Chronological trends in the use of Valley of Oaxaca ceramics and ceramic styles at Cerro Jazmín, Mixteca Alta, Oaxaca

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Abstract:

This paper presents data on Late Formative to Terminal Formative (300 BCE-300 CE) ceramic assemblages that suggest a change in the use of Valley of Oaxaca ceramics and ceramic styles at Cerro Jazmin, Oaxaca, Mexico. We describe the characteristics of 29 dated ceramic assemblages from civic-ceremonial and residential contexts. We present INAA results and chronological trends in the ceramic assemblages that point to a decrease in the use of Valley of Oaxaca gray-ware serving vessels from the Late to Terminal Formative and a significant increase in the use of two types of locally-made serving vessels, one that was stylistically similar to *crema* vessels from the Valley of Oaxaca and another that was stylistically distinct and widespread in the Mixteca Alta, but rare in the Zapotec region. These serving vessels would have featured prominently in domestic and public food-consumption events. We interpret this shift as evidence of Cerro Jazmin's political and cultural independence, centuries after it was first established.

Resumen:

En este artículo se presentan datos de colecciones cerámicas del Formativo tardío y terminal (300 a.C.-300 d.C.) del sitio mixteco llamado Cerro Jazmin, en Oaxaca, México. A través de la descripción de 29 colecciones cerámicas asociadas a fechas de radiocarbono, se demuestra que hubo un cambio cronológico notable en el uso de cerámicas y estilos cerámicos procedentes del Valle de Oaxaca. El artículo describe las características de las 29 colecciones cerámicas provenientes de contextos residenciales y cívico-ceremoniales además de presentar los resultados de un análisis por activación neutrónica de una muestra de los materiales. Los cambios cronológicos apuntan a una disminución en el uso de cerámicas de pasta gris provenientes del Valle de Oaxaca del Formativo tardío al terminal. Otro cambio fue el incremento significativo en el uso de dos tipos cerámicos hechos en la región mixteca, uno que producía vasijas estilísticamente similares a las cerámicas cremas del Valle de Oaxaca y otro que seguía un estilo propio de la Mixteca Alta y que era menos frecuente en la región zapoteca. Arguimos que estos tipos cerámicos de vasijas de servicio hubieran sido importantes en actos de consumo de alimentos en el ámbito doméstico y en eventos públicos y rituales. Interpretamos este cambio cerámico como un reflejo de la creciente independencia política y cultural de Cerro Jazmin siglos después de su fundación.

1. Introduction

This paper presents data on the chronological trends detected in the use of Valley of Oaxaca ceramics and ceramic styles at the Late and Terminal Formative site of Cerro Jazmín, in the Mixteca Alta region, Oaxaca, Mexico (Figure 1, Table 1). New ceramic and chronological evidence indicates that Cerro Jazmín was continuously inhabited from the Late Formative (300 BCE) to the Terminal Formative period and then suffered a period of demise and abandonment towards the start of the Classic period (300 C.E.).

Figure 1. Map of the Mixteca Alta, Cerro Jazmín, and other places mentioned in the text. Cartography by Antonio Martínez Tuñón.

	Mesoamerica	Valley of Oaxaca	Mixteca Alta
1500			
1400	Late Postclassic	Chila	Monte Albán
1300			V (Late)
1200			
1100	Early	Liobaa	Monte Albán
1000	Postclassic		V (Early)
900			Early Natividad
800			
700	Late Classic	Xoo	Monte Albán
600		Pече	IIIb-IV
500	Early Classic	Pitao	
400		Tani	Monte Albán
300			IIIa
200	Terminal		Monte Albán
100	Formative	Nisa	II
AD/BC			
100			Monte Albán
200	Late Formative	Pe	Late I
300		Danibaa	Monte Albán
400			Early I
500	Middle		Cruz D
600	Formative	Rosario	(Late Cruz)
700			Cruz C
800		Guadalupe	(Middle Cruz)
900			
1000			Cruz B
1100		San José	(Early Cruz)
1200	Early		
1300	Formative		Cruz A

1400		Tierras Largas	(Early Cruz)
1500			
1600			
1700			
1800		Espiridión	
1900			
2000	Archaic		

Table 1. Mesoamerican, Mixteca Alta, and Valley of Oaxaca chronologies used in this article, adapted from Joyce 2010: 16, Kowalewski et al. 2009: 411, and Zborover 2015.

At least a century after the city's initial establishment by 300 BCE and towards its first period of growth in 150 BCE, we identified a rise in the use of Valley of Oaxaca ceramics and ceramic styles, in particular decorated gray ware G12 bowls and polished brown wares that were stylistically similar to Zapotec *crema* wares (C4, C7, and C20 in Caso et al. 1967: 46-47). Later, as the city's regional position solidified, political strategies shifted in the Terminal Formative period (50 BCE-200 CE) and the use of Valley of Oaxaca decorated vessels decreased (gray wares) or changed (fine brown wares) (Table 2). We interpret these changes as material manifestations of the city's changing relationship with the Valley of Oaxaca, as Cerro Jazmín became better established as its own center of power and regional influence.

	Early Ramos		Late Ramos		χ^2	p>	d.f.
Yellow wares/all ceramics	358/986	36%	893/2432	37%	0.07	<i>not significant</i>	
Tan wares/all ceramics	433/986	44%	865/2432	36%	20.22	0.001	2
Fine brown wares/all ceramics	22/986	2%	158/2432	6%	25.72	0.001	2
Gray wares/all ceramics	164/986	16%	477/2432	19%	4.22	0.05	2
**G12-G17 vessels/all gray wares	44/164	27%	90/477	19%	4.67	0.05	2

Rust wares/all ceramics	9/986	1%	39/2432	2%	2.44	<i>not significant</i>
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	Late Ramos		Transition		X ²	p>	d.f.
Yellow wares/all ceramics	893/2433	37%	322/537	60%	100.02	0.001	2
Tan wares/all ceramics	865/2433	36%	130/537	24%	24.92	0.001	2
Fine brown wares/all ceramics	158/2433	6%	40/537	7%	0.68	<i>not significant</i>	
Gray wares/all ceramics	477/2433	19%	34/537	6%	54.02	0.01	2
**G12-G17 vessels/all gray wares	90/477	19%	10/34	29%	2.23	<i>not significant</i>	
Rust wares/all ceramics	39/2433	2%	11/537	2%	0.54	<i>not significant</i>	

Table 2. Table presents the percentages and proportions of different ceramic wares across the Late Formative to Terminal Formative and Transition period occupations. Also included are the chi-square results that reveal statistical significance in some of the chronological trends and changes seen in the ceramic assemblage.

** The table also presents, within the category of gray wares in particular, the chronological shifts in the presence of G12 and G17 decorated gray ware bowls, many of which may have been directly imported from the Valley of Oaxaca.

The presence of Valley of Oaxaca wares (decorated gray and *crema* wares) outside of the Valley of Oaxaca has been previously interpreted as evidence of Zapotec expansion, migration, or political involvement (Balkansky 2002; Flannery 1983; Spencer et al. 2013; Redmond and Spencer 1983, 2006; Sherman et al. 2010). In this paper, we propose that while Valley of Oaxaca ceramics were imported and favored a century and a half after Cerro Jazmín's initial foundation, the use of Valley of Oaxaca decorated ceramics fell out of favor in later times. As this occurred, locally-made decorated serving vessels, which were not stylistically aligned with Monte Albán ceramics, grew more popular. Also, locally made versions of ceramics similar to the Zapotec *cremas* changed in form and decoration. This new understanding shifts the focus away from the Zapotec, as dominant exporters of

ceramic trends, to the Mixtec, as selective participants in multi-directional trade of foreign and domestic items and styles. The wares were used according to local preferences and their own changing political strategies.

2. The Mixteca Alta and its ceramic chronology

The Mixteca Alta is a temperate region of narrow valleys and high mountains extending across western Oaxaca, eastern Guerrero, and southwestern Puebla (Bernal 1965; Spores 1984). In the region, archaeological surveys have documented the development of sedentary communities since the Early Formative period and a shift towards hilltop urban centers in the Late Formative (Kowalewski *et al.* 2009: 287-290; Spores 1972). Between the Formative and Classic periods, some regional centers, Cerro Jazmín among them, became abandoned while other urban polities emerged in nearby hills (Kowalewski *et al.* 2009: 305). By the Postclassic period, the Mixteca Alta had become a densely populated region that was politically divided among the numerous peer polities whose histories and rulers loom large in the codices and early Colonial documents.

Archaeological research in the Mixteca Alta began in the 1930s with the work of Alfonso Caso (1938), Ignacio Bernal (1949), Jorge Acosta and Javier Romero (1992), and John Paddock (1953). These investigations, which initially predated radiocarbon dating, dated Mixtec settlements by the presence of Zapotec-style ceramics and their placement in the Monte Albán sequence. Thus, since the beginning of Mixteca Alta archaeology, the presence of Zapotec ceramics or ceramic styles has been noted. In fact, the scholarship initially favored a Zapotec-first perspective when explaining the development of sociopolitical complexity in the Mixteca Alta.

Based on stratigraphic excavations in the Nochixtlán Valley, Ronald Spores (1972: 22, 172) established the Mixteca Alta ceramic chronology. Since then, there have been further

chronological refinements (Blomster 2004; Gaxiola 1984: 44-45; Lind 1967, 1979, 1987, 2015; Plunket 1983: 24; Winter 2006; Zárate 1987). More recently, chemical composition studies of Mixteca Alta ceramics have provided a baseline of the chemical differences between ceramics produced in the Mixteca Alta and the Valley of Oaxaca. These data have also confirmed the presence of ceramics produced in the Valley of Oaxaca at Mixteca Alta sites (Joyce et al. 2006). This article builds on the work of previous scholars.

We focus on ceramic assemblages that date to the Late and Terminal Formative period (Early Ramos and Late Ramos phases) and the start of the Classic period, which is also known as the transition into the Early Las Flores phase (hereafter referred to as the Transition period). In these time periods we document the frequency and proportions of both Mixteca Alta and Zapotec-style ceramics through the integration of macroscopic ceramic analysis and instrumental neutron activation analysis (INAA). We discuss trends in the use of what we will generally call Zapotec-style ceramics from the Early Ramos to the Transition period at Cerro Jazmín. And finally, we offer an interpretation of the sociopolitical factors that may have precipitated the identifiable ceramic trends.

3. Methodology

We analyzed 29 radiocarbon-dated ceramic assemblages from residential and civic-ceremonial contexts excavated at Cerro Jazmín (14 for Early Ramos, 12 for Late Ramos, and 3 for Transition). The ceramic assemblages came from fifteen civic-ceremonial contexts and fourteen residential and mixed-use contexts. Civic-ceremonial contexts were architecturally prominent locations associated with plazas. For example, one such area was identified as a feasting site near the hilltop of Cerro Jazmín (Pérez et al. in press). Residential contexts were terraces that contained household complexes with features needed for domestic life: kitchens, hearths, refuse areas, activity areas, and burials (Winter 1976). Mixed-use contexts

included architectural features and artifact assemblages that suggested a variety of uses, including storage, craft-production, points of access or transit through the city, or residential occupations that were later modified to accommodate other activities.

All ceramic materials, rims and bodies, were washed and sorted according to ware or paste, hardness, vessel form, neck or rim form, surface finish, and decoration. We recorded the number and weight of the various categories. For the 29 assemblages, we calculated the total number of different paste wares by vessel form and then grouped the assemblages into four temporal categories. These categories are based on the distribution of the radiocarbon dates (Figure 2): Early Ramos 1 (cal. 274 to 250 BCE), Early Ramos 2 (150-100 BCE), Late Ramos (cal. 14 BCE to 168 CE), and Transition into the Las Flores period (261-273 CE).

Figure 2. Histogram of calibrated radiocarbon dates obtained from the Cerro Jazmín, excluding Postclassic period results.

We calculated the percentages of different vessel forms for all the wares in each time period and created two main functional categories: serving vessels and cooking/storage vessels. Serving vessels included all manner of bowls, plates, and vases. Cooking/storage vessels included jars, comals, and water jugs. Within each vessel-form category we calculated

the percentages of different slips, paint-surface finishes, specific decorations, and rim-form differences. In doing this functional categorization, we found that certain ceramic wares were predominantly used as cooking, serving, or storage vessels. Across all phases, gray, fine brown, and yellow wares represent nearly 90% of serving vessels, while tans and rust wares comprise over 80% of cooking vessels (Table 3).

Serving vessels											
Total		Yellow		Tan		Fine Brown		Gray		Rust	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
E. Ramos	559	323	58	61	11	22	4	153	27	0	0
L. Ramos	1596	822	52	168	11	162	10	442	28	2	0
Transition	375	296	79	7	2	40	11	32	9	0	0
Cooking/storage vessels											
Total		Yellow		Tan		Fine Brown		Gray		Rust	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
E. Ramos	426	31	7	372	87	0	0	14	3	9	2
L. Ramos	841	71	8	697	83	0	0	36	4	37	4
Transition	160	25	16	123	77	0	0	1	1	11	7

Table 3. Frequencies of different ceramic wares according to functional vessel categories.

When we performed these calculations for the 29 dated ceramic assemblages, bodies and rims, we found an over-representation of vessel forms that had large body-to-rim ratios (jars and water jugs). To make our results comparable with the work of colleagues, we ran

our analysis again for rims, supports, and decorated body sherds only, reducing the number of ceramics by 90%. Chi-square testing in both iterations of the analysis identified several statistically significant chronological trends. To identify which wares or vessel forms were responsible for the statistical significance, we performed the chi-square tests on pairs that compared each category of ware or form to the remaining, entire assemblage; these results are discussed in the next section.

We also submitted 53 ceramic samples—tan wares (n=12), fine brown wares (n=12), yellow wares (n=11), and gray wares (n=18)—for Instrumental Neutron Activation Analysis (INAA) at the Oregon State University Archaeometry Laboratory. Leah Minc's analysis and interpretation builds on previous work done by Joyce et al. (2006) and Minc et al. (2016; n.d.). The ceramic samples were photographed at 50-power magnification and then subjected to INAA following irradiation and gamma spectroscopy protocols summarized in Minc and Sherman (2011). Potential subgroups within the Cerro Jazmín sample were identified through a series of exploratory data analyses including bivariate plots, cluster analysis, and compositional profile plots, although group sizes were generally too small to allow for rigorous multivariate refinement (Figure 3). In addition, all of the Cerro Jazmín samples were evaluated against reference groups established for the Late to Terminal Formative periods of the Valley of Oaxaca (Minc et al. n.d.).

Figure 3. Graph showing the chemical subdivisions within the Cerro Jazmín INAA sample. A. Bivariate plot of aluminum by sodium showing macro-group divisions; B. Bivariate plot of Th by Sc, showing subdivisions of the Cerro Jazmín composition groups. Ellipses represent 95% confidence intervals for bivariate group centroids.

4. The Ceramics of Cerro Jazmín and the Valley of Oaxaca

The Cerro Jazmín ceramic collections we identified included, in order of most to least frequent: first, Yucuita tan and red-on-tan wares, which are coarse-paste utilitarian cooking vessels; second, Tiltepec yellow wares, which are finer-paste serving and storage

vessels (Pérez et al. n.d.); third, Nochixtlán gray wares, some of which included decorated serving vessels like the Valley of Oaxaca G12 and G17 bowls; fourth, fine brown wares, which are serving bowls (some with hollow round or mammiform supports) and small jars covered by black, red, or orange slip that is then polished and sometimes incised, thus resembling the vessel forms and decorations of the Valley of Oaxaca *cremas* (C4, C7, and C20 types); and fifth, rust wares, which are very coarse utilitarian vessels that were continuously exposed to fire.

In the Cerro Jazmín collections, types of three ceramic wares include vessels made to resemble ceramics and ceramic styles that originate in the Valley of Oaxaca; these are decorated gray ware bowls of the G12 and G17 types, certain fine brown ware vessels with surface decorations similar to the C4, C7, and C20 *cremas*, and yellow wares made to resemble G21-type bowls. All other ceramic wares and vessel forms represent local, Mixteca Alta ceramic styles.

In the sections that follow we present INAA results that provide chemical composition data on which ceramics were imported from the Valley of Oaxaca, and which were locally-made ceramics that resemble some of the Valley of Oaxaca *crema* vessels or G21 vessel decorations. We divide our discussion by focusing first on gray wares, then fine brown wares, and lastly yellow ware. These descriptions also outline the temporal trends identified in the use of these wares and their associated vessel forms and how these temporal trends point to changes in Cerro Jazmín's relationship with Monte Albán.

5. INAA results

The trace-element results indicate that 78% of Cerro Jazmín gray-ware samples sent to the OSU laboratory (n=18) matched the compositional signature of Valley of Oaxaca gray wares, specifically those manufactured along the eastern Valle Grande (Figure 3). The

remaining 17% (n=3) match the predominant pastes described below and are thus likely to have been produced locally; one remaining sample was unclassifiable (Minc et al. 2016). Fine brown wares, tans, and yellow wares comprise two regionally available compositional groups. Group 1 is distinguished by elevated concentrations of Al and Na, and appears to closely match the Café 1 paste group previously identified by Joyce et al. (2006). Ceramics from this compositional group were widely distributed across the Mixteca Alta and were even exported to Monte Albán. Cerro Jazmín's Group 1 can be further subdivided into subgroups 1a, 1b, and 1c, which match different wares identified during our macroscopic ceramic analysis. Subgroup 1a contains mostly utilitarian tan wares and a few examples of fine brown wares, yellows, and locally-made gray wares. Subgroup 1b consists exclusively of fine brown wares. Subgroup 1c includes only hard-paste yellow wares.

The second compositional group for the Cerro Jazmín samples aligns closely with the Café 2 group described in Joyce et al. (2006), and indicates a calcium-rich clay that possibly came from areas with calcareous clays derived from limestone and calcilutites (i.e., calcareous mudstones). Joyce et al. (2006) report that ceramics with this composition had a more restricted distribution than Café 1, limited to the north part of the Nochixtlán Valley and Yucunama, not far from Cerro Jazmín. Group 2 can potentially be further subdivided into a fine-textured subgroup 2a, used to make finer oxidized yellow wares and locally-made, reduced gray wares, and the coarsely tempered subgroup 2b clays, used to make utilitarian tan wares. These results suggest that both subgroups shared similar clays that were used in different paste recipes and fired in reduced or oxidizing environments to make the various wares. Although additional research is needed to identify the precise provenance of Group 1 and 2 clays (Café 1 and 2), geological evidence currently suggests that they originated somewhere in the Mixteca Alta (Minc et al. 2016).

6. Decorated gray wares (G12 and G17)

Gray wares identified in the Cerro Jazmín collections corresponded with Spores' (1972: 37-47) Nochixtlán gray ware descriptions and variations (Figure 4). We recorded soft, powdery, and spongy-textured gray wares with no inclusions (Pablito wares), more compact, paste gray wares with light to dark gray colors (Juanito wares), and hard, high-fired gray vessels that fit the Miguelito hard grays. Hard grays are comparable in paste body and sound with the high-fired yellow wares; both were used to make water jugs and fine bowls. Even before the INAA analysis, we wondered whether some of the gray and yellow wares were actually the same clays, which were then made to look different by using different firing techniques; this was confirmed through INAA analysis.

Common gray ware vessel forms are jars, water jugs, and bowls. Most gray ware serving vessels were undecorated conical bowls, as well as semi-hemispherical and composite silhouette bowls. However, among our collections we also documented conical bowls with two-line incised decorations on the inner rims and "combed-bottom" incised line decoration on the bottom of the bowl (Figure 4). These are the characteristics of the G12 gray ware bowls documented at Monte Albán in Monte Albán I contexts (Caso, Bernal, and Acosta 1967: 25-26). In their description of the G12 type, Caso et al. mention their presence at the Mixteca Alta site of Monte Negro, where they note that these bowls appear in a paste that resembles that of the Valley of Oaxaca (gray) or in the local yellow paste.

At Cerro Jazmín we also documented G17-type decorated gray ware vessels. Caso et al. (1967: 32-35) described G17s as displaying a dark slip and polished finish, along with an eccentric rim that gives the vessel a zoomorphic silhouette in the shape of fish fins or bird wings. Incised decoration on the interior of these eccentric rims gives the vessel a higher production value. Although Caso et al. (1967: 35) note that G17s are undoubtedly ceremonial in function, they also note that these vessels are quite frequent at Monte Albán. At Cerro Jazmín they are rare.

Figure 4. Photographs and drawings of decorated gray wares. Drawings by Barbara K. Elizalde Carbajal and photographs by CJAP.

At Cerro Jazmín, gray wares accounted for 17% of all materials in the Early Ramos period assemblages, 20% in Late Ramos period, and 6% in the Transition period (Table 2). Next, we focus our discussion on G12 and G17-types specifically since the majority of these vessels have been found to be Valley of Oaxaca imports based on our INAA results. When looking at G12 and G17 vessels specifically, there was a striking pattern. These types are completely absent from our earliest Early Ramos collections and only appear in the later part

of Early Ramos, when they account for 26% of all gray wares. The frequency of G12s and G17s continuously decreased after that. By the Late Ramos period, G12s and G17s displayed a statistically significant drop, when they represented only 18% of gray wares. By the Transition period, G12s account for 29% of gray wares, so no significant drop was recorded by this later time; as noted above, however, in the Transition period gray wares accounted for only 6% of the entire ceramic assemblage, and that shift was statistically significant.

Valley of Oaxaca-style gray wares have been identified in a broad range of contexts at Cerro Jazmín: civic-ceremonial areas and residential terraces of higher and relatively lower status. We therefore conclude that gray wares were available to a large portion of the city's population. However, the fact that the imported gray wares so far identified came from only a single source in the Valley of Oaxaca suggests that the trade of Zapotec ceramics took place through a limited number of trade connections.

7. Fine brown wares that resemble Zapotec *cremas*

Our analysis also identified a collection of ceramics that correspond to materials previously defined as Yucuita polished brown wares (Spores 1972: 63) or fine brown wares (Blomster 2004: 172), which we believe are the same. These kinds of ceramics have also been found at Huamelulpan, where Gaxiola (1984: 22-26) classified them as tan wares belonging to the polished black, polished black-on-red, and polished red-on-cream varieties of the Huamelulpan I period (250-100 B.C.).

Cerro Jazmín fine brown wares were made using a tan paste that was smoothed, covered in red, black, red-over-tan, or black-over-red slip, and then highly polished. Most of the fine brown ware vessels are bowls and jars, which we categorized as serving vessels because of their delicacy, small size, and lack of fire exposure. The small jars and bowls are rather thin (3-5 mm thickness) and have a soapy or waxy feel. We originally labeled these

ceramics as fine tans due to the use of a tan paste combined with fine workmanship and finish, but for the sake of consistency with the work of other scholars, we are calling them fine brown wares. These ceramics were the most costly ware to manufacture in our entire assemblage and their decoration and surface finishes make them similar to the finer C4, C7, and C20 types of *crema* vessels produced at Atzompa and used at Monte Albán.

Caso, Bernal, and Acosta (1967: 44-49) described *cremas* as having a distinct pale cream paste, which contains diorite. Recent studies have found that this clay originates at Atzompa, an area just north of Monte Albán (Joyce et al. 2006). C4 types are *crema* vessels that are covered in a red garnet slip that is then highly polished. They have a waxy feel and Caso et al. chronologically place them in either the Monte Albán I period or Early Ramos. C7 vessels are *crema* paste vessels covered by an orange slip, which is then covered in red paint applied in streaky paint strokes. This type is also highly polished and is found in the late Monte Albán I period, but mainly in Monte Albán II contexts. C20 varieties are made from the same *crema* paste, which is then covered in a black or dark brown slip that is highly polished. It is most characteristic of Monte Albán II contexts (Late Ramos), but starts in late Monte Albán I (the later part of Early Ramos). Information on *crema* vessel forms is only provided through illustrations (Caso et al. 1967: Lam. II), which suggest composite silhouette bowls (Lam. II), conical bowls with everted rims, fine jars (Lam. VII), and decorated serving vessels with hollow tripod supports (Lam. X).

Cerro Jazmín fine brown wares include vessels that resemble the surface treatments, decorations, and vessel forms that characterize the C4, C7, and C20 *crema*-types described above. Frequently, the fine brown wares are small jars, both thin and short, with constricted necks (<12-cm diameters) and flaring rims (Figure 5). There are also small-to-medium composite silhouette bowls (8-12-cm diameters) with exterior base flanges, with flat, smooth bases or with bases that show the remains of hollow spherical or mammiform supports.

These vessels have the remains of red, black, or red-on-orange slips that were highly polished to give the vessel a waxy surface feel.

Figure 5. Photographs and drawings of fine brown wares. Drawings by Barbara K. Elizalde Carbajal and photographs by CJAP.

Twelve examples of fine brown wares from our collections were submitted for compositional analysis. Microphotography showed that some tan and fine brown-ware pastes have a similar paste body to coarser tan wares, containing abundant medium-to-fine sub-angular whitish-to-gray inclusions. Although the clay body of the fine brown wares was denser and more compact than that of the coarse tan wares, fine brown wares were not fired at a high temperature, and some retained dark firing cores.

INAA analyses revealed that the fine brown ware samples were made of compositional subgroups 1a and 1b clays, local or regional clays, which match the Café 1 composition recorded in Joyce et al. (2006). Compositional subgroup 1a includes fine brown wares along with tan wares, some yellow wares, and some locally-made gray wares, suggesting that this paste was used to make different wares by using different paste recipes and firing techniques. This confirms our idea that fine brown-wares were made of tan ware pastes and subsequently turned into finer vessels by taking additional manufacturing steps. Some of the fine brown wares came exclusively from compositional group 1b, a different and more restricted clay source that may account for the ware's more restricted distribution and more costly and specialized production.

Our analysis identified the presence of fine brown wares since the earliest Early Ramos occupation, from which 17 examples of fine brown vessels (bowls=13, jars=3, supports=1) were recorded primarily in the civic-ceremonial area of Plaza 1 (n= 11), in the Tres Cerritos sector. The frequency of fine brown wares increased in the later part of the Early Ramos period and then increased significantly in the Late Ramos period (Table 2), while yellow wares decreased. Between the Late Ramos and Transition periods, the overall proportion of fine brown wares remained relatively constant, although the total number of brown ware samples decreased.

While the use of fine brown wares significantly increased in the Late Ramos period, the popularity of the various brown-ware vessel forms shifted. For instance, composite silhouette bowl frequencies remained constant across all serving vessels and wares in general, but among fine brown wares, composite silhouette bowls significantly decreased from the Early Ramos to the Late Ramos period (Table 4: 23% to 8%, $X^2 = 5.17$; $p < 0.05$, d.f. = 2).

Fine brown wares	Early Ramos	%	Late Ramos	%	X^2	p>	d.f.
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Conical bowls	6/22	27	65/158	41	1.55	not significant
Semi-hemisph. bowls	4/22	18	37/158	23	0.3	not significant
Composite silhouette bowls	5/22	23	12/158	8	5.17	0.05 2
Jars	3/22	14	28/158	18	0.22	not significant
Vases	2/22	9	5/158	3	1.8	not significant
Supports	1/22	4.5	4/158	3	0.29	not significant
Water jugs	1/22	4.5	7/158	4	0.0006	not significant

	Late Ramos		Transition		X ²	p>	d.f.
		%		%			
Conical bowls	65/158	41	18/40	45	0.19	not significant	
Semi-hemisph. bowls	37/158	23	8/40	20	0.21	not significant	
Composite silhouette bowls	12/158	8	3/40	7.5	0.0004	not significant	
Jars	28/158	18	6/40	15	0.16	not significant	
Vases	5/158	3	2/40	5	0.31	not significant	
Supports	4/158	3	1/40	2.5	0.0001	not significant	
Water jugs	7/158	4	2/40	5	0.02	not significant	

Table 4. Fine brown ware vessel form frequencies from the Early Ramos to the Transition period and their chi-square results.

Throughout the entire sequence, the most common slip finish was black or black slip over a previous layer of red slip, which gave the vessels a waxy, black surface finish reminiscent of the C20 types from the Valley of Oaxaca. This pattern was only reversed in the Transition period when, for the first time in the occupation, red-slipped vessels outnumbered black-slipped vessels. That is to say that the frequency of red slips increased through time with a statistically significant shift occurring between the Late Ramos and Transition periods (Table 5: $X^2 = 19.93$; $p < 0.01$, d.f. = 2). Black slips, which are shared with the C20 types, decreased in frequency over the same period (67% in Early Ramos, 48% in Late Ramos, 33% in Transition); although this shift was not statistically significant, it is interesting to note that it is opposite to the Valley of Oaxaca trend for C20 vessels, which became more common in later Monte Albán II (Late Ramos) times. As the Valley of Oaxaca black-slipped C20s became more common, at Cerro Jazmín red-slipped vessels gained ground.

Among cylindrical vases, which were prominent vessels used to consume drinks in feasts and other ritual settings, including prestigious cacao or alcoholic drinks, we saw a trend towards ware standardization. For the Early Ramos period we documented gray ware, fine brown ware, tan ware, and yellow ware vases. In the Late Ramos period, the proportion of yellow ware vases increased as the number of vases in all other wares decreased. By the Transition period our analysis identified vases only in yellow ware and fine brown ware, with yellow wares accounting for over 90% of all vases.

Early Ramos	Late Ramos	X^2	p>	d.f.
%	%			

Black	10/15	67	43/90	48	1.8	not significant
Black/Red	3/15	20	27/90	30	0.63	not significant
Red	2/15	13	19/90	21	0.48	not significant
Brown	0/15	0	1/90	1	0.16	not significant

	Late Ramos		Transition		X ²	p>	d.f.
		%		%			
Black	43/90	48	9/27	37	0.967	not significant	
Black/Red	27/90	30	0/27	0	10.53	0.001	2
Red	19/90	21	18/27	67	19.93	0.001	2
Brown	1/90	1	0/27	0	0.3	not significant	

Table 5. Slip color frequencies among fine brown ware vessels from the Early Ramos to the Transition period and their chi-square results.

8. Yellow wares, including G21 vessels

Tiltepec yellow wares, although previously noted by other scholars (Winter 2006), had not been explicitly defined as diagnostic ceramic type for the Ramos period until recently (Pérez Rodríguez et al. 2017). In our collections, however, Tiltepec yellow wares are present from the start of the city's occupation in the earliest Early Ramos period (Table 2). Comprising 36% of the overall assemblage and 58% of serving vessels, yellow wares are second only to Yucuita tans in frequency, and they more than double gray wares in the serving vessel category. Indeed, their frequency surpassed that of gray wares throughout the city's Formative-period occupation.

According to the INAA results, these yellow wares fall into subgroups 1a, 1c and 2a pastes, all of which suggest a local or regional manufacture. Note that two of these groups (groups 1a and 2a) also contain gray wares and it appears that the primary difference

between these gray and yellow-ware vessels was the oxidizing environment in which the yellow wares were fired.

Of all yellow-ware serving vessels, 12% (Early Ramos), 32% (Late Ramos), and 26% (Transition) had an interior channel or stepped-rim. Among serving vessels, an even smaller number (22 for Early Ramos, 69 for Late Ramos, and 5 for Transition) had incised line- or nail-print decorations along the bottom (Figure 6). This style of decorated bowl differed from the G12s and instead is reminiscent of G21 bowls that Caso et al (1967: 61-67) found in Monte Albán II (Nisa phase) contexts. G21 bowls at Monte Albán were conical bowls with flat bottoms that were invariably made from gray ware paste. Their interior rim displayed two incised lines, and the bottoms of the bowls had coarsely made incised-line decorations consisting of curved, concentric, undulating, or squiggly lines executed with a single sharp instrument, as opposed to the combed bottom decoration.

In the Cerro Jazmín assemblages, examples of G21-like vessels were always made from yellow ware paste. Although noted as a Monte Alban II type by Caso, Bernal, and Acosta (1967: 67), G21-like vessels are found in our Early Ramos assemblages (contemporaneous to Monte Albán I), where they account for 5% of all bowls. Their frequency increased to 6% in the Late Ramos period, although this increase was not statistically significant. What was significant was the drop in their frequency towards the Transition period, when G21s account for only 2% of all bowls. As the frequency of G21-like decoration decreased, the frequency of channel-rim decoration significantly increased among yellow ware serving vessels, bowls, and cylindrical vases. We recorded channel rim decoration in 8% of Early Ramos vessels of all wares. This frequency increased to 20% in the Late Ramos period and 21% in the Transition period.

Figure 6. The graph shows surface decoration among decorated serving vessels and slip color information for all vessels by time period. The bars represent the percentage of each paste or slip color within each of the categories indicated below the graph. The numbers above the bars indicate the number of sherds of a ware or slip color within a category. The number of sherds in each category and the percentage within the entire assemblage is noted below the X-axis.

9. Discussion

The presence of Monte Alban-style gray ware and *crema* ware ceramics in regions beyond the Valley of Oaxaca has been noted for decades (Caso et al. 1967:26). The appearance or absence of these ceramics in regions like the Cuicatlán Cañada, Sola de Vega, the Río Verde region, and the Nochixtlán Valley, has been interpreted as evidence of

interaction with the Zapotec, of disruption of trade with the Zapotec, or of conquest by the Monte Albán state. The particular settlement histories of each region have been considered and scholars have come to different conclusions on whether their particular region came to be under Monte Albán's thumb or resisted Zapotec expansion (Balkansky 2002; Balkansky et al. 2004; Barber 2005; Joyce 1991: 514-535; Joyce et al. 2006; Levine 2002: 98; Redmond and Spencer 1983, 2006; Spencer and Redmond 2003, 2004; Spencer et al. 2013; Workinger 2002: 347-360).

Even within the Valley of Oaxaca there is evidence of resistance. At the site of El Palenque, in Tilcajete, the absence of decorated *cremas*, or creamwares, has been interpreted as evidence of reduced interaction and political resistance to the Monte Alban state in the Late Monte Alban I period (Redmond and Spencer 2006; Spencer et al. 2013). In that time period the people of Tilcajete also lacked access to obsidian. Spencer et al. proposed that Monte Albán blocked the trade route that supplied obsidian to the southern part of the valley. After a period of resistance, which left its mark on El Palenque, the researchers recorded a settlement shift to Cerro Tilcajete in Monte Albán II times, when *cremas* (including C4, C7, and C20 types) and other ceramic wares (G21s and A9s) finally became part of the ceramic assemblage. Spencer and colleagues believe that these changes were the result of Cerro Tilcajete becoming a secondary administrative center for Monte Albán.

Based on the research done in the Cañada region and then in Tilcajete, Spencer proposed a two-stage model for Monte Albán territorial expansion (Spencer and Redmond 2003; Redmond and Spencer 2006). According to the model, in Monte Albán Late I the polity expanded to nearby regions of the Cañada, Peñoles, and Sola de Vega. During the second stage, in the Monte Alban II period, Monte Albán was finally successful in consolidating the entire Valley of Oaxaca under its rule, perhaps even expanding its reach further beyond the Valley.

In the Sola Valley, just south of the Valley of Oaxaca, the presence of *cremas*, produced in the Sola region, has been quoted as evidence of Monte Albán's expansion over the valley as it extended its control over trade routes to the Pacific coast. Balkansky (2002: 37) reported that in the Late Monte Albán I period (Late Formative or later Early Ramos period), settlements in Sola included Valley of Oaxaca ceramics (G12, C2, C4, and C13 types). However, he noted that “few if any sherds were true creamwares with the distinctive Atzompa clay body.” In the subsequent Monte Albán II period, G12, C7, and C11 types were the most common decorated ceramics in the Sola Valley. Most of the creamwares, however, continued to be made from a local clay body. Balkansky reported limited numbers of C20 vessels at Sola sites, which is a ceramic type that dominated the Monte Albán II assemblages. Finally, he reported that the primary center in the Sola Valley, site S39, was the only site that had “true creamwares (i.e. of the Atzompa clay body)” especially associated with period II public buildings (Balkansky 2002: 46). According to Balkansky's interpretation, the presence of these materials—and even the initial settlements recorded in the Sola Valley in Late Monte Albán I times—were the result of migration and political expansion from the Valley of Oaxaca.

Although the published Sola Valley data does not include specifics on frequencies or ratios of local versus “true” Valley of Oaxaca creamwares and other ceramic types, we can make some useful comparisons. In the 2014 and 2015 field seasons, we processed over 222,634 ceramic artifacts, and among them we recorded 4,744 (2.13%) fine brown wares. Although their vessel forms and surface decorations were reminiscent of the decorated *cremas* (C4s, C7s, and C20s), our fine brown wares had a tan ware clay body, not a *crema* paste. INAA results confirmed this observation. Cerro Jazmín fine brown wares were made of the regionally-available Group 1 and Group 2 clays.

Crema pastes are quite distinctive and easily recognizable in the modern-day pottery produced in Santa María Atzompa, just north of Monte Albán. In the Cerro Jazmín collections we did not record cream ware ceramics with surface decorations or vessel forms that correspond with the Monte Albán I and II *cremas*. Despite of the fact that Cerro Jazmín was the primary center for its corner of the Nochixtlán Valley, much like site S39 was the main center for the Sola Valley, there is little evidence of “true” cream wares present at Cerro Jazmín. We interpret this as a suggestion that Cerro Jazmín had a different and more autonomous relationship to Monte Albán.

Another important contrast is that while the Sola Valley was reportedly “virtually unoccupied before the [Monte Albán] Ic phase” (Balkansky 2002: 49), the Nochixtlán Valley enjoyed centuries of occupation and sociopolitical development prior to the establishment of Cerro Jazmín. Whereas the Sola Valley data suggest an influx of people and settlement shifts which correspond with the establishment of hilltop sites like S39, where Zapotec-style stone carvings are present, no such monuments have been documented at Cerro Jazmín.

Previous studies focusing on the influence of the Valley Zapotec on nearby regions have recorded the presence of G12 bowls. For example, scholars working in the lower Río Verde Valley have reported that between the Late and Terminal Formative periods there was a significant decrease of Valley of Oaxaca gray wares at coastal sites. They interpret this effect to trade route disruption as a result of conflict with the Monte Albán polity, perhaps as the Zapotec fully consolidated their power within the Valley of Oaxaca, in accordance with Spencer’s two-step model of Monte Albán’s expansion (Barber 2005; Joyce 1991: 514-535; Joyce et al. 2006; Levine 2002: 98; Workinger 2002: 347-360).

Our analysis documented the presence of gray wares at Cerro Jazmín, but no earlier than a century after the settlement was first established in 300 BCE. Gray wares were never co-dominant in our assemblages, but instead were the third most common category in the

entire assemblage. Gray wares were the second most frequent ware among the serving vessels, and G12 and G17 vessels in particular, represented an even smaller subsample (Table 2). Throughout the Late and Terminal Formative periods, gray-ware serving vessels were half as frequent as the locally-made yellow-ware serving vessels and throughout the sequence of occupation, the frequency of G12 bowls decreased.

In considering the meaning of G12 vessels, we follow the suggestion of Feinman et al. (1989:331) who argued that G12 vessels were not high-status items. These vessels are less elaborate and less costly to make than the *cremas* vessels. G12s were more widely distributed and sometimes made in multiple loci of the Valley of Oaxaca (Fargher 2007). For example, while Tilcajete was resisting Monte Albán incorporation in Late Monte Albán I times, G12 vessels (of the G12b subtype in particular) were widespread at El Palenque, where they accounted for 40-45% of diagnostic materials (Spencer et al. 2013). Based on the available information we conclude that G12s at Cerro Jazmín are not indicative of Monte Albán's preeminent influence, but instead a sign of the times or a sign of interaction with a more broadly defined group of Zapotec people, potters, and pottery styles originating in the Valley of Oaxaca as a whole.

Even if the G12 bowls were material indicators of Zapotec political or stylistic influence at Cerro Jazmín, we must remember that these ceramics were always used alongside others that represented local ceramic traditions and styles. In addition, G12 vessels and undecorated gray wares were recorded in all contexts at Cerro Jazmín—civic-ceremonial areas and high and lower-status residential terraces—although with varying frequencies. The widespread distribution of G12 bowls across the city suggests that their use was not exclusive or restricted to any sociopolitical group. Finally, the fact that the G12 examples so far subjected to chemical compositional analysis came from a single location in the Valley of

Oaxaca, the eastern Valle Grande area, suggests that these vessels were traded through a restricted network into Cerro Jazmín.

Our analysis contributes to the existing scholarship by identifying possible ceramic evidence of multi-directional trade and interaction with Monte Albán and the Valley of Oaxaca. An example of this is the presence of yellow wares, or *amarillos*, at Monte Albán. Caso et al. (1967: 55) noted that *amarillos* are relatively rare at Monte Albán and they proposed that this ware was intrusive to the Valley of Oaxaca. Among the yellow wares that Caso et al. (1967: 55, 60) described, they mentioned an A6 type—G12-like vessels made in a pale pink paste—and an A5 type—very thin, high-fired, and pale pink vessels similar to the hard-paste yellow wares we documented at Cerro Jazmín (Pérez et al. in press). In Monte Albán II times, Caso et al. (1967: 70) also report A9 and A11 vessels. A9 had red-paint designs and both A9 and A11 wares had incised line decorations along the interior or exterior of the vessel and on the bottom of the bowl. These descriptions are reminiscent of our yellow-ware conical bowls with G-21 incised line decoration at Cerro Jazmín (Pérez et al. n.d.). Caso et al. noted that *amarillos* appeared very rarely in Monte Albán I collections, but became more frequent in Monte Albán II (Late Ramos period; Nisa phase).

At Tilcajete, once the area was politically integrated into Monte Albán during the Monte Albán II period, Spencer et al. (2013) note that Cerro Tilcajete had a spatial configuration more closely aligned with that of Monte Albán and that *cremas* are present at the site, as are A9 vessels (Spencer et al. 2013). It is interesting to note that one of the signs of renewed interaction with Monte Albán is the presence of a ceramic type (A9) that Caso et al. believed to be intrusive to the Valley of Oaxaca.

We have documented the presence of yellow wares at Cerro Jazmín in contexts that predate the Late Ramos or Monte Albán II (Nisa) period, lending further support to the idea that yellow ware ceramics did not originate in the Valley of Oaxaca, but in the Mixteca Alta.

Our INAA results provide preliminary support for this hypothesis, although it must be further tested. Chemically characterized yellow wares, corresponding with paste groups 1 and 2, are thought to originate in the Mixteca Alta. The presence of yellow wares at Monte Albán and Cerro Tilcajete suggests that there was two-way ceramic or ceramic-style trade between the Mixteca Alta and the Valley of Oaxaca. Based on the currently available data, however, we cannot assess whether this interaction was one among equals. Trade relationships are seldom fair or equal for all involved parties, but it is noteworthy that the relative frequency of *amarillos* in the Valley of Oaxaca seems to be lower than the presence of gray wares in the Nochixtlán Valley.

10. Conclusion

In this article we have proposed that there is evidence of two-way trade and interaction between the Valley of Oaxaca and the Nochixtlán Valley as reflected in 29 dated ceramic assemblages from Cerro Jazmín. In the initial occupation of Cerro Jazmín, during the earliest part of the Early Ramos period, 300-250 BCE, the ceramic assemblages were entirely dominated by locally-made ceramics and there is no evidence of Valley of Oaxaca imports. It would appear that the political transformation that led to the establishment of Cerro Jazmín occurred independently, outside of Zapotec interaction, and perhaps before the inhabitants of Cerro Jazmín established trade relationships with Monte Albán.

Decades later, during the later part of the Early Ramos period (200-50 BCE), we see an influx of Valley of Oaxaca decorated gray bowls in Cerro Jazmín collections and an increase of locally-produced decorated serving wares. Zapotec gray wares, though present throughout the city, were more numerous in civic-ceremonial areas and higher status residences. At this time, the Cerro Jazmín ruling groups may have favored the use of these

ceramics as ideological vehicles to further their status, perhaps referencing the power and influence of Monte Albán as a rising regional political player.

In 100 ± 39 BCE (UGAMS#15442), a fire destroyed and covered with a layer of ash the main buildings associated with an important civic-ceremonial area near the hilltop of Cerro Jazmín, the Sunken Courtyard Sector (Pérez et al. n.d.). After this time our ceramic analysis detected a shift, which mirrors the material cultural changes we previously documented at the feasting area of the Sunken Courtyard Sector. In this later period, which corresponds with the start of the Late Ramos period (50 BCE-200 CE; Monte Albán II or Nisa to early Tani phase) we document a significant decrease of gray wares and an even more marked decrease in the frequency of G12 and G17 bowls. Fine brown ware and yellow ware vessels gained significant ground among serving vessels, which would have been featured prominently in private and public food consumption events and rituals.

We propose that by the Late Ramos period, the local Cerro Jazmín elites no longer needed or wanted to be associated with symbols of Monte Albán's power. There are several reasons why this should be the case. As Spencer noted, during the Monte Albán II period, the Zapotec capital was able to consolidate its political power throughout the entire Valley of Oaxaca and abroad. This shift into a more successful expansionistic regional polity could have prompted nearby regions to rethink their positions and relationships with Monte Albán. What was once an uneasy trade relationship may have turned into an adversarial threat that required the ideological rejection of Zapotec symbols of power.

By the Transition period, 200-300 CE, the century leading up to Monte Albán's political zenith, there is a precipitous drop in the use of gray wares, especially G12 vessels. Yellow ware conical bowls and cylindrical vases became the most important serving ware categories. Fine brown wares continued to be present, but they were no longer used to make vases and for the first time, red slips surpassed the frequency of black-slipped vessels that

resemble the C20 types that abound at Monte Albán. The Transition period was a time of decline leading up to the abandonment of Cerro Jazmín after nearly 600 years of continuous occupation. It would appear that Cerro Jazmín and its rulers were unable to maintain their power and the city lost most of its population nearly two centuries after shifting away from the use of Zapotec ceramics and styles.

Was this act of resistance or defiance towards the Monte Albán state a factor that led to Cerro Jazmín's eventual abandonment by 300 CE? We recently assessed the skeletal health of the Cerro Jazmín population from the Early Ramos to the Transition periods and we found no evidence of diminishing skeletal health in the centuries leading up to the city's abandonment, suggesting that perhaps other external political factors could have played a role in the city's demise. A full assessment on whether Cerro Jazmín's demise was associated with the expansion and consolidation of Monte Albán is beyond the scope of the current article and to answer this, further research is needed.

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Data availability statement

The Cerro Jazmín Archaeological Project collections are curated by the Centro INAH Oaxaca. Technical reports are available at INAH's technical archives. Project results and other educational materials were given to the community and authorities of Santa María Tiltepec for their knowledge and safe-keeping.

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Table captions

Table 1. Mesoamerican, Mixteca Alta, and Valley of Oaxaca chronologies used in this article, adapted from Joyce 2010: 16, Kowalewski et al. 2009: 411, and Zborover 2015.

Table 2. Table presents the percentages and proportions of different ceramic wares across the Late Formative to Terminal Formative and Transition period occupations. Also included are the chi-square results that reveal statistical significance in some of the chronological trends and changes seen in the ceramic assemblage.

** The table also presents, within the category of gray wares in particular, the chronological shifts in the presence of G12 and G17 decorated gray ware bowls, many of which may have been directly imported from the Valley of Oaxaca.

Table 3. Frequencies of different ceramic wares according to functional vessel categories.

Table 4. Fine brown ware vessel form frequencies from the Early Ramos to the Transition period and their chi-square results.

Table 5. Slip color frequencies among fine brown ware vessels from the Early Ramos to the Transition period and their chi-square results.