


ARTICLE

# Implications of Rock Art Aesthetics in Olmec Sculpture

Jillian Mollenhauer 

Department of Art, Metropolitan State University of Denver, Denver, CO, USA  
Email: [jmollenh@msudenver.edu](mailto:jmollenh@msudenver.edu)

(Received 26 July 2023; revised 6 February 2024; accepted 11 February 2024)

## Abstract

The development of freestanding stone sculpture by the Olmec people of Mesoamerica's Gulf lowlands has long been considered one of the defining artistic achievements of the Formative period. However, by the Middle Formative period the production of freestanding sculpture was often eclipsed by the contemporaneous creation of rock art outside the Gulf lowlands. In this article I argue that Gulf Olmec sculptors and audiences occasionally co-opted the aesthetic and ritual treatments of rock art at topographic shrines to construct and reinforce the sacred geographies of primary site cores. In so doing, Olmec elites converted the ideological power of the wild and the animate earth into a form of political capital.

## Resumen

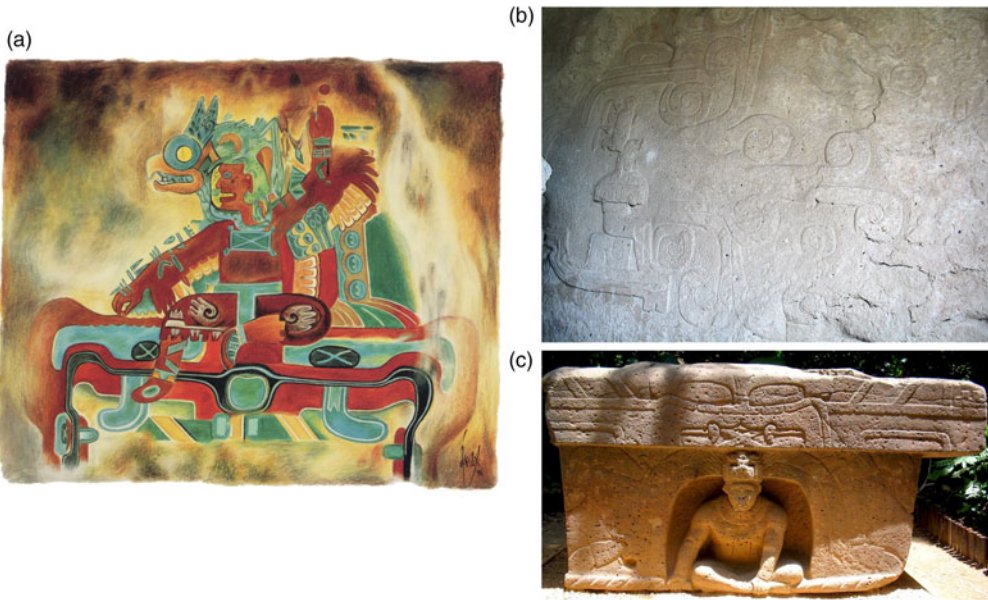
El desarrollo de la escultura de piedra independiente por parte del pueblo olmeca, localizado en las tierras bajas del Golfo de Mesoamérica, ha sido considerado durante mucho tiempo uno de los logros artísticos definitorios del período Formativo. Sin embargo, en el Formativo Medio, la producción de escultura independiente fue eclipsada frecuentemente por la creación contemporánea de arte rupestre fuera de las tierras bajas del Golfo. En este artículo argumentaré que los escultores y el público olmeca del Golfo, en ocasiones cooptaron los tratamientos estéticos y rituales del arte rupestre de los santuarios topográficos para construir y reforzar las geografías sagradas de los núcleos de los sitios primarios. Al hacerlo, las élites olmecas convirtieron el poder ideológico de la tierra salvaje y animada en una forma de capital político.

**Keywords:** Olmec; rock art; sculpture; landscape

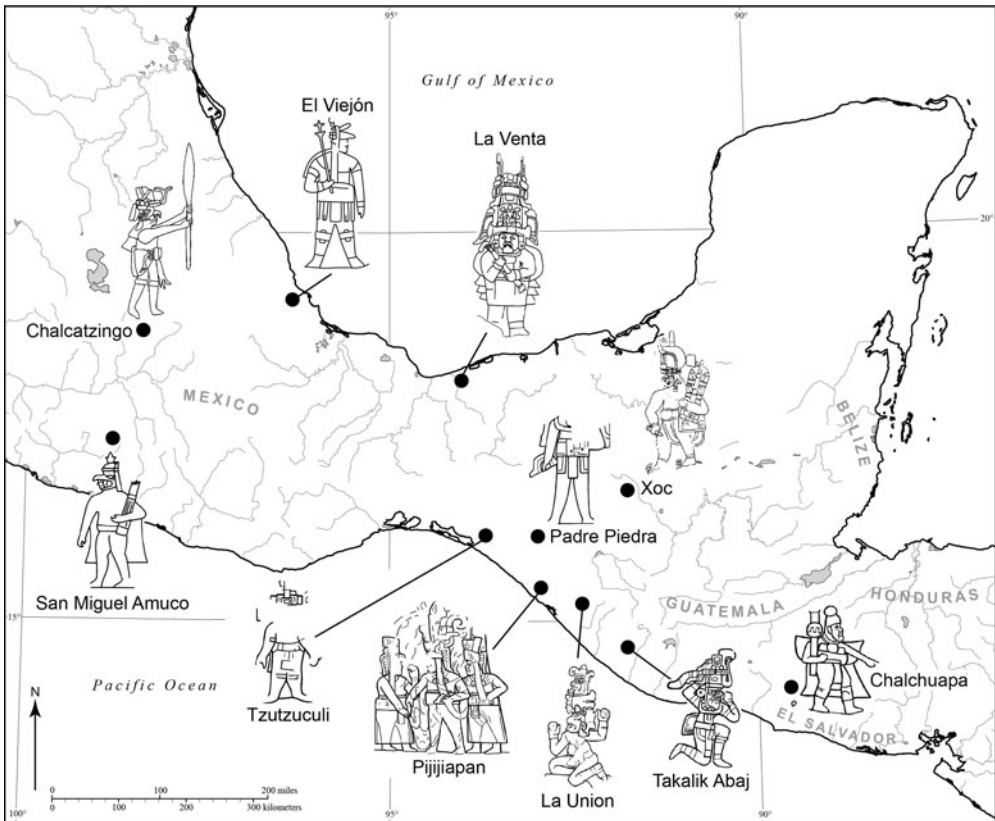
**Palabras clave:** olmeca; arte rupestre; escultura; paisaje

In Formative Mesoamerica, the production of rock art—defined here as marks or images produced on natural rock surfaces—was both extensive and remarkable for the iconographic and stylistic affinities it shared with contemporaneous freestanding sculpture. David Grove (1973:132–133) was among the first to observe the correspondence between these two art forms, noting the similarities between images of individuals seated in caves at the Middle Formative (850–350 BC) rock art sites of Oxtotitlan (Mural C-1) and Chalcatzingo (Monument 1) and the rulers seated in the cave niches of Olmec altar-thrones.<sup>1</sup> When preserved, the ledges of these thrones are marked with earth symbols and—in the case of La Venta's Altar 4—a zoomorphic face similar to the animate caves shown in rock art (Grove 1973:132–133; [Figure 1a-c](#)). Such congruence between the visual vocabularies of rock art and monumental sculpture has at times led to their treatment in scholarship as largely equivalent.

Yet, to elide the distinction between these categories of artistic production is to overlook both the experiential and functional differences between sculpture and rock art, as well as the significance of rock art's role within the development of Formative artistic traditions. Indeed, outside the Gulf lowlands, rock art is one of the primary vehicles for large-scale representations of Olmec-style imagery ([Figure 2](#); Clark et al. 2010:9). Pictographs—painted images on rock surfaces—record Olmec-style imagery at the Guerrero cave sites of Juxtlahuaca, Oxtotitlan, and Cacahuaziziqui (Gay 1967;



**Figure 1.** Examples of animate caves in Olmec-style art. (a) Mural C-1 pictograph, Oxtotitlán cave, Guerrero (drawing by Ajax Moreno; courtesy of the New World Archaeological Foundation); (b) Monument 1 (“El Rey”) petroglyph, Chalcatzingo; (c) Altar 4, La Venta, La Venta Parque. (Color online)



**Figure 2.** Distribution of early Middle Formative petroglyphs and relief carvings (courtesy of the New World Archaeological Foundation).

Grove 1967, 1969, 1970) and at a rockshelter above Lake Amatitlán in Guatemala (Parsons 1986:90).<sup>2</sup> Petroglyphs—relief carving, incising, or etching on natural rock surfaces such as cliff faces, exposed bedrock, or boulders—in the Olmec style are found more even more extensively at Formative sites such as Chalcatzingo, Morelos; Los Mangos, Veracruz; Xoc, Chiapas; Pijijiapan, Chiapas; Takalik Abaj, Guatemala; and Chalchuapa, El Salvador (Angulo V. 1987; Graham 1981:169; Grove and Angulo V. 1987; Milbrath 1979:34–38; Parsons 1986:13–14, 90). Often these images are placed at significant points along routes of travel or at sites believed to mark territorial boundaries (Clark et al. 2010:10; Parsons 1986:90). Their chronology is generally thought to range from around 950 to 750 BC, placing their production in the first half of the Middle Formative period (Clark et al. 2010:9).

Many of these rock art sites are in the corridor of travel and cultural exchange that ran between Chiapas, the Pacific Coast, and highland Guatemala. Subsequently, their correspondence to Olmec monumental traditions has most often been seen in the context of cross-regional or diachronic studies of artistic influence and development among Olmec, Izapan, and Maya cultures (e.g., Clark and Pye 2000; Graham 1976, 1989; Miles 1965; Parsons 1986; Schieber de Lavarreda and Orrego Corzo 2010; Sharer 1989). Alternatively, scholars such as Grove (e.g., 1989) and Angulo V. (1987; Grove and Angulo V. 1987) have explored the intercultural exchanges between the Olmec and their contemporaries in Morelos and Guerrero. These and other studies have noted the relationship between rock art and sculpture as it relates to the development of style, iconography, or monument form between the Middle (850–350 BC) and Late Formative periods (350 BC–AD 100; e.g. Clancy 1990; Clark et al. 2010; Milbrath 1979). In this article I build on this work by shifting the focus of inquiry to investigate the adaptation of rock art practices and aesthetics by Gulf Olmec sculptors of the Early (1500–850 BC) and Middle Formative periods.

Initial studies of Olmec monuments at the Middle Formative site of La Venta made note of the unique treatment of stelae and other monuments that retained the natural contours of the stone (Drucker et al. 1959:197; Stirling 1943:51). Tatiana Prouskouriakoff (1968:121) later hypothesized that “the stela originated in the Olmec habit of recording their presence wherever they went, and . . . the lack of native rock at La Venta led to the substitution of artificial slabs.” Following Proskouriakoff, Flora Clancy (1990:22–25) suggested that these Middle Formative stelae should fall under the category of “boulder sculptures,” likening them to the petroglyphs at Pijijiapan and Los Mangos. Clancy’s work provided the most detailed consideration of rock art’s adaptation by Olmec sculptors up to that point. However, her project was a larger “genealogy” of monument forms and compositional modes during the Middle, Late, and Terminal Formative periods. As such, it did not support a more detailed interrogation of these aesthetic correspondences or their cultural implications.

As both Prouskouriakoff and Clancy observed, the aesthetic properties of certain Gulf Olmec sculptures demonstrate an awareness and even appropriation of formal approaches to sculpture developed at rock art sites outside the Gulf lowlands. However, this approach is held in tension with a simultaneous sculpting of carefully modeled figures in the round that removed all formal referents to the stone’s original appearance. When and for what purpose, then, did Olmec sculptors choose to incorporate approaches that reflect the traditions of rock art? Did such aesthetic treatments signal something more indelible about the shared properties of rock art produced in the wild and freestanding sculpture erected in civic centers? What might the link between rock art and sculpture in the Formative suggest about sacred geography and its replication in the built environment? These are just a few of the questions guiding my inquiry.

Through an examination of the aesthetic and ritual treatments of monuments from Gulf Olmec sites, I argue that formal and conceptual parallels were intentionally drawn between select freestanding sculptures and rock art traditions. Subsequent ritual markings in the form of cupules and grooves indicate that Olmec artists did not just make sculptures that looked like rock art but also occasionally treated stone monuments in a manner comparable to sites of rock art and ritual in the sacred landscape. In so doing, Gulf Olmec peoples harnessed the properties of rock art that embedded its existence in complex relational networks formed between humans, nonhumans, and the animate earth to construct and reinforce the sacred geographies of primary site cores.

### Distinguishing Rock Art and Sculpture in the Formative Landscape

As previously mentioned, many examples of Formative rock art demonstrate considerable stylistic and iconographic overlap with contemporaneous sculptures. It may therefore be tempting to dismiss any distinction between these two artforms as a product of Western bias, suggesting that Mesoamerican peoples did not differentiate between the two. Certainly, petroglyphs and sculpture share methods of facture—hammering, incision, and abrasion—and their intrinsic materiality. As David Stuart (2010:286, 287–290) argued, “Mesoamericans saw upright stones and associated altars, both carved and uncarved, as evoking the very natural substance of the earth and its interior,” further suggesting that both rock faces and stone monuments were conceptually related as extensions of the animate earth.

However, there are also strong arguments for distinguishing between these two categories. On one hand, we can simply choose to embrace etic classifications of art as meaningful and pertinent to modern scholarly inquiry, even if they were not shared by the Indigenous creators, recognizing that external frameworks can be useful to academic studies of cultural and historical development. On the other hand, we can recognize the experiential and contextual distinctions between both the production and viewing of rock art versus sculpture. Such distinctions would have been readily evident to both creators and audiences.

The production of freestanding stone monuments required quarrying and transporting the rock, separating it from its place of origin, and eventually integrating it into the built environment. Beginning in the Early Formative, stones were carved and recarved in specialized workshops like those of Llano del Jicaró (Gillespie 1994) and the monument recycling workshop adjacent to the Red Palace in San Lorenzo’s Complex D (Cyphers 1999:165–168). In contrast, rock art was often produced *in situ*, at times in distant locations that required laborious travel for both its creation and viewing.

Rock art is inherently landscape art (Whitley 2005:3), and as such it is ideologically bound in place, both responding to and manifesting the inherent significance or sacredness of the site. Rock art images are integrated—both literally and conceptually—with the support surface, as well as the surrounding topography. Its production requires the artist to adapt their methods of facture to the natural qualities of the support surface, compensating for the changes in depth, texture, quality, and so on. Rock art may also include marks on stone, such as pecked pits or grooves, that are created both autonomously and in conjunction with petroglyphs and pictographs. These marks are indexical traces of rituals frequently carried out in the vicinity of rock art in conjunction with the creation and use of the site’s imagery (Bednarik 2010:71; Palka 2014:194; Whitley 2005:13).

Once created, rock art becomes part of the “interlinked ecologies that make places” (Jones 2021:51). These ecologies include other-than-human beings, such as the supernatural forces believed to dwell in potent natural features such as caves, mountains, springs, and rocks (Moyes and Pruffer 2013:229; Stone 2014:49), but also extending to animals, insects, lichen and other plants, and the deified elemental forces of rain, wind, and sun (Alberti and Fowles 2018:134).

That Mesoamerican artists, patrons, and viewers may have drawn conceptual parallels between rock art and stone monuments (Stuart 2010:286–287) need not erase the very clear differences that must have been perceptible in their facture and contexts of viewing. Rather, as I suggest later, this conceptual overlap was a contrivance or conceit of a cultural ideology intentionally cultivated to harness the potency of the wild and re-site it within the landscape of the civic center.

Over the past decades a significant cross-cultural body of literature has emerged that considers the materiality of stone and its artistic engagements via sculpture and rock art within the broader context of the landscape—a term defined here as a cognitive and symbolic construction of space that is informed by but also moves beyond natural topography (e.g., Cosgrove 1998; Dean 2010; Tilley 2004, 2021). In considering Mesoamerican landscape specifically, scholars such as James Brady and Wendy Ashmore (1999:126) have argued that ancient Indigenous peoples viewed the built and natural environments as a continuum, “a nearly seamless extension of worldview, manifest in domestic, civic, and wider spatial scales.” However, within this larger continuum, the roles played by rock art and free-standing sculpture can be differentiated in part by their placement in a dualistic framework that distinguished center from periphery and wild from domestic.



Rock art in the Formative period tends to be relegated to liminal spaces, such as routes of travel, borders or territorial boundaries, cave entrances and interiors, or rocky hillsides and talus slopes (Angulo V. 1987; Clark et al. 2010:10; Gay 1967, 1972; Grove 1969, 1970; Parsons 1986:90–91). David Grove and Susan Gillespie (2009:66–67) note that the petroglyphs at Chalcatzingo were both spatially associated with the site’s periphery and thematically tied to peripheral states of being. They contrasted this with the placement of freestanding stone sculptures in the site center to suggest a conceptual and spatial center–periphery duality. As at Chalcatzingo, freestanding sculptures throughout the Formative tend to be concentrated in site centers, with few examples found outside areas of human settlement.

Similar to Grove and Gillespie’s model of center–periphery dualism, Andrea Stone (1992) argued for a distinction between the wild and domesticated spaces of ritual activity in Mesoamerica, an argument that Karl Taube (2003) elaborated in relation to Maya concepts of field (*milpa*) and forest. Stone (1992:112–113) associated rock art with the liminal spaces of wilderness that were both dangerous and sacred, home to spiritual forces that governed the animate earth. In discussing contemporary Maya pilgrimage to caves, boulders, or unusual rock formations—including sites with rock art—Joel Palka (2014:192) likewise noted, “These portals into the spiritual realm are in the peripheries of settlements because of their dangerous, wild, socially marginal, and spiritual characteristics.”

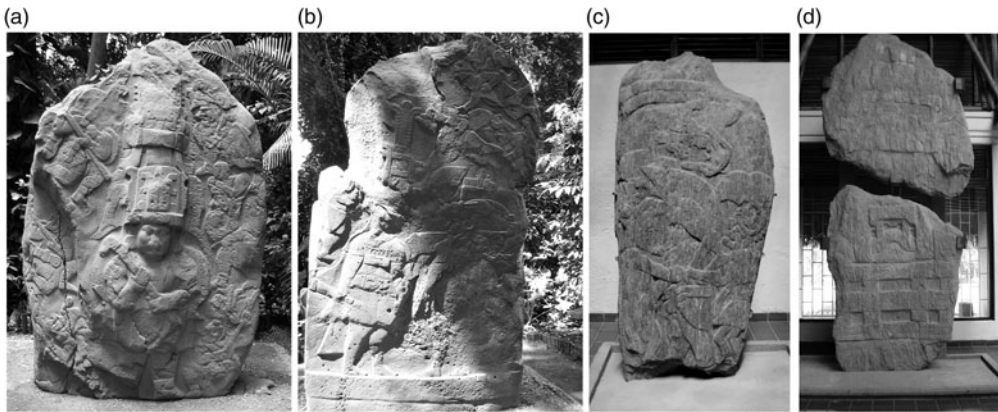
Alternatively, Taube (2003:463–465) observed that human labor, including the production of art and architecture, was associated with spaces of domestic habitation, as well as governance, morality, and cosmic order. Principles of cosmic order pervade the site cores of many Mesoamerican settlements beginning in the Formative period, including those of the Gulf Olmec. Scholars have long argued that these urban ceremonial spaces were configured in relation to cosmological models (e.g., Clark 2004; Fuente 1996:41; Grove 1999; Reilly 2002; Tate 2008). Beatriz de la Fuente (1981:83) also theorized that some Olmec sculptures incorporated the golden mean, suggesting that sculptors working in the round strove to convey cosmic order through the harmonic proportions of their figures. It seems reasonable to suggest, then, that sculptures within the built environment of primary site cores were part of the ordered domestic realm designed to replicate and convey broader cosmological principles.

Despite their shared stylistic and iconographic vocabularies, rock art can be clearly distinguished from freestanding sculpture in method of facture and context, both of which would have informed meaning. The production and viewing of rock art as a manifestation of the sacred in peripheral or liminal places gave it a potency that was quite distinct from freestanding sculptures erected in the domestic order of the urban center. In drawing this distinction, I do not wish to eschew nuance or to overlook slippages between these categories. Instead, I mean to draw attention to the artistic agency of such slippages, suggesting that some Formative artists—particularly those of the Gulf Coast—intentionally harnessed the aesthetic properties of rock art, bringing its conceptual power into the civic arena.

### Aesthetic Continuities

With little stone suitable for sculpting found in their local topography, Olmec societies in the Gulf lowlands imported large blocks of volcanic rock and carved them into freestanding megalithic monuments.<sup>3</sup> Many of these sculptures were carved in rounded, organic forms that show remarkable attention to modeling and smoothly finished surfaces (see Figure 1c). However, the sculptors of the Gulf lowlands occasionally abandoned the three-dimensional modeling of figures in favor of an adherence to and adaptation of unmodified stone surfaces, wedding “their incisions to the natural valleys, planes, and protuberances of the stone’s surface” (Guernsey and Strauss 2022:211). Preservation of the natural contours and surface qualities of the stone is unusual in figurative freestanding sculpture but is frequently a hallmark of rock art, including Olmec-style petroglyphs. Here I suggest that this aesthetic quality would have been recognizable to audiences as comparable to the appearance of contemporaneous rock art.

Matthew Stirling was among the first to observe that some monuments at La Venta retained the organic shapes of natural rocks. He particularly drew attention to Stela 2, which he noted preserves the irregularities of the original stone surface, rather than creating a smooth plane on which to carve the imagery of the ruler surrounded by floating supernatural beings (Figure 3a; Stirling 1943:51). Other stelae at La Venta similarly retain the irregular surfaces and outlines of the megalithic



**Figure 3.** Examples of stelae from La Venta, Tabasco. (a) Stela 2, La Venta Parque; (b) Stela 3, La Venta Parque; (c) Stela 5, La Venta site museum; (d) Monument 25/26, La Venta site museum.

stones onto which relief imagery featuring human elites, supernatural beings, and sacred mountains was grafted (Figure 3b-d; González Lauck 1997; Grove 2007; Stirling 1943). The dimensions of some of these Middle Formative stelae, such as Monument 25/26, are significantly grander than their Late Formative and Classic period counterparts, giving them a geological, rather than human, sense of scale (Guernsey and Strauss 2022:213).

Other sculptures at La Venta juxtapose planar supports for relief with irregular surfaces and borders. For example, the smooth, regular surface of Monument 13—bearing the relief of a human figure and one of the earliest columnar inscriptions in Mesoamerica—stands in contrast to the rest of the monument, which is left uncarved to reveal its origin: a transverse section of columnar basalt (Figure 4; Guernsey and Strauss 2022:212). Similarly, the delicate sculpting of Monument 19 stands out from a planar surface at variance with the monument’s uneven natural borders. Philip Drucker and coauthors (1959:197) first noted that the curves of the sinuous avian serpent on this monument follow the irregular outline of the stone support, while Stone (1992:121) drew parallels between this serpent and the one painted in the interior recesses of Juxtahuaca Cave in Guerrero. The Juxtahuaca serpent’s body similarly follows the natural profile of the stone projection on which it is painted (Figure 5a-b; Stone 1992:121).

Are these La Venta monuments representative of a new sculptural trend emerging in the Middle Formative? Few sculptures from the Early Formative center of San Lorenzo and its hinterlands demonstrate the same interest in adhering to the irregular contours of their stone supports. One exception is San Lorenzo Monument 56, carved with a human struggling against a monstrous zoomorph sporting a sinuous tongue and wicked claws (Cyphers 2004a:120, Figure 68). Notably, the subject matter of this stela or column parallels that of Monument 63 from La Venta, which features a male figure gripping a fierce creature with rows of menacing teeth and aquatic flippers (Figure 6; Coe and Diehl 1980:363). Both monuments preserve at least some sense of an organic outline and irregular stone surface, as well as ground circular depressions or pits also referred to as “cupules.” The frequency of adapting the sculpted forms to irregular stone surfaces does appear to increase dramatically at La Venta, suggesting a growing trend as we shift from the Early to Middle Formative centers of the Gulf Olmec.

However, the Early Formative does see the incorporation of boulder sculpture into the site of San Lorenzo. As mentioned earlier, boulder sculpture—defined as a boulder that has had one or more surfaces modified by sculpting or incising—is here considered a form of rock art and is one of the primary formats associated with Olmec-style petroglyphs, including those at Chalcatzingo, Morelos; Los Mangos, Veracruz; Xoc, Chiapas; Pijijiapan, Chiapas; Takalik Abaj, Guatemala; and Chalchuapa, El Salvador. These and other boulder sculptures retain some or most of their original contours and mass, preserving clear visual referents to their status as boulders. The significance of boulders as features in the sacred landscape of Mesoamerica is occasionally overlooked. However, Palka (2014:190)



Figure 4. Monument 13, La Venta, La Venta Parque.

(a)



(b)



Figure 5. Formative avian serpent imagery. (a) Monument 19, La Venta, Tabasco, Museo Nacional de Antropología; (b) pictograph in Juxtlahuaca Cave, Guerrero (courtesy of Matthew Lachniet). (Color online)

notes, “Boulders—viewed as places of interaction with the gods and ancestors who may be petrified within them—are frequently seen at cave entrances, and they often share similar rock art.” Contemporary Maya groups still make pilgrimages to and conduct rituals at specific boulders and bed-rock sites, which they perceive as entrances to the home of the earth lord (Palka 2014:190–192). In the



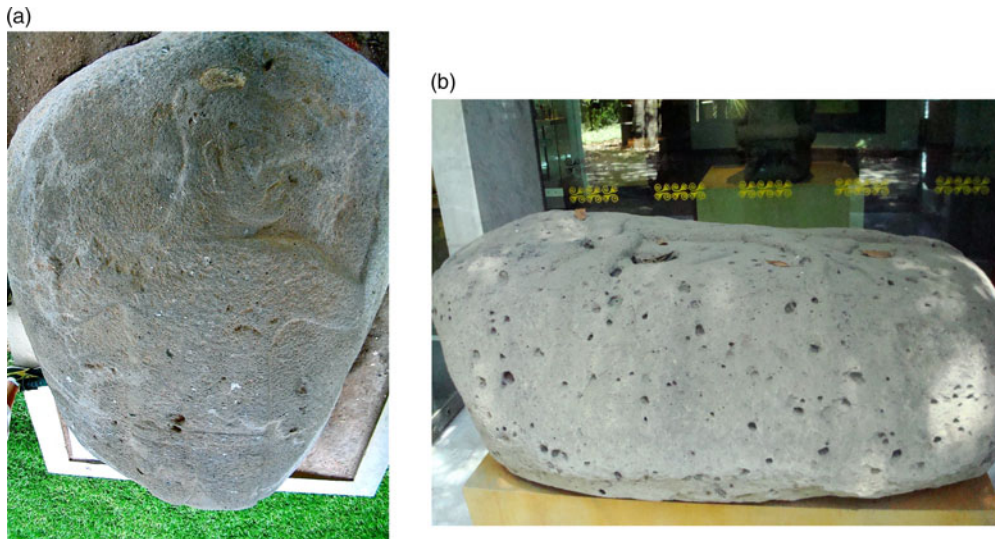


Figure 6. Monument 63, La Venta, La Venta Parque.

context of Formative site centers, boulder sculptures recall their counterparts in the wild while providing an aesthetic counterpoint to the three-dimensional modeling and planar surfaces of other sculptures in the urban landscape.

Several of San Lorenzo's monuments take the form of irregular boulders (Monuments 21, 109, 112). These sculptures retain vestiges of low relief carvings on one or more surfaces, although the remnants of relief on Monument 109 have largely been effaced or eroded, preventing any interpretation of the stone's original function or iconography (Cyphers 2004a:188, Figure 123). Monument 112 is a large





**Figure 7.** Examples of Olmec boulder sculptures at San Lorenzo. (a) Monument 112, site museum; (b) Monument 21, Museo Nacional de Antropología.

boulder sculpted with the figure of a single man spread-eagled over the surface, a knife and belt his only adornments (Figure 7a). The stone was discovered with the relief face down, its dorsal surface marked with 102 grooves and six cupules (Cyphers 2004a:191, 2004b). A similar boulder with comparable groove marks (Monument 63) was discovered by Jürgen Brüggemann and Marie-Areti Hers in 1970, but the monument was never fully excavated (Brüggemann and Areti-Hers 1970; Coe and Diehl 1980:365). It is possible that the posterior side bears a relief similar to that of Monument 112, but for now this remains only speculation (Coe and Diehl 1980:365; Cyphers 2004a:130).<sup>4</sup>

Monument 21 is believed to have functioned as a sort of “lid” or cover to a stone box or sarcophagus (Fuente 1984:110; Graham 1989:245). However, when viewed from the side, the stone resembles nothing so much as a smoothed boulder with asymmetrical proportions. Its surface bears a petroglyph depicting a quadrupedal animal positioned as though in motion (Figure 7b; see also Cyphers 2004a:85–86, Figures 41–42). The animal is surrounded by several cupules and grooves, similar to those marking Monument 112. The relief was placed face down over a pit containing a “cache of celts, natural rocks resembling celts, and pottery” dating to the San Lorenzo A phase, the early part of the period between 1150 and 900 BC designated as the San Lorenzo phase (Coe and Diehl 1980:332). However, John Graham (1989:245) noted that erosion of the surface bearing the relief indicates that this was the side facing upward for much of the stone’s use life. In contrast, the opposing side is evenly sculpted with smoothed planes and a hollow or niche of relatively even proportions (Coe and Diehl 1980:Figure 453). The careful working of this side provides a stark contrast to the exposed surfaces that mimic the irregularly rounded profile of a natural boulder. I propose that this monument may have begun its “life” as a boulder sculpture that was later converted into a lid or container, with the niche added to support its new function.

It is also worth noting that Colossal Head 8 from San Lorenzo retains the irregular outlines of the original basaltic flow from which it was sculpted, which might associate it with other forms of boulder sculpture (Figure 8; Cyphers 2004a:127). It was originally found under the floor of a platform bordering the sunken patio of the Group E complex, its context unique among the colossal heads (Cyphers 1999:163). However, the other colossal heads also seem designed to emphasize their material origins. As Michael Coe and Richard Diehl (1980:300) observed of Head 1 from San Lorenzo, “an examination of this and other great heads will show how very slightly the original boulder (or the transported blank) has been modified.” More broadly, the size and mass of colossal heads afford them a topographic quality, carved on a scale typically associated with geological phenomena in the natural world.



Figure 8: Colossal Head 8 at San Lorenzo, Museo de Antropología de Xalapa.



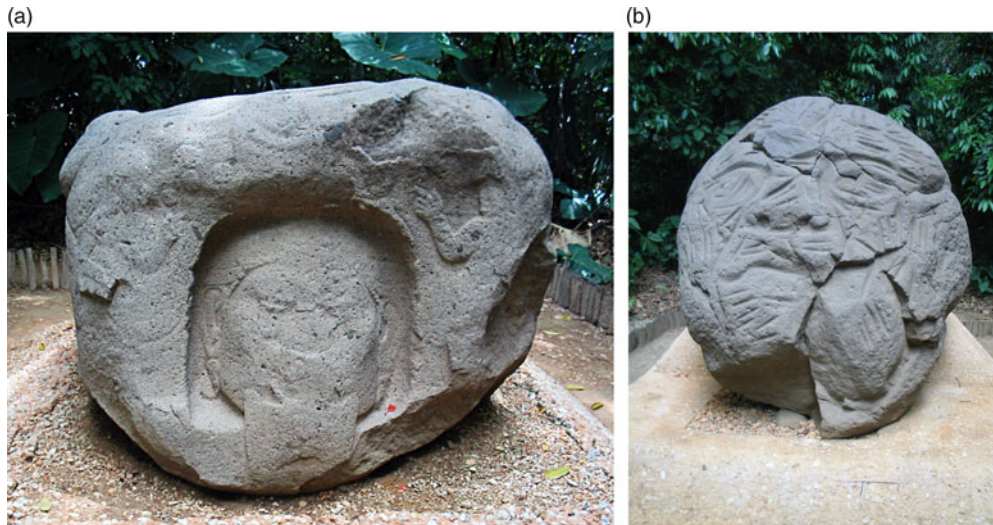


Figure 9. Boulder sculptures in La Venta Parque. (a) Altar 7; (b) Monument 68.

Additional boulder sculptures are also present at La Venta, although they are not abundant. The most notable example is the so-called Altar 7, the front of which is sculpted with a single niche filled with the head of an individual (spirit or human) wearing a buccal mask (Figure 9a). The surrounding stone undulates with irregular projections and recessions carved with human figures in low relief and the heads of birds (perhaps owls) sculpted from protruding nodules as though emerging from the stone itself. Its surface is marked with linear grooves comparable to those on the Early Formative Monuments 21 and 112 from San Lorenzo.

La Venta Monument 68 is also an irregularly shaped boulder that shows the remnants of relief carving on one side (see González Lauck 2021:120). However, at some point a humanoid face was crudely incised and holes were drilled or ground to suggest nostrils (Figure 9b). The rough features blend with numerous incised grooves on the surface, as well as with the natural irregularities of the stone. This sculpture has sometimes been interpreted as the beginnings of a colossal head that was abandoned during the carving process (González Lauck 2021:119). However, the stone is much smaller and narrower than the other heads, and the process by which the features were created—as well as their placement—would not have supported the modeling seen in the faces of the other colossal heads. It seems possible that the monument was a re-carved boulder sculpture, given its dimensions and the traces of relief on one side.

The northernmost Olmec site center, Tres Zapotes, has a relatively small corpus of Middle Formative monuments that show little evidence of rock art influence. However, it sits within a region rife with rock art and boulder sculpture—most probably dating to the period of epi-Olmec florescence or later (Porter 1989:16–18)—including the petroglyphic field of Cobata. Although it is difficult to determine the chronology of the rock art at this site, the presence of a colossal head is often viewed as evidence of its ties to the Olmec cultural legacy.

Following the observations of James Porter (1989:16–18), Christopher Pool and Michael Loughlin (2017:255, Figure 19) noted similarities between the methods of pecking used to produce rock art in the region and the facture of the Cobata head. They suggest that local artists familiar with the production of petroglyphic sculpture could have been responsible for its carving. This seems a plausible notion given the position of the head among a field of rock art, although the head also evinces similarities to the Monte Alto “potbelly” boulder sculptures from the south, which share its rustic style and closed eyes (Guernsey 2012; Miles 1965:244–245; Parsons 1981:280–288, 1986:44–45). It is possible that the Cobata head’s relationship to both petroglyphic techniques and “potbelly” boulder sculptures is based on earlier associations between the colossal heads and boulder sculptures originating at San Lorenzo.



To summarize, it appears that at Early Formative San Lorenzo a few select works of boulder sculpture were incorporated into the site, whereas Monument 56 exhibits the first relief sculpture wrapped around an irregular vertical column or stela. The colossal heads at this site also seem designed to index their material origins as large boulders, with the human features grafted onto enormous stone supports. As we move into the Middle Formative at La Venta, colossal heads and boulder sculptures (although present) are quickly outnumbered by stelae and irregularly shaped monuments supporting relief sculpture. At times these reliefs conform to the irregular stone surfaces in a manner comparable to that of Olmec-style petroglyphs. Although this progression suggests an increasing interest by Gulf Olmec sculptors in adopting or appropriating the aesthetics of petroglyphic relief, the influence of rock art sites and practices—specifically in the form of boulder sculpture—extends back to the Early Formative. As illustrated in the next section, evidence in the form of ritual markings also suggests that conceptual affinities between rock art and sculpture can be traced to the Early Formative period.

### Ritual Correspondences

Many of the monuments discussed in the previous section are marked with cupules (sometimes called “pits” or “cup marks”)<sup>5</sup> and V-shaped linear incisions or “grooves.” Often referred to by David Grove’s (1981:61) designation of “nonspecific mutilations,” these marks have been variously discussed as a form of mutilation or defacement (Clewlow et al. 1967:71; Coe 1968; Coe and Diehl 1980:297–298; Covarrubias 1957:76–77; Drucker et al. 1959:229–230; Stirling 1940:334), the product of tool sharpening by later cultures (Clewlow 1974:13; Clewlow et al. 1967:70–76; Covarrubias 1946:29; Stirling 1943:52), or ceremonial markings related to Olmec ritual practices (Clewlow et al. 1967:72, 83; Grove 1981:61; Lambert 2014; Pohorilenko 1974, 2007; Steede and Athy 2000:332). They appear on a variety of figural sculptures, as well as on natural and human-formed columns and unworked stones at both San Lorenzo and La Venta.

Within the context of the Formative Olmec, cupules and grooves have been almost exclusively considered in relation to monumental sculpture. However, these marks are better understood as the two most common forms of rock marking in the world (Robert Bednarik reports that cupules are *the* most common marking, closely followed by linear grooves [2008:24; see also Lewis and Bednarik 2010]). Although both cupules and linear grooves are sometimes considered under the umbrella of “rock art” (Strecker 1982:3), they are more properly the indexical markings of ritualized activities carried out in the natural landscape (Bednarik 2010:71; Whitley 2005:13).<sup>6</sup> That these marks are found on a selection of Olmec sculptures suggests that they were subject to ritual treatments that paralleled those carried out on stones located at sacred natural sites and topographic shrines (Pohorilenko 2007:16, 27).

Carlo Gay (1972:97) was perhaps the first to suggest that the cupules on Olmec monuments were related to the corpus of rock markings. However, he conflated the cupules on Gulf monuments with deeper mortars, which Grove (1987:126, 159–170) suggested were created to hold sacred water. Graham (1989:234) observed cupules on Takalik Abaj Monument 23, suggesting continuities with the markings on Gulf Olmec monuments, and Robert Sharer (1989:262) likewise claimed that cupules found on Chalchuapa Monument 12 and several boulders with pictographs in the finca Sibabaj and Rabinal valleys of Guatemala could similarly be connected to these markings. However, it was unclear how these cupules might relate to or differ from the distinctive cupulate tradition of the nearby Salamá Valley, where the regularity of the depressions on Formative monuments has been interpreted as a form of calendrical notation or ancestral semiographic system (Fahsen 2010:245–246; Sharer and Sedat 1987:381).

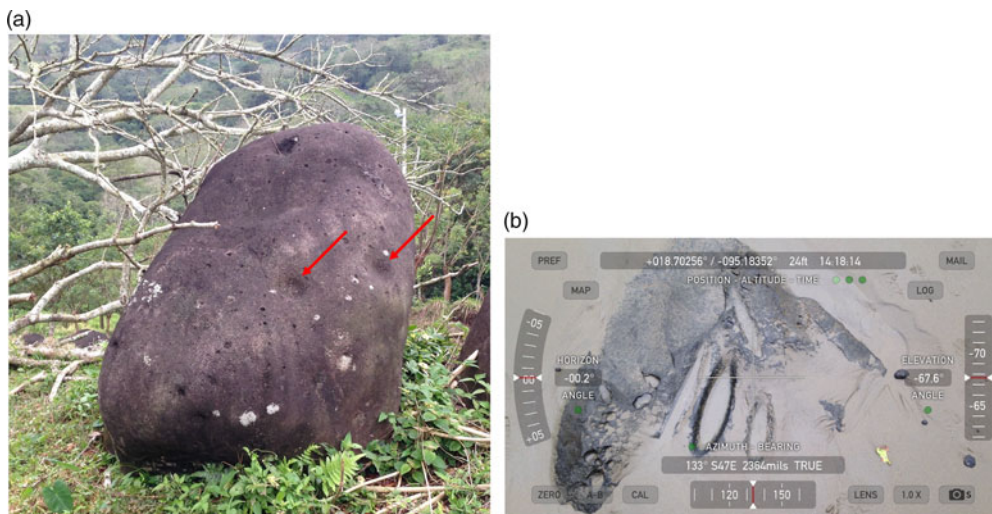
It seems likely that all such marks on Formative rock art and sculptural monuments are comparable to those on Gulf Olmec monuments and that the cupulate monuments of the Formative Salamá Valley have been misinterpreted as semiographic. However, as Arnaud Lambert (2014:7) asserts, “Until evidence of such a pan-Mesoamerican cupulate tradition is produced that does not rely exclusively on the perceived morphological similarities between the cup-marks of these different regions, we cannot assume that these anthropic markings are part of a single Formative period cultural tradition or even contemporary works.” I agree with Lambert that the distinctive cupulate traditions of greater

Mesoamerica cannot be definitively linked to the markings on Gulf Olmec monuments, although their presence on both Formative sculptural monuments and rock art sites is suggestive. Additionally, the connection between anthropic markings on or near Formative petroglyphs and those on Gulf lowland monuments is more tenable when comparing these markings to cupules and grooves found at several charged spaces within the Olmec ritual landscape.

Stirling's (1943:29, Plate 16b) survey of the region around Tres Zapotes included several examples of petroglyphs on boulders, including a stone carved with scroll designs that appears to have also featured several cupules. More recently, the RRATZ survey project—led by Christopher Pool—documented numerous examples of rock art in the region of Tres Zapotes, including at least two boulders marked with cupules (Petroglyphs B0129, C0059; Pool et al. 2014:151, 158). In 2015 I recorded an additional boulder with visible cupules during a visit to the petroglyphic field of Cobata (Figure 10a). Given the difficulty of spotting cupules in the natural environment (Bednarik 2008), there are certainly other examples that have yet to be recorded. Yet this small sample provides clear evidence that a local tradition of cupule production did exist in the rock art of the Gulf Coast.

Linear grooves can also be found marking stones along the coastline of Punta Roca Partida, a site adjacent to the Tuxtla mountains where lava once flowed into the waters of the Gulf (Figure 10b; Clewlow et al. 1967:71). These lava flows produced an islet of columnar jointed basalts from which the La Venta and Tres Zapotes Olmec are believed to have culled the natural columns they incorporated into their most ritually significant architecture (Williams and Heizer 1965:7). It seems possible that the groove marks on the volcanic shore of Punta Roca Partida indicate another site of ritual significance in the natural landscape, where the fiery flow of molten rock met the sea in a dramatic clash. Alternatively, Anatole Pohorilenko (2007:24, 27) believes that these grooves are the product of more recent inhabitants, suggesting that they indicate the continuation of rock-marking traditions from the Formative into the recent past.

Anthropic markings are difficult to date in rock art settings, and it is possible that the examples of cupule and grooves referenced here postdate the Olmec culture. However, there is clear evidence that their production in the Gulf lowlands extended into the Early Formative period. Both cupules and linear grooves are found on a layer of sandstone fragments that begin the deposition of offerings carried out at the topographic shrine of El Manatí. There a layer of sandstone rocks was used to stabilize the bottom of a spring before ritual offerings were deposited over the course of 600 years (1600–1000 BC; Ortiz Ceballos and Rodríguez Martínez 2000:75). The larger of these stones—arranged along a north–



**Figure 10.** Examples of cupules and grooves documented in the Tuxtla landscape. (a) Cupules on a boulder located in Cobata, Veracruz; (b) linear grooves along the coastline at Punta Roca Partida, Veracruz.

south axis—bear traces of linear grooves and rounded depressions, which the excavators noted were similar to the marks appearing on Olmec sculptural monuments (Ortiz Ceballos and Rodríguez Martínez 2000:75). Another series of offerings, excavated as part of the Early Formative Ceiba Group at nearby La Merced, included at least one stone marked with cupules in the final phase of deposition (Rodríguez Martínez and Ortiz Ceballos 2000:163). According to Pohorilenko (2007:16), the appearance of these markings on stones incorporated into the offering deposits at El Manatí and La Merced provides

tangible proof of possible practices related to ritual and ceremonial activity. Furthermore, they suggest that these ritualistic and ceremonial practices, which involved boulders, slabs, as well as carved monuments, began in Mesoamerica before the dated appearance of the Olmec style, were continued by those who carved the Olmec monuments, and survived, in some areas of the southern Gulf Coast of Mexico, to the present day.

Additional evidence for the Formative dating of both cupules and grooves comes from monuments discovered in situ that were interred during the Early Formative. Monument 112 and Head 8 were discovered under Early Formative floors at San Lorenzo (Cyphers 1999:163; 2004b), and both bore many of these markings. Additionally, the absence of both cupules and grooves on Classic and Postclassic sculptures from the region suggests that these markings (and the ritual activities that led to their creation) were the product of the Formative Olmec.

The appearance of cupules and linear grooves on Olmec stone monuments indicates that—beginning in the Early Formative—Olmec peoples treated these monuments as conceptually similar to topographic sites of ritual in the natural world, such as Punta Roca Partida and El Manatí, perhaps using them as an urban substitution for the more distant sacred loci in the wild. Such continuities between practices of rock marking in the natural landscape and on stone monuments can help us better comprehend both the function of these markings and the reasons for their appearance on certain monuments and not others.

Although Pohorilenko (2007:16) describes cupules and grooves as “ubiquitous” in Gulf Olmec sculpture, they mark a relatively small percentage of the overall corpus (see Tables 1 and 2). Notably, all colossal heads from San Lorenzo and La Venta are marked with cupules, and all but one (San Lorenzo Head 10) also bear grooves. Additionally, thrones are sometimes subject to these ritual markings, as are several monuments thought to have served as altars (San Lorenzo Monument 51 and Monument 64; La Venta Monument 59). All three of the large-scale “dwarf” sculptures from La Venta’s Complex D (Monuments 52–54) show evidence of cupules and grooves (see González Lauck 2010:134, Figure 6.3). However, except for the colossal heads, these rock markings are most common on stones that are either unworked or retain some irregularities of the original

**Table 1.** Monuments at San Lorenzo with Anthropic Markings (Cupules or Linear Grooves).

Type	Colossal Head	Throne	Stela	Unworked Stone or Fragment (including natural columns)	Boulder Sculpture	Flat “Altar” Stone
Number	10	2	2	3*	2	2
List	Heads 1–10 (Mon. 1, 2, 3, 4, 5, 17, 53, 61, 66, 89)	Mon. 14, Mon. 20	Mon. 23, Mon. 56	Mon. 19, Mon. 50, Mon. 63	Mon. 21, Mon. 112	Mon. 51, Mon. 64
Total % of marked sculptures at site	47.61%	9.52%	9.52%	14.28%	9.52%	9.52%

\* Two of these fragments may have been broken off from one or more colossal heads.



**Table 2.** Monuments at La Venta with Anthropic Markings (Cupules or Linear Grooves).

Type	Colossal Head	Throne	Stela	Unworked Stone or Fragment (including natural columns)	Boulder Sculpture	Figural Sculpture	Unidentifiable Fragment
Number	4	4*	2	7	2	7	1
List	Heads 1–4	Altar 2, Altar 4, Altar 8, Unnumbered throne fragment	Stela 4, Mon. 63	Mon. 13, Mon. 32, Mon. 36a/b, Mon. 47, Mon. 59, Mon. 62, Mon. 67	Altar 7, Mon. 68	Mon. 44, Mon. 52, Mon. 53, Mon. 54, Mon. 57, Mon. 59, Mon. 78	Mon. 69
Total % of marked sculptures at site	14.81%	14.81%	7.4%	25.92%	7.4%	25.92%	3.7%

\* The single groove mark on Altar 2 is distinct in its morphology and may be the result of a different process from that which was used to produce the linear grooves on other monuments. Nevertheless, I have included it here because it cannot be clearly ruled out from the final tally of monuments with anthropic markings.

stone support. Boulder sculptures, irregular stelae, unworked stones, and naturally formed columns make up 33.3% of the total number of marked sculptures at San Lorenzo (where the colossal heads comprise 47.61%) and 40.7% of the marked sculptures at La Venta. Cupules and grooves are relatively uncommon at both Tres Zapotes (where they appear only on Stela F) and on monuments outside the major site centers, though they do appear on the El Viejón monument, an irregularly shaped stela bearing a bas-relief of two elite individuals.

It is beyond the scope of this article to fully delve into the potential significances of the cupules and grooves marking Olmec sculpture. However, clear points of overlap between the anthropic markings at topographic shrines in the Gulf lowlands and those appearing on the sculptures of San Lorenzo and La Venta are evident. Comparisons with other, global traditions of cupule and groove production may provide fruitful avenues for future research via ethnographic analogy (for a list of potential interpretations compiled from global ethnographic accounts, see Bednarik 2010:67–69). I now turn to some of the possible political and social implications of adapting rock art aesthetics and ritual markings to the sculptures displayed in Olmec site cores.

### Re-siting Sacred Landscape in the Civic Center

The adaptation of rock art aesthetics and ritual practices by the sculptors of San Lorenzo and La Venta suggests a deliberate blurring of the boundaries between center and periphery, domestic and wild. Yet, we may ask what Olmec patrons and audiences sought to achieve in making sculptures that looked like rock art or by treating sculptures as congruent with sacred sites in the surrounding landscape. How did the appearance of these works and their engagement by audiences function within the urban center?

In discussing the emergence of Maya kingship, Holly Moyes and Keith Prufer (2013:226) observe, “One of the many paths to political power and legitimacy is the creation of ancestral ties to the land by coopting sacred features within the landscape.” They go on to note that political leaders in Mesoamerica positioned themselves within a symbolic landscape that did not replace but rather reinforced the power of the natural world, with its caves, mountains, springs, and boulders (Moyes and Prufer 2013:227). This same political strategy of harnessing the ideological and spiritual potency of the landscape is evident in Formative centers, which incorporated structural and iconographic referents to caves, mountains, and other natural features to manifest and reify their associations with broader sacred geographies (e.g., Grove 2007; Reilly 2002:57, Stone 1992:117). And yet, these referents did not dilute the power of the wild places they were meant to represent. Political authority continued to be tied to these places and the spiritual forces that governed them.

Andrea Stone’s seminal studies of Mesoamerican rock art and its role in Indigenous ritual practices provide an important window into the political dimensions of Mesoamerican religious life conducted beyond the urban center. Stone (1992:127) first pointed out that Mesoamerican urban rituals were intended to mimic those carried out at topographic shrines in the wilderness. In later research she went on to note that rock art was often an expression of pilgrimage to sacred sites within the landscape and that such pilgrimages were often rhetorically tied to political authority (Stone 2014:50–51). This rhetorical link is explained as a paradigm in which

a human supplicant at a shrine is subordinate to the shrine deity just as a human subject is subordinate to a political overlord. From this analogy flows certain ideas and behaviors, among them deities are often characterized in terms that are indistinguishable from a political leader...the underlying rationale of this metaphor was strengthened by the fact that offerings made to deities were similar to the gifts and tribute payments made to rulers [Stone 2014:51].

That this analogy was already present in the Early Formative is suggested by the excavations at El Manatí, where offerings included scepters, pectorals, earrings, and other elite paraphernalia (Ortiz Ceballos and Rodríguez Martínez 2000:83).

Stone’s work provides a model for understanding the significance of rock art as part of the sacred landscape and a powerful source of political capital to be co-opted by Formative elites. At San Lorenzo examples of rock art in the form of boulder sculptures were integrated into the site architecture

(Monument 112) and used to mark a cache or offering deposition (Monument 21). Concurrently we see the marking of colossal heads, thrones, and other monuments (including these two boulder sculptures) with cupules and grooves like those used to mark stones at topographic shrines such as El Manatí. These same cupules and grooves mark a selection of monuments at La Venta. Additionally, La Venta's sculptors chose to create numerous monuments that model their contours and compositions to the natural surfaces or outlines of the stones from which they are carved. This both draws greater attention to their materiality—tying these images to the ideological force and permanence of the animate earth—and creates aesthetic parallels to contemporaneous Olmec-style petroglyphs located outside the Gulf lowlands.

That many of these petroglyphs appear along routes of travel or as territorial boundary markers likely contributed to their significance for Formative elites. As Moyes and Prufer (2013:227) note, “Features of the landscape served yet another function in the establishment of place by emerging rulers because they aided in reifying territorial and political boundaries.” Marking these territorial boundaries through circumambulation creates the division between field and forest among contemporary Maya peoples and parallels pilgrimage undertaken to topographic shrines in the wild (Moyes and Prufer 2013:229–230). Both the establishment of territorial boundaries and acts of pilgrimage can be connected to Mesoamerican traditions of political authority that stretch back to the Classic and likely into the Formative period. That Olmec-style rock art is found in these peripheral regions of travel (and perhaps pilgrimage)<sup>7</sup> or marking territorial boundaries suggests that its creation would likewise have been important to the establishment of political authority.

At San Lorenzo, Cyphers and di Castro (2009:28–29) proposed that the colossal heads were arranged in a macro-scene that could have been experienced via processual movement. Similarly, various scholars have argued that architecture and sculptural groupings at La Venta might have been used to delimit site boundaries and to guide audiences through the space as a part of their viewing (e.g., González Lauck 2010:154; Guernsey and Strauss 2022:210; Tate 2008:38).<sup>8</sup> Stone (1992:117) also suggested that the axial plan at La Venta formed a processional route leading to the C-1 pyramid, facilitating public processions that were intended to evoke actual pilgrimages to sacred mountains. Within this context, the inclusion of sculptural referents to rock art sites would likely have recalled similar acts of procession and circumambulation in the wild, reinforcing the site core's construction as microcosm.

The adaptation of rock art aesthetics appears to represent efforts by Olmec elites to bring the potency of topographic shrines into the cosmic order of the urban setting (Stone 1992:127). These shrines were places of relational ecologies between humans and nonhumans that provided access to the forces that governed the land, suggesting that their sculptural referents likewise functioned as places of social action and engagement, not merely representation. The presence of cupules and grooves, insofar as they can be read to index ritual behaviors, reinforces this supposition.

By the Late Formative period, however, the artistic winds seem to shift. Sculptors largely move away from irregular surfaces and toward planar supports wherein the pictorial field is clearly defined. Image is privileged over material, and the iconography becomes more complex and is occasionally accompanied by text (Clancy 1990:27). Cupules and grooves disappear from sculpted monuments by the early Classic period, although they are likely still produced in the wild. However, sacred geographies and the supernatural forces that control the land continued to be important sources of political legitimation among later Indigenous peoples of Mesoamerica, their power expressed via new aesthetic and material forms.

## Conclusions

In this article I have proposed that Olmec sculptors and audiences intentionally treated some stone monuments as congruent with sites of rock art production and ritual activity. This included adapting sculpted forms to naturally occurring or minimally modified rock profiles and surfaces, highlighting their material origins. Sculptures with these attributes were often among those subject to ritual markings via the laborious hammering of cupules and grinding of grooves. Like their rock art counterparts, these monuments would have functioned to outwardly manifest the sacred character of the Olmec site cores, constructing continuities between urban and natural landscapes and allowing the practices of



pilgrimage and territorial circumambulation to occur on a microcosmic scale. By cultivating clear aesthetic and ritual correspondences between the natural and built spaces of ceremony, the Gulf Olmec converted the spiritual power of the animate earth into a new and potent form of political capital.

**Acknowledgments.** A great many thanks are owed to the journal reviewers for their generous feedback and to Dr. Christopher Pool for sharing the Informe of the RRATZ survey with me. Thanks also to Drs. Summer Trentin and Jessica Weiss for their unflinching advice and support and to my research assistants Michelle Burns and Krista Allen. Finally, thanks to the staff at the Palacio Municipal de Santiago Tuxtla, Veracruz, for sharing their knowledge and for a memorable visit to Cobata. Unless otherwise noted, all photographs are courtesy of the author.

**Funding Statement.** This research was supported by a 2015 CLAS Mini-Grant from Metropolitan State University of Denver.

**Data Availability Statement.** No original data were used.

**Competing Interests.** The author declares none.

## Notes

1. In this article, the term “Olmec-style” is used to refer to the shared artistic vocabulary of Formative cultures that is often labeled “Olmec,” although expressions of the style may include regional variations (Guernsey 2012:34). The term “Gulf Olmec” or “Olmec” specifically refers to the archaeological cultures of the people inhabiting the primary sites of San Lorenzo, La Venta, and Tres Zapotes and their hinterlands between the Early and Middle Formative periods.
2. Chalcatzingo is also the site of an extensive pictographic tradition; however, these pictographs cannot be stylistically related to the Olmec and some, if not most, certainly date from much later in the site’s history (Apostolides 1987).
3. Few sources of stone are present in this region beyond rough bentonite, some sandstone, and limestone from Chinameca, Veracruz, requiring the importation of large volcanic stones from sources roughly 60 to 120 km distant from San Lorenzo and La Venta (Williams and Heizer 1965).
4. Both the relief carvings on Monument 112 and Monument 21 were face down when excavated, making this the most likely position for any relief carving on Monument 63.
5. For the purposes of this article, I chose not to distinguish between cupules with and without “dimples” (central depressions located at the center of the “cup” or concavity; Clewlow et al. 1967:80; Lambert 2014:6–7). However, it may be assumed that the process of creating the dimpled cupules was similar to, but distinct from, the process used to create the cupules without dimples.
6. See Bednarik (2008:2) for an argument in favor of referring to cupules as rock art, rather than rock markings. The same argument could be applied to grooves as they are defined in this article.
7. Stone (2014:50) has noted the difficulty in separating travel for purposes of pilgrimage from travel undertaken for other purposes in the Mesoamerican tradition.
8. It should be noted that the sculptural groupings that mark the northern and southern boundaries of the site core, according to González Lauck (2010), are among those monuments sporting cupules, grooves, or both.

## References Cited

- Alberti, Benjamin, and Severin Fowles. 2018. Ecologies of Rock and Art in Northern New Mexico. In *Multispecies Archaeology*, edited by Suzanne Pilaar Birch, pp. 133–153. Routledge, London.
- Angulo V., Jorge. 1987. The Chalcatzingo Reliefs: An Iconographic Analysis. In *Ancient Chalcatzingo*, edited by David C. Grove, pp. 132–158. University of Texas Press, Austin.
- Apostolides, Alex. 1987. Chalcatzingo Painted Art. In *Ancient Chalcatzingo*, edited by David C. Grove, pp. 171–199. University of Texas Press, Austin.
- Bednarik, Robert. 2008. Cupules. *Rock Art Research* 25(1):1–40.
- Bednarik, Robert. 2010. Interpretation of Cupules. In *Mysterious Cup Marks: Proceedings of the First International Cupule Conference*, BAR International Series 2073, edited by Roy Querejazu Lewis and Robert Bednarik, pp. 67–73. British Archaeological Reports, Oxford.
- Brady, James, and Wendy Ashmore. 1999. Mountains, Caves, Water: Ideational Landscapes of the Ancient Maya. In *Archaeologies of Landscape: Contemporary Perspectives*, edited by Wendy Ashmore and A. Bernard Knapp, pp. 124–145. Blackwell, Oxford.
- Brüggemann, Jürgen, and Marie Areti-Hers. 1970. Exploraciones Arqueológicas en San Lorenzo Tenochitlán. *Boletín del Instituto Nacional de Antropología e Historia* 39:18–23.
- Clancy, Flora S. 1990. A Genealogy for Freestanding Maya Monuments. In *Vision and Revision in Maya Studies*, edited by Flora S. Clancy and Peter D. Harrison, pp. 21–32. University of New Mexico Press, Albuquerque.
- Clark, John. 2004. Mesoamerica Goes Public: Early Ceremonial Centers, Leaders, and Communities. In *Mesoamerican Archaeology: Theory and Practice*, edited by Julia Hendon and Rosemary Joyce, pp. 43–72. Blackwell, Malden, Massachusetts.
- Clark, John, Julia Guernsey, and Barbara Arroyo. 2010. Stone Monuments and Preclassic Civilization. In *The Place of Stone Monuments: Context, Use, and Meaning in Mesoamerica’s Preclassic Transition*, edited by Julia Guernsey, John Clark, and Barbara Arroyo, pp. 1–26. Dumbarton Oaks, Washington, DC.

- Clark, John, and Mary Pye. 2000. The Pacific Coast and the Olmec Question. In *Olmec Art and Archaeology in Mesoamerica*, edited by John Clark and Mary Pye, pp. 217–251. Yale University Press, New Haven, Connecticut.
- Clellow, William. 1974. *A Stylistic and Chronological Study of Olmec Monumental Sculpture*. Contributions of the University of California Archaeological Research Facility No. 19. University of California, Berkeley.
- Clellow, William, Richard Cowan, James O'Connell, and Carlos Benemann. 1967. *Colossal Heads of the Olmec Culture*. Contributions of the University of California Archaeological Research Facility No. 4. University of California, Berkeley.
- Coe, Michael D. 1968. *America's First Civilization*. American Heritage in association with the Smithsonian Institution, New York.
- Coe, Michael D., and Richard A. Diehl. 1980. *In the Land of the Olmec Volume 1: The Archaeology of San Lorenzo Tenochtitlán*. University of Texas Press, Austin.
- Cosgrove, David. 1998. *Social Formation and Symbolic Landscape*. University of Wisconsin Press, Madison.
- Covarrubias, Miguel. 1946. *Mexico South: The Isthmus of Tehuantepec*. Alfred A. Knopf, New York.
- Covarrubias, Miguel. 1957. *Indian Art of Mexico and Central America*. Alfred A. Knopf, New York.
- Cyphers, Ann. 1999. From Stone to Symbols: Olmec Art in Social Context at San Lorenzo Tenochtitlán. In *Social Patterns in Pre-Classic Mesoamerica*, edited by Dave Grove and Rosemary Joyce, pp. 155–181. *Dumbarton Oaks*, Washington, DC.
- Cyphers, Ann. 2004a. *Escultura Olmeca de San Lorenzo Tenochtitlán*. Universidad Nacional Autónoma de México, Mexico City.
- Cyphers, Ann. 2004b. Emergency Funding for the Protection of Monument 112 from San Lorenzo, Veracruz. *FAMSI* (website). Electronic document, <http://www.famsi.org/reports/03102/index.html>, accessed May 8, 2024.
- Cyphers, Ann, and Anna di Castro. 2009. Early Olmec Architecture and Imagery. In *The Art of Urbanism: How Mesoamerican Kingdoms Represented Themselves in Architecture and Imagery*, edited by William Fash and Leonardo López Luján, pp. 21–52. *Dumbarton Oaks*, Washington, DC.
- Dean, Carolyn. 2010. *A Culture of Stone: Inka Perspectives on Rock*. Duke University Press, Durham, North Carolina.
- Drucker, Philip, Robert F. Heizer, and Robert J. Squier. 1959. *Excavations at La Venta, Tabasco, 1955*. Smithsonian Institution Bureau of American Ethnology Bulletin 170. US Government Printing Office, Washington, DC.
- Fahsen, Frederico. 2010. Preclassic Stone Sculpture in the Guatemalan Highlands: Broken Monuments and Forgotten Scripts. In *The Place of Stone Monuments: Context, Use, and Meaning in Mesoamerica's Preclassic Transition*, edited by Julia Guernsey, John Clark, and Barbara Arroyo, pp. 231–258. *Dumbarton Oaks*, Washington, DC.
- Fuente, Beatriz de la. 1981. Toward a Conception of Monumental Olmec Art. In *The Olmec and Their Neighbors: Essays in Memory of Matthew W. Stirling*, edited by Elizabeth Benson, pp. 83–94. *Dumbarton Oaks*, Washington, DC.
- Fuente, Beatriz de la. 1984. *Los Hombres de la Piedra*. Universidad Autónoma de México, Mexico City.
- Fuente, Beatriz de la. 1996. Homocentrism in Olmec Monumental Art. In *Olmec Art in Ancient Mexico*, edited by Elizabeth Benson and Beatriz de la Fuente, pp. 41–59. National Gallery of Art, Washington, DC.
- Gay, Carlo. 1967. Oldest Cave Paintings in the New World. *Natural History* 76(4):28–35.
- Gay, Carlo. 1972. *Chalcatzingo*. International Scholarly Book Services, Portland, Oregon.
- Gillespie, Susan. 1994. Llano del Jicaró: An Olmec Monument Workshop. *Ancient Mesoamerica* 5:231–242.
- González Lauck, Rebecca. 1997. Acerca de pirámides de tierra y seres sobrenaturales: Observaciones preliminares en torno al Edificio C.1, La venta, Tabasco. *Arqueología* 2a. época 17:79–97.
- González Lauck, Rebecca. 2010. The Architectural Setting of Olmec Sculpture Clusters at La Venta, Tabasco. In *The Place of Stone Monuments: Context, Use, and Meaning in Mesoamerica's Preclassic Transition*, edited by Julia Guernsey, John Clark, and Barbara Arroyo, pp. 129–148. *Dumbarton Oaks*, Washington, DC.
- González Lauck, Rebecca. 2021. *Acervo escultórico Parque Museo La Venta*. Gobierno del Estado de Tabasco, Secretaría de Cultura, Villahermosa, Tabasco.
- Graham, John. 1976. Maya, Olmecs, and Izapans at Abaj Tkalik. *Actes du XLIIe Congrès International des Américanistes* 8:179–188.
- Graham, John. 1981. Abaj Takalik: The Olmec Style and Its Antecedents in Pacific Guatemala. In *Ancient Mesoamerica: Selected Readings*, edited by John Graham, pp. 163–176. Peak Publications, Palo Alto, California.
- Graham, John. 1989. Olmec Diffusion: A Sculptural View from Pacific Guatemala. In *Regional Perspectives on the Olmec*, School of American Research Advanced Seminar Series, edited by Robert J. Sharer and David C. Grove, pp. 227–246. Cambridge University Press, Cambridge.
- Grove, David C. 1967. Juxtahuaca Cave (Guerrero) Revisited. *Katunob* 6(2):37–40.
- Grove, David C. 1969. Olmec Cave Paintings: Discovery from Guerrero, Mexico. *Science* 164(3878):421–3.
- Grove, David C. 1970. *The Olmec Paintings of Oxtotitlan Cave, Guerrero, Mexico*. Studies in Pre-Columbian Art and Archaeology No. 6. *Dumbarton Oaks*, Washington, DC.
- Grove, David C. 1973. Olmec Altars and Myths. *Archaeology* 26(2):128–135.
- Grove, David C. 1981. Olmec Monuments: Mutilation as a Clue to Meaning. In *The Olmec and Their Neighbors: Essays in Memory of Matthew W. Stirling*, edited by Elizabeth Benson, pp. 49–68. *Dumbarton Oaks*, Washington, DC.
- Grove, David C. 1989. Chalcatzingo and Its Olmec Connection. In *Regional Perspectives on the Olmec*, School of American Research Advanced Seminar Series, edited by Robert J. Sharer and David C. Grove, pp. 122–147. Cambridge University Press, Cambridge.
- Grove, David C. 1999. Public Monuments and Sacred Mountains: Observations on Three Formative Period Sacred Landscapes. In *Social Patterns in Formative Mesoamerica*, edited by David C. Grove and Rosemary Joyce, pp. 255–299. *Dumbarton Oaks*, Washington, DC.
- Grove, David C. 2007. Cerros Sagrados Olmecas, Montañas en la Cosmovisión Mesoamericana. *Arqueología Mexicana* 15(87):36–42.

- Grove, David C., and Jorge Angulo V. 1987. A Catalog and Description of Chalcatzingo's Monuments. In *Ancient Chalcatzingo*, edited by David C. Grove, pp. 114–131. University of Texas Press, Austin.
- Grove, David C., and Susan Gillespie. 2009. People of the Cerro: Landscape, Settlement, and Art at Middle Formative Period Chalcatzingo. In *The Art of Urbanism: How Mesoamerican Kingdoms Represented Themselves in Architecture and Imagery*, edited by William L. Fash and Leonardo López Luján, pp. 53–76. *Dumbarton Oaks*, Washington, DC.
- Grove, David C. (editor). 1987. *Ancient Chalcatzingo*. University of Texas Press, Austin.
- Guernsey, Julia. 2012. *Sculpture and Social Dynamics in Preclassic Mesoamerica*. Cambridge University Press, New York.
- Guernsey, Julia, and Stephanie Strauss. 2022. Art and Urbanity in Late Formative Mesoamerica. In *Early Mesoamerican Cities: Urbanism and Urbanization in the Formative Period*, edited by Michael Love and Julia Guernsey, pp. 199–223. Cambridge University Press, New York.
- Jones, Andrew Meirion. 2021. Rock Art and the Ontology of Images. In *Ontologies of Rock Art*, edited by Oscar Moro Abadía and Martin Porr, pp. 59–66. Routledge, London.
- Lambert, Arnaud. 2014. *Pit and Groove Work among the Olmec-Style Monuments of the Gulf Coast Lowlands*. BAR International Series 2637. British Archaeological Reports, Oxford.
- Lewis, Roy Querejazu, and Robert Bednarik (editors). 2010. *Mysterious Cup Marks: Proceedings of the First International Cupule Conference*. BAR International Series 2073. British Archaeological Reports, Oxford.
- Milbrath, Susan. 1979. *A Study of Olmec Sculptural Chronology*. Studies in Pre-Columbian Art and Archaeology No. 23. *Dumbarton Oaks*, Washington, DC.
- Miles, Suzanne W. 1965. Sculpture of the Guatemala-Chiapas Highlands and Pacific Slopes, and Associated Hieroglyphs. In *Handbook of Middle American Indians*, Vol. 2, edited by Gordon Wilely, 237–276. University of Texas Press, Austin.
- Moyes, Holley, and Keith M. Prufer. 2013. The Geopolitical of Emerging Maya Rulers: A Case Study of Kayuko Naj Tunich, a Foundational Shrine at Uxbenka, Southern Belize. *Journal of Anthropological Research* 69(2):225–248.
- Ortiz Ceballos, Ponciano, and María del Carmen Rodríguez Martínez. 2000. The Sacred Hill of El Manatí: A Preliminary Discussion of the Site's Ritual Paraphernalia. In *Olmec Art and Archaeology in Early Mesoamerica*, edited by John Clark and Mary Pye, pp. 75–93. National Gallery of Art, Washington, DC.
- Palka, Joel. 2014. *Maya Pilgrimage to Ritual Landscapes: Insights from Archaeology, History, and Ethnography*. University of New Mexico Press, Albuquerque.
- Parsons, Lee Allen. 1981. Post-Olmec Stone Sculpture: The Olmec-Izapan Transition on the Southern Pacific Coast and Highlands. In *The Olmec and Their Neighbors: Essays in Memory of Matthew W. Stirling*, edited by Elizabeth P. Benson, pp. 257–288. *Dumbarton Oaks*, Washington, DC.
- Parsons, Lee Allen. 1986. *The Origins of Maya Art: Monumental Stone Sculpture of Kaminaljuyu, Guatemala, and the Southern Pacific Coast*. Studies in Pre-Columbian Art and Archaeology No. 28. *Dumbarton Oaks*, Washington, DC.
- Pohorilenko, Anatole. 1974. *Olmec Ceremonial Markings: Striations and Cupping Effects*. Master's thesis, Department of Anthropology, Tulane University, New Orleans, Louisiana.
- Pohorilenko, Anatole. 2007. Updating Olmec Extraneous Markings. *Codex* 15(3):16–30.
- Pool, Christopher, and Michael Loughlin. 2017. Creating Memory and Negotiating Power in the Olmec Heartland. *Journal of Archaeological Method and Theory* 24:229–260.
- Pool, Christopher, Michael Loughlin, Ramesh Shrestha, Juan Fernández Díaz, Manuel Alfonso Melgarejo Pérez, Gabriela Montejo, Gustavo García, et al. 2014. *Proyecto de investigación arqueológica: Estabilidad social de largo tiempo en la región de Tres Zapotes, temporada 2014*. Informe Técnico Partial. Instituto Nacional de Antropología e Historia, Mexico City.
- Porter, James. 1989. *The Monuments and Hieroglyphs of Tres Zapotes, Veracruz, Mexico*. PhD dissertation, University of California, Berkeley.
- Proskouriakoff, Tatiana. 1968. Olmec and Maya Art: Problems of Their Stylistic Relation. In *Dumbarton Oaks Conference on the Olmec*, edited by Elizabeth Benson, pp. 119–134. *Dumbarton Oaks*, Washington D.C.
- Reilly, F. Kent, III. 2002. The Landscape of Creation: Architecture, Tomb, and Monument Placement at the Olmec Site of La Venta. In *Heart of Creation: The Mesoamerican World and the Legacy of Linda Schele*, edited by Andrea Stone, pp. 34–65. University of Alabama Press, Tuscaloosa.
- Rodríguez Martínez, María del Carmen, and Ponciano Ortiz Ceballos. 2000. A Massive Offering of Axes at La Merced, Hidalgotitlán, Veracruz, Mexico. In *Olmec Art and Archaeology in Mesoamerica*, edited by John Clark and Mary Pye, pp. 155–168. National Gallery of Art, Washington, D.C.
- Schieber de Lavarreda, Christa, and Miguel Orrego Corzo. 2010. Preclassic Olmec and Maya Monuments and Architecture at Takalik Abaj. In *The Place of Stone Monuments: Context, Use, and Meaning in Mesoamerica's Preclassic Transition*, edited by Julia Guernsey, John Clark, and Barbara Arroyo, pp. 177–205. *Dumbarton Oaks*, Washington, DC.
- Sharer, Robert J. 1989. The Olmec and the Southeast Periphery of Mesoamerica. In *Regional Perspectives on the Olmec*, School of American Research Advanced Seminar Series, edited by Robert J. Sharer and David C. Grove, pp. 247–271. Cambridge University Press, Cambridge.
- Sharer, Robert J., and David W. Sedat. 1987. *Archaeological Investigations in the Northern Maya Highlands, Guatemala: Interaction and Development of Maya Civilization*. Monograph 59. University Museum, University of Pennsylvania, Philadelphia.
- Steede, Neil, and Lawrence F. Athy. 2000. *A Report Describing the Grooves on the Colossal Stone Heads of La Venta*. Early Sites Research Society, Independence, Missouri.
- Stirling, Matthew. 1940. Great Stone Faces of the Mexican Jungle. *National Geographic* 78(3):309–334.



- Stirling, Matthew. 1943. *Stone Monuments of Southern Mexico*. Bureau of American Ethnology Bulletin 138. Smithsonian Institution, Washington, DC.
- Stone, Andrea Joyce. 1992. From Ritual in the Landscape to Capture in the Urban Center: The Recreation of Ritual Environments in Mesoamerica. *Journal of Ritual Studies* 6(1):109–132.
- Stone, Andrea Joyce. 2014. Spiritual Journeys, Secular Guises: Rock Art and Elite Pilgrimage at Naj Tunich Cave. *Mexicon* 36(2): 49–64.
- Strecker, Matthias. 1982. *Rock Art of East Mexico and Central America: An Annotated Bibliography*. 2nd rev. ed. Cotsen Institute of Archaeology, Los Angeles.
- Stuart, David. 2010. Shining Stones: Observations on the Ritual Meaning of Early Maya Stelae. In *The Place of Stone Monuments: Context, Use, and Meaning in Mesoamerica's Formative Tradition*, edited by Julia Guernsey, John E. Clark, and Barbara Arroyo, pp. 283–298. Dumbarton Oaks, Washington, DC.
- Tate, Carolyn. 2008. Landscape and a Visual Narrative of Creation and Origin at the Olmec Ceremonial Center of La Venta. In *Pre-Columbian Landscapes of Creation and Origin*, edited by John Staller, pp. 31–66. Springer, New York.
- Taube, Karl. 2003. Ancient and Contemporary Maya Conceptions about Field and Forest. In *The Lowland Maya Area: Three Millennia at the Human Wildland Interface*, edited by Arturo Gómez-Pompa, Michael F. Allen, Scott L. Fedick, and Juan J. Jiménez-Osornio, pp. 461–492. Food Products Press, New York.
- Tilley, Christopher. 2004. *The Materiality of Stone*. Berg, New York.
- Tilley, Christopher. 2021. *Thinking through Images: Narrative, Rhythm, Embodiment and Landscape in the Nordic Bronze Age*. Oxbow Books, Havertown, Pennsylvania.
- Whitley, David. 2005. *Introduction to Rock Art Research*. Left Coast Press, Walnut Creek, California.
- Williams, Howell, and Robert F. Heizer. 1965. Sources of Rocks Used in Olmec Monuments. In *Sources of Stones Used in Prehistoric Mesoamerican Sites*, Contributions of the University of California Archaeological Research Facility 1, pp. 1–39. University of California, Department of Anthropology, Berkeley.