

Shadow vs. Horizon Archaeoastronomy

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Ages in Astronomy: Prehistoric Archaeoastronomy

- Model? Flat earth
- Point of reference: Horizon, 2 D, megalithic
- Observations? Sun, moon, planets and stars
 - Sun: Solstice, equinox, seasons
 - Moon: month, phases, eclipses
 - Stars: constellations, zodiac, heliacal rising
 - Planets: Characteristics and Periodicity
- Time Concept? Year, seasons. month, day
- Mathematics? Arithmetic, counting
- Big Question: Will the sun return?

Ages: Ancient History

- Model? Ptolemy - geocentric spherical, 3 D
 - Armillary sphere, round earth, geocentric universe
- Point of Reference: Shadow astronomy
 - Hours, latitude, size of earth
- Observations? Sun, moon, planets and stars
 - Sun: Solstice, equinox, seasons, solar year
 - Moon: month, phases, eclipses
 - Stars: constellations, zodiac, heliacal risings, precession
 - Planets: Cycles and epicycles
- Time Concept? Sidereal vs solar year, hours
- Mathematics? Geometry, circles and spheres
- Big Question: Prediction of planets

Ages : Renaissance

- Model? Copernican solar centric
- Observations? Telescopic
 - Sun: Sunspots
 - Moon: mountains, craters
 - Stars: proper motion, galaxies
 - Planets: orbits, new planets, moons of Jupiter
- Time Concept? Hours and minutes
- Mathematics? Trig, calculus, and ellipses
- Big Question: Longitude

Age of Revolution

- Model? Solar centric, 3D, mechanical clockwork universe
- Observations? Telescopic, instrumental
 - Stars: proper motion,
 - Planets: New planets, moons, asteroids, life?
- Time Concept? Chronometer time, seconds
- Mathematics? Anomalies predict planets
- Big Question: Precise size of earth and the universe, life on Mars?

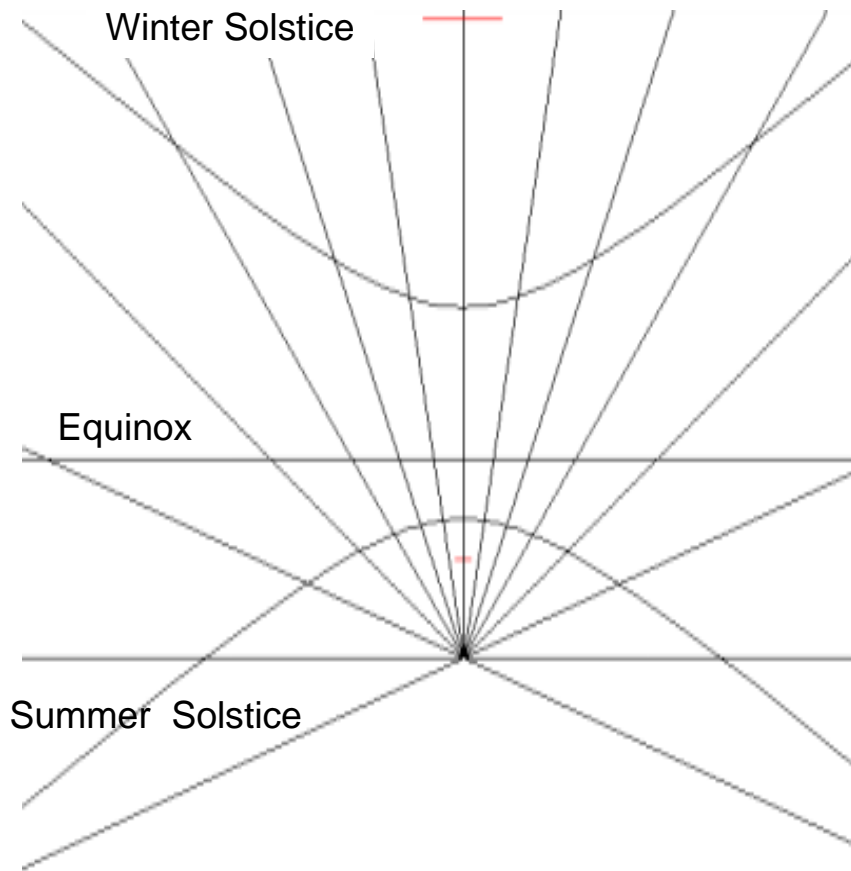
Modern Age of Astronomy

- Model? Cosmological
- Observations? Multi spectral, galactic
 - Stars: galaxies,
 - moon: been there, done that
 - Planets: exploration of geology and biology,
- Time Concept? picoseconds
- Mathematics? quantum, atomic, relativistic
- Big Question: How did the universe begin?

New Age Astrology

- Model? Celestial events affect people
- Point of Reference: Birth date, zodiac, magic crystals, energy vortex
- Observations? Ecliptic: sun, moon, planets
 - Sun: Solstice, equinox, seasons
 - Moon: month, phases, eclipses
 - Planets: personality characteristics
- Time Concept? Zodiac
- Big Question: What is your sign?
- Non science to science to nonsense

Shadow Astronomy and Sundials



- A shadow can display the fundamentals of astronomy, our place in the universe.
- Shadow projects solar positions in 3D celestial sphere onto a 2D plane.
- Shadow angles show daily rotation of the earth as time.
- Minimum shadow length shows annual cycle, solstice through equinox to solstice.

“*Cogito, Ergo Sum*”

- The unique ability of humans to think is the basis of civilization and the development of cultures
- Cycle of cultural development:
 - Observation
 - Concept:
 - Explanation, model, story, myth,
 - Prediction:
 - Code, ceremony, celebration
 - Confirmation
 - reinforcement, empowerment
- This is a universal cross cultural phenomenon

Knowledge is Power

- Predictions prove the concept
- Predictor is empowered
- Concept becomes a Credo, a code of culture
- Civilization evolves based on “Three Estates”
 - Bellators: Nobility, Kings, War Lords, Land Owners
 - Orators: Clergy, Prophets, Wise Men, Priests, Shamans
 - Laborators: Commoners, workers, serfs, soldiers
- Cycle starts with observations and explanations
- Observation sites are evidence of Civilization

Horizon Archaeoastronomy



- Observations need a point of reference
- Two dimensional
 - Horizon markers
 - Orientation Lines
 - Standing Stones
 - Megalithic structures
 - Burrows, tumulus
- Rising/setting phenomenon
- Solar: year and seasons
- Solstices, equinox

Winter Solstice

- The energy from the sun is the basis for life
- The First Big Question for Civilization *When will the sun stop sinking and start to return with life giving light and heat?*
- Need to predict, mark, and confirm the solstice
- Ceremonies to cause and to celebrate the return of the sun

Winter Solstice Celebrations

- Common Theme: Light, salvation, rebirth, renewal
- Saturnalia -Sol Invictus - 25 December
- Christmas – Birth of Messiah – 25 December
- Pre-Christian – Christmas tree, Yule log, red & green, mistletoe
- New Years Day
- Hanukkah – renewal - Lighting the Menorah
- Santa Lucia – Crown of Candles
- Guy Fawkes Day – Bonfires predate Gunpowder Plot



*Stonehenge
Summer Solstice Sunrise*

Summer Solstice

- Summer solstice sunrise is corresponding bearing from winter solstice sunset
- Marks the longest day, shortest night
- Significant calendar point in many cultures
- Many archaeoastronomy sites like Stonehenge mark summer solstice sunrise or set
- Time of celebration and revelry
- Shakespeare's “Midsummer’s Night Dream”

Heliacal Rising of Stars

- Stars always rise at the same point on the horizon
- Time of rising increases through the year
- Day of first observation just before sunrise is a useful date mark
- Heliacal rising of Sirius marked the time of Nile flooding for early Egyptians
- Heliacal Rising of Star of Bethlehem
- “We have seen his star in the East (on Rising)”

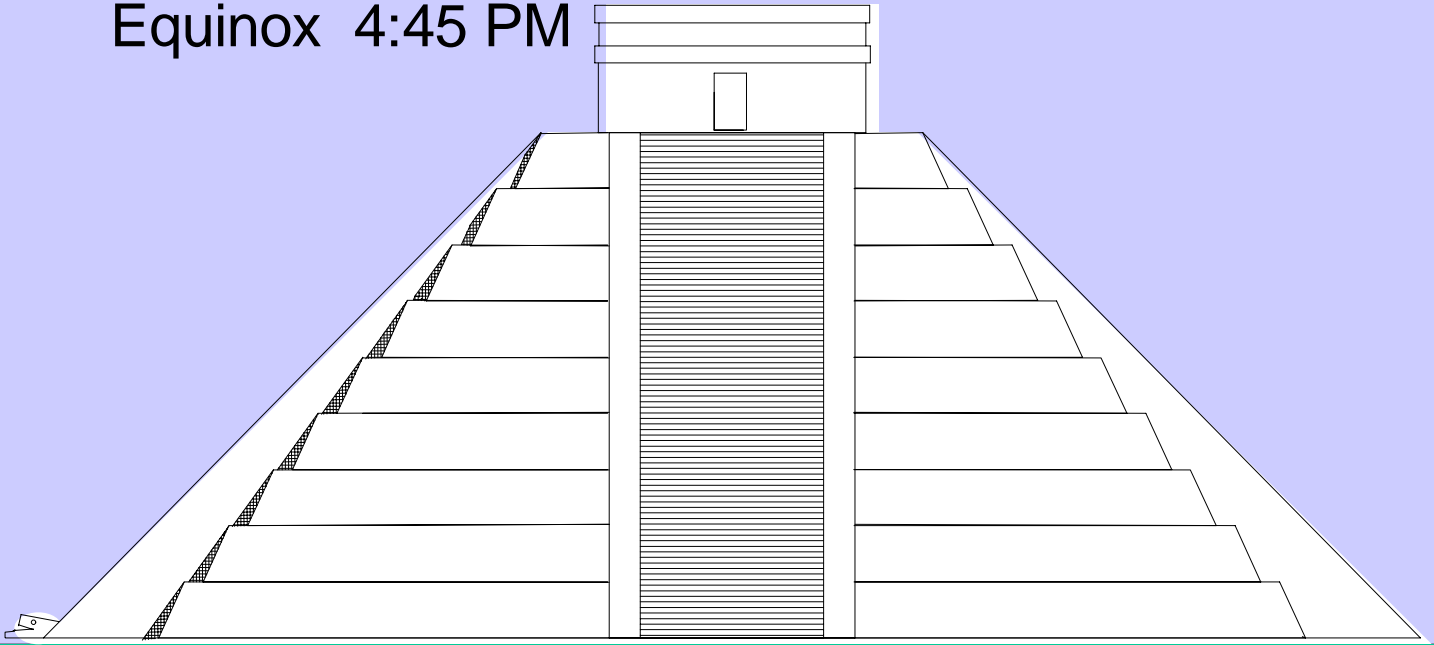
Equinox Phenomenon

- Sun rises due east and sets due west
- Solar declination is zero
- Time of greatest daily change in declination
- Two markers on E/W axis can determine the equinox
- Shadow path through the day is a straight line
- Equinox is not Equal Day, the time interval from crack of dawn to last ray of sunset
- Mayan “Feathered Serpent Descending” on Equinox

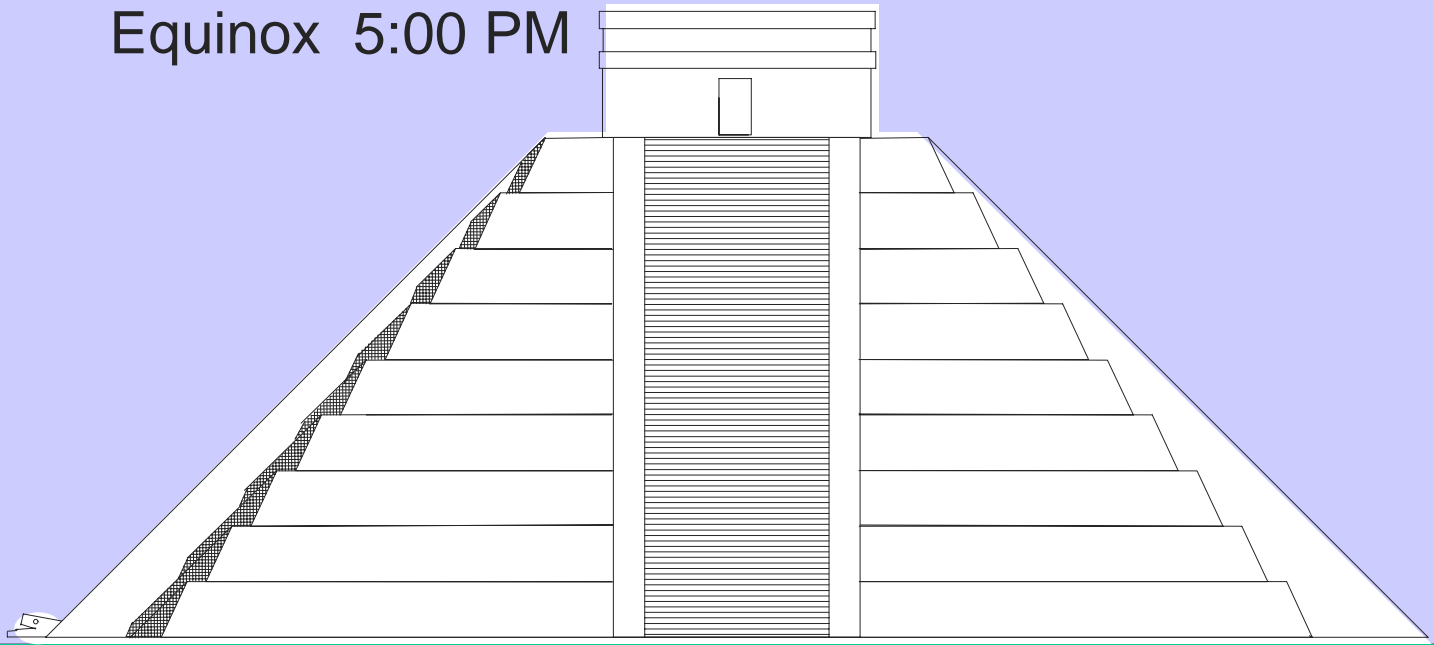
Kukulcan Equinox Shadows



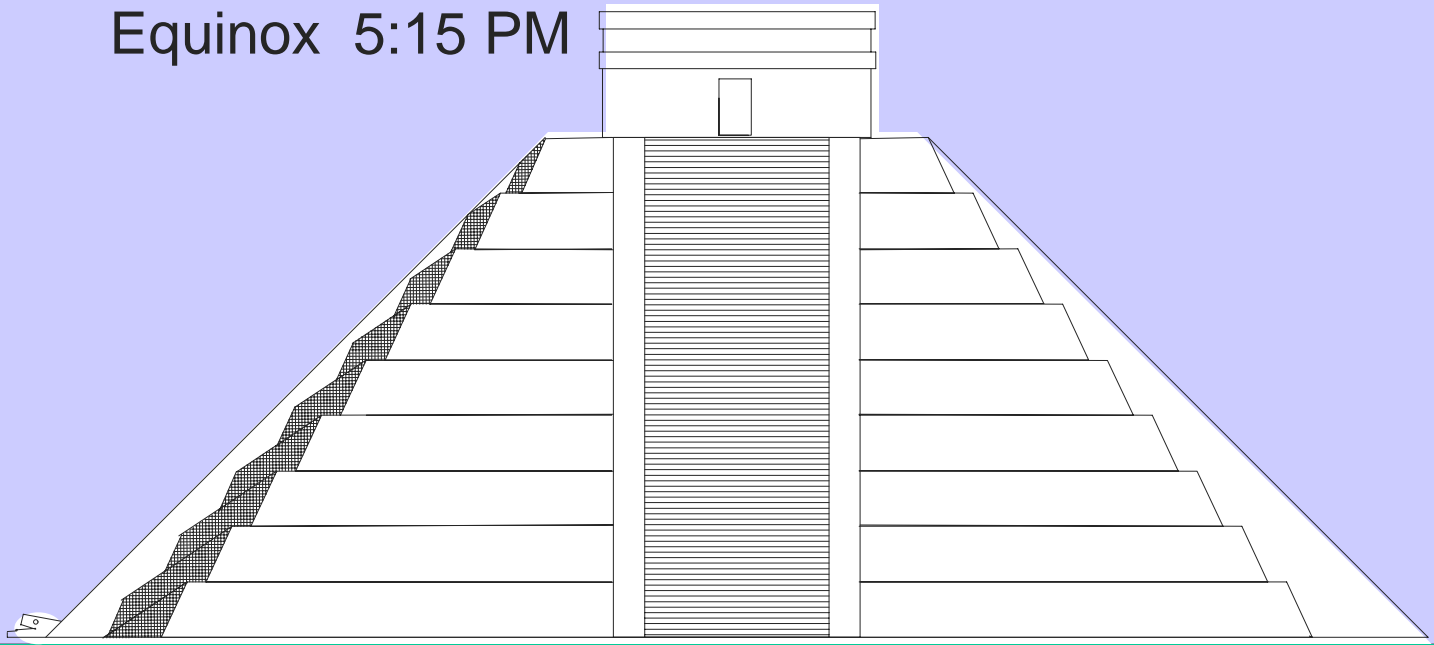
Equinox 4:45 PM



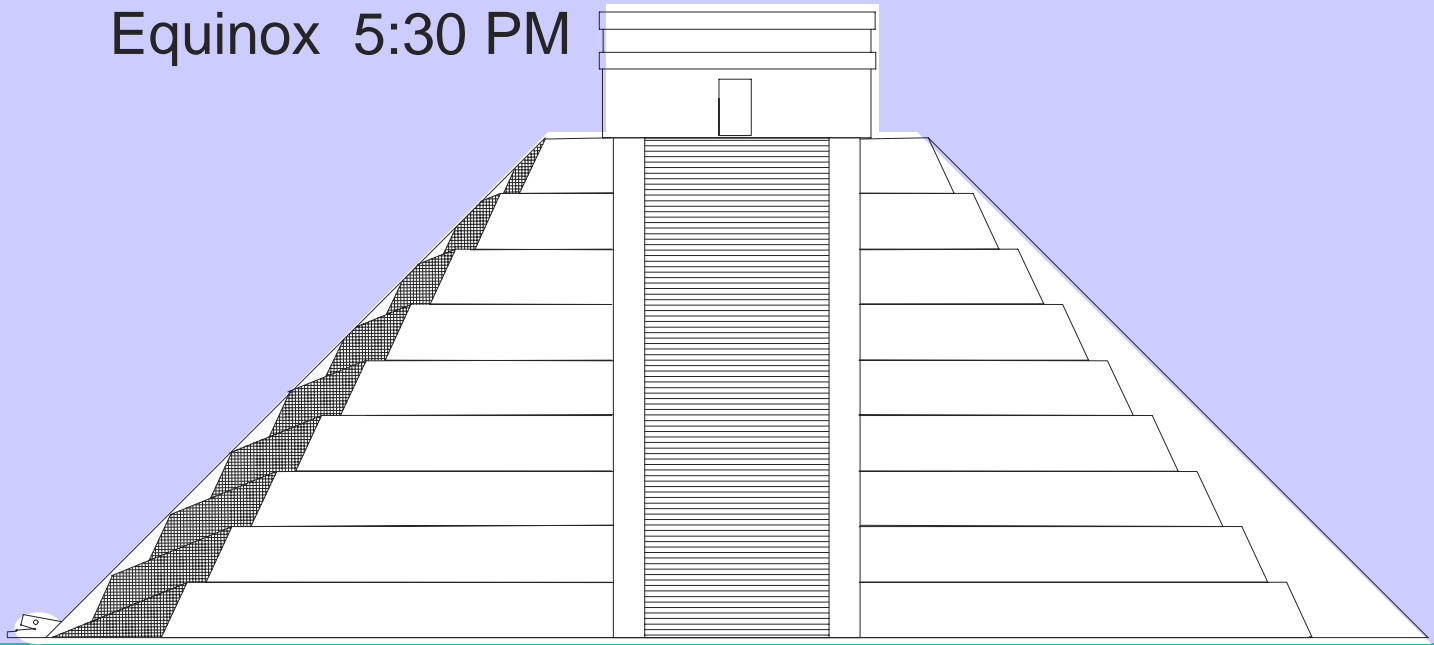
Equinox 5:00 PM



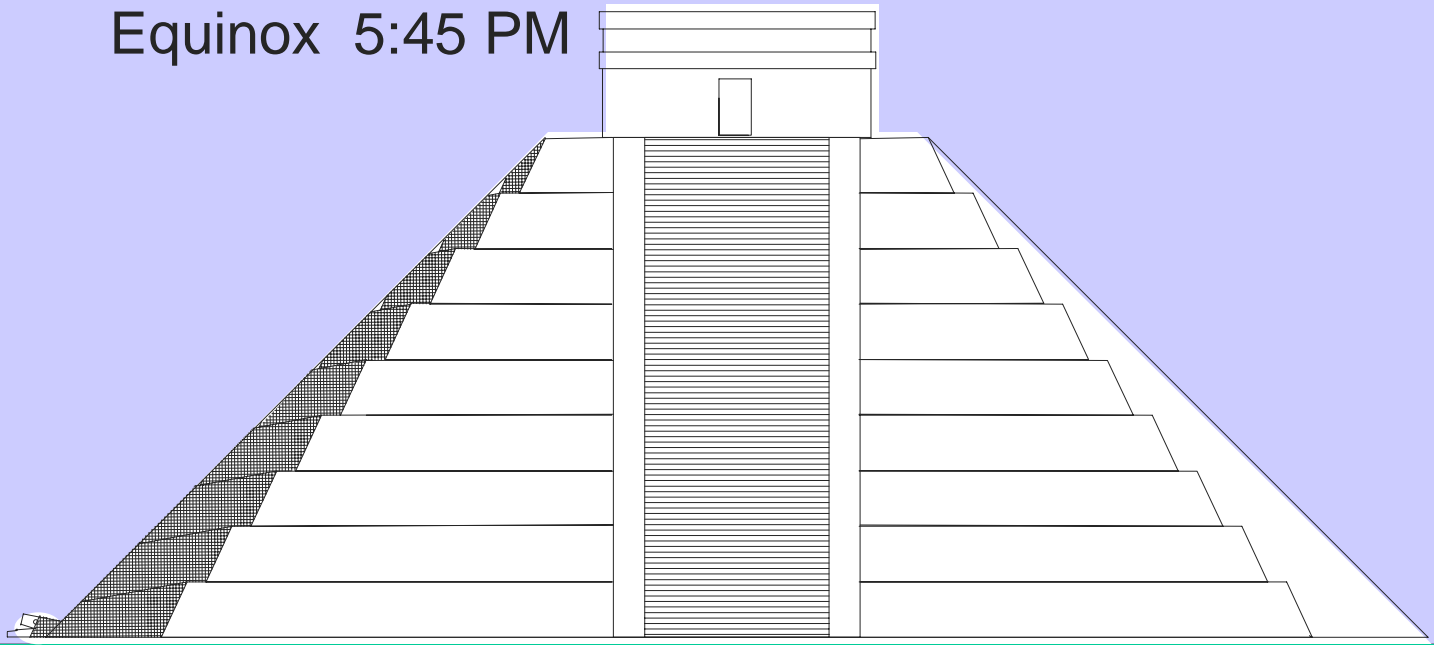
Equinox 5:15 PM



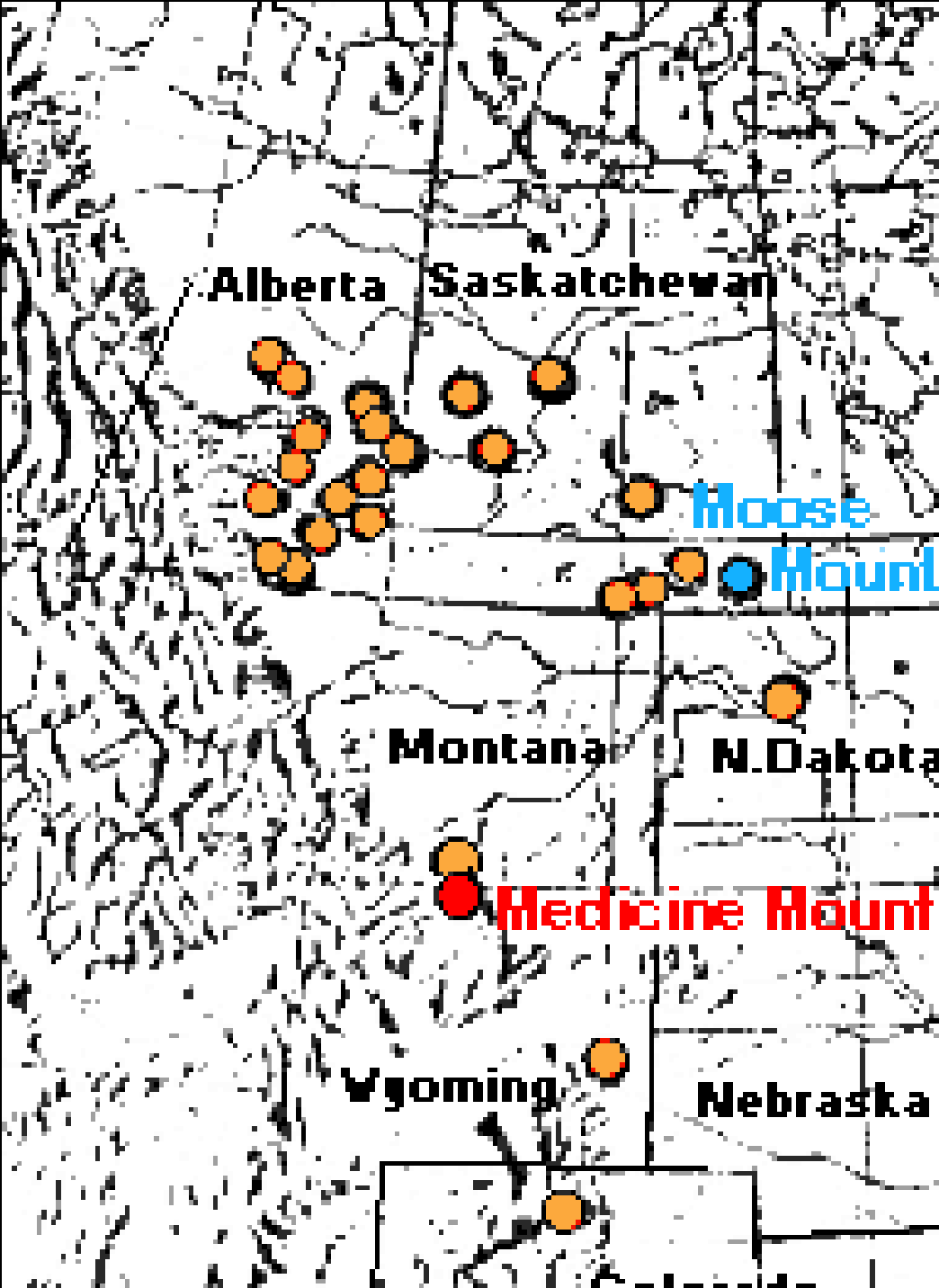
Equinox 5:30 PM



Equinox 5:45 PM



Medicine Wheels of the Western Plains



- Medicine Wheels in Alberta
- Ancient Aboriginal Stone Alignments
- Solar alignments? Majorville Medicine Wheel
- Stellar alignments? Moose Mountain Sask Bighorn Mountain, Wyoming

Majorville Medicine Wheel



Archaeological Survey of Alberta

- Central cairn
- Wheel with 28 spokes
- On bluff with horizon sight lines
- Nearby sites and markers

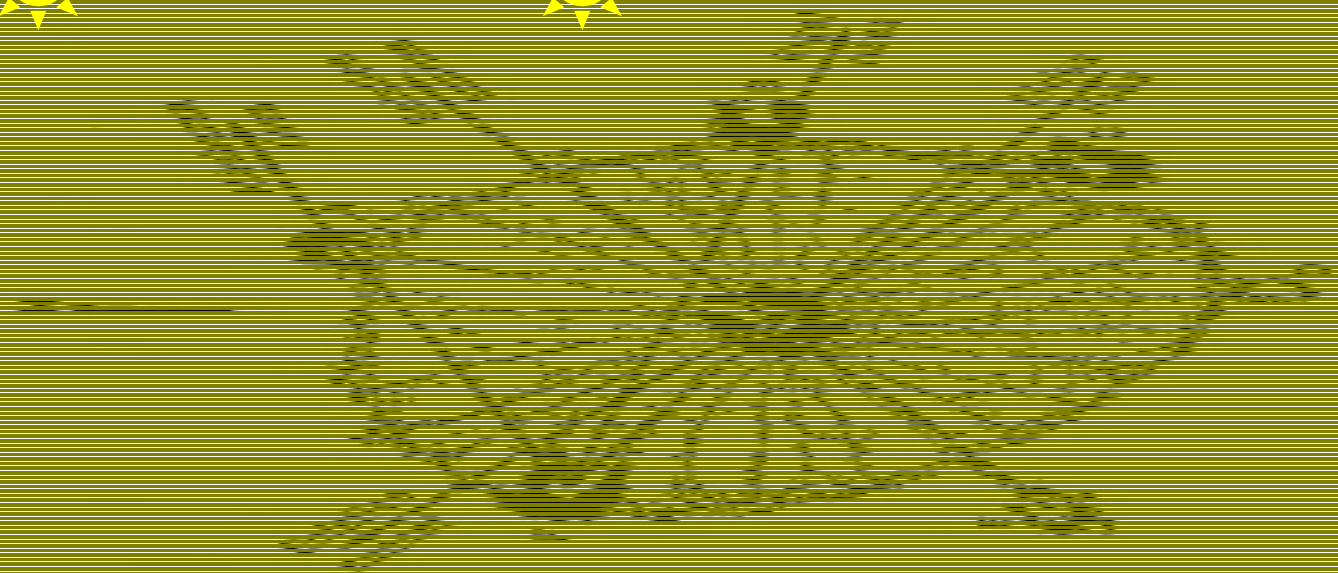
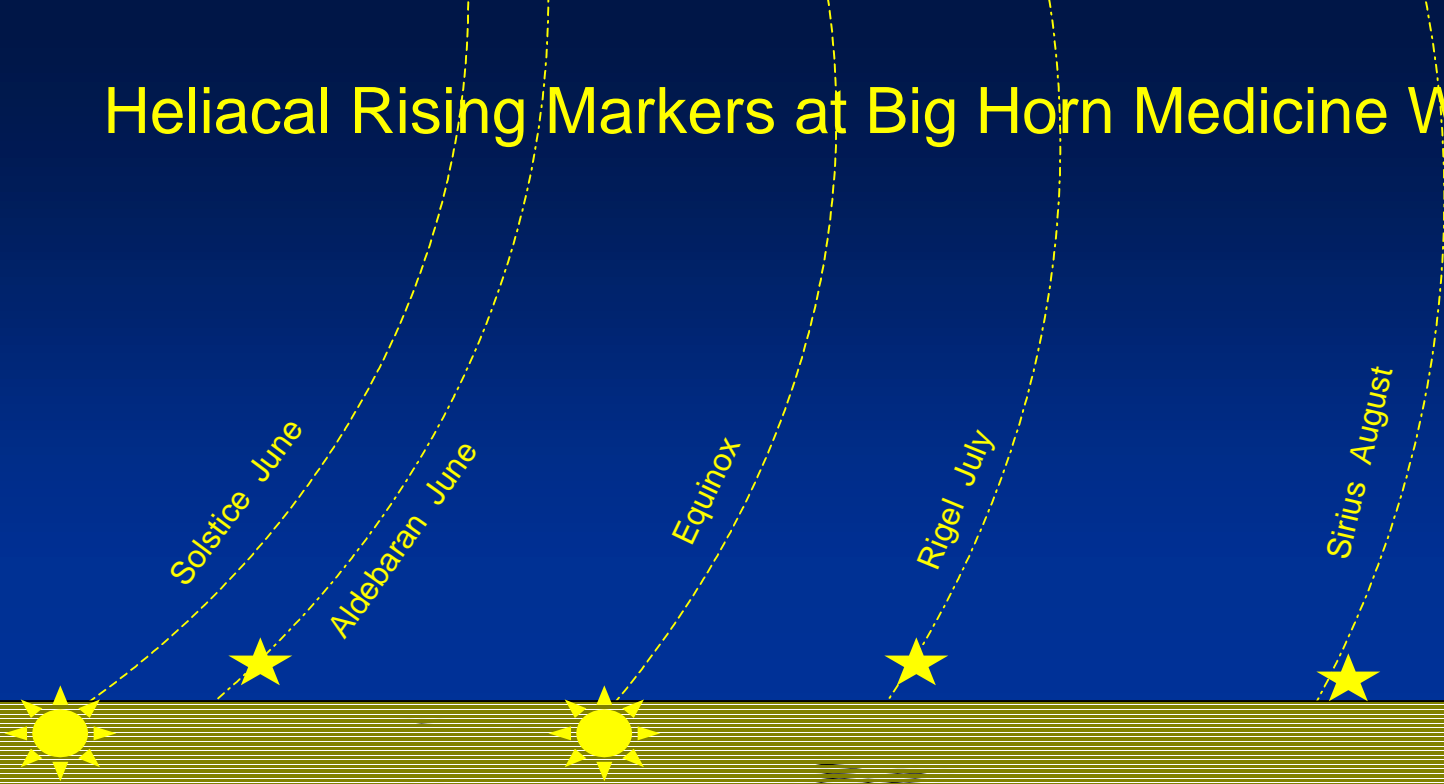
Summer Solstice Sunrise

Winter Solstice Sunset

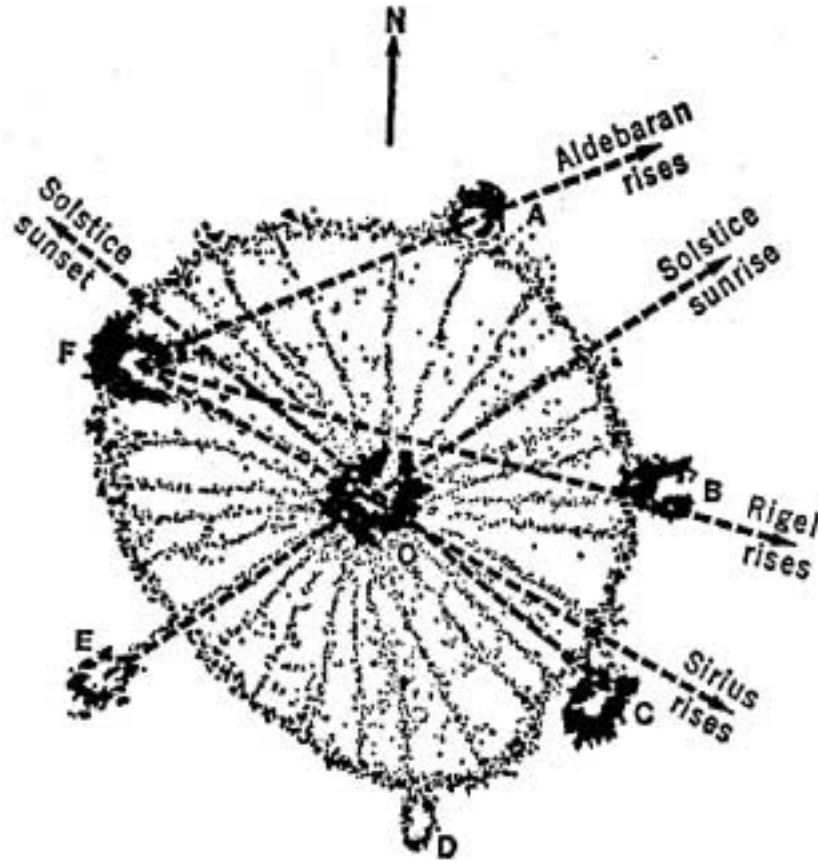


Majorville Medicine Wheel Central Cairn

Heliacal Rising Markers at Big Horn Medicine Wheel



Astronomical Alignment of Big Horn Medicine Wheel



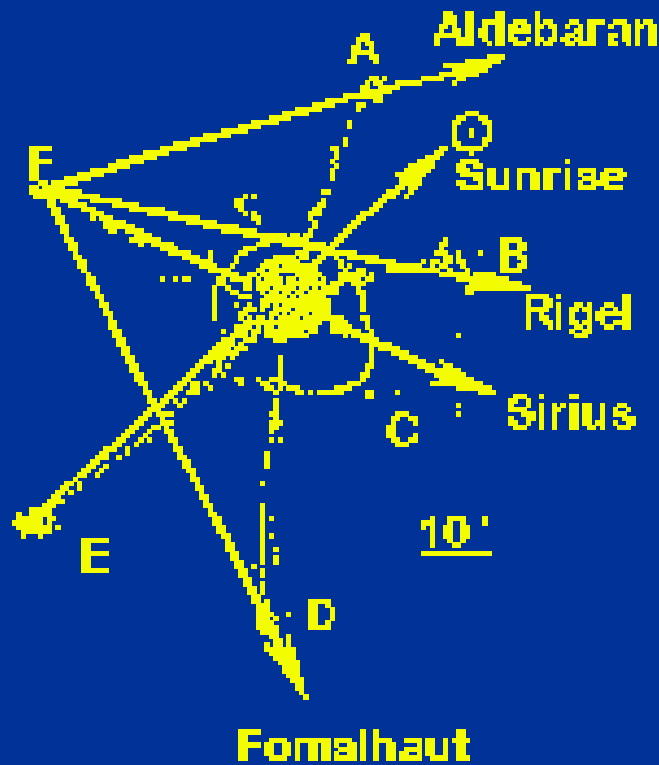
John Eddy found
cairns aligned to:
Summer Solstice

- Sunrise E-O
- Sunset C-O

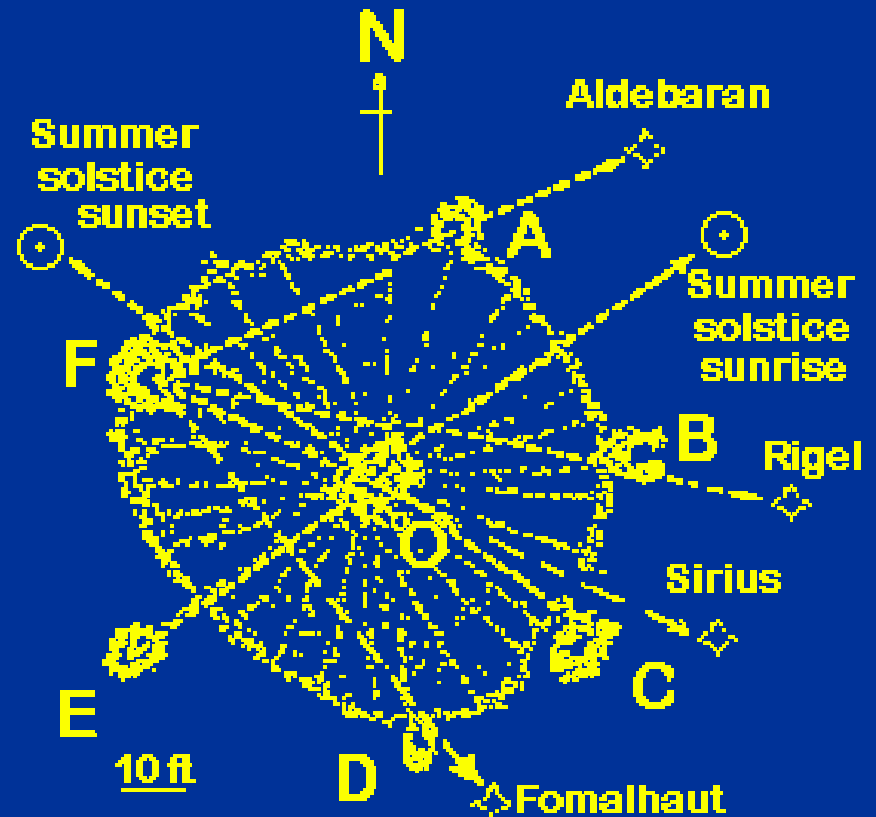
Heliacal Risings

- Aldebaran (June)
- Rigel (July)
- Sirius (August)
- Formalhaut (May)

Heliacal Rising Alignments Alignments

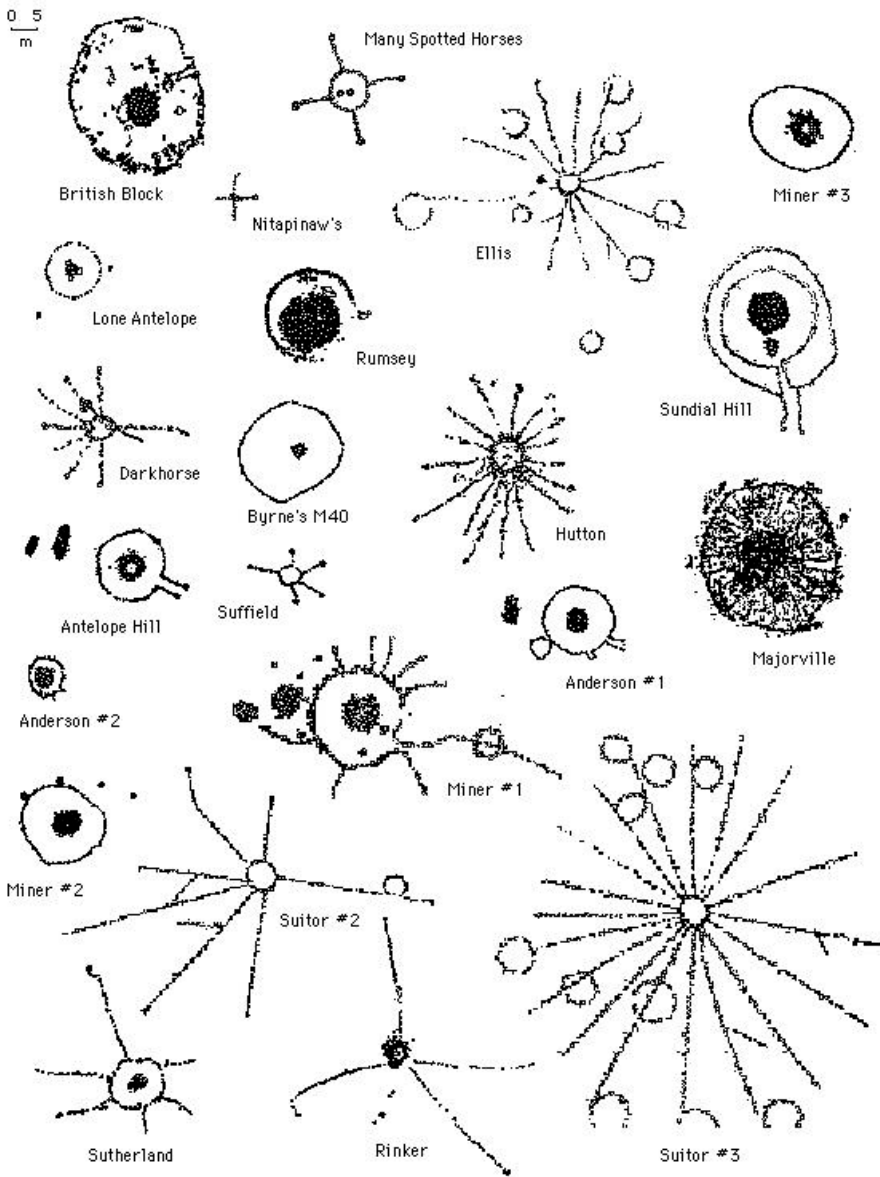


Moose Mountain, Sask



Big Horn, Wyoming

Archaeoastronomy and Medicine Wheels



- Rays from a central cairn are common
- Openings to the south east are common
- Solar and stellar alignments have been found
- Accurate astronomical alignments are rare

Conclusions

- Horizon markers for solar phenomenon were common in pre-historic cultures
- Calendar was determined using such markers
- Markers determined critical dates through the seasons of the year
- Civilization and the development of cultures around started with these markers
- The “Medicine Wheels” of the Western Plains are excellent examples of such date determining markers
- Be wary of over interpretation