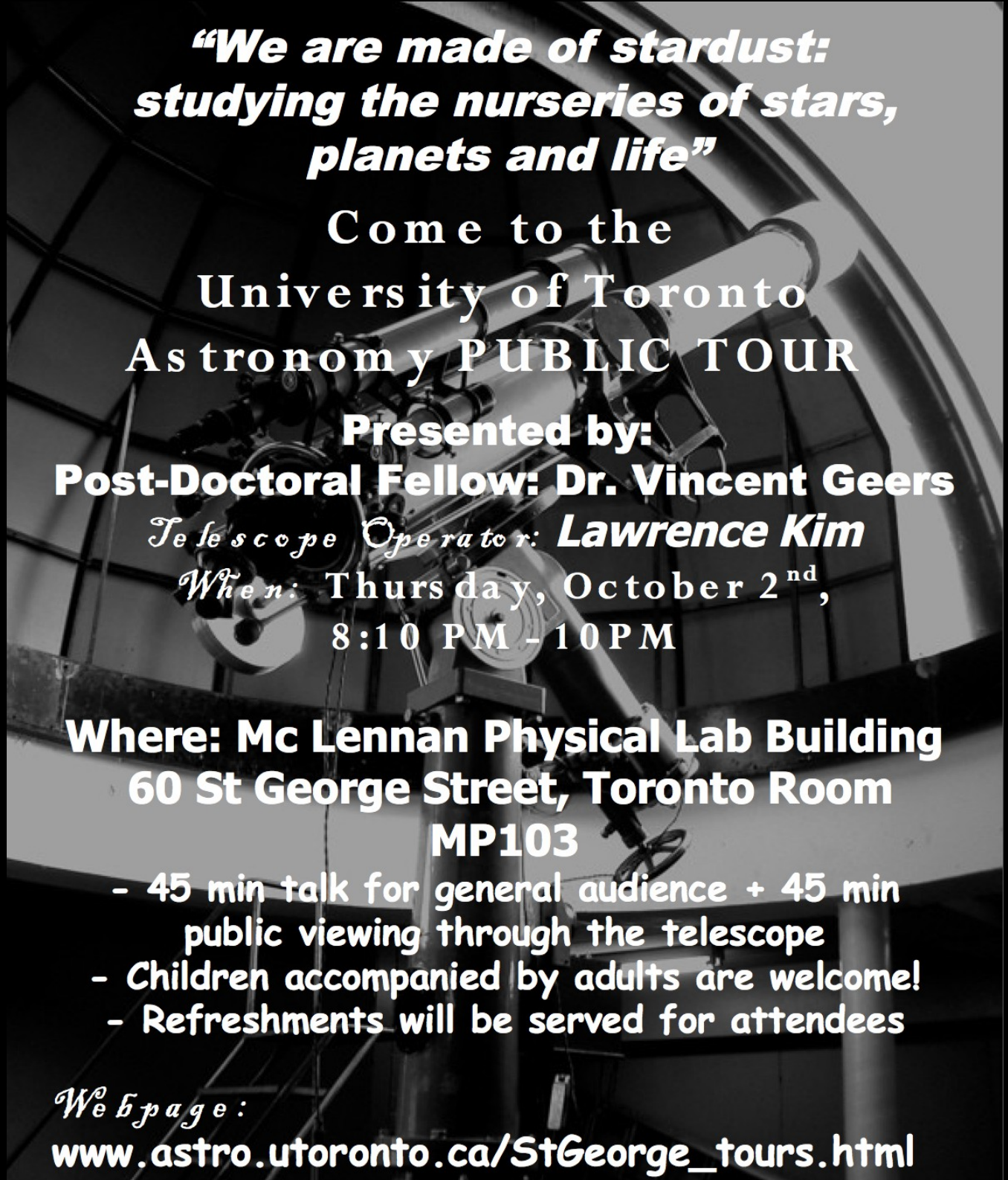
Is this a falsifiable statement?

God Exists.



"We are made of stardust: studying the nurseries of stars, planets and life"

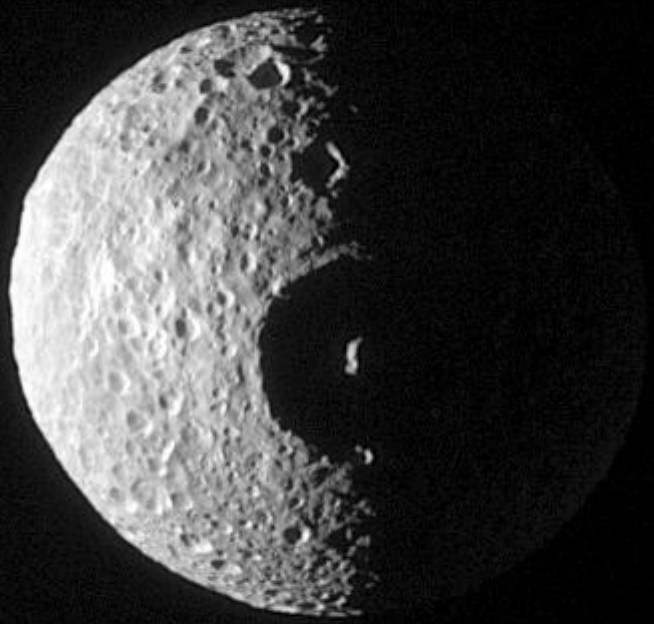
Come to the University of Toronto Astronomy PUBLIC TOUR

Presented by:
Post-Doctoral Fellow: Dr. Vincent Geers
Telescope Operator: ***Lawrence Kim***
When: Thursday, October 2nd,
8:10 PM - 10PM

Where: Mc Lennan Physical Lab Building
60 St George Street, Toronto Room MP103

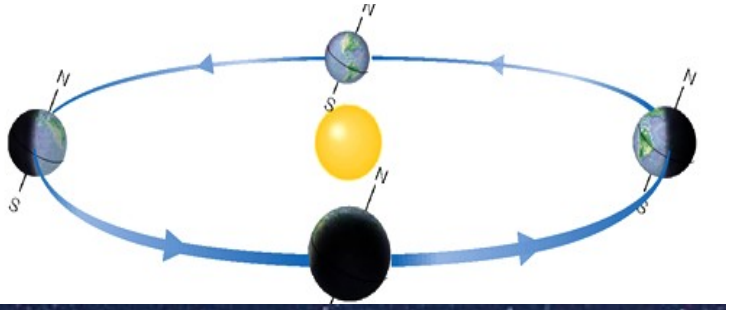
- 45 min talk for general audience + 45 min public viewing through the telescope
- Children accompanied by adults are welcome!
- Refreshments will be served for attendees

Webpage:
www.astro.utoronto.ca/StGeorge_tours.html



Astronomy Common Senses

What is special about Polaris?

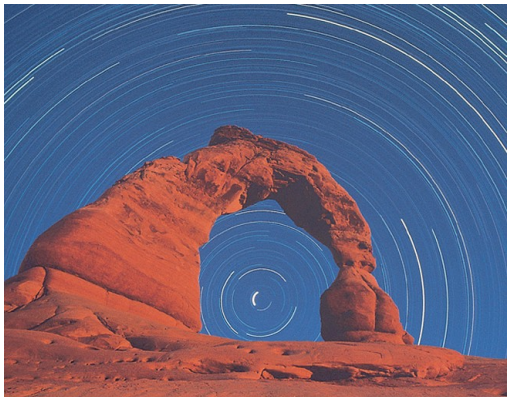


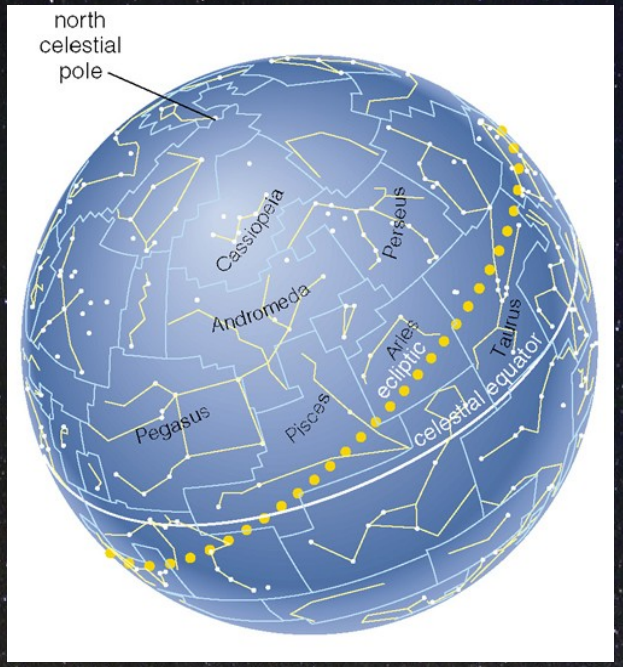
Polaris

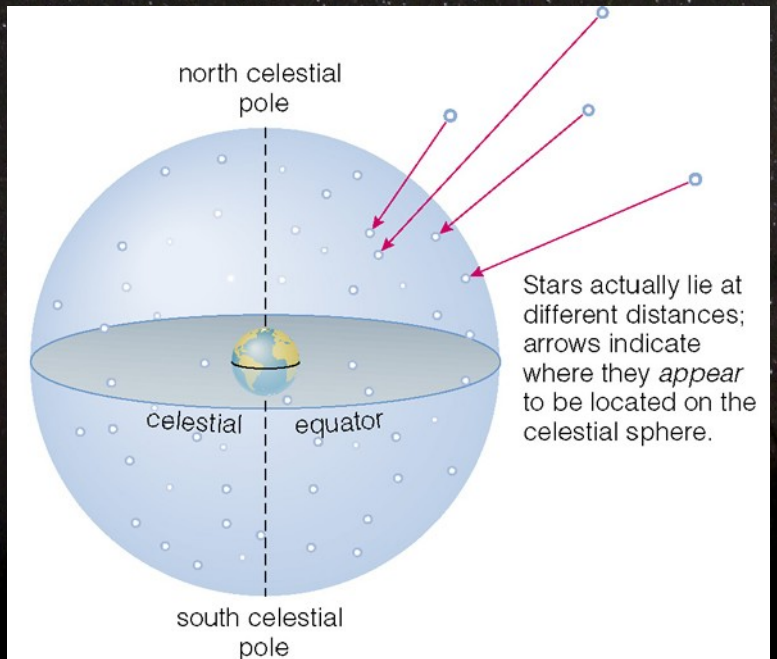
23.5°

Big dipper

Polaris



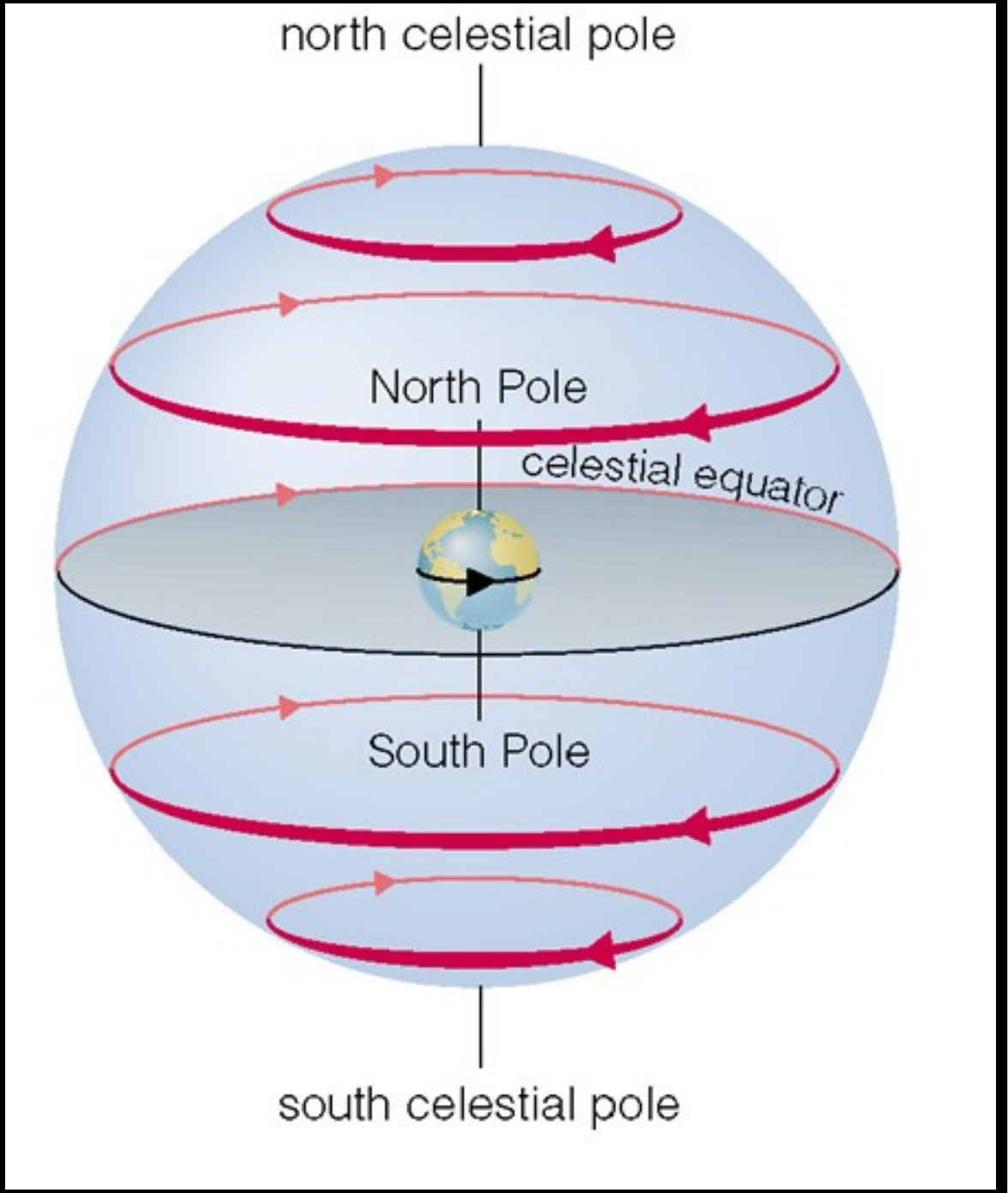

north
celestial
pole
Cassiopeia
Perseus
Andromeda
Aries
ecliptic
Taurus
celestial equator
Pegasus
Pisces


north celestial
pole
celestial
equator
south celestial
pole
Stars actually lie at
different distances;
arrows indicate
where they *appear*
to be located on the
celestial sphere.

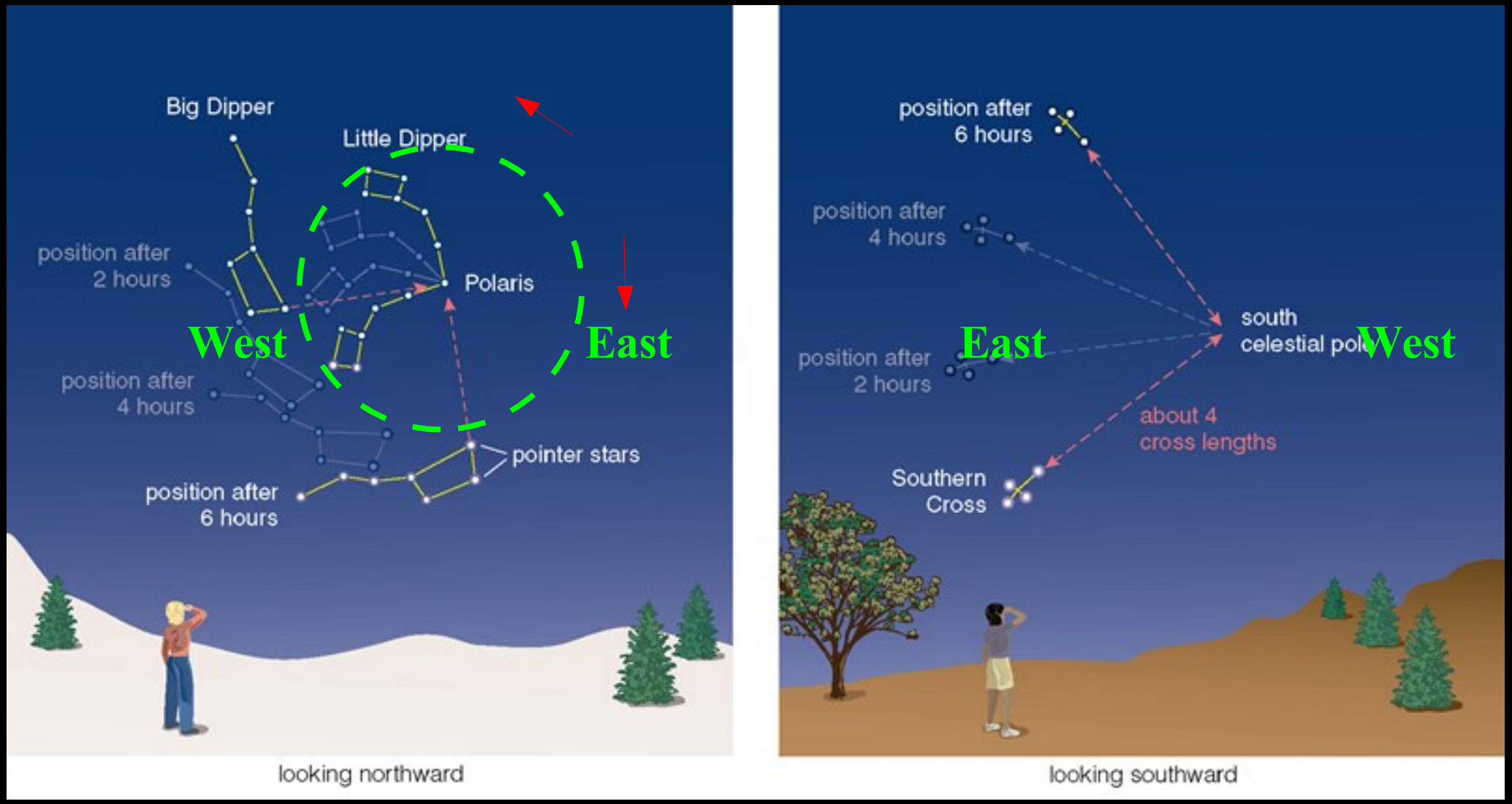
The Earth spins around its axis (from west to east)

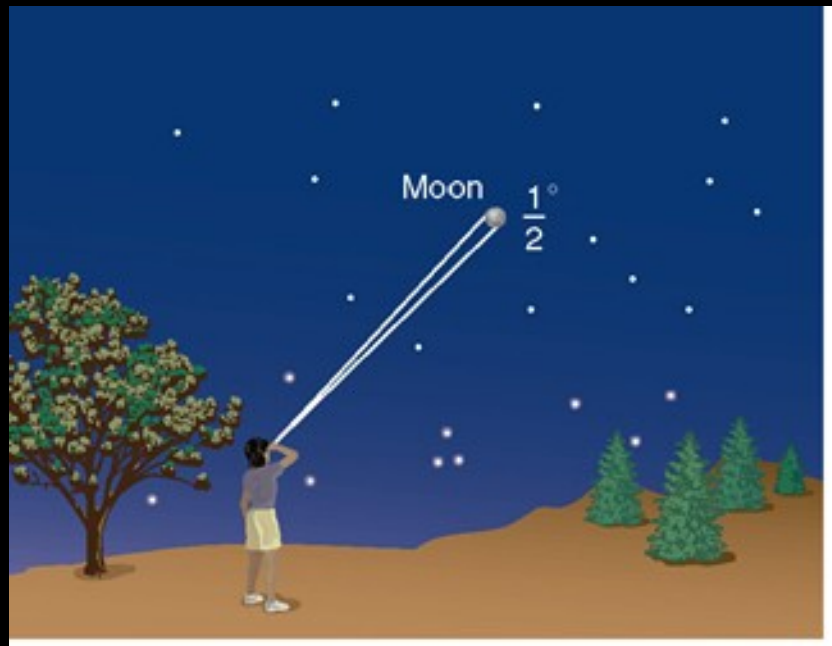
and celestial objects
appear to move oppositely

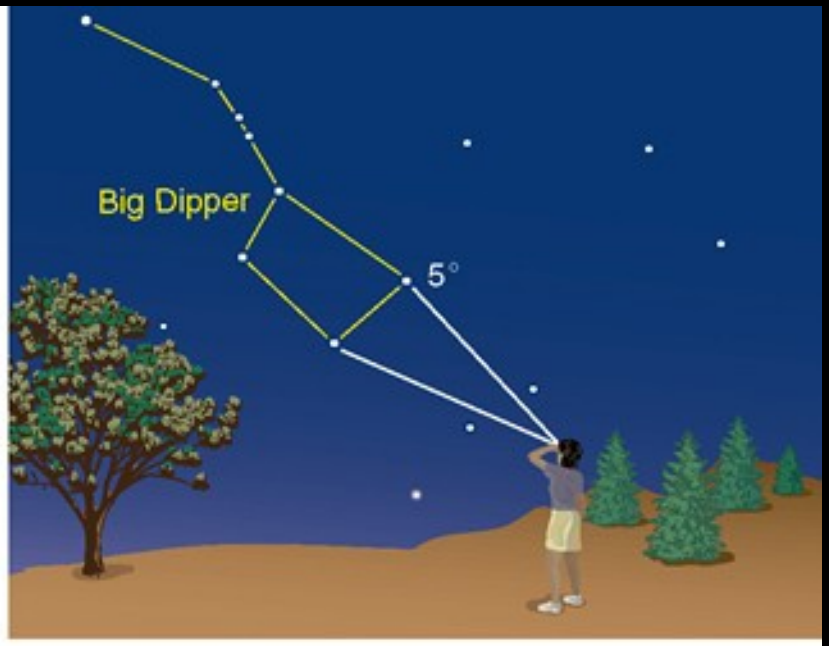
e.g.,
the Sun rises in the east,
and sets in the west



Do stars also rise in the east and set in the west?







(also the Sun)

How many hours before the sun sets/rises?

Sun/star run ~ 15°/hour

Sun set & Sun rise

Yes or No?

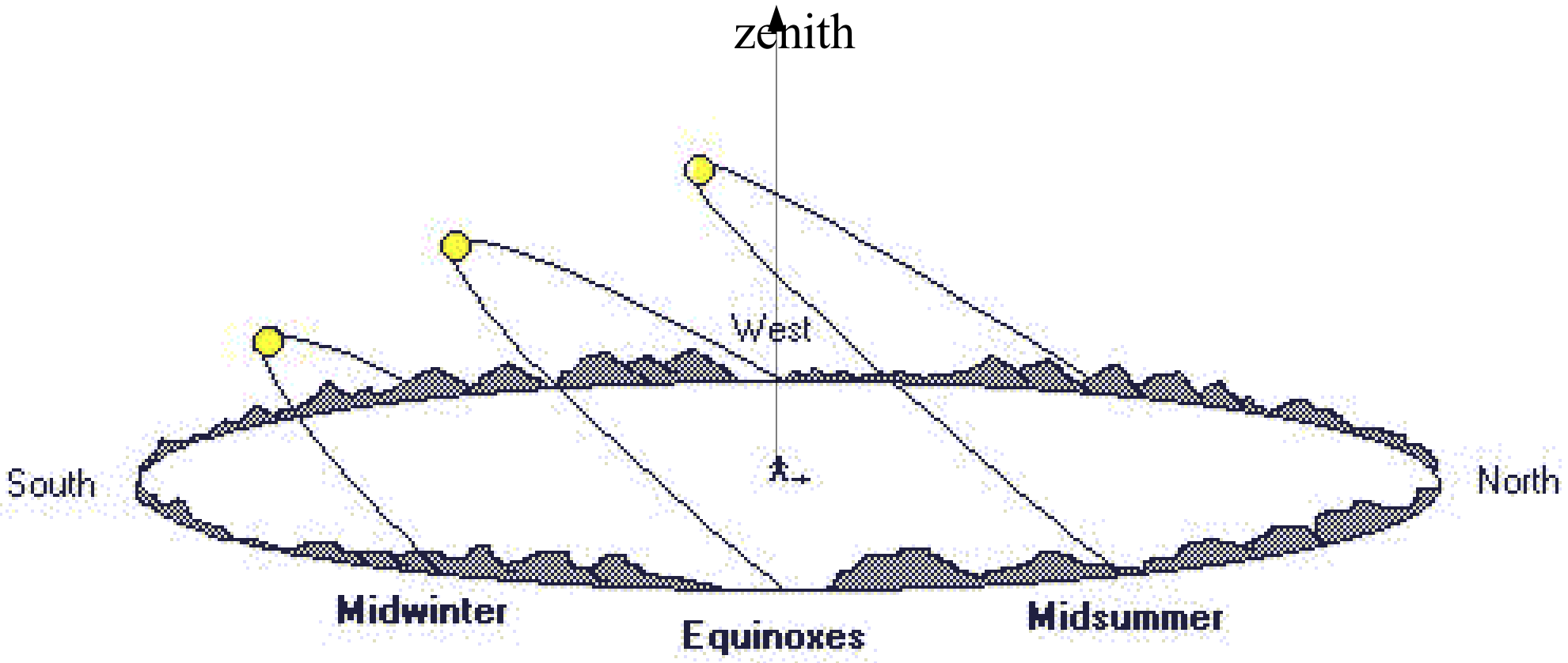
In Toronto, if your window is north facing, you would never be able to see direct sunlight from this window.

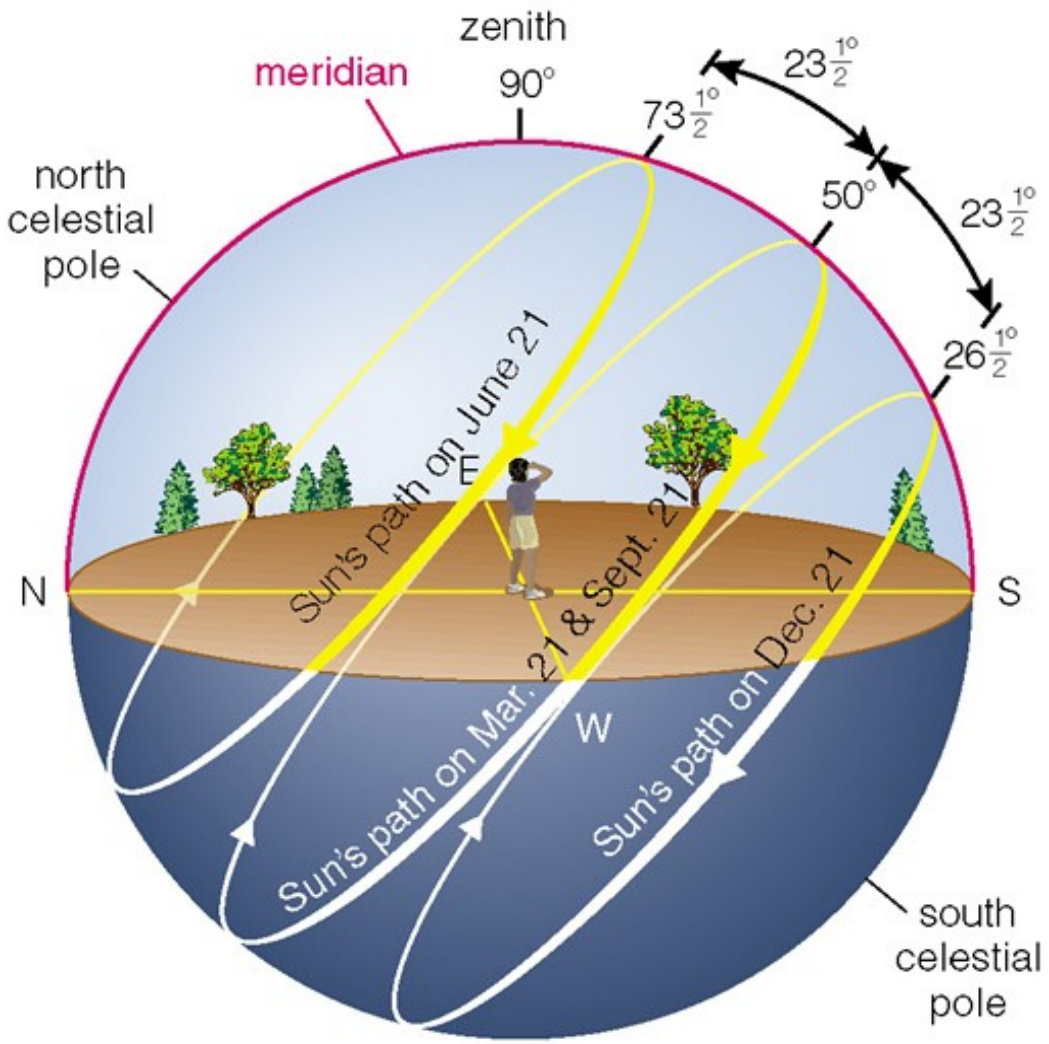
The directions of sun rise/set & city grids

In midsummer, the Sun comes closest to zenith

(how close it gets depends on your lattitude)

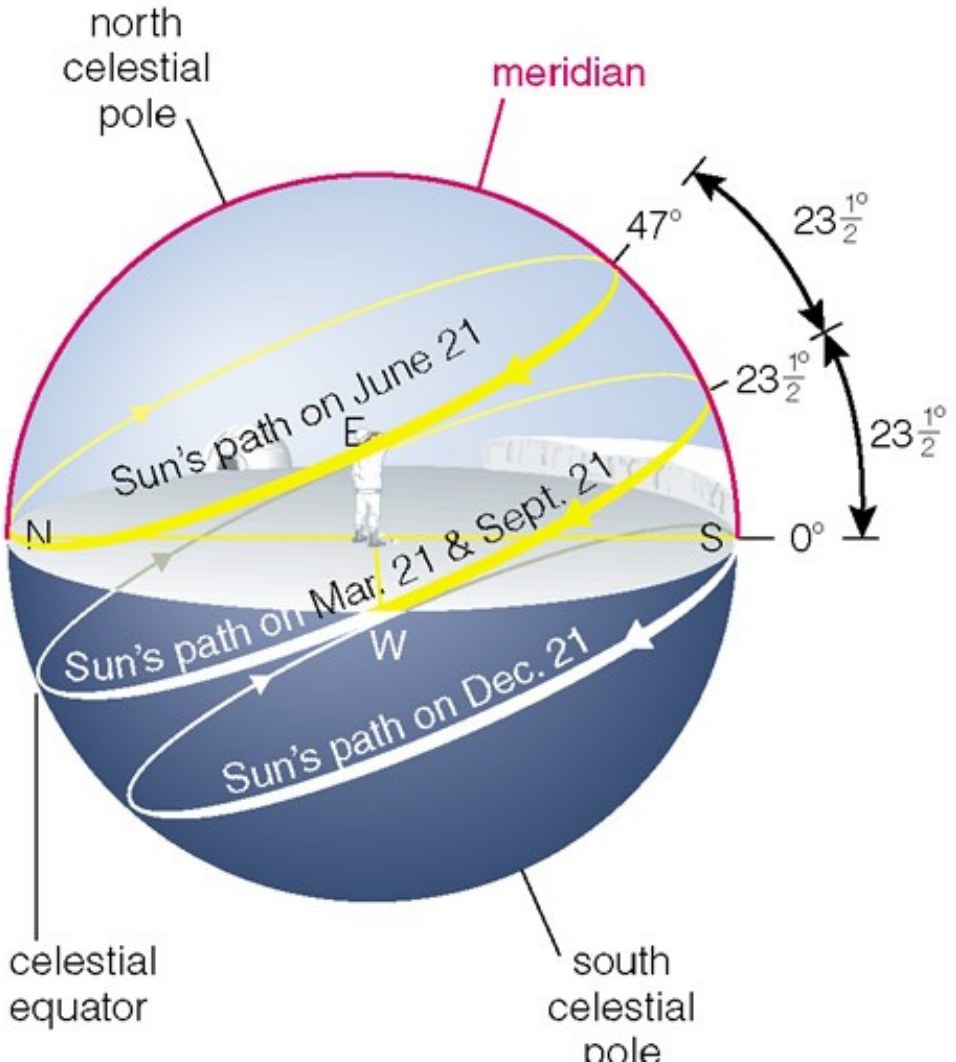
In winter, the Sun hangs low above the horizon.





If you are in Toronto

... Hudson Bay

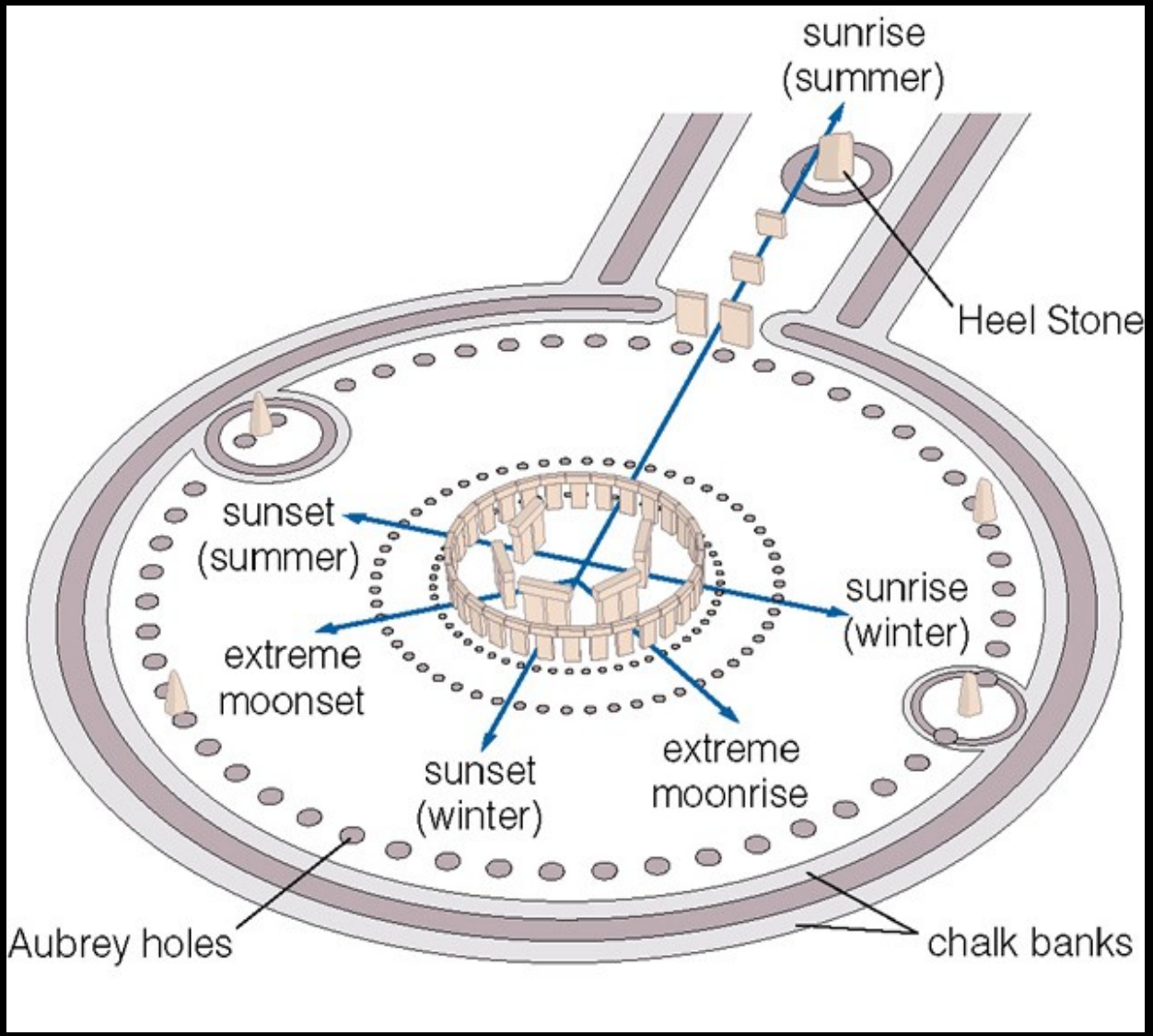


The directions of sun-rise/sun-set tell

1) where you are on Earth if you know the date

2) season, if you know where you are on Earth

Pre-historics used sun set/rise positions to determine season



Origin of Seasons:
why is summer hotter?

1) The Earth is closer to the Sun in the summer.

1 Hand

2) The Earth's spin axis is tilted relative to the orbit. So the Northern hemisphere is closer to the Sun in the summer.

2 Hands

3) Daylight (sunrise to sunset) lasts longer in the summer.

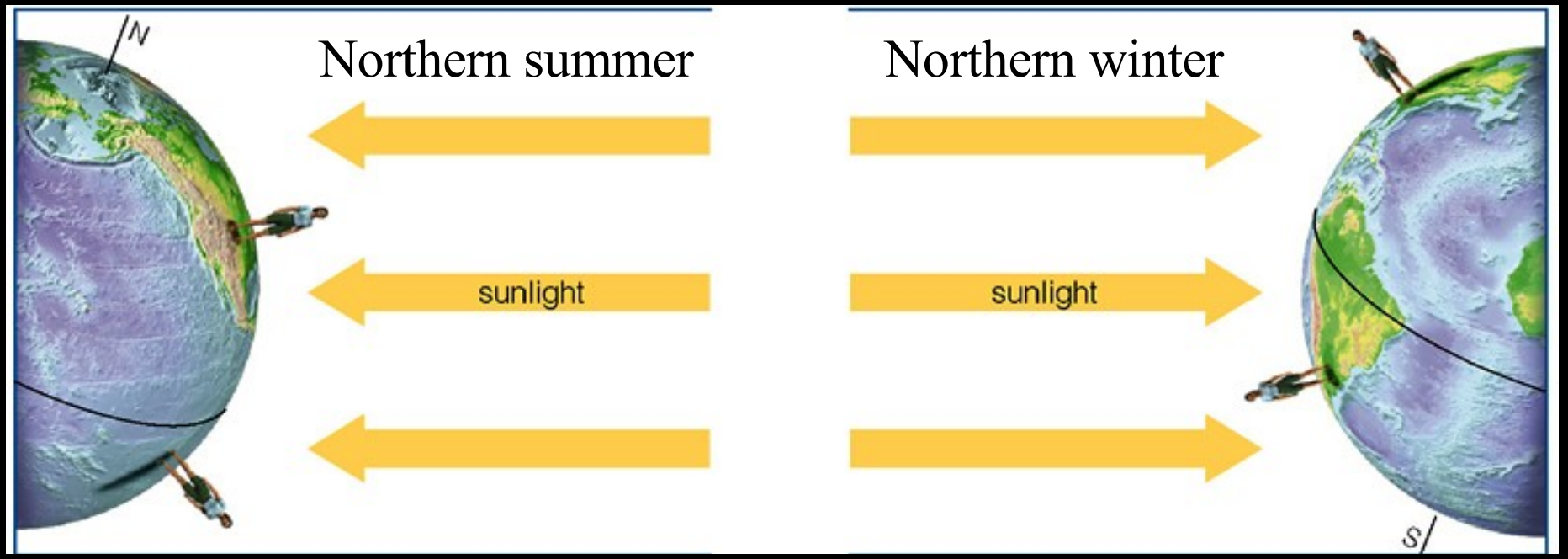
Pray Sign

4) The Earth's axis is tilted. During the Northern summer the Sun shines straighter overhead in the Northern hemisphere.

Stop Sign

5) None of the above.

Shout!


N
Northern summer
Northern winter
sunlight
sunlight
S

Polaris

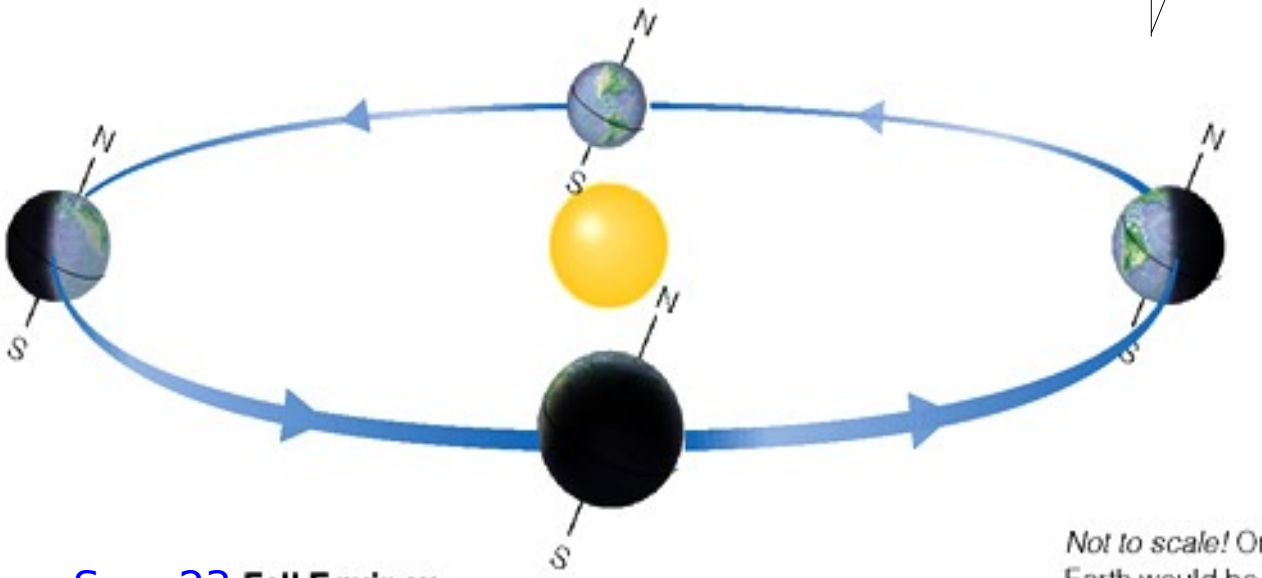
~March 23

Spring Equinox
The Sun shines equally on both hemispheres. Northern Hemisphere is entering spring; Southern Hemisphere is entering fall.

23.5°

~June 21

Summer Solstice
Northern Hemisphere receives its most direct sunlight of the year (beginning of summer); Southern Hemisphere receives its least direct sunlight (beginning of winter).



~ Dec. 21st

Winter Solstice
Northern Hemisphere receives its least direct sunlight of the year (beginning of winter); Southern Hemisphere receives its most direct sunlight (beginning of summer).

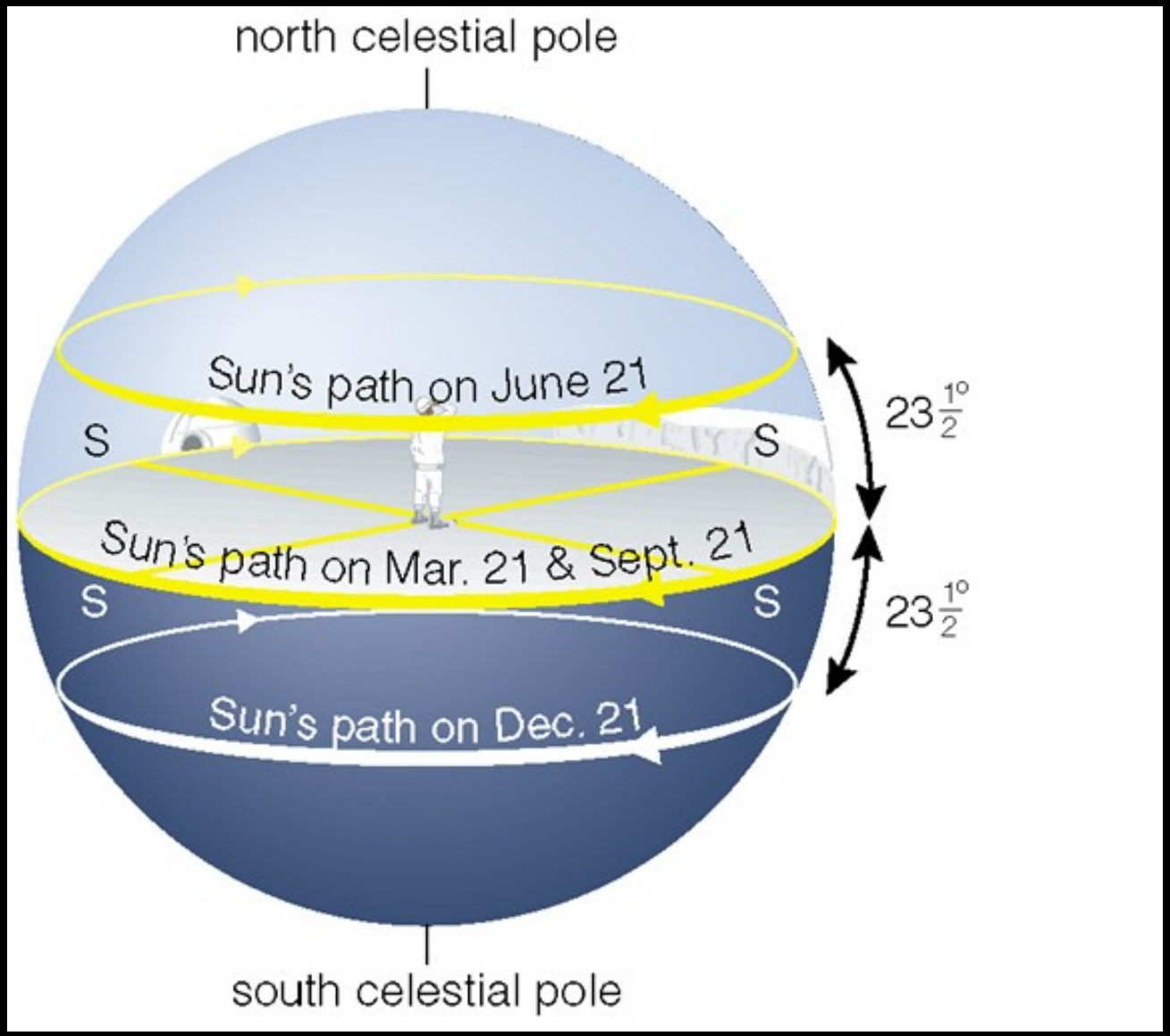
Not to scale! On the scale the orbit is drawn, Earth would be too small to see (and the Sun would be a tiny dot).

~Sep. 23 **Fall Equinox**
The Sun shines equally on both hemispheres. Northern Hemisphere is entering fall; Southern Hemisphere is entering spring.

We are **NOT** closer to the Sun during Summer.

(in fact, we are slightlyer further)

Why is the arctic/antarctic so cold?



June 21st, Antartica

Why does the Moon change its appearances every month?

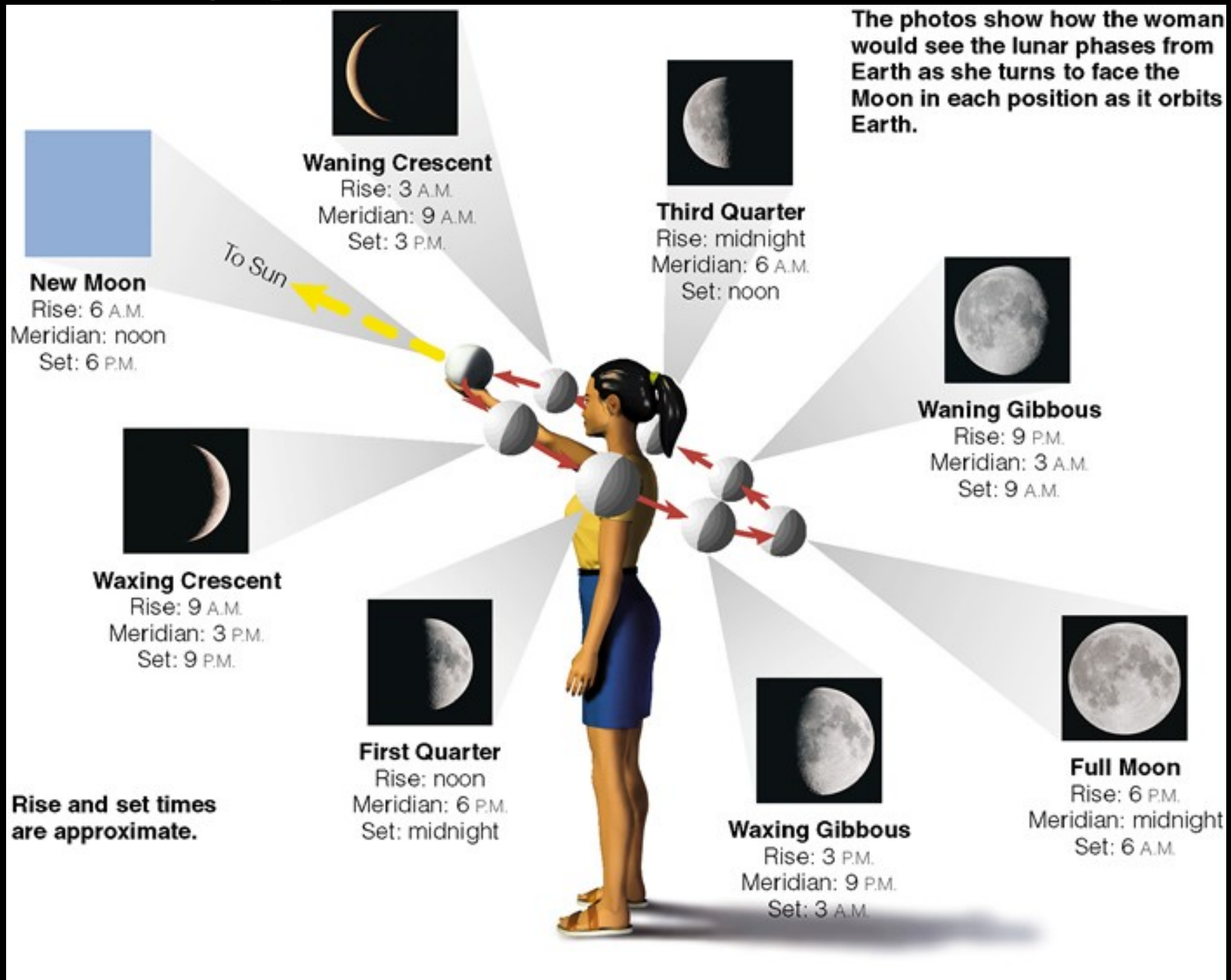
---- Phases of the Moon

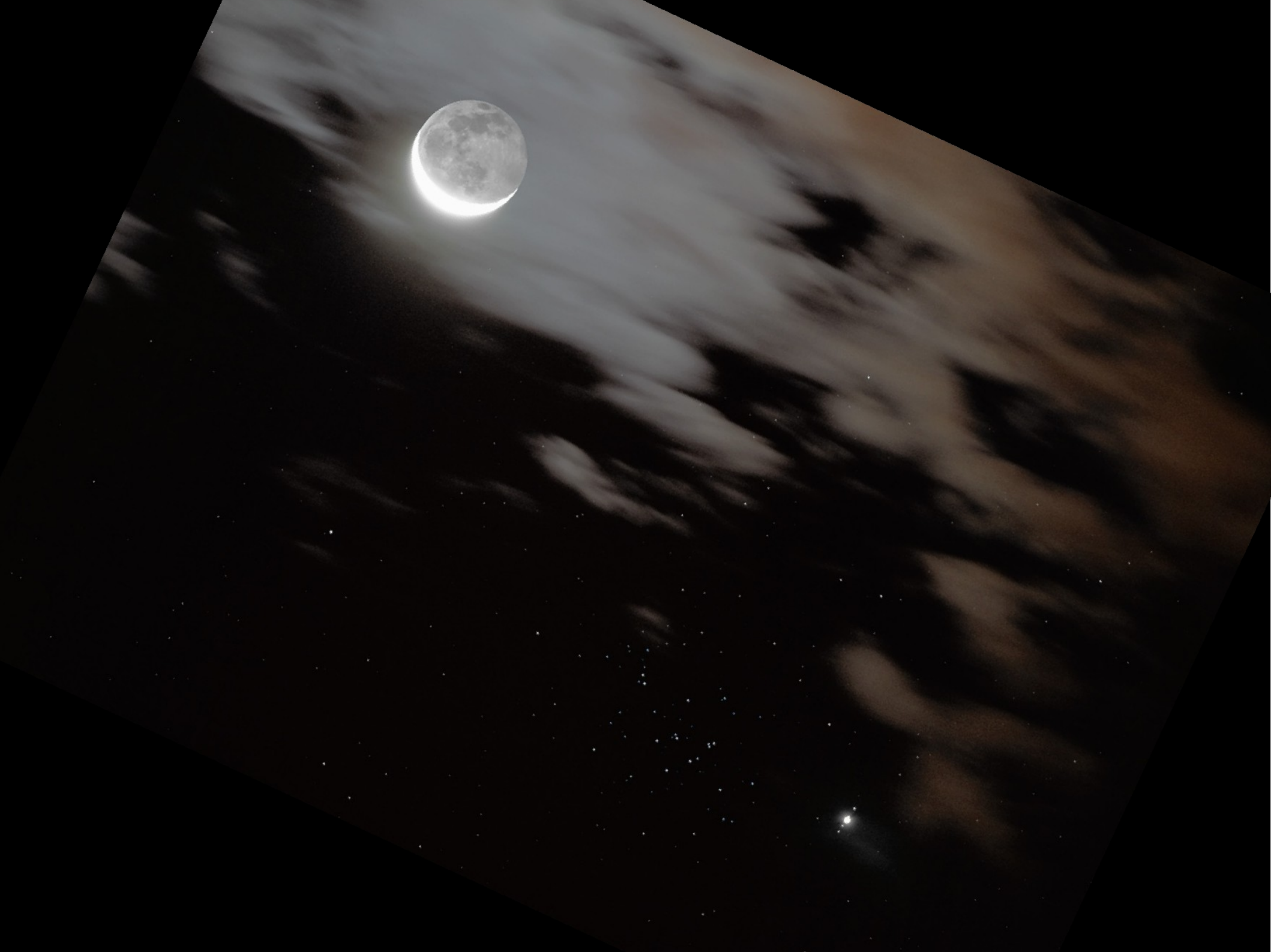
Is it shadow cast by the Earth?

Virtual Reality Phase of the Moon

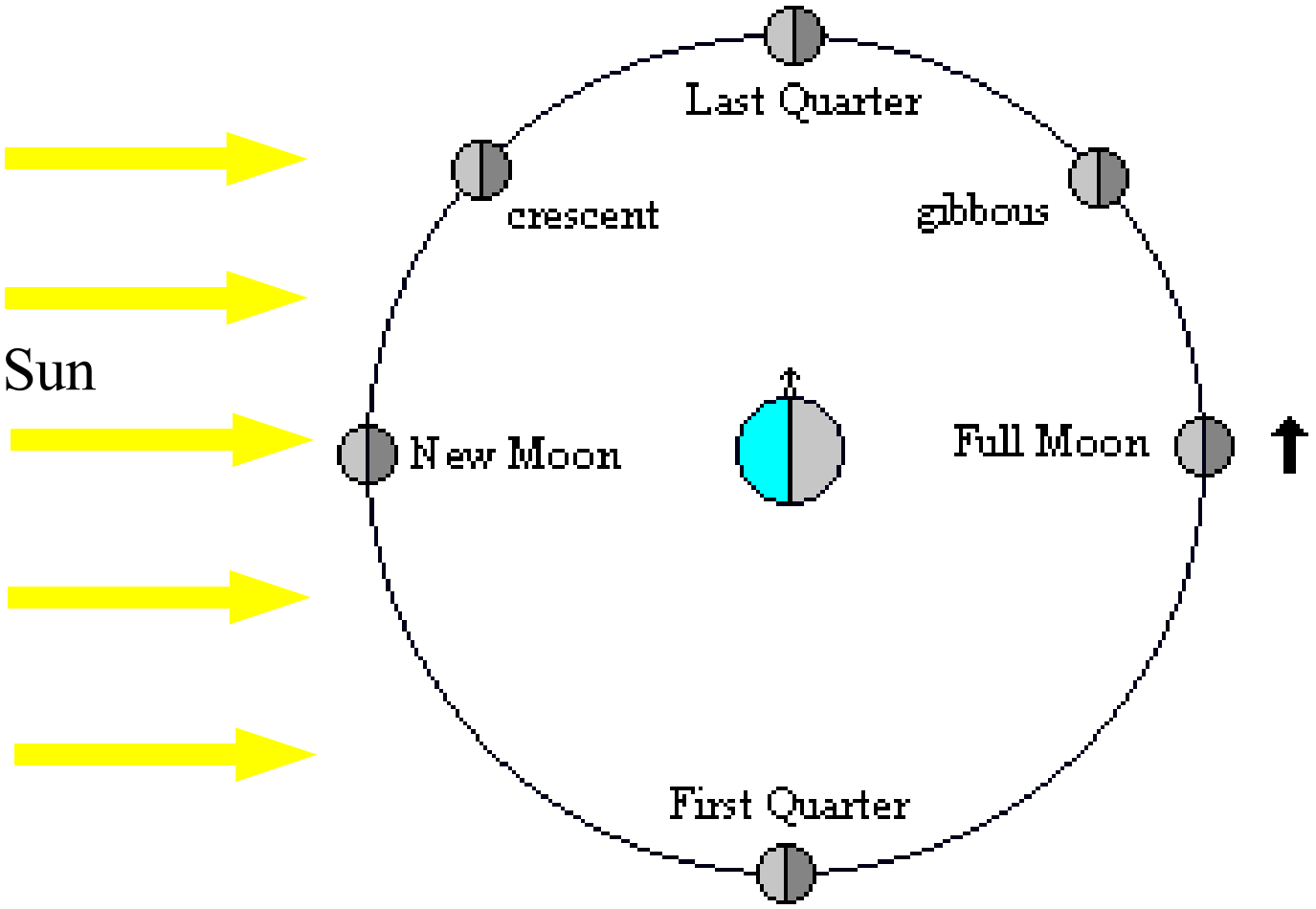
2008 September 30, 0 hrs UT

The Moon changes phases because it orbits around us.



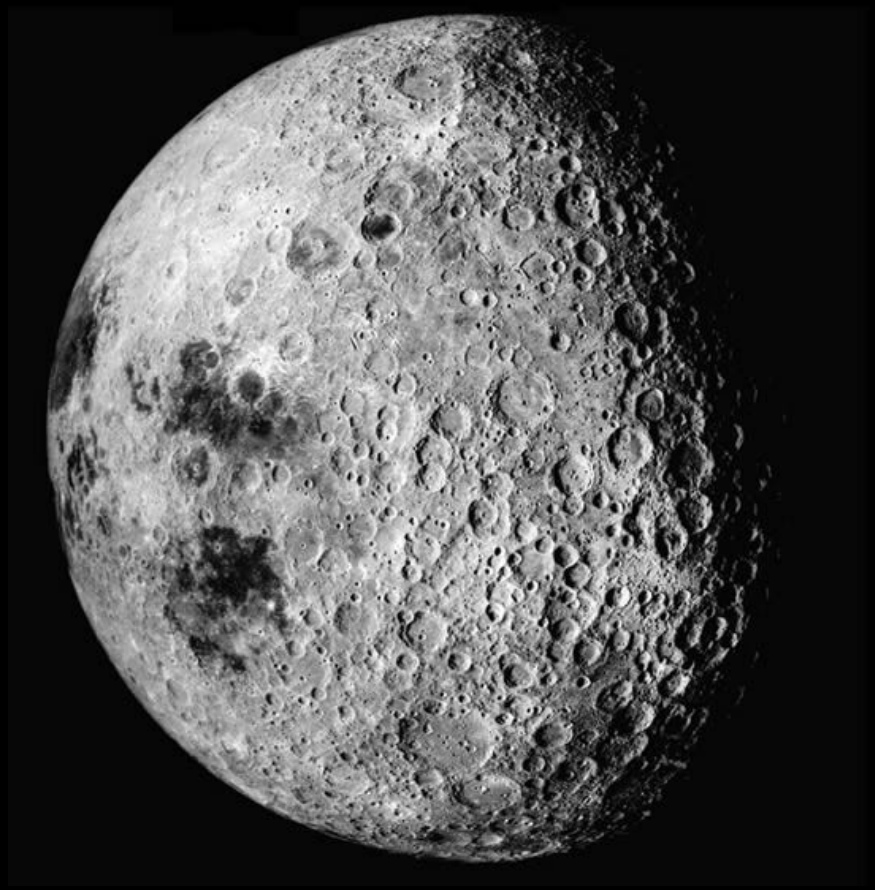


Phases of the Moon



It's NOT the shadow of the Earth!

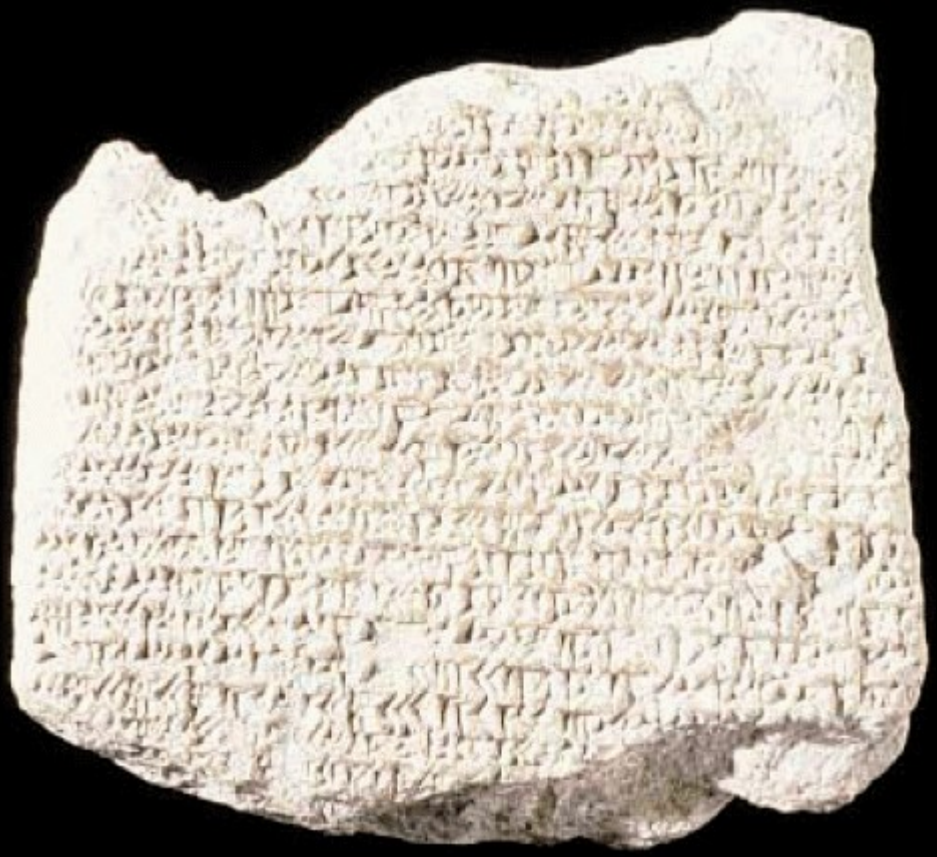
The Moon always faces us with the same side.



There is no 'Dark side' of the Moon, but there is the 'invisible side' of the Moon.

Is the Moon bigger nearer the horizon?

Lunar and Solar Eclipses



Solar eclipse
April 15, 136BC Babylon

至之日在斗二十一度少檢十一年七月十
六日望月蝕加時在卯到十五日四更二唱五
初始蝕到四唱蝕既在營室十五度末景初其
日日在軫三度以月蝕所衝考之其日應在

Lunar eclipse
Sep. 4, AD434, Chinese

Lunar & Solar Eclipses

Lunar eclipse IS caused by the shadow of the Earth.

Ancient Greeks inferred from this that
the Earth is round!

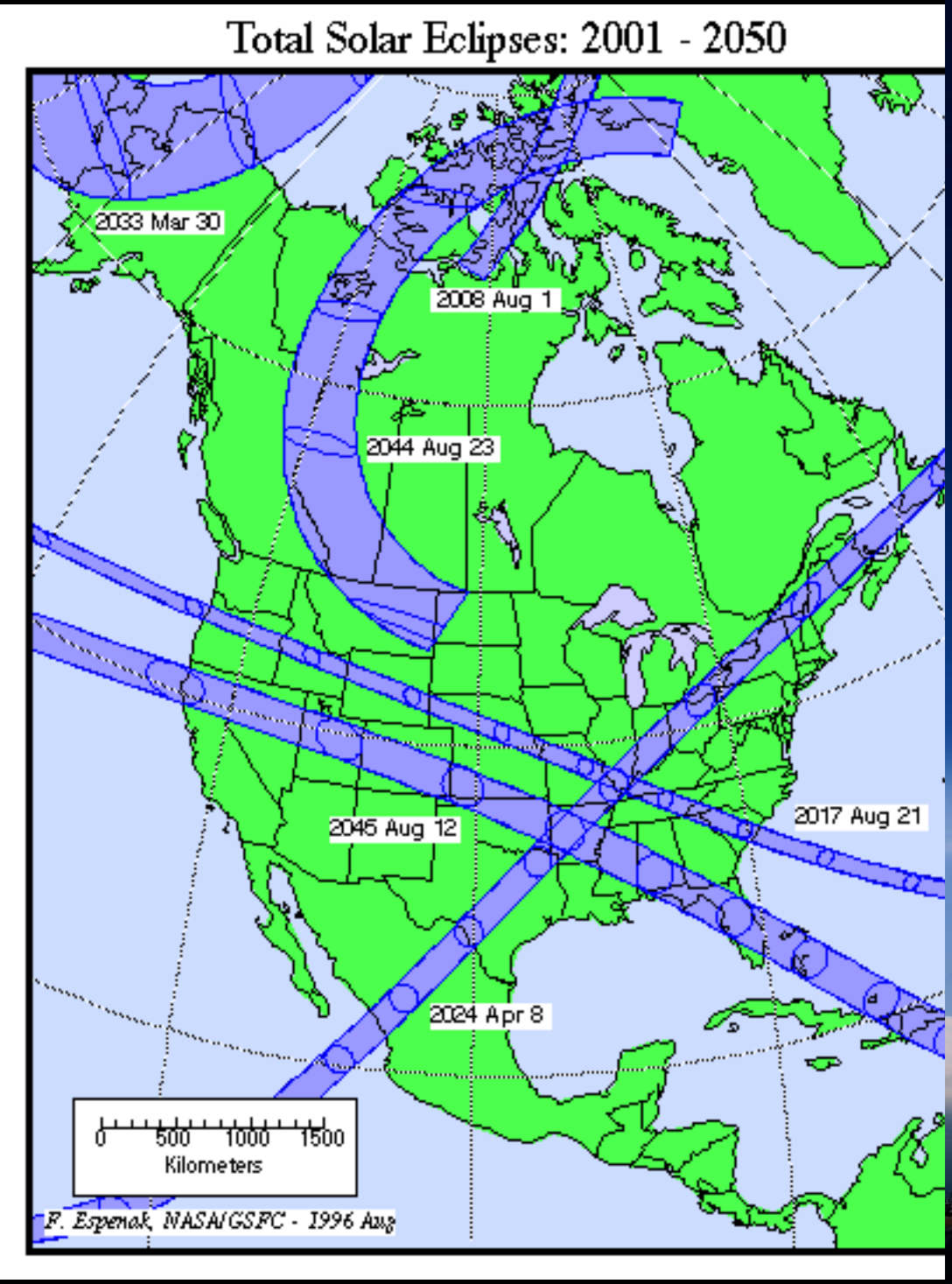
Solar Eclipse --- whose shadow is it?

How often are lunar and solar eclipses?

Not as often as once a month.

because the Moon's orbit is inclined relative to the ecliptic.

Lunar eclipse ~ once a year
solar eclipse ~ a couple a year
Total solar eclipse: once every ~ 2 years, only visible locally



Tips for 2024 April 8th:

1) How to look for it?

2) Don't stare directly into the Sun even during total eclipse!

1% of Sun ~ 10,000 full Moon

Next total Lunar eclipse
Dec. 21,2010

In the ... future, there won't be any total solar eclipses...