Introdução à Astronomia

Prof Antônio Kanaan

Aula 2 – 25 Mar 2013

Movimentos no Céu

Bibliografia:

http://www.if.ufrj.br/~tati/
http://www.fsc.ufsc.br/~tati/caronte/

Cosmos, Carl Sagan

Discovering Astronomy, Robbins, Jefferys, Shawl

Astronomy Today, Chaisson, McMillan

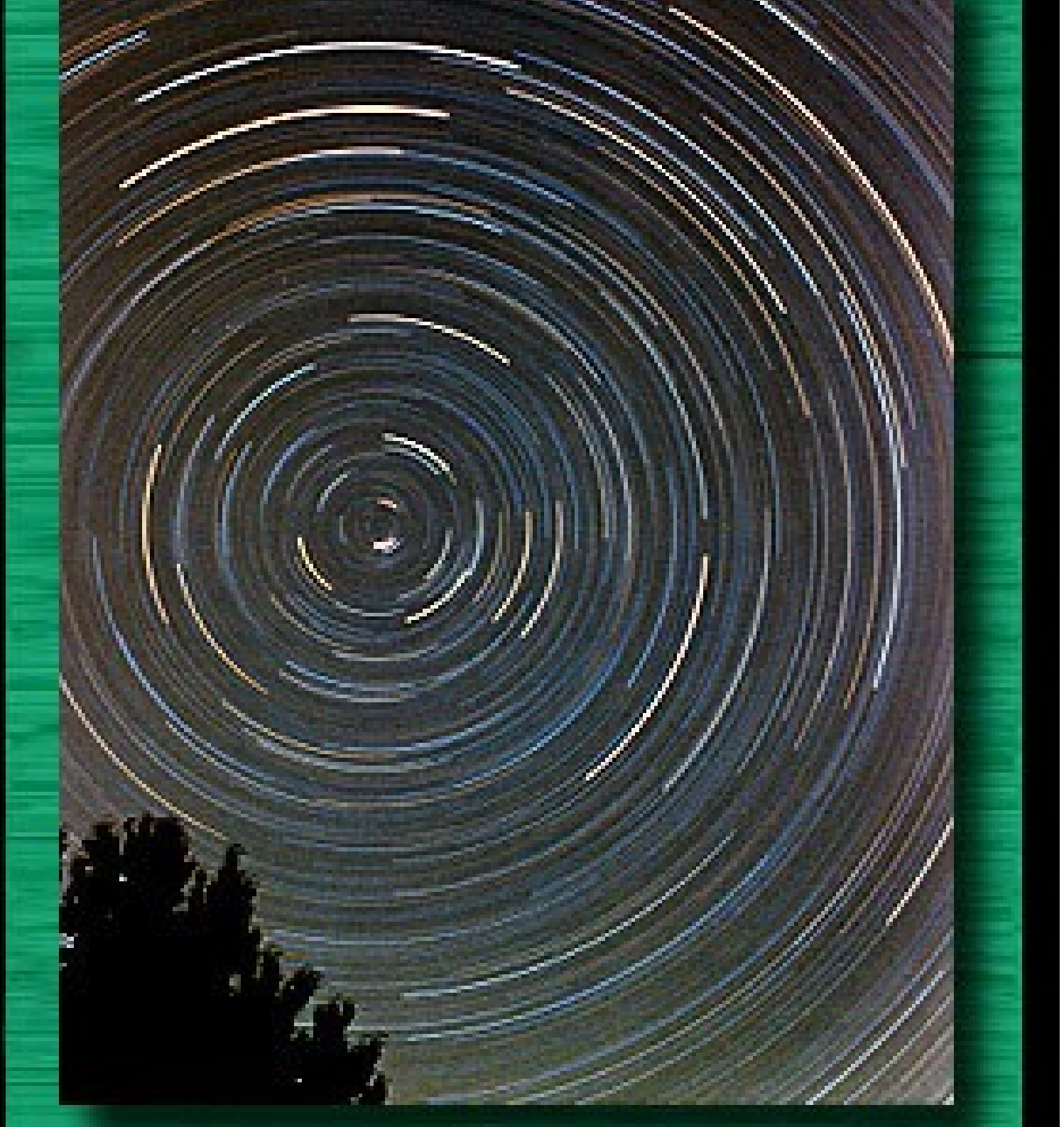
Astronomia, Kepler Oliveira, Maria de Fátima Saraiva

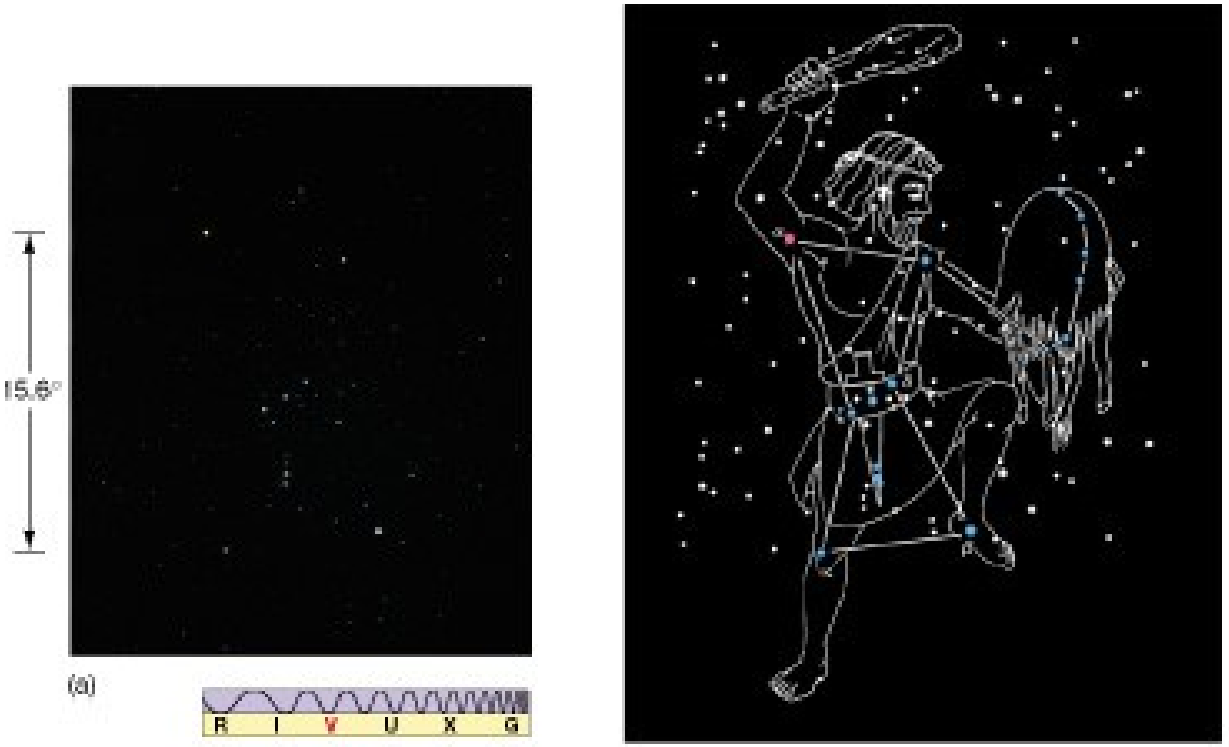
Movimento diurno
Coordenadas Celestes
Movimento anual do Sol
Movimento da Lua
Eclipses do Sol e da Lua
Movimento dos planetas
- planetas interiores
- planetas exteriores

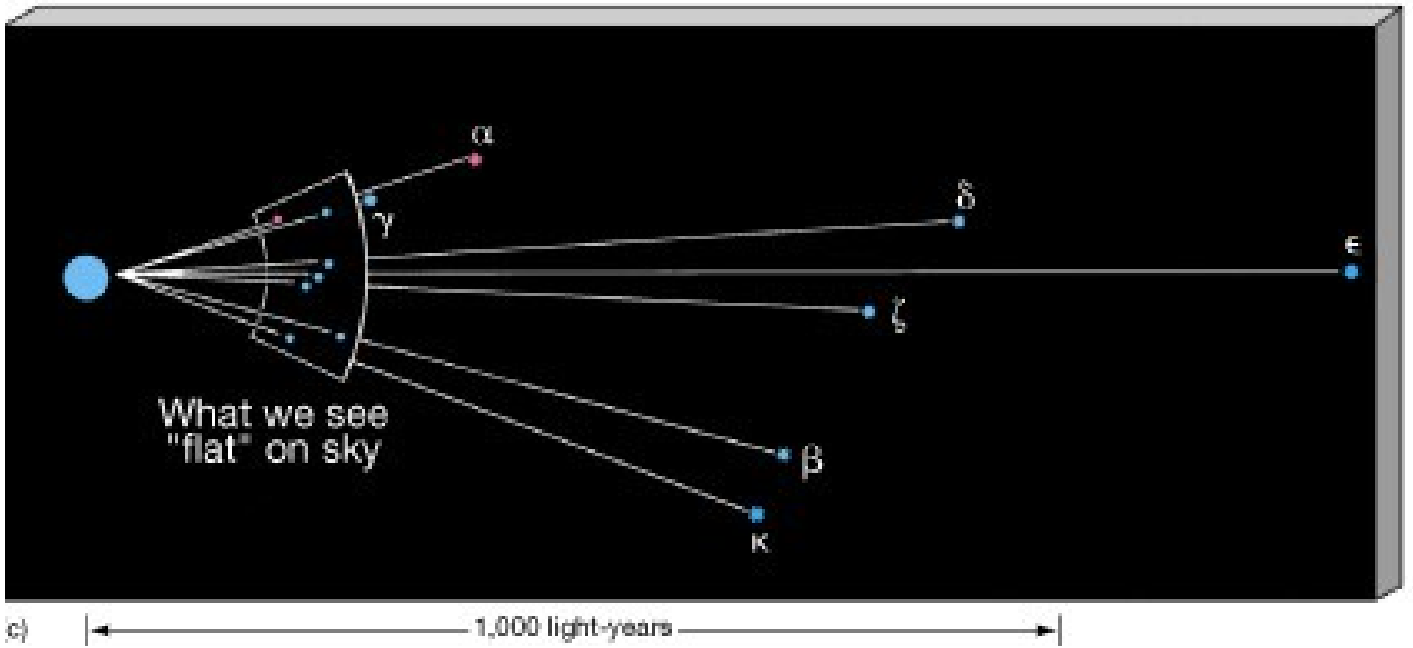
Satélites dos planetas

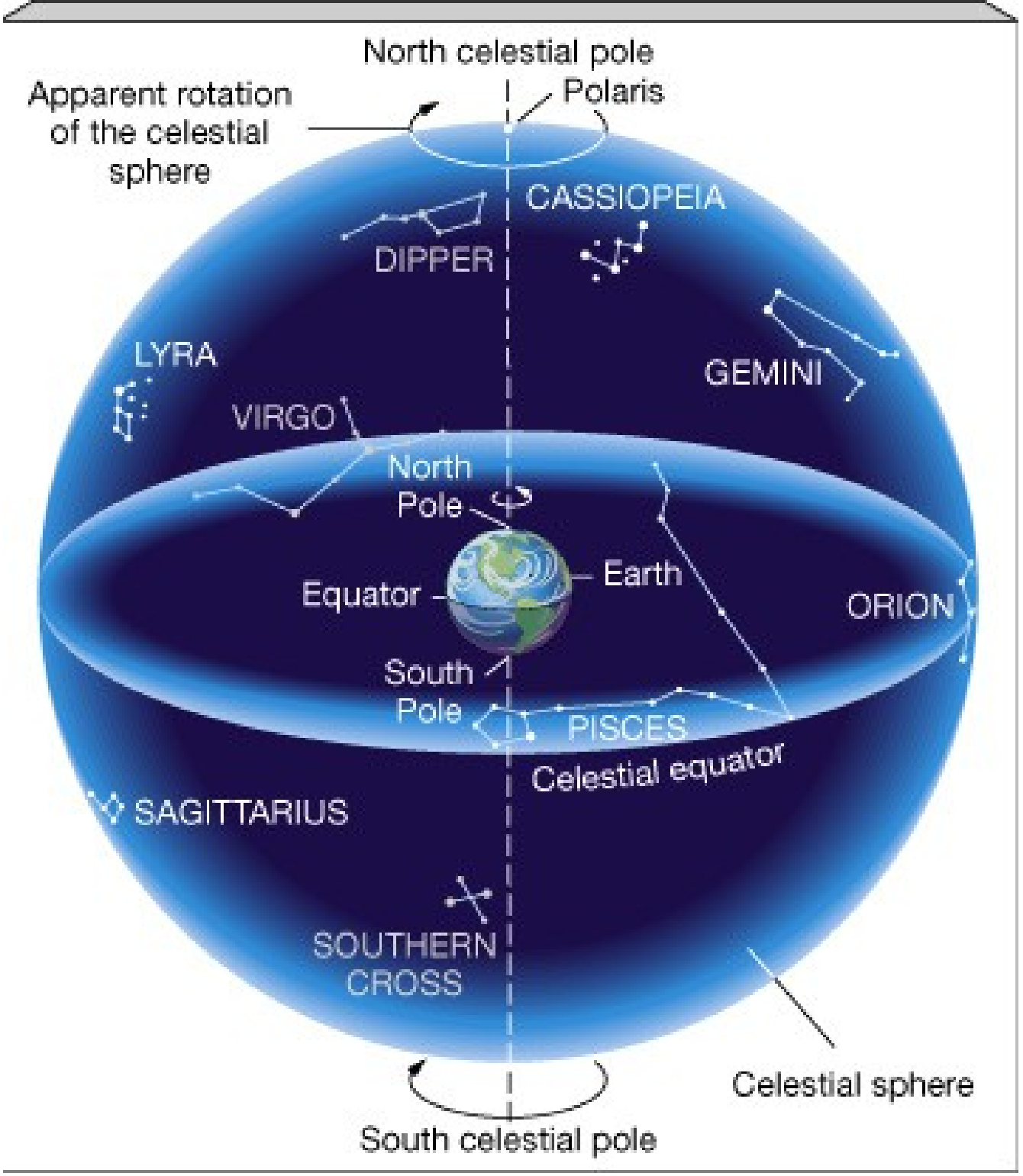
O movimento diurno dos astros

Parece mas não é, nós não estamos no centro do Universo




15.6°
(a)
R I V U X G
(b)


α
γ
δ
ε
ζ
What we see
"flat" on sky
β
κ
(c)
1,000 light-years

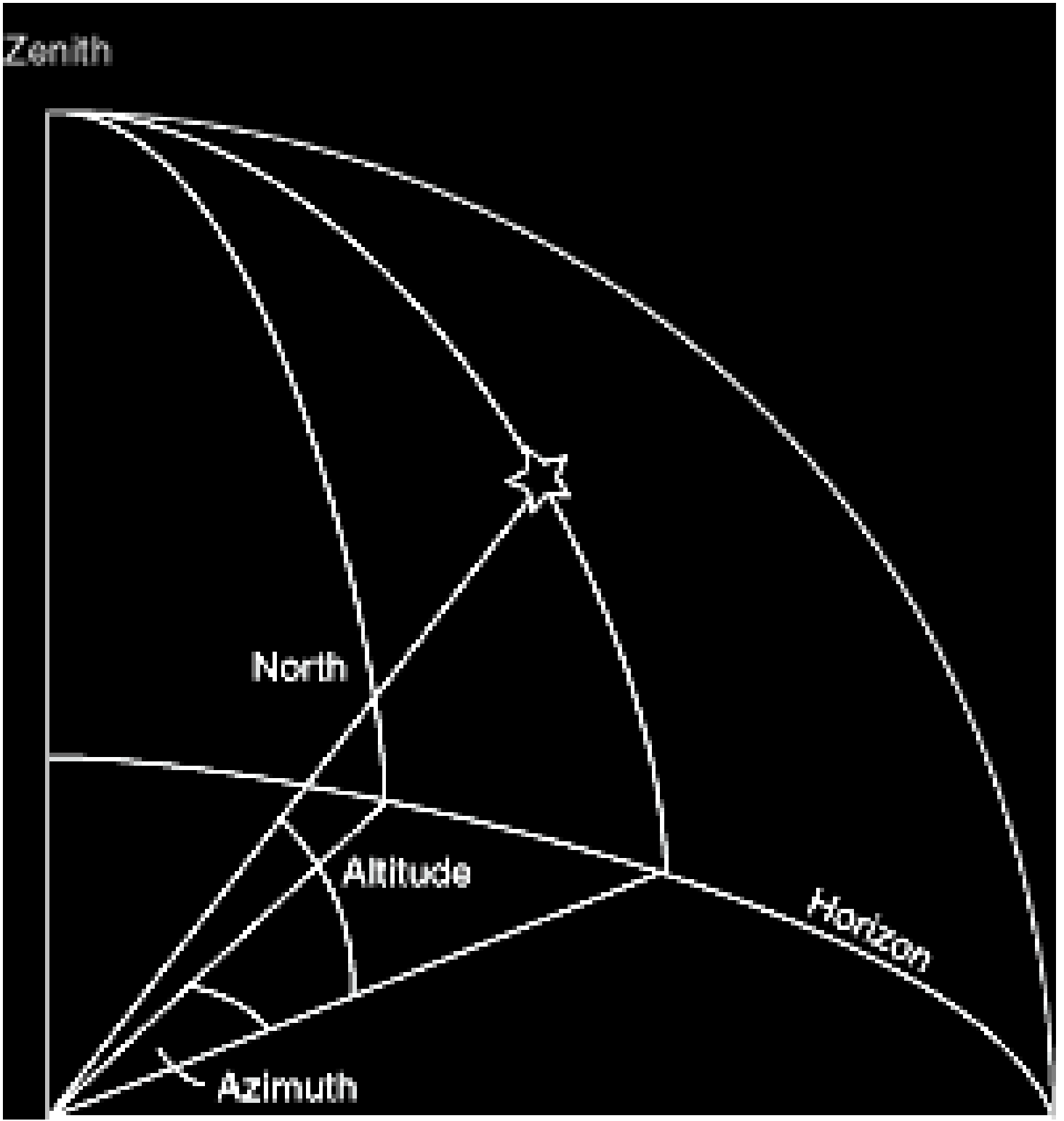

North celestial pole
Polaris
Apparent rotation of the celestial sphere
CASSIOPEIA
DIPPER
LYRA
GEMINI
VIRGO
North Pole
Earth
Equator
ORION
South Pole
PISCES
Celestial equator
SAGITTARIUS
SOUTHERN CROSS
Celestial sphere
South celestial pole

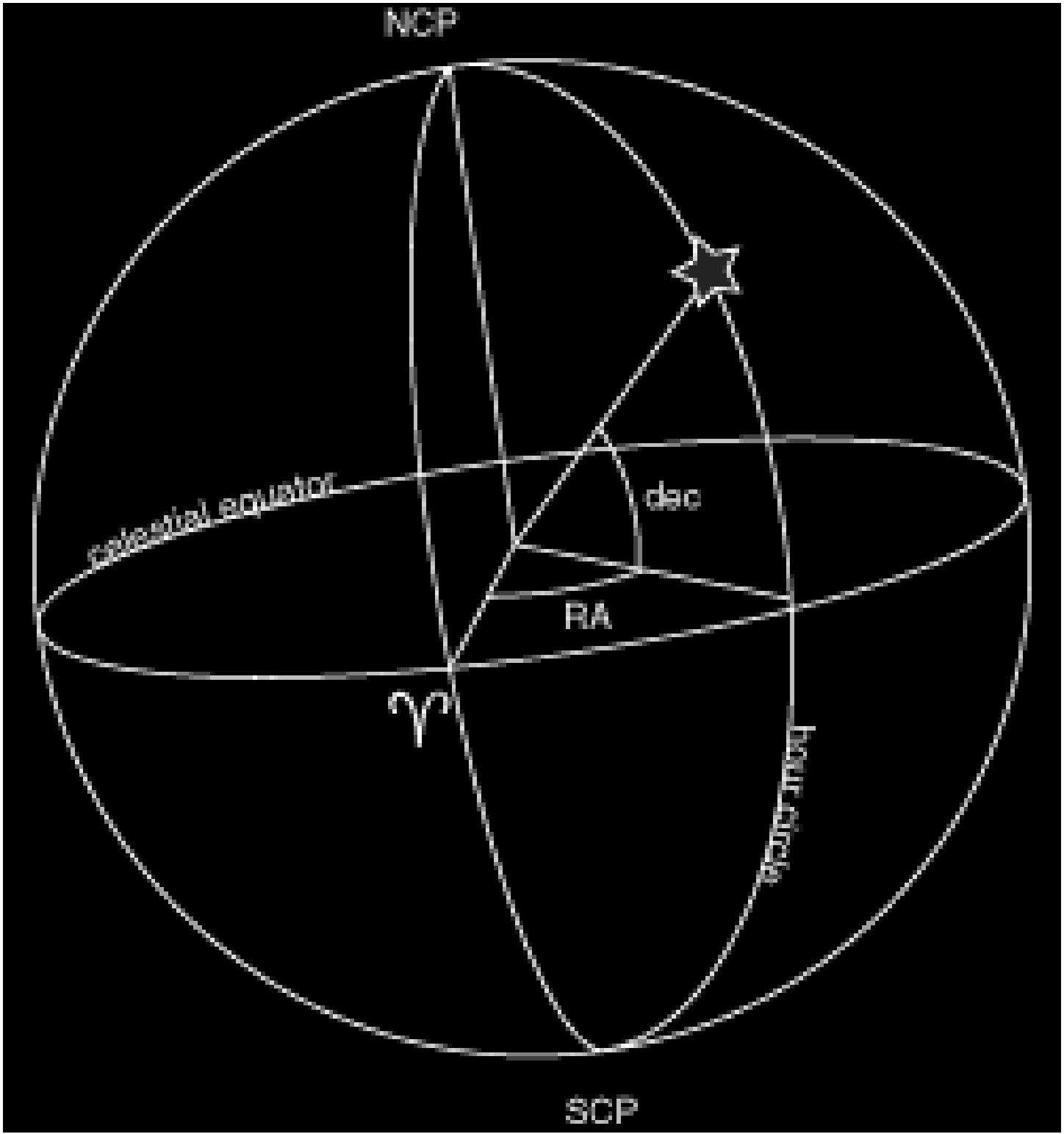
Coordenadas celestes

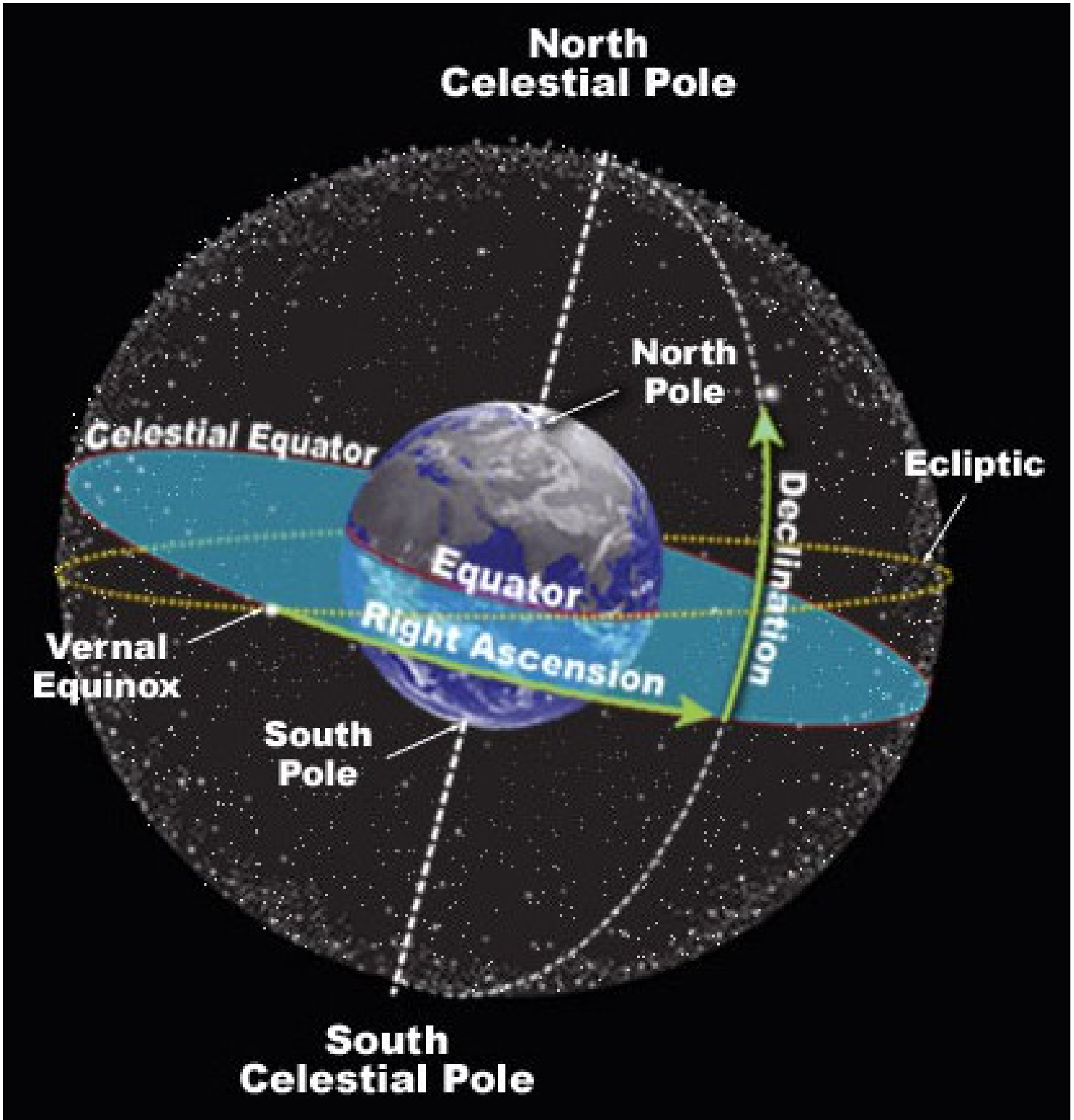
uma projeção das coordenadas terrestres sobre a “esfera” celeste

Altazimutais: altura e azimute

Equatoriais: ascenção reta e declinação


Zenith
North
Altitude
Horizon
Azimuth

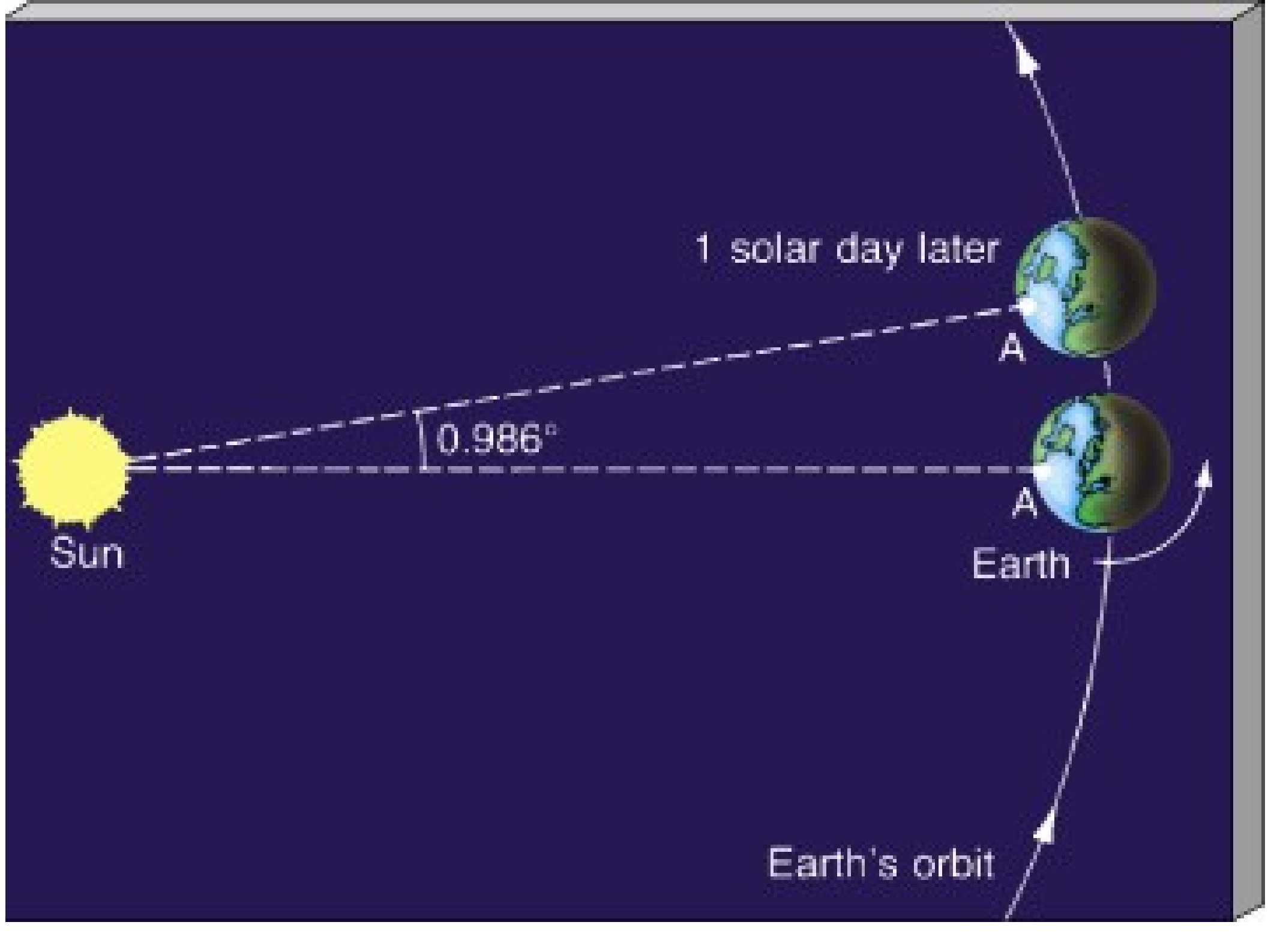

NCP
celestial equator
dec
RA
hour circle
SCP

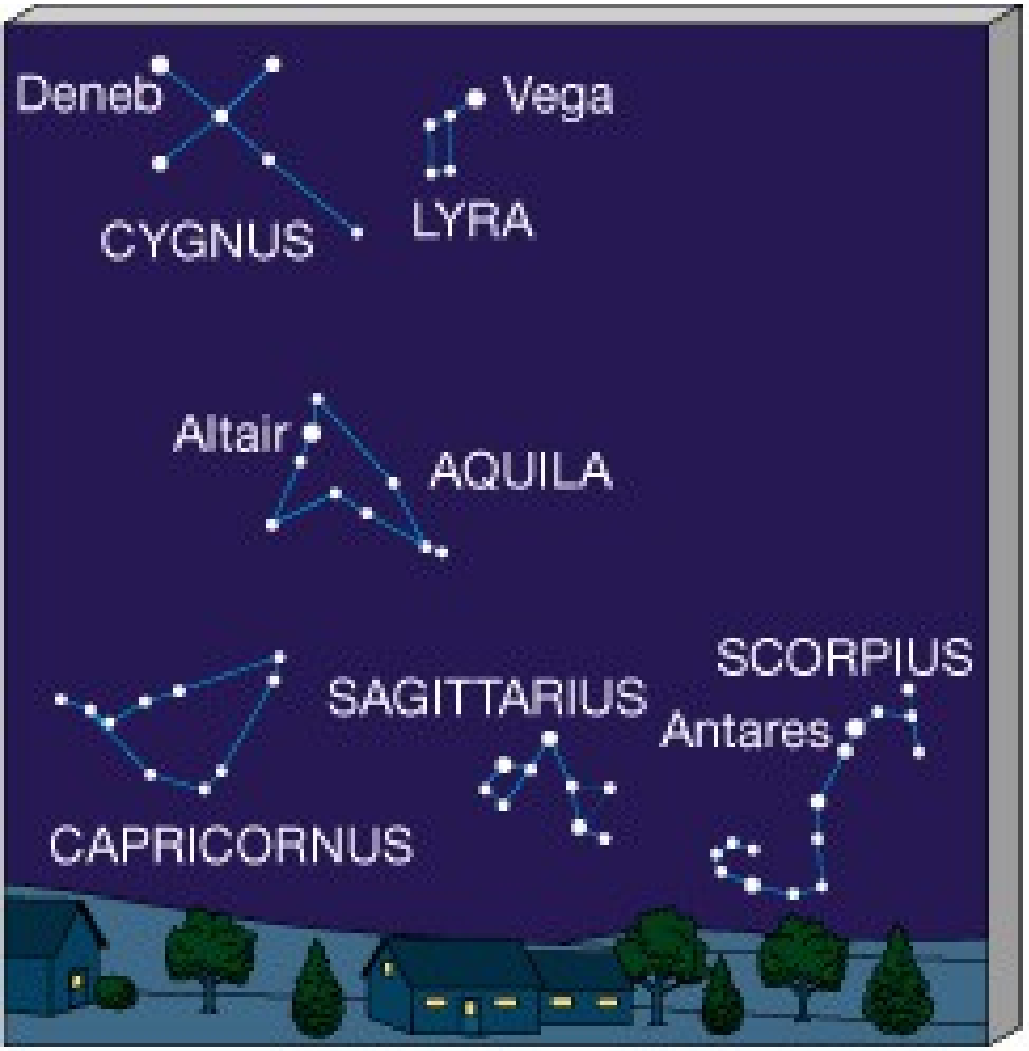

North
Celestial Pole
North
Pole
Celestial Equator
Ecliptic
Declination
Equator
Right Ascension
Vernal
Equinox
South
Pole
South
Celestial Pole

Movimento anual dos astros:

a Terra gira ao redor do Sol!

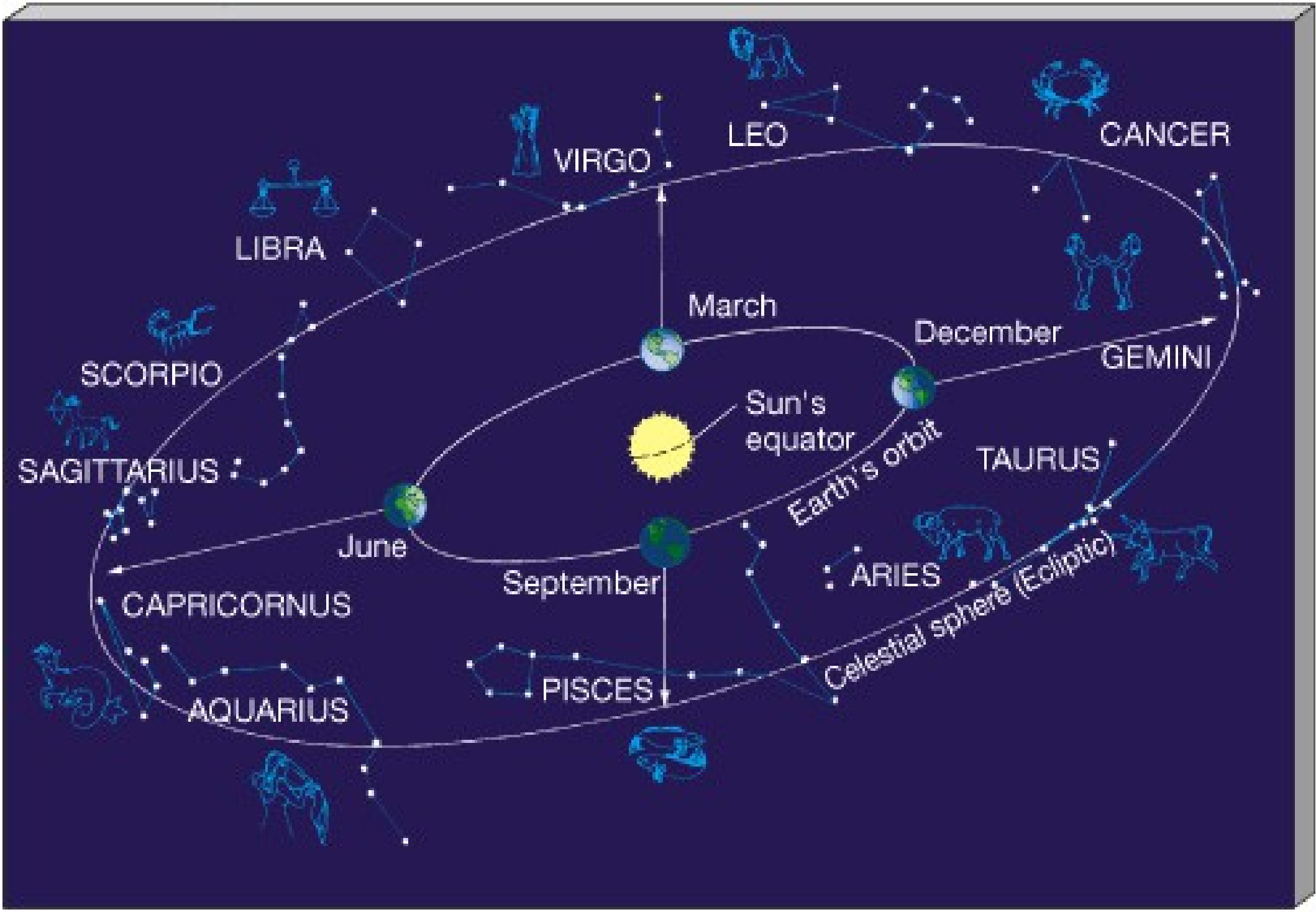
a Lua gira ao redor da Terra!


1 solar day later
A
0.986°
A
Sun
Earth
Earth's orbit

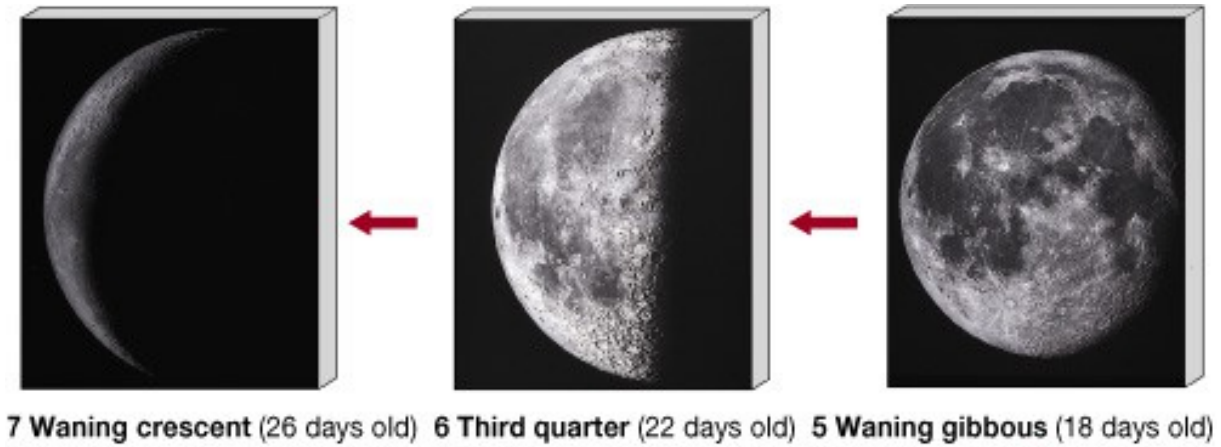


(a) Southern horizon, Summer

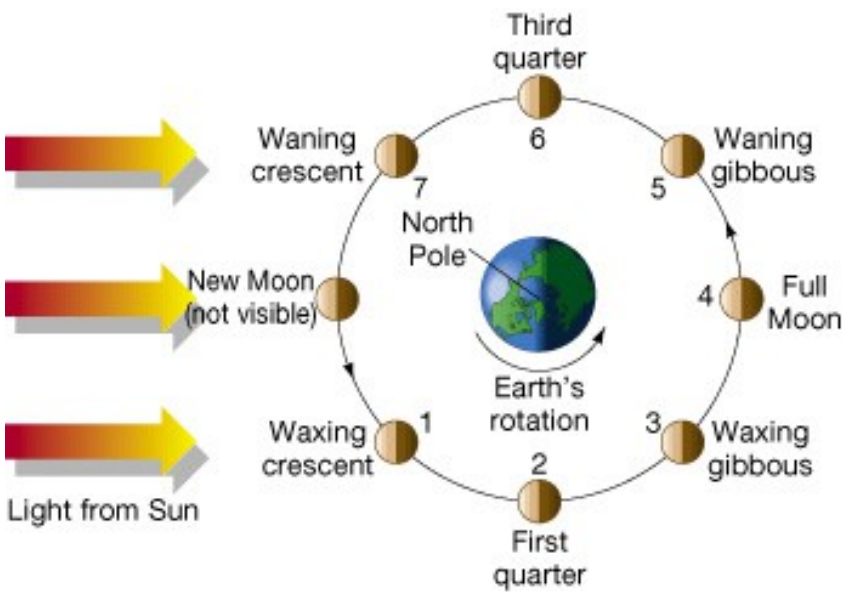
(b) Southern horizon, Winter


LEO
CANCER
VIRGO
LIBRA
March
December
GEMINI
SCORPIO
Sun's
equator
SAGITTARIUS
TAURUS
Earth's orbit
June
September
ARIES
CAPRICORNUS
Celestial sphere (Ecliptic)
PISCES
AQUARIUS

Movimento da Lua

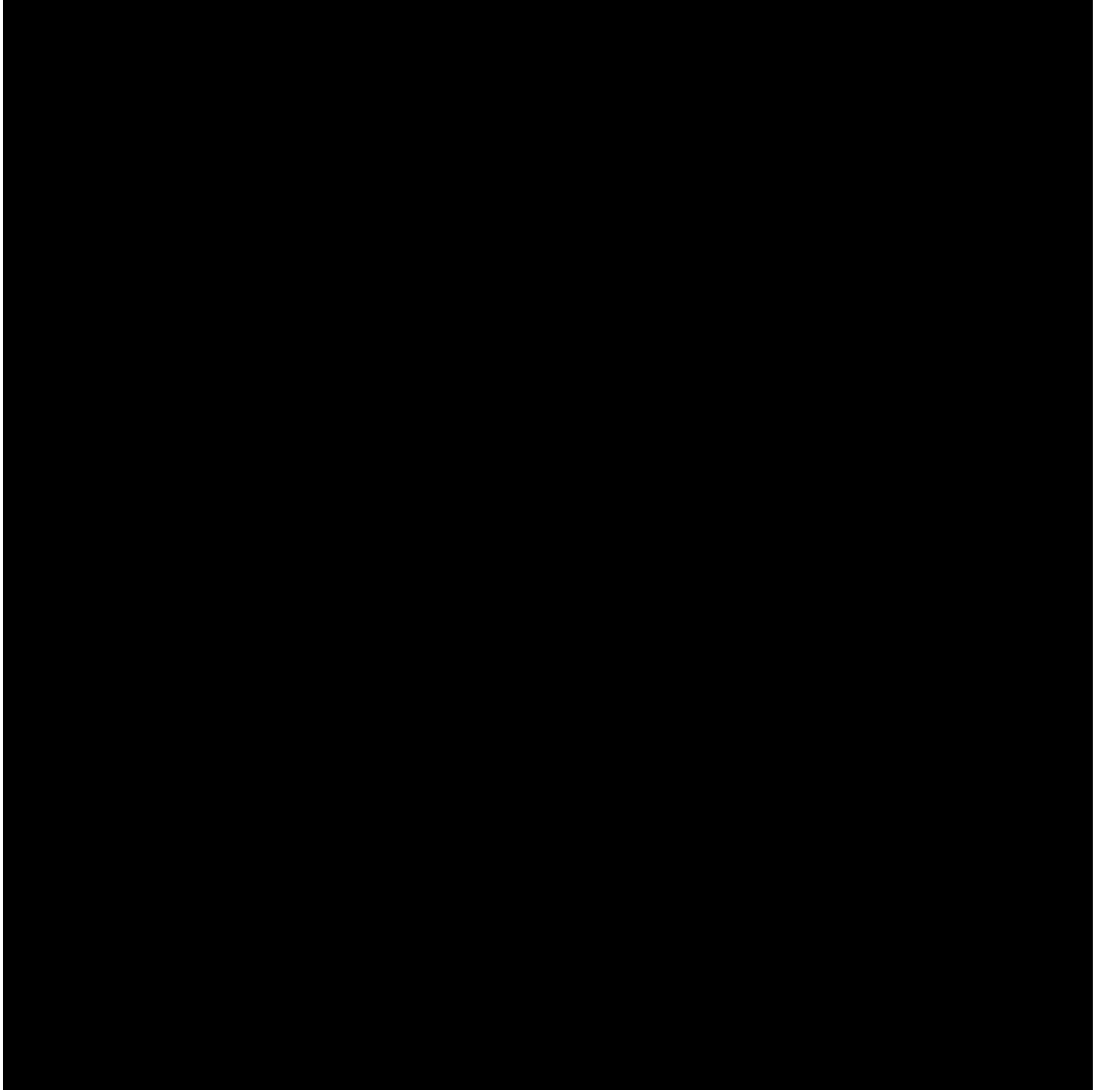


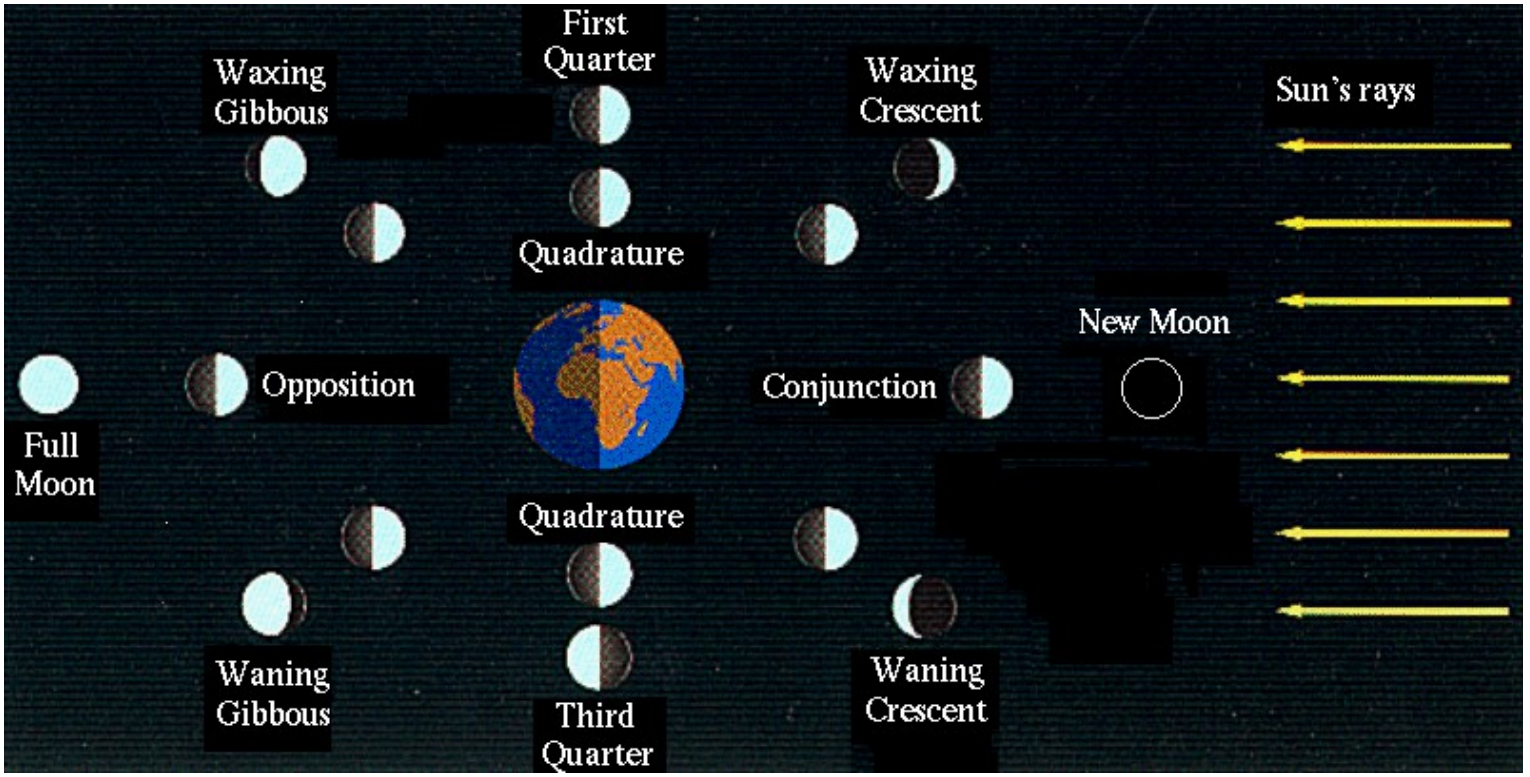
7 Waning crescent (26 days old) **6 Third quarter** (22 days old) **5 Waning gibbous** (18 days old)

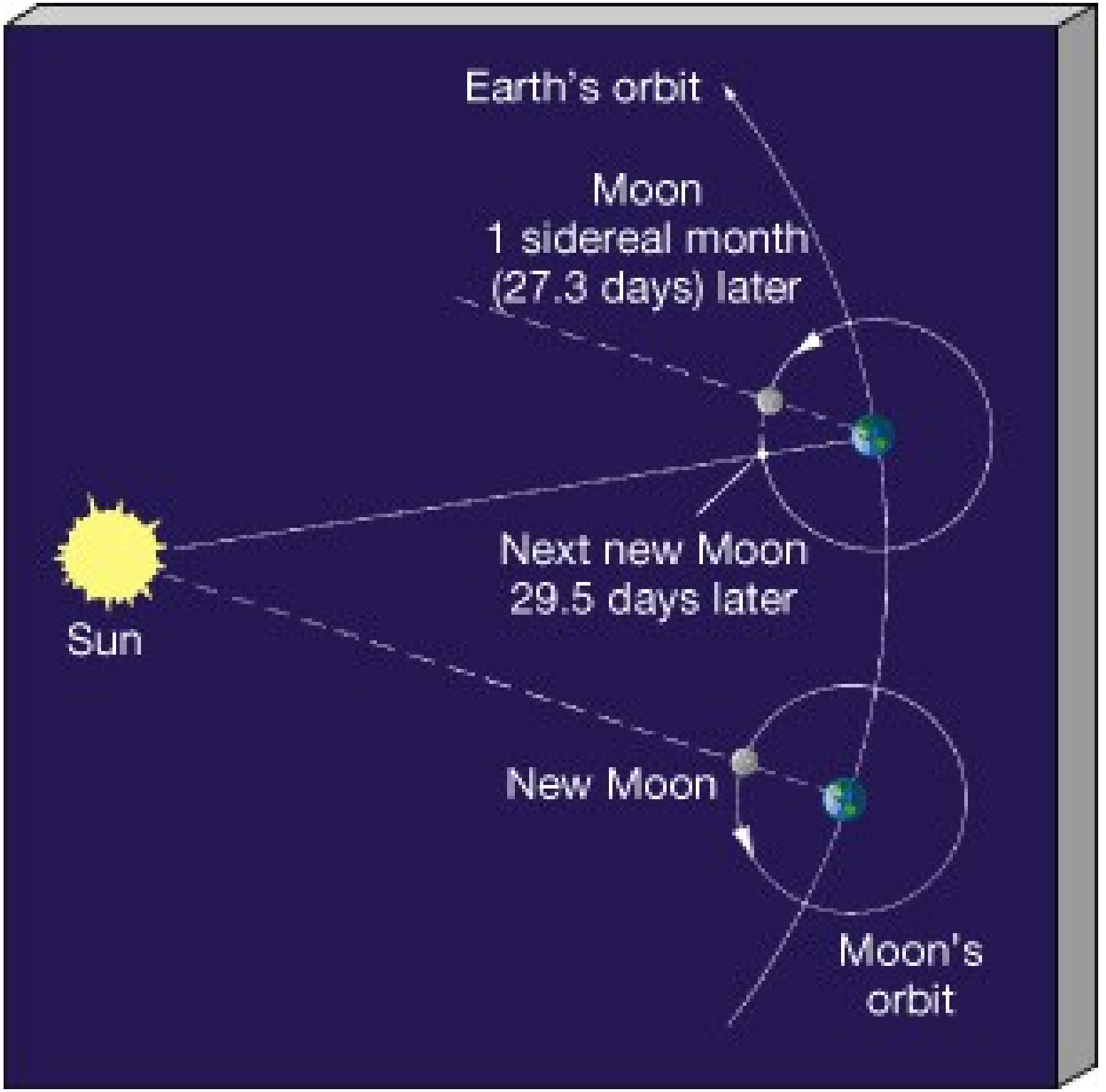


4 Full Moon (14 days old)

1 Waxing crescent (4 days old) **2 First quarter** (7 days old) **3 Waxing gibbous** (10 days old)

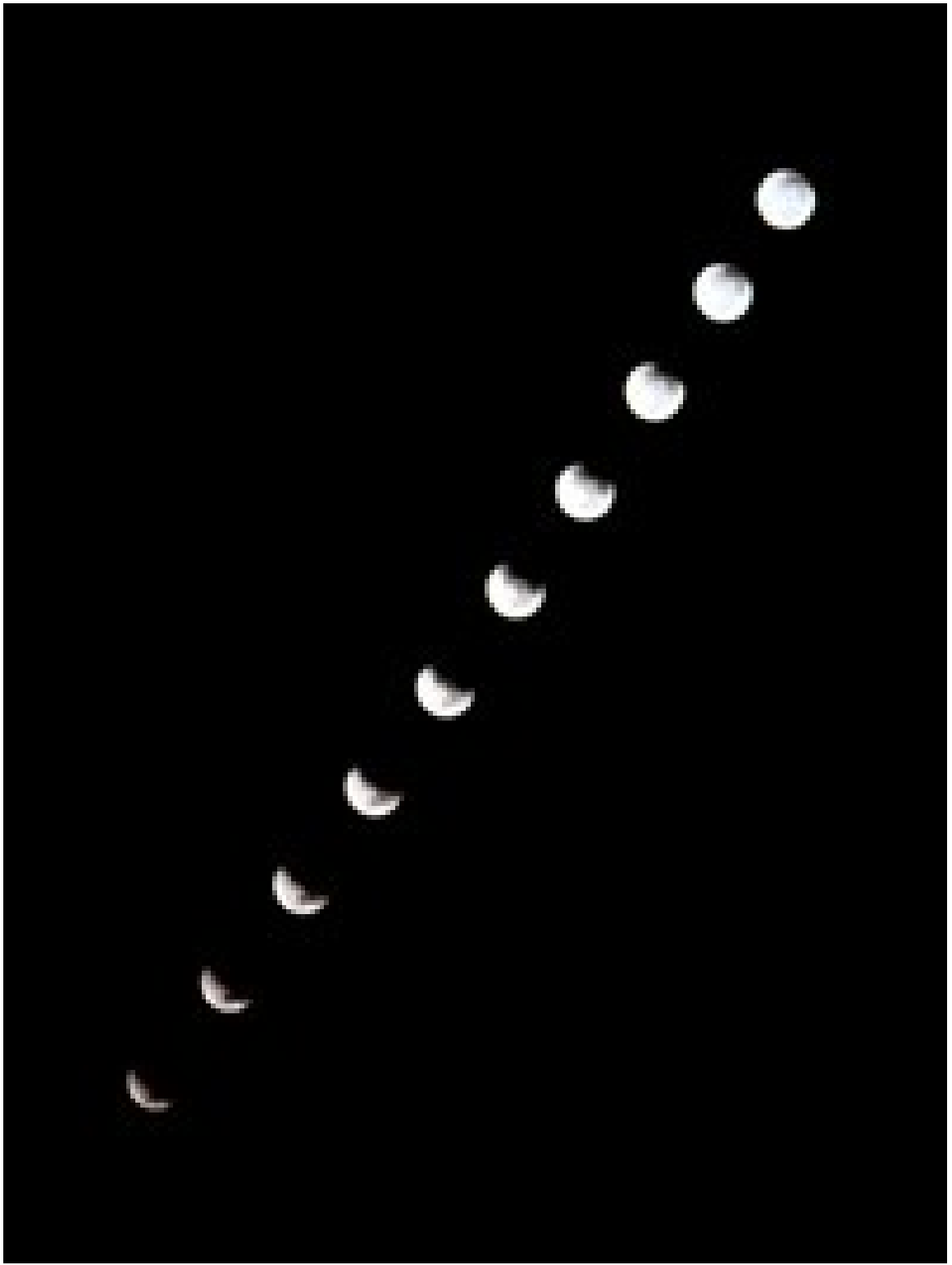


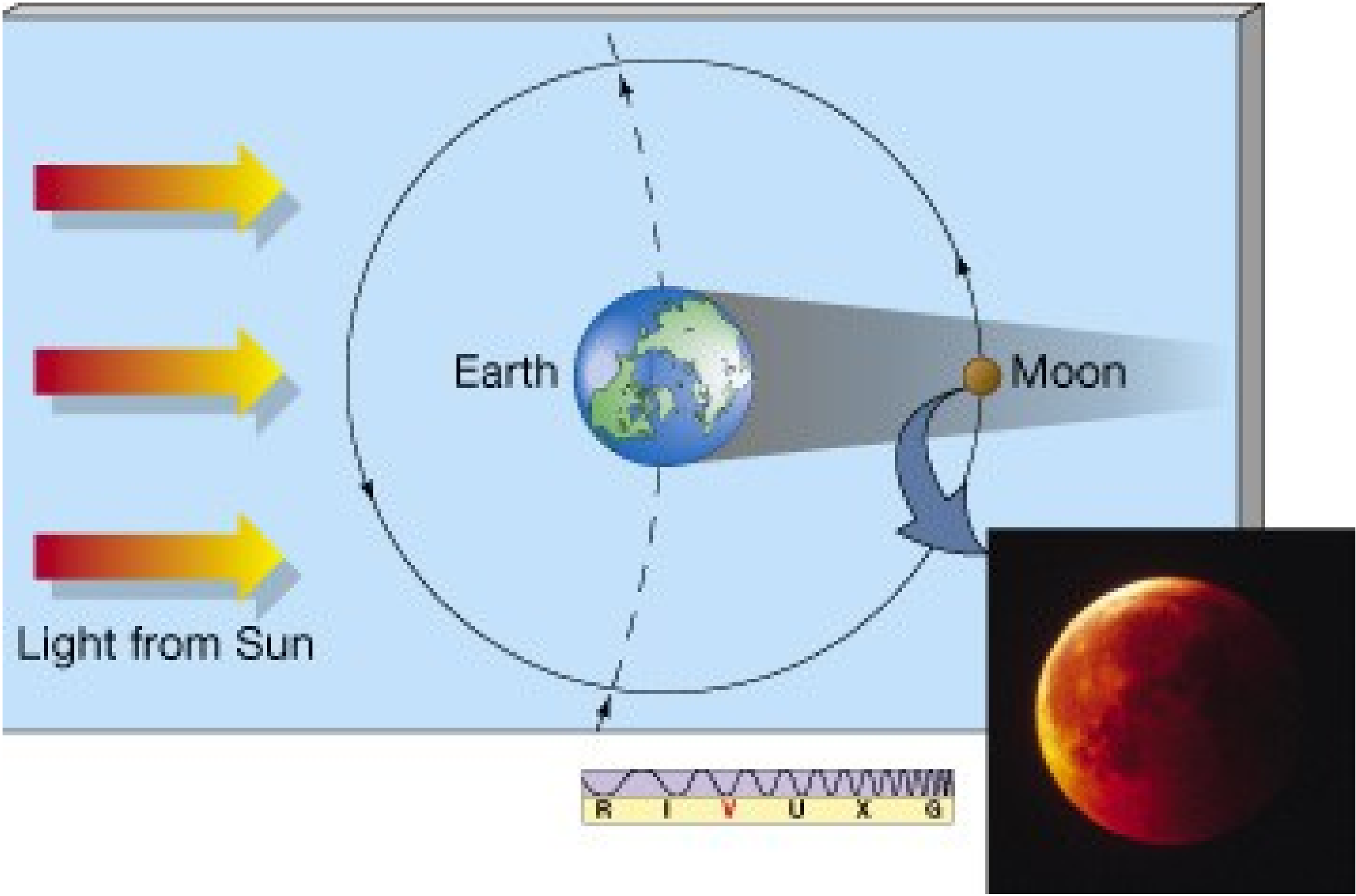

First Quarter
Waxing Gibbous
Waxing Crescent
Sun's rays
Quadrature
New Moon
Opposition
Conjunction
Full Moon
Quadrature
Waning Gibbous
Waning Crescent
Third Quarter


Earth's orbit
Moon
1 sidereal month
(27.3 days) later
Next new Moon
29.5 days later
Sun
New Moon
Moon's
orbit

Eclipses

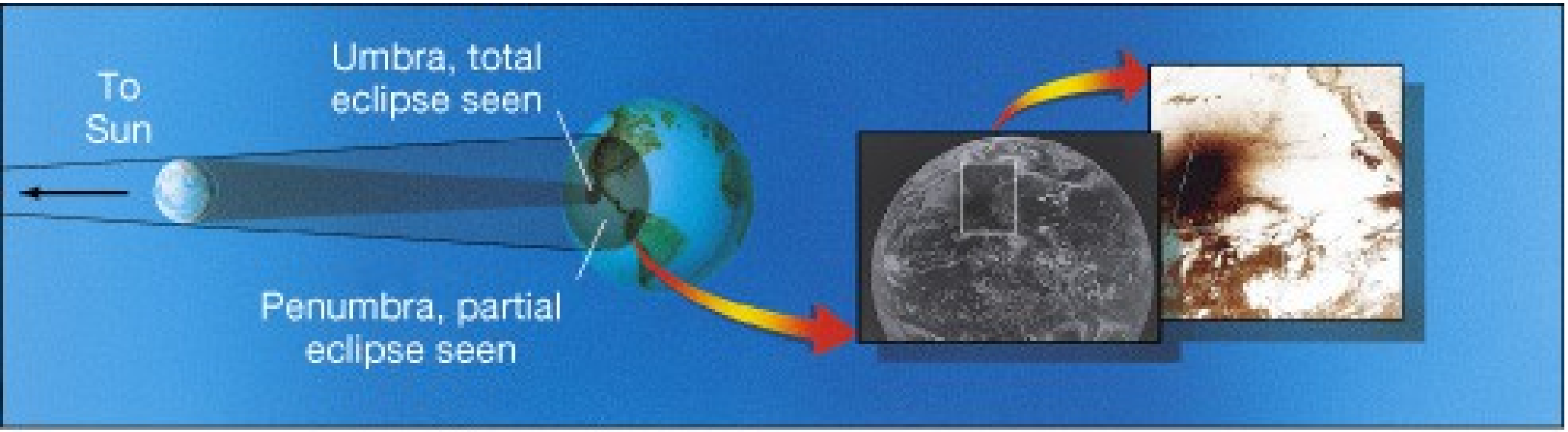
Sol
Lua
Trânsitos
Ocultacões

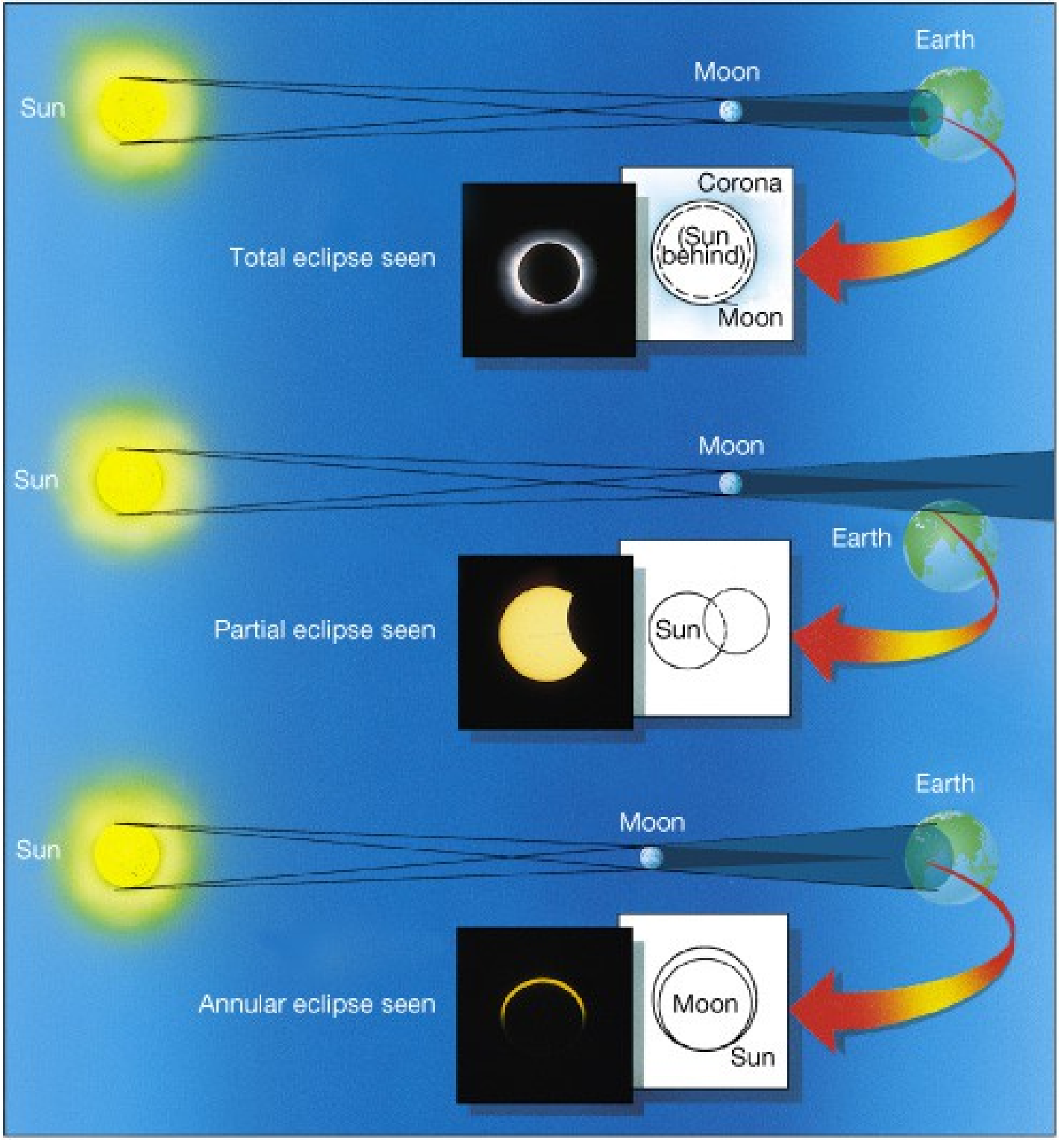


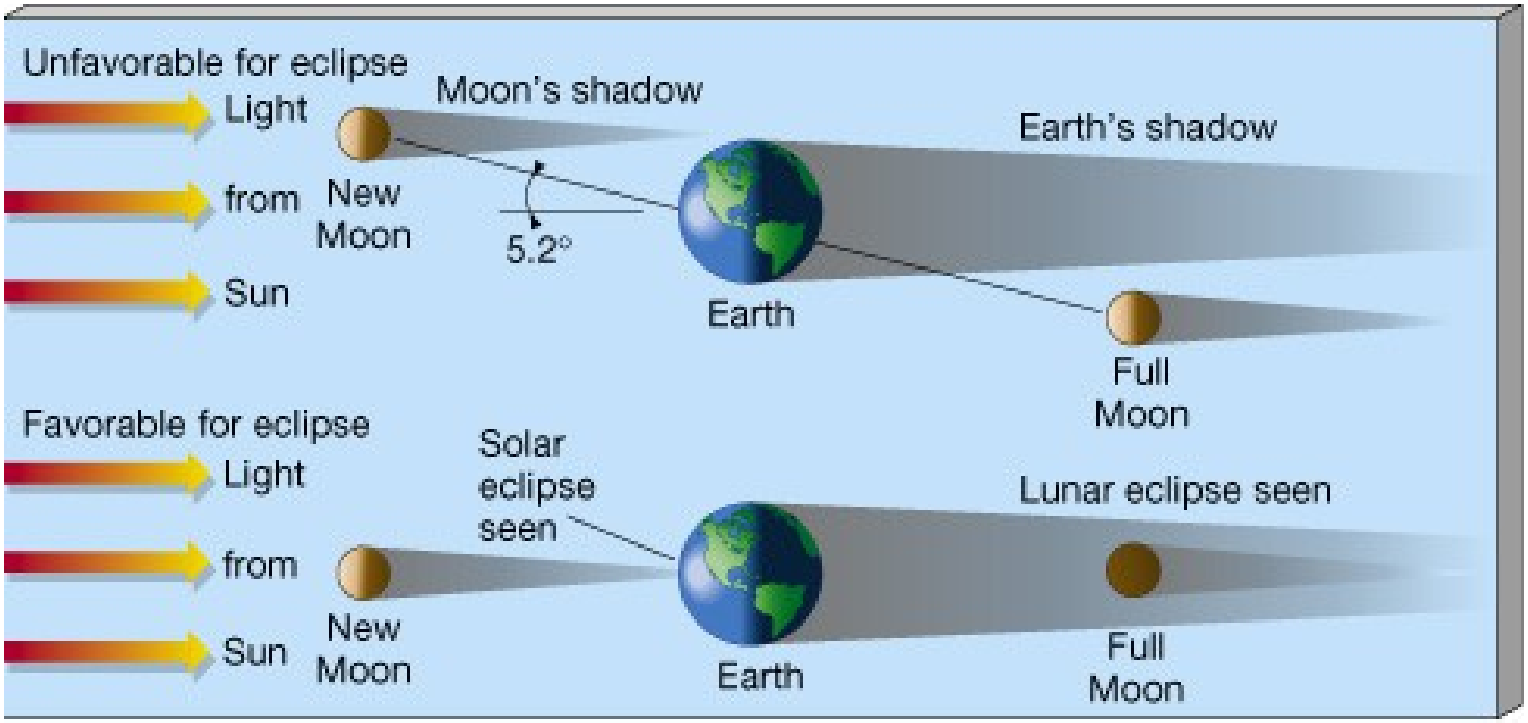

Earth
Moon
Light from Sun
R I V U X G

(a)

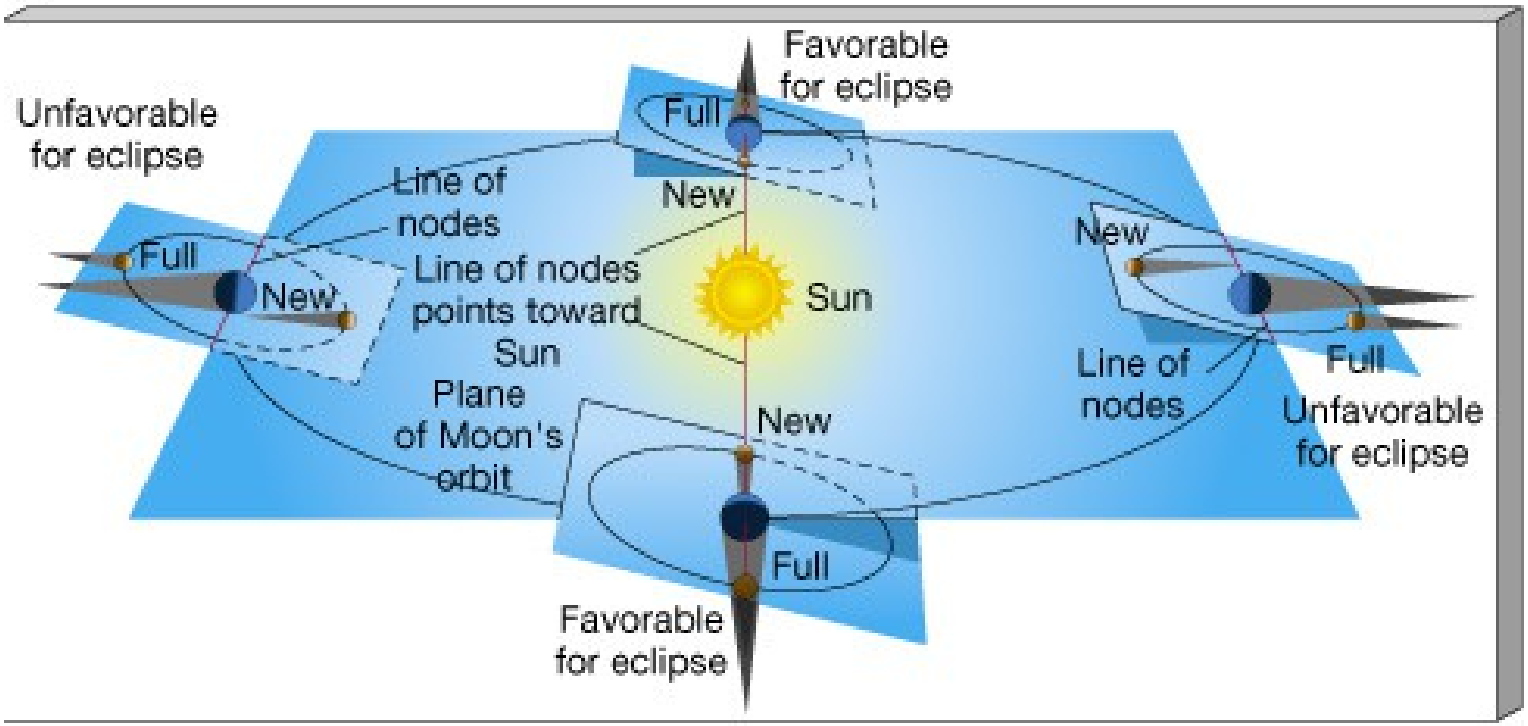
(b)


To
Sun
Umbra, total
eclipse seen
Penumbra, partial
eclipse seen

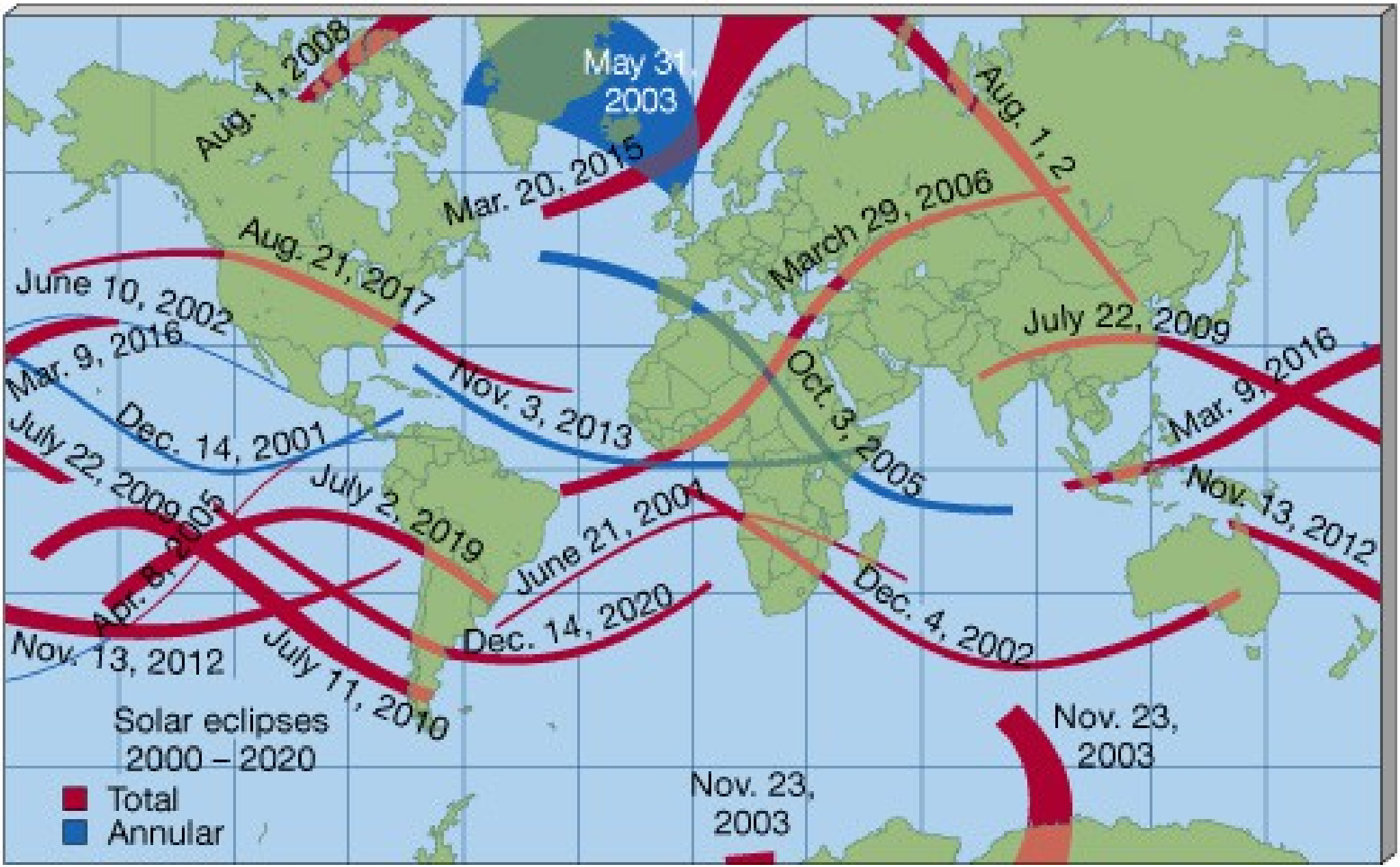

Earth
Moon
Sun
Corona
(Sun behind)
Moon
Total eclipse seen
Moon
Sun
Earth
Sun
Partial eclipse seen
Earth
Moon
Sun
Annular eclipse seen
Moon
Sun

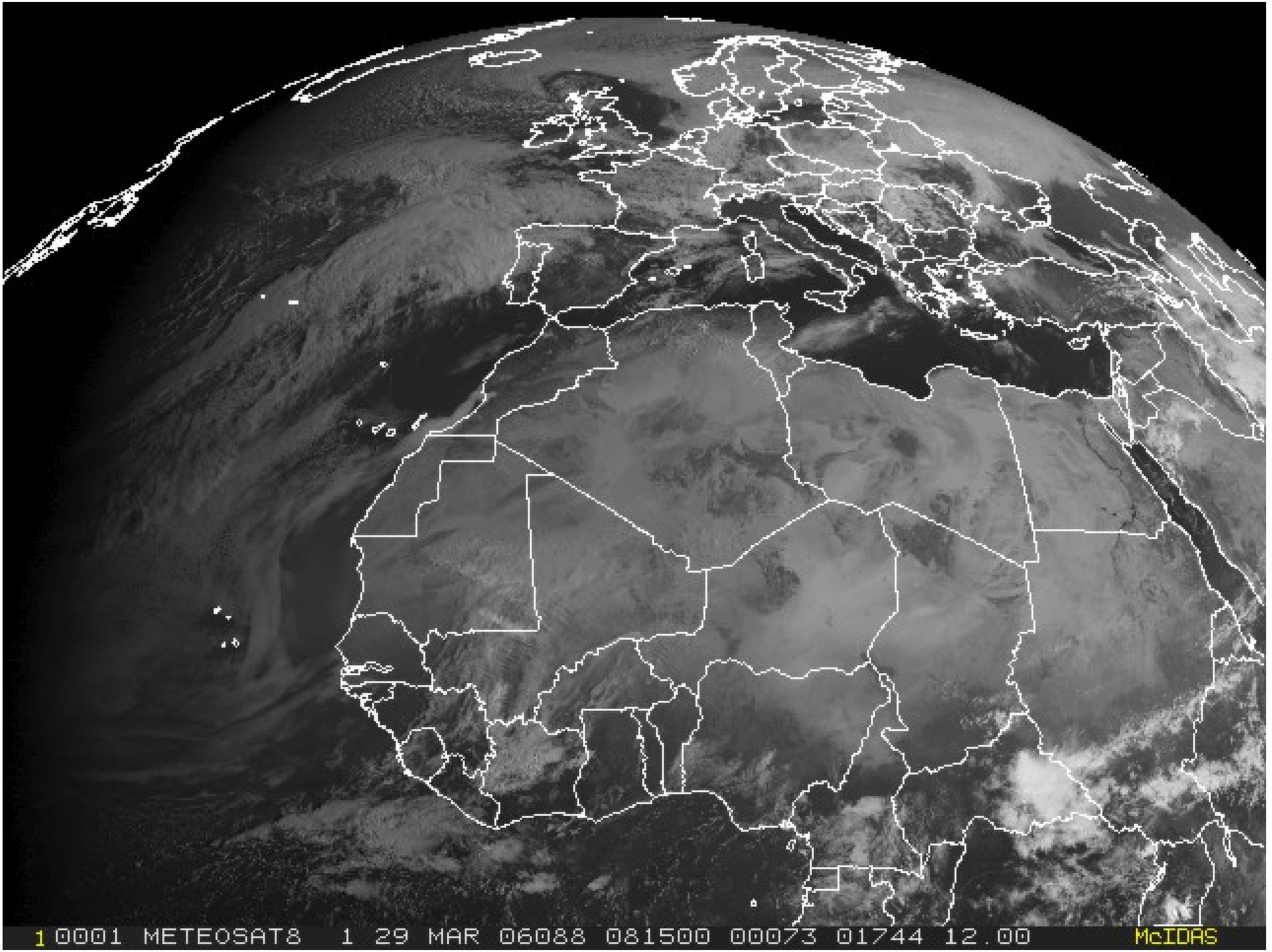

Unfavorable for eclipse
Light
from
Sun
New Moon
Moon's shadow
5.2°
Earth
Earth's shadow
Full Moon
Favorable for eclipse
Light
from
Sun
New Moon
Solar eclipse seen
Earth
Lunar eclipse seen
Full Moon

(a)


Favorable for eclipse
Full
New
Unfavorable for eclipse
Line of nodes
Line of nodes points toward Sun
Sun
Plane of Moon's orbit
New
Full
Favorable for eclipse
New
Line of nodes
Full
Unfavorable for eclipse

(b)


May 31, 2003
Aug. 1, 2008
Mar. 20, 2015
Aug. 21, 2017
June 10, 2002
Mar. 9, 2016
Dec. 14, 2001
July 22, 2009
Apr. 8, 2005
July 2, 2019
Nov. 13, 2012
July 11, 2010
March 29, 2006
Oct. 3, 2005
Nov. 3, 2013
June 21, 2001
Dec. 14, 2020
Dec. 4, 2002
Nov. 13, 2012
Nov. 23, 2003
Nov. 23, 2003
Solar eclipses
2000 – 2020
Total
Annular

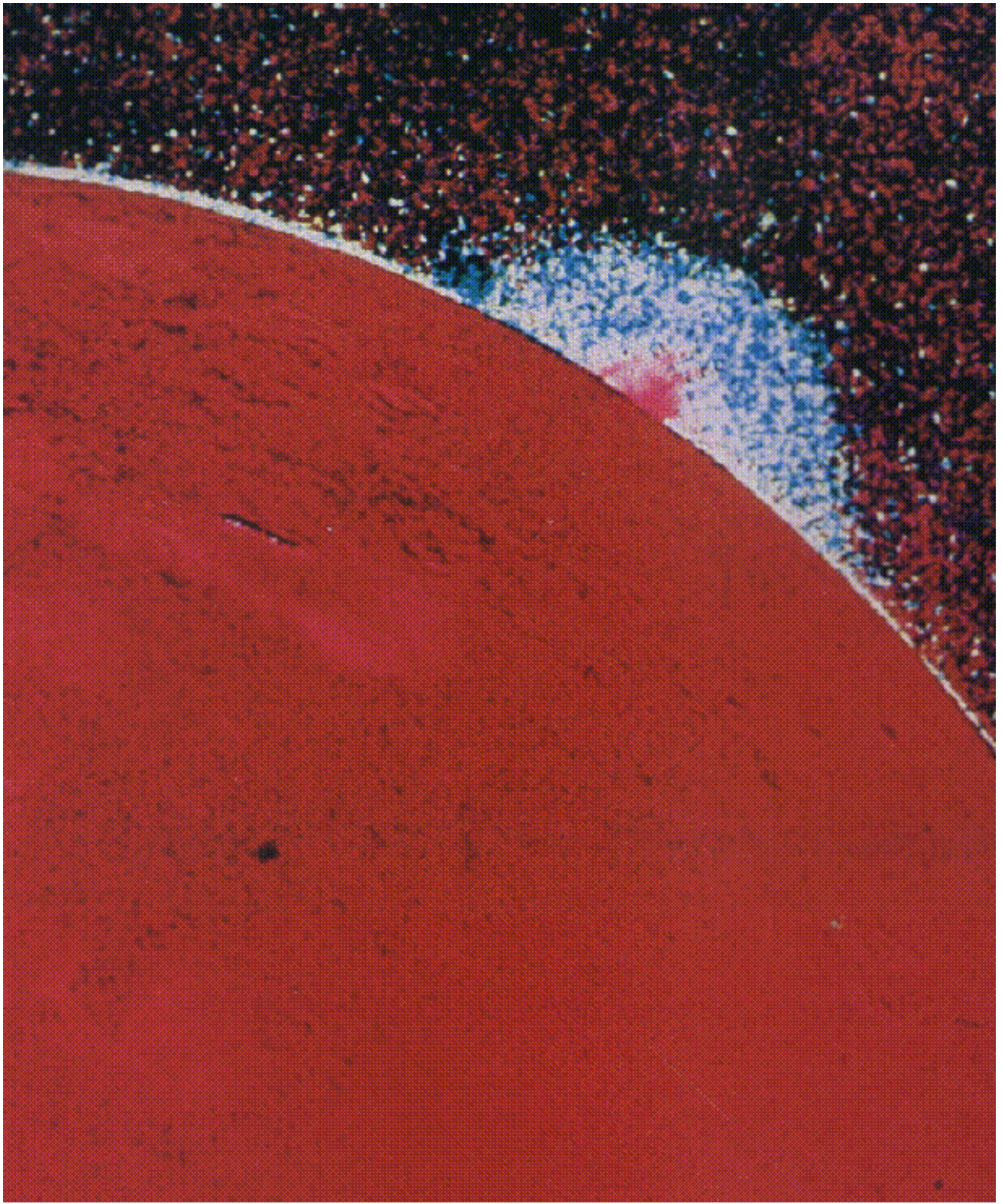

1 0001 METEOSAT8 1 29 MAR 06088 081500 00073 01744 12.00
McIDAS

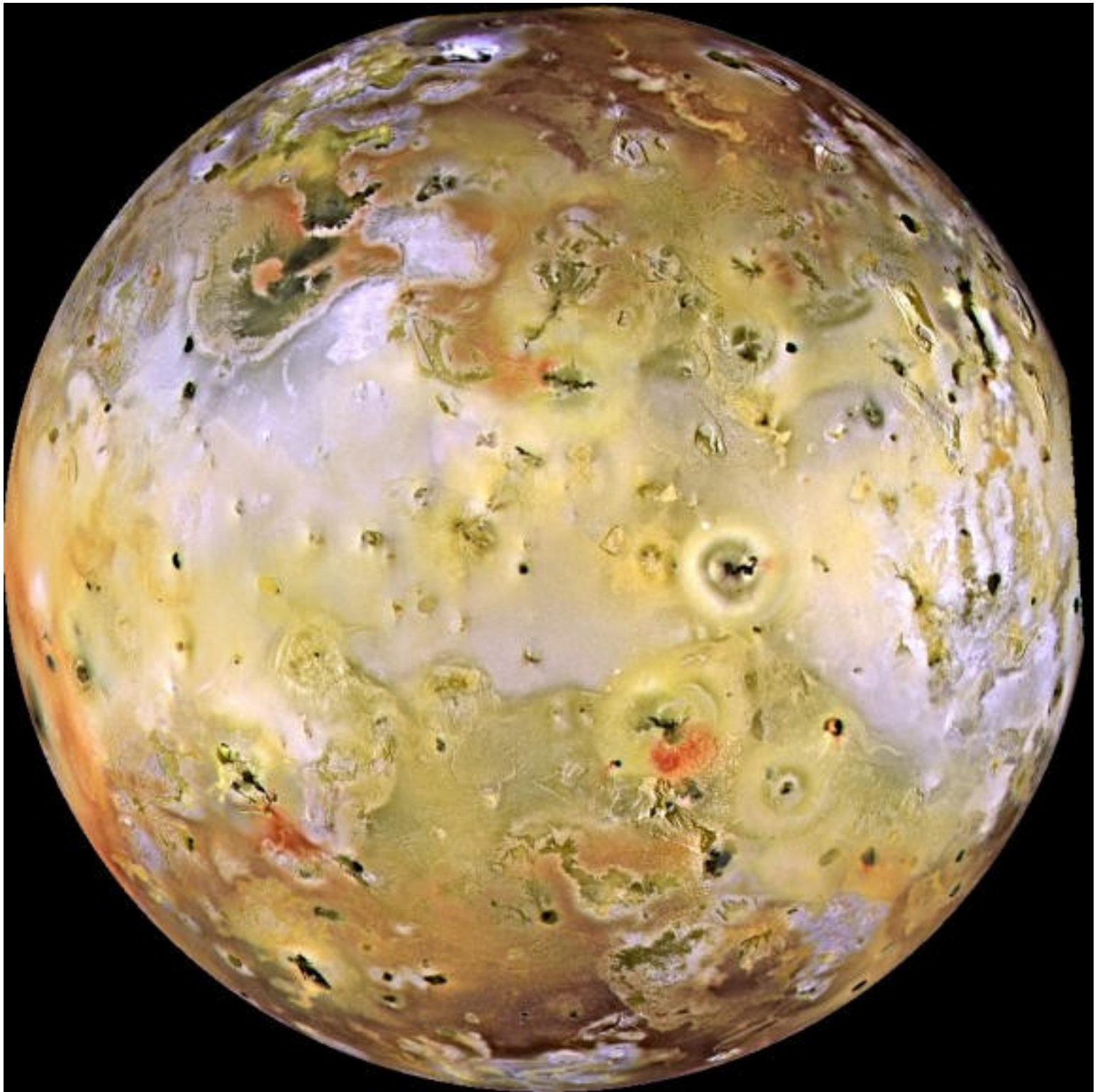
Ocultações e trânsitos

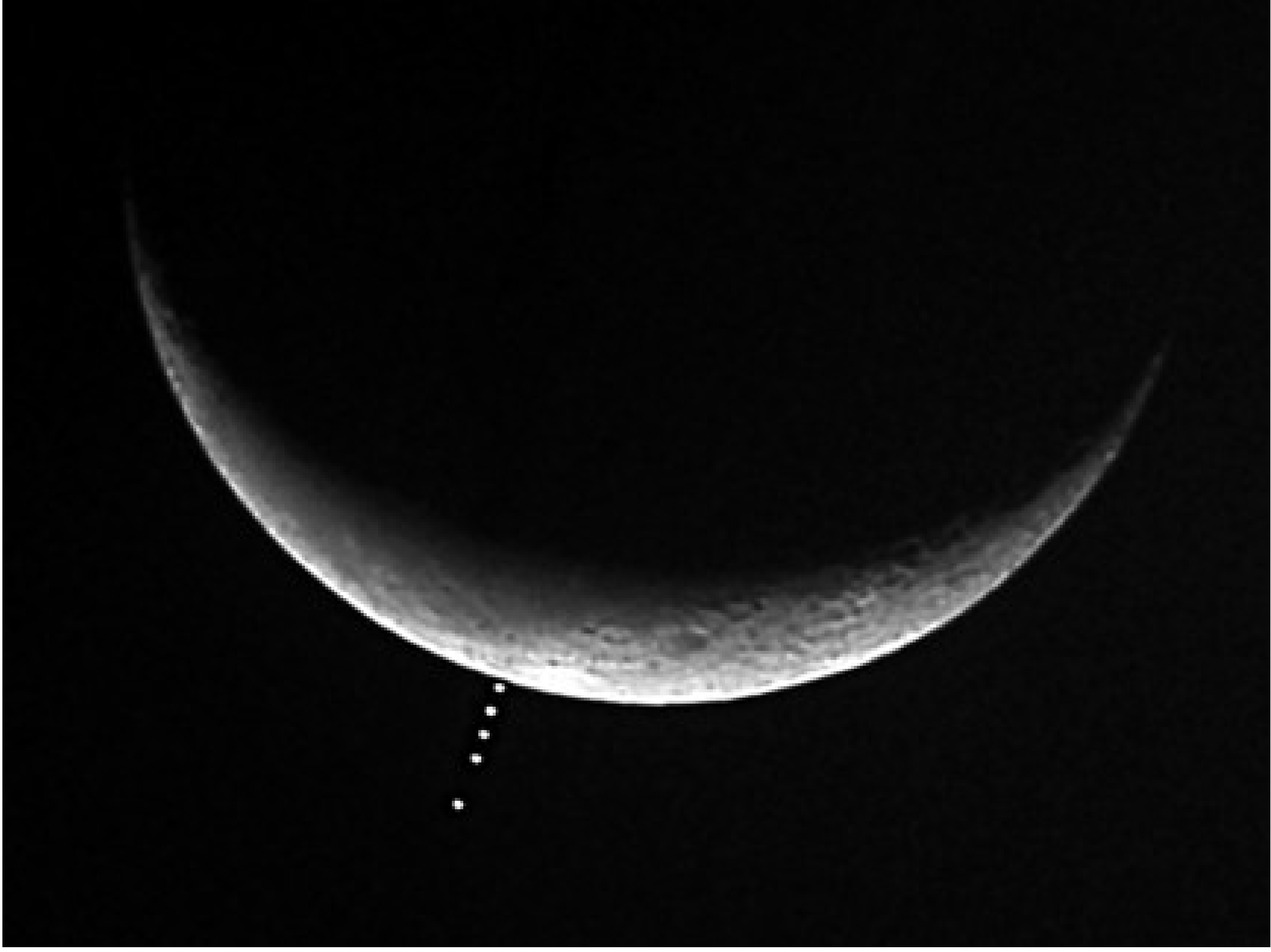
Ocultação – quando um astro tapa a visão do outro

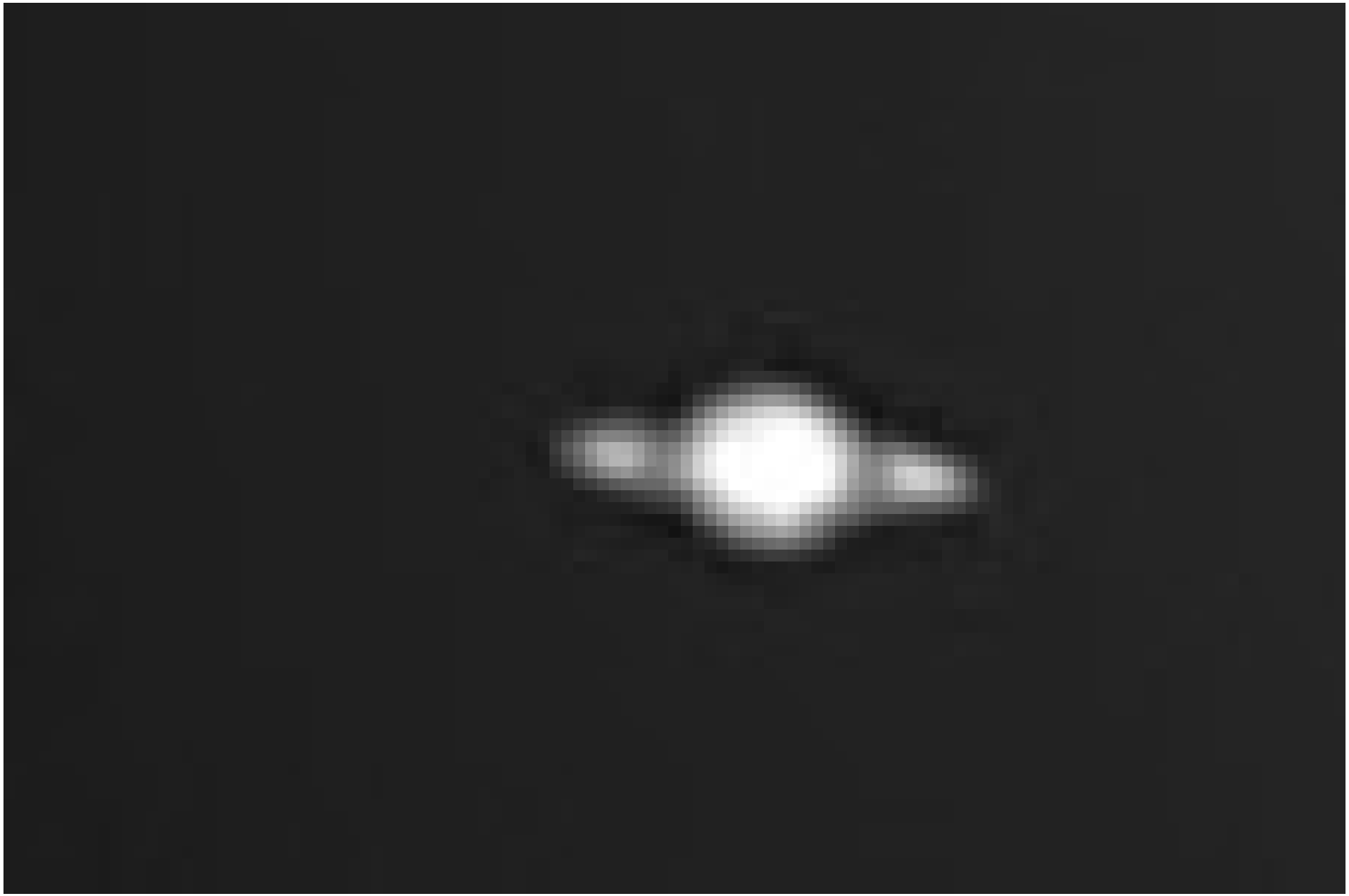
Trânsito – quando um astro pequeno passa na frente do outro.

Ocultações e trânsitos nos dão idéia de distâncias





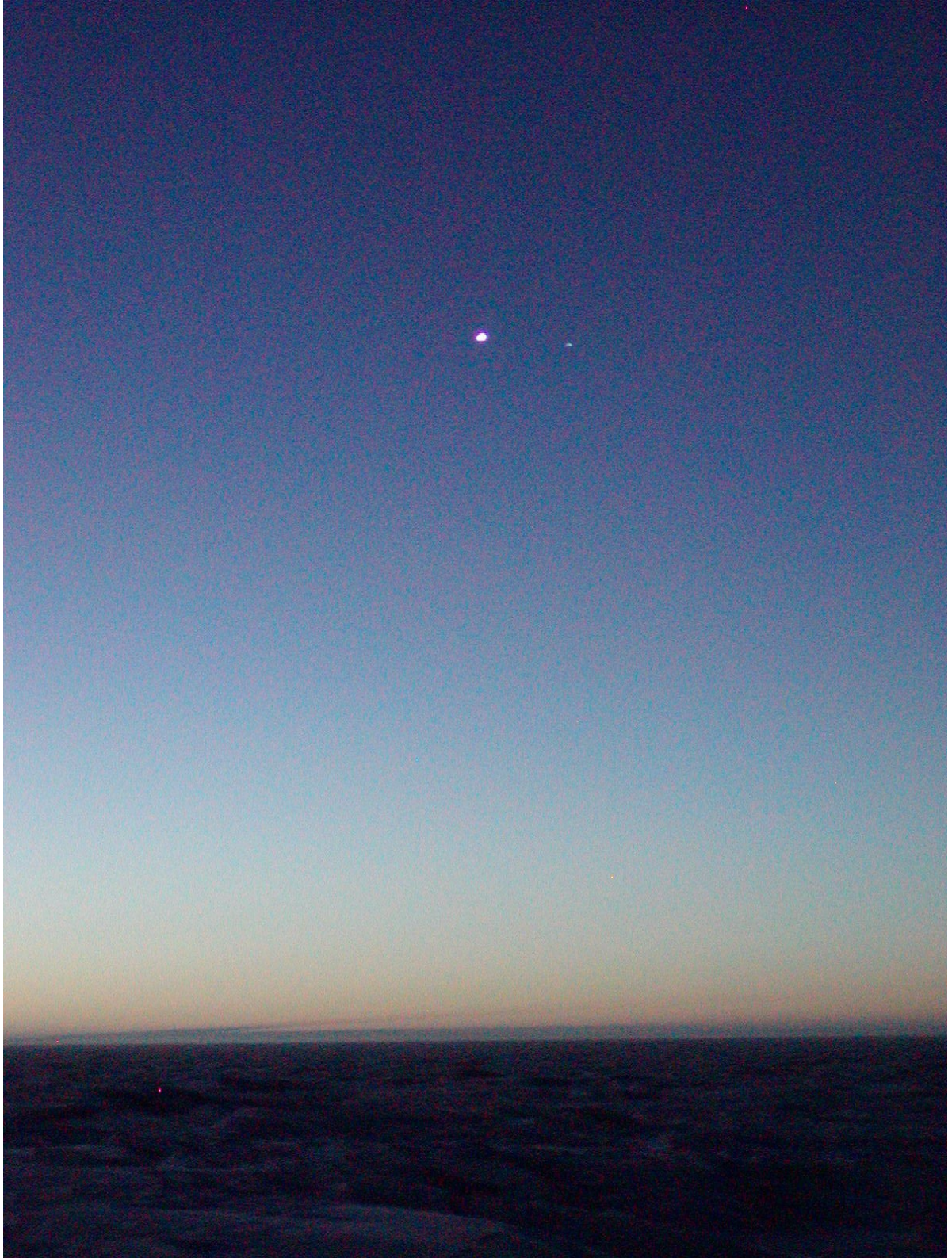




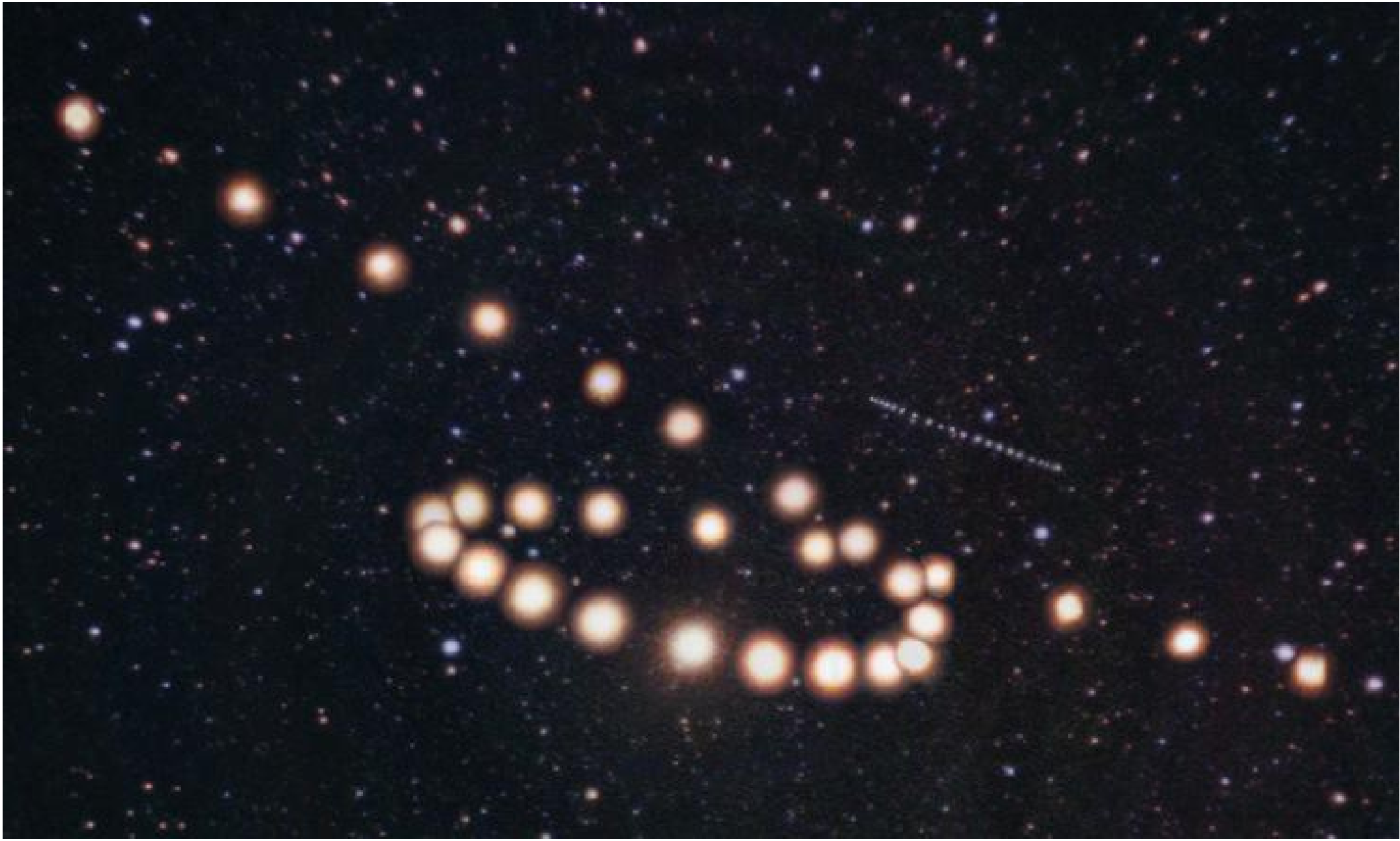
Movimentos dos planetas

internos

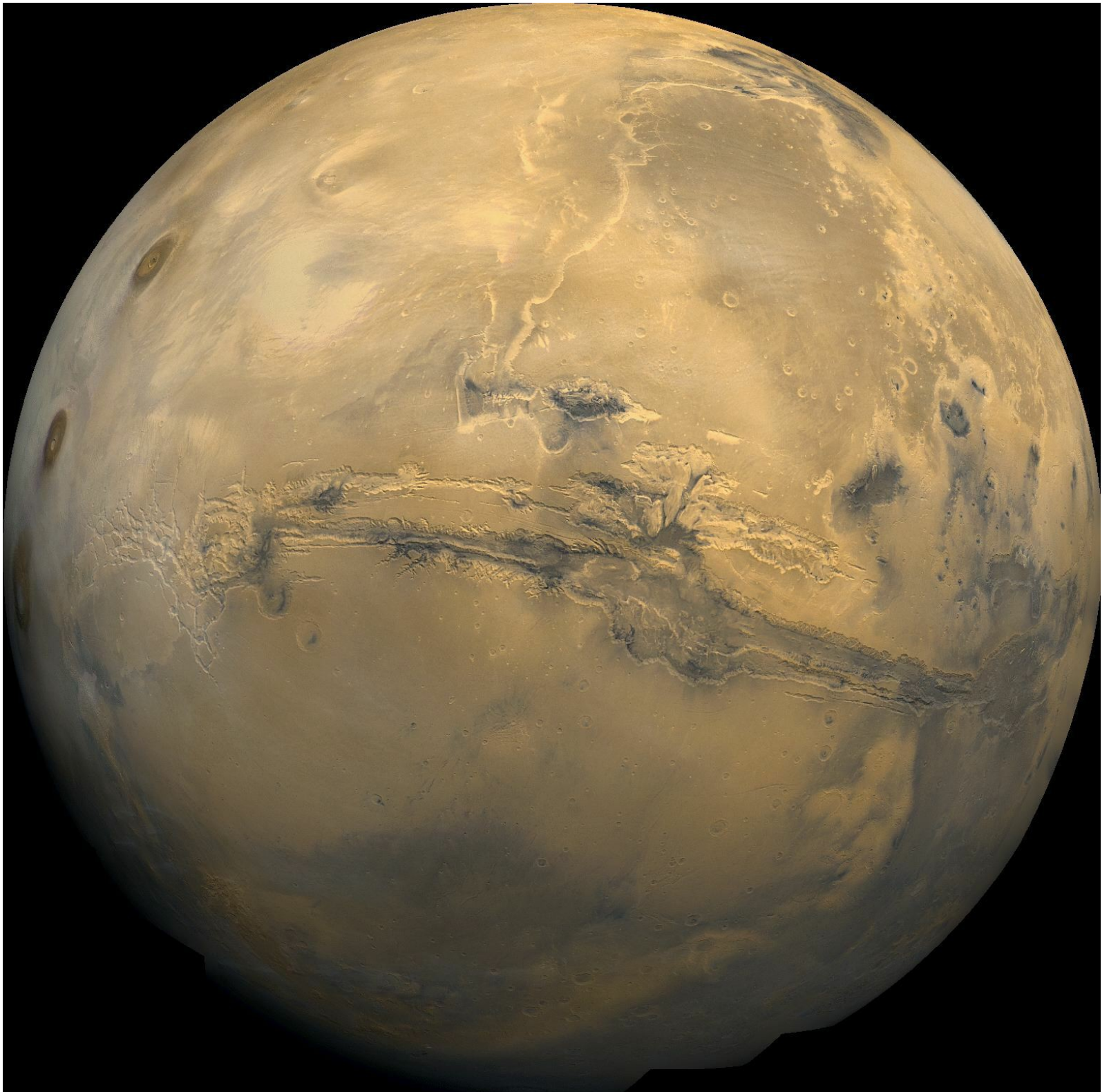
externos

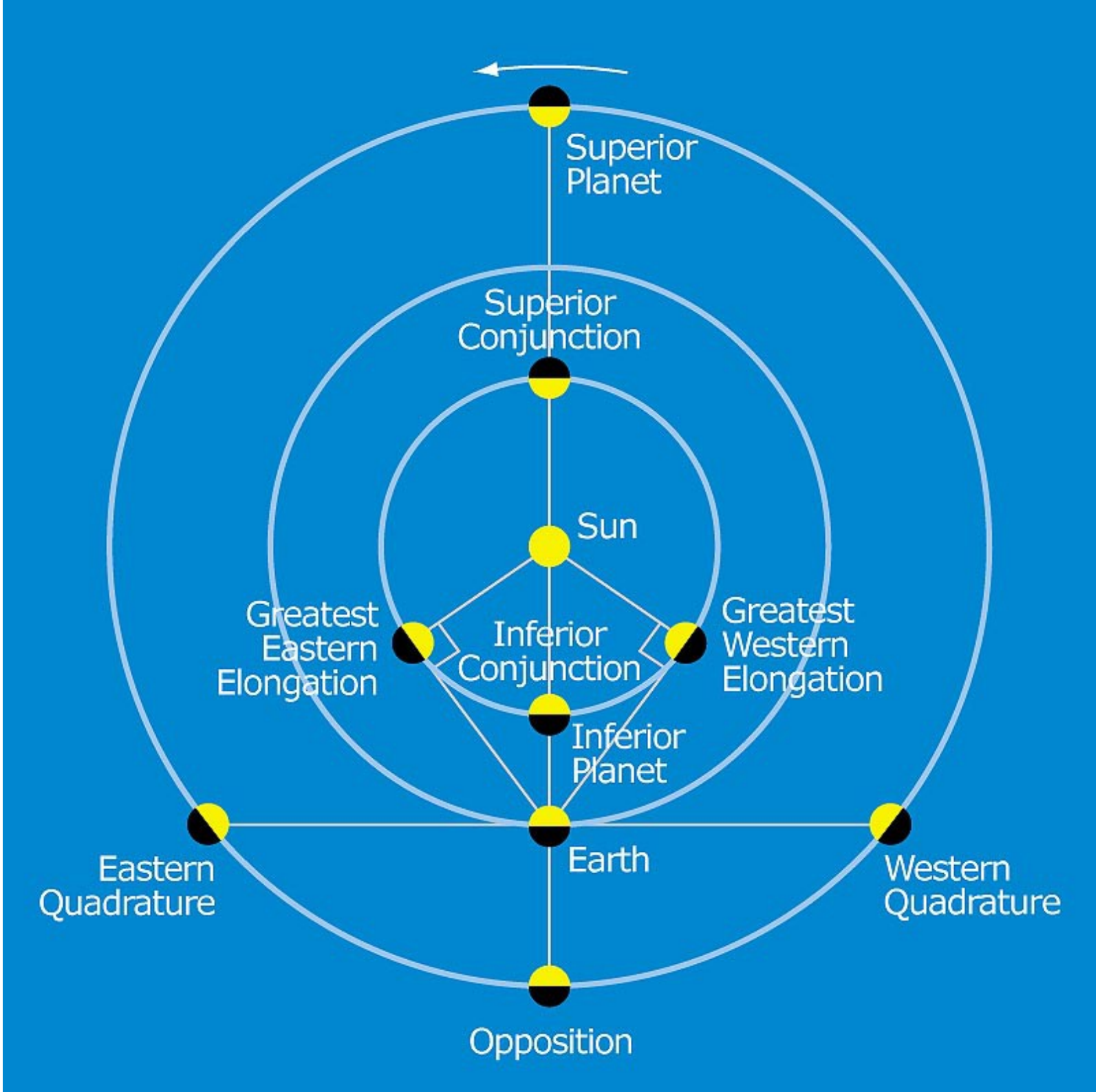


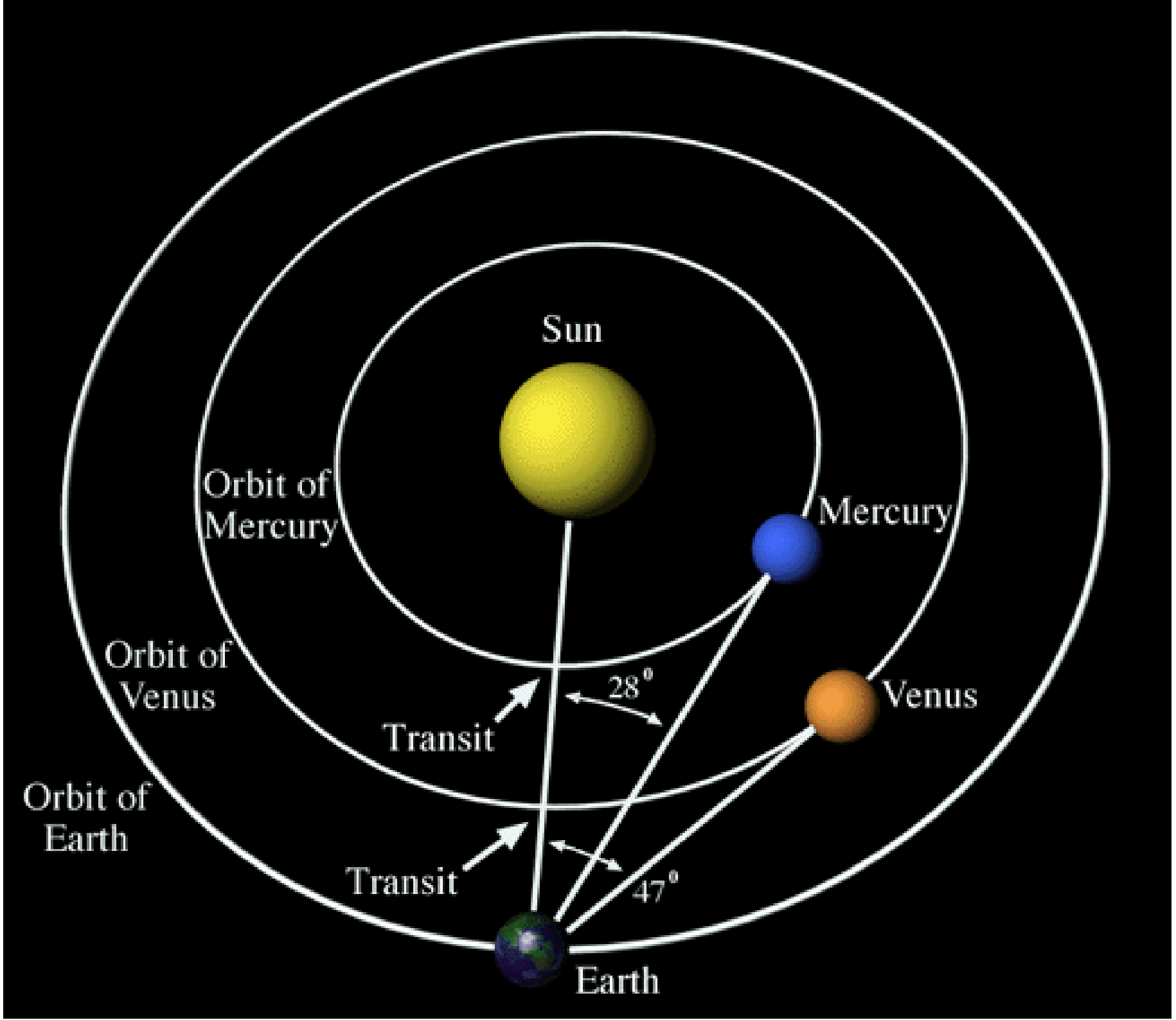

Venus
March 6th 2004 UT 16.25
SCT 8" Celestron
Barlow 3X APO
Vesta Pro + IRCut filter ON
Danny Sivo

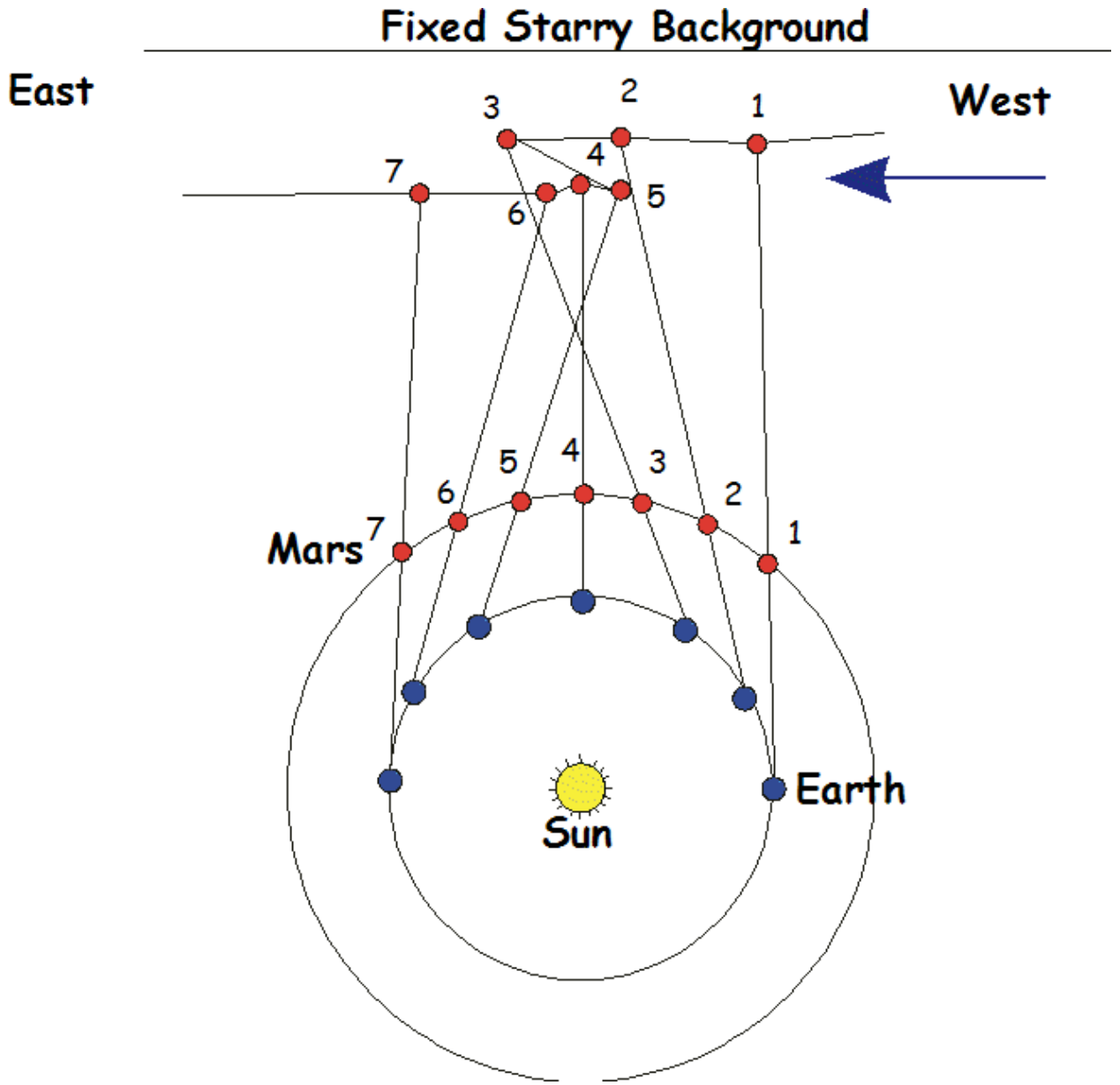



Mars




Superior
Planet
Superior
Conjunction
Sun
Greatest
Eastern
Elongation
Inferior
Conjunction
Greatest
Western
Elongation
Inferior
Planet
Eastern
Quadrature
Earth
Western
Quadrature
Opposition


Sun
Orbit of Mercury
Mercury
Orbit of Venus
28°
Venus
Transit
Orbit of Earth
Transit
47°
Earth


Fixed Starry Background
East
West
3
2
1
4
7
6
5
5
4
3
6
2
Mars
7
1
Sun
Earth

Movimentos dos satélites

sistema solar em miniatura

Mostrar filminho:

anim_jup_satellites.gif