Mediterranean Archaeology and Archaeometry, Vol. 18, No 4, (2018), pp. 191-198

DOI: 10.5281/zenodo.1478674

THE OBSERVATIONS OF THE MOON AT NARANJO – NEW FACTS AND INTERPRETATIONS

Stanisław Iwaniszewski

Posgrado en Arqueología, Escuela Nacional de Antropología e Historia, Instituto Nacional de Antropología e Historia, Mexico City

Received: 27/02/2018
Accepted: 04/06/2018
**Corresponding author: (siwanisz@yahoo.com)*

ABSTRACT

According to the Maya records, in 682 CE the Dos Pilas ruler Bahlaj Chan K'awiil, sent his daughter, "Lady Six Sky", to Naranjo (today's Guatemala) to re-establish the local dynasty. Some years later, her arrival to the city was described by a glyph that was widely associated with the age of the moon in the Maya Lunar Series, while she was portrayed in the guise of the Moon Goddess. At Naranjo, the Lunar Series attached to the date of "Lady Six Sky" arrival is associated with the start of Teeple's (1931) "Period of Uniformity". However, for some time on, another system of counting the moon run in parallel.

The name of the ruler's consort, "Lady Six Sky" appears on other sites where the title of a "weaver" is added reinforcing associations with the Moon Goddess, commonly regarded as a weaver. The number six in the name usually identifies various Maize Gods, so when used to denote the Moon Goddess emphasizes the links between the moon and planting of maize.

The paper aims to examine the Lunar Series at Naranjo and to compare them with those from La Corona, Yaxchilan and Oxpemul.

KEYWORDS: Maya Astronomy, Lunar Theory, Lunar Series, Xultun Lunar Table, Naranjo, La Corona, Oxpemul, Yaxchilan.

1. INTRODUCTION

The archaeological remains of Naranjo are situated in the northeastern part of the Guatemalan Department of Peten, not far from the border of Belize. The ancient city of Naranjo was the capital of the Classic Maya kingdom called Sa'al and flourished between late 5th and early 9th centuries CE. Located between Tikal and Caracol, and politically dominated by Calakmul, Naranjo was often defeated, even suffering the extinction of its ruling dynasties (Martin and Grube 2008:69-83).

After the defeat that Naranjo suffered at the hands of Caracol's ruler K'an II in 631 CE, the site disappeared from the political map for about 40 years. Though the reasons for this chronological gap are far from settled, at the time of this writing, there are no inscriptions that would tell us the story of what happened in this period. Be as it may be, in 682 CE reached Naranjo, a woman that would change the history of the city: her name has long been recognized as Lady Wak Chanil Ajaw (Lady Six Sky Queen), the daughter of the Dos Pilar ruler B'alaj Chan K'awiil. Her arrival brought a revival for the dynasty of Naranjo. Her son K'ak' Tiliw Chan Chaak became a new Naranjo ruler, the 38th in the line, and a series of military campaigns allowed the kingdom to reclaim the political control over the neighboring area.

The texts that record Lady Six Sky Queen "arrival" to Naranjo also register the adoption of the Lunar Uniformity. As is known, the Maya scribes used a sequence of three to six glyphs, usually displayed after the Long Count, *tzolk'in* and Glyphs G and F, to offer information regarding the synodic period of the Moon. Their so-called Lunar Series embodied a type of a lunar calendar. Glyphs E and D determined the age of the Moon, Glyphs C grouped lunar periods into sets of 6 or 18 differentiated months, Glyphs X provided individual names for lunar months and Glyphs A defined the length of the current lunar month to be either 29 or 30 days.

In his discussion of lunar reckoning among the Maya Teeple (1931) argued that most Late Classic Maya polities adopted the uniform system of reckoning moons. Within Teeple's Period of Uniformity (9.12.15.0.0 - 9.16.5.0.0, or 687 - 756 CE) all Glyphs C bore the same values. As will be shown in this paper, the Maya scribes of Naranjo kept the same count until the end of the 8th century.

2. MAYA MOON RECKONING

The Mayan lunar month began, in principle, on the evening of the first sighting of the crescent moon, although on occasions the new month was counted from the astronomical new moon. The evolution of the Lunar Series towards greater predictability and regularity led to the installation of a fixed cycle based on a standardized alternation of 29- or 30-day lunar months grouped into the sets of 6 months (of 177 days each). The six-month groupings were organized in 3 groups of 6 months (determined by both head variants and numerical coefficients of Glyph C) for a fixed total of 18 months or 531 days (9 x 30 + 9 x 29). In such a way, succeeding lunar months were arranged in a series of alternating fixed units, forming a regular and easily predictable sequence that also simplified any further calculations.

However, to accord the predicted moon to the observational one, the Maya scribes practiced intercalation through adding an extra day to a standard lunar month of 29 days. The Lunar Table from the wall paintings found in Structure 10K-2, in a residential sector of Xultun, a Classic-period (200-900 AD) city in Petén, Guatemala, shows such intercalations were made at pretty regular intervals determining the cycles of 30 lunar months (equaling 886 days, roughly 2.4 years). The text was first recognized as a Lunar Table by David Stuart (Saturno et al. 2012b: S5-S6) and dated to the early ninth century. The table consists of 27 columns, each containing six lunar months containing either 30 or 29 days, giving a total of 4784 days, because five extra days were added to 29-day months. In other words, the use of a 4784-day cycle comprising five intercalations over 162 lunar months (86 x 30 + 76 x 29 = 4784) determined the pattern of regular intercalations. This pattern defines the average lunar month to be 29.5308642 days long (Aveni et al. 2013: 2; Iwaniszewski 2012, 2015). One 4784-day cycle equals two periods of 2392-days, known as the Palenque formula (81 moons = 2392 days, or 43 x 30 + 38 x 29 days, Teeple 1931). Furthermore, one 4784-day cycle covers 2/5th parts of a 11960-day period, known from the Eclipse Table in the Dresden Codex (Dresden 51-58). However, in this respect, the Eclipse Table introduces nine groups consisting of 5 lunar months which is not the case of the Xultun table. Another difference between the Xultun and Eclipse Table is that the latter does not mention Glyphs C (also consult Aveni et al. 2013: 3; Zender and Skidmore 2012: 13). Be as it can be the Lunar Table from Xultun is the only known Late Classic record of lunar computations proving conceptual continuity with the lunar tables of the Postclassic period Dresden Codex. Nevertheless, it should be mentioned that though the Dresden Codex was manufactured during the Late Postclassic period, its content includes tables computed in earlier centuries, for example, the Eclipse Table is dated to 755 CE (Bricker and Bricker 2011: 254).

Epigraphers also found out that the wall computations were made by the *taaj* scribal-priests, "who cel-

ebrated its members' achievements in consulting and producing work for their sovereign's reign" (Saturno et al. 2015: 134). The texts, carefully painted on the walls already received many interpretations (Aveni et al. 2013; Bricker et al. 2014; Iwaniszewski 2012; Zender and Skidmore 2012) providing direct evidence of the Maya involvements with calendrical and astronomical computations previously known only from Late Postclassic (1250-1530) codices.

3. THE LUNAR SERIES AT NARANJO

The Lunar Table from Xultun is dated to the early ninth century CE (Saturno et al. 2012: 717). This period roughly corresponds to the reign of Waxaklajuun Ub'aah K'awiil, the last known ruler of Naranjo who acceded in 814 CE. The last known and dated Lunar Series comes from Stela 8 (800 CE) commissioned by Itzamnaaj K'awiil, his predecessor, who reigned between 790 and 810 CE. My computations of lunar cycles at Naranjo suggest that the process of employing the rigid 4784-day period to the Lunar Series began during the reign of Lady Six Sky Queen. In Table 1, I present the lunar data at Naranjo. Glyphs C displayed on Stelae 24 and 29, the earliest known monuments erected by Lady Six Sky Queen and her son K'ahk' Tiliw Chan Chaak, belong to Teeple's (1931: 54-61) and Aldana's (2006: 240, 248) periods of Uniformity. In both cases, the lunar data are counted backward from the same Dedicatory Date at 9.13.10.0.0 (702 CE) using the fixed 4784-day intervals. Interestingly, to perform backward computations, Stela 24 utilized a 7088-day period (8 x 886 days), perhaps signaling the knowledge of an 886-day cycle cited above (Barthel 1951: 234; Iwaniszewski 2013: 264, 2015: 25-27). However, the Xultun 4784-day cycle is composed of 354 + 4430 days, so we should deal with the alternating sequence of 354 + 5 x 886 + 354 + 5 x 886 + 354 +…, rather than simply with the rigid sequence of 8 x 886. This problem can be resolved by computing the lunar data between Stela 24 and Stela 30. Both IS dates are separated by 11768 days. The application of 886 cycles calls for 13 intercalations (11768 = 13 x 886 + 250 days), while the use of the 4784-day cycle (or of the 9568-day cycle) calls for 12 intercalations. From Table 2 we learn that between both dates were 210 months of 30 days and 188 months with 29 days, implying there were only 11 intercalations made. Therefore, our reconstruction using the 4784-day cycle better approximates the lunar data recorded on Stela 30 than the alternative interval scheme basing entirely on the 886-day period. From Table 2 we learn that the best solution is to count 210 months of 30 days and 188 months of 29 days, suggesting that only 11 intercalations were introduced.

Table 1. Naranjo summary. Is = Initial Series, LS = Lunar Series, DD = Dedicatory Dates, PE = Period Ending. The letters E, D, C, A stay for Glyphs E, D, C, and A respectively. Combined with Glyph C are its lunar patrons denoting: s = skull (God A), m =Young Maize (Tonsured) God, and j= Jaguar God of the Underworld. Glyphs E, D, and A denote the number of days, numerical coefficients of Glyph C denote numbers of lunar months. Data (IS and DD dates, events and protagonists) according to Closs 1985, 1989; Grube 2004; Martin and Grube 2008. The IS Date on Stela 6 is tentative only and will not be taken into account.

No.	Monument	IS Date	LS	Event	Protagonist	DD	Uniformity
1	Stela 24	9.12.10.5.12	18D 1Cj A10	Arrival	Lady Six Sky	9.13.10.0.0	U
2	Stela 22	9.12.15.13.7	20ED 1Cf	Birth	K'ahk' Tiliw Chan Chaak	9.13.10.0.0	U
3	Stela 23	9.13.18.4.18	15D 5Cf A9	War against Yaxhá	K'ahk' Tiliw Chan Chaak	9.14.0.0.0	U + 1
4	Stela 2	9.14.1.3.19	13D 5?Cf A10	1st k'atun anniversary of accession	K'ahk' Tiliw Chan Chaak	9.14.1.3.19	U + 1
5	Stela 29	9.12.10.5.12	19D 6Cf A9	Arrival	Lady Six Sky	9.14.3.0.0	U + 1
6	Stela 30	9.14.3.0.0	4D 4Cj A9	PE, bloodletting	K'ahk' Tiliw Chan Chaak	9.14.3.0.0	U
7	Stela 28	9.14.4.7.1	4D 3Cj A10		Lady Six Sky	9.14.5.0.0/ 9.14.8.0.0.	U
8	Stela 31	9.14.4.12.7	21ED 6Cj A9	K'atun PE	Lady Six Sky	9.14.10.0.0	U
9	Stela 18	9.14.15.0.0	13D 6Cj	Lajuntun PE	Lady Six Sky	9.14.15.0.0	U
10	Stela 6	9.16.4.10.18?	23D 1Cf A10	Accession	K'ahk' Ukalaw Chan Chaak	9.17.10.0.0	?
11	Stela 13	9.17.10.0.0	27ED 4Cs A9	Lajuntun ending	K'ahk' Ukalaw Chan Chaak	9.17.10.0.0	U
12	Stela 14	9.17.13.4.3	7D 2Cf A9	Accession	Itzamnaaj K'awiil	9.18.0.0.0	U
13	Stela 8	9.18.10.0.0	21D 2Cj A9	Lajuntun ending	Itzamnaaj K'awiil	9.18.10.0.0	U

Table 2. Lunar computations between the IS dates from Stela 24 and 29.

Monument	IS date, Maya Day Number	LS	Difference, (days)	4784-day formula	Copán formula
Stela 24	9.12.10.5.12 1,386,112	18D 1Cj A10	11768	18D 1Cj 10: 29.5308642 = 398L + 14.72d, then 211x 30 + 187 x 29 + 15 = 3D 4Cj 9,	18D 1Cj 10 : 29.53020134 = 398L + 14.98d, then 210 x 30 + 180 x 29 + 16 = 4D 4Cj 9
Stela 30	9.14.3.0.0 1,397,880	4D 4Cj III. 4 9			
				3 D = 12 intercalations, 4 D = 11 intercalations	11 intercalations

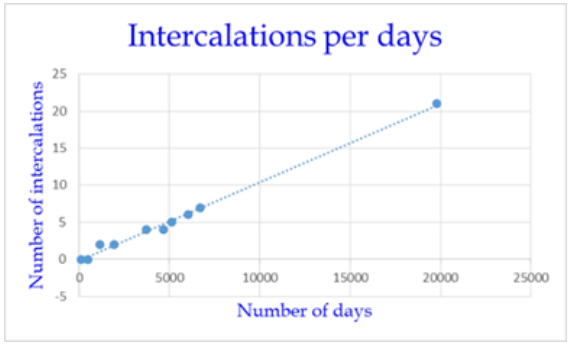
Two monuments, Stelae 24 and 29, recorded the same date 9.12.10.5.12 (August 687 AD) which associated with two different Lunar Series (see Table 1). The uniform system is listed as 18D 1Cj 10, whereas the non-uniform as 19D 6Cm 9. The Uniform system increases the numerical coefficient of Glyph C by one, simultaneously decreasing the age of the Moon by one and shifting the length of the lunar month from 29 to 30 (see Thompson 1954: 48). Both lunar data are, in some sense, equivalent to each other. What is important here is that both series, the Uniform and the non-uniform one, utilized the same, 4784-day intercalary cycle (see Table 3). Since first uniform dates (Stelae 24 and 22) were retrospectively counted from the same base at 9.13.10.0.0 (January 702 CE), I assume this date seems to be appropriate to mark the introduction of the Lunar Uniformity to Naranjo. All non-uniform texts are counted retrospectively from the period between 9.14.0.0.0 and 9.14.3 0.0 (711 – 714 CE). Thus, the estimated period when Lunar Uniformity and 4784-day intercalary cycles were introduced to Naranjo (roughly 702 – 714 CE) coincides with K'ahk' Tiliw Chan Chaak efforts to recover the political control over Naranjo's neighbors (see Beliaev 2000: 76).

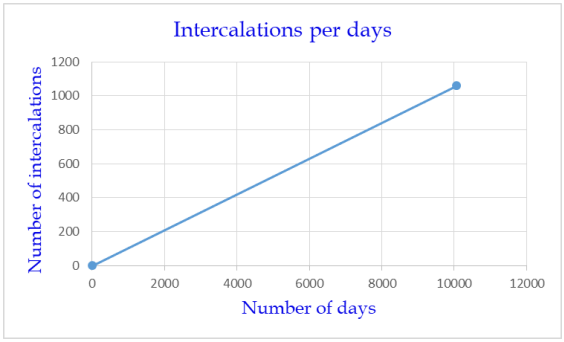
Not only lunar information from Naranjo follows the structure of the Lunar Table from Xultun, but also the Uniformity Period, as identified at Naranjo, is based on the same principle. It shows that the reckoning of the lunar months was the result of a gradual process which at Naranjo began at least a century earlier than the elaboration of the Lunar Table at Xultun.

As mentioned above, Stela 24 portrays Lady Six Sky Queen in the guise of the Lunar Goddess. Several scholars observed that impersonators of the Moon Goddess displayed the regalia similar to those of the Maize God costume. The diamond-like or jade net pattern is often seen on the images representing either by both deities or their impersonators. The overlapping or conflation of both divinities is often attributed to the ancestral-mythical character that considers them as the First Father and First Mother of the gods (Freidel et al. 1993: 279, 464; Looper 2002: 177-181; Schele and Miller 1986: 309; Tate 2000: 1060). Mutual relations observed between those two deities are attributed to the widespread use of the moon phases for planting and harvesting in pre-Hispanic Mesoamerica (Milbrath 1999: 133-135; Taube 1992: 68-69). Be as it may be, the overlapping costume elements reveal individual associations existing between this plant and the Moon. By extension, the costumes worn by Maya rulers and other persons which displayed Maize God forms sometimes merged with Moon Goddess representations causing a certain ambiguity among different female and male impersonators (Looper 2002: 177-184; Quenon and Le Fort 1997: 894-895; Zender 2014: 8). Recently Nikolai Grube (2016) has shown that "Six Sky" epithets may refer to the Maize God rather than to the Moon Goddess. Following Tokovine's (2013: 116) identifications of the place names containing number six with the Maize God, Grube observes that, on occasions, the name of the female ruler should be read as Ix(ik) Wak Jalam Chan, "Lady Six Weaver Sky". Therefore while the epithet "six sky" may refer to the Maize God, the epithet "Six Sky Weaver or "Six Weaver Sky" are exclusively associated with the Moon Goddess.

Her arrival is introduced by the same glyph HUL which is associated with the age of current moons (Glyphs E and D). Houston et al. (2006: 261) proposed the verb *hul-i*, meaning "arrival to" first described the arrival of the moon in the sky, but later compared the celestial movement to royal processions. The Maya imagined that like a human pilgrim on the earth, the Lunar Goddess traveled across the sky, and in Colonial times tens of pilgrims crossed Yucatan to get to the Ixchel (Lunar Goddess) shrine on the Island of Cozumel. Colonial dictionaries from Yucatan tell us these pilgrims were known as *hula* (Barrera Vásquez et al. 1980: 242-243).

Table 3. Lunar Series at Naranjo. Left – Lunar Uniformity, right non-uniformity.





According to this interpretation, the introduction and eventual fixation of lunar uniformity and intercalations are closely related to the Lady Six Weaver Sky Queen "arrival" to the Naranjo-Sa'al kingdom. Grube (2016) identified a number of other Classic Maya queens bearing the name of Six Weaver Sky, each associated with a different polity and respective ruling family. The question remains whether Moon Goddess identities of those princesses can also be related to the fixing of intercalation and/or lunar uniformity.

4. OXPEMUL

The name of Ix(ik) Wak Jalam Chan, "Lady Six Weaver Sky", appears at Oxpemul, the Classic city located in the vicinity of Calakmul, one of the Maya superpowers. Stela 5 displays her name, but this monument bears no lunar data (Grube 2008: 201-202) and due to the erosion cannot be dated. According to Robichaux (2005: 31), the reference to the name of the ruler from Stela 5 can be found on Stelae 18 and 19, dedicated on 9.16.5.0.0 (756 CE). Whereas between 9.16.0.0.0 (751 CE, Stela 9) and 9.16.5.0.0 (756 CE) Oxpemul adopted a 4784-day cycle comprising five intercalations, by 9.17.0.0.0 (771 CE) this system was abandoned (consult Table 4). Unfortunately, the lack of Moon Ages on several inscriptions does prevent us from drawing graphical timelines.

5. LA CORONA

Still another queen with the same name is found in La Carona, where she became the wife of Chakaw Nahb Chan who reigned from 658 to 667 CE (Stuart et al. 2014: 438-439). It may be observed that between 677 (Panel 1) and 721 CE (Panel 6) ritual specialists at La Corona utilized both the Lunar Uniformity and the 4784-day intercalary cycle (see Tables 4 and 5).

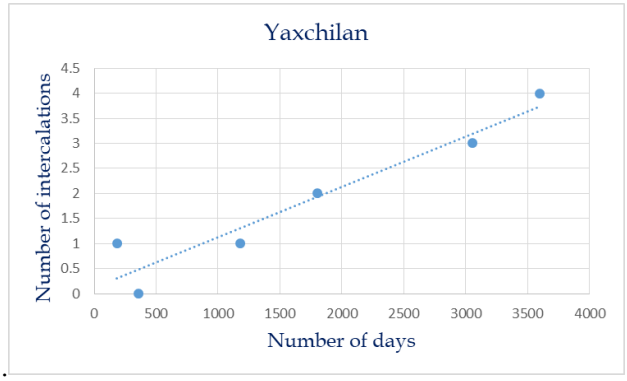
Table 4. The Lunar Series at Oxpemul and La Corona.

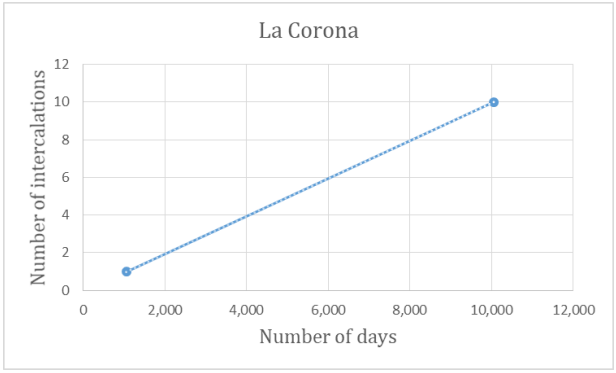
Monument	IS Date	LS	Uniformity
Oxpemul			
Stela 9	9.16.0.0.0	4Cj 29	U+1
Stelae 18/19	9.16.5.0.0	5D 5Cs 10	U+1
Stela 19	9.16.5.0.0	?D 5Cs 10	
Stelae 2	9.17.0.0.0	?D 3Cm 10	U
Stela 4	9.17.0.0.0	?D 3Cm 9	
Stela 7	10.0.0.0.0	13D 6Cj 9?	U
La Corona			
Panel 193	9.9.2.0.8	5D 2Cm 9	U-1
Panel 1	9.12.5.7.4	22ED 1Cm 10	U
Panel 6	9.14.9.9.14	25ED 5Cs 10	U

6. YAXCHILAN

Lady Six Weaver Sky is also the name of one of the wives of Bird Jaguar IV, one of the greatest lords of Yaxchilan. Here she is described as ajaw, meaning "queen", that is, Lady Six Weaver Sky Queen (Grube 2016: 5; Martin and Grube 2008: 131). She originated from Motul de San José, in Petén, Guatemala. The first date recording Xultun formula appears on Lintel 56 from Structure 11 which was raised on 738 CE but from that time onwards all monuments commissioned by Bird Jaguar IV bear the lunar data computed by the scheme known from the Xultun Lunar Table (see Table 5). In this way, the institution of an intercalary cycle was associated with the authority with which the queen was endowed.

Table 5. Intercalation trends at Yaxchilan and La Corona during the Uniformity.





7. DISCUSSION

We see, therefore, that arrivals of various Maya queens bearing the name of Six Weaver Sky to new political seats to become wives of local rulers could have been associated with the dissemination of the knowledge of proper moon reckoning. Of course, my sample of records used in this paper is reduced to the cases listed by Grube (2016) who enumerates the queens from five Mayan centers: Naranjo, La Corona, Yaxchilan, Oxpemul, and Rio Azul. Since the name of a lady from Rio Azul lacks "Six Sky" element, it may be dismissed. So, interestingly, during the periods when the Maya queens were acting, Maya scribes utilized 4784-day intervals to follow the Moon.

8. CONCLUSIONS

Sources such as the Lunar Series are far more informative about astronomic computing rules of the Maya than it might be expected. The data in the Lunar Series can be treated as reliable, as they were meticulously computed and recorded; so there is no need to convert them to equivalent Julian dates. The knowledge of a 4784-day intercalary cycle was the result of a gradual process which already was in progress in the seventh and eighth centuries CE. Indeed, the Lunar Table from Xultun was not a sudden endowment of the early ninth century.

The use of the number "six" in the names of Mayan queens portrayed as embodying the Moon Goddess, may reflect the idea that the Maize God and the Moon Goddess were considered as parallel beings. It may be conjectured that the adoption of a rigid pattern of intercalations was somewhat instigated by the Mayan queens who migrated to new cities to re-establish local dynasties. Geographic distribution of these Maya polities may suggest, that the region where the Xultun Lunar Table was produced was related to the central Petén, Guatemala.

Finally, returning to lunar computations, it may be concluded the widespread use of the Lunar Table from Xultun makes futile any attempt to find a day-to-day correlation constant.

ACKNOWLEDGMENTS

The study of the Lunar Series at Naranjo, Oxpemul, Yaxchilán and La Corona was supported by the Instituto Nacional de Antropología e Historia through the Project 296 "La teoría lunar en astronomía maya".

REFERENCES

Aldana, G. V. (2006) Lunar Alliances: Shedding Light on Conflicting Classic Maya Theories of Hegemony. In *Viewing the Sky Through Past and Present Cultures*, T. W. Bostwick and B. Bates (eds.), Phoenix, City of Phoenix Parks and Recreation Department, pp. 237-258.

Aveni, A. F., Saturno, W., and Stuart, D. (2013) Astronomical Implications of Maya Hieroglyphic Notations at Xultun. *Journal for the History of Astronomy,* Vol. 44, No. 1, pp. 1-16.

Barrera Vásquez, A., Bastarrachea Manzano, J. R., and Brito Sansores, W. (1980) *Diccionario maya Cordemex*. Merida, Ediciones Cordemex.

Barthel, T. (1951) Maya Astronomie: Lunare Inschriften aus dem Südreich. *Zeitschrift für Ethnologie*, Vol. 76, pp. 216-238.

Beliaev, D. (2000) Wuk Tsuk and Oxlahun Tsuj: Naranjo and Tikal in the Late Classic. In *Sacred and the Profane: Architecture and Identity in the Maya Lowlands*, P.R. Colas (ed.), Markt Schwaben, A. Saurwein, pp. 63-81.

Bricker, V. R., Aveni, A. F., and Bricker, H.M. (2014) Deciphering the Handwritting on the Wall: Some Astronomical Interpretations of The Recent Discoveries at Xultun, Guatemala. *Latin American Antiquity,* Vol. 25, No. 2, pp. 152-169.

Bricker, H.M., and Bricker, V.R. (2011) *Astronomy in the Maya Codices.* Memoirs of the American Philosophical Society, Vol. 265, Philadephia, American Philosophical Society.

Closs, M. P. (1985) The Dynastic History of Naranjo: The Middle Period. In *Fifth Palenque Round Table, 1983*, V.M. Fields (ed.), The Pre-Columbian Art Research Institute, San Francisco, Monterey, CA, Herald Printers, pp. 65-77.

(1989) The Dynastic History of Naranjo: The Late Period. In *Word and Image in Maya Culture*, F. Hanks and D.S. Rice (eds.) Salt Lake City, University of Utah Press, pp. 244-254.

Freidel, D., Schele, L, and Parker, J. (1993) *Maya Cosmos. Three Thousand Years of the Shaman's Path.* New York, William Morrow.

Grube, N. (2004) La historia dinástica de Naranjo, Petén. *Beiträge zur allgemeinen und vergleichenden Archäologie*, Vol. 24, pp. 195-213.

(2008) Monumentos esculpidos: epigrafía e iconografía. In *Reconocimiento arqueológico en el sureste del estado de Campeche, México: 1996-2005*, I. Šprajc (ed.), BAR International Series, 1742, British Archaeological Association, Oxford, pp. 177-231.

(2016) The Logogram JALAM. *Research Note 3. Textdatenbank und Wörterbuch des Klassischen Maya.* Arbeitsstelle der Nordrhein-Westfälischen Akademie der Wissenschaften und der Künste an der Rheinischen Friedrich-Wilhelms-Universität Bonn.

Houston, S., Stuart, D. and Taube, K. (2006) *The Memory of Bones. Body, Being, and Experience among the Classic Maya*. Austin, University of Texas Press.

Iwaniszewski, S. (2011) El arribo de la Señora Seis Cielo a Naranjo y las Series Lunares. In *Los investigadores de la Cultura Maya, 19*. Campeche, Universidad Autónoma de Campeche, Vol. 19, tomo II, pp. 155-167.

(2012) Los ciclos lunares y el calendario maya. *Arqueología Mexicana*, Vol. 19, No. 118, pp. 38-42.

(2013) Las Series Lunares en Petén y en el sur de Campeche a la luz de la Tabla Lunar de Xultun. In *Los investigadores de la Cultura Maya, 21*, Campeche, Universidad Autónoma de Campeche, Vol. 21, Tomo 1, pp. 259-270.

(2015) La Tabla Lunar de Xultun y su comparación con las Series Lunares. In *Diferentes povos, diferentes saberes na América Latina*, L.C. Borges (ed.), Rio de Janeiro, Museu de Astronomia e Ciências Afins – MAST, pp. 16-31.

Looper, M. G. (2002) Women-men (and Men-Women): Classic Maya Rulers and the Third Gender. In *Ancient Maya Women*, T. Ardren (ed.), Walnut Creek, CA, Altamira Press, pp. 171-202.

Martin, S. and Grube, N. (2008) *Chronicle of the Maya Kings and Queens: deciphering the Dynasties of the Ancient Maya*, Second Edition. London, Thames and Hudson.

Milbrath, S. (1999) *Star Gods of the Maya: Astronomy in Art, Folklore, and Calendars,* Austin, University of Texas Press.

Quenon, M. and Le Fort, G. (1997) Rebirth and Resurrection in Maize God Iconography, In *The Maya Vase Book*, J. Kerr (ed.), New York, Kerr Associates, Vol. 5, pp. 884-902.

Robichaux, H. R. (2005) Las inscripciones de Oxpemul, In *Los investigadores de la cultura maya*. Campeche, Universidad Autónoma de Campeche, Vol. 13, No. 1, pp. 29-43.

Saturno, W., Aveni, A.F., Stuart, D., and Rossi, F. (2012a) Ancient Maya astronomical tables from Xultun, Guatemala, *Science*, Vol. 336, No. 6082, pp. 714-717.

Saturno, W., Stuart, D., Aveni, A.F., and Franco Rossi, F. (2012b) Supplementary Materials for Ancient Maya Astronomical Tables from Xultun, Guatemala, *Science*, Vol. 336, No. 6082, pp. S1-S8.

Saturno, W., Hurst, H., Rossi, F., and Stuart, D. (2015) To set before the king: residential mural painting at Xultun, Guatemala, *Antiquity*, Vol. 89, No. 343, pp. 122-136.

Schele, L. and Miller, M. (1986) *The Blood of Kings: Dynasty and Ritual in Maya Art*. Fort Worth, TX, Kimbell Art Museum.

Stuart, D., Mathews, P., Canuto, M., Barrientos Q., T., Guenter, S., and Baron, J. (2014) Un esquema de la historia y epigrafía de La Corona. In *XXVII Simposio de Investigaciones Arqueológicas en Guatemala, 2013*, B. Arroyo, L. Méndez Salinas, and A. Rojas (eds.), Guatemala City, Museo Nacional de Arqueología y Etnología, pp. 435-448. Available: www.asociaciontikal.com (accessed 20 February 2018).

Tate, C. (2000) Writing on the Face of the Moon: Women as Potters, Men as Painters in Classic Maya Civilization. In *The Maya Vase Book,* J. Kerr (ed.), New York, Kerr Associates, Vol. 6, pp. 1056-1071.

Taube, K. (1992) *The Major Gods of Ancient Yucatan*, [Studies in Pre-Columbian Art and Archaeology, 32]. Washington, D.C., Dumbarton Oaks.

Teeple, J. E. (1931) *Maya Astronomy. Contributions to American Archaeology*, No. 2:29-115. Publication 403. Washington, Carnegie Institution of Washington.

Thompson, J.E.S. (1954) Memoranda on Some Dates at Palenque, Chiapas. *Notes on Middle American Archaeology and Ethnology,* No. 120, Washington, D.C., Carnegie Institution of Washington, pp. 45-52.

Tokovine, A. (2013) *Place and Identity in Classic Maya Narratives,* [Studies in Pre-Columbian Art and Archaeology, Number 37], Washington, D.C., Dumbarton Oaks Research Library and Collection.

Zender, M. and Skidmore, J. (2012) Unearthing the Heavens: Classic Maya Murals and Astronomical Tables at Xultun, Guatemala. Available: *Mesoweb Reports*, www.mesoweb.com/reports/Xultun.pdf. (accessed 1 July 2012).

Zender, M. (2014) On the Reading of Three Classic Maya Portrait Glyphs. *The PARI Journal,* Vol. 15, No. 2, pp.1-14. Available: www.mesoweb.com/pari/journal.html (accessed 10 February 2017).