

# ETNO Y ARQUEO-ASTRONOMÍA EN LAS AMÉRICAS

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# THE SOUTH-OF-EAST SKEW OF MESOAMERICAN ARCHITECTURAL ORIENTATIONS: ASTRONOMY AND DIRECTIONAL SYMBOLISM

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## Abstract

Archaeoastronomical research carried out during the last few decades has revealed that civic and ceremonial buildings in Mesoamerica were mostly oriented on astronomical grounds, particularly to the Sun's positions on the horizon on certain dates of the tropical year. While it has been shown that the orientations allowed the use of observational calendars serving practical needs, there seems to be no compelling observational or practical motive for their prevalent clockwise skew from cardinal directions. I argue this peculiarity can be accounted for by the symbolism associated with the parts or sides of the universe: since the dry season was conceptually related to the east and the rainy season to the west, the orientations were intended to record the dates in the dry and wet seasons on the eastern and western horizon, respectively, which was achieved with their south-of-east (north-of-west) skew. Possible observational bases of the directional symbolism are also discussed.

Las investigaciones arqueoastronómicas realizadas en las últimas décadas han revelado que los edificios cívicos y ceremoniales en Mesoamérica fueron orientados mayormente con base en consideraciones astronómicas, particularmente hacia las posiciones del Sol en el horizonte en ciertas fechas del año trópico. Mientras se ha mostrado que las orientaciones permitieron el uso de calendarios observacionales que servían para fines prácticos, parece que no hay ningún motivo observacional o práctico que pueda aclarar de manera contundente la prevaleciente desviación de las orientaciones de los rumbos cardinales en el sentido de las manecillas de reloj. Esta peculiaridad, según se argumenta aquí, puede explicarse en términos del simbolismo asociado con las partes o lados del universo: puesto que la época seca se relacionaba conceptualmente con el oriente y la de lluvias con el poniente, se procuraba que las orientaciones marcaran las fechas en las épocas seca y húmeda en el oriente y el poniente, respectivamente, lo cual fue logrado con su desviación al sur del oriente (al norte del poniente). También se discuten las posibles bases observacionales del simbolismo direccional.

## Introduction

Systematic archaeoastronomical research carried out during the last few decades has revealed that the orientations in civic and ceremonial architecture of prehispanic Mesoamerica were mostly based on astronomical considerations. While the arguments supporting this view and the evidence about the significance and observational use of astronomical alignments are summarized in the first section, the main purpose of the paper is to explore another characteristic feature of Mesoamerican architectural orientations, namely, their prevalent clockwise skew from the cardinal directions. Upon examining the unconvincing hypotheses that attempt to explain such orientations as having some practical advantages, I will argue they can be understood in the light of the Mesoamerican directional symbolism.

No extensive general introduction seems to be necessary about the importance of religious concepts and ideology in the structuring of the built environment in archaic civilizations. Among the beliefs influencing the formation of ancient cultural landscapes, the

ideas about the structure and functioning of the universe had a paramount role: examples from a number of traditional societies could be adduced to show that cosmological and other concepts composing their worldviews were embedded in the architectural design and orientation of both individual structures and building complexes, as well as in the spatial arrangement of entire settlements, but particularly of their civic and ceremonial cores.<sup>148</sup> With respect to the Maya settlement patterns, it has been mentioned that “both ancient and modern communities were commonly laid out as microcosms of the four-quartered world, with attendant directional symbolism, as harmonious replication, in miniature, of the encompassing universe,”<sup>149</sup> and there is no reason to doubt that such practices were shared, along with so many other cultural traits, by prehispanic societies throughout Mesoamerica. As for the Lowland Maya, Ashmore<sup>150</sup> shows that the directional symbolism, specifically, must have played an important role in the principles dictating architectural arrangements and site planning; however, while her studies focus on the north-south conceptual dichotomy, as manifested in the spatial distribution of characteristic types of architectural and other archaeological vestiges, my own interpretations rely on symbolic connotations of the east and the west, which seem to provide a clue for understanding the clockwise skew from cardinal directions, prevailing in Mesoamerican architectural orientations.

It should be underscored that east and west, as applied in the present context, do not refer to the cardinal directions or points in the modern sense of the word. Closs argues the Maya terms for north, south, east and west must have referred to relatively wide sectors of the horizon.<sup>151</sup> The evidence discussed below suggests, moreover, that the significance of these words was frequently even broader, corresponding to extensive and loosely delimited parts of both the earth and the sky. It seems, indeed, that the directional terms were polysemous, as proposed by Lounsbury,<sup>152</sup> and that the prehispanic cardinal “sides” were assigned variable extents in different contexts. When applied to the horizon only, they may have been approximately delimited by the sky-bearers or world corners, whose location, according to the recently accumulated and mostly ethnographic evidence, coincided with the solstitial points on the horizon.<sup>153</sup>

### **Astronomical Alignments in Prehispanic Mesoamerican Architecture**

The architectural orientations measured during the last few decades at a large number of archaeological sites in various Mesoamerican regions exhibit well defined groups within certain azimuthal ranges. This fact can only be explained by the use of astronomical references: had the orientations been fortuitous or conditioned by local topographic or geomorphological features, military considerations or other practical motives, they would have been different at different sites, resulting in a random azimuthal distribution. The clusters of azimuths also indicate that the orientations refer to the astronomical phenomena observable on the horizon, i.e. to the rising and setting points of celestial bodies.<sup>154</sup> The archaeoastronomical studies of

<sup>148</sup> General discussions on this topic and analyses of particular cases can be found, for example, in Wheatley (1971), Eliade (1972: 328-345), Ashmore (1989; 1991), Kowalski (1999), and Aveni (2001: 217-222).

<sup>149</sup> Ashmore 1989: 272.

<sup>150</sup> 1989; 1991.

<sup>151</sup> Closs 1988a: 392; 1988b.

<sup>152</sup> Fide Closs 1988a: 392.

<sup>153</sup> Köhler 1995: 85-98; Sosa 1989: 132; Villa Rojas 1985.

<sup>154</sup> Aveni 2001: 233, fig. 81; Aveni and Hartung 1986: 7-14, 56, fig. 2; \_prajc 2001a: 293-297; 2001b: 57-64; Tichy 1991: 94, fig. 6-11. In their study on the Maya architectural orientations, Aveni and Hartung (1986: 7f) comment: “The astronomical hypothesis would seem especially worthy of consideration if we find alignments that are confined to a narrow azimuthal range in a sample of buildings spread far apart in space. In this case, there can be no conceivable way of actually laying out the chosen direction other than by the use of astronomical bodies at the horizon as reference objects.”

alignments have so far been focused on orientations of civic and ceremonial buildings. According to the available data (which are admittedly meager), domestic and other structures with secular functions do not seem to have been oriented on astronomical grounds. However, where a single orientation dominates the whole urban layout, as is evident at a few sites, it must have been dictated by the (astronomically functional) orientation of the main temple; this assumption is supported by comparative data from other cultures<sup>155</sup> and also, in a few cases, by internal evidence.<sup>156</sup>

It has been suggested that the Mesoamericans employed compass-like devices and that, at least in some areas, they oriented their buildings to the magnetic north.<sup>157</sup> However, the archaeomagnetic data available for Mesoamerica, though still insufficient, do not support these hypotheses.<sup>158</sup> Even supposing the practice of orienting structures toward the magnetic north existed in Mesoamerica, it must have been limited to certain epochs and regions, because most of the known orientations cannot be explained this way: if the predominant orientational reference had been the magnetic north, all contemporaneous orientations in a region would have been similar, varying as a function of time, because the local magnetic declination (angular difference between the magnetic and astronomical north) changes gradually through time.<sup>159</sup> The reality we know is different: though the orientation patterns exhibit regional and temporal variations, some orientation groups persist along various centuries in extensive areas; on the other hand, contemporary orientations, even at a single site, commonly pertain to different groups.

Since the azimuths of most of the east-west axes of the buildings lie within the angle of annual movement of the Sun along the horizon (Figure 1), the *orientations must refer predominantly to certain dates of the tropical year recorded by the corresponding Sun's positions on the horizon*:<sup>160</sup> the Moon and the planets do not appear to have significant rising and setting points within this angle, whereas by postulating that stars were primary orientational references, we would be forced to accept that practically only those rising or setting at azimuths within the angle of solar movement, or (since the buildings are mostly rectangular) in perpendicular northerly and southerly directions, were of interest. Some alignment groups, whose target declinations (dates) remained virtually the same through many centuries, additionally support the conclusion that the stars were not common orientational references: since the rising or setting azimuth of a star manifests secular variations due to the precession of the equinoxes, we would observe, in the orientations corresponding to a star, a consistent variation as a function of time. Though it is quite likely that some structures, whose east-west axes have azimuths beyond those reached by the Sun on the horizon, were oriented to stars or planets,<sup>161</sup> the distribution of orientations suggests the practice was not very common.

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<sup>155</sup> Cf. Wheatley 1971.

<sup>156</sup> Sprajc 2000a; 2000b; 2001b.

<sup>157</sup> Carlson 1975; Fahmel 1993.

<sup>158</sup> Urrutia and Soler 1995: 395.

<sup>159</sup> Aveni 2001: 118f, fig. 49.

<sup>160</sup> Cf. Aveni and Hartung 1986: 59f; Sprajc 2001a: 294-297; 2001b: 21-29, 55-71; Tichy 1991: 117). In Mesoamerican latitudes the solstitial points (extremes of the annual movement of the Sun along the horizon) are located approximately 25° north and south of true east and west (Figure 1).

<sup>161</sup> Cf. Aveni 2001: 262-288; Galindo 1994: 148-189; \_prajc 1993a: 45-53; 1993c; 1996a: 72-91.

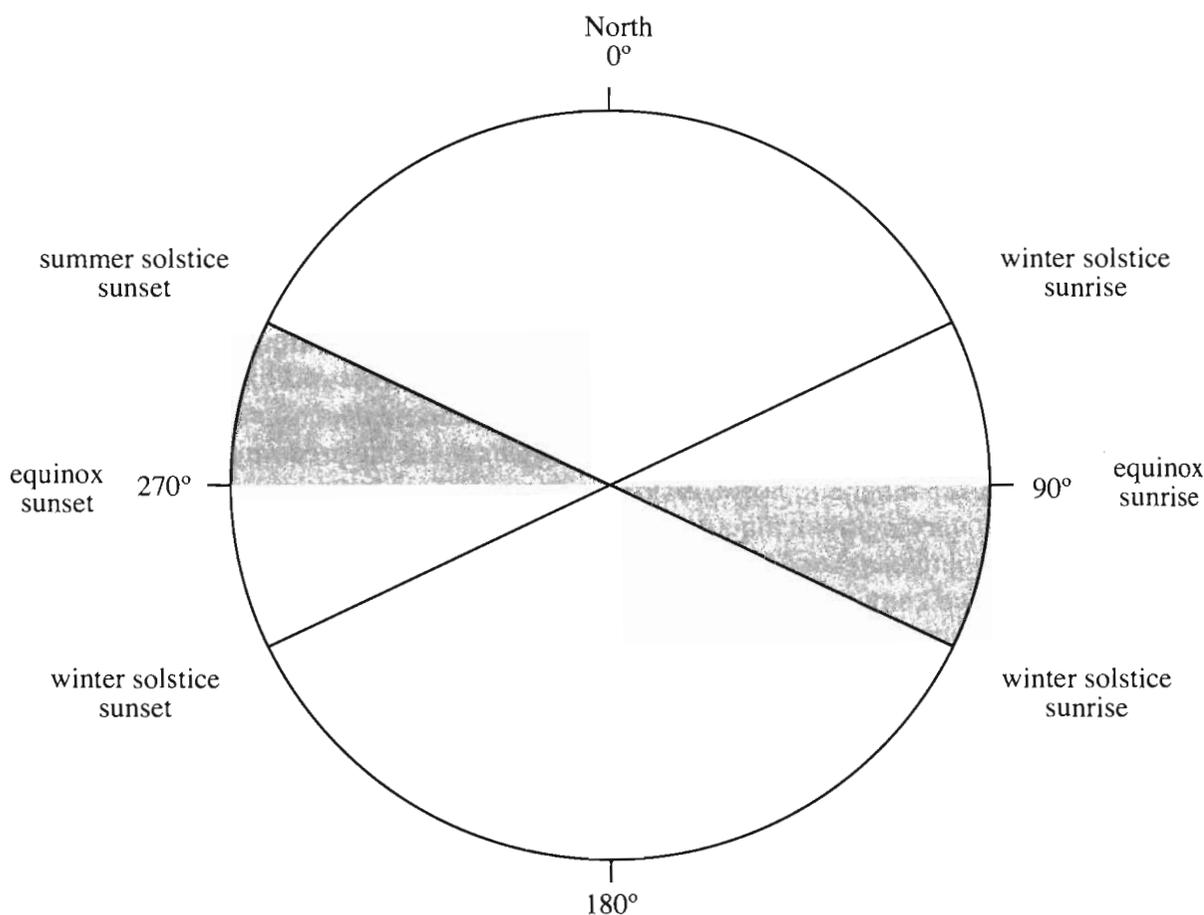


Figure 1. Zones of horizon where the Sun rises and sets in Mesoamerican latitudes. The view is from the sky upon an imaginary observer at the center. The azimuths of the east-west axes of Mesoamerican buildings fall predominantly within the shaded sections and correspond to sunrises from September to March equinox and to sunsets from March to September equinox.

The results of a systematic study based on a number of archaeological sites in central Mexico show that the dates of sunrises and sunsets both along the architectural orientations and above the prominent hills on the local horizon exhibit consistent patterns: the intervals separating the dates recorded at a particular site tend to be multiples of 13 and 20 days and are, therefore, significant in terms of the Mesoamerican calendrical system; furthermore, the most recurrent dates apparently marked crucial moments of a ritual agricultural cycle. The regularities detected strongly suggest that the places for the construction of important religious structures were carefully selected, so that certain mountain peaks on the local horizon could have been used as natural markers of sunrises and sunsets on significant dates; furthermore, both the architectural orientations and the prominent local horizon features allowed the use of *observational calendars* that, in view of the lack of permanent concordance of the calendrical and tropical years, were necessary for predicting important seasonal changes and

for an efficient scheduling of the corresponding agricultural activities.<sup>162</sup> Further study of alignments is expected to reveal whether comparable observational calendars were employed also in other parts of Mesoamerica.

A characteristic feature of Mesoamerican architectural orientations, known since Macgowan<sup>163</sup> published his brief report, is that they tend to be skewed clockwise from cardinal directions, i.e. south of east or, viewed differently, east of north. Macgowan recognized three groups of orientations in Mesoamerican architecture; while observing that the buildings are mainly oriented either approximately to the true north or are skewed about 7° and 17° east of north, he noted that the deviations west of north are extremely rare. This tendency in Mesoamerican architectural orientations has been amply confirmed,<sup>164</sup> even if exceptions are found in all periods.

### **Significance of the South-of-East Skew of Architectural Orientations**

Since the orientations in Mesoamerica refer predominantly to the Sun's positions on the horizon, it seems convenient to speak about skews north and south of true east or west, rather than about deviations east and west of true north. The solar orientations skewed south of east (or north of west) recorded sunrises in autumn and winter and sunsets in spring and summer (Figure 1). However, the prevailing practice of orienting buildings with a clockwise skew from cardinal directions could not be dictated by observational motives, because the same dates can be marked both by sunrises and sunsets: the orientations could have recorded the autumn and winter dates on the western horizon and the spring and summer dates on the eastern horizon, had they been deviated south of west (north of east). It could even be argued that such orientations, corresponding to sunsets in the dry season and to sunrises in the rainy season, would have made the observations easier: in the rainy season, which in Mesoamerica lasts approximately from May to October, the sky is more likely to be clear in the morning than in the afternoon. However, the buildings were oriented in the great many cases to *sunsets in the rainy season*, although the observations of these events must have been frequently hindered by unfavorable weather conditions.<sup>165</sup>

### **Practical Motives**

The characteristic clockwise skew of orientations in Mesoamerican architecture has been interpreted in terms of meteorological conditions, as reflecting the purpose of the builders to manipulate seasonal light and warmth in the most convenient ways. In his discussion concerning the orientation of the urban layout of Teotihuacan, Dow comments that “an orientation somewhere between zero and 30° north of west has some practical advantages in relation to the sun. It allows the late evening sun to come into the streets in the summer; thus it increases the available light at this time.”<sup>166</sup> In fact, one could argue that the streets and houses skewed south of west would have made more sense, as they would have allowed the Sun rays to fall along the streets in winter afternoons, when the days are particularly short. Dow also affirms that the north-of-west skew “allows the winter sun to shine more directly

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<sup>162</sup> Sprajc 2000a; 2000b; 2001b.

<sup>163</sup> 1945.

<sup>164</sup> Aveni and Gibbs 1976; Aveni and Hartung 1986: 10; Aveni 2001: 233; Tichy 1991; \_sprajc 2001b.

<sup>165</sup> To be precise, some dates very frequently recorded on the western horizon actually fall in late April and early May, i.e. slightly *before* the beginning of the rainy season; as argued elsewhere (Sprajc 2001b: 79-88, 151-155), the observation of sunsets on these dates must have served for predicting this important annual climatic change.

<sup>166</sup> Dow 1967: 333.

on the southern walls in the winter afternoons. This allows them to store heat in the afternoons in preparation for the colder nights.”<sup>167</sup> In his study on Mayapán, Carlson also related the practice of orienting buildings south of east to climatic peculiarities, but he suggested this allowed optimizing the effects of the morning sun in the coldest period of the year.<sup>168</sup> However, since “the sun does not rise vertically in the East, but ascends to the right toward the South every morning”,<sup>169</sup> one could also reason—employing an argument similar to the one expressed by Dow (*supra*)—that a north-of-east skew would have been more advantageous, allowing the Sun to shine more directly on southern walls of the buildings in winter mornings. It seems, then, that any orientation can be interpreted as having some advantage in terms of climatic circumstances. But it should be pointed out, in the first place, that the south-of-east skews are particularly consistent in the orientations of ceremonial structures, for which practical considerations like those referred to above must have been less relevant than in the case of housing units.<sup>170</sup>

### Symbolism of East and West

Since practical motives do not seem to provide a cogent explanation of the clockwise skew from cardinal directions, prevalent in Mesoamerican architectural orientations, I believe this peculiarity was based rather on the symbolism related to the world directions. The civic-ceremonial buildings with orientations skewed south of east or north of west corresponded to sunrises in autumn and winter and to sunsets in spring and summer. In other words, the dates recorded on the eastern and western horizon fell mostly in the dry and wet seasons, respectively, and I will argue this is precisely what the Mesoamericans intended to achieve: there is evidence indicating that the dry season was conceptually related to the eastern and the rainy season to the western side or part of the universe.

The rainy season was, in the Mesoamerican worldview, the “dark period” of the year, related to the night, the Moon, Venus, the earth, the underworld and the feminine principle, whereas the dry season was dominated by the masculine, solar, igneous and celestial forces.<sup>171</sup> Particularly revealing in this sense is the symbolism of the Sun, Moon and Venus. The Sun was associated with heat, fire and drought,<sup>172</sup> whereas the Moon and Venus, particularly its evening manifestation, were linked to water, maize and fertility.<sup>173</sup> On the other hand, it can be shown that these celestial bodies were specifically related to certain directions or parts of the world.

The Classic Maya bicephalic celestial dragon or monster usually has a Sun (*kin*) glyph on its rear head and a star (*ek*) glyph, normally referring to Venus,<sup>174</sup> on its front head.<sup>175</sup> In Temple 22 at Copán and in House E at Palenque, a two-headed monster is placed in an east-west direction, having its front head with a Venus sign in the west and the rear head with the Sun glyph in the east.<sup>176</sup> At Palenque, the star signs are also found on the western parts of the

<sup>167</sup> Ibid.

<sup>168</sup> Carlson 1982: 54f.

<sup>169</sup> Ibid.: 55.

<sup>170</sup> Cf. Aveni and Hartung 1986: 3.

<sup>171</sup> Preuss 1912: XXVII-XXXII; Broda 1983: 156f; López Austin 1994: 120, 149; Graulich 1999: 430.

<sup>172</sup> Thompson 1975: 292, 294; Broda 1983: 156f.

<sup>173</sup> Preuss 1912: LIXf; Thompson 1939: 143f; 1950: 231; 1975: 296-304; Klein 1976: 96f; 1980; Báez-Jorge 1988; Köhler 1991; Milbrath 1995; 1996; 1999; \_prajc 1993a; 1993b; 1996a.

<sup>174</sup> Although the Maya star glyph (T510) may refer to any planet or star, in most cases it denotes the star par excellence, i.e. Venus (Closs 1979: 147f; \_prajc 1993a: 38f; 1996a: 62f).

<sup>175</sup> Kelley 1976: 96; Schele 1976: 17.

<sup>176</sup> Schele 1976: 20.

so-called celestial bands<sup>177</sup> on the Tablet of the Cross (Figure 2), as well as on the sarcophagus lid and on piers d and e in the Temple of the Inscriptions.<sup>178</sup>

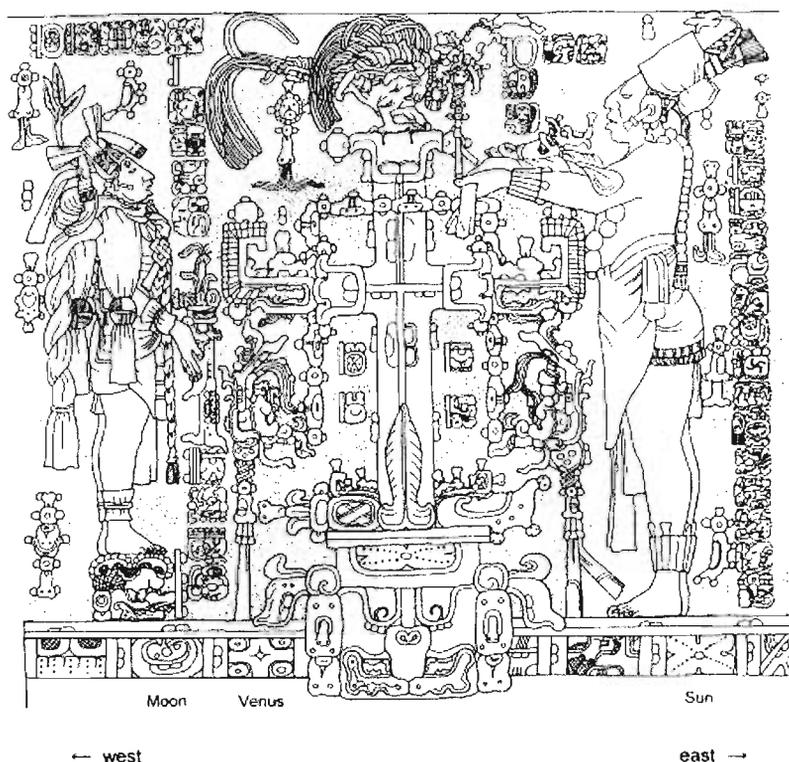


Figure 2. Central tablet in the Temple of the Cross at Palenque, Chiapas, Mexico (after Schele 1976: fig. 6); note the location of the Sun, Moon and Venus glyphs in the celestial band below.

The Venus glyphs in these cases must refer to the evening aspect of the planet; supporting this view is the fact that one of the structures decorated with a sky monster, Temple 22 at Copán, has a window facing west and most probably designed for observations of Venus as evening star.<sup>179</sup>

Schele and Miller<sup>180</sup> contended that the Maya celestial monster represents the dawn, with the Sun following the Morning Star. Such reasoning, however, cannot explain why the Moon glyphs are also placed on the west side of the celestial bands.<sup>181</sup> It is much more likely that the iconography and spatial orientation of celestial monsters and bands reflect directional

<sup>177</sup> A close iconographic and conceptual relationship between the decorative elements known as celestial (or sky) bands and bicephalic monsters is manifested, for example, in House E at Palenque, where a celestial band constitutes the monster's body.

<sup>178</sup> Maudslay 1889-1902, IV: pls. 52-56, 76; Schele 1976: 16, fig. 7.

<sup>179</sup> Closs et al. 1984; \_prajc 1987-88; 1993a: 50-53; 1996b: 99-102.

<sup>180</sup> 1986: 45.

<sup>181</sup> Maudslay 1889-1902, IV: pls. 43, 53, 55, 74; Schele 1976: 16, fig. 7. Schele and Miller's interpretation might apply to Temple 22 at Copán, where also the eastern head of the monster has a star-Venus glyph, most probably referring to the morning aspect of the planet.

associations of the Sun with the east and the Moon and Venus as evening star with the west, as revealed also in other sources.

Thompson<sup>182</sup> mentions that the west is “the natural home of the moon goddess”, who was also the patron of the Maya month Ch'en, associated with the west. In the quadripartite cosmic diagram on page 1 of the central Mexican Codex Fejérváry-Mayer (Figure 3), the Sun disk is placed on the east and the Moon symbol, together with a skeletal creature probably representing the dying (setting) Sun, on the west;<sup>183</sup> furthermore, one of the gods depicted on the east is Piltzintecuhli, basically a solar deity,<sup>184</sup> whereas the west is presided by the earth and water goddesses Tlazolteotl and Chalchiuhtlicue, both related also to the Moon.<sup>185</sup> In other central Mexican codices, too, the Sun gods are placed on the east, while “all the western deities, except the sky bearers, are associated with maize”;<sup>186</sup> since the sky bearer on the west is normally Quetzalcoatl-Ehecatl, and considering that his Maya counterpart, Itzamna, was also associated with the west,<sup>187</sup> it should be noted that both the latter two deities, supreme controllers of celestial water, and the maize gods were related to Venus, particularly its evening manifestation.<sup>188</sup>

Quite explicit information about such concepts has been ethnographically documented among the Mixe-Popoluca of the Veracruz Isthmus: the dry season is presided by the Sun and the Morning Star, who have their houses in the east, while the rainy season is controlled by the Moon and the Evening Star, who reside in the west.<sup>189</sup> Also interesting in this context is that, according to Preuss<sup>190</sup>, the stories about a paradise to the west, where the maize deities reside, can be found not only in Mexico but also among the Pueblos of Arizona.

## Discussion

It can thus be concluded that the Mesoamericans associated the east with the Sun and the dry season, and the west with the Moon, Venus as evening star, water, maize and, consequently, the rainy season. The bases of these concepts should be sought, no doubt, in natural reality. The east is the direction of the Sun *par excellence*, because it is there that it rises every day; since the Sun's power is obviously more patent in the dry season, the relationship of this period of the year with the east appears to be logical. The west, however, is the place where the Moon “is born”»: after a short period of its invisibility around the conjunction with the Sun, the tiny crescent of the waxing Moon appears first in the western sky, shortly after sunset. The Moon's association with water and fertility, apparently universal, may have been derived from various observational facts; the most important one must have been the correspondence between the length of the Moon's synodic period, perceived through the alternation of its phases, and the woman's menstrual cycle,<sup>191</sup> though it is also worth recalling that the Moon controls tides and that there may be a link between the lunar phases and variations in rainfall.<sup>192</sup> Thompson, saying that the west is “the natural home of

<sup>182</sup> 1950: 112.

<sup>183</sup> Aveni and Hartung 1986: 1; Aveni 2001: 150f; Köhler n.d.: 2. 7; Krupp 1983: 291-293.

<sup>184</sup> Thompson 1934: 223-225; Nicholson 1971: 417f.

<sup>185</sup> Preuss 1912: LX; Thompson 1939: 129f, 141-144; Milbrath 1995: 52-60.

<sup>186</sup> Thompson 1934: 225.

<sup>187</sup> Thompson 1934: 218-227; López Austin 1994: 26.

<sup>188</sup> Sprajc 1993a: 21f, 38-40; 1996b: 76-106.

<sup>189</sup> Lehmann 1928: 768, 772. Among the Pawnees of North America, too, the deities of the west were both the Evening Star and the Moon, while the Morning Star and the Sun were gods of the east (Wedel 1977: 133).

<sup>190</sup> 1912: XXXVII.

<sup>191</sup> Eliade 1972: 150-177.

<sup>192</sup> Milbrath 1999: 29, 119.

the moon goddess both because she was a woman, and because she was the patroness of childbirth",<sup>193</sup> derives his statement from the Mexican belief about the west being the region of goddesses and deified women who died in childbirth, but the very belief associating the west with fertility and women must have been based on the observational facts associated with the Moon and discussed above.

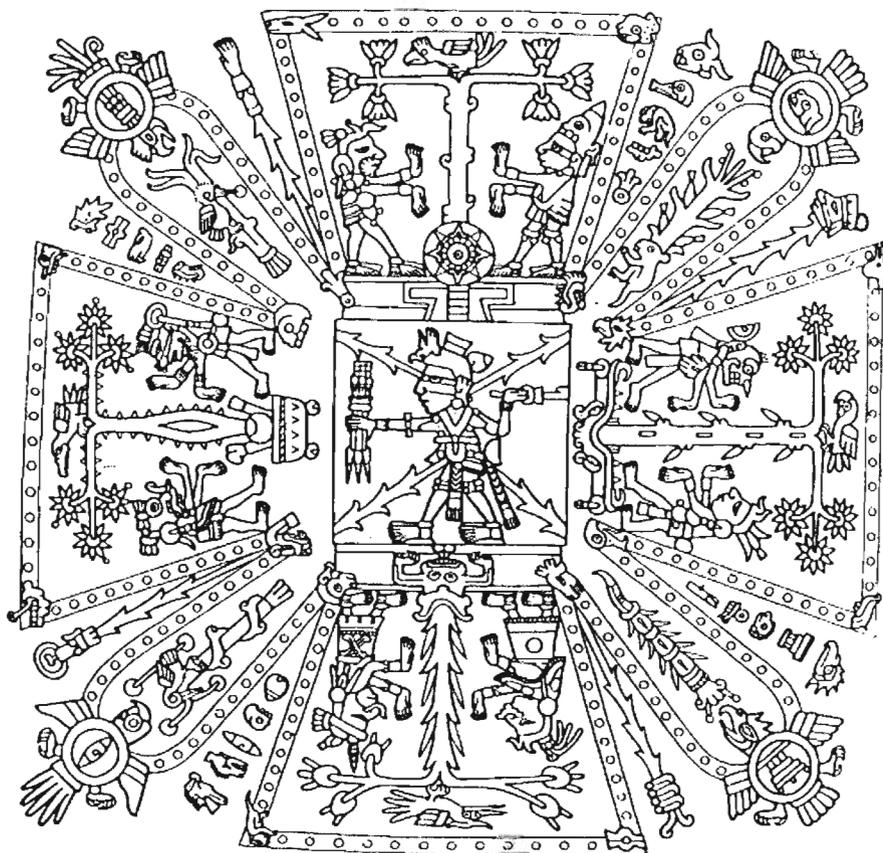


Figure 3. Quadrupartite cosmic diagram on page 1 of the Codex Fejérváry-Mayer (after Krupp 1983: 291): the east with a spiked disk representing the Sun is at the top, and the west with the Moon symbol at the bottom.

While the connection of the west with rain may have been an extension of the symbolism and directional association of the Moon, it could also have been derived from the easily observable characteristics of the apparent motion of Venus: when visible as *evening star in the western sky*, the planet always attains its northerly extremes between April and June and its southerly extremes between October and December. In other words, the extremes of the evening star approximately delimit the rainy season and agricultural cycle in Mesoamerica, and it has been argued that these phenomena were the most important observational base of the amply documented conceptual relationship between Venus, particularly its evening

<sup>193</sup> Thompson 1950: 112.

manifestation, and rain, maize and fertility. Among the data supporting this conclusion and exhaustively discussed elsewhere,<sup>194</sup> the following ethnographic evidence is particularly explicit, revealing rather clearly the connection between religious ideas and observational reality.

In a chant recorded about a century ago among the Cora in western Mexico, Venus as evening star, identified with the maize god, comes from the north bringing whiteness, clouds, life, and some flower species that the Cora associate with the rainy season.<sup>195</sup> The poetic narrative agrees with astronomical and climatic facts: Venus, whenever visible in the western sky around the beginning of the rainy season, is always seen north of true west, and its "return" from the extreme northerly setting point is accompanied by the progressively heavier rainfall. Comparable data were obtained among the Mixe-Popoluca in the Mexican state of Veracruz. The Sun and Venus as morning star, governing in the dry season, are lords of *east and south*, whereas *west and north* are dominated by the Moon and Satan, which is related to both rain and the evening aspect of Venus.<sup>196</sup> In one story, Satan is said to reside in the south in the dry season, but reaches his northern house with the winds blowing from the south from February to the end of May.<sup>197</sup> These concepts are, again, perfectly congruent with the easily observable natural phenomena: in the dry season both the Sun and Venus, if visible as morning star, are located south of east; on the other hand, if Venus is visible as evening star in the months between February and May, it moves from the south toward its northerly extreme, which announces the beginning of the rainy season.<sup>198</sup>

Also the Sun during the greater part of the rainy season sets north of west; of course, it also rises north of east, whereas in the dry season it moves south of the east-west line, both rising and setting. *However*, the *northwesterly* direction must have been associated with the rainy season because the latter was related to the west: it is there that the Moon, deity of the earth, water and fertility, had its house, and it is there that Venus in its evening aspect marks the beginning and the end of the wet season of the year.<sup>199</sup> Furthermore, it is also because the northerly extremes of the evening star herald, or coincide with, the onset of the rainy season, thus announcing the proper time for maize planting, that the northwestern direction must have had a foremost importance, reflected also in architectural orientations: relatively few Venus alignments have been identified so far in Mesoamerican architecture, but most of them refer to the northerly extremes of the evening star.<sup>200</sup>

In general, it is precisely the symbolism discussed above and based on observational facts that the Mesoamerican architectural orientations, largely skewed south of east (north of west), seem to reflect: most of them referred to the Sun's positions on the horizon, recording the dates in the dry season on the southeastern horizon and those in the rainy season on the northwestern horizon; since they pinpointed agriculturally significant moments of the tropical year and thus allowed the use of observational calendars that served practical needs, we

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<sup>194</sup> Sprajc 1993a: 1993b; 1996a; 1996b.

<sup>195</sup> Preuss 1912: 230. LXI-LXXIV; \_prajc 1993a: 26f; 1996a: 41-43.

<sup>196</sup> Lehmann 1928. About the fusion of prehispanic rain deities with the Christian devil, see \_prajc 1993a: 22f; 1996a: 33-36.

<sup>197</sup> Lehmann 1928: 767f.

<sup>198</sup> Sprajc 1993a: 35-38; 1996a: 58-61.

<sup>199</sup> It is interesting that for the Hopi of the North American Southwest, the most important directions are those corresponding to the summer solstice sunsets (northwest) and to the winter solstice sunrises (southeast) (McCluskey 1990: S1f).

<sup>200</sup> Sprajc 1993a: 45-50; 1993c; 1996a: 72-85; 1996b: 170-184.

could say that the orientations with the characteristic clockwise skew from cardinal directions reconciled observational necessities with the symbolism associated with the eastern and western parts of the universe.

In this context it is worth recalling that, according to the analyses of the alignment data from a number of central Mexican archaeological sites, the ceremonial centers of prehispanic settlements were located on carefully selected places that allowed prominent elevations on the local horizon to be employed as natural markers of horizon calendars: it has been shown that significant dates were frequently recorded not only by architectural orientations but also by conspicuous mountain tops on the local horizon. However, while the buildings, due to their prevalent clockwise skew from cardinal directions, registered the rainy season dates mostly on the western horizon, the mountains marking the same dates are often placed on the eastern skyline.<sup>201</sup> It thus seems that the symbolic aspect of astronomical orientations in the architecture—assuming their south-of-east skew—was dictated by the directional concepts discussed here—overshadowed their practical use and observational reliability, whereas the latter was of primary importance in the case of the mountain peaks serving as horizon markers of the Sun's positions: it can be recalled that the chances of having clear skies in the rainy season are much greater in the morning than in the afternoon.

Finally, a clarifying note is in order concerning some contradictions that seem to be contained in the available evidence about the Mesoamerican directional symbolism. Inconsistencies occasionally found in the directional associations of the Sun, Moon and Venus can be accounted for by the fact that celestial bodies, indeed, appear at different times in different parts of the sky. Whenever sufficient data are available, it is evident that the differing spatial associations of the Sun, Moon and Venus correspond to their specific aspects. The morning Sun dominates the east, while the afternoon or setting Sun belongs to the west and may appear in a specific guise of the Night Sun, which in the Mesoamerican worldview merged with Venus as evening star, the Moon and rain deities.<sup>202</sup> The Moon, generally placed to the west, is sometimes related to the east, but this association applies to the waning Moon, visible in the morning sky and, therefore, conceptually fused with the rising Sun and the morning aspect of Venus.<sup>203</sup> If deities with different attributes were identified with one and the same celestial body, they probably corresponded to distinct moments or positions along its apparent motion in the sky and may have reflected also the characteristics of the concomitant natural phenomena;<sup>204</sup> however, a certain degree of (con)fusion of the concepts linked to the same celestial object seems to have been unavoidable.

The fact that not only the west but also the north is occasionally associated with water and maize<sup>205</sup>—note that the rain god Tlaloc is placed to the north in the Codex Fejérváry-Mayer (Figure 3)—may reflect the concomitance of the beginning of the rainy season with both the northerly extremes of Venus as evening star and the first annual solar zenith passage, which in Mesoamerican latitudes occurs in May, when the Sun is moving northwards.<sup>206</sup> On the other hand, the relationship of rain gods with the east, attested in some sources,<sup>207</sup> is

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<sup>201</sup> Sprajc 2001b: 64-71.

<sup>202</sup> Klein 1976: 97; 1980; D. Tedlock 1985: 296f.

<sup>203</sup> Lehmann 1928: 764-766, 779; \_prajc 1993a: 37f; 1996a: 61.

<sup>204</sup> Cf. Milbrath 1995; 1996; 1999; \_prajc 1993a; 1993b; 1996a.

<sup>205</sup> Sprajc 1993a: 27; 1996a: 43.

<sup>206</sup> Note, however, that Cinteotl (maize god) is placed to the south in Fejérváry-Mayer (Figure 3), which might have to do with the fact that the Sun is in the southern half of celestial vault at the time of maize harvest.

<sup>207</sup> Preuss 1912: LXXVIII; Milbrath 1999: 17.

probably due to a very concrete observational fact: the east is, indeed, the direction where the rain clouds normally come from in tropical latitudes.

Nonetheless, it seems that the origin of the most widespread beliefs about the properties of the parts or sides of the universe is to be sought in the symbolic connotations and directional associations of the most important celestial bodies. The fact that the architectural orientations in Mesoamerica were largely astronomical is at least consistent with the hypothesis that their prevalent south-of-east skew was based precisely on these astronomically-derived concepts. I am well aware that my interpretations require testing against further, particularly archaeological data. If, for example, some meaningful archaeological features and their spatial distribution within civic and ceremonial cores of settlements were found to exhibit consistent patterns that could be interpreted as reflecting the directional symbolism discussed above, the propositions offered would be reinforced. However, the situation is complicated by the most likely existence of local, regional and time-dependent variations, both in the conceptual framework underlying orientational rules and in its material expressions detectable through archaeologically recoverable vestiges. The orientations skewed counterclockwise from the cardinal directions, found in certain Mesoamerican regions and periods, represent only one example, though perhaps the most evident one, of such variations. As Ashmore puts it, "It is naive to expect that any medium-to-large Mesoamerican centers, especially as these were usually occupied and rebuilt over long periods of time, would be reducible to a single or simple planning idea."<sup>208</sup> In spite of such difficulties, the quest for relevant evidence should not be abandoned, but it will be more successful if we are aware of the questions posed and the problems involved.

### **Concluding Remarks**

The architectural orientations in Mesoamerica, especially those incorporated in ceremonial and civic structures, recorded sunrises and sunsets on particular dates that composed observational calendars, but there seems to be no compelling observational or practical motive for their predominantly clockwise skew from cardinal directions. In the light of the evidence presented, this tendency can be interpreted in terms of certain concepts about world directions or sides of the universe. It has been shown that the Sun was associated with the dry season and the Moon and Venus as evening star with the rainy season; since the Sun "is born" in the east and the Moon in the west (because after conjunction with the Sun it first appears in the west), where also the extremes of Venus in its evening aspect approximately delimit the rainy season, the east and the west came to be related to the dry and the rainy season, respectively. Hence the orientations must have been viewed as "ideal" if they recorded the dates in the dry season in the east and those in the wet part of the year in the west; this could be achieved precisely with their south-of-east (north-of-west) skew.

It has been argued that the astronomical orientations in Mesoamerican architecture served practical needs, allowing the use of observational calendars necessary for predicting important seasonal changes and for a proper scheduling of agricultural works in the yearly cycle.<sup>209</sup> However, the fact that the astronomically functional alignments were embodied in the most important buildings, particularly temples, clearly reveals that the utilitarian aspect of astronomy was intertwined with religious beliefs and ritual practices. The annual movement of the Sun along the horizon, as well as the recurrent positions of other objects in the sky,

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<sup>208</sup> Ashmore 1989: 283.

<sup>209</sup> Aveni and Hartung 1986; Sprajc 2001b: 79-88, 101-155.

represented a spatial materialization of the passage of cyclical time; indeed, the characteristics of the apparent motion of celestial bodies, particularly the Sun, must have been the main observational base of the well-known union of time and space in the Mesoamerican worldview.<sup>210</sup> Since the sky was visualized, both in Mesoamerica and in other archaic civilizations, as an image of divine perfection and insuperable order to which the course of terrestrial and human affairs was subordinated,<sup>211</sup> it is understandable that the Sun and other celestial bodies were deified and that, accordingly, the directions to their significant positions on the horizon, corresponding to important seasonal changes in natural environment, also acquired sacred dimensions.<sup>212</sup> Consequently, by incorporating astronomical alignments into their architecture and urbanism, the ancient Mesoamericans reproduced and perpetuated the cosmic principles and heavenly order in their earthly environment.<sup>213</sup> In the light of these facts it is very likely that the beliefs concerning the most important celestial bodies, the natural phenomena they controlled and the parts of the universe they presided over were also included in the concepts underlying the architectural orientations in Mesoamerica, and must have been responsible for their characteristic clockwise skew from cardinal directions.

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<sup>210</sup> B. Tedlock 1992: 19; Aveni 2001: 148-152.

<sup>211</sup> Cf. Krupp 1983.

<sup>212</sup> Cf. McCluskey 1990: S13.

<sup>213</sup> Broda 1982: 101f; Ashmore 1989: 273; Aveni 2001: 217-223; \_prajc 1996b: 21f; 2001a: 304.

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