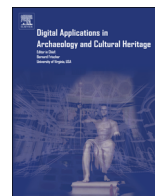




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A 3d model of Complex A, La Venta, Mexico

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ABSTRACT

La Venta was a large regional center located near the Gulf coast in Tabasco, Mexico. From ca. 800–400 BC it was the major Olmec capital in Mesoamerica. Despite its significance La Venta has received little archeological attention. The clay structures of its ritual precinct, Complex A, excavated in the 1940s–50s, were subsequently destroyed. Unfortunately, the published reports on those excavations are inadequate, with misleading archeological drawings. In order to obtain a more precise and comprehensive understanding of La Venta the original excavation records were consulted, and field drawings and maps were digitized to create more accurate 2d images as well as a 3d model of Complex A. This article summarizes the process of digitizing the archival records and the interpretive benefits from utilizing 3d visualizations of the site. Recounting the process may inform similar projects dependent on archival records when field mapping or excavation are no longer possible.

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1. Introduction

1.1. The importance of La Venta

La Venta was a major regional center of the Olmec culture in Mesoamerica. Its apogee is dated to approximately 800–400 BC (uncalibrated), roughly coincident with the Middle Formative period (Pool, 2007: 160). The site is located in the state of Tabasco in southern Mexico 15 km inland from the Gulf coast (González Lauck, 1996: 73). First excavated in the 1940s La Venta became the “type site,” the basis for defining Olmec culture (Grove, 1997), especially its stone-working tradition and distinctive art style. Despite the absence of native stone on the coastal plain La Venta’s artisans crafted colossal sculptures out of boulders brought from the Tuxtla Mountains some 100 km to the west, and finely made small objects of serpentine and jadeite, the latter material originating nearly 500 km to the east (Diehl, 2004).

Although subsequent research in the Gulf coast area has provided more details on Olmec culture and chronology (Diehl, 2004; Grove, 1997; Pool, 2007), as the regional capital La Venta remains essential for understanding the Middle Formative Olmecs. Furthermore, the complex political and religious institutions evident at La Venta have long been thought to have influenced societal developments in many other parts of Mesoamerica, including neighboring Maya peoples to the east (Coe, 1968; Drucker et al., 1959; González Lauck, 1996).

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Once shrouded in tropical vegetation, the 1.5 km long civic-ceremonial core of La Venta has now been mapped, revealing over 30 mounds and platforms. The site is dominated by a massive earthen pyramid over 30 m high, perhaps the largest single structure at its time in Mesoamerica (González Lauck, 1988, 1996; Pool, 2007: 157). Just north of the pyramid is a group of clay platforms and small plazas designated Complex A. Excavations in Complex A first brought world attention to Olmec culture, revealing richly stocked stone “tombs” and numerous purposely buried clusters of jade and other artifacts (“dedicatory offerings”) (Stirling and Stirling, 1942). The most enigmatic finds at La Venta were three huge mosaic “pavements” all of the same design, crafted out of hundreds of polished rectangular blocks made from imported serpentine. The mosaics, as well as two large deposits of serpentine blocks not forming a design, were laid in great pits and then immediately covered with clay fill. Nothing comparable to these five “massive offerings” is known elsewhere in Mesoamerica (González Lauck, 1996: 78).

1.2. Excavations at La Venta Complex A

Although Complex A was small relative to the entire site, it remains the most thoroughly excavated and documented portion of La Venta’s civic-ceremonial center. Three major excavation projects were carried out in Complex A: in 1942 directed by Matthew Stirling and Philip Drucker (Drucker, 1952; Stirling and Stirling, 1942); in 1943 directed by Stirling and Waldo Wedel (Drucker, 1952); and in 1955 directed by Drucker and Robert Heizer (Drucker et al., 1959; Drucker and Heizer, 1965, 1975). This last project was the most extensive and was dedicated to

investigating the construction history of the earthen platforms into which the dedicatory and massive offerings were buried (Drucker et al., 1959: 1). Built out of specially prepared clays, the platform surfaces and the floor of the principal court were regularly painted in colorful thin layers of clay and sand, much of it brought to the site. At several intervals, great pits were dug to house the blocks of serpentine, after which the platforms were enlarged and repainted.

While the architectural biographies of the individual structures vary considerably, four construction phases (I–IV) were determined for Complex A as a whole based on the sequence of structural modifications initiated by the massive serpentine deposits (Drucker et al., 1959: 121–127; Drucker and Heizer, 1965; González Lauck, 2007). In the absence of chronological information elsewhere from the site, these four construction phases became the basis for the four “archeological” phases of La Venta’s occupation (Grove, 1997; Pool, 2007). The phases were tentatively dated by radiocarbon, but samples were not obtained from every identified phase, leading to continuing questions about La Venta’s chronology (Grove, 1997: 72).

Soon after the 1955 project ended, the site was badly damaged by looting and development, especially Complex A (Drucker and Heizer, 1965), although some stratigraphic data were retrieved there during a brief expedition in 1967 (Heizer et al., 1968a). Interpretations of La Venta’s history and function, and by extension of Olmec cultural practices, are thus dependent on the Complex A excavations published over a half-century ago. Especially important is the 1955 instrument-made map of Complex A. As Heizer later observed, Complex A was “so torn up by bulldozers that no surface feature whatsoever exists that can be identified as being present in 1955. The 1955 map of Complex A, therefore, is the best we will ever have” (Heizer et al., 1968b: 139).

1.3. Shortcomings of the published excavation data

Unfortunately, the scant published excavation data are incomplete and inadequate. The maps and profile drawings in particular are inaccurate and misrepresent the field data (Coe and Stuckenrath, 1964). In the single major report of the 1955 field season (Drucker et al., 1959) it is impossible to correlate the textual descriptions of the excavations with the two-dimensional profile and plan views, many of which are schematic, leading archeologists to neglect the descriptive information in the text (Gillespie, 2011). Furthermore, the goal of the 1955 project was to reveal the four-phase history of construction of Complex A (Drucker and Heizer, 1965: 63) (Section 1.2). However, the various architectural strata that were assigned to those phases “float” in the published profile drawings because no datum was provided to anchor them in vertical space. Thus, the construction phases of one clay platform cannot be correlated with the phases of an adjacent platform (Coe and Stuckenrath, 1964).

Heizer’s reference (Section 1.2) to the “1955 map” is a single plan map showing the structure footprints, excavation units, and locations of offerings (Drucker et al., 1959, Fig. 4). This map compress all phases of the history of Complex A into one flattened image. Later maps of La Venta derived from the 1959 report omit important information or misrepresent the size or configuration of structures (Gillespie, 2011). Interpretations of Complex A have tended to emphasize its structural design, especially its notable bilateral symmetry (e.g., González Lauck, 1996: 76), although that design is best evident only in the final phase of construction shown in the single plan map. In sum, despite the site’s importance in Mesoamerican prehistory, archeologists, being so dependent on maps and drawings, cannot make much sense of the La Venta excavations.

1.4. Reconstructing the architectural history of Complex A

The lack of adequate publication, especially by today’s standards, does not mean that archeologists can never know more about Complex A; neither does it imply that the excavation projects themselves were poorly done or inadequately recorded. Although there are shortcomings in the published maps, the original field maps and supporting data recorded during the 1955 project still exist and provide the opportunity to create more accurate, computer-assisted images of Complex A.

In 2007 Gillespie began a project, “Reconstructing the Architectural History of La Venta Complex A,” to create new profiles and plans primarily from the field records of the 1955 excavations. The project’s research objective is to determine the sequence and technology of the ritual practices – the building and elaboration of the clay structures and placement of artifact caches – that created and modified Complex A over time, similar to the intentions of Drucker and Heizer (1956) (Section 1.2). Volk was added to the project for his expertise with digitization and visualization software and knowledge of landscape formations.

Because the surface architecture of Complex A is destroyed, it is not possible to correlate the field records with the physical remains at the site today. We therefore had to rely entirely on the available archived field notes and drawings, made when mapping instrumentation and recording standards were quite different. All of the images had to be digitized to create 2d profiles and plans at a single scale that could then be developed into a 3d model of Complex A, to visualize how it looked at different periods of its construction history.

1.5. Objectives for this article

The first objective is to summarize the digitization and modeling processes, detailing some of the problems, missteps, and successes (Sections 2 and 4). A second important goal is to briefly explain the great benefits of the 3d digital model (Section 3), which has transformed our understanding of the site and its history of use (Section 4). We now have very different interpretations than those of the 1955 archeologists, who lacked the technology and means to utilize all their mapping data to evaluate the chronology and function of the Complex A ceremonial precinct.

2. Materials and methods

2.1. Major Complex A features

Complex A was a small group of low platform mounds and plazas approximately 13,520 m² in extent located immediately north of the 30 m tall pyramidal mound (Complex C) (Fig. 1). Its finished design plan is marked by bilateral symmetry – the arrangement of structures on either side of a virtual north–south centerline 8° W of N (Drucker et al., 1959: 15). Bisecting the centerline, from north to south, are the largest mound (A-2); a rectangular plaza (Feature A-1, the Ceremonial Court) measuring 2396 m² and partially walled with adobe bricks and columnar basalt pieces set vertically; the South-Central Platform within the Ceremonial Court; and a platform (Mound A-3) just south of the court. The other structures form pairs positioned equidistant east and west of the centerline: the Northeast and Northwest Platforms within the Ceremonial Court, the Southeast and Southwest Platforms on the court’s southern boundary, and Mounds A-4 and A-5 flanking Mound A-3.

A trench excavated along the centerline from Mound A-2 to south of Mound A-3, begun in 1942 and extended in 1943, revealed a number of buried caches – the “dedicatory offerings” – including several presumed tombs and deposits of finely made

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