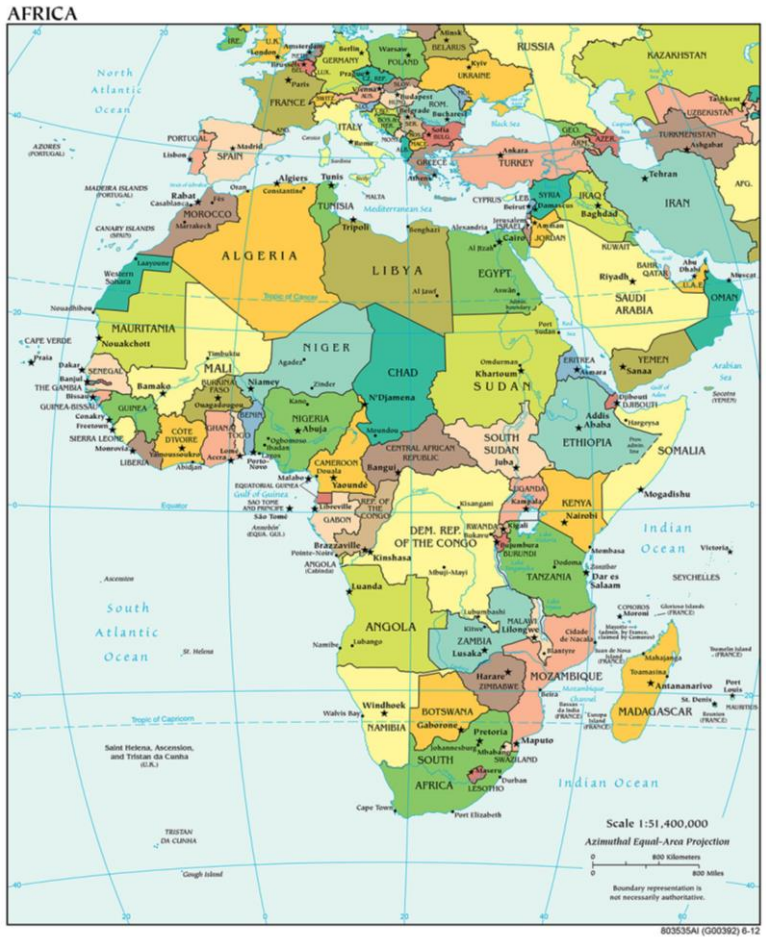
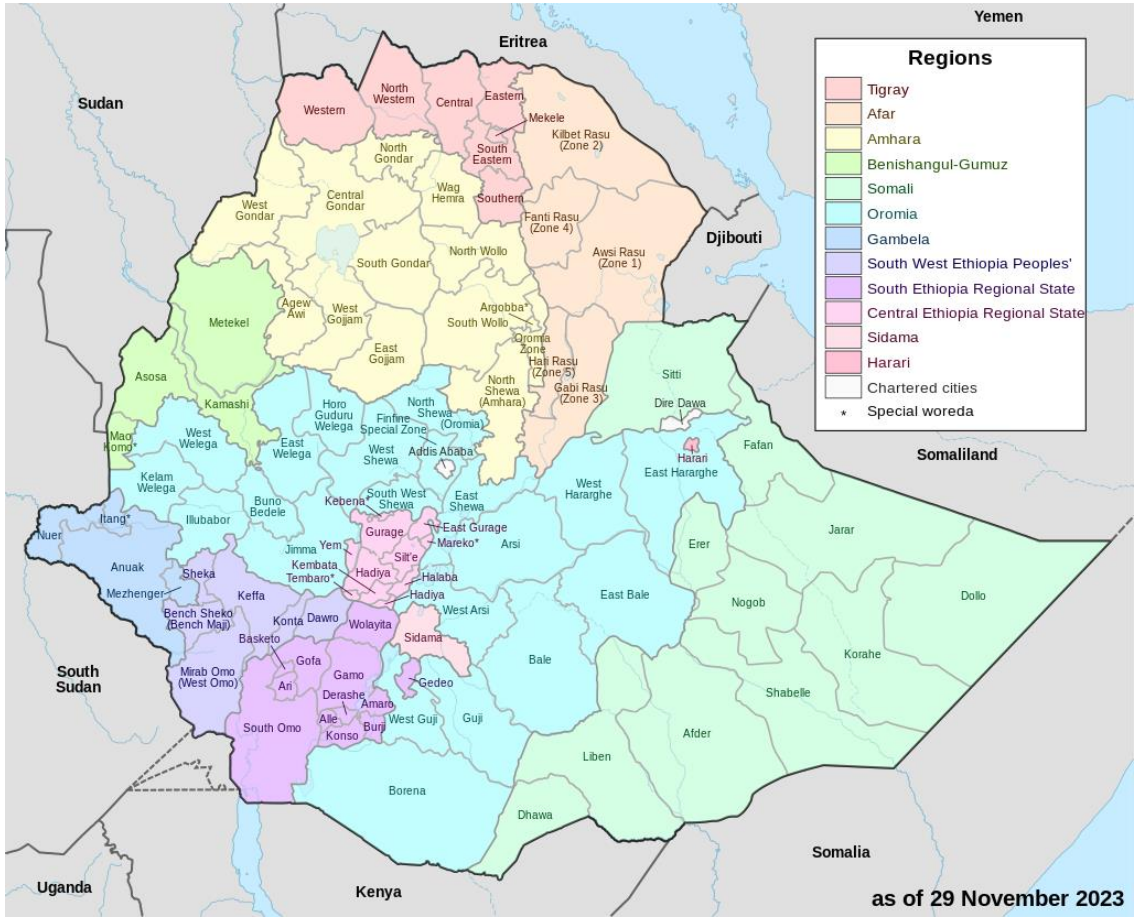
Guji Societal Practices and Astronomy

Dr Elfneh Bariso

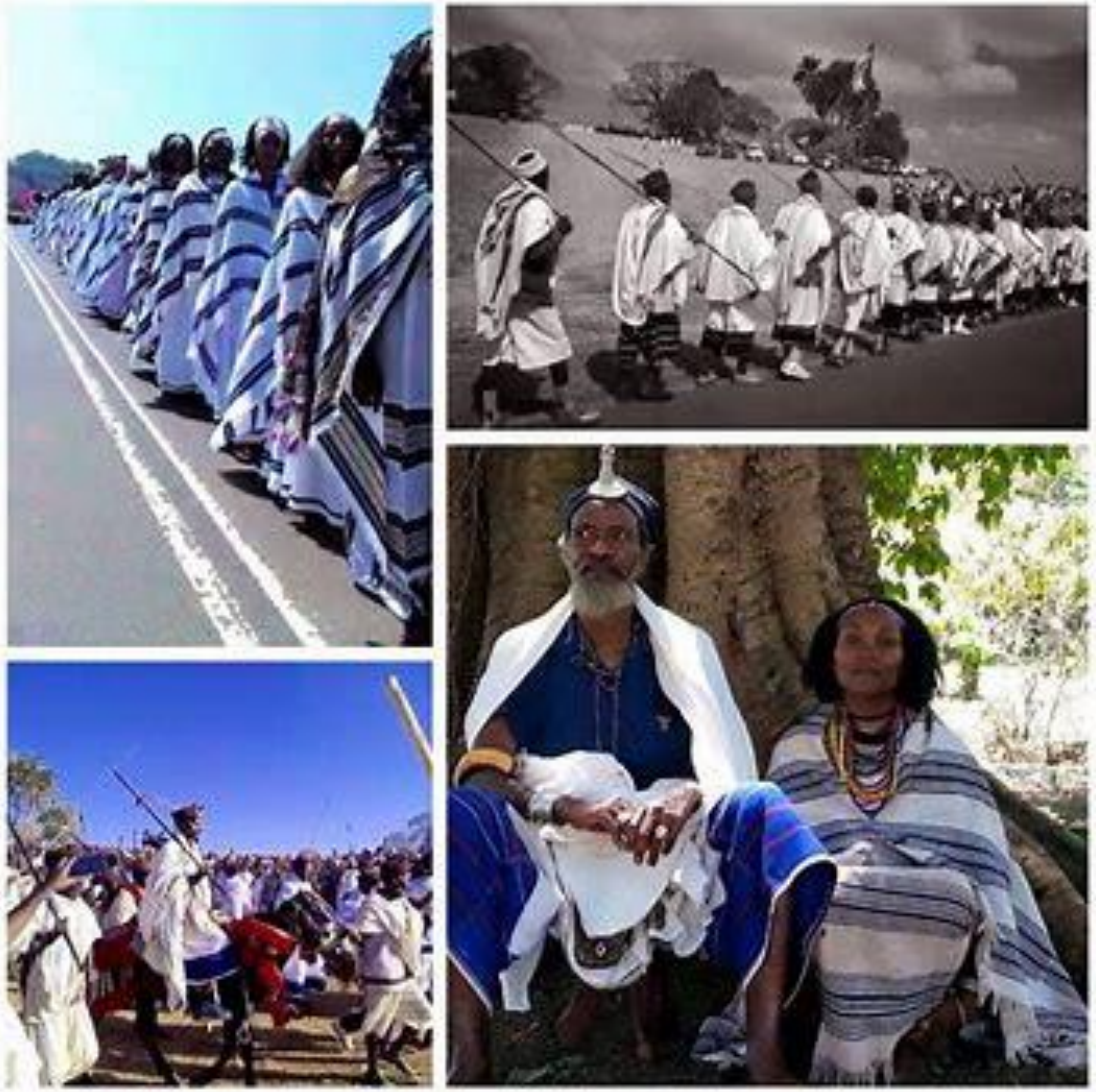
Prof Kevin Walsh

The Guji Region





The Guji People



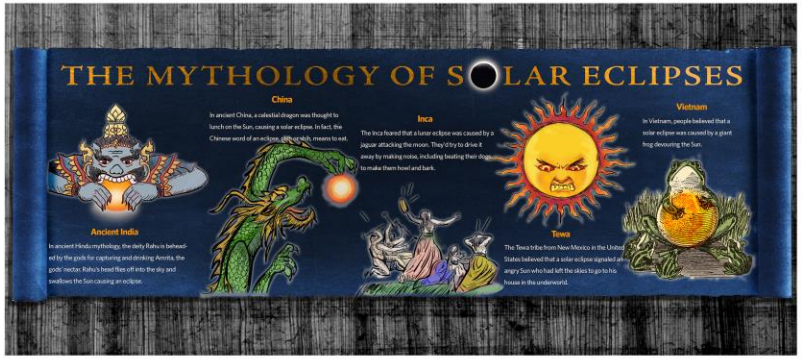
A Guji song
https://www.youtube.com/watch?v=VW7luOqzBSc

Guji Societal Practices and Astronomy

Passing Down Astronomical Knowledge in Guji Culture

Guji astronomical knowledge is deeply embedded in their cultural traditions and practices.

Oral traditions and storytelling play a crucial role in the intergenerational transmission of this knowledge



Myths, beliefs, rituals

Elders share stories and myths that explain the significance of celestial objects, such as the sun, moon and stars, in Guji beliefs and worldview.

These stories are often woven into cultural rituals, festivals and everyday life, ensuring the continuous engagement with and understanding of astronomical phenomena.

Indigenous education/ training

Practical skills and observations related to timekeeping, seasonal changes, and agricultural practices are also passed down through hands-on learning and apprenticeship-style training

Younger generations learn from their elders how to interpret the position of the sun, moon, and stars to determine the time of day, the changing of seasons, and the appropriate times for planting and harvesting.

Astronomical knowledge and environment

This experiential knowledge is essential for the Guji's subsistence-based lifestyle and is deeply integrated into their cultural identity.

The Guji's astronomical knowledge is not confined to a specialised or elite group, but is widely shared and practiced within the community, ensuring its continued relevance and adaptability to changing environmental conditions.

Guji names

Waaqaa/Waaqoo (sky or God)

Baatii (new moon)

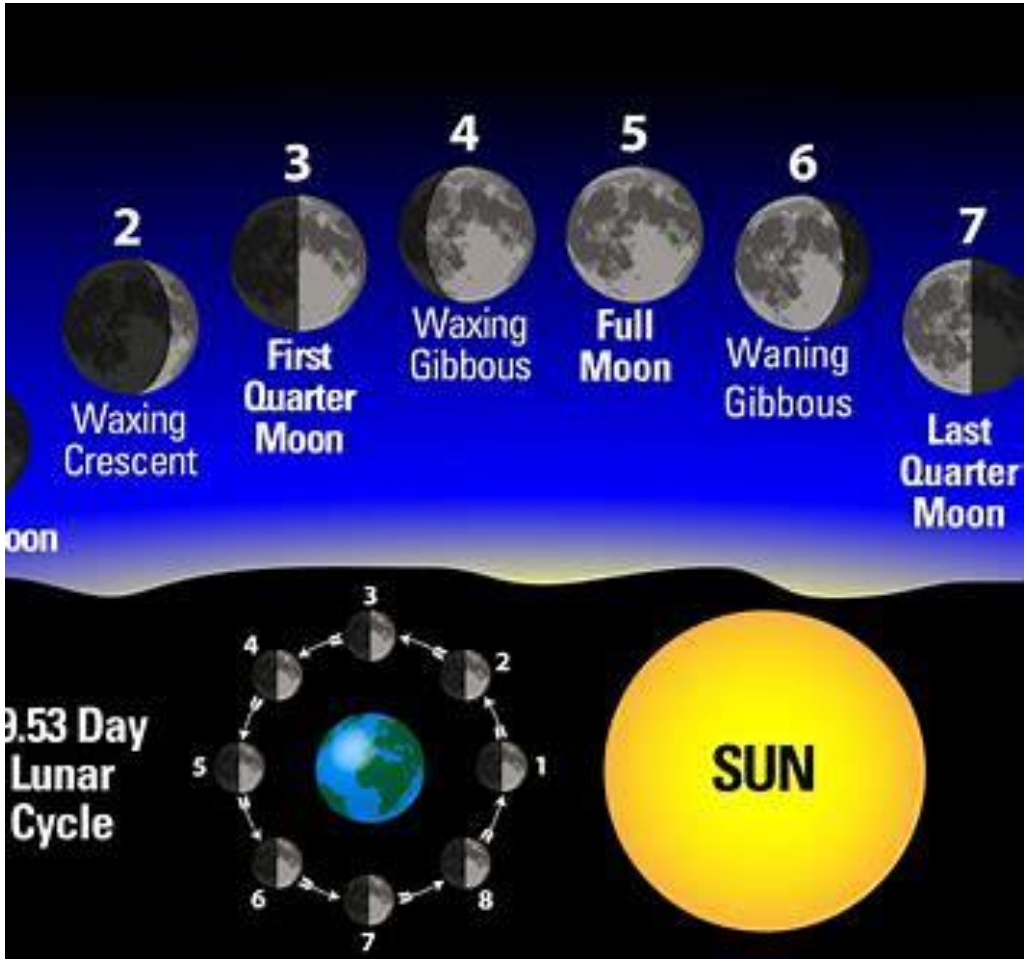
Goobanaa (full moon)

Aduu (the Sun)

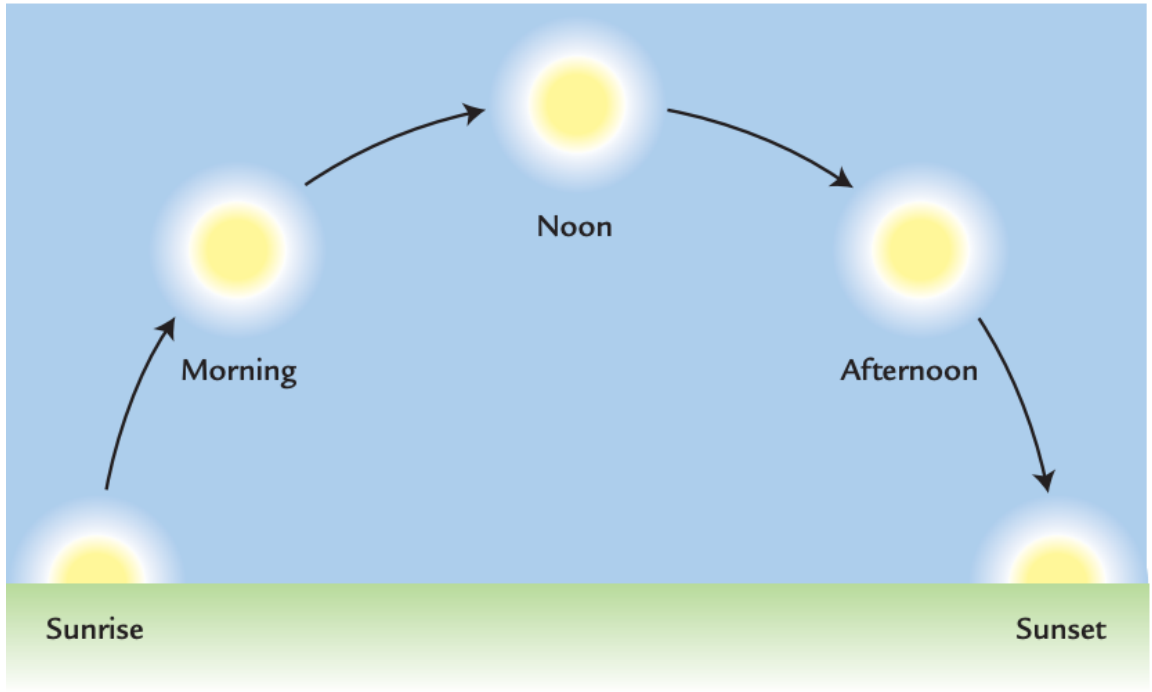
Urjii (stars)

Bakkalchaa (a bright planet such as Venus)

The Guji Lunar calendar



The Guji Sun clock



Dayya’a Boruu (down),

baya aduu (sunrise),

Waaree Gabaadduu (around 9am),

Waaree Dheertuu (around 11am) A

duu Utubaa Geette (12noon), Saafa (afternoon),

Seensuma Aduu (sunset), Dhi’a (evening), Halkan (night), Hoxxeessa Wolqixxaaye (midnight)

Compiled by Chari Boro Boriso (2020)

DHAWA GUJII' OR 'THE GUJI OROMO CALENDAR' (የጉጂ ኦሮሞ ከላንደር)

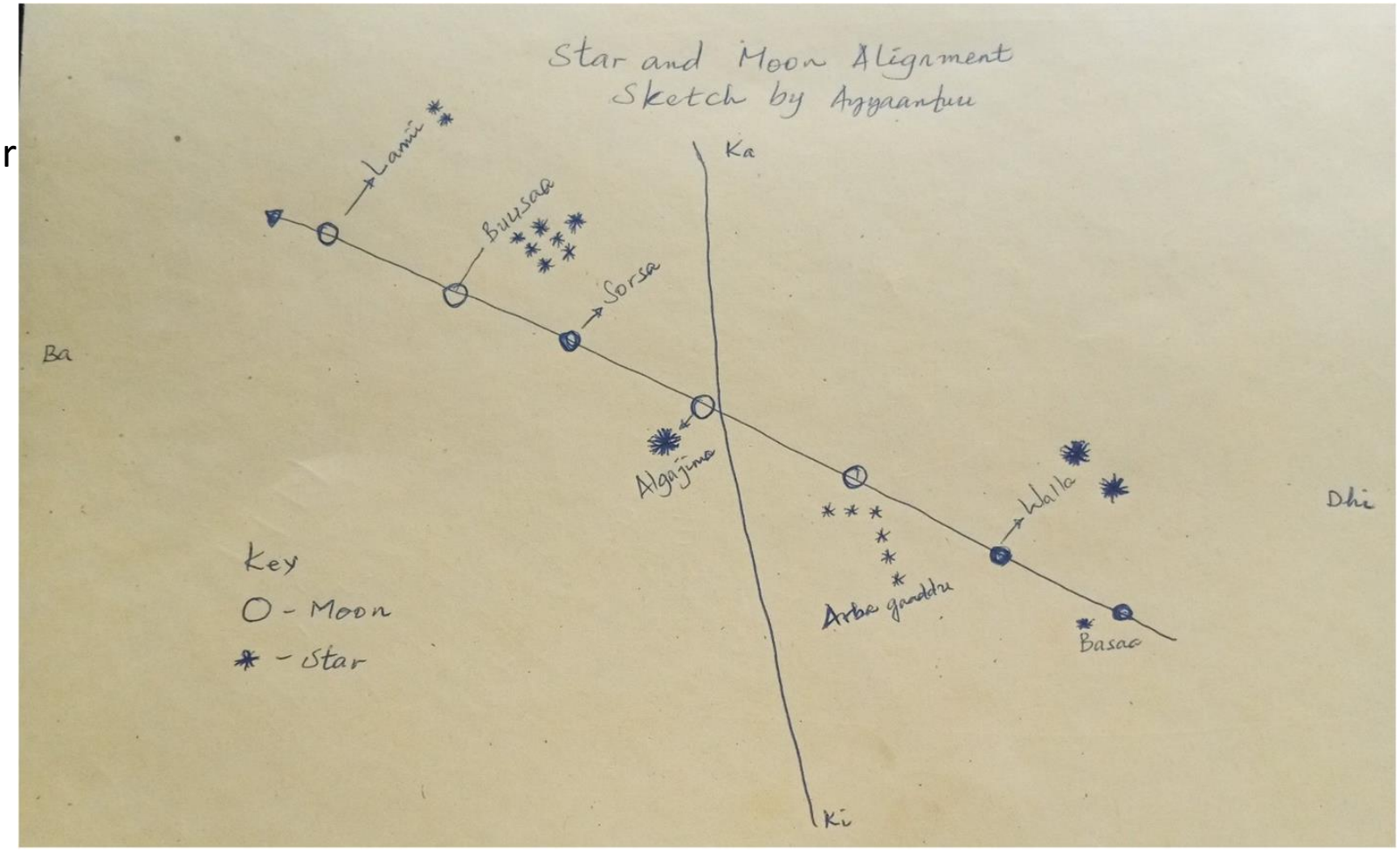
Waqtii	Oromiyaa	Birraa			Bona			Ganna			Arfaasaa		
	Gujii	Hageyya			Bona			Ganna				Adoolessaa	
Maqaa Ji'ootaa Kalandarootaan	Gujii	1	2	3	4	5	6	7	8	9	10	11	12
		Hageyya	Birraa	Onkoleessa	Sadaasa	Arraasaa	Qaamuu	Badheessa	Bitdotteessa	Caansaa	Ella	Wocabajjii	Adoolessa
	Oromiyaa	Fulbaana	Onkololeessa	Sadaasa	Muddee	Amajjii	Gurraandhala	Bitootessa	Ebla	Caamsaa	Waxabajjii	Adoolessaa	Hageyya
	Gregorian	September	October	November	Deceember	January	February	March	April	May	June	July	August
	Ethiopia	መስከረም	ጥቅምት	ህዳር	ተህሳስ	ጥር	የካቲት	መጋቢት	ምያዝያ	ግንቦት	ሰኔ	ሓምሌ	ነሃሴ
Guyyootaa (Ayyaanota) Dhawa Gujii (በጉጂ ከላንደር ጨስፐ የምገኙ ቀናት እና ስያሜዎ ያቸው)	Shalbaana Deettii	1 29	27	25	23	20	18	16	13	11	8	6	4
	Karaabicha	2 30	28	26	24	21	19	17	14	12	9	7	5
	Gardaaduma	3	1 29	27	25	22	20	18	15	13	10	8	6
	Busaawaa Qaraa	4	2 30	28	26	23	21	19	16	14	11	9	7
	Busaawaa Jidduu	5	3	1 29	27	24	22	20	17	15	12	10	8
	Busaawaa Eegee	6	4	2 30	28	25	23	21	18	16	13	11	9
	Gidaada	7	5	3	1 29	26	24	22	19	17	14	12	10
	Ruuda	8	6	4	2 30	27	25	23	20	18	15	13	11
	Areerii Badhoo	9	7	5	3	28	26	24	21	19	16	14	12
	Areerii Garbittii	10	8	6	4	1 29	27	25	22	20	17	15	13
	Adulaa Qaraa	11	9	7	5	2 30	28	26	23	21	18	16	14
	Adulaa Eegee	12	10	8	6	3	1 29	27	24	22	19	17	15
	Harrattuu	13	11	9	7	4	2 30	28	25	23	20	18	16
	Deettii	14	12	10	8	5	3	1 29	26	24	21	19	17
	Garba	15	13	11	9	6	4	2 30	27	25	22	20	18
	Bitaa Qaraa	16	14	12	10	7	5	3	28	26	23	21	19
	Bitaa Jidduu	17	15	13	11	8	6	4	1 29	27	24	22	20
	Bitaa Eegee	18	16	14	12	9	7	5	2 30	28	25	23	21
	Soorsa	19	17	15	13	10	8	6	3	1 29	26	24	22
	Algaajima	20	18	16	14	11	9	7	4	2 30	27	25	23
	Arba	21	19	17	15	12	10	8	5	3	28	26	24
	Bolla	22	20	18	16	13	11	9	6	4	1 29	27	25
	Basaa Qaraa	23	21	19	17	14	12	10	7	5	2 30	28	26
	Basaa Eegee	24	22	20	18	15	13	11	8	6	3	1 29	27
	Carrawa	25	23	21	19	16	14	12	9	7	4	2 30	28
	Dureettii	26	24	22	20	17	15	13	10	8	5	3	1 29
	Dullattii	27	25	23	21	18	16	14	11	9	6	4	2 30
	Shalbaana Bidirsaa	28	26	24	22	19	17	15	12	10	7	5	3

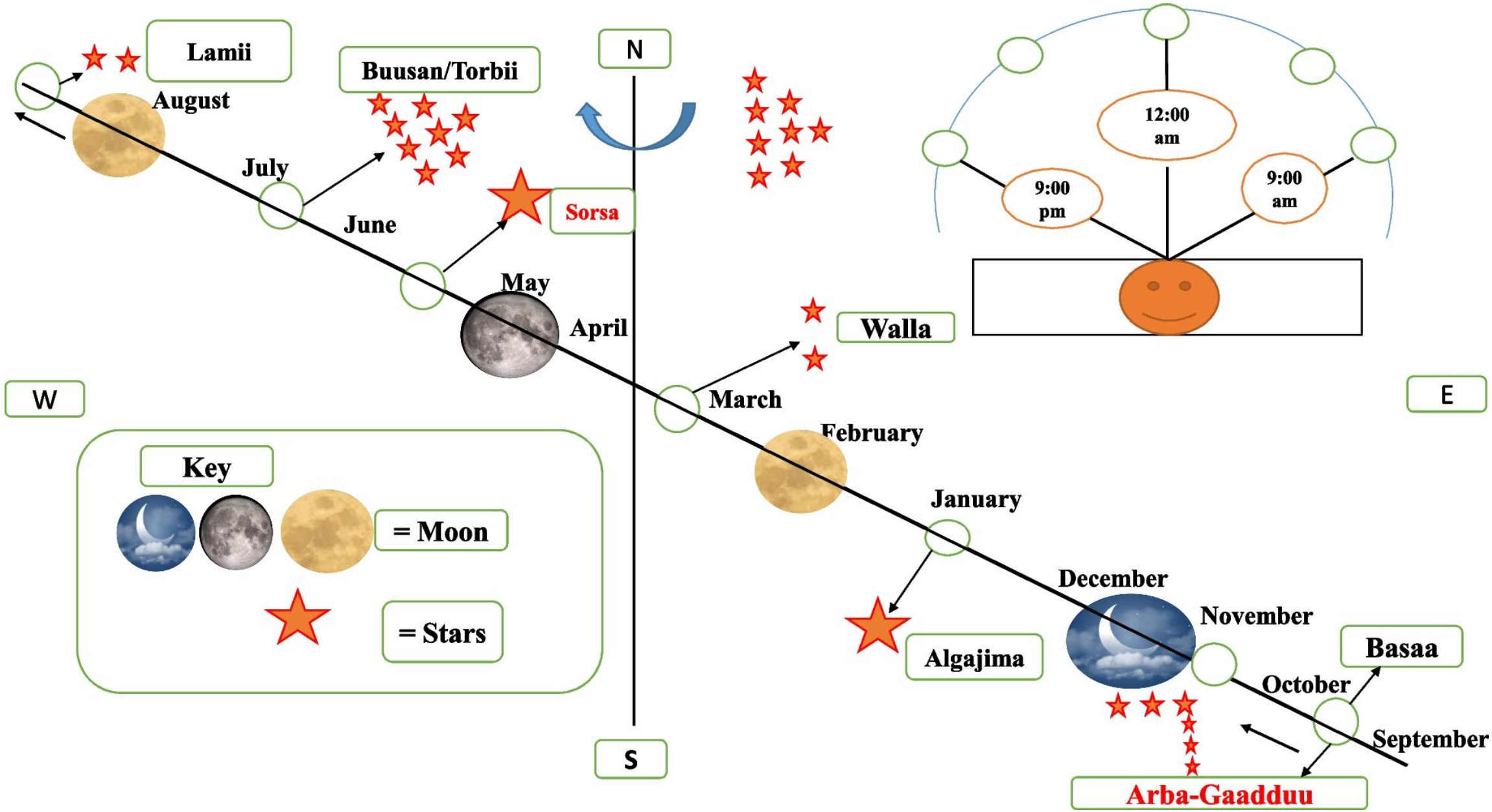
Position of star and moon drawn by *Ayyaantuu*

Indigenous weather forecasting among Gujii pastoralists in souther Ethiopia: Towards monitoring drought

Mekuria Guye, Abiyot Legesse & Yimer Mohammed

Pastoralism **volume 12**, Article number: 43 (2022)




Lamii
August
Buusan/Torbii
July
June
Sorsa
May
April
N
W
E
S
Walla
March
February
January
December
November
October
September
Basaa
Algajima
Arba-Gaadduu
12:00 am
9:00 pm
9:00 am
Key
= Moon
= Stars


Date and time
Date and time
Julian Day
2024 – 10 – 17
19 : 27 : 39
Moon
N
NE
E

Initial compilation of data to compare actual and predicted seasonal events (Stephenson)

Lack of lining up = slippage and loss of synchronisation

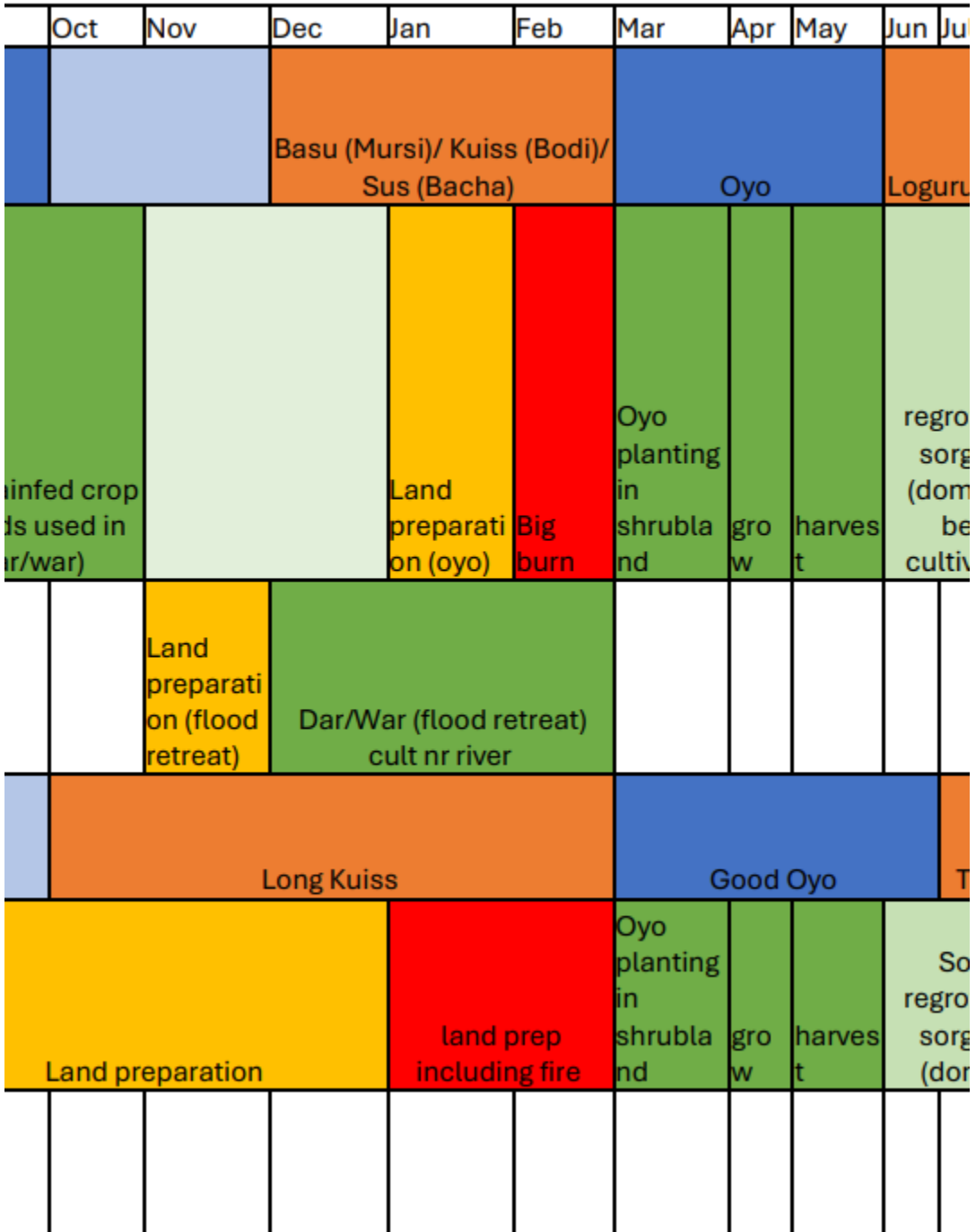


Image from: Preliminary notes on the Stelae of Efrata and Gidim of northern Shoa
Tekle Hagos, Annales d'Éthiopie Année 2000 16 pp. 55-58

The most famous example

New research reveals the ‘spectacular’ secrets of Britain’s earliest stone circles

The two oldest stone circles in the country were built to align with the sun and moon

Katie Forster • Saturday 20 August 2016 19:27 • Comments

Investigating a simple question:

Were the designs and constructions of significant buildings in the ancient world significantly influenced by celestial phenomena?

Significance and Influence

- Important characters (births, coronations, etc)
- Celestial predictions and calendar
- Agriculture
- Ceremony: religion and cultural practice
- Worship (of the heavens)
- Demonstration of knowledge and power

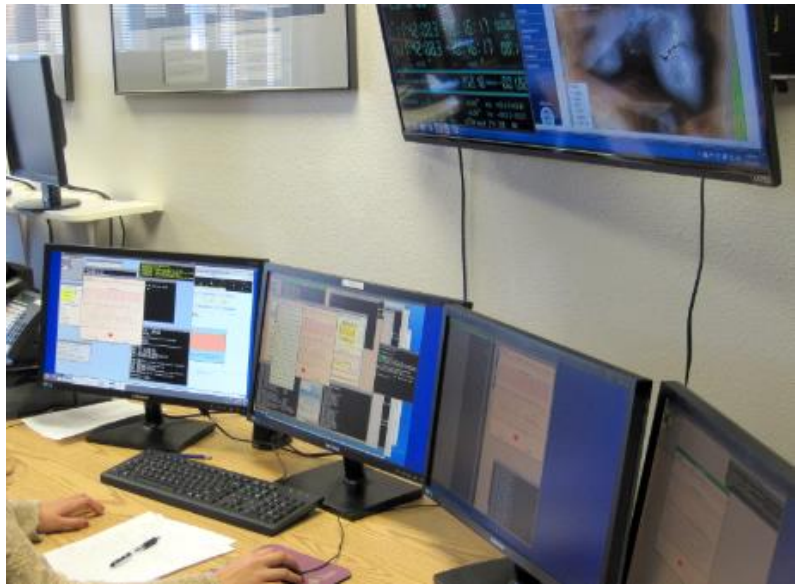
Celestial events

- Passage of time
- Messages and Responses from gods
- Range of phenomena and associated meanings

Caution!

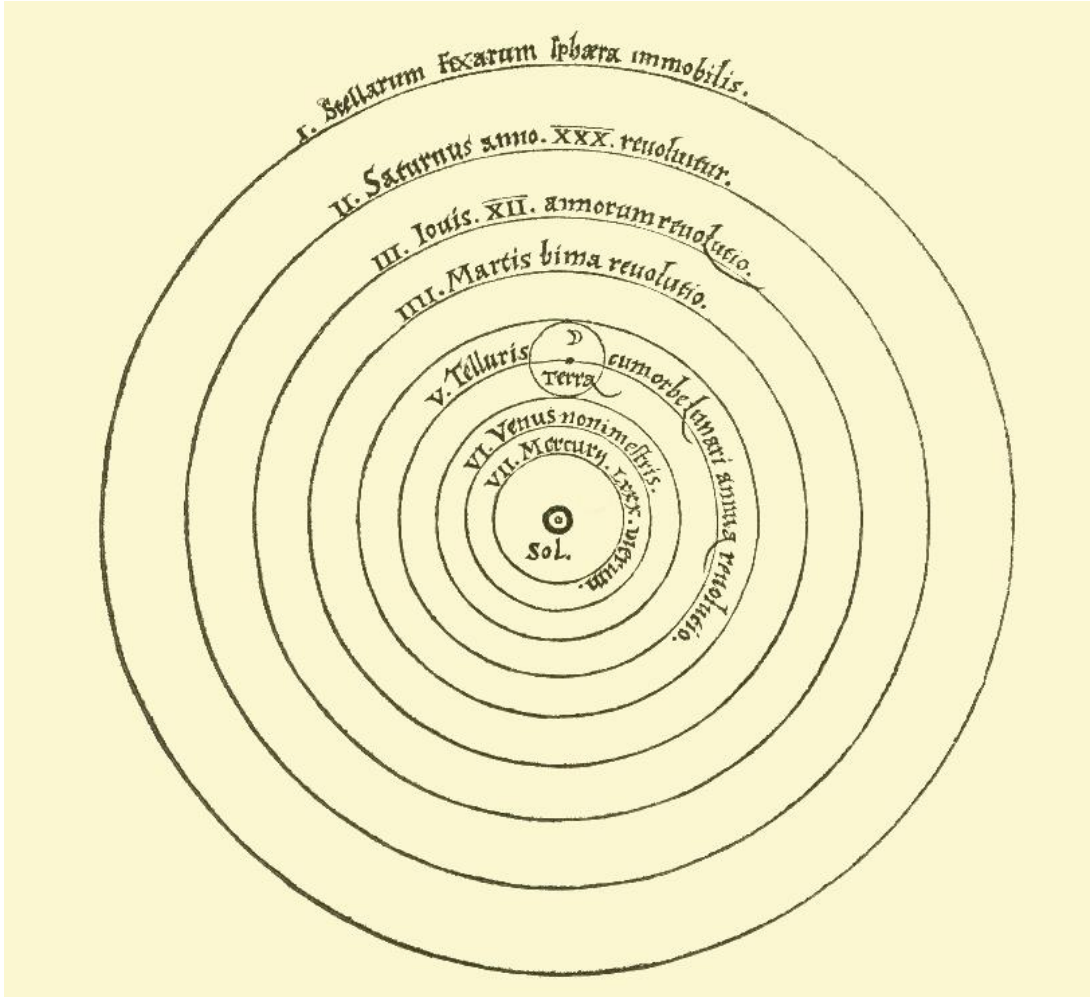

ILLUSTRATED
CORGI
ERICH VON DANIKEN
CHARIOTS
OF THE
GODS?
WAS GO
ONAUT?
OVER A M
COPIES IN
IN CORGI

New ways of exploring old questions……



Ptolemaic system

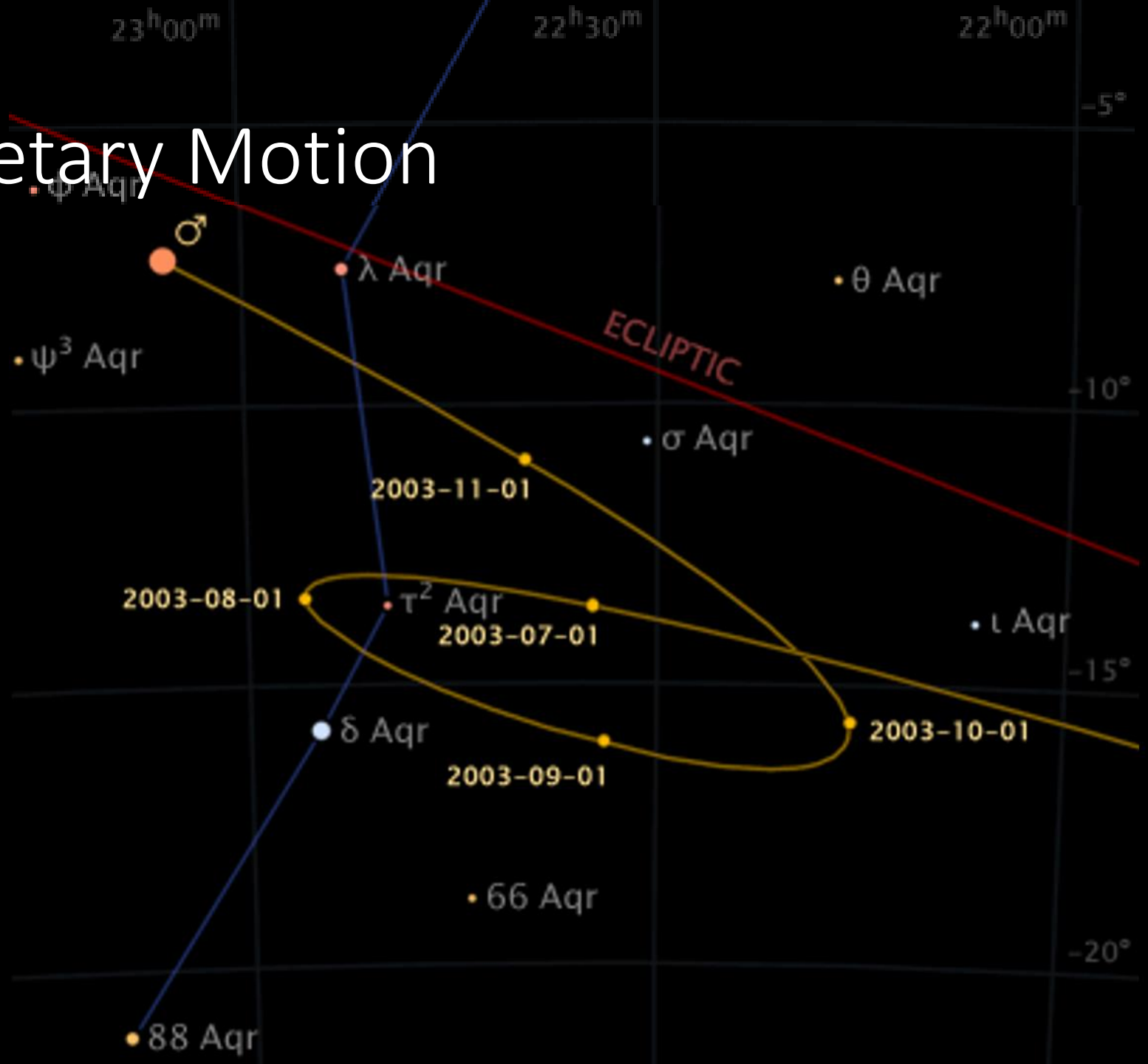
Copernican System



Sunrise and sunset

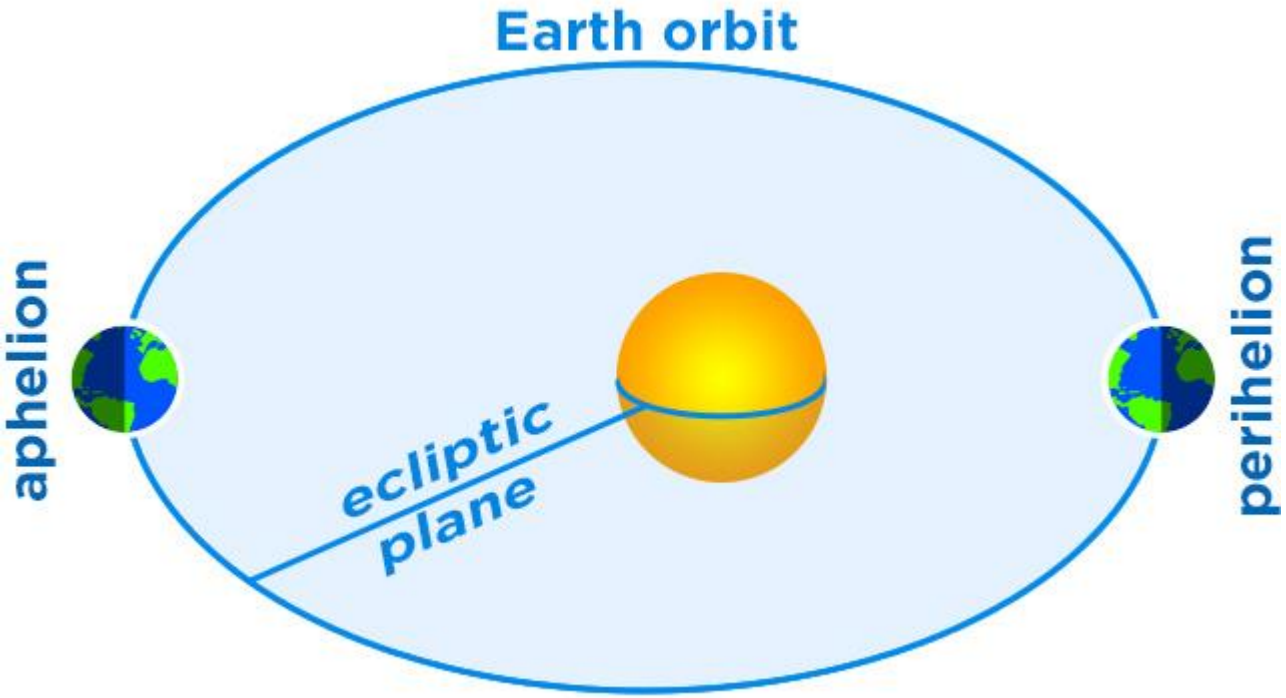
Lunar phases

Planetary Motion

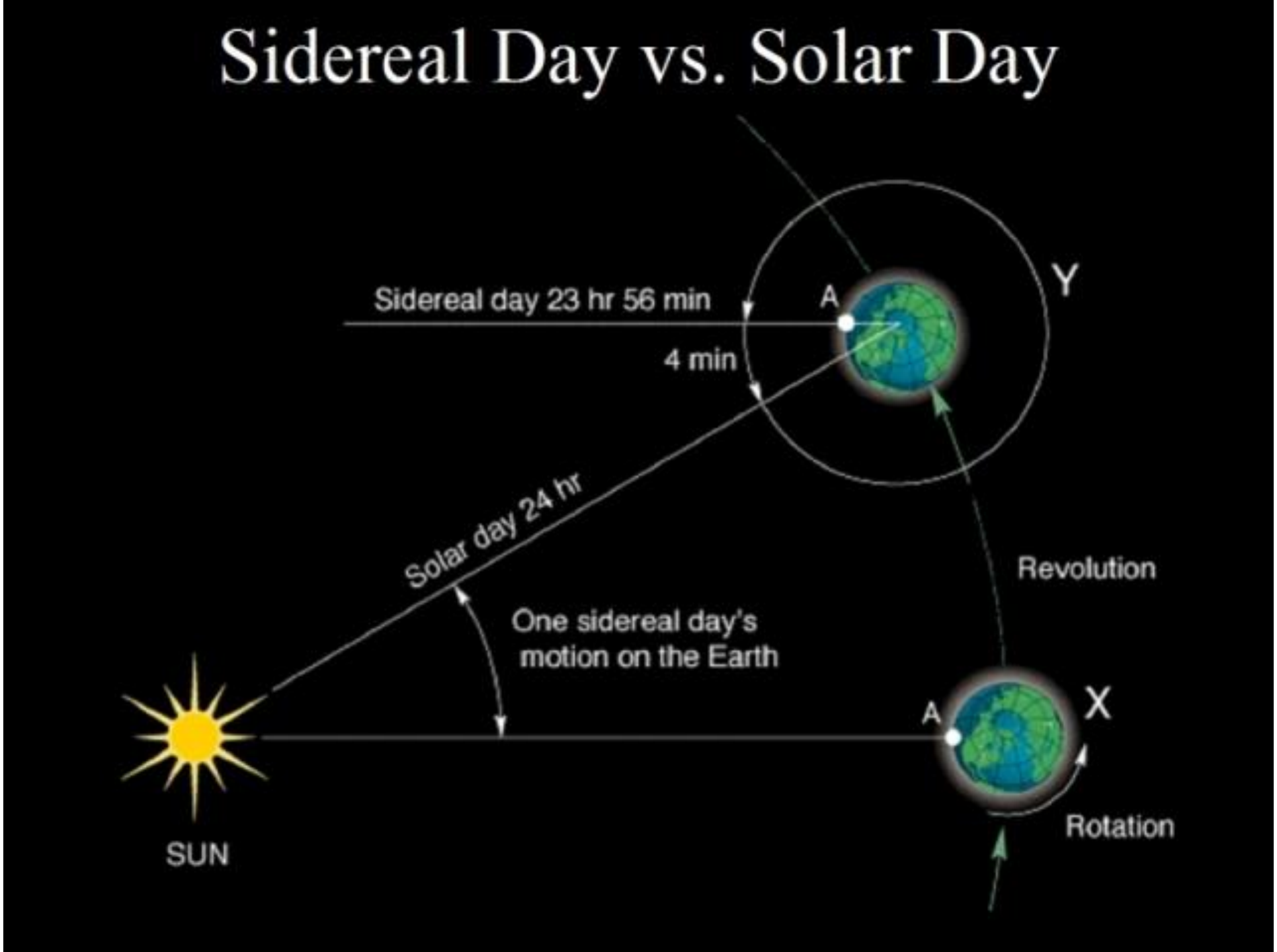


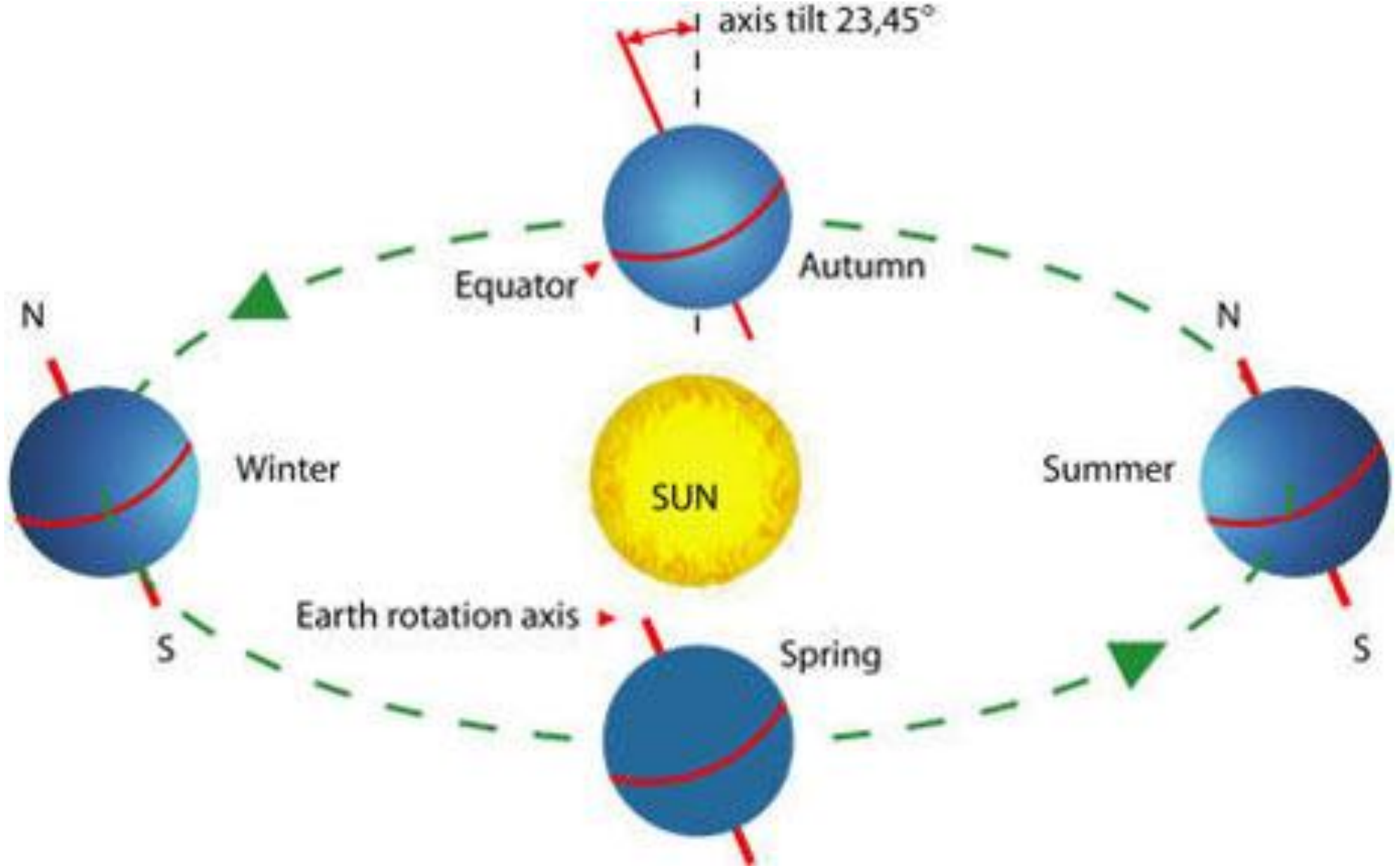
Rising and Setting of stars

Complications…

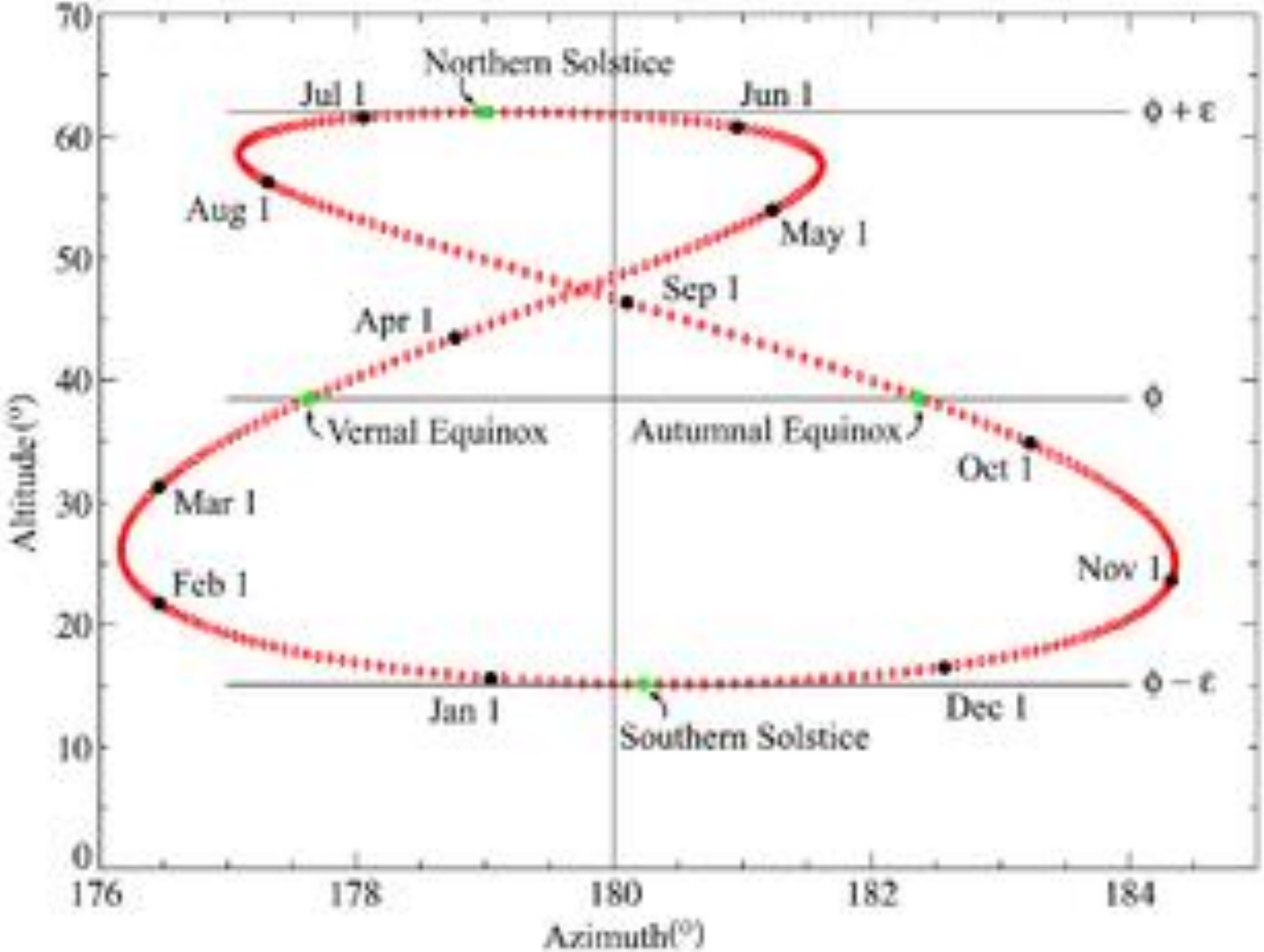


Sidereal Day vs. Solar Day

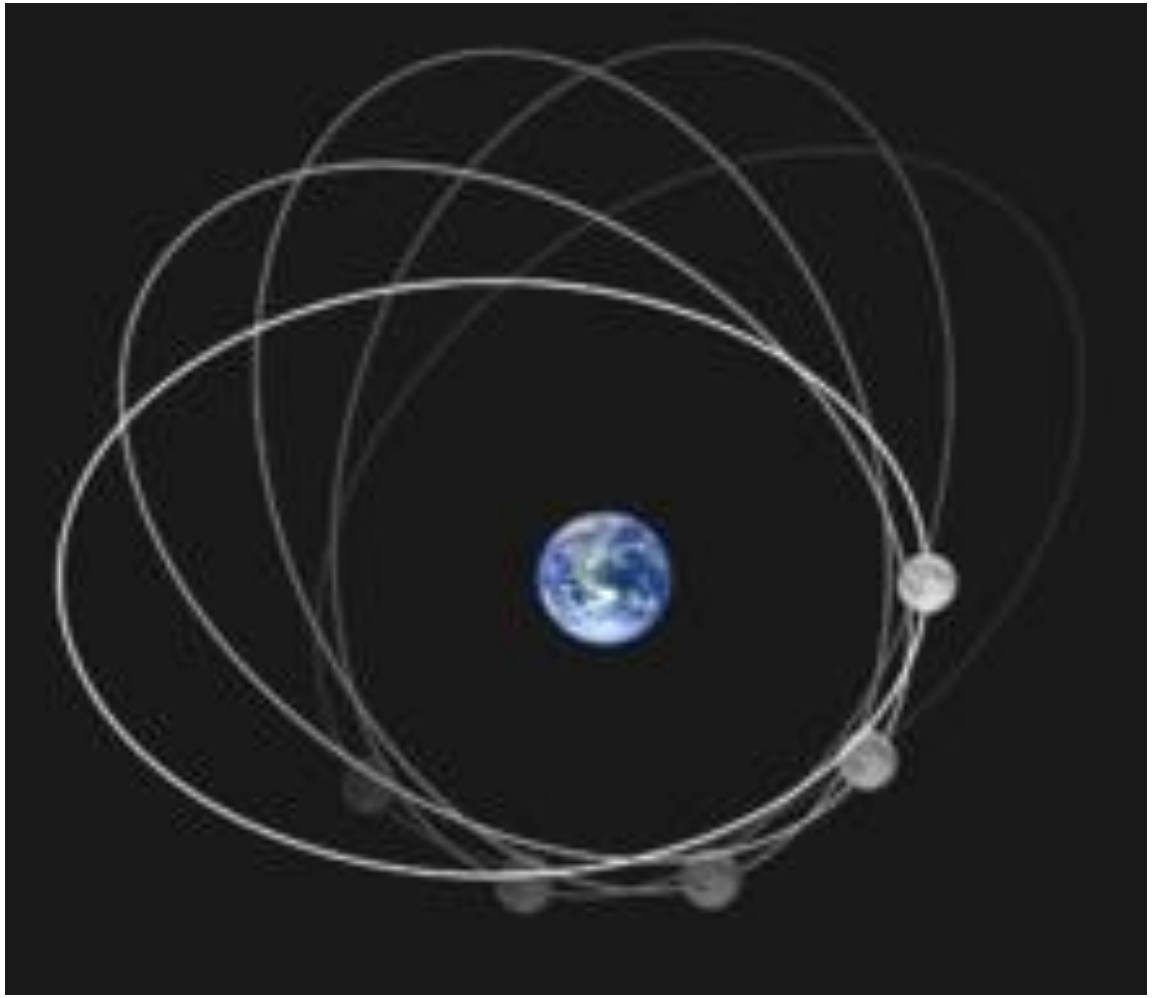



axis tilt 23,45°
Equator
Autumn
N
Winter
SUN
Summer
N
Earth rotation axis
S
Spring
S

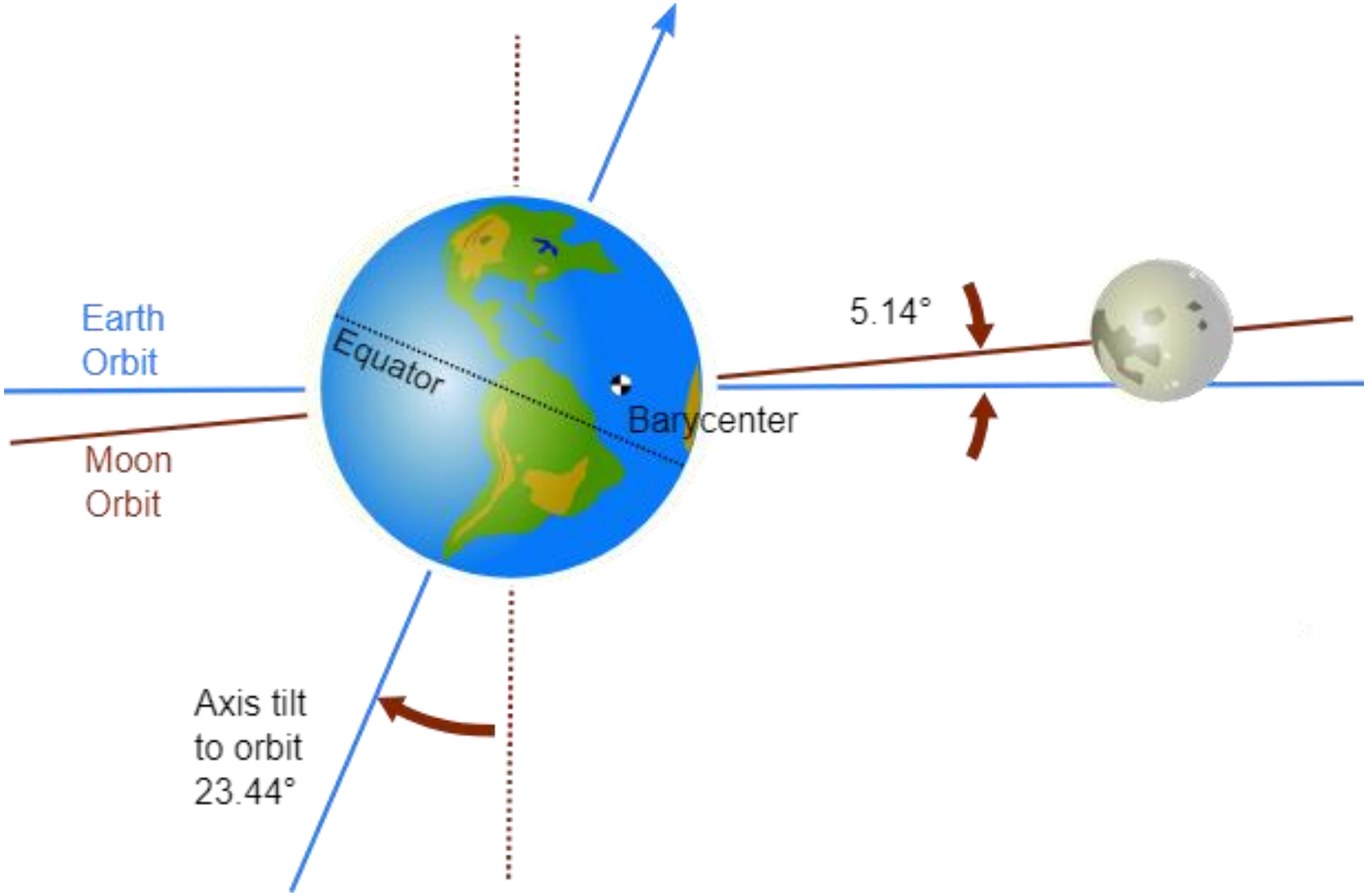
Analemma of the Sun


Northern Solstice
Jul 1
Jun 1
ϕ + ε
Aug 1
May 1
Sep 1
Apr 1
ϕ
Vernal Equinox
Autumnal Equinox
Oct 1
Mar 1
Nov 1
Feb 1
ϕ − ε
Jan 1
Dec 1
Southern Solstice
Altitude(°)
Azimuth(°)
70
60
50
40
30
20
10
0
176
178
180
182
184

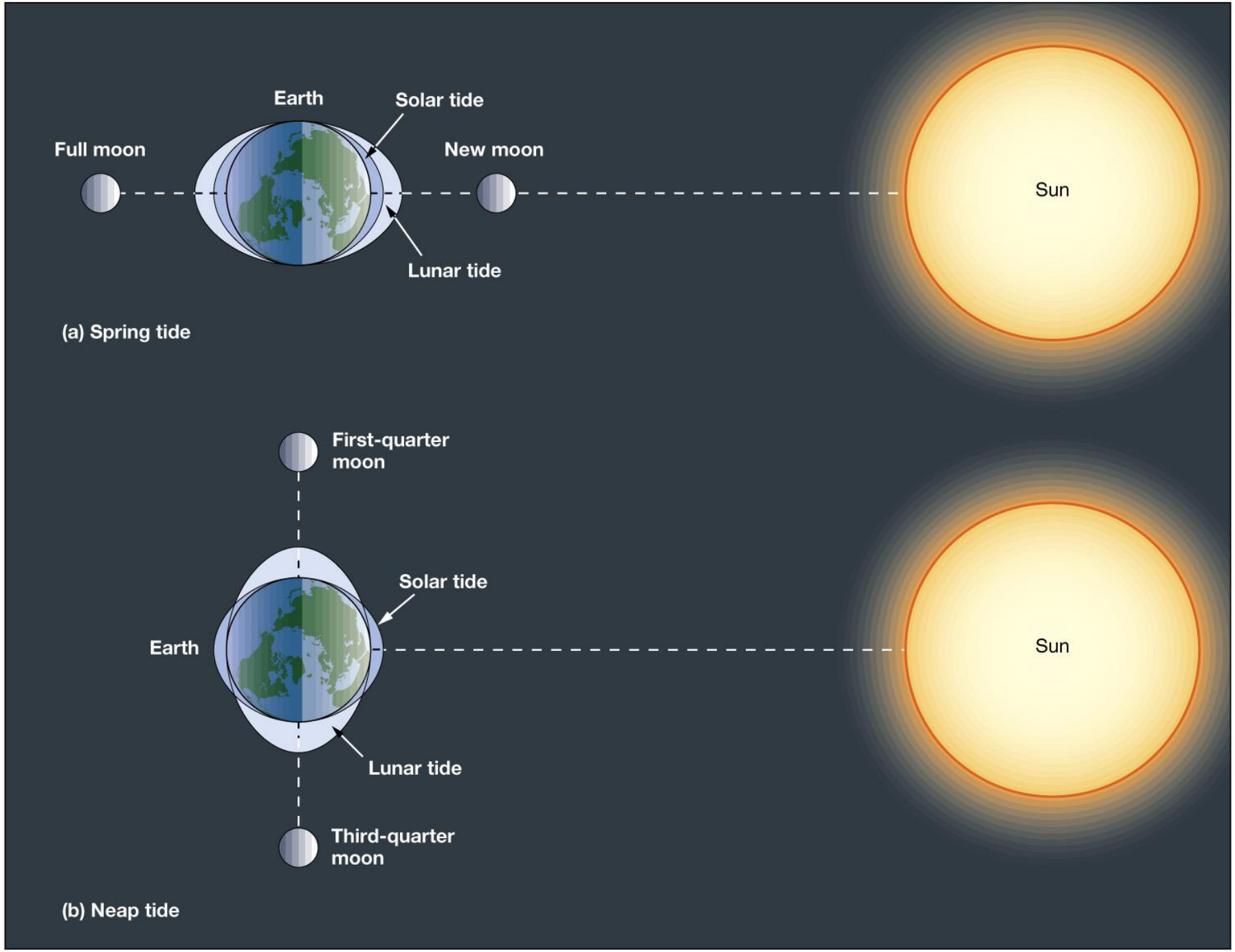
Elliptical lunar orbit



Tilt of Moon orbit



Tide



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A project in Archaeoastronomy

- “The study of stars and stones”
- Astronomical events and observations greatly influenced the behaviours and practices of ancient civilisations
- Truly global

Studying the Astronomy

A project challenge:

You are the principal technologist in an ancient community and you have been asked to DESIGN and CONSTRUCT a temple.

1. Consider the nature of the community. Decide on something astronomical that is revered and worshipped – for example, a particular constellation or planet.
2. Where is this community located? Consider global and local details.
3. What structure is required? What would be its purpose?
4. How will it be constructed?

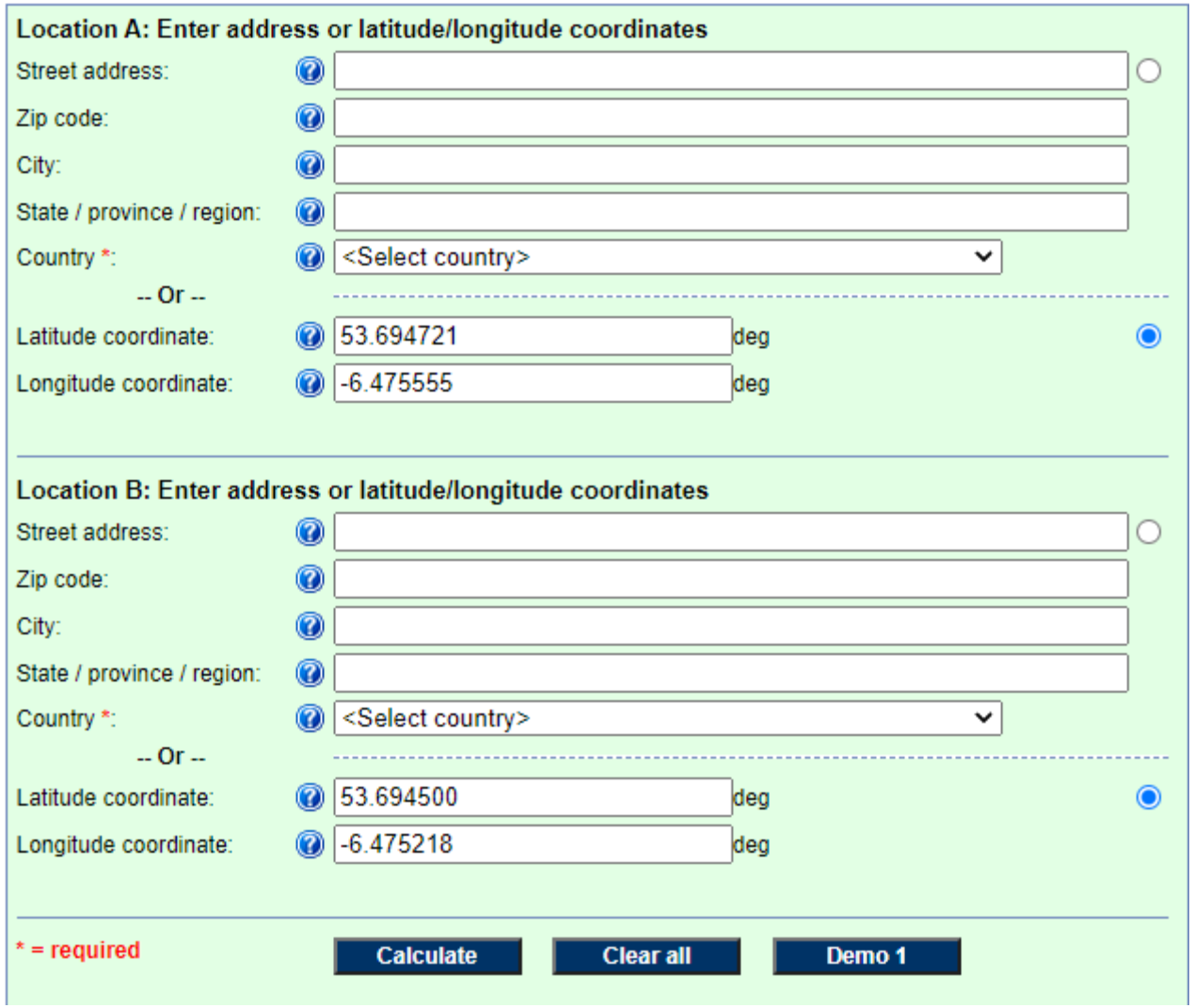
Investigating existing structures

MOBILEFISH.COM

Example: New Grange, Ireland

Google Earth

MobileFish


Location A: Enter address or latitude/longitude coordinates
Street address:
Zip code:
City:
State / province / region:
Country *:
<Select country>
-- Or --
Latitude coordinate:
53.694721
deg
Longitude coordinate:
-6.475555
deg
Location B: Enter address or latitude/longitude coordinates
Street address:
Zip code:
City:
State / province / region:
Country *:
<Select country>
-- Or --
Latitude coordinate:
53.694500
deg
Longitude coordinate:
-6.475218
deg
* = required
Calculate
Clear all
Demo 1

Calculated distance between two latitude/longitude coordinates:

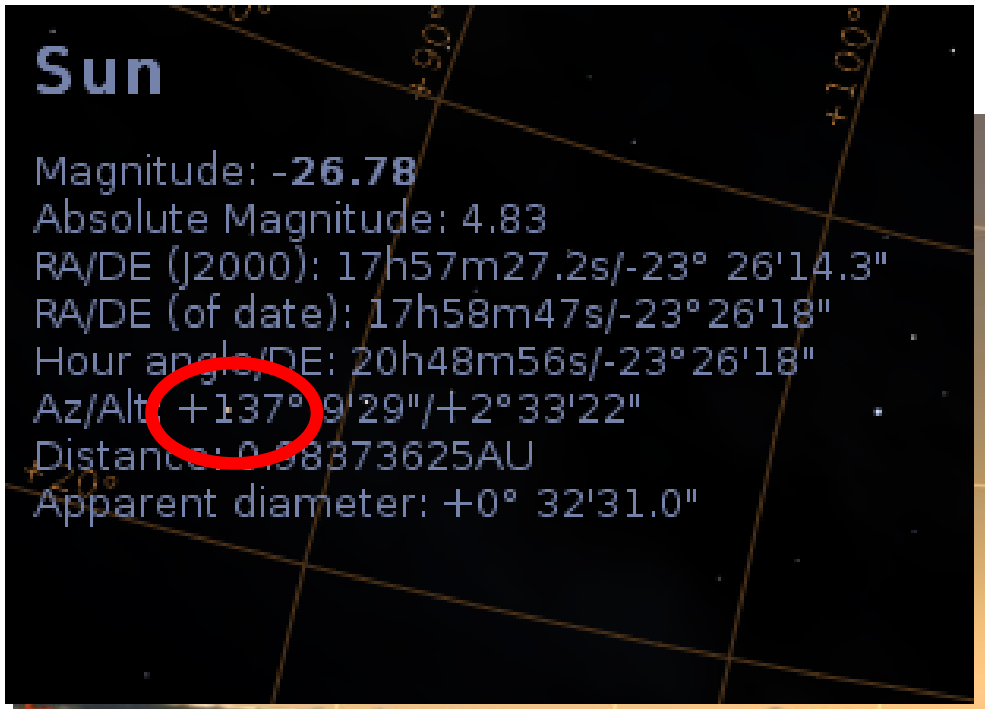
Distance: 0.033085933329765 kilometers [km]

True bearing location A: 137 deg

True bearing location B: 137 deg

You can drag the markers to their new locations or click on the map to create new marker locations.

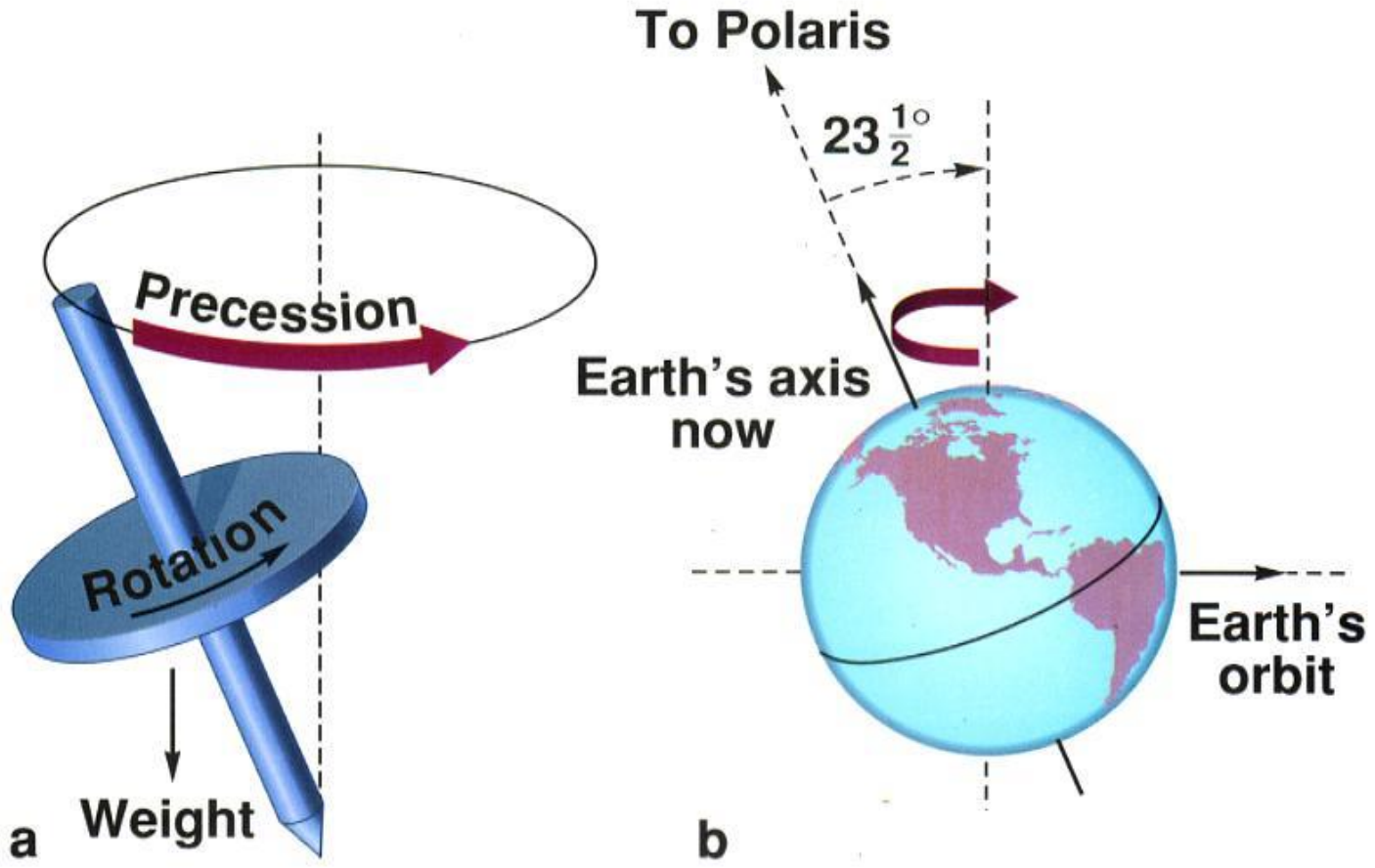
Stellarium

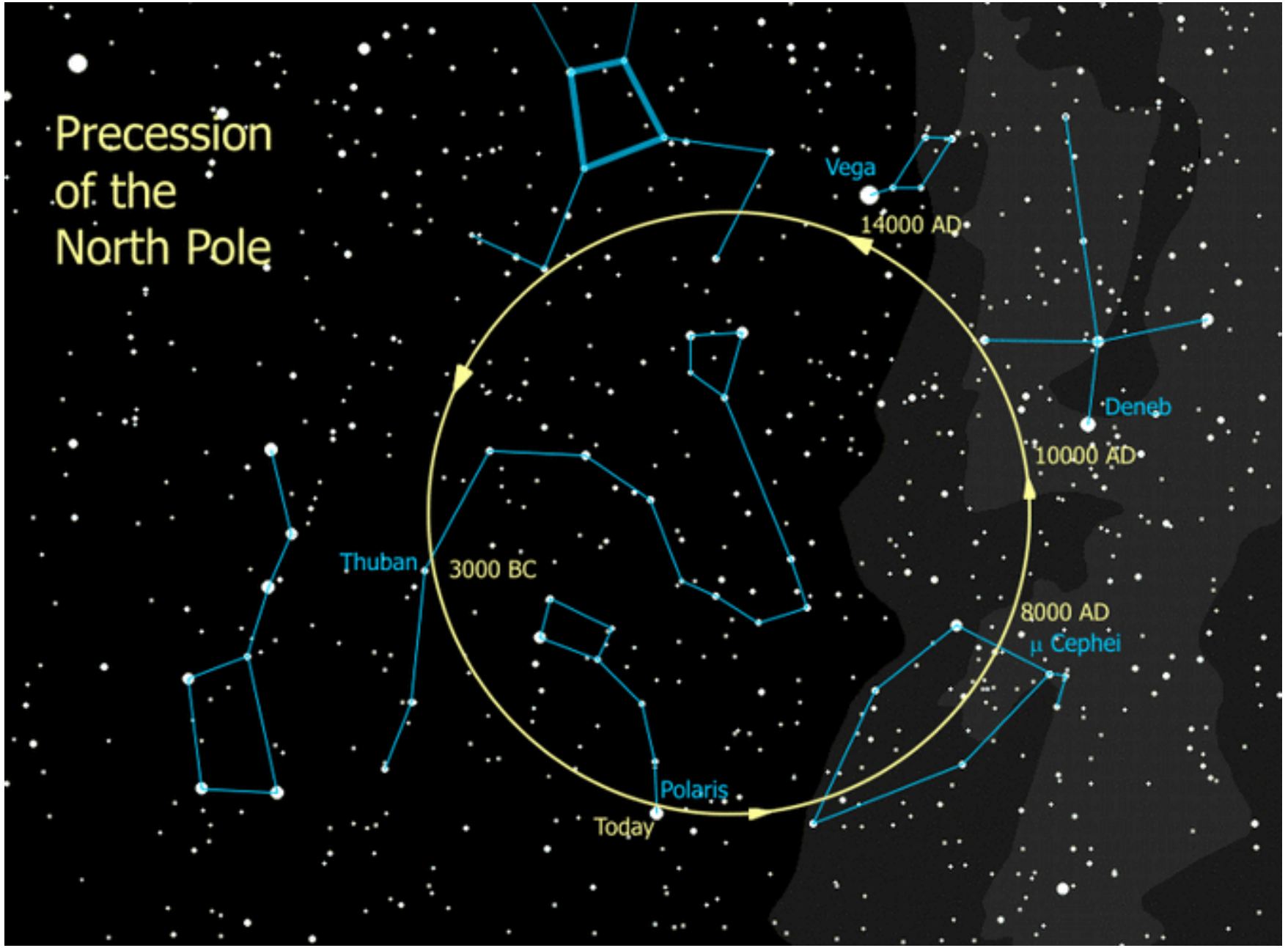

Sun
Magnitude: -26.78
Absolute Magnitude: 4.83
RA/DE (J2000): 17h57m27.2s/-23° 26'14.3"
RA/DE (of date): 17h58m47s/-23°26'18"
Hour angle/DE: 20h48m56s/-23°26'18"
Az/Alt: +137° 9'29"/+2°33'22"
Distance: 0.98373625AU
Apparent diameter: +0° 32'31.0"

S
Earth, Newgrange Ireland, 38m
FOV 60°
15.8 FPS
2021-12-21 09:12:59

Uncertainties

- Refraction
- Absorption
- Precession (date?)
- And others….



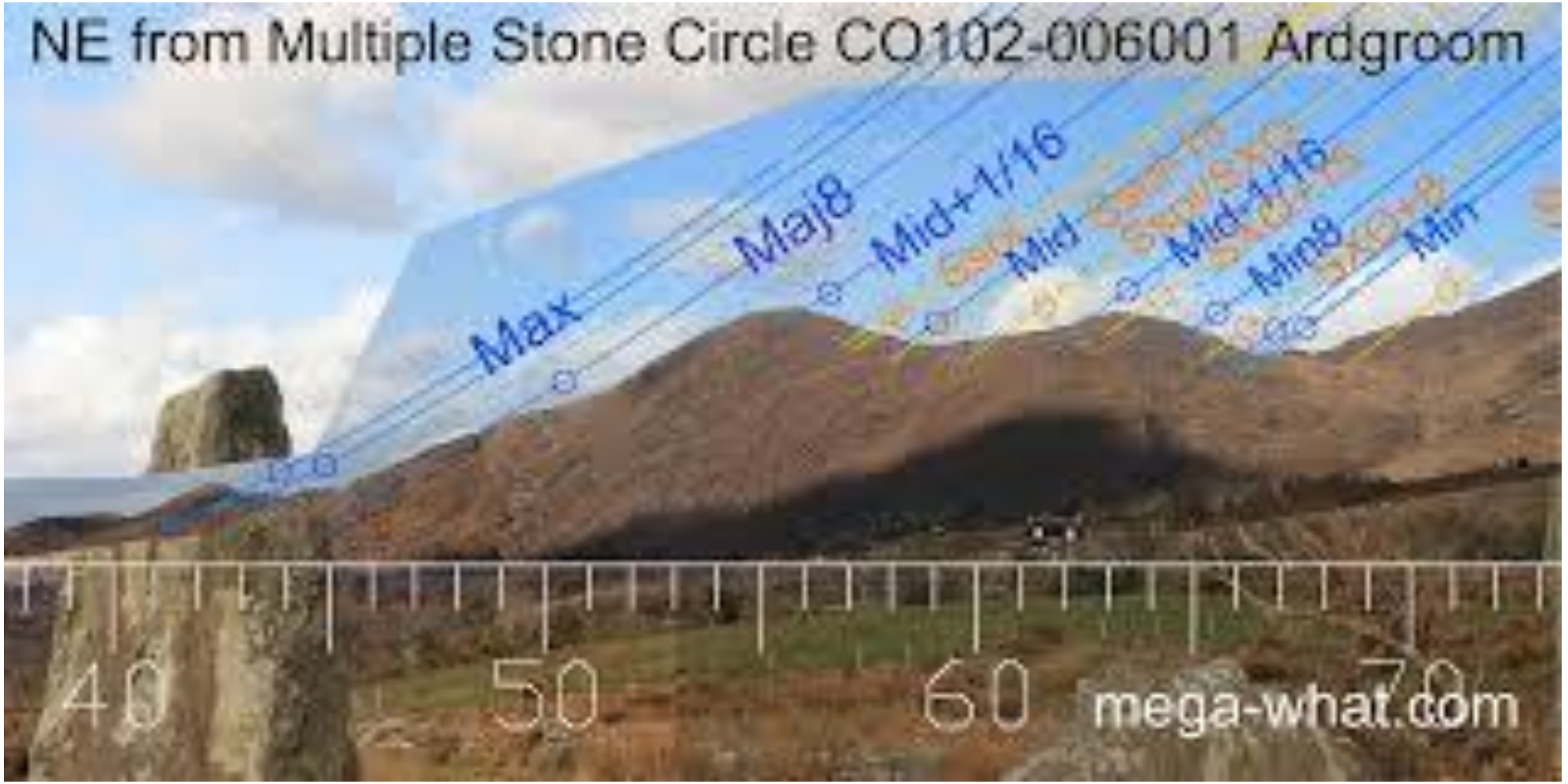

Precession
of the
North Pole
Vega
14000 AD
Deneb
10000 AD
Thuban
3000 BC
8000 AD
μ Cephei
Polaris
Today

Likelihood?

- Probability of alignment not being a fluke
- Null hypothesis
- Consider four cardinal and four solstitial points (sunrise and sunset, midsummer and midwinter)
- +/- 30’ of arc (one degree overall)
- 16/360 = 0.044
- 2s accounts for 95.5% of normal distribution
- 2s just about ok!
- Can’t repeat the experiment…..

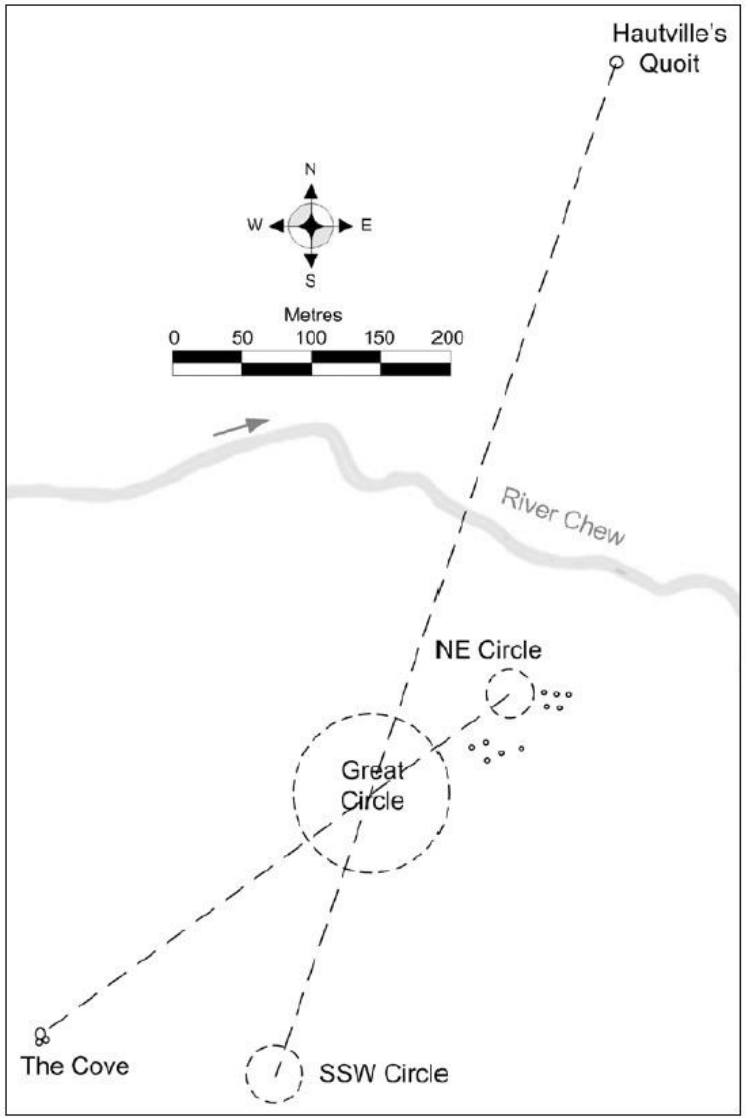
Other significant events?

Alignment with geographical features



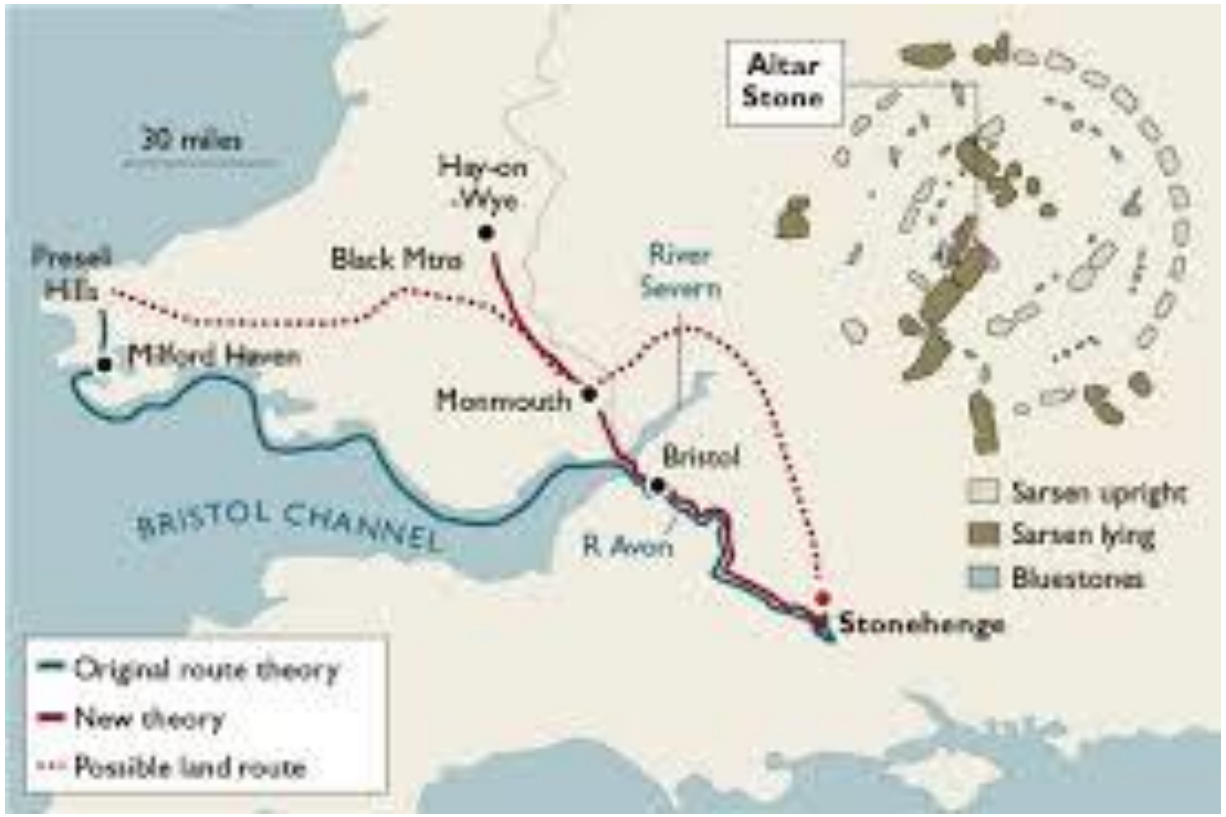
Silbury Hill

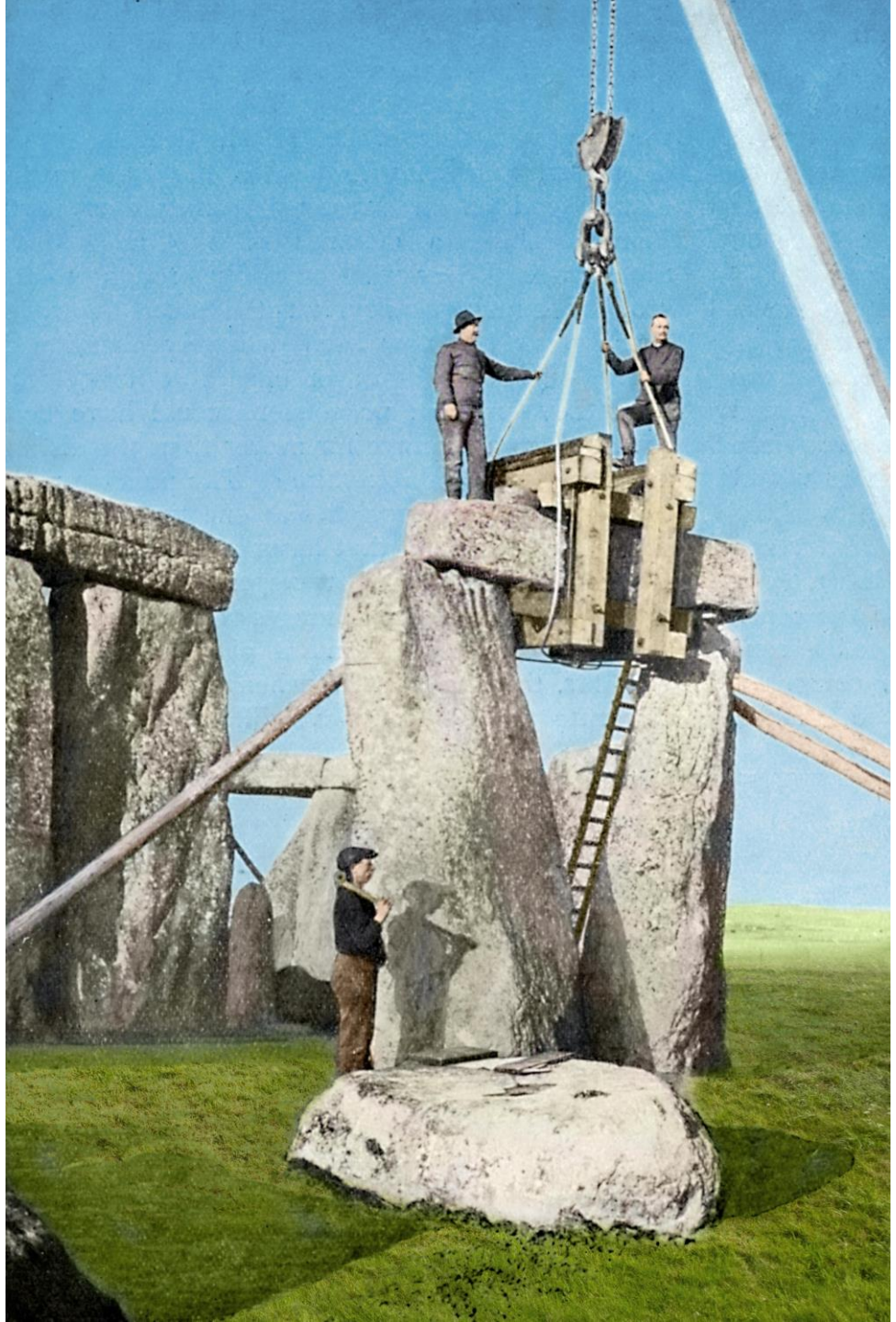
Stanton Drew in Somerset, England



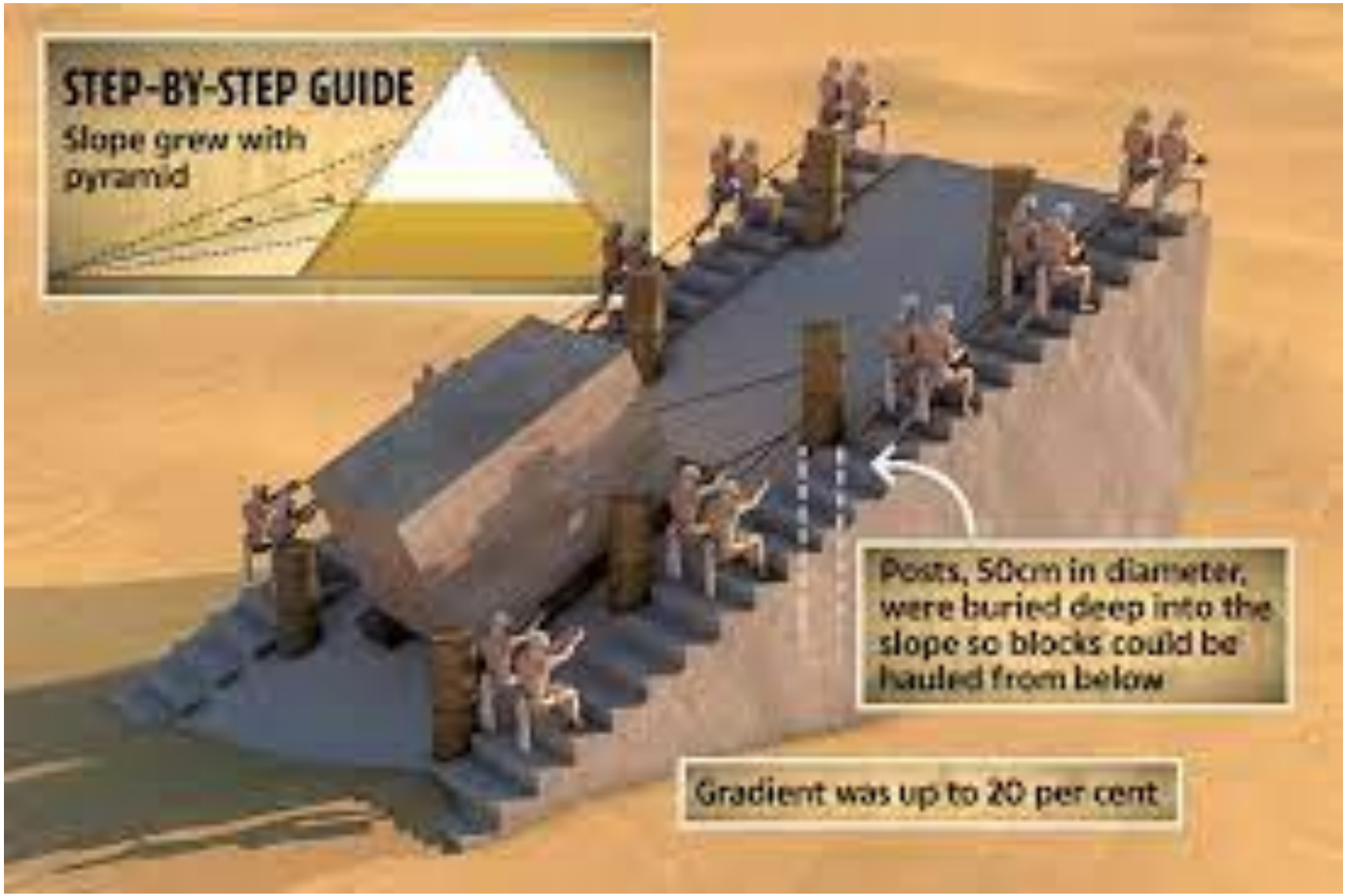
Alignments of the Stanton Drew circles and stones

And how?


Altar Stone
30 miles
Hay-on Wye
Preseli Hills
Black Mtns
River Severn
Milford Haven
Monmouth
Bristol
BRISTOL CHANNEL
R. Avon
Stonehenge
Sarsen upright
Sarsen lying
Bluestones
Original route theory
New theory
Possible land route

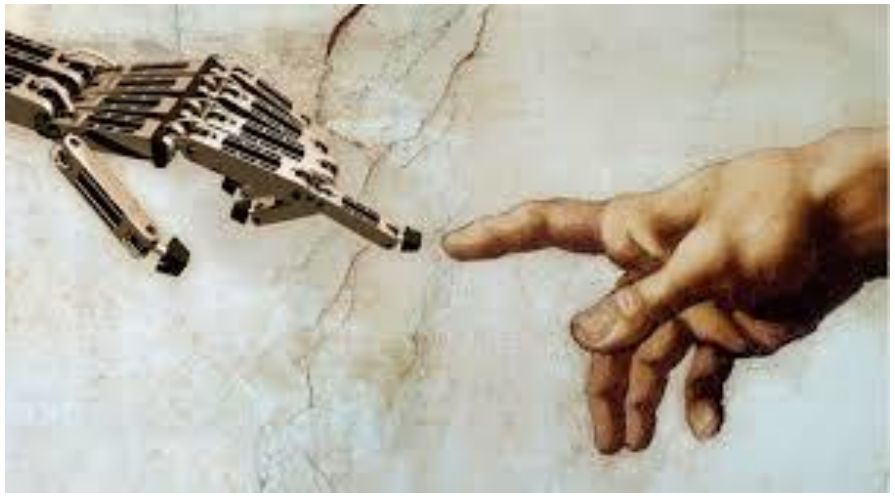


Working out how to do it.



Meaningful for humans? Why do it?

AI and Creativity



Empathy: the necessity of being human?

- Self-awareness and identity
- Religious, cultural and sociological character
- More than just identifying patterns?
- Though that is a good start!

Debating AI in Archaeology: applications, implications, and ethical considerations

Martina Tenzer, Giada Pistilli, Alex Brandsen and Alex Shenfield

Within archaeology, AI can process big data accumulated over decades of research and deposited in archives. By combining these capabilities, AI offers new insights and exciting opportunities to create knowledge from archaeological archives for contemporary and future research. However, the ethical implications and human costs are not yet fully understood. Therefore, we question whether AI in archaeology is a blessing or a curse.

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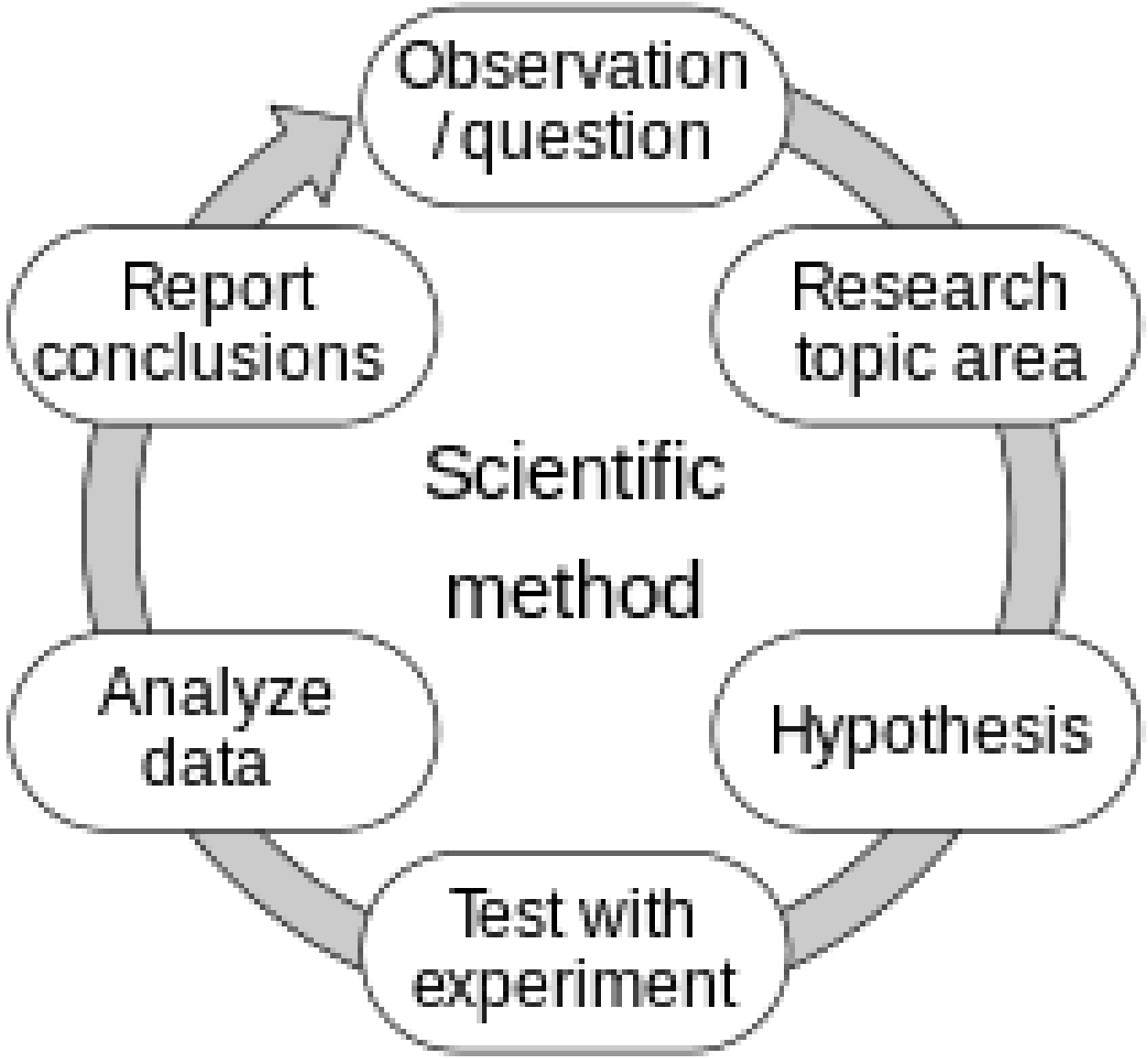
A range of disciplines:

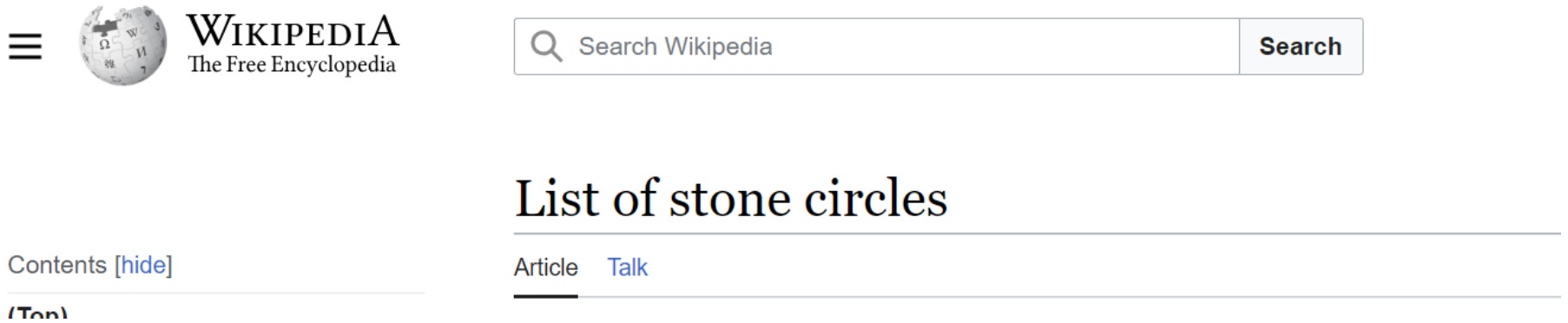
- Astronomy
- Anthropology
- History
- Geography
- Mathematics
- Religion
- Engineering
- Art and Design

Scientific Method exemplar



Having a go!

- Google Earth
- MobileFish
- Stellarium



List of stone circles

From Wikipedia, the free encyclopedia

This is an incomplete photographic list of stone circles.

Australia [edit]

See also Aboriginal stone arrangement Stone circles in Australia are sometimes revered as sacred sites by Australian Aboriginal people's. While often small, there are some large stones comparable to their European counterparts, particularly in Victoria. While some are small and not well attended, others are well-known, for instance the stone arrangements in Victoria at Carisbrook and Lake Bolac.[1]

Brazil [edit]

See also Parque Arqueológico do Solstício.[2]

A range of disciplines:

- Astronomy
- Anthropology
- History
- Geography
- Mathematics
- Religion
- Engineering
- Art and Design
- AI
- Meteorology