

The background of the slide is a dark, textured image of a night sky filled with numerous small white stars of varying brightness.

The Planets and how to see them

OLLI Week #4

Tonight 7pm SW



Venus

A photograph of the evening sky. The horizon is visible at the bottom, showing a dark silhouette of trees and buildings against a bright orange and yellow sunset. In the upper left, there is a bright white star. To its right is a larger, slightly dimmer white star labeled "Venus". Further to the right is a large, bright, circular object labeled "Moon (x4)". The background is a dark blue gradient transitioning to orange near the horizon.

Moon (x4)

SW



Jupiter

Saturn

Tonight 7pm SE

SE

S

“Planètes” (Greek) = “wanderer”

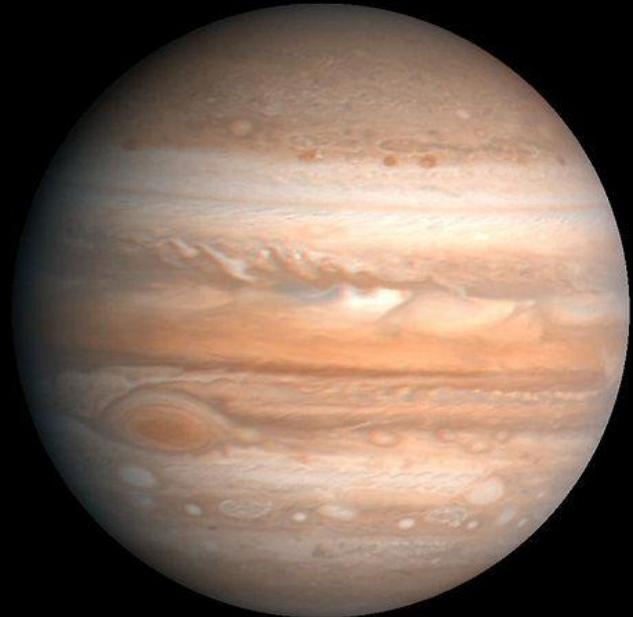


# 7 wanderers!

Planet	Ancient Planet-gods			Modern-day Names		
	Babylonian	Roman	Anglo-Saxon	English	French	Spanish
Sun	Shamash	Sol	Sun	Sunday	<i>dimanche</i>	<i>domingo</i>
Moon	Sin	Luna	Moon	Monday	<i>lundi</i>	<i>lunes</i>
Mars	Nergal	Mars	Tiw	Tuesday	<i>mardi</i>	<i>martes</i>
Mercury	Nabu	Mercurius	Woden	Wednesday	<i>mercredi</i>	<i>miércoles</i>
Jupiter	Marduk	Jupiter	Thor	Thursday	<i>jeudi</i>	<i>jueves</i>
Venus	Ishtar	Venus	Freya	Friday	<i>vendredi</i>	<i>viernes</i>
Saturn	Ninurta	Saturnus	Saturn	Saturday	<i>samedi</i>	<i>sabato</i>

# *Inventory\** . . .

- Star (1)
- Major planets (8)
- Dwarf planets (5)
- Moons (219)\*\*
- Asteroids (1,024,991)
- Kuiper Belt Objects (2,717)
- Comets (6996 cataloged)

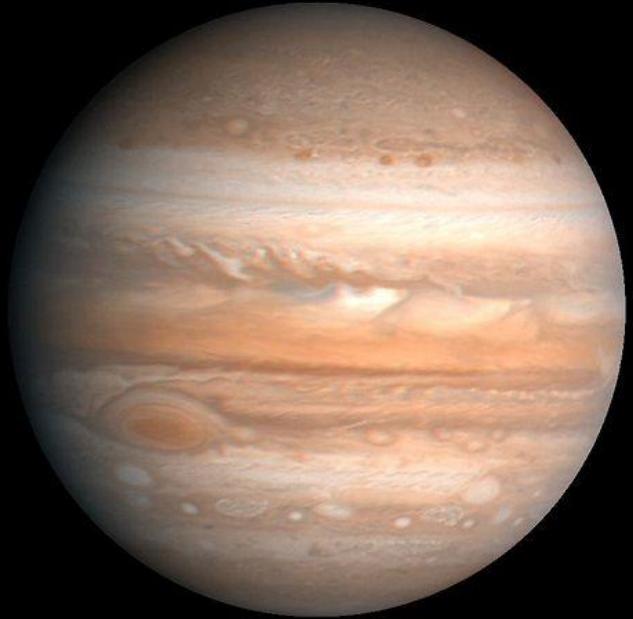


\* as of Nov. 2020

\*\* as of Aug. 2021

# *Inventory . . .*

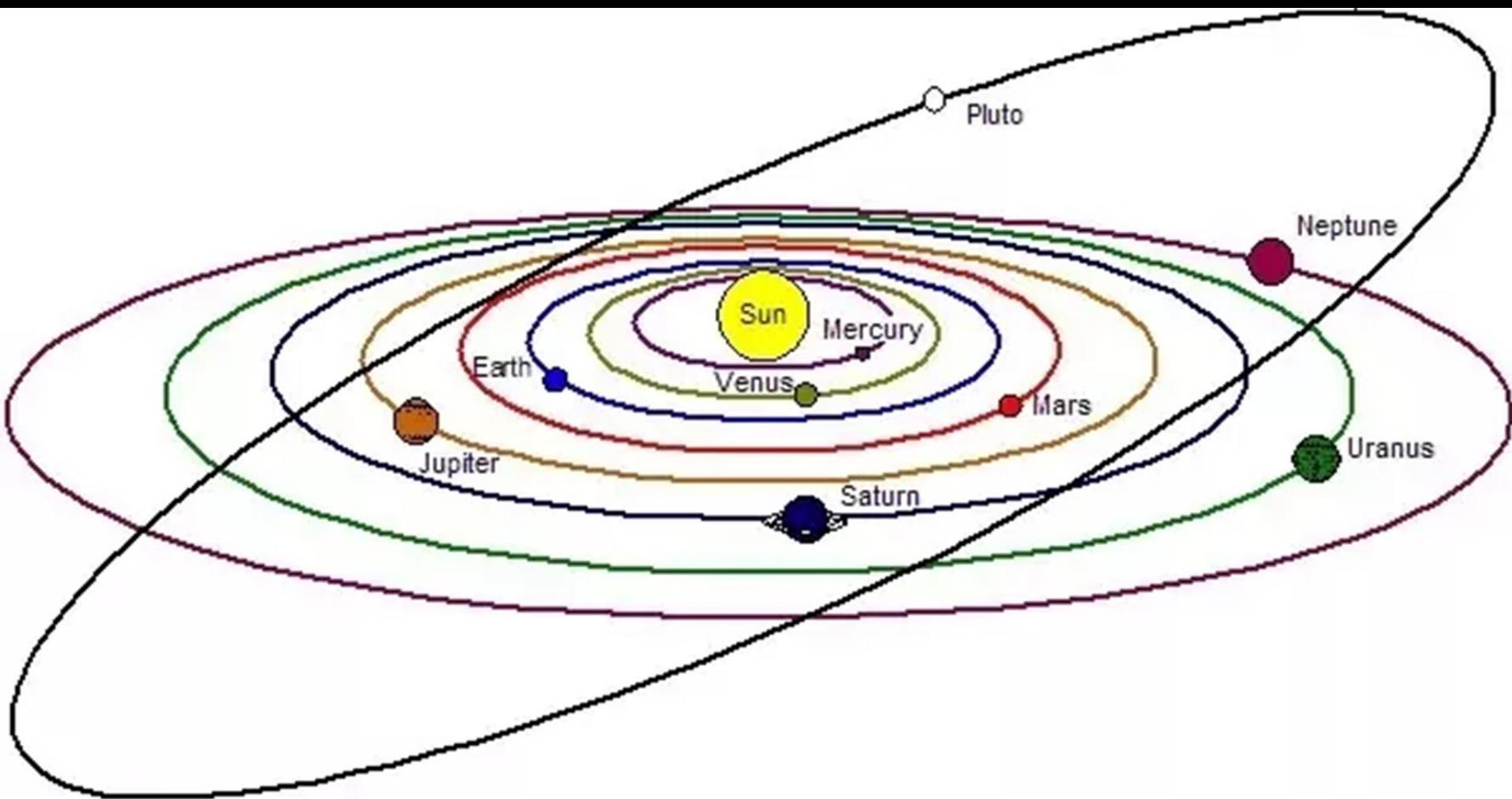
- “Visited” all eight
  - Landed on two (+2 moons)
  - orbited six
  - flyby for outer two  
(Pluto in 2015)



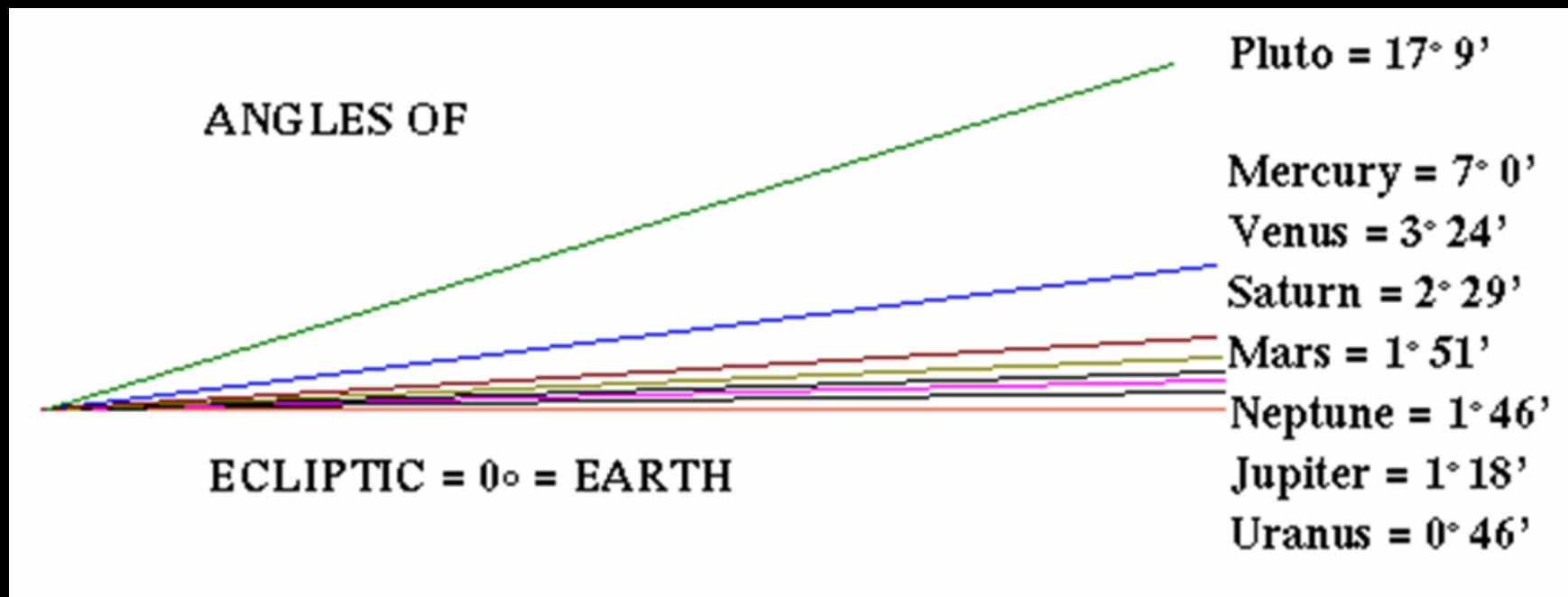
**Question . . . why do this? Is it worth the money?**

# Number of major planets . . .

- *SEVEN WANDERERS!*
- ~1610 – drop Sun & Moon ..... 5
- Earth revolves! Add back in ..... 6
- 1781 – Uranus ..... 7
- 1801 . .Ceres (asteroid) ..... 8
- Pallas, Vesta, Juno ..... 11
- No, wait, they're “minor planets” .. 7
- 1846 – Neptune ..... 8
- 1930 – Pluto ..... 9
- 2006 – Crap. Pluto demoted ..... 8



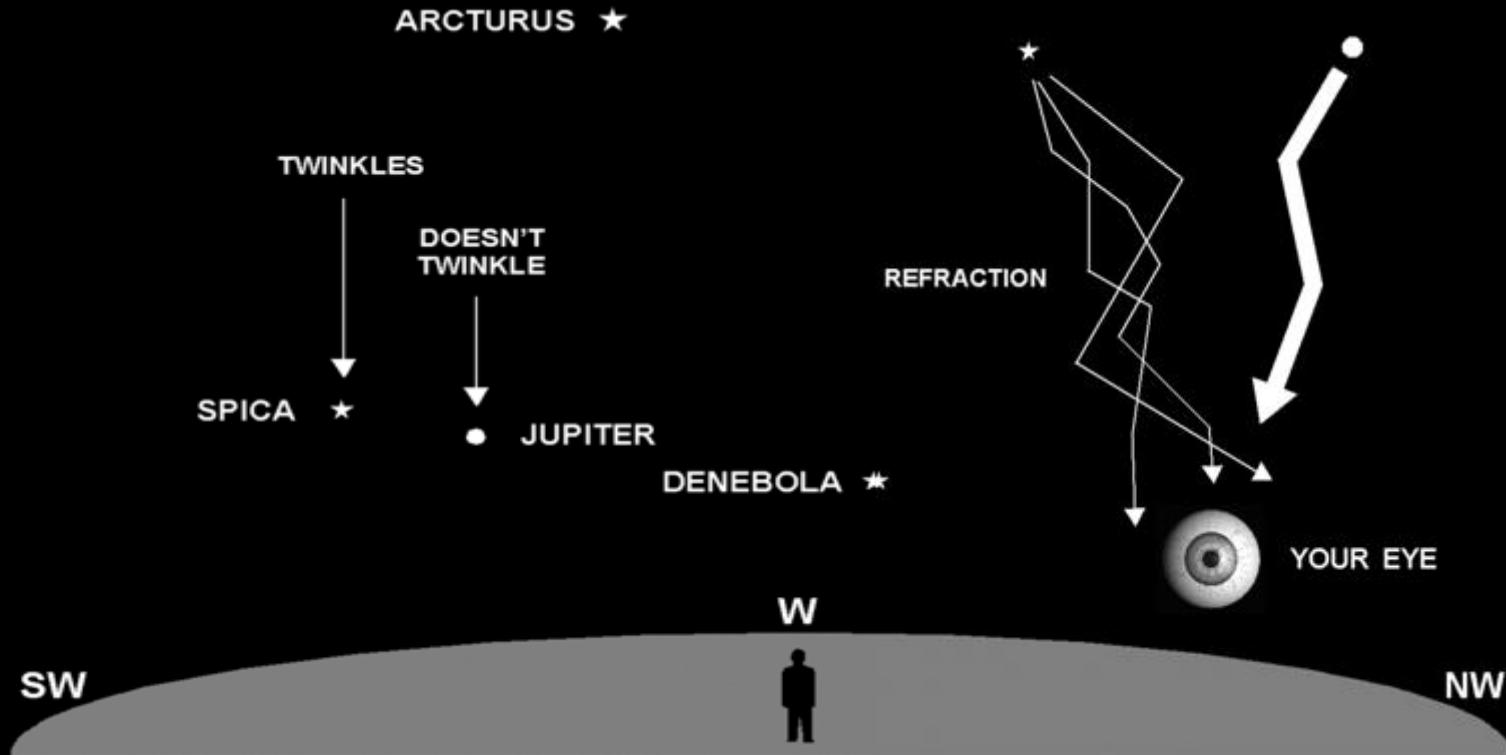
# “Orbital inclination”



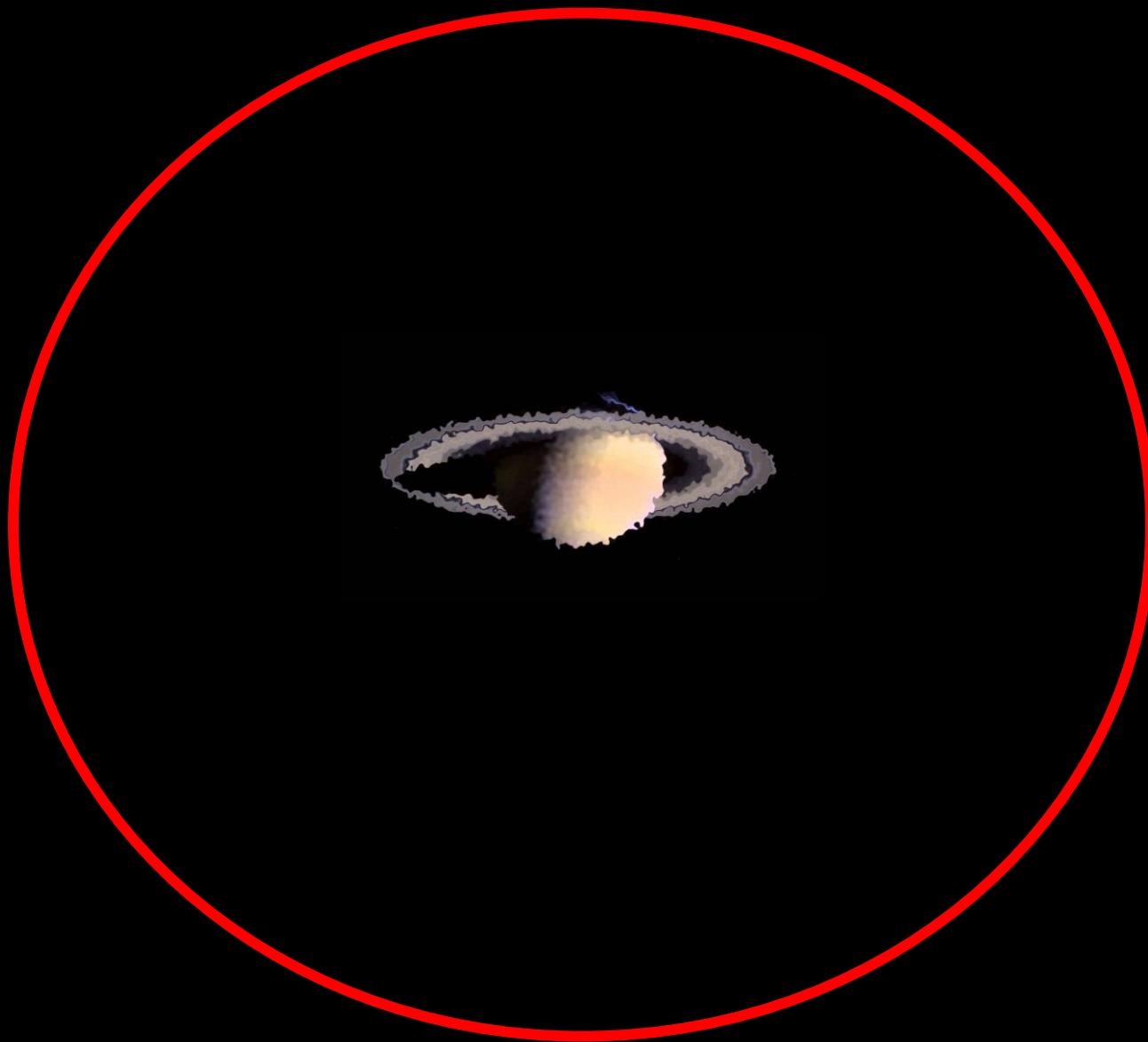
Conclusion – look for the planets on the ecliptic



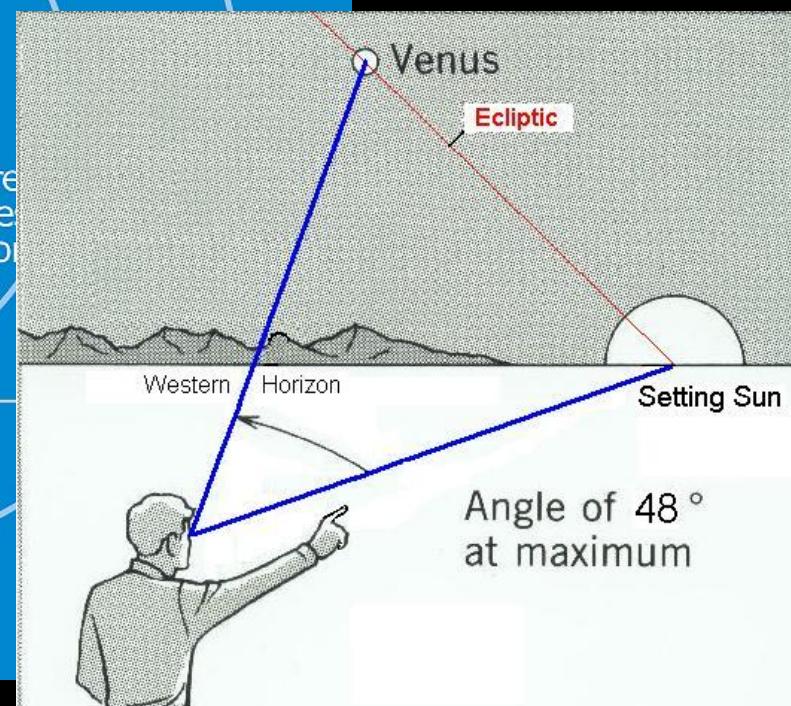
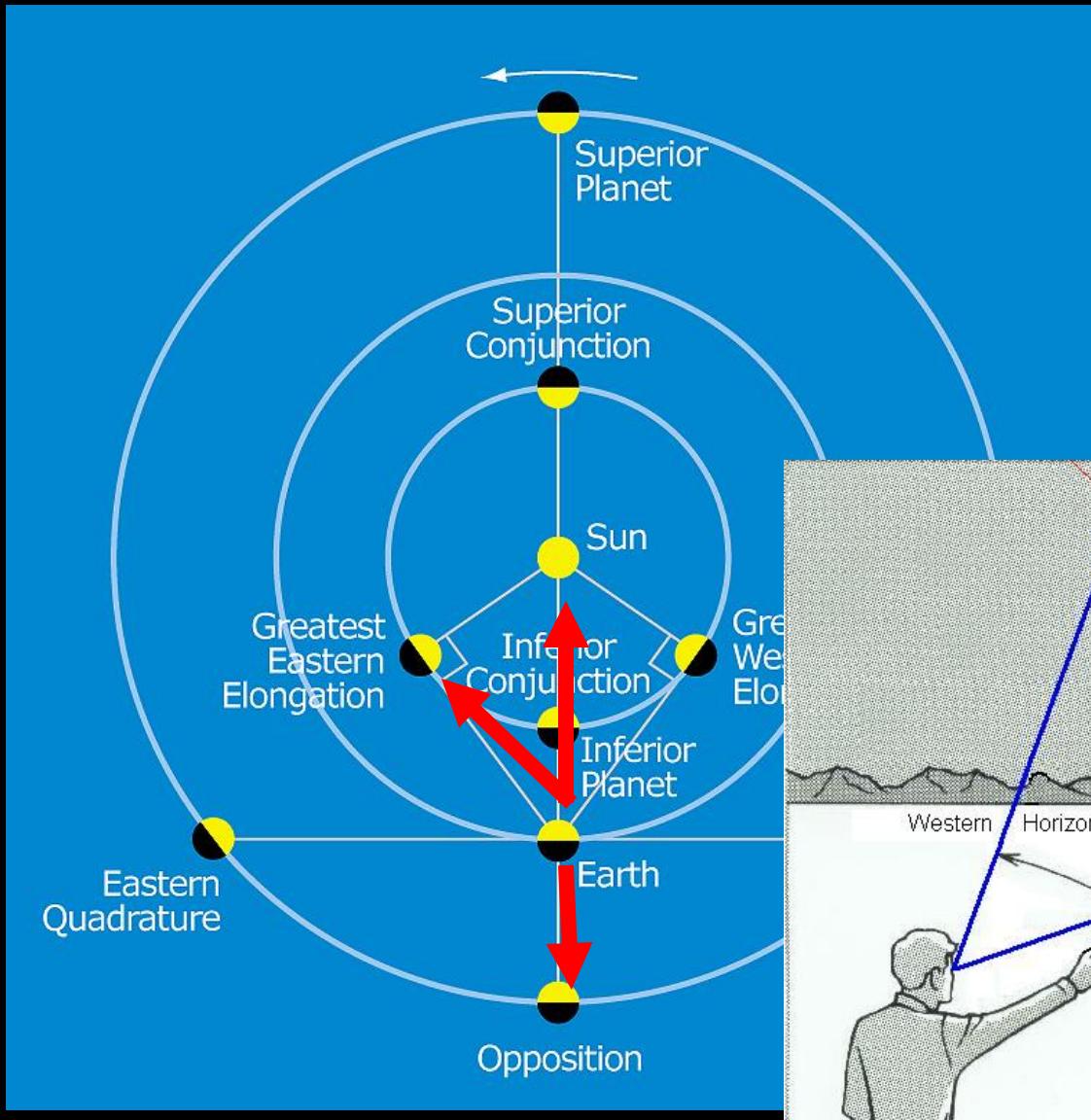
# Planets don't twinkle!



“Seeing” – state of the Earth’s atmosphere



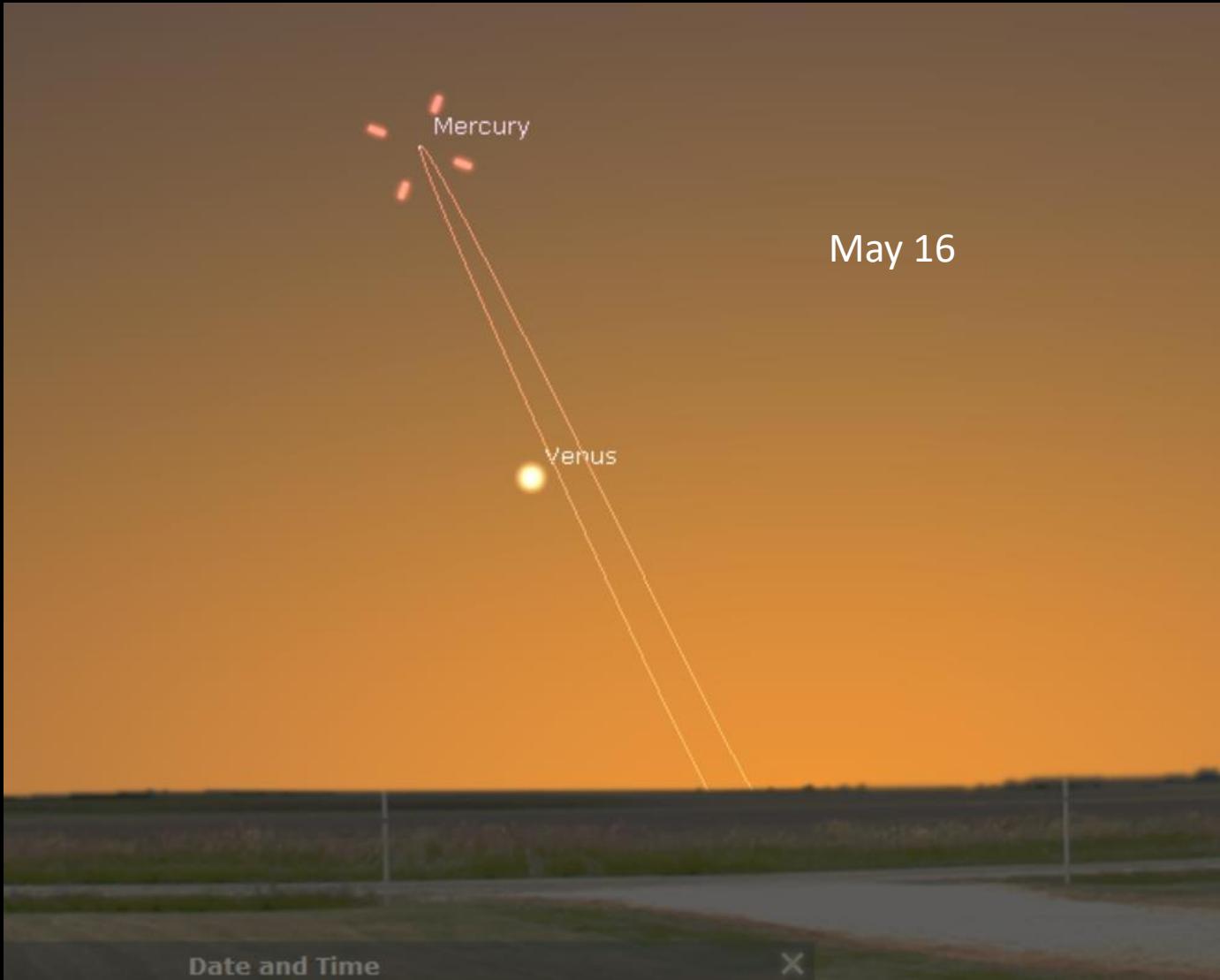
# Planetary configurations



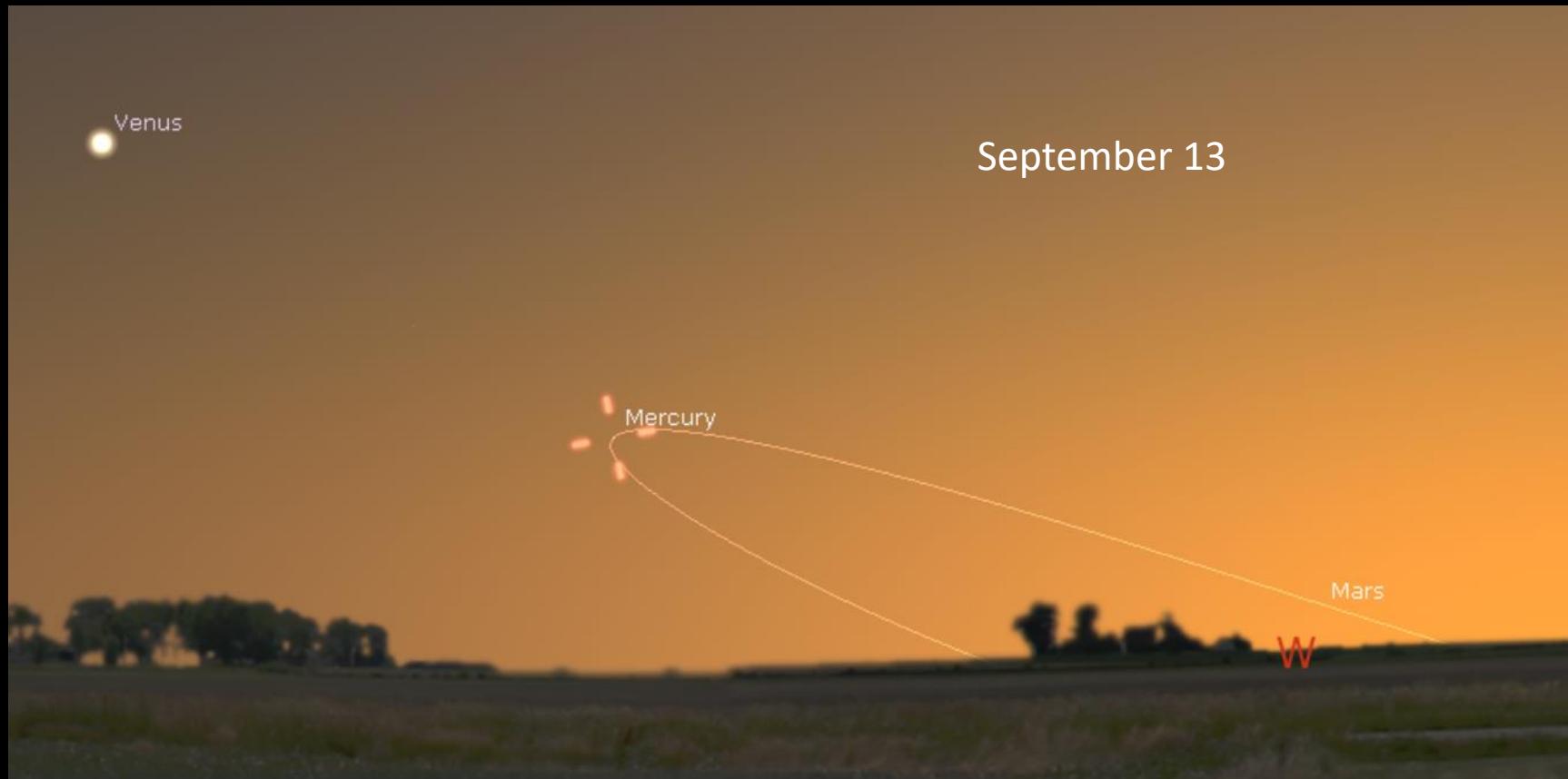
# 2021 dates

- Mercury eve elongation – January 23
  - Mercury morn elongation – March 6 (bad)
  - Mercury eve elongation – May 16
  - Mercury morn elongation – July 4
  - Saturn opposition – August 2
  - Jupiter opposition – August 19
  - Mercury eve elongation – September 13 (bad)
  - Neptune opposition – September 14
  - Mercury morn elongation – October 25
  - **Venus eve elongation – October 29**
  - Uranus opposition – November 4
- (Next Mars opposition – December 8, 2022)

# Mercury in 2021 (evening)



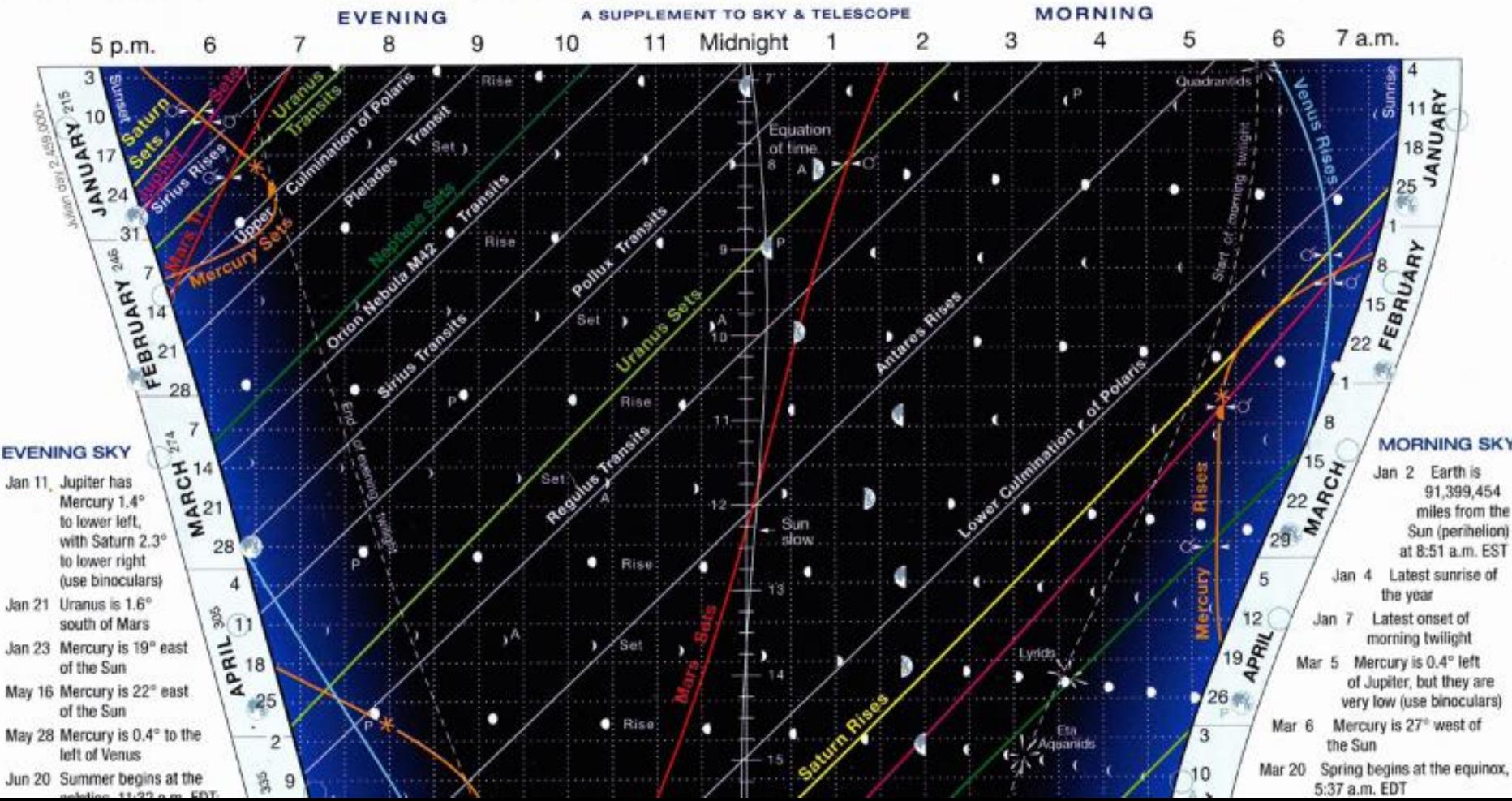
# Mercury in 2021 (evening)



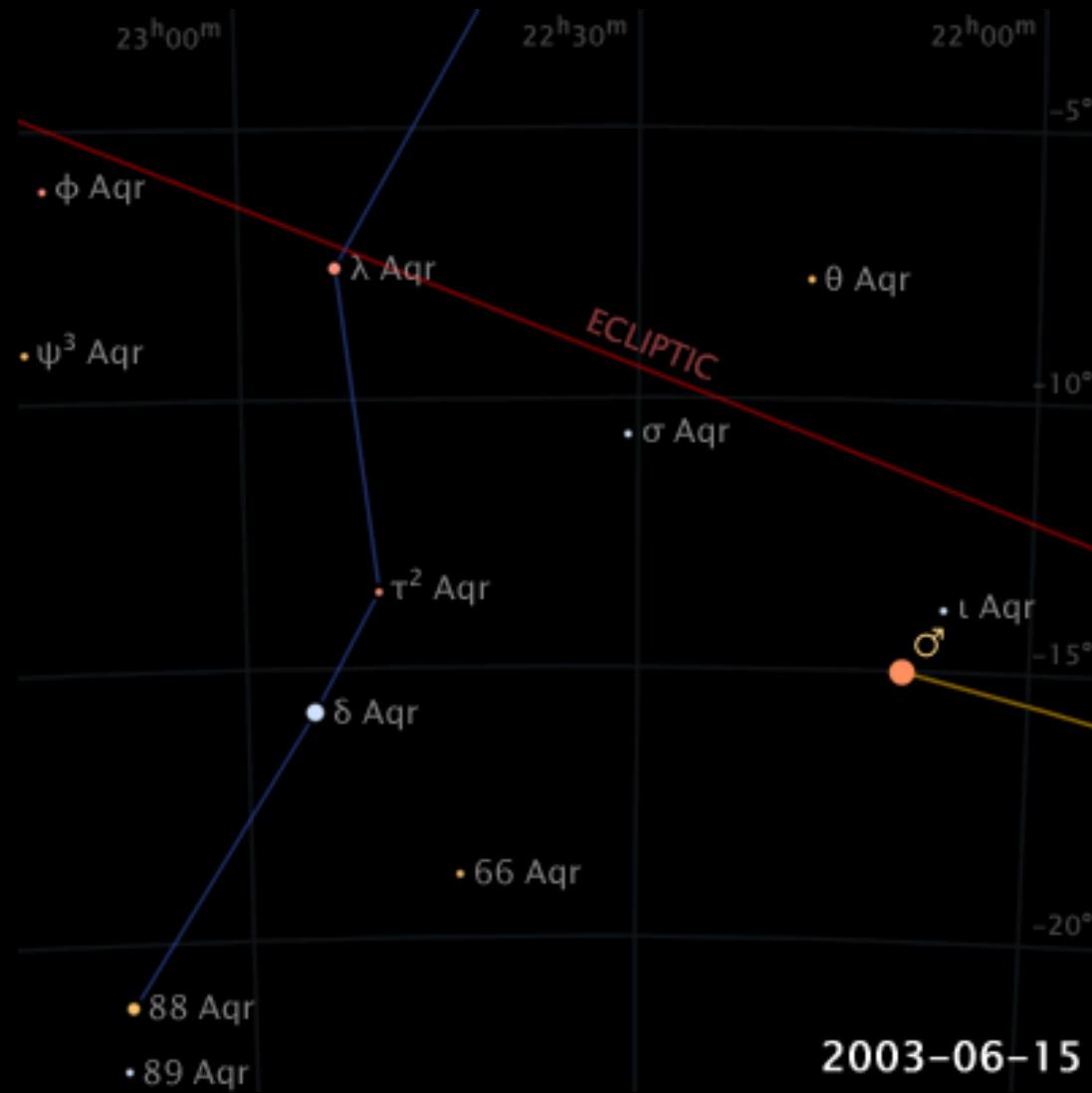
# Skygazer's Almanac 2021

**40°N**

FOR LATITUDES NEAR 40° NORTH



# Outer planet motion . . . Retrograde motion



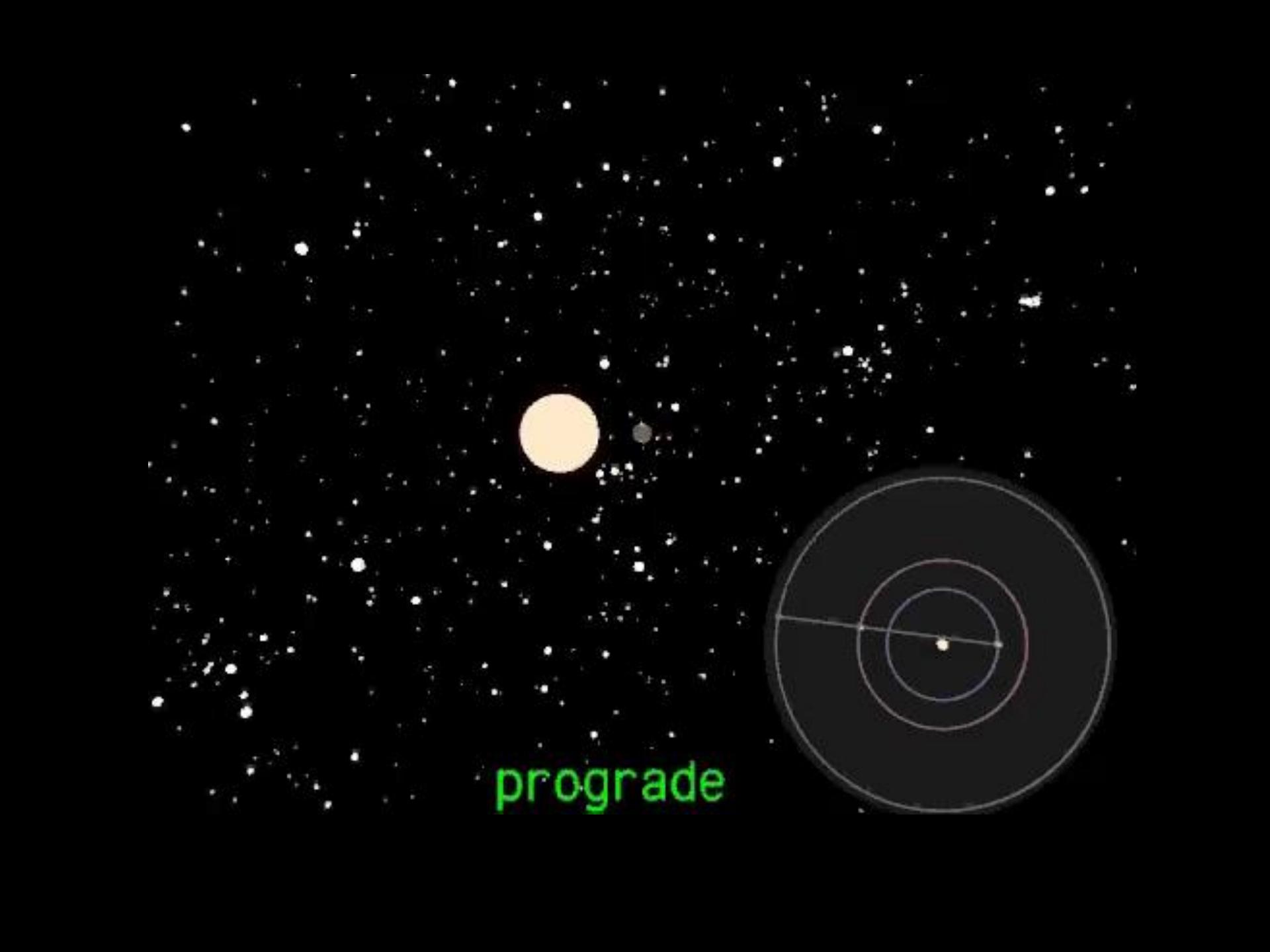


A diagram illustrating the orbital phases of a binary star system. It features three circular orbits of different sizes, all centered around a central point. The innermost orbit has a small grey dot at its center. The middle orbit contains a yellow dot at its center. The outermost orbit is a large dark grey circle. The text "periapsis" is positioned above the yellow dot, and "apoapsis" is positioned below it. The word "prograde" is written in green at the bottom left.

periapsis

apoapsis

prograde



prograde



So . . . what do they look like?



# Max planetary *magnitudes* . . . .

- Venus = -4.92
- Jupiter = -2.94
- Mars = -2.94
- Mercury = -2.48
- Saturn = -0.55
- Uranus = +5.38
- Neptune = +7.67

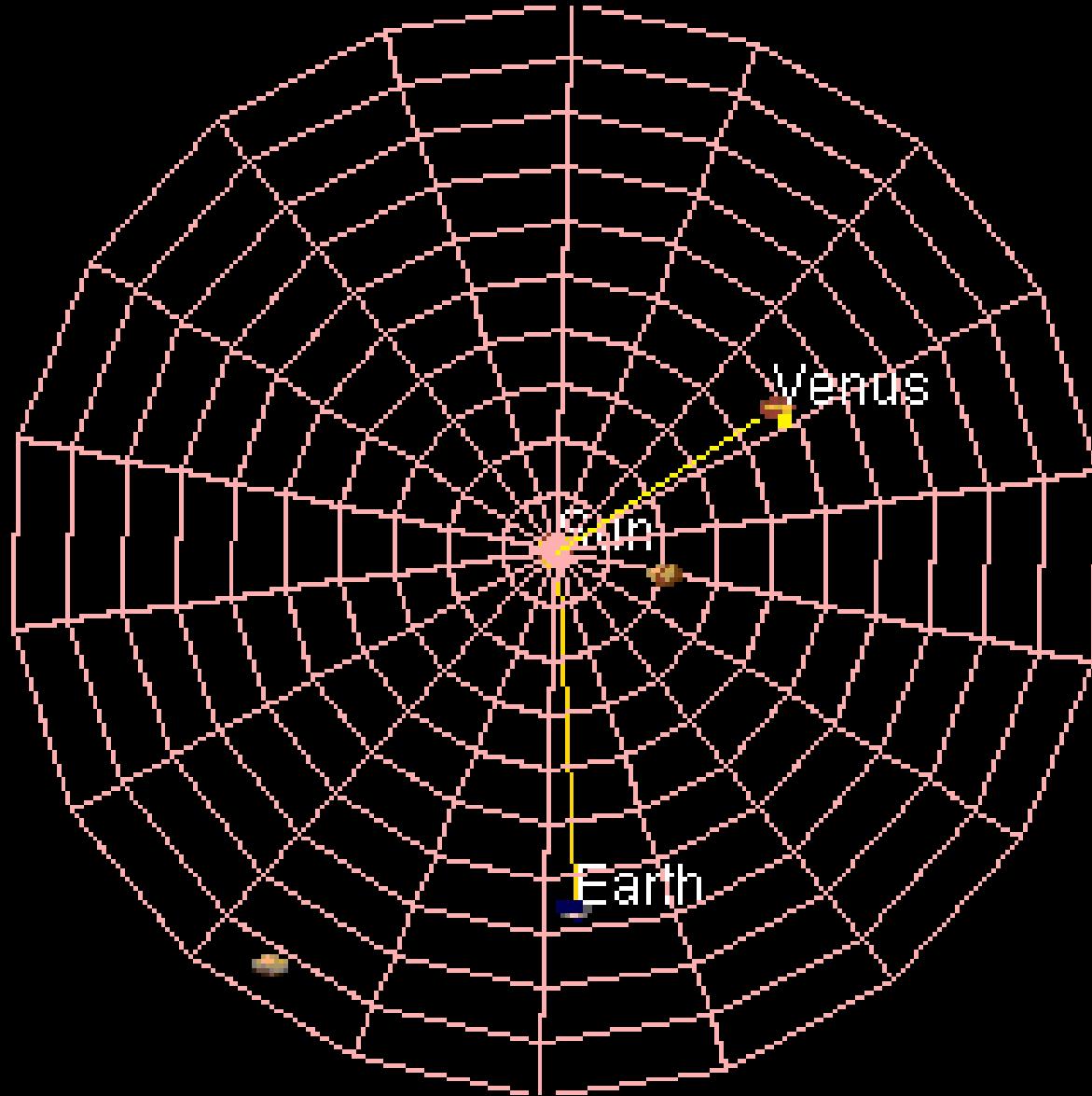


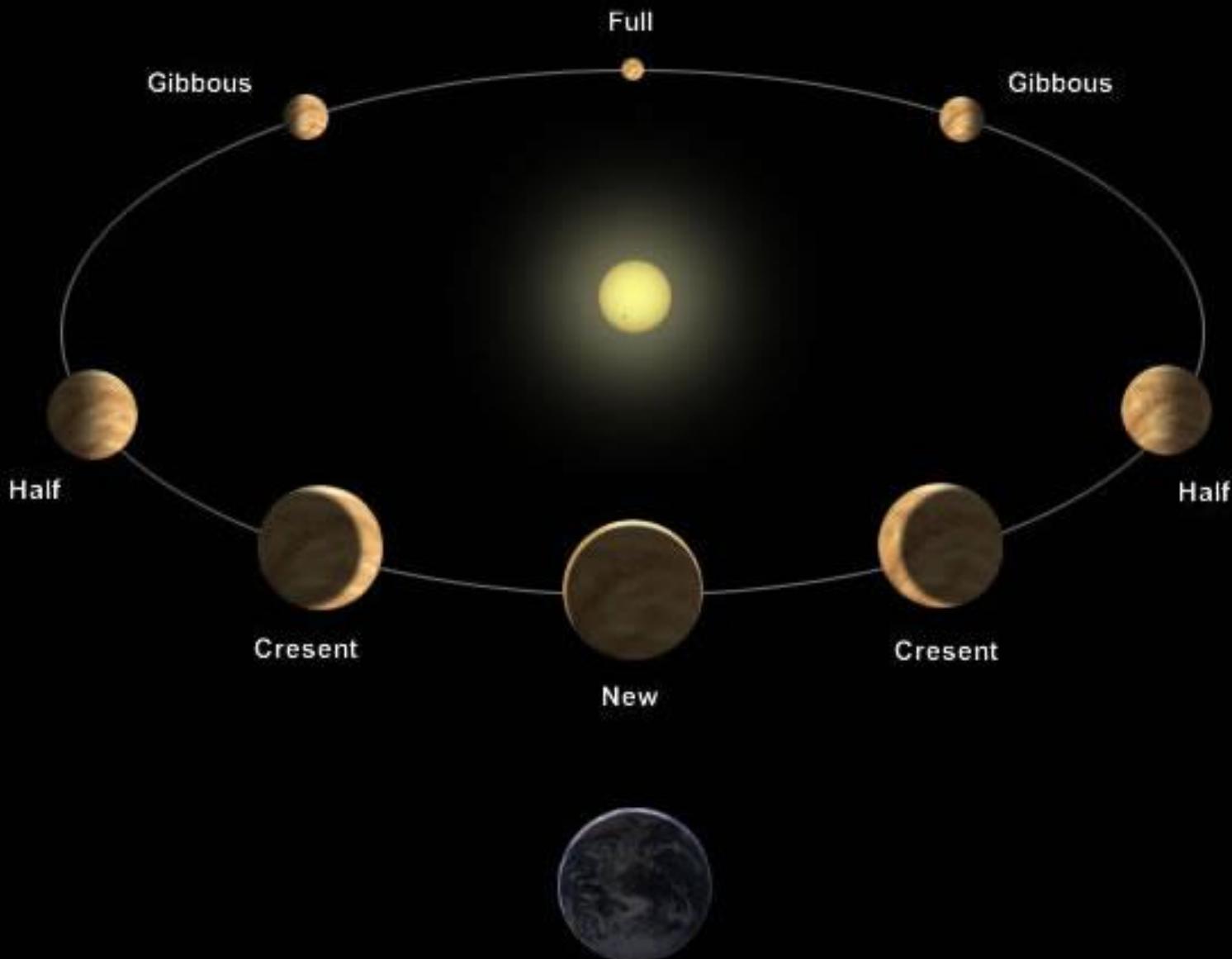
# Angular Sizes

- Mercury      4.5" – 13.0"
- Venus        9.7" – 66"
- Mars          3.5" – 25.1"
- Jupiter       29.8" – 50.1"
- Saturn        14.5" – 20.1"
- Uranus        3.3" – 4.1"
- Neptune       2.2" – 2.4"
- Pluto          0.06" – 0.11"



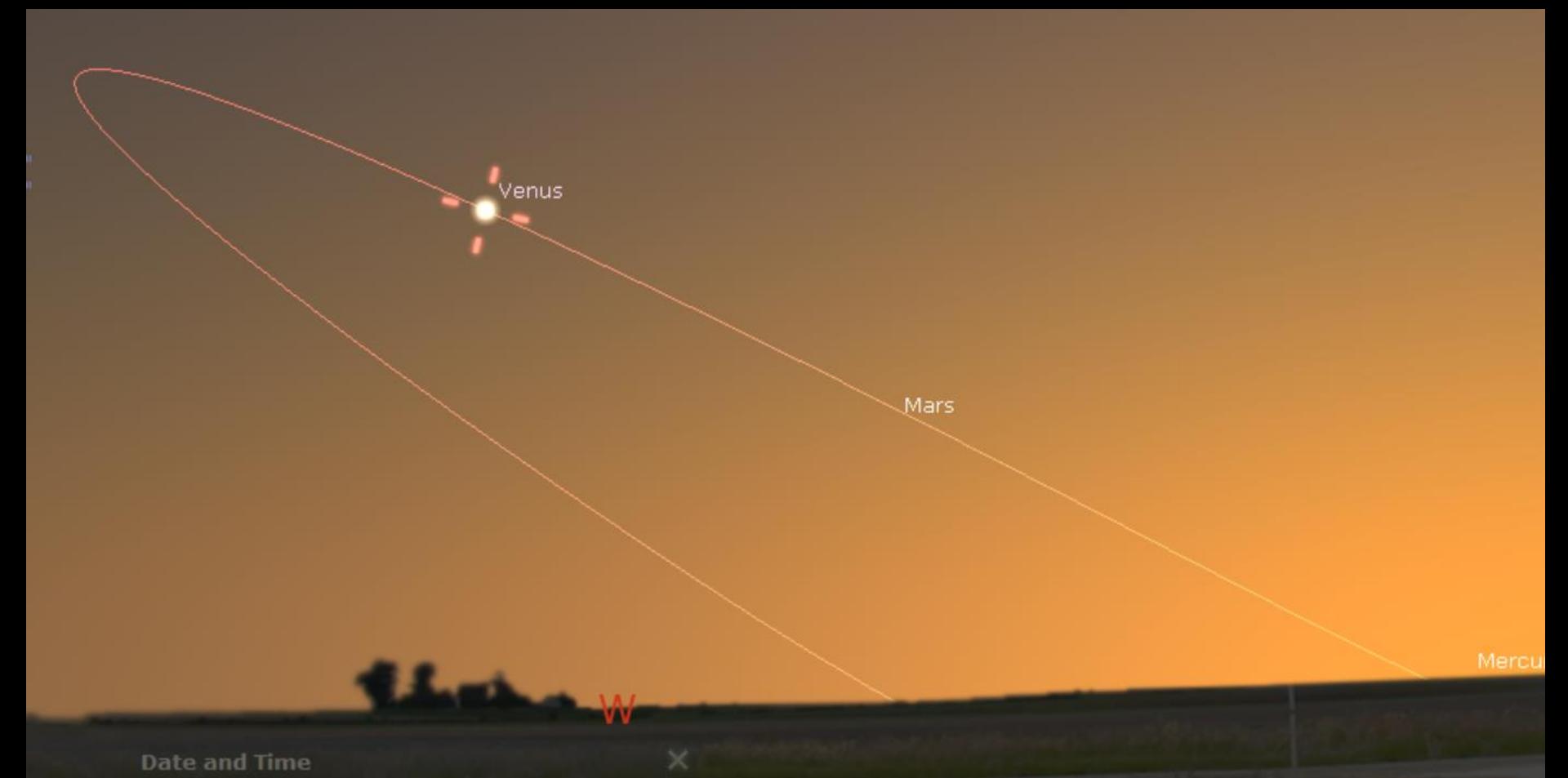
Venus





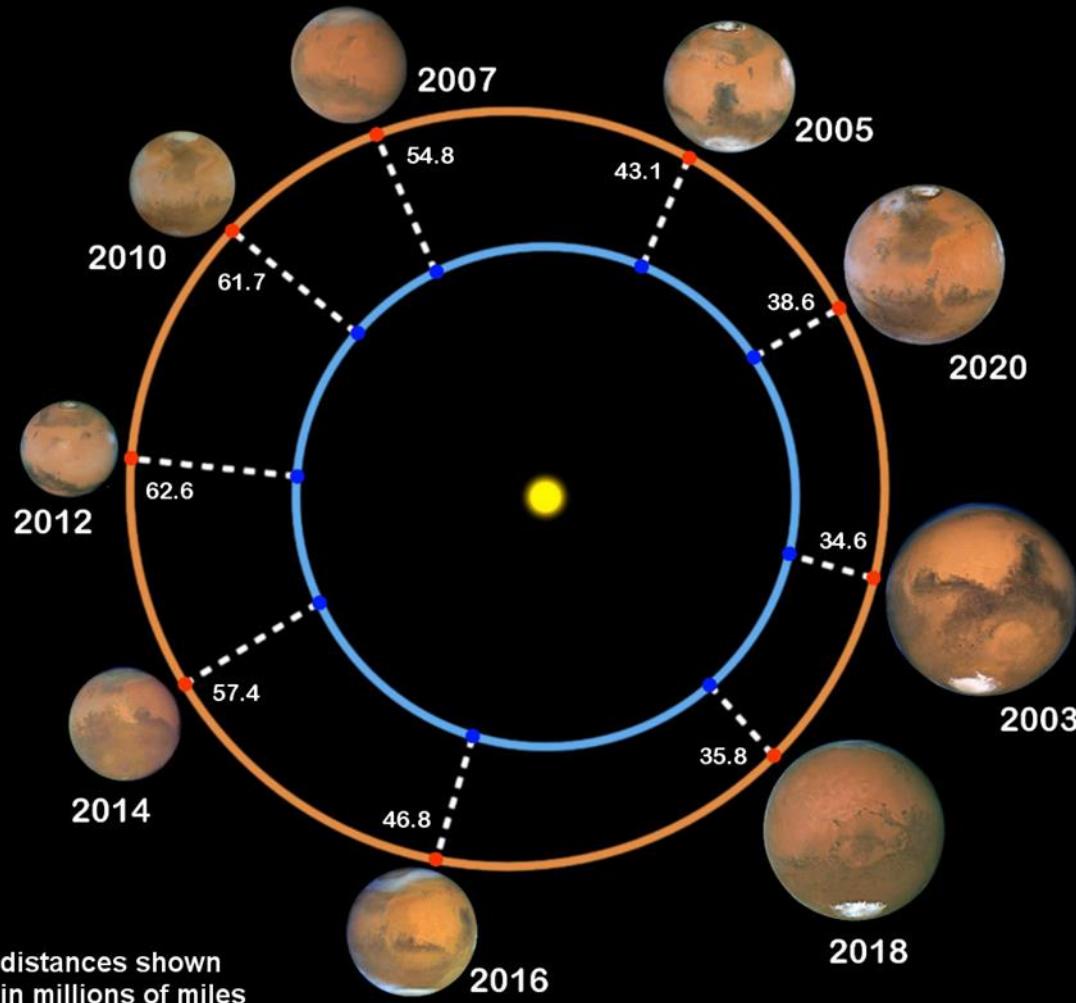
# Venus

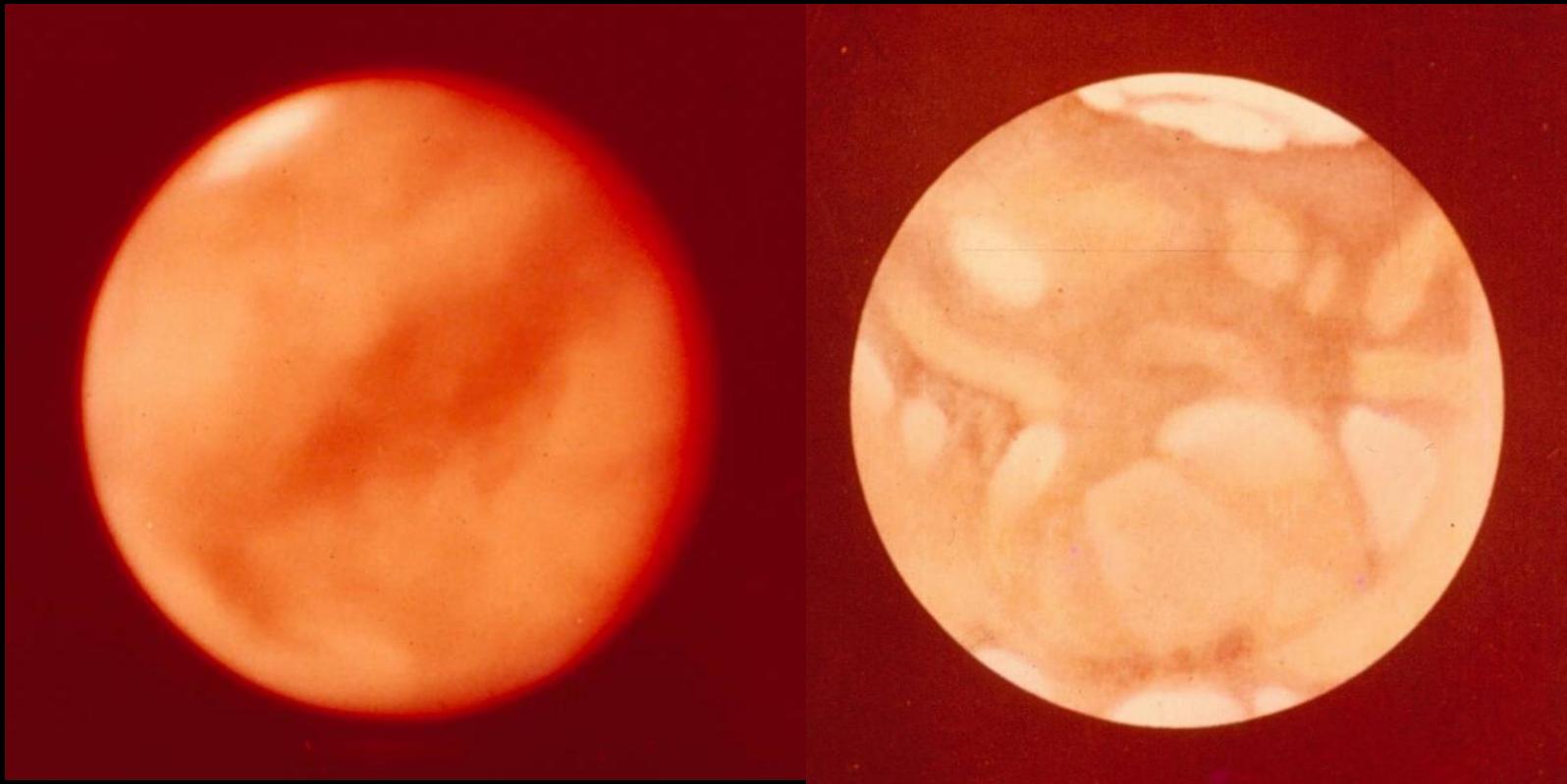




# Mars

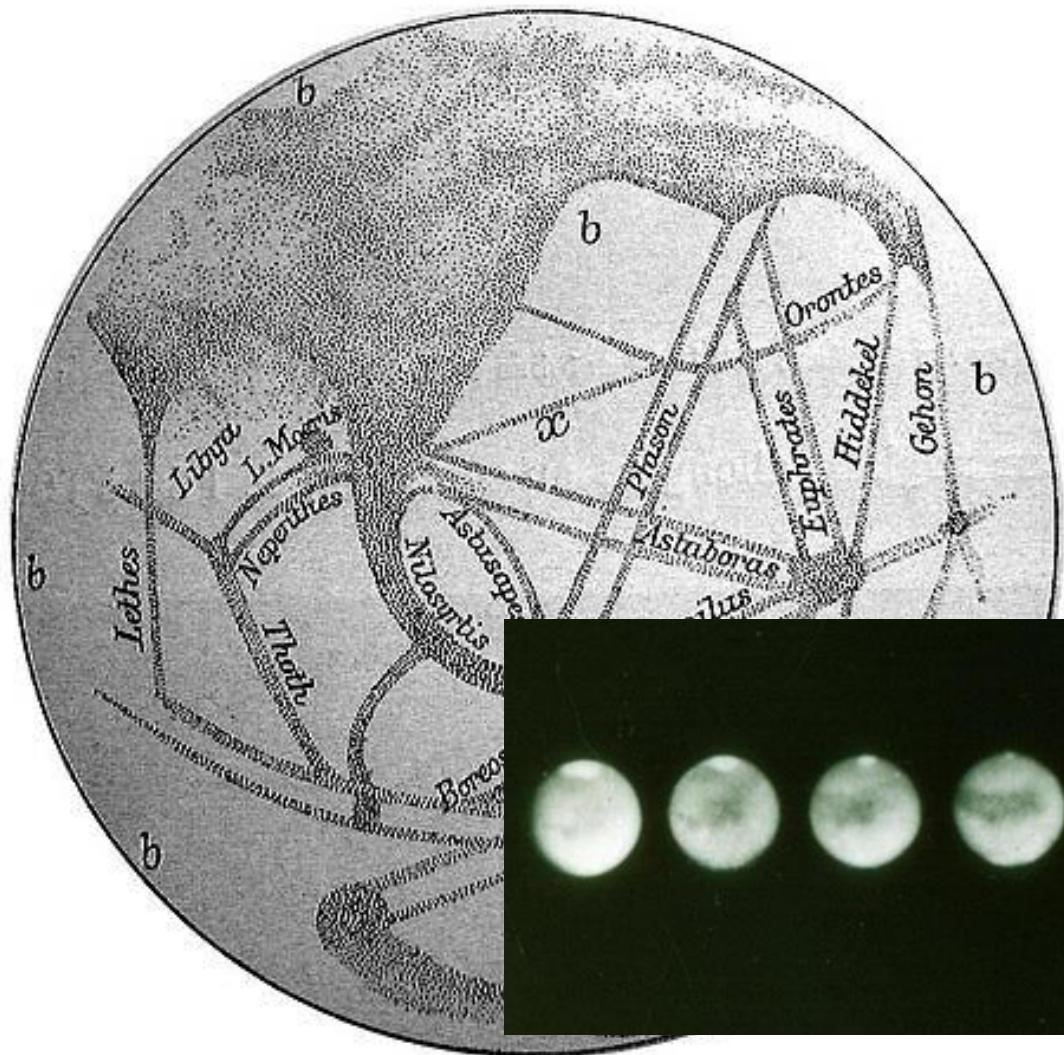
## *Mars Oppositions 2003 - 2020*



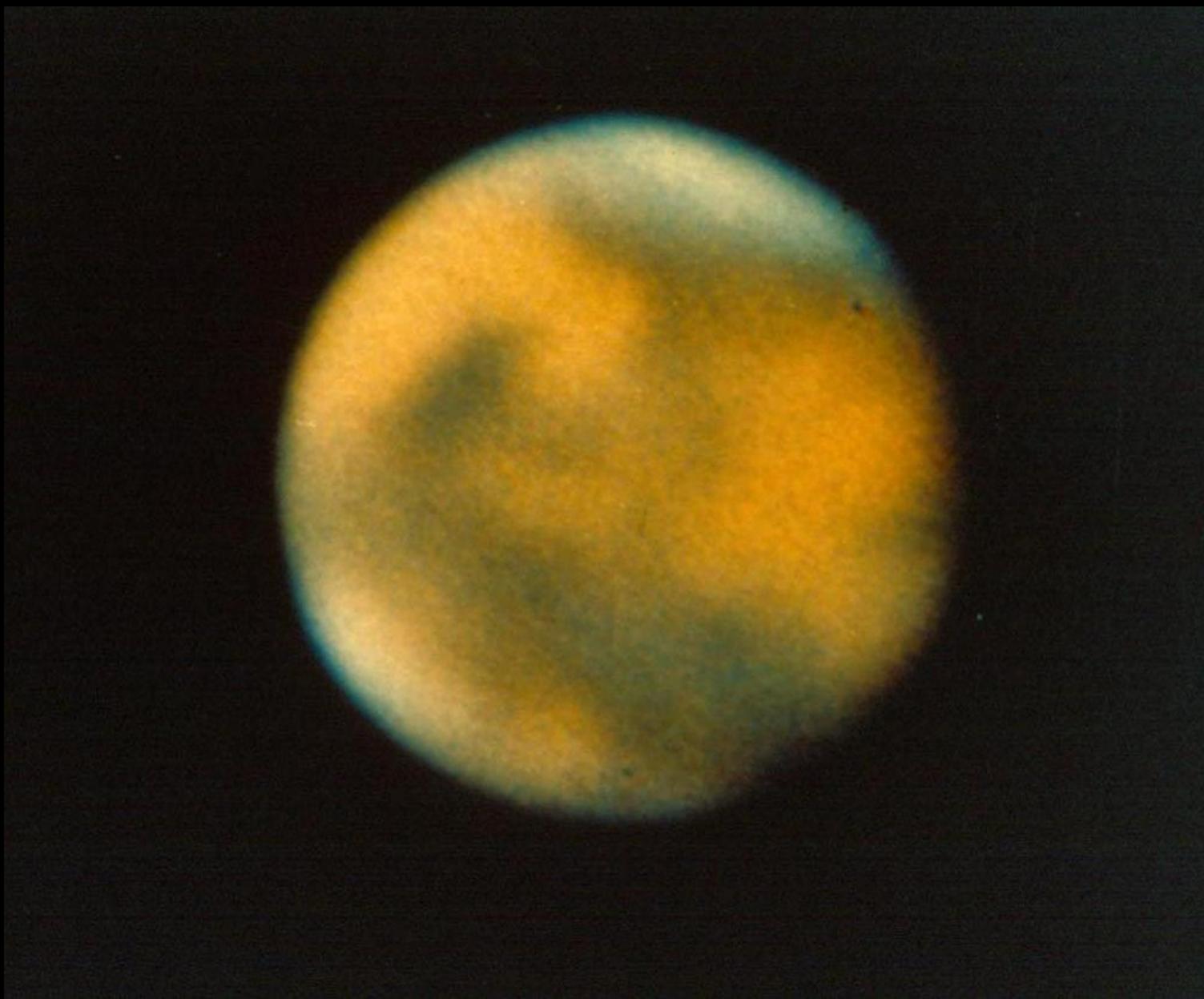


Photography

Eyes with good “seeing”



Dessin de Mars fait le 4 Juin 1888, par M. Sohiaparoli, à Milan.



Mars • 2001 Opposition



Hubble  
Heritage

NASA and The Hubble Heritage Team (STScI/AURA)  
Hubble Space Telescope WFPC2 • STScI-PRC01-24

# Global dust storms



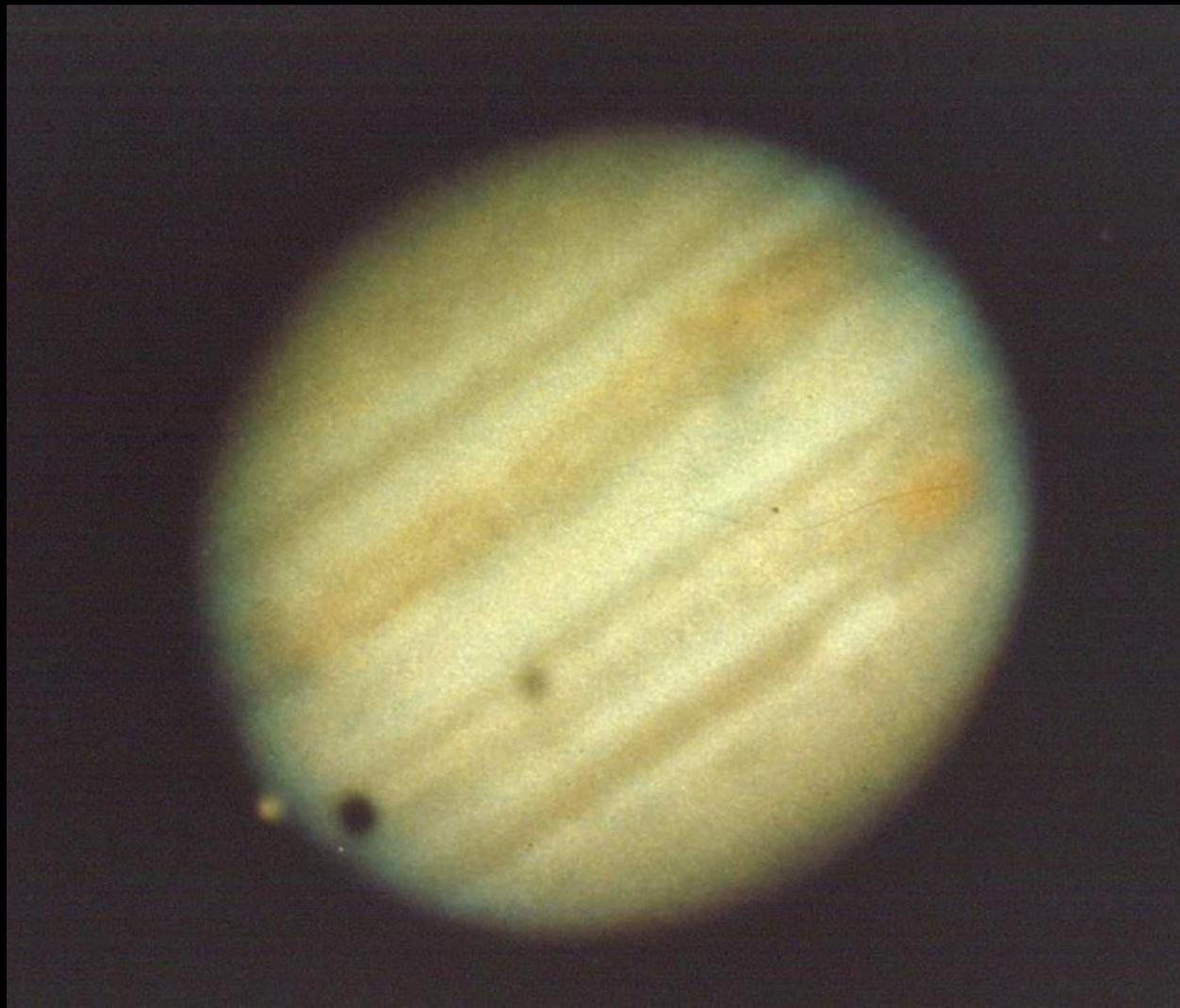
June 26, 2001



September 4, 2001

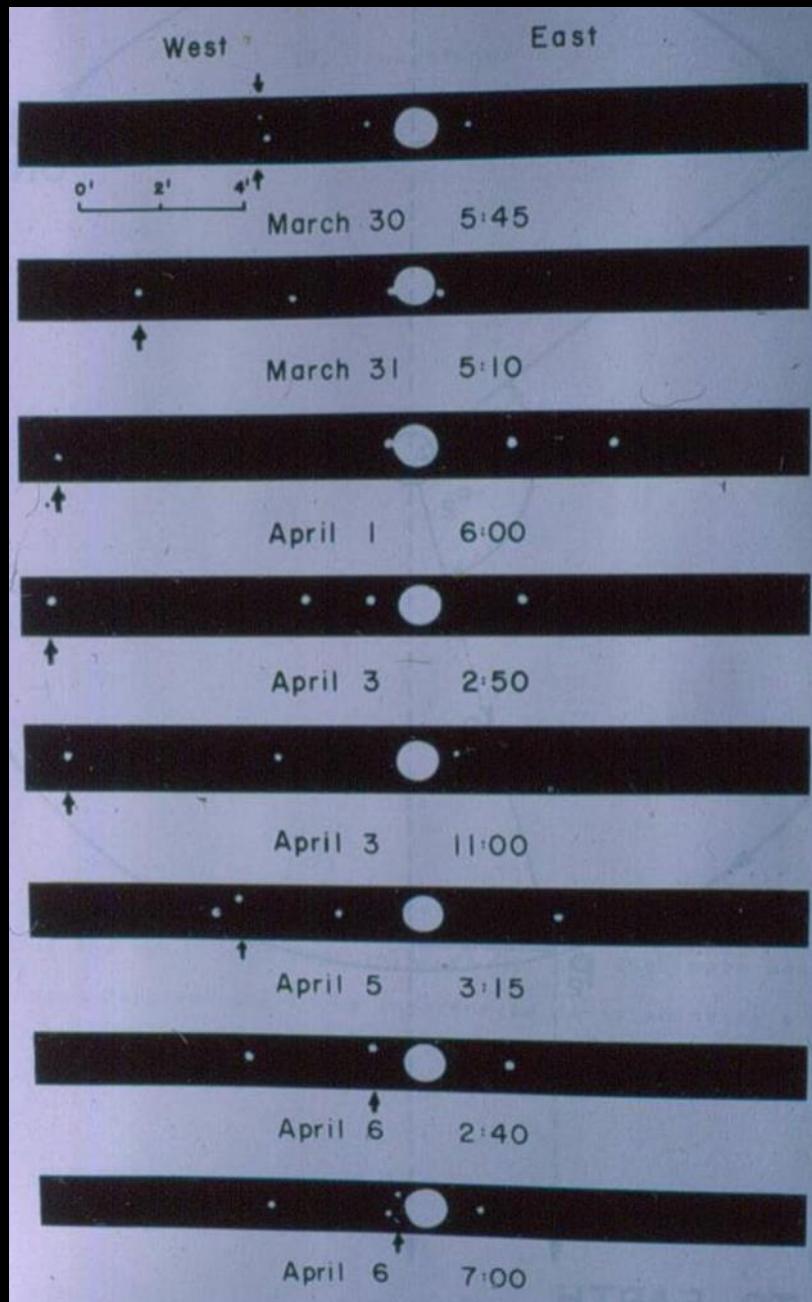
# Jupiter

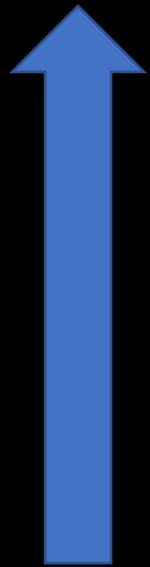




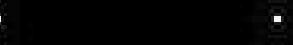
# Jupiter

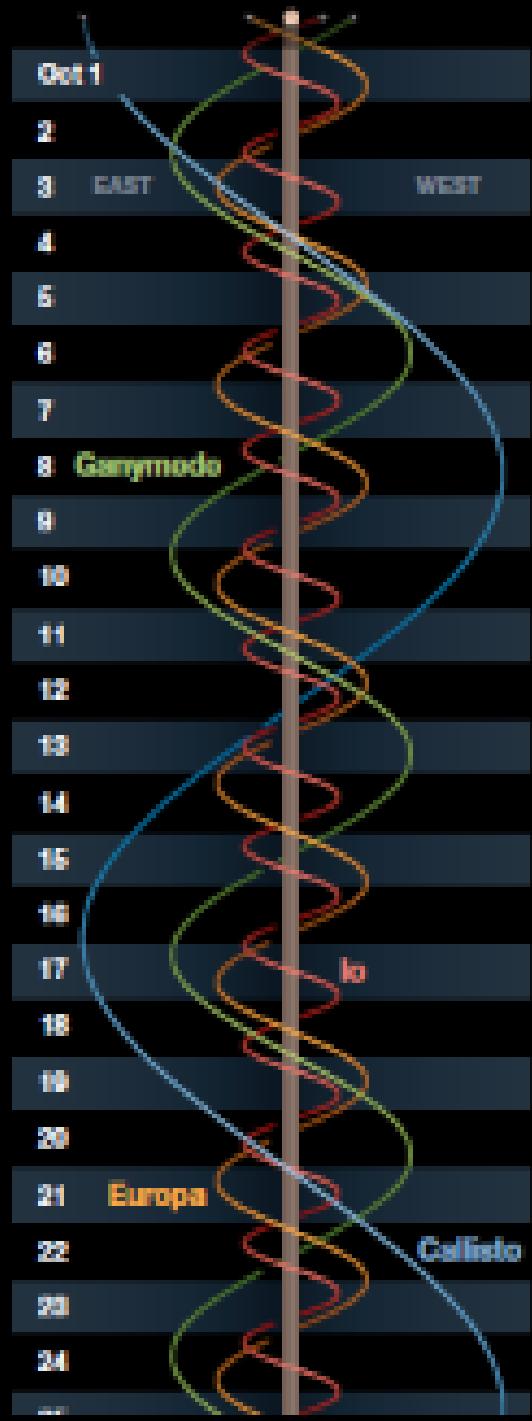






TIME





October, 2021

September 13, 2021

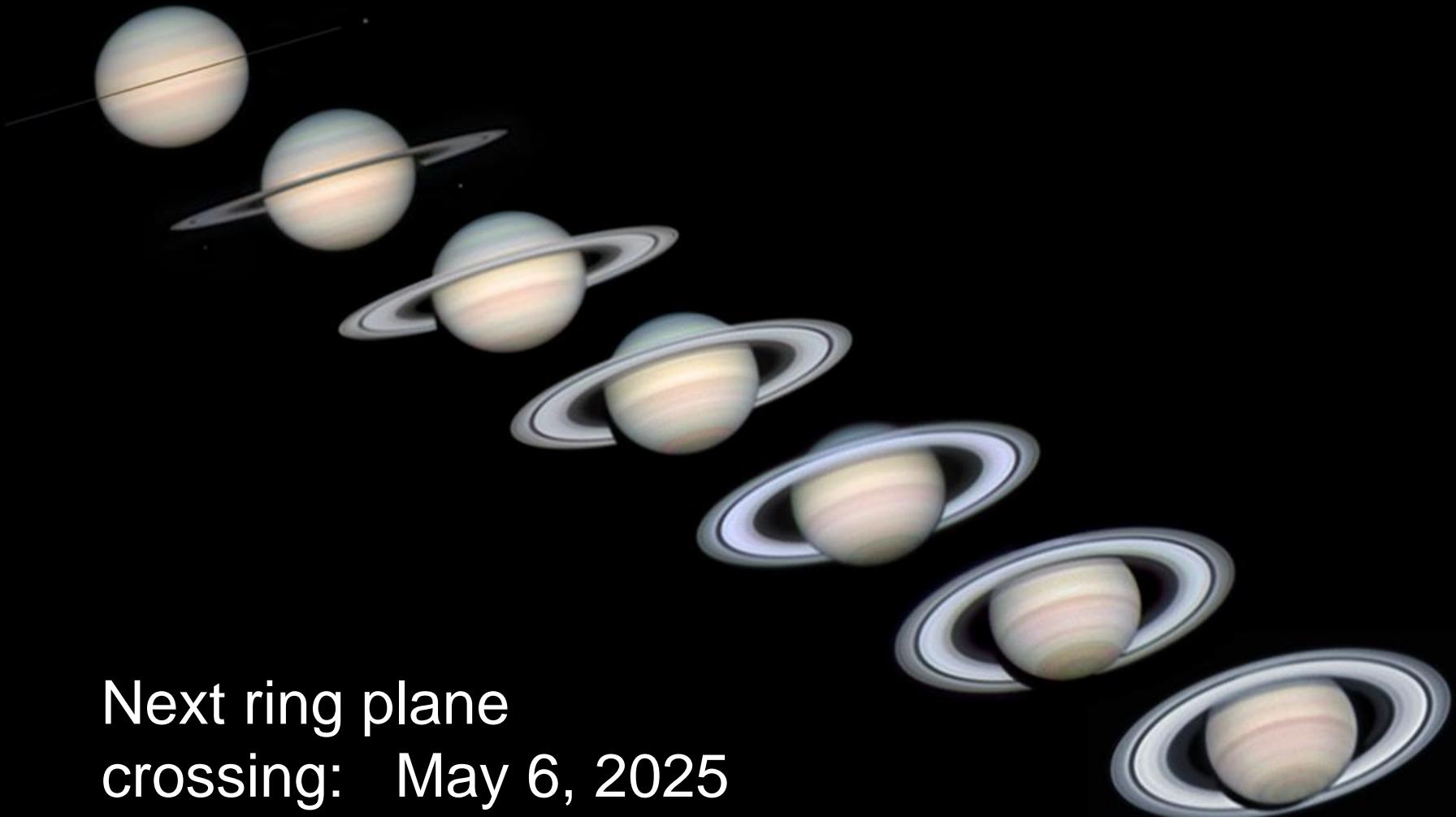


# Saturn





# Axial tilt ( $27^\circ$ )

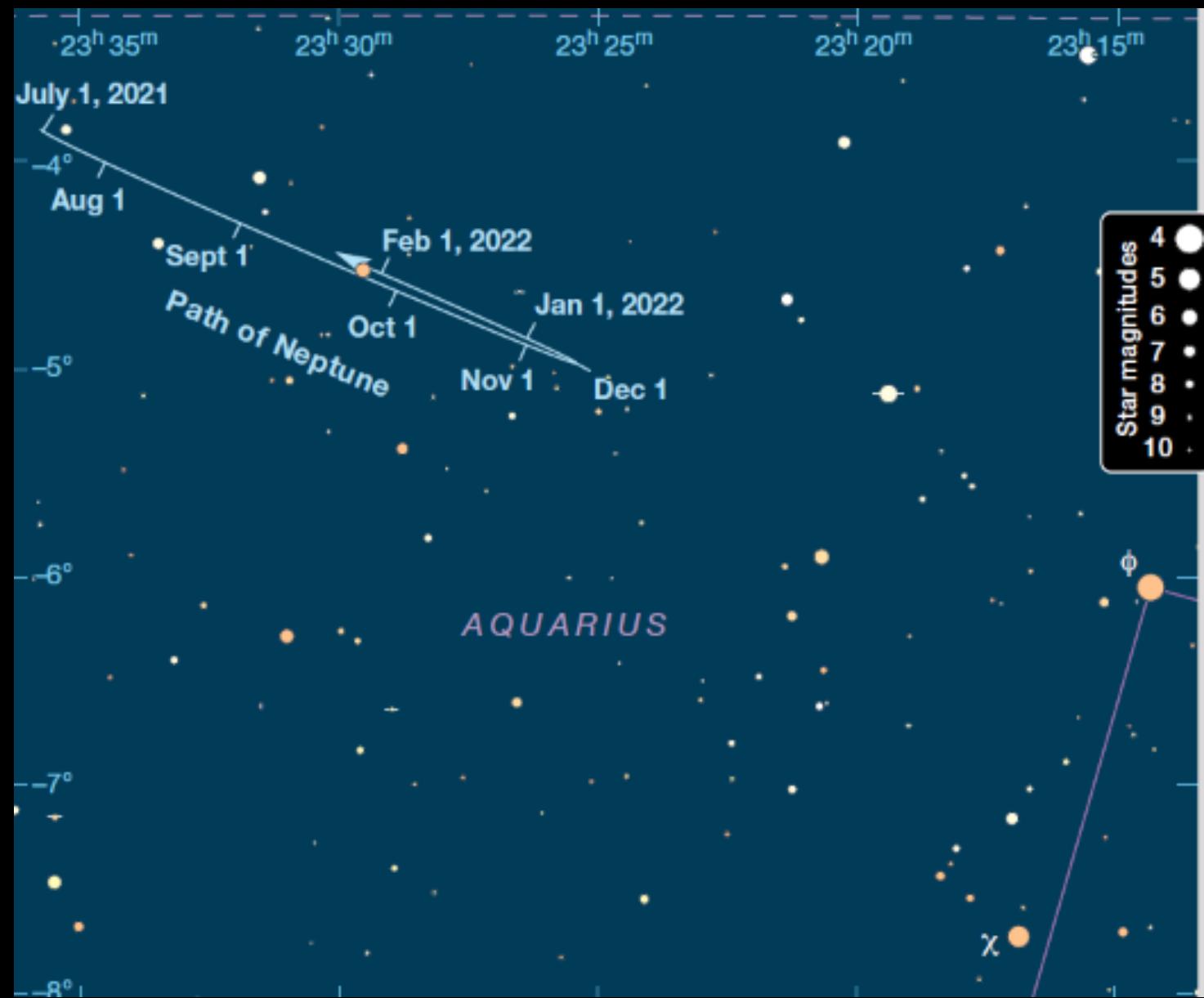


Next ring plane  
crossing: May 6, 2025



# Uranus & Neptune





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P. CLAY SHERROD

WITH THOMAS L. KOED

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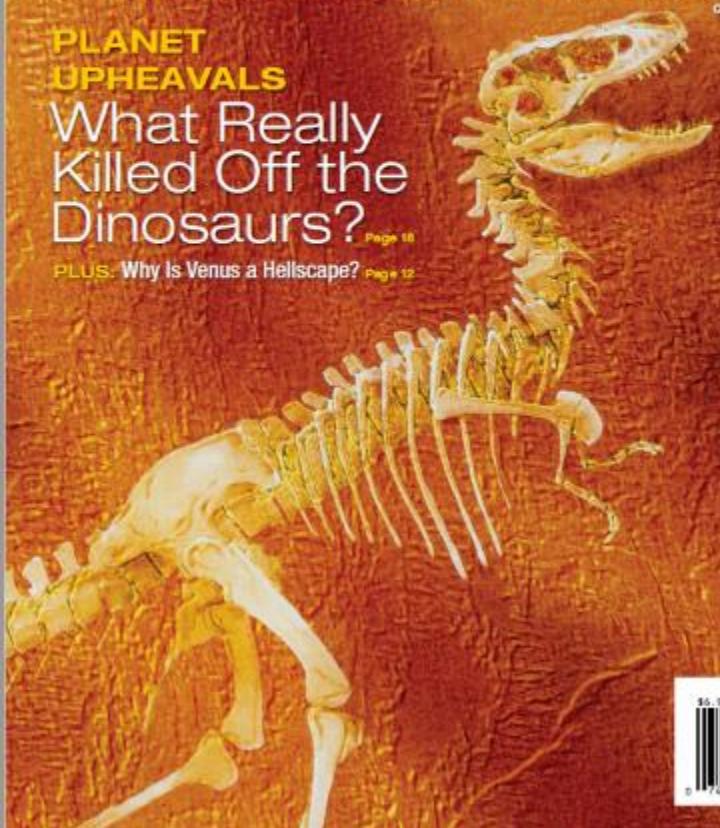
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# Abrams Planetarium *Sky Calendar*

**Evenings:** Venus, nearly at mag. -4, is bright enough to be seen in twilight quite soon after sunset. It follows the Sun over WNW horizon by only 6° south on May 1. Increasing to 14 hours at month's end, Mercury is easily, in a very brief appearance, seen fading into the westward glow of sunset. Mercury opens its morning apparition on May 13, reaching 0° declination by May 21, 10.5° by May 25, and similarly disappears from view, though dim at mag. +1.6 to +1.7, and easily seen in a dark sky. Using binoculars, track Mag. +2.0, motion of 0.6° per day as it passes by 3rd mag. stars.

In Gemini on Apr. 28-29, May 2, 9, and 23, and forms noteworthy configurations with brighter Polus (L=12) and Castor (+1.6) on May 31, and June 2.

**Mornings:** Jupiter, shining at mag. -2.2 to -2.4, rises ahead of the Sun by nearly three hours on May 1, and by more than four hours on May 31. An hour before sunup, it's the prominent "morning star" in SE, while Saturn, three mags fainter at +0.7 to +0.6, is 15°-18° to Jupiter's upper right.

**Catch a waxing crescent Moon near each evening planet in turn, on May 12 (don't miss it - look early!), May 13, and 15. Catch a waning Moon near planets at dawn on May 3-5, 31, and June 1.**

**A brief total lunar eclipse** is visible from roughly the western half of U.S. on morning of Wednesday, May 26, from 4:11 a.m. until 4:26 a.m. PDT. Folks in northeastern U.S. miss out completely as Moon sets even before it begins to enter Earth's shadow. Details with links to more eclipse info are given on our Extra Content Page, [abramspaceplanetarium.org/eclipse](#).

You'll also find mention of conjunctions of Jupiter and Saturn with background stars to help you track their impending retrograde motions, and notes on May's rare events involving Jupiter's moons, and on the 3-0 aspect of Saturn's rings.

**Planetarium business office:**  
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<http://abramsplanetarium.org/>

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**SKY CALENDAR MAY 2021**

## An aid to enjoying the changing sky

Use this scale to measure angular distances between objects on diagrams below.



SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
May 1-5, 1½ hours before sunset	Alpha Cap Beta Cap CAPRICORNUS	Sat 1 Sunday 2 Sat 1 SAGITTARIUS	Sat May 1, 30 minutes after sunset	Mon May 3	Tues May 4, 30 minutes after sunset	PISCES
AQUARIUS	Theta Jupiter Delta Cap Iota Tues 4	Serum Men 3 Territory of Dogs	TAURUS Aldebaran Me-Ve 5.2° Mercury + Venus *	TAURUS Aldebaran Me-Ve 20° Mercury + Venus *	PEGASUS	TAURUS Me-Ve 8.6° Mercury + Aldebaran + Plates
Wed 5	Eta Aquarid meteor shower May 5 and 6, before morning twilight begins	SE	SSE	S	Fri 7	Thurs 8
Tuesday, May 11 New Moon 12:00 noon PDT (2:00 p.m. EDT)	Mars	Wed May 12, 40 minutes after sunset	GEMINI	Thurs May 13, 40 minutes after sunset	Fri May 14, 40 minutes after sunset	Mars + Moon
Most distant Moon of year, 262,505 miles from Earth at 3 p.m. PDT (8 p.m. EDT)	GEMINI	BetaTauri	Mars	GEMINI	Mars	GEMINI
Orion's belt W	Betelgeuse ORION	Mo-Ve 9.2° (max dist) TAURUS	Mercury + Young Moon	BetaTauri	Moon	Mars, 12° from "Twin" and Pollux; Castor above Mars and not shown, forming isosceles triangle
Kappa Geminorum	PoBox Castor	Aldebaran *	Betelgeuse ORION	Taurus Mercury + Moon	BetaTauri	Taurus Mercury + Venus
Mercury at greatest elongation, 22° from Sun. Last time since 1987. 8.7° lower right of Mercury. Mars still forms nearly isosceles triangle with "Twins". BetaTauri	GEMINI	WNV	Orion's belt W	Orion's belt W	Orion's belt W	Orion's belt W
Sunday May 16, 1½ hours after sunset	Mars	Capella	Mon May 12, 45 minutes after sunset	Capella	May 18-20, 1½ hours after sunset	May 22 and 23, 1½ hours after sunset
Deepest lunar eclipse, as seen from Palm Springs, CA, Wed, May 26, 4:19 a.m. PDT.	AURIGA	BetaTauri	AURIGA	Denebola	Fri May 21, 45 min after sunset	Mon May 24, 45 min after sunset
Antares	Jupiter in SE	Saturn Theta in SSE	Mercury	LEO	Mo-Ve 6.5° Mercury + Beta Tauri	Mo-Ve 4.2° Mercury +
SCORPIUS	Iota Aqr	Delta Cap	Mo-Ve 8.4°	Thurs 20	Venus	Venus
Tues 1	Zeta	Mon 31	Wed, May 19 First Quarter 3:13 p.m. EDT	Wed 19	Weds 21-22	Weds 26-27
7 p.m. PDT/10 p.m. EDT	CAPRICORNUS	Alpha Cap Beta Cap	Regulus well up in SW to SSW	Regulus well up in SW to SSW	Set 22	Set 23
Moon at perigee, 222,023 miles from Earth, 2nd closest Moon of year. Compare Dec. 4.	Saturn	Sunday 30	Wind May 26 "Supermoon, Rusty" Full Moon, 6:16 a.m. PDT, 7:14 a.m. EDT, Closest FM of year	Sagittarius	Spica well up in SSE to S	Spica well up in SSE to S
SSW	Theta Cap	Mon 31	Sat 29 In South	Fri 28	May 27-June 1, 1½ hours before sunrise	May 28-29, 45 min after sunset
SW	Tau	Territory of Dogs	Sat 29 In South	Fri 28	Fridays 27	Mon May 31, one hour after sunset
Tues 25	Full	Sun 30	Sat 29 In South	Fri 28	Antares low in SW	Polux
SCORPIUS	Antares	Sagittarius	Sat 29 In South	Fri 28	Venus	Mars
7 p.m. PDT/10 p.m. EDT	Antares	Antares	Sat 29 In South	Fri 28	Mars	Castor
Moon 5.3° S of Pollux (min dist), Venus near Mer	Antares	Antares	Sat 29 In South	Fri 28	Procyon	GEMINI
Wind May 25 "Supemoon"	SCORPIUS	Antares	Sat 29 In South	Fri 28	Mars 5.3° S of Pollux (min dist), Venus near Mer	SCORPIUS
Moon at perigee, 222,023 miles from Earth, 2nd closest Moon of year. Compare Dec. 4.	Antares	Antares	Sat 29 In South	Fri 28	Venus	SCORPIUS

John S. French, Robert C. Victor  
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# Abrams Planetarium Sky Calendar

