drop = 1.2 [67%]v
Sun : Dist = 165°
Moon: Dist = 19°, illum = 96%
Error 31.0 x 19.3 mas in PA 84°

Asteroid:
Mag = 12.9
Dia = 107 ±7km, 78 mas
Parallax = 4.651"
Hourly dRA =-2.565s
dDec = 23.39"
JPL#902022Nov22, Known errors



Date: 8 Jan 2023
Time:9:59pm
Duration:7.1sec

Asteroid Occultations 2023

Jan 17, 00:50 (469) Argentina TYC 0594-00338-1 12 3.43 5.4 0.27 [Map] [SteveP]

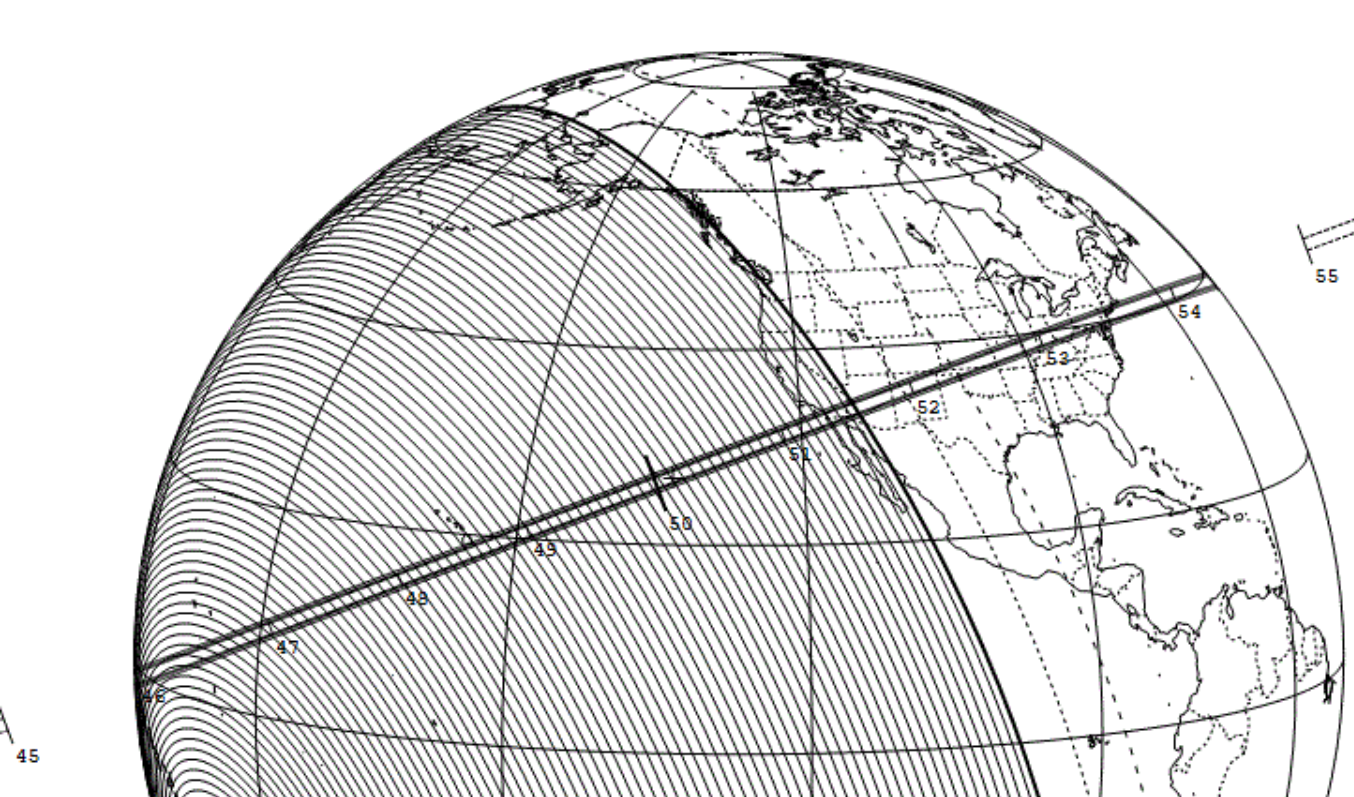
469 Argentina occults TYC 0594-00338-1 on 2023 Jan 17 from 0h 46m to 0h 54m UT

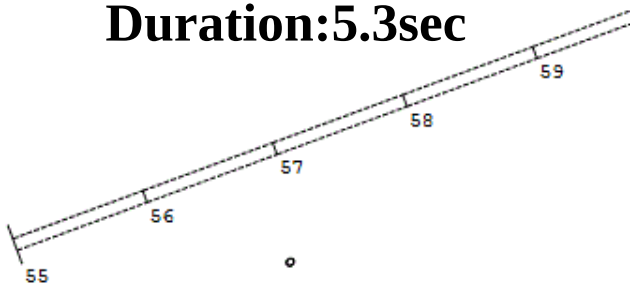
Star: (Dia < 0.1 mas)
Mv 12.0
RA = 0 5 59.7003 (astrometric)
Dec = 9 14 17.367 ...
[of Date: 0 7 9, 9 21 55]
Prediction of 2022 Dec 1.1
Reliable not available

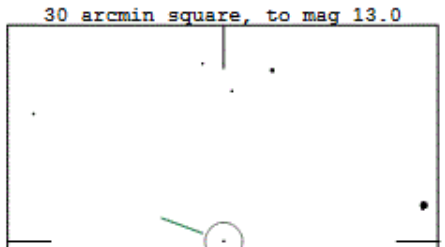
Durations: Max = 5.4 secs
1km = 0.041 secs, 1mas = 0.12 secs
Mag Drop = 3.4 [96%]v
Sun : Dist = 69°
Moon: Dist = 135°, illum = 30%
Error 14.7 x 12.3 mas in PA 51°

Asteroid:
Mag = 15.4
Dia = 131 ±7km, 46 mas
Parallax = 2.244"
Hourly dRA = 1.955s
dDec = 10.68"
JPL#582022Nov22, Known errors

Date: 16 Jan 2023
Time:7:50pm
Duration:5.3sec







Asteroid Occultations 2023

Jan 17, 07:16 (1977) Shura TYC 2424-00475-1 11.3 4.91 1.5 0.75 [Map] [SteveP]

1977 Shura occults TYC 2424-00475-1 on 2023 Jan 17 from 7h 7m to 7h 25m UT

Star: (Dia < 0.1 mas)
Mv 11.3
RA = 6 15 41.4905 (astrometric)
Dec = 32 12 41.953 ...
[of Date: 6 17 12, 32 12 17]
Prediction of 2022 Dec 1.1
Reliable not available

Durations: Max = 1.45 secs
1km = 0.085 secs, 1mas = 0.13 secs
Mag Drop = 4.9 [99%]v
Sun : Dist = 155°
Moon: Dist = 140°, illum = 27%
Error 24.0 x 3.7 mas in PA 97°

Asteroid: (in DAMIT)
Mag = 16.2
Dia = 17 ±1km, 11 mas
Parallax = 4.261"
Hourly dRA =-2.188s
dDec = -6.10"
JPL#492022Nov22, Known errors

Date: 17 Jan 2023
Time:2:16am
Duration:1.4sec

Asteroid Occultations 2023

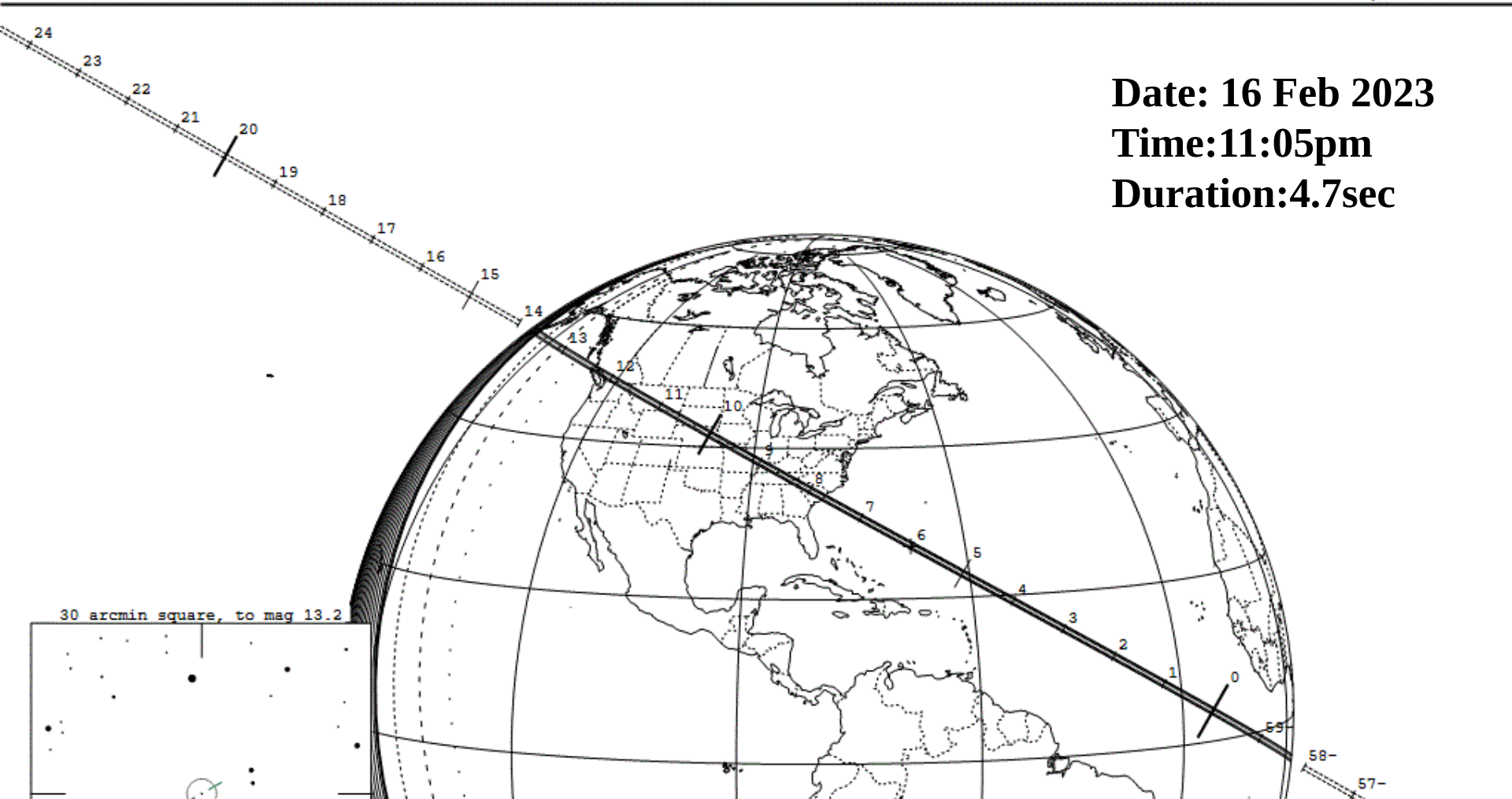
Feb 17, 04:05 (1023) Thomana UCAC4 482-044126 12.2 2.8 4.7 0.25 [Map] [SteveP]

1023 Thomana occults UCAC4 482-044126 on 2023 Feb 17 from 3h 58m to 4h 14m UT

Star: (Dia < 0.1 mas)
Mv 12.2
RA = 8 30 36.0783 (astrometric)
Dec = 6 15 41.705 ...
[of Date: 8 31 51, 6 10 59]
Prediction of 2022 Jun 15.0
Reliable not available

Durations: Max = 4.7 secs
1km = 0.080 secs, 1mas = 0.13 secs
Mag Drop = 2.8 [92%]v
Sun : Dist = 157°
Moon: Dist = 150°, illum = 14%
Error 22.7 x 4.3 mas in PA 99°

Asteroid: (in DAMIT, ISAM)
Mag = 14.9
Dia = 59 ±3km, 36 mas
Parallax = 3.851"
Hourly dRA =-1.588s
dDec = 13.43"
JPL#552022Jun06, Known errors



Date: 16 Feb 2023
Time:11:05pm
Duration:4.7sec

Asteroid Occultations 2023

Jul 06, 08:01 (1010) Marlene TYC 5259-00244-1 9.7 5.93 4.7 0.22 [Map] [SteveP]

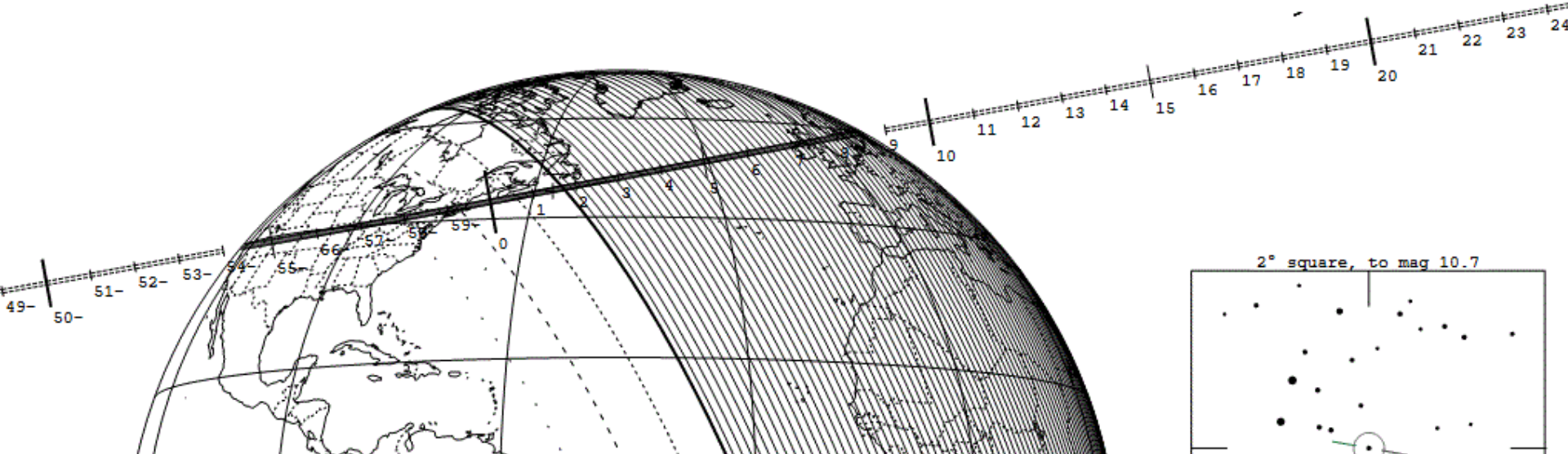
1010 Marlene occults TYC 5259-00244-1 on 2023 Jul 6 from 7h 54m to 8h 9m UT

Star: (Dia < 0.1 mas)
Mv 9.7
RA = 23 53 23.8322 (astrometric)
Dec = - 5 3 0.875 ...
[of Date: 23 54 36, - 4 55 9]
Prediction of 2022 Jun 15.2
Reliable not available

Durations: Max = 4.7 secs
1km = 0.10 secs, 1mas = 0.17 secs
Mag Drop = 5.9 [100%]v
Sun : Dist = 108°
Moon: Dist = 33°, illum = 88%
Error 26.7 x 1.7 mas in PA 67°

Asteroid: (in DAMIT, ISAM)
Mag = 15.6
Dia = 45 ±2km, 28 mas
Parallax = 3.981"
Hourly dRA = 1.421s
dDec = 3.88"
JPL#632022Jun06, Known errors

Date: 6 July 2023
Time:2:01am
Duration:4.6sec



Asteroid Occultations 2023

Feb 04, 01:39 (15094) Polymele UCAC4 631-037227 13.3 5.48 2 1.75 [Map] [SteveP]

15094 Polymele occults UCAC4 631-037227 on 2023 Feb 4 from 1h 30m to 1h 50m UT

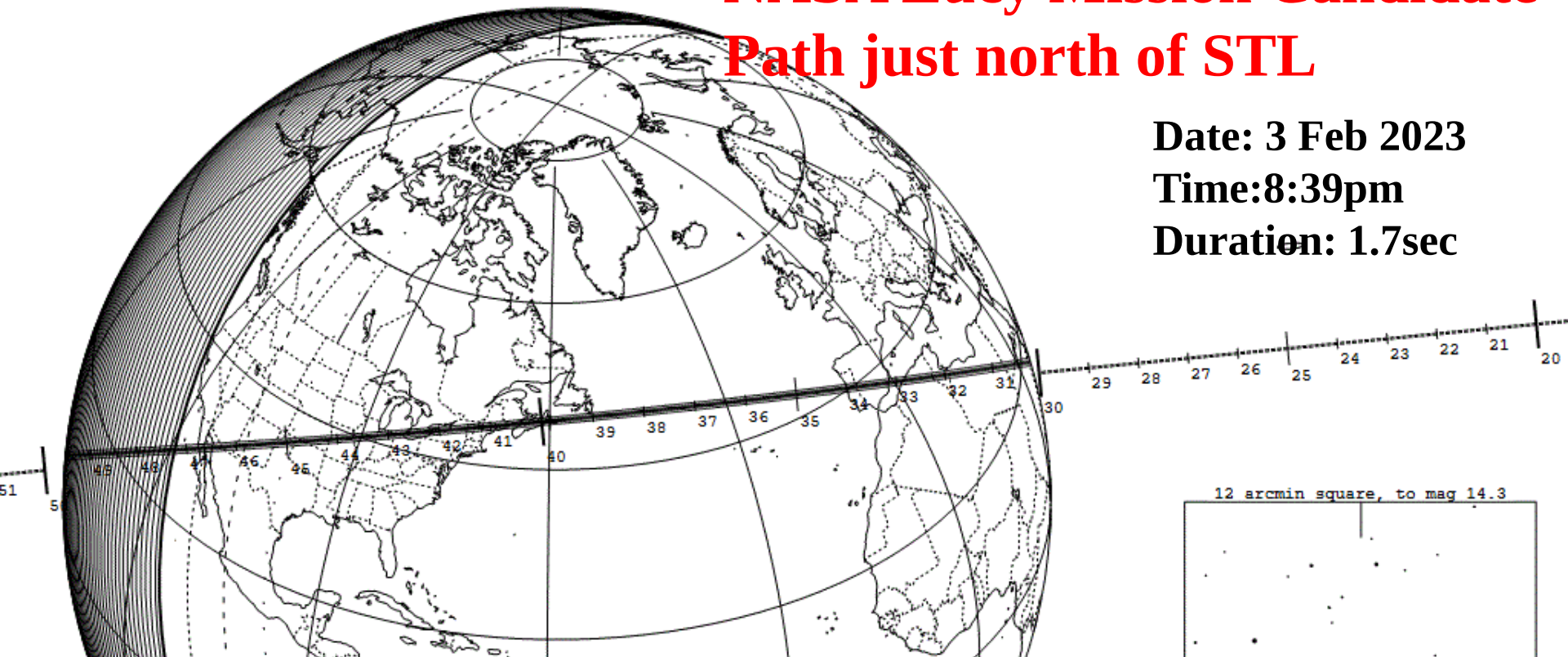
Star: (Dia < 0.1 mas)
Mv 13.3; Mb 13.6; Mr 13.1
RA = 6 38 54.6562 (astrometric)
Dec = 36 1 27.194 ...
[of Date: 6 40 29, 36 0 17]
Prediction of 2022 Aug 14.8
Reliable not available

Durations: Max = 1.97 secs
1km = 0.093 secs, 1mas = 0.27 secs
Mag Drop: 5.5 [99%]v, 5.2 [99%]r
Sun : Dist = 141°
Moon: Dist = 20°, illum = 97%
Error 57.3 x 12.7 mas in PA 85°

Asteroid:
Mag = 18.8
Dia = 21 ±2km, 7 mas
Parallax = 2.185"
Hourly dRA =-1.087s
dDec = -1.29"
JPL#162019Oct15, Known errors

Trojan Asteroid
NASA Lucy Mission Candidate
Path just north of STL

Date: 3 Feb 2023
Time:8:39pm
Duration: 1.7sec



Public Telescope Viewing
At Jefferson College Observatory
+38.264001, -90.556321

Month	Day	Sunday	Event
2	5	Sunday	JCO - First Sunday
3	5	Sunday	JCO - First Sunday
4	2	Sunday	JCO - First Sunday
5	7	Sunday	JCO - First Sunday
6	4	Sunday	JCO - First Sunday
7	2	Sunday	JCO - First Sunday
8	6	Sunday	JCO - First Sunday
9	3	Sunday	JCO - First Sunday
10	1	Sunday	JCO - First Sunday
10	14	Saturday	JCO – Solar Eclipse Viewing
11	5	Sunday	JCO - First Sunday
12	3	Sunday	JCO - First Sunday

Feb-Dec first Sunday each month

Public Telescope Viewing
At Francis Park

Month	Day		Event
4	26	Wednesday	Francis Park Wednesday closest to First Quarter
5	24	Wednesday	Francis Park Wednesday closest to First Quarter
6	21	Wednesday	Francis Park Wednesday closest to First Quarter
7	26	Wednesday	Francis Park Wednesday closest to First Quarter
8	23	Wednesday	Francis Park Wednesday closest to First Quarter
9	20	Wednesday	Francis Park Wednesday closest to First Quarter
10	18	Wednesday	Francis Park Wednesday closest to First Quarter

April-Oct Wednesday closest to First Quarter Moon each month

Public Telescope Viewing
At Tower Grove Park

Month	Day		Event
4	29	Saturday	Tower Grove Park Stargazing
5	27	Saturday	Tower Grove Park Stargazing
6	24	Saturday	Tower Grove Park Stargazing
7	29	Saturday	Tower Grove Park Stargazing
9	23	Saturday	Tower Grove Park Astronomy Festival Placeholder
9	30	Saturday	Tower Grove Park Astronomy Festival Placeholder Second Choice
10	21	Saturday	Tower Grove Park Stargazing

Happy observing

Interesting Astronomical Events for 2023

Astro Links:

- https://eclipse.gsfc.nasa.gov/SKYCAL/SKYCAL.html?cal=2022
- http://www.seasky.org/astronomy/astronomy-calendar-2023.html
- http://astropixels.com/almanac/almanac21/almanac2023cst.html
- https://www.cloudynights.com/topic/849936-lunar-x-2023/
- https://www.mkrgeo-blog.com/the-most-unique-astronomical-events-you-shouldnt-miss-in-the-2021-2030-decade/
- https://www.go-astronomy.com/astronomy-events.htm
- http://www.lunar-occultations.com/iota/iotandx.htm
- https://www.asteroidoccultation.com/
- http://www.lunar-occultations.com/iota/bstar/bstar.htm
- http://www.lunar-occultations.com/iota/planets/planets.htm
- https://www.timeanddate.com/astronomy/

Interesting Astronomical Events for 2023

More Astro Links:

- http://astroclub.tau.ac.il/ephem/PlanetsConj/
- http://astroclub.tau.ac.il/ephem/Daily/
- http://www.earthriseinstitute.org/inboundcoms.html
- https://www.greatamericaneclipse.com/october-14-2023
- https://solarsystem.nasa.gov/eclipses/2023/oct-14-annular/overview/
- http://xjubier.free.fr/en/site_pages/solar_eclipses/ASE_2023_GoogleMapFull.html
- https://eclipsewise.com/solar/SEgmapx/2001-2100/SE2023Oct14Agmapx.html
- https://www.timeanddate.com/eclipse/map/2023-october-14
- https://www.greatamericaneclipse.com/october-14-2023
- https://nationaleclipse.com/maps_2023.html

Solar Eclipse Links

- https://solarsystem.nasa.gov/eclipses/2023/oct-14-annular/overview/
- http://xjubier.free.fr/en/site_pages/solar_eclipses/ASE_2023_GoogleMapFull.html
- https://eclipsewise.com/solar/SEgmapx/2001-2100/SE2023Oct14Agmapx.html
- https://www.timeanddate.com/eclipse/map/2023-october-14
- https://www.greatamericaneclipse.com/october-14-2023
- https://nationaleclipse.com/maps_2023.html

Lunar Links

More Astro Links:

https://www.ap-i.net/avl/en/start

- https://svs.gsfc.nasa.gov/5048

Astrophoto examples

Moon and Venus July 15, 2018

Astrophoto examples

Moon and Mercury May 13, 2021

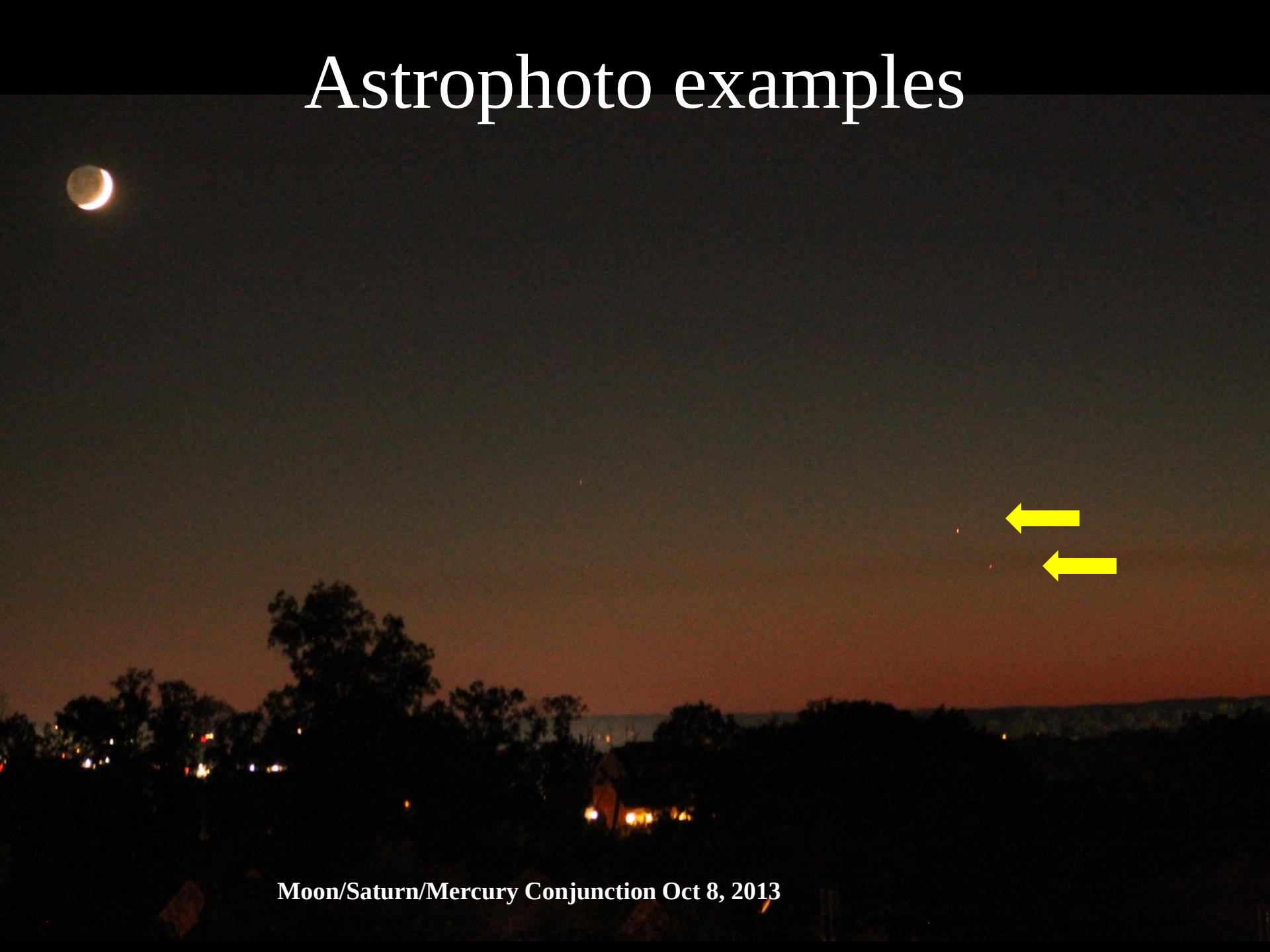
Astrophoto examples

Moon and M45/Pleiades Apr 1, 2020

Astrophoto examples

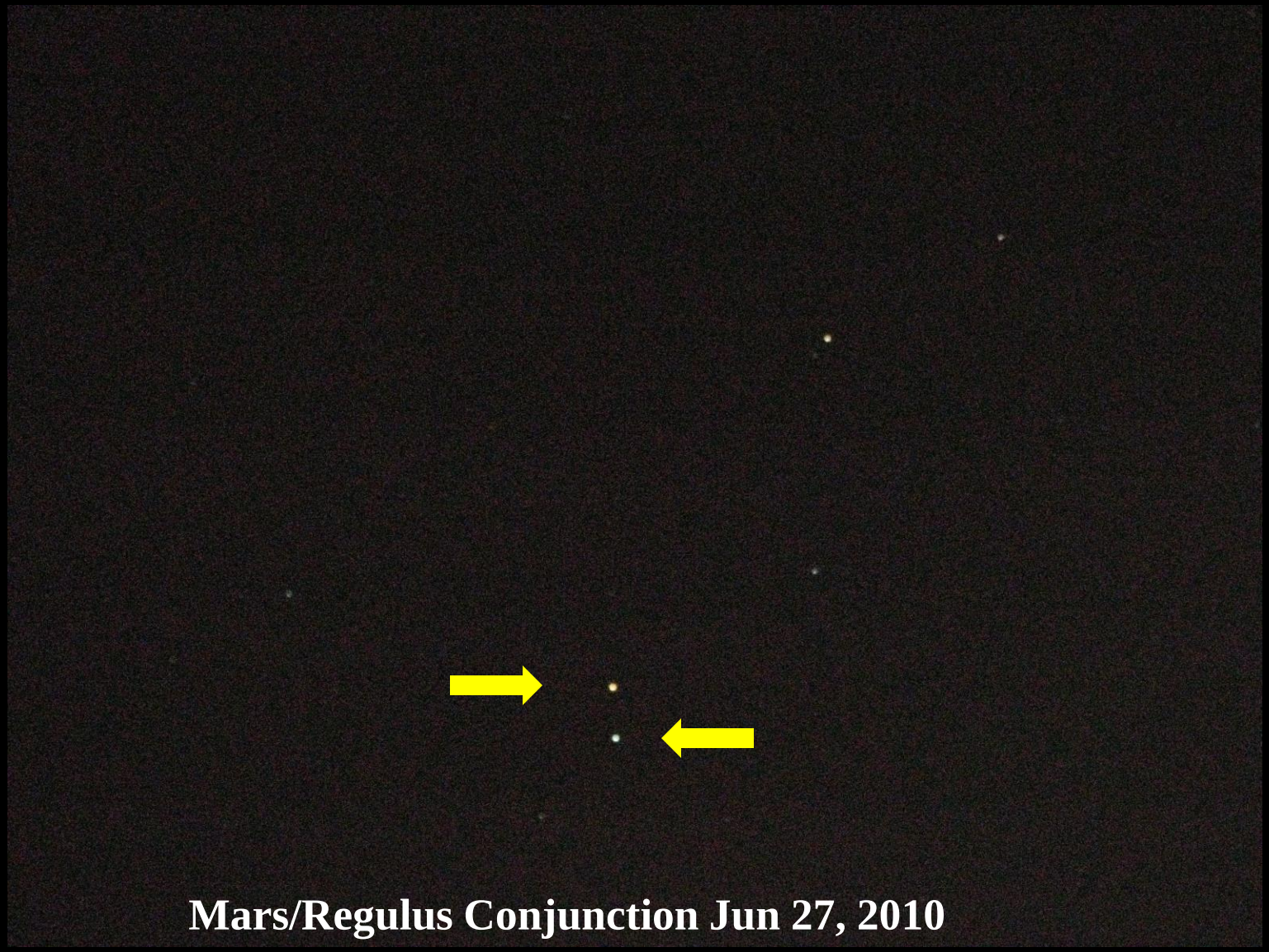
Jupiter and Venus March 18, 2012

Astrophoto examples



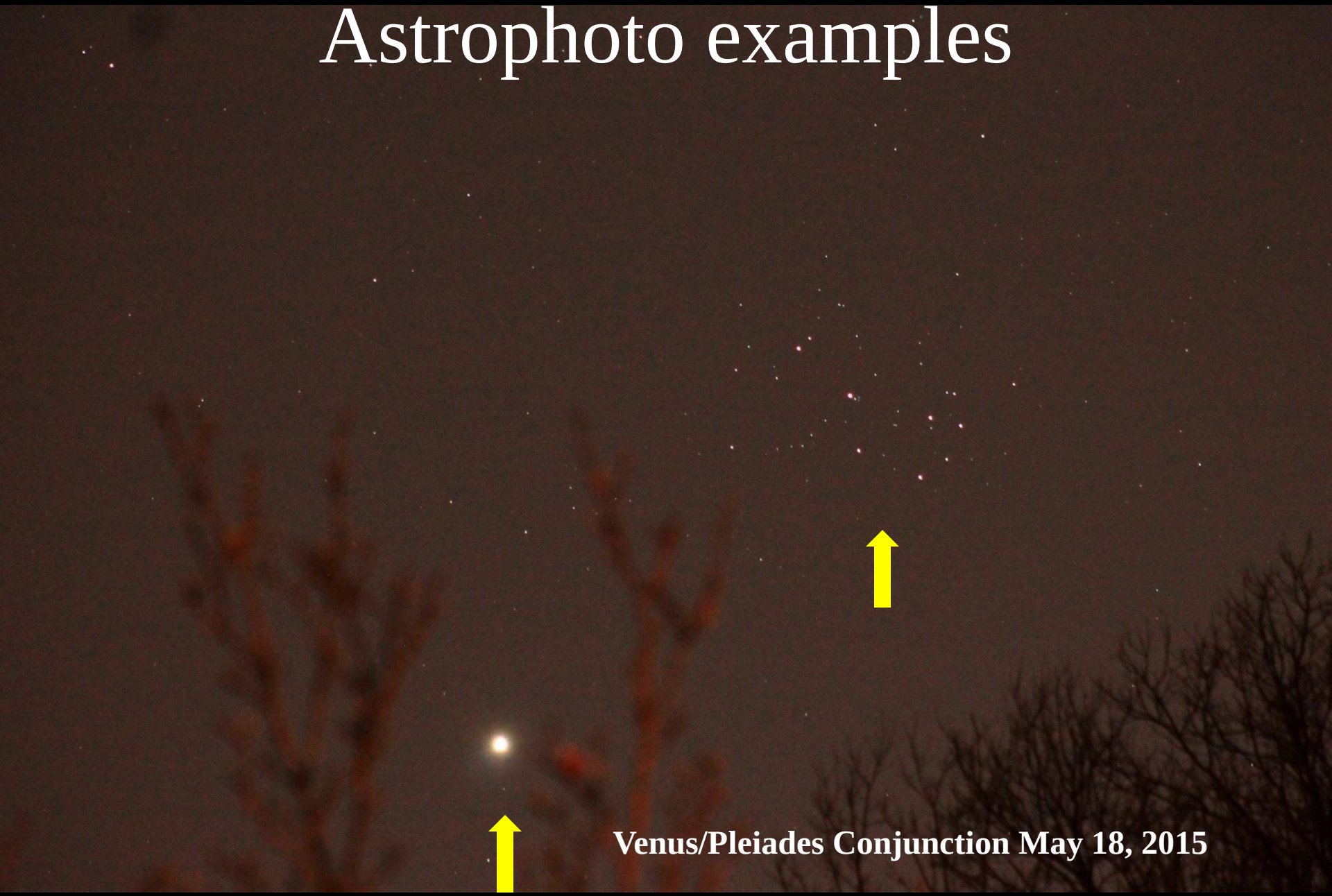
Moon/Saturn/Mercury Conjunction Oct 8, 2013

Astrophoto examples



Mars/Regulus Conjunction Jun 27, 2010

Astrophoto examples



Venus/Pleiades Conjunction May 18, 2015

Astrophoto examples

Moon/Mars – 10-2-2020

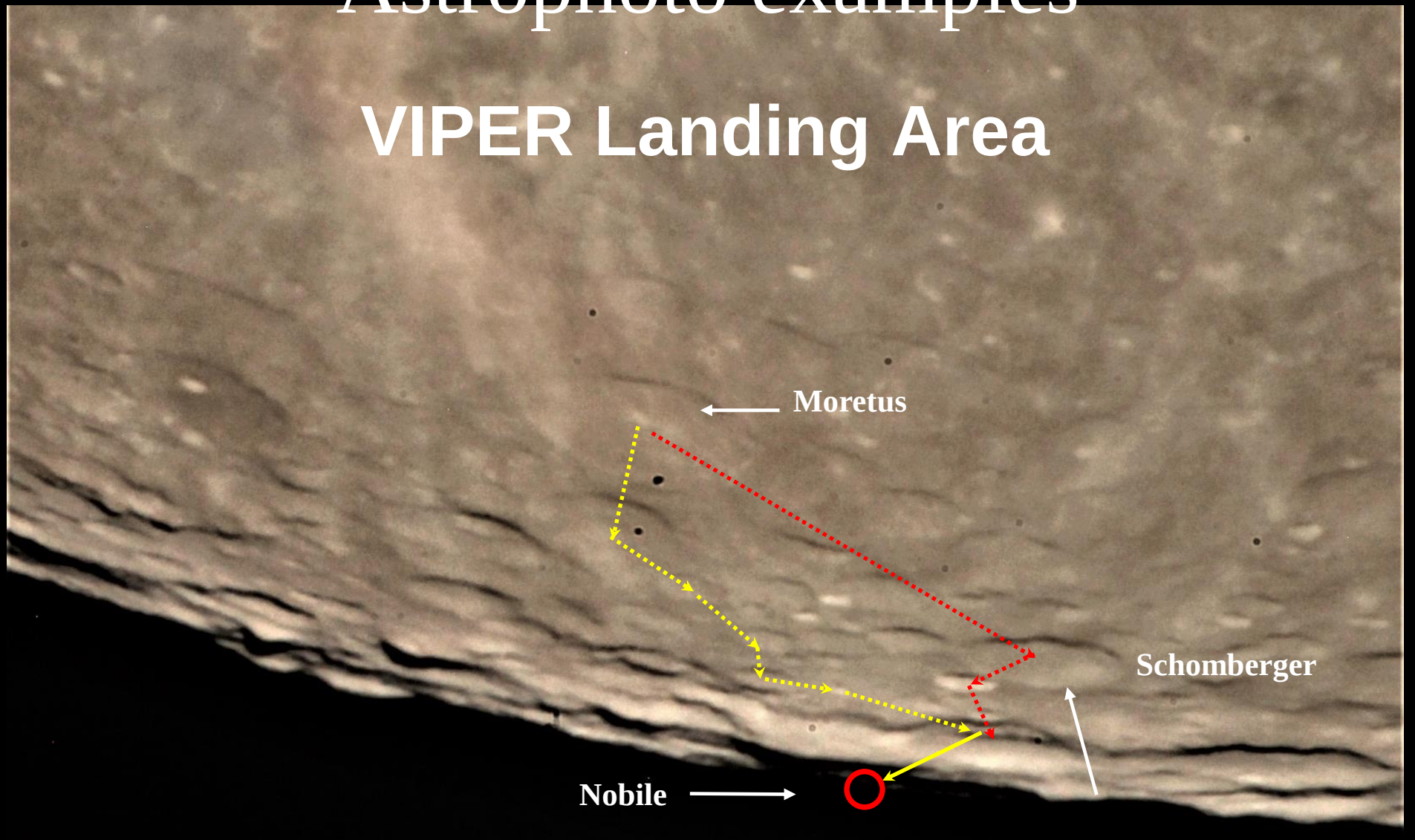
Moon/Saturn/Jupiter – 10-2-2020

Astrophoto examples

Moon/ Aldebaran Occultation
Jul 29, 2016

Astrophoto examples

VIPER Landing Area



Lunar South Pole Region Mar 3, 2022