Discussions of ancient Maya political authority have largely focused on Classic period (ca. A.D. 250–900) royal courts and the extent of their control over the landscape by means of alliances, diplomacy, and warfare (see Garrison and Dunning 2009; Lucero 1999; Martin and Grube 2008). Yet it is important to emphasize that some of the greatest Classic Maya cities owe their eventual geographic locations to decisions made by settlers as early as the Middle Preclassic period (ca. 1000–300 B.C.). Recent finds have emerged from the Preclassic period that indicate a high degree of sociopolitical complexity, along with expressive resources that include mural painting and hieroglyphic writing (Estrada-Belli 2006, 2011; Hurst 2009; Saturno et al. 2005; Taube et al. 2010), elaborate architectural sculpture (Estrada-Belli 2011; Hansen 1998; Laporte and Fialko 1995), and dedicatory caches of greenstone axes (Estrada-Belli 2006, 2011; Inomata et al. 2009). Despite renewed archaeological attention to Preclassic contexts, however, the nature of Preclassic

For nearly a century, scholars have used astronomical evidence to explain the Lowland Maya architectural type known as “E-Groups” as solar observatories and, by extension, as locations for rituals related to solar and agricultural cycles. This article departs from the usual focus on the observational properties of E-Groups and places them in the context of early Maya monumentality during the Middle Preclassic period. Specifically, E-Groups are seen as the earliest monumental social spaces in the Maya Lowlands, with multifaceted functions and placements that indicate a shared social map of the landscape. Geographic information systems viewshed analysis of Middle Preclassic E-Group sites demonstrates that populations constructed E-Groups in places that maximized visibility of the nearby landscape. Viewsheds conducted at sites with Middle Preclassic E-Groups in the central Maya Lowlands suggest that the large plazas and similar monumental architecture represent the centers of comparable, mutually visible communities. Settlers founding these communities consciously created distance from neighboring monumental centers, perhaps as means of defining and buttressing group identity and undergirding spatial claims to political authority. Recent archaeological evidence affords clues that such spaces were civic, allowing architectural settings for social gatherings and access to resources.

Por casi cien años, diversos estudios se han basado en evidencia arqueoastronómica para tratar los complejos arquitectónicos del “Grupo Tipo E,” propio de las Tierras Bajas Mayas, como observatorios solares y, por consiguiente, como centros rituales relacionados con los ciclos solares y agrícolas. El presente artículo parte de las características observacionales de los Grupos Tipo E y los ubica en un contexto de desarrollo temprano de la monumentalidad en el mundo maya, durante el periodo Preclásico Medio. Específicamente, el artículo ubica a los Grupos Tipo E como los primeros espacios sociales-monumentales con funciones polifacéticas en las Tierras Bajas Mayas. Esto lo realiza tras presentar la localización de los grupos como evidencia de un mapa social del paisaje compartido entre los colonos mayas tempranos. El autor usa sistemas de información geográfica de sitios con Grupos Tipo E del Preclásico Medio para demostrar que las poblaciones construyeron los Grupos Tipo E en lugares que maximizaron la visibilidad sobre los terrenos aledaños. El análisis del campo visual llevado a cabo en sitios con Grupos Tipo E del Preclásico Medio en las Tierras Bajas Mayas centrales sugiere que las plazas monumentales con la arquitectura similar representan los centros de comunidades comparables. Los fundadores de estas comunidades habrían creado conscientemente distancia de los centros monumentales vecinos, quizás con el fin de definir o reforzar una identidad grupal o de sustentar autoridad política sobre reclamos territoriales. El artículo presenta evidencia arqueológica reciente sobre el uso cívico de dichos espacios monumentales tempranos, espacios que proveían de un marco arquitectónico para concurrencias sociales y a la vez facilitaban el acceso a distintos recursos.

James A. Doyle

Copyright ©2012 by the Society for American Archaeology

355
Maya political authority and the emergence of monumental centers remains opaque.

During the Middle Preclassic, the Maya built the first monumental architecture, which implies large-scale mobilization of labor. The current article considers this period of incipient monumentality as a foundation for concepts of landscape and authority broadly shared and linked to later, known Maya groups. Specifically, the article traces significant shifts in Maya monumentality throughout the Middle Preclassic period that culminated in the construction of wide plazas and pyramidal platforms that characterize posterior Lowland Maya settlements. A geographic information systems (GIS) examination of a hallmark architectural type, the so-called E-Groups, shows that a regular distribution of settlements, and thus a shared spatial consideration of the landscape, may have existed as early as 500 B.C. In such settlements, monumental plaza groups with similar architectural plans formed the civic centers of comparable communities. The discussion explores archaeological data to account for such a social map of the landscape, in relation to the development of political authority in the Middle Preclassic Lowlands.

Building Big

Archaeologists have long recognized the correlation of early complex societies and large settlements with monumental architecture (e.g., Childe 1950:12). Monumental architecture, a cross-cultural phenomenon, consists of facilities built with scale and architectural elaboration that “exceed the requirements of any practical functions that a building is intended to perform” (Trigger 1990:119). Still, the nature of the relationship among the ancient landscape, aggregations of populations, and monumental architecture remains unclear (see Joyce 2004; McAnany 2010:141–157). Materials that archaeologists interpret as monumental are typically located in culturally important places and constructed with significant human energy, by either a practiced specialist or a large amount of people (Trigger 1990:121; Willey 1962:1–2). But why did people settle densely and undertake massive building projects in certain places, and at certain points in history, but not in others? What makes architecture “monumental” is hard to pinpoint, but “the immense scale of these constructions bespeaks a desire to transform the landscape, to engineer a cultural topography that radically altered living space” (McAnany 2010:145). Thus monumentality, or the social impulse to build big things, is defined both by the intent and by the perception of elevated scale and durability.

Early Maya Monumentality, ca. 1000–700 B.C.

Maya Lowland communities did not construct monumental structures as defined above until after 700 B.C. (Awe et al. 1990; Garber et al. 2004; Hammond 1991; Joyce 2004; Lohse 2010; McAnany and López Varela 1999; Potter et al. 1984). Before this time, there is little evidence of archeaic, preceramic populations in the Lowlands (see Iceland 2005; Lohse 2010). Current palynological data show that maize cultivation (and possibly associated forest clearing) may have occurred between 5100 and 4600 cal B.P. (Pohl et al. 1996; Wahl 2005; Wahl et al. 2006, 2007). Maize pollen intrusion and disturbance taxa indicating forest clearance do not appear widely in the geological record until after 1500–1000 B.C. and sharply increase after 400 B.C. (Dunning et al. 2002; Estrada-Belli and Wahl 2010). The early settlers’ use of perishable construction material would explain the intrusion of maize pollen and the lack of clear archaeological evidence of agriculturalists. The strongest evidence of preceramic occupations comes from northern Belize, namely, near Colha (Iceland 2005; Lohse et al. 2006; Rosenswig and Masson 2001). The data show that there was a substantial population engaged in lithic production and intensive agriculture, with evidence of occupational continuity into the Middle Preclassic (Iceland 2005:16).

Although the timing is unclear and variable between regions, the first evidence of sedentary villages in the Maya Lowlands with concomitant ceramics comes from the time between 1000 and 700 B.C. (Cheetham 2005; Clark and Cheetham 2003; Forsyth 1999). Settlement pattern studies have concluded that people at this time lived in small house clusters, often close to permanent water sources, and did not engage in major landscape modification for construction purposes (Fialko 2000; Puleston 1973:311; Rice 1976:435; Ringle 1999:189; Rosenswig and Masson 2001). Early Middle Preclassic villagers also engaged in shared ritual practice and craft specialization, perhaps
reflecting social inequality through the presence of imported items, such as jade, shells, or obsidian (Hammond 1991; Hansen 1998, 2000; Hendon 1999; McAnany and López Varela 1999:155). The introduction of ceramic production and long-distance trade items signals that the Early Middle Preclassic settlers began to invest more heavily in places on the landscape. Perhaps several kin groups cooperated as communities, centered on a specific geographic area. Presumably, the communities began cooperating with neighbors through trade networks to obtain long-distance commodities. Such cooperation could be the mechanism to explain shared customs and architectural conventions visible in the archaeological record. Most significantly, the material changes that occur in personal items seem to correspond to a major shift in residential constructions by 700 B.C., “most notably] the partial replacement of small perishable structures by permanent raised masonry or earthen house platforms” (Ringle 1999:190).

Although few settlements from this time have been extensively excavated, the earliest detectable buildings in the Maya Lowlands were built on the ground surface with a perishable superstructure (Gerhardt and Hammond 1991:99). Subsequent buildings took the form of apsidal, keyhole-shaped, or circular low platforms with or without superstructures (Aimers et al. 2000; Awe et al. 1990; Gerhardt 1988; Hammond 1991; Hansen 1998; Inomata et al. 2009; Ricketson and Ricketson 1937). As Gerhardt and Hammond (1991:101–102) describe at Cuello, the low platforms included a low retaining wall of limestone cobble and a core of small stones, sealed with a layer of limestone plaster. The introduction of stone-lined platforms and plaster floors is the earliest evidence of an emerging Maya Lowland monumentality.

Buildings of this type exist at several sites in northern Belize (Garber et al. 2004; McAnany and López Varela 1999; Potter et al. 1984). The residents periodically renewed the platforms by covering them with new layers of plaster and building new superstructures. This activity often included the burial of deceased family members below the floor. Over time, both the platforms and the outdoor patios were repaved with plaster, thus sealing the previous occupation levels and raising the relative elevation of the building area. In subsequent phases, people invested more labor including steps, moldings, and interior thresholds, which eventually led to solid retaining walls (Gerhardt and Hammond 1991:102). This shift to elaborate entrances and durable stone walls of residential platforms signals the gradual development of Middle Preclassic Lowland monumental architecture in the context of living space. The monumentality of living space, rather than large ceremonial earthen platforms (see Joyce 2004:10), signifies intent to construct larger, more permanent structures, although the perceived manipulation of scale would have only affected immediate inhabitants or visitors.

The Rise of Cardinal Rectangularity, ca. 700–500 B.C.

As settlements grew, populations constructed large plazas and monumental buildings over the circular or apsidal platforms, especially noted at Uaxactún, Guatemala, and Cahal Pech, Belize. Aimers et al. (2000) provide a synthesis of work on round structures from the Middle Preclassic at Cahal Pech, which often show signs of dismantling and superimposition of rectilinear structures in later time periods. The authors argue that round structures were important platforms for performance and ancestor veneration and touch upon the implications of the architectural transition from round to rectangular building forms, which at Cuello also included the first superstructures with limestone walls (Aimers et al. 2000:80–81; Gerhardt and Hammond 1991:104; Hendon 2000). At some point thereafter during the Middle Preclassic, round structures were rendered “obsolete” (Aimers et al. 2000:83). Aimers et al. argue (2000:81) that it “does not appear to be the transformation of the formal qualities of a dwelling, but the complete abandonment of one building type (the exposed circular platforms) and its replacement with another (the rectilinear building with superstructure).” The appearance of rectangular platforms and pyramidal structures perhaps reflects social changes as a result of population growth at a local level. Kent Flannery (1972:39–40, 2002:431) has argued that rectangular houses allow space for entire nuclear families and the easy addition or subtraction of rooms, perhaps related to changes in residential strategies that cut across kinship ties in early Mesoamerica.

The earliest monumental plazas and buildings in the Middle Preclassic that mimicked the forms...
of earlier domestic architecture signal a second distinct shift in the social importance of monumentality in the built environment. Lowland Maya architecture developed as a discrete style with strong evidence of planning related to the cardinal directions, with similar building groups and construction techniques (Hansen 1998). The directionality of architecture, and possible general patterns of Maya cosmology, is also reflected in dedicatory offerings at Ceibal and Cival (Bauer 2005; Estrada-Belli 2006, 2011; Willey 1978). The point to emphasize here is that after about 700 B.C., buildings and preexisting social spaces became truly monumental in intent and perception in the Lowlands for the first time. Large plazas and platforms, requiring a sizable labor force to construct, signal to archaeologists that populations in the Lowlands aggregated or cooperated at this time. Recent evidence from the central Lowlands shows that Middle Preclassic population nucleation and monumental building very often included the construction of a distinct architectural pattern, labeled and now reified as the E-Group type. The following discussion explores the sociopolitical implications of the distribution of the E-Group pattern, itself an expression of Lowland Maya monumentality that transcended residential buildings.

To “E” or Not to “E”

“E-Groups” are named after Group E at Uaxactún, excavated by the Carnegie Institution of Washington in the early twentieth century (Blom 1924; Chase and Chase 1995; Ricketson 1928; Ricketson and Ricketson 1937; Ruppert 1940). These groups most often contain the earliest cultural material at their respective sites (Clark and Hansen 2001; Fialko 1988; Hansen 1992; Laporte and Fialko 1995; Laporte and Valdés 1993). Various E-Groups exhibit similar features and orientation, all arranged around a rectangular plaza that served as a defined level space. The primary buildings include a large square-based pyramid on the western side of the plaza, usually “radial,” or with staircases on each face (see Coggins 1980; Cohodas 1980). East of the pyramid lies a long, narrow platform with the longer axis running north to south, sometimes containing three structures. These three structures, usually dating to the Classic period, generally lined up with the locations of the sunrise on the solstices and equinoxes when viewed from the western pyramid. Thus, scholars consider that the original configuration of E-Groups facilitated observation of solar movement, albeit with some reservations about their accuracy as actual observatories (Aveni and Hartung 1989; Aveni et al. 2003). The precise social function or meaning of E-Groups eludes archaeologists, although most concur that they are not residential spaces. The main argument about the meaning of E-Groups is that they were used for rituals commemorating agricultural cycles (Aimers 1993:46; Aimers and Rice 2006; Aveni and Hartung 1989; Aveni et al. 2003; Aylesworth 2004; Chase and Chase 1995; Stanton and Freidel 2003).

Origins

The origins of E-Groups are poorly understood. Some scholars propose E-Groups as part of a larger construction pattern, dubbed the “Middle Formative Chiapas” (MFC) pattern, with architectural groups on a north–south axis found at many different sites (Clark and Hansen 2001:4). The MFC pattern also contains residential platforms or “compounds” of approximately 80 x 80 m (Clark and Hansen 2001:2; Hendon 1999). Some have also posited that the earliest MFC groups exist in the Grijalva Basin of Chiapas or may be similar to a group at the Olmec site of La Venta, Tabasco, Mexico (Clark and Hansen 2001; Lowe 1989:61, Figure 4.1a). Unfortunately, a lack of precise comparative chronology between the Maya Lowlands and western Mesoamerica impedes an understanding of where and when E-Groups first appeared. The available data from the Maya Lowlands show consistency in construction techniques and dimensions of buildings that differs greatly from similar groups, such as at Chiapa de Corzo and Mirador, Chiapas (cf. Clark and Hansen 2001:Figures 1.3–1.4). The hypothetical existence of a distinct regional pattern in the central Maya Lowlands suggests an independent, parallel development from similar groups in Chiapas and Tabasco, although more data are needed (Hansen 2000:56). Regardless of origin, the frequency and distribution of E-Groups at major Lowland population centers during the Preclassic imply that the structures and wide plaza formed an integral part of community life (Aimers and Rice 2006:82; Chase and Chase 1995:100; Clark and Hansen 2001).
Categorization

Whereas E-Groups in the past have been treated as a unitary phenomenon, new data necessitate a clear definition of the formal and chronological criteria used here. First, architectural form and scale are of the utmost importance when defining the heuristic category of E-Groups. In the present work, E-Groups have wide rectangular plazas of approximately 50 x 100 m, as bounded by a large western pyramid of approximately 30–60 m at the base and a long eastern platform ranging from approximately 50 to 100 m north–south (Laporte 2001). The current sample consists of E-Group sites that exhibit similar architectural forms, most importantly the defined level plaza space. Most of the E-Groups that fit these criteria are located in the central Maya Lowlands, ranging from southern Campeche eastward to the Holmul River Valley and south to the Petén lakes region, as noted by Ruppert (1940:224) and others.

One major obstacle to the application of the E-Group category is that the visible dimensions generally reflect the Late Preclassic configurations of such groups. Chronological history is crucial, as the architectural groups did not develop overnight; nor did they remain fixed in form for centuries. However, as demonstrated through stratigraphic excavation, many E-Groups are clearly built upon smaller forms in the same arrangement erected during the Middle Preclassic (e.g., Doyle et al. 2011; Estrada-Belli 2011; Laporte and Fialko 1995; Laporte and Valdés 1993). The limited evidence of Middle Preclassic E-Group architecture shows construction on natural bedrock, or masonry and plaster platforms, perhaps with superstructures (Doyle et al. 2011; Estrada-Belli 2006:58, 2011:77; Hansen 1998; Laporte and Fialko 1995).

Another challenge with previous E-Group research is a tendency to view the type synchronically over too long a time range. As Laporte (1993:303) and Fialko (1988; Laporte and Fialko 1995) have noted, there is a clear disconnection in the meanings and function of E-Groups between the Preclassic and Classic periods. Although some have argued that the “construction of E-groups in general appears to have spanned most of Preclassic and Classic Maya history” (Aimers and Rice 2006:80), the dearth of accurate and contemporaneous site plans impedes a conclusive understanding of E-Group chronology in many sites. Subtypologies of E-Groups based on Late Preclassic arrangements (see Chase and Chase 1995), and possible variant E-Group examples in the Classic period (e.g., Guderjan 2006), are also not included in the current analysis.

The comparative data utilized here come from three groups of sites: (1) those with certain Middle Preclassic E-Groups, (2) sites with unexcavated E-Groups but nearby evidence of Middle Preclassic occupation, and (3) unexcavated sites with E-Groups that fit the formal criteria (Figure 1). Examples with stratigraphic evidence of Middle Preclassic E-Group construction include Cival (Estrada-Belli 2011), El Palmar (Doyle et al. 2011), Nakbé (Hansen 1992, 1998), Naranjo (Fialko 2004:180; Gámez 2005:229; Quintana 2008; Quintana and Wurster 2004), San Bartolo (Urquizú and Saturno 2008), Tikal (Laporte and Fialko 1995), and Uaxactún (Laporte and Valdés 1993; Ricketson and Ricketson 1937). Examples of E-Groups as defined above that have not been fully excavated but exist at sites with firm archaeological evidence for Middle Preclassic occupation are Calakmul (Carrasco Vargas 1999, 2003; Delvendahl 2008; Domínguez Carrasco 1994:301), Cenote (although as Chase [1983:149] notes, the E-Group may have Middle Preclassic construction), El Mirador (Forsyth 2006:499–500; Hansen 1990, 1998), Mucaancah (Šprajc 2012), Nakum (Quintana and Wurster 2002; Žralčka 2008:31), Wakná (Hansen 1994:19, 1998), Yaxhá (Quintana 2008; Quintana et al. 2000:279), and Yaxnohcah (Šprajc 2012). Finally, many sites exhibit E-Groups with the formal criteria but have yet to be excavated thoroughly, such as Balakbal (Ruppert and Denison 1943; Šprajc 2012), El Cedro (Mejía 2009), El Pesquero (Mejía 2009), Las Torres (Mejía 2009), Naachtun (Ruppert and Denison 1943), Uxul (Paap et al. 2010; Ruppert and Denison 1943), and Xunlal (Mejía 2008:654, Figure 12). The current E-Group model, then, is based on sites with similar architectural patterns, divided into three groups by building chronology ranging from Middle Preclassic certainty, to high probability, to a predicted Middle Preclassic outcome (see Figure 1). Further archaeological investigation in the E-Group plazas of the high-probability and predicted groups of sites could recover similar evidence as found in the first group of well-excavated examples. It is also probable that other E-Groups exist outside the known
Figure 1. Distribution of E-Group sites mentioned in the text with confirmed, probable, or unknown Middle Preclassic construction dates.
clusters in the study area (see Estrada-Belli 2011:Figure 4.5; Laporte 2001:Figure 1).

**E-Group Distribution, Landscape Visibility, and Community**

The distribution of the current sample of known Middle Preclassic E-Groups combined with probable and predicted Middle Preclassic E-Groups can provide clues to the earliest community organization in the Lowlands. The main premise in this study is that the Middle Preclassic Maya constructed settlements with monumental architecture in very specific locations on the landscape; in other words, although small villages probably existed across the Lowland terrain, only certain places became foci of monumental E-Group construction. Previous studies have concluded that Classic Maya sites generally lie in prominent areas of greater relative height than the average terrain (Podobnikar and Šprajc 2007). Thus during the Middle Preclassic, the distribution of E-Groups can provide information about the original choices made by settlers when building monumental centers.

A comparison of two neighboring sites from the well-excavated sample with very similar E-Group construction sequences can perhaps suggest a wider pattern. The first case involves the Mundo Perdido group at Tikal, one of the most thoroughly investigated E-Groups, and El Palmar, approximately 15 km to the west of Tikal, which I recently investigated as part of the Proyecto Arqueológico El Zotz (Figure 2). The El Palmar E-Group contains very similar evidence of construction over the Preclassic period to the Mundo Perdido group at Tikal (Figure 3). The proximity of the two sites raises the question, What factors could have contributed to two similar monumental plaza groups in these specific locations?

The Mundo Perdido group demonstrates a continual, episodic occupation from the Early Middle Preclassic period to the Terminal Classic period (ca. 1000 B.C.–A.D. 900 [Laporte and Fialko 1995]). The El Palmar E-Group exhibits a similar Middle Preclassic beginning but seems to have been completely abandoned during the transition from the Late Preclassic to the Early Classic (Doyle et al. 2011). Tunnel excavations in the western pyramids of each site (El Palmar Structure E4-1 and Tikal Structure SC-54) have revealed at least five to six construction phases throughout the Preclassic, beginning with earthen platforms, transitioning to masonry architecture surfaced with stucco, and finally solid block construction with modeled stucco facades (see Figure 3). The architectural fill consists of *bajo* mud and fine limestone blocks and soils (Doyle et al. 2011:47–48; Laporte ca. 1983:1-08–1-25).

Radiocarbon dates from the fills at El Palmar generally confirm the time line set out by Laporte and Fialko (1995) for the Mundo Perdido (Table 1). During the earliest phases of construction, ca. 700–600 B.C., the residents of El Palmar excavated the nearby *laguna* for architectural fill, with sediment originally deposited around 1800 B.C. (Beta-285473, Beta-285474). This act could also have been motivated by a need to modify the *laguna*, a hypothesis subject to future investigation. The subsequent generations constructed platforms between 600 and 300 B.C., which culminated in a large tiered pyramid with stucco-covered-stone facades, approximately 18–20 m in height, dating to the early Late Preclassic, ca. 300 B.C.–A.D. 1 (Beta-265817, Beta-285472). The Early Classic population at El Palmar seems to have ceased major constructions by about A.D. 300 (Beta-265821), and the E-Group was completely in ruins by the Late Classic period (Beta-285471). On the other hand, the Mundo Perdido shows intense construction episodes and ceramic production in the Early Classic and Late Classic periods (see Laporte and Fialko 1995:Figure 3), conspicuously absent from El Palmar. Possible visitors in the Postclassic period (ca. A.D. 950–1520) utilized the lakeside ruins at El Palmar for hunting or to collect water from the *laguna* (Beta-285470). Dates from the nearby center of El Zotz demonstrate extensive occupation in the Postclassic (Arredondo Leiva and Houston 2008; Garrido López et al. 2010; Román and Houston 2009).

The monumental scale of the El Palmar and Tikal groups during the Preclassic is also very similar (Figure 4). Most notably, the plazas are of comparable width, a significant fact in light of the construction sequences mentioned above. Excavation data show that, as an initial step, the plazas were leveled and paved with plaster, with concurrent construction of the eastern platform and western pyramid. In both cases, the builders of subsequent phases went to great lengths to preserve the footprint of the plaza: to maintain the size over time, by constructing the bulk of structures away from
Figure 2. El Palmar site map.
the center, sometimes even destroying earlier structures (Doyle et al. 2011:48; Laporte ca. 1983; Laporte and Fialko 1995:Figure 6). A key point to note is that, despite the cessation of construction in many E-Groups during the Early Classic, the residents of monumental centers maintained the plaza space throughout generations of later settlement. This pattern of plaza preservation, also noted at many other sites in the area (see Estrada-Belli 2011:77), could possibly be a defining factor of E-Groups—that the absolute size of the plaza was crucial to those who built the group. One interpretation of the plaza size has been that it created sight lines that allowed for viewing of the sunrise on certain points throughout the year (see Aimers and Rice 2006:Figure 6). Recent research on plazas throughout many time periods in Mesoamerica also proposes that these wide level spaces were more than frames creating proper geometric conventions for astronomical alignments but actually gathering spaces for ritual performances (e.g., Inomata 2006; Lucero 2003). Thus, the respective E-Group plazas at Tikal and El Palmar were likely the setting of similar social activities for the inhabitants of each community.

**Spatial Analysis**

El Palmar and Tikal are located very close together (approximately 15 km), and GIS studies of line-of-sight show that the two centers were probably inter-

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Type of Material</th>
<th>Uncalibrated Age (B.P.)</th>
<th>2σ Calibrated</th>
<th>1σ Calibrated</th>
<th>13C/12C Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta-265817</td>
<td>Charcoal</td>
<td>2230 ± 40</td>
<td>390–190 B.C.</td>
<td>200–90 B.C.</td>
<td>–25.4</td>
</tr>
<tr>
<td>Beta-265821</td>
<td>Charcoal</td>
<td>1730 ± 40</td>
<td>A.D. 230–410</td>
<td>A.D. 250–380</td>
<td>–24.8</td>
</tr>
<tr>
<td>Beta-285470</td>
<td>Charcoal</td>
<td>720 ± 40</td>
<td>A.D. 1240–1300 and 1370–1380</td>
<td>A.D. 1270–1290</td>
<td>–26.4</td>
</tr>
</tbody>
</table>
visible, even in Preclassic times (Doyle et al. 2011). Remote sensing and settlement survey near El Palmar (Garrido López et al. 2010) and Tikal (Webster 2007) have yet to reveal an E-Group as defined above between or near the two sites. Thus, at least in the area around these two Middle Preclassic monumental centers, only two specific places contain a major plaza with a similar inventory of associated major architectural constructions. Therefore, spatial analysis of these two sites has the potential to address early geopolitical processes and motivations to build at particular locations across the central Maya Lowlands. Prior distributional analysis of E-Group sites in the area based on two-dimensional maps (e.g., Aimers 1993) has been inconclusive, in part because it lacked a connection to the topography of particular local landscapes. For instance, many have noted that there seems to be a minimum
arbitrary radius around each E-Group, but the distance is inconsistent within the study region and other Lowland areas (Figure 5).

Recent spatial analysis in archaeology has utilized GIS as a tool to provide alternative hypotheses for site location, by considering visual perception of the landscape through viewshed analysis (Arkush 2011; Doyle et al. 2012; Estrada Belli and Koch 2007:266; Kosiba and Bauer 2012; Podobnikar and Šprajc 2007; see also Krist and Brown

Figure 5. E-Group sites with arbitrary 6 km buffer zones applied.
Spatial research on Classic Maya cities has proposed viewshed or direct line-of-sight observation as a motivation for certain Classic period constructions (Estrada-Belli 2008; Golden 2010; Podobnikar and Šprajc 2007; Quintana 2008:Figure 10). This study builds on such research and seeks to use viewshed analysis as a method to evaluate visibility as a possible factor in the Middle Preclassic Maya spatial consideration of the landscape. Several limitations affect the utility of viewshed analysis in the Maya Lowlands, mainly the consideration of what a human viewer could have seen in the past or whether visibility was meaningful to inhabitants. (For further critiques of viewshed analysis in general, see Conolly and Lake 2006:228–231; Wheatley and Gillings 2000:2.)

Between Tikal and El Palmar, at a distance of 15 km, probably only the largest structures, smoke, and fire would have been visible to the naked eye. Regarding vegetation, viewshed analysis assumes a degree of deforestation, some evidence of which exists in paleoenvironmental investigations (Estrada-Belli and Wahl 2010; Wahl et al. 2006, 2007). Nevertheless, monumental buildings would not have supported vegetation during their use; furthermore, despite full forest cover today at sites such as El Palmar, Tikal, and Yaxhá, ground-truthed observations still show extensive viewsheds. The current study, which utilized both AIRSAR 5-m resolution and ASTER 30-m resolution digital elevation models, obtained results using the standard Viewshed feature in the Spatial Analyst Toolbox in the commercially available software ArcGIS 10 by ESRI. In the current analysis, cumulative viewsheds, or the sum of multiple generated viewsheds, display the visible topography from five viewer points on the approximate location of E-Groups at the sample sites, using the standard correction for the earth’s curvature.

From the approximate location of the El Palmar and Tikal E-Groups, it is clear that a large territory around each site is visible, with the majority of the visible areas mutually exclusive and nonoverlapping (Figure 6). The viewshed pattern hints that early E-Groups were constructed to exist on higher ground relative to nearby terrain to allow for a clear view of the nearby geographic area, not solely to view the sun rising on the solstices and equinoxes. Such distribution could perhaps be a consequence of the hydrological processes in the tropical environment, as communities avoided low-lying areas that flood during the intense rainy season. The fact that the viewsheds appear to be at intervals based on visibility of the landscape relative to each other may also speak to the original decisions of the settlers who built the E-Groups at Tikal and El Palmar. In other words, settlers of one area were conscious of how far away they were, or how visible the intervening territory was, from...
Figure 7. Viewsheds (dark gray) from Middle Preclassic E-Group sites. Dotted lines represent approximate area of viewshed extent. See Supplemental Figure 1 for color image.
Figure 8. Viewsheds (dark gray) from all E-Group sites. Dotted lines represent approximate areas of viewshed extent. See Supplemental Figure 2 for color image.
prior settlements when they began monumental constructions.

The El Palmar–Tikal pattern holds up when examining ASTER viewsheds of other Middle Preclassic E-Group sites in the region, and the landscape seems to contain communities with complementary areas of visible topography (Figure 7, Supplemental Figure 1). For example, Uaxactún and San Bartolo have expansive views, but aside from the elevated ridges, their areas of visible territory do not overlap. The same holds true for Cival and Naranjo, as their viewsheds are divergent except for the prominent ridge to the west of the sites. The Nakbé viewshed extends radially more than 10 km, supporting claims for its Middle Preclassic importance in the Mirador region (Hansen 1992, 2000). Expanding the viewshed pattern analysis to other E-Group sites suggests that although centers were intervisible, they did not share large views of the surrounding landscape (Figure 8, Supplemental Figure 2). For example, the views from Calakmul, Yaxnohcah, Naachtun, and Balakbal seem to cover a continuous large area, but closer examination reveals little overlap among the four viewsheds, despite their geographic proximity. The same pattern holds up for Uxul, El Mirador, Nakbé, Wakná, and Xulnal, some of the largest settlements in the Mirador region. Another cluster of close sites in the southern Mirador area, El Cedro, El Pesquero, and Las Torres, demonstrates that even the sites with the least intersite distance do not have significant overlapping viewsheds. Another notable characteristic of sites such as El Palmar, Cenote, and Yaxhá is that the viewsheds cover most, if not all, of the nearby water sources. The viewshed analysis supports the interpretation that the distribution of early monumental site cores, possibly as early as the Middle Preclassic, could have been based on sight lines and vistas.

Sociopolitical Implications of Early Maya E-Groups

Juan Pedro Laporte (1993:314) has argued that E-Groups are clues to understanding the extents of Early Classic sociopolitical units. The GIS research here supports that assertion, proposing the existence of distinct communities with similar monumental spaces as far back as the Middle Preclassic period. The architectural similarity and geographic distance of the E-Group communities could imply that each asserted a conceptual autonomy relative to its neighbors. But what was the sociopolitical impulse for populations to construct new monumental centers rather than migrate to existing communities?

E-Groups could perhaps be the earliest examples of a Maya civic requirement for sociopolitical units, a space and monumental architectural formation necessary for settlers to interact with one another. Adam Smith elaborates on “civic” values embedded in the political landscape: “The political landscape is constituted in the places that draw together the imagined civil community, a perceptual dimension of space in which built forms elicit affective responses that galvanize memories and emotions central to the experience of political belonging” (2003:8). The fact that many monumental settlements in the Middle Preclassic Maya Lowlands seem to contain an E-Group speaks to its centrality to the daily lives of settlers, perhaps even a widespread belief that these spaces garnered a sense of belonging to a group identity. A sense of belonging forms a major part of the recently proposed model for a Classic Maya “moral community” (Houston and Inomata 2009:28–42). According to Houston and Inomata (2009:36):

There was not one moral community within the Classic Maya world but many, most more-or-less coterminous with individual kingdoms. . . . The conceptual origins of Classic Maya covenants lay deep in the past and, indeed, were not devised anew in each generation but built on the very premise of great antiquity.

Although little evidence exists regarding the dynamics of Middle Preclassic Maya moral communities or shared group identities, one could argue that the distribution of E-Groups represents the earliest archaeological evidence of many individuals adopting a shared covenant beyond the kin group. The covenant became manifest in the monumental gathering spaces and architecture.

In addition to group identity, many have stressed the importance of elite legitimation and the expression of political authority as motivations for building early monumental centers (see McAnany 2010:155–156). Though, as Ringle (1999:187) succinctly notes, “it seems improbable that Formative elites could somehow hoodwink an entire populace into building massive reminders of their humble station in life . . . monumental construction
expressed aspects of communal life that were of deepest importance.” Early E-Groups could represent the earliest large-scale places of community cohesion and political belonging in the Maya Lowlands. Viewshed analysis suggests that from E-Groups, one could visually perceive the limits of one’s community in relation to neighboring settlements. More broadly, it seems that Middle Preclassic monumentality coincided with the settlers’ distinct desire to create and maintain distance from others over the landscape, another nod to the confluence of group identity and possibly political authority. Future excavations in Middle Preclassic monumental civic centers will illuminate the sociopolitical relationship between these distinct, but architecturally similar, communities and the activities they engaged in during their daily lives.

**Discussion: Constructing Meaning**

Most prior research on the function of E-Groups operates on the assumption that “it is sufficient to repeat the generality that this special arrangement of mounds served ritual purposes, perhaps connected with observations of the sun’s passage and with calendrical rites” (Clark and Hansen 2001:23). The current discussion attempts to depart from this assumption. Recent archaeological evidence has opened new channels for research into the social meaning of the monumental plazas and associated buildings of the Middle Preclassic Maya civic spaces.

It is important to mention the implications of Middle Preclassic communities that did not construct E-Groups. The distribution of E-Groups described above applies to the central Lowlands, where known groups exhibit the most similar morphological and chronological similarities. E-Groups as defined are conspicuously absent at the same frequency in certain areas, including the Usumacinta drainage, the eastern (coastal) Lowlands of Belize, and the northern Lowlands, all regions that demonstrate ample evidence of Middle Preclassic occupations. Some E-Groups have been identified in these areas, but they are generally of differing scales and architectural forms than those in the central area, such as at La Técnica along the Usumacinta (Scherer et al. 2007) and Dzibilchaltún and Yaxuná in northern Yucatán (Andrews and Andrews 1980; Stanton and Freidel 2003, 2005), among others. A clear example of a Middle Preclassic site that lacks an E-Group civic space but shows evidence of shared Middle Preclassic Maya ritual practice is Cuello, Belize (see map in Hammond 1991:10–11; cf. Aimers 1993, cited in Aimers and Rice 2006:81). Why, then, would certain Preclassic centers noticeably lack monumental civic spaces and buildings that seem so prominent and necessary in other communities? If the construction of E-Groups indeed represents communities consciously positioning themselves on the landscape, what implications does this have for communities without such monumental civic spaces?

As mentioned, evidence for the chronological development of ritual activity that contributed to the monumental growth of E-Groups in the Middle Preclassic is largely inaccessible to current archaeological research methods. Therefore, it is impossible to distinguish between the dynamic historical trajectory of a site like Cuello and that of sites with E-Groups, such as Tikal and Uaxactún. Regardless, recent excavations and comparative evidence from across the Maya Lowlands bring to light new possibilities for central Lowland E-Groups. Specifically, evidence exists that E-Groups, and their common inventory of civic architecture, may have formed early centers of emerging political authority, as elite groups and individuals engaged with the spaces in which people gathered for various activities. The fact that many sites with Middle Preclassic E-Groups later developed into dynastic kingdoms invites further exploration of the relationship among E-Groups, population aggregation, and early Maya political authority.

**Lithic Production Evidence**

E-Group locations with a commanding view of the surrounding landscape could possibly relate to the appearance of “radial” pyramids, with staircases on all four sides, implicative of cosmic centrality and four-part movement and ritual (see Coggins 1980; Cohodas 1980). Unfortunately, due to overburden from Late Preclassic and Classic constructions, radial pyramids in the Middle Preclassic are difficult to identify, and such cosmological interpretations “may take as cause what may be consequences of the first monumental constructions” (Joyce 2004:8). Although excavations were unable to conclusively determine if the earlier
phases of the El Palmar E-Group pyramid, Structure E4-1 (Figures 2–4; Doyle et al. 2011), were radial, a striking feature of Middle Preclassic building practices became evident in building fills. When constructing the Middle Preclassic (ca. 500 B.C.) pyramid of the E-Group, the residents of El Palmar used distinct layers of dark mud from low-lying wetlands and a layer almost entirely composed of rock and chipped-stone tool production debitage (Figure 9). Excavators at Mundo Perdido Tikal report similar layers with large quantities of lithic materials (Laporte ca. 1983:1-19). Other Middle Preclassic sites with E-Groups have yielded large quantities of worked chert in architectural fills (e.g., San Bartolo [see Saturno 2003:321]).

It stands to reason that stone tools were a vital prerequisite for successful Middle Preclassic village life—from hunting to building shelter to agri-
cultural production. The debitage recovered at El Palmar consists of a large quantity of mid- and early-stage chert biface reduction flakes, suggesting that residents of El Palmar worked raw chert into biface preforms locally (Hruby and Lang 2009:310). This chert debitage may imply that El Palmar was located close to a large source of chert (see Hester and Shafer 1984). The possible proximity to chert sources has also been noted by archaeologists at other major Preclassic sites, such as Tikal (Moholy-Nagy 1997:296), San Bartolo (Garrison and Dunning 2009:535), and many sites in Belize (Cackler et al. 1999). The lack of a soil matrix in the lithic layer could signify that the debris was collected directly in the immediate area and deposited in one event when constructing the El Palmar pyramid. It remains unclear who was producing such quantities of stone tools at El Palmar or what prompted the seemingly simultaneous deposit of the debitage in the construction fill.

Although more lithic analysis is necessary, the possibility exists that the E-Group plaza served as a locus for early-stage stone tool production, that is, obtaining and reducing nodules into biface preforms. Thus the spatial distribution of Middle Preclassic E-Groups perhaps provides a window into the earliest civic centers of early “moral communities” engaging in daily tasks, such as stone tool production, in addition to ritual activities. The deposit of stone tools and debitage in architectural fills might have symbolic significance as well, considering that working stone was at the “center of craft production from the Early Preclassic onward” (Stuart 2010:297). Stuart (2010:286) notes that for the Classic Maya, stone was “an inherently powerful and timeless substance, a permanent material both of the earth and transcendent, evoking other spatial realms and categories.” Therefore layers of stoneworking by-products could be considered a deliberate offering, given as part of the building process. But currently it is unclear whether the lithic production was part of the motivation for creating these monumental buildings or a consequence of preexisting E-Group activities that were incorporated into subsequent renewal efforts.

Evidence for Gathering and Exchange?

As discussed above, scholarship on monumental civic spaces highlights a tension regarding the motivations to build: between expressions of group identity and statements of political authority—or a combination of both. A key fact remains certain about Middle Preclassic E-Groups: the initial act of construction always involved the building of a large, level plaza. These plazas would have accommodated many people, almost certainly more than the residents in the immediate vicinity, according to current archaeological evidence. The scale of these plazas could mean that people would have been traveling to the E-Groups from a distance, as proposed by Estrada-Belli for the site of Cival, where “the first inhabitants of the Cival community lived on hilltop farmsteads widely dispersed in a 3.7 km radius around the main hill. Construction of the first ceremonial plaza was contemporary with the first farming occupation and is not a result of gradual population increase” (Estrada-Belli and Wahl 2010:25). The likelihood that people from distant areas constructed, and periodically gathered in, these plazas has important implications when considering material culture evidence, specifically the distribution and homogeneity of certain ceramics from the Middle Preclassic period.

The innovation of Mamom-sphere ceramic technology happened in the Maya Lowlands around the same time as the appearance of E-Groups. Smith (1955) initially identified Mamom-type ceramics at Uaxactún, characterized by waxy slips and forms including everted-rim bowls and large, unslipped utilitarian jars. Many have noted that the widespread similarities in the form and surface treatment of Mamom ceramics may signal a consistent production process throughout a large area (Ringle 1999:198). However, no causal explanation or proposed social mechanism exists for such a wide distribution of similar household goods. One possibility is that the construction of monumental plazas and subsequent aggregation of large numbers of settlers could have contributed to such a reduction in the diversity and quality of clay sources used by potters, as argued by Fowles et al. (2007) for pre columbian New Mexico.

Stark and Garraty (2010; see also Feinman and Garraty 2010:176–178) recently proposed another possibility for the regional distribution of similar household goods, like the Mamom pottery example here. They argue that the large-scale distribution of household goods very likely suggests the existence of a market system, relative to the possibilities of nonmarket mechanisms such as redis-
Several lines of evidence in recent research point to the existence of Maya marketplaces, in large open plazas, throughout many different time periods (Carrasco Vargas et al. 2009; Dahlin 2009; Dahlin et al. 2007; for a central Mexican comparison, see Hirth 2009). Relevant to the household ceramic example are the early Late Classic market murals at Calakmul, Mexico, where a “clay-vessel person” displays a basket full of vessels, presumably for exchange (Carrasco Vargas et al. 2009:Figure 7). Although it is highly speculative, perhaps E-Group plazas could have been a spatial medium through which necessary or desired materials flowed. In other words, as populations gathered in E-Groups, perhaps visiting more than one near their home communities, technical knowledge of Mamom-type ceramics spread among communities of potters within a few generations.

Thus, it is possible that groups of settlers constructed E-Groups as a central place to gather and facilitate access to and exchange of goods such as stone, foodstuffs, or ceramic vessels. To be clear, this is not to argue that the E-Groups during the Preclassic period are equivalent to the proposed markets of the Classic Maya or Postclassic Maya. Nor is the economic association proposed for E-Groups here a first; Rathje et al. (1978) have proposed E-Groups as a complex specifically built to mark calendrical cycles in order to schedule long-distance trade. Rathje’s analysis focused on Classic period processes, when in fact, E-Groups emerged as primary social spaces at many sites much earlier. Considering that the earliest E-Group platforms do not seem to have explicitly marked the solstices and equinoxes as observatories (Aveni and Hartung 1989; Aveni et al. 2003), it is plausible that the platforms and buildings formed a bounded, cleared public space, within which early settlers exchanged goods (cf. Stanton and Freidel 2003:8). The reality of the E-Group plazas is that they were probably multiuse spaces, with rituals, exchanges, celebrations, and social interactions occurring throughout time.

Under Whose Authority?

Although suggestive, a functional or economic explanation of E-Group community distribution coupled with previous interpretations of ritual behavior does not explain fully the radical increase in the scale and durability of construction materials in the Middle Preclassic E-Groups. As mentioned before, the construction of such large buildings for the first time in the Lowlands implies both a sophisticated labor organization and monumental intent—but which groups or individuals could have been supervising authorities?

Unfortunately, very little evidence of Middle Preclassic political authority exists. It is clear that Classic Maya divine kingship—as attested to by epigraphic, archaeological, and ethnographic scholarship—has its roots in the Preclassic period (e.g., Freidel and Schele 1988). With the discovery of the San Bartolo murals, dated at around 100 B.C., came further evidence of accession, sophisticated rituals relating to autosacrifice and the cardinal directions, and possibly kingship (Taube et al. 2010). The artistic skill and iconographic content of these murals are extraordinary and imply an even more ancient cultural tradition yet to be discovered for Middle Preclassic times. San Bartolo, a modestly sized site, also hints that the Classic period practices of hereditary kingship were present at many more Late Preclassic centers than previously thought (Saturno et al. 2006). In 2008, excavations uncovered a Middle Preclassic E-Group, albeit of a smaller scale than found in other study sites, composed of the Hunahpu and Ixbalanque structures (Hurst 2009; Urquizú and Saturno 2008).

The San Bartolo E-Group shows similar formal characteristics to contemporary groups, but the group at San Bartolo contains what seems to be a ball court alley on the eastern face of the radial pyramid (Hurst 2009; Urquizú and Saturno 2008). The radial pyramid itself serves as the western ball court wall, with the eastern wall built inside the plaza, complete with a ball court marker actually painted in the center of the ball court alley. Others have noted the association of ball courts with E-Groups, but never has one this early been found associated directly within the E-Group plaza itself (see Aimers and Rice 2006:89–90).

The San Bartolo ball court E-Group harkens back to the proposed interpretations of gathering and possible production and exchange: perhaps after some generations of use for various daily or ceremonial activities, the E-Groups became locales for performance, gaming, and other forms of elite interaction known from later periods. The ball court could have been the scene of public spectacles performed by the ancestors of the very rulers shown
in the accession scenes on the western wall of the murals (Taube et al. 2010). Even in the non–ball court E-Groups, large amounts of people would have had a clear view of what occurred on top of the masonry platforms or later pyramids. In short, these plazas were giant performance spaces for emerging dynastic rulers, possibly the first of their kind in the Maya Lowlands (see Inomata 2006; Lucero 2003).

Conclusions

The E-Group architectural configuration, the subject of much debate within archaeoastronomy, deserves renewed attention as the earliest monumental, multifaceted social space in the Maya Lowlands. The distribution of early E-Groups implies that the Middle Preclassic Maya had imposed order on the landscape, an order expressed through a common monumentality of civic centers. GIS viewshed analysis supports the hypothesis that sites with Middle Preclassic E-Groups represent centers of early communities with complementary visible access to the landscape, although the precise social meaning of distance or perceived boundaries remains unknown. The plazas of confirmed Middle Preclassic E-Groups, and perhaps those of other sites that await stratigraphic excavation, could have been hubs of activity for distinct “moral communities” or even early polities. The pyramids and platforms might represent the earliest requirement to achieve civic belonging, or express political authority, among communities in the Maya Lowlands. Clearly more research is needed to investigate the relationship among E-Group monumentality, group identity, and political power during the Middle Preclassic.

Research in E-Groups from the Late Preclassic period supports the claim that over many generations, one group or individual came to exert power over ritual, production, or exchange activities at the E-Group civic center. Elite ritual caches and burials appear widely in Late Preclassic E-Groups, especially noted at Calakmul, Mexico; Caracol, Belize; and Tikal, Guatemala (Carrasco Vargas 1999; Chase and Chase 1995:95; Laporte and Fialko 1995). Furthermore, Late Preclassic residential platforms, including at least four at El Palmar, exhibit the same form as alleged elite “compounds” at many other Middle and Late Preclassic sites (Clark and Hansen 2001; Hendon 1999).

Finally, Late Preclassic sites with E-Groups exhibit extensive evidence of comprehensive urban planning, including major spatial axes, consistent building orientations, and standards for architectural measurements (see Doyle 2012; Šprajc et al. 2009; for a discussion of ancient urban planning, see Smith 2009). Buildings in the Late Preclassic E-Groups, as well as the massive “Triadic Groups,” became larger and were full of rich iconographic programs of architectural sculpture, the meaning of which is still only partially understood by scholars (see Estrada-Belli 2011; Hansen 1998). So through associating themselves with E-Groups at a specific geographic place, a hub of ritual and perhaps economic activity, elite groups used the proximity and interaction of the surrounding settlers to gain authority over the Maya sociopolitical landscape, for the first time.

Acknowledgments. I am grateful to the editors of Latin American Antiquity and three anonymous reviewers for insightful comments that helped improve the clarity of this article. Many individuals provided helpful feedback on earlier drafts of this article, especially Stephen Houston, Andrew Scherer, Takeshi Inomata, and Thomas Garrison. Digital elevation model data were generously provided by NASA Jet Propulsion Laboratory. The Institute of Anthropology and History of Guatemala graciously granted permission to investigate the site of El Palmar within the El Zotz Archaeological Project, directed by Dr. Stephen Houston and Lic. Edwin Román. Work at El Palmar was only possible with the dedication of Varinia Matute, Rony Pinedasanta, and excavation assistants from Cucul Dos Aguadas and Dolores, Petén. Work at El Palmar was supported generously by the U.S. National Science Foundation (BCS #1023274—Doctoral Dissertation Improvement Grant, Houston and Doyle PIs; BCS #0840930—Landscape Succession in Lowland Maya Archaeology, Houston and Garrison PIs), the U.S. National Endowment for the Humanities (grant #RZ-50680-07—Archaeology of El Zotz, Guatemala, Houston PI), the Wenner-Gren Foundation for Anthropological Research (Dissertation Fieldwork Grant, Doyle PI), Brown University Graduate School and Department of Anthropology, the Brown University Dupee Family Professorship of Social Sciences (Houston, chair), and the Tinker Foundation along with the Brown University Center for Latin American and Caribbean Studies. Other organizations that provided me with research and practical support include the Dumbarton Oaks Library and Research Collection (Short-Term Pre-Doctoral Residency, 2010; Junior Fellowship 2011–2012) and the Mesoamerica Center at the University of Texas at Austin Casa Herrera (Visiting Scholar Residency). Special thanks also go to the Doyle family and Pablo Suárez Becerra.
Supplemental Materials. Supplemental materials are linked to the online version of the paper, which is accessible via the SAA member login at www.saa.org/members-login

Supplemental Figure 1. Viewsheds (colors) from Middle Preclassic E-Group sites. Supplemental Figure 2. Viewsheds (colors) from all E-Group sites.

References Cited

Aimers, James J.

Aimers, James J., Terry G. Powis, and Jaime Awe

Aimers, James J., and Prudence M. Rice

Andrews, E. Wyllis, IV, and E. Wyllis Andrews, V
1980 Excavations at Dzibilchaltun, Yucatan. Publication 48. Middle American Research Institute, New Orleans.

Arkush, Elizabeth N.

Arredondo Leiva, Ernesto, and Stephen Houston (editors)

Aveni, Anthony F., Anne S. Dowd, and Benjamin Vining

Aveni, Anthony F., and Horst Hartung

Awe, Jaime J., Cassandra Bill, Mark Campbell, and David Cheetham

Aylesworth, Grant R.

Bauer, Jeremy R.

Blom, Frans

Cackler, Paul R., Michael D. Glascock, Hector Neff, Harry Iceland, K. Anne Pyburn, Dale Hudler, Thomas R. Hester, and Beverly Mitchum Chiarulli

Carrasco Vargas, Ramón


Carrasco Vargas, Ramón, Verónica A. Vázquez López, and Simon Martin

Chase, Arlen F.

Chase, Arlen F., and Diane Z. Chase

Cheetham, David

Chiade, V. Gordon

Clark, John E., and David Cheetham

Clark, John E., and Richard D. Hansen

Coggins, Clemency
1980 The Shape of Time: Some Political Implications of a Four-Part Figure. Ancient Antiquity 45:727–739.

Cohodas, Marvin

Conolly, James, and Mark Lake

Dahlin, Bruce
Golden, Charles

Guderjan, Thomas H.

Hammond, Norman (editor)

Hansen, Richard D.


Hendon, Julia A.


Hester, Thomas R., and Harry J. Shafer

Hirth, Kenneth G.

Houston, Stephen D., and Takeshi Inomata

Hruby, Zachary, and Katrina Lang

Hurst, Heather

Iceland, Harry B.

Inomata, Takeshi


Joyce, Rosemary A.


Krist, Frank J., and Daniel G. Brown

Laporte, Juan Pedro


Laporte, Juan Pedro, and Vilma Fialko

Laporte, Juan Pedro, and Juan Antonio Valdés (editors)
1993 *Tikal y Uaxactún en el Preclásico*. Universidad Nacional Autónoma de México, Mexico City.

Lock, Gary R., and Trevor M. Harris

Lohse, Jon C.

Lohse, Jon C., Jaime Awe, Cameron Griffith, Robert M. Rosenswig, and Fred Valdez, Jr.


Martin, Simon, and Nikolai Grube 2008 *Chronicle of the Maya Kings and Queens*. 2nd ed. Thames and Hudson, New York.


Submitted: April 12, 2011; Revised: February 28, 2012; Accepted: September 18, 2012.