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Recovering the Lost World,
A Saturnian Cosmology -- Jno Cook
Appendix C: Site Alignments.

$Revision: 1.37 $ (align.php)

Contents of this appendix: [Expected Dates] [Izapa] [Edzna] Olmec sites: [San Lorenzo Tenochtitlan] [La Venta] [Tres Zapotes] [Laguna De Los Cerros] [Cerro De La Mesas] [Remojadas] [Zempoala] Valley of Mexico sites: [Teotihuacan] [Tlatilco] [Tizatlan] [Cuicuilco] [Tlapacoya] [Cholula] Other: [Monte Alban] [Endnotes]

This file is linked from the chapter ["Olmec Alignments"];
it is primarily data, and well worth skipping.
No metric equivalents in this Appendix.

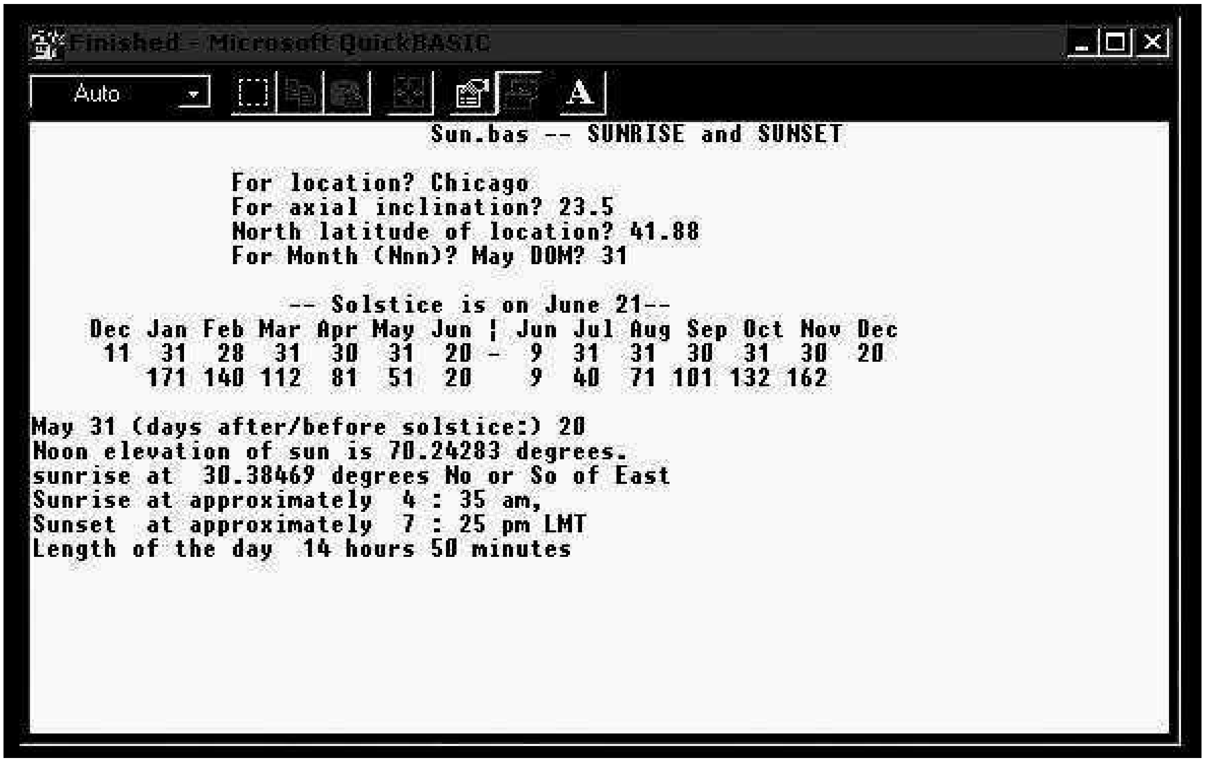
Site Alignments

The following data is the results of an initial investigation. The latitudes and longitudes are from [www.geonames.org]. They are shown as **{degrees north latitude} -- {degrees west longitude}**. Truncation by Geonames. Locations of ceremonial centers and mountains are shown as **"center:"** and **"marker:"** below.

The angle between a site and a mountain can be found from the arctangent, **arctangent({difference in latitude} / {difference in longitude})**. These are shown below. If the latitude and longitude of the site is used as the first term of the differences, then negative angles denote "north of east" and "south of west."

The dates for various angles to the setting or rising Sun at the horizon are from a javascript program, [saturniancosmology.org/sun.html], available locally, which can be set for different axial inclinations and latitudes. The angles shown are for sunrise, even if listed for sunsets. Sunsets will differ from sunrise by about 0.25 degrees in the part of the year closer to the equinoxes, with a virtually imperceptible difference as the Sun nears the solstices. Documentation of "sun.html" in the following endnote. [note 1]

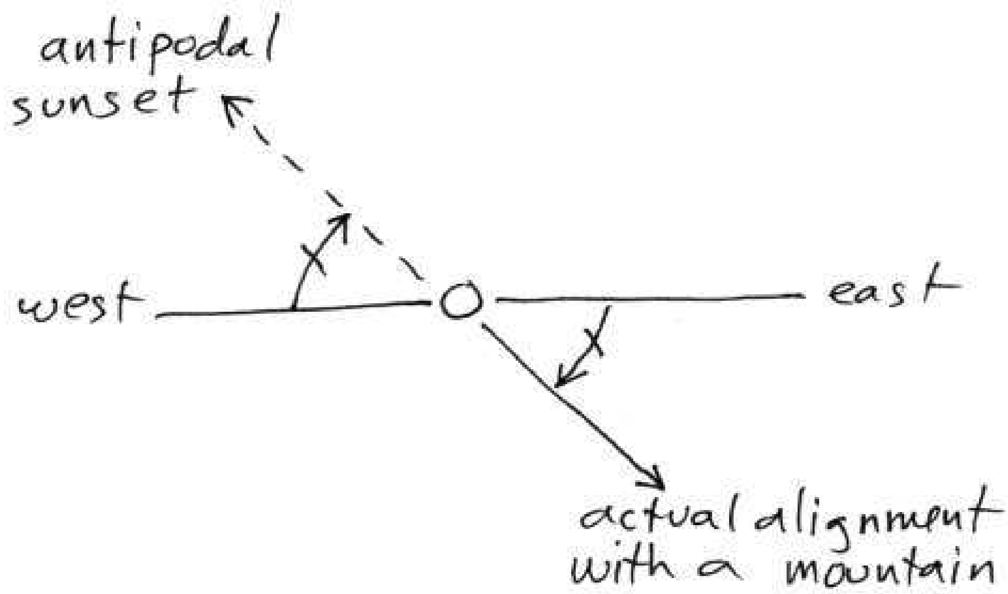
The distance between two locations can be found approximately from the latitudes and longitudes also, using the Pythagorean theorem, and using 69 miles per degree of latitude and, for central Mexico at 20 degrees latitude, an average of 65 miles per degree of longitude, as **sqrt((69 * {delta latitude})^2 + (65 * {delta longitude}) ^2)**. Distance between a center and a mountain is shown as **"remove:"** below.



[*Image: sun.html output example. Kees Cook.*]

The line of sight distance of a mountain can be found from **sqrt(2 * 4000 * h)**, where "h" is the height in miles. The value of h is derived from **3.25 * H / 5280**, where H is the height in meters. The figure "4000" is the radius of the Earth in miles. The figure "3.25" is the number of feet per meter. Line of sight distance between a center and a mountain is shown as **"viewed:"** below. The line of sight is for sea level. Intervening hills and raised terrain might block the view. [note 2]

I am using the term **antipodal** to mean a reverse alignment to a horizon location. The equivalence of angles above and below the east-west cardinal direction could be implied, and would be correct as equivalent, but makes little sense. At a few locations this is used, however.



[*Image: Antipodal alignment example; plan view.*]

Expected Dates

To ease the task of reading the following data, let me propose the important dates (horizon locations) which we are looking for (or which have been discovered inadvertently). The angles shown below are for a sunrise or sunset, and thus so many degrees north or south of an east-west axis. The angles shown in the list below are for an "average" latitude of 19 degrees. The actual angles will vary with the latitude of individual sites. These are shown for an axial inclination of 30 degrees and 23.5 degrees, since many sites use either the horizon location for a 30-degree axis or for a 23.5-degree axis, irrespective of what the current axial inclination was at the time the site was founded. The overhead (zenithal) passage of the Sun is also listed below. The dates are all "equivalent Gregorian."

Sunset in Degrees North of West for Various Dates

For an axial inclination of ...	30 degrees	23.5 degrees
End of era 3114 BC, August 12	19.9 degrees	14.9 degrees
End of era 2349 BC, September 8	6.6 degrees	5.2 degrees
End of era 1492 BC, April 19	15.3 degrees	12.0 degrees
End of era 747 BC, February 28	11.0 degrees	8.6 degrees
Solstice before 685 BC	32.0 degrees	25.0 degrees
Plasmoid start, July 9, 685 BC	30.4 degrees	23.7 degrees
Jupiter plasmoid, July 14	29.4 degrees	23.0 degrees
Delivery of plasmoid, July 26	26.6 degrees	20.7 degrees
Zenithal, August 9 - 14	20.3 degrees *	
July 23 - Aug 1		20.3 degrees *

* varies with latitude

In addition to sunsets, the setting angles for the Pleiades after culmination are suggested for some recurring alignment angles, as follows. These are additional to sunset alignments indicating the end of the era in 2349 BC on September 8. These are discussed in the text of the chapter "Olmec Alignments."

- Culmination 685 BC, Oct 8 Gregorian -- 13.0 degrees
- Culmination 600 BC, Oct 10 Gregorian -- 13.6 degrees
- Culmination 200 BC, Oct 14 Gregorian -- 15.8 degrees
- Culmination AD 100, Oct 18 Gregorian -- 17.1 degrees
- Culmination AD 200, Oct 20 Gregorian -- 18.1 degrees
- Culmination AD 400, Oct 21 Gregorian -- 18.7 degrees

The angle of 13 to 14 degrees and the angle of 18 to 19 degrees, correspond to the setting locations for the Pleiades at the dates shown above. These show up repeatedly.

Izapa

center: Izapa (Chiapas), 14.90 -- 92.18

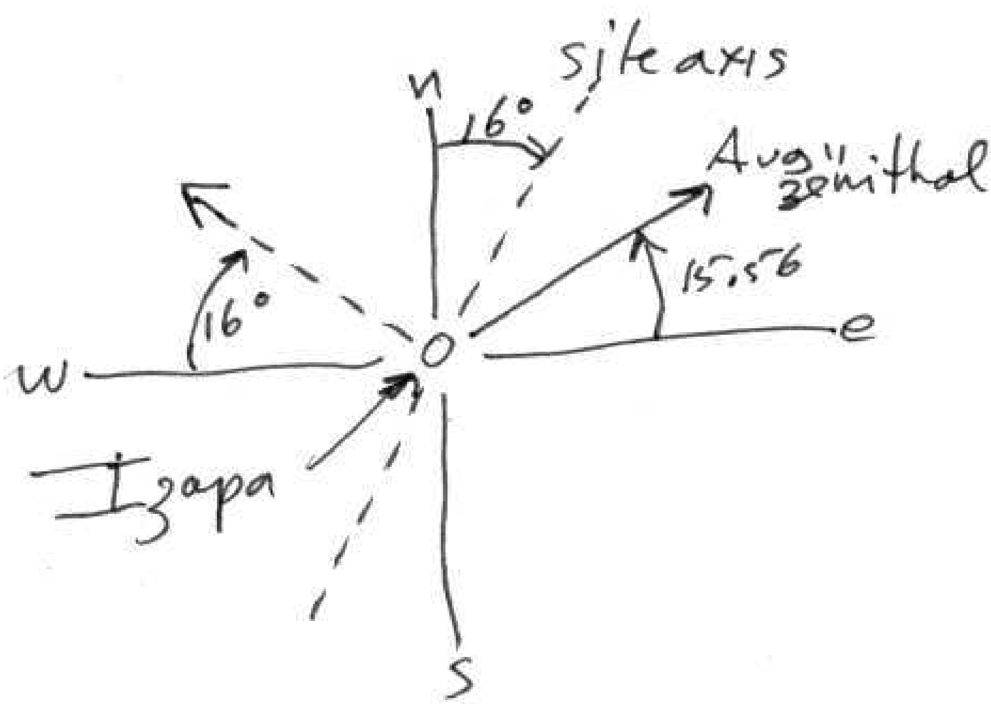
	axis 30 degrees		axis 23.5 degrees	
event	date	angle	date	angle
start 3114 BC era	Aug 11	19.87		15.55*|
start 2349 BC era	Sep 8	6.52		5.11
start 1492 BC era	Apr 19	15.01		11.75
start 747 BC era	Feb 28	-10.82		-8.47
solstice	Jun 21	31.16		24.36 ?
Jup flare-up	Jul 9	29.66		23.20
Jup plasmoid	Jul 14	28.73		22.48
Jup strike	Jul 25	25.94		20.30
zenithal passage	Aug 21	15.47*	Aug 11	15.56*

* -- alignment found, (*) -- antipodal, | -- site axis
Note: August 11 is used as the start of creation.

I have added **Volcan de Agua** in Guatemala which is 3760 meters high, and can clearly be seen from **Izapa**. **Izapa** is located at the base of the volcano **Tacana**. But the site axis (16 degrees e of n, thus 74 degrees n of e) does not point to **Tacana** (69.67 degrees n of e) except as "sort of."

Additionally I have added an alignment corresponding to a site axis which falls 16 degrees east of north. At right angles this points to 16 degrees north of west.

```
 Izapa (Chiapas), 14.90 -- 92.18
marker: Volcan Tajumulco, 15.034 -- 91.903, 4220 meter
remove: sqrt((69*(14.9-15.034))^2+(65*(92.18-91.9))^2) = 20.4 mi
  a((14.90-15.034)/(92.18-91.9))/rad = -25.57 degrees n of e

marker: Volcan Tacana (Mexico), 15.116 -- 92.1
  a((14.90-15.116)/(92.18-92.1))/rad = -69.67 degrees (out of limits)

marker: Volcan de Agua (Guatemala), 14.466 -- 90.742, 5280 meters
remove: sqrt((69*(14.9-14.466))^2+(65*(92.18-90.742))^2) = 98 mi
viewed: sqrt(2*4000*(3.25*3760)/5280) = 136 mi
  a((14.90-14.466)/(92.18-90.742))/rad = 16.79 degrees s of e
marker: site axis, 16 degrees e of n
  At right angle this equals 16 degrees n of w

Note: "a" is the arctangent, here and in following tables
```



[*Image: Izapa alignments; plan view.*]

The Sun passes overhead on August 11 (89.87 degrees above the horizon), rising at 15.55 degrees north of east. Malmstrom uses a latitude of 14.8 degrees north. This results in an alignment corresponding to August 12, where I have August 11.

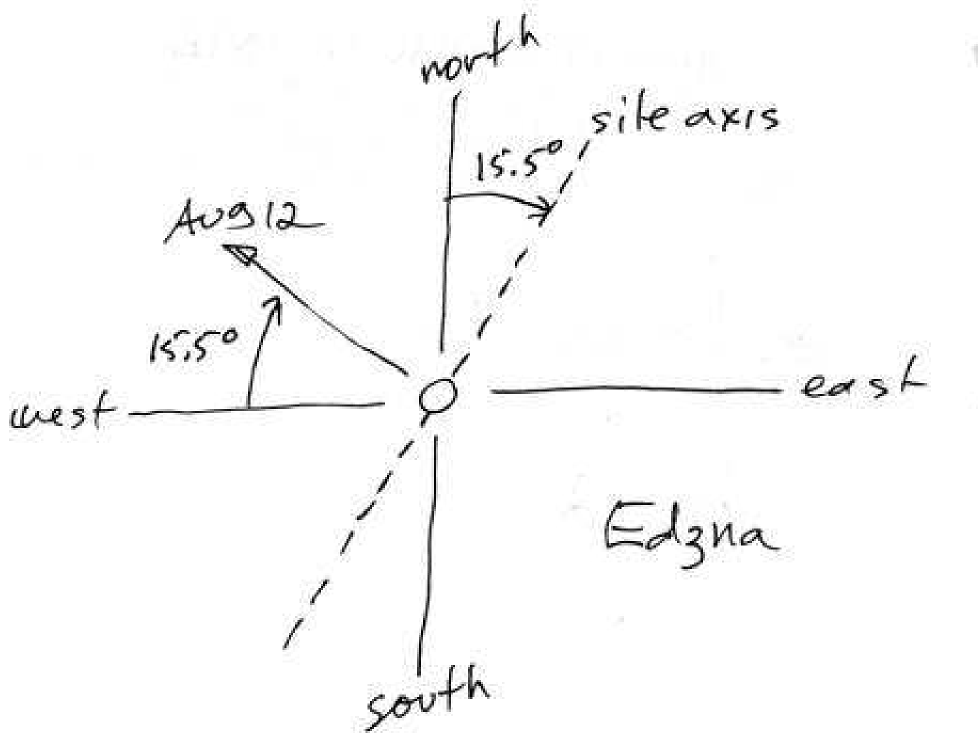
The alignment at right angles to the site axis points also to a sunset on August 11, at 16.0 degrees (15.56 n of w).

There is no solstitial alignment. The volcano **Tajumulco** is held to represent a solstitial alignment by Malmstrom (and others), but an alignment of 25.57 degrees n of e, is not close to the solstice sunrise which happens at 24.36 degrees n of e. It is off by more than a degree, which at the time of a solstice, causes an error of 15 days.

I should note, however, that there is no reliable latitude and longitude for Izapa, and changes of a few percent will change the angles to some of the nearby mountains considerably. Malmstrom used a latitude of 14.8 which is seven miles south of my use of 14.9 degrees.

Edzna

```
center: Edzna (Campeche), 19.583 -- 90.25

The long axis of the site is aligned 15.5 degrees east of north.

The Sun passes over the site on July 25th.
```



[*Image: Edzna alignments; plan view.*]

The 15.5-degree alignment is identical to the alignment of the long axis of Teotihuacan in the valley of Mexico and results in sight line between three structures at a right angle to this, which represents a sunset on August 12, 3114 BC (15.6 degrees north of west).

The overhead passage of the Sun is elevated at an angle of 89.96 degrees on July 25th, setting at 20.85 degrees n of w. New Year's Day is July 26th.

Malmstrom lists an additional sightline made at 30 degrees north of west. He identifies this as the most northerly displacement of the Moon. This is correct, for at an "axial inclination" of 23.5 degrees for the Earth plus 5 degrees more for the Moon, this places the angle to a possible horizon location of the Moon at 30.42 degrees n of w.

San Lorenzo Tenochtitlan

San Lorenzo is an extensive site. I have checked data using the latitude/longitude for three included sites, shown below, but am only showing the results for the village of **Tenochtitlan** which seems to strike an average.

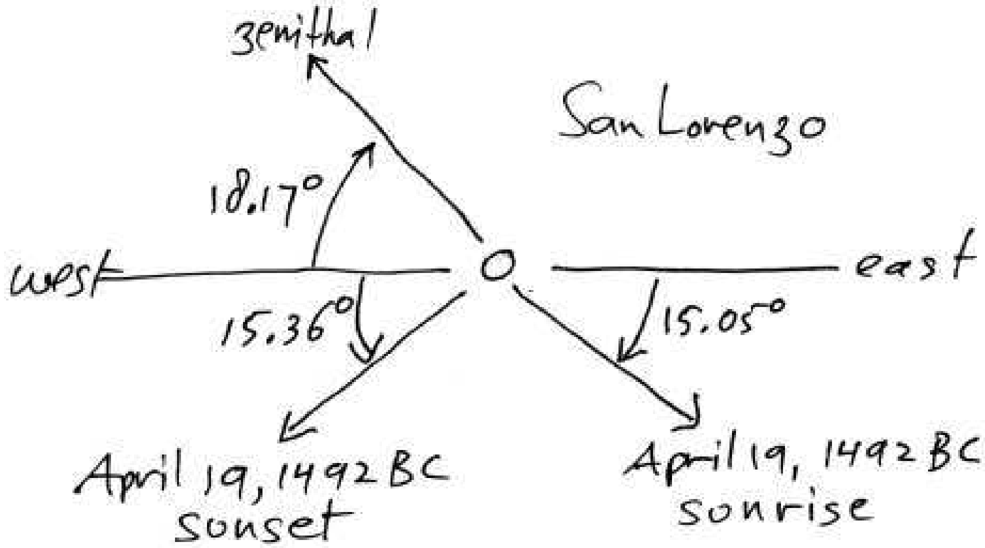
The first three sites are within 8.3 miles of each other; **Potrero Nuevo** is 10 miles further south. **Tenochtitlan** is a couple of miles north of the archaeological site, thus about 0.03 degrees of latitude different. The following only considers the location of **Tenochtitlan**.

```
center: San Lorenzo, 17.666 -- 94.833
       Tenochtitlan, 17.758 -- 94.75   <---
       El Azuzul, 17.733 -- 94.8
       Potrero Nuevo, 17.783 -- 94.58
```

event	axis 30 degrees date	angle	axis 23.5 degrees date	angle
start 3114 era	Aug 12	19.75		15.46
start 2349 BC era	Sep 8	6.62		5.18
start 1492 BC era	Apr 19	15.23**		11.93
start 747 BC era	Feb 28	-10.98		-8.60
solstice	Jun 21	31.67		24.75
Jup flare-up	Jul 9	30.14		23.56
Jup plasmoid	Jul 14	29.19		22.83
Jup strike	Jul 25	26.35		20.16
zenithal passage	Aug 15	18.45*	Aug 2	18.54*

* -- alignment found

```
San Lorenzo Tenochtitlan, 17.758 -- 94.75

        ... valley mountains
marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(17.758-19.483))^2+(65*(94.75-97.133))^2) = 195 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((17.758-19.483)/(94.75-97.133))/rad = 35.89 degrees (out of limits)
marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(17.758-19.033))^2+(65*(94.75-98.633))^2) = 267 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((17.758-19.033)/(94.75-98.633))/rad = 18.17 degrees n of w
marker: Citlaltepetl (Pico de Orizaba), 19.016 -- 97.266, 5636 meters
remove: sqrt((69*(17.758-19.016))^2+(65*(94.75-97.266))^2) = 185 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((17.758-19.016)/(94.75-97.266))/rad = 26.56 degrees n of w

marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(17.758-19.183))^2+(65*(94.75-98.65))^2) = 271 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((17.758-19.183)/(94.75-98.65))/rad = 20.07 degrees

marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(17.758-19.233))^2+(65*(94.75-98.033))^2) = 236 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((17.758-19.233)/(94.75-98.033))/rad = 24.19 degrees
        ... coast mountains
marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(17.758-18.316))^2+(65*(94.75-94.8))^2) = 38 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((17.758-18.316)/(94.75-94.8))/rad = 84.8 degrees (out of limits)

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(17.758-18.55))^2+(65*(94.75-95.2))^2) = 62 mi
viewed: sqrt(2*4000*(3.25*1659)/5280) = 90 mi
  a((17.758-18.55)/(94.75-95.2))/rad = 60.4 degrees (out of limits)

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meters
remove: sqrt((69*(17.758-18.35))^2+(65*(94.75-94.855))^2) = 41 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((17.758-18.35)/(94.75-94.855))/rad = 79.9 degrees (out of limits)

marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(17.758-20.745))^2+(65*(94.75-99.970))^2) = 397 mi
viewed: ??
  a((17.758-20.745)/(94.75-99.970))/rad = 29.78 degrees
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(17.758-17.35))^2+(65*(94.75-93.233))^2) = 102 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((17.758-17.35)/(94.75-93.233))/rad = 15.05 degrees s of e

marker: Cerro Zempoaltepec, 17.42 -- 95.98, 3396 meters
remove: sqrt((69*(17.758-17.42))^2+(65*(94.75-95.98))^2) = 83 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((17.758-17.42)/(94.75-95.98))/rad = -15.36 degrees s of w
```



[*Image: San Lorenzo alignments; plan view.*]

San Lorenzo site identity:

18.177 degrees n of w -- At 5452 meters, **Popocatepetl** is the 2nd highest mountain in Mexico, but cannot be seen from **San Lorenzo**, since it is 267 miles away. Under the condition of a 30-degree axial inclination of the polar axis, this mountain would signal the day (sunset) that the Sun passes directly overhead at **San Lorenzo (Tenochtitlan)** on August 15 (setting at 18.45 degrees n of w).

After 685 BC, the Sun would pass directly over **San Lorenzo** on August 2, 13 days earlier, setting at 18.54 degrees north of west. The horizon location thus stayed nearly the same.

San Lorenzo era marker:

15.05 degrees s of e -- **El Chichon** is 1060 meters high. This mountain could not be seen. Before 685, with the Earth's axis at 30 degrees, this angle defined a sunrise in winter (sunrise at 15.23 degrees south of east), but in an antipodal direction it is a spring sunset on April 19th, the start of the era after 1492 BC.

15.36 degrees s of w -- At 3396 meters **Cerro Zempoaltepec** is the 11th highest mountain in Mexico. It can be seen from any of the **San Lorenzo** locations. With the Earth's axis at 30 degrees, the angle defined a winter sunset. In the antipodal direction it marked a spring sunrise, which matches the sunrise angle made by **El Chichon**, April 19.

Under the condition of having the axis of the Earth was at 30 degrees, the mountains **El Chichon** and **Cerro Zempoaltepec** would triangulate **San Lorenzo** to a Gregorian equivalent calendar date of April 19th (15.23 degrees).

San Lorenzo additional notes:

The two alignments of 15 degrees could be suggested to represent alignments for a sunrise and sunset for August 12 in the current era. That is just unlikely.

La Venta

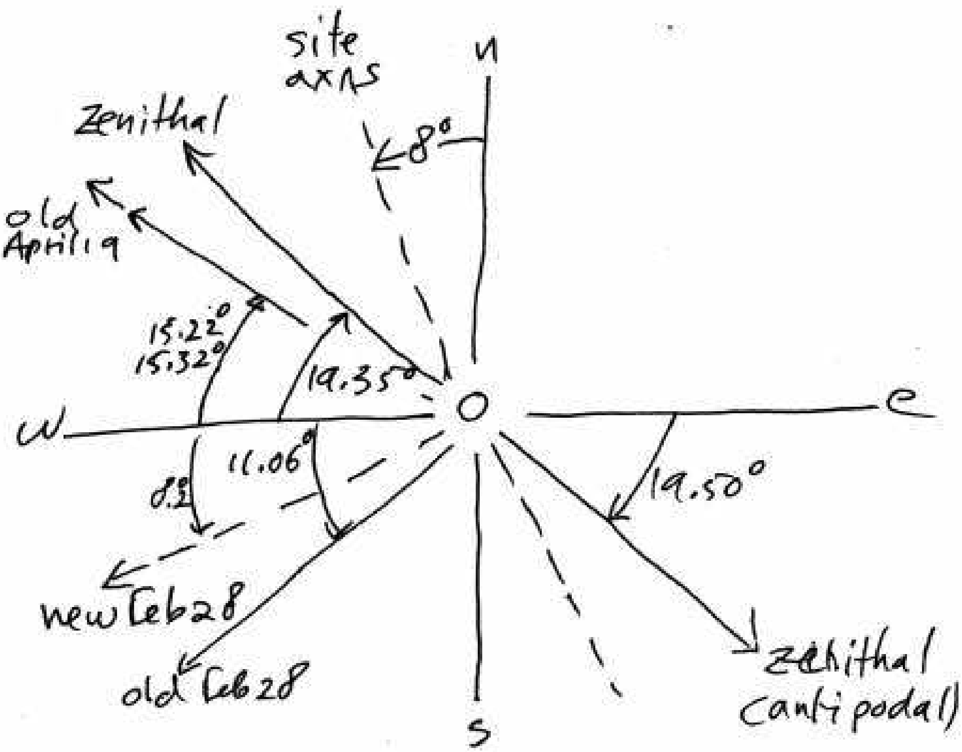
center: La Venta, 18.125 -- 93.99

The axis of the site is aligned 8.0 degrees west of north.

	axis 30 degrees		axis 23.5 degrees		
event	date	angle	date	angle	
start 3114 BC era	Aug 13	19.36* ?		15.49	
start 2349 BC era	Sep 8	6.63		5.20	
start 1492 BC era	Apr 19	15.27**		11.95	
start 747 BC era	Feb 28	-11.00(*)		-8.61*	
solstice	Jun 21	31.74		24.81	
Jup flare-up	Jul 9	30.21		23.62*	
Jup plasmoid	Jul 14	29.26		22.88	
Jup strike	Jul 25	26.41		20.66	
zenithal passage	Aug 14	18.93*	Jul 31	19.13*(*)	
Pleiades setting (actual)	--		Oct 8	12.79*	685 BC
			Oct 8	13.27*	685 BC

* -- alignment found; (*) -- antipodal

```
La Venta, 18.125 -- 93.99

                ... valley mountains
marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(18.125-19.483))^2+(65*(93.99-97.133))^2) = 224 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((18.125-19.483)/(93.99-97.133))/rad = 23.36 degrees s of w
marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(18.125-19.033))^2+(65*(93.99-98.633))^2) = 308 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((18.125-19.033)/(93.99-98.633))/rad = 11.06 degrees s of w

marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(18.125-19.0164))^2+(65*(93.99-97.2667))^2) = 221 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((18.125-19.0164)/(93.99-97.2667))/rad = 15.22 degrees n of w

marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(18.125-19.183))^2+(65*(93.99-98.65))^2) = 311 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((18.125-19.183)/(93.99-98.65))/rad = 12.79 degrees

marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(18.125-19.233))^2+(65*(93.99-98.033))^2) = 273 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((18.125-19.233)/(93.99-98.033))/rad = 15.32 degrees n of w

                ... coast mountains

marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(18.125-18.316))^2+(65*(93.99-94.8))^2) = 54 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((18.125-18.316)/(93.99-94.8))/rad = 13.27 degrees n of w

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(18.125-18.55))^2+(65*(93.99-95.2))^2) = 84 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((18.125-18.55)/(93.99-95.2))/rad = 19.35 degrees n of w

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(18.125-18.35))^2+(65*(93.99-94.855))^2) = 58 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((18.125-18.35)/(93.99-94.855))/rad = 14.58 degrees n of w

marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(18.125-20.745))^2+(65*(93.99-99.970))^2) = 428 mi
viewed: ?? -
  a((18.125-20.745)/(93.99-99.970))/rad = 23.65 degrees n of w
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(18.125-17.35))^2+(65*(93.99-93.233))^2) = 72 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((18.125-17.35)/(93.99-93.233))/rad = 45.67 degrees (out of limit)

marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(18.125-17.419))^2+(65*(93.99-95.983))^2) = 138 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((18.125-17.419)/(93.99-95.983))/rad = 19.50 degrees s of w
```



[*Image: La Venta alignments; plan view.*]

La Venta site identity:

19.35 degrees north of west -- The alignment with **Volcan San Martin Tuxtla** defines the sunset after the overhead passage of the Sun at **La Venta** on August 14 (18.93 degrees), when the axial inclination was 30 degrees, and on July 31 (19.13 degrees), in the current era with a 23.5-degree axial inclination.

19.50 degrees s of w -- This angle to **Cerro Zempoaltepec** defines the same day as above, but as an antipodal sunrise.

La Venta era marker:

Both of the site identity angles shown above (19.36 and 19.50 degrees n of w) also locate a sunset on August 13 before 685 BC. Thus at this site an era-ending marker is combined with a zenithal passage of the Sun. The site of **Izapa** will accomplish the same, but for the date of August 11, and conformed to the current axial inclination of the Earth.

15.22 degrees n of w -- This angle to **Citlaltepetl** defines a sunset on April 19 (15.27 degrees), for a 30-degree axial inclination. **Citlaltepetl** is the highest peak in Mexico. **(See notes, below.)**

15.32 degrees n of w -- This angle to **Volcan La Malinche** defines the same sunset on April 19 as above, for a 30-degree axial inclination. **Volcan La Malinche** in direct line with **Citlaltepetl**. **(See notes, below.)**

11.06 degrees s of w -- The angle to **Popocatepetl** defines a sunrise for the day of February 28 (11.00 degrees), as the start of the era after 747 BC, but selected while the axial inclination was still at 30 degrees, that is, before 685 BC.

Site axis at 8 degrees w of n -- The central axis of the present monuments at **La Venta** determine an orientation for the date of February 28th (8.61 degrees), based on the current axial inclination of 23.5 degrees. Actually, the following day, March 1 might be a better fit (8.21 degrees).

23.65 degrees north of west -- The angle with **Cerro San Martin (Queretaro)** defines a summer sunset on July 9th (23.62 degrees) in the current era. This may be a coincidence.

Setting of the Pleiades -- There are two coaxial alignments for the setting of the Pleiades in 685 to 600 BC to the mountains **Ixtaccihuatl** (12.79 degrees) and **Volcan San Martin Pajapan** (13.27 degrees).

La Venta notes:

The site location was likely established after 747 BC, as shown by the fact that there is an alignment for February 28. This was selected while the axial inclination was still at 30 degrees. This suggests that the 15.22-degree alignment (a sunset n of w) with **Citlaltepetl** (and **Volcan La Malinche**), defines an antipodal sunrise (s of e) for the date of April 19 (of 1492 BC).

Thus the 1492 BC "era-ending" date of **San Lorenzo** was duplicated at **La Venta**, and the era-ending date for 3114 BC and 747 BC were added. These are site location alignments which could not be altered when the Earth’s axis changed in 685 BC. A new alignment for the just previous era ending was established by selecting a reconstruction site axis as 8 degrees west of north.

Coincidentally, the two prior alignments at approximately 15.27 degrees, which had pointed to the 1492 BC era-ending dates of April 19th, now could be assigned to point to the 3114 BC era-ending date of August 13th at 15.49 degrees north of west.

Malmstrom, in "Archaeoastronomy in the Americas" (Ray Williamson, ed. 1981), shows the "Stirling compound," located adjacent (east) to the main structures (Compounds A, B, and C) at **La Venta** as aligned 15 degrees east of north. I do not know the date of the Stirling compound, but the alignment could point directly to a northwest sunset (15.49 degrees) for August 12 of the current era. Malmstrom wanted to use this to establish an "August 13" alignment. This is unlikely to be so because the "Stirling Compound" is older than the remainder of the site, and thus built before 747 BC and before the invention of the Long Count. From site plans I have seen, the Stirling compound looks to have one edge aligned at about 20 degrees west of north, and another at 28 degrees east of north.

Tres Zapotes

center: Tres Zapotes, 18.4667 -- 95.4333

event	axis 30 degrees date	angle	axis 23.5 degrees date	angle	
start 3114 BC era	Aug 12	19.83*		15.52	
start 2349 BC era	Sep 8	6.65		5.21	
start 1492 BC era	Apr 19	15.30		11.98 ?	
start 747 BC era	Feb 28	-11.02(*)		-8.63	
solstice	Jun 21	31.81		24.86	
Jup flare-up	Jul 9	30.28*		23.67	
Jup plasmoid	Jul 14	29.32		22.92	
Jup strike	Jul 25	26.47*(*)		20.70	
zenithal passage	Aug 13	19.40*	Jul 30	19.44*	
Pleiades setting (actual)	--		Oct 8	12.56*	685 BC
			Oct 8	13.39(*)	685 BC
			Oct 16	16.68*	100 BC
			Oct 16	16.43*	100 BC

* -- alignment found; (*) -- antipodal

Tres Zapotes was founded sometime in the centuries well before 1000 BC **Tres Zapotes** became a regional center in 900 BC to 800 BC, coinciding with the decline of **San Lorenzo Tenochtitlan**. Abandoned by AD 900.

```
Tres Zapotes, 18.4667 -- 95.4333

        ... valley mountains

marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(18.4667-19.483))^2+(65*(95.433-97.133))^2) = 130 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((18.4667-19.483)/(95.433-97.133))/rad = 30.87 degrees n of w
marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(18.4667-19.033))^2+(65*(95.433-98.633))^2) = 211 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((18.4667-19.033)/(95.433-98.633))/rad = 10.03 degrees s of w
marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(18.4667-19.0164))^2+(65*(95.433-97.2667))^2) = 125 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((18.4667-19.0164)/(95.433-97.2667))/rad = 16.68 degrees n of w

marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters *
remove: sqrt((69*(18.466-19.183))^2+(65*(95.433-98.65))^2) = 214 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((18.466-19.183)/(95.433-98.65))/rad = 12.56 degrees

marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters *
remove: sqrt((69*(18.466-19.233))^2+(65*(95.433-98.033))^2) = 177 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((18.466-19.233)/(95.433-98.033))/rad = 16.43 degrees n of w

                ... coast mountains
marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(18.4667-18.316))^2+(65*(95.433-94.8))^2) = 42 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((18.4667-18.316)/(95.433-94.8))/rad = 13.39 degrees s of e
marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(18.4667-18.55))^2+(65*(95.433-95.2))^2) = 16 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((18.4667-18.55)/(95.433-95.2))/rad = -19.67 degrees n of e

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(18.4667-18.35))^2+(65*(95.433-94.855))^2) = 38 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((18.4667-18.35)/(95.433-94.855))/rad = 11.41 degrees s of e
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(18.4667-20.745))^2+(65*(95.433-99.970))^2) = 334 mi
viewed: ?? -
  a((18.4667-20.745)/(95.433-99.970))/rad = 26.66 degrees n of w
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(18.4667-17.35))^2+(65*(95.433-93.233))^2) = 162 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((18.4667-17.35)/(95.433-93.233))/rad = 26.91 degrees s of e
marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(18.4667-17.419))^2+(65*(95.433-95.983))^2) = 80 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((18.4667-17.419)/(95.433-95.983))/rad = -62.30 degrees (out of limits)
```

Tres Zapotes site identity:

19.67 degrees n of e -- The alignment with **Volcan San Martin Tuxtla** represents the day the Sun passes directly overhead on August 13 in the previous era, rising at 19.40 degrees n of e.

Tres Zapotes era markers:

The above 19.67-degree angle is also an alignment for August 12th, 3114 BC (19.83 degrees), for the era before 685 BC.

11.41 degrees s of e -- This angle with **Cerro Santa Martha** (Veracruz), is an antipodal alignment for a sunrise on April 19th, 1492 BC (11.98 degrees), conformed to the current axial inclination of 23.5 degrees. But this is unlikely since all the other alignments are conformed to the era before 685 BC. Thus this more likely represents the era-ending for 747 BC (11.02 degrees s of w), conformed to the previous axial inclination. The antipodal alignment here reflects across the north south axis.

30.87 degrees n of w -- This angle with **Nauhcampatepetl** for a summer sunset defines July 9th (30.28 degrees), but in the era of an axial inclination of 30 degrees, before 685 BC.

26.66 degrees n of w -- The alignment with **Cerro San Martin** (Queretaro) defines a sunset for the date of July 25th (26.47 degrees), but for the era where the axis is still 30 degrees.

26.91 degrees s of e -- The angle with **El Chichon** also defines a sunset for the day of July 25, but in antipodal fashion, and also for the era where the axis is still 30 degrees.

Pleiades setting: -- There are two alignments for the setting of the Pleiades in the era of 685 BC or earlier, to **Ixtaccihuatl** (12.56 degrees) and **Volcan San Martin Pajapan** (13.39 degrees).

Pleiades setting: -- There are two additional alignments for the setting of the Pleiades in about 100 BC, at 16.68 degrees n of w to **Citlaltepetl** and 16.43 degrees to **Volcan La Malinche** also n of w.

Tres Zapotes notes:

It is really strange to see the current era-ending alignments of July 9 and July 25 cast in terms of the previous axial alignment, and to find the much older alignment with April 19th -- of 1492 BC -- presented in terms of the current axial inclination. It is more likely, however, that this last is an era-ending for 747 BC, conformed, like the other alignments, to a 30-degree axial inclination.

Tres Zapotes is an old site, and it has been suggested that it became important when **San Lorenzo** was abandoned. This is likely, but because of the August 13th zenithal, and the existence of an August 12 alignment for 3114 BC, I think the site was not developed and located until after 747 BC. Before that time it would have been impossible to retrocalculate the era-ending date for 3114 BC.

Laguna De Los Cerros

center: Laguna De Los Cerros, 18.1167 --
95.1

	axis 30 degrees		axis 23.5 degrees		
event	date	angle	date	angle	
start 3114 BC era	Aug 12	19.79		15.49	
start 2349 BC era	Sep 8	6.63		5.20	
start 1492 BC era	Apr 19	15.26		11.95	
start 747 BC era	Feb 28	-11.00		-8.61	
solstice	Jun 21	31.74		24.80	
Jup flare-up	Jul 9	30.21		26.62	
Jup plasmoid	Jul 14	29.26		22.87*(*)	
Jup strike	Jul 25	26.41		20.66	
zenithal passage	Aug 14	18.93	Jul 31	19.13	
Pleiades setting (actual)	--		Oct 16	16.71*	100 BC

* -- alignment found; (*) -- antipodal

```
Laguna De Los Cerros, 18.1167 -- 95.1

        ... valley mountains
marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(18.1167-19.483))^2+(65*(95.1-97.133))^2) = 162 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((18.1167-19.483)/(95.1-97.133))/rad = 33.9 degrees (out of limits)

marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(18.1167-19.033))^2+(65*(95.1-98.633))^2) = 238 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((18.1167-19.033)/(95.1-98.633))/rad = 14.54 degrees
marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(18.1167-19.0164))^2+(65*(95.1-97.2667))^2) = 154 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((18.1167-19.0164)/(95.1-97.2667))/rad = 22.55 degrees n of w

marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(18.1167-19.183))^2+(65*(95.1-98.65))^2) = 242 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((18.1167-19.183)/(95.1-98.65))/rad = 16.71 degrees
marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(18.1167-19.233))^2+(65*(95.1-98.033))^2) = 205 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((18.1167-19.233)/(95.1-98.033))/rad = 20.83 degrees
        ... coast mountains
marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(18.1167-18.316))^2+(65*(95.1-94.8))^2) = 24 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((18.1167-18.316)/(95.1-94.8))/rad = -33.59 degrees (out of limits)

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(18.1167-18.55))^2+(65*(95.1-95.2))^2) = 30 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((18.1167-18.55)/(95.1-95.2))/rad = 77.00 degrees (out of limits)

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(18.1167-18.35))^2+(65*(95.1-94.855))^2) = 23 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((18.1167-18.35)/(95.1-94.855))/rad = -43.59 degrees (out of limits)

marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(18.1167-20.745))^2+(65*(95.1-99.970))^2) = 364 mi
viewed: ?? -
  a((18.1167-20.745)/(95.1-99.970))/rad = 28.35 degrees
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(18.1167-17.35))^2+(65*(95.1-93.233))^2) = 132 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((18.1167-17.35)/(95.1-93.233))/rad = 22.32 degrees s of e
marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(18.1167-17.419))^2+(65*(95.1-95.983))^2) = 75 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((18.1167-17.419)/(95.1-95.983))/rad = -38.3 degrees (out of limits)
```

22.55 degrees n of w -- The angle made with **Citlaltepetl** in the northwest defines a summer sunset on July 14th (22.87 degrees).

22.32 degrees s of e -- The angle with **El Chichon** in the southeast defines an antipodal summer sunset on July 14th (22.87 degrees).

The alignment of 16.71 degrees may define the setting of the Pleiades after culmination in about 100 BC.

Cerro De La Mesas

center: Cerro De La Mesas, 18.7167 -- 96.15

event	axis 30 degrees date	axis 30 degrees angle	axis 23.5 degrees date	axis 23.5 degrees angle
start 3114 BC era	Aug 12	19.86*		15.55
start 2349 BC era	Sep 8	6.66		5.21
start 1492 BC era	Apr 19	15.32*(*)		11.99
start 747 BC era	Feb 28	-11.04(*)		-8.65
solstice	Jun 21	31.86		24.90(*)?
Jup flare-up	Jul 9	30.33		23.70
Jup plasmoid	Jul 14	29.37		22.96
Jup strike	Jul 25	26.51		20.73
zenithal passage	Aug 12	19.86*	Jul 29	19.74*

* -- alignment found; (*) -- antipodal

Cerro De La Mesas ("hill of the altars"), is an archaeological site in Veracruz, Mexico. It was a prominent regional center from 600 BC to AD 900, and a regional capital from perhaps AD 300 to AD 600.

```
Cerro De La Mesas, 18.7167 -- 96.15

        ... valley mountains
marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(18.7167-19.483))^2+(65*(96.15-97.133))^2) = 83 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((18.7167-19.483)/(96.15-97.133))/rad = 37.9 degrees (out of limits)

marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(18.7167-19.033))^2+(65*(96.15-98.633))^2) = 163 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((18.7167-19.033)/(96.15-98.633))/rad = 7.25 degrees

marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(18.7167-19.0164))^2+(65*(96.15-97.2667))^2) = 75 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((18.7167-19.0164)/(96.15-97.2667))/rad = 15.02 degrees n of w
marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(18.716-19.183))^2+(65*(96.15-98.65))^2) = 165 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((18.716-19.183)/(96.15-98.65))/rad = 10.58 degrees n of w

marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(18.716-19.233))^2+(65*(96.15-98.033))^2) = 127 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((18.716-19.233)/(96.15-98.033))/rad = 15.35 degrees n of w

                ... coast mountains
marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(18.7167-18.316))^2+(65*(96.15-94.8))^2) = 92 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((18.7167-18.316)/(96.15-94.8))/rad = 16.53 degrees

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(18.7167-18.55))^2+(65*(96.15-95.2))^2) = 62 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((18.7167-18.55)/(96.15-95.2))/rad = 9.95 degrees
marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(18.7167-18.35))^2+(65*(96.15-94.855))^2) = 88 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((18.7167-18.35)/(96.15-94.855))/rad = 15.81 degrees s of e
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(18.7167-20.745))^2+(65*(96.15-99.970))^2) = 285 mi
viewed: ?? -
  a((18.7167-20.745)/(96.15-99.970))/rad = 27.96 degrees
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(18.7167-17.35))^2+(65*(96.15-93.233))^2) = 211 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((18.7167-17.35)/(96.15-93.233))/rad = 25.10 degrees s of e
marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(18.7167-17.419))^2+(65*(96.15-95.983))^2) = 90 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((18.7167-17.419)/(96.15-95.983))/rad = 82.6 degrees (out of limits)
```

Cerro De La Mesas site identity:

Interestingly, the Sun passes overhead on August 12th, but there is no mountain at 19.73 degrees for an alignment. This is also the era-ending marker for 3114 BC.

25.10 degrees s of e -- The alignment with **El Chichon (Chiapas)** is a winter solstitial alignment (24.90 degrees) or an antipodal alignment for a summer solstice sunset, for the current era. I think this is in error, that is, it is a coincidence, for all the other alignments are for the previous era.

Cerro De La Mesas era marker:

The zenithal passage of the Sun on August 12 also signals the era-ending of 3114 BC.

15.35 degrees n of w -- The alignment with **Volcan La Malinche** defines a sunset on April 19 (15.32 degrees) in the era with the axis at 30 degrees.

15.81 degrees s of e -- The angle with **Cerro Santa Martha** (Veracruz) marks an antipodal sunset on April 19 (15.55 degrees), in the era with the axis at 30 degrees.

10.58 degrees n of w -- This is a summer sunset over **Ixtaccihuatl** but defines an antipodal winter sunrise for February 28th (11.04 degrees), for an axial inclination of 30 degrees.

Cerro De La Mesas discussion:

At this site, dated to after 600 BC, we see the first solstitial alignment, although it might be coincidental.

Remojadas

center: Remojadas, 18.9833 -- 96.3167

	axis 30 degrees		axis 23.5 degrees	
event	date	angle	date	angle
start 3114 BC era	Aug 12	19.90		15.57
start 2349 BC era	Sep 8	6.67		5.22*
start 1492 BC era	Apr 19	15.34		12.01
start 747 BC era	Feb 28	-11.06		-8.66(*)
solstice	Jun 21	31.92*		24.94
Jup flare-up	Jul 9	30.38		23.74(*)
Jup plasmoid	Jul 14	29.42		23.00(*)
Jup strike	Jul 25	26.56		20.77(*)
zenithal passage	Aug 11	20.32	Jul 28	20.03

* -- alignment found

```
Remojadas, 18.9833 -- 96.3167

        ... valley mountains

marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(18.9833-19.483))^2+(65*(96.3167-97.133))^2) = 63 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((18.9833-19.483)/(96.3167-97.133))/rad = 31.47 degrees n of w
marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(18.9833-19.033))^2+(65*(96.3167-98.633))^2) = 150 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((18.9833-19.033)/(96.3167-98.633))/rad = 1.23 degrees n of w

marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(18.9833-19.0164))^2+(65*(96.3167-97.2667))^2) = 61 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((18.9833-19.0164)/(96.3167-97.2667))/rad = 1.99 degrees n of w
marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters *
remove: sqrt((69*(18.9833-19.183))^2+(65*(96.3167-98.65))^2) = 152 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((18.9833-19.183)/(96.3167-98.65))/rad = 4.89 degrees n of w

marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters *
remove: sqrt((69*(18.9833-19.233))^2+(65*(96.3167-98.033))^2) = 112 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((18.9833-19.233)/(96.3167-98.033))/rad = 8.27 degrees n of w

                 ... coast mountains

marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(18.9833-18.316))^2+(65*(96.3167-94.8))^2) = 108 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((18.9833-18.316)/(96.3167-94.8))/rad = 23.74 degrees s of e

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(18.9833-18.55))^2+(65*(96.3167-95.2))^2) = 78 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((18.9833-18.55)/(96.3167-95.2))/rad = 21.20 degrees s of e

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(18.9833-18.35))^2+(65*(96.3167-94.855))^2) = 104 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((18.9833-18.35)/(96.3167-94.855))/rad = 23.42 degrees s of e
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(18.9833-20.745))^2+(65*(96.3167-99.970))^2) = 266 mi
viewed: ?? -
  a((18.9833-20.745)/(96.3167-99.970))/rad = 25.74 degrees n of w

marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(18.9833-17.35))^2+(65*(96.3167-93.233))^2) = 229 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((18.9833-17.35)/(96.3167-93.233))/rad = 27.908 degrees

marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(18.9833-17.419))^2+(65*(96.3167-95.983))^2) = 110 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((18.9833-17.419)/(96.3167-95.983))/rad = 77.95 degrees (out of limits)
```

Remojadas site identity:

31.47 degrees n of w -- This angle with **Nauhcampatepetl** defines a summer solstice in the previous era, with an axial inclination of 30 degrees (31.92 degrees).

Remojadas era markers:

4.89 degrees n of w -- The angle with **Ixtaccihuatl** marks the ending of the era on September 8, 2349 BC before 685 BC (5.22 degrees), conformed to the current axial inclination, as are all the other alignments at this site (except the possible solstice, above).

8.27 degrees n of w -- The angle with **Volcan La Malinche** marks an antipodal sunrise of date of February 28th (8.66 degrees), conformed to the current era.

23.74 degrees s of e -- The angle with **Volcan San Martin Pajapan** defines an antipodal summer sunset on July 9th (23.74 degrees), conformed to the current era.

23.42 degrees s of e -- The angle with **Cerro Santa Martha** (Veracruz) marks the antipodal day of the release of the plasmoid, July 14, 586 BC (23.00 degrees), conformed to the current era.

21.20 degrees s of e -- The angle with **Volcan San Martin Tuxtla** marks the antipodal day of the delivery of the plasmoid, July 25, 586 BC (20.77 degrees), conformed to the current era.

Remojadas notes:

The complete array of era markers which are presented, September 8, 2349 BC, February 28, 747 BC, April 2, 685 BC, and July 9th, 14th, and 25th, is amazing. All of these are presented under the current condition of a 23.5-degree axial inclination.

The solstice alignment is conformed to the previous 30-degree axial inclination, and is probably in error.

Zempoala

center: Zempoala, 19.447 -- 96.408

event	axis 30 degrees date	axis 30 degrees angle	axis 23.5 degrees date	axis 23.5 degrees angle
start 3114 BC era	Aug 12	19.96		15.62
start 2349 BC era	Sep 8	6.69(*)		5.24
start 1492 BC era	Apr 19	15.39		12.05
start 747 BC era	Feb 28	-11.09*		-8.68
solstice	Jun 21	32.02		25.01
Jup flare-up	Jul 9	30.48		23.81
Jup plasmoid	Jul 14	29.51		23.07
Jup strike	Jul 25	26.64*		20.83
zenithal passage	Aug 10	20.80*	Jul 26	20.59*

* -- alignment found

```
Zempoala, 19.447 -- 96.408

                ... valley mountains
marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(19.447-19.483))^2+(65*(96.408-97.133))^2) = 47 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((19.447-19.483)/(96.408-97.133))/rad = 2.84 degrees
marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(19.447-19.033))^2+(65*(96.408-98.633))^2) = 147 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((19.447-19.033)/(96.408-98.633))/rad = -10.54 degrees s of w

marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(19.447-19.0164))^2+(65*(96.408-97.2667))^2) = 63 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((19.447-19.0164)/(96.408-97.2667))/rad = -26.6 degrees s of w

marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(19.447-19.183))^2+(65*(96.408-98.65))^2) = 146 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((19.447-19.183)/(96.408-98.65))/rad = -6.71 degrees s of w
marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(19.447-19.233))^2+(65*(96.408-98.033))^2) = 106 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((19.447-19.233)/(96.408-98.033))/rad = -7.50 degrees s of w
                ... coast mountains
marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(19.447-18.316))^2+(65*(96.408-94.8))^2) = 130 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((19.447-18.316)/(96.408-94.8))/rad = 35.12 degrees (out of limits)

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(19.447-18.55))^2+(65*(96.408-95.2))^2) = 100 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((19.447-18.55)/(96.408-95.2))/rad = 36.59 degrees (out of limits)

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(19.447-18.35))^2+(65*(96.408-94.855))^2) = 126 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((19.447-18.35)/(96.408-94.855))/rad = 35.23 degrees (out of limits)
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(19.447-20.745))^2+(65*(96.408-99.970))^2) = 248 mi
viewed: ?? -
  a((19.447-20.745)/(96.408-99.970))/rad = 20.02 degrees n of w
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(19.447-17.35))^2+(65*(96.408-93.233))^2) = 252 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((19.447-17.35)/(96.408-93.233))/rad = 33.44 degrees (out of limits)

marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(19.447-17.419))^2+(65*(96.408-95.983))^2) = 142 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((19.447-17.419)/(96.408-95.983))/rad = 78.16 degrees (out of limits)
```

Zempoala site identity:

20.02 degrees n of w -- The angle with **Cerro San Martin (Queretaro)** defines the summer sunset for the zenithal passage of the Sun (at 89.92 elevation) on July 26th (20.59 degrees) conformed to the era after 685 BC. In the prior era the zenithal passage would have fallen on August 10.

Zempoala era markers:

10.54 degrees s of w -- The angle with **Popocatepetl** marks a sunset for the date of February 28th (11.09 degrees), but for the condition of a 30-degree axis.

6.71 degrees s of w -- The angle with **Ixtaccihuatl** marks an antipodal rise of the Pleiades for September 8, 2349 BC (6.69 degrees), for the condition of a 30-degree axis.

26.6 degrees s of w -- The angle with **Citlaltepetl** defines the day of the plasmoid strike on July 25th (26.64 degrees), but for the condition of a 30-degree axis.

Zempoala notes:

Again, era markers are presented as alignments only valid for the previous axial inclination. The site identification alignment could also be grouped with these. Interestingly, the site identity alignment became important after 685 BC because it fell on July 26 -- New Year's Day as established by **Teotihuacan**.

Teotihuacan

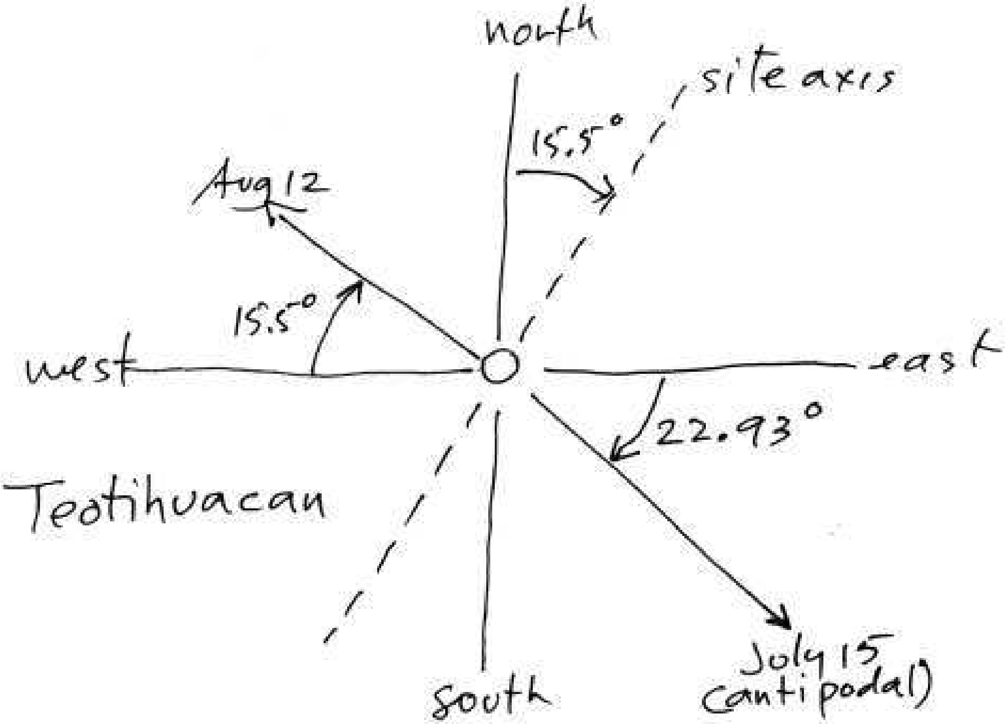
center: Teotihuacan; 19.683 -- 98.85

The axis of the site is aligned 15.5 degrees east of north.

	axis 30 degrees		axis 23.5 degrees	
event	date	angle	date	angle
start 3114 BC era	Aug 12	19.99		15.64*
start 2349 BC era	Sep 8	6.70		5.24
start 1492 BC era	Apr 19	15.41		12.06
start 747 BC era	Feb 28	-11.11		-8.70
solstice	Jun 21	32.07		25.05
Jup flare-up	Jul 9	30.52		23.85
Jup plasmoid	Jul 14	29.56		23.10(*)
Jup strike	Jul 25	26.68		20.86#
zenithal passage	Aug 10	20.83*	Jul 25	20.86*
Pleiades setting (actual)	--		Oct 22	18.65(*) AD 200
			Oct 22	18.45(*) AD 200

*** -- alignment found, (*) -- antipodal, # -- implied**

```
Teotihuacan; 19.683 -- 98.85

                ... valley mountains
marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(19.683-19.483))^2+(65*(98.85-97.133))^2) = 112 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((19.683-19.483)/(98.85-97.133))/rad = 6.64 degrees s of e

marker: Popocatepetl, 19.033 -- 98.633,  5452 meters
remove: sqrt((69*(19.683-19.033))^2+(65*(98.85-98.633))^2) = 47 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 164 mi
  a((19.683-19.033)/(98.85-98.633))/rad = 71.5 degrees (out of limits)
marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(19.683-19.0164))^2+(65*(98.85-97.2667))^2) = 113 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((19.683-19.0164)/(98.85-97.2667))/rad = 22.83 degrees s of e
marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(19.683-19.183))^2+(65*(98.85-98.65))^2) = 36 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((19.683-19.183)/(98.85-98.65))/rad = 68.1  degrees (out of limits)

marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(19.683-19.233))^2+(65*(98.85-98.033))^2) = 61 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((19.683-19.233)/(98.85-98.033))/rad = 28.84 degrees
                ... coast mountains

marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(19.683-18.316))^2+(65*(98.85-94.8))^2) = 279 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((19.683-18.316)/(98.85-94.8))/rad = 18.65 degrees s of e
marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(19.683-18.55))^2+(65*(98.85-95.2))^2) = 249 mi
viewed: sqrt(2*4000*(3.25*1659)/5280) = 90 mi
  a((19.683-18.55)/(98.85-95.2))/rad = 17.24 degrees
marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meters
remove: sqrt((69*(19.683-18.35))^2+(65*(98.85-94.855))^2) = 275 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((19.683-18.35)/(98.85-94.855))/rad = 18.45 degrees s of e
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(19.683-20.745))^2+(65*(98.85-99.970))^2) = 103 mi
viewed: ??
  a((19.683-20.745)/(98.85-99.970))/rad = 43.47 degrees (out of limits)

marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(19.683-17.35))^2+(65*(98.85-93.233))^2) = 399 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((19.683-17.35)/(98.85-93.233))/rad = 22.55 degrees s of e

marker: Cerro Zempoaltepec, 17.42 -- 95.98, 3396 meters
remove: sqrt((69*(19.683-17.42))^2+(65*(98.85-95.98))^2) = 243 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 mi
  a((19.683-17.42)/(98.85-95.98))/rad = 38.25 degrees (out of limits)
```



[*Image: Teotihuacan alignments; plan view.*]

Teotihuacan site identity:

The Sun passes overhead at 89.86 degrees on July 25th. This also marks the delivery of Jupiter's plasmoid at the Sun in 685 BC.

Teotihuacan era marker:

The axis of the site defines the setting of Sun at 15.60 degrees north of west for August 12, 3114 BC (15.64 degrees n of w) -- at right angle to the long axis of the site.

22.83 degrees s of e -- This angle with **Citlaltepetl**, the highest mountain in Mexico, suggests an antipodal sunset on July 15th (22.93 degrees), the day after July 14th (23.10 degrees).

The zenithal passage of the Sun on July 25 also marks the era-ending of 685 BC.

Pleiades setting: -- There are two antipodal alignments to **Volcan San Martin Pajapan** (18.65 degrees) and **Cerro Santa Martha (Veracruz)** (18.45 degrees). Both of these are correct for the era of AD 200 to 400.

The overhead passage of the Sun is also a marker for the current era.

Tlatilco

```
center: Tlatilco, 19.466 -- 99.166

                        axis 30 degrees    axis 23.5 degrees
   event                date      angle    date        angle
 ------------           ------   ------    ------     ------
 start 3114 BC era      Aug 12    19.96*                15.62
 start 2349 BC era      Sep 8      6.69                  5.24
 start 1492 BC era      Apr 19    15.39**               12.05
 start 747 BC era       Feb 28   -11.09*                -8.68
 solstice               Jun 21    32.02                 25.02

 Jup flare-up           Jul 9     30.48                 23.81
 Jup plasmoid           Jul 14    29.51                 23.07
 Jup strike             Jul 25    26.64                 20.83

 zenithal passage       Aug 10    20.80*    Jul 26      20.59*
 Pleiades setting (actual)  --              Oct 8       13.31(*) 685 BC
                                            Oct 8       13.00(*) 685 BC

             * -- alignment found; (*) -- antipodal
```

```
Tlatilco, 19.466 -- 99.166

        ... valley mountains

marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters *
remove: sqrt((69*(19.466-19.483))^2+(65*(99.166-97.133))^2) = 132 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((19.466-19.483)/(99.166-97.133))/rad = -.479 degrees n of e
marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(19.466-19.033))^2+(65*(99.166-98.633))^2) = 45 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((19.466-19.033)/(99.166-98.633))/rad = 39.09 degrees (out of limits)
marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(19.466-19.0164))^2+(65*(99.166-97.2667))^2) = 127 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((19.466-19.0164)/(99.166-97.2667))/rad = 13.31 degrees
marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(19.466-19.183))^2+(65*(99.166-98.65))^2) = 38 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((19.466-19.183)/(99.166-98.65))/rad = 28.74 degrees
marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(19.466-19.233))^2+(65*(99.166-98.033))^2) = 75 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((19.466-19.233)/(99.166-98.033))/rad = 11.62 degrees s of e

                ... coast mountains

marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(19.466-18.316))^2+(65*(99.166-94.8))^2) = 294 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((19.466-18.316)/(99.166-94.8))/rad = 14.75 degrees s of w

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(19.466-18.55))^2+(65*(99.166-95.2))^2) = 264 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((19.466-18.55)/(99.166-95.2))/rad = 13.00 degrees

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(19.466-18.35))^2+(65*(99.166-94.855))^2) = 290 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((19.466-18.35)/(99.166-94.855))/rad = 14.51 degrees s of w
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(19.466-20.745))^2+(65*(99.166-99.970))^2) = 102 mi
viewed: ?? -
  a((19.466-20.745)/(99.166-99.970))/rad = 57.84 degrees (out of limits)
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(19.466-17.35))^2+(65*(99.166-93.233))^2) = 412 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((19.466-17.35)/(99.166-93.233))/rad = 19.62 degrees s of e
marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(19.466-17.419))^2+(65*(99.166-95.983))^2) = 250 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((19.466-17.419)/(99.166-95.983))/rad = 32.74 degrees (out of limits)
```

Tlatilco site identity:

In the era after 685 BC, the zenithal sun passed over the site on July 26, a significant day, but there is no mountain associated with this.

0.479 degrees n of e -- This is a vernal equinox sunrise over the mountain **Nauhcampatepetl**, a very unusual alignment.

Tlatilco era markers:

19.62 degrees s of e -- The angle with **El Chichon** (Chiapas) marks a sunset for August 12, under the condition of a 30-degree axis.

14.75 degrees s of w -- The angle with **Volcan San Martin Pajapan** marks a sunset for the date of April 19th, 1492 BC (15.39 degrees), under the condition of a 30-degree axis.

14.51 degrees s of w -- The angle with **Cerro Santa Martha** (Veracruz) also marks a sunset for the date of April 19th (15.39 degrees), under a 30-degree axis, lining up with **Volcan San Martin Pajapan**.

11.62 degrees s of e -- The angle with **Volcan La Malinche** marks a sunrise for the date of February 28, 747 BC (11.09 degrees) for the era before 685 BC.

Pleiades setting: -- There are two antipodal alignments to **Citlaltepetl (Pico de Orizaba)** (13.31 degrees) and **Volcan San Martin Tuxtla** (13.00 degrees). These alignments were in effect directly after 685 BC.

Tlatilco notes:

The era markers, and the curious equinoctial site identity, suggest that this is a fairly old site, but established after 747 BC.

Tizatlan

An archaeological site in the valley of Mexico.

center: Tizatlan, 19.338 -- 98.219

event	axis 30 degrees date	axis 30 degrees angle	axis 23.5 degrees date	axis 23.5 degrees angle	
start 3114 BC era	Aug 12	19.94 ?		15.61	
start 2349 BC era	Sep 8	6.68		5.23	
start 1492 BC era	Apr 19	15.38(*)		12.04	
start 747 BC era	Feb 28	-11.08		-8.68	
solstice	Jun 21	32.00		25.00	
Jup flare-up	Jul 9	30.45		23.80	
Jup plasmoid	Jul 14	29.49*		23.05	
Jup strike	Jul 25	26.62		20.81	
zenithal passage	Aug 11	20.37*	Jul 26	20.57*	
Pleiades setting (actual)	--		Oct 16	16.64(*)	100 BC
			Oct 16	16.36(*)	100 BC
			Oct 22	18.66(*)	AD 200

* -- alignment found; (*) -- antipodal

```
Tizatlan, 19.338 -- 98.219

        ... valley mountains
marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters *
remove: sqrt((69*(19.338-19.483))^2+(65*(98.219-97.133))^2) = 71 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((19.338-19.483)/(98.219-97.133))/rad = -7.60 degrees

marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(19.338-19.033))^2+(65*(98.219-98.633))^2) = 34 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((19.338-19.033)/(98.219-98.633))/rad = -36.37 degrees (out of limits)
marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(19.338-19.0164))^2+(65*(98.219-97.2667))^2) = 65 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((19.338-19.0164)/(98.219-97.2667))/rad = 18.66 degrees

marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(19.338-19.183))^2+(65*(98.219-98.65))^2) = 30 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
  a((19.338-19.183)/(98.219-98.65))/rad = -19.78 degrees s of w

marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(19.338-19.233))^2+(65*(98.219-98.033))^2) = 14 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((19.338-19.233)/(98.219-98.033))/rad = 29.44 degrees s of e

                ... coast mountains

marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(19.338-18.316))^2+(65*(98.219-94.8))^2) = 233 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((19.338-18.316)/(98.219-94.8))/rad = 16.64 degrees

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(19.338-18.55))^2+(65*(98.219-95.2))^2) = 203 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((19.338-18.55)/(98.219-95.2))/rad = 14.62 degrees s of e

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(19.338-18.35))^2+(65*(98.219-94.855))^2) = 229 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((19.338-18.35)/(98.219-94.855))/rad = 16.36 degrees
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(19.338-20.745))^2+(65*(98.219-99.970))^2) = 149 mi
viewed: ?? -
  a((19.338-20.745)/(98.219-99.970))/rad = 38.78 degrees (out of limits)

marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(19.338-17.35))^2+(65*(98.219-93.233))^2) = 352 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((19.338-17.35)/(98.219-93.233))/rad = 21.73 degrees

marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(19.338-17.419))^2+(65*(98.219-95.983))^2) = 196 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((19.338-17.419)/(98.219-95.983))/rad = 40.63 degrees (out of limits)
```

Tizatlan site identity:

19.78 degrees s of w -- The angle with **Ixtaccihuatl** marks the antipodal zenithal sunrise for July 26 for current era (20.57 degrees) or August 11 of the previous era (20.37 degrees).

Tizatlan era markers:

The zenithal passage is so close to the angle required to denote August 12, 3114 BC (19.94) before 685 BC, that it may as well be used as such. This is yet another case of the setting angle of the zenithal Sun being used also for an era-ending marker. However, see below.

14.62 degrees s of e -- The angle with **Volcan San Martin Tuxtla** marks an antipodal sunset for April 19, 1492 BC (15.38 degrees) under the previous 30-degree axial alignment.

29.44 degrees s of e -- The angle with **Volcan La Malinche** defines the date of July 14 (29.49 degrees), but in the era before 685 BC, with an axial inclination at 30 degrees.

Pleiades setting: -- There is an antipodal alignment with **Citlaltepetl (Pico de Orizaba)** (18.66 degrees) representing a date of AD 200.

Pleiades setting: -- There is an alignment with **Volcan San Martin Pajapan** at 16.64 degrees, and an alignment with **Cerro Santa Martha** at 16.36 degrees. Both point southeast and are thus antipodal. The horizon locations represent the setting of the Pleiades after culmination in about 100 BC.

Cuicuilco

center: Cuicuilco, 19.301 -- 99.181, from 700 BC

event	axis 30 degrees date	axis 30 degrees angle	axis 23.5 degrees date	axis 23.5 degrees angle
start 3114 BC era	Aug 12	19.94 ?		16.60
start 2349 BC era	Sep 8	6.68		5.23*
start 1492 BC era	Apr 19	15.37		12.03(*)(*)
start 747 BC era	Feb 28	-11.08(*)		-8.67(*)
solstice	Jun 21	31.99		24.99
Jup flare-up	Jul 9	30.44(*)		24.62
Jup plasmoid	Jul 14	29.48		22.04
Jup strike	Jul 25	26.62(*)		20.81
zenithal passage	Aug 11	20.36 ?	Jul 26	20.57
Pleiades setting (actual)	--		Oct 22	18.15(*) AD 200

* -- alignment found; (*) -- antipodal; ? -- suspected

```
Cuicuilco, 19.301 -- 99.181

        ... valley mountains

marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters *
remove: sqrt((69*(19.301-19.483))^2+(65*(99.181-97.133))^2) = 133 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((19.301-19.483)/(99.181-97.133))/rad = -5.07 degrees n of e

marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(19.301-19.033))^2+(65*(99.181-98.633))^2) = 40 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((19.301-19.033)/(99.181-98.633))/rad = 26.06 degrees s of w

marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(19.301-19.0164))^2+(65*(99.181-97.2667))^2) = 126 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((19.301-19.0164)/(99.181-97.2667))/rad = 8.45 degrees s of e
marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(19.301-19.233))^2+(65*(99.181-98.033))^2) = 74 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((19.301-19.233)/(99.181-98.033))/rad = 3.38 degrees
                ... coast mountains

marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(19.301-18.316))^2+(65*(99.181-94.8))^2) = 292 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((19.301-18.316)/(99.181-94.8))/rad = 12.67 degrees s of e

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(19.301-18.55))^2+(65*(99.181-95.2))^2) = 263 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((19.301-18.55)/(99.181-95.2))/rad = 10.68 degrees s of e

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(19.301-18.35))^2+(65*(99.181-94.855))^2) = 288 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((19.301-18.35)/(99.181-94.855))/rad = 12.39 degrees s of e
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(19.301-20.745))^2+(65*(99.181-99.970))^2) = 112 mi
viewed: ?? -
  a((19.301-20.745)/(99.181-99.970))/rad = 61.34 degrees (out of limits)
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(19.301-17.35))^2+(65*(99.181-93.233))^2) = 409 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((19.301-17.35)/(99.181-93.233))/rad = 18.15 degrees

marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(19.301-17.419))^2+(65*(99.181-95.983))^2) = 245 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((19.301-17.419)/(99.181-95.983))/rad = 30.47 degrees s of e
```

Cuicuilco site identity:

There seem to be no site identity alignments. The zenithal Sun passes over on August 11, setting at an angle nearly identical to the angle needed to mark the era-ending of August 12, 3114 BC. There are no mountains associated with these.

Cuicuilco era markers:

... prior era

A possible dual use of the zenithal passage of the Sun is noted above.

10.68 degrees s of e -- The angle with **Volcan San Martin Tuxtla** defines an antipodal sunset for the date of February 28 (11.08 degrees), under the condition of a 30-degree axial inclination.

30.47 degrees s of e -- The angle with **Cerro Zempoaltepec** defines (surprisingly) an antipodal sunset date of the suspected initial flare-up of Jupiter on July 9 (30.44 degrees), and under the condition of a 30-degree axial inclination.

26.06 degrees s of w -- The angle with **Popocatepetl** likewise defines the antipodal sunrise date of the suspected delivery of the plasmoid by Jupiter on July 26 (26.91 degrees), under the condition of a 30-degree axial inclination.

... current era

12.67 degrees s of e -- The angle with **Volcan San Martin Pajapan** defines an antipodal sunset for the date of April 19, 1492 BC (12.03 degrees), for a 23.5-degree axis.

12.39 degrees s of e -- The angle with **Cerro Santa Martha** (Veracruz) additionally marks the date of April 19th. The mountain is almost the same distance from the site as **Volcan San Martin Pajapan**.

8.45 degrees s of e -- The angle to **Citlaltepetl** defines an antipodal sunset for the date of February 28th (8.67 degrees), under the present conditions of the sky. This duplicates the 10.68-degree alignment.

5.07 degrees n of e -- The angle with **Nauhcampatepetl** marks September 8, 2349 BC (5.23 degrees) for the current era.

Pleiades setting: -- In addition to a sunset for September 8 in the era before 685 BC, there is an antipodal alignment for the setting of the Pleiades to **El Chichon (Chiapas)** (18.15 degrees).

Cuicuilco notes:

Many era markers, but no site identification.

Tlapacoya

center: Tlapacoya, 19.3 -- 98.916

event	axis 30 degrees date	axis 30 degrees angle	axis 23.5 degrees date	axis 23.5 degrees angle	
start 3114 BC era	Aug 12	19.94?		15.60	
start 2349 BC era	Sep 8	6.68		5.23(*)	
start 1492 BC era	Apr 19	15.37		12.03	
start 747 BC era	Feb 28	-11.08*		-8.67	
solstice	Jun 21	31.99		24.99	
Jup flare-up	Jul 9	30.44		23.79(*)	
Jup plasmoid	Jul 14	29.48		23.04	
Jup strike	Jul 25	26.61		20.81	
zenithal passage	Aug 11	20.36?	Jul 26	20.57	
Pleiades setting (actual)	--		Oct 8	13.44(*)	685 BC
			Oct 8	13.16(*)	685 BC
			Oct 22	18.93(*)	AD 200

* -- alignment found; (*) -- antipodal

```
Tlapacoya, 19.3 -- 98.916

        ... valley mountains

marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(19.3-19.483))^2+(65*(98.916-97.133))^2) = 116 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
  a((19.3-19.483)/(98.916-97.133))/rad = -5.86 degrees n of e
marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(19.3-19.033))^2+(65*(98.916-98.633))^2) = 26 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
  a((19.3-19.033)/(98.916-98.633))/rad = 43.3 degrees (out of limits)

marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(19.3-19.0164))^2+(65*(98.916-97.2667))^2) = 109 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
  a((19.3-19.0164)/(98.916-97.2667))/rad = 9.75 degrees
marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(19.3-19.183))^2+(65*(98.916-98.65))^2) = 19 mi
viewed: sqrt(2*4000*(3.25*5230)/5230) = 161 miles
  a((19.3-19.183)/(98.916-98.65))/rad = 23.74 degrees s of e
marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(19.3-19.233))^2+(65*(98.916-98.033))^2) = 57 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
  a((19.3-19.233)/(98.916-98.033))/rad = 4.33 degrees
              ... coast mountains

marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(19.3-18.316))^2+(65*(98.916-94.8))^2) = 276 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
  a((19.3-18.316)/(98.916-94.8))/rad = 13.44 degrees

marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(19.3-18.55))^2+(65*(98.916-95.2))^2) = 247 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
  a((19.3-18.55)/(98.916-95.2))/rad = 11.41 degrees s of e

marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(19.3-18.35))^2+(65*(98.916-94.855))^2) = 271 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
  a((19.3-18.35)/(98.916-94.855))/rad = 13.16 degrees
marker: Cerro San Martin (Queretaro),  20.745 -- 99.970
remove: sqrt((69*(19.3-20.745))^2+(65*(98.916-99.970))^2) = 121 mi
viewed: ?? -
  a((19.3-20.745)/(98.916-99.970))/rad = 53.89 degrees (out of limits)
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(19.3-17.35))^2+(65*(98.916-93.233))^2) = 393 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
  a((19.3-17.35)/(98.916-93.233))/rad = 18.93 degrees
marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(19.3-17.419))^2+(65*(98.916-95.983))^2) = 230 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
  a((19.3-17.419)/(98.916-95.983))/rad = 32.67 degrees (out of limits)
```

Tlapacoya site identification:

There seem to be no site identity alignments, although it could be held that the zenithal sun would mark the era-ending of August 12, 3114 BC. But there are no mountains associated with this.

11.41 degrees s of e -- The angle to **Volcan San Martin Tuxtla** marks the winter sunrise for the date of February 28th (11.08 degrees), but for the condition of having the inclination of the Earth's axis at 30 degrees.

5.86 degrees n of e -- The angle with **Nauhcampatepetl** marks an antipodal sunset for September 8, 2349 BC (5.23 degrees).

23.74 degrees s of e -- The angle to **Ixtaccihuatl** marks an antipodal sunset for the date of July 9th (23.79 degrees).

Setting of the Pleiades -- In addition to the sunset alignment for September 8, 2349 BC, there are two alignments for the setting of the Pleiades in 685 to 600 BC to **Volcan San Martin Pajapan** (13.44 degrees) and **Cerro Santa Martha (Veracruz)** (13.16 degrees) and one for the era of AD 200 to 400 to **El Chichon (Chiapas)** (18.93 degrees).

Cholula

```
center: Cholula, 19.066 -- 98.3

                        axis 30 degrees    axis 23.5 degrees
   event                date      angle    date        angle
 ------------           ------   ------    ------     ------
 start 3114 BC era      Aug 12    19.91                14.94
 start 2349 BC era      Sep 8      6.67                 5.22*
 start 1492 BC era      Apr 19    15.35                12.02(*)(*)
 start 747 BC era       Feb 28   -11.06                -8.66
 solstice               Jun 21    31.94*               24.95

 Jup flare-up           Jul 9     30.40                23.75
 Jup plasmoid           Jul 14    29.44                23.01
 Jup strike             Jul 25    26.57                20.78

 zenithal passage       Aug 11    20.33*    Jul 27     20.29*
 Pleiades setting (actual)  --              Oct 22     18.48(*) AD 200
                                            Oct 22     18.71*   AD 200

               * -- alignment found; (*) antipodal
```

Cholula, 19.066 -- 98.3

... valley mountains

marker: Nauhcampatepetl, 19.483 -- 97.133, 4282 meters
remove: sqrt((69*(19.066-19.483))^2+(65*(98.3-97.133))^2) = 81 mi
viewed: sqrt(2*4000*(3.25*4282)/5280) = 145 mi
a((19.066-19.483)/(98.3-97.133))/rad = -19.66 degrees n of e

marker: Popocatepetl, 19.033 -- 98.633, 5452 meters
remove: sqrt((69*(19.066-19.033))^2+(65*(98.3-98.633))^2) = 21 mi
viewed: sqrt(2*4000*(3.25*5452)/5280) = 163 mi
a((19.066-19.033)/(98.3-98.633))/rad = -5.66 degrees s of e
marker: Citlaltepetl (Pico de Orizaba), 19.0164 -- 97.2667, 5636 meters
remove: sqrt((69*(19.066-19.0164))^2+(65*(98.3-97.2667))^2) = 67 mi
viewed: sqrt(2*4000*(3.25*5636)/5280) = 166 mi
a((19.066-19.0164)/(98.3-97.2667))/rad = 2.74 degrees
marker: Ixtaccihuatl, 19.183 -- 98.65, 5230 meters
remove: sqrt((69*(19.066-19.183))^2+(65*(98.3-98.65))^2) = 24 mi
viewed: sqrt(2*4000*(3.25*5230)/5280) = 160 miles
a((19.066-19.183)/(98.3-98.65))/rad = 18.48 degrees

marker: Volcan La Malinche, 19.233 -- 98.033, 4462 meters
remove: sqrt((69*(19.066-19.233))^2+(65*(98.3-98.033))^2) = 20 mi
viewed: sqrt(2*4000*(3.25*4462)/5280) = 148 mi
a((19.066-19.233)/(98.3-98.033))/rad = -32.02 degrees n of e

... coast mountains

marker: Volcan San Martin Pajapan, 18.316 -- 94.8, 1219 meters
remove: sqrt((69*(19.066-18.316))^2+(65*(98.3-94.8))^2) = 233 mi
viewed: sqrt(2*4000*(3.25*1219)/5280) = 77 mi
a((19.066-18.316)/(98.3-94.8))/rad = 12.09 degrees s of e
marker: Volcan San Martin Tuxtla, 18.55 -- 95.2, 1650 meters
remove: sqrt((69*(19.066-18.55))^2+(65*(98.3-95.2))^2) = 204 mi
viewed: sqrt(2*4000*(3.25*1650)/5280) = 90 mi
a((19.066-18.55)/(98.3-95.2))/rad = 9.45 degrees
marker: Cerro Santa Martha (Veracruz), 18.35 -- 94.855, 1680 meter
remove: sqrt((69*(19.066-18.35))^2+(65*(98.3-94.855))^2) = 229 mi
viewed: sqrt(2*4000*(3.25*1680)/5280) = 91 mi
a((19.066-18.35)/(98.3-94.855))/rad = 11.74 degrees s of e
marker: Cerro San Martin (Queretaro), 20.745 -- 99.970
remove: sqrt((69*(19.066-20.745))^2+(65*(98.3-99.970))^2) = 158 mi
viewed: ?? -
a((19.066-20.745)/(98.3-99.970))/rad = 45.15 degrees (out of limits)
marker: El Chichon (Chiapas), 17.35 -- 93.233, 1060 meters
remove: sqrt((69*(19.066-17.35))^2+(65*(98.3-93.233))^2) = 350 mi
viewed: sqrt(2*4000*(3.25*1060)/5280) = 72 mi
a((19.066-17.35)/(98.3-93.233))/rad = 18.71 degrees
marker: Cerro Zempoaltepec, 17.419 -- 95.983, 3396 meter
remove: sqrt((69*(19.066-17.419))^2+(65*(98.3-95.983))^2) = 188 mi
viewed: sqrt(2*4000*(3.25*3396)/5280) = 129 miles
a((19.066-17.419)/(98.3-95.983))/rad = 35.40 degrees (out of limits)

Cholula site identification:

19.66 degrees n of e -- The angle with **Nauhcampatepetl** defines a zenithal sunrise for July 27th (20.29 degrees).

32.02 degrees n of e -- The angle with **Volcan La Malinche** is the summer solstice sunrise of June 21 (31.94 degrees), for the condition of having the inclination of the Earth's axis at 30 degrees. I doubt the validity of this alignment, since all the other alignments are conformed to the current era.

Cholula era markers:

12.09 degrees s of e -- The angle with **Volcan San Martin Pajapan** defines an antipodal sunset for the start of a previous era, on April 19, 1492 BC (12.02 degrees), but under the current axial inclination.

11.74 degrees s of e -- The angle with **Cerro Santa Martha** (Veracruz) also defines an antipodal sunset for the date of the start of the previous era, on April 19, 1492 BC (and under the current axial inclination). **Cerro Santa Martha** is almost the same distance from the site as **Volcan San Martin Pajapan**

5.66 degrees s of e -- The angle with **Popocatepetl** defines September 8, 2349 BC (5.22 degrees).

Setting of the Pleiades -- In addition to the sunset alignment for September 8, 2349 BC, there are two alignments for the setting of the Pleiades in AD 200 -- 400 **Ixtaccihuatl** (18.48 degrees) and **El Chichon (Chiapas)** (18.71 degrees).

Cholula notes:

Except for the possible solstice marker under the condition of a 30-degree axis, all the alignments are conformed to the current axial inclination.

Monte Alban

center: Monte Alban, 17.033 -- 96.766

event	axis 30 degrees date	angle	axis 23.5 degrees date	angle
start 3114 BC era	Aug 12	19.67		15.40
start 2349 BC era	Sep 8	6.59		5.17
start 1492 BC era	Apr 19	15.18		11.88
start 747 BC era	Feb 28	-10.94		-8.56
solstice	Jun 21	31.53		24.65
Jup flare-up	Jul 9	30.01		23.47
Jup plasmoid	Jul 14	29.07		22.73
Jup strike	Jul 25	26.25		20.53
zenithal passage	Aug 16	17.93	Aug 4	17.89

I am including **Monte Alban** as a matter of reference. I have not checked this site against the mountains of Veracruz and the Valley of Mexico because it is too far south. **Monte Alban** is discussed in the chapter "Olmec Alignments."

Endnotes

Note 1 --

The short javascript program is available on line which can be used to find the location (in degrees from east) and time of sunrise and sunset for any axial inclination and latitude. Originally written to predict the angle of shadows for outdoor filming at various locations and dates. At [saturniancosmology.org/sun.html].

Documentation: The program uses elements of spherical geometry to determine the location of the Sun. The year is divided up into two halves of 182 days each with the solstice of June 21 as day zero. Thus the quarter day is neglected. The actual calendar days of the equinoxes and solstices move two days in the year, because our calendar varies between 365 and 366 days. In this program the leap days are neglected, summer solstice is set to "day zero" and the remainder of the year is divided up into two 182-day segments.

Since the Sun travels a little over one degree on the ecliptic each day, a sunset will differ from sunrise by about a half degree at most (but considerably less near the solstices). Except for this, the program should be fairly accurate. Small differences in latitude or axial inclination will not significantly affect the results.

The angles are for sunrises. To find the equivalent sunset angle, find the difference between the current sunrise and the next day. One half of this difference, when added to a sunrise angle, will give a good approximation for the corresponding sunset angle in the tropics.

The program will on occasion crash at the equinox (a divide by zero problem). Live with it, or change the axial inclination from 23.5 to 23.45 degrees (the actual value).
[return to text]

Note 2 --

The line of sight distance is at a right angle to the radius of the Earth. Thus we have from the pythagorian:

hypotenuse squared = leg1 squared + leg2 squared
(r + h)^2 = r^2 + d^2
r^2 + 2rh + h^2 = r^2 + d^2

solving for d, **r^2 + 2rh + h^2 - r^2 = d^2**.

Since h is a fractional mile, h^2 is very small compared to 2rh, and can be neglected.
[return to text]

Calculations are in Unix bc notation, where ^ denotes exponentiation; the functions a(rctangent), s(ine), and c(osine) use radians; angle conversions to radians or degrees by the divisors rad=.017+ and deg=57.2+; other functions are shown as f( ); tan( )=s( )/c( )
units: million == 1,000,000; billion == 1,000,000,000;
AU == 93,000,000 miles.
