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THE EARLY HORIZON AT TRES ZAPOTES: IMPLICATIONS FOR OLMEC INTERACTION

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Abstract

Modeling Olmec participation in Early Horizon interaction networks requires better understanding of the relations of Gulf Olmec communities with one another as well as with contemporaries elsewhere in Mesoamerica. We compare pottery, figurines, and obsidian assemblages from a recently isolated Early Formative component at Tres Zapotes with contemporary assemblages from San Lorenzo and Macayal, both in the Coatzacoalcos basin. Our analysis indicates that village inhabitants at Tres Zapotes interacted with populations in eastern Olman but also forged their own economic and social ties with central Veracruz and the Mexican highlands. This evidence suggests a heterogeneous politico-economic landscape in which multiple polities of varying complexity participated in overlapping networks of interaction, alliance, and competition within and beyond Olman.

In 1989, Robert Sharer remarked, "we now know relatively more about the origins of complex societies in a number of regions outside the Gulf Coast than we know about Olmec civilization itself" (Sharer 1989:4). The situation has improved a great deal since with settlement surveys, excavations at sustaining area settlements, and renewed investigations of major centers, but we still know relatively little about interactions among Gulf Olmec sites beyond the relationships of major centers to their immediate hinterlands. The reasons for this are several; they include a perception of Olmec centers and polities as sequential, rather than temporally overlapping, entities; difficulties in establishing well-dated chronological sequences; difficulties in identifying intraregional exchange patterns of some commodities; and an understandable preoccupation with long-distance interaction between the Gulf Olmecs and their contemporaries. While we agree with John Clark (personal communication 2005) that understanding interactions at and beyond the margins of polities is important to understanding their organization, we argue that it is also necessary to understand the articulations and disarticulations among communities "back home," especially in cases, such as the Olmecs and Early Formative Mesoamerica, where interregional interaction appears to have varied a great deal in intensity and form (Clark 1997:229; Pool 2007a).

In this paper we explore intra- and interregional interaction from the vantage point of the Eastern Lower Papaloapan Basin (ELPB), and more specifically the site of Tres Zapotes, at the western margin of the Olmec "heartland." Our focus is on the Early Horizon (ca. 1250–900 uncal B.C. or 1500–1000 cal B.C.), represented at Tres Zapotes by the newly defined Arroyo phase, which we have recently isolated in stratigraphic contexts. Although we think our results speak to the territorial extent and number of Early Horizon Gulf Olmec polities, our principal concern is not whether these early complex polities were organized as states or chiefdoms, but how communities forged social and economic networks with their neighbors and more distant contemporaries.

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THE ARROYO PHASE AT TRES ZAPOTES

Alhough several authors have suspected the existence of an Early Formative period component at Tres Zapotes on the basis of scattered surface finds and redeposited artifacts in excavations (Lowe 1989; Ortiz Ceballos 1975; Pool and Ohnersorgen 2003), it was not until our 2003 excavations that Early Formative period deposits were uncovered in a secure stratigraphic context. Our first discovery came at a depth of 5–6 m in excavation Unit 12 in Group 2, also known as the Arroyo Group, hence our name for the phase (Figure 1). At 5.25 m below datum we uncovered a plate fragment with Limón Carved-Incised decoration containing a catfish spine. Associated with the plate was a blackware sherd with Calzadas Carved decoration and a white-slipped sherd with vertical carving. In the same levels we found the partly articulated bones of a dog. About 40 cm deeper we found the skull, patella, and distal femur of a human burial, apparently interred in a flexed position. Centuries later the deposits of the Arroyo phase and the Middle Formative period Tres Zapotes phase were covered by an 80-cm-thick cap of gray clay, bracketed by dates of 2450 ± 40 BP (Beta-199251, wood charcoal, $\delta^{13}C-27.2$) (780–400 cal B.C.) and 2410 ± 40 BP (Beta-199241, wood charcoal, $\delta^{13}C-27.2$) (760–390 cal B.C.) (all dates calibrated at 2σ using Calib rev4.4.2. [Stuiver and Reimer 2004]). Subsequently we found stratified Arroyo phase deposits in Unit 8 about 250 m to the south, which yielded a date of 2970 ± 40 BP (Beta-199248, wood charcoal, $\delta^{13}C-27.7$) (1310–1040 cal B.C.). Arroyo phase materials were also recovered from excavations 600 m to the west in Operations 3A and 7, but some mixing with later materials is indicated, so

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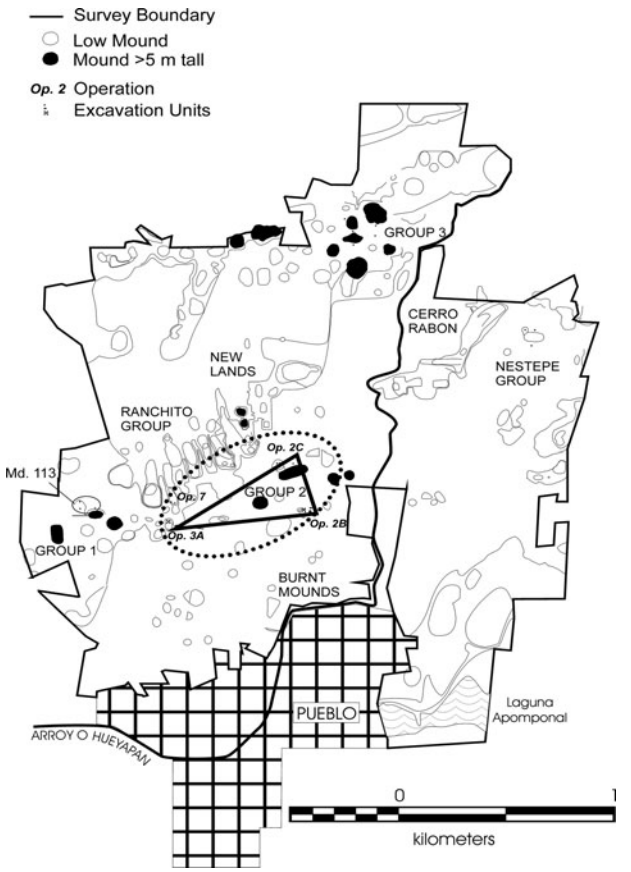


Figure 1. Map of Tres Zapotes showing extent of Arroyo phase in excavations (triangle) and in excavations, auger tests, and surface collections combined (dotted oval).

we exclude them from quantitative description of the phase. Excavations with Arroyo phase materials describe an area of about 7 ha. Other Early Horizon materials recovered from auger tests 6 to 8 m deep in floodplain deposits and surface collections suggest a maximum extension of about 17 ha for the Arroyo phase village (Pool and Ortiz Ceballos 2008).

Ceramics

Ceramics of the Arroyo phase include diagnostics that show clear ties to the San Lorenzo phase (Figure 2), but the phase also exhibits a strongly local character as well as interaction with other more distant areas. Table 1 and Figure 3 compare sherd percentages of equivalent ceramic types for the Arroyo phase at Tres Zapotes, the San Lorenzo phase at San Lorenzo, and the Macayal phase equivalents at Macayal, a village site about 15 km southwest of San Lorenzo in the Coatzacoalcos basin. We focus our quantitative comparisons with San Lorenzo primarily on the Yale University project's Stratigraphic Pit II (SL-PNW-St. II, or simply St. II), strata F through J (Coe and Diehl 1980:Table 4-1). According to Coe and Diehl (1980:84–85, 133), this pit produced the clearest stratigraphic sequence from their excavations, and the San Lorenzo phase assignment of materials from these strata appear straightforward. Recently, David Cheetham (personal communication 2008) has compiled relative frequencies of types for rims and for total sherd counts from the much larger sample from all of Coe and Diehl's pits in the collections at Yale University. Cheetham has generously provided us with this unpublished information so that we may refer to it when trends differ markedly from those in St. II (see also Figure 2). We also note that Ann Cyphers has recently developed a new classification for San Lorenzo phase materials (Symonds et al. 2002), but frequency data from her excavations have not been published as of this writing.

We have adapted our quantitative comparisons to accommodate differences in the recording and reporting of data (Table 1). Published data from San Lorenzo pit St. II present type frequencies as counts, which may be converted to percentages of all sherds (n = 1014) or of classified sherds (n = 444). At Macayal, 3,164 of 21,025 sherds were unclassifiable—2,225 of them due to the degree of erosion. We therefore use percentage of classified sherds as our main basis of comparison. At Tres Zapotes, we recorded type counts for all sherds in a sample of units that provided key stratigraphic sequences, including the 1,535 sherds from Arroyo phase deposits in Unit 12. In other units, we classified only rim sherds by type and recorded counts and weights of body sherds. This was the case for the Arroyo phase deposits in Unit 8. Inclusion of relative type frequencies for rim sherds provides a broader sampling of Arroyo phase contexts at Tres Zapotes but reduces the total sample size to 200. Nevertheless, we present these rim sherd data to facilitate future comparisons with assemblages from Canton Corralito and San Lorenzo (Cheetham 2011).

In terms of general paste characteristics, the distinctive dark, basaltic, volcanic ash of the Tuxtla Mountains is a common temper in the Arroyo phase as is quartz sand, with which it is often mixed. As distinct from the curved splinters typical in vitric ashes, the Tuxtla basalts produce rounded particles of dark glass embedded with phenocrysts of olivine, pyroxene, and plagioclase. Such basaltic ash temper is apparently absent from ceramics of the San Lorenzo and Macayal phases, although recent reports suggest that vitric ash temper is relatively common at San Lorenzo, and other tempering materials besides quartzite sand also are present in the San Lorenzo phase assemblage (González et al. 2006; see also Guevara 2004, cited in Neff et al. 2006:112).

Black ware sherds are more common in the village assemblages at Macayal and Arroyo phase Tres Zapotes than at San Lorenzo,



Figure 2. Arroyo phase pottery from Unit 12. Limón Incised plate (top); Calzadas Carved beaker (lower left); white-slipped sherd with vertical carving (lower right).

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Table 1. Comparison of San Lorenzo, Macayal, and Arroyo phase assemblages

San Lorenzo phase Pit SL-PNW-St. II, Strata F-J*			Macayal phase, Macayal Pits 5, 6, 8, 10, 11, 15, 16, 20, 22		Arroyo phase, Tres Zapotes Unit 12, Levels 50–60 (all sherds classified); Unit 8, levels 43–51 (rims only)		
San Lorenzo type	% of total	% of classified	Macayal type	% of classified	Equivalent PATZ type (and code)	% all Unit 12	% rims Units 8, 12
Camaño Coarse	21.0%	48.3%	Tecomates Rastrillados	20.1%	Coarse Brown (2701) Coarse Brown Brushed (2701.5) Coarse Brown half-brushed (2520)	0.5%	1.5%
Macayas Scored	1.2%	2.7%			Scored Coarse Brown (2618) Scored Coarse Red (2907.1)	1.9%	1.0%
Achiotl Gray and Aguatepec Thick	3.5%	7.9%			Coarse Gray w/volcanic ash temper (2113)	0.1%	0.5%
			Café Rojizo con desgrasante de cuarzo mediano o grueso	16.7%			
Tatagapa Red	1.7%	3.8%	Engobado Rojo	0.2%	Red Tecomates (2906) Polished Red (2906.2) Thick Polished Red (2906.3) Smoothed Red (2906.4)	3.5%	5.5%
Nacahuite Red (Bajio Phase)	0.0%	0.0%			Specular Red (2905)	1.1%	1.5%
Calzadas Carved	1.0%	2.3%	Cross-cuts Macayal types		Calzadas Carved (2518)	0.9%	1.5%
Limón Carved-Incised	0.6%	1.4%	Cross-cuts Macayal types		Cross-cuts PATZ types	0.1%	0.5%
El Tigre White	0.5%	1.1%			White-slipped Gray (2112) White-slipped Sandy Gray (2114) Cream-slipped with Coarse Paste (2302)	2.9%	9.0%
La Mina White	1.5%	3.4%	Blanco Engobado	0.2%	White-slipped with Matte Finish (2405) White-slipped Incised (2403)	7.8%	8.8%
Xochiltepec White	0.2%	0.5%			Kaolin White (2301)	0.3%	0.5%
Ixtepec White	0.2%	0.5%					
Conejo Orange on White					Orange-slipped Kaolin White (2301.1)	0.1%	0.1%
Mojonera Black	7.5%	17.1%	Negro Ahumado	43.1%	Fine Polished Black (2112) Medium Polished Black (2123, 2123.1) Coarse Polished Black (2512) Medium Coarse Brown (2519)	34.8%	20.5%
Perdida Black and White	1.6%	3.6%	Bícromo por cocción	18.0%	Fine Paste Black and White (2212) Fine Paste Black and Tan (2214)	12.7%	1.0%
Tular Black and White	2.9%	6.5%			Medium Paste Black and White (2214) Medium Paste Black and Tan (2226) Coarse Paste Black and White (2213) Coarse Paste Black and Tan (2225) Coarse Paste Black and Tan Incised (2225.21)	5.3%	6.0%
					White-slipped Fine Paste Black and White (2214.3) White-slipped Fine Paste Black and Tan (2224.3)	0.0%	4.0%
					White-slipped Medium Paste Black and White (2214.3) White-slipped Medium Paste Black and Tan (2226.3) White-slipped Coarse Paste Black and White (2213.3)	0.2%	3.7%
Yagua Orange	0.6%	1.4%			Fine Paste Polished Orange (2904.4)	0.4%	0.0%
					Plain Polished Orange (2904, 2904.5, 2904.6, 2904.8)	26.6%	11.0%
					Smoothed Orange (2904.9)	2.0%	0.0%
			Naranja Engobado	0.3%			
			Naranja Burdo	0.1%			
			Other Classified	1.3%			
N	1014	444		17861		1535	200

*From Coe and Diehl 1980:Table 4-1.

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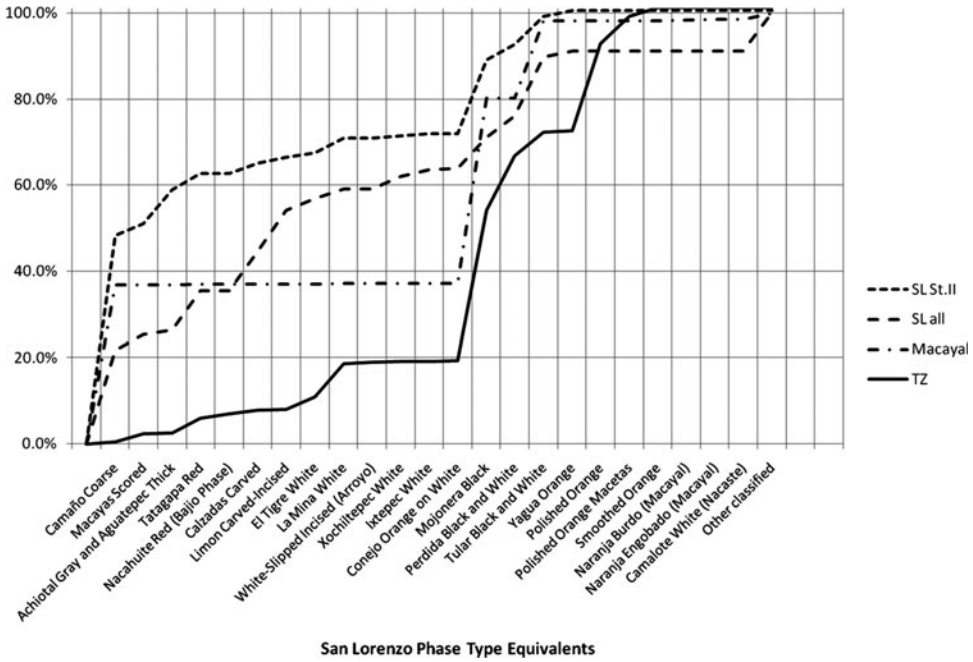


Figure 3. Cumulative percentages of ceramic types in assemblages of the San Lorenzo, Macayal, and Arroyo phases. For the Macayal phase, sherds with Calzadas Carved and Limón Incised decoration are included with black and differentially fired ware frequencies (see Table 1).

regardless of the measure used (percentage of all sherds, classified sherds, or rims). As a percentage of all classified sherds, differentially fired wares appear to be more common in the Arroyo and Macayal phases than in the San Lorenzo phase. However, differentially fired wares account for 63% of all San Lorenzo phase rim sherds (Cheetham, personal communication 2008) but only about 16% of the Arroyo phase rims. Moreover, the differentially fired wares of the Arroyo phase tend toward finer pastes equivalent to Perdida Black-and-White (unless only rim sherds are considered; see Table 1), and their lighter surfaces tend toward tan and buff tones. White-slipped pottery also appears to be more common in the Arroyo phase than the San Lorenzo and Macayal phases and was occasionally used to enhance the light rims of differentially fired pottery at Tres Zapotes. This greater prevalence of white slipping most likely is a consequence of the generally better preservation of slips in the excavated Tres Zapotes material, rather than the relatively late Early Formative date of the Arroyo phase. Better preservation of surfaces at Tres Zapotes would also help explain the lower proportions of unslipped gray pottery comparable to Aguatepec Thick of the San Lorenzo phase, the sherds of which were all heavily eroded (Coe and Diehl 1980:156).

One of the most striking differences with both Coatzacoalcos basin sites is the much lower proportion of a type comparable to Camaño Coarse in the Arroyo phase. This is somewhat surprising because brushed coarse brown jars (*Rastreado*) become the dominant utilitarian type in the Late Formative period at Tres Zapotes, but comparable treatments are nearly absent from Early Formative period contexts.

Another impressive contrast is the high proportion of "Polished Orange" in the Arroyo Phase (about 30%). Polished Orange is a type with a fairly soft and lightly tempered orange paste that is easily eroded, although it is likely that many vessels were left unburnished. Burnishing raises a "self-slip" on some examples, but otherwise the Arroyo phase variants all lack the slips that are diagnostic of Middle and Late Formative Polished Orange. The closest parallel to Polished Orange in Coe and Diehl's San Lorenzo phase descriptions is Yagua Orange, but it is far less common (1.4%). Naranja erosionado reported by O'Rourke (2002:171) at Las Galeras may also be related, but at 3% of the Formative period assemblage, it too is much less common than is Polished Orange in the Arroyo phase. Naranjo Burdo and Naranja Engobado, however, are very localized types of the Macayal phase, with no precise equivalents at San Lorenzo or Tres Zapotes. These Formative period types are also distinct from Classic period Coarse Orange in the Tuxtla Mountains (see Arnold et al. 1993; Pool 1990; Stoner et al. 2008).

Calzadas Carved and Limón Carved-Incised each constitute less than 1% of the sherds from the Arroyo phase. This is not terribly different from 1 to 2.3% for the San Lorenzo phase levels of St. II (Table 1). Cheetham's tallies for Calzadas and Limon sherds from all pits at San Lorenzo in the Yale collection, however, are much higher at about 8% of all sherds for each (or 6.4% and 8.8%, respectively, of rims) (personal communication 2008). Current evidence, then, suggests that relative frequencies of these typically Olmec decorative styles at Tres Zapotes were more in line with such distant sites as Canton Corralito (Cheetham. 2010), San José Mogote, or Zohapilco (Stark 2007: 551–552, Table 3.1) than at the much closer site of San Lorenzo.

Some of the Calzadas-like motifs in the Arroyo phase resemble styles reportedly more common in Oaxaca than at San Lorenzo, including incised "music brackets" (Flannery and Marcus 2000: 24; see also Stark 2007:50–53).[1] In one plate (Figure 4), we have

[1] Flannery and Marcus (2000:28) place greater emphasis on differing orientations of motifs commonly glossed as "fire serpent" or "sky dragon," stating, "At Tlapacoya and San José Mogote, Motif 1 was usually placed on bowls at a 45° angle (Figures 21a–b). At San Lorenzo and various Chiapas sites, on the other hand, the same motif was usually placed horizontally (Figures 21c–d)." Diagonal representations of "fire serpent" occur at Tres Zapotes, but it is difficult to assess quantitatively their relative prevalence in different regions and sites from published

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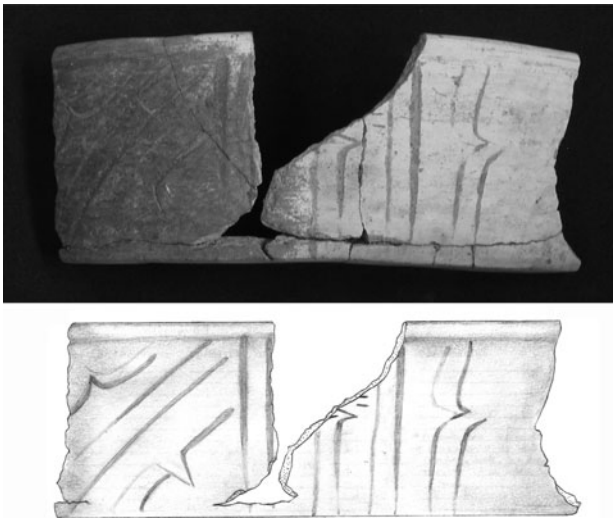


Figure 4. Photograph and drawing of differentially fired vessel with incised "music bracket" design. Tres Zapotes, Unit 8, level 44. Drawing by Israel Trujillo Ramirez.

the unusual co-occurrence of diagonal and vertical incised (not carved) motifs associated by Pyne (1976) with the zoomorphic supernatural in Oaxaca. This calls to mind the less abstract design on a famous vessel attributed to Tlapacoya, which bears profile and frontal views of the zoomorphic supernatural (Joralemon 1971:42). Note, however, that the slanted element on this vessel is not the typical abstracted sky motif but a double music bracket (Motif 11), which Pyne (1976) associates with the were-jaguar and Marcus (1989) associates with earth/earthquake.[2] To our knowledge, this particular combination of vertical and slanted music brackets is not reported from Oaxaca or San Lorenzo, suggesting some local reinterpretation of the significance of these motifs at Tres Zapotes. Note that we make no claim here of importation of pottery from Oaxaca, and in fact paste characteristics suggest this piece was locally made.

Figurines and Other Ceramic Artifacts

Arroyo phase figurines include local and regional styles. Hollow, white-slipped baby figurines (Blomster's [2002] Type I) are rare, but do occur (Figure 5). We have two face fragments and two or three limbs. One face fragment was redeposited in a Late Formative context, and the other is from the surface, but there can be no doubt they are of Early Formative period manufacture.

Solid heads similar to San Lorenzo phase examples are rare (Figure 5). More common are the hawk-nosed variants with filleted mouths first identified by García Payón (1942; see also García Payon 1966) at Trapiche, and soon thereafter described at Tres Zapotes as a "Morelos" type by Weiant (1943:92–93) and Type II-D by Drucker (1943:79) (Figure 6). Arnold and Follensbee (2004) described similar figurines for the Early Formative period at La Joya, which they subdivided into "Cantante" and "Bantam" varieties—both of which occur in the Arroyo phase. Despite some similarities to some highland Type C, D, and K figurines, particularly in the filleted mouth, and eye treatments, the Trapiche figurine type is mainly associated with Veracruz, where it has been identified as far north as Santa Luisa, and eastward to the central Tuxtlas (García Payón 1971:521) (Figure 4). They are rare or absent at San Lorenzo, although one helmeted figurine assigned to the Nacaste phase is similar (Coe and Diehl 1980:366, leftmost). We have not yet found any Arroyo phase figurines resembling Arnold and Follensbee's (2004) Axoquín type, which they compare to Pilli figurine heads from the Basin of Mexico.

Figurine bodies include seated and cross-legged variants resembling examples from the San Lorenzo phase but only one tripod figurine. Particularly spectacular examples include a large female torso, whose rightward-leaning posture resembles seated examples from San Lorenzo; a seated old, pot-bellied man, and a beautiful white-slipped standing female figure whose skirt was highlighted by omitting the slip. We have not recovered ceramic spatulas like those reported from San Lorenzo (Coe and Diehl 1980:284, Figure 399) and Cantón Corralito (Cheetham 2005, 2010), although we cannot rule out their existence without more extensive excavation.

Obsidian

The Arroyo phase obsidian assemblage from Units 8 and 12 comprises 113 pieces, dominated by flakes (106, 93.8%) and bipolar flake cores (5, 4.4%), with only 2 (1.8%) prismatic blades or blade tools. Visual categories of obsidian previously sourced by INAA to the Guadalupe Victoria source (Knight 2003) account for 49.6% of the assemblage, Pico de Orizaba may account for as much as

reports. Flannery and Marcus (1994) illustrate 41 examples of Pyne's Motifs 1 and 2 (both "fire serpent" representations), not counting duplicate illustrations of the same sherd or vessel. Of these, 25 (61%) are diagonal versions of the fire serpent (Figures 12.4, 12.5a/12.54, 12.5c/12.49/12.50, 12.5d/12.49/12.50, 12.5e/12.55-right, 12.6a/12.41, 12.6b, 12.6c, 12.28a, 12.38b, 12.44c, 12.45, 12.46c, 12.51-top, 12.51-bottom, 12.56-left, 12.56-right, 12.68a, 12.146a, 12.146b, 12.148; 16.1-upper right, 16.1-middle left, 16.1-middle right, 16.1-lower right). The 16 horizontal examples are illustrated in Figures 12.5b/12.39, 12.5f, 12.6d, 12.6e, 12.38c, 12.38d, 12.38e, 12.39/12.5b, 12.44e, 12.53, 12.55-left, 12.146e, 16.1-upper left, 16.1-lower left, 16.2-upper left, 16.2-lower left. Coe and Diehl (1980: Figures 138–143) illustrate 12 Calzadas Carved sherds with "fire serpent" motifs, 7 (58.3%) of which are horizontal (Figures 138i, 139k, 140a, 140i, 142, 143b, and 143j) and 5 of which are diagonal (138b, 141a, 141h, 143g, 143i). (We exclude from this count 7 occurences of the hand-paw-wing motif, all horizontal, which Stark [2007:63] includes in her tally of possible fire serpents). Thus, if the frequency of illustrated motifs approximates their occurrence in assemblages (and this is admittedly a shaky assumption), Flannery and Marcus's impression regarding regional tendencies in the orientation of this element may be strictly true, but horizontal and diagonal orientations do not consistently distinguish highland and lowland modes of representation.

Regional variation does appear to occur in the frequencies of other motifs, however, including the "music brackets" that form elements of Pyne's (1976) Motifs 8–11. In the collections from the Valley of Oaxaca analyzed by Pyne (1976:Table 9.12), 132 of 591 sherds (22.34%) exhibited these motifs. Of the 55 Calzadas Carved sherds illustrated by Coe and Diehl (1980: Figures 138–143), only 3 (5.45%) (or possibly 4 [7.2%]) have some form of "music bracket." If incised motifs from non-Calzadas sherds are included, the proportion with music brackets is even lower. Again, the utility of this comparison depends on the illustrated sherds being broadly representative of the prevalence of motifs in the San Lorenzo collection. Other authors (Flannery and Marcus 2000: 24; Stark 2007: footnote 8) have also commented on the scarcity of earth or jaguar imagery (with which music brackets may be associated) among the sherds from San Lorenzo illustrated by Coe and Diehl.

[2] Joralemon (1975) and Taube (1995, 2000, 2004), among others, offer alternative identifications of the supernaturals represented by these motifs. Here we are less concerned with the specific meaning of these motifs than with their formal qualities. We reference Pyne's (1976) and Marcus's (1989) labels because they refer to specific sets of motifs in Oaxacan ceramics.

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Figure 5. Olmec-style figurines of the Arroyo phase. "Olmec baby" face fragment (left). San Lorenzo type figurine (right).



Figure 6. Trapiche-type figurines of the Arroyo phase.

38.1%, and the rest consists of varieties of black and banded obsidian tied to Zaragoza-Oyameles (12.4%).[3] In contrast to the San Lorenzo phase (Cobean et al. 1971, 1991) none of the materials from the Arroyo phase deposits are visually assignable to Otumba, Pachuca, or Guatemalan sources, and the overall variety of sources is much less.

Groundstone

The stone material for utilitarian groundstone artifacts appears to consist entirely of olivine and pyroxene basalts derived from the Tuxtla Mountains, principally Cerro el Vigía (Kruszczynski 2001; Williams and Heizer 1965), although recently completed analysis suggests varieties from more distant Tuxtlas sources may also be represented in minor amounts (Jaime-Riverón, personal communication 2006). Basalts from the western Tuxtlas appear not to have been imported to San Lorenzo (Willams and Heizer 1965; Fernández and Coe 1980) owing, no doubt, to the greater proximity of sources at Llano del Jícaro and other locales in the eastern Tuxtlas.

[3] Knight (1999, 2003) analyzed obsidian at Tres Zapotes and the nearby site of Palo Errado using the same visual categories. INAA was conducted on pieces from Palo Errado. Visual characteristics identify the most likely source of the Arroyo phase prismatic blade as Guadalupe Victoria, and the blade tool as Zaragoza-Oyameles. Preliminary results of INAA on five Arroyo phase obsidian pieces tentatively identify one macroflake of Paredón obsidian as well as flakes from the Guadalupe Victoria and Pico de Orizaba sources (Esmeralda Robles Fernández, personal communication).

Other Exotic Artifacts

We recovered one multiperforate ilmenite cube fragment from Arroyo phase levels in Unit 12. Five ilmenite cubes almost certainly dating to the Arroyo phase were encountered 200 m to the west in the Ranchito group by Stirling (Weiant 1943:121 and Plate 78), and we recovered one on survey 600 m to the west in the vicinity of Operation 7. The source of the ilmenite for these small, enigmatic objects is probably the Río La Venta area of western Chiapas, where excavations at Plumajillo recovered over 2,000 pieces in various stages of production (Agrinier 1984:80–81). In the southern Gulf lowlands they have been found at the village site of La Joya in the Tuxtla Mountains (Arnold 1995:195), at the secondary center of Las Limas (Yadeun in Agrinier 1984:75). They are most numerous, however, at San Lorenzo, where a total of over six metric tons of finished and discarded multiperforate ilmenite cubes were found in two large pits (Cyphers and Di Castro Stringher 1996) as well as a few in other contexts (Coe and Diehl 1980:242). It is not clear if the cubes at Tres Zapotes were acquired directly from the source or indirectly via San Lorenzo.

Olmec Monuments

We doubt that community leaders of the Arroyo phase at Tres Zapotes had the authority or labor reserves to carve and transport the two known colossal heads to the site, and so we assign them to early in the Middle Formative Tres Zapotes phase. As several people have noted, the Tres Zapotes heads are carved in a local style distinct from those of San Lorenzo or La Venta (Clewlow et al. 1967; de la Fuente 1977; Kubler 1962; Wicke 1971). Most of the other six or seven Olmec monuments from Tres Zapotes also appear to be of a Middle Formative period date (Pool 2007b; Pool and Ortiz Ceballos 2008). Two seated figures, however, may be from an earlier time. Milbrath (1979) tentatively assigned Monument I, the crossed legs of a seated figure (Stirling 1943: Plate 9a, b), and Monument M, the torso and head of a seated figure (Stirling 1943: Plate 11b, c, d), to her sculptural Group II, to which she also assigns seated figures from San Lorenzo, La Venta, Arroyo Sonso, Cruz de Milagro, and Cuahtotoalpan Viejo, among others. Crenulated earflaps on Monument M relate it to both early Formative San Lorenzo Monument 52 and (probably) Middle Formative La Venta Monument 77 (the latter discussed below). Unfortunately, Monument M and the right half of Monument I have disappeared since Stirling reported them, making detailed comparisons difficult.

Two monuments recently discovered to the north of Tres Zapotes hint at political interactions with eastern Olman. One, currently at the Casa de Cultura in Lerdo de Tejada, closely resembles the San Martín Pajapan monument (Figure 5). The other monument is currently on the plaza in Angel R. Cabada (Figure 6). It is also mutilated, but the rope-like elements on its stiff cape are clearly visible, as is the battered attachment of its legs to the torso, showing it to be a seated, cross-legged figure. Although caped cross-legged figures appear at San Lorenzo, the closest in form and details of costume to the Cabada monument is La Venta Monument 77. Interestingly, the element worn on the belt of the Lerdo monument (Figure 5) also links it to La Venta Monument 77, which wears an identical belt. Given the presumed association of these monuments with themes of rulership, we cannot rule out the possibility that the northeastern Papaloapan plain fell under eastern Olmec hegemony for a time, but it would appear to relate to the apogee of La Venta and so postdate the Arroyo phase.

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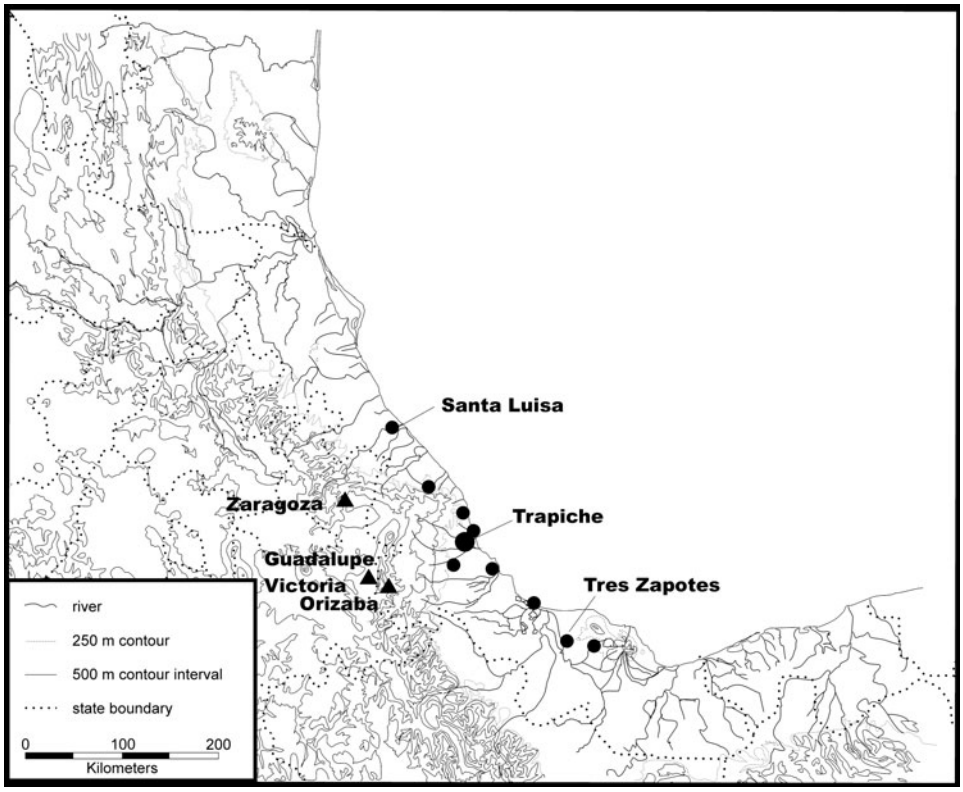


Figure 7. Distribution of sites with Trapiche type figurines (circles) and sources of obsidian used at Tres Zapotes in the Arroyo phase (triangles).

ARROYO PHASE SETTLEMENT IN THE EASTERN LOWER PAPALOAPAN BASIN

Recent surveys in the Eastern Lower Papaloapan Basin (ELPB) provide information of variable quality on Formative period settlement patterns (Figure 7). In a "siteless" feature-based survey of 28 km^2 around Angel R. Cabada, north of Tres Zapotes, Loughlin (2004) encountered 28 locations with Arroyo phase materials. These locations consisted primarily of later mounds into which nearby deposits with Arroyo phase sherds had been redeposited as fill. Clusters of these locations and isolated finds suggest the existence of Arroyo phase communities on the scale of villages or hamlets, although their extent is difficult to determine due to heavy alluviation covering most of the in situ deposits.

Kruszczynski (2001) surveyed a 24 km^2 area covering the southwest quadrant of Cerro el Vigía. At the time of Kruszczynski's survey, the Arroyo phase had not been identified, and the author did not discriminate between the Middle and Late Formative periods (Tres Zapotes and Hueyapan phases). It is therefore possible that some Arroyo phase occupations were lumped with later phases. Nevertheless, no site of Late Formative period date or earlier in Kruszycynski's survey was larger than 1.2 ha.

In a more expansive but less intensive survey that extended from west of Angel R. Cabada south to Tres Zapotes, the late Ignacio León Pérez (2003) identified 31 sites with Formative period components in an area of 356 km^2. All except three of these sites are classified as villages and hamlets. Unfortunately, León Pérez's report does not distinguish chronological subdivisions of the Formative period, but the one center for which ceramic type frequencies are provided is clearly Late Formative period in date, and the other



Figure 8. Olmec Monument found in municipio of Lerdo. Photo by Pool.

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Figure 9. Olmec Monument found in municipio of Cabada. Photo by Pool.

two Formative period "centers" are described as occupying 2 ha or less. Therefore, to date, it is fair to say that no Early Formative period administrative center has been identified in the ELPB. Rather, the area appears to have been lightly occupied by hamlets and villages, including a medium to large village at Tres Zapotes.

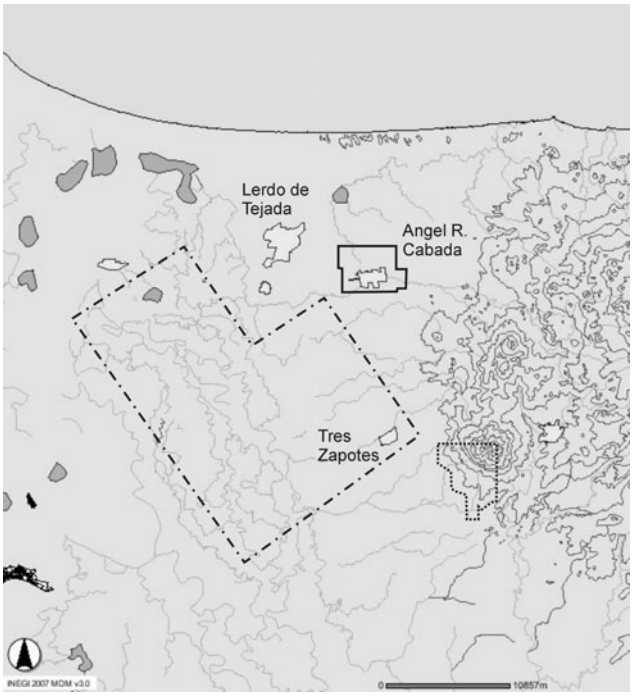


Figure 10. Map of settlement surveys in the Eastern Lower Papaloapan Basin: solid line, El Mesón area (Loughlin 2004); dotted line, Cerro el Vigía (Kruszczynski 2001); dashed-and-dotted line, JIMBA 3D survey (León Pérez 2003). MAP modified after INEGI 2007.

DISCUSSION AND CONCLUSION

The Arroyo phase artifact assemblage from Tres Zapotes underscores the heterogeneity of Gulf Olmec material culture as well as differential participation of Gulf Olmec communities in overlapping social and economic networks. Ceramic pastes are primarily of local materials, incorporating alkali basalt ash as a temper, as well as widely available quartz sand. This is hardly surprising. What *is* surprising is the degree to which the assemblage differs from contemporaneous assemblages at San Lorenzo and El Macayal at modal and typological levels, with far less brushed Camaño Coarse-like pottery and much more orange-paste pottery. In fact, the ceramic assemblage of Tres Zapotes appears less similar to that of San Lorenzo in several respects than does that of the far more distant Soconusco site of Canton Corralito reported by Cheetham (2010). We also note differences in the relative frequencies of tecomates between the Arroyo phase (12.1% of 173 rims) and the Coyame phase at La Joya (about 45%) (Arnold 2003:Figure 6). This may relate to greater residential mobility at La Joya, where Arnold (1999) argues that tecomates served as multifunctional vessels that offered a compromise among requirements for "transportability, durability, and cooking effectiveness" (Arnold 2000:127).

Ceramic decorative techniques reflect the participation of Tres Zapotes in regional style zones of the Gulf Coast (especially for Limón Carved-Incised decoration and Tatagapa Red incised designs) as well as incorporating motifs, like incised music brackets, that appear to be more common in the highlands.

Figurine styles likewise exhibit a combination of more typically Gulf Olmec Styles (Type I baby faces, solid San Lorenzo heads) and styles with a central Gulf orientation (Trapiche style heads) not typical of eastern Olmec centers, with the latter predominating.

Materials for grinding stones exhibit local patterns of exploitation, all apparently coming from western Tuxtlas basalt sources, principally Cerro el Vigía. On the other hand, obsidian, necessarily from sources beyond the Gulf Coast, came from a smaller and more spatially restricted suite of sources than at San Lorenzo, and these were concentrated in eastern Puebla and adjacent Veracruz.

From these observations we may conclude, first, that Olmec material culture was not homogeneous across Olman, a point that has been made by others, especially Philip Arnold and Robert Santley (Arnold 2000, 2003; Santley et al. 1997). Second, Olmec social networks were not tightly bounded, at least inasmuch as we can discern from the flow of information as represented in pottery and figurine styles. Third, Early Formative period Olmec communities participated differentially in overlapping long-distance exchange networks. Although Tres Zapotes may well have obtained its ilmenite cubes from intermediaries at San Lorenzo, it seems too much of a coincidence that the obsidian at Tres Zapotes comes exclusively or nearly so from the nearest sources and that the amount of obsidian reaching Tres Zapotes appears to decline with distance from the source, if control over the acquisition of obsidian was not in local hands.

At the regional scale, what settlement data exist do not indicate the establishment of an administrative hierarchy in the region, either developed internally or imposed from without. Of course, we cannot say if the Arroyo phase witnessed a reorganization of settlement because we have no information on pre-Arroyo phase settlement. With regard to more overt indicators of power, Olmec monuments reasonably interpreted as proclaiming political authority exist in

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the ELPB, but with two possible exceptions (Tres Zapotes Monuments L and M) they appear to postdate the Arroyo phase and the two with the strongest similarities to eastern Olmec sculptures, those from Cabada and Lerdo, are linked by iconography and style to La Venta. Early Formative period monumental architecture simply has not been detected in the region.

We find little support in the foregoing for external political domination of the ELPB in the Early Formative period. But even if San Lorenzo claimed nominal dominion over the area, its inhabitants appear to have exercised considerable autonomy in their tastes for material culture and their external interactions. The larger point, though, is that Early Formative Gulf Olmec society was not a homogeneous entity, and it cannot simply be reduced to San Lorenzo. Rather, we must continue to explore the interactions of other Gulf Olmecs with their contemporaries within Olman and beyond.

RESUMEN

Para elaborar modelos de la participación de los olmecas en las redes de interacción del período formativo temprano se requiere de un mejor conocimiento de las relaciones de las comunidades olmecas del golfo entre ellos así como con otras sociedades contemporáneas en otras partes de Mesoamérica. Comparamos los conjuntos de alfarería, figurillas y obsidiana de un componente del formativo temprano recién identificado en Tres Zapotes con los conjuntos contemporáneos de San Lorenzo y Macayal en la cuenca del río Coatzacoalcos. Nuestro análisis indica que los habitantes de la aldea en Tres Zapotes interaccionaron con poblaciones en el este de Olman pero también elaboraron sus propias ligas económicas y sociales con el centro de Veracruz y las tierras altas de México. Estos datos sugieren un paisaje heterogéneo en términos económicos y políticos en el cual las unidades políticas de diversos niveles de complejidad participaron en redes traslapadas de interacción, alianza y competencia dentro y fuera de Olman.

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REFERENCES

Agrinier, Pierre
1984 *The Early Olmec Horizon at Mirador, Chiapas, Mexico*. Papers of the New World Archaeological Foundation No. 48, Provo, UT.

Arnold III, Philip J.
1995 Ethnicity, Pottery, and the Gulf Olmec of Ancient Veracruz, Mexico. *Biblical Archaeologist* 58:191–199.
1999 Tecomates, Residential Mobility, and Early Formative Occupation in Coastal Lowland Mesoamerica. In *Pottery and People*, edited by James M. Skibo and Gary M. Feinman, pp. 157–170. University of Utah Press, Salt Lake City.
2000 Sociopolitical Complexity and the Gulf Olmecs: A View from the Tuxtla Mountains, Veracruz, Mexico. In *Olmec Art and Archaeology in Mesoamerica*, edited by John E. Clark and Mary E. Pye, pp. 117–135. National Gallery of Art, Washington, DC.
2003 Early Formative Pottery from the Tuxtla Mountains and Implications for Gulf Olmec Origins. *Latin American Antiquity* 14:29–46.

Arnold, Philip III J., and Billie J. A. Follensbee
2004 Early Formative Figurines from La Joya: Implications for Gulf Olmec Regional Variation. In *Faces of Continuity and Change: Figurine Studies at the Turn of the Millenium*, edited by Charles Kolb and Cynthia Otis-Charlton. University of Arizona Press, Tucson.

Arnold III, Philip J., Christopher A. Pool, Ronald R. Kneebone, and Robert S. Santley
1993 Intensive Ceramic Production and Classic-Period Political Economy in the Sierra de los Tuxtlas, Veracruz, Mexico. *Ancient Mesoamerica* 4:175–191.

Blomster, Jeffrey P.
2002 What and Where is Olmec Style? Regional Perspectives on Hollow Figurines in Early Formative Mesoamerica. *Ancient Mesoamerica* 13:171–195.

Cheetham, David
2010 Cultural Imperatives in Clay: Early Olmec Carved Pottery from San Lorenzo and Cantón Corralito. *Ancient Mesoamerica* 21:165–186.
2011 *Interregional Interaction and Social Identity in Mesoamerica, 1200-1000 B.C.: A Possible Olmec Enclave on the Pacific Coast of Chiapas, Mexico.* Unpublished Ph.D. dissertation in preparation, School of Human Evolution and Social Change, Arizona State University, Tempe.

Clark, John E.
1997 The Arts of Government in Early Mesoamerica. *Annual Review of Anthropology* 26:211–234.

Clewlow, C. William, Richard A. Cowan, James F. O'Connell, and Carlos Beneman
1967 *Colossal Heads of the Olmec Culture*. Contributions of the University of California Archaeological Research Facility, No. 4. University of California, Berkeley.

Cobean, Robert H., Michael D. Coe, Edward A. Perry, Jr., Karl K. Turekian and Dinkar P. Kharkar
1971 Obsidian Trade at San Lorenzo Tenochtitlan, Mexico. *Science* 174:666–671.

Cobean, Robert H., James R. Vogt, Michael D. Glascock, and Terrance L. Stocker
1991 High-Precision Trace-Element Characterization of Major Mesoamerican Obsidian Sources and Further Analyses of Artifacts from San Lorenzo Tenochtitlan, Mexico. *Latin American Antiquity* 2:69–91.

Coe, Michael D. and Richard A. Diehl
1980 *In the Land of the Olmec: Vol. 1, The Archaeology of San Lorenzo Tenochtitlán*. University of Texas Press, Austin.

Cyphers, Ann, and Anna Di Castro Stringher
1996 Los artefactos multiperforados de ilmenita en San Lorenzo. *Arqueología* 16:3–14.

https://doi.org/10.1017/S0956536110000064 Published online by Cambridge University Press

de la Fuente, Beatríz
1977 *Los hombres de piedra: Escultura olmeca*. Universidad Nacional Autónoma de México, Mexico City.
Drucker, Philip
1943 *Ceramic Sequences at Tres Zapotes, Veracruz, Mexico*. Bureau of American Ethnology Bulletin 140. Smithsonian Institution, Washington, DC.
Fernandez, Louis A., and Michael D. Coe
1980 Appendix 2. Petrographic Analysis of Rock Samples From San Lorenzo. In *In the Land of the Olmec: Vol. 1, The Archaeology of San Lorenzo Tenochtitlán*, edited by Michael D. Coe and Richard A. Diehl, pp. 397–404. University of Texas Press, Austin.
Flannery, Kent V. and Joyce Marcus
2000 Formative Mexican Chiefdoms and the Myth of the "Mother Culture". *Journal of Anthropological Archaeology* 19:1–37.
García Payón, José
1942 Conclusiones de mis exploraciones en el Totonocapan meridional, temporada 1939. *27th International Congress of Americanists* 2:88–96.
1966 *Prehistoria de Mesoamérica*. Cuadernos de la Facultad de Filosofía, Letras, y Ciencias 31. Universidad Veracruzana, Xalapa, Ver.
1971 Archaeology of Central Veracruz. In *Archaeology of Northern Mesoamerica, Part 2*, edited by Gordon F. Ekholm and Ignacio Bernal, pp. 505–542. *Handbook of Middle American Indians, Vol. 11*, Robert Wallchope general editor. University of Texas Press, Austin.
Gonzáles, S. E., R. J. Behl, D. Cheetham, and H. Neff
2006 Petrographic Analyses of Early Formative Olmec Carved Pottery. Poster presented at the Archaeological Sciences of the Americas Symposium, University of Arizona, Tucson.
Guevara, María Eugenia
2004 *La cerámica de San Lorenzo Tenochtitlán, Veracruz: Origen y naturaleza.* Master's thesis. Facultad de Filosofía y Letras, Universidad Nacional Autónoma de México, Mexico City.
Instituto Nacional de Estadística, Geografía e Informática
2007 Mapa Digital de México. http://galileo.inegi.org.mx/website/mexico/viewer.htm?sistema=1&s=geo&c=1160. (Accessed August 31, 2007).
Joralemon, Peter David
1971 *A Study of Olmec Iconography*. Studies in Pre-Columbian Art and Archaeology, No. 7. Dumbarton Oaks, Washington, DC.
Knight, Charles L. F.
1999 *The Late Formative to Classic Period Obsidian Economy at Palo Errado, Veracruz, Mexico*. Unpublished Ph.D. dissertation, University of Pittsburgh, Pittsburgh.
2003 Obsidian Production, Consumption, and Distribution at Tres Zapotes: Piecing Together Political Economy. In *Settlement Archaeology and Political Economy at Tres Zapotes, Veracruz, Mexico*, edited by Christopher A. Pool, pp. 69–89. Cotsen Institute of Archaeology, University of California, Los Angeles.
Kruszczynski, Mark A. R.
2001 *Prehistoric Basalt Exploitation and Core-Periphery Relations Observed from the Cerro el Vigía Hinterland of Tres Zapotes, Veracruz, Mexico*. Unpublished Ph.D. dissertation, Department of Anthropology, University of Pittsburgh, Pittsburgh.
Kubler, George
1962 *The Art and Architecture of Ancient America*. Penguin Books, Baltimore.
León Pérez, Ignacio
2003 *Rescate arqueológico realizado en estudios sismológicos Jimba 3D, primera fase y segunda fase*. Report submitted to the Instituto Nacional de Antropología e Historia. Veracruz, Veracruz, Mexico.
Loughlin, Michael L.
2004 *Recorrido arqueológico El Mesón*. Report submitted to the Foundation for the Advancement of Mesoamerican Studies, Inc. Coral Gables, FL. http://www.famsi.org/reports/02058/index.html. (Last accessed June 16, 2010)
Lowe, Gareth W.
1989 Heartland Olmec: Evolution of Material Culture. In *Regional Perspectives on the Olmec*, edited by Robert J. Sharer and David C. Grove, pp. 33–67. Cambridge University Press, Cambridge.
Marcus, Joyce
1989 Zapotec Chiefdoms and the Nature of Formative Religions. In *Regional Perspectives on the Olmec*, edited by Robert J. Sharer and David C. Grove, pp. 148–197. Cambridge University Press, Cambridge.
Milbrath, Susan
1979 *A Study of Olmec Sculptural Chronology*. Studies in Pre-Columbian Art and Archaeology, No. 23. Dumbarton Oaks, Washington, DC.
Neff, Hector, Jeffrey Blomster, Michael D. Glascock, Ronald L. Bishop, M. James Blackman, Michael D. Coe, George L. Cowgill, Ann Cyphers, Richard A. Diehl, Stephen Houston, Arthur A. Joyce, Carl P. Lipo and Marcus Winter
2006 Smokescreens in the Provenance Investigation of Early Formative Mesoamerican Ceramics. *Latin American Antiquity* 17:104–118.
O'Rourke, Laura Catalina
2002 *Las Galeras and San Lorenzo: A Comparative Study of Two Early Formative Communities in Southern Veracruz, Mexico*. Ph.D. dissertation, Department of Anthropology, Harvard University, Cambridge.
Ortiz Ceballos, Ponciano
1975 *La cerámica de los Tuxtlas*. Unpublished Maestría thesis, Department of Archaeology, Universidad Veracruzana, Xalapa, Veracruz.
Pool, Christopher A.
1990 *Ceramic Production, Resource Procurement, and Exchange at Matacapan, Veracruz, Mexico*. Ph.D. dissertation, Department of Anthropology, Tulane University, New Orleans.
2007a *Olmec Archaeology and Early Mesoamerica*. Cambridge University Press, Cambridge.
2007b Stone Monuments and Earthen Mounds: Polity and Placemaking at Tres Zapotes, Veracruz, Mexico. Paper presented at the Dumbarton Oaks Pre-Columbian Symposium, Antigua, Guatemala.
Pool, Christopher A., and Michael A. Ohnersorgen
2003 Archaeological Survey and Settlement at Tres Zapotes. In *Settlement Archaeology and Political Economy at Tres Zapotes, Veracruz, Mexico*, edited by Christopher A. Pool, pp. 7–31. Cotsen Institute of Archaeology, University of California, Los Angeles.
Pool, Christopher A., and Ponciano Ortiz Ceballos
2008 Tres Zapotes como un centro olmeca: Nuevos datos. In *Olmeca: Balance y Perspectives. Memoria de la primera mesa redonda, Tomo II*, edited by María Teresa Uriarte and Rebecca B. González Lauck, pp. 424–443. Universidad Nacional Autónoma de México, Consejo Nacional para la Cultura y las Artes, Instituto Nacional de Antropología e Historia, and New World Archaeological Foundation, Mexico City.
Pyne, Nanette
1976 The Fire-Serpent and Were-Jaguar in Formative Oaxaca: A Contingency Table Analysis. In *The Early Mesoamerican Village*, edited by Kent V. Flannery, pp. 272–280. Academic Press, New York.
Santley, Robert S., Philip J. Arnold and Thomas P. Barrett
1997. Formative period settlement patterns in the Tuxtla Mountains. In *Olmec to Aztec: Settlement Patterns in the Ancient Gulf Lowlands*, edited by Barbara L. Stark and Philip J. Arnold III, pp. 174–205. The University of Arizona Press, Tucson.
Sharer, Robert J. and David C. Grove (editors)
1989 *Regional Perspectives on the Olmec*. University of Cambridge Press, Cambridge.
Stark, Barbara L.
2007 Out of Olmec. In *The Political Economy of Ancient Mesoamerica*, edited by Vernon L. Scarborough and John E. Clark, pp. 47–63. University of New Mexico, Albuquerque.
Stirling, Matthew William
1943 *Stone Monuments of Southern Mexico*. Bureau of American Ethnology, Bulletin 138, Washington, DC.
Stoner, Wesley D., Christopher A. Pool, Hector Neff and Michael Glasscock
2008 Exchange of Coarse Orange Pottery in the Middle Classic Tuxtla Mountains, Southern Veracruz, Mexico. *Journal of Archaeological Science* 35:1412–1426.
Stuiver, Minze, and Paula J. Reimer
2004 Calib rev4.4.2 Radiocarbon Calibration Program. Quaternary Isotope Lab, University of Washinbton, Seattle.
Symonds, Stacey, Ann Cyphers and Roberto Lunagómez
2002 *Asentamiento prehispánico en San Lorenzo Tenochtitlán*. Universidad Nacional Autónoma de México, Mexico City.
Taube, Karl A.
1995 The Rainmakers: The Olmec and their Contribution to Mesoamerican Belief and Ritual. In *The Olmec World: Ritual and Rulership*, edited by Jill Guthrie and Elizabeth P. Benson, pp. 83–103. The Art Museum, Princeton University, Princeton.

https://doi.org/10.1017/S0956536110000064 Published online by Cambridge University Press

2000 Lightning Celts and Corn Fetishes: The Formative Olmec and the Development of Maize Symbolism in Mesoamerica and the American Southwest. In *Olmec Art and Archaeology in Mesoamerica*, edited by John E. Clark and Mary E. Pye, pp. 297–337. National Gallery of Art, Washington, DC.

2004 *Olmec Art at Dumbarton Oaks*. Dumbarton Oaks Research Library and Collection, Washington, DC.

Weiant, Clarence W.

1943 *An Introduction to the Ceramics of Tres Zapotes, Veracruz, Mexico*. Bureau of American Ethnology Bulletin 139. Smithsonian Institution, Washington DC.

Wicke, Charles R.

1971 *Olmec: An Early Art Style of Precolumbian Mexico*. University of Arizona Press, Tucson.

Williams, Howel, and Robert F. Heizer

1965 Sources of Stones Used in Prehistoric Mesoamerican Sites. *Contributions of the University of California Archaeological Research Facility* 1:1–39.

https://doi.org/10.1017/S0956536110000064 Published online by Cambridge University Press