



# The Planets and how to see them

OLLI Week #4

Tonight 7pm SW

Venus

Moon (x4)

SW



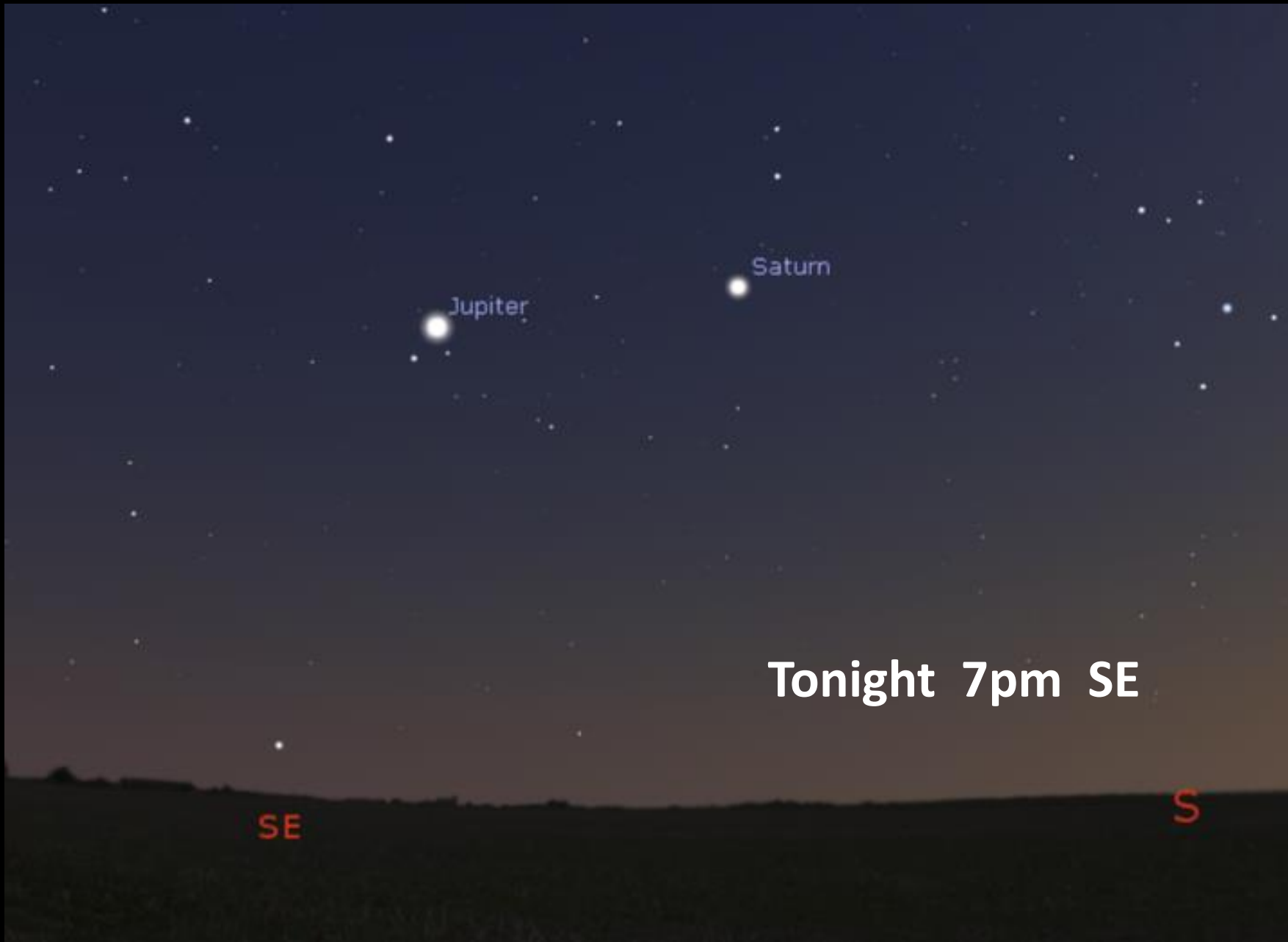
Jupiter

Saturn

Tonight 7pm SE

SE

S





“Planetes” (Greek) = “wanderer”

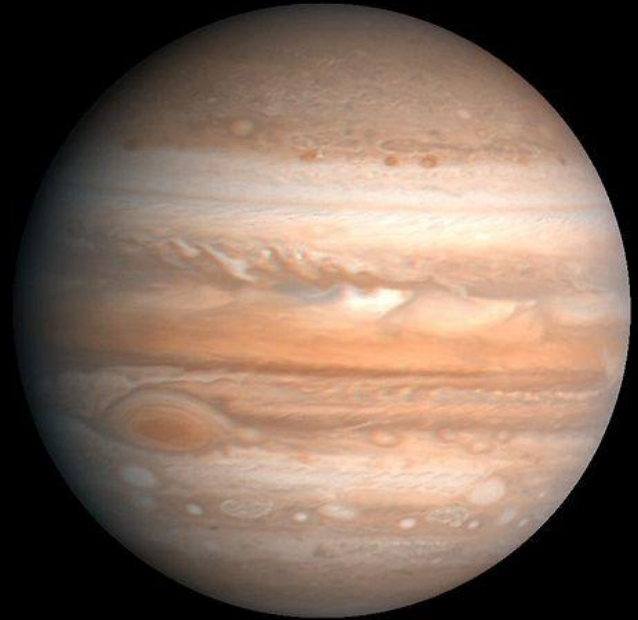


# 7 wanderers!

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)

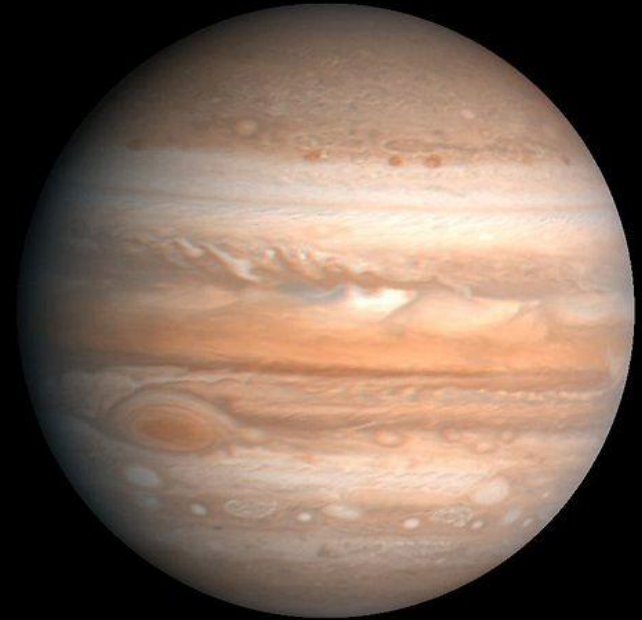


\* as of Nov. 2020

\*\* as of Aug. 2021

# *Inventory . . .*

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

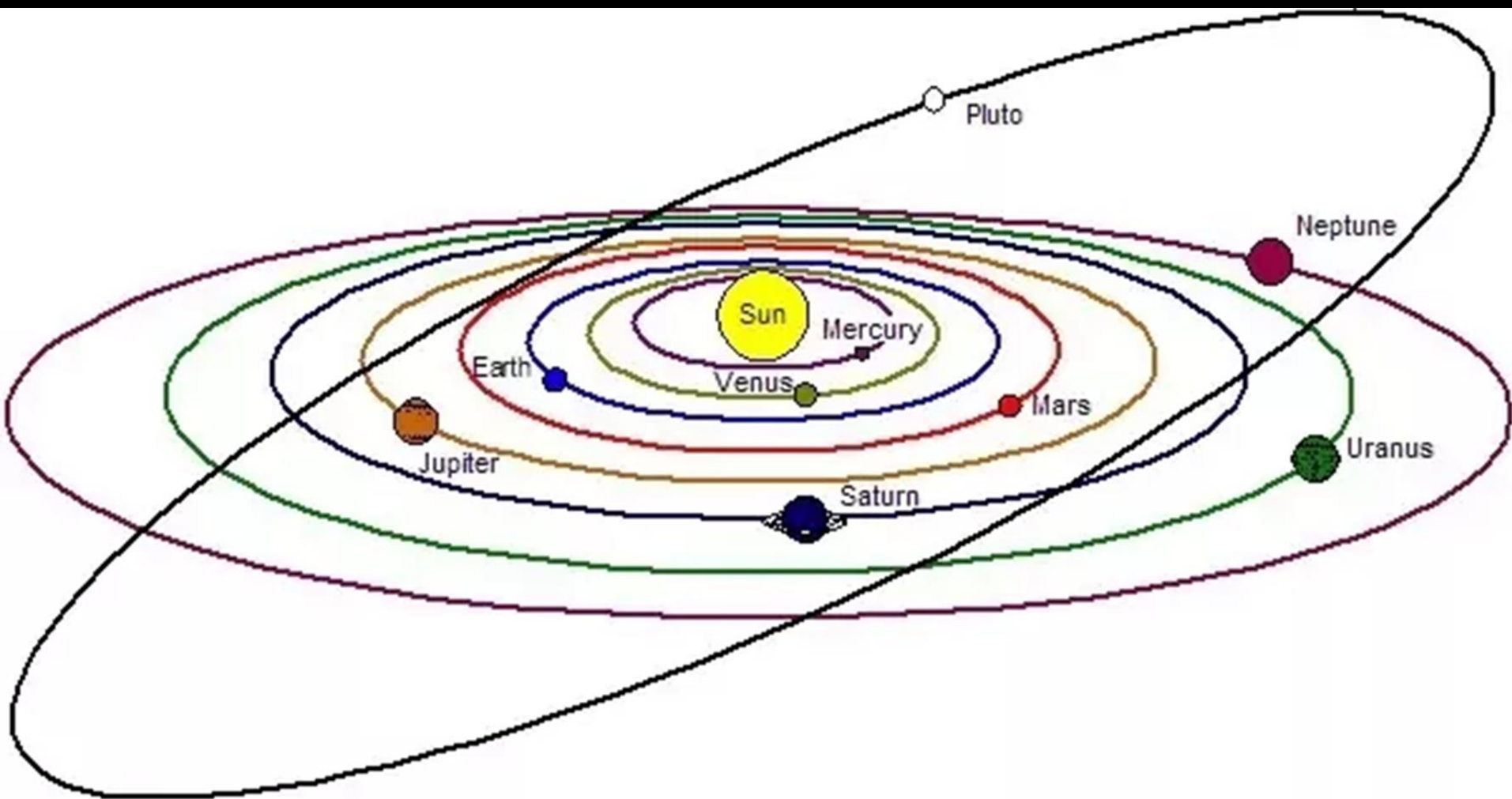


**Question . . . .*why* do this? Is it worth the money?**

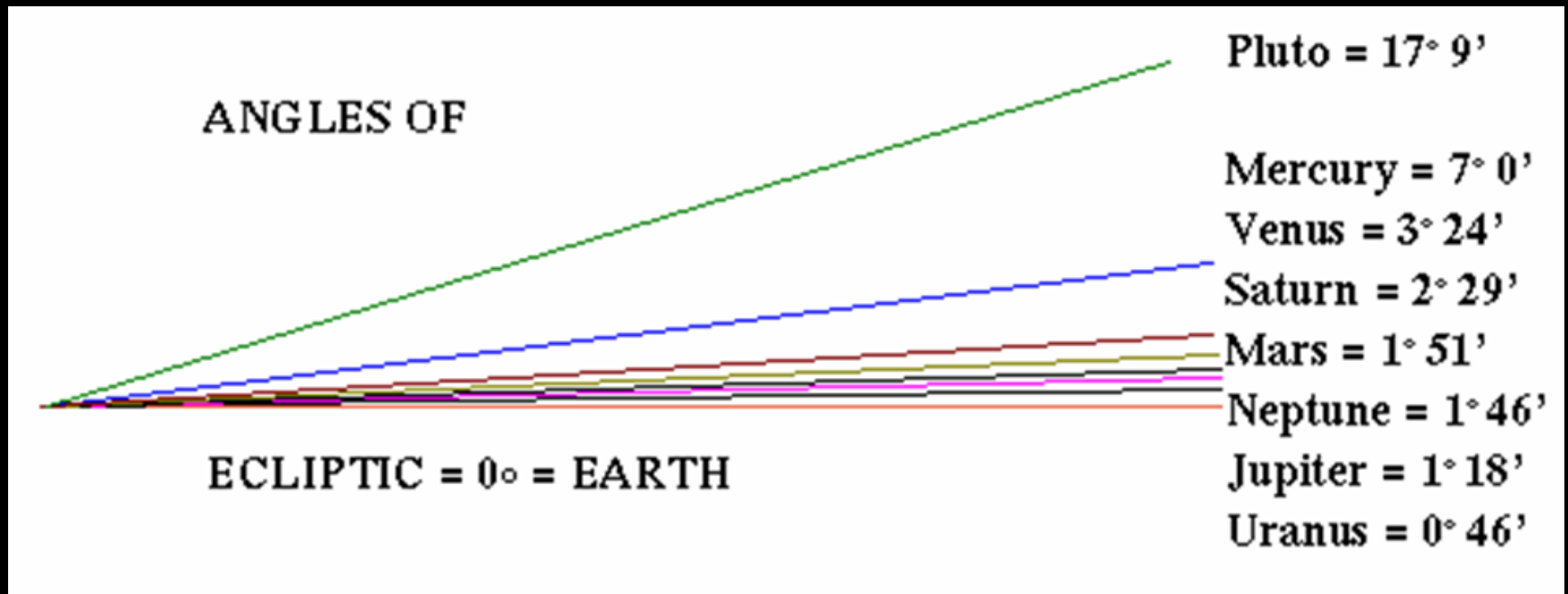
# Number of major planets . . .

- *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



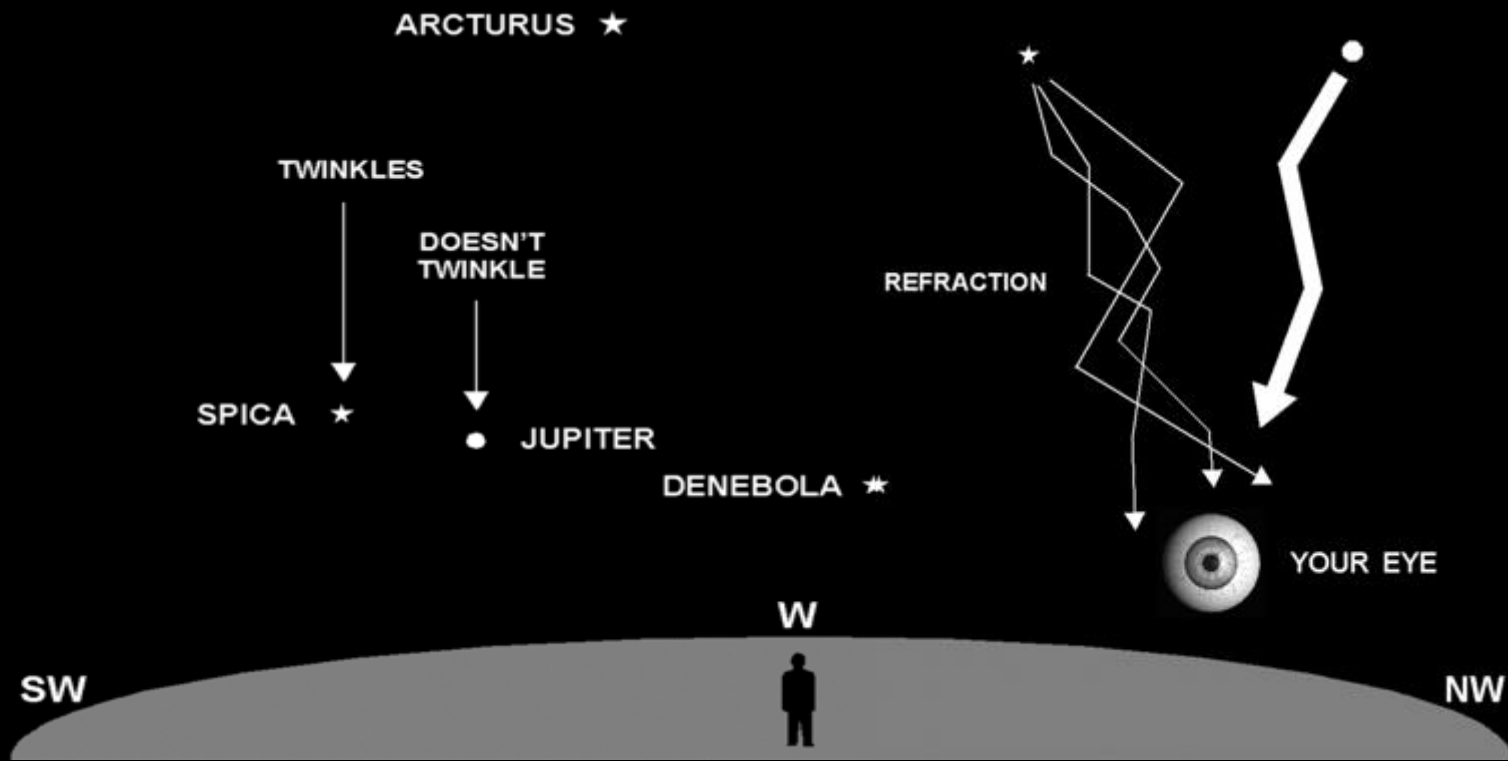
Jupiter

Moon (x4)

Saturn

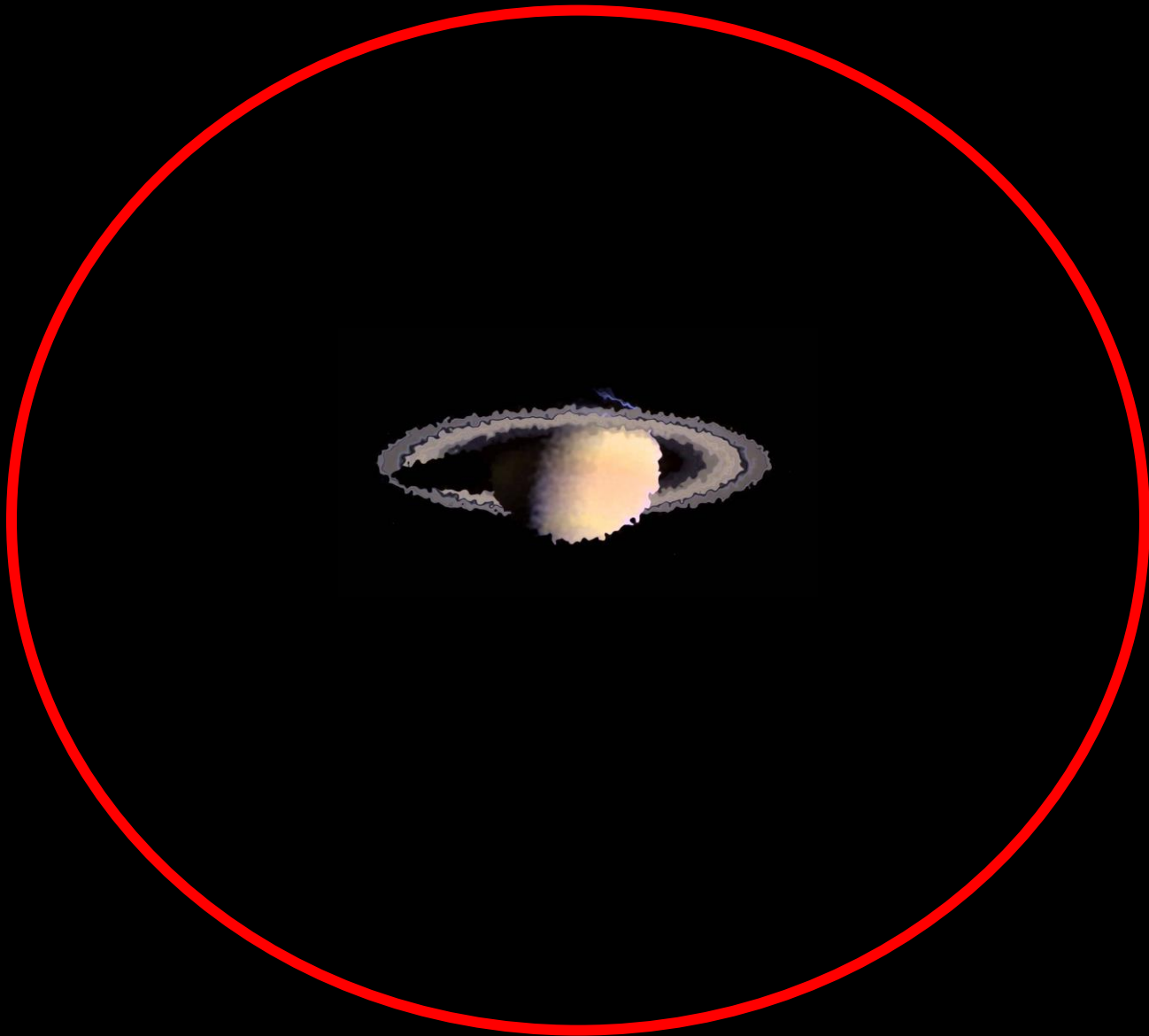
S

# Planets don't twinkle!

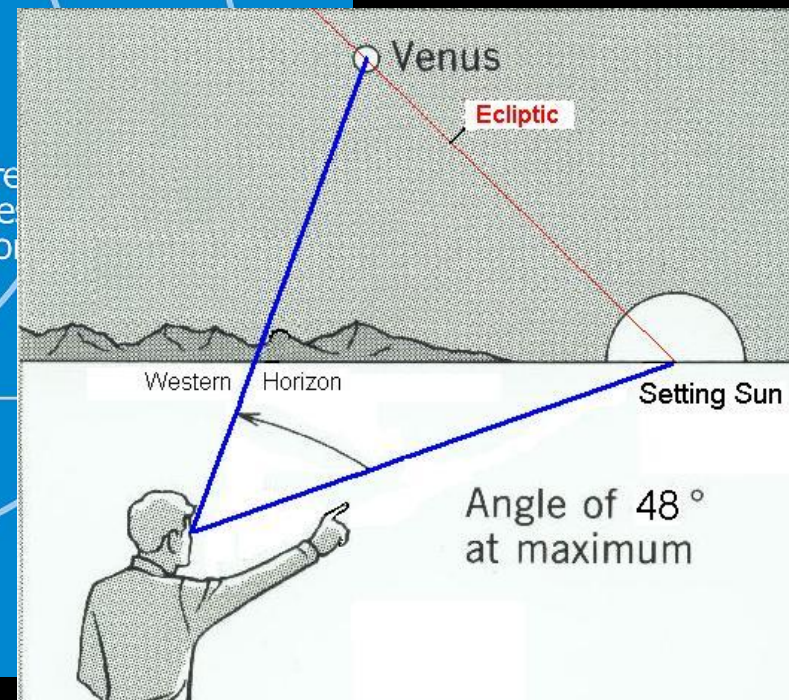
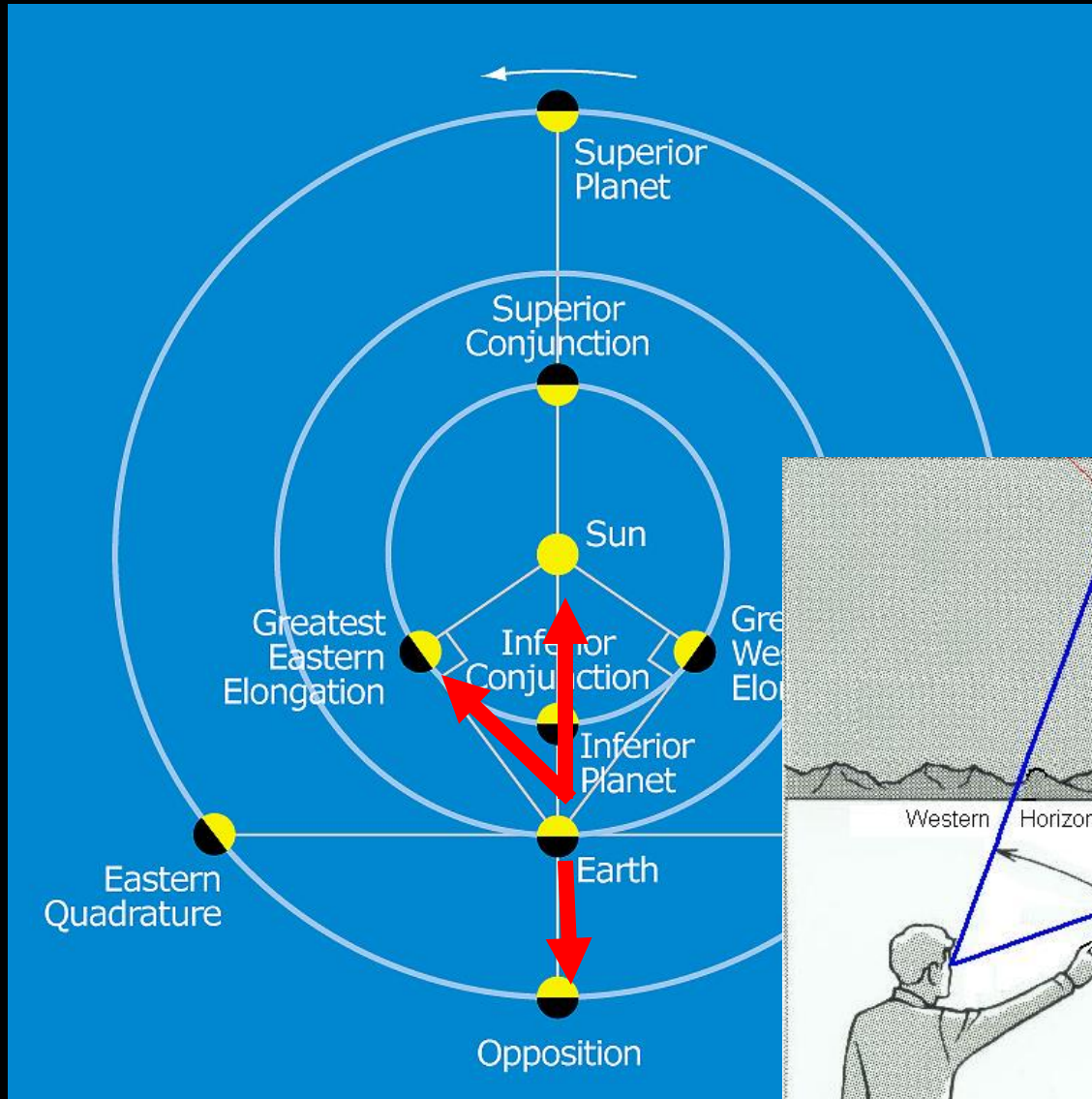




“Seeing” – state of the Earth’s atmosphere



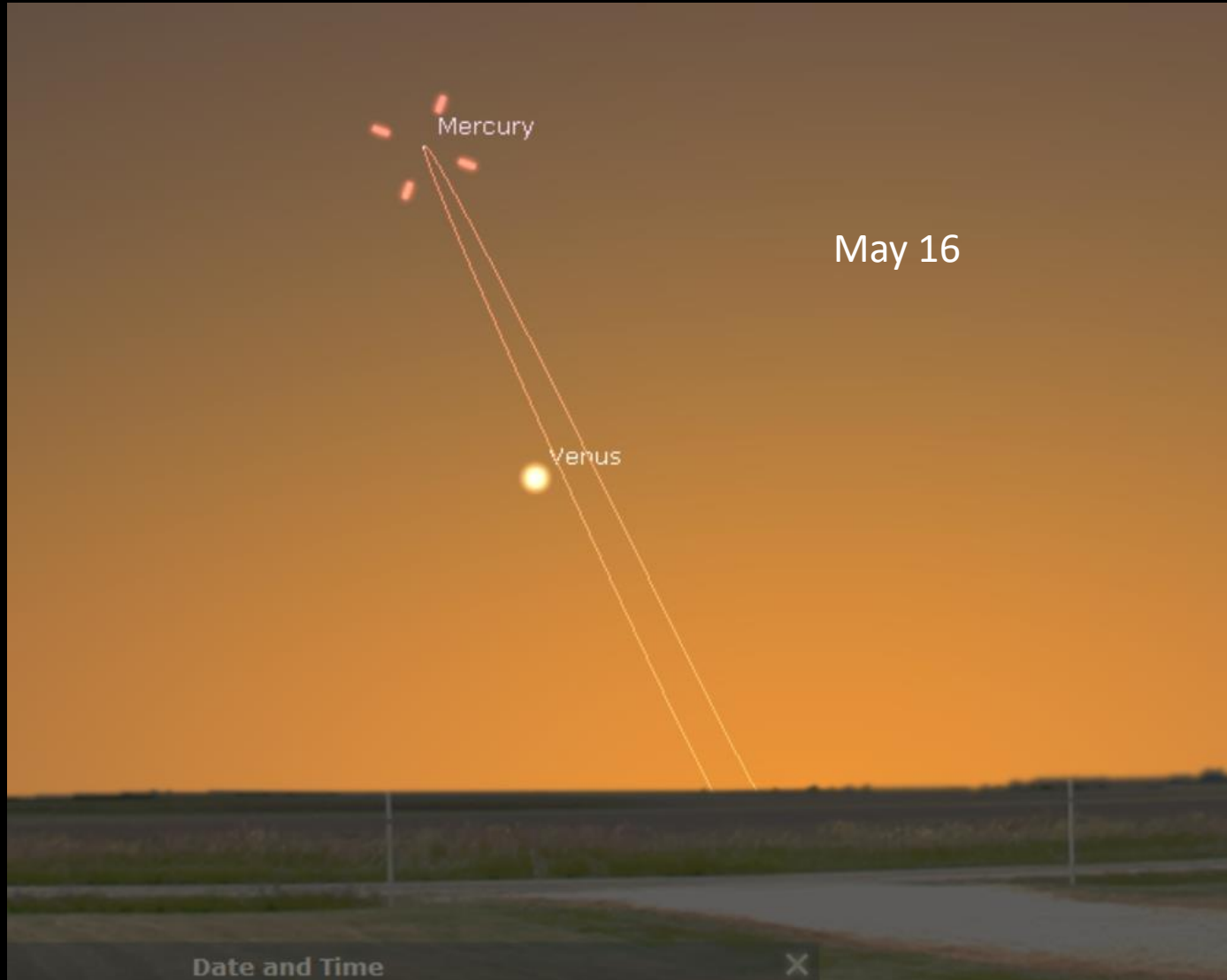
# Planetary configurations



# 2021 dates

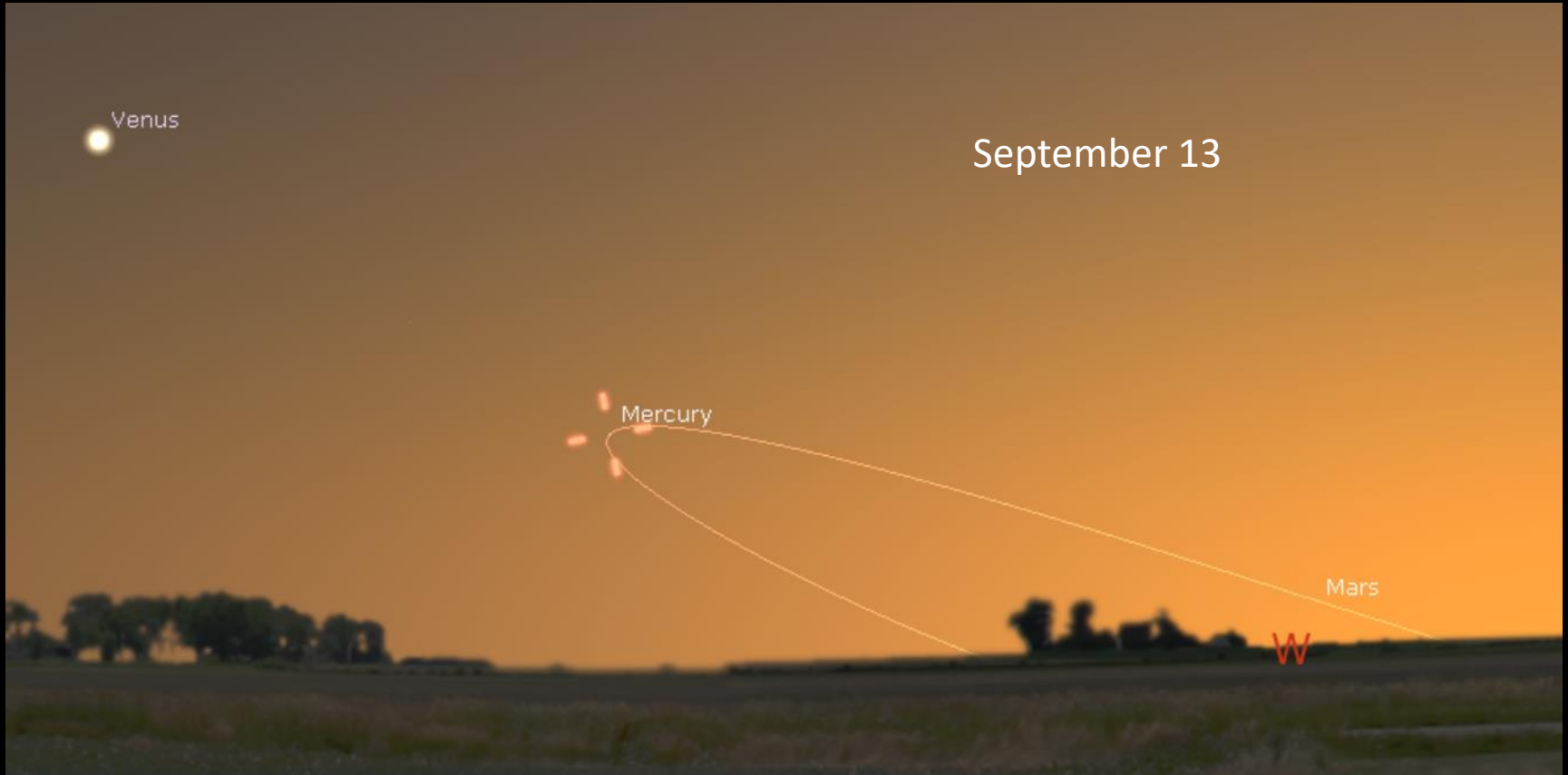
- Mercury eve elongation – January 23
  - Mercury morn elongation – March 6 (bad)
  - Mercury eve elongation – May 16
  - Mercury morn elongation – July 4
  - Saturn opposition – August 2
  - Jupiter opposition – August 19
  - Mercury eve elongation – September 13 (bad)
  - Neptune opposition – September 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 40°N 2021

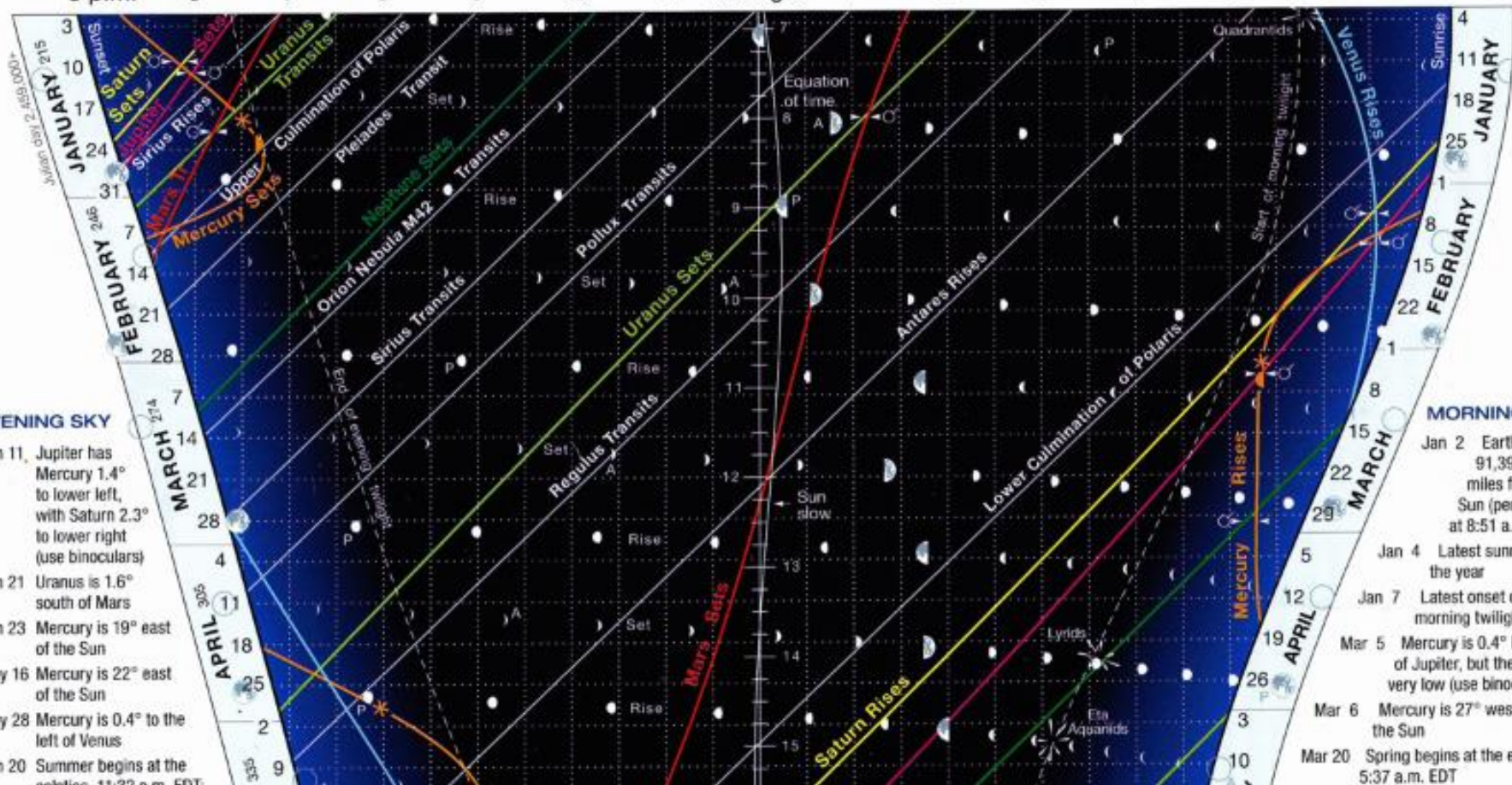
FOR LATITUDES NEAR 40° NORTH

EVENING

A SUPPLEMENT TO SKY & TELESCOPE

MORNING

5 p.m. 6 7 8 9 10 11 Midnight 1 2 3 4 5 6 7 a.m.



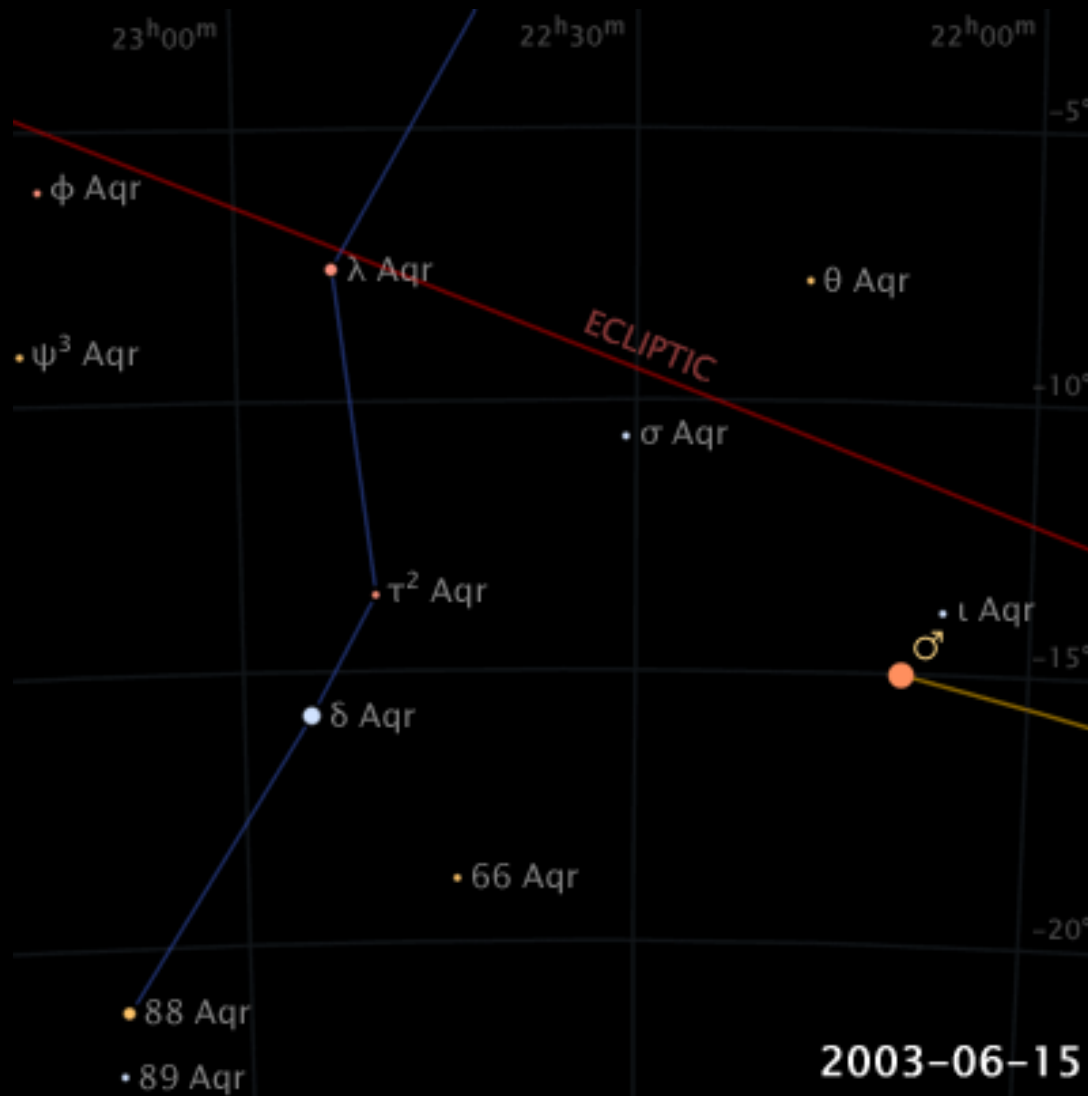
## EVENING SKY

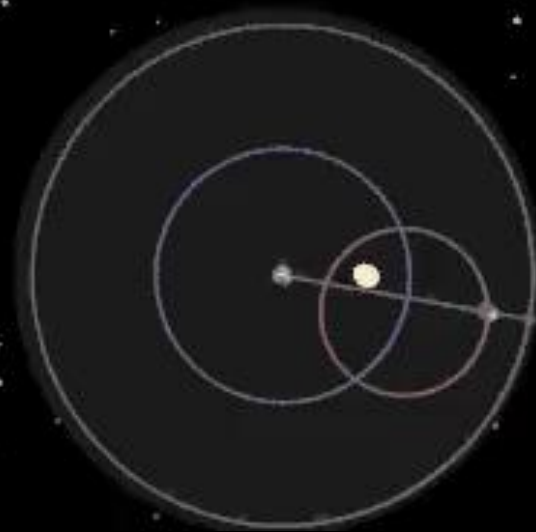
- Jan 11, Jupiter has Mercury 1.4° to lower left, with Saturn 2.3° to lower right (use binoculars)
- Jan 21 Uranus is 1.6° south of Mars
- Jan 23 Mercury is 19° east of the Sun
- May 16 Mercury is 22° east of the Sun
- May 28 Mercury is 0.4° to the left of Venus
- Jun 20 Summer begins at the equinox, 11:23 a.m. EDT

## MORNING SKY

- Jan 2 Earth is 91,399,454 miles from the Sun (perihelion) at 8:51 a.m. EST
- Jan 4 Latest sunrise of the year
- Jan 7 Latest onset of morning twilight
- Mar 5 Mercury is 0.4° left of Jupiter, but they are very low (use binoculars)
- Mar 6 Mercury is 27° west of the Sun
- Mar 20 Spring begins at the equinox, 5:37 a.m. EDT

# Outer planet motion . . . Retrograde motion





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



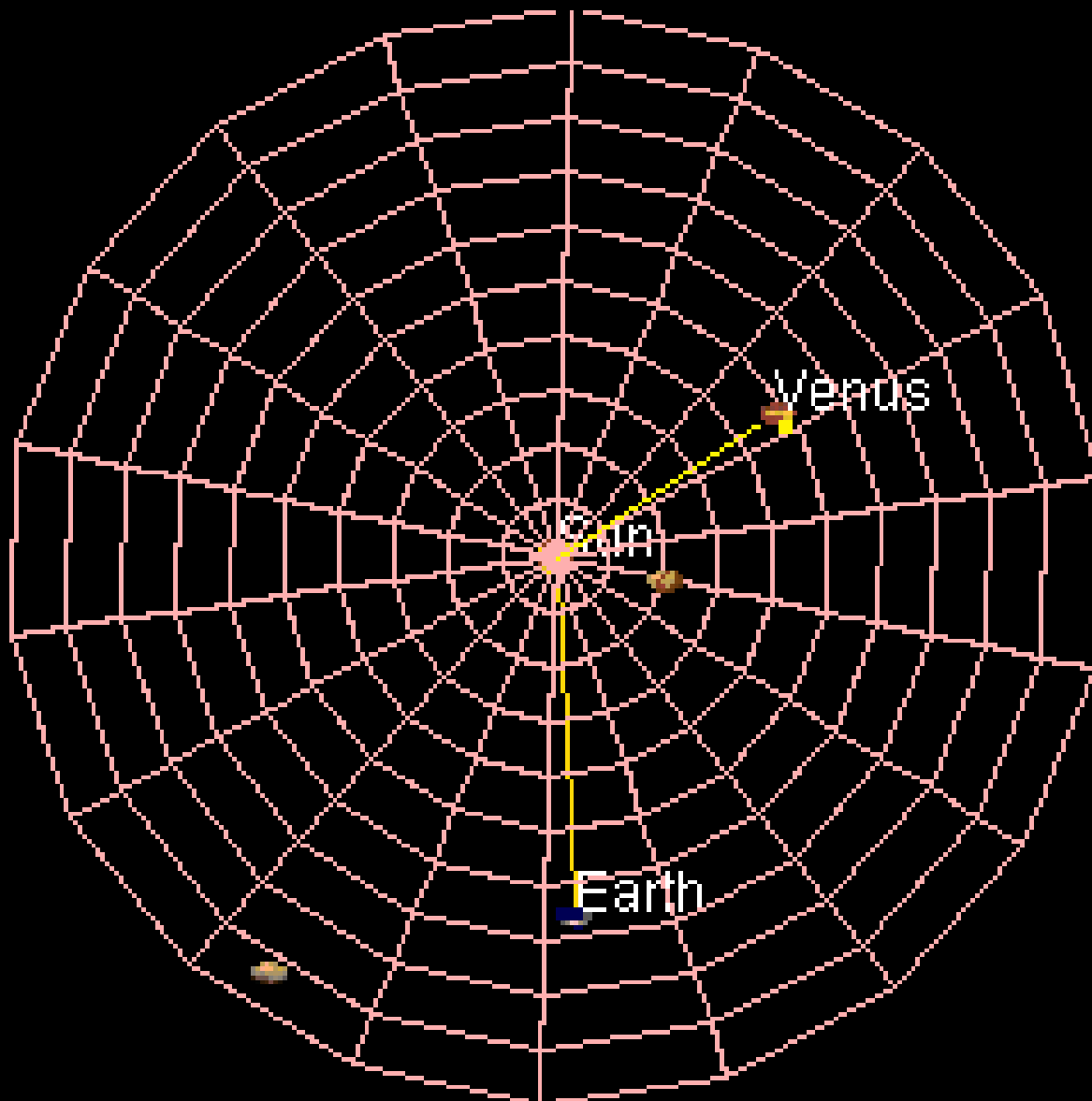


# Angular Sizes

- 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"



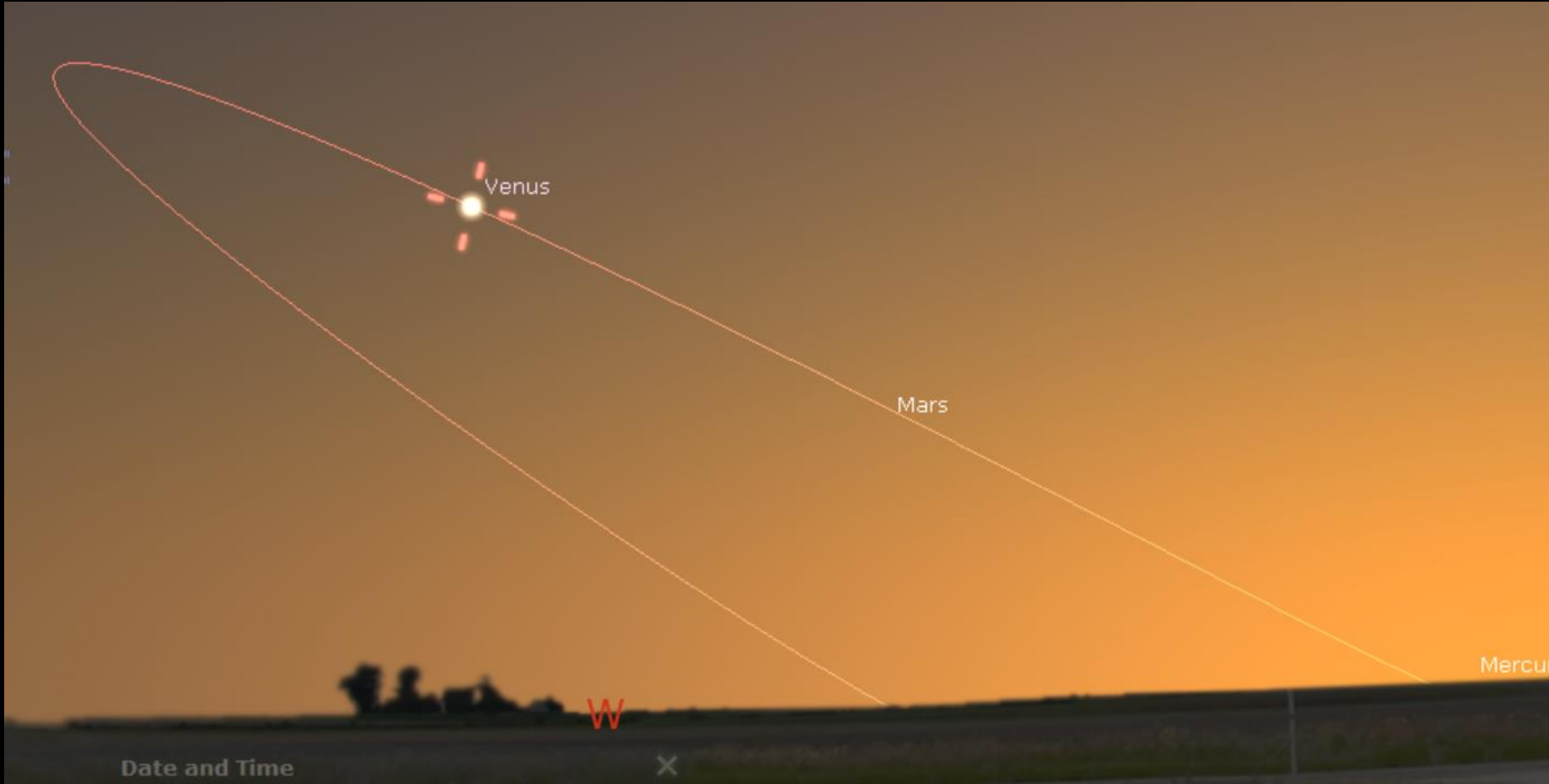
# Venus





# Venus





Venus

Mars

Mercury

W

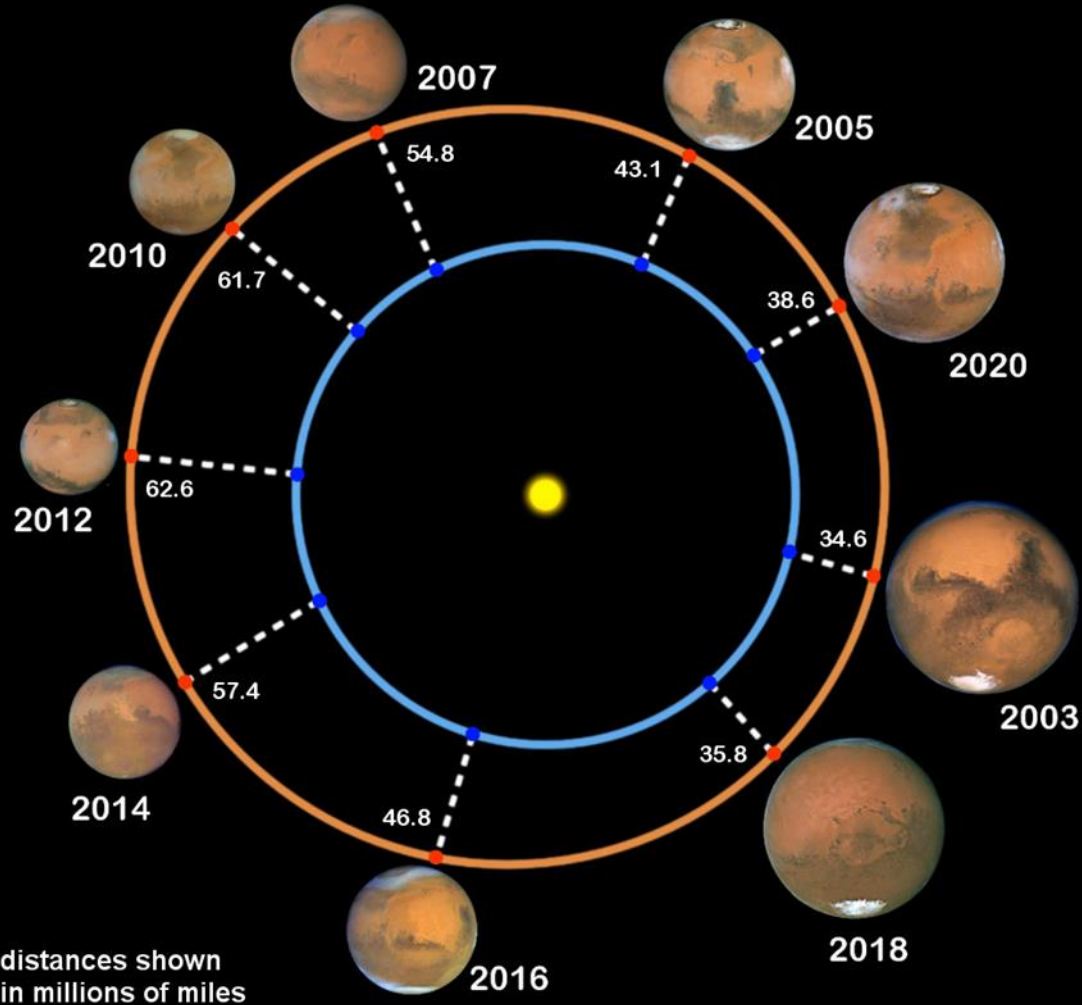
x

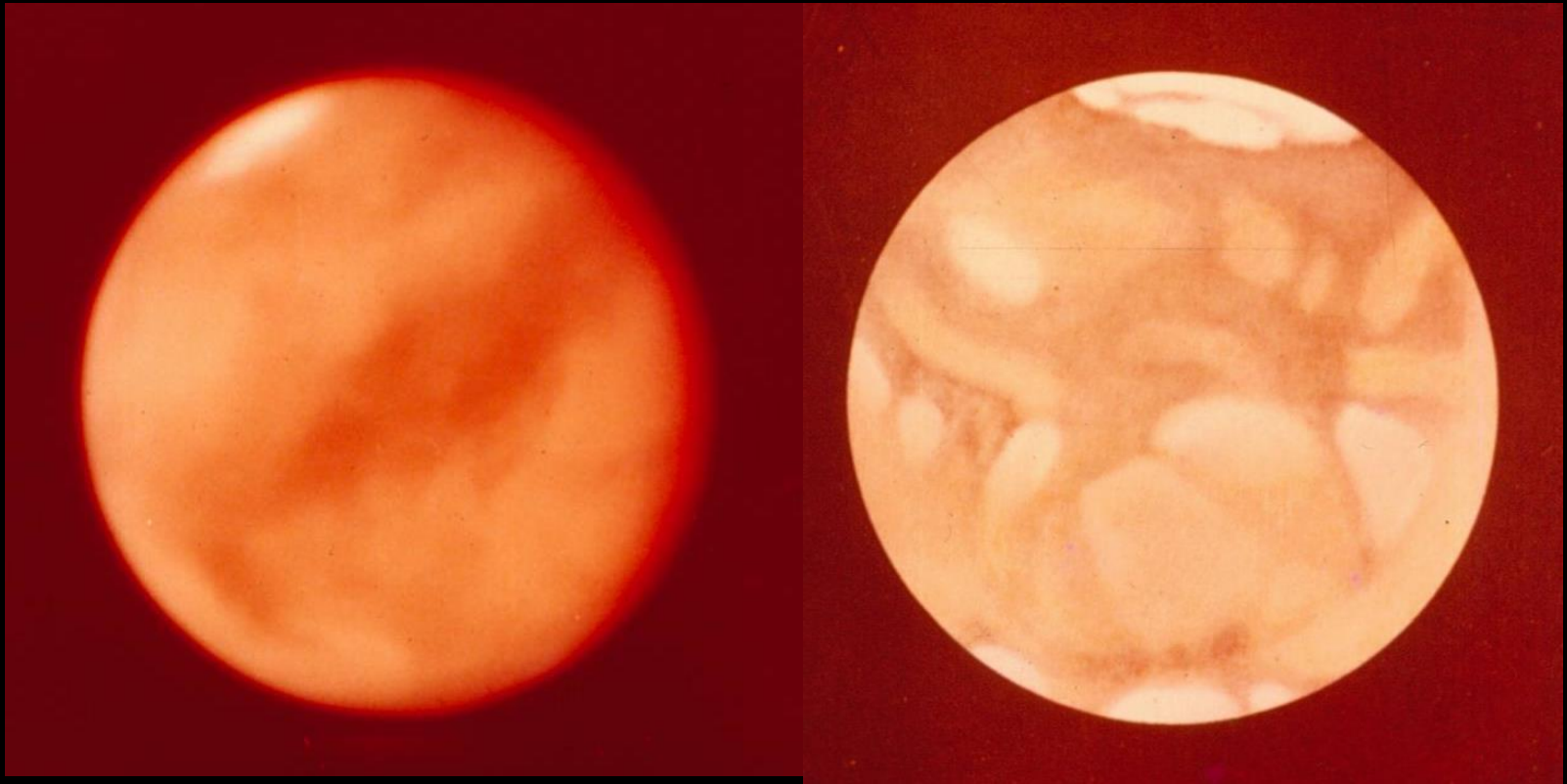
Date and Time



# Mars

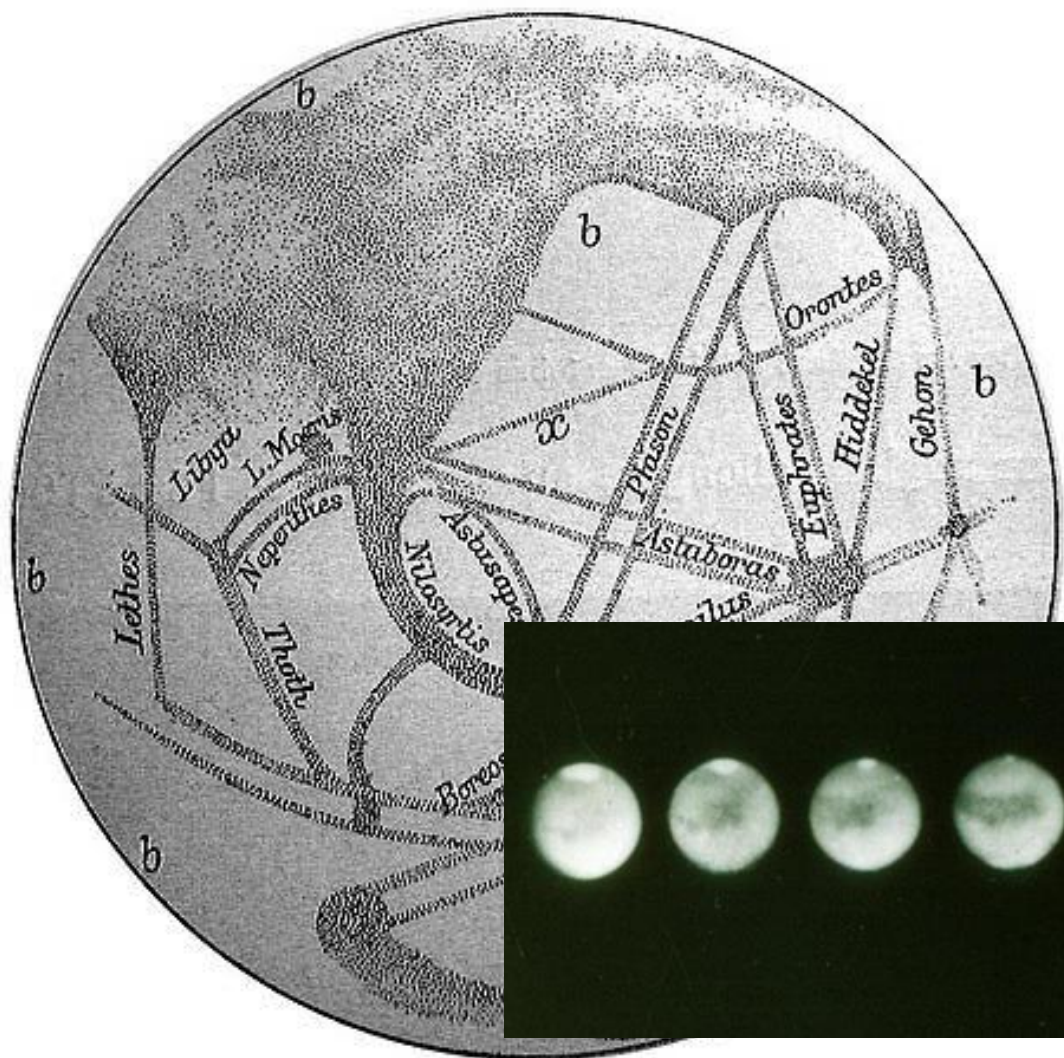
## Mars Oppositions 2003 - 2020





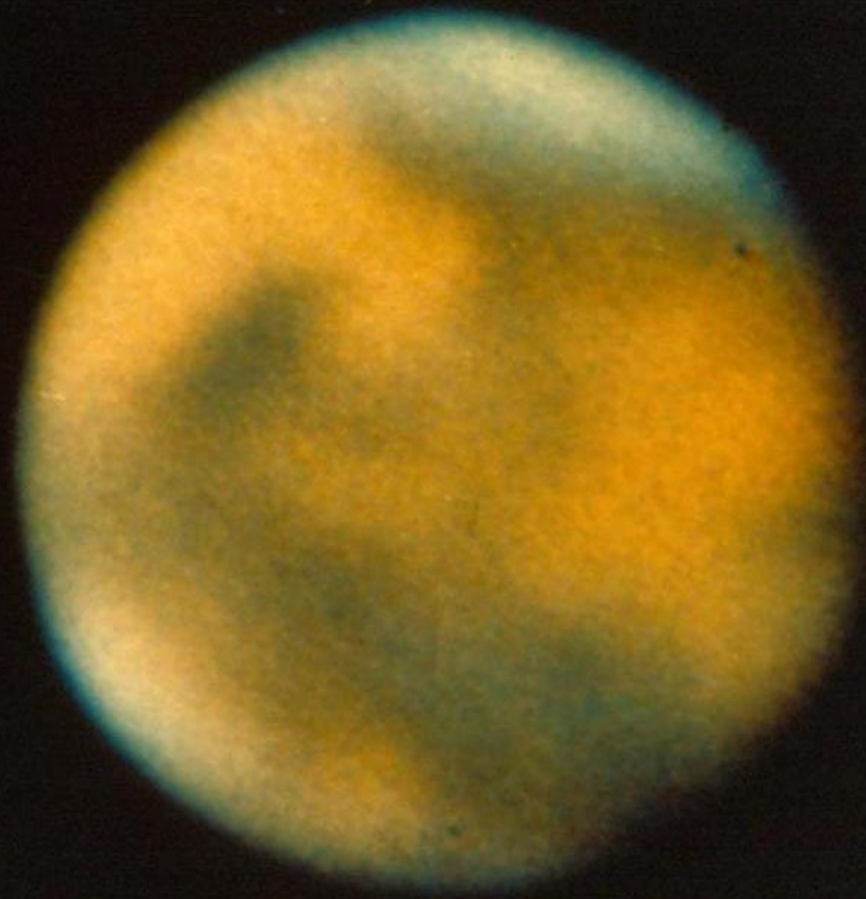
Photography

Eyes with good “seeing”



Dessin de Mars fait le 4 juin 1888, par M. Schiaparelli, à Milan.





Mars • 2001 Opposition



Hubble  
Heritage

# Global dust storms



June 26, 2001

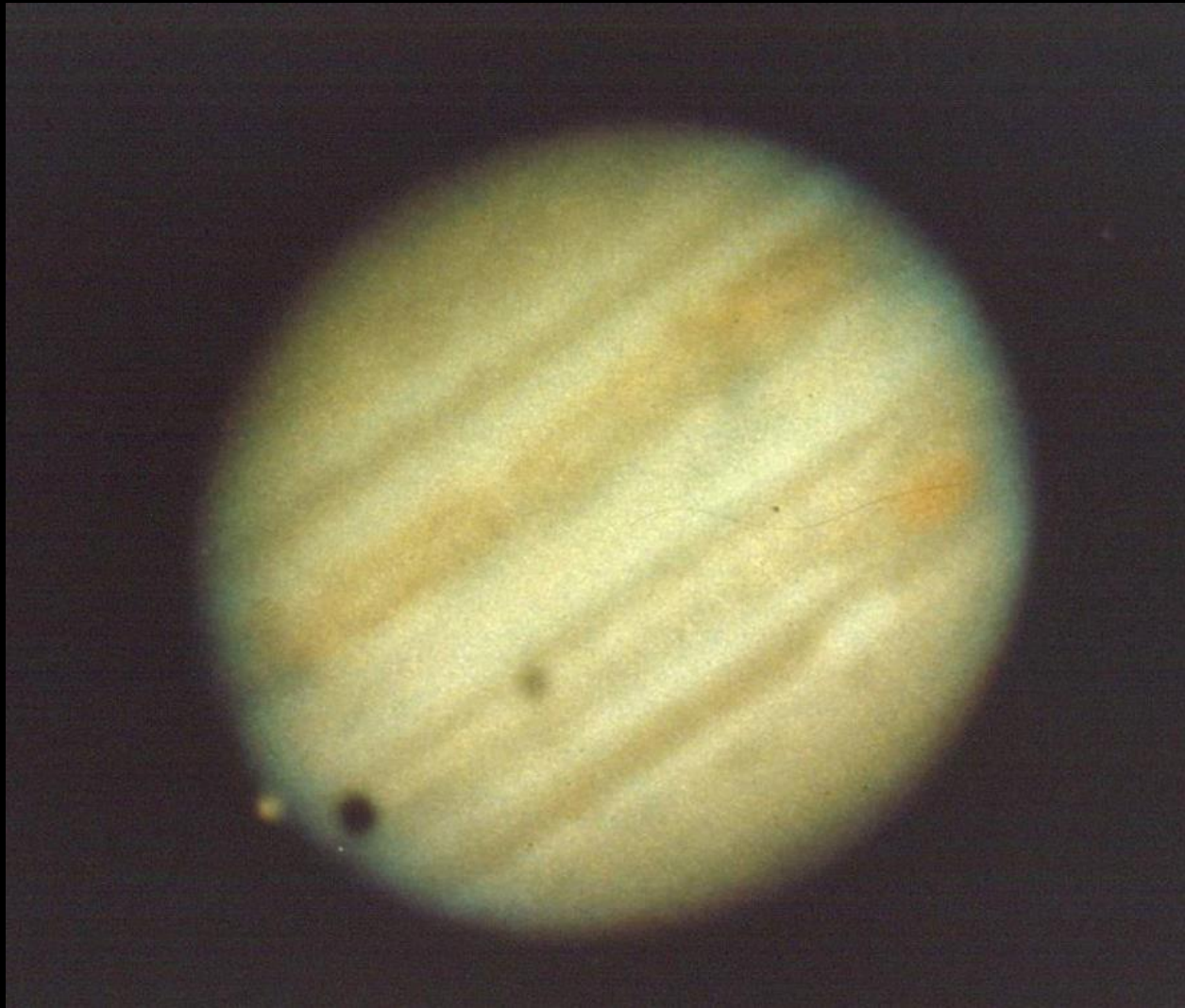


September 4, 2001

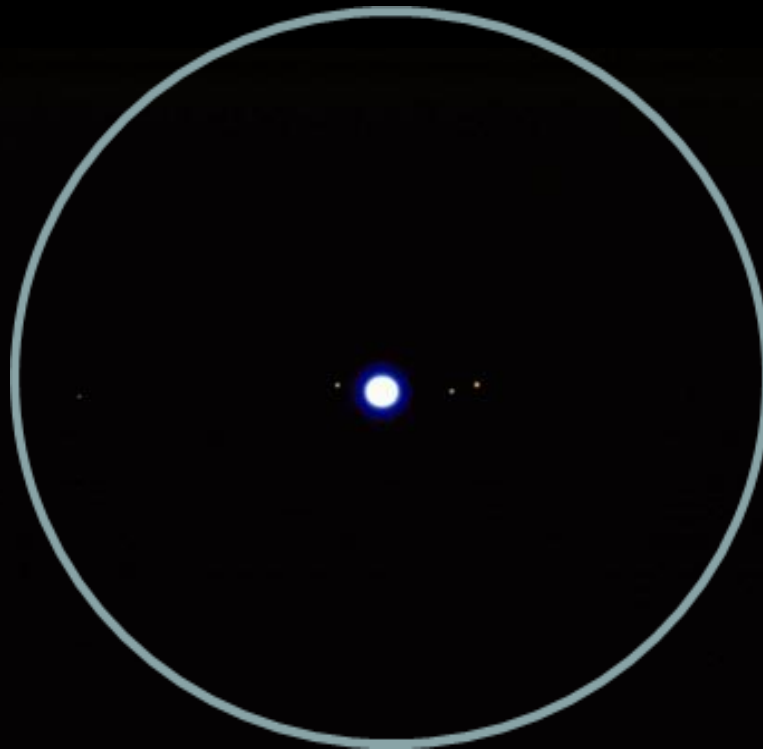


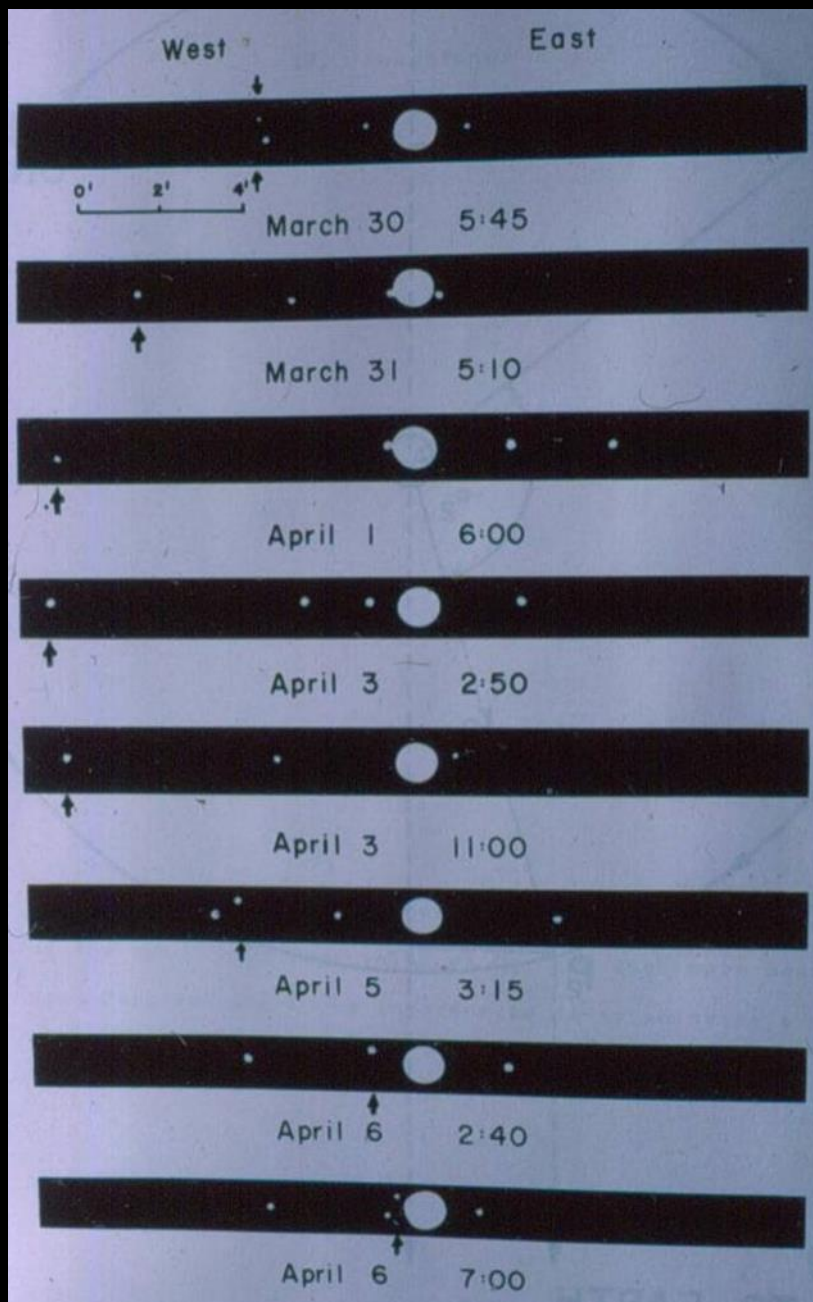
Jupiter

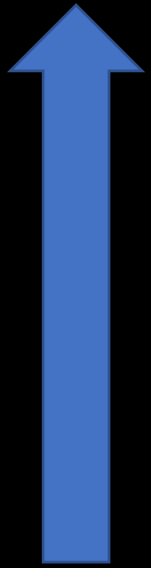




# Jupiter

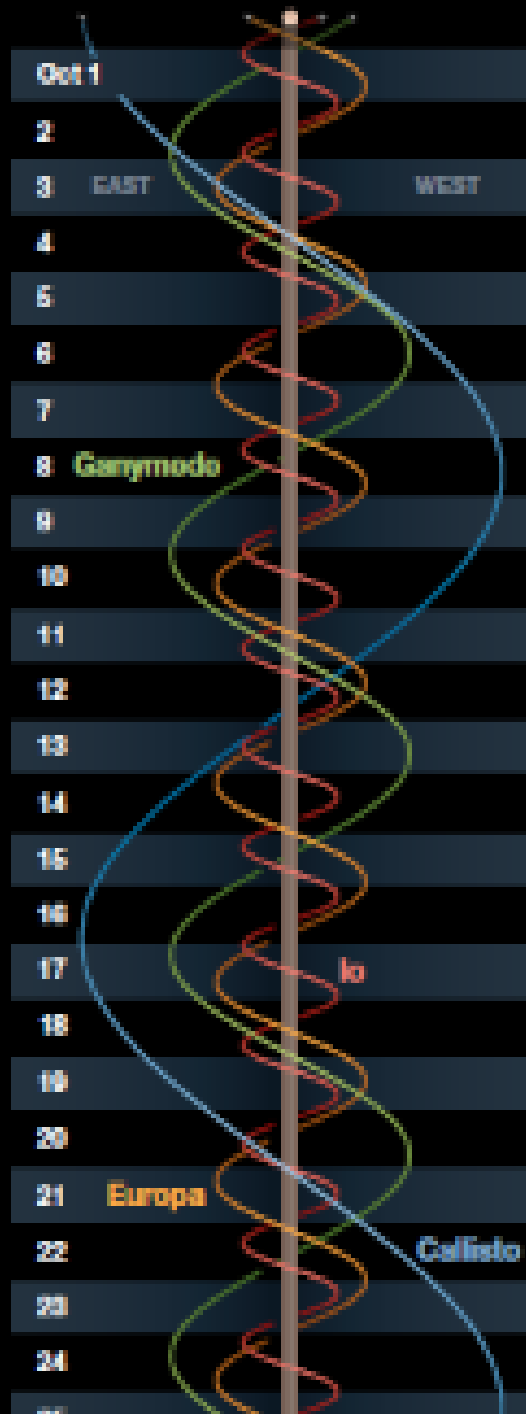






TIME





October, 2021



September 13, 2021

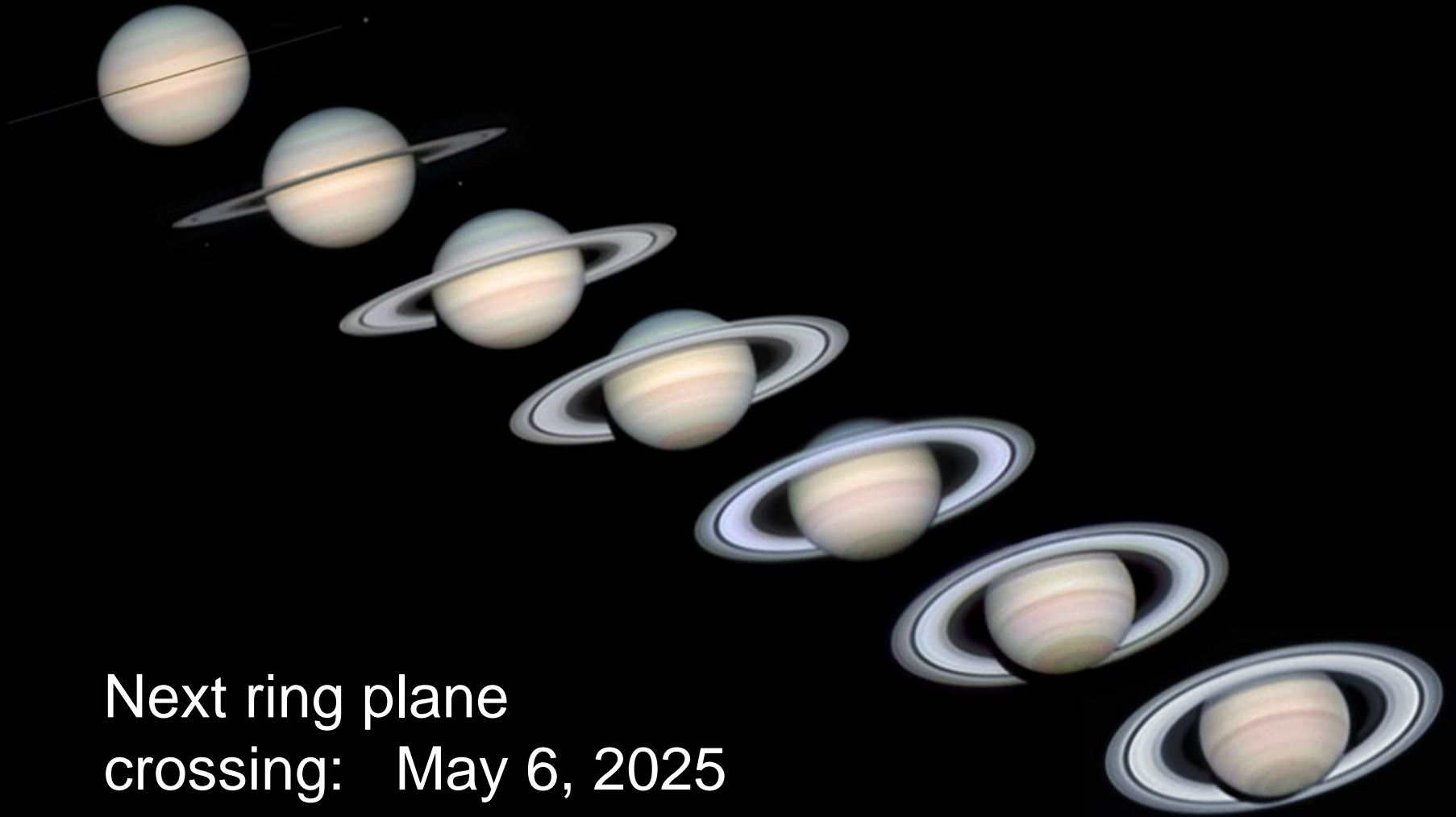


# Saturn





# Axial tilt ( $27^\circ$ )



Next ring plane  
crossing: May 6, 2025

**RHEA**

**TETHYS**



**ENCELADUS**

**MIMAS**

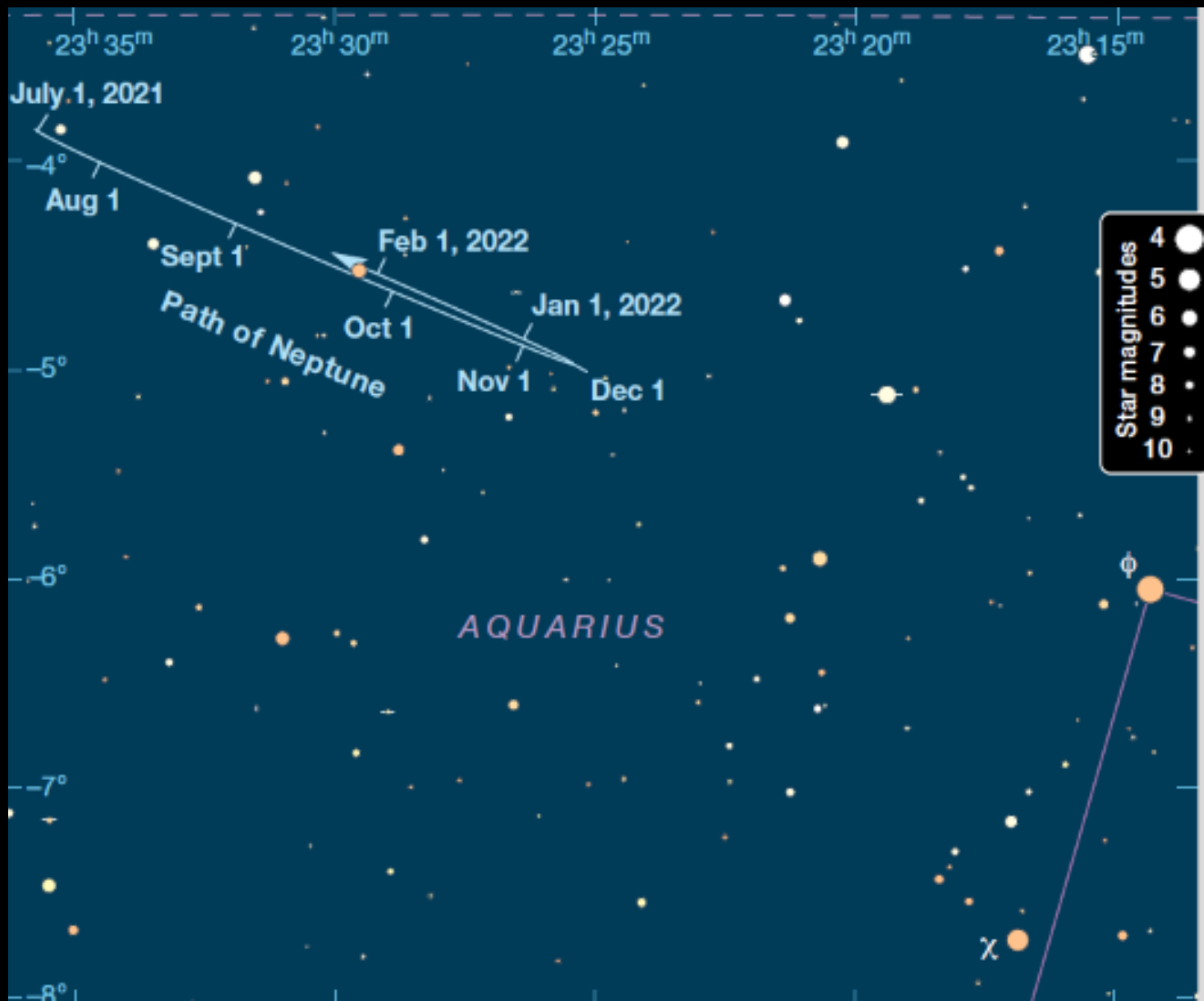
**DIONE**

**TITAN**

# Uranus & Neptune









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# Abrams Planetarium Sky Calendar

## ©ABRAMS PLANETARIUM SKY CALENDAR MAY 2021

An aid to enjoying the changing sky

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



**Evenings:** Venus, nearly of mag. -4, is bright enough to be seen in twilight quite soon after sunset. It follows the Sun over WNW horizon by only 16 hours on May 1, increasing to 14 hours at month's end. Mercury is nearby, in a very favorable apparition until fading late in month. Mercury opens May at mag. -1.1, fading to 0.0 by May 13, to mag. +1.0 by May 21, to +1.5 by May 24, and sharply thereafter. Mars, though dim at mag. +1.6 to +1.7, is higher and easily seen in a dark sky. Using binoculars, track Mars' motion of 0.6° per day as it passes by 3rd mag. stars in Gemini on Apr. 28-May 2, May 9 and 25, and forms noteworthy configurations with brighter Polux (1+2) and Castor (1+6) on May 15, 31, and June 7.

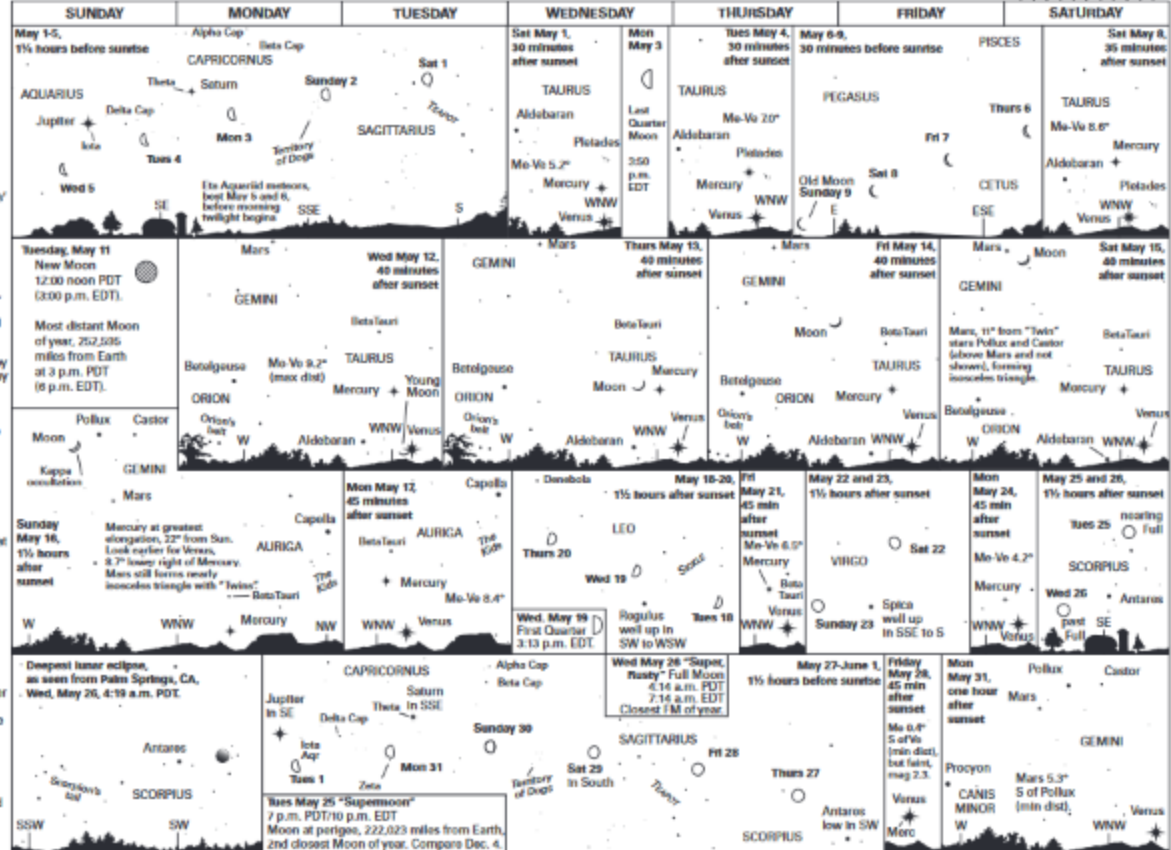
**Mornings:** Jupiter, shining at mag. -2.2 to -2.4, rises ahead of the Sun by nearly three hours on May 1, and by more than four hours on May 31. An hour before sunrise, it's the prominent "morning star" in SE, while Saturn, three mags fainter at +0.7 to +0.6, is 15°-18° to Jupiter's upper right.

Catch a waxing crescent Moon near each evening planet in turn, on May 12 (about mid 8 - look early!), May 13, and 15. Catch a waxing 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 4:11-5 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, [abramsplanetarium.org/mats/](http://abramsplanetarium.org/mats/)

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-D aspect of Saturn's rings.

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# Abrams Planetarium *Sky Calendar*

