

Maya Creation: The Stellar Frame and World Ages

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This article became Chapter 10 in my 1997 self-published version of *Maya Cosmogenesis 2012* (Four Ahau Press, May 1997). It was written in March of 1995, the core focus of which was the precession of the equinoxes. I recorded this essay in April 1995 for the *Mayan Cosmogenesis 2012* audiotope offering, which was sold through my Four Ahau Press mail order catalogue and the Borderland Sciences Research Foundation catalog. This audiotope can be considered the first publication of the breakthrough discoveries diagnostic of my “Maya Cosmogenesis 2012” reconstruction work. The audiotope included an 8x14” fold-out page with 11 diagrams and 8 notes (from the essays). The essays I recorded are:

1. Introduction (to *The Center of Mayan Time*, 1995)
2. Thesis (regarding the astronomical meaning of 2012). 1994.
3. Maya Cosmogenesis (Cosmic Ma & Pa Do It). 4-1995.
4. Maya Creation: The Stellar Frame and World Ages (March 1995)
5. “Dirty Laundry” (from *Journey to the Mayan Underworld*, 1989)
6. Hunab Ku (poem). October 1992.

I have re-recording the first five pages of this essay (“Maya Creation: The Stellar Frame and World Ages,” track 4) in April of 2015, for the 20th anniversary of this first publication (in audio form) of the body of research conceived as “Maya Cosmogenesis 2012.” It is discussed further in an April 2015 blog post at <http://JohnMajorJenkins.com>. JMJ - 4-14-15

Having examined and clarified the astronomical factors of the 2012 alignment, we can now look more closely at how this event was incorporated into Maya cosmology. How did the ancient skywatchers observe the slow convergence of the sun and the Milky Way, over 2,000 years ago? How were those astronomical players depicted in Maya myth? What did the alignment look like to them? And why did they conceive of this as a future rebirth of the world? What are the late-breaking ideas about Maya Creation mythology emerging in academic circles?

The sky defined the Maya understanding of cosmogenesis. Celestial events were mythologized into stories for the masses that nevertheless had deeper esoteric underpinnings. For example, the resurrection of the *Popol Vuh* deity One Hunahpu (First Father) as the Maize God was an annual event, commemorated with each year's corn harvest. Yet First Father's resurrection also had a celestial component of much larger scope, a rebirth of the world on a scale of epic proportions. My research emphasizes the importance of the larger perspective, one necessary in consideration of the alignment pointed to by the Long Count end-date. Maya scholar Linda Schele recently offered a revolutionary mytho-astronomical interpretation of the celestial origins of Maya Creation myth,¹ although the full story is still emerging. In the book *Maya Cosmos*, Linda Schele recounts the process by which she came to her important discoveries.

She drew from the body of ethnographic evidence that shows mythological beings have astronomical identities. For example, the vain and false ruler Seven Macaw corresponds to the Big Dipper and his wife, Chimalmat, corresponds to the Little Dipper, which contains the Polestar. As such, they are regents of the polar area. In the Maya Hero Twin myth (the *Popol Vuh*), the Hero Twins are destined to destroy Seven Macaw. In doing so, they make way for the resurrection of their father, One Hunahpu, otherwise known as First Father. This long-anticipated rebirth ushers in a new World Age, one of many described in the Maya Creation myth.

Linda Schele identified the birth of First Father/One Hunahpu on Classic-period ceramics, where he is depicted emerging from the cracked back of a turtle—a symbol of the earth. According to star-glyphs found in Maya codices, the turtle also is found in the sky, the three stars of Orion's belt forming its back. Alnitak, the southernmost star in Orion's belt, combines with the two leg stars to make a cosmic triangle. Schele pointed out that the Maya call this triangle the hearth, and identify it with the three stones used in their hearths. They are thought of as the three stones of Creation, and the embers of the primal fire are seen to be the Orion nebula, located in the center of the triangular hearthstones.² First Father's emergence from the nearby belt stars is connected to the lighting of the primal fire and the dawn of time. First Father is thus likened to the Aztec deity Xiuhtecuhtli, who, as we saw earlier is the Fire God that Maya scholar David Kelley identified with the Orion constellation. But First Father is also the Maize God, so the celestial movement of the sun past the Orion-Gemini constellations, in June, evokes the annual rebirth of life-giving maize during the growing season. In other words, when the solar fire passes through the hearth (the triangle formed from stars in Orion), life returns to Earth in the form of germinating maize. Schele's interpretation revolves around a cosmic navel of creation, the place in Gemini where the Milky Way crosses the ecliptic. Probably the most exciting identification explained by Schele involves this cosmic crossroads. She points out that the ecliptic corresponds to the many double-headed serpent bars found in Maya art, and the Milky Way is the cosmic axis, the "trunk" of the World Tree. Thus, the crossing point of the Milky Way and ecliptic is the Maya Sacred Tree, the place of Creation and rebirth.

Diagram 53. Orion, the Turtle, Hearthstones, Sacred Tree, Milky Way and the Maize God

In general terms then, Maya myth and astronomy complement each other, and, according to Schele, Maya Creation revolves around the cosmic crossroads, the Sacred Tree—the crossing point of the Milky Way and ecliptic. This in itself is a major breakthrough in understanding the profound sources of Maya cosmology. However, additional considerations not recognized until now paint an even more astounding picture.

The Other Creation Place

Schele focused her reconstruction of Maya Creation mythology on the crossing point of the Milky Way and ecliptic in Gemini. This is a valid celestial origin point for the mapping out of the quadrated celestial divisions of the sky. As such, four roads should emanate from this spot. According to Maya cosmology, there is a Black Road in the sky, and a White one also, but they are not found at the crossing point in Gemini. They are found at

the crossing point of the Milky Way and ecliptic in Sagittarius. It is true: there are two crossroads. It just so happens that the crossroads in Sagittarius also is the location of the Black Road, known to the Quiché Maya as the *xibalba be*, the Road to the Underworld. This is the dark-rift in the Milky Way, extending north from the ecliptic as previously discussed. The part of the Milky Way stretching south of the ecliptic is called the *sac be*, the White Road. The Green and Red Roads extend east and west along the ecliptic, with the Milky Way dividing them.³ These are the four roads and the four directions of Maya cosmivision. In the Hero Twin Creation myth, the First God maps out the cosmos by stretching the cord, marking the corners, designing the four-fold siding, the four-fold cornering. The quadrated cosmos thus emerges from the navel-crossroads, the Place of Creation. With these initial identifications, we are fully justified in examining the Sagittarian cross as another likely place of Maya Creation. The region of Sagittarius is particularly compelling as a Place of Creation because that is where the Galactic Center is located.

As previously discussed, the *xibalba be* occurs in the Hero Twin myth in at least three contexts. The Black Road and the "four-junction roads" are first encountered when One Hunahpu and Seven Hunahpu journey to battle the Lords of Xibalba. They come to a crossroads and must decide which road to take. They choose the Black Road, which, of course, is the *xibalba be*. It was an appropriate choice, since it is the road that leads to Xibalba, the Underworld. In the Underworld, they encounter the Dark Lords, face trickery and trials, and ultimately are defeated and killed. The Dark Lords of Xibalba then hang One Hunahpu's decapitated head, now resembling a gourd-like skull, in a calabash tree. The skull rests in a crook or crevice in the branches of the Cosmic Tree, which stands "by the road." According to *Popol Vuh* translator Dennis Tedlock, this road is the ecliptic. Here is the second appearance of the *xibalba be*, in new mythic garb: The Milky Way is the World Tree, so this crevice in the tree is another metaphor for the dark-rift. The crossing point of Milky Way and ecliptic was, after all, identified by Schele as the Sacred Tree, and the tree near the ecliptic is the Milky Way.⁴

The third role of the *xibalba be* Creation Place occurs in the next scene. A woman named Blood Moon comes along, the skull spits in her hand and magically conceives the Hero Twins, metaphorically associating the *xibalba be* with sexual conception and the vagina of a cosmic Great Mother deity. Ultimately, the Twins avenge their father's death, paving the way for his rebirth, which is nothing less than the long-awaited dawning event in the Maya Creation myth. Given the symbolic identification of the dark-rift as a cosmic birthplace, we are probably safe in deducing that One Hunahpu will be reborn from the *xibalba be* as well. Linda Schele saw First Father/One Hunahpu's birth from the back of an earth turtle; however, these are Classic-period depictions. If we look at the early portrayals of One Hunahpu's resurrection, on the monuments of Izapa, he is shown emerging from the mouth of a jaguar-toad or other Earth deity. The mouth of the jaguar has been considered since ancient times to symbolize the entrance to the Underworld, as were terrestrial caves, and thus clearly refers to the dark-rift in the Milky Way. The toad motif goes back to the Olmec, and is related to concepts of the Cosmic Mother or Earth Goddess. The cleft head that is so prevalent in Olmec art was a portrayal of the triangular cleft in the head of the *Bufo marines* toad species,⁵ which in turn signified the cave or "cleft" of Creation—the crater at the top of the cosmic volcano that is occupied by the ancient Fire God. Coatlicue, the name of the Aztec Mother Goddess, means Snake Woman, and the Milky Way was

envisioned as a cosmic snake. Furthermore, the related goddess Citlalinicue was the Great Mother of the Stars who lives in the Milky Way.⁶ Thus, the Milky Way was conceived as a Great Mother Goddess in many Mesoamerican myths. In a Creation scene from the Mixtec *Codex Vindobonensis*, First Father does not emerge from a turtle, he emerges from a tree, which, upon closer inspection, is the inverted Goddess. As such, he emerges from the Goddess's birth canal. In these mythic transformations, the dark-rift in the Milky Way symbolizes the cosmic birth canal.

Diagram 54. Inverted Goddess, birth canal emergence

I believe that Schele's Gemini/Orion-centered model of Maya Creation refers to the annual rebirth of the life-giving Corn God, which is played out in the sky on certain nights of the year. Remembering that the ancient Mesoamericans considered maize to be the source and origin of life, we can understand this annual resurrection of life as a celestial Mystery Play related to the June-August-September growing season of life-giving maize. However, Maya cosmogenesis is also about epic spans of time and World Age transformations, so we may suspect that Schele's reconstruction is incomplete. After all, she focused on only one of the crossing-point Places of Creation—the one near Gemini. When we examine the astronomy and mythology of the Sagittarian crossing point, we encounter more complex considerations, ones that nevertheless speak to the vast nature of World Age rebirth described in the *Popol Vuh*. While the annual resurrection of One Hunahpu as the Maize Deity is an important seasonal application of the resurrection myth, we find that it has a more startling World Age component as well. In that the two readings related here (Schele's and my own) refer to two different temporal levels—a year and a "great year"—it seems appropriate that one myth was located at one crossing point, while the other was located at the opposite one.⁷

Union of First Father and First Mother

In the Hero Twin myth, the rebirth of First Father/One Hunahpu signifies the dawning or creation of a new World Age. His calendric name is One Ahau, Ahau being the twentieth day-sign of the 260-day tzolkin calendar. In its oldest connotation, this day-sign means Lord or Sun. Thus, One Hunahpu is First Sun. The First Sun of the year is the December solstice sun.⁸ The December solstice is the time when the sun begins its own resurrection, making the identification between One Hunahpu and the December solstice sun not only appropriate but clear. We must keep this identification in mind as we examine the following mytho-astronomical motifs. We have seen how the *xibalba be* has several mythic forms and how it appears in the *Popol Vuh* in three contexts. It is the road that One Hunahpu and Seven Hunahpu choose to take to the Underworld, and it led to their deaths. It is the crook in the calabash tree where One Hunahpu's head is hung. It is the place where the Hero Twins are conceived. It is a road, it is the crevice in a tree, it is the cosmic birth canal. [It is also a mouth.] It appears self-evident that One Hunahpu will be reborn from this place as well. In related contexts, we have seen how the image of the Cosmic Mother's birth canal maps onto the astronomical image of the dark-rift in the Milky Way. Water is life giving, the activator of fertility, and, we have seen how the Milky Way, in addition to its other identities, was conceived of as a river. In another image from *Codex*

Vindobonensis, a deity emerges from a cleft in a river that contains a four-junction crossroads. In the illustration below, notice the footprints in the quadrated circle, indicating the four cosmic roads.

Diagram 55. Cross and cup: River of Apoala emergence

In this image, again we see the crossroads near the cosmic birth portal. All of these mythic images attest that the dark-rift in the Milky Way was imaged in many ways and appears in many different forms of Mesoamerican myth. But they all indicate that the dark-rift was conceived of as a place of magical conception and celestial rebirth. The parallel image of birthplace and crossroads relates to the oldest universal ideas about celestial rebirth, the laying out of the four directions, and World Age Creation. The crossroads and the birth portal: the cross and the cup. These two powerful metaphors work together and provide a compellingly clear map to the true astronomical place of Maya Creation.

If we now look again at the astronomy of the end-date in 2012, the pieces of the puzzle begin to fall into place. On 13.0.0.0.0, December 21, 2012, the December solstice sun is dead center in the *xibalba be*, right at the crossing point of Creation in Sagittarius. The December solstice sun is First Father and the Milky Way is Cosmic Mother. Mythologically speaking, on this date First Father and Cosmic Mother are joined. Actually, it might be more accurate to say that Cosmic Mother rebirths Cosmic Father, our star, the sun. Here we see a reflection of a very ancient cosmogonic Creation myth, attributable to a substratum of history prior to patriarchal overlay: the Cosmic Mother is the head-point of a trinity involving the birth of a male deity who is also her mate. This Trinity Principle involves the dynamic between mother, father, and child, and shares with many Old World traditions the idea that the Great Mother, as the first principle of creation, must give birth to her mate, First Father, and only then can engender the multiplicity of created beings. On the cosmic level, the astronomical trinity is Galactic Center, solstice sun, and humanity.

Diagram 56. 13.0.0.0.0. The end-date of the 13-baktun cycle of the Long Count. December solstice sun enters the Milky Way dark-rift.

It is initially strange to think that Maya Creation occurs on what we are calling the "end-date." But Mayan concepts of weaving, birthing, and dawning declare that Creation (birth) occurs *at the end* of a time cycle. The birth of a child occurs at the end of the nine-month period of human gestation. Furthermore, the Maya utilized "end naming," such that periods of time were named after their *last* day. For example, we are presently [in 1995] in the 4 Ahau katun of the Great Cycle, because it ends on the tzolkin day 4 Ahau. On Creation Day, the New Sun emerges from the Cave of Creation. The astronomical event of the 13-baktun cycle end-date is perfectly evocative of World Age transformation and cosmological recreation.

The alignment of the December solstice sun with the dark-rift in Sagittarius is caused by the precession of the equinoxes, a cycle of almost 26,000 years. It is probably no coincidence that the 13-baktun period is exactly one-fifth of this precessional cycle. The ancient Mesoamerican skywatchers clearly anticipated and calibrated the future celestial juncture—an epic, cosmic collusion of male and female Creation forces. This new

cosmological knowledge was encoded into the Hero Twin myth as the story of Creation. It is an essential key to understanding my reconstruction of the Galactic Cosmology formulated by Mesoamerican skywatchers. [new 2015 audio recording ends here]

The Monuments of Izapa

Some straightforward questions arise in considering the implications of this discovery. For example, when and where was the Long Count invented, and who devised it? And, if the Hero Twin Creation myth is a type of esoteric doctrine that, in its deepest meaning, describes the nature of the Long Count end-date, when and where was it developed? Amazingly, it turns out that the answers to these questions are the same. Both the Long Count and the *Popol Vuh* emerged at the same time, in the same region, in the same cultural context. The answer points us to the pre-Maya Izapan civilization of southern Mesoamerica.⁹

Izapa was a ceremonial site in southern Chiapas that flourished some 2,100 years ago. It was the transition culture between the older Olmec and the emerging Maya. Michael Coe and other scholars credit the Izapan civilization with devising the Long Count. Many of Izapa's carved monuments depict distinct episodes from the *Popol Vuh*, the earliest examples in the archaeological record. Nearby sites such as Abaj Takalik yield Izapan-style art and the first Long Count dates. In examining the monuments of Izapa, we find iconographic evidence that supports my end-date thesis. On over fifty carved monuments found at this pre-Classic site, there is a preoccupation with the demise of Seven Macaw at the hands of the Hero Twins and the resurrection of First Father.

Scholars identify the crocodile-tree depicted on several Izapan stelae as the Milky Way.¹⁰ The mouth of the crocodile monster is the dark-rift. Several monuments at Izapa and related sites depict the emergence of First Father from the mouth of an Earth deity with tree-like and reptilian features, as in the jaguar-frog/Milky Way/Mother Goddess complex of mythic forms.

One of the most compelling depictions from Izapa is Stela 11, which clearly portrays the astronomical meaning of the Long Count end-date:

Diagram 57. Stela 11 Izapa

Here we have First Father performing the primal measuring act. The durability of this Mesoamerican deity is evident when we realize that the later One Ahau of the Maya Venus Calendar is derived from our "Hun-ahpu." The small circular symbol on First Father's nose is a "star" symbol. The four sky-streaks emanating from behind First Father, though not in a crossroads format, may be the Four Roads. He is emerging from the "mouth" of the jaguar-toad, who represents the cosmic Milky Way Goddess. This monument is one of many at Izapa that portray the alignment of the end-date. In fact, as will be shown in more detail in Part IV, Izapa was the home of the Initiation Mysteries into Galactic Cosmology, where astronomer-priests utilized Izapa's many carved monuments as teaching tools for initiates.

The Ancient Skywatchers' View of Creation

What were the ancient skywatchers of Izapa actually looking at? And how does Stela 11 portray the future alignment? It is extremely interesting that Stela 11 faces the rising position of the December solstice sun, where the following skyviews were visible over a seven-hundred-year period:

Diagram 58. The Cross and dark-rift as viewed from the latitude of Izapa, 700 B.C.

In this diagram, we can see how the Milky Way and its dark-rift looked to Mesoamerican skywatchers on the December solstice of 700 B.C. I chose this date because this is when the pre-Maya site of Izapa was on the rise.

By 200 B.C., again on the December solstice, the dark-rift "creation place" was noticeably closer to the horizon:

Diagram 59. View from Izapa, 200 B.C.

The difference in the dark-rift's position is some 7° —a very noticeable change. By the first century B.C., Long Count dates start appearing in the archaeological record. If Mesoamerican skywatchers continued to chart the convergence of the solstice sunrise with the Milky Way as it appeared on the December solstice, they would find an impasse around the year A.D. 650. Around this era, they would find that the rising Milky Way was too close to the horizon to be seen as the rays of the December solstice sun began to brighten the sky.¹¹ In other words, morning came on before the Milky Way was high enough over the horizon to be seen. However, the phenomenon could still be tracked by watching the skies days or weeks before the solstice, as well as by other, more complicated means. The point is that the phenomenon—precession—was tracked and calculated long before this impasse occurred. The date of the future "Zero Time" of Galactic Alignment was calculated by *at least* 37 B.C., when the Long Count first appears in the archaeological record. By that time, the following skyview was seen from Izapa on the December solstice:

Diagram 60. December Solstice 37 B.C., viewed from Stela 11 Izapa

Here we have the Cosmic Milky Way Monster with her dark-rift "mouth" some 30° above the dawning December solstice sun. Throughout the process, the precession of the stellar frame has been causing the December solstice sun to slowly converge with the "mouth." Izapan skywatchers of the formative period (400 B.C. to 100 B.C.) certainly could have noticed the process. They would have realized that when the alignment occurred, at dawn on Creation Day, the Milky Way rims the horizon. The sky will then sit upon the Earth, touching it at all points around the horizon. This alignment of solar and Galactic planes may define a subtle Earth-rhythm, empirically measurable, propelling transformations of life on Earth at distinct intervals, an arcane artifact of ancient cosmology that points to our immediate future. The precession-defined alignment highlighted by the Maya end-date occurs only once every 26,000 years. We are living in the shadows of a rare celestial juncture.

The Maya End Times*

The full meaning of the celestial origins of Maya Creation should now be clear. In addition to Linda Schele's interpretation of Maya Creation revolving around the crossing point in Gemini, there is a more far-reaching esoteric component that becomes apparent when we examine the crossing point in Sagittarius. During the archaic transition from Olmec to Maya culture, we may imagine that a new discovery defined the emerging Maya as unique bearers of a more sophisticated cosmological understanding, and heirs to a new era. They were, with great ingenuity, very far-seeing and pointedly focused on a vision of future rebirth. Anchored as this belief is to an actual stellar process, we cannot say that it is not going to happen. Our own millennial milestone [year 2000, five years away at the time of writing] is strangely mocked and modified by ancient Maya cosmology. For the ancient Izapans and the early Maya, and in the earliest version of the Long Count-*Popol Vuh* Creation myth, Creation occurs on 13.0.0.0.0, December 21, 2012, when First Father and First Mother join forces to engender a new World Age.

The Hero Twin story is one "myth" that encodes the astronomy of the Long Count end-date. Earlier, we saw how the New Fire ceremony was the "myth" that explained the Zenith Cosmology. There is another Mesoamerican tradition that encodes the alignment in 2012, one that involves heroic triumph and Mystery Play, as well as human sacrifice. Like the Hero Twin and New Fire myths, this esoteric tradition, with precessional knowledge at its center, was not a marginal aspect of Mesoamerican society. It had everything to do with the renewal of the sun, the rebirth of First Father, and the triumph of light over darkness. It is the Mesoamerican ballgame.

*This phrase was used in the sense of "end time" of the 13-Baktun cycle of the Long Count. Obviously, given the discussion in this brief section, my interpretation is *not* a final end in 2012, but a "renewal of the sun," "engendering a new World Age," "the triumph of light over the darkness," etc. –JMJ-2015

Notes:

1. Freidel et al. (1993).
2. B. Tedlock (1992) points out that the Orion nebula was not reported in Medieval astronomical sources, and thus may not have even existed during the Maya Classic period. This challenges Schele's interpretation of the Orion nebula as the primal fire of ancient Maya Creation mythology.
3. D. Tedlock (1985:334, 358).
4. Ethnographer and translator Dennis Tedlock explicitly offers this reconstruction in his translation of the Quiché *Popol Vuh* (1985:39, 334).
5. Furst (1981).
6. For additional information, Joann Roman Brisko's 1993 M.A. thesis (*Aztec Goddesses*) thoroughly explores the identity and role of female deities in Mesoamerican cosmology. Citlalinicue and Coatlicue have associations with the Milky Way. Also see Brundage (1979:35-37), "Star Skirt and Her Children," an Aztec story in which the Goddess Star Skirt (the Milky Way)

gives birth to many deities, including Quetzalcoatl and Tezcatlipoca. Brundage writes, "She [Citlalinicue] was the Great Mother of the stars and as such was peculiarly incarnate in the Milky Way" (33). Citlalinicue was the Mother of the Gods, and "enthroned in the Milky Way Star Skirt [Citlalinicue] was the source of all wisdom. . . ." (33).

7. In *The Orion Mystery*, Robert Bauval discusses Egyptian cosmology and the astronomy near the Milky Way/ecliptic crossing point in Gemini, in which Orion, Sirius, and the Milky Way play key roles. It is quite thought-provoking that both the Egyptians and the Maya recognized Orion in their Creation mythologies, and an intuitive insight about that part of the sky may be at the root of the shared interest. The Gemini crossing-point indicates the direction to travel out of the Galaxy; in a sense, it is the doorway out of the local neighborhood. The Sagittarian crossing-point, on the other hand, points our way *into* the Galaxy—into the Galaxy's center and the mysteries of the origin of time and space that reside there. In other words, the Sagittarian crossroads signifies an inner orientation whereas the Gemini/Orion crossroads represent an outward looking, or objective, orientation to life. In the context of the model of a unified Zenith Cosmology and Galactic Cosmology presented in Part II [of my book *Maya Cosmogogenesis 2012*], the polarity between the zenith-center passage of the Pleiades (near Gemini) and Galactic Center passage of the December solstice sun refers to a polarity between inner orientation and outer orientation—the subject-object polarity in human thought, or the inner-outer polarity present in philosophical models of reality. The synthesis of the Zenith Cosmology and the Galactic Cosmology, as achieved at ninth-century Chichén Itzá, thus represents a transcendence of dualistic thinking in general, a worldview in which inner and outer realities are understood and perceived to be inextricably interwoven. This view, of course, is recognizable as the ancient "as above, so below" doctrine. These considerations are beyond the scope of the present book, as they access more metaphysical aspects of Mesoamerican time philosophy; for more on this perspective, see Jenkins (1991a, 1994a:8-21, 1994c, and 1995m).

8. In my book *The Center of Mayan Time* (Jenkins 1995a) I demonstrated how One Ahau corresponds to the December solstice quarter. It is the primary year-bearer, the senior day-sign, corresponding to the senior seasonal quarter.

9. According to Lowe (et al. 1982), there are prototypical tun and katun glyphs at Izapa. The first Long Count dates in the archaeological record date to the first century B.C. One is from Tres Zapotes, one is from Chiapa de Corzo north of Izapa, and several other Cycle 7 dates are within the Izapan sphere of influence.

10. Freidel et al. (1993:89).

11. Sullivan (1996:371). Sullivan relates that the dimmest stars can be seen at heliacal rise when the sun is at least 20° below the horizon. For the dimmer contrast between the Milky Way and its dark-cloud formations, a further 4° is required, given clear stargazing conditions. This means that the last time the dark-rift was visible rising heliacally on the December solstice was about 1,700 years ago.

For bibliographic references, see <http://Alignment2012.com/bibbb.htm>