Pathways to power in the southern Brazilian highlands: Households, communities and status at Southern Proto-Jê pit house settlements

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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

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Abstract

This thesis is a contribution to the debate about the emergence of politically complex societies in the southern Brazilian highlands from a regional, community and household approach. At the regional level, I compare settlement patterns of the Southern Proto-Jê (Taquara/Itararé Tradition) in different areas, developing a model of territories structured around central places – represented by dense pit house villages and oversized pit houses. I test this model with new survey data from a yet unexplored region. At the centre of the pilot area, the site Baggio 1 – a dense, well-planned settlement focused around an oversized pit house – was chosen for excavations.

I frame the discussion about the function of oversized structures in the broader theoretical debates about aggrandising *vs* corporate strategies in early complex societies and their archaeological correlates. Thus, the excavations at Baggio 1 were targeted at understanding community organisation, functional variation between pit houses of distinct sizes, and inter-household differentiation. I demonstrate how the oversized House 1 emerged as the founding structure in the settlement, hosting ceremonies of house renewal during the first part of the site's history. Later, as the settlement grew, House 1 persisted as the social epicentre of the community. However, major differences emerged between the hilltop, formally arranged residential sector around House 1 and the periphery of the site. Although the earlier house renewal ceremonies were no longer practised, the inhabitants of House 1 asserted their presence in the same dwelling for over two centuries, maintaining the oversized structure as a conspicuous mark in the landscape and potentially deriving special status from their descent of the site's founders. The excavations at Baggio 1 reveal a complex interplay of corporate and aggrandising strategies to power in the southern Brazilian highlands.

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Acknowledgements

Three years ago I arrived at a part of the southern Brazilian highlands that was archaeological *terra incognita*. That landscape is now dotted with sites, some of which are the best dated burial mounds and pit house villages in the highlands, and has been the stage for some of the most promising research on human-environment interactions in the region – the results of which are still being processed. I am proud to be part of the team that made that possible, and this thesis is my contribution to that project.

Fieldwork was funded by AHRC-FAPESP project *Jê Landscapes of Southern Brazil*, granted to José Iriarte (University of Exeter), Francis Mayle (University of Reading) and Paulo De Blasis (USP). Excavations at Baggio 1 and dating of the site were funded by a Wenner-Gren Foundation Dissertation Fieldwork Grant entitled *House Architecture and Community Organization: Exploring Alternative Pathways to Complexity in the Southern Brazilian Highlands*. My PhD at the University of Exeter was funded by a CAPES scholarship from the Brazilian Ministry of Education. All finds from the *Jê Landscapes* project are stored at the UNISUL University, Tubarão, Santa Catarina, and I am grateful to Deisi Scunderlick and her team for their help and for hosting me during the artefact analysis.

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Mark Robinson deserves a special paragraph. The excavations at Baggio 1 and the interpretation of the site would not have been possible without him. Mark has contributed to my professional growth and has also become one of my closest friends in Exeter.

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Chapter 1

Introduction

A new look at South American prehistory

Lowland South America is one of the regions of the world where archaeological research has made a quantitative and qualitative leap over the last few decades. As a result, the image that we now have of the prehistory of the once “least known continent” (Moore, 2014) could not be more distant than what was envisaged 50 years ago. This is particularly true of Brazil – a country that alone occupies nearly half of South America’s landmass.

For a long time and until very recently, Brazilian archaeology was influenced by the Cultural Ecology paradigm of anthropology, best expressed in the influential *Handbook of South American Indians* (Steward, 1946). The basic assumption of Cultural Ecology was that the environment set limitations to the development of the “core” elements of human culture, those related to technology and subsistence. These, in turn, determined aspects such as ideology and socio-political organisation. Under that premise, Steward (1946) divided the South American groups into cultural areas with varying degrees of complexity, culminating with the Andean states. At the bottom of Steward’s evolutionary scale were the “marginal” tribes, scattered over most of the continent outside of Amazonia and the Andes.

Needless to say, Steward's evolutionism has long been abandoned by contemporary anthropology, and the idea that the environment imposes an insurmountable barrier to cultural development is constantly being challenged (especially by those working in the Amazon rainforest, Bush et al., 2015; Clement et al., 2015; Heckenberger and Neves, 2009; Heckenberger et al., 2003; Watling et al., 2017). Let us examine for a moment the most problematic of concepts, that of "marginal" tribes, as expressed in the *Handbook* and later syntheses. These cultural groups, occupying a considerable part of the South American lowlands, were defined by a series of absences rather than by specific traits. For instance, the marginal tribes were described as "extremely simple" cultures, lacking agriculture, weaving, basketry, and pottery (Steward, 1949, p. 678-679). If these features were present, they were presumed to be borrowed from other tribes. In socio-political terms, they were described as organised in kin units and differentiated only on the basis of age and gender, lacking formalised leadership, and living in very low population densities (Steward, 1949, p. 669-679).

In contrast with that image, it seems that wherever archaeologists have been looking in lowland South America in recent times, evidence has been found of large populations, mixed economies, permanent villages, regional hierarchies, and large-scale architecture both in settlements and in public monuments. More than 10 years ago, some of these finds led Peter Stahl (2004) to announce "greater expectations" when dealing with the pre-Columbian record of lowland South America, and to emphasise that models based on outdated sketchy data and the projection of recent ethnographic data to the past should be abandoned. Let us briefly review some of the data highlighted by Stahl as well as new discoveries made ever since (Figure 1.1). For example, in the state of Acre, south-western Amazonia, hundreds of monumental geometrical earthworks (geoglyphs) connected by causeways have been identified after recent deforestation (Schaan et al., 2012). In the Upper Xingu basin, southern rim of the Amazon, dozens of large fortified settlements connected by roads in a regional "galactic system" have been uncovered (Heckenberger et al., 2003). In the Central Brazilian *cerrado* (savannahs), large circular villages have been located whose dimensions are many times those of the modern ethnographic examples and with evidence of long-term occupation (Wüst and Barreto, 1999). In the southern Brazilian highlands, funerary mound and enclosure complexes organised at the regional level and representing a unique form of ritual architecture have called the attention of researchers (Iriarte et al., 2008). Finally, mounded villages in the grasslands of Uruguay have been shown to be well-planned settlements where mixed economies were practised since the mid-Holocene (Iriarte et al., 2004).

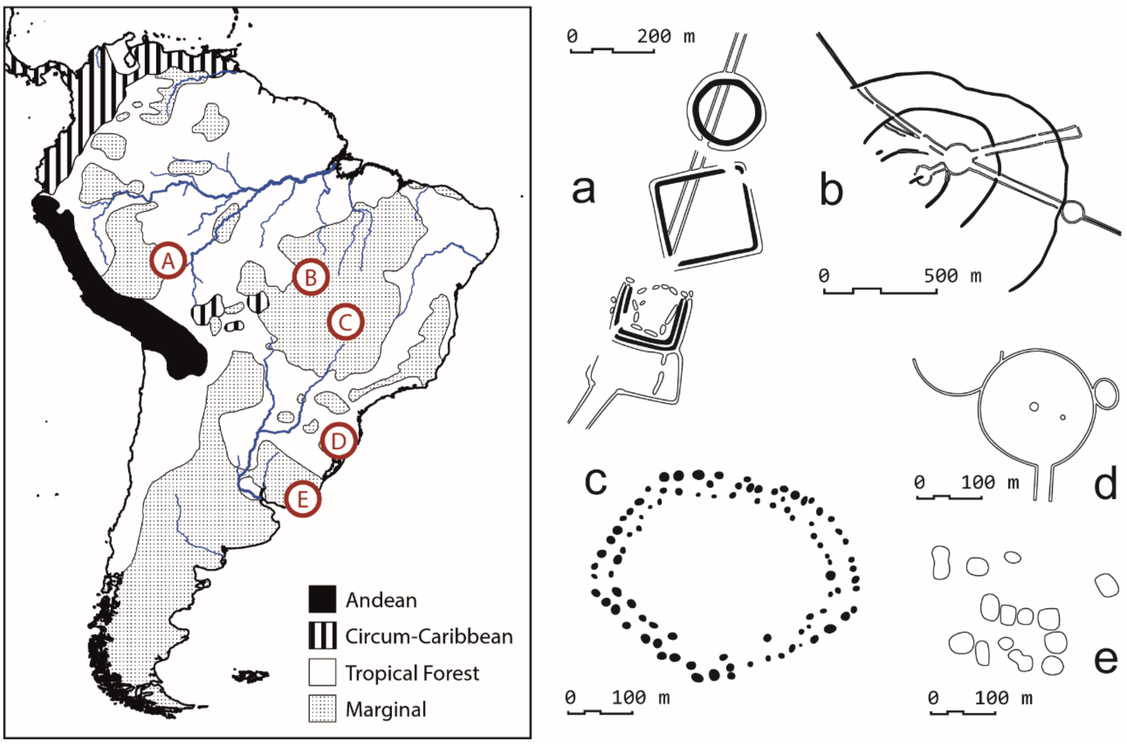

Figure 1.1 An outdated view of South America and new evidence of cultural complexity. Left: map of the culture types from the *Handbook of South American Indians* (Steward, 1949, p. 670) with challenging archaeological discoveries in “marginal” areas. A) The geoglyphs of Acre; B) The “garden cities” of the Upper Xingu; C) The ring villages of Central Brazil; D) The Taquara/Itararé funerary monuments; E) The mound builders of Uruguay. Right: site plans exemplifying those discoveries. a) Fazenda Colorada (Schaan et al., 2012, p. 136); b) Nokugu (Heckenberger, 2005, p. 82); c) GO-RV-66 (Wüst and Barreto, 1999, p. 16); d) PM-01 (Iriarte et al., 2008, p. 950); e) Los Ajos (Iriarte, 2006, p. 651).

All of these discoveries have taken place in areas that were considered “marginal” by outdated Cultural Ecology views, showing that post-conquest ethnographic impressions cannot be uncritically projected onto the Pre-

Columbian past. Evidently, archaeological research in South America during the Cultural Ecology days, in the first half of the 20th century, was in its infancy. It is the task of 21st century archaeology to rewrite and rethink what happened in the prehistory of lowland South America.

However, despite the quantitative growth in data, there are many gaps in our understanding of the processes behind the flourishing of those cultures, their regional organisation, their socio-political structure and, to paraphrase Nelson (1995, p. 614), "how they were complex?". The commonalities in the presence of large settlements, monuments and ceremonial centres may in fact hide an enormous diversity of social formations. For example, is the investment in large-scale architecture an expression of social distinctions sponsored by aggrandisers in pursue of power (Clark, 2004; Earle, 1997; Hayden and Spafford, 1993; Lesure and Blake, 2002)? Or is it a result of group-oriented ideologies whereby community purposes are served without implying hierarchy (Blanton et al., 1996; McGuire and Saitta, 1996; Saitta, 1994; Saitta and Keene, 1990)?

With those questions in mind, the contribution of this thesis is twofold. First, I add to the growing body of literature about the emergence of complex societies in lowland South America with a new case study from the southern Brazilian highlands. This vast basaltic plateau has seen renewed archaeological research over the last decade (Copé, 2007; Corteletti et al., 2015; De Blasis et al., 2014; De Masi, 2009; De Souza et al., 2016a; De Souza et al., 2016b; Iriarte et al., 2013; Iriarte et al., 2008; Saldanha, 2008). The region is noticeable for its high density of domestic and ceremonial large-scale earthworks, coupled with a rich ethnohistorical literature attesting the persistence of mound-building and formalised leadership into colonial times. Second, beyond the impact of the study for South America, the southern Brazilian highlands have a unique potential to contribute to broader theoretical debates on alternative pathways to complexity. My case study is especially relevant for those interested in the role of large-scale public and domestic architecture for consolidating power and status in different types of social formations, namely the important distinction between aggrandising *vs.* community-oriented strategies of early leaders (Blanton et al., 1996; Renfrew, 1973; Saitta and Keene, 1990).

Organisation of this thesis

This study can be divided in two parts, progressing from the regional to the intra-site analysis. **Chapter 2** introduces the archaeology of the southern Brazilian highlands and the Taquara/Itararé tradition, together with what is known about the social organisation of the Southern Jê peoples that inhabited the area in recent times. These were regionally integrated societies with a certain degree of formalised leadership, but the archaeological correlates of this organisation have been mainly sought in the funerary mound and enclosure monuments.

Following a different direction, I turn in **Chapter 3** to pit house settlement data in order to understand the regional organisation of the Southern Jê in the past. I selected three regions in the southern Brazilian highlands that have been thoroughly investigated, comparing their settlement patterns and chronologies. I conclude that, in all cases, the Southern Jê did not settle randomly in the landscape. Rather, they established repeated modules consisting of central places and satellite sites. The central places in the settlement system were occupied by dense settlements or pit houses of abnormally large dimensions.

In order to test that model, I present in **Chapter 4** the results of a survey in a yet unexplored area, Campo Belo do Sul, Santa Catarina state. With the discovery of over 60 archaeological sites, a major gap was filled in the regional archaeology, confirming the model developed in the previous chapter. I argue that the central place of the pilot area was occupied by a large and architecturally complex site, called Baggio 1, consisting of a dense aggregation of small and medium-sized pit houses around an oversized structure, formally divided into a hilltop inner precinct and a lower peripheral area.

The function of oversized pit houses in the southern Brazilian highlands has been long debated. Proposals vary from high-status dwellings, through extended family homes, to communal non-domestic facilities. However, excavation data about those structures are scarce. Baggio 1 presented a perfect opportunity to contribute to that debate and to understand the function of central settlements in the Southern Jê territories. Before moving to the intra-site analysis, a background is provided in **Chapter 5** to understand the material correlates of alternative scenarios that I summarise as *aggrandising* and *corporate* models of emergent complexity. My focus is on a community and household perspective. I emphasise the potential of elaborate domestic architecture to bespeak incipient hierarchies in societies where the household is the basic economic unit and kin size largely determines status. On the other hand, I consider the possibility of large-scale labour mobilisation in communal social formations where integrative facilities serve group purposes. The archaeological correlates of both scenarios are examined in order to inform my interpretation of the oversized pit houses of the southern Brazilian highlands.

The excavations at Baggio 1 are described in **Chapter 6**. The methodology employed was directed at unveiling community organisation and variation between pit houses. Therefore, a sample of structures with various dimensions and in different sectors of the site were excavated, including the oversized structure (House 1) and a selection of small pits in the inner precinct (Houses 2 and 3) and the peripheral area (House 11). Major differences were noticed in stratigraphy, architecture, features and artefact density between the various structures of the site. Of particular relevance was the discovery of a sequence of burnt floors, cache deposition, and entombment in the early phases of House 1.

In **Chapter 7**, I analyse the chronology obtained for Baggio 1. With over 20 radiocarbon dates, this is now the most intensely dated settlement in the southern Brazilian highlands. The precision of the chronology was further enhanced by Bayesian modelling, framing the occupation of the site between *Cal. A.D. 1385* and *1765*. No major gaps were found, showing that the site would not have been abandoned for significant periods, a conclusion that contradicts some long-standing models that portrayed the Southern Jê societies as highly mobile.

The artefact analysis of the site is then presented in **Chapter 8**. The focus of the analysis was to understand variation in material culture between the various pit houses and sectors of the site, as well as changes over time. I demonstrate a tendency towards reduction in ceramic size, abandonment of a distinctive red slipped ware (particularly frequent in House 1), and changes in lithic raw material selection. It is the first time that such technological changes are observed over the history of a single site.

Chapter 9 examines the formation processes that resulted in the floor assemblages recovered from the site, a crucial question before interpretation can proceed. I argue that most of the debris inside pit houses results from primary and secondary deposition in the context of use, around hearths and other features. The notable exception is the early phase of House 1, when abundant broken ceramics and lithic tools were purposefully placed on top of the burnt structure before resurfacing. I interpret those practises as related to rituals of conflagration and entombment, involving the deposition of caches or “ceremonial trash” before the renewal of the house’s floor.

Finally, in **Chapter 10**, I present a synthesis of the site’s history and an interpretation of the social organisation during each major period. I propose that the settlement began as a single oversized dwelling (House 1) sheltering an extended family that was integrated by community-oriented domestic rites. During this period, power was expressed through strategies closer to the corporate end of the continuum. Later, as the site grew, smaller pit houses were progressively added to the surroundings of House 1, which remained as the social focus of the settlement. I argue that, over time, the dwellers of House 1 derived a higher status from their position as the founding lineage of the site, their broader kin network, and the house’s past ideological role as a stage for ceremonies. When the division of the site in an upper and lower neighbourhood became formalised, activities within House 1 became more individualised and monumental burials emerged as a new ritual focus on the regional landscape. Thus, by the apogee of the site’s occupation, emerging leaders were at the verge of consolidating their power. Although the site collapses in the middle of the 18th

century, its history reveals the persistence of a long-lived residential group involved in a complex interplay of different strategies to power.

Chapter 2
Archaeology and ethnohistory of the southern Brazilian highlands

In this chapter, I will set the scene for the remainder of the thesis by presenting a basic environmental and culture-historical background to the southern Brazilian highlands. An initial description of the environment will be followed by a summary of the archaeology of the Taquara/Itararé Tradition – ancestor to the Southern Jê peoples. Given the direct continuity between that archaeological tradition and the indigenous groups recorded in historical accounts and modern ethnographies, I will dedicate the final part of the chapter to a brief review of the Southern Jê, focusing on their socio-political organisation.

Environmental context of the southern Brazilian highlands

The southern Brazilian highlands are a vast (over 400,000 km^2) plateau located approximately between latitudes 23°S and 30°S. They extend from the southernmost part of the state of São Paulo to the states of Paraná, Santa Catarina, and the northern half of the state of Rio Grande do Sul. Elevation is highest in the easternmost parts of the plateau: the highest point of southern Brazil, *Morro da Igreja*, in Urubici, Santa Catarina state, is located 1822 m above sea level. Elevation gradually decreases towards the west, as one approaches the Paraná River floodplain, in average ca. 200 m above sea level (Figure 2.1).

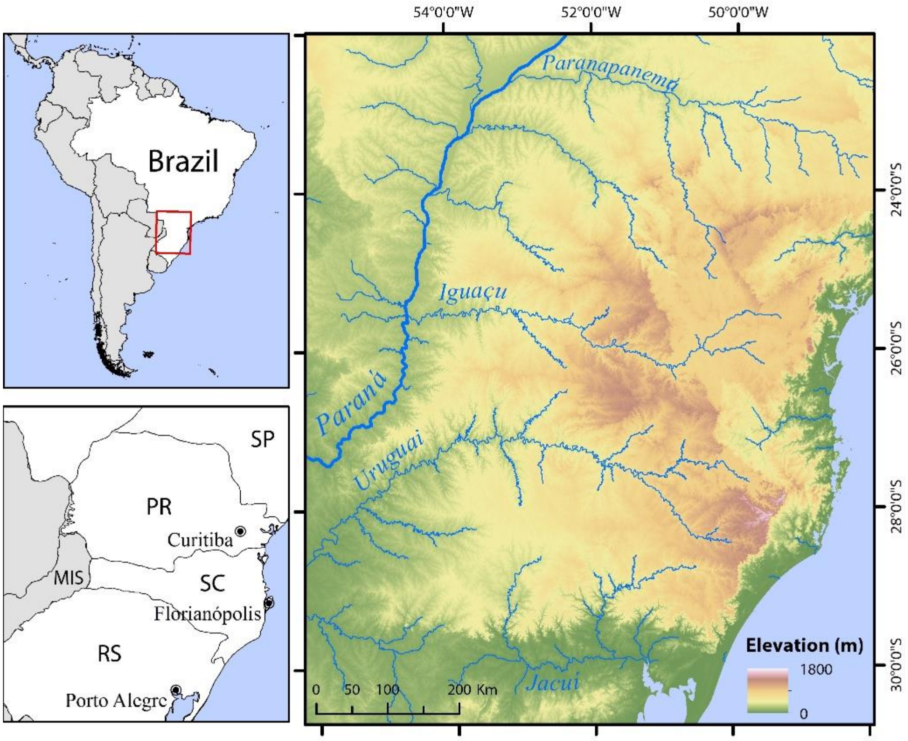

Figure 2.1 Location of the southern Brazilian highlands in South America, with political (states and capitals) and physical (elevation and main rivers) maps of the region. Abbreviation of state/province names mentioned in the text: SP = São Paulo, PR = Paraná, SC = Santa Catarina, RS = Rio Grande do Sul, MIS = Misiones

The main geological event responsible for the formation of this plateau is a series of volcanic activities during the Jurassic and Cretaceous periods. The thick lava cover (2000 m deep in some points) originated the igneous rocks of the Serra Geral formation, broadly classified as basalts and rhyolites, which now cover approximately 75% of the area. This volcanic cover is superimposed to the sandstone formations of the Paraná sedimentary basin, which are of fluvial and aeolian origin and date from the Devonian period (Da Silva et al., 2003, p. 71-74; Milani et al., 2007; Peate et al., 1992, p. 120).

According to the Köppen climatic classification, most of the southern Brazilian highlands have a subtropical climate (*Cfa*), i.e. humid mesothermal with warm summers, whereas the areas with the highest elevations (800 m or above) have a temperate or oceanic climate (*Cfb*), distinguished by cool summers (Pandolfo et al., 2002). The variation in average temperature in the highlands roughly follows the changes in elevation. The areas of highest elevation have annual average temperatures of 11°C or less, and average low temperatures below 5°C in the winter (Pandolfo et al., 2002; Schmitz, 2007, p. 18-21). However, most of the areas inhabited by the Taquara/Itararé Tradition experience a much milder climate. Annual average temperatures in the highlands normally range between 15°C and 18°C, with low temperatures of no less than 5°C to 8°C in the winter and high temperatures of up to 28°C in the summer (Pandolfo et al., 2002). Snowfall is extremely rare (Schmitz, 2007, p. 42-43). Rainfall is high and relatively constant throughout the year, with total annual precipitation ranging from 1300 mm to 2300 mm (Pandolfo et al., 2002).

In phytogeographical terms, the vegetation of the southern Brazilian highlands is part of the Atlantic Rainforest biome, one of the hotspots of biodiversity in the globe. Two vegetation types dominate the highlands: mixed rainforest and steppe[1] (IBGE, 2012) (Figure 2.2). The mixed rainforest is also called *Araucaria* forest in reference to its dominant species, *Araucaria angustifolia* (Paraná pine). The genus *Araucaria* comprises conifer species restricted to the southern hemisphere, more specifically to South America and Oceania (Bittencourt, 2007, p. 1; Stefenon, 2007, p. 26). In Brazil, *Araucaria angustifolia* is an endangered and now protected species after decades of logging. Mature trees are calix-shaped and can attain 25 m to 50 m of height. Their nutritious seeds (*pinhão*) disperse in the late autumn and early winter months, from May to June (Bittencourt, 2007, p. 2-4; Stefenon, 2007, p. 3-4). However, some varieties of *Araucaria angustifolia* produce mature seeds in other seasons (Reitz and Klein, 1966).

[1] Steppe is the name adopted by the most recent classification (IBGE, 2012). This grassland vegetation is distinct from the tropical, seasonally-dry savannahs, and is also called *campos* in Brazil. The term 'mixed rainforest' is a literal translation of *floresta ombrófila mista*.

In the mixed rainforest, mature *Araucaria angustifolia* trees dominate the canopy, emerging from a lower stratum with trees of the genera *Nectandra*, *Ocotea*, *Ilex*, *Cedrela* and *Podocarpus*, among others (IBGE, 2012, p. 80-83). In the southern Brazilian highlands, the *Araucaria* forest coexists with extensive areas of temperate grasslands (steppe) locally known as "*Campos Gerais*". They are dominated by grasses of the genera *Paspalum*, *Axonopus*, *Andropogon* and *Stipa.* The grasslands form a mosaic with sparse *Araucaria* groves and gallery forests along streams (IBGE, 2012, p. 128-133; Mattos, 1994, p. 72-93).

These two vegetation types cover most of the core areas of Taquara/Itararé occupation. However, in the lower altitudes and along major river valleys, there is a predominance of seasonal deciduous and semi-deciduous forests (Guarino, 2010, p. 7). Deciduous forests, found in the Uruguai basin, are those in which more than 50% of the trees lose their leaves in the winter, comprehending species of the genera *Peltophorum*, *Anadenanthera* and *Apuleia*, all of tropical origin (IBGE, 2012, p. 96-102). In contrast, the Iguaçu basin is dominated by semi-deciduous forests, where only 20% to 50% of the trees lose their leaves in the winter. Common genera include *Parapiptadenia*, *Peltophorum*, *Cariniana* and others of tropical origin (IBGE, 2012, p. 93-96).

Figure 2.2 Landscapes of the southern Brazilian highlands. a) Mosaic of steppe and *Araucaria* forest (São José dos Ausentes, Rio Grande do Sul). b) *Araucaria* forest along a small stream (São José dos Ausentes, Rio Grande do Sul). c) View from *Morro da Igreja*, over 1800 m above sea level (Urubici, Santa Catarina).

The vegetation history of the southern Brazilian highlands is relatively well understood thanks to several palynological studies. Because native *Araucaria* forests were of fundamental importance to the economy of the historical and pre-Columbian groups that inhabited the plateau, and given the possibility of human management of those forests (Bitencourt and Krauspenhar, 2006; Iriarte and Behling, 2007; Reis et al., 2014), it is worth discussing such studies in some detail. Most of the palynological research has been conducted in the eastern portion of the plateau, in the states of Paraná, Santa Catarina and Rio Grande do Sul (Behling, 1995, 1997; Behling et al., 2001; Behling et al., 2004; Ledru et al., 1998). More recently, research was extended to the western limits of the highlands, in the province of Misiones, Argentina (Gessert et al., 2011). All the pollen records show a trend for the expansion of *Araucaria* forests at the expense of grasslands during the late Holocene. In the state of Paraná, the core from Serra dos Campos Gerais attests a first expansion of *Araucaria angustifolia* around 1030 Cal. B.C., and a major increase in this species after Cal. A.D. 420, when the modern mosaic of *Araucaria* forests and open grasslands was established (Behling, 1997, p. 115-120). In the state of Santa Catarina, three cores from Serra da Boa Vista, Morro da Igreja, and Serra do Rio do Rastro point to an initial increase in *Araucaria* forest taxa between 1810 Cal. B.C. and 480 Cal. B.C., with the greatest expansion occurring after ca. Cal. A.D. 1050 (Behling, 1995, p. 131-149). In the state of Rio Grande do Sul, the Cambará do Sul core provided evidence for a minor *Araucaria* expansion as a network of gallery forests after 2370 Cal. B.C., followed by a strong expansion after Cal. A.D. 850 (Behling et al., 2004, p. 281-295). This tendency is matched by the neighbouring São Francisco de Paula core, which attests a greater frequency of *Araucaria angustifolia* pollen after Cal. A.D. 960 (Behling et al., 2001, p. 633-638). Finally, in the province of Misiones, near the transition to lowland deciduous forests, the Cruce Caballero core confirmed the appearance and expansion of *Araucaria angustifolia* and other elements of mixed *Araucaria* forests after ca. Cal. A.D. 110-140. However, in this case, *Araucaria* advanced over an existing forest dominated by Myrtaceae and never achieved the abundance found in the records from the eastern highlands (Gessert et al., 2011, p. 35-36).

In synthesis, most of the southern Brazilian highlands were dominated by grasslands when the climate was colder and drier, until the late Holocene. As conditions became wetter between 2350 Cal. B.C. and Cal. A.D. 540, *Araucaria angustifolia* began to expand, forming gallery forests. It was only very recently, between Cal. A.D. 540 and 1050, with the onset of an even wetter and less seasonal climate, that *Araucaria angustifolia* started to take over the open grasslands (Iriarte and Behling, 2007, p. 117-119).

Climate change was undoubtedly a major factor in facilitating the expansion of *Araucaria angustifolia*, but human management of the landscape should not be disregarded as a potential cause. Iriarte and Behling (2007, p. 122-

124) point to a coincidence between the frequency of the dates of Taquara/Itararé sites and the peak of *Araucaria* expansion: 79% of the published dates for Taquara/Itararé sites were more recent than Cal. A.D. 950. Iriarte and Behling (2007, p. 122-124) suggest that the greater availability of the nutritious *Araucaria* seeds (*pinhão*) would have allowed a more permanent human occupation of the highlands. On the other hand, Bitencourt and Krauspenhar (2006, p. 112-113) attribute the expansion of *Araucaria* forests directly to human action. The main argument is that *Araucaria angustifolia* is naturally replaced by more competitive broadleaf species in the shade of the forest, so that its reproduction depends heavily on dispersion agents, mainly birds but also humans (about the natural succession of Araucaria giving place to deciduous forests, see also Mattos, 1994). Thus, the coincidence between the exponential growth in the number of Taquara/Itararé sites and the expansion of Araucaria forests as seen through the pollen record could point to human management of *Araucaria angustifolia* in the past (Bitencourt and Krauspenhar, 2006, p. 114-115).

After this brief review of the environmental aspects of the southern Brazilian highlands, I will now examine the archaeology of the Taquara/Itararé Tradition that occupied most of the region during the late Holocene. I will restrain from presenting a detailed history of archaeological research in Brazil (in-depth accounts can be found in Barreto, 2000; Mendonça de Souza, 1991; for the specific case of southern Brazil, syntheses can be found in Noelli, 1999a; Noelli, 1999b, 2005), only highlighting the major facts when they are relevant to understand the development of certain research questions.

The Taquara/Itararé Tradition

The term Taquara/Itararé Tradition (along with Itararé-Taquara, Southern Jê, and Southern Proto-Jê) is used in the literature to encompass what were originally three different archaeological traditions of southern Brazil (called Taquara, Itararé and Casa de Pedra), but which are now recognised as regional variants of the same phenomenon (Araujo, 2007, p. 15-17; Beber, 2004, p. 45-95; Da Silva, 2001, p. 37-99; Noelli, 1999b).

Remains of the Taquara/Itararé Tradition, especially earthworks, were known and eventually described by amateurs since at least the 19th century (e.g. Kunert, 1890, 1892). However, the first systematic description by a professional archaeologist was accomplished by Menghin (1957) in the province of Misiones, Argentina. Named “Eldoradense” (in reference to the municipality of Eldorado), this tradition was believed to mark the beginning of the Neolithic period in Misiones. It was initially characterised by small, thin pottery vessels and, in one site, also by earthworks: large circular enclosures, a causeway, and a mound. The earthworks were interpreted by Menghin (1957, p. 30-34) as remnants of a structure similar to the circular villages of the Jê peoples of central Brazil (Maybury-Lewis, 1979). However, he postulated a local genesis of the Eldoradense tradition in Misiones through a neolithisation process of pre-established hunter-gatherer groups, represented by the Altoparanaense lithic tradition (Menghin, 1957, p. 19-29).

In Brazil, similar pottery was studied since 1958, when it was noticed by P. I. Schmitz in the coast of Rio Grande do Sul (Schmitz, 1958; Schmitz and Becker, 2006, p. 66). However, systematic research only started in 1965 with the beginning of the *National Programme of Archaeological Research* (PRONAPA) coordinated by Smithsonian Institute archaeologists Betty Meggers and Clifford Evans (Barreto, 2000, p. 44-45; Mendonça de Souza, 1991, p. 118). The main purpose of the programme was to construct a basic culture-historical sequence for the prehistory of different parts of Brazil, until then largely unknown. This was to be accomplished by means of a standardised methodology including surface collections, small test excavations, and ceramic seriation. The material was organised according to a simplified version of the North American taxonomy proposed by Willey and Phillips (1958, p. 21-43). Two main levels of classification were used by PRONAPA: (1) a *phase*, meant to include materials with similar traits and a restricted spatial and temporal distribution; and (2) a *tradition*, which encompassed several phases and was meant to have broader geographical distribution and longer time persistence (Chmyz, 1976, p. 131-145). Some Brazilian researchers later compared a phase with an “indigenous tribe”, and a tradition with an “indigenous nation” (Schmitz and Becker, 1991, p. 256-257), but, in general, no ethnographic correlations were attempted by PRONAPA archaeologists at the early stages of the programme, making their classifications “devoid of anthropological meaning” (Araujo, 2007, p. 11).

It was in this context that Miller (1967) defined the *Taquara phase* based on pottery from sites of the north-eastern part of the state of Rio Grande do Sul, distributed over the highlands and its southern escarpment. Pottery of the Taquara phase was recovered from two types of settlements: surface sites and pit houses, the last ones restricted to the highlands. The defining traits of the Taquara pottery were its small size, cylindrical shape, and high frequency of plastic decoration, including punctuations, incisions, nail and basketry impressions, and other techniques (Miller, 1967, p. 20). This phase would later be expanded to become the *Taquara Tradition*, encompassing many phases with similar pottery (Brochado et al., 1969, p. 12-15).

In the same year, Chmyz (1967a) independently defined the *Itararé phase* based on ceramics from surface sites in the state of Paraná. Shape and decoration distinguish this pottery from the previous one: the Itararé vessels are globular and mostly plain, with a few red slipped examples (Chmyz, 1967a, p. 67-68). As in the previous case, the Itararé phase would later become an homonymous tradition encompassing several phases with similar traits (Chmyz, 1968b, p. 116-120). Alongside these two traditions, a minor one called *Casa de Pedra* was also defined based on rock shelter occupations and surface sites in the state of Paraná (Chmyz, 1967b, 1968b).

Archaeologists soon realised that the differences between the three traditions were smaller than their similarities, eventually leading to their unification (Miller, 1971). There is now general agreement that the three traditions represent a single phenomenon with regional peculiarities. The similarities include most aspects of ceramic technology, the presence of earthworks, and an association with the precolonial ancestors of the Southern Jê ethnolinguistic groups (Araujo, 2007; Beber, 2004; Noelli, 1999b; Ribeiro, 1999). Some authors have suggested the label *Itararé-Taquara* to refer to this broad tradition, acknowledging the fact that the Itararé Tradition was defined first (Araujo, 2001, p. 29; 2007, p. 17; Parellada, 2005, 2008). Others use the term *Southern Jê* (e.g. Noelli, 1999a; Noelli, 2004, 2005) or *Southern Proto-Jê* (e.g. Corteletti et al., 2015; Iriarte et al., 2013) in order to explicitly connect the archaeological record with the historical populations of the southern Brazilian highlands. For convenience, I will employ the term *Taquara/Itararé* (Beber, 2004) when alluding to ceramic technology and other specific characteristics of material culture; otherwise, I will refer to *Southern Proto-Jê*[2] groups, given the significance of ethnohistory and the *longue durée* perspective adopted in this thesis. Both terms are consolidated in the international literature.

In the next sections of this chapter, I will introduce the most important characteristics of the Taquara/Itararé Tradition – namely, the diagnostic traits in ceramic technology and style, as well as site types (pit houses, mounds and enclosures, surface sites and others). After that, I will deal with the ethnohistorical information about the native societies of the southern Brazilian highlands, focusing on their socio-political organisation.

Ceramics

The Taquara/Itararé Tradition comprises over 15 ceramic phases (Beber, 2004, p. 45-95; Schmitz, 1988, p. 75-117). However, some phases were created based on a sample as small as 15 sherds (e.g. Ribeiro, 1972), and many are too similar to justify their separation (Saldanha and Copé, 1999).

An overview of the published material (Beber, 2004; Chmyz, 1967b, 1979, 1981; Chmyz et al., 2003; Chmyz et al., 1999; Copé, 2006; De Masi, 2005; Miller,

[2] The term Southern Proto-Jê (or rather *Proto-Southern Jê*, cf. Jolkesky 2010) also has its drawbacks, since it could be misinterpreted as referring only to the time period when the southern Jê languages were still undifferentiated (Noelli, personal communication, 2015). However, it is employed here following the proposal of Da Silva (2001, p. 11-12), disconnected from the linguistic usage and referring to all ancestral southern Jê societies during the precolonial period.

1967, 1971; Parellada, 2005, 2008; Robrahn, 1988; Rohr, 1966, 1971; Saldanha, 2005; Schmitz, 1988; Schmitz et al., 2002) demonstrates that technological differences between the regions are few to non-existent. Virtually all of the Taquara/Itararé pottery is tempered with minerals (either naturally-occurring inclusions or purposefully crushed rock)[3], shaped by coiling, and fired in a reduced or incompletely oxidising atmosphere (such attributes will be examined in more depth in Chapter 8 when analysing in detail the ceramics from the Baggio 1 site). In contrast, stylistic differences are noticeable[4], and I propose that most of the phases can be subsumed under three major styles (Figure 2.3, Figure 2.4).

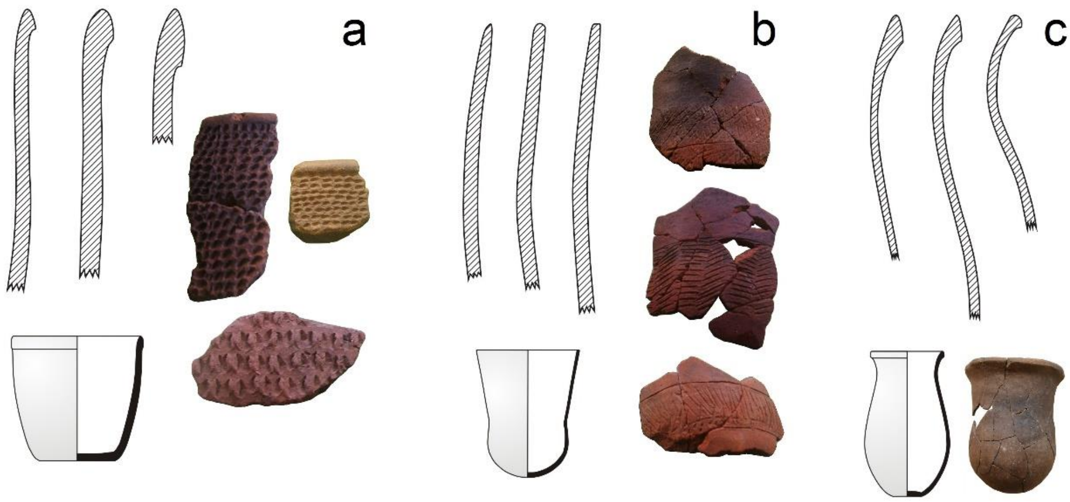

Figure 2.3 Major styles of Taquara/Itararé pottery. a) Taquara phase; b) Guatambu and Guabiju phases; c) Itararé tradition. All drawings and photos are by the author, taken from collections in the three southern Brazilian states (SC/PR/RS). For details, see De Souza (2009).

(a) The pottery of the *Taquara* phase is concentrated in the north-eastern portion of the state of Rio Grande do Sul, from the highlands, through the escarpment, to the coastal plains. It is characterised by simple, cylindrical, non-

[3] Rare cases of tree-bark ash temper have been recently reported (Schmitz and Rogge, 2008; Araújo, 2016), raising the possibility that there might be more technological variation within the tradition than previously assumed.

[4] The terms "technological" and "stylistic" are used here merely as a convenient distinction between the "invisible" attributes of the pottery, such as temper and firing, and the highly "visible" ones, such as shape and decoration (Carr, 1995; Parkinson, 2006).

constricted vessels with reinforced rims and a high frequency of plastic decoration – cord and basketry impressions, punctuations, stamped motifs, nail impressions – covering the whole vessel (Beber, 2004, p. 51-54; Miller, 1967; Schmitz, 1988, p. 81-83).

(b) A different style is represented by the pottery of a few phases whose similarities are so obvious that they should be merged, mainly the *Guatambu, Guabiju* and *Xaxim* phases. Unlike the previous one, these phases are restricted to the highlands, having their epicentre at the border between the states of Santa Catarina and Rio Grande do Sul. Their defining trait is the predominance of cylindrical, non-constricted vessels with a slightly inflected contour. Decoration is less frequent than in the Taquara phase and the motifs are different, consisting mostly of zigzag and checkerboard incisions forming a band around the central portion of the vessel (Beber, 2004, p. 46-64; Miller, 1971; Ribeiro and Ribeiro, 1985; Rohr, 1971; Saldanha, 2005, p. 48-57; Schmitz, 1988, p. 76-86).

(c) Finally, what was originally defined as the *Itararé* tradition appears indeed to form a very consistent, homogeneous group. This is the pottery style with the broadest distribution, occupying all the state of Paraná, the southern part of the state of São Paulo, the coastal strip of Santa Catarina, and the province of Misiones, Argentina. It is characterised by thin, ovoid vessels with inflected contours, constricted necks, and thickened rims. Apart from occasional red slip and smudging, decoration is extremely rare (Beber, 2004, p. 66-94; Chmyz, 1967a, 1969, 1979, 1981; Da Silva et al., 1990; Menghin, 1957; Robrahn, 1988; Schmitz, 1988, p. 96-117).

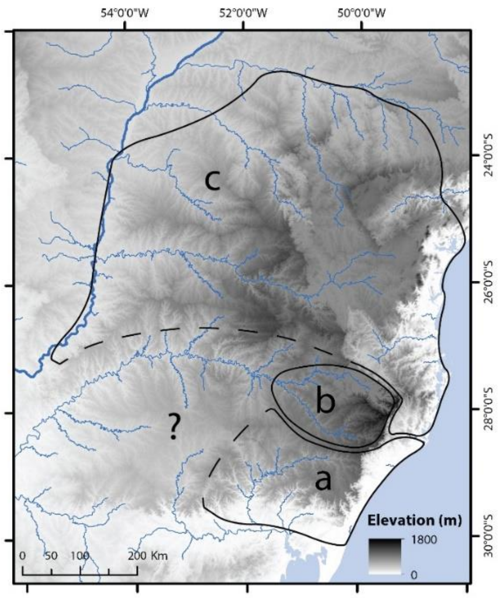

Figure 2.4 Location in southern Brazil of the ceramic styles described in the text. Some borders are imprecise, and the scarcity of material published for some areas does not allow a secure affiliation.

Pit houses

Ceramics fulfilled an important role in the definition of the Taquara/Itararé Tradition, but even in their absence another class of material remains has been equally diagnostic: earthworks. In fact, the archaeological sites of the southern Brazilian highlands that immediately called researchers' attention were the pit houses (Figure 2.5). Pit houses were first excavated in the 1960s in the state of Rio Grande do Sul (Chmyz, 1963) by suggestion of the American archaeologist Alan Bryan, who recognised similarities between the Brazilian sites and the better known pit houses of the United States and Canada (Schmitz and Becker, 2006, p. 66; Schmitz et al., 1988, p. 8).

Pit houses are generally circular, with a few elliptic examples. Their diameters vary between 1 m and 25 m, but most are between 2 m and 5 m. They occur isolated or in groups of up to 107 pits, although most pit house clusters do not exceed three structures. Their depth (before excavation) tends to be 1 m or less, but larger pits can be deeper. When pit houses are built on slopes, an embankment is frequently found around the depression in order to level the surrounding terrain; mounds, presumably resulting from the excavation of the pits, are sometimes found alongside them (Beber, 2004, p. 203-206; Copé, 2006, p. 53-85; Reis, 2007; Saldanha, 2005, p. 74-75; Schmitz and Rogge, 2011; Schmitz et al., 2002). In terms of geographical distribution, pit houses are more commonly found above 800 m of elevation (Beber, 2004; Panek Jr. and Noelli, 2006), almost coinciding with the distribution of *Araucaria* forests. This preference for high altitudes led some researchers to explain the use of pit houses as an adaptation to colder climates (La Salvia, 1983). The region of greatest concentration of pit houses are the eastern highlands of the states of Santa Catarina and Rio Grande do Sul, where the largest structures and densest settlements can also be found (see Figure 2.7 and Chapter 3).

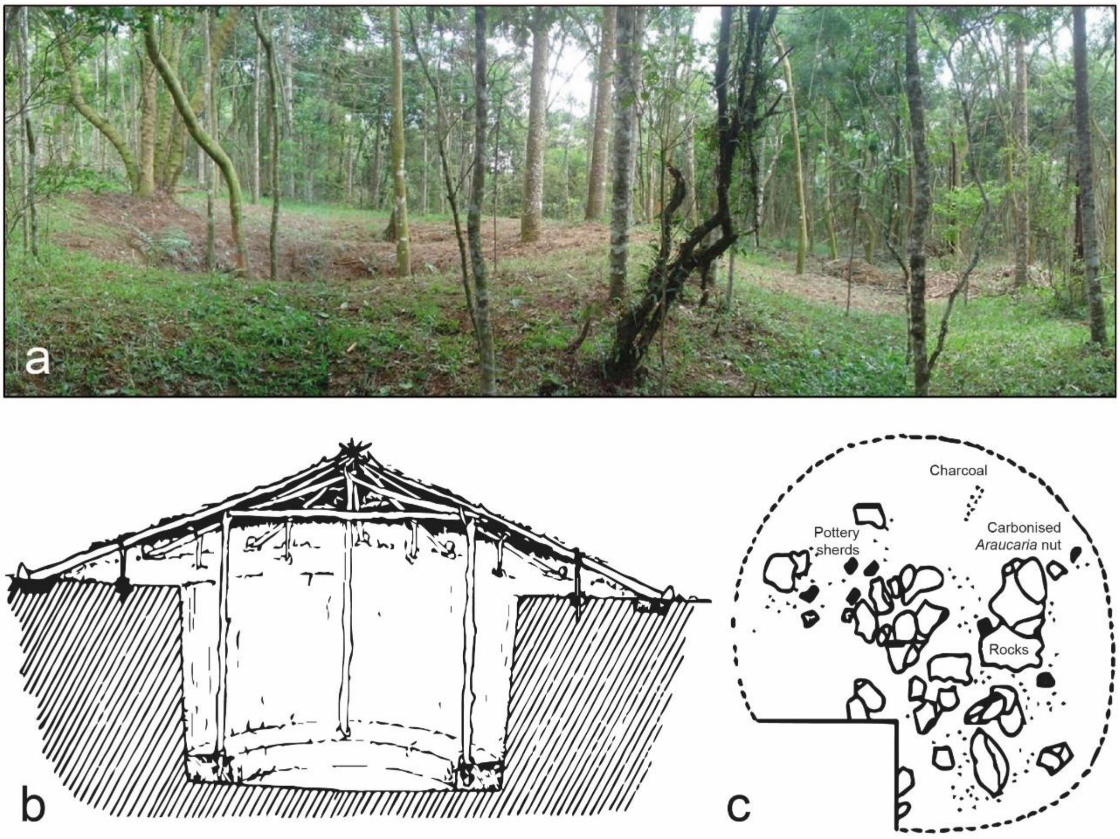

Figure 2.5 a) Pit houses and artificial terracing at the SC-CL-43 site (photo by Rafael Corteletti); b) Hypothetical reconstruction of a roofed pit house (La Salvia, 1983, p. 18); c) Typical internal features on a pit house floor: excavation plan of the site RS-37 (Schmitz et al., 1988, p. 26).

Admittedly, the use of the term “pit house” in itself implies a function, when it is known that in other parts of the world similar structures may have had specialised uses. For those reasons, many archaeologists have resorted to more neutral terms, such as “semi-subterranean structure” (e.g. Copé, 2006; Reis, 2007; Saldanha, 2005). The function of most pits as habitations has been deducted from excavations that revealed domestic refuse such as lithics, utilitarian pottery, charred *Araucaria* seeds, and features such as hearths and post holes (Chmyz et al., 2003, p. 14-38; Copé, 2006, p. 177-271; Saldanha, 2005, p. 75-83; Schmitz et al., 1988; Schmitz et al., 2002). Nevertheless, there is now evidence that smaller pits may have been used exclusively as cooking facilities (Corteletti, 2012, p. 65-81).

The most interesting question pertaining to pit house function, one that is at the centre of this thesis, is related to the oversized structures. What exactly is the threshold for a pit house to be considered abnormally large varies according to region, since the average pit diameter is not uniform throughout the highlands. In any case, structures with 16 m to 25 m diameter should be at least one standard deviation above the mean independent of region (see Chapter 3 for a comparison of three areas within the Canoas-Pelotas basin), and pits with such diameters have been reported in many different places. Not many excavations have been conducted in oversized pit houses, and few researchers have theorised about their function. Because this literature is reviewed in detail in Chapter 5, I will now only mention that the first archaeologist to explicitly address the problem, M. J. Reis (2007, p. 189-195), suggested two hypotheses to explain oversized pit houses: they were either ritual spaces, similar in form and function to the Puebloan *kivas*, or habitations of extended families.

Another crucial problem is the degree of permanence in pit house settlements, a matter that has been debated over the years. In a cross-cultural study, Gilman (1987) points out that ethnographic groups that use pit houses tend to be sedentary during at least one season of the year. In the case of the southern Brazilian highlands, there are evidences to argue both for and against long permanence at the sites. For example, settlements with multiple pit houses are sometimes built over a single previous levelling of the terrain, suggesting that they were planned as a whole, rather than reflecting a random accumulation or palimpsest of occupations (Saldanha, 2005, p. 73). These sites also exhibit track-ways between the houses, pointing to long-term patterns of movement within the villages (Iriarte et al., 2013, p. 84). Moreover, deep occupation strata have been reported with a five-century span from top to bottom (Copé, 2006, p. 249).

On the other hand, thick layers of abandonment between living floors are evident in many excavated sites, and radiocarbon dates frequently show long intervals between occupations (Chmyz et al., 2003, p. 19-38; Müller, 2007; Saldanha, 2005, p. 76-78; Schmitz et al., 1988, p. 23-40; Schmitz et al., 2002). This type of evidence led Schmitz et al. (2002) to hypothesise that few houses would have been simultaneously occupied: people would have periodically moved from one site to the next, alternating between different settlements in their territory, and building new pit houses or reoccupying old ones every time they moved. One major contribution of this thesis is the modelling of over 20 dates for the same site, including the longest sequence for a single pit structure, allowing us for the first time to debate permanence *versus* abandonment based on a robust chronological dataset (Chapter 7).

Mounds and enclosures

Besides pit houses, ceremonial earthworks are also a hallmark of the Southern Proto-Jê presence in the highlands, and those have been noticed since the earliest research in the region (Menghin, 1957, p. 30-34). Ceremonial earthworks take the form of mounds and enclosures (Figure 2.6). What is striking is the persistence of such monuments until modern times: Southern Jê peoples, especially the Kaingang, were still erecting burial mounds well into the 20th century (Da Silva, 2001; Maniser, 1930; Métraux, 1946). Thus, the southern Brazilian highlands are one of the few regions in the Americas[5] where the practise of mound building has been directly observed and recorded in historical accounts, making it a case of prime anthropological interest for understanding the rites and meanings associated with such monuments.

The first description of a Southern Proto-Jê mound and enclosure complex was provided by Menghin (1957, p. 30-34) in Eldorado, Misiones, Argentina. The site, now known as PM-01, consisted of a circular enclosure with 180 m diameter whose entrance was framed by a long causeway that extended for 400 m downhill. A 3 m high mound was located near the centre of the circle, paired by a smaller mound. Other circular enclosures, ranging from 35 m to 130 m wide, were attached to the largest ring. Excavations revealed rows of stone clusters

[5] Another prominent example are the Mapuche (Araucanians) of Chile, extensively studied by Dillehay (1990, 1992, 1995, 2007).

that were then interpreted as remnants of a palisade (Menghin, 1957, p. 33). More recent excavations by Iriarte et al. (2008, p. 954-957) suggest that those features are rather remains of earth ovens. Coupled with phytolith evidence for maize consumption in small ceramic vessels, this led to an interpretation of PM-01 as a place for conspicuous consumption and drinking of fermented maize beverages during post-funerary feasting events around the burial of an important individual in the central mound (Iriarte et al., 2008, p. 957-958; Iriarte et al., 2010, p. 33-34).

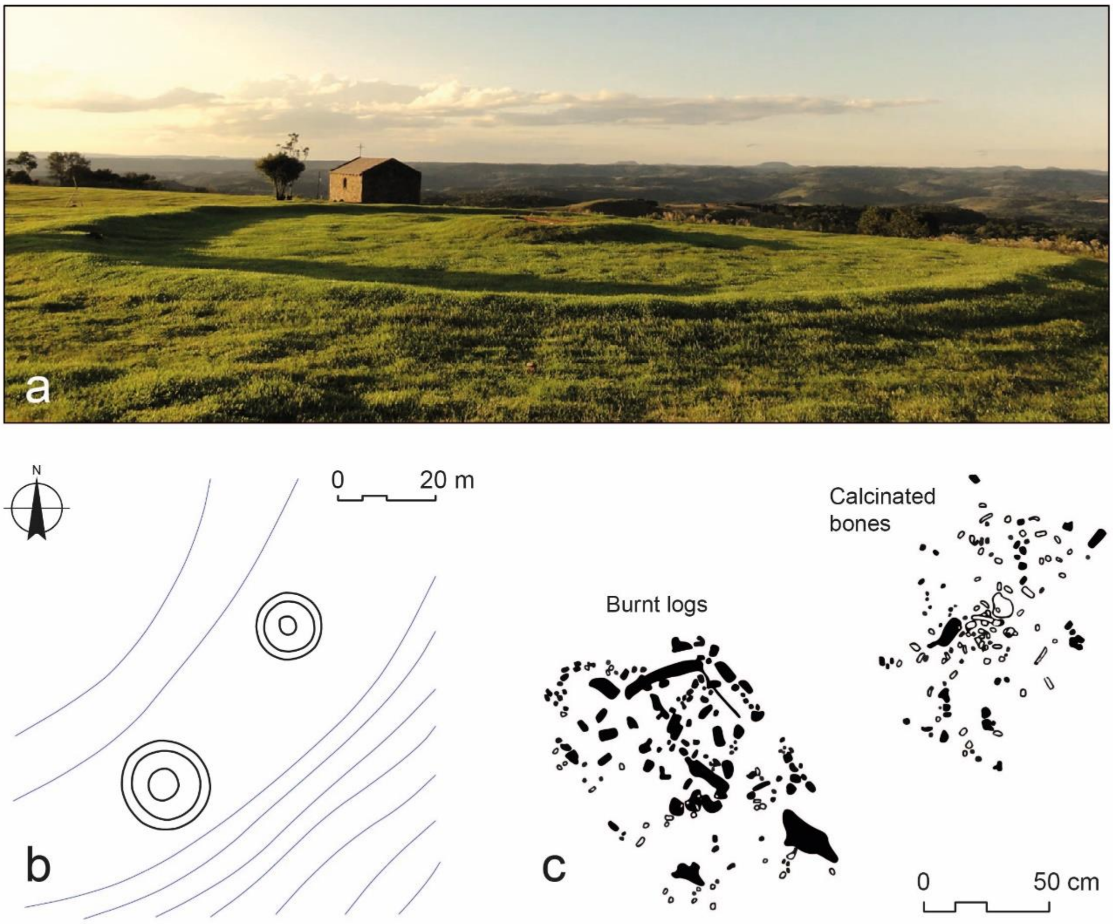

Figure 2.6 a) Abreu Garcia mound and enclosure complex (photo by Rafael Corteletti); b) Plan of typically paired mounds and enclosures, site RS-PE-21 (modified from Copé et al., 2002); c) Excavation plan showing a funeral pyre and secondary cremated deposit at site RS-PE-29 (De Souza and Copé, 2010, p. 105).

In Brazil, similar sites were initially interpreted as remnants of fortified settlements based on the presence of earthen enclosures and on their location on hilltops, presumably for defensive reasons (Ribeiro and Ribeiro, 1985, p. 90-91; Rohr, 1971, p. 19). It is now clear that such sites are ceremonial in nature. Enclosures range in diameter from 15 m to 180 m. There is a bimodal distribution: small enclosures, between 15 m and 25 m, almost always have central mounds, whereas large ones – over 60 m diameter – may or may not contain mounds (De Masi, 2006a, p. 60-63; 2009, p. 110-111; Iriarte et al., 2013, p. 77-79; Rohr, 1971, p. 52-54). When enclosing mounds, they can be referred to as *mound and enclosure complexes* (Iriarte et al., 2013). Central mounds often (but not always) contain secondary cremated deposits of single or multiple individuals, and *in situ* funeral pyres have occasionally been reported (Copé et al., 2002; De Masi, 2005, p. 222-247; 2009, p. 107-109; De Souza and Copé, 2010, p. 104-105; Herberts and Müller, 2007; Müller, 2008, p. 38-52). Although in most cases only one or two burials are found per mound, the excavations at two sites revealed considerably more: in one of the mounds of SC-AG-12, six cremated deposits were found (De Masi, 2009, p. 108), whereas the main mound of Abreu Garcia contained sixteen cremated deposits, the highest number so far (Robinson et al., in press) (see also Chapter 4). The calcination and very fragmentary state of the bones hamper the identification of attributes such as age and sex. The few existing studies show that virtually all burials belong to adults, with only three infants having been identified so far (De Masi, 2005, p. 226-227; 2006a; 2009, p. 107-108; Müller, 2008, p. 118-119). Pathologies are ubiquitous: porotic hyperostosis, a condition caused by anaemia, malnutrition or persistent infections, has been identified in most cremated burials from the Barra Grande region (Müller, 2008, p. 119-120).

In contrast with the small mound and enclosure complexes, large enclosures (60 m to 180 m diameter) sometimes exhibit evidences of a wider range of ceremonial activities beyond burials. These include the remnants of feasting located at site PM-01 and others (De Masi, 2005, p. 225-227; 2006a; 2009, p. 107; Iriarte et al., 2008, p. 954-957; Iriarte et al., 2010, p. 31-34). Initiation ceremonies could also have been performed at oversized enclosures, as suggested by the recovery of a quartz lip plug from site SC-AG-12. Historical accounts of the Xokleng, a Southern Jê group, describe gathering places enclosed by a wooden fence where boys were initiated into adulthood through ritual perforation of the lips (De Masi, 2005, p. 226-230; 2006a; 2009, p. 107; De Paula, 1924, p. 128). Whatever their function, it is reasonable to suppose that large enclosures were designed for the gathering of a larger audience than the small mound and enclosure complexes, as suggested by their size (Adler and Wilshusen, 1990) and by evidences of greater mobilisation of labour in their construction, including possible exogenous sediment in the earthwork construction fill (De Souza and Copé, 2010, p. 104).

As for site layout, circular enclosures are the most common, but there are cases of elongated, U-shaped, and rectangular earthworks (Chmyz, 1968c, p. 47; Herberts and Müller, 2007; Müller, 2008, p. 38-52; Ribeiro and Ribeiro, 1985, p. 115). There are also sites where circular and rectangular enclosures are combined, resulting in “keyhole” shapes (Iriarte et al., 2013, p. 88; Ribeiro and Ribeiro, 1985, p. 115). Typically, each enclosure surrounds a single central mound, but sites where enclosures contain up to nine mounds have eventually been recorded (De Masi, 2005, p. 222-232; 2009, p. 101-102; Herberts and Müller, 2007; Müller, 2008, p. 38-52).

In terms of distribution, mound and enclosure complexes appear to be more common in the eastern highlands of Santa Catarina and Rio Grande do Sul, where pit houses are also clustered (Figure 2.7). Elsewhere, unenclosed mounds are the typical funerary site. For example, in the state of São Paulo, in the Ribeira River valley, hundreds of mounds have been recorded in a single site (Robrahn, 1988, p. 56-57). Araujo (2001, p. 317-318) and De Blasis (2000) record similar sites in the highlands of São Paulo, interpreting them as central places in the settlement system of the Southern Proto-Jê groups. In the state of Paraná, Chmyz and Sauner (1971) excavated a large mound surrounded by a ditch, very similar in appearance to the ones depicted in the historical accounts of the Kaingang (Maniser, 1930, p. 767). At the base of the mound, those authors describe two layers of burnt clay floors covered by ashes, post holes, lithics and pottery, but it is not clear from the text whether human bones were present (Chmyz and Sauner, 1971, p. 21-23).

One crucial question pertains to the possible status distinctions in the burials. Evidence for such distinctions is still scarce, but compelling. For example, in the case of sites PM-01 and SC-AG-12, it is clear that only a few individuals were buried inside oversized enclosures that probably also served as spaces for gathering, feasting, and initiation rituals (De Masi, 2005, p. 225-227; 2006a; 2009, p. 105-108; Iriarte et al., 2008, p. 957-958; Iriarte et al., 2010, p. 33-34). If that is the case, where would the majority of the population be buried? Beber (2004, p. 239-240) contrasts the individual burials in mounds with the collective burials in rock shelters, attributing a higher status to the first, mainly based on the historical accounts of the Kaingang chiefs' burials (Mabilde, 1897, p. 162-166). These two modes of burial, however, appear to be mutually exclusive depending on the region, and as such might reflect different concepts of ancestry – one emphasising collective ancestors, the other focusing on individuals (Saldanha, 2008, p. 93-94). The differences may also be partly explained by chronology: burials in rock shelters tend to precede Cal. A.D. 1000, whereas all the mound and enclosure complexes are posterior to that date (Corteletti, 2012, p. 197-199).

Surface sites

I will use the term "surface site" to refer to Southern Proto-Jê sites without earthen architecture. These are open air sites, usually in ploughed fields, with scattered lithics and ceramics on the surface. In comparison with pit houses and mound and enclosure complexes, surface sites are relatively poorly understood. Different functions have been suggested for them, from permanent villages to temporary camps and special activity areas (Copé, 2007; De Masi, 2006a, p. 68-70; Rogge and Schmitz, 2009, p. 80; Saldanha, 2005, p. 115).

Extensive surface sites are common in the southern escarpment of the highlands, in the state of Rio Grande do Sul, where they sometimes contain anthropogenic dark earth (Miller, 1967). A similar situation occurs in the states of São Paulo, Paraná, and in the coast of Santa Catarina, where large and dense surface sites are more common than pit house settlements (Araujo, 2001, p. 165-239; Chmyz et al., 1999, p. 20-38; Da Silva et al., 1990; Parellada, 2005, p. 128-180; Robrahn, 1988; Schmitz et al., 1993). Coastal sites may include middens with shell and fish bones, and many are ephemeral, suggesting temporary fishing camps (Rogge, 2006). In the escarpment of Santa Catarina, a large number of surface sites with anthropogenic dark earth appears contemporary with the core Southern Proto-Jê occupation of the highlands, but the diagnostic ceramics are scarce or sometimes absent (Farias and Kneip, 2010).

Although surface collections are the favourite method for investigating this type of site (Araujo, 2002), the few highland sites that have been excavated frequently contained features such as hearths and post holes (Rosa, 2007, p. 138-166; Saldanha, 2005, p. 92-103). Additionally, a considerable number of subfloor burials have been found in some sites, both in the highlands and in the coast, where they appear to have been placed along the walls of the huts (Chmyz et al., 1999, p. 21-31; Da Silva et al., 1990; Schmitz and Rogge, 2013, p. 23-27; Schmitz et al., 1993). Such evidence points to a certain degree of permanence in those sites, but the truth is that surface sites are an extremely heterogeneous category, including many locations with very few, dispersed lithic and ceramic artefacts – and whose contemporaneity can hardly be ascertained. In those cases where palimpsests are likely to be present, a “non-site” or “off-site” approach (Dunnell, 1992; Foley, 1981) has been proven more productive for understanding occupation at a landscape level (Riris, 2014, 2017).

Other types of sites

The site types listed above subsume the majority of Southern Proto-Jê remains. Less common are rock shelters, sites with rock art, and coastal shell mounds. In the case of rock shelters, evidence of domestic (even if temporary) occupation are scarce, and usually Taquara/Itararé ceramics appear as the uppermost component on top of millennia of Archaic levels (Chmyz, 1967b; Ribeiro, 1972). On the other hand, rock shelters used exclusively for collective burials have been recorded in the eastern highlands of the states of Santa Catarina and Rio Grande do Sul (Beber, 2004, p. 189-190; Corteletti, 2008, p. 111-113; 2012, p. 53-54; Miller, 1971; Rohr, 1971). Not all of them contain pottery associated with the bones, making the affiliation to the Taquara/Itataré Tradition tentative in many cases. The best studied site is RS-A-08, known as the *Matemático* rock shelter (Lazzarotto et al., 1971, p. 81-84; Miller, 1971, p. 45-46). With its entrance originally covered by a bamboo mat, the rock shelter contained numerous human bones associated with ceramics and materials rarely preserved: maize cobs, gourds, cotton, and fragments of basketry. Recent analyses of the bones estimated that the minimum number of individuals buried at the site lies between 30 and 37, depending on the method used for counting (Brentano and Schmitz, 2010, p. 123-124). Despite the richness in material culture, this is not the site with the largest number of burials, as over 60 individuals have been reported for another rock shelter (Beber, 2004, p. 50-51).

Some of the Southern Proto-Jê sites in rock shelters or contiguous to rock outcrops are associated with rock art, mostly in the form of engravings (Chmyz, 1968a; Da Silva, 2001; Ribeiro, 1972; Rohr, 1971). These usually include geometrical motifs, but in one case – the *Avencal* site – anthropomorphic “masks” have been recorded (Corteletti, 2012, p. 279-282; Riris and Corteletti, 2015; Rohr, 1971, p. 32). Because sites that have been excavated show a superimposition of Taquara/Itararé ceramics to earlier, Archaic strata (e.g. Parellada, 2015, p. 58-60), it is difficult to connect the rock art specifically to the Southern Proto-Jê period. Nevertheless, Da Silva (2001) attributes nearly all rock art of southern Brazil to a Southern Proto-Jê authorship, based on the resemblances between the geometrical motifs, the Taquara/Itararé pottery decoration, and the body painting and basketry of the Kaingang and Xokleng. This hypothesis, however, has not gained general acceptance.

Finally, in the Atlantic coast, a Southern Proto-Jê occupation is often found on top of mid-Holocene shell mounds (Beber, 2004, p. 76-84; DeBlasis et al., 2007, p. 42-44). These sites represent a much earlier monumental funerary tradition in southern Brazil. Built between 4000 and 2000 B.P., shell mounds can reach 70 m height and are the result of millennia of repeated episodes of collective burials covered by thick shell layers (DeBlasis et al., 2007; Fish et al., 2010; Gaspar et al., 2008). The arrival of the Southern Proto-Jê occured in a period when monumental construction was in decline, and coastal societies were experiencing major changes in site construction and funerary practises. The Taquara/Itararé ceramics in the terminal levels of shell mounds make their appearance during this period of change, concomitant with the spread of Southern Proto-Jê surface sites and burial mounds in the coast (De Blasis et al., 2014, p. 114-115; DeBlasis et al., 2007, p. 41-42).

A central debate in the archaeology of this region is whether the coastal Taquara/Itararé pottery was diffused to pre-established mid-Holocene populations, or whether there has been population replacement by the highland groups. From a physical anthropology perspective, multivariate analysis of non-metrical traits of skulls from coastal burials pointed to discontinuities between pre-ceramic and ceramic levels in the northern Santa Catarina shell mounds – but not in other sites (Neves, 1988). A comparison with highland burials confirmed the affinities between them and the foreign coastal ceramic populations (Neves, 1999, p. 172-177), giving further strength to the migration hypothesis. A more recent analysis revealed the same proximity between ceramic populations of the coast in opposition to the pre-ceramic ones, but not in all sites (Okumura, 2007, p. 338-339). On the other hand, analyses of strontium isotopes have so far failed to identify more than one or two non-local individuals (if any) among the burials of coastal ceramic sites (Bastos, 2009, p. 50-52; 2014, p. 50-51; Oppitz, 2015, p. 220-241). Overall, the evidence supports a scenario in which both migration and diffusion have taken place, probably with an initial influx of a few highland groups to the coast, followed by the adoption of ceramics and changes in settlement patterns by the coastal populations.

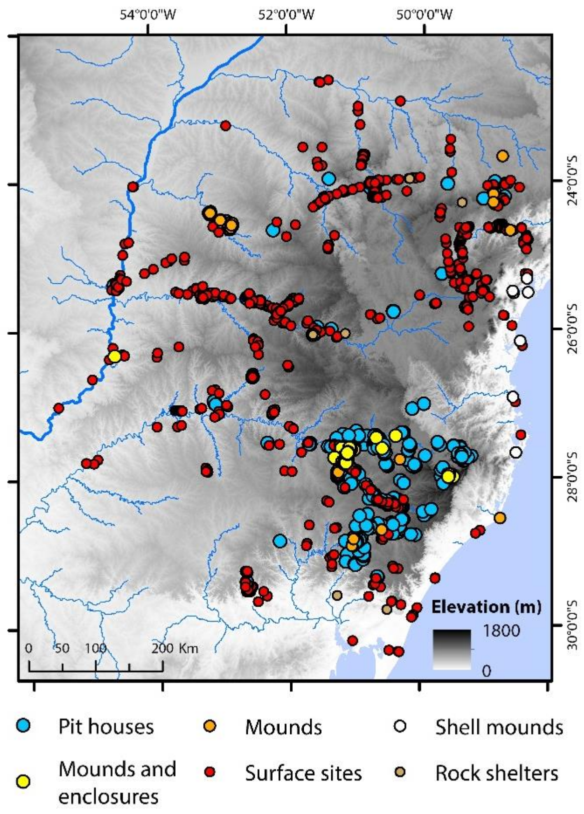

Figure 2.7 Distribution of Southern Proto-Jê sites.

The summary provided above is not exhaustive. The variability in Southern Proto-Jê site types and material culture is only beginning to be uncovered, and research is still incipient in many areas. Figure 2.7 presents the geographical distribution of the major types of Southern Proto-Jê sites. Obvious differences in settlement patterns can be immediately noticed on the map, such as the association between pit houses and mound and enclosure complexes in the southern highlands *versus* surface sites and mounds in the north. These patterns partly coincide with distinct ceramic styles (compare with Figure 2.4), opening an avenue to the study of precolonial frontiers that is yet to be explored.

Chronology and origins of the Taquara/Itararé Tradition

The earliest accepted Southern Proto-Jê sites suggest a rapid expansion, as they are broadly contemporary in the northernmost and southernmost points of the territory. A date of 1790 ± 210 ^{14}C yr B.P. has been reported for a rock shelter (*Abrigo da Janela*) with Taquara/Itararé ceramics (and no earlier strata) in the northern part of Paraná (Parellada, 2005, p. 42). Parallel to that, a date of 1810 ± 85 ^{14}C yr B.P. has been obtained from a surface site (RS-P-12) in the eastern plateau of the state of Rio Grande do Sul (Schmitz and Brochado, 1972). These sites are separated by over 400 km. Given that most of the early dates are located along the eastern edge of the plateau, where elevations are higher, this has been suggested as the route through which the Jê populations colonised southern Brazil (Araujo, 2007, p. 27-28; Noelli, 2004, p. 37-40).

Although a date of ca. 2000 ^{14}C yr B.P. is usually considered a good estimate for the first colonisation of the highlands by the Southern Proto-Jê, earlier dates have been published by some authors. For example, a date of 2640 ± 40 ^{14}C yr B.P. has been obtained by Schmitz et al. (2010, p. 54) from a fire pit directly beneath the artificial terracing around a pit house. Because the feature must necessarily precede the construction of the pit house – dated two millennia later – there can be doubts about its association with a Southern Proto-Jê context. An even earlier date of 3310 ± 200 ^{14}C yr B.P., in this case presumably from an occupation level within a pit house[6], is reported by Reis (2007, p. 179), but discarded by the same author as “suspicious”. Another outlier is the date of 2180 ± 40 ^{14}C yr B.P. from a pit house excavated by Copé (2006, p. 191-192). This date was also discarded, as it was not in agreement with the other dates form the same structure and had been obtained from unreliable charcoal. De Masi (2005, p. 261-262) published dates of 2510 ± 40 ^{14}C yr B.P. and 4070 ± 40 ^{14}C yr B.P. for surface sites, but the last one is of such antiquity when compared to all other Southern Proto-Jê sites that it has failed to gain acceptance (see debate in De Masi, 2006b, p. 190-196)[7]. Finally, Chmyz et al. (1999, p. 107) mention dates of Cal. B.C. 1875 and Cal. B.C. 405 for the state of Paraná, but there is no indication of their context or laboratory number, and this information has never been published ever since.

In summary, it is reasonable to suppose that the Southern Proto-Jê groups first arrived in the southern Brazilian highlands between 3000 and 2000 B.P., but few sites from the first incursions will be detectable. They became well established in the region after 2000 B.P. and, as mentioned previously, reached

[6] Unfortunately, not much contextual information is provided by Reis (2007).

[7] Remarkably little information can be found in the report by De Masi (2005) concerning the site from which the date was obtained. However, in a later publication, it is stated that the site was disturbed and that excavations took place in different seasons. It is not clear whether the dated charcoal and the ceramics were directly associated, as they appear to have been collected in separate occasions and from different areas (De Masi, 2007, p. 194).

their highest density after 1000 B.P. (Iriarte and Behling, 2007, p. 121-123; Iriarte et al., 2016, p. 8-9). What was the origin of this tradition? Early researchers postulated an autochthonous development for the Taquara/Itararé Tradition and a continuity of population from the pre-ceramic period (Menghin, 1957; Ribeiro, 1991, p. 106; Schmitz, 1988; Schmitz and Becker, 1991, p. 275-276). However, this perspective has been criticised (e.g. Noelli, 1999b, p. 288-290) for not taking into consideration the linguistic data that points to central Brazil as the homeland of the Jê languages, where the greatest ethnolinguistic diversity within this family is to be found (Urban, 1992, p. 90-91). Presently there is reason to believe that the Taquara/Itararé pottery originated from the Una Tradition of the central Brazilian highlands. This tradition has earlier dates, coincides in geographical distribution with the probable Proto-Jê homeland, and is very similar to the Taquara/Itararé pottery in technology and style (except for the plastic decoration typical of the later), thus reinforcing the possibility of a migration that brought both the Jê languages and the Taquara/Itararé material culture to the south (Araujo, 2007, p. 19-20; Brochado, 1984, p. 196-221; Noelli, 1999b, p. 240-241; Prous, 1992, p. 333-345).

Ethnohistory of the southern Brazilian highlands

In the previous section, I dealt with the earliest dates and probable origins of the Jê populations in southern Brazil. As for the latest dates of this archaeological tradition, the boundary is difficult to establish, since the occupation of many archaeological sites reaches the 17th century A.D. and sometimes even later, concomitant with the first European accounts of the native peoples of the southern Brazilian highlands. These were written by Spanish Jesuits in the province of *Guairá* (which corresponds to the western part of the modern state of Paraná) during the first half of the 17th century, and the description of aspects such as burial rites and even fragments of the language leave no doubt that they refer to an ancestral Jê population (Cortesão, 1951, p. 346-347; D'Angelis, 2003,

p. 1-2). The clear continuity between the archaeological record and the historical groups means that written sources and modern ethnographies may benefit the archaeological interpretation. In fact, this is one of the few cases in lowland South America where an unequivocal association can be made between a particular archaeological culture and a modern indigenous population. Beyond the territorial extent of the Taquara/Itararé Tradition, which broadly overlaps with the historical distribution of the Southern Jê peoples, there are also continuities in ceramic technology (Da Silva, 2001; Miller Jr., 1978; Silva, 2006) and burial practises, i.e. the construction of mounds (Mabilde, 1897; Maniser, 1930; Métraux, 1946).

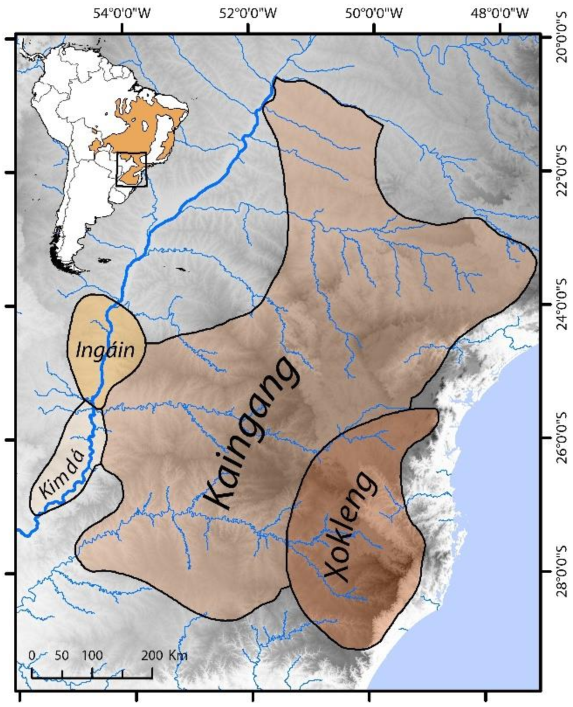

Figure 2.8 Territorial extent of the Macro-Jê stock (inset) and distribution of the southern Jê languages in the 19th century. Based on Campbell (1997, p. 364-372) and Jolkesky (2010, p. 17).

In the earliest historical accounts, written during the 16th and 17th centuries, the indigenous highland groups were called *Guayanás* and *Gualachos*. These ethnonyms were replaced, in the 19th century, with the designations *Coroados* and *Botocudos*, which correspond to the modern Kaingang and Xokleng[8], respectively (Becker, 1976, p. 11-15; Ihering, 1904; Mabilde, 1897; Métraux, 1946, p. 445). The Kaingang and Xokleng are currently the only representatives of the southern branch of the Jê linguistic family, itself a member of the broader Macro-Jê stock, one of the largest in South America (Davis, 1966; Jolkesky, 2010; Ribeiro, 2006; Rodrigues, 1999) (Figure

[8] *Coroados*, meaning "the crowned ones", is a reference to the tonsure used by the Kaingang in the 19th century, whereas *Botocudos* (from *botoque*, "lip plug") is a reference to an adornment typically worn by the Xokleng in the same period (Métraux, 1946, p. 447-448). As is common elsewhere in South America, the modern self-designation Kaingang simply means "people", and the same name was even applied to the Xokleng in the early 20th century (Henry, 1941). Presently, the latter prefer the self-denomination *Laklãnõ*, but Xokleng has been in use for a long time in the literature and will be adopted here.

2.8). During the late 19th and early 20th centuries, there were records of two small groups, called Ingáin and Kimdá, living in the province of Misiones (Argentina), southern Paraguay, and adjacent Paraná (Brazil). They have long become extinct or have been assimilated by other groups, but their languages were recently proven to be part of the Southern Jê branch (Jolkesky, 2010, p. 1). The Jê family has its origins in central Brazil, most probably in the headwaters of the Tocantins and Araguaia Rivers, where the greatest ethnolinguistic diversity within the family is found. The southern branch, which is the most divergent, is estimated on glottochronological grounds to have been the first to split from the rest of the family around 3000 B.P. (Urban, 1992, p. 90). Although this date precedes by about one millennium the earliest manifestations of the Taquara/Itararé Tradition, one must keep in mind that this is an estimate of the time of the language split, not necessarily of the migration to the south. The latest application of lexicostatistics to the Southern Jê languages shows that Kimdá and Ingáin were the first to diverge, ca. A.D. 840, whereas Kaingang and Xokleng are much closer to each other, having split ca. A.D. 1390 (Jolkesky, 2010, p. 265-270). As usual with glottochronological estimates, these dates must be seen with caution. In any case, Jolkesky (2010, p. 270) observes that the similarity between Kaingang and Xokleng is even larger than that between Portuguese and Spanish, certainly pointing to a time of divergence of less than a thousand years.

The Kaingang are now one of the most numerous indigenous peoples in Brazil, with a population of nearly 29,000 dispersed across 30 reservations, whereas the Xokleng were until recently less than 900 individuals living in a single reservation (Jolkesky, 2010, p. 18). Although both groups are closely related, there are crucial differences between them in language, social structure, kinship, subsistence, and even genetics (Henry, 1941; Noelli, 1999a; Salzano and Freire-Maia, 1967; Schaden, 1958; Wiesemann, 1978). One important difference, always stressed in the literature, is that while the Kaingang were horticulturists, the Xokleng were mobile hunter-gatherers (Ambrosetti, 1895; Henry, 1941; Lavina, 1994; Lima, 1842; Métraux, 1946; Taunay, 1888). Such distinction, however, seems to have emerged relatively recently: the Xokleng themselves had memories of a time when they lived in sedentary villages and practised agriculture (Henry, 1941, p. 3; Métraux, 1946, p. 450). The Xokleng were in constant conflict with the Kaingang and faced systematic attacks by European immigrants during the first half of the 20th century, which likely led them to abandon agriculture, settled village life, and even ceramics in favour of a more nomadic lifestyle (Noelli, 1996, p. 21-22; Santos, 1973). Interestingly, even some 19th century descriptions of the Kaingang state that they lacked ceramics and agriculture (e.g. Mabilde, 1899, p. 144)[9], *contra* all the archaeological knowledge gathered to this day.

In the remainder of this section, I will summarise the most relevant aspects of Southern Jê subsistence and socio-political organisation. As usual, these will be based mostly on the Kaingang[10], who are better documented – the others having disappeared or lost many of the traditional facets of their culture before proper ethnographies could have been conducted. However, whenever possible, examples from the Xokleng and from historical sources of the 16th and 17th centuries will be provided.

Southern Jê economy and socio-political organisation

The Kaingang practised a mixed economy, combining hunting and gathering with the cultivation of manioc (*Manihot esculenta*), sweet potato (*Ipomoea batatas*), potato (*Solanum tuberosum*), yams (*Dioscorea sp.*), maize (*Zea mays*), beans (*Phaseolus sp.*) and peanuts (*Arachis hypogaea*) (Ambrosetti, 1895, p. 326-328; Becker, 1976, p. 177-183; Métraux, 1946, p. 450-451; Noelli,

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[9] Most Jê groups were until recently described as lacking ceramics and agriculture, which was part of their classification as “marginal tribes” (Lowie, 1946, p. 479-482; Steward, 1947, p. 90-94).

[10] Many of the references about the Kaingang will be taken from Mabilde (1897, 1899, 1983). Pièrre F. A. B. Mabilde was a Belgian engineer who, in the condition of surveyor, spent some time with the Kaingang in the state of Rio Grande do Sul. The reader must be aware that, whereas Mabilde’s descriptions are very precise in some points, in others they are controversial, as he did not personally witness many of the events and facts that he describes, in the worst cases resorting to pure fantasy (an in-depth critique can be found in D’Angelis, 2006). Nevertheless, the most relevant observations of Mabilde for this thesis (i.e. functions and privileges of chiefs, regional organisation, mound-building) are multiply attested, and can be considered reliable.

1999a, p. 246). Historical accounts testify to the agricultural lifestyle of the 17th century Guayanás (Becker, 1976, p. 177-179), indicating the antiquity of plant cultivation among the Southern Jê. In fact, the archaeobotanical and isotopic records leave no doubt about the consumption of cultigens in prehistoric times (Corteletti et al., 2015; De Masi, 2001, p. 81; Iriarte et al., 2008, p. 954; Lazzarotto et al., 1971, p. 81-84; Miller, 1971, p. 45-46). However, even the Kaingang were not fully agriculturists, but also relied heavily on the collection of *Araucaria* seeds (*pinhão*), which were gathered during the autumn months and stored to last for the winter – when even maize was depleted before the supplies of *pinhão* could be touched (Mabilde, 1899, p. 141-144). Another important observation is that the practise of a mixed economy by some of the 19th century Kaingang did not necessarily imply a fully sedentary lifestyle. For example, according to Ambrosetti (1895, p. 307-337), the Kaingang of San Pedro (province of Misiones, Argentina) moved according to the following cycle: first, they cleared plots in the forest, burned them and planted maize; then, the plots were abandoned, and the group moved to the margins of a tributary of the Paraná River, where they subsisted on fishing (including dried and stored fish); later, they migrated to the higher elevations to collect *pinhão*; finally, three months after sowing, the Kaingang returned to their maize plots for the harvest. One must be notice, however, that the group observed by Ambrosetti was very small and were newcomers to the area, having migrated from the Brazilian side (Ambrosetti, 1895, p. 307). Thus, the possibility that their mobility was a consequence of transformations provoked by the European conquest, as in the case of the Xokleng, cannot be discarded, and we should not uncritically project their image to the precolonial past.

The aspect of the Kaingang social organisation that has aroused most interest of anthropologists is their moiety system. The moieties are patrilineal and exogamic, i.e. every child belongs to the moiety of his father and must marry someone from the opposite moiety, creating a network not too dissimilar from the ideal cross-cousin marriage. The moieties are called *Kamé* and *Kairu*[11], the names of two mythological twin brothers who are believed to be their ancestors.

[11] Also *Kainru* or *Kañeru*.

Not only people, but plants, animals and all natural phenomena can be classified as belonging to one of the moieties, depending on their characteristics: *Kamé* is associated with the west, the sun, daytime, high places, and objects that are strong, long, thin or heavy; in contrast, the *Kairu* class encompasses the east, the moon, nighttime, lower places and objects that are fragile and round (Crépeau, 2002, p. 116-118; Da Silva, 2001, p. 101; Métraux, 1946, p. 461-462; Nimuendajú, 1993, p. 59-62; Veiga, 1994, p. 12-14; 2000, p. 78-88). The moieties are further divided into ritual “sub-moieties” that were ascribed, not inherited, and were particularly important during mortuary ceremonies. The “nested dualism” of the Kaingang is a common feature of all Jê and some Macro-Jê speakers (Maybury-Lewis, 1979), and must therefore have been present since remote times. Not all groups preserve the system intact: the Xokleng, for example, were divided into three exogamic patrilineal clans, which cast doubt over the statement that all Southern Jê peoples had a dual organisation. However, Métraux (1947) demonstrated that the names and body paintings of two of the Xokleng clans corresponded to those of the Kaingang moieties, whereas the third was ceremonial in nature and not inherited, probably corresponding to one of the Kaingang sub-moieties. Thus, it is likely that the Xokleng system was originally identical to that of the Kaingang (especially considering their recent split) but was profoundly transformed due to the severe reduction in their population.

The antiquity of the moiety system can also be inferred from the archaeological record. For example, Da Silva (2001, p. 163-223) identified resemblances between the motifs in the decoration of Taquara/Itararé ceramics and those in the modern Kaingang basketry and body painting. Parallels also exist in the mortuary architecture: when mound and enclosure complexes appear in pairs, they are usually positioned east-west (or variations thereof), the western circle being the largest; sometimes, paired mounds display the same alignment and architectural emphasis on the western side, and this cardinal axis has even been noticed in the placement of multiple burials within a single mound (De Souza, 2007; Iriarte et al., 2013, p. 80-83; Iriarte et al., 2008, p. 956; Robinson et al., in press). Such distinctions echo the spatial division of Kaingang cemeteries, where the highest part is reserved for the *Kamé*, the stronger moiety associated with the west (Crépeau, 2002, p. 117-118; 2006, p. 12).

Politically, the Kaingang were a regionally organised, ranked society with formalised, hereditary leadership, endemic warfare, and (according to some sources) two levels of authority. The recent anthropological literature agrees that the modern Kaingang, as well as their 19th century ancestors, were divided into local groups headed by *pã'i* or chiefs, forming larger political-territorial units under the authority of a *pã'i mbâgn* or paramount chief (Becker, 1976, p. 110-124; Fernandes, 2003, p. 111-112; 2004; Laroque, 2007, p. 10-12; Tommasino, 1995, p. 84; Veiga, 2000, p. 63-64). Some sources mention that the position of paramount chief was inherited, whereas the subordinate chiefs were appointed (Baldus, 1937, p. 46-47; Mabilde, 1897, p. 160-165; Métraux, 1946, p. 463). In the mid-19th century, the plateau was divided into a small number of political units, each paramount chief ruling over extensive territories between 3000 and 5000 km^2. Because war was a constant between the *pã'i mbâgn*, and subordinate chiefs frequently rebelled against their paramount, the borders of the Kaingang political-territorial units were constantly being redrawn (Becker, 1976, p. 285-300; Fernandes, 2003, p. 110-112; 2004; Mabilde, 1899, p. 127-131). It is difficult to provide demographic estimates, but since each local group was composed of 130-300 individuals and one of the most powerful paramount chiefs was said to rule over 23 subordinates, it is reasonable to suppose that the population of each political-territorial unit was in the low thousands (Fernandes, 2003, p. 112; Mabilde, 1899, p. 127-131).

Inequality and power among the Southern Jê

It is not clear whether all historical Southern Jê groups were living under some form of chiefly authority. There is no mention of hierarchy among the Xokleng, apart from uncertain and isolate references to "chiefs" (Vasconcellos, 1912, p. 19). In this case, one could argue that, as with ceramics, agriculture and settled village life, the complex political organisation was yet another trait lost after the conquest. As for the 17th century sources, the Jesuit priests refer to the Gualachos as living "in small villages, each one with a chief that ordinarily has up to a hundred vassals" (Cortesão, 1951, p. 346-347). Some 17th century Guayaná chiefs are even mentioned by name (Becker, 1976, p. 109-110). The evidence suggests that formalised leadership is indeed ancient among the Southern Jê, but we know close to nothing about the attributes and role of these early chiefs. Even among the Kaingang, there are discrepancies in the way chiefly power was interpreted: for example, while Mabilde (1897, p. 152) describes chiefs as all-powerful despots whose disobedience was punishable with death, Métraux offers what is probably a more realistic picture:

> Chiefs wield little authority. They work in their fields and hunt like the rank and file of the group. Their position is conspicuous only when the community organizes a big feast, which is always given in the chief's name (Métraux, 1946, p. 463).

Thus, it seems that the institution of leadership among the Southern Jê was similar to other ranked societies in the Americas where power was exercised in some spheres but not in others; inequality was not yet congealed, invalidating "checklist approaches" to political complexity and making it difficult to find clear archaeological correlates (Drennan, 1991; Earle, 1997; Yoffee, 1993; Feinman, 1984). For example, when it comes to economic power, Kaingang chiefs appear to have held little authority. There is no evidence that mechanisms such as tribute collection – so common in chiefdoms worldwide – have ever been in place among the Southern Jê. The only clue that chiefs had some control over their subordinates' economic activities is a reference by Mabilde (1899, p. 142-144). According to him, paramount chiefs divided *Araucaria* exploitation territories among their subordinates and determined their settlements' locations, therefore controlling access to important resources.

The Southern Jê chiefs seem to have had a more prominent role in leading war expeditions. In fact, a constant state of warfare reigned among the 19th century Kaingang, motivated by rivalry between the paramount chiefs and by uprisings from subordinate chiefs (Becker, 1976, p. 285-300; Fernandes, 2003; Mabilde, 1899, p. 127-131). Another sphere where chiefs held authority was in the ritual life. Métraux (1946, p. 463) observes that chiefs organised feasts and were “the leaders of any collective undertaking”. They played a special role in the organisation and enactment of post-funerary ceremonies, directing ritual specialists, controlling prayers, and ensuring that members of the two moieties occupied their right positions around the ritual fires (Da Rosa, 2005, p. 207-211; Fernandes, 2003, p. 147-150).

Many of the roles of historical Southern Jê chiefs would be hardly recognisable archaeologically, making it difficult to apply outdated “checklist approaches” to ascertain whether a past society was ranked or not {Peebles, 1977 #104}. At the same time, other markers are easily verifiable. One example is the treatment given to chiefs after death: the burial of a Kaingang paramount chief was an elaborate ceremony that lasted several days, congregated all of his subordinates, and culminated with the construction of a mound over his grave. Earth for the construction of the burial mound was transported in baskets, and people lit fires, ate and mourned around the corpse; the paramount’s eldest son took his father’s club as a sign that he would inherit the office (Mabilde, 1897, p. 162-166). As noted by Fernandes (2004), the burial of the paramount chiefs was an important occasion for reinforcing the regional integration of the subordinate local groups. Chiefly lineages were symbolically inscribed in the landscape by means of the repeated construction of mounds in the same cemetery over several generations (Mabilde, 1983, p. 99-111).

I believe this is one of the reasons why the mound and enclosure complexes of the Taquara/Itararé Tradition have figured so prominently in archaeological discussions about political complexity in the southern Brazilian highlands (Iriarte, 2008; De Souza, 2012; De Masi, 2009). In comparison, settlement patterns and variability in pit house sites have received relatively little attention. However, an archaeological focus on houses and communities might have an even higher potential to reveal inequalities among the Southern Proto-Jê. For example, in their cross-cultural analysis of ranked societies in the

Americas, Feinman and Neitzel (1984, p. 75) found that one ubiquitous status marker of leaders was elaborate residence.

At the regional level, the existence of a hierarchy of settlements, with multiple levels of decision-making, has not been properly evaluated for the Southern Proto-Jê pit house sites. However, the transition from autonomous villages to a regional hierarchy of settlements has always been considered a key factor in the emergence of complex societies (Carneiro, 1981; Flannery, 1976; Johnson and Earle, 2000; Steponaitis, 1981; Yoffee, 1993). In the historical period, many sources agree that the Kaingang were regionally organised in a two-tiered hierarchy, with (1) paramount chiefs presiding over large political-territorial units, and (2) subordinate chiefs ruling over local groups (Becker, 1976, p. 110-124; Fernandes, 2003, p. 111-112; 2004; Laroque, 2007, p. 10-12; Tommasino, 1995, p. 84; Veiga, 2000, p. 63-64). Unfortunately, there are very few historical descriptions suggesting any distinction between the paramount chief's settlement or house and those of his subordinates. One exception is provided by Mabilde (1899, p. 142), who observed that the paramount chief's village was centrally located in the intersection of pathways connecting his subordinates, in order to control the communication between the other villages.

Before I end this chapter, an observation is needed regarding the definition of "complexity". This word will appear throughout the thesis and, although the theoretical questions pertaining to the emergence of complex societies will be dealt with in Chapter 5, I find it necessary to state what is meant by "complexity" from the beginning. I agree with Nelson (1995, p. 598) that the term is "easy enough to grasp intuitively", but somewhat difficult to define in practise. This is because the term often brings with it the implicit notion of a set of co-occurring traits – large populations, regional integration, hereditary inequality, investment in the construction of monuments, among many others. As we have seen in the course of this section, such traits do not necessarily appear associated in all "complex" societies, leading to a necessary fragmentation of the definition of complexity (Drennan, 1991; Earle, 1997; Yoffee, 1993; Feinman, 1984). The Kaingang case is a perfect example of that, as the clear political power exercised by a group of ruling chiefs was not accompanied by tribute collection, large demography, long-distance trade, inequalities in material wealth and other traits typical of complex societies as envisaged through “checklist” approaches (e.g. Peebles and Kus, 1977). Therefore, whenever I use the term “complexity” along this thesis, I will be referring specifically to *political complexity*, here understood as inequality in the wielding of authority, concentration of power, and distribution of prestige not by individual achievement, gender or age (as it exists in most hunter-gatherer societies), but by an institutionalised order, often sanctioned by reference to ancestry, the supernatural, or other symbolic means that set apart a group of rulers from the remainder of the population.

Summary

The ethnohistorical evidence shows that Southern Jê societies were regionally integrated and displayed some degree of formalised, ascribed leadership. Interestingly, many of the historical Southern Jê chiefs’ functions and markers would be hardly recognisable archaeologically. Coupled with the rich literature about the Southern Jê funerary rituals and the persistence of mound building until recent times, I believe that explains why most of the discussions about emergent complexity in the Taquara/Itararé Tradition are based on data from mound and enclosure complexes. This is the domain that correlates most clearly with the elaborate burials of the chiefs, and where status inequality among the Southern Jê was most visibly manifest (Iriarte et al., 2008, 2013; De Souza, 2012; Saldanha, 2008; De Masi, 2009). Beyond this focus on funerary monuments, other material correlates of incipient hierarchies could be reflected in the household and regional settlement record of the Southern Proto-Jê. Pit house sites have a great potential to address that question, given the immense variability in number, dimensions and architectural arrangement of structures. In the next chapter, I will compare the settlement patterns from three regions of dense Southern Proto-Jê occupation, demonstrating how their territories consisted of a modular repetition of central places (dense settlements or oversized pit houses) surrounded by smaller sites. This model will later be tested with new data from a yet unexplored area. Moving from the regional to the intra-site analysis, I will focus the remainder of the thesis on the Baggio 1 site – a large pit house settlement with the hallmarks of a well-planned village centred on an oversized hilltop structure. The site represented an ideal case study to understand emergent inequalities among the Southern Proto-Jê due to the disparities in pit house dimensions and architecture formality between distinct sectors of the site.

Chapter 3

Southern Proto-Jê settlement systems and central places: a comparison of three regions

> "You can't fool him on settlement patterns," said the Skeptical Graduate Student, looking over his shoulder. "There's *nothing* he likes better than a lot of black dots on a map."
> (Flannery, 1976a, p. 161)

The use of regional data to understand socio-political organisation has a long history in archaeology. The first research explicitly directed to correlate spatial patterns, their developments along time, and respective changes in social organisation is the survey in the Virú Valley, coastal Peru, by Willey (1953). In that context, the term *settlement patterns* was coined and employed by Willey (1953, p. 1) to refer to "the way in which man disposed himself over the landscape on which he lived", and was compared to a "static mould" that bears an "imprint" of the living society that created it. Settlement patterns were defined by the spatial disposition and arrangement of structures and sites in relation to physiographic features (Willey, 1953, p. 1). In the next decades, with the advent of New Archaeology, the concept of *settlement system* was developed to account for the dynamics behind those spatial patterns: social organisation, the use of different places for distinct activities, and other behaviours that generate the archaeological record (Binford, 1980, p. 4-5; 1982; 1983, p. 109-114; Chang, 1972; Parsons, 1972, p. 127-135). In summary, settlement patterns represent a static distribution of residues that can be mapped, described, and measured by the archaeologist, whereas settlement systems are the dynamic network of behaviours that generated them. Systems cannot be directly observed, but must be inferred from the patterns.

When regional data are used to infer social organisation, one indicator that archaeologists normally search for is the presence of settlement hierarchies. In a classic paper about how to recognise “ranked societies” in the archaeological record, Peebles and Kus (1977, p. 431-432) used, among other criteria, the existence of a hierarchy of settlement types and sizes, suggesting that the position of a site in the hierarchy should reflect its rank in the “regulatory network”. Of course, we are a long way from “checklist approaches” such as the one advocated by Peebles and Kus (1977), but the search for central places and site hierarchies continues to be pursued. In fact, this topic has a long history in the social sciences, and can be traced back to the seminal work by the geographer Walter Christaller (1933). His theory was derived from the observed distribution of towns and markets in southern Germany, but in principle can be applied cross-culturally: first-order centres (the ones that provide specialised goods and services) tend to be regularly spaced, surrounded by second-order centres, smaller villages, and hamlets. The rationale behind this distribution is that settlements tend to be located within range and on the shortest route to the centres that provide them with goods and services. The optimal distribution would thus assume the form of a hexagonal lattice with major settlements at the centres and secondary ones at the corners or edges. Evidently, for this regularity to emerge, a series of assumptions had to hold true – e.g. flat terrain, evenly distributed population, evenly distributed resources.

Even if the ideal hexagonal distribution is difficult to find in the real world, Christaller’s central place theory influenced all the later archaeological literature on the subject. Traditionally, analyses of rank-size distribution have dominated the debate about settlement hierarchies. For example, the early works of Johnson

(1977, 1980) and Pearson (1980) on settlement size have explored rank-size distributions in terms of departure from a log-normal curve, which is the expected distribution (null hypothesis) according to Zipf's law[1]. In his analysis of settlement data from Elam (modern south-western Iran) during the fourth millennium B.C., Johnson (1977, p. 496-501) demonstrates how the rank-size graph fluctuates from convex, signalling many large settlements of equal importance, to primate, reflecting the emergence of state-level control over the region from a single major site. Later, comparing worldwide cases from ancient Mesopotamia to the colonial United States, Johnson (1980, p. 234-240) further concluded that convex rank-size distributions appear in situations where settlement systems are poorly integrated and many large centres vie for the control of a region. However, in another cross-cultural study, Johnson (1980, p. 457-461) noticed that, from Mesopotamia to the prehistoric United States, rank-size distributions showed one settlement much larger than any other even when the societies in question were far from the integration level of a state.

Nowadays, there is an increasing preoccupation with the statistical significance of rank-size distributions. For example, Savage (1997, p. 233-236) advocated the use of the Kolomogorov-Smirnov (K¯) test in order to quantify departures from log-normality. Further exploring the use of Monte Carlo simulation methods, Savage (1997, p. 238-239) also developed a programme for generating a hypothetical log-normal distribution, drawing a random sample from it, and comparing it with the archaeological data for a given region. Later, building on this approach, Drennan and Peterson (2004) tried to reduce the amount of subjectivity in the interpretation of the shape of a rank-size graph by introducing a coefficient that measures how concave or convex is a curve. Equally influenced by Monte Carlo methods, Drennan and Peterson (2004, p. 539-543) also

[1] Zipf's law is a power law that applies to a variety of linguistic, social and natural phenomena, and predicts that the size of a given observation is inversely proportional to its rank. Translating that to settlement size, the law predicts that first-order settlements will be twice the size of second-order ones, three times the size of third-order ones, and thus progressively. When plotted on a logarithmic scale, the resulting rank-size graphs will be perfectly linear.

developed a software based on bootstrapping – drawing random subsamples for the dataset in order to assign a confidence interval to the rank-size curve.

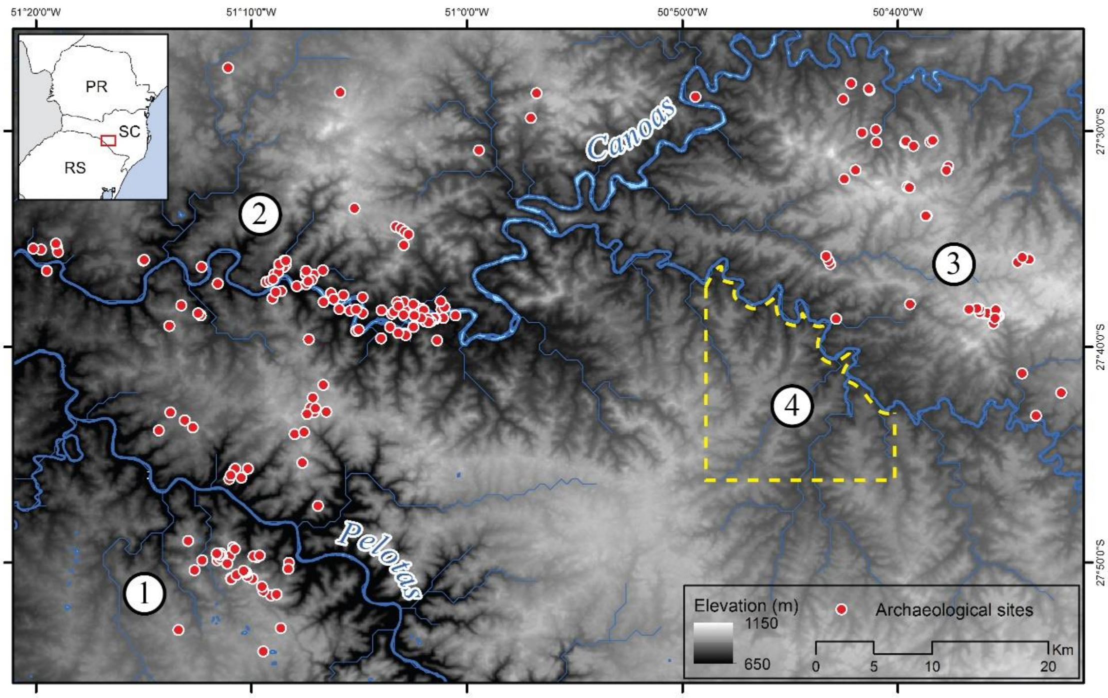


Figure 3.1 Southern Proto-Jê archaeological sites in the basins of the rivers Canoas and Pelotas to the east of their confluence, with location of the three regions analysed in this chapter and the pilot area (dashed yellow polygon). 1) Barra Grande; 2) Campos Novos; 3) São José do Cerrito; 4) Campo Belo do Sul.

This chapter is dedicated to the analysis of Southern Proto-Jê settlement systems with the specific aim of understanding whether pit house sites' architecture, size and location reflect any subjacent hierarchies. In other words, do the rank-size curves point to the existence of exceedingly large settlements? Is their spatial distribution indicative of central places in a site hierarchy? Are there central sites with exceptional architectural features? To answer those questions, I will experiment with the methods reviewed above using data from three well-studied regions of dense Southern Proto-Jê occupation: Barra Grande, Campos Novos, and São José do Cerrito (Figure 3.1, Appendix I). Special attention will be paid to the number of pits per site, their dimensions and distribution in each of the regions. The variability in the types, architectural features, and dimensions of archaeological sites in these three regions is unparalleled elsewhere in the southern Brazilian highlands, making them an ideal case study. All three regions are situated in the drainage of the Canoas and Pelotas Rivers, whose confluence originates the Uruguay River, a major waterway in the La Plata basin. Finally, surrounded by the three regions analysed in this chapter lies the pilot area of this thesis, Campo Belo do Sul.

Barra Grande

The region of Barra Grande encompasses two municipalities: Pinhal da Serra, in the state of Rio Grande do Sul, and Anita Garibaldi, across the border, in the state of Santa Catarina state. In spite of this separation, archaeological research on both sides of the river has been intimately connected, as the two areas are geographically very close, share similar chronologies, site architecture, and pottery styles. Therefore, they can be considered a single unit for ends of analysis. The northern half of the municipality of Anita Garibaldi, however, lies on the watershed of the Canoas River and will be included in a different region, Campos Novos (see next section). The first survey in Barra Grande was undertaken in the 1980s and motivated by commercial archaeology (Copé et al., 2002; Ribeiro and Ribeiro, 1985). Later, academic research continued through a partnership between the University of Exeter and the Federal University of Rio Grande do Sul, funded by the National Geographic Society and by the Wenner-Gren Foundation, and restricted to the municipality of Pinhal da Serra, on the southern margin of the Pelotas River (Iriarte et al., 2013).

Over 25 years of research revealed a dense Southern Proto-Jê occupation in Barra Grande (Figure 3.2), bringing new data for the discussion of settlement patterns, partly due to the pioneering work of Saldanha (2005), who applied techniques of spatial analyses for the first time in the archaeology of the highlands. This region revealed a highly structured landscape populated by well-planned pit house villages adjacent to mound and enclosure complexes with standardised sizes, plans, and alignments (Iriarte et al., 2013).

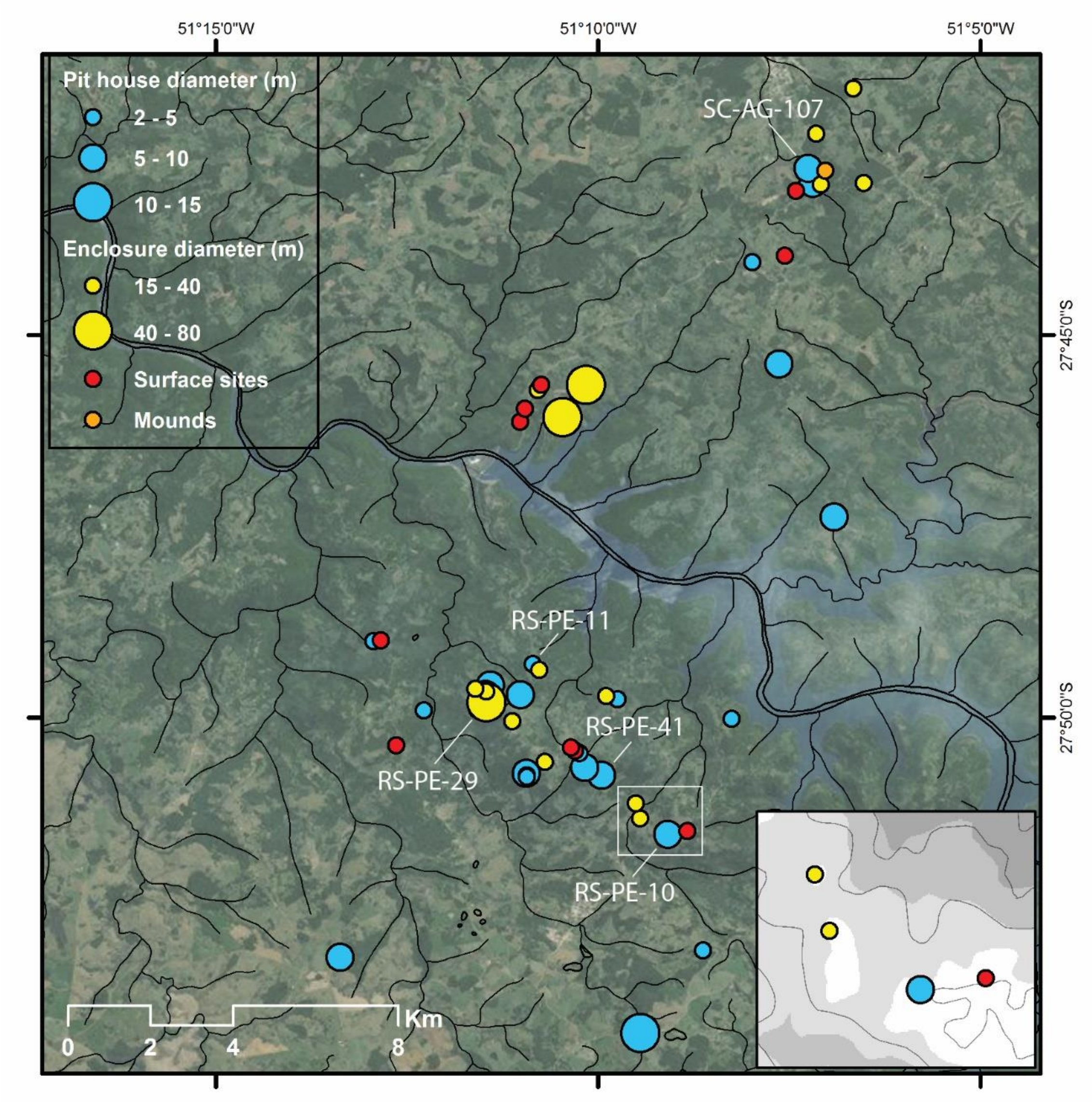


Figure 3.2 Southern Proto-Jê sites in Barra Grande, with indication of sites mentioned in the text. The inset exemplifies a typical cluster with a pit house settlement, surface site, and mound and enclosure complex.

Pit houses occur isolated or in groups, the largest site (RS-PE-10) containing 23 structures (Ribeiro and Ribeiro, 1985; Saldanha, 2005, p. 72) (Figure 3.3c). It seems that in Barra Grande, clusters of pit houses tend to be more common than elsewhere. When this is the case, the multiple structures appear to have been dug over a single, previous terrace built to level the terrain, suggesting contemporaneity and large-scale planning (Iriarte et al., 2013, p. 84;

Saldanha, 2005, p. 73). In terms of dimensions, pit houses in Bara Grande have been divided by Saldanha (2005, p. 74-75) into the following categories: small (less than 3 m diameter), medium (3 to 5 m), large (5 to 10 m) and extra-large (over 10 m). Large and medium structures are predominant, with only 5 examples of extra-large pit houses. Furthermore, Saldanha (2005, p. 75) noticed that sites with high density of structures (more than 15) tend to include pit houses of all sizes, from extra-large to small, whereas isolated houses or in groups of few structures tended to be in the medium to large range. This observation is similar to that of Reis (2007, p. 122-123), who found that sites with multiple structures tended to include smaller pits, whereas isolated houses had some of the largest diameters – a difference interpreted in terms of nuclear *versus* extended family residences.

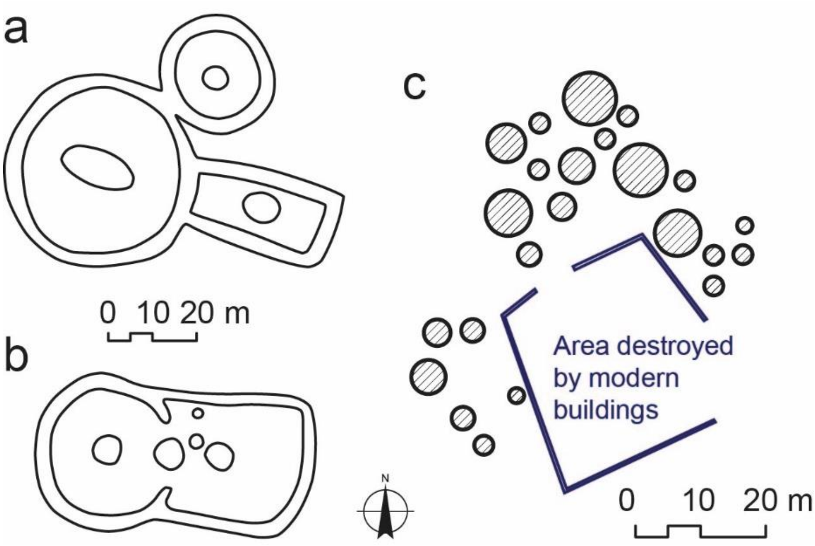


Figure 3.3 Site plans from Barra Grande. Keyhole-shaped mound and enclosure complexes: a) RS-PE-31; b) Posto Fiscal (based on Iriarte et al., 2013). A dense pit house settlement: c) RS-PE-10 (based on Ribeiro and Ribeiro, 1985 and satellite imagery).

Not only pit houses, but also mound and enclosure complexes are densely concentrated in Barra Grande, exhibiting great diversity in site size and layout. In fact, this is the region where ceremonial earthworks were better studied (Copé et al., 2002; De Souza, 2012a, b; De Souza and Copé, 2010; Iriarte et al., 2013).

Most of the mound and enclosure complexes are located within 1 km of pit house settlements, on adjacent hilltops, suggesting their use as village or family cemeteries (De Souza, 2012b, p. 81-82; Saldanha, 2005, p. 118-122; 2008, p. 91-92). For some authors, the large number of mound and enclosure complexes – almost one for every pit house village – coupled with the occasional presence of multiple burials are an indication that all individuals were buried in those sites (Müller, 2008, p. 137). However, one must take into account that the number of individuals per mound rarely exceeds two, a reason why Iriarte et al. (2013, p. 93) interpret them as more exclusive burial grounds, possibly "cemeteries of important persons likely associated with the moiety ancestor cult". The analogy with the historical southern Jê moieties was developed thanks to data from this region, where paired enclosures tend to follow a NW-SE alignment, echoing the spatial division of modern Kaingang cemeteries (De Souza, 2007; Iriarte et al., 2013, p. 83) (see Chapter 2).

A unique characteristic of Barra Grande is the combination of circular and rectangular enclosures to form keyhole-shaped sites (Iriarte et al., 2013, p. 84-88; Ribeiro and Ribeiro, 1985, p. 115; Saldanha, 2008, p. 89). These sites are architecturally more elaborate than the typical mound and enclosure complexes, involving earthworks of various shapes and often multiple mounds (Figure 3.3a-b). Detailed topography indicates that rectangular annexes are a later addition to sites that began as circular enclosures, an observation that was confirmed through radiocarbon dating (Iriarte et al., 2013, p. 86-87). Not only architecture, but also the activities performed at keyhole-shaped sites set them apart from the ordinary mortuary complexes. Abundant lithic tools and ceramic sherds, together with features such as pits, post holes and stone clusters have been uncovered by excavations in keyhole-shaped earthworks, suggesting that a broad range of activities were performed at those sites (De Souza, 2012a, p. 55-73; Iriarte et al., 2013, p. 84-87). Overall, it seems that keyhole-shaped structures are the result of long histories of architectural change and focus of special activities, and should be considered as a separate category of ceremonial earthworks.

Large enclosures, with diameters between 50 m and 80 m and without central mounds, have been recorded in this region (Ribeiro and Ribeiro, 1985, p. 51). Oversized enclosures not associated with mounds had long been recognised as a distinct class of ceremonial earthwork in relation to the typically small, paired mound and enclosure complexes (e.g. Rohr, 1971). In Barra Grande, excavations at the largest oversized enclosure, RS-PE-29-Structure 1, revealed that the earthen embankment was constructed with two layers of possibly exogenous sediment (De Souza and Copé, 2010, p. 104). This led De Souza and Copé (2010, p. 108-109) to propose that such enclosures were not only distinguished by their size, but also by a different technique of construction that involved greater labour mobilisation, as constructive material had to be brought from a longer distance. It is interesting to notice that the 19th century Kaingang travelled long distances in search of a suitable place to extract clay for the construction of the chief's burial mound (Mabilde, 1897, p. 162-166). For those reasons, oversized enclosures can be interpreted as regional ceremonial centres for a broad audience or, to use the terminology of Adler and Wilshusen (1990), *large-scale integrative facilities*.

At the landscape level, nearest neighbour analyses showed that sites in Barra Grande are organised in discrete clusters. (Saldanha, 2005, p. 118-124) interpreted the clusters of sites as small territories, since many of them included a domestic site (pit house settlement), a funerary site (mound and enclosure complex), and special activity areas (surface sites). However, many sites appear to be isolated, and Saldanha (2005, p. 122) does not discard the possibility that some of the clusters with extreme variability might actually result from a palimpsest of occupations. However, when comparing attributes such as site dimensions, Saldanha (2005, p. 123-130) arrives at a crucial conclusion: some of the clusters contain significantly larger earthworks than the others, suggesting differential access to labour mobilisation and "groups with a certain socio-political centralisation". As we will see, the model of central places surrounded by satellite settlements can be extended to other parts of the highlands.

Finally, the dates available for Barra Grande (Table 3.1) show that the initial occupation of the region by the Southern Proto-Jê groups took place between the 7th and the 10th centuries Cal A.D. Two pit house settlements, RS-PE-41 and RS-PE-11, are dated from this period. The latter is potentially contemporary with a keyhole-shaped site (Posto Fiscal) whose initial construction phase, consisting solely of a circular enclosure with a central mound, has a conventional date of 1070 ± 40 B.P., Cal. A.D. 2σ 890-1025. This is so far the earliest date for a mound and enclosure complex in the highlands (De Souza et al., 2016, p. 207-208; Iriarte et al., 2013, p. 82). The best sampled pit house settlement in Barra Grande is the site SC-AG-107, although only three of its nine structures were dated (Müller, 2007). This site appears to have been continuously occupied from Cal. A.D. 970 to Cal. A.D. 1635. The peak in the occupation of Barra Grande occurs relatively late, between ca. Cal. A.D. 1400 and 1600. During these two centuries, all elements of the regional settlement system – pit houses, mound and enclosure complexes, surface sites – are present and articulated. Significantly, the site with the highest density of structures, RS-PE-10, dates to this 'hot' period: although only two of the 23 pit houses of the settlement have been dated, they show an occupation between Cal. A.D. 1400 and 1640 (Ribeiro and Ribeiro, 1985, p. 79). The fact that so many of the dates in Table 3.1 are later than the 17th century comes as no surprise, given that the colonial presence in this part of the highlands was ephemeral until the 19th century (see next chapter).

Table 3.1 Radiocarbon dates for Barra Grande.

Site	Structure	Conventional Radiocarbon Age BP	Cal A.D. (2σ)	Lab. number	Reference
RS-PE-41	House 1	1200 ± 40	690-950	Beta 276195	(Iriarte et al., 2010, p. 59)
RS-PE-11	House C	1140 ± 40	775-985	Beta 276189	(Iriarte et al., 2010, p. 58)
Posto Fiscal	Enclosure	1070 ± 40	890-1025	Beta 303594	(Iriarte et al., 2013, p. 82)
Posto Fiscal	Mound B	370 ± 40	1445-1635	Beta 309037	(Iriarte et al., 2013, p. 82)
Posto Fiscal	Mound B	330 ± 40	1465-1645	Beta 304479	(Iriarte et al., 2013, p. 82)
Posto Fiscal	External	200 ± 30	1650-1950	Beta 309038	(Iriarte et al., 2013, p. 82)

SC-AG-107	House C	970 ± 60	970-1200	N/A	(Müller, 2007, p. 4)
SC-AG-107	House C	880 ± 70	1025-1260	N/A	(Müller, 2007, p. 4)
SC-AG-107	House C	720 ± 60	1190-1395	N/A	(Müller, 2007, p. 4)
SC-AG-107	House I	750 ± 40	1205-1380	N/A	(Müller, 2007, p. 4)
SC-AG-107	House I	510 ± 40	1320-1450	N/A	(Müller, 2007, p. 4)
SC-AG-107	House G	420 ± 60	1410-1635	N/A	(Müller, 2007, p. 4)
RS-PE-28	House A	650 ± 55	1270-1405	SI 6563	(Ribeiro and Ribeiro, 1985, p. 80)
RS-PE-28	House A	420 ± 55	1410-1635	SI 6562	(Ribeiro and Ribeiro, 1985, p. 80)
RS-PE-26	House A	635 ± 45	1280-1405	SI 6561	(Ribeiro and Ribeiro, 1985, p. 79)
SC-AG-98	Mound	560 ± 50	1300-1435	Beta 175188	(Herberts and Müller, 2007, p. 12)
RS-PE-29-3	Mound	490 ± 40	1325-1465	Beta 242869	(De Souza and Copé, 2010, p. 105)
RS-PE-29-3	Mound	340 ± 40	1460-1640	Beta 242860	(De Souza and Copé, 2010, p. 105)
RS-PE-10	House A	465 ± 40	1400-1610	SI 6558	(Ribeiro and Ribeiro, 1985, p. 79)
RS-PE-10	House A	390 ± 50	1435-1635	SI 6556	(Ribeiro and Ribeiro, 1985, p. 79)
RS-PE-10	House B	355 ± 50	1450-1640	SI 6559	(Ribeiro and Ribeiro, 1985, p. 79)
RS-PE-12	Surface	460 ± 40	1415-1625	Beta 242871	(De Souza, 2012b, p. 27)
RS-PE-21	Mound A	350 ± 40	1455-1640	Beta 242868	(De Souza and Copé, 2010, p. 105)
SC-AG-100	Mound	390 ± 50	1435-1635	Beta 226124	(Herberts and Müller, 2007, p. 6)
SC-AG-108	Mound A	350 ± 40	1455-1640	Beta 226125	(Herberts and Müller, 2007, p. 9)
SC-AG-40	Surface	180 ± 40	1665-1950	N/A	(Saldanha, 2005, p. 117)
RS-PE-31	Mound 2	110 ± 40	1670-1950	Beta 276193	(Iriarte et al., 2013, p. 82)

Campos Novos

Campos Novos encompasses four municipalities on the margins of the lower Canoas River, state of Santa Catarina: Campos Novos, Abdon Batista, Celso Ramos, and the northern part of Anita Garibaldi. This region is in the immediate northern vicinity of Barra Grande, and the diversity in site types is essentially similar (Figure 3.4). However, in terms of settlement patterns, Campos Novos is one of the rare areas of the southern Brazilian highlands where Southern Proto-Jê sites are concentrated in a river valley. This is due to the fact that the Canoas River forms a broad, flat floodplain on its lower course, in contrast with the typical steep, narrow valleys of the basaltic plateau (for a similar situation in the upper Canoas, see Corteletti, 2012, p. 202-219). Other peculiarities of this region are the conspicuous presence of Archaic sites and the publication of a controversial early date for the Southern Proto-Jê occupation.

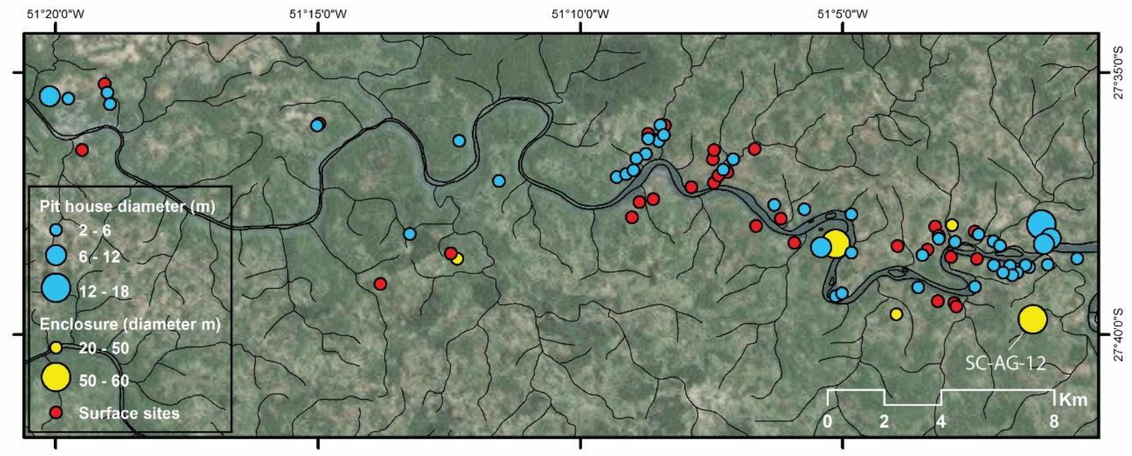


Figure 3.4 Southern Proto-Jê sites in Campos Novos, with indication of sites mentioned in the text. Only the area with full coverage by De Masi (2005) is shown.

Archaeological research in Campos Novos began approximately at the same time as in the previous region, and was also motivated by commercial projects. The first survey in Campos Novos was conducted in the 1980s by Naue et al. (1989). Later, De Masi (2005) completed a full systematic survey in the Canoas floodplain. He also conducted sample excavations and radiocarbon dating of different categories of sites, explicitly testing a model of settlement system for the area. Thus, the data discussed in this section are mainly taken from his report and later publications (De Masi, 2005, 2006b, 2007, 2009). However, some important sites discovered in the 1980s (located away from the floodplain) were not revisited by De Masi. They are fundamental for understanding the settlement system in the region, and will be reviewed below.

Most of the pit house sites in Campos Novos contain a single structure, and the settlement with the highest density consists of only 14 pits (De Masi, 2005, p. 210). The largest reported pit house diameter in the area is 18 m, although it refers to the longer axis of an elliptic structure (De Masi, 2005, p. 215). Beyond the number of structures and their dimensions, one of the criteria analysed by De Masi (2005, p. 210-211) is the nearest site type. Together with elevation, slope and other environmental information, this provides contextual information for his settlement system model. He notes that over 90% of the pit houses have a surface site – in most cases ceramic scatters, but in a minority of cases only lithic artefacts – as their nearest neighbour, implying that open air sites and sites with domestic earthen architecture had complementary functions (De Masi, 2005, p. 213). In fact, in the view of De Masi (2005, p. 256), pit houses constitute the *storage* component of the settlement system, whereas the actual *villages* would be represented by surface sites.

The most significant results of the research in Campos Novos pertain to the mound and enclosure complexes: data from this region contributed to the debate about a possible site typology and the evidence for differential treatment of the dead. De Masi (2005, p. 223) divides mound and enclosure complexes into two classes: large enclosures (over 50 m diameter) are called *danceiros* ("dancing grounds"), an expression used by the locals to refer to those sites; small enclosures (from 15 to 30 m diameter), typically surrounding mounds, are referred to as *tombs*. This is based on the fact that cremated burials were located in the majority of excavated mounds (De Masi, 2005, p. 227-229). As seen in the previous section, this typology applies to other regions (De Souza and Copé, 2010). While the oversized enclosures tend to appear isolated, small mound and enclosure sites can occur in groups of up to four structures, and sometimes contain two central mounds (De Masi, 2005, p. 223).

The best excavated ceremonial site in Campos Novos is SC-AG-12, where both types of structures are present (De Masi, 2005, p. 225-227). The largest structure is an enclosure with 60 m diameter encircling a central rectangular platform and a peripheral mound. A smaller enclosure, with 30 m diameter, encircles two mounds. The excavations in the large enclosure revealed many stone ovens, similar to the ones uncovered in the PM-01 site by Iriarte et al. (2008). They were located in the plaza, arranged in a semi-circle facing the central platform. In the mound, two secondary cremated deposits were excavated, one belonging to an infant and the other to an adult. Two small ceramic vessels (a cup and a bowl) were associated with the burials as possible grave goods. Other artefacts recovered from the large circle included two ceramic figurines and a quartz labret (De Masi, 2005, p. 240-242). In the small enclosure, the excavation of one of the mounds revealed six secondary cremated deposits and two funeral pyres, but no offering directly associated with any of the individuals (De Masi, 2005, p. 226-227). The fact that only two individuals were buried inside the oversized enclosure, coupled with the offerings and feasting remains associated with them, led De Masi (2005, p. 230; 2009, p. 110-111) to suggest that they had a higher status than those buried inside the small circle. This is the first substantial evidence for status distinctions in mortuary treatment among the Southern Proto-Jê.

The most interesting aspect of the work of De Masi (2005) is his model of Southern Proto-Jê settlement systems in Campos Novos. The model was based on the distinction proposed by Binford (1980) between *foragers* and *collectors*. These are different strategies of resource procurement by hunter-gatherer groups: the first are very mobile and constantly shift camp to be closer to resources, whereas the latter tend to move less and are more dependent on storage. As argued by De Masi (2005, p. 248), the low effective temperatures in the southern Brazilian highlands (under 15°C) imply spatio-temporal discontinuities in the availability of resources[2]. In this type of environment, a

[2] For example, in areas of mixed forest and grasslands, the distribution of *Araucaria* is patchy, and for most varieties of the tree its seeds can be gathered only during a limited period in the autumn. Few resources are available during the winter.

collector strategy would be preferred, involving low mobility, reliance on storage, and logistical trips for provisioning of resources (Binford, 1980, p. 13-17). De Masi (2005, p. 252-255; 2006a, p. 64-66) attributes a function to each category of site according to the expectations of the collector model. Similarly to the proposal of Saldanha (2005, p. 118-124), every cluster of sites is interpreted as a small territory containing (1) residential bases, represented by large surface sites with ceramics in the vicinity of pit houses – the latter interpreted as storage facilities; (2) burials and gathering places, represented by mound and enclosure complexes; (3) agricultural plots, represented by lithic sites with large bifacial tools; and (4) lithic sites with projectile points, interpreted as hunting camps.

In my view, there are two problems with the model of De Masi. The first and most obvious is the application of a model developed to explain variability in hunter-gatherers to what was probably a mixed-economy society (see Chapter 2). The second is the category of hunting camps. Lithic projectile points in southern Brazil are usually classified as part of the Umbu tradition, the local equivalent of the Archaic period (Chmyz, 1968, 1979, 1981; Dias, 1994, 2003; Miller, 1967, 1971; Ribeiro and Ribeiro, 1985). As there is marked discontinuity between the Umbu lithic industry and that found in Southern Proto-Jê sites, and considering that none of the sites with projectile points in the lower Canoas has been dated, it is more prudent to consider them as remnants of an earlier occupation by hunter-gatherers.

It is also necessary to stress that the work of De Masi (2005) and his model to explain the Southern Proto-Jê settlement system in the region of Campos Novos are limited to the Canoas River floodplain and adjacent low-elevation areas. I believe his model should be complemented with data from the previous investigation in the region by Naue et al. (1989), who also surveyed upland areas. This previous survey identified a dense cluster of pit houses in a single farm: the largest site, SC-UC-420, contained 40 pit houses, and was situated in a high area, ca. 950 m elevation, about 8 km north of the Canoas River valley. This site and its neighbours are probably part of the same settlement system that includes the sites studied by De Masi (2005) in the floodplain.

Finally, the chronology of Campos Novos has aroused some controversy. A very early date of 4070 ± B.P., Cal. B.C. 2σ 2860-2480, was obtained from a surface ceramic site (De Masi, 2005, p. 262). As I mentioned in Chapter 2 when discussing the chronology of the Taquara/Itararé Tradition, there are contextual problems with this date, which is over two millennia earlier than any other Southern Proto-Jê site (see De Masi, 2006b, p. 194). Based on the currently accepted chronology of the Taquara/Itararé Tradition, the earliest undisputable date for Campos Novos would be that of site SC-AB-95, the largest pit house in the region, with a date of Cal. A.D. 680-890 – slightly earlier than the first occupation at Barra Grande. Other pit houses appear between Cal. A.D. 890 and 1050, followed by the oversized enclosure at SC-AG-12, with a date of Cal. A.D. 1270-1400. As in Barra Grande, the period between Cal. A.D. 1400 and 1600 comprises most of the dated sites.

Table 3.2 Radiocarbon dates for Campos Novos. Dates in red are too early when compared to the regional chronology and should be considered with caution. Although both are accepted by the excavator of the sites, Beta 190295 clearly has contextual problems (see Chapter 2).

Site	Structure	Conventional Radiocarbon Age BP	Cal A.D. (2σ)	Lab. number	Reference
SC-AB-101	Surface	4070 ± 40	2860-2480 B.C.	Beta 190295	(De Masi, 2005, p. 261)
SC-AG-19	Surface	2510 ± 40	790-430 B.C.	Beta 190307	(De Masi, 2005, p. 261)
SC-AB-95	House B	1230 ± 40	680-890	Beta 190302	(De Masi, 2005, p. 261)
SC-AG-76	House	1050 ± 40	890-1035	Beta 190310	(De Masi, 2005, p. 261)
SC-AG-76	House	940 ± 40	1020-1185	Beta 190308	(De Masi, 2005, p. 261)
SC-AG-75	Mound 1	980 ± 40	990-1155	Beta 190309	(De Masi, 2005, p. 261)
SC-AB-93	House D	840 ± 40	1050-1270	Beta 190300	(De Masi, 2005, p. 261)
SC-AB-93	House A	690 ± 40	1255-1395	Beta 190301	(De Masi, 2005, p. 261)
SC-AB-93	External	650 ± 40	1275-1400	Beta 190297	(De Masi, 2005, p. 261)
SC-AB-93	House D	340 ± 40	1460-1640	Beta 190299	(De Masi, 2005, p. 261)
SC-AB-93	House C	300 ± 40	1475-1660	Beta 190298	(De Masi, 2005, p. 261)
SC-AG-12	Enclosure 1	690 ± 40	1295-1410	Beta 185443	(De Masi, 2005, p. 261)
SC-AG-12	Enclosure 1	600 ± 40	1260-1395	Beta 190304	(De Masi, 2005, p. 261)

SC-AG-12	Mound 1	470 ± 40	1330-1610	Beta 185444	(De Masi, 2005, p. 261)
SC-AG-12	Mound 2	430 ± 40	1410-1625	Beta 185442	(De Masi, 2005, p. 261)
SC-AB-48	Surface	450 ± 40	1405-1620	Beta 190294	(De Masi, 2005, p. 261)
SC-AG-77	Enclosure	420 ± 40	1420-1630	Beta 190311	(De Masi, 2005, p. 261)
SC-AB-04	House A	400 ± 40	1430-1630	Beta 190292	(De Masi, 2005, p. 261)
SC-AB-04	House A	370 ± 40	1445-1635	Beta 190293	(De Masi, 2005, p. 261)
SC-AB-96	Mound 2	360 ± 40	1450-1635	Beta 190303	(De Masi, 2005, p. 261)
SC-CR-06	Mound	220 ± 40	1640-1810	Beta 190312	(De Masi, 2005, p. 261)
SC-AG-18	Surface	180 ± 40	1650-1880	Beta 190306	(De Masi, 2005, p. 261)
SC-AB-92	Surface	190 ± 40	1650-1820	Beta 190296	(De Masi, 2005, p. 261)

São José do Cerrito

The last region analysed here, São José do Cerrito, Santa Catarina, has the longest history of research. Over 30 years of investigation in the area revealed a sizable Southern Proto-Jê occupation (Figure 3.2), most of it represented by pit houses. This region is characterised by extremes: it has the pit house settlement with the largest number of structures recorded so far in the highlands, and the average dimensions of pit houses in São José do Cerrito also tends to be larger than in the other regions reviewed in this chapter. Another distinguishing characteristic of São José do Cerrito is the surprisingly early chronology for pit houses, at least when compared with the neighbouring areas, coupled with the virtual absence of pottery – which led to a debate about the possible existence of a pre-ceramic Southern Proto-Jê horizon (Schmitz et al., 2010, p. 8-9; Schmitz and Novasco, 2013, p. 37; Schmitz et al., 2013b, p. 94-97).

Unlike the two previous regions, research in São José do Cerrito was always academic. It began in the late 1970s with a survey by Reis (2007). Besides performing the first systematic, research-oriented survey in the highlands, she also performed small trench excavations in selected pit houses and mounds. Reis (2007) was especially interested in explaining functional variability in pit house dimensions, number of structures per site, and distribution in the landscape. She provided the first explicit discussion about the function of oversized pit houses, sites with multiple small houses, and adjoining pits (Reis, 2007, p. 185-198). More recently, research in the region was resumed by archaeologists of the Anchietano Institute, led by P. I. Schmitz, who revisited many of the sites described by Reis, discovered new ones, performed open area excavations, and obtained radiocarbon dates for a variety of sites (Schmitz et al., 2010; Schmitz and Rogge, 2011; Schmitz et al., 2013a, b).

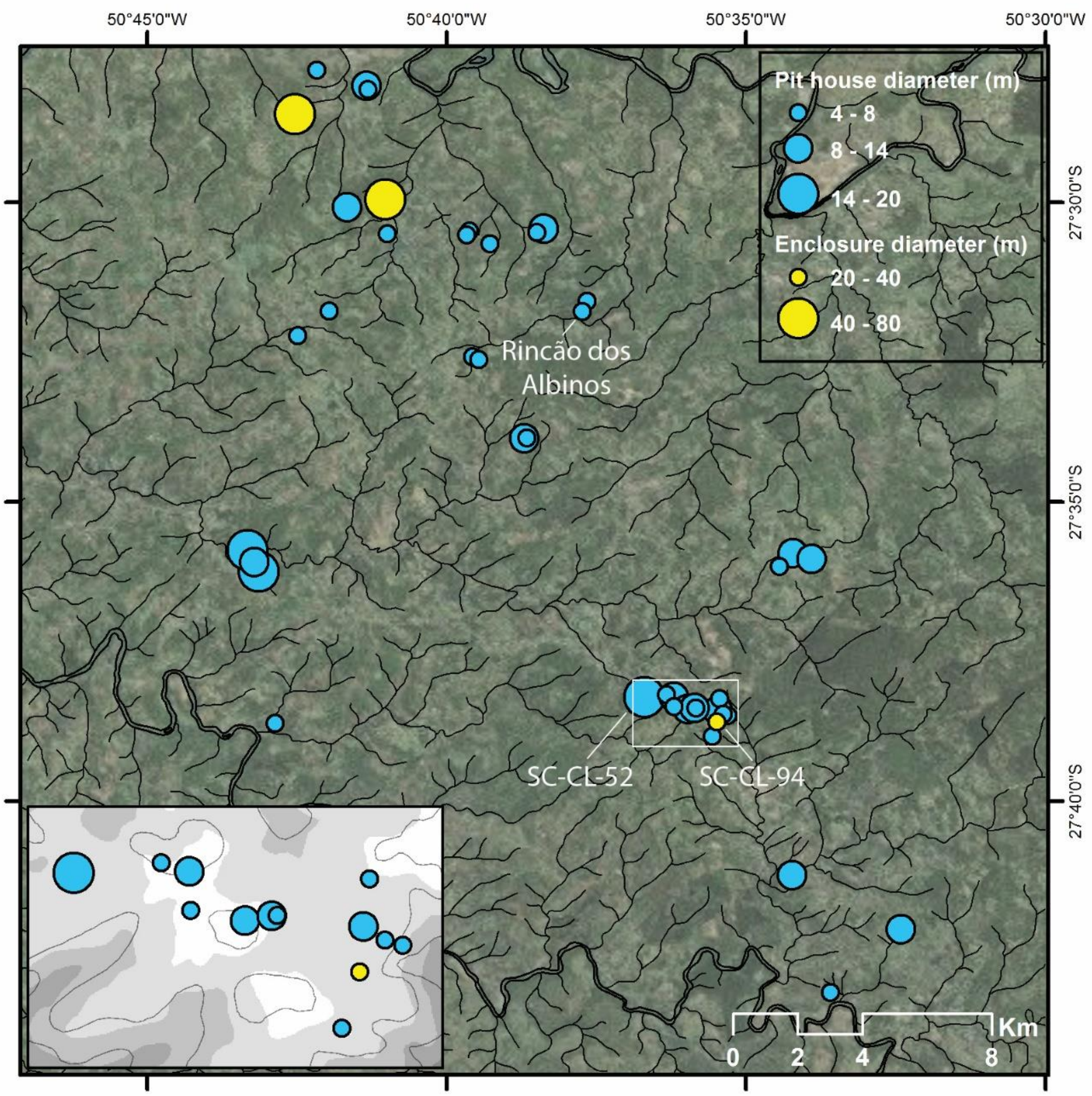


Figure 3.5 Southern Proto-Jê sites in São José do Cerrito, with indication of sites mentioned in the text. The inset shows the cluster of sites in Boa Parada.

Pit houses constitute the near totality of sites recorded in São José do Cerrito. They appear isolated or in groups that normally do not exceed 18 houses. However, an absolute outlier is represented by the site Rincão dos Albinos, which contains 107 pits. This settlement was originally recorded by Reis (2007, p. 91-99) as two different sites, numbered SC-CL-70 and SC-CL-71. These two clusters of pit houses are less than 100 m apart, separated only by a small stream, and should be considered a single settlement – which is reinforced by the contemporaneity in their dates (Schmitz and Rogge, 2011, p. 187; Schmitz et al., 2013b, p. 66). Among the sites of São José do Cerrito, certainly Rincão dos Albinos deserves most attention. Not only the number of pit houses in the site is exceptional, but also their arrangement and chronology. One of the two clusters of pit houses comprises 39 structures tightly packed in an area of 50 m x 80 m (Schmitz et al., 2013b, p. 72-73). The other, larger group has 68 pit houses arranged in discrete clusters and accompanied by mounds. The layout of this part of the site appears to be well-planned: small groups of houses are either aligned or disposed in semi-circles; in one case, a semi-circle or houses surrounds a large mound (Schmitz et al., 2013b, p. 79) (Figure 3.6). Both "neighbourhoods" of pits are situated on the upper slopes of a hill whose top is dominated by a group of mounds, ca. 200 m from the houses (Schmitz et al., 2013b, p. 70). The excavations at the site – targeting a sample of ten pit houses and some of the external areas – revealed an unexpectedly low density of artefacts, ceramics being notably absent.

The dates obtained from the site proved to be very early for the region, reaching the 6th century A.D. Based on those data, Schmitz (2010, p. 8-9; 2013, p. 37; 2013b, p. 94-97) hypothesised that the initial settlement of the highlands by the Southern Proto-Jê involved pre-ceramic, small pit houses, like the ones in Rincão dos Albinos. Pottery would appear only later, around the 10th century A.D., together with more permanent, larger pit houses and mound and enclosure complexes, a conclusion based on the chronology for those types of sites in São José do Cerrito. Given that ceramics are present in pit houses in the state of Rio

Grande do Sul with similar dates to Rincão dos Albinos, and taking into account that pit houses in other regions also lack ceramics (e.g. Rogge and Schmitz, 2009), I believe it is more appropriate to speak of *aceramic* sites, and that the absence of pottery in some places is explained by function or cultural choice rather than chronology (for a similar discussion about pre-ceramic or aceramic sites in the Initial Period of the Peruvian coast, see Pozorski and Pozorski, 1999, p. 178-179).

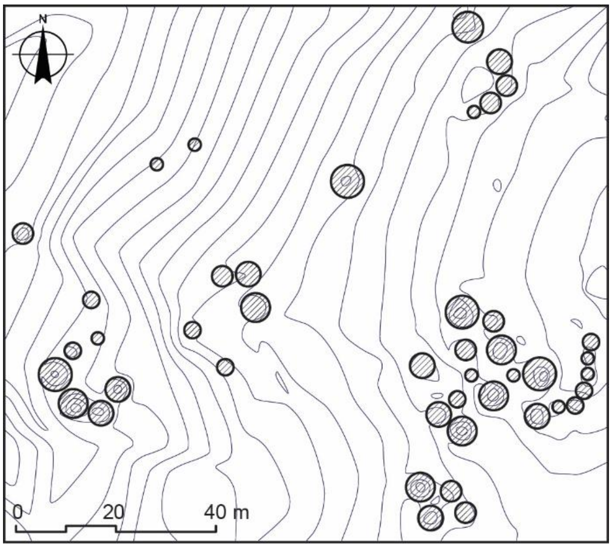


Figure 3.6 Part of the plan of Rincão dos Albinos. Notice the semi-circular arrangements of pits in discrete neighbourhoods. Based on Novasco (2013, p. 65).

To explain the early chronology of such a large site, Schmitz et al. (2013b, p. 92-94) resorted to palaeoecological data. Reviewing the pollen records published so far, they point out that Rincão dos Albinos was occupied during the initial expansion of *Araucaria angustifolia*, but not during the 11th century A.D. peak in the spread of that species (see Chapter 2). Therefore, the environment would still have been dominated by grasslands, and the distribution of *Araucaria* forests would be patchier than in the present. Schmitz et al. (2013b, p. 92-94) then hypothesise that the location of Rincão dos Albinos was a pioneer woodland during the early stages of forest expansion, and that the Southern Proto-Jê repeatedly visited the place during the autumn/winter months. Thus, they view the site as a palimpsest of small camps rather than as a planned village.

A settlement like Rincão dos Albinos may have an exceptional number of pit houses, but their dimensions are not impressive: even the largest houses at the site are below 8 m diameter (Schmitz and Rogge, 2011, p. 188). This is in agreement with the observation, valid for this region and others, that the number of pits in a site is inversely proportional to their size, as the oversized structures tend to occur in isolation or small groups (Reis, 2007, p. 122-123). Reis (2007, p. 120) divides pit house diameters into small (2 to 5 m), medium (6 to 8 m) and large (9 to 20 m). The last category is perhaps too broad – we should consider truly oversized structures, with diameters between 16 m and 20 m (only about 2% of sites, Reis, 2007, p. 119), as a class of their own. One of the most interesting hypotheses examined by Reis (2007, p. 189-194) relates to the function of such abnormally large structures. She considers the possibility that oversized pit houses were not habitations, but ceremonial sites similar to men's houses or the *kivas* of south-western U.S. This potential ceremonial function was discarded by Reis (1980, p. 190-193) for the following reasons: 1) most of the oversized pit houses are found in isolation; 2) they are either too far away from other pit house settlements, or 3) they have as their nearest neighbour another oversized house. Instead, the interpretation offered by Reis (2007, p. 203) is that larger houses belong to an earlier period, later replaced by multiple smaller pits – reflecting a change from extended to nuclear family houses.

Settlement patterns have not been as well studied in this region as in the previous ones. It is clear, however, that sites are not evenly distributed throughout the landscape: Schmitz et al. (2013a, p. 135) notice a concentration in the locality of Boa Parada, where 18 sites are clustered in a radius of 1.5 km. The largest pit house of São José do Cerrito (site SC-CL-52, an isolated structure with 20 m diameter and 7 m depth) is part of this cluster, which includes a great diversity of earthworks. For example, site SC-CL-94, the only mound and enclosure complex excavated in the region, is in the same neighbourhood (Schmitz et al., 2010, p. 23-30). In the vicinity of the pit houses of Boa Parada, platform mounds (a type of site absent from the previous regions) have also been recorded. Although mounds in the proximity of pit houses are usually seen as construction debris, the platform mounds of Boa Parada tend to be architecturally patterned: circular, with a flat top, diameters from 17 to 30 m and up to 2.2 m height, they appear to be more than mere refuse (Schmitz et al., 2013a, p. 179). Finally, regarding the diversity of sites in São José do Cerrito, the scarcity or absence of surface sites is worthy of mention. This could either reflect a real absence or be an artefact of the opportunistic surveys with a focus on earthworks that have been carried out in the region.

As for the chronology of São José do Cerrito, the available radiocarbon dates point to an earlier occupation than in the previous regions. As mentioned above, Rincão dos Albinos has the earliest dates, reaching Cal. A.D. 570-680 (Table 3.3). According to Schmitz's model, the concentration of pit houses at this site reflects a palimpsest of discontinuous and repetitive occupations. However, an evaluation of the published dates suggests otherwise: for example, out of the seven houses that were dated, three appear to be contemporary. The peak of activity at the site took place between Cal. A.D. 650 and 770. No other site in the region has similar dates: all of them are later than the turn of the second millennium A.D. (Table 3.3). As for the platform mounds, the mound and enclosure complex, and the pit houses (including the oversized one) of Boa Parada, they form a coherent system between Cal. A.D. 1050 and Cal. A.D. 1450. This is closer in time, but still earlier than the peak in the occupation of Campos Novos and Barra Grande. Another difference in relation to those regions is that, even though a few sites reach the 17th century, such late dates are uncommon.

Table 3.3 Radiocarbon dates for São José do Cerrito. Dates in red are too early when compared to the regional chronology and should be considered with caution. SPC 00135 has been discarded by the excavator of the site. The same site was recently dated to a much later period. Beta 275577 comes from a fire pit beneath the terracing around a pit house, and thus might predate the Southern Proto-Jê occupation.

Site	Structure	Conventional Radiocarbon Age BP	Cal A.D. (2σ)	Lab. number	Reference
SC-CL-52	House	3310 ± 200	2120-1015 B.C.	SPC 00135	(Reis, 2007, p. 179)
SC-CL-43	External	2640 ± 40	730-650 B.C.	Beta 275577	(Schmitz et al., 2013a, p. 136)
SC-CL-70	External	1400 ± 40	570-680	Beta 297431	(Schmitz et al., 2013b, p. 77)
SC-CL-70	House 14	1320 ± 40	650-770	Beta 293588	(Schmitz et al., 2013b, p. 77)
SC-CL-70	House 17	1320 ± 40	650-770	Beta 293589	(Schmitz et al., 2013b, p. 77)
SC-CL-70	House 17	470 ± 50	1320-1620	Beta 297432	(Schmitz et al., 2013b, p. 77)
SC-CL-70	External	1250 ± 40	670-880	Beta 297430	(Schmitz et al., 2013b, p. 77)
SC-CL-70	House 25	1190 ± 40	695-965	Beta 293590	(Schmitz et al., 2013b, p. 77)

SC-CL-70	External	1110 ± 40	775-985	Beta 293591	(Schmitz et al., 2013b, p. 77)
SC-CL-70	House 2	1080 ± 30	895-1020	Beta 297429	(Schmitz et al., 2013b, p. 77)
SC-CL-71	House 27	1360 ± 30	615-760	Beta 319363	(Schmitz et al., 2013b, p. 85)
SC-CL-71	House 27	1330 ± 30	650-765	Beta 319370	(Schmitz et al., 2013b, p. 85)
SC-CL-71	House 14	1350 ± 30	635-765	Beta 319363	(Schmitz et al., 2013b, p. 85)
SC-CL-71	House 14	370 ± 30	1445-1635	Beta 316464	(Schmitz et al., 2013b, p. 87)
SC-CL-71	House 26	1310 ± 30	655-770	Beta 319374	(Schmitz et al., 2013b, p. 87)
SC-CL-71	House 26	1290 ± 30	665-770	Beta 319372	(Schmitz et al., 2013b, p. 87)
SC-CL-71	House 26	1270 ± 30	660-860	Beta 319371	(Schmitz et al., 2013b, p. 87)
SC-CL-71	House 26	1260 ± 30	670-865	Beta 329373	(Schmitz et al., 2013b, p. 87)
SC-CL-71	House 4	830 ± 30	1160-1265	Beta 316467	(Schmitz et al., 2013b, p. 87)
SC-CL-52a	Platform	960 ± 30	1020-1160	Beta 370820	(Schmitz et al., 2016b, p. 40)
SC-CL-52a	Platform	920 ± 30	1050-1220	Beta 411921	(Schmitz et al., 2016b, p. 41)
SC-CL-52a	Platform	890 ± 30	1155-1265	Beta 411918	(Schmitz et al., 2016b, p. 41)
SC-CL-52	External	870 ± 30	1045-1250	Beta 351742	(Schmitz et al., 2013a, p. 148)
SC-CL-52	House	860 ± 30	1050-1255	Beta 357350	(Schmitz et al., 2013a, p. 145)
SC-CL-64	Platform 1	920 ± 30	1050-1220	Beta 411918	(Schmitz et al., 2016a, p. 88)
SC-CL-50	External	910 ± 30	1030-1205	Beta 351740	(Schmitz et al., 2013a, p. 166)
SC-CL-46	Platform 3	910 ± 30	1030-1205	Beta 357352	(Beber, 2013, p. 48)
SC-CL-46	Platform 3	690 ± 30	1270-1300	Beta 370819	(Schmitz et al., 2016b, p. 36)
SC-CL-46	Platform 2	610 ± 30	1295-1405	Beta 357351	(Beber, 2013, p. 48)
SC-CL-46	Platform 1	580 ± 30	1300-1420	Beta 351739	(Schmitz et al., 2013a, p. 170)
SC-CL-46	Platform 1	510 ± 30	1330-1445	Beta 357346	(Schmitz et al., 2013a, p. 170)
SC-CL-56	House 1	830 ± 40	1050-1275	Beta 242151	(Schmitz et al., 2013a, p. 136)
SC-CL-94	Mound 1	770 ± 40	1185-1290	Beta 275576	(Schmitz et al., 2013a, p. 137)
SC-CL-63	House 2	670 ± 30	1290-1400	Beta 431942	(Schmitz et al., 2016a, p. 72)
SC-CL-43	House 5	640 ± 40	1280-1400	Beta 275575	(Schmitz et al., 2013a, p. 136)
SC-CL-43a	House 3	590 ± 40	1295-1415	Beta 242152	(Schmitz et al., 2013a, p. 137)
SC-CL-43	House 4	470 ± 50	1320-1620	Beta 256216	(Schmitz et al., 2013a, p. 136)
SC-CL-43	House 7	370 ± 40	1445-1635	Beta 285996	(Schmitz et al., 2013a, p. 137)
SC-CL-45	House 7	360 ± 30	1450-1640	Beta 370822	(Schmitz et al., 2016b, p. 31)
SC-CL-45	House 1	320 ± 30	1470-1650	Beta 374021	(Schmitz et al., 2016b, p. 28)

SC-CL-51	House 5	330 ± 30	1500-1655	Beta 411919	(Schmitz et al., 2016b, p. 13)
SC-CL-51	External	320 ± 30	1480-1645	Beta 351741	(Schmitz et al., 2013a, p. 159)

The three regions compared

A brief comparison of chronologies: the question of cycling

Fluctuations in the radiocarbon record have long been considered a potential correlate of demographic booms and busts, as long as an adequate sample is available. The assumption is that more intense occupations leave behind more charcoal to be recovered by the archaeologist, providing at least a relative measure of past population (Rick, 1987, p. 55-58). In Figure 3.7, I present the sum of the calibrated probability distributions (SCPDs) for the three regions. SCPDs are produced by calibrating each independent date and adding the results in order to produce a single density distribution (Shennan et al., 2013; Steele, 2010; Timpson et al., 2014). This method has an advantage over simple date counts, since it considers the full range of probabilities associated with the calibrated dates, and can be easily implemented in OxCal 4.2 using the *R_Sum* command (Bronk Ramsey, 2009). I have included in the SCPDs only the undisputable Southern Proto-Jê dates for each region, excluding dates highlighted in red in Table 3.1-Table 3.3. Those were either too early according to the known chronology or had contextual problems. As mentioned before, date Beta 190295 (Table 3.2) was not obtained from charcoal associated with cultural material; SPC 00135 (Table 3.3), obtained from an unspecified context inside a pit house, is several thousand years older than the dates obtained more recently from well-described contexts at the same site, and is most likely contaminated or old, intrusive charcoal; Beta 275577 (Table 3.3) comes from a pre-pit house context and cannot be reliably associated with a southern Jê occupation.

It is clear that São José do Cerrito has an earlier bulk of activity than the other two regions, between ca. Cal. A.D. 600 and 800, related solely to the occupation at Rincão dos Albinos. Interestingly, the period when the occupation of that site is in decline is precisely when the first signs of Southern Proto-Jê presence are seen in Barra Grande and Campos Novos.

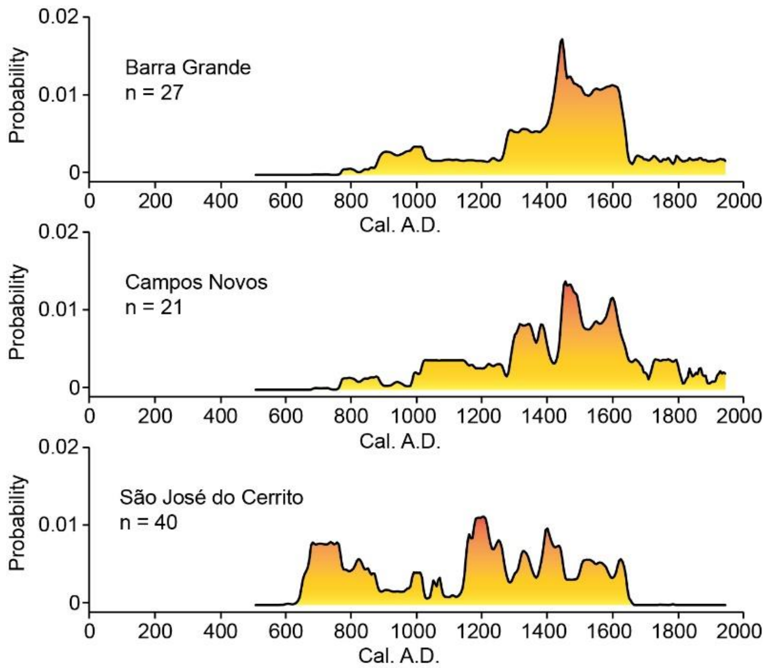


Figure 3.7 Sum of the calibrated probability distributions of the three regions analysed in this chapter. *N* refers to the number of radiocarbon dates considered for each area.

In São José do Cerrito, there is an interval between the decline of Rincão dos Albinos and the next signal of activity, as all other sites are later than the turn of the second millennium A.D. Overall, as can be seen in the graph, the distribution of calibrated probabilities for this region oscillates without a discernible trend, except perhaps for a more intense occupation ca. Cal. A.D. 1200 with a slight decline in the following centuries. In contrast, Barra Grande and Campos Novos show a similar tendency for exponential growth until a peak is reached a few centuries after São José do Cerrito, around Cal. A.D. 1400. The sharp decline seen in all graphs after Cal. A.D. 1600 is attributable to the impact of European colonisation – in this case, indirect, since Portuguese settlements were not established in this part of the highlands until the 18th century (Herberts, 2009, p. 149). In summary, even if the SPDs show broad contemporaneity in the occupation of the different regions, there is not a concomitance in the trends of growth and decline. I suggest that one possible explanation is the phenomenon of *cycling*. As originally developed by Anderson (1994b, p. 2-50), the concept of cycling refers to the constant emergence and collapse of regional societies due to factionalism, competition, fissioning, and inequality in resource distribution. Dramatic demographic shifts may follow, as population relocates to more attractive places. Thus, as one centre declines, another flourishes, creating a pattern similar to "a series of blinking Christmas tree lights" (Anderson, 1994a, p. 74). Potential spatial correlates of the process of cycling will be shown in the next section while examining the distribution of central places in the three regions.

Settlement size and hierarchy: rank-size analysis

As I mentioned in the introduction to this chapter, a useful tool in the analysis of settlement patterns, especially if we suspect to be dealing with complex societies, is rank-size analysis. The basic principles of rank-size analysis were laid out by Johnson (1977), and this was a popular technique during the early days of New Archaeology – together with a series of other spatial analyses derived from Geography, including central place theory. It is still useful to describe settlement data, as long as one is aware of its limitations.

Rank-size analyses are grounded on the principle that two forces influence settlement location and size: *centralisation* and *dispersion*. When they are in balance, it is expected that the rank-size graph of settlements belonging to the same system will be log-normal: the largest settlement must be twice the size of the second in rank, three times the size of the third in rank, and so forth (Drennan and Peterson, 2004, p. 533; Johnson, 1977, p. 488-496; Savage, 1997, p. 233-234). If there is a tendency towards centralisation in a single settlement for political, religious, or trade reasons, population will be attracted to it; as a consequence, either the first-order settlement be larger than expected, or the second-order settlements will be smaller than expected, giving the rank-size graph a distinctive "concave" – also called "primate" – shape (Drennan and

Peterson, 2004, p. 534; Johnson, 1977, p. 494-496; Savage, 1997, p. 234). In contrast, if there is a tendency towards dispersion, or if we are pooling more than one system together in the analysis, the resulting graph will have a “convex” shape, as there will be more than one high-rank settlement with similar sizes (Drennan and Peterson, 2004, p. 533-534; Johnson, 1977, p. 498-501; 1980; Savage, 1997, p. 234) (Figure 3.8).

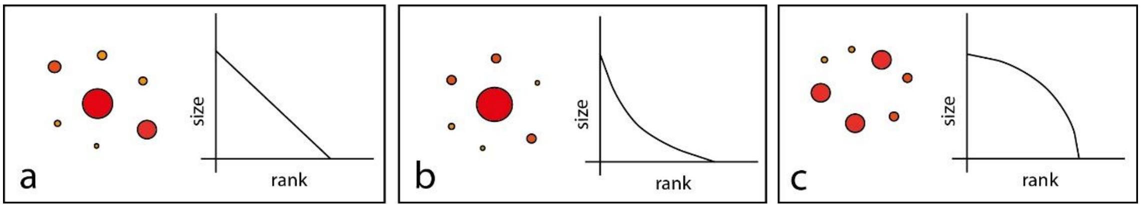


Figure 3.8 Expected rank-size curves for different types of settlement systems. a) log-normal; b) primate or concave, indicating highly integrated, strongly centralised systems; c) convex, indicating little integration or the pooling together of different settlement systems.

There are three major problems with a simplistic approach to rank-size analysis: the first is that the definition of a concave or convex graph is often subjective. This can be solved by applying some quantitative measurement – for instance, calculating the areas above and below the log-normal line, the *A* coefficient of Drennan and Peterson (2004, p. 534-535).

A second, more serious problem involves sampling. Because our settlement data are rarely based on full-coverage of a region, it is possible that any site missed during a survey could radically alter the shape of the rank-size curve. To account for that problem, Drennan and Peterson (2004, p. 539-540) propose a bootstrapping or resampling approach, by which samples are repeatedly selected at random and with replacement from the initial set of observations. Each sample has the same number of observations as the original set, but because it is drawn with replacement, it may repeat some sites while omitting others. Samples thus created are then averaged and the standard deviations can be used to establish a confidence interval for the empirical rank-size curve. Evidently, the more settlements there are in the sample, the more confident we are about the shape of the rank-size curve. The bootstrapping procedure solves the problem of determining whether the apparent convexity or primacy of a rank-size curve is not due to the vagaries of sampling (see Savage, 1997 for an alternative using Monte Carlo simulation). A software (RSBOOT) that calculates the *A* coefficient (a measure of departure from log-normality) and executes the bootstrapping procedure for a set of settlement data was made available by Robert Drennan on his website[3].

The final problem relates to the boundaries of the settlement system under study, as they rarely coincide with the boundaries of an archaeological survey. In fact, one explanation offered for convex rank-size graphs is that they result from the analysis of peripheries, when the actual centre is missed, or from the pooling together of different regions, when various independent centres are erroneously considered part of the same system (Johnson, 1977, p. 498-499; 1980, p. 240-242). Unfortunately, this is a problem that needs to be solved prior to the analysis of the data (Drennan and Peterson, 2004, p. 538-539).

I will consider each of the three regions analysed in this chapter as a separate system for ends of comparison. Although their boundaries are more defined by the history of research than by anything else, there is *a priori* no better solution. The rank-size analysis provides an interesting comparison of the three regions. I applied the method of Drennan and Peterson (2004) using the RSBOOT software and the areas in m^2 (calculated from the reported pit house diameters) for each settlement. Figure 3.9 presents the resulting rank-size graphs for the three regions, where *N* is the number of settlements and *A* is the coefficient proposed by Drennan and Peterson (2004, p. 534-535) to measure the shape of the rank-size curve. *A* values range from -1 to 1, with zero equalling log-normality, negative values indicating a primate curve, and positive values indicating convexity. The shaded zones in the graphs represent 90% confidence levels as calculated by the bootstrapping method. Interestingly, the only graph that is primate (A = -0.23) is that of São José do Cerrito, due to the inclusion of Rincão dos Albinos. The graph for Campos Novos (A = 0.056) shows a curve that is very

[3] http://www.pitt.edu/~drennan/ranksize.html

close to log-normality, whereas Barra Grande (A = 0.124) has a more pronounced convex distribution.

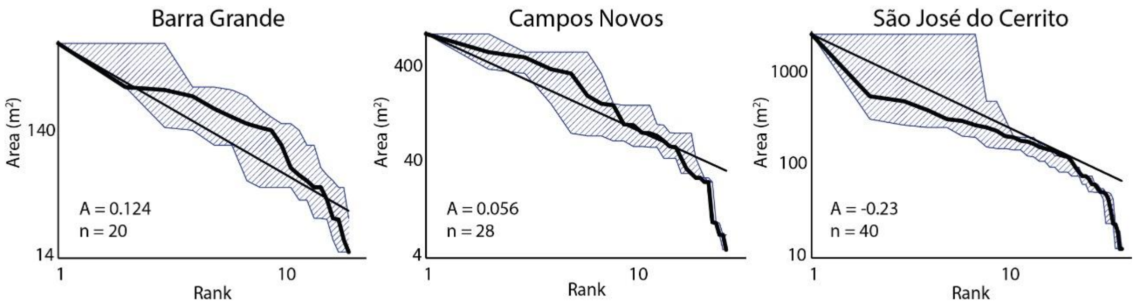


Figure 3.9 Rank-size plots of the settlements in the three regions with 90% confidence zone for the rank-size curve according to the method of Drennan and Peterson (2004).

The negative value for *A* in São José do Cerrito is caused by the inclusion of an abnormally large settlement, Rincão dos Albinos. In comparison to it, most of the other sites are smaller than expected. However, if that site is excluded – which might be justified due to its chronological position – the resulting curve appears even more convex than in the other two cases. Therefore, there is a tendency for convexity in all regions, which means that, even if there is one very large site in each region, there are also many intermediate, second-order settlements of sizable dimensions. Does that indicate that we are pooling together more than one system per region (Johnson, 1977, p. 498-499; 1980, p. 240-242)? That is a distinct possibility: as we will see in the spatial analysis below, perhaps each region should be broken down into several clusters.

How much should we interpret rank-size curves in terms of social organisation? Early applications of rank-size analysis tended to be enthusiastic about correlating particular distributions with specific socio-political formations (e.g. primate curves and early states), but this is no longer the dominant view. For example, Pearson (1980, p. 458-461) showed that rank-size distributions for Early Dynastic Mesopotamia and two regions of prehistoric North America were similar, exhibiting primate tendencies – even though the later belonged to pre-state societies. Thus, different levels of complexity and distinct social organisations may result in similar rank-size distributions. I believe the most fruitful applications of rank-size analysis, as presented in this section, involve the comparison of closely related regions synchronically or a single area diachronically (Drennan and Peterson, 2004, p. 542) in order to infer *relative* differences in how centralised the population was and how integrated was the settlement system (see also Drennan and Peterson, 2012).

Central places in the highlands? Dense settlements and oversized pit houses

The area of the largest settlement in a sample largely determines the shape of the rank-size curve (Drennan and Peterson, 2004, p. 548). In the three regions analysed, the first-order settlements either 1) include a large number of structures; or 2) contained structures of exceptional dimensions. Figure 3.11 presents the histograms for number of pits and largest diameter in each of the three regions. Notice that the largest pit house is never found in the sites with highest density of pits, confirming the observation of (Reis, 2007, p. 122) that number of structures is inversely proportional to structure size. Therefore, I suggest that we divide the purported “first-order” Southern Proto-Jê sites into two categories: *dense settlements* and *oversized pit houses*.

Examples of dense settlements have been shown over the course of this chapter (Figure 3.3, Figure 3.6). Interestingly, these sites are not only remarkable in terms of number of pit houses, but also because of their architecture: many of them display characteristics of well-planned villages with distinct sectors, in line with the observations of Saldanha (2005, p. 73) and Iriarte et al. (2013, p. 84). This is best exemplified by Rincão dos Albinos, whose

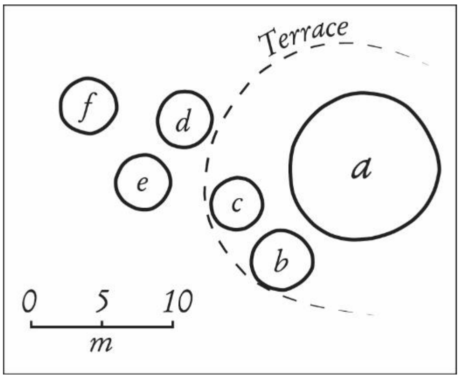


Figure 3.10 Site RS-37/127. Note the cluster of small pits (b-f) around a large one (a). Based on (Corteletti, 2008, p. 62).

houses are clearly arranged in discrete neighbourhoods, often aligned or in semi-circles (Figure 3.6). Most intriguing is the juxtaposition of large and small pit houses found in those sites. In fact, as noticed by Beber (2004, p. 205), Saldanha (2005, p. 75) and (Reis, 2007, p. 121-122), settlements with a high density of pits tend to include structures with large disparities in size. This pattern is even discernible beyond the study area, in other parts of the highlands (Figure 3.10). In some cases reported in the literature, an oversized pit house occupies a central position in the site and is surrounded by small pits (Kern et al., 1989, p. 112; Schmitz and Becker, 2006, p. 92).

On the other hand, most oversized pit houses appear in isolation and form a distinct category from the dense settlements. The debate about the potential functions of oversized pit houses, together with the data from the few excavations conducted at those sites, will be reviewed in detail in Chapter 5. For now, it suffices to say that the following functions have been attributed to oversized pit houses: 1) specialised ritual structures or communal integrative facilities, much like the *kivas* of the U.S. Southwest (Copé, 2006, p. 378; Reis, 1980, p. 189-190); 2) dwellings of extended families, possibly from an earlier period than the small house clusters (Reis, 2007, p. 203; Schmitz et al., 2013a, p. 191); 3) dwellings of high-status individuals (Copé, 2006, p. 341).

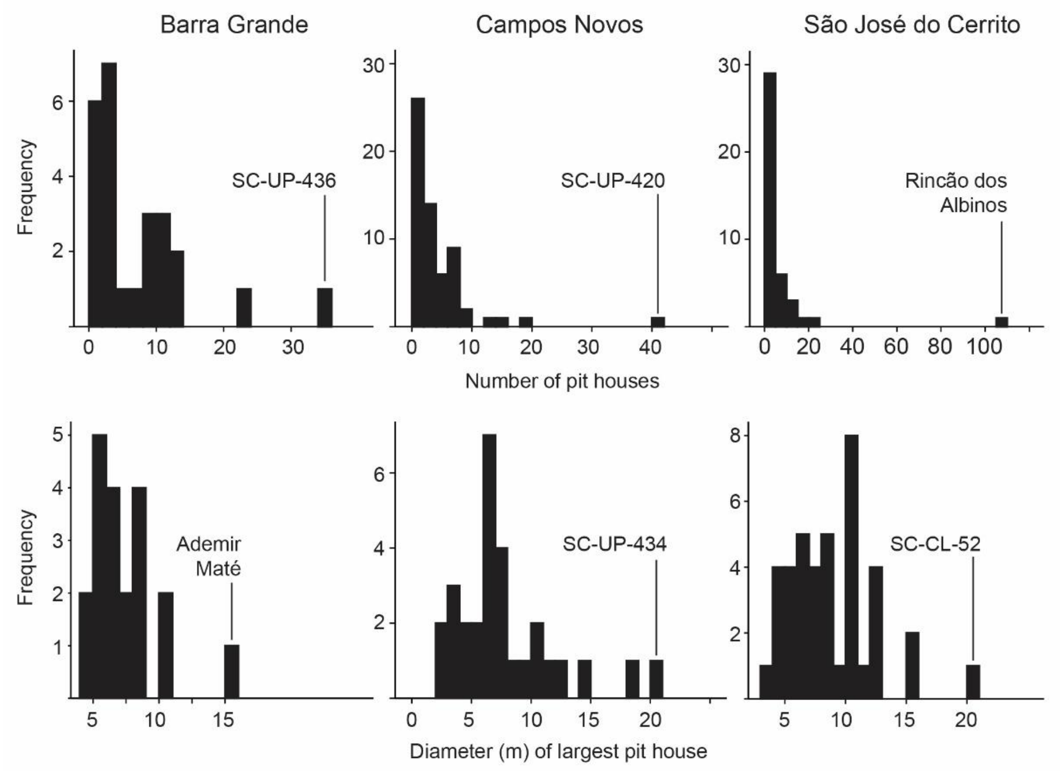


Figure 3.11 Histograms of number of pit houses per site (above) and diameter of largest pit house (below) for each of the three regions. The largest sites according to those criteria are indicated.

Table 3.4 Dense settlements and oversized pit houses in the three regions.

Region	Site name	Number of pits	Diameter of largest pit (m)	Diameter of smallest pit (m)	Type
São José do Cerrito	**Rincão dos Albinos**	107	8	2	Dense
	SC-CL-86	20	5	3	Dense
	SC-CL-58	18	8	3	Dense
	SC-CL-84	14	5	3	Dense
	SC-CL-45	13	10	3.8	Dense
	SC-CL-69	12	6	4	Dense
	SC-CL-52	1	20	20	Oversized
	SC-CL-63	2	15.8	13	Oversized
Campos Novos	**SC-UP-420**	40	10	2	Dense
	SC-UP-435	19	7.6	3	Dense
	SC-UP-418	12	6.9	1.3	Dense
	SC-UP-434	3	20.3	11.5	Oversized
	SC-AB-95	-	18	-	Oversized
Barra Grande	**SC-UP-436**	34	10	1	Dense
	RS-PE-10	23	8	3	Dense
	Ademir Maté	1	15	15	Oversized

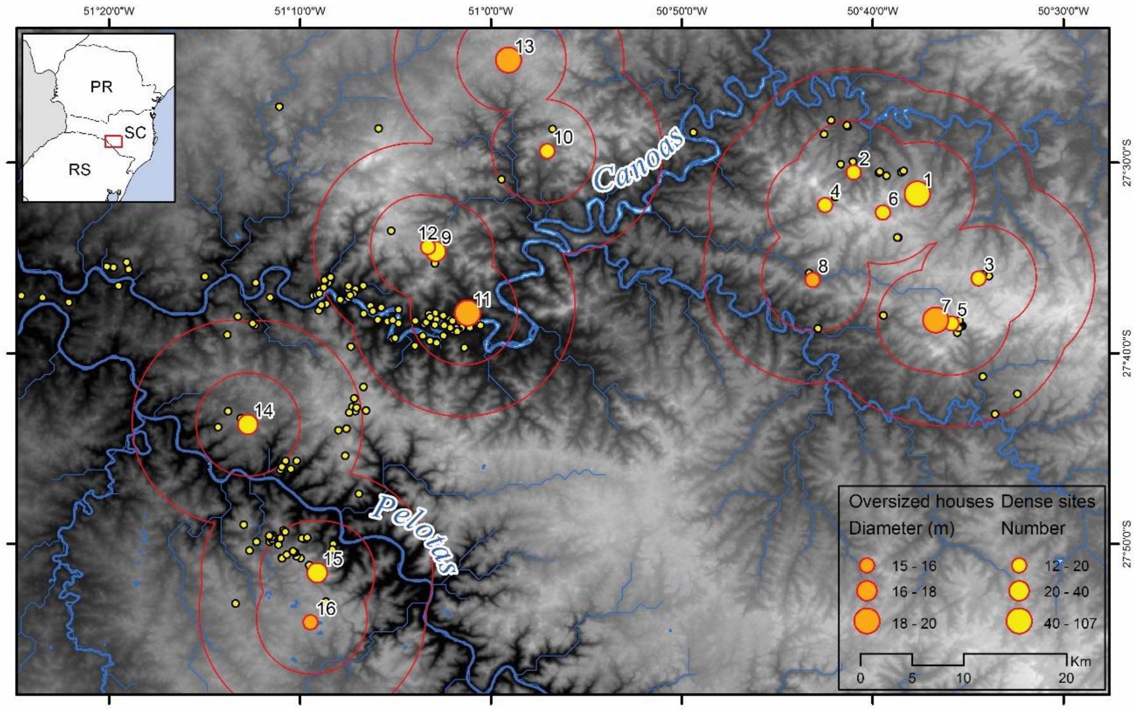


Figure 3.12 Distribution of oversized pit houses and dense settlements. 1) Rincão dos Albinos; 2) SC-CL-86; 3) SC-CL-58; 4) SC-CL-84; 5) SC-CL-45; 6) SC-CL-69; 7) SC-CL-52; 8) SC-CL-63; 9) SC-UP-420; 10) SC-UP-435; 11) SC-AB-95; 12) SC-UP-418; 13) SC-UP-434; 14) SC-UP-436; 15) RS-PE-10; 16) Ademir Maté. Buffers represent a radius of 5 km and 10 km.

I finish this chapter with an analysis of the spatial distribution of high-ranking Southern Proto-Jê pit house sites – oversized pit houses and dense settlements – in the three regions analysed (Figure 3.12). Nearest neighbour analysis[4] was conducted to ascertain whether any clustered or regular pattern was present in the dispersal of those sites. When all sites are taken into account, the resulting pattern is slightly clustered, but not statistically different from random (R_n = 0.79, p = .11). The average distance between the sites is 5.14 km, or close to a one-hour walk. However, as can be seen in Figure 3.12, oversized pit houses tend to be more regularly spaced and further away from each other. In fact, this is confirmed by nearest neighbour analysis, which shows a statistically significant

[4] The analysis was performed with the *Average Nearest Neighbour* tool of the *Spatial Analyst* toolset in ArcGIS 10.2.2. The results are given in the form of a nearest neighbour ratio (R_n). When R_n is higher than 1, the data tend towards dispersal; when lower than 1, the trend is towards clustering. Values close to 1 are indicative of randomness.

trend towards dispersion (R_n = 1.9, p < .001). Oversized pit houses are separated in average by 20.98 km, giving each site a catchment close to a two-hour walk.

A model of Southern Proto-Jê territories

The three regions analysed in this chapter appear to have been structured according to a similar principle: repeated modules of small, satellite sites around dense settlements or pit houses of exceptional dimensions. I am convinced that the later represent central places of some sort, but can we interpret them as anything similar to chiefdom capitals? That is unlikely: as can be seen in Figure 3.12, there are too many “top-tier” sites and they are too closely spaced. The Southern Jê political-territorial units reported in historical accounts appear to have been much larger (Fernandes, 2003, p. 111-112; Laroque, 2007, p. 10-12). Many subordinate chiefs settled far from the paramount village, over a distance that could not be travelled in a single day (Mabilde, 1983, p. 44). In fact, cross-culturally, competing chiefdom centres tend to exert control over a radius of at least a half-day of travel, which translates into 20 km or more (King, 2003, p. 12; Scarry and Payne, 1986, p. 83; Spencer, 1994, p. 36).

Moreover, the rank-size analyses presented above did not suggest a pronounced hierarchy in which one major settlement eclipses all others. The only exception, site Rincão dos Albinos, appears to be a chronological outlier (Table 3.3, Figure 3.7). As I mentioned previously, processes of cycling might explain the apparent clustered spatial distribution of major Southern Proto-Jê sites. For example, looking at Figure 3.12, it is evident that 5 km catchments around the top-tier sites exhibit much overlap. It is not impossible that, over the course of each region’s occupation, there were alternations in which centre was attracting most population. This means that we should possibly break the regions into their constituents modules (satellite hamlets around major villages), each functioning as an independent political-territorial unit.

Although the idea of cycling, as developed by Anderson (1994a, p. 74; 1994b, p. 2-50), was originally applied to chiefdom capitals, political centralisation is not necessary to explain the growth and collapse of regional centres. For example, Duffy (2015) offered a thorough examination of how disparities in site size may emerge in the absence of hierarchy. These mechanisms are similar to those already discussed by Parkinson (2002) in his work on the archaeology of "tribal societies", their segmentary nature and the cycling in settlement patterns and social organisation that these societies constantly experience. Let us examine some of them (Figure 3.13):

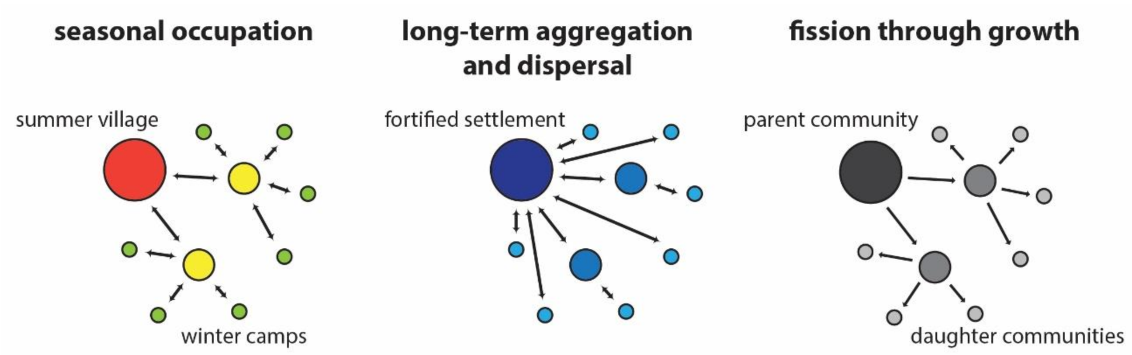


Figure 3.13 Some of the processes behind the formation of apparent site hierarchies without true political centralisation. Based on Duffy (2015, p. 87).

1. **Seasonal occupation** of different sites may result in some of them growing much larger than the others, as when people aggregate in summer villages but disperse into small camps during the winter (Duffy, 2015, p. 88; Parkinson, 2002, p. 397).

2. The previous is an example of short-term, annual cycles, but **long-term cycles of aggregation and dispersal** (e.g. Parkinson, 2002, p. 431), especially for conflict reasons, have similar results: during periods of increased warfare, people may aggregate in a few large sites, only to disperse back into smaller villages during peaceful times (Duffy, 2015, p. 88).

3. Another important long-term factor behind the emergence of disparities in site size is **fission through growth**: in this model, an initial colonising population establishes small settlements in the landscape but, as population grows, the villages fission into daughter communities. In this case, the larger sites correspond to the earlier, "parent" settlements (Duffy, 2015, p. 88).

Of course, many other processes could lead to one settlement growing much larger than its neighbours, including differences in resource productivity and regional functional specialisation. Most importantly, the models are not mutually exclusive: a site in a more productive environment may grow larger than others, fission into smaller communities, and then become a centre for aggregation during times of hostility (Duffy, 2015, p. 89). Each of these processes has specific archaeological correlates and, in the case of the Southern Proto-Jê sites, fortifications can be ruled out (perhaps with the notable exception of linear earthworks surrounding pit houses, as described by Copé, 2006, p. 361). Seasonal occupation of the sites was once considered plausible (Schmitz et al., 1988), but the evidence is now on the side of year-round permanence over multiple generations (Corteletti et al., 2015) (see Chapter 7).

Could fission through growth be a feasible explanation for the disparities in pit house settlement size? A similar model was envisaged a long time ago by Flannery (1976b) in a pioneer study about the evolution of complex settlement systems. He pointed out that complex patterns could emerge from original villages growing and giving rise to daughter settlements. The smaller sites, in turn, maintained ties to the parent community. This pattern occurred in Formative Mesoamerica, where primary regional centres developed from the oldest communities in their respective areas. According to Flannery (1976b, p. 168), early villages grew and incorporated public architecture at the same time that they gave birth to "daughter" communities. He also hypothesised that senior, higher-ranking lineages remained in the original villages, whereas younger, lower-rank lineages founded new sites. With time, the parent, larger communities with integrative architecture took administrative functions over the younger, smaller ones. Beyond Formative Mesoamerica, similar trajectories have been evidenced archaeologically in lowland South America, from the Valdivia Valley of Ecuador (Schwarz and Raymond, 1996, p. 220-222), through the Upper Xingu (Heckenberger, 2005, p. 120-126), to the Marajó Island (Schaan, 2004, p. 173-177). If fission through fusion and cycling were major processes in the formation of disparities in Southern Proto-Jê settlement size, then the early dates of a large site like Rincão dos Albinos certainly begin to make sense.

My hypothesis is that the territorial "modules" of the Southern Proto-Jê emerged from a process of growth of central settlements that, over time, incorporated and maintained social, economic or ceremonial functions not present in smaller, daughter hamlets. In the long term, the ties of the satellite sites to their parent villages could have developed into relations of subordination, paving the way for the hierarchical regional organisation described for the Southern Jê in historical times. However, limitations in the current data prevent an evaluation of that hypothesis. For example, are the dense settlements well-planned villages or do they result from a palimpsest of short-term occupations and abandonments? Are the oversized pit houses even dwellings, or are they public integrative facilities similar to *kivas*?

I address those questions with data from a yet unexplored area, the municipality of Campo Belo do Sul, Santa Catarina. In the next chapter, I present the results of the archaeological survey in that area, which confirmed the proposed settlement model. Within Campo Belo do Sul, I selected the Baggio 1 site, a settlement with the characteristics of a large, dense pit house village centred around an oversized house, to carry out excavations with the aim of understanding (i) the function of oversized structures; (ii) the chronology and occupation dynamics of dense pit house sites; and (iii) the potential development of household differentiation and inequality at those sites. In the chapters that follow, I will show how the oversized pit house at Baggio 1 began and persisted as an epicentre for the social and ritual life of the community for over three centuries, as the settlement grew, smaller pits were gradually added to its surroundings, and a formal division between an inner precinct and a lower peripheral area was established. Based on the excavation, radiocarbon and artefact data, I suggest that the lineage responsible for the initial construction of that structure consolidated its prestige through the sponsoring of conspicuous domestic ceremonies of house conflagration and entombment. Moreover, inhabitants of the oversized dwelling kept the structure as an important, permanent reference in the landscape, providing links with the past through which they could derive an upper status in relation to other sectors of the site. In conclusion, I argue that the development of such long-lived corporate groups (sensu Hayden et al., 1996) could have led to the formation of ranked societies as those described for the southern Brazilian highlands in historical times.

Chapter 4

Exploring uncharted territory: the pilot area and the Baggio 1 site

In the previous chapter, I have compared the settlement data from three distinct regions in the basins of the Canoas and Pelotas Rivers – a broad area of dense Southern Proto-Jê occupation. I concluded that, even though a marked site hierarchy is absent, the Southern Proto-Jê territories in the three regions consisted of repeated modules of central places (oversized pit houses or dense settlements) surrounded by smaller sites. However, although the regions chosen for analysis in the previous chapter had long histories of research, there were still gaps in the regional archaeology. One of those gaps is the pilot area chosen for this thesis – an area of approximately 240 km^2 south of the Caveiras River. The pilot area comprises the northern half of the municipality of Campo Belo do Sul, Santa Catarina state (see location in the previous chapter, Figure 3.1). Unlike the surrounding regions, Campo Belo do Sul was not surveyed by Reis (2007) in the late 1970s and was not object of archaeological research ever since. The boundaries of the pilot area were initially defined as a 10 km buffer around the only archaeological site known in the area, the Abreu Garcia mound and enclosure complex (see below). Research was restricted to the south of the Caveiras River, as the other margin is currently being investigated by the *Instituto Anchietano de Pesquisas* (Schmitz et al., 2010; Schmitz and Rogge, 2011; Schmitz et al., 2013a, b).

The selection of the pilot area was initially inspired by the discovery of a mound and enclosure complex in good state of preservation in the *Abreu Garcia* vineyard. The first visit to this site occurred in 2011 as part of the project *Sacred Places and Funerary Rites: the Longue Durée of Southern Jê Monumental Landscapes*, an international collaborative research grant funded by the Wenner-Gren Foundation (see Iriarte et al., 2013). The site's state of preservation and architectural features, combined with the lack of a regional archaeological context until that moment, motivated further interest in the area. Currently, Campo Belo do Sul is one of the regions investigated by the AHRC-FAPESP project *Jê Landscapes of Southern Brazil: Ecology, History and Power in a Transitional Landscape during the Late Holocene*.

The Jê Landscapes Project

The project *Jê Landscapes of Southern Brazil: Ecology, History and Power in a Transitional Landscape during the Late Holocene* is funded by a collaborative grant between the Arts and Humanities Research Council (AHRC) in the United Kingdom and the São Paulo State Research Foundation (FAPESP) in Brazil. The project takes an interdisciplinary approach, combining archaeology, palaeoecology, and ethnohistory to examine (1) the social organisation of the Southern Jê groups in different ecological zones; (2) the relation between prehistoric land use and the expansion of the *Araucaria* forest; and (3) the potential of interdisciplinary works for the archaeology of southern Brazil. The project is developed along a transect that crosses different ecological zones of Southern Proto-Jê occupation in the state of Santa Catarina, including the coastal plains, the escarpment of the highlands, and the plateau. In the highlands proper, Campo Belo do Sul was one of the areas chosen for fieldwork. The first activities took place in April 2014 and included the excavation of the Abreu Garcia site, a reconnaissance regional survey, and the extraction of sediment cores from wetlands for pollen analyses.

The Abreu Garcia site

The Abreu Garcia site is a mound and enclosure complex in excellent state of preservation. The main enclosure has approximately 40 m diameter and surrounds a platform mound with 10 m diameter and 1 m height (Figure 4.1a). This large mound is accompanied by a smaller mound. Approximately 30 m southeast of the main structure, another mound surrounded by a ditch has been located. Therefore, the site's layout conforms to the pattern found in other mound and enclosure complexes: a northwest-southeast alignment, with the largest and more complex structure placed in the west (De Souza, 2007; Iriarte et al., 2013; Iriarte et al., 2008). The location of the site is also typical, on a hilltop 930 m above sea level, with broad view towards the Caveiras River valley and the distant hills of São José do Cerrito. The central mound, however, is much larger than usual, and is also distinguished by its flat top, resembling a platform. Its pairing with a smaller mound inside the same enclosure is also a rare characteristic – one that is shared with architecturally complex sites such as PM-01 and SC-AG-12 (De Masi, 2005; Iriarte et al., 2008; Iriarte et al., 2010). The excavations at Abreu Garcia, described in Robinson et al. (in press), targeted a sample of features at the site, including both central mounds of the main enclosure, the smaller mound to the southeast, trenches over the ring and test pits on external areas. The excavations at the main mound recovered 16 cremated deposits, nine of which were distributed inside four aligned pits dug into the bedrock, in one case accompanied by a small decorated ceramic vessel (Figure 4.1b-d). The formal grave architecture represented by the burial pits was restricted to the south-western half of the mound, leading Robinson et al. (in press) to suggest that dualism in Southern Proto-Jê mound and enclosure complexes was expressed in nested levels – the pair of enclosures, the twin mounds within the main enclosure, and the division in the mound interior. The dates obtained for the site were surprisingly recent, revealing broad contemporaneity of all structures and a span of 170 years in the use of the main mound, starting at the eve of the Columbian encounter (Table 4.1, Figure 4.2).

Figure 4.1 a) Satellite image and superimposed hachure map of the Abreu Garcia site (MEC = Mound and Enclosure Complex); b) One of the cremated deposits (Cluster 16) from the “informal” north-eastern sector of Mound A; c) The four aligned burial pits dug into the bedrock in the south-western half of Mound A; d) Ceramic vessel associated with the cremated deposits in one of the pits.

Table 4.1 Radiocarbon dates from the Abreu Garcia site. Clusters refer to cremated deposits in the main mound. Based on Robinson et al. (in press).

Context	Lab. number	Conventional Radiocarbon Age BP	Cal A.D. (2σ)
Cluster 14	Beta 395742	400 ± 30	1455-1630
Cluster 6	Beta 417389	390 ± 30	1455-1630
Cluster 16	Beta 395744	370 ± 30	1460-1640
Mound B	Beta 395741	360 ± 30	1465-1645
Mound B	UGAMS 19003	330 ± 20	1488-1604
Burnt feature	Beta 414096	300 ± 30	1510-1575
Cluster 11	Beta 395743	270 ± 30	1630-1675
Cluster 12	Beta 395740	230 ± 30	1650-1695

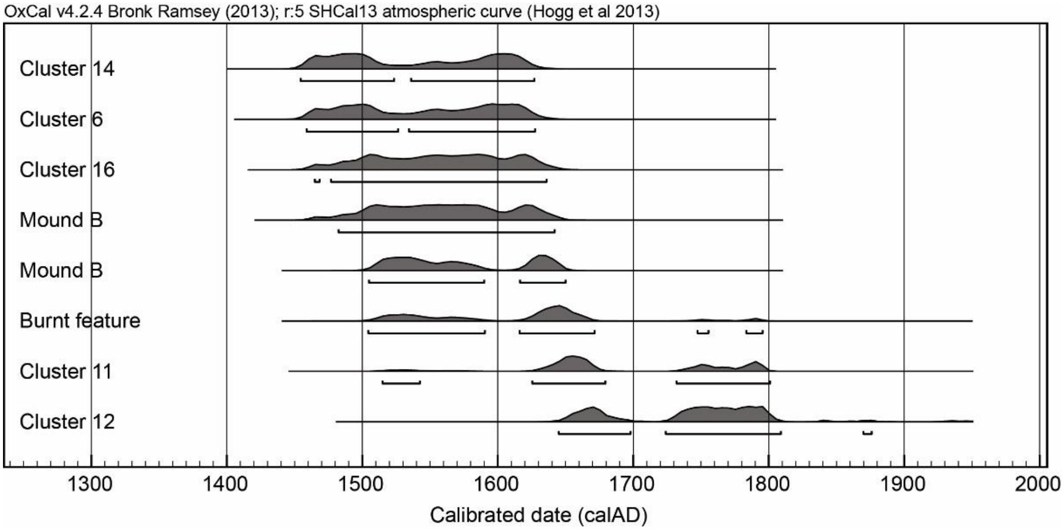


Figure 4.2 Calibrated dates from the Abreu Garcia site. Bars under each distribution represent the 2σ confidence interval.

At the same time that the excavations were conducted at the site, a regional survey was carried out over the course of four field seasons between 2014 and 2016. While the excavations were directed at understanding the use and development of the ritual space at the Abreu Garcia mound and enclosure complex, the survey was intended to elucidate the regional context in which that ritual site emerged and functioned. For the aims of this thesis, the survey in a yet unexplored area was also an opportunity to test the model developed in the previous chapter and to compare the settlement patterns found in Campo Belo do Sul with those already known from the surrounding regions. Before moving to the general discussion of the site types in the pilot area, I will briefly describe the regions' environmental characteristics and its historical context.

Modern environment and recent history of the pilot area

The municipality of Campo Belo do Sul is located in the region of the state of Santa Catarina known as the *Campos de Lages*, as a reference to the oldest and largest city of the area, which is located approximately 40 km east of Campo Belo do Sul. Lages was founded in 1766 in what was then a nearly uninhabited portion of the *Caminho das Tropas*, an important trade route that connected the southernmost part of Brazil to São Paulo and the central part of the country. That route had only been established in 1727, and even by then the southern Brazilian highlands were so sparsely populated by the Portuguese crown that a census of 1751 mentions only 21 properties in the whole highlands of Rio Grande do Sul. According to the census, few families actually lived in any of the farms, most being occupied by estate managers and a few slaves (Kuhn, 2004, p. 50). The 18th century accounts describe that a traveller would spend several days without finding anywhere to rest in safety along most of the route in the Santa Catarina highlands, except for a couple of cattle ranches and many ruins of abandoned properties (Herberts, 2009, p. 138-147). In fact, even in the late 18th century there were complaints to the crown about the difficulties of settling in the highlands due to the low fertility of the land and to the constant attacks by the indigenous peoples (Osório, 2007, p. 129).

The urban core of Campo Belo do Sul is located in the headwaters of the Caveiras and Pelotas river basins. These rivers mark the boundaries of the municipality to the north and south, respectively. Both rivers figure prominently in the 18th century accounts about the *Caminho das Tropas*, as they needed to be crossed by the traveller. This was an easy task for the first one, but not for the second, which was known by then as *Rio dos Infernos*, “River of Hell”. *Rio Caveiras* means “River of Skulls”, a name of obscure origins that already appears in the 18th century accounts. It has been suggested that the name is a corruption of *Rio dos Cavaleiros*, “River of the Horsemen”, which makes sense in the context of the colonial trade route (Herberts, 2009, p. 143).

Near the Pelotas and Caveiras Rivers, where the elevation varies between 600 and 700 m above sea level, the terrain is broken, with prominent hills, steep slopes, and narrow valleys (Figure 4.3). In contrast, as one approaches the headwaters, the landscape becomes flatter, with gently rolling hills and elevations of 1000 m or higher. The average annual temperature in the pilot area varies between 16°C and 17°C, with the average minimum of July between 6°C and 7°C and the average maximum of January between 27°C and 28°C (Pandolfo et al., 2002). Total annual precipitation ranges from 1500 to 1700 mm (Pandolfo et al., 2002). The potential natural vegetation of the area largely depends on the elevation zones. In the lower elevation areas, deciduous and mixed *Araucaria* forests dominate, while mosaics of grasslands and *Araucaria* are predominant in the higher elevations. Different land uses are also associated with the two elevation zones: large-scale agriculture is more common in the areas of higher elevation and less broken terrain. As elsewhere in the southern Brazilian highlands, maize and soybeans are the main products. In areas where landscape is hilly, the land is not so productive for intensive mechanised agriculture, giving place to cattle herding and other economic activities, such as commercial plantations of *Pinus elliottii*. This difference in land use is also related to soil types, as some portions of the higher, flatter areas are covered by deep fertile nitosols, contrasting with the shallow and poorly developed cambisols that cover most of the region (Fasolo et al., 1998, 2004).

As in other areas of the highlands, the region of Campo Belo do Sul acquired economic significance in the middle of the 20th century with the exploitation of *Araucaria* logging. Lumber companies were already exploiting the forests since the last decade of the 19th century, but it was only during the decades of 1940-1950 that vast expanses of the forest were cleared to sustain the rapid growth of cities like São Paulo and Rio de Janeiro (Carvalho and Nodari, 2010, p. 717). The devastation was so great that already by 1966 *Araucaria* was considered exhausted, and the exploitation of the exotic, fast-growing *Pinus elliottii* became more profitable (Carvalho and Nodari, 2010, p. 723). For the whole state of Santa Catarina, it is now estimated that *Araucaria* forests cover only 3.18% of their original extent (Carvalho and Nodari, 2010, p. 724).

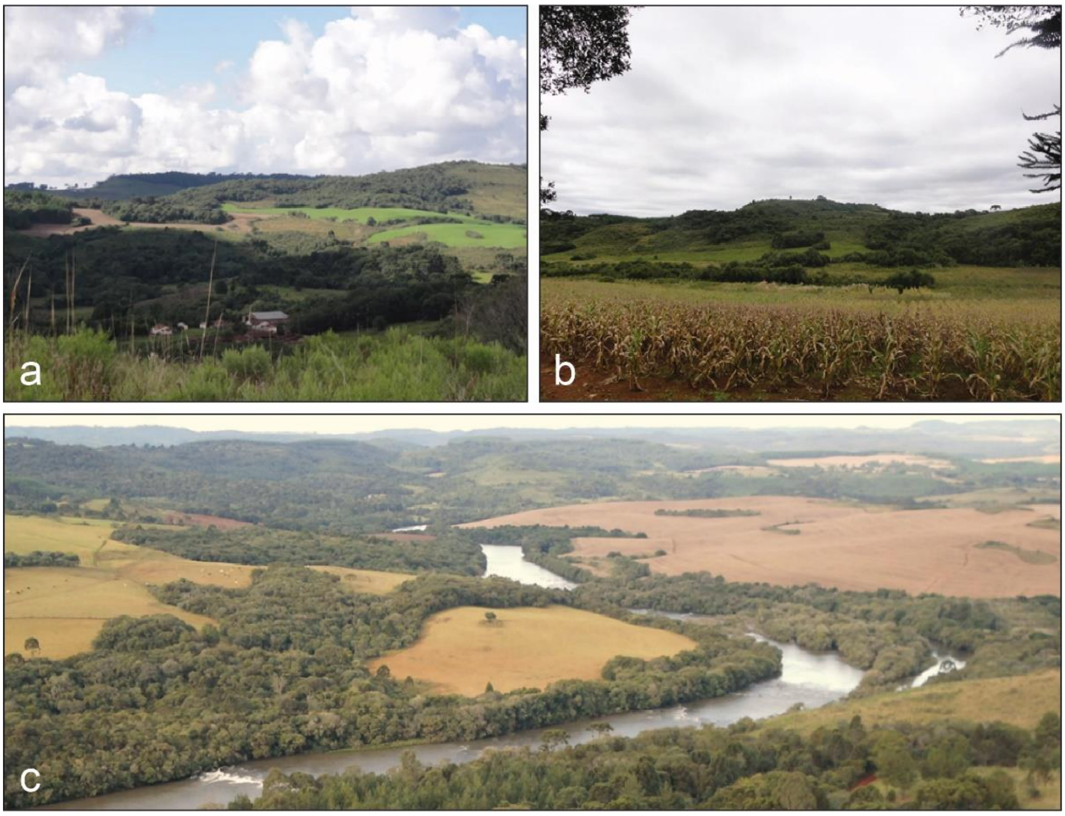


Figure 4.3 Typical landscapes of Campo Belo do Sul. a-b) Broken terrain near the Caveiras River, with prominent hills and small-scale agriculture; c) The Caveiras River valley.

Aims and results of the survey

The immediate aims of the survey in the pilot area were to provide a regional context for the excavations at the Abreu Garcia site, to fill a gap in the archaeology of the Canoas-Pelotas River Basin, and to integrate the results with the published data from neighbouring areas (Chapter 3). The survey in this yet unexplored region would also present an excellent opportunity of testing the model developed in the previous chapter about the regional organisation of Southern Proto-Jê territories and potential central places. The survey was conducted within a radius of 10 km around the Abreu Garcia site, aiming to capture the possible social catchment of the mound and enclosure complex. That radius was probably adequate, considering that previous analyses demonstrated that major Southern Proto-Jê enclosures in the regions of Barra Grande and Campos Novos tend to be separated by about 5 km, roughly the distance of a one-hour walk (De Souza, 2012, p. 90-92). As I have shown in the previous chapter, this is also the average distance between major domestic sites (both dense settlements and oversized pit houses) in the regions analysed. This means that the survey area would probably be large enough to locate at least one first-order pit house settlement. As will be seen below, these expectations were confirmed, and more than 40 archaeological sites[1] related to a Southern Proto-Jê occupation have been discovered in Campo Belo do Sul (Figure 4.4, Appendix II). In the following sections, I will explore the general characteristics of the different types of sites found in the region. I will then focus on how the pit house settlements' rank-size distribution compares to the regions analysed in the previous chapter, concluding with a description of the potential central place of Campo Belo do Sul, the Baggio 1 site, which will be the topic of the remainder of this thesis.

[1] Following Araujo (2001, p. 135), a site is here somewhat arbitrarily defined as any concentration of artefacts or features (mounds, pits, enclosures) within 100 m of each other, considering the scale of the base maps. Cultural remains located more than 100 m from each other can be plotted as individual features on the chart (scale 1:100,000) and appear in separate cells of the SRTM digital elevation model, which has an horizontal resolution of 90 m for the region in question.

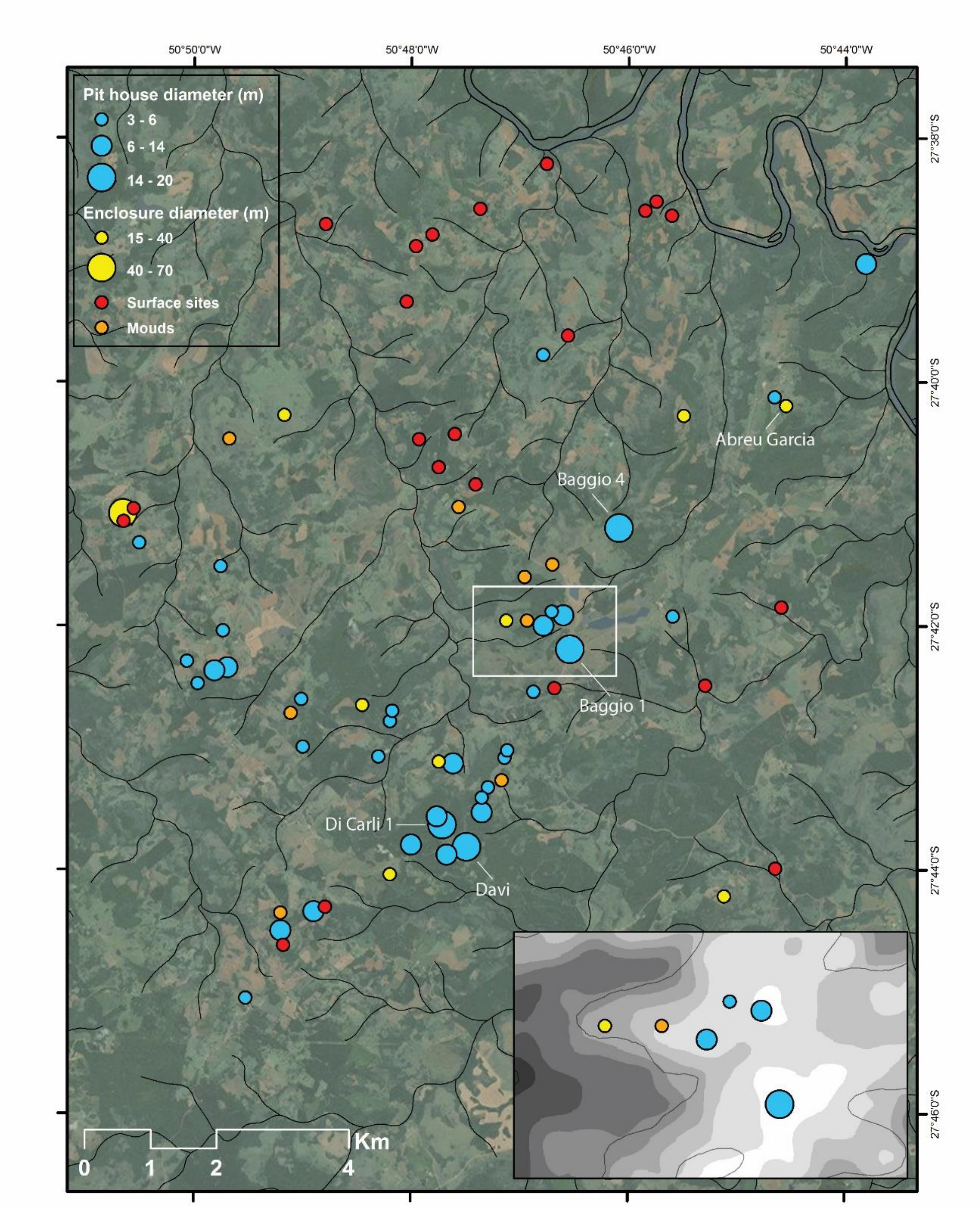


Figure 4.4 Southern Proto-Jê sites in Campo Belo do Sul as of March 2017, with the location of the Abreu Garcia mound and enclosure complex and of the oversized pit houses mentioned in the text. In detail, the cluster of sites around Baggio 1.

Mound and enclosure complexes

Including the Abreu Garcia site, nine mound and enclosure complexes have been located in the pilot area, to which we must add a further nine unenclosed mounds. Most of the enclosures vary in diameter between 15 and 40 m, with one case of an oversized enclosure with ca. 70 m diameter. Thus, the bimodal distribution of enclosure sizes in Campo Belo do Sul follows the pattern found in other regions (Iriarte et al., 2013; Müller, 2008; Rohr, 1971; Saldanha, 2005, 2008). Both mound and enclosure complexes and isolated mounds tend to be placed on prominent hilltops with broad visibility of the surroundings, in elevations from 900 to 990 m. So far, only two sites (Abreu Garcia and Luís Carlos 3) exhibited the typical dual pattern with two enclosures aligned SE-NW (De Souza, 2007; Iriarte et al., 2013; Iriarte et al., 2008; Iriarte et al., 2010). As can be seen in Figure 4.4, mound and enclosure complexes are distributed all over Campo Belo do Sul. They tend to appear in the immediate vicinity of pit houses, conforming to a pattern found in other regions (Chapter 3).

Surface sites

Surface sites are well represented in the pilot area, with a total of 15 sites. These sites were recognised by scatters of ceramic sherds and lithic tools in areas of exposed soil – usually where ploughing had recently taken place, or in fields planted with products like maize, which permit a good visibility of the ground. As noticed in Chapter 2, this type of site is possibly the least understood in the core Southern Proto-Jê areas of the highlands, where sites with earthworks have always received most of the attention. In the northernmost parts of the highlands, in the states of Paraná and São Paulo, pit house sites are rare and sites without earthen architecture are the most common form of settlement. In those regions, more sophisticated models have been developed to understand the Southern Proto-Jê settlement systems as reflected in the spatial distribution of surface sites (Araujo, 2001; Parellada, 2005; Robrahn, 1988).

The surface sites in the pilot area are generally located in lower elevations when compared to the sites with earthworks, between 730 and 970 m (most being found below 900 m). They are found in all classes of landforms, but are especially common in valleys and in mid-slope ridges, overlooking the Caveiras River and its tributaries. Surface sites in the pilot area tended to include abundant flint flakes, ceramic sherds that were mostly plain but also showing eventual decorations, and polished basalt axe heads (Figure 4.5). The axe heads are rectangular to trapezoidal in shape and have a slightly convex cutting edge. Future analyses can reveal differences in the artefact assemblages of the several surface sites, helping to assess functional variations. As can be seen in the map of Figure 4.4, the distribution of surface sites and pit houses is almost mutually exclusive. Coupled with the fact that surface sites are predominantly located in low elevations near the Caveiras River (Figure 4.6), this reinforces the hypothesis of Saldanha (2005) for Barra Grande that at least some of those sites would perform specialised functions, possibly related to swidden farming in the deciduous forests near the major rivers.

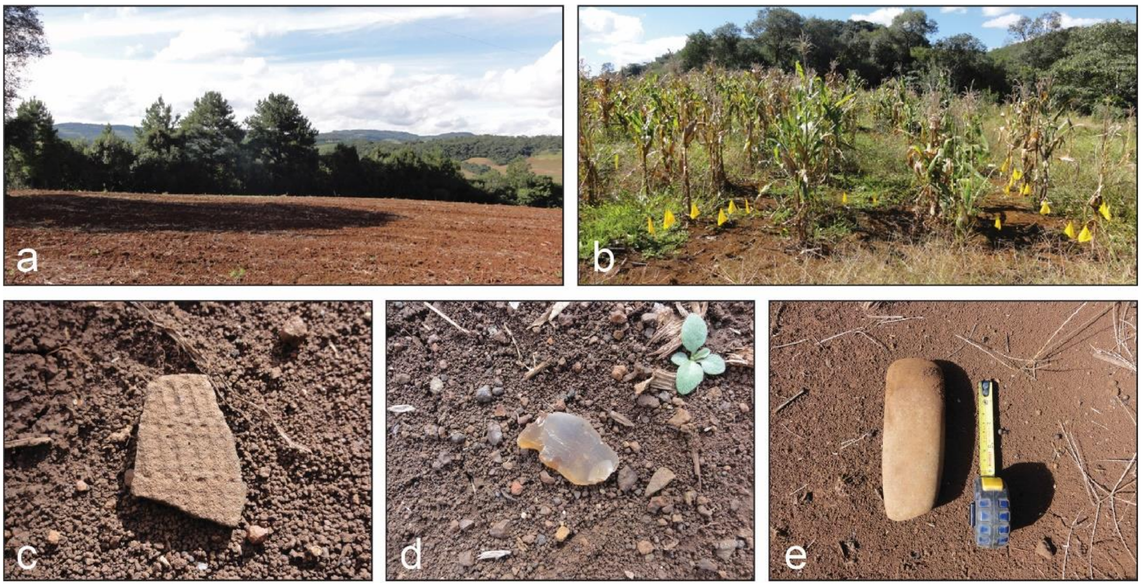


Figure 4.5 a) Typical location of a surface site: recently ploughed field in low elevation near the Caveiras River (Divercino da Silva site); b) Yellow flags marking the concentration of surface finds at the Juvenil site; c) Decorated sherd (Moisés site); d) Chert flake (Moisés site); e) Polished basalt axe head (Juvenil site).

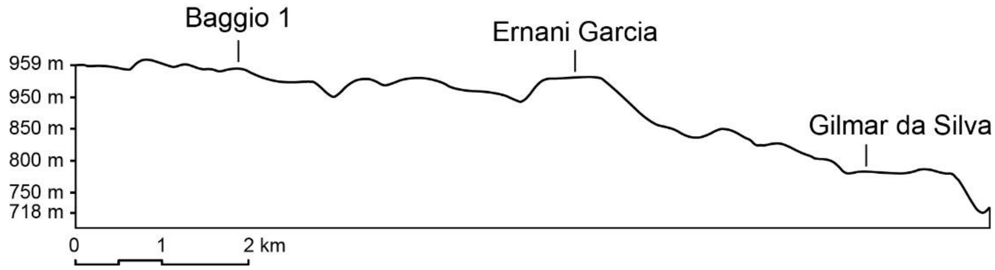


Figure 4.6 Elevation profile showing the typical topographic compartments occupied by a pit house site (Baggio 1), a mound and enclosure complex (Ernani Garcia) and a surface site (Gilmar da Silva).

Pit houses

Pit houses were the most common type of earthwork found in Campo Belo do Sul, with a total of 23 sites. Pit houses tend to occur in high elevations, between 900 and 1000 m, in headwater areas further away from the Caveiras River (Figure 4.4). The range of variation in number and dimensions of the structures is similar to the neighbouring regions analysed in the previous chapter. Pit house sites in Campo Belo do Sul appear mostly isolated or in small clusters of up to three pits. There are, however, dense settlements with up to 17 pits. As for pit diameter, most structures are between 2 and 6 m, but oversized examples occurred with diameters of up to 17 m (Figure 4.7, Figure 4.8).

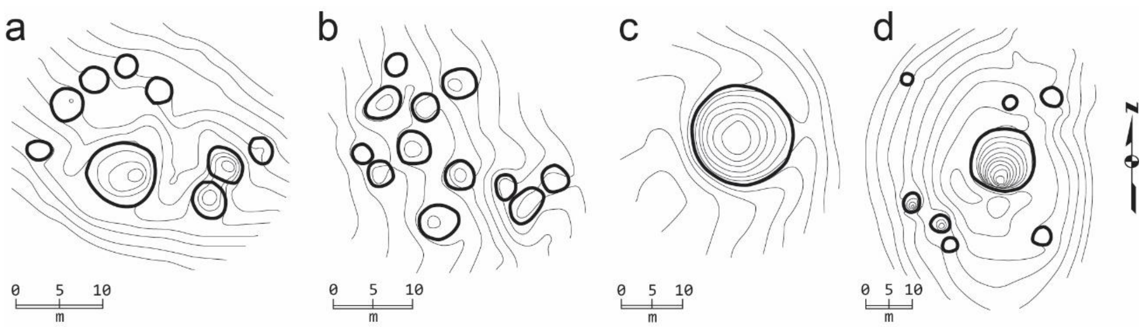


Figure 4.7 Variability in the layout of pit house sites in Campo Belo do Sul. a) João 3, a site with multiple pit houses in close proximity; b) Travessão, similar layout as the previous site; c) Di Carli 1, a lonely oversized pit house; d) Baggio 1, oversized structure surrounded by smaller pits.

Figure 4.8 Pit houses in the pilot area. a) One of a small cluster of three pit houses in a pasture (Baggio 2 site); b) One of the pit houses of the Travessão site, a cluster of 12 structures in a forest; c) Edge of an oversized pit house (Davi site, 17 m diameter and ca. 3 m depth); d) Platform mound associated with a large pit house (Luís Carlos 3 site, 13 m diameter).

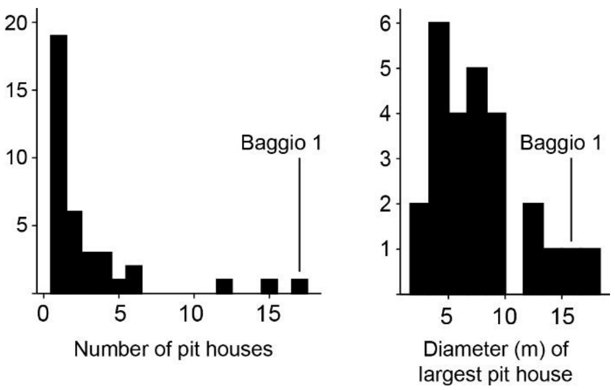


Figure 4.9 Histograms of number of pit houses per site (left) and diameter of the largest pit house (right) for Campo Belo do Sul.

When we plot the frequencies of pit house number and size, however, some important differences emerge in relation to the regions analysed in Chapter 3. Settlements tend to be less dense in Campo Belo do Sul, with a maximum of 17 pits, and the distribution of pit house dimensions appear to be continuous, without a single dominating oversized structure (Figure 4.9). Most importantly, the oversized pit houses of the pilot area (with 15 m diameter or more) are all clustered within a maximum of 3 km from each other (see the map of Figure 4.4)[2]. This seemingly more heterarchical distribution of site dimensions is reflected in the rank-size analysis. Figure 4.10 shows the rank-size graph of Campo Belo do Sul using pit house area as a measure of rank, with the coefficient *A* and the 90% confidence intervals as described in Drennan and Peterson (2004). There is a clear tendency for convexity, with an *A* value of 0.379, much higher than in any of the three regions analysed in the previous chapter. This means that most of the lower rank pit house sites in the pilot area are larger than expected, confirming the tendency for convexity in Southern Proto-Jê settlement size distributions. There is one site, however, that clearly occupies a dominant position in Campo Belo do Sul due to its dimensions and architectural complexity: Baggio 1. As a dense settlement that also includes an oversized pit house, Baggio 1 occupies the top of the rank-size curve. Not only the scale of the earthworks, but their architectural arrangement also differentiates the site from other settlements in the pilot area, leading to its selection as a case study for this thesis.

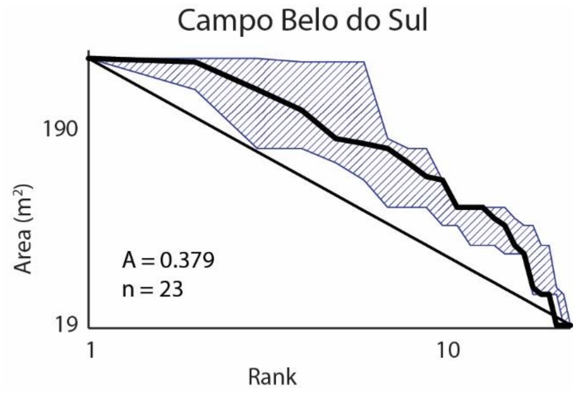


Figure 4.10 Rank-size plot of the pit house settlements in Campo Belo do Sul with 90% confidence zone for the rank-size curve according to the method of Drennan and Peterson (2004).

The Baggio 1 site and its significance

Baggio 1 is a pit house settlement first identified during the March-April 2014 survey in Campo Belo do Sul, and excavated over the course of two field seasons between 2015 and 2016. The site is located at coordinates 27°42'11.45"S 50°46'32.17"W at an elevation of 948 m above sea level and less

[2] One of the oversized pit houses of the pilot area, Baggio 4, had been filled by the land owner in order to level the terrain for ploughing. Although the outline of the site is clearly visible as a crop mark in the satellite imagery, its precise original dimensions could not be assessed, and therefore it was not included in the analyses.

than 5 km south of the Abreu Garcia mound and enclosure complex. As mentioned above, four other oversized pit houses have been found in close proximity, in a radius of less than 4 km from the site.

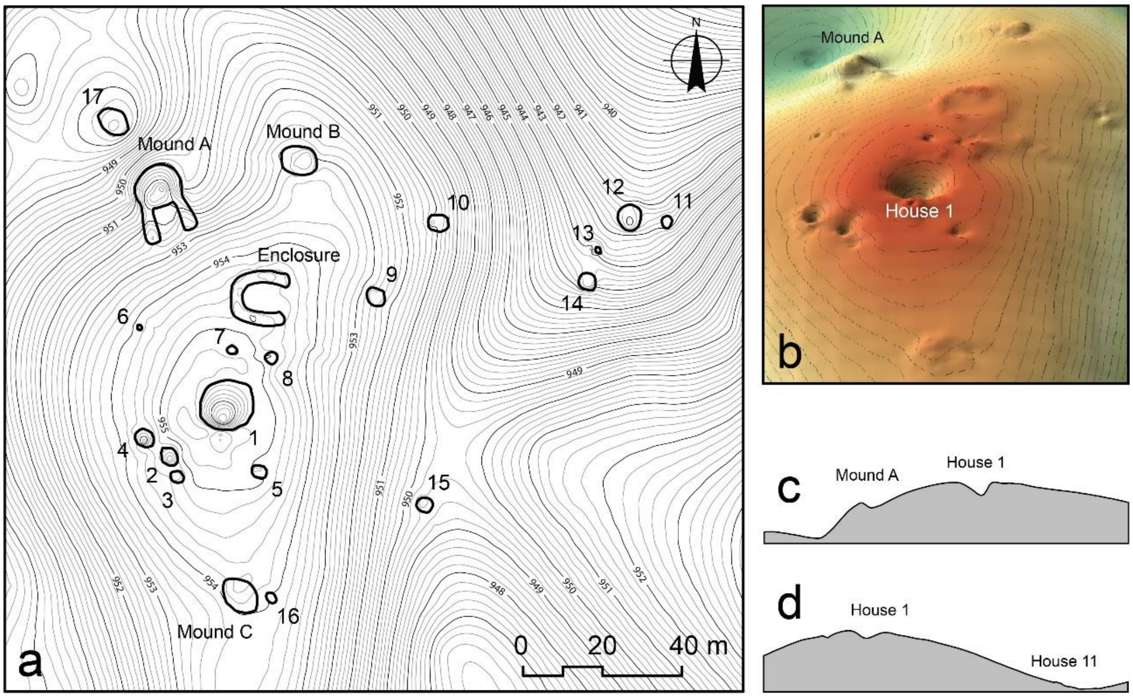


Figure 4.11 a) Topographic and planimetric map of the Baggio 1 site. b) 3D view of the inner precinct. c) NW-SE profile. d) SW-NE profile.

Baggio 1 is a large, dense, and well-planned settlement (Figure 4.11, Figure 4.12). The site is currently in pasture land used for cattle grazing. Apart from deforestation during the 1970s, no other economic activities were carried out at the site, which is in a good state of preservation and unaffected by agriculture. The site can be divided into an inner precinct with formal architectural arrangement and a peripheral area with dispersed, less formal architecture. The central inner precinct occupies an area of 2 ha on a hilltop, and exhibits the largest (16 m diameter) and deepest (1.6 m) pit house, henceforth called House 1. The oversized pit house is surrounded by seven smaller pits, between 2 m and 5 m diameter. A further eight pits, all small or medium-sized (2.5 m to 7 m diameter), occur in the lower slopes of the hill to the southeast, within a radius of 200 m from

House 1. A platform mound (Mound A) is located 60 m northwest, downhill from House 1. This platform mound is flanked by two low parallel wings, giving it a U shape facing in the direction of House 1 uphill. This is a novel form of mound architecture never recorded before in the southern Brazilian highlands, and all the more interesting since its orientation seems to reference House 1. Adjacent to House 1, to the east, another unusual earthwork has been noticed: a small circular enclosure (14 m diameter), partly destroyed by a cattle feeder.

Figure 4.12 a) A view of the Baggio 1 site and its surrounding landscape. The hilltop where the Abreu Garcia mound and enclosure complex is located can also be seen. b) The inner precinct of Baggio 1, showing the oversized House 1.

From the description above it is clear that Baggio 1, a dense settlement that also includes an oversized pit structure, shares some key architectural features with other major pit house villages seen in the previous chapter. For example, the juxtaposition of a centrally-placed oversized pit house with smaller structures happens in other major settlements (Corteletti, 2008, p. 62; Kern et al., 1989, p. 112; Schmitz et al., 2002, p. 71) (Figure 3.9). Another intriguing pattern found in other dense settlements is the existence of discrete neighbourhoods of pit houses (Schmitz et al., 2013b, p. 79; Schmitz et al., 2002, p. 71) (Figure 3.5) – one of which, in the case of Baggio 1, is more formally arranged and located in a privileged hilltop position. All of these distinctions are potentially correlated with incipient household inequalities (Hayden and Spafford, 1993; Lesure and Blake, 2002; Preucel, 2000; Van Gijseghem and Vaughn, 2008). This means that the emergence of settlements like Baggio 1 and the other major sites listed in the previous chapter could signal the beginning of a trajectory towards the historical Southern Jê chiefdoms recorded in the 19th century, especially given the regional organisation observed in Chapter 3. Could the oversized structures and dense settlements have incorporated functions and social inequalities not present at smaller sites? Alternatively, the hypotheses that variation in pit house dimensions and site layout would rather be related to temporal differences or to specialised functions (e.g. communal integrative facilities) is still to be tested. Moreover, even some basic questions about dense pit house settlements – for example, the debate about the length of occupation and contemporaneity of all structures in a site – remain to be answered. These gaps exist because an understanding of the internal spatial organisation of such settlements and of the nature of the architectural variability in Southern Proto-Jê pit houses demands a different field methodology than the one normally employed in the area – often involving small trench excavations in isolated houses from distinct sites and focusing solely on regional chronology.

With those questions in mind and determined to fill that gap, I have conducted two seasons of excavations at the Baggio 1 site, targeting various earthworks and external areas in different sectors of the site. The project was funded by the Wenner-Gren Foundation through a Dissertation Fieldwork Grant entitled *House Architecture and Community Organization: Exploring Alternative Pathways to Complexity in the Southern Brazilian Highlands*. Using Baggio 1 as an ideal case study, the focus of the project was to contribute to the debate concerning the role of oversized pit structures either as possible high status domestic units or communal integrative facilities (Copé, 2006; Reis, 2007; Schmitz et al., 2013a), shedding new light on the socio-political organisation of the Southern Proto-Jê groups.

In the chapter that follows, I lay the theoretical foundations for understanding the emergence of inequality from a household and community perspective, as well as a summary of the empirical evidence from other oversized pit houses in the highlands and the interpretations offered so far about their function. After that, I present the results of the excavations, radiocarbon dating and artefact analysis from Baggio 1, finishing with my interpretation of the function of the various sampled structures, the development of the site, and the changing social organisation expressed in the community plan during different phases.

Chapter 5
Approaches to emergent complexity: household archaeology and community patterns

In this chapter, I begin by reviewing different models for the emergence of complex societies and how they apply to the current evidence of the southern Brazilian highlands. As I will point out, most of the discussion about emergent complexity in the region is based on funerary data, even though pit house sites have a great potential to contribute to the debate. I emphasise that potential by reviewing the role of household archaeology and the study of community patterns in the understanding of the origins of inequality. Finally, I analyse the current data from Southern Proto-Jê pit houses and the gaps that I intend to fill with the excavations at the Baggio 1 site, to be presented in the next chapter.

Models of emergent complexity

The literature about emergent complexity is vast (for influential syntheses, see Arnold, 1996; Earle, 1991, 1997; Haas, 2001; Johnson and Earle, 2000; Price and Feinman, 1995, 2010). However, some general tendencies can be observed: two main approaches can be identified based on whether the explanation focuses on adaptive needs of the social system as a whole or on the interests of individual agents (Arnold, 1993, p. 80; Hayden, 2001, p. 246-247; Prentiss et al., 2007, p. 301-302; Wiessner, 2002, p. 233-234). Following Hayden (2001, p. 244-247), we can refer to the first as *functional* models and to the second as *political* models.

Functional models

Functional models explain the emergence of political inequality (and, in fact, any other social changes) as the result of an adaptive need of the social system as a whole. This adaptive need is triggered by some type of stress or crisis, e.g. circumscription / warfare (Carneiro, 1970), unequal distribution of resources across the environment (Binford, 1983, p. 215-217), population pressure / scalar stress (Bandy, 2004), or the need for redistribution of resources (Service, 1962, p. 143-144).

In the classical scenario proposed by Carneiro (1970), situations of circumscription – either environmental or social – favour the emergence of complexity. When rich, circumscribed environments become packed, village relocation – a normal procedure after conflict takes place in tribal societies – becomes impossible, and conflict results in one entity progressively conquering its neighbours until hierarchical regional systems are born. Binford (1983, p. 215-217), also from a functional point of view, posits that political inequality develops in environments with unequal, patchy distribution of resources. Under these circumstances, people established closer to very productive patches amidst a regional context of scarcity can claim a monopoly over the control of those resources. In the scenario of scalar stress proposed by Bandy (2004), it is population pressure that occupies the central role. According to this model, fissioning is the normal way of egalitarian, autonomous village societies to solve their conflicts. However, when fissioning becomes impossible due to population packing, other mechanisms are necessary to integrate a large number of people, and it is in this context that formal leadership emerges. This idea that political complexity provides a benefit to the society as a whole – e.g. to process information or integrate a large population – was also behind the model of Service (1962, p. 143-144) who emphasised the economic role of leaders as redistributors (something that is highly questionable today, cf. Hayden, 2001, p. 247; Yoffee, 1993). Finally, in the category of functional models must also be included some old proposals, such as that of Wittfogel (1957), who envisaged the political elite of the earliest civilisations as emerging form the need to organise and manage large irrigation systems.

In summary, functional models see the emergence of complexity as a response of the whole social system to a given problem, environmental or social. The main weakness of these models is their inability to take into account human agency and the role of individuals and groups in the process (Brumfiel, 1992).

Political models

Political models, on the other hand, emphasise the role of individuals as active agents in the process of social change. These models focus on situations of abundance rather than stress or crisis (Hayden, 2001, p. 248-250), on the actions of individuals with aggrandising personalities (Clark, 2004; Clark and Blake, 1994, p. 17-18), and on the manipulation of surplus production or other economic activities for the aggrandisers' own gains through a variety of strategies (Earle, 1997, p. 4-16; Hayden, 1995, p. 28-76). Competition, feasting, and the ideological justification of inequality play important roles in political models (Aldenderfer, 2010; Clark, 2004; Earle, 1997, p. 8-10; Hayden, 1995, 2001, 2009; Hill and Clark, 2001, p. 338-343; Yoffee, 1993, p. 69-71).

Contrary to the expectations of models that emphasise crisis as a prime mover of political change, Hayden (1995, p. 21-28; 2001, p. 248-250) calls attention to the fact that it is only in contexts of abundance, not scarcity, that the egalitarian ethos of sharing may be broken. The rationale behind that is simple: when everyone has enough, those who want to accumulate more than others do are not seen as positing any threat, and their hoarding behaviour becomes acceptable. But who are the ones who desire to accumulate more than others? Political models assume the existence of a certain type of individual, those whom Hayden and Villeneuve (2010, p. 99) call “Triple A” personalities: “aggressive, ambitious, and accumulative”. These are the ones Clark and Blake (1994, p. 17) called *aggrandisers*: individuals who compete for prestige and social esteem. Taking an agency-oriented approach, Clark and Blake (1994, p. 28-29) suggest that the emergence of institutionalised inequality is an unforeseen consequence of the actions of those ambitious individuals promoting their own interests. Aggrandisers vying for a base of support need to be generous and engage in expensive activities such as the sponsorship of large feasts. In agreement with Hayden (1995, 2001), Clark and Blake (1994, p. 18-19) stress that not all environments can sustain such competitive displays, and high productivity seems to be a necessary condition. Although many strategies may be followed in the pursuit of power, the existence of a surplus that can be channelled to the political economy in order to serve the aggrandisers’ interests is considered an essential premise (Earle, 1997, p. 203-211). This is an important point, because inequalities based on criteria such as age, gender and knowledge have always existed among otherwise egalitarian hunter-gatherers (Flanagan, 1989), but, since they are not economically based, their effects are ephemeral (Hayden, 1995, p. 20). Once surplus is in place, the crucial question is how to convert it into power (Hayden, 1995, p. 20). Many authors emphasise activities such as warfare, competitive feasting, production and control of prestige goods, and the establishment of long-distance trade networks (Earle, 1991; 1997, p. 1-16; Hayden, 1995, p. 28-76; 2001, p. 258-263; 2009; Yoffee, 1993, p. 69-71). The sponsorship of feasts, especially when embedded in funerals or other rituals, as well as the investment in public ceremonial spaces, are important strategies that provide the ideological justification so essential to the consolidation of a leader’s authority (Aldenderfer, 2010, p. 88-89; Clark, 2004; Earle, 1997, p. 143-158; Flannery and Marcus, 2012, p. 208-337; Hayden, 2009; Hill and Clark, 2001, p. 341-343; Marcus and Flannery, 2004; Yoffee, 1993, p. 70).

In summary, political models focus on the actions of individuals with aggrandising personalities. These individuals divert resources to compete with other aggrandisers for prestige, building an image of generosity at the same time that they promote their own interests. Institutionalised political inequality is thought to emerge as an unforeseen consequence of those actions.

Attempts at synthesis

Functional and political models are not mutually exclusive. As argued by Wiessner (2002, p. 234) and Prentiss et al. (2007, p. 302), we need approaches that can shed light on the interaction between individual human agency, unique historical events and a given set of pre-existing conditions or structure.

Wiessner (2002, p. 236-252) analyses the changes that were brought to Enga society of Papua New Guinea after the introduction of the sweet potato. This new resource allowed people to raise a larger number of pigs than ever before. Pigs became a surplus that was used to finance long-distance exchange and war death reparations. After five to six generations, the leadership position of the Big Men who managed these exchange and reparation cycles became formalised and inherited, and the families at the top of the hierarchy began to intermarry, forming a true elite stratum. It must be stressed, however, that those changes happened in a social context that already permitted trade networks, moderate competition, and achievement-based status before the introduction of the sweet potato (i.e., the preconditions for inequality were somewhat already set). A similar approach that emphasises historical preconditions is offered by Prentiss et al. (2007). Following Arnold (1993, p. 99-101; 1996), Prentiss et al. (2007, p. 320-323) propose that, even though conditions of abundance may favour the beginnings of inequality (as suggested by Hayden, 1995, p. 23-24; 2001, p. 247-248), it is only during punctuated periods of crisis that populations become stressed enough to be willing to submit to aspiring elites' control. This is demonstrated with data from the Keatley Creek pit house site in British Columbia. Differences in house size during the early period of occupation of the site do not relate to differences in wealth. However, after a regional drought ca. 1200 BP, small houses (and some entire villages in the area) are abandoned, and oversized houses exhibit evidences of competitive display in the form of prestige goods. Prentiss et al. (2007, p. 321-322) suggest that, as the environment became patchier, people from abandoned villages and small houses would have become dependent on the large corporate groups of the large pit houses of Keatley Creek who had access to a key fishing location.

In summary, models that attempt to conciliate functional and political explanations emphasise the actions and aspirations of individuals or groups, as well as specific historical events. However, such models take into consideration the wider social or environmental circumstance in which those specific actions/events occur, and how those pre-existing conditions influence them.

Emergent complexity in the southern Brazilian highlands

A view from funerary monuments

How does the evidence from the Southern Brazilian Highlands fit current models of emergent complexity? Functional explanations, emphasising environmental fluctuations in the rise of village aggregates and population expansion, have been in the literature for some time. For example, the largest Southern Proto-Jê pit house village, Rincão dos Albinos (SC-CL-70/71), has early dates that precede the expansion of *Araucaria* forests. This led Schmitz et al. (2011, p. 194-195; 2013b, p. 92-94) to suggest that the site was located in pioneer *Araucaria* woodlands at a time when most of the highlands were covered by grasslands. Although further palaeoecological data are still needed to confirm this hypothesis, this could imply that circumscription in patchy environments did play a role in the first Southern Proto-Jê population aggregates and early village life.

However, most of the evidence for the emergence of political complexity comes from a period when the resource-rich *Araucaria* forest was well developed – in other words, a period of abundance. The dates indicate that Southern Proto-Jê sites become more common after ca. 1500 BP and peak after ca. 1000 BP, coinciding with trends in the expansion of *Araucaria* as reconstructed from pollen cores (Bitencourt and Krauspenhar, 2006; Iriarte and Behling, 2007, p. 121-123). This is also a period when isotopic evidence coupled with macro- and micro-botanical remains point to the consumption of maize and a variety of other cultigens (Corteletti, 2012, p. 118-167; Corteletti et al., 2015; De Masi, 2007; Gessert et al., 2011; Iriarte et al., 2008; Iriarte et al., 2010; Miller, 1971; Wesolowski et al., 2010).

Not only did population growth occur in this period of resource abundance and potential surplus production, but also novel social developments appear to have taken place during those times. The most important development is represented by new burial practises in mound and enclosure funerary complexes. This type of site appears after ca. 1060 BP and becomes more frequent between ca. 600 and 300 BP (Corteletti, 2012, p. 198-201). The massive labour mobilisation in the construction of monumental burials for a small number of individuals, coupled with numerous evidences of feasting, could point to the deployment of surplus by aggrandisers sponsoring ancestor cults of their own lineages (these ideas have been implicit or explicit in the literature for some time, cf. De Masi, 2006, p. 61-62; 2009, p. 111; De Souza, 2011; 2012, p. 135-136; Iriarte et al., 2013, p. 93; Iriarte et al., 2008, p. 956-958; Iriarte et al., 2010) (see also the section about Campos Novos in Chapter 3).

The most convincing evidences are the following:

(1) Oversized enclosures originally used for communal ritual and feasting were re-utilised for the burial of selected individuals (De Masi, 2005, p. 230; 2009).

(2) Monumental burials were continuously revisited for enlargement and feasting after many generations (De Souza, 2012, p. 133-135; Iriarte et al., 2013, p. 84; Iriarte et al., 2008, p. 957-958; Iriarte et al., 2010).

Thus, one could argue that the surplus generated by the advance of the *Araucaria* forests after ca. 1000 BP, combined with agriculture, played an important role in the emergence of Southern Proto-Jê monumental burials. There does not seem to have been any form of environmental stress connected with the multiplication of mound and enclosure funerary complexes, quite on the contrary. However, some important social factors must be considered: for those favouring a functionalist approach, the peak in population density during this period could be seen as evidence of some degree of scalar stress and the subsequent need for new integrative institutions (Bandy, 2004, p. 331). At the same time, others could argue that the possible population packing and intensified interaction in this period provided an opportunity for emerging leaders to engage in competition for prestige and followers, leading to the spread of similar ceremonial architectural patterns and feasting practices over a large area of the Highlands – a phenomenon known as *peer-polity interaction* (Clark and Blake, 1994, p. 18-19; Dillehay, 1990, p. 225-230; 2004; Hill and Clark, 2001, p. 341-343; Renfrew, 1973, 1986; Renfrew and Cherry, 1986).

However, I have reasons to believe that unique historical events, related to the arrival of outsiders in the southern Brazilian highlands, were responsible for periods of social disruption during which the rapid spread of monumental burials took place, hand in hand with the consolidation of formalised leadership. The dates so far available for mound and enclosure complexes point to two possibilities: (1) the initial appearance and spread of funerary monuments coincides with the migration of the TupiGuarani Tradition to the southern Brazilian highlands; (2) the ranges of many dates for monumental burials suggest their contemporaneity with the European conquest.

I have elaborated on the first hypothesis in a recently published co-authored paper (De Souza et al., 2016). The basic conclusion was that Southern Proto-Jê monuments appear to have emerged as a response to the earliest incursions of the TupiGuarani into the Highlands. The TupiGuarani Tradition expanded out of Amazonia about 3000-2000 years BP, occupying a network of over 5000 km of the Atlantic coast and major rivers in the hinterland – what is undoubtedly one of the major population expansions of South America (Bonomo et al., 2015; Brochado, 1984, p. 28-39; Noelli, 1998). The TupiGuarani are clearly distinct from local traditions, including the Southern Proto-Jê, in their material culture and settlement patterns, being characterised by polychrome, corrugated and brushed pottery and secondary burials in urns, among other traits (Brochado et al., 1969, p. 18-23; Chmyz, 1976; Prous, 1992, p. 371-412). Their rate of expansion in the south of Brazil has been estimated to be between 0.8 and 1 km per year, which Rogge (2004, p. 201) compares to the Neolithic in Europe and tentatively associates with a wave-of-advance model (Ammerman and Cavalli-Sforza, 2014, p. 61-68).

In many instances, interaction between the TupiGuarani and the Southern Proto-Jê is attested (Chmyz, 1971; Copé, 2006, p. 346-348; Corteletti, 2008; De Masi and Artusi, 1985, p. 107; Ribeiro, 1991, p. 319-320; Rogge, 2004, p. 113-170; Schmitz and Becker, 1968; Schmitz et al., 1987, p. 17; Volcov, 2011, p. 141-150). However, when we compared the spatial distribution of sites with evidences of interaction with that of the mound and enclosure complexes, we found that those were negatively correlated: in other words, in areas where funerary monuments proliferated, the Southern Proto-Jê groups appear to have established impermeable frontiers against the outsiders (De Souza et al., 2016, p. 203-209). Moreover, the dates for the appearance of mound and enclosure complexes and the beginning of the TupiGuarani incursions up the Uruguay river, towards the core of the Highlands, are identical: 1070 ^{14}C BP (De Souza et al., 2016, p. 207-208).

Another interesting hypothesis, which still remains to be explored, is that the indirect impact of the European conquest could have triggered a second wave of proliferation of funerary monuments and strenghtening of chiefly authority. About two thirds of all dated mound and enclosure complexes have calibrated age ranges that extend later than the 17th century (De Souza et al., 2016, p. 207-208). We have historical data that demonstrate the permanence of mound building and funerary feasting for chiefly lineages as late as the 19th century

(Mabilde, 1897, p. 162-166). Thus, the role of monumental burials and memorial feasting for deceased chiefs as symbols of power and, potentially, resistance to foreign invasions, should not be underestimated.

The proliferation of ceremonial architecture and mounded landscapes in a context of strengthening of political centralisation in order to resist outsiders is not without parallels in South America. The best studied case is that of the Araucanians (Mapuche) of Chile, analysed in detail by Dillehay (2007). He shows how the Araucanian leaders expanded their power through sponsoring ceremonies and mound building, creating a ceremonial mounded landscape and uniting a previously decentralised population in order to resist invaders – first the Inka, and later the Spanish. If a similar process was in place in the southern Brazilian highlands, this would be a prime example of how, given a previous set of conditions (the abundance of resources represented by the *Araucaria* forest) and unique historical events (the TupiGuarani migration and, later, the Portuguese colonisation), the agency of aggrandisers might have shaped the political trajectory of the southern Jê groups.

A view from pit houses

As can be seen from the discussion above, the Southern Proto-Jê mound and enclosure complexes appear to be, so far, the type of site with the most fruitful evidences to debate the emergence of political complexity the groups of the southern Brazilian highlands (De Masi, 2009, p. 111; Iriarte et al., 2013, p. 77-79, 93; Iriarte et al., 2008, p. 956-957; Iriarte et al., 2010). The attention that this type of site has received is not only due to the widely accepted relationship between monumental burials and hierarchy, but also to the rich ethnohistorical and ethnographic records concerning Southern Jê burial practices (Baldus, 1937; Crépeau, 1994, 2002; D'Angelis and Veiga, 1996; Da Silva, 2001, p. 141-162; Mabilde, 1897, p. 162-166; 1983, p. 96-108; Maniser, 1930; Métraux, 1946, p. 465-467; Nimuendajú, 1993; Veiga, 2000).

However, the changes that might have occurred at the domestic sphere during the emergence of institutionalised inequality among the Southern Proto-Jê groups are still to be elucidated. This occurs despite the fact that domestic structures may yield some of the best evidences of early social differentiation (Feinman and Neitzel, 1984, p. 57, 75; Prentiss et al., 2007, p. 306-309). The Southern Proto-Jê pit house villages have a large potential to contribute to that debate. After ca. 1000 BP – coinciding in time with the peak of *Araucaria* forest, the multiplication of sites, and the first manifestations of ceremonial architecture – we see the development of well-planned villages which include mounded architecture and centrally-placed oversized pit structures (Copé, 2006, p. 178-179; Kern et al., 1989, p. 112; Schmitz et al., 2010; Schmitz et al., 2013a, p. 134-179; Schmitz et al., 2002, p. 37, 71).

In the next section, I will bring the discussion beyond funerary mounds to stress the potential of household studies for debates about emergent complexity. I will proceed by examining the possible functions of oversized buildings, and how the evidence from Southern Proto-Jê pit house sites has been interpreted until now. This will serve as a background to understand the data recovered from the excavations at the Baggio 1 site, to be presented in the next chapter.

Households and communities

The importance of household archaeology in studies concerning the rise of early sedentary communities and complex societies has long been recognised (Flannery, 1976; Flannery and Winter, 1976; Winter, 1976). However, when one evokes households, it must be clear that they are not always equivalent to a family or residential group bounded by a single house. There are many definitions of household, but they all agree in considering it a small social unit or “activity group” which performs broad corporate functions, including shared production, consumption, and transmission of property (Ashmore and Wilk, 1988, p. 3-5; Rogers, 1995, p. 8-10; Wilk and Rathje, 1982, p. 618). Apart from this functional definition, one can also stress the role of the household as a symbolically meaningful group, “the next bigger thing on the social map after the individual” (Hammel, 1984 apud Hendon, 1996, p. 47). This can be a nuclear family, an extended family, or any other group, and though its components often share the same roof, they can also be split between many houses, sometimes forming compounds with various structures around patios or other spaces (Ashmore and Wilk, 1988, p. 6; Pluckhahn, 2010, p. 334; Rogers, 1995, p. 10; Wilk and Rathje, 1982, p. 620-621). In fact, co-residence is *often*, but *not always* an attribute of households (Pluckhahn, 2010, p. 334-335). Therefore, as observed by Wilk and Rathje (1982, p. 620), archaeologists must be aware that they excavate dwellings, not households. For archaeological ends, terms such as “co-residential group” or “corporate residential group” can be used to stress the sharing of the same roof by a potential household (Ashmore and Wilk, 1988, p. 6; Hayden and Cannon, 1982, p. 135). Another solution is to “divorce” the term of its anthropological usage and refer to an *archaeological household*, meaning just a co-residential group that occupies the same dwelling (Nash, 2009, p. 224).

The study of households can be particularly informative in the debates about emergent complexity. Because the household – in its many different compositions – functions as the basic economic unit in most middle-range societies, it is at the household level that decisions are made which in the long term may lead to the development of social inequality (Coupland, 1996, p. 74-75; Maschner and Patton, 1996, p. 93-95; Mehrer, 1995, p. 15-17; White, 2013, p. 123). For example, as noted by Nash (2009, p. 207), it is the ability of households to produce surplus that leads to specialisation and emergence of leadership, and it is the households that provide extra labour to build states. That can be illustrated by new developments in the archaeology of the Mississippian period in the United States: once dominated by the study of elite mound centres, now researchers are paying more attention to the rural farmsteads spread throughout the hinterland, shedding light on how these commoner households participated in the emergence of the complex political structure of the period. They have noted, for example, the existence of “nodal point households”: sites with civic or mortuary facilities, that controlled access to exotic items and ritual paraphernalia, and functioned as hubs for the surrounding farmsteads, suggesting the presence of rank beyond the mound centres (Mehrer, 1995, p. 112-122; Mehrer and Collins, 1995, p. 44-50; Mistovich, 1995, p. 178-179).

Variability in residential buildings is often recognised as one of the archaeological signatures with the highest potential to reveal disparities in wealth and status. It is no surprise that, in a cross-cultural study of middle-range societies in the Americas, Feinman and Neitzel (1984, p. 75) found that one of the most frequent means of differentiating leaders was the size, construction or location of their houses. In fact, when other indicators are absent or not detectable archaeologically, residential architecture may be the only material correlate of inequality (Lesure and Blake, 2002, p. 2-3). High-status households are expected to be larger, as they have more members and perform a range of specialised functions; they are also expected to contain extravagant architecture, special-purpose facilities, and greater quantity or quality of goods (Pluckhahn, 2010, p. 348). In terms of membership, high-status households tend to be polygamous, to include more non-kin, and to have children that are less likely to move (Carballo, 2011, p. 138).

A pioneering work relating house architecture, community layout and variability in social organisation was written by Flannery (1972) and later revisited by the same author (Flannery, 2002). He contrasted villages where small circular huts were the rule with those where rectangular houses dominated. In the first case, each hut housed a wife and child of polygynous marriages, and some had specialised facilities for cooking and storage. In contrast, rectangular compounds sheltered whole families and contained compartments for private storage (Flannery, 1972, p. 30-46). Later, Flannery (2002) explored the emergence of extended households – large compounds with multiple hearths, kitchens, and storage rooms. The appearance of high density settlements with patios and public architecture would result from planned, extended family households (Flannery, 2002, p. 423-431). The first type of site would correspond to societies where the whole group functioned as a basic economic unit, whereas the second would be related to societies where each family was independent and risk was taken at the family level (Flannery, 2002, p. 421) – with consequences to the degree of inequality (see debate below).

Household size and wealth

In summary, the crucial question examined by a number of researchers is how residential architecture – house size, location, construction materials, and elaboration – relates to (1) number of residents and (2) residents' status. Perhaps most importantly, we must investigate the relationship between those two underlying variables (Netting, 1982, p. 641).

In the first publications about household archaeology, a relationship was already noticed between number of tasks, labour organisation, and size of households. Wilk and Rathje (1982, p. 622-624) observed that large households could accomplish a greater number of tasks in different places at the same time, allowing for the pooling and redistribution of resources among its members. This diversity of tasks and large labour force required coordination, leading to the first developments of inequality as power was exercised by the household head. Wilk and Rathje (1982, p. 627-629) also propose that heirs of extended households – held together by the desire to inherit the family's property – had better prospects to acquire spouses, leading to a process of "stratified marriage". With time, this resulted in the formation of a landless class of "detached persons" who were forced to become clients of landowning households. An important insight is that the process of social stratification ultimately is linked to the creation of "extreme households" – the landless and the landed (Wilk and Rathje, 1982, p. 633).

In a recent article, White (2013) examined the role of asymmetrical distributions of family size as a basis of germination of hereditary inequality using computer simulations and data on house floor area for the Archaic and Woodland periods of North America. White (2013, p. 152) proposed that, in scenarios where polygyny was high and children participated in the economy from an early age, larger families produced more surplus. The gap between large, high status families and the remainder of the population was widened by a positive feedback or “rich get richer” mechanisms: for example, if a system of bride price was in place, wealthier families tended to acquire more wives, further enlarging their labour pool. With time, inequalities initially based on family size could be institutionalised and become hereditary, preserving wealth within the lineages.

An analysis of the historical relationship between large households and wealth was also provided long ago by Netting (1982). He noticed that, whenever recorded data for those two variables were present, the two varied together. The rationale behind that is that households must have larger than average resources in order to support a large number of members. Historical data frequently show a mean household size that was larger among the rich, as well as a greater complexity in their household structure. This happened not only because the number of close kin was larger in wealthy households, but also because their prosperity attracted distantly related individuals, servants and others who further increased the household’s labour force (Netting, 1982, p. 642).

Going back to Flannery (2002), one of the topics discussed by the author was precisely the role of elite status in the emergence of extended households: elite families would occupy bigger houses with more storage facilities and more members so as to allow the production of larger amounts of food and, in the case of attached specialists, craft goods. He cited the case of Moala, Polynesia, where chiefs were pressured to maintain large extended families in order to produce reserves of food (Flannery, 2002, p. 425).

Perhaps the best parallel to inform discussions about the variability of Southern Proto-Jê pit houses is the British Columbian case examined by Hayden (1997; Hayden et al., 1996; Hayden and Spafford, 1993). Pit house villages in British Columbia can contain many houses and exhibit disparities in their dimensions; large houses show a longer occupation, and spatial analysis of their floor assemblages demonstrates access to privileged resources and a complex internal division of activities, including possible elite areas (Hayden, 1997, p. 247-258). Unlike small houses, inhabited by nuclear families, large structures are interpreted as houses of long-lived residential corporate groups with ownership of prime fishing locations (Hayden, 1997, p. 244; Hayden et al., 1996; Hayden and Spafford, 1993, p. 119-124). In Hayden's definition, residential corporate groups consist of two or more nuclear families with a recognisable degree of residential coherency; they do not, however, necessarily inhabit the same structure, but may be distributed over a number of adjacent houses or in neighbourhoods (Hayden and Cannon, 1982, p. 135). Residential corporate groups are thought to emerge in situations of competition for the control of restricted economic resources (Hayden and Cannon, 1982, p. 149-151).

Early pit houses of the Mogollon period in the American southwest have also provided data on emergent complexity in a study by Lightfoot and Feinman (1982). These authors tested a series of assumptions regarding early leaders using pit house data. In the model outlined by them, prospective leaders would build a power base through redistribution of surplus (e.g. promoting feasts), augmenting their household size (e.g. acquiring more wives, having more children, incorporating unattached individuals) so as to intensify production, and participating in regional exchange networks in order to build political alliances outside the local community. With that model in mind, Lightfoot and Feinman (1982, p. 71-80) proposed the existence of supra-household decision-making hierarchies in the Mogollon period based on the correlation between pit house size, storage capacity, and quantity of exotic goods. Another important aspect was the spatial distribution of large and small houses, as I will comment later when dealing with community organisation (see below). This study is also relevant because it was subject to criticism by Schiffer (1983, p. 694-696; 1987), as will be reviewed in Chapter 9 when I discuss formation processes.

Coupland (1996) examined the relationship between changing household forms and evolving social complexity in the Northwest Coast of North America. During historical times, large multifamily dwellings were the rule. A group of related houses constituted a lineage, and the lineage chief's residence was larger and better built. Each village was composed of many lineages, each with a chief. In the archaeological sequence, early villages had small, undifferentiated houses; later, chiefly oversized houses with multiple hearths made their appearance, although only one per site (multi-chief villages only emerged in historical times). Coupland (1996, p. 87) argued that, as chiefs competed with each other to control labour, one strategy was to increase the size and cohesiveness of the co-residential group. By gathering multiple related families under a single roof, lineage chiefs could more directly observe and control their activities.

A similar situation was noted for the Chinese Neolithic by Shelach (2006) and Peterson and Shelach (2012). Settlements were constituted of clusters of small dwellings around a larger one. Large buildings had evidences that more activities were performed in them and exhibited a more complex internal organisation of tasks (Shelach, 2006, p. 336-338). They also had large hearths which could serve for cooking for many people or for entertaining guests (Peterson and Shelach, 2012, p. 274). This suggests that they were dwellings of more prestigious individuals, whereas the smaller houses around them were occupied by subordinate members of their extended family or lineage (for an alternative interpretation of oversized buildings as communal facilities, see Lee, 2007 and discussion below). Although there are no other signs of wealth disparities, Shelach (2006, p. 339) recognised that differences in family size may reflect incipient strategies that lead to inequality – for instance, the ability of some families to mobilise more labour by absorbing unattached individuals into their household.

The incorporation of outsiders means that the growth of a village over time – paired with the emergence of disparities in house size – may be a consequence not only of internal processes, but also of influxes of newcomers, and this is something that must also be taken into consideration. One useful example are the *Linearbandkeramik* villages. Gomart et al. (2015, p. 243-244) have demonstrated differences in consumption between large and small houses – the first being more agricultural and the second still depending on hunting. The later also had ceramics of mixed styles, some of which were foreign, the others apparently imported from the large houses. Gomart et al. (2015, p. 244-245) concluded that small dwellings belonged to families that recently moved into the village, and were still dependent on the economically “mature” large houses whose extended families represented the original inhabitants of the site. In fact, the lower socio-economic position of newcomers in relation to the first settlers of a site is a common theme worldwide (e.g. Preucel, 2000, see discussion below).

Finally, the significance of house architecture as an indicator of inequality in the absence of other types of evidence has also been emphasised by Lesure and Blake (2002). Their analysis of the site Paso de la Amada, in Mexico, revealed distinct large dwellings set atop platforms. However, the artefact distribution exhibited no differences between those buildings and the ground-level residences, except for ritual items. Lesure and Blake (2002, p. 19-20) suggested the presence of high-status households who guarded ritual knowledge and hosted ceremonies in their platform dwellings, but whose power and economic advantages were limited. Thus, although inequality was encoded in residential architecture, it was not linked to economic power and privileges, and the high-status households did not yet constitute a fully formed, coercive class.

Exactly the same situation has been observed in Chachapoyas, Peru. There, only residential architecture revealed marked disparities in status. Guengerich (2014, p. 11-14) correlated the dimensions of dwellings with labour-intensiveness: the largest houses are restricted to a particular sector of the site, they are set on top of platforms, and their façades are decorated with stone friezes. However, Guengerich (2014, p. 11-12) found no correlation with the presence of exotic goods, special foods, or fine ceramics, concluding that status was not based on accumulation of wealth, but rather on social capital, i.e. the capacity of mobilising people to contribute labour in house construction.

Community organisation

Above the level of the household is that of the community. When using that term, one must remember that, in the same way as a household does not equal a house, a community is not necessarily equivalent to an archaeological site: current definitions see communities as dynamic, diverse and ephemeral institutions (Yaeger and Canuto, 2000, p. 5-9). Many levels of communities are recognised: from the local, residential community to the imagined, symbolic communities that link individuals over long distances through a common ideology (Carr, 2005, p. 75-76; Joyce and Hendon, 2000; Yaeger, 2000, p. 124-126; Yaeger and Canuto, 2000).

Turning specifically to residential communities, where people interact most and where most space and practices are shared (Yaeger and Canuto, 2000, p. 9-11), one can observe that the location of a dwelling in relation to other domestic and public spaces within a community plan is an important clue to the status of its residents. For example, in the large pit house villages of British Columbia, large structures occur evenly spaced and surrounded by smaller structures, reinforcing the interpretation that the inhabitants of the last were socially attached to or dependent on the residents of the larger houses (Hayden and Spafford, 1993, p. 136).

The manner by which community identities, privileges, and subordination between its members are created and negotiated through architecture was examined by Preucel (2000) in Kotyiti Pueblo. The site is composed of two adjacent residential units: one of them is a plaza pueblo with formal architecture and public, ceremonial spaces; the other is a "*ranchería*", lacking formal residential architecture and access to ceremonial areas. Preucel (2000, p. 66-73) suggested that the inhabitants of the later were "refugees" recently established at the site. They were not positioned in order to "appropriate the sacred landscape" and had to perform ceremonies at the neighbouring plaza pueblo, entering in a relation of ceremonial dependency with the original settlers.

The fact that not all villages had access to ceremonial structures (*kivas*) was noticed by Lightfoot and Feinman (1982) in their analysis of the Mogollon pit house sites. They noticed that only the larger villages contained *kivas*, and that they probably served as ceremonial centres and central places for small, satellite villages in the regional decision-making hierarchy. Because *kivas* served as nodes for regional integration, Lightfoot and Feinman (1982, p. 76-77) tested the hypothesis that leader's residences should be located near them, and found a significant correlation between pit house size and close proximity to *kivas*.

In Paso de la Amada, Hill and Clark (2001, p. 7-8) noticed that the only platform dwelling that persisted in the same place for generations appeared to be associated with a ballcourt – an important locus for games and rituals in Mesoamerica. They suggest that sponsoring the construction of the ballcourt would have given aggrandizers a means of expanding their influence and debasing competitors, as well as conferring them ownership of that important community space, setting the basis for hereditary inequality.

Examining the Formative architecture of the Maya site of Komchen, Ringle and Andrews (1988) find little evidence for differential wealth as measured by the distribution of exotic artefacts. However, as in the previous case, they found marked disparities in residential platform size, noticing that larger dwellings tended to be placed closer to the civic core of the community. This was suggested to reveal an attempt by larger extended family households to control power and wealth (Ringle and Andrews, 1988).

In a similar vein, Schachner (2001, p. 169) proposes that changes in settlement architecture may reveal attempts of individuals or groups to control spaces of communal ritual, thus monopolising an important source of power. Ritual is a powerful means of legitimising power, and those able to monopolise control over it could succeed in justifying social inequality. Examining the architecture of Puebloan settlements in the North American Southwest, Schachner (2001, p. 177-182) calls attention to oversized pit structures – ritual buildings that appear in some sites enclosed by domestic rooms. Access to ritual facilities is restricted, but the residents of the surrounding rooms do not appear to have been privileged in terms of resources. Therefore, they could have controlled and determined ritual participation, engaged in aggrandizing activities, built prestige and hosted feasts, but – as in Paso de la Amada – still did not constitute an elite class.

In the Peruvian Coast, Van Gijseghem and Vaughn (2008) examine the relationship between households and public spaces in Paracas settlements, also focusing on the relative position of the houses relative to non-residential spaces as a correlation of status. Paracas settlements contain some houses placed in a privileged position, near hilltops with plazas. These dwellings have better architectural quality, more fineware, and exclusive access (or at least control over access) to spaces of interaction, suggesting they were high-status residences.

A very similar situation, where spatial and consumption data co-vary in relation to status, is found in much later periods in the Peruvian Highlands, in Wanka settlements (DeMarrais, 2001). These sites show a few (less than 5%) groups of houses that are much larger than average and surround oversized patios. DeMarrais (2001, p. 127-129) interprets them as elite households: they are located in central and elevated areas, display fine masonry, lie close to plazas, and had access to preferred foods and exotic goods. Elite households also contained large ceramic vessels, which DeMarrais (2001, p. 129) sees as evidence of food preparation for feasts. She concludes that the association with the public sector of the villages and the construction of conspicuous residences served to separate the elites physically and symbolically from the commoners.

An association between elite households and ceremonial spaces has not been left unnoticed in the largest chiefdom capital of North America: Cahokia. There, a bimodal distribution of house size is present, with the largest houses located at the northern end of the main site plaza, and spatially associated with sweat lodges (Pauketat, 1994, p. 116-140).

Finally, the house itself may incorporate ritual functions, using those functions as a sign of distinction and base for developing social inequalities. That, of course, blurs the definition between domestic and public spaces – as ritual performance may occur in the domain of the house (Robin, 2003, p. 321-322). One example are the Austronesian houses, which display anthropomorphic motifs such as wooden figures at the centre of the dwelling as a representation of ancestors and their cult. Chiang (2015) examines their archaeological counterparts in Neolithic Taiwan, showing that houses that contained ancestral symbols (jade zoo-anthropomorphic objects) shared more homogeneous artefact styles and depended less on imports. Chiang (2015, p. 159-161) believes they had the rights to exploit more of the local resources, whereas families without access to ancestral objects had to rely on wider networks to supply their needs.

Even in the absence of public architecture, the differential location of houses within a settlement can reveal disparities of status. In the site of El Palmillo, Oaxaca, Carpenter et al. (2012, p. 386) notice that status apparently followed the gradient of the hill slope: high-status residences are located near the top, whereas lower-status ones are found downhill. The higher status of the hilltop houses is confirmed by their access to exotic goods, ornaments, obsidian, and production of finer threads. Low-status residents, however, produced pottery to be exchanged with the elite neighbourhood of the site (Carpenter et al., 2012, p. 392-396).

The aggrandising model: a summary

I propose that all of the case studies reviewed above can be classified as variations of an *aggrandising model* for the development of disparities in house architecture and settlement organisation in early complex societies. This model can be summarised in the following key points:

1. Differences in house architecture are one of the clearest manifestations of social hierarchies (e.g. Feinman and Neitzel, 1984, p. 75);
2. The dimensions and architectural elaboration of domestic structures indicate the effort dispended in construction and the household size, thus relating to the relative affluence, prestige and power of their respective residential groups (e.g. Ames, 1995; Coupland, 1996; Hayden and Spafford, 1993; Prentiss et al., 2007);
3. Even in the absence of other indicators (e.g. differences in access to prestige items), data pertaining to house architecture still have the potential to bespeak social distinctions (e.g. Lesure and Blake, 2002);

4. This happens because, in many early complex societies, status distinctions are strongly influenced by family size and, therefore, status was not initially expressed by means of disparities in material wealth, but rather by attributes such as variation in house size (e.g. Maschner and Patton, 1996; White, 2013);
5. When public architecture is incorporated within settlements, there may be spatial relationships between individual domestic structures and ritual spaces, suggesting the sponsorship or control of certain ceremonies by particular households as a possible avenue to power (e.g. Clark, 2004; Hill and Clark, 2001; Schachner, 2001; Van Gijseghem and Vaughn, 2008).

Southern Proto-Jê pit house sites exhibit several characteristics that might suggest similar social developments in the past. There are noticeable disparities in terms of number, size and arrangement of pit structures: whereas most of the sites are composed of one or two pit houses of medium size – being more adequately characterised as hamlets than as proper villages – some sites contain as many as 107 pits (Schmitz and Rogge, 2011; Schmitz et al., 2013b). These are not randomly placed, but are organised in neighbourhoods with linear and semi-circular arrangements, sometimes having a mound as the focal point. Even more striking is the fact that some sites with multiple structures have at their centre an oversized pit house (Kern et al., 1989, p. 112; La Salvia, 1968; Schmitz et al., 1988). Such oversized structures, whose dimensions may reach over 25 m of diameter (Copé, 2006, p. 150), are a puzzle for the archaeology of the southern Brazilian highlands. The possibility that these structures could shelter extended and/or high status families has not been overlooked, but it has also been suggested that they could be communal facilities similar to the *kivas* of the Puebloan Southwest (Copé, 2006, p. 341, 378-379; Kern et al., 1989, p. 111-112; Reis, 2007, p. 189-195). Before examining the evidence from the southern Brazilian highlands in more detail, I will briefly discuss this other potential function of elaborate buildings.

Oversized structures as communal facilities

Elaborate buildings with a ritual function, commonly called men's houses, are ubiquitous among societies with a moderate degree of inequality based on achievement (Flannery and Marcus, 2012, p. 110-183; Marcus and Flannery, 2004, p. 18258-18259). The emergence of public architecture such as ritual buildings or patios is a widespread feature coinciding with the appearance of the first dense, well-planned villages (Flannery, 2002, p. 110-183). In the first sedentary Neolithic villages of the near east, novel intra-site organisational patterns include the rise of large, centrally-placed nondomestic buildings reflecting new mechanisms of community integration (Byrd, 1994, p. 643-644). They are recognised by their large dimensions, lack of artefacts indicative of domestic activities, and distinctive architectural features: painted walls, very large formal hearths, and floor re-plastering (Byrd, 1994, p. 649-652).

Many early public buildings are similar in layout to domestic structures: for instance, in the American Southwest, early circular pit structures which were previously domestic became, in later periods, ritual buildings (*kivas*) shared by households living in above-ground rectangular structures (Adler and Wilshusen, 1990, p. 138-141; Flannery, 2002, p. 422; Schachner, 2001, p. 178-180; Wilshusen, 1986, p. 248-250). Buildings such as *kivas*, men's houses, and many others fall into the category of *social integrative facilities*, as proposed by Adler and Wilshusen (1990, p. 133). In their definition, these are structures for the integration of individuals above the household level, and can be divided into high and low-level facilities. The last are reserved for a small portion of the community and, interestingly, tend to be more "generalised" in function, accommodating secular activities – cooking, eating meals, sleeping – as well as ritual ones (Adler and Wilshusen, 1990, p. 135-137). In some cases this may create difficulties for distinguishing between integrative facilities and dwellings.

One example of that problem is the Chinese Neolithic case alluded to previously: Lee (2007) offers an alternative interpretation to the function of the oversized buildings thought to be prestigious dwellings by Shelach (2006) and

Peterson and Shelach (2012). Oversized buildings were found relatively separated from other residential areas, but smaller houses formed clusters, each associated with a larger structure. Coupled with the fact that they contained few artefacts, this led Lee (2007, p. 651-653) to suggest that they were structures for communal gathering within a heterarchical, not hierarchical community.

Similarly, the possibility that platform buildings in Paso de la Amada were ritual structures has been considered by Lesure and Blake (2002, p. 7-8). They list features such as offerings beneath the floors, ritual implements known only from those contexts, and the scattered distribution of platform structures through the site. Ultimately, however, they argue for the embedment of rituals in the domestic activities of high-status households.

A range of ethnographic and archaeological ritual houses are analysed by Flannery and Marcus (2012, p. 110-183). Sometimes, men's houses are open to every male and their use confers no prestige; in other cases, only a few are allowed into those spaces and initiation into them bestows a form of ritual leadership. More interestingly, in the Solomon Islands, a *Big Man* can sponsor the construction of a ritual house that is believed to shelter a demon who protects the leader who paid for the building (Flannery and Marcus, 2012, p. 116-120).

Ritual houses are recognisable in the archaeological record worldwide by their distinct architectural features (benches, paved floors, sometimes human remains) and can be small (for the initiated few) or large (in cases where they were open to all) (Flannery and Marcus, 2012, p. 121-152). It is important to remember that the "communal" function of such buildings does not preclude some form of inequality, as access to them can be restricted to a few initiates, and sometimes the construction of a ritual house is sponsored by a leader who thus try to associate himself with the supernatural (Flannery and Marcus, 2012, p. 116-120).

The corporate model: a summary

The case studies reviewed above raise the cautionary note that archaeologists digging large, elaborate house-like structures might not necessarily be dealing with high-status or extended-family dwellings, but rather with communal facilities of the “ritual house” type. In fact, it is known that large-scale, public construction is not always correlated with incipient hierarchies or the pursuit of power by aggrandisers. Several concepts have been developed to explain the emergence of large-scale public architecture without resorting to an “aggrandising”, exclusionary scheme, of which we can mention Renfrew (1974, p. 82) “group-oriented chiefdoms”, Blanton et al. (1996, p. 5-7) “corporate strategy”, and Saitta and Keene (1990, p. 213-214) “communal social formations”. We can, for simplicity, consider all of them as variations of a *corporate model* that contrasts with the aggrandising model alluded to above. The main points of this model are:

1. Surplus in the form of labour or products can be appropriated collectively to serve community purposes (McGuire and Saitta, 1996, p. 201-203; Saitta, 1994, p. 28-30; Saitta and Keene, 1990, p. 213-215);
2. Although that does not exclude some forms of leadership in surplus collection and coordination of labour, leaders are subordinate to group interests and the access to resources and public facilities is not restricted (McGuire and Saitta, 1996, p. 202; Saitta, 1994, p. 27-28; Saitta and Keene, 1990, p. 219-223).

Corporate formations should be archaeologically recognisable by the presence of architectural features that, despite being massive, were designated for communal purposes, and by a lack of individual power. Inequality may still exist, but leadership in these cases is rather “faceless” and “anonymous”, unlike in aggrandising scenarios (Blanton et al., 1996, p. 9-10; Renfrew, 1973).

As previously mentioned, the Southern Proto-Jê pit house sites with centrally-placed oversized structures could be the material correlate of either an aggrandising or a corporate social formation (Copé, 2006, p. 341, 378-379; Kern et al., 1989, p. 111-112; Reis, 2007, p. 189-195; Schmitz et al., 2013a, p. 150). In the next section, I will review the primary data available from the few oversized pit houses that have been excavated in the Southern Brazilian Highlands (Figure 5.1), before turning, in the next chapter, to my work at the Baggio 1 site.

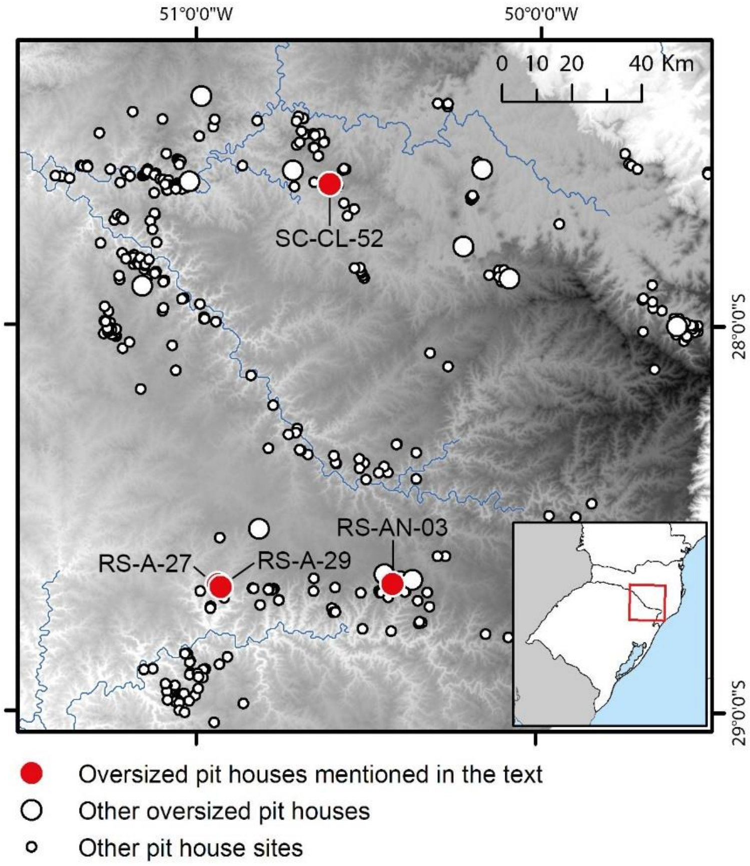


Figure 5.1 Location of the Southern Proto-Jê oversized pit houses reviewed in the text.

Southern proto-Jê oversized pit houses: the data so far

Vacaria

In the municipality of Vacaria, Rio Grande do Sul state, Schmitz et al. (2002) excavated oversized structures in two sites, RS-A-27 and RS-A-29, which are also characterised by the juxtaposition of large and small pit houses (Figure 5.2). The smaller pits have also been sampled. In site RS-A-27, the excavation of the oversized House 3 (14 m of diameter) revealed no clear activity areas, but it was noticed that ceramics became more abundant over time, unlike in the smaller houses, where ceramics were rare. In fact, in the immediate vicinity of House 3, the largest concentration of ceramics (over 2,000 sherds) in the site was found. Thus, it is possible that the house was kept clean and the refuse deposited in a midden outside. This could explain why clear activity areas could not be identified inside the structure – although Schmitz et al. (2002, p. 22) do distinguish discrete fire pits and note that the material is mostly concentrated in the centre of the house, suggesting that activities were repeatedly carried out in the same place. In contrast to the oversized house, the small houses excavated at the site contained clear activity areas with hearths and knapping debris. For example, House 7, a small depression with 2.7 m diameter, exhibited a central hearth surrounded by discrete activity areas with knapping debris.

In site RS-A-29, located only ca. 500 m from the previous one, the excavations at oversized House 2 (14.5 m diameter) also produced few artefacts – in fact, this was the cleanest house in the site, in proportion to its size – but it is interesting that those artefacts included lithics of good quality raw materials (Schmitz et al., 2002, p. 67). Schmitz et al. (2002, p. 67) suggest that the material absent from the interior of the house could be in its surroundings (as in RS-A-27), or maybe in the smaller pits. As in the previous site, some small houses at RS-A-29 had clear activity areas with hearths, ceramics and lithics. In others, the activities taking place inside the structures were less clear. For example, House 3 (4.5 m diameter) had a sequence of six very small hearths, not associated with lithics, ceramics, or even fire-cracked rocks.

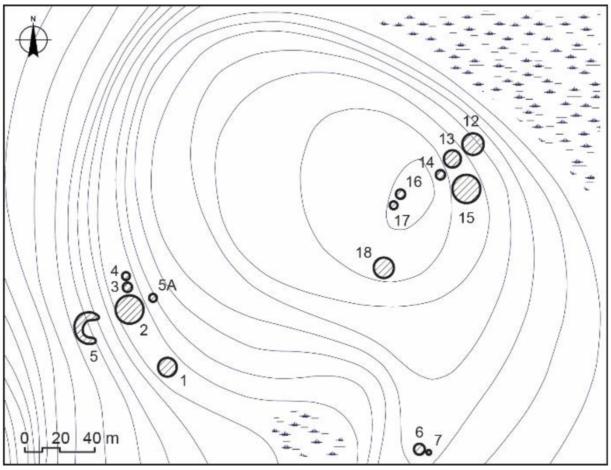


Figure 5.2 Part of the plan of site RS-A-29. Based on Beber (2004, p. 182).

Despite the variability in the finds, Schmitz et al. (2002, p. 99) conclude that all pits were utilised as dwellings, due to the ubiquity of hearths associated with domestic artefacts (ceramics and lithics). They also notice that the dates for the occupation of the different houses do not show contemporaneity, suggesting a palimpsest of cyclical occupation and abandonment episodes related to high mobility and circulation through the territory (Table 5.1). Interestingly, they point out that, for each period of occupation at the site, there was at least one pit house much larger than the others (Schmitz et al., 2002, p. 101). They suppose that most of the group would be living in oversized structures – the external areas of House 3, site RS-A-27, are specifically identified as a “collective kitchen” due to the abundance of ceramics (Schmitz et al., 2002, p. 100). Thus, even if the excavations at Vacaria were not originally intended to address the function of oversized pit houses, they did bring important new data in terms of the chronology and contents of such structures in comparison to smaller ones.

Table 5.1 Dates for sites RS-A-27 and RS-A-29 in Vacaria. *Oversized house. **TL date.

Site	Structure	Date (BP)	Cal. A.D. 2σ	Reference
RS-A-27	House 3*	950 ± 72 (LVD-624)**	980-1125	Schmitz et al. (2002, p. 22)
RS-A-27	House 3*	723 ± 55 (LVD-625)**	1225-1335	Schmitz et al. (2002, p. 22)
RS-A-27	Mound	870 ± 60 (Beta-144247)	1045-1290	Schmitz et al. (2002, p. 24)
RS-A-27	House 6	870 ± 50 (Beta-144244)	1050-1285	Schmitz et al. (2002, p. 33)
RS-A-27	External area	830 ± 64 (LVD-623)**	1110-1235	Schmitz et al. (2002, p. 25)
RS-A-27	House 2	520 ± 60 (Beta-144245)	1315-1620	Schmitz et al. (2002, p. 27)
RS-A-27	House 5	386 ± 31 (LVD-627)**	1585-1645	Schmitz et al. (2002, p. 31)
RS-A-27	House 1*	348 ± 30 (LVD-621)**	1625-1685	Schmitz et al. (2002, p. 28)
RS-A-27	House 4	166 ± 15 (LVD-620)**	1820-1850	Schmitz et al. (2002, p. 30)
RS-A-27	House 7	40 ± 60 (Beta-144243)	1685-…	Schmitz et al. (2002, p. 34)
RS-A-27	House 2	30 ± 50 (Beta-144246)	1695-…	Schmitz et al. (2002, p. 27)
RS-A-29	House 1	680 ± 80 (Beta-153842)	1230-1430	Schmitz et al. (2002, p. 65)
RS-A-29	House 3	380 ± 60 (Beta-153843)	1450-1650	Schmitz et al. (2002, p. 68)

Bom Jesus

Not far from the previous location, in Bom Jesus, Rio Grande do Sul state, Copé (2006) excavated houses of different sizes in site RS-AN-03 – also characterised by the association of an oversized structure with smaller ones in its immediate surroundings (Figure 5.3). House C, the small pit (7 m diameter), had evidences of post holes, successive central hearths, and activity areas which divided the structure into a set of spaces: to the west, a clean area interpreted as a resting place; to the east, abundant debris and charcoal, probably a zone of discard; to the north, concentrations of *débitage* and ceramics for consumption, possibly reflecting a male working area; and, finally, in the centre of the house was found a hearth associated with lithic tools and ceramics for cooking, indicating a probable female working area (Copé, 2006, p. 327-333; Copé and Saldanha, 2002, p. 112-113). Similar conceptual divisions of the house into male and female working areas have been suggested for other Southern Proto-Jê contexts (Saldanha, 2005, p. 78-82).

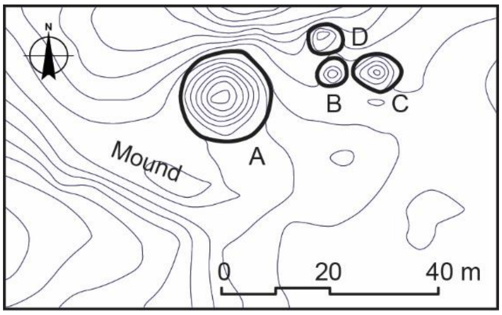


Figure 5.3 Plan of site RS-AN-03. Based on Copé (2006, p. 185).

In contrast to the small pit house, the oversized House A (18 m diameter) did not contain comparable activity areas. There was, however, a semicircle of five hearths around the central post holes, associated with ceramic sherds and lithics considered primary refuse by the excavators (Figure 5.4). This disposition of hearths in a semicircle is interpreted as reflecting recurrent gatherings, and

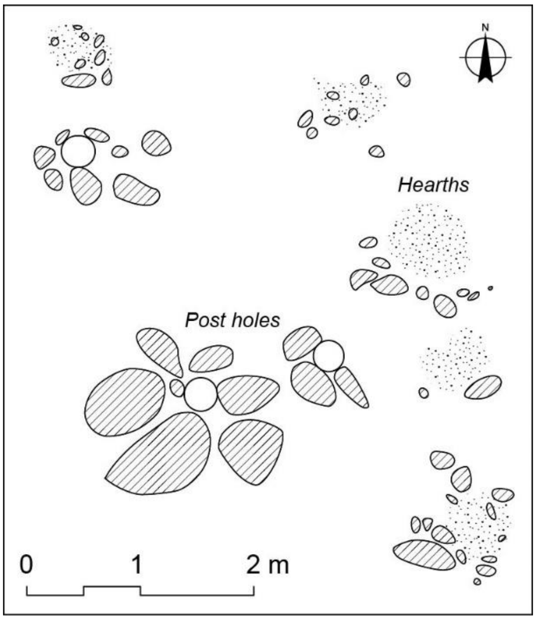


Figure 5.4 Excavation plan of the oversized House A, RS-AN-03 site, showing the semicircle of hearths. Based on Copé (2006, p. 205).

Copé (2006, p. 341) suggests that House A could have been either the dwelling of a high-status individual who hosted meetings, or purely a communal facility. The dates available for the site (Table 5.2) provide a different picture from the one envisaged by Schmitz et al. (2002): the chronology of RS-AN-03 is evidence, for Copé (2006, p. 192), of a continuous occupation, an argument based on the dates for House C and the absence of discontinuities in the stratigraphy. The site would have grown, starting with House C and possibly the other small structures, followed by the construction of the oversized House A two centuries later. In summary, the excavations at RS-AN-03 revealed clear differences between houses of different sizes: if House C is a typical dwelling, then House A should be interpreted as an upper-status residence or a gathering place for the community (Copé, 2006, p. 252, 341).

Table 5.2 Dates for site RS-AN-03 in Bom Jesus. *Oversized structure.

Site	Structure	Date (BP)	Cal. A.D. 2σ	Reference
RS-AN-03	House C	1070 ± 70 (Beta-178135)	880-1180	Copé (2006, p. 191)
RS-AN-03	House C	550 ± 40 (Beta-166584)	1325-1455	Copé (2006, p. 191)
RS-AN-03	House A*	880 ± 40 (Beta-183020)	1055-1275	Copé (2006, p. 202)
RS-AN-03	House A*	870 ± 50 (Beta-183022)	1050-1285	Copé (2006, p. 202)
RS-AN-03	House A*	690 ± 60 (Beta-183021)	1270-1415	Copé (2006, p. 202)
RS-AN-03	House A*	370 ± 50 (Beta-166584)	1460-1645	Copé (2006, p. 202)
RS-AN-03	House A*	250 ± 50 (Beta-178134)	1510-…	Copé (2006, p. 201)
RS-AN-03	External area	780 ± 60 (Beta-1781136)	1180-1390	Copé (2006, p. 214)

São José do Cerrito

The oversized pit houses of São José do Cerrito are the closest to the pilot area of this dissertation. The data from this region are particularly important, since they informed the first explicit debate about the nature of pit house architectural variability in the southern Brazilian highlands (Reis, 2007). Reis (2007, p. 189-195) was interested in the possible communal function of oversized pit houses. She noticed that ethnographic men's houses are often larger than domestic structures and tend to occur in small numbers, one or two per village, being located in a special position either at the centre of the settlement or in its periphery (see also the discussion in the previous section). In the sample of pit houses surveyed by Reis (2007), large structures are rare and tend to occur in isolation, far from other sites. Only seven sites had spatial characteristics that suggested a communal function for the oversized pit houses according to the criteria of Reis (2007, p. 193), i.e. the close proximity of one or a few large structures with many small ones (Figure 5.5). Therefore, she concluded that oversized pit structures were residences of extended families, in contrast to the small ones which could shelter nuclear families or individuals (cf. Flannery, 1972, p. 30-32).

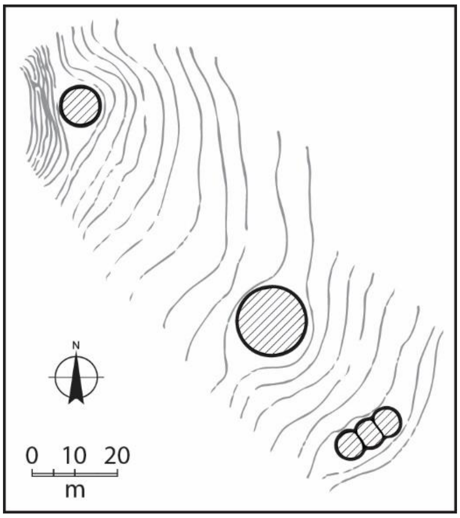


Figure 5.5 Site SC-CL-61, one of the cases where centrally-placed, oversized pit houses could have served a communal function according to Reis (2007).

A review of the radiocarbon dates then available led Reis (2007, p. 194) to propose that larger pit houses and, consequently, an extended family residential pattern was older and later replaced by settlements with many small structures for nuclear families. However, one must keep in mind that, even if the radiocarbon dates available in the 1980s did show a tendency for older houses to be larger, no truly oversized pit house had been excavated. The argument was based on dates for the Caxias do Sul region, where even the largest of the dated houses does not surpass 11 m diameter (cf. Corteletti, 2008, p. 191-196). Reis (2007, p. 42-44) excavated an oversized pit with ca. 20 m diameter at site SC-CL-52. Very few artefacts were found in the house and, unfortunately, Reis (2007) did not publish a description of the stratigraphy or horizontal distribution of artefacts and features.

More recently, however, site SC-CL-52 was revisited by Schmitz et al. (2013a, p. 141-150). They found that the activities that took place in the oversized structure were similar to those of other houses in the region, although, as previously noticed by Reis (2007, p. 43), there were very few artefacts in its interior, which they consider disproportional to the energy invested in construction. The same phenomenon was noticed in sites RS-A-27 and RS-A-29 as I mentioned above, and it must be kept in mind that this scarcity of artefacts could be the result of regular cleaning. Two radiocarbon dates were obtained for the site: the deepest level of the structure was dated to 860 ± 30 ^{14}C BP (Cal. A.D. 2σ 1180-1275) (Beta-357350) and an external activity area provided a date of 870 ± 30 ^{14}C BP (Cal. A.D. 2σ 1160-1270) (Beta-351742). Schmitz et al. (2013a, p. 150) concluded that the labour necessary for the construction of site SC-CL-52 suggests the occupation by an extended family or even larger group, but did not reject that the oversized pit could be a space “connected to power”.

The dates obtained from SC-CL-52 and other sites in São José do Cerrito led Schmitz et al. (2013a, p. 192) to endorse the hypothesis that large pit houses were earlier than small ones. In the immediate vicinity of SC-CL-52, sites SC-CL-43 and SC-CL-51 provided more recent dates – between 640 ± 40 ^{14}C BP (Cal. A.D. 2σ 1300-1415) (Beta-275575) 320 ± 30 ^{14}C BP (Cal. A.D. 2σ 1500-1660) (Beta-351741) – from smaller houses, between 4 m and 5.8 m diameter (Beber, 2013, p. 45-50). However, it must be pointed out that, when one increases the scale, smaller houses actually seem to precede larger ones: the earliest site in São José do Cerrito, SC-CL-70/71, dated to 1400 ± 40 ^{14}C BP (Cal. A.D. 2σ 610-770) (Beta-297431) only contains houses between 4 m and 8 m diameter (Schmitz et al., 2013b) (see Table 3.3 for a complete list of the published dates for São José do Cerrito). More interestingly, at site RS-AN-03, described above, the oversized structure postdates the cluster of smaller houses – even within the same site (Copé, 2006, p. 256-257).

Overall, the work in São José do Cerrito informed the first explicit discussion about pit house size and function. However, the data from recent excavations still leave some ambiguity on how to understand architectural differences, and the researchers who worked in the area seem inclined to interpret oversized pit houses as extended family dwellings from an earlier period than small structures (Reis, 2007, p. 194; Schmitz et al., 2013a, p. 150).

Summary

In this chapter, I have discussed how the architectural disparities in pit house sites of the southern Brazilian highlands can be understood according to two contrasting models of social formations. In the first, that I suggested calling the “aggrandising model”, emerging élites accumulate surplus, power and prestige by maintaining wider networks and a numerous family. They are part of larger households, and express their status by means of the size, elaboration and privileged location of their dwellings. In the second model, that I suggested calling the “corporate model”, the investment in the construction of monumental public buildings is a collective effort intended to serve community ends. That does not preclude the existence of status inequalities, but those are usually “masked” as serving the common will. These two poles are cross-culturally recognised strategies of early leaders, and have been called *network x corporate* or *individualising x group-oriented* strategies, among others (Blanton et al., 1996; McGuire and Saitta, 1996; Renfrew, 1974; Saitta and Keene, 1990).

The disparities in pit house architecture in the southern Brazilian highlands have been the subject of debate for some time. Although there was no explicit discussion about the social formations behind the emergence of inequalities in household size and wealth, or the investment in communal buildings, many authors have tentatively addressed the question of whether oversized pits are high-status dwellings, houses for extended families, or *kiva*-like facilities (Copé, 2006; Reis, 1980; Schmitz et al., 2013a). However, excavations at oversized pit houses were rare, and the data too ambiguous to support one interpretation or the other. This is the gap that I intended to fill with the research at Baggio 1, specifically designed to explore household variability and community organisation. In the next chapters, I will present the excavations, chronology and artefact analysis from that site.

Chapter 6

Excavations at the Baggio 1 site

The excavations at the Baggio 1 site followed standard archaeological techniques. Hoes and spades were used to excavate test units, as well as sterile levels of the pit houses and mounds. Levels with archaeological materials and features in the pit houses, as well as features identified in external areas, were carefully excavated with trowels. Arbitrary levels of 10 cm were initially followed. However, when clear cultural strata were defined, they were followed in disregard of the artificial levels. This was especially true for the early floors of House 1, since they were not flat, but sloped considerably towards the east. At each level, artefacts and features were graphically recorded on standard plans and photographs were taken, providing a three dimensional record of the excavation. Charcoal samples from well-documented contexts and controlled features were collected for radiocarbon dating. All excavated sediments were sieved. Flotation samples were also collected from each level and from selected features. Once the excavation had reached the base of the cultural deposits, the profiles were drawn and the layers described.

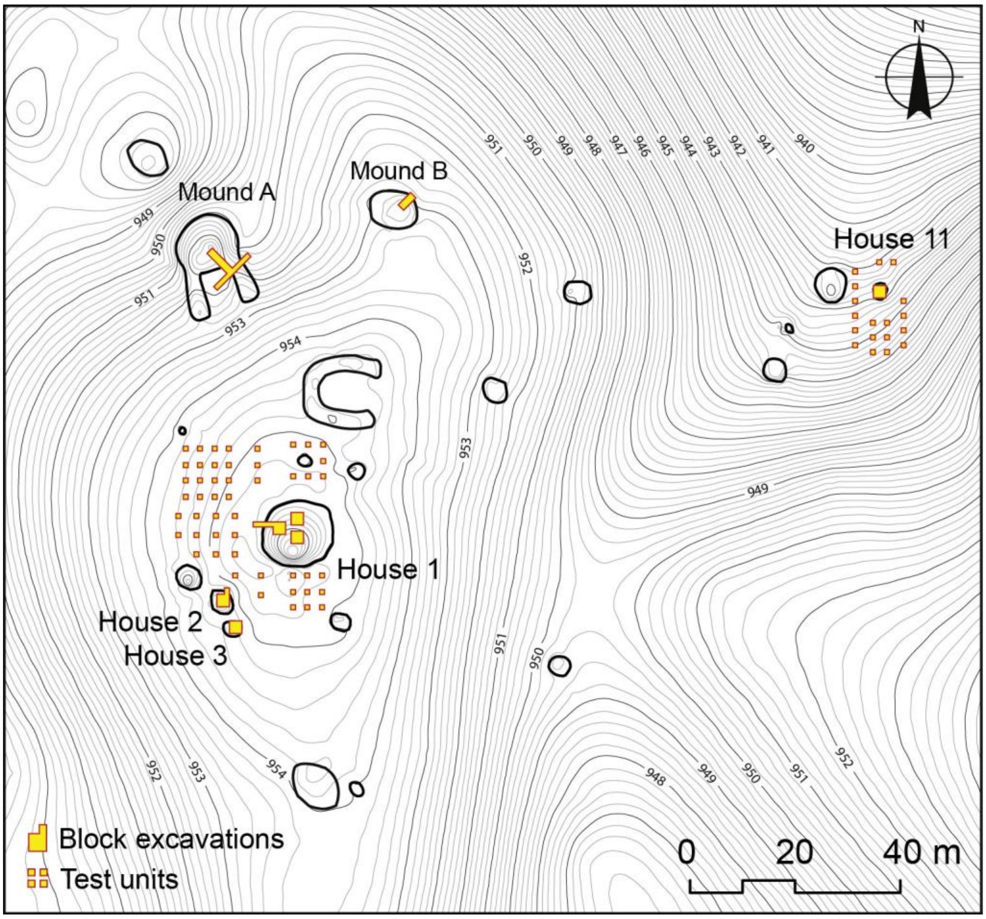


Figure 6.1 Topographic and planimetric map of the Baggio 1 site with indication of the areas targeted for archaeological excavations.

Description of the excavated contexts

In the inner precinct of Baggio 1, a range of structures was sampled, including pit houses of different sizes and distinct types of mounds (Figure 6.1). Excavations at pit houses took place at the oversized House 1 (16 m diameter) and at two small structures in its neighbourhood, Houses 2 and 3 (with 3 and 2 m diameters before excavation, respectively). Two mounds were also investigated by excavations: Mound A, which is the U-shaped mound located downhill from House 1, and Mound B, a circular, low platform mound located near the edge of the plateau to the north of House 1. In addition to the excavation of earthen structures, a grid of test pits was opened outside of House 1, between the oversized structure and the other earthworks in its surroundings.

In the peripheral area, the only structure investigated by excavations was House 11. Although not ideal, the decision to sample only one pit house followed a pragmatic reason: all the other pit houses in the area were eroded and filled as a result of the cattle coming near their edges to drink water. Some of them were still filled with water. In the inner precinct, this had been the fate of House 4. Such phenomenon appears to have taken place over the last three years, as all the pit houses were in perfect condition when we first visited the site. A grid of test pits was also opened outside of House 11, covering flat areas in its surroundings, including the area between this house and the larger House 12. The test pits in the peripheral area were almost completely sterile in prehistoric finds (although they did contain historical finds such as glass and tiles). A single sherd appeared between Houses 11 and 12.

House 1

The excavations at House 1 consisted of three block excavations separated by unexcavated baulks of 1 m (Figure 6.1). One of the units (Area A, 2 x 2 m) was placed at the centre of the structure, another (Area B, 2 x 2 m) to the north of the former, and the last to the west, close to the structure's limits (Area C, 3 x 2 m). The latter was connected by a trench (Trench 1, 4 x 0.75 m) to the edge of the house, in order to obtain a full profile of its original architecture.

In all excavated areas of House 1, the first 20 cm consisted of the humic layer and modern top soil formed after the house's abandonment. Amidst the silty clay sediments were grass roots, recent charcoal and loose lithics and ceramics. The artefacts were slope-washed from outside of House 1 after the terminal occupation, and therefore correspond to post-abandonment debris accumulated by natural processes.

After the removal of the top levels, the terminal floor before the definitive abandonment of House 1 was uncovered. Numbered **Floor 12** (h = 178 cm)[1], it consisted of a silty clay surface with fewer roots, more charcoal, lithics and ceramics (Figure 6.11). Of particular interest is the occurrence of stone features. In Area B, two small stone-lined fire pits were found. Each was about 60 cm diameter and lined with very small rocks (Figure 6.3a). The fire pits were associated with concentrations of artefacts – including a large basalt scraper – both within the features, amidst the rocks, and in close proximity to them. The largest concentration of ceramic sherds was found in Area B in the vicinity of the fire pits. In Area A, this floor contained large rocks, in one case forming a cluster resembling a post support.

Floor 12 sloped considerably near the wall of House 1, in Area C, forming a bench leading to the centre of the house. Its surface was stained by small burnt patches in Area C, and also included a shallow basin-shaped feature filled with small quantities of charcoal. The density of artefacts was higher in Areas A and B (i.e. in the centre of the structure), especially around the fire pits, and becomes almost null near the structure's edge.

Beneath Floor 12, after the removal of a layer of a friable silty clay with no inclusions, a continuous surface of hard-packed, dark clay was exposed. This was the first in a sequence of six compacted floors (6 to 11) separated by looser fills. Floors 6 to 11 were generally found to be clean. Primary refuse consisted only of a few ceramic sherds, lithics and charcoal on top of the hard-packed clay surfaces, sometimes accompanied by features such as burnt patches, degraded basalt lenses, post holes and stone-lined fire pits. These floors were recognised by changes in the colour and texture of the sediments, consisting of very compact

[1] The floors of House 1 and all other houses excavated in the Baggio 1 site were numbered from bottom (earliest) to top (more recent). In the case of House 1, their surfaces are, in general, not flat, and I offer, as a reference, their depth at the centre of the house, which corresponds to the north-eastern corner of Area A. For all pit houses, the depths presented were measured in centimetres relative to the modern surface of the terrain immediately outside of the pits.

clay surfaces with finds on top of them (Figure 6.2). Loose clay fills (subfloors) with few to no inclusions separated each occupation.

Figure 6.2 Examples of the late floors of House 1. a) Floor 11, Area A. b) Same floor in Area B.

Floor 11 (h = 211) was an irregular compacted clay surface, following the slope of the terrain. When compared to the previous floor, remarkably few artefacts were found on top of this surface (Figure 6.12). All areas included a few ceramic sherds, lithics and charcoal deposited directly on top of the compacted clay surface. In Area B, the floor was stained by small burnt patches and cut by one small depression, approximately 20 cm diameter – a possible post hole. In Area C, the bench noticed in the floor above was still present, and a large burnt area occurred near the centre of the pit house. A distinct fire pit was identified in Trench 1, close to the structure’s wall. It was a relatively large feature, with 80 cm diameter, filled with dark soil, abundant charcoal and large rocks (Figure 6.3b).

Floor 10 (h = 216) was a compact clay surface practically devoid of artefacts. It was irregular, with a steep slope in the north-eastern corner of Area B. The bench leading to the centre of the house noticed in the previous two floors in Area C was again present. A few ceramic sherds and charcoal flecks occurred laying directly on top of the floor in the centre of the house (Figure 6.13). In Area B, yellow basalt spreads covered part of the floor. These lenses of degraded basalt were a frequent feature in the subsequent levels, and appear to have been used to cap parts of the floors (Figure 6.3c). Both Copé (2006, p. 200-203) and Schmitz et al. (2013a, p. 144) describe similar layers in pit houses they excavated, suggesting that they may result from erosion of the walls during abandonment. However, in House 1, these lenses were small and discrete, and some of them covered concentrations of charcoal; similar discrete basalt caps were noticed in other pit house sites directly covering hearths – reinforcing their role in floor repair and cleaning (Copé, 2006, p. 205-206). A dark stained feature was also noticed in Area B, as well as a small, 20 cm diameter depression, possibly a post hole. In Trench 1, the fire pit from the previous floor continued through this level, its base being narrower and lined with large rocks. The original wall of the structure, excavated in the natural horizon (a red, very compact clay with degraded basalt inclusions) was uncovered. It formed a steep slope that occupied most of Trench 1, making the area of this floor more restricted to the central part of House 1 than the previous floors.

Floor 9 (h = 220) was a dark, compact clay surface with very few artefacts and features (Figure 6.14). In Area A, near the centre of House 1, large yellow basalt spreads were found capping part of the floor (Figure 6.3c). Smaller patches of the same basalt cap were also found in Areas B and C. A few ceramic sherds and charcoal flecks appeared on top of the compact floor surface, together with a small depression in the north-eastern corner of Area B. In Trench 1, a large fire pit was located. It was a large feature, ca. 80 cm diameter, filled with charcoal and dark soil, and surrounded by large rocks.

Floor 8 (h = 225) was a hard packed clay surface with many features (Figure 6.15). A central hearth was located in Area A. This feature was a very compact, grey patch associated with a cluster of large rocks. Many charcoal flecks occurred on top of the floor in the south-western corner of Area A, in the vicinity of the hearth, together with some ceramic sherds and lithics. Burnt stains were noticed in Area B, next to a large yellow basalt spread that capped part of the floor. A few small post holes (10-20 cm diameter) overcut this floor in the central part of the pit house. Closer to the structure's wall, in Area C, several concentrations of charcoal appeared on the floor associated with ceramic sherds.

This floor's area was even more restricted to the centre of the pit house than the previous floors: at this level, all of Trench 1 was occupied by the steep original wall excavated in the natural horizon.

Floor 7 (h = 231) was an orange-brown compacted clay surface with features, charcoal and artefacts. Discrete concentrations of ceramic sherds and charcoal flecks laying directly on top of the compacted surface occurred throughout the floor (Figure 6.16). In Area B, this floor was heavily stained by burnt patches and contained stone features. One of them was a small fire pit, ca. 40 cm diameter, filled with dark soil and abundant charcoal, and lined with burnt rocks disposed in a circle.

Floor 6 (h = 250) consisted of a similar compact orange-brown clay surface as the floor above, and contained similar features (Figure 6.17). The fire pit present in Area B in Floor 7 continued through Floor 6, possibly representing an earlier phase of the same feature (Figure 6.3d). It was lined with many fire-cracked and burnt rocks and filled with dark, loose soil with large quantities of charcoal, as well as a few ceramic sherds. Smaller burnt patches also occurred in the vicinity of the fire pit. Nearer to the centre of House 1, in Area A, many ceramic sherds, lithics and charcoal flecks appeared scattered throughout the surface of the floor. They were associated with a fire pit filled with very dark, loose soil, abundant charcoal and many ceramic sherds. Closer to the walls of House 1, the density of artefacts and charcoal was lower, and the floor's surface was very irregular, with a deep depression filled with hard-packed clay in the north-eastern corner of Area C.

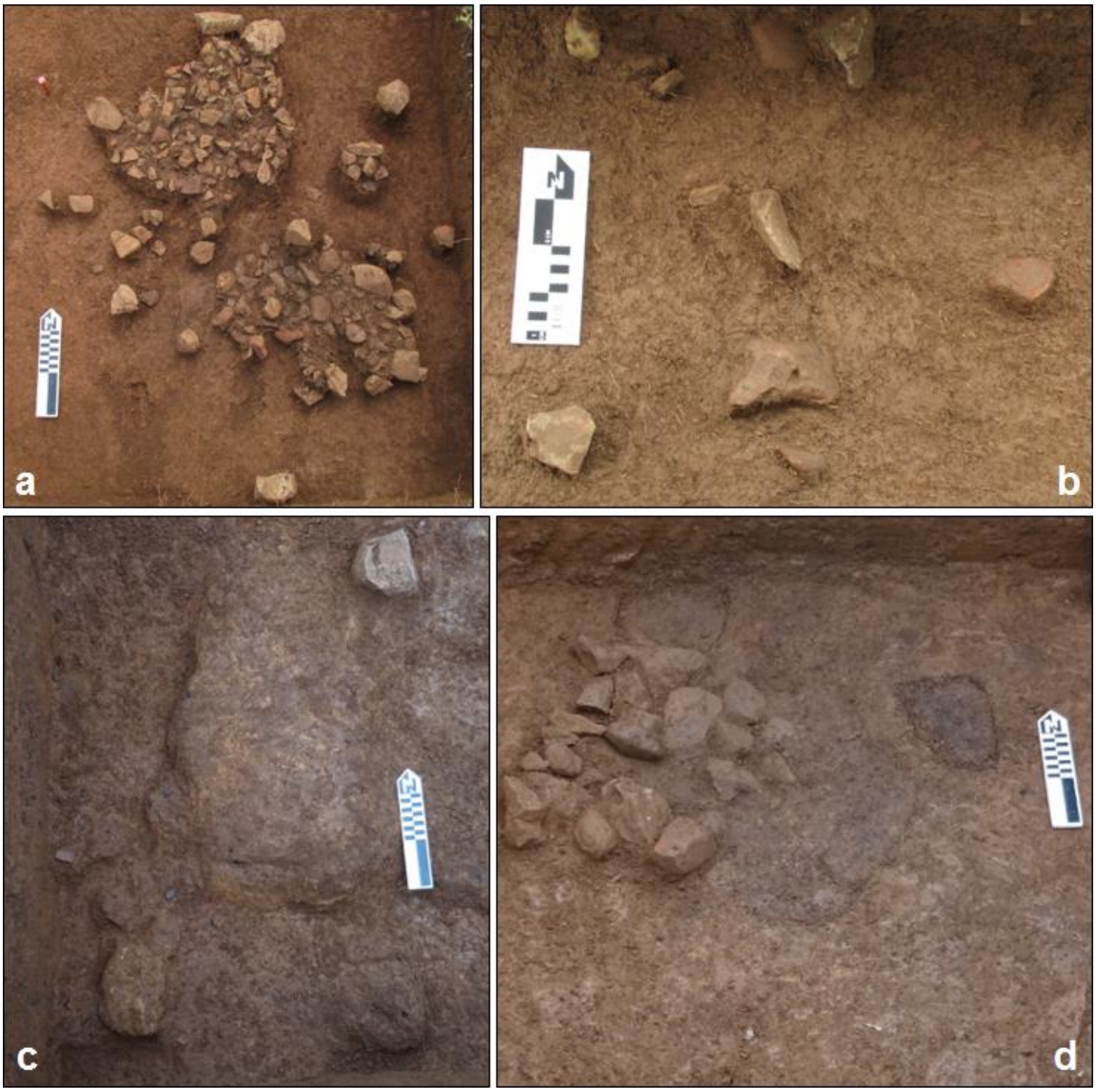


Figure 6.3 Features on the floors of House 1. a) Fire pits on Floor 12, Area B. b) Fire pit on Floor 11, Trench 1. c) Yellow basalt cap on Floor 9, Area A. d) Fire pit on Floor 6, Area B.

After the removal of the sterile loose clay that formed the subfloor of Floor 6, a sharp difference in colour and texture was noticed, marking the transition to the earliest five floors. These were very different form the floors above, and consisted of heavily burnt, thin surfaces littered with charcoal. On top of the charcoal layers were large ceramic sherds, lithics and stone features. The burnt floors were separated by a matrix of sterile, hard-packed orange clay (Figure 6.4).

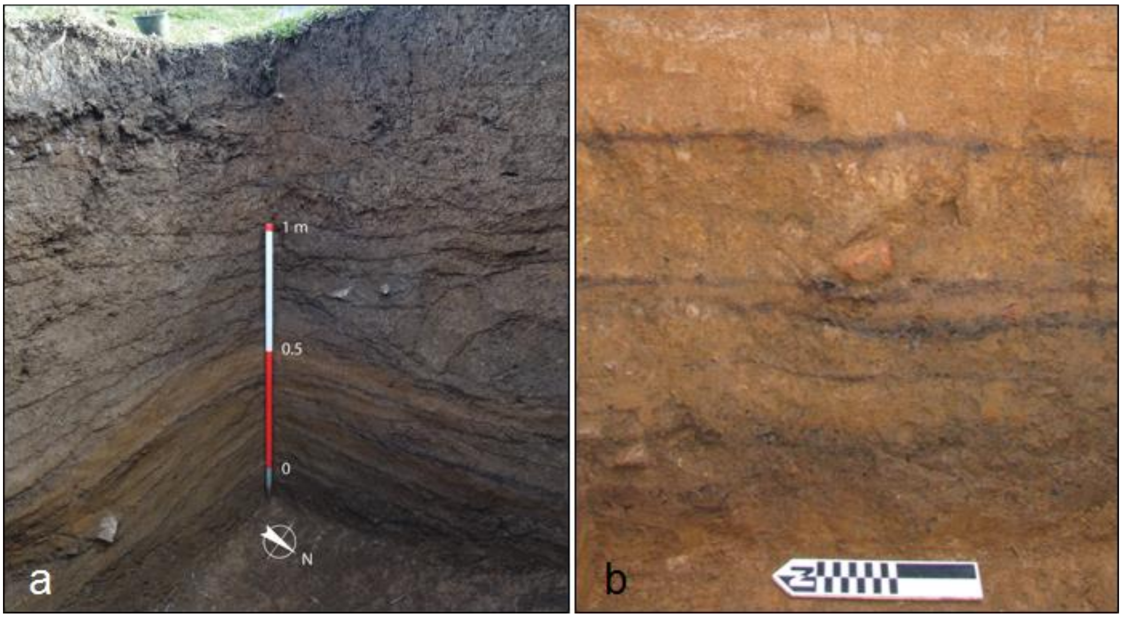


Figure 6.4 Stratigraphy of House 1. a) Complete profile in Area B. Notice the sharp transition from the burnt floors to the subsequent floors and from those to the top soil. b) Detail of the burnt floors separated by orange clay fills at the bottom of the profile in Area A.

The burnt surfaces did not follow the modern inclination of the terrain, but sloped considerably towards the east, suggesting that the original architecture of the house differed from the present-day topography of the structure. The charcoal that covered these five burnt floors consisted of charred intertwined fibres – remnants of the thatch from the roof of the structure. The majority of artefacts was found laying directly on top of the burnt surfaces, raising the possibility that they did not represent *de facto* or primary refuse, but must have been deposited after the roof was set on fire and collapsed. This conclusion is reinforced by the fact that the artefacts were not burnt throughout, but only on the down facing surfaces that adhered to the burnt surface – i.e., they must have been added after the burning of the structure. A full discussion of formation processes will be provided in Chapter 9.

Floor 5 (h = 272) was a heavily burnt surface with orange plastic clay as fill matrix. On this floor was found the largest quantity of ceramics in House 1, forming many discrete clusters of sherds (Figure 6.5a, Figure 6.18). Unlike the previous floors, where ceramics were very fragmented, the sherds found on top of Floor 5 were large, and sometimes articulated and belonging to the same vessel (Figure 6.6a). Very large basalt blocks were also found throughout the central areas of the house. The burning was intense and continuous in Areas A and B, but decreased towards the edges of the structure. In Area C, the amount of charcoal littering the floor was smaller, and its surface had a noticeable slope, possibly a shallow bench leading from the wall towards the centre of the house.

Floor 4 (h = 311) was a heavily burnt surface with hard-packed orange clay as matrix. As in the floor above, abundant ceramic sherds were found scattered throughout the central areas of the house, deposited on top of the charcoal-littered surface, and associated with a few lithics and large basalt blocks (Figure 6.19). The artefacts were restricted to the centre of the house: in Area C, this floor was only recognised by the continuous burnt surface. It did not occupy the whole area, but was limited by the original walls of the structure, excavated in the natural red clay horizon – now exposed in all of Trench 1 and about a third of Area C. Thus, the living surface of the house at this point was restricted to the centre of the house, and was much smaller than in the floors above.

Amongst the burnt floors of House 1, **Floor 3** (h = 322) is of particular interest (Figure 6.5b-c, Figure 6.20). On this burnt floor, close to the centre of the house, near the southern wall of Area B, a cache of ceramics was found. The cache contained several large and a small decorated cup, all disposed in a circular manner (Figure 6.6b). Burnt tree bark was identified amidst the sherds. In the proximity of the cache, dispersed ceramics, lithics and variety of carbonised botanical material, including *Araucaria angustifolia* nodes and charred palm fibres, were found on top of the burnt floor.

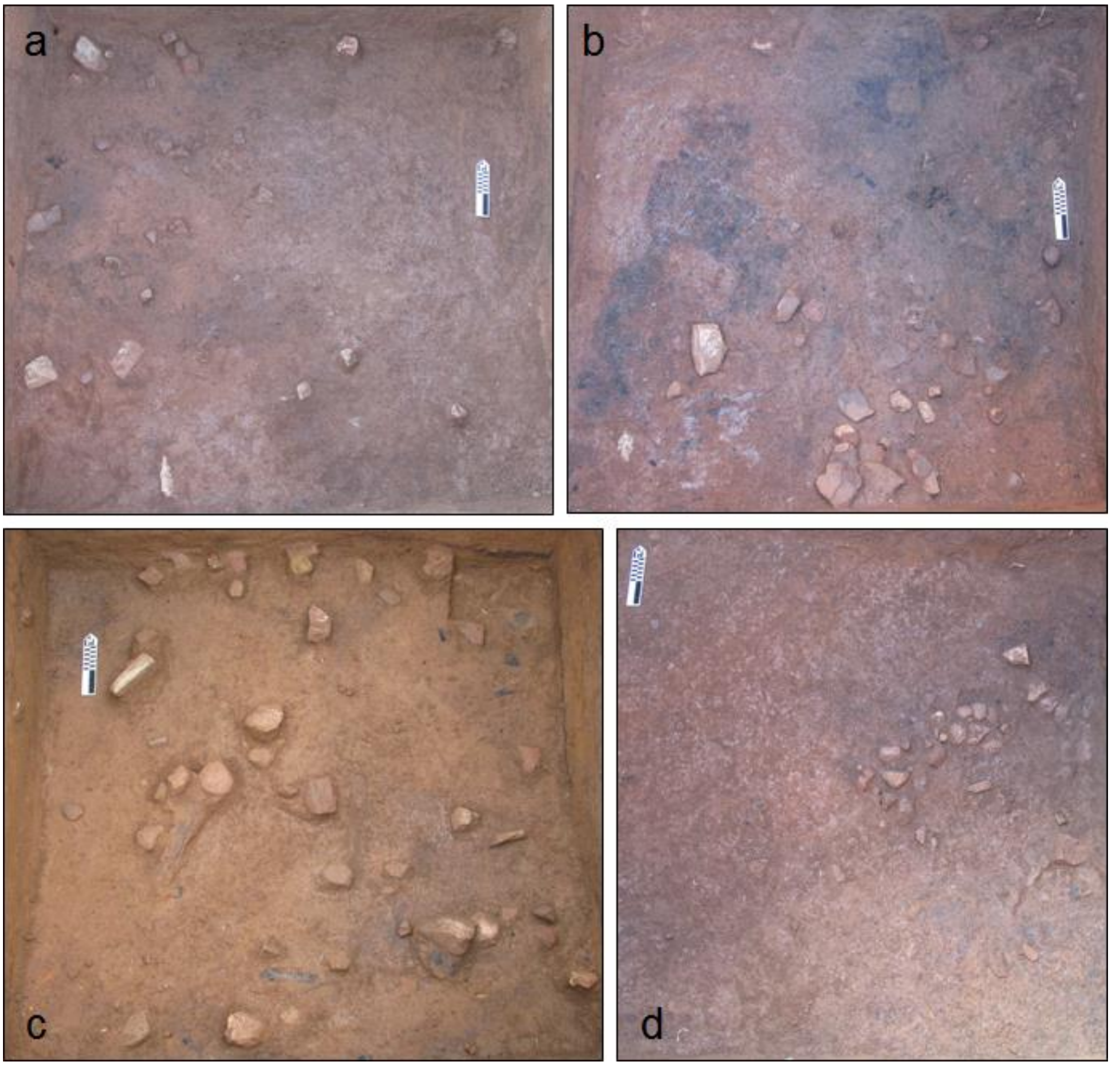


Figure 6.5 Burnt floors. a) Floor 5, Area A. b) Floor 3, Area B. c) Floor 3, Area A. d) Floor 1, Area B.

In Area A, a many large basalt blocks and burnt logs occurred scattered on top of the continuously burnt surface (Figure 6.6c). Large ceramic sherds were concentrated near the centre of the house. Two pieces of columnar basalt were also found laying side by side on the floor. Near the walls of the house, in Area C, this floor had only a few sherds on its surface, and was limited by the original wall of the structure – which, at this level, already occupied about half of Area C.

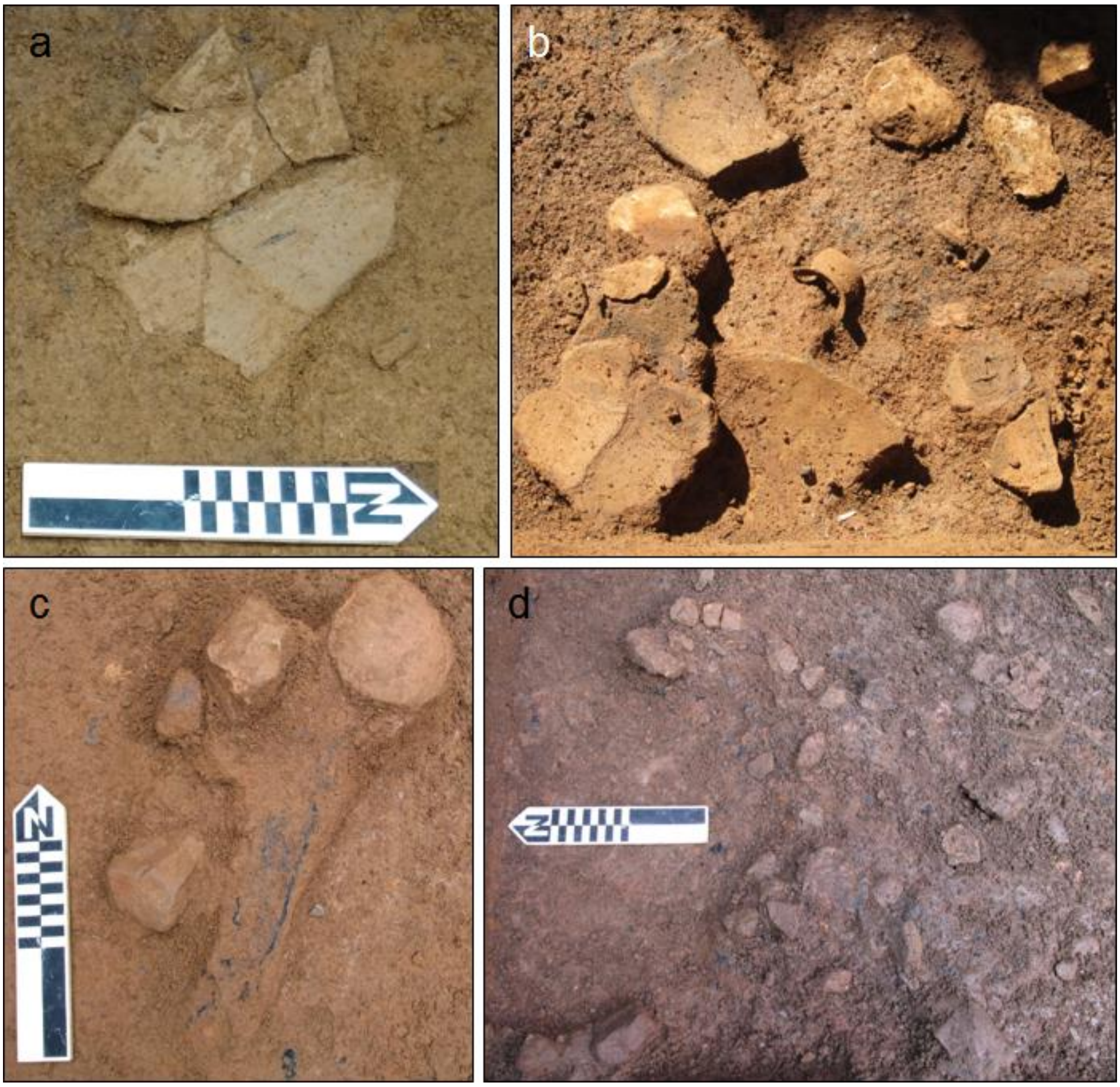


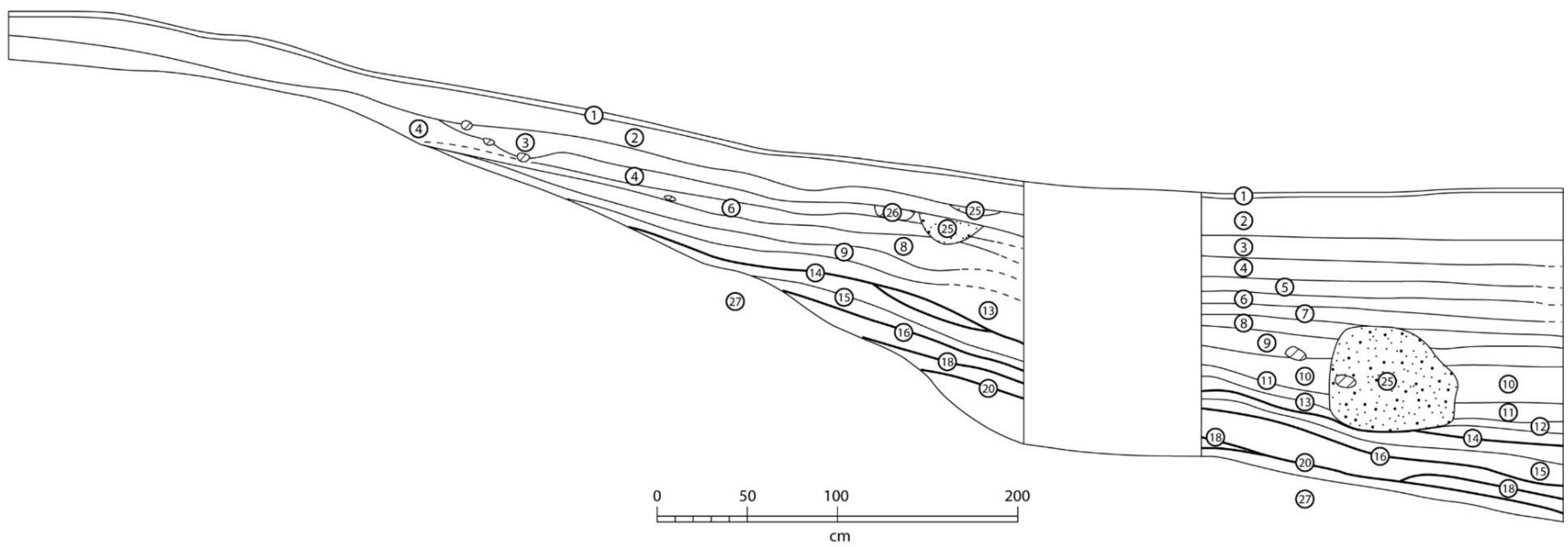
Figure 6.6 Some features from the burnt floors of House 1. a) Articulated broken ceramics (Floor 5, Area B). b) Ceramic cache (Floor 3, Area B). c) Burnt log with large ceramic sherds and rocks (Floor 3, Area A). d) Stone lining (Floor 1, Area A).

Floor 2 (h = 329) was a burnt surface mostly restricted to the centre of House 1 (Figure 6.21). It lay immediately on top of the original architecture of the house on the north-western corner of Area B, where the natural clay formed a slight bench. Throughout the central part of the structure, large rocks burnt underneath were found on top of the charcoal-littered surface, associated with ceramics and lithics. Near the centre of House 1, in the south-eastern corner of Area B and north-eastern corner of Area A, this floor was deeper and composed of multiple superimposed lenses of burning, representing a possible central fire pit. Towards the edges of the house, in Area C, this floor was only recognised by a few burnt patches on top of the natural horizon.

The deepest burnt floor, **Floor 1** (h = 352), was present only in the central area of the structure (Figure 6.5d, Figure 6.22). In the southeast of Area B and northeast of Area A, i.e. at the very centre of the house, it was lined with many small cobbles that were burnt around and underneath, associated with charred fibres from the structure's roof and ceramic sherds (Figure 6.6d). This stone floor could be a hearth or, alternatively, a subfloor fill (e.g. to aid drainage) atop the earliest occupation. The burning was deeper in the centre of the structure, associated with baked clay possibly related to a central fire pit. At the level where Floor 1 was found, the original architecture of the house was already exposed in most of the excavated area (Figure 6.7). The house was originally excavated in the natural horizon, which consisted of a red, hard-packed plastic clay mixed with degraded yellow basalt. A steep bench, about 1 m high, conducted to the centre of the house. The burning associated with Floor 1 did not lay directly on top of the initial cut on the natural clay, but on a transition zone of the eroded natural horizon, which was more friable.

Figure 6.7 Original wall of House 1 completely exposed in Area C

Site: Valmor Baggio 1
Structure: House 1
Section: North

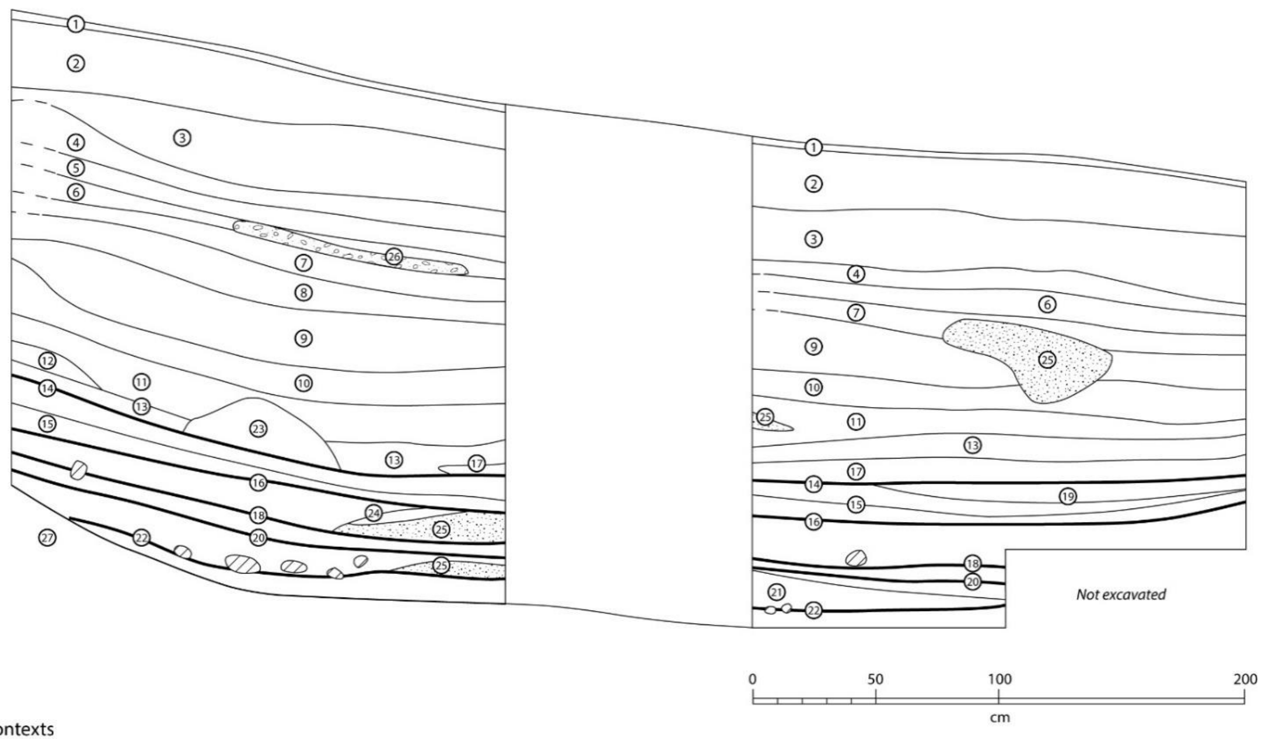


Description of contexts

1 - Humic (O)
2 - Modern top soil (A) with roots, charcoal and artefacts - 7.5 YR 4/3
3 - 7.5 YR 4/4
4 - Friable clay - 7.5 YR 4/4
5 - Friable clay with charcoal and orange clay flecks - 7.5 YR 4/6
6 - Compact clay - 7.5 YR 4/4
7 - Plastic clay with charcoal flecks on surface - 7.5 YR 4/4
8 - Friable silty clay with charcoal - 7.5 YR 3/3
9 - Compact clay - 10 YR 3/4
10 - Very compact clay with charcoal on surface - 7.5 YR 4/6
11 - Compact orange clay with charcoal on surface - 7.5 YR 4/6
12 - Hard packed clay with charcoal on surface - 7.5 YR 4/6
13 - Dark layer with charcoal - 7.5 YR 3/4
14 - Heavily burnt floor with orange clay as matrix - 7.5 YR 4/6
15 - Orange clay - 5 YR 4/6
16 - Heavily burnt floor with hard plastic clay as matrix - 7.5 YR 4/3
17 - Loose orange clay - 7.5 YR 4/6
18 - Burnt floor with ceramic and lithic caches - 7.5 YR 4/6
20 - Burnt floor - 7.5 YR 3/2
21 - Dark moist clay - 7.5 YR 3/3
22 - Burnt floor with cobbles and central firepit - 7.5 YR 3/3
23 - Hard packed greyish clay with charcoal - 7.5 YR 3/2
24 - Orange clay - 5 YR 3/4
25 - Fire pits with charcoal and burnt clay - 5 YR 4/4 to 7.5 YR 4/6
26 - Lens of yellow basalt - 7.5 YR 5/8
27 - Reddish plastic, hard packed clay (natural) - 5 YR 4/6

Figure 6.8 Stratigraphic profile drawing of the north section of House 1.

Site: Valmor Baggio 1
Structure: House 1
Section: East

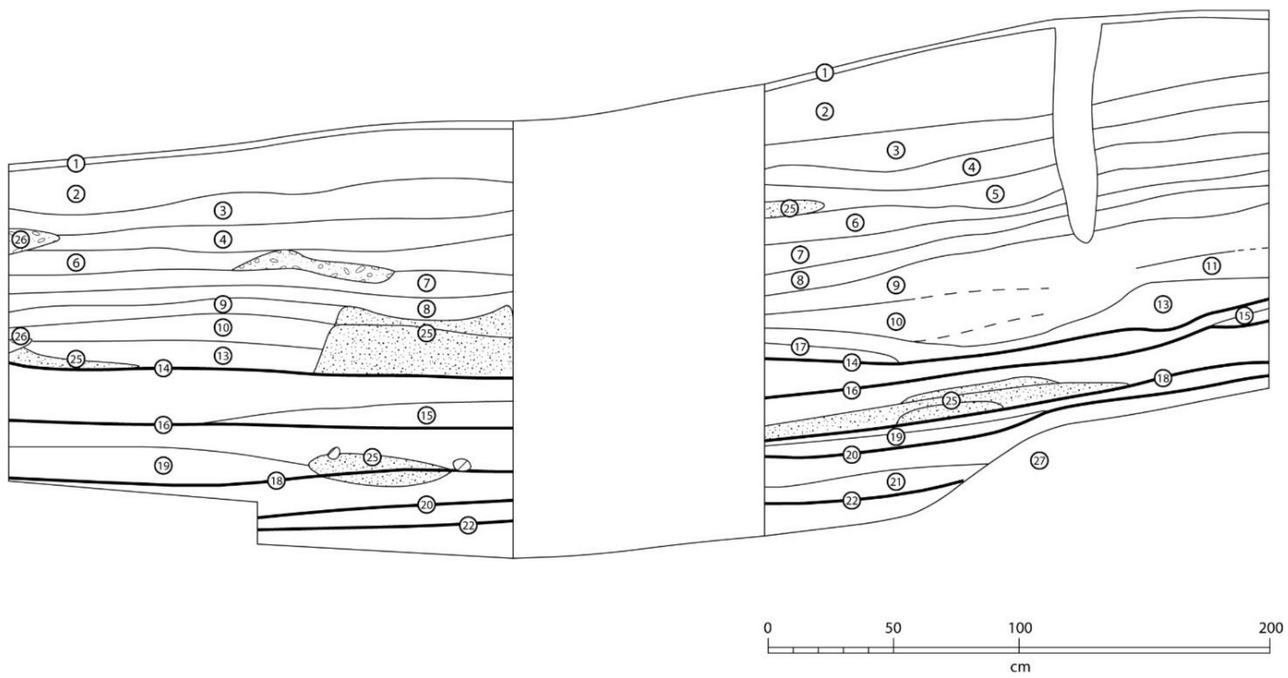


Description of contexts

1 - Humic (O)
2 - Modern top soil (A) with roots, charcoal and artefacts - 7.5 YR 4/3
3 - 7.5 YR 4/4
4 - Friable clay - 7.5 YR 4/4
5 - Friable clay with charcoal and orange clay flecks - 7.5 YR 4/6
6 - Compact clay - 7.5 YR 4/4
7 - Plastic clay with charcoal flecks on surface - 7.5 YR 4/4
8 - Friable silty clay with charcoal - 7.5 YR 3/3
9 - Compact clay - 10 YR 3/4
10 - Very compact clay with charcoal on surface - 7.5 YR 4/6
11 - Compact orange clay with charcoal on surface - 7.5 YR 4/6
12 - Hard packed clay with charcoal on surface - 7.5 YR 4/6
13 - Dark layer with charcoal - 7.5 YR 3/4
14 - Heavily burnt floor with orange clay as matrix - 7.5 YR 4/6
15 - Orange clay - 5 YR 4/6
16 - Heavily burnt floor with hard plastic clay as matrix - 7.5 YR 4/3
17 - Loose orange clay - 7.5 YR 4/6
18 - Burnt floor with ceramic and lithic caches - 7.5 YR 4/6
20 - Burnt floor - 7.5 YR 3/2
21 - Dark moist clay - 7.5 YR 3/3
22 - Burnt floor with cobbles and central firepit - 7.5 YR 3/3
23 - Hard packed greyish clay with charcoal - 7.5 YR 3/2
24 - Orange clay - 5 YR 3/4
25 - Fire pits with charcoal and burnt clay - 5 YR 4/4 to 7.5 YR 4/6
26 - Lens of yellow basalt - 7.5 YR 5/8
27 - Reddish plastic, hard packed clay (natural) - 5 YR 4/6

Figure 6.9 Stratigraphic profile drawing of the east section of House 1.

Site: Valmor Baggio 1
Structure: House 1
Section: West



Description of contexts

1 - Humic (O)
2 - Modern top soil (A) with roots, charcoal and artefacts - 7.5 YR 4/3
3 - 7.5 YR 4/4
4 - Friable clay - 7.5 YR 4/4
5 - Friable clay with charcoal and orange clay flecks - 7.5 YR 4/6
6 - Compact clay - 7.5 YR 4/4
7 - Plastic clay with charcoal flecks on surface - 7.5 YR 4/4
8 - Friable silty clay with charcoal - 7.5 YR 3/3
9 - Compact clay - 10 YR 3/4
10 - Very compact clay with charcoal on surface - 7.5 YR 4/6
11 - Compact orange clay with charcoal on surface - 7.5 YR 4/6
12 - Hard packed clay with charcoal on surface - 7.5 YR 4/6
13 - Dark layer with charcoal - 7.5 YR 3/4
14 - Heavily burnt floor with orange clay as matrix - 7.5 YR 4/6
15 - Orange clay - 5 YR 4/6
16 - Heavily burnt floor with hard plastic clay as matrix - 7.5 YR 4/3
17 - Loose orange clay - 7.5 YR 4/6
18 - Burnt floor with ceramic and lithic caches - 7.5 YR 4/6
20 - Burnt floor - 7.5 YR 3/2
21 - Dark moist clay - 7.5 YR 3/3
22 - Burnt floor with cobbles and central firepit - 7.5 YR 3/3
23 - Hard packed greyish clay with charcoal - 7.5 YR 3/2
24 - Orange clay - 5 YR 3/4
25 - Fire pits with charcoal and burnt clay - 5 YR 4/4 to 7.5 YR 4/6
26 - Lens of yellow basalt - 7.5 YR 5/8
27 - Reddish plastic, hard packed clay (natural) - 5 YR 4/6

Figure 6.10 Stratigraphic profile drawing of the west section of House 1.

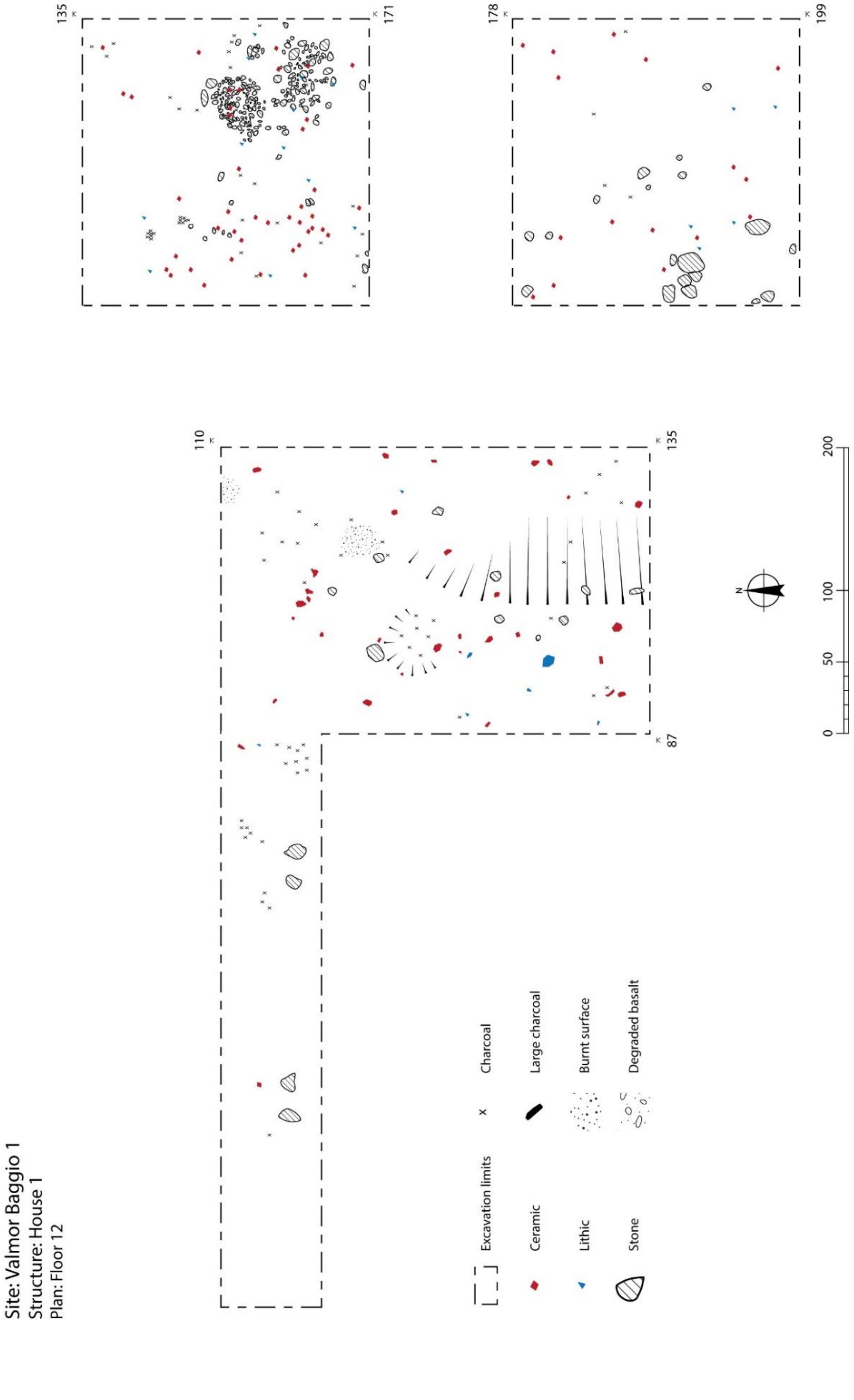


Figure 6.11 Plan of Floor 12, House 1.

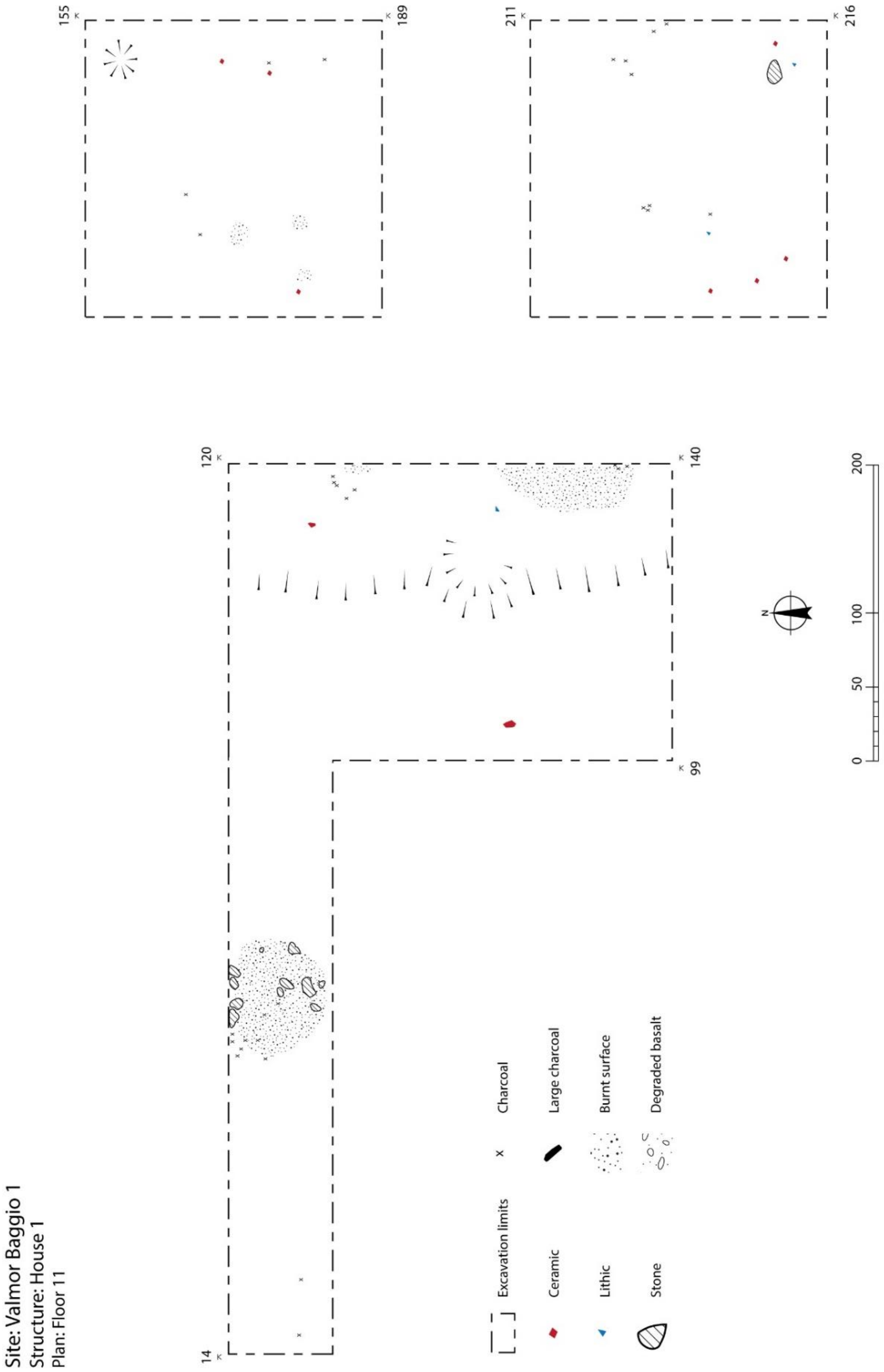


Figure 6.12 Plan of Floor 11, House 1.

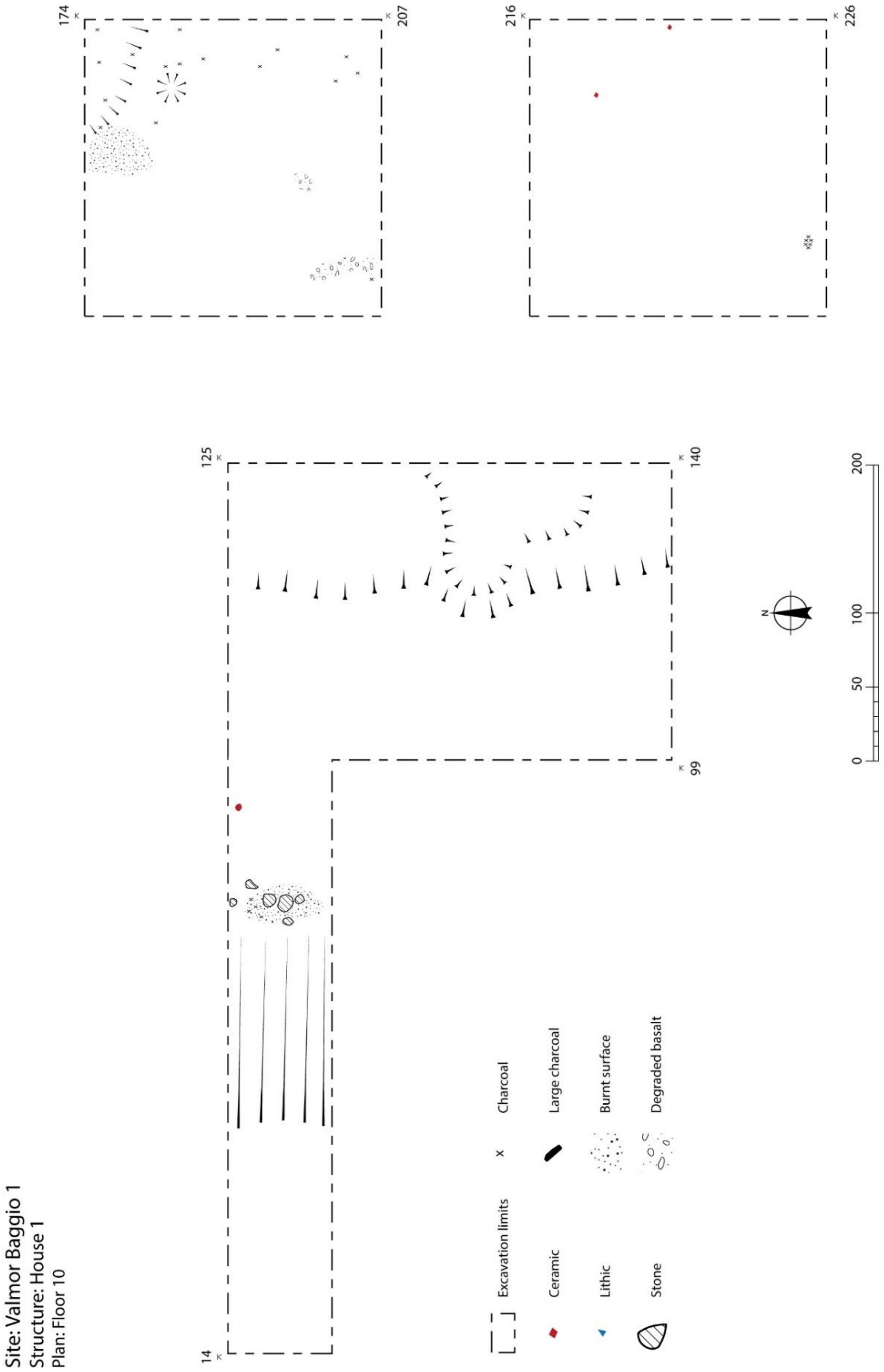


Figure 6.13 Plan of Floor 10, House 1.

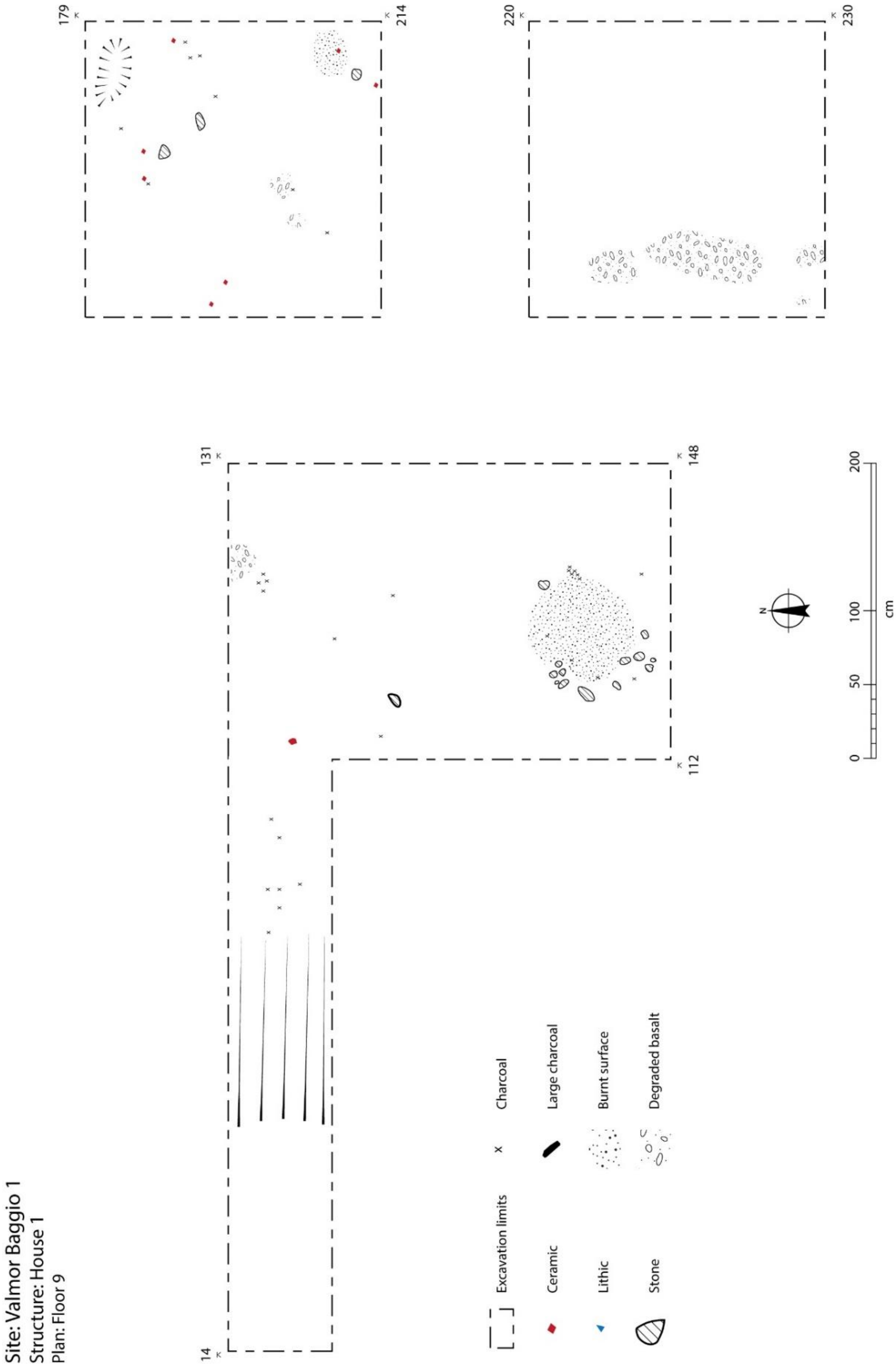


Figure 6.14 Plan of Floor 9, House 1.

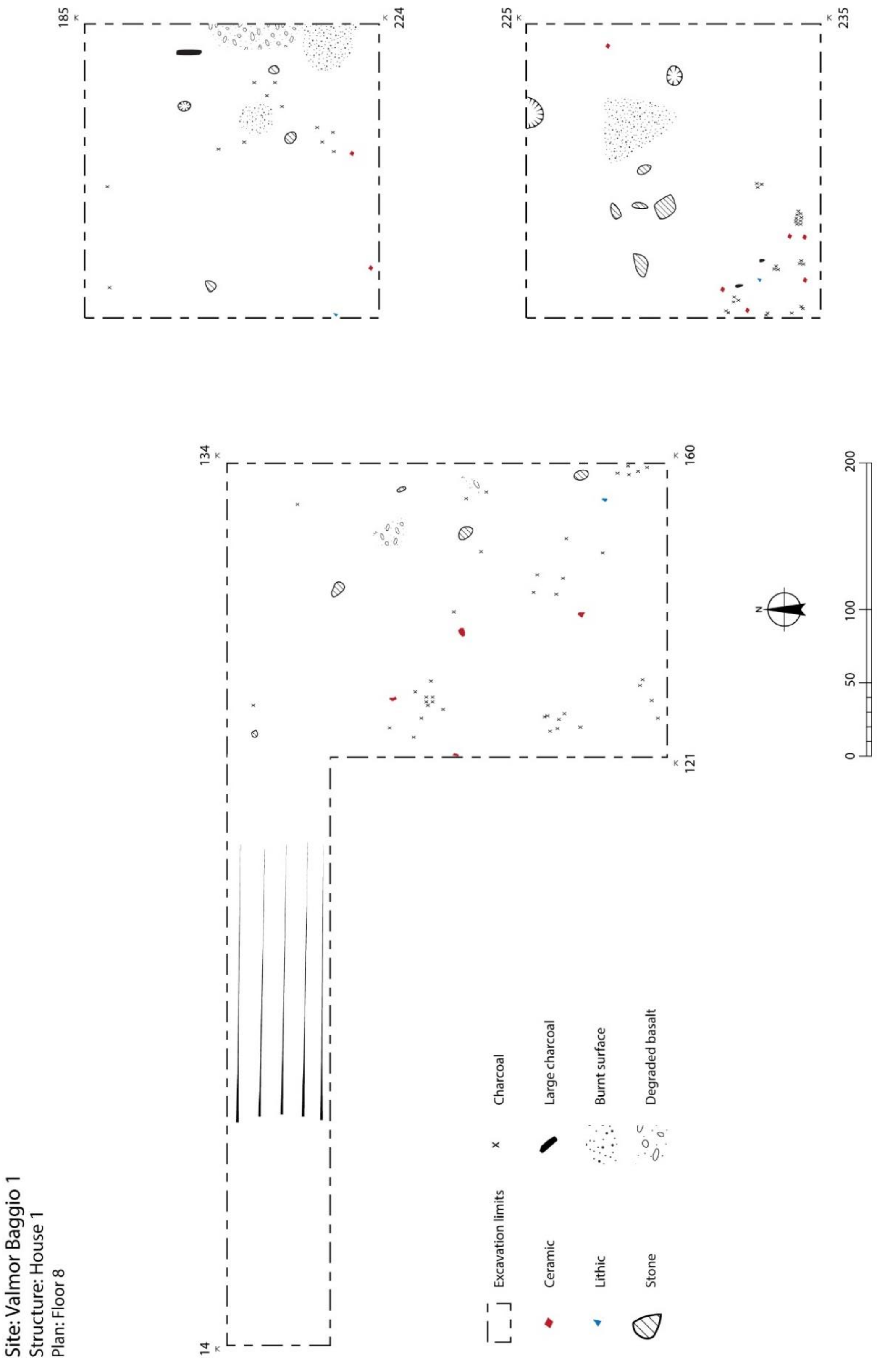


Figure 6.15 Plan of Floor 8, House 1.

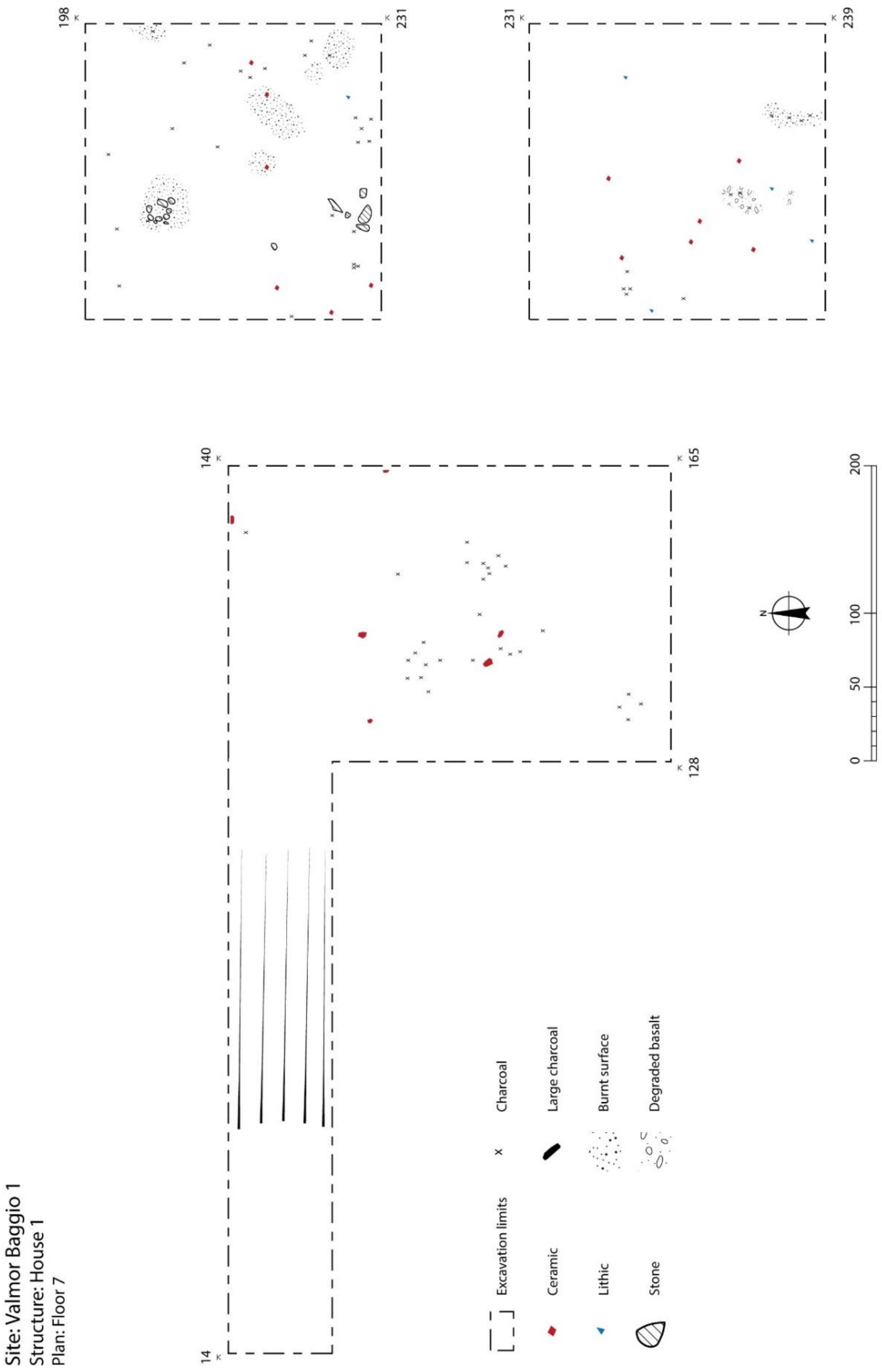


Figure 6.16 Plan of Floor 7, House 1.

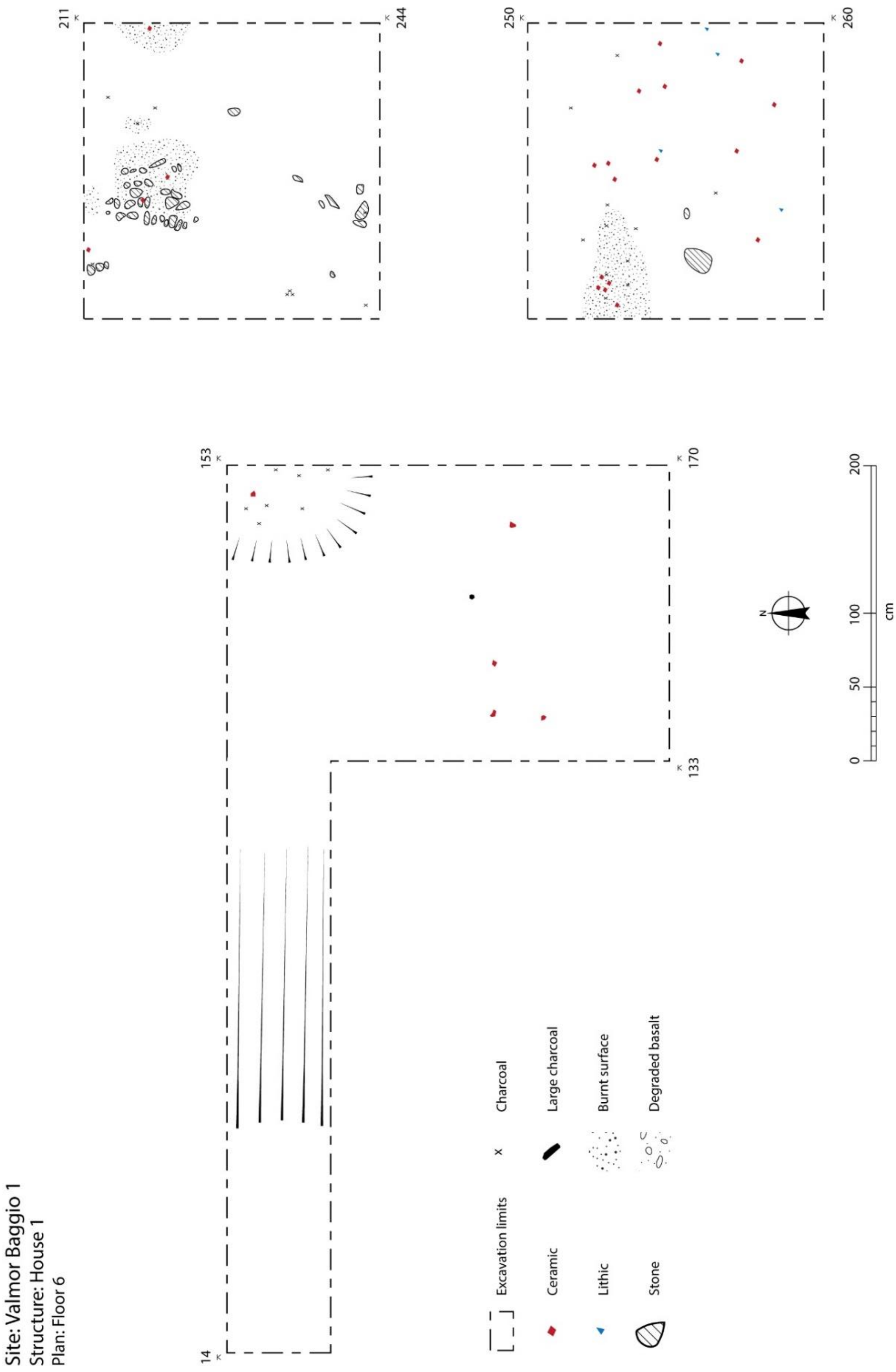


Figure 6.17 Plan of Floor 6, House 1.

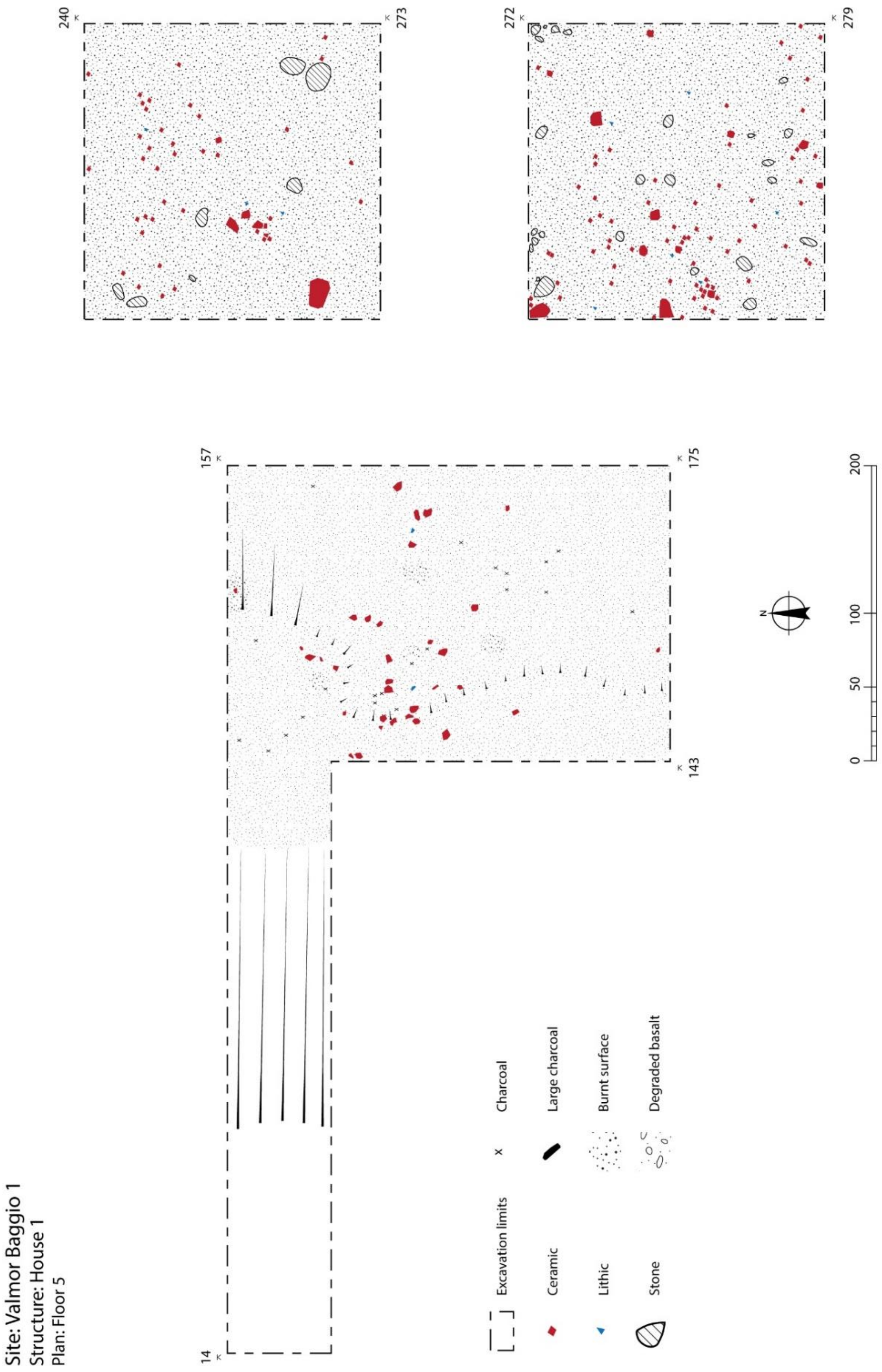


Figure 6.18 Plan of Floor 5, House 1.

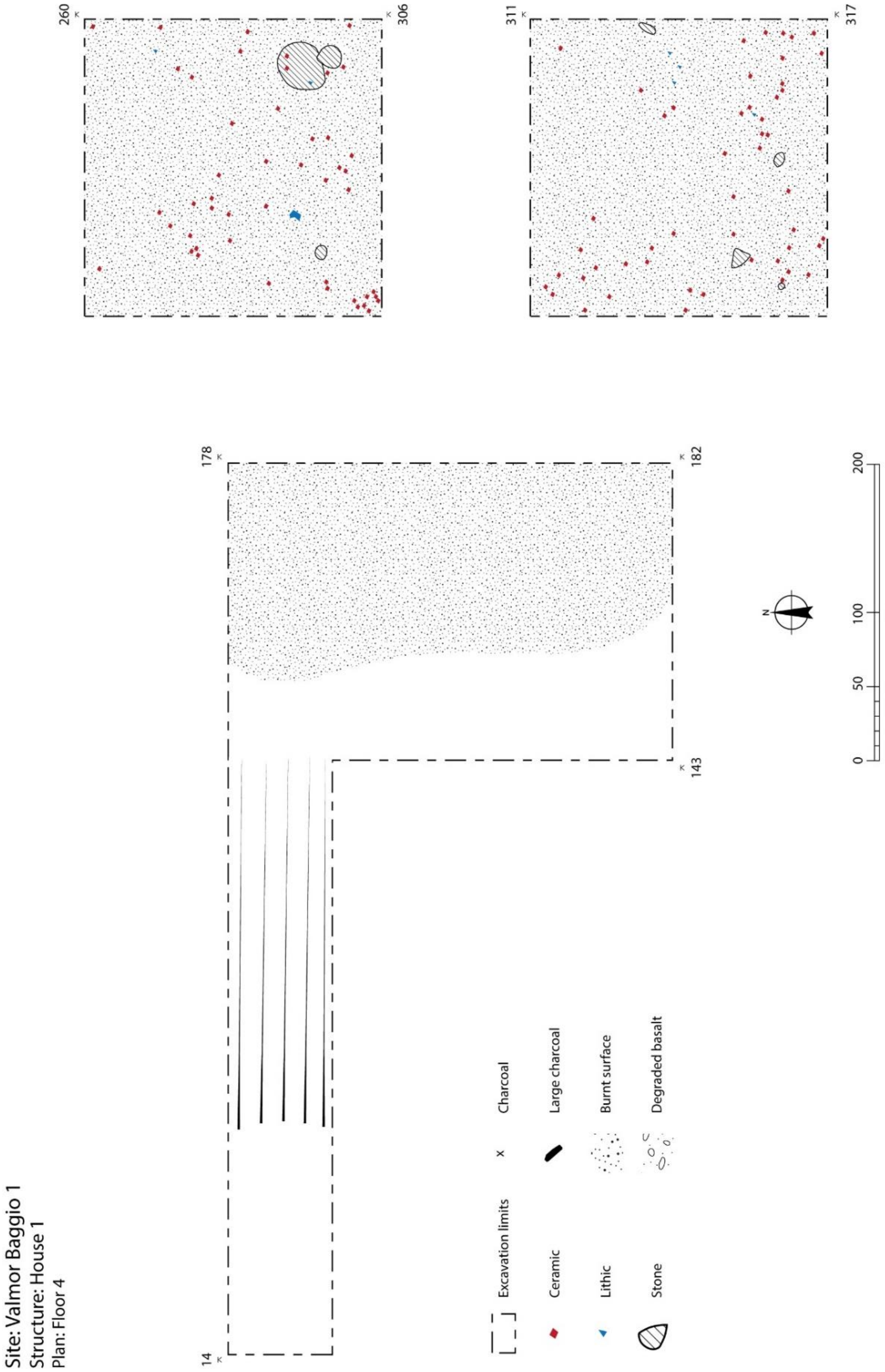


Figure 6.19 Plan of Floor 4, House 1.

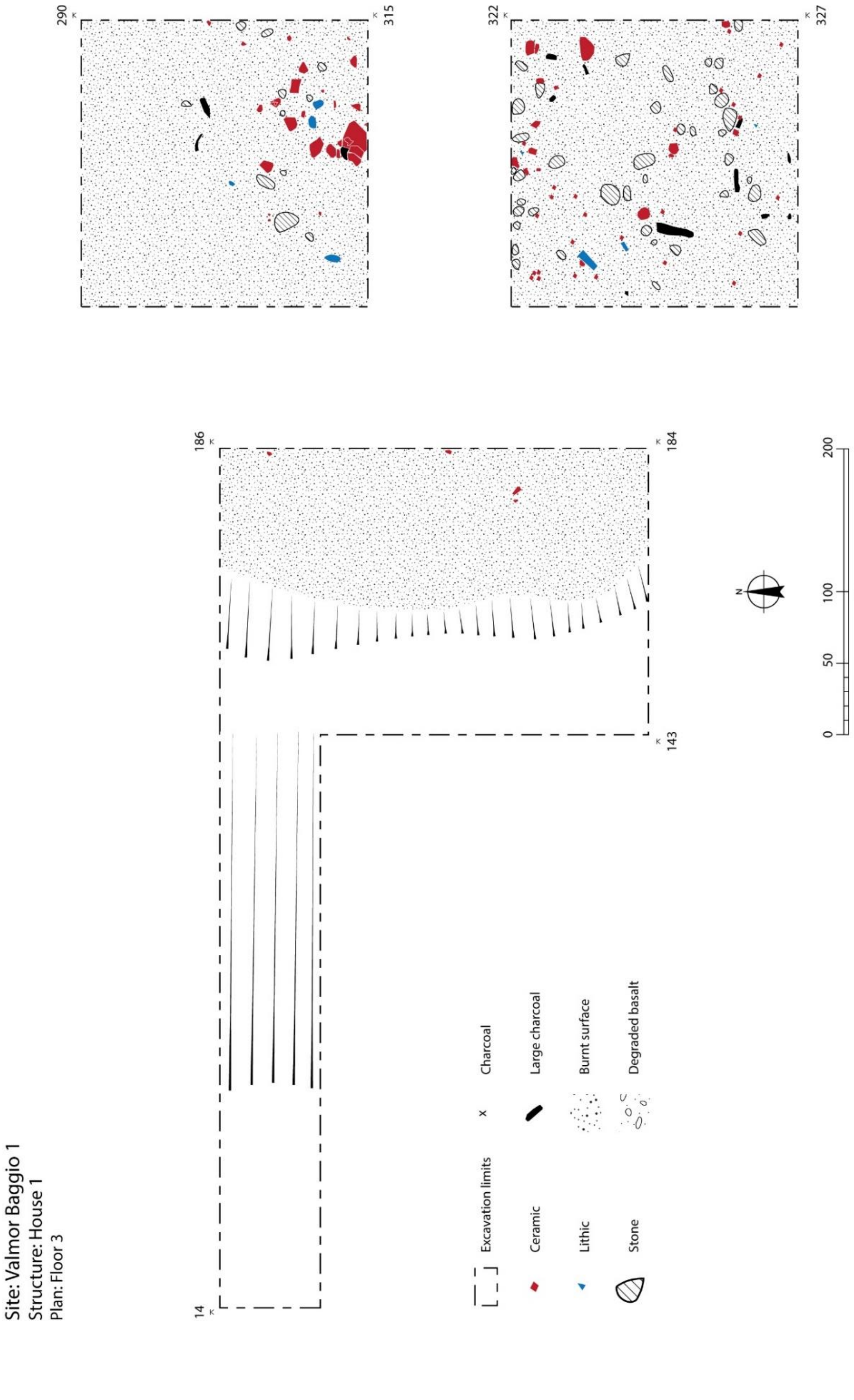


Figure 6.20 Plan of Floor 3, House 1.

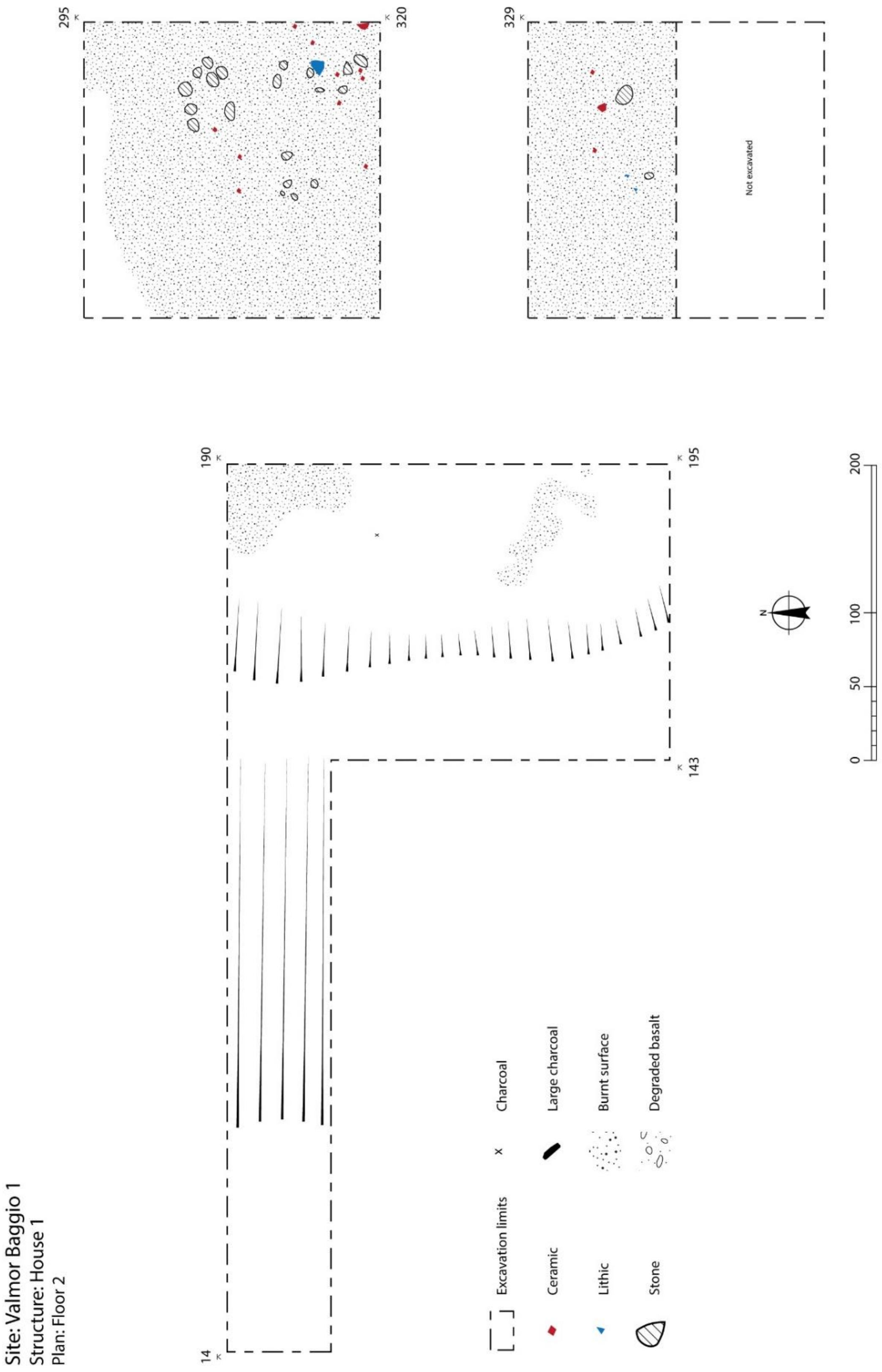


Figure 6.21 Plan of Floor 2, House 1.

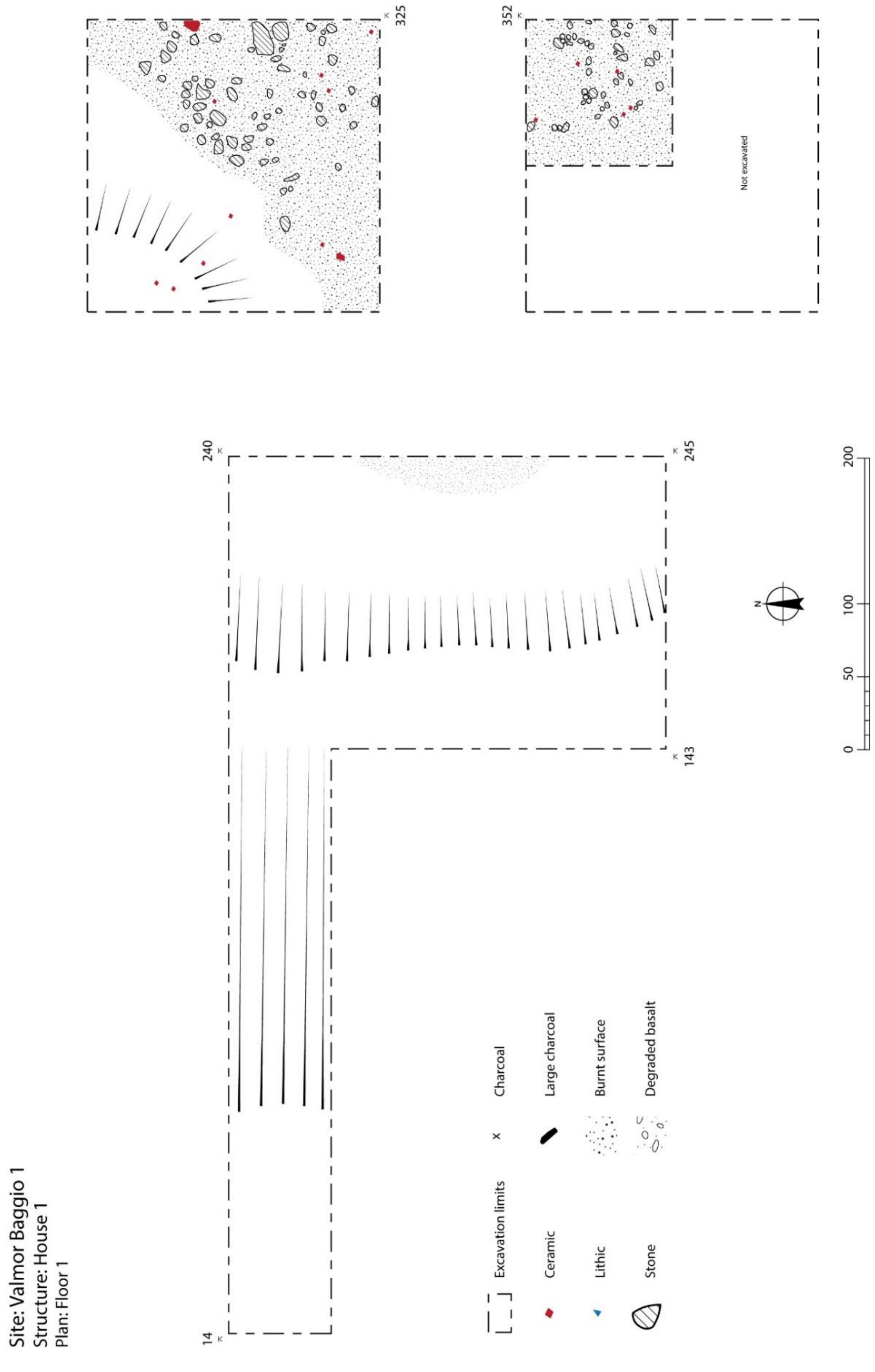


Figure 6.22 Plan of Floor 1, House 1.

House 2

The excavations in House 2 consisted of a block of 2 x 2 m placed near the centre of the depression, extended by a 1 x 0.5 m trench towards the northern edge of the structure in order to obtain a complete profile of the original walls (Figure 6.1). The post-abandonment levels occupied the first 30 cm excavated, consisting of the humic layer and modern top soil with grass roots and recent charcoal. Unlike the post-abandonment layers of House 1, House 2 had no archaeological artefacts in its top levels.

After the removal of the post-abandonment levels, the terminal occupation of House 2 was exposed: **Floor 4** (h = 61), the last in a sequence of living floors. As in House 1, the floors of House 2 were compacted clay surfaces on top of which lay artefacts and features, and were separated from occupations above and below by friable, sterile clay fills (subfloors). The centre of Floor 4 was a dark grey, compact surface, with a few ceramics, lithics, charcoal and burnt clay inclusions on top of it. This area was encircled by a red clay transition to the natural horizon below, evidencing the circular outline of the original walls of the pit house (Figure 6.23a, Figure 6.25).

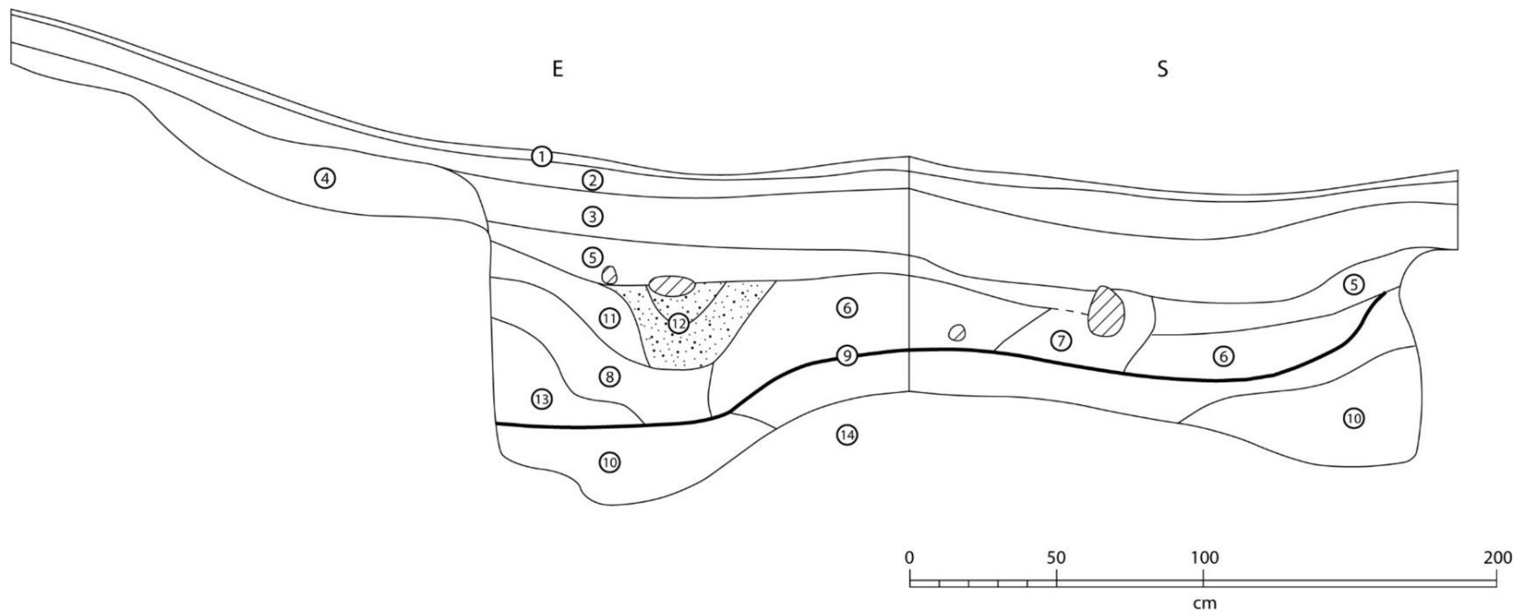
After the removal of the loose clay fill that composed the subfloor of Floor 4, a previous occupation (**Floor 3**, h = 64) was exposed. This was another hard-packed clay surface with charcoal, ceramics and rocks on its surface (Figure 6.26). The floor was restricted to the centre of the house, encircled by the original walls of the structure excavated in the natural horizon.

Floor 2 (h = 77) was different from the previous ones, containing clear architectural features: a bench with 12 small post holes, between 5 and 10 cm diameter, and a large post hole (approximately 20 cm diameter) overcutting the original wall of the structure (Figure 6.23b-c, Figure 6.27). The bench did not consist of the same material as the original walls, but was a remodelling constructed in some parts with very hard packed clay, and in others with looser red clay. The central feature of Floor 2 was a large fire pit filled with loose, dark soil containing charcoal, many ceramic sherds, lithics and large rocks. Near its southern edge, a cluster of stones suggested a post support. The fire pit continued through the next levels. Its top occupied most of Floor 2, except for the bench, and was about 120 cm diameter, whereas its base was narrower, ca. 75 cm, with many large ceramic sherds.

The deepest floor of House 2, **Floor 1** (h = 136), was similar to the early floors of House 1: a heavily burnt surface with large ceramic sherds and basalt blocks on top of it (Figure 6.23d, Figure 6.30). This burnt floor lay on top of a hard clay fill with many orange clay inclusions, representing the transition to the underlying natural horizon and the original cut of the pit house.

Figure 6.23 Floors of House 2. a) Floor 4. The dashed line marks the outline of the original walls. b) Floor 2. Notice the bench dotted by post holes around the large central fire pit. c) Another level of Floor 2, approaching the base of the fire pit. d) Floor 1. Notice the extensive burning.

Site: Valmor Baggio 1
Structure: House 2
Sections: East and South



Description of contexts

1 - Humic (O)
2 - Modern top soil (A) with roots and charcoal
3 - Friable silty clay with roots - 7.5 YR 4/6
4 - Reddish clay - 5 YR 4/6
5 - Compact clay with charcoal and burnt clay - 5 YR 3/4
6 - Hard packed clay - 5 YR 3/4
7 - Compact clay with basalt inclusions - 7.5 YR 3/4
8 - Loose clay with charcoal - 5 YR 4/4
9 - Heavily burnt floor with hard clay as matrix - 5 YR 4/6
10 - Hard clay with orange inclusions - 5 YR 4/6
11 - Friable clay with no inclusions - 5 YR 4/6
12 - Fire pit with charcoal and burnt clay - 7.5 YR 4/4
13 - Loose clay with charcoal - 5 YR 4/6
14 - Plastic clay (natural) - 2.5 YR 4/6

Figure 6.24 Stratigraphic profile drawing of the east and south sections of House 2.

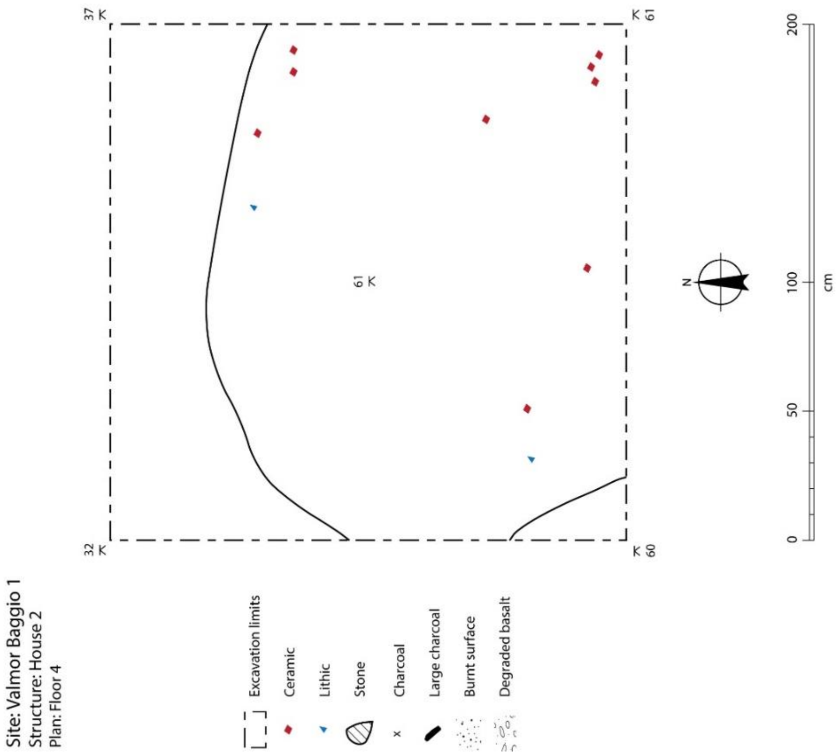


Figure 6.25 Plan of Floor 4, House 2.

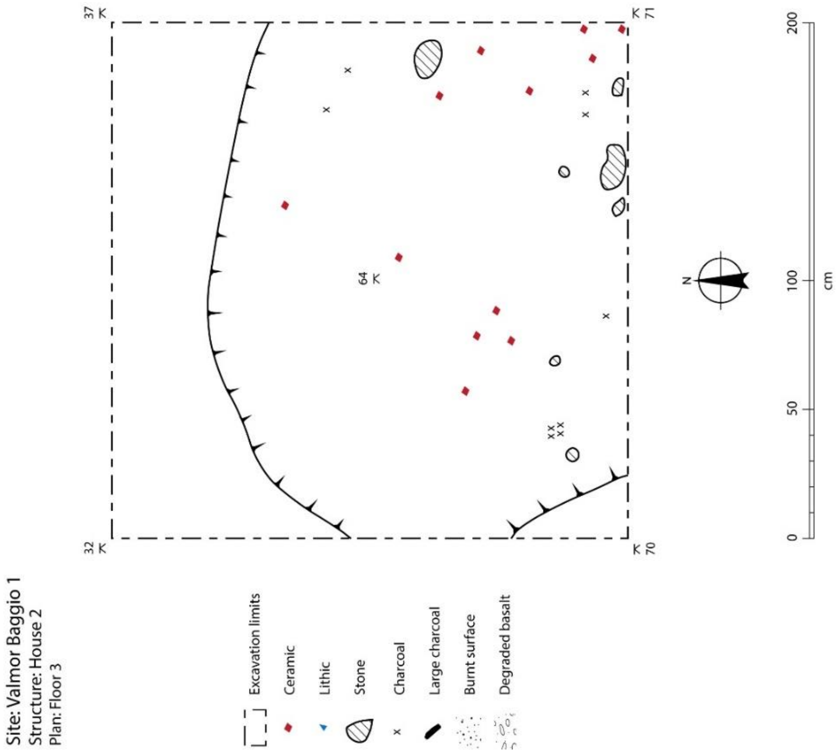


Figure 6.26 Plan of Floor 3, House 2.

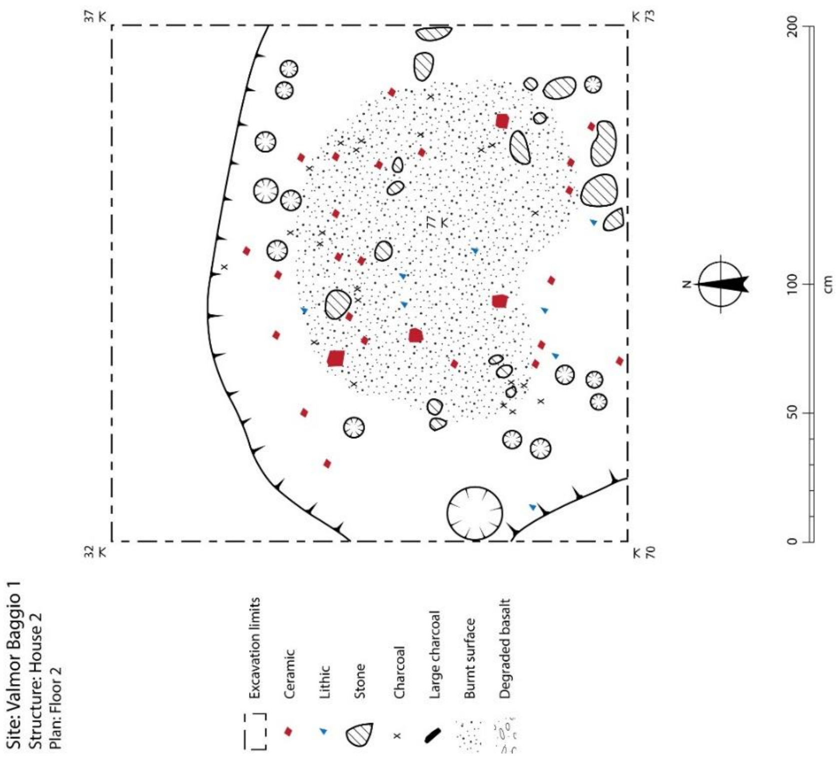


Figure 6.27 Plan of Floor 2, House 2.

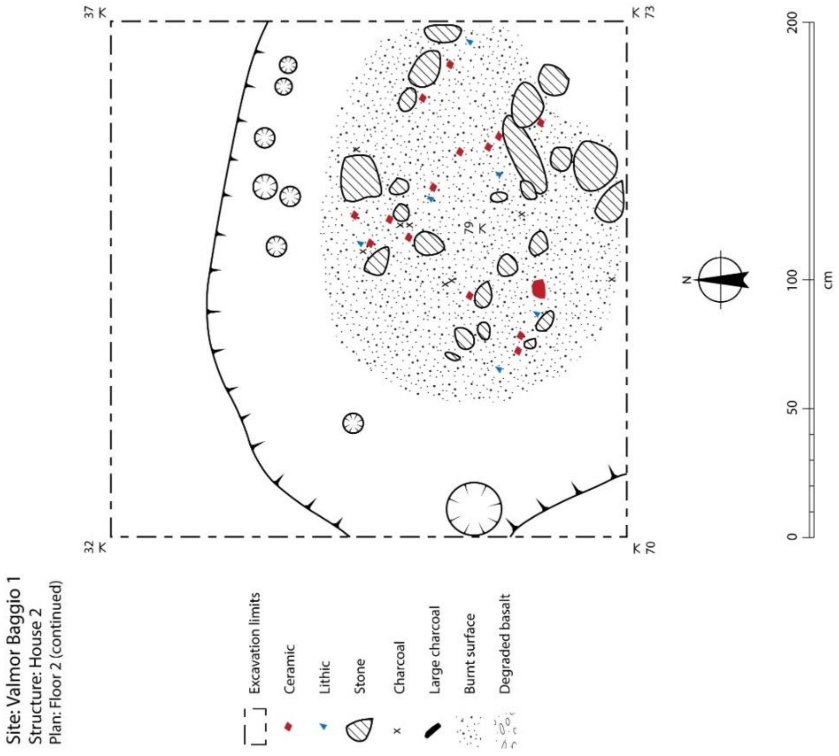


Figure 6.28 Plan of Floor 2, House 2 (continued).

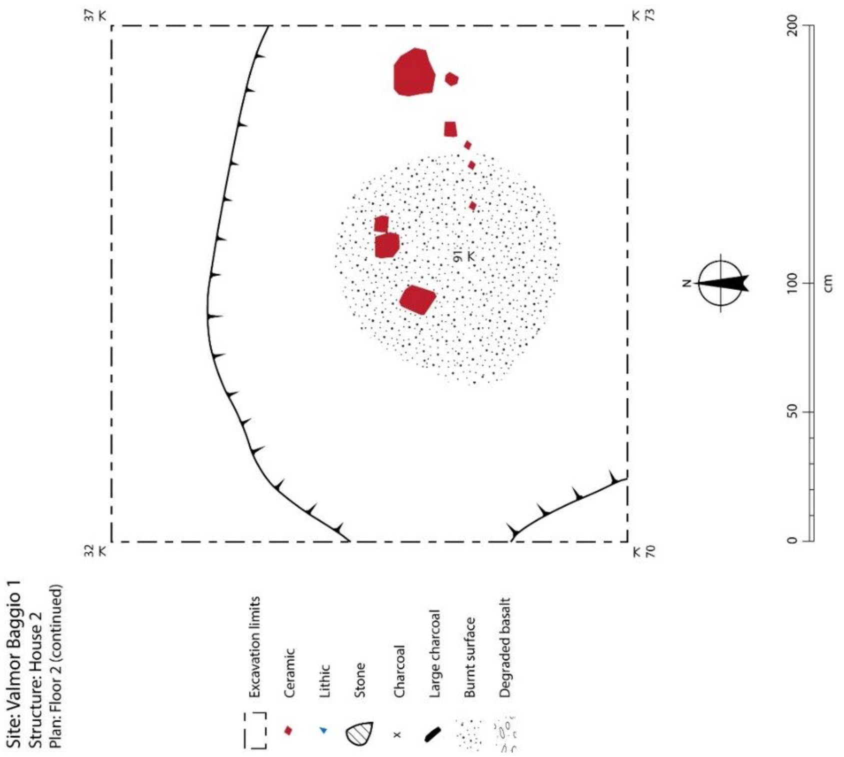


Figure 6.29 Plan of Floor 2, House 2 (base of fire pit).

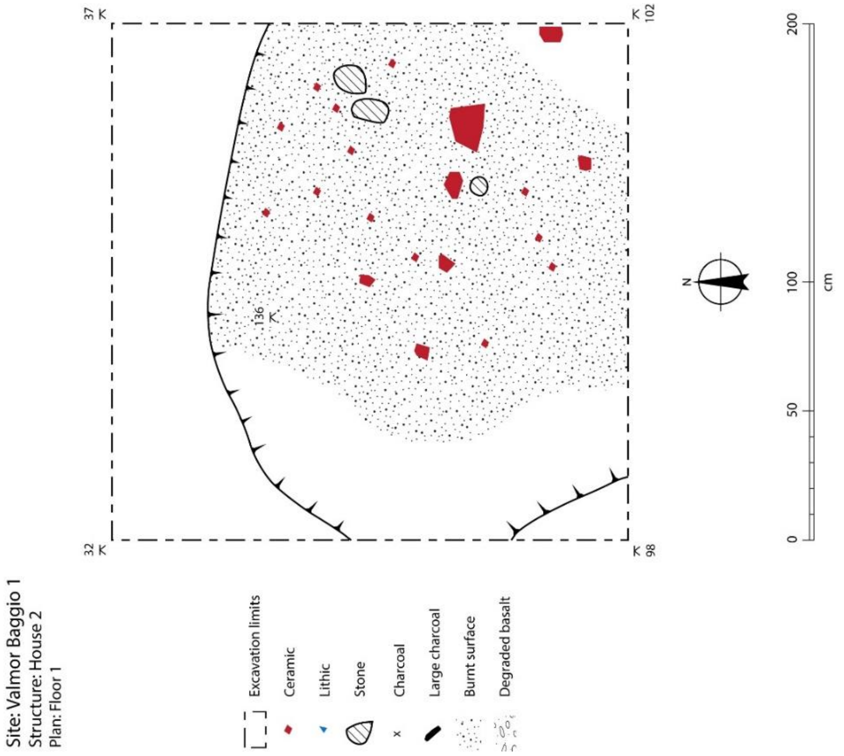


Figure 6.30 Plan of Floor 1, House 2.

House 3

The excavations in House 3 consisted of a block of 2 x 2 m placed near the centre of the depression (Figure 6.1).

The first 40 cm comprised the humic layer and modern top soil formed after the abandonment of the structure. These levels contained recent charcoal and were highly disturbed by large roots. The terminal occupation of the structure, numbered **Floor 10** (h = 43), appeared as in House 2: a dark, compact clay surface with charcoal and ceramics on its top, encircled by the red clay of the natural horizon where the walls of the pit were originally excavated (Figure 6.33).

Following the pattern of other pit houses excavated in the inner precinct, the later floors of House 3 consisted of compact, dark surfaces with artefacts, charcoal and features, and separated from other floors by loose, sterile clay fills. In general, the density of artefacts was very low – some floors only being recognised by the presence of charcoal.

Floor 9 (h = 60) was a dark surface covered with many charcoal flecks and some burnt patches (Figure 6.34). Near the northern wall of the house, a small bench was constructed of extremely hard-packed, lighter clay, creating a short step between the centre and the edge of the pit house. **Floor 8** (h = 73) was a dark, compact clay layer with many charcoal flecks, nodules of burnt clay, ceramic sherds and lithics scattered throughout its surface (Figure 6.35). Below that level, **Floor 7** (h = 79) was almost completely devoid of finds except for the northern half of the pit house, where a large fire pit, ca. 80 cm diameter, was filled with dark soil, charcoal and abundant nodules of burnt clay (Figure 6.36).

Floor 6 (h = 92) had as its matrix a compact orange clay whose surface was littered with charcoal. The northern half of the floor contained a basin-shaped fire pit filled with charcoal and heavily burnt in its centre (Figure 6.31a, Figure 6.37). Ceramic sherds occurred associated with the edges of the fire pit. On the western corner, this floor contained a basin-shaped feature filled with burnt clay and minuscule, fragile calcinated bones amidst very loose, grey soil.

Beneath Floor 6, a very thick brown clay fill with few inclusions covered **Floor 5** (h = 130). This floor was a very compact clay surface covered by small, discrete burnt patches associated with some charcoal, ceramic sherds and lithics. A single post hole, approximately 15 cm diameter, was located close to the western wall of the structure (Figure 6.31b, Figure 6.38).

The first four floors of House 3 followed a distinct pattern. They consisted of relatively thin and very dark, friable layers with abundant charcoal and large rocks. These surfaces were separated from each other by thick, extremely compact and sterile orange clay fills – very similar to the natural horizon of the structure's walls.

Floor 4 (h = 146) was a thin layer of very loose, dark grey soil with clusters of charcoal, burnt patches, and large rocks, all concentrated near the centre of the pit house (Figure 6.31c, Figure 6.39). After the removal of the hard-packed orange clay matrix beneath this floor, the next level, **Floor 3** (h = 164) was exposed, consisting of another dark layer with abundant charcoal restricted to the centre of the pit (Figure 6.40). Beneath that level, **Floor 2** (h = 195) was recognised as a central area of dark grey, loose soil with charcoal, surrounded by the orange clay matrix of the subfloor fills (Figure 6.41). As the excavation continued through these deepest floors, it was found that the walls of House 3 were no longer vertical, making the base of the structure progressively wider than its opening (Figure 6.32). Its profile became bell-shaped, with an abrupt change in the south of the structure, where the inclination of the walls created a niche or chamber. The deepest floor of House 3, **Floor 1** (h = 221), contained a large central basin-shaped fire pit excavated in the natural red clay horizon mixed with degraded yellow basalt (Figure 6.31d, Figure 6.42). The fire pit was filled with several lenses of charcoal associated with large nodules of burnt clay. It was surrounded by large rocks, lithics and ceramic sherds.

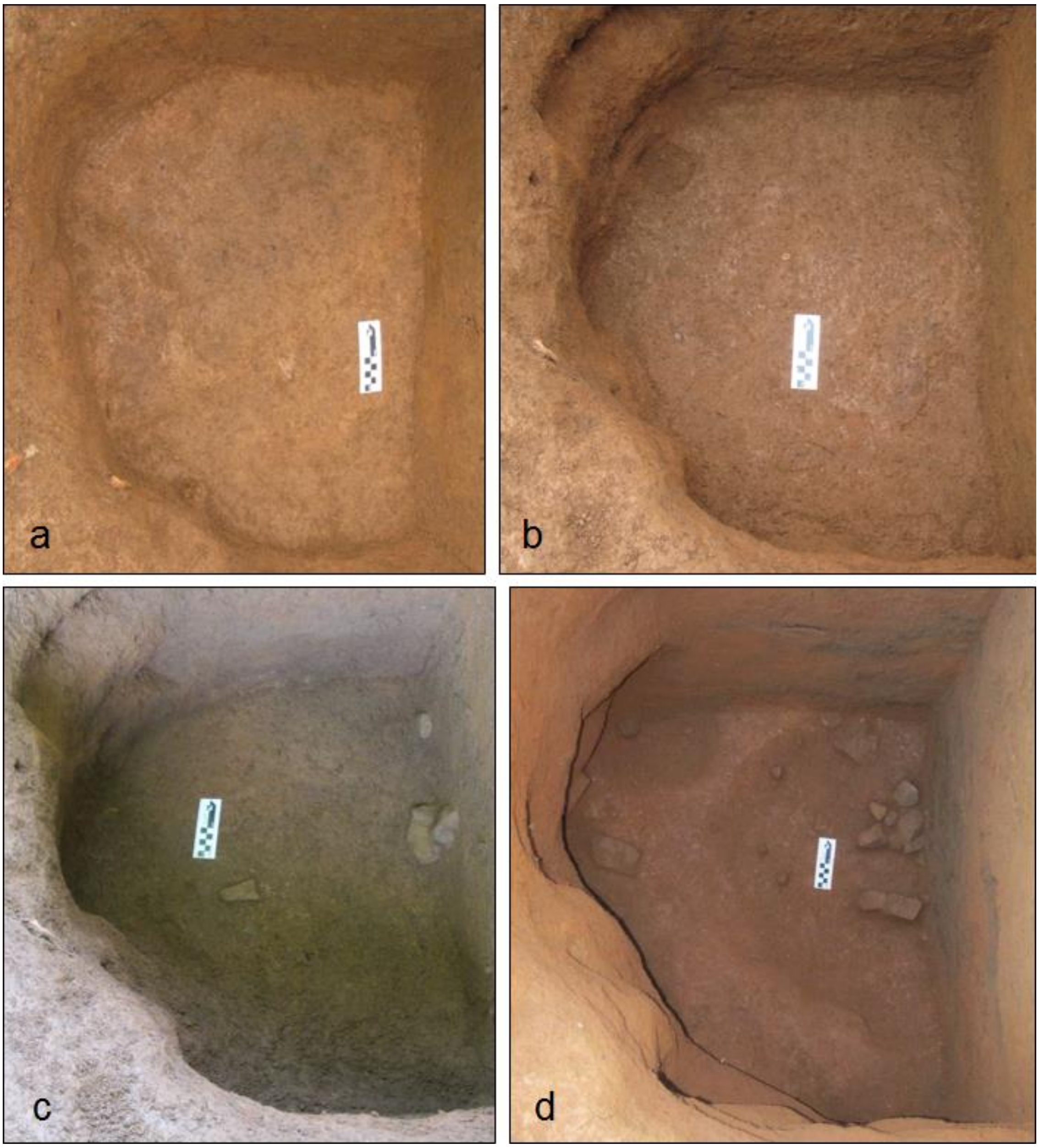
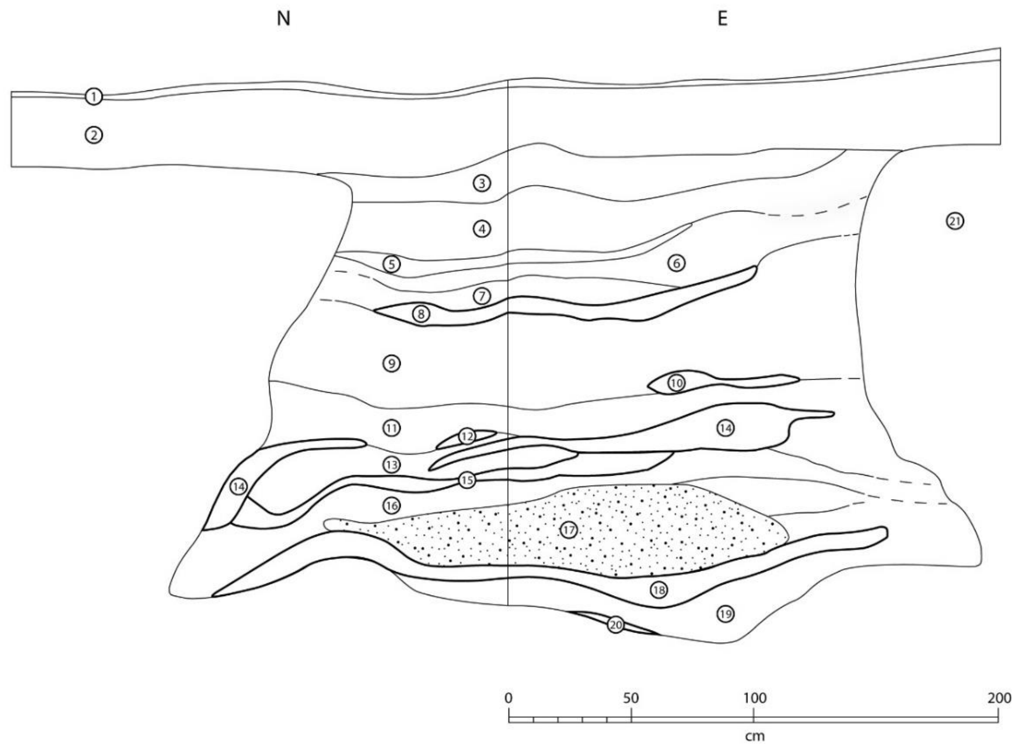


Figure 6.31 Floors of House 3. a) Floor 6, with fire pit and ash-filled feature. b) Floor 5. Notice the small post hole next to the wall. c) Floor 4, with large rocks and burning. d) Floor 1, with large central fire pit already clear of fill, but large rocks and ceramics still in place.

Site: Valmor Baggio 1
Structure: House 3
Sections: North and East



Description of contexts

1 - Humic (O)
2 - Modern top soil (A) with roots and charcoal - 7.5 YR 3/3
3 - Compact silty clay with charcoal and artefacts - 7.5 YR 3/4
4 - Charcoal and nodules of burnt earth - 7.5 YR 3/4
5 - Orange clay - 5 YR 4/6
6 - Friable brown clay with charcoal - 7.5 YR 3/4
7 - Orange clay - 5 YR 4/4
8 - Dark compact clay with charcoal - 7.5 YR 3/4
9 - Friable brown clay with charcoal - 7.5 YR 3/4
10 - Dark compact clay with charcoal - 7.5 YR 3/4
11 - Orange clay - 5 YR 4/4
12 - Burnt lens with charcoal - 7.5 YR 3/4
13 - Orange clay - 5 YR 4/6
14 - Friable, dark layer with charcoal - 7.5 YR 3/2
15 - Friable, dark layer with charcoal - 7.5 YR 3/2
16 - Orange clay - 5 YR 4/6
17 - Fire pit with charcoal and burnt clay - 7.5 YR 3/3
18 - Friable, dark layer with charcoal - 7.5 YR 3/2
19 - Orange clay - 5 YR 4/6
20 - Friable, dark layer with charcoal - 7.5 YR 3/2
21 - Hard, reddish clay with degraded basalt (natural) - 5 YR 4/6

Figure 6.32 Stratigraphic profile drawing of the north and east sections of House 3.

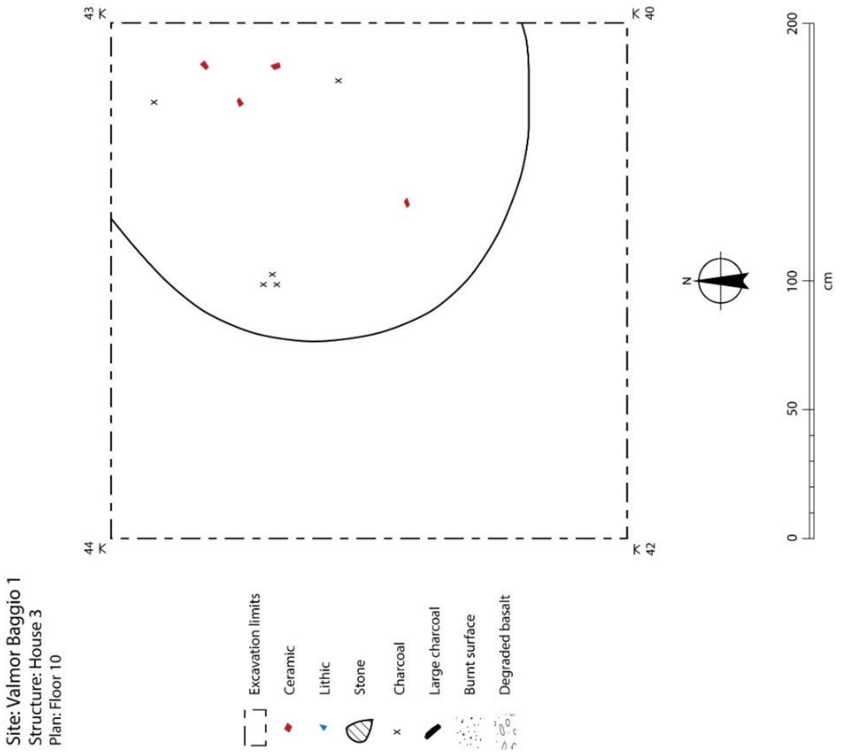


Figure 6.33 Plan of Floor 10, House 3.

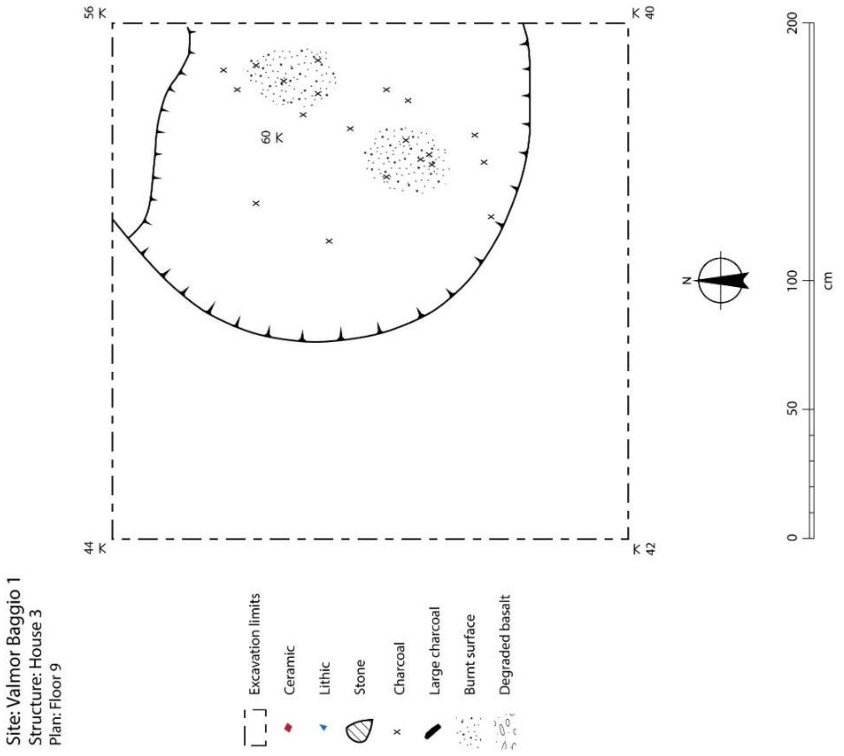


Figure 6.34 Plan of Floor 9, House 3.

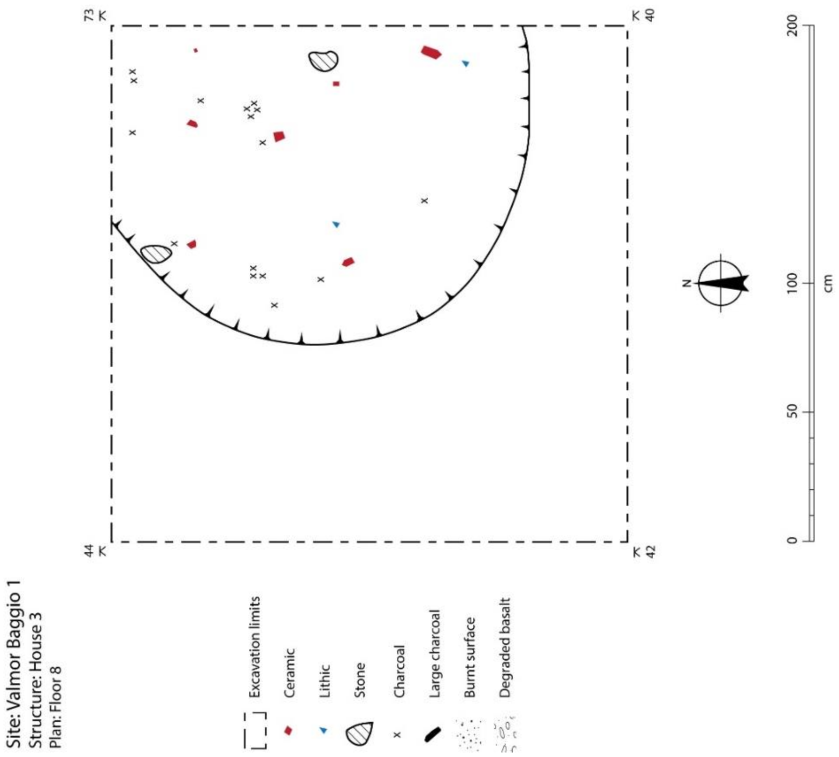


Figure 6.35 Plan of Floor 8, House 3.

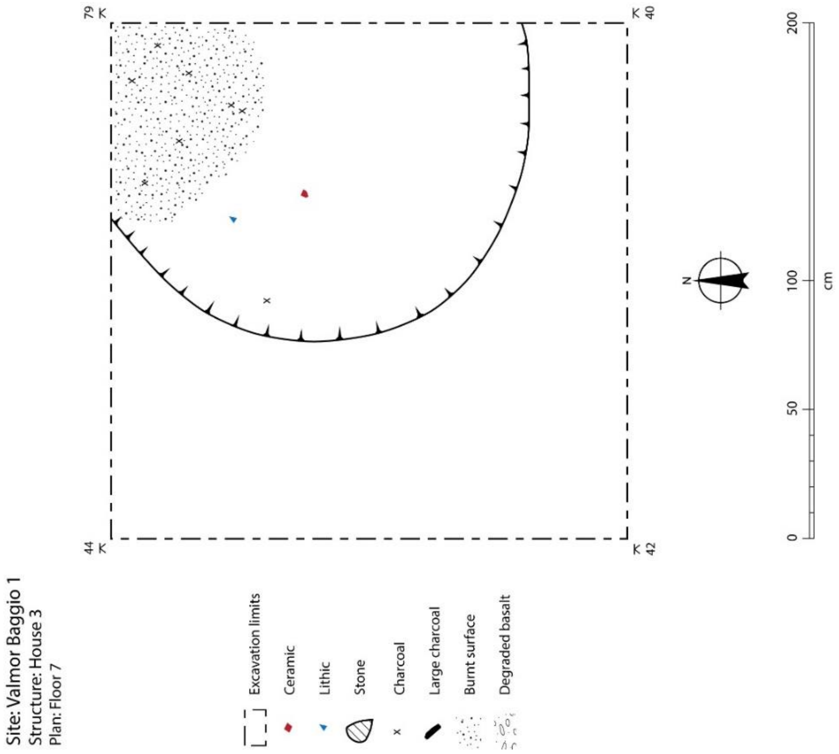


Figure 6.36 Plan of Floor 7, House 3.

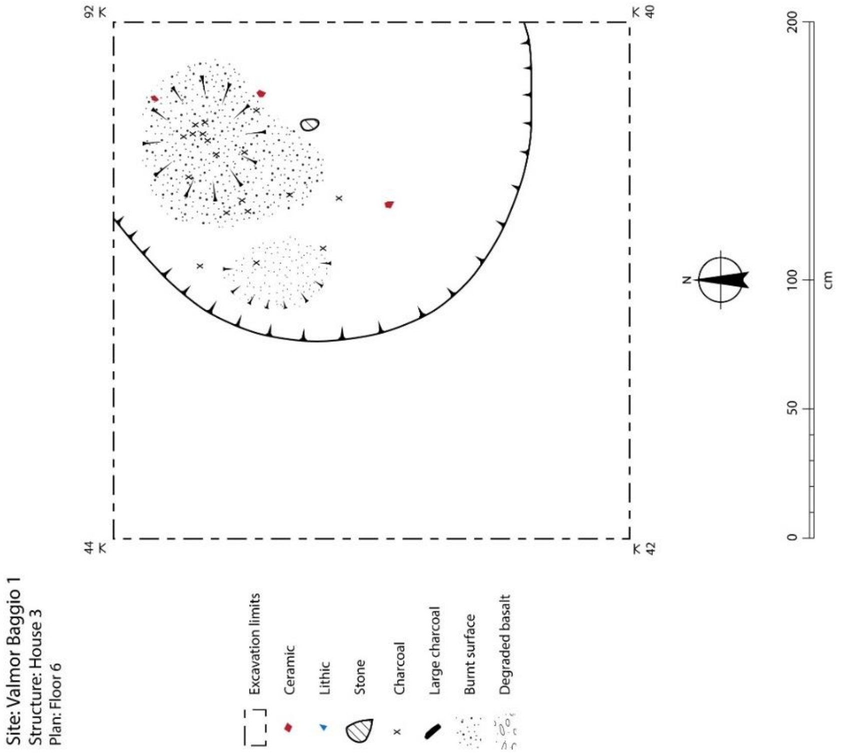


Figure 6.37 Plan of Floor 6, House 3.

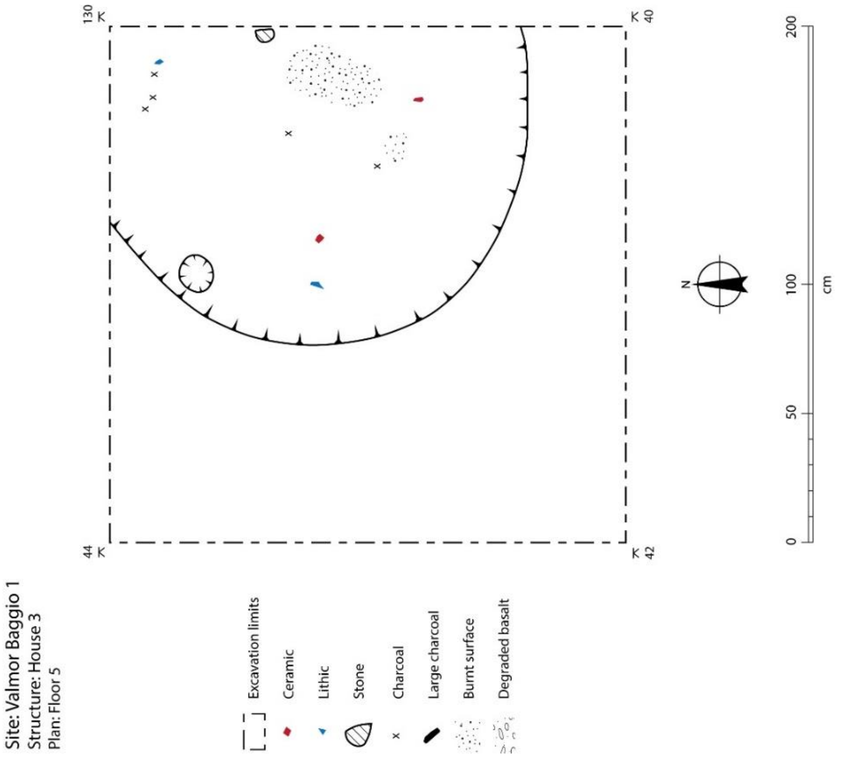


Figure 6.38 Plan of Floor 5, House 3.

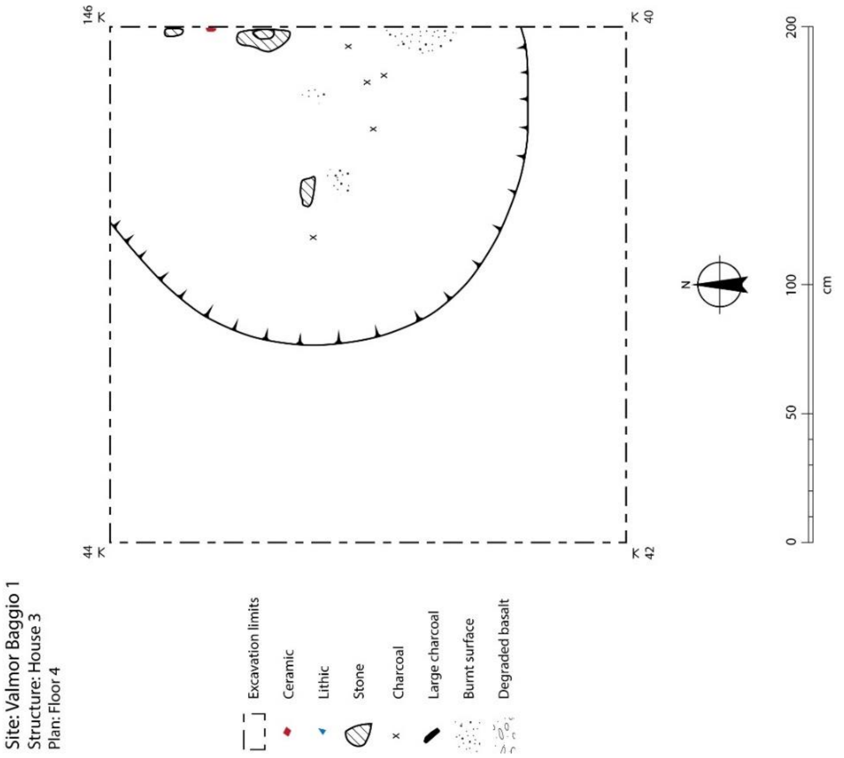


Figure 6.39 Plan of Floor 4, House 3.

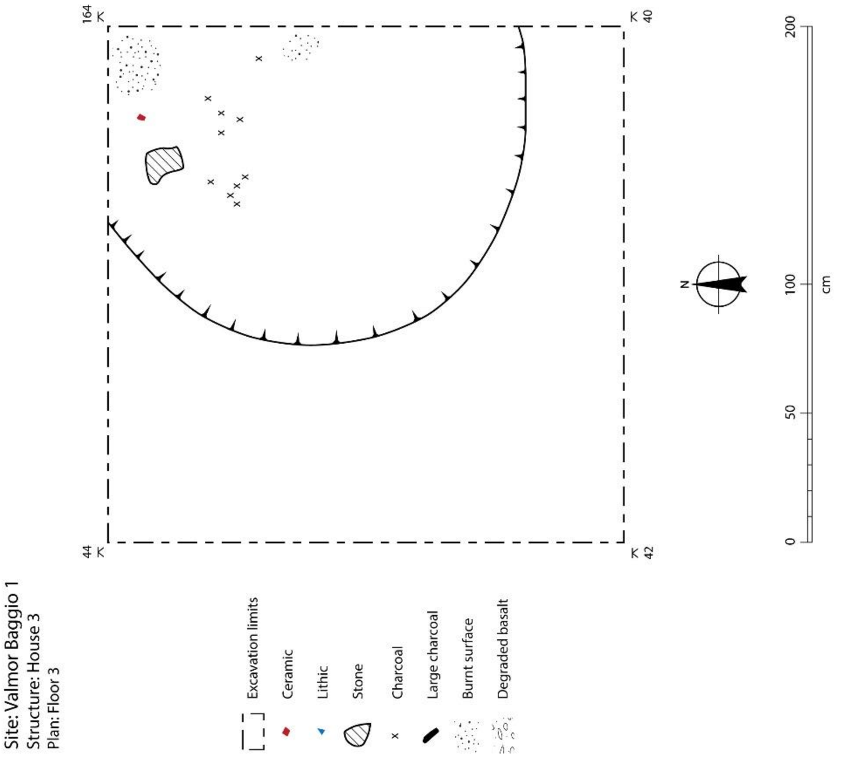


Figure 6.40 Plan of Floor 3, House 3.

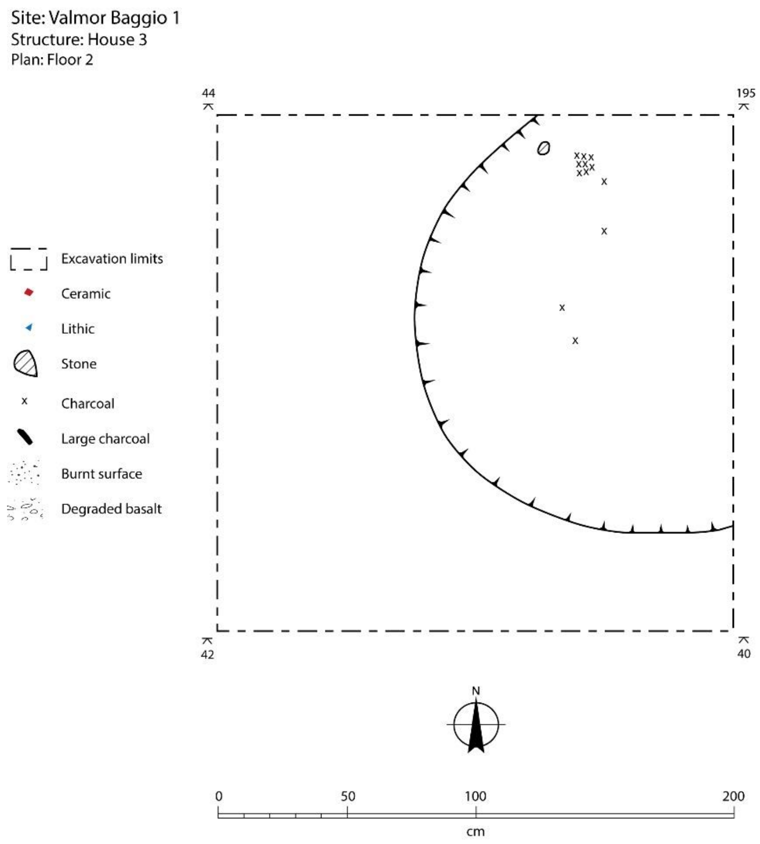


Figure 6.41 Plan of Floor 2, House 3.

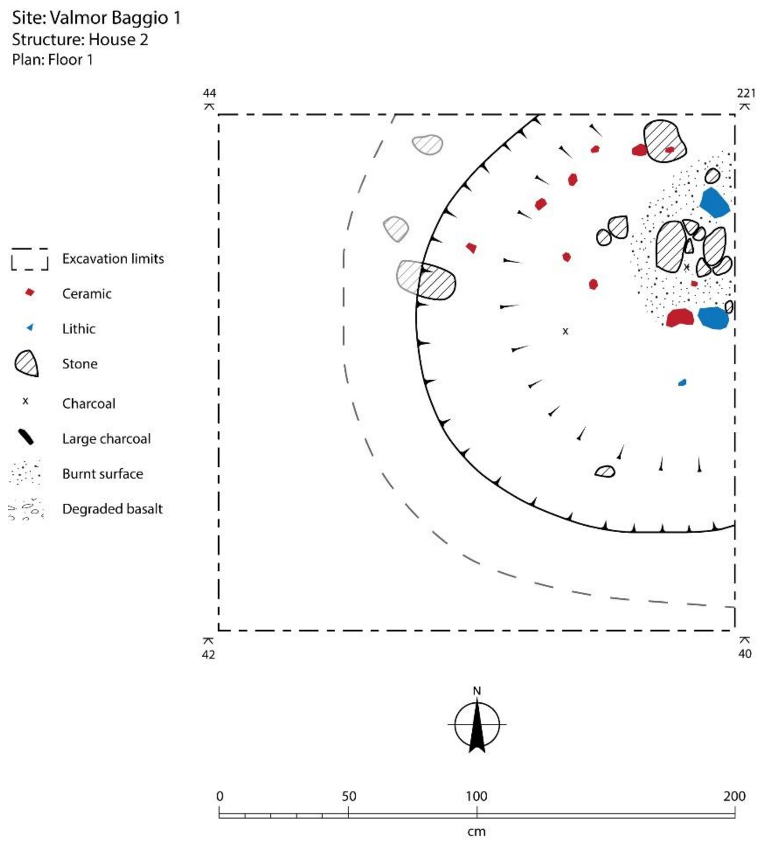


Figure 6.42 Plan of Floor 1, House 3.

Mound A

The excavations in the U-shaped Mound A consisted of two trenches. One of them (Trench A), measuring 9 x 0.75 m, was placed so as to cross the point where one of the “wings” joins the main platform. Parallel to this, another trench (Trench B), measuring 4 x 1 m, was extended towards the summit of the main platform (Figure 6.1).

The humic layer and modern top soil were very shallow, no deeper than 10 cm on the top of the mound and its “wing”. In the slopes of the mound, the modern top soil was up to 30 cm deep. After the removal of the upper levels, a continuous layer of degraded yellow basalt mixed with clay was exposed (Figure 6.43a). All the artefacts – very fragmented ceramic sherds and lithics – were found laying on top of the yellow basalt, which constituted the original surface of the mound (Figure 6.45).

In Trench B, close to the base of the main platform, a basin-shaped feature in the yellow basalt surface was noticed. It was filled with loose, dark soil and contained some charcoal associated with very large basalt flakes and numerous small ceramic sherds belonging to two small vessels (Figure 6.43b). Apart from this cache, the degraded basalt layer contained no archaeological materials or features, consisting purely of construction fill. Not even charcoal was present. At the top of the mound and its annex, this basalt construction fill was 60 cm thick.

In the main platform, the yellow basalt layer was on top of yet another construction fill – this one made of extremely friable red clay. This level was also sterile in artefacts or features. As in the fill above, it did not event contain charcoal. Beneath these two construction events, the natural horizon was exposed, consisting of a compact red clay with small degraded basalt inclusions (Figure 6.43c). Overall, the stratigraphy of the mound can be seen as an inversion of the natural stratigraphy of the local nitosols – reddish clay (B) followed by yellow degraded basalt (C) before reaching the basalt bedrock. However, no top soil (A) lens was observed at the base of the mound, which would further reinforce the stratigraphic inversion. In any case, it is likely that the mound was formed using materials excavated during the construction of pit houses. Other mounds investigated in pit house settlements show the same stratigraphic inversion, but with multiple layers of A horizon – indicating that each time a new pit house was dug, the dirt was added to the mound (Copé, 2006, p. 254). This was not observed in Mound A, suggesting that it possibly resulted from a single pit house excavation event –most likely that of House 1, given its dimensions.

Figure 6.43 Excavations at Mound A. a) Original surface of the mound, constructed with yellow basalt. b) Feature with flakes, sherds and charcoal. c) Natural horizon at the base of the mound.

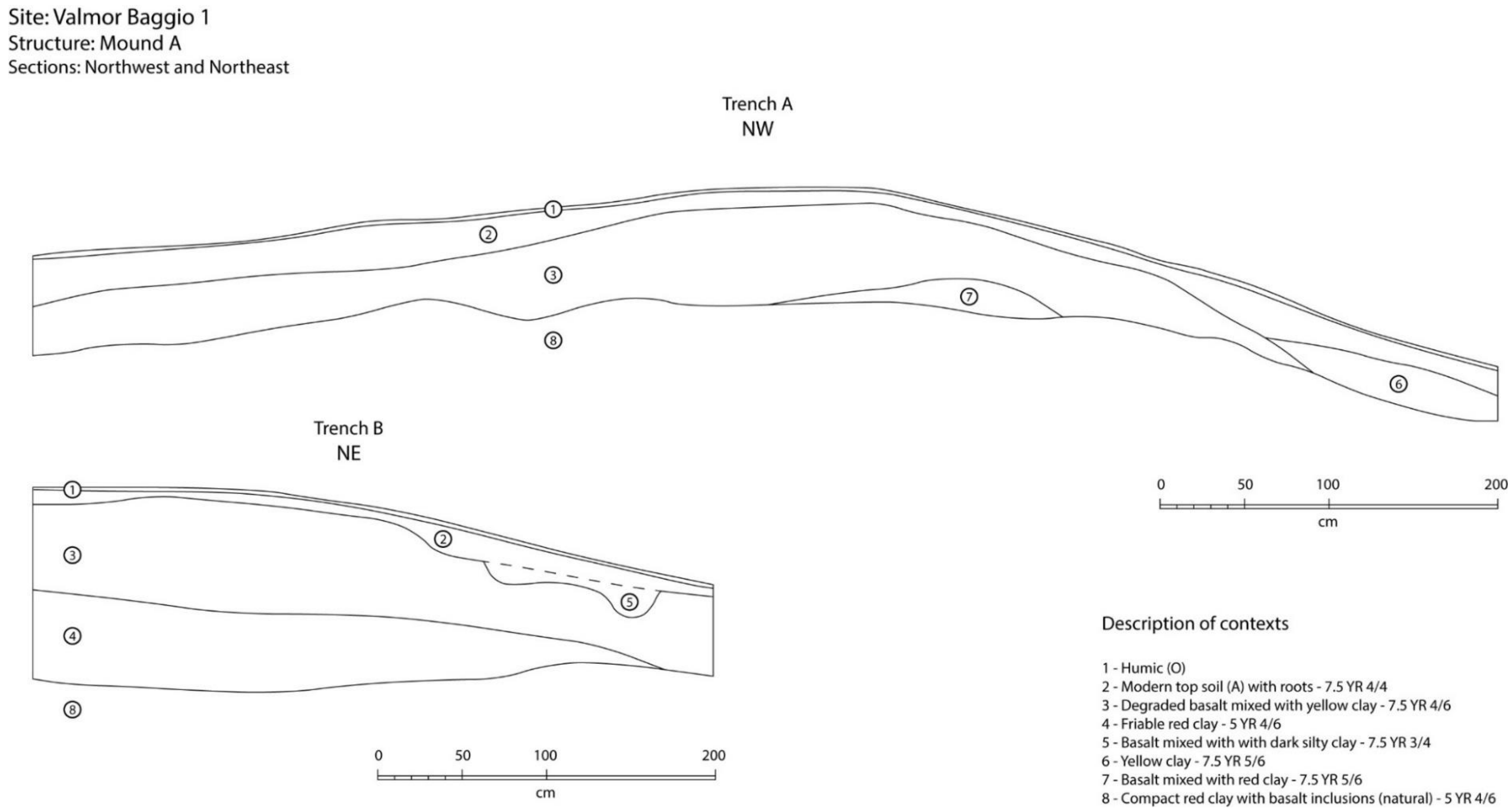


Figure 6.44 Stratigraphic profile drawing of the northwest and northeast sections of Mound A.

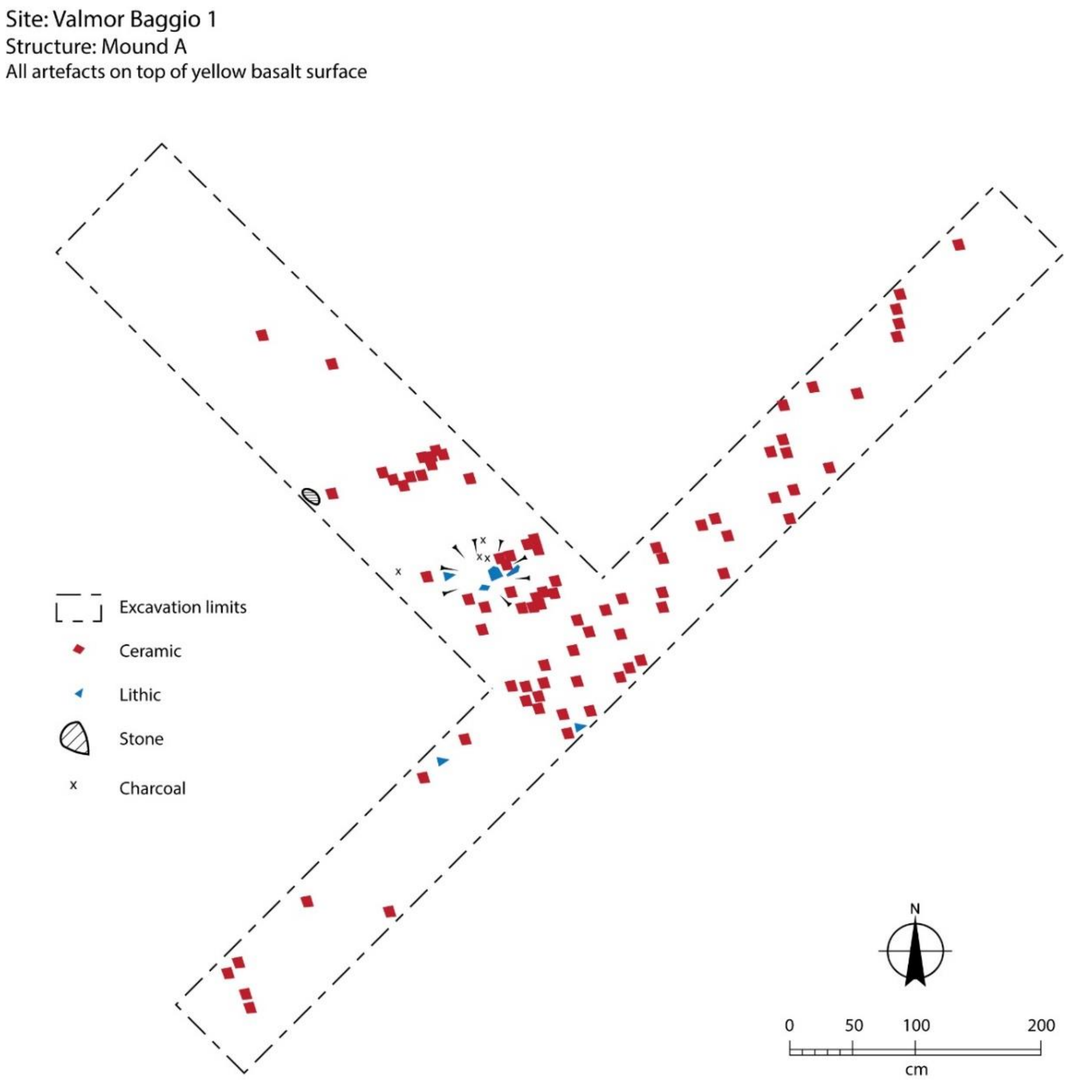


Figure 6.45 Plan of Mound A.

Mound B

The excavations at Mound B – a low circular platform located to the north of House 1 – consisted of a 3 x 1 m trench placed at one of the points where the platform was higher, sectioning it from the base to the summit (Figure 6.1).

After the removal of the humic layer and top soil – very shallow at the top of the mound, but up to 30 cm thick in the slope – the original surface of the structure was uncovered, built with a compact red clay (Figure 6.46a). Many ceramic sherds were associated with the recent fill, laying directly on top of the original mound's surface, especially at the base of the mound, where they were clustered together with a large quartz crystal and abundant charcoal (Figure 6.48). Artefacts and charcoal were also mixed in the construction fill, although restricted to its upper levels. Different layers of construction were identified, all composed of similar red clay fills. At approximately 75 cm depth from the top of the platform, the natural horizon was reached – a very compact red clay with degraded basalt inclusions (Figure 6.46b).

Figure 6.46 Excavations at Mound B. a) Original surface of the mound exposed. c) Base of the mound on the natural horizon.

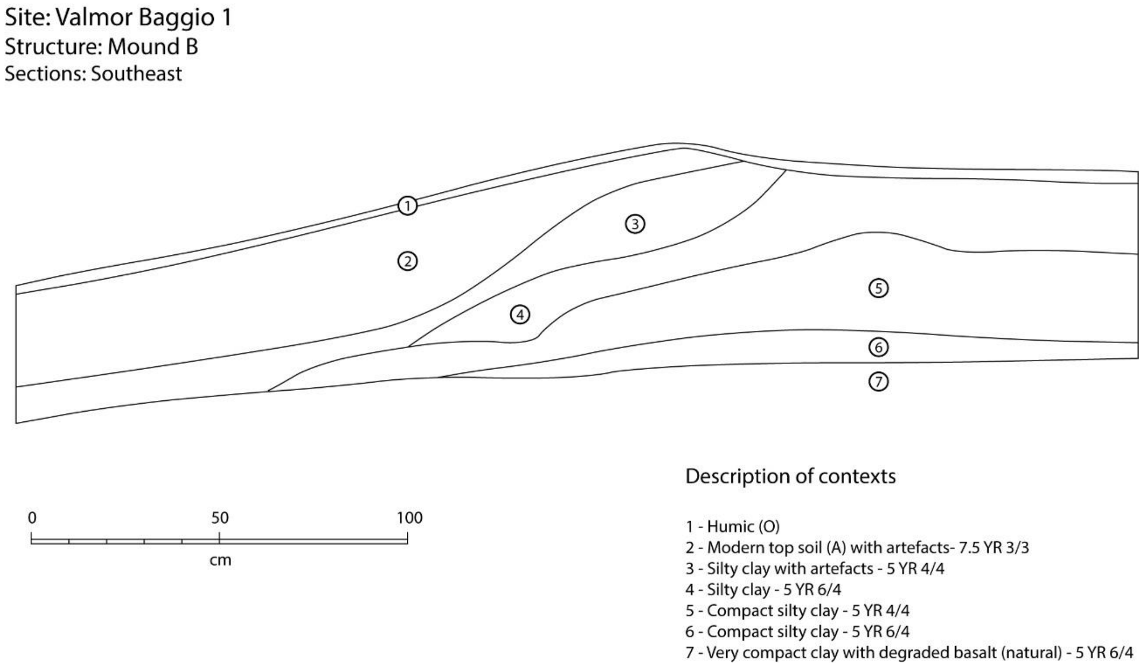


Figure 6.47 Stratigraphic profile drawing of the southeast section of Mound B.

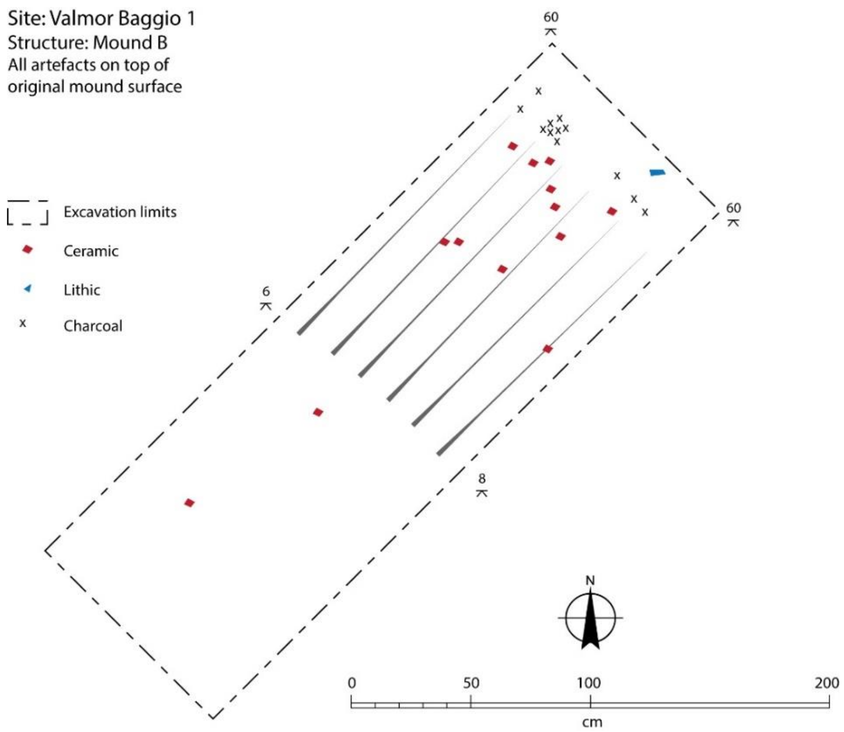


Figure 6.48 Plan of Mound B.

External areas of the inner precinct

A total of 49 test units of 1 x 1 m were laid out in a systematic grid over an area of 900 m^2, covering the areas between the pit houses of the inner precinct (Figure 6.1). The units were expanded whenever features were intercepted.

These external test units revealed several features and concentrations of lithics and ceramics. All artefacts and features lay on the transition between the modern top soil and the underlying natural horizon, between 10 and 20 cm deep.

Different types of features were located. Stone-lined fire pits occurred to the northwest and south of House 1. The first, located in unit 88/115, was a large stone cluster ca. 1 m diameter associated with some charcoal (Figure 6.49a). This feature was very similar to other stone-lined cooking facilities – variously called “fire places”, “earth ovens” and “combustion structures” – described for many southern proto-Jê contexts, both domestic (Schmitz et al., 2009, p. 215, 277; Schmitz et al., 2013b, p. 74-77, 123-125) and ceremonial (De Masi, 2009; Iriarte et al., 2008, p. 955-957). The second feature, located in unit 106/91 was a very small stone cluster, only ca. 20 cm diameter, on top of a charcoal layer (Figure 6.49b). Small hearths – burnt areas with abundant charcoal, but not associated with stones – were also located to the southwest of House 1, between the oversized structure and House 2, in units 88/97 and 88/101. The later was associated with many ceramic sherds.

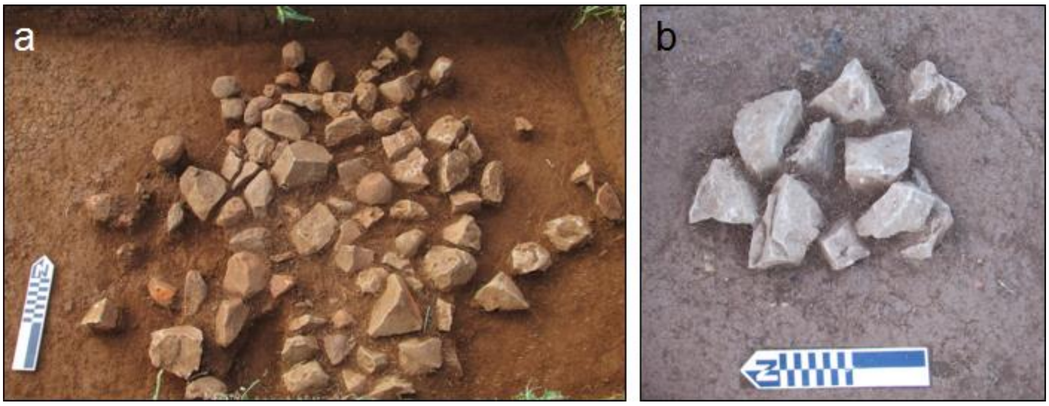


Figure 6.49 Features located in the external areas of the inner precinct. a) Large fire pit in unit 88/115. b) Small fire pit in unit 106/91.

The distribution of artefacts in the external areas partly coincides with the location of fire pits and hearths. Ceramics occured in practically all external test pits, but most of the units contained one or two sherds. In contrast, the area between Houses 1, 2 and 4 provided a much higher number of finds. Unit 84/101 alone contained 90 sherds, and the units in its surrounding also provided large amounts of ceramics (Figure 6.50). Lithics were less frequent, but similarly concentrated in the same area between houses 1, 2 and 4. This is the area where two small hearths were evidenced, indicating a possible activity area outside of the pit houses (Figure 6.50). The general distribution of finds in the external areas will be examined in Chapter 9.

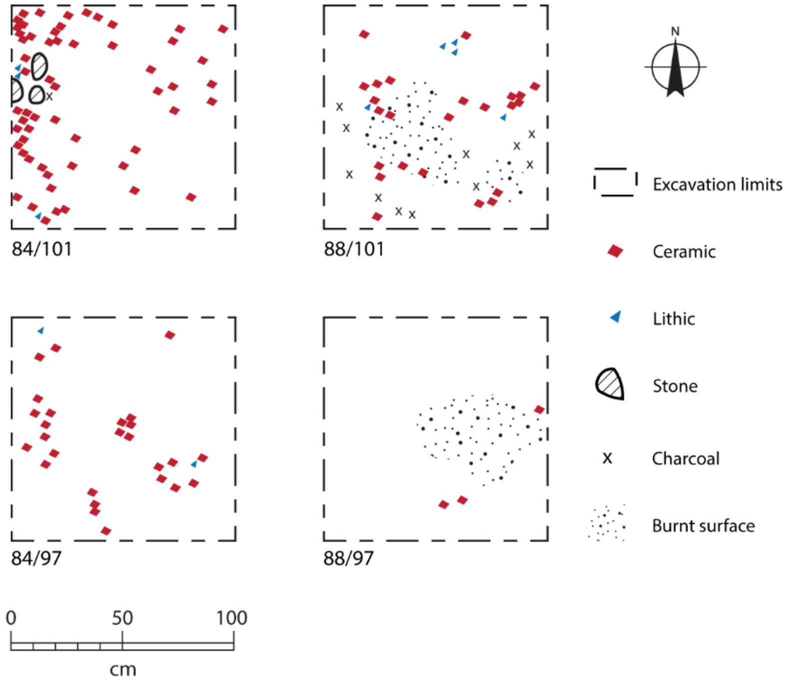


Figure 6.50 Plan of the excavations in part of the grid where four external test-pits contained the largest concentration of debris associated with hearths. N-S and E-W Distance between the test-pits is 3 m.

House 11

The excavations at House 11 consisted of a block of 2 x 2 m placed near the centre of the structure (Figure 6.1).

The top levels comprised the humic layer and modern top soil. The first 30 cm excavated contained charcoal associated with fragments of tiles, nails and historical ware (Figure 6.51a). This was the only sector of the site where the historical component was present. An old road crosses the peripheral area, and most of the houses are disposed along this trackway, which might explain the historical artefacts. Pit houses represent convenient locations for trash disposal and were commonly used as such in recent times (e.g. Copé, 2006, p. 201).

The terminal floor of the structure, numbered **Floor 5**, was exposed at 40 cm depth. The only feature of this occupation was a circular area of dark, loose soil with ca. 120 cm diameter at the centre of the pit house, associated with charcoal, but no archaeological artefacts (Figure 6.51b, Figure 6.53). The remaining area of the floor was a compact orange clay surface.

The central dark feature expanded in the subsequent levels. At 100 cm depth, it occupied all of the central area of **Floor 4**, encircled by the compact red clay of the natural horizon which constituted the original architecture of the pit house. A single basalt flake and ceramic sherd were found at this floor, associated with few charcoal flecks (Figure 6.54). Another floor, numbered **Floor 3**, was exposed at 145 cm depth. The floor was characterised by dark, loose loam filling all of the central area of the pit house, limited by the walls excavated in the natural hard clay horizon, and contained more charcoal associated with lithics and rocks (Figure 6.55).

The deepest floors of House 11 followed a different pattern. **Floor 2** (h = 165) was mostly covered by the same very dark and moist loam associated with charcoal, but had parts of it capped with hard-packed, baked red clay with many quartz inclusions (Figure 6.51c, Figure 6.56). A similar spread of red clay was found capping most of the central area of **Floor 1** (h = 185) and was littered with charcoal flecks. Charcoal was also present in the surrounding dark grey loam, where a single ceramic sherd and a large basalt block were found (Figure 6.51d, Figure 6.57). This floor lay on top of the original base of the structure.

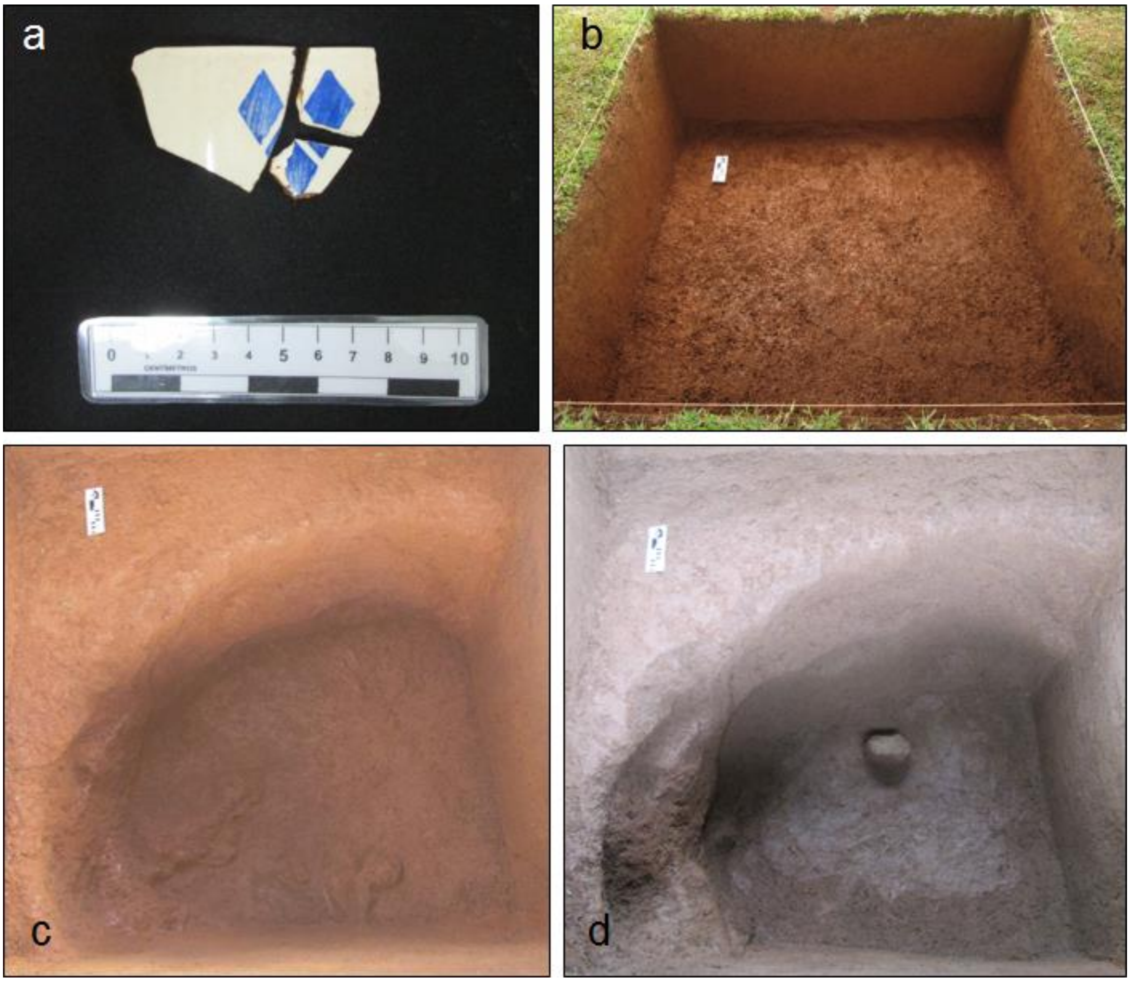


Figure 6.51 Excavations at House 11. a) Historical ceramic from the post-abandonment levels. b) Floor 5, with central dark area beginning to be evidenced. c) Floor 2. d) Floor 1.

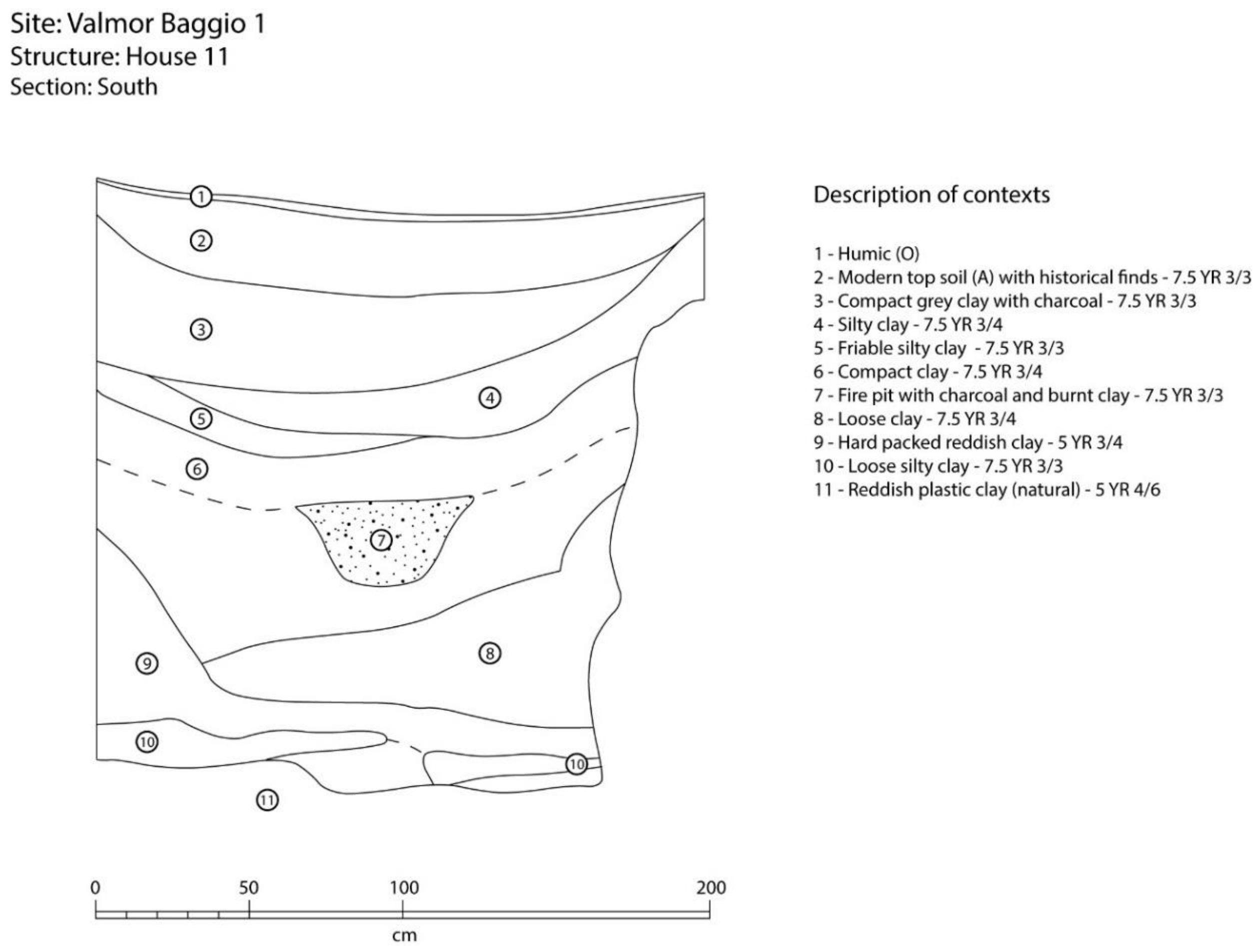


Figure 6.52 Stratigraphic profile drawing of the south section of House 11.

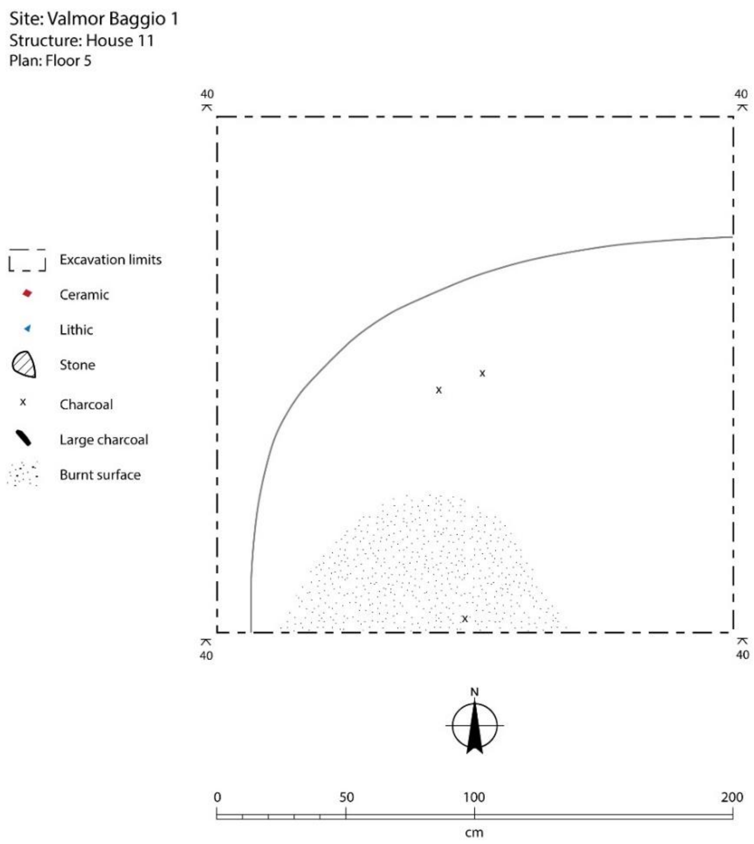


Figure 6.53 Plan of Floor 5, House 11.

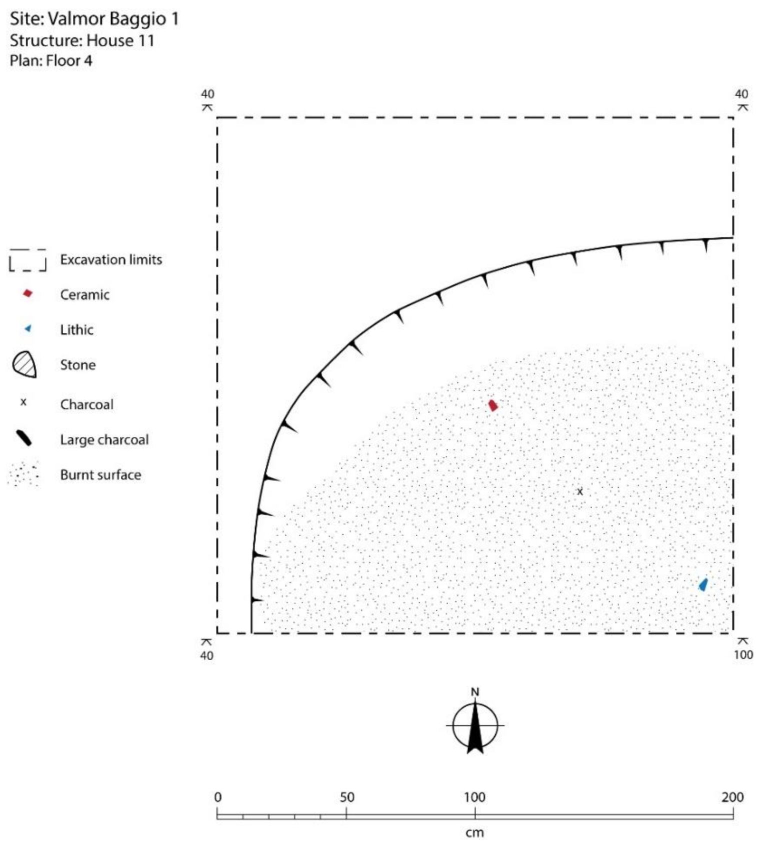


Figure 6.54 Plan of Floor 4, House 11.

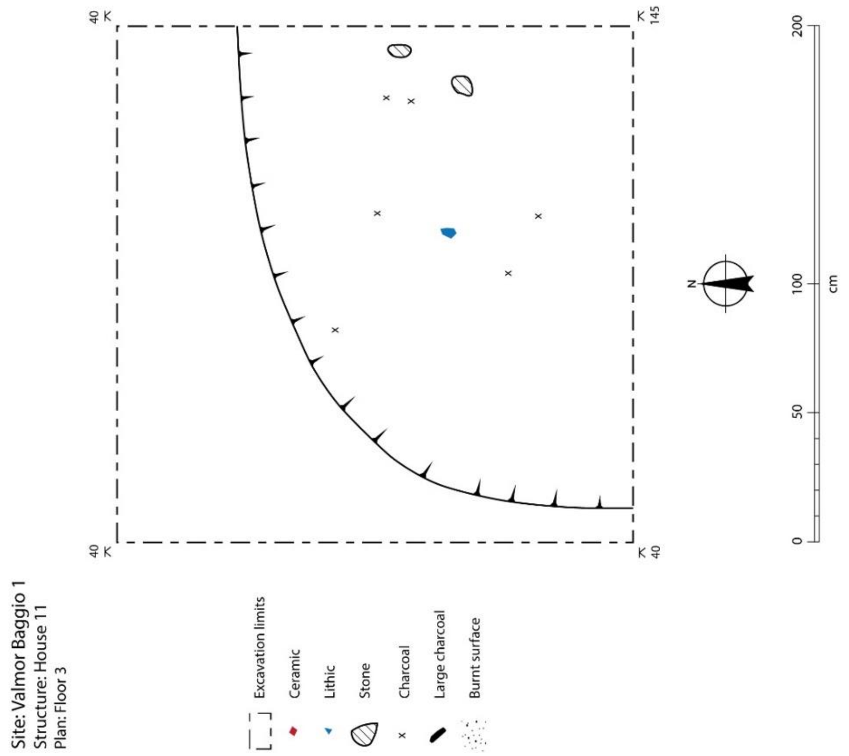


Figure 6.55 Plan of Floor 3, House 11.

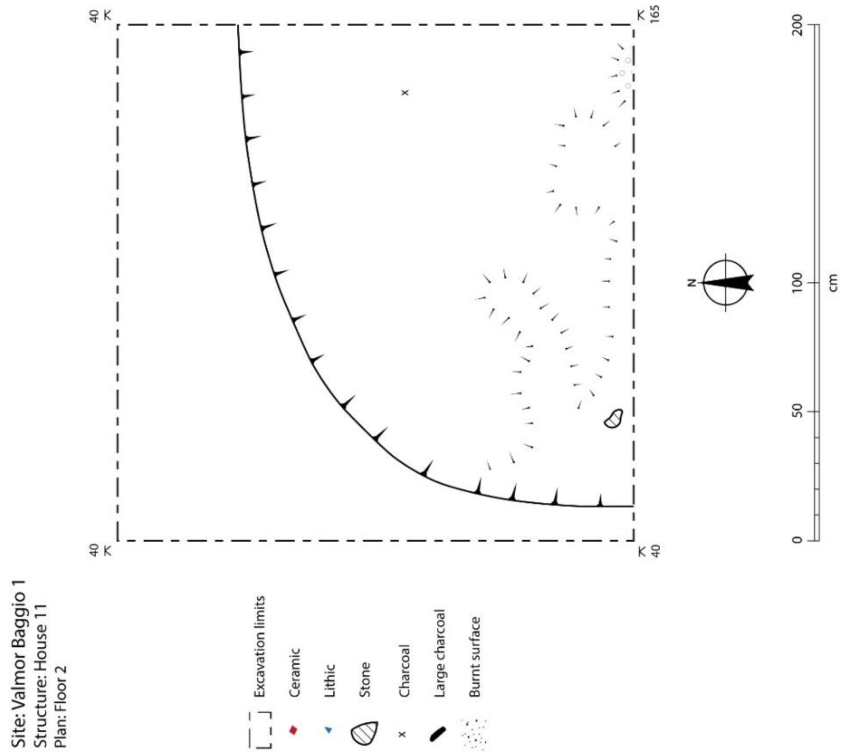


Figure 6.56 Plan of Floor 2, House 11.

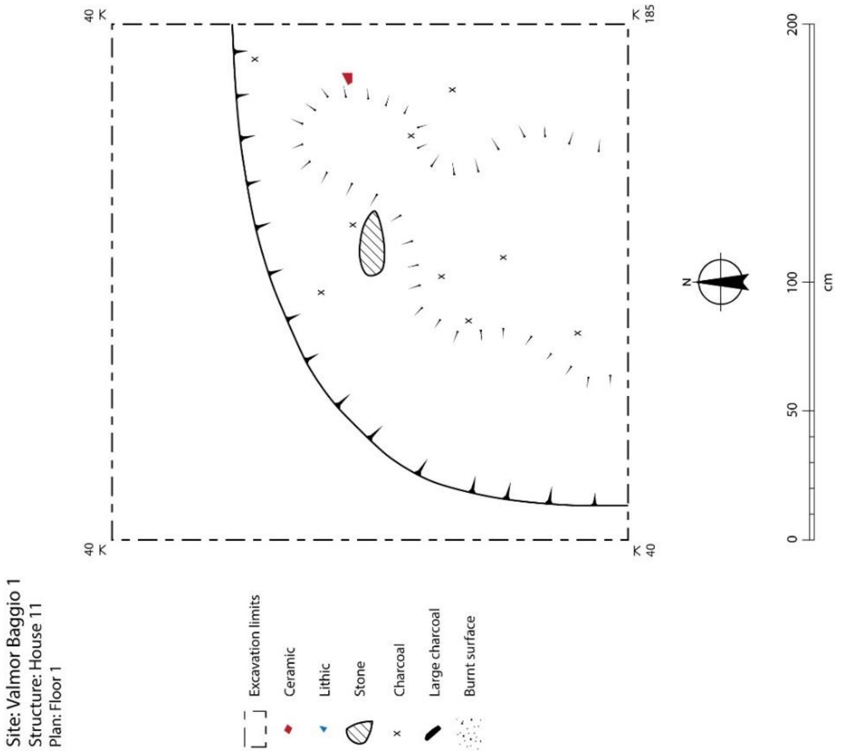


Figure 6.57 Plan of Floor 1, House 11.

Chapter 7
Chronology

In this chapter, I will present the dates obtained for the different structures excavated at Baggio 1. The main purpose of dating a large number of contexts at the site was to assess (1) contemporaneity of the different pit houses, mounds and areas sampled; (2) the development of the settlement over time; and (3) its occupation dynamics, i.e. for how long the site was inhabited and whether there was a single, continuous occupation or cycles of abandonment and return. All these are widely debated issues in the archaeology of Southern Proto-Jê pit houses (Copé, 2006, p. 351-361; Corteletti et al., 2015, p. 55-59; Iriarte et al., 2013, p. 84; Saldanha, 2005, p. 73; Schmitz, 2006, p. 18; Schmitz et al., 2013, p. 91-92; Schmitz et al., 2002, p. 99-102).

A total of 23 radiocarbon dates were obtained for Baggio 1. Three of them had to be rejected, but the remaining 20 dates considered valid still mean that this is the site with the largest number of dates in the southern Brazilian highlands. It is important to recognise that researchers working on other sites where many dates have been obtained followed a different approach. Sites such as SC-CL-70/71 (Schmitz and Rogge, 2011; Schmitz et al., 2013) have fewer dates than Baggio 1, but those dates are distributed across a larger number of structures. The approach so far pursued in the southern Brazilian highlands has been to obtain a few dates for many different pit houses (Beber, 2013; Schmitz et al., 2010; Schmitz and Rogge, 2011; Schmitz et al., 2013; Schmitz et al., 2002).

This approach has the advantage of providing a general chronology for whole sites, but hampers a proper understanding of the history of each structure, preventing the development of well-informed models about the degree of continuity in pit house occupation (see Chapter 10).

I followed a different approach, obtaining vertical sequences of dates for each structure, especially for House 1. The oversized pit house, with its 12 floors, represented a unique opportunity, given that well-dated stratigraphic sequences from a single structure were still lacking in the region.

Charcoal from secure contexts was collected and sent to Beta Analytic for radiocarbon dating. Only charcoal that was directly on top of floors or came from features (fire pits, hearths, collapsed roofs) was dated. All samples consisted in charred material, received the standard Acid/Alkali/Acid pre-treatment, and were dated by AMS. In the case of structures with long stratigraphic sequences (Houses 1, 2, 3 and 11), the precision of the chronology was further enhanced by the application of Bayesian statistics.

Bayesian modelling

Bayesian statistical modelling consists in the incorporation of prior information, generally the known stratigraphic order of a sample of radiocarbon dates, in the estimation of the probable date range (Bayliss, 2009, p. 127-132; Bronk Ramsey, 2009a, p. 338-339; Buck et al., 1996, p. 13-26). For example, if there is overlap between the calibrated ranges of two dates, but one is known with certainty to come from an earlier context than the other, those ranges can be narrowed with a greater precision. Thus, the combination of stratigraphy and calibrated radiocarbon dates provides a result that is more reliable than each of those lines of evidence considered in isolation (Bayliss, 2015, p. 680). In cases where a large number of radiocarbon dates are available and the knowledge about their stratigraphic relationship is secure, Bayesian modelling permits the construction of high-resolution chronologies, as demonstrated by a number of successful applications worldwide, where fine-grained chronologies sometimes attain the precision of a human generation (Burley et al., 2015; Nunn and Petchey, 2013; Overholtzer, 2015; Whittle et al., 2007; Whittle et al., 2008; Whittle et al., 2011).

In the case of the Southern Proto-Jê pit houses, it is not uncommon to find structures with over 1 m of stratified cultural deposits, their lower and upper strata separated by as much as five centuries (Copé, 2006, p. 186-192; Schmitz et al., 1988, p. 27; Schmitz et al., 2002). All the houses excavated in Baggio 1 had such deep deposits with multiple phases of construction, representing a fertile opportunity for the application of Bayesian modelling, allowing the assessment of household occupation dynamics within a fine-grained absolute chronology (Jazwa et al., 2013, p. 185; Overholtzer, 2015, p. 37-39). Coupled with an understanding of a site's macro- and micro-strata, this permits us to shed light on the social tempo and the collective rhythms expressed in recapping and refurbishing events (Dillehay, 2004, p. 248).

I constructed separate Bayesian models for each of the stratified structures (Houses 1, 2, 3 and 11) using the software OxCal v4.2.4 (Bronk Ramsey, 2009a; Bronk Ramsey and Lee, 2013) and the southern hemisphere calibration curve (Hogg et al., 2013). In all cases, a single date was obtained per stratum, which brings certain limitations, as the results will not provide the duration of each episode of occupation. However, within well-defined stratigraphic sequences, they do allow us to estimate the approximate intervals *between* episodes of occupation and, therefore, assess the chronology of occupation dynamics.

Typically, a model written in OxCal will consist of `dates` grouped into `phases` arranged in a `sequence` and delimited by `boundaries` (Bronk Ramsey, 2009a, p. 342-349; Bronk Ramsey and Lee, 2013). The sequence command simply specifies that the radiocarbon dates are in stratigraphic order. This is the case with the current model, but not necessary for all applications of Bayesian statistics to radiocarbon dating, e.g. multiple dates within each phase may be unordered. A phase groups radiocarbon dates representing the same span of activities, bounded by a start and an end events. For example, if one obtains multiple radiocarbon dates from the same living floor in a domestic context, they all should be entered as part of the same phase.

The start and end events are themselves defined by the boundary command. Because the precise start and end events will most likely not be captured by radiocarbon dates, those undated events can be modelled with the boundary commands. Of course, actual dates for those events can also be entered as priors, if one assumes that the beginning and/or end of a phase must correspond to previously known precise calendar ages. Boundaries can be contiguous, sequential or overlapping (Bronk Ramsey, 2009a, p. 348-349). In the first case, the end of a phase immediately abuts the beginning of the next, but they do not overlap. In the second case, there is a hiatus between the end of a phase and the beginning of the next. Finally, in the last case, there is overlap between the end of a phase and the beginning of the next. The simple boundary command in OxCal also assumes the “uniform phase model”, in which a span of events is constant between two boundaries and all events have an equal likelihood to occur anywhere in that interval (Bronk Ramsey, 2009a, p. 345). Oxcal also allows the creation of complex models if there is enough information to assume different distributions, e.g. normal distributions in which the likelihood of events has a gradual onset and tailing off, and start and end boundaries are undefined (Bronk Ramsey, 2009a, p. 345).

Run: /BaggioHouse2.oxcal

```
Plot()
{
 Curve("ShCal13","ShCal13.14c");
 Sequence("Baggio 1, House 2")
 {
  Boundary("Start House 2");
  Phase("Floor 1")
  {
   R_Date("Beta 414093", 320, 30);
  };
  Boundary("Transition 1/2");
  Phase("Floor 2")
  {
   R_Date("Beta 414092", 360, 30);
  };
  Boundary("End House 2");
 };
};
```

```
Plot()
    Curve("ShCal13","ShCal13.14c")
    Sequence("Baggio 1, House 2")
        Boundary("Start House 2")
        Phase("Floor 1")
            R_Date("Beta 414093", 320, 30)
        Boundary("Transition 1/2")
        Phase("Floor 2")
            R_Date("Beta 414092", 360, 30)
        Boundary("End House 2")
```

Figure 7.1 Example of the syntax used in OxCal for modelling the chronology of House 2, and resulting model structure, illustrating the use of phases and boundaries.

In the case of Baggio 1, each sample came from a discrete stratigraphic layer representing a living floor, separated by construction fill from the ones above and below. Based on that, I included each radiocarbon date in the models as a phase in a sequence of contiguous phases delimited by the simple boundary command based on the lack of gaps or overlaps between the occupation floors, and because there is not enough stratigraphic or chronological information to assume more complex models (Bronk Ramsey, 2009a, p. 349-351) (Figure 7.1). The simple boundary command in OxCal was also used for the start and end limits of the sequences, as I could not assume specific dates as priors. OxCal facilitates the evaluation of the results by presenting an agreement index (A) that measures how well each date fits the model, as well as the likelihood of the model as a whole (A_{model}). Bronk Ramsey (2009a, p. 356) recommends an agreement index threshold of 60%, and one must consider the exclusion of a date from the model if it falls below that percentage.

House 1

In House 1, eleven AMS dates were obtained, representing all but one of the twelve superimposed floors. The initial run identified two dates (Beta 414083 and Beta 414086) as outliers based on the recommended agreement index threshold of 60%, and the model would not run with the inclusion of those dates. These two outliers were then excluded from the subsequent run of the model. One of the remaining dates (Beta 414087) had an agreement of 57.4%, only marginally inferior to the threshold. This date comes from a secure burnt roof context and does not affect the overall agreement of the model; based on those criteria, it should not be rejected (Bronk Ramsey, 2009b, p. 2-3).

The presence of outliers may be due to redeposition or old wood effect, a problem to be kept in mind when dating wood charcoal. Most wood charcoal, in fact, is expected to be only slightly earlier than its context of deposition, but a few older dates may result from old wood/redeposited charcoal (Bronk Ramsey, 2009b, p. 7). It is also important to notice that, despite the abundance of wood in the forests of the highlands, *Araucaria*, *Ocotea* and other trees are longevous species that can survive for hundreds of years. Furthermore, *Araucaria* knots are still widely used by the local population as fuel, and are collected on the forest ground from trees that have been long dead, a practise that probably extends back to precolonial times. Added to the fact that, by a simple matter of probability, a small percentage of any series of radiocarbon dates from a site may be wrong, those factors could explain the outliers in the model. Apart from the two outliers, the remaining sequence of House 1 is coherent and does not appear to have been affected by old wood effects.

With the exclusion of the outliers, the final model included nine radiocarbon dates and had an overall agreement index of 96.7%. Bayesian modelling considerably narrowed the error ranges of the radiocarbon dates from an average of ± 109 years to ± 42 years at a 2σ confidence interval. The occupation of House

1 can be confidently framed between *Cal. A.D. 1385* and *1660*[1] with no significant hiatus (Table 7.1, Figure 7.2).

Using the medians of the modelled dates as a base, it is possible to estimate that the interval separating the earliest three floors is of ca. 60-65 years, whereas the subsequent floors are separated by an average of 15-30 years. Stratigraphic information precludes the possibility that those intervals correspond to periods of abandonment, due to the lack of soil formation, slope-washed materials or bioturbation between the habitation surfaces. These were rather separated by fill materials, especially evident in the first five episodes of occupation, which were intercalated by thick intentional deposits of hard packed sterile clay. Therefore, the intervals between the dates must correspond to the approximate time elapsed from one resurfacing episode to the next. Interestingly, the interval between each floor is not constant. The earliest floors appear to have been resurfaced after a longer time span: the dates for the earliest three floors have modelled probability distributions with little or no overlap, and their medians are separated by ca. 60-65 years. In contrast, the subsequent floors have dates that are very close, with a great deal of overlap even between the modelled distributions, and an average interval of 15-30 years between their medians.

[1] Throughout this thesis, the posterior distributions of modelled dates have been italicised to emphasise their interpretative character.

Table 7.1 Modelled dates from House 1. Dates marked with * are outliers and were not included in the final run of the model. Dates marked with ** have long-tailed distributions; in these cases, only the 68% interval (1σ) is shown. All dates are rounded to the next 5 years. m = median, A = agreement, C = convergence.

Stratum	Context	Lab. number	Conventional Radiocarbon Age BP	Δ13C‰	Cal A.D. (2σ)	m	A	C
Upper boundary					*1630-1670***	*1660*		96.4
Floor 12	Charcoal from fire pit	Beta 414080	280 ± 30	-25.2	*1625-1675*	*1650*	143.2	99
Floor 11	Charcoal on floor	Beta 414081	340 ± 30	-23.5	*1585-1655*	*1630*	96.6	99.6
Floor 10	Charcoal on floor	Beta 414082	350 ± 30	-28.9	*1560-1645*	*1620*	93.6	99.5
Floor 9	Charcoal on floor	Beta 414091	360 ± 30	-27.0	*1550-1635*	*1595*	101.2	99.2
Floor 8*	Charcoal on floor	Beta 414083	520 ± 30	-22.6	*1405-1455*	*1435*		99.1
Floor 7	Charcoal on floor	Beta 414084	350 ± 30	-24.7	*1520-1605*	*1565*	111.5	99.2
Floor 5	Charcoal from burnt roof	Beta 414085	340 ± 30	-27.4	*1510-1585*	*1545*	114.4	99.3
Floor 4*	Charcoal from burnt roof	Beta 414086	860 ± 30	-23.8	*1175-1275*	*1225*		98.9
Floor 3	Charcoal from burnt roof	Beta 414087	300 ± 30	-26.3	*1485-1550*	*1520*	57.4	99.7
Floor 2	Charcoal from burnt roof	Beta 414088	460 ± 30	-24.1	*1430-1500*	*1460*	110.1	99.8
Floor 1	Charcoal from burnt roof	Beta 414089	630 ± 30	-24.8	*1315-1430*	*1395*	87	99.1
Lower boundary					*1355-1425***	*1385*		95.3

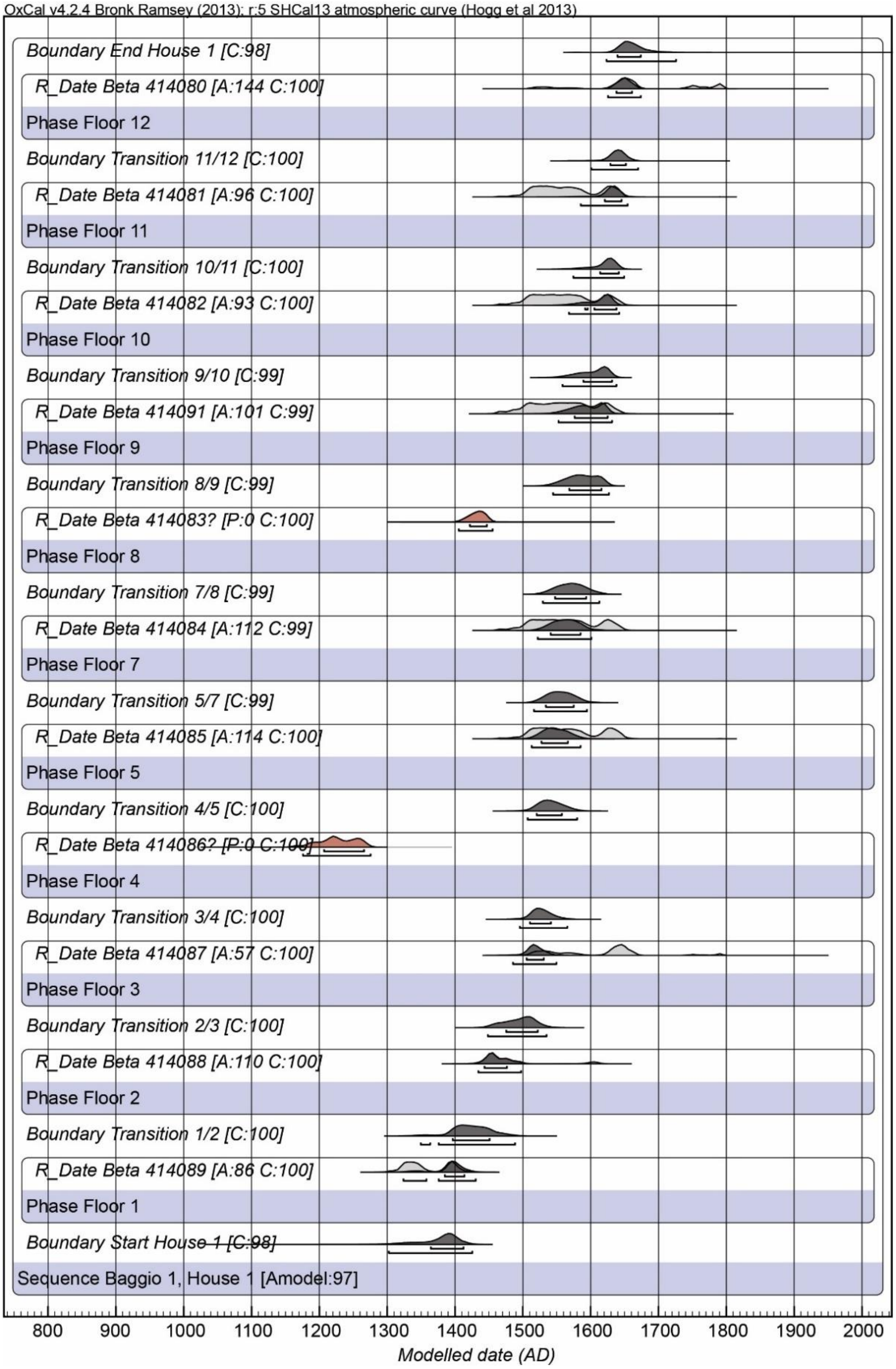


Figure 7.2 Bayesian model of the dates from House 1. The unmodelled probability distributions are shown as light grey areas, and the results of the Bayesian model appear as dark grey areas. Bars under each distribution represent 1σ and 2σ. Outliers, shown in red, have been calibrated but not included in the model. C = convergence, A = agreement index of each date, Amodel = overall agreement index of the model.

House 2

In House 2, only two AMS dates were obtained, representing the first and the second floors. The Bayesian model had an overall agreement of 97.7%, narrowing the error ranges of the radiocarbon dates from an average of ± 82 years to ± 69 years at a 2σ confidence interval. The occupation of House 2 can be confidently framed between *Cal. A.D. 1515* and *1610*, but certainly extends beyond that period, since the terminal floor was not dated. It is likely that House 2 was abandoned at the same moment as House 1, ca. *Cal. A.D. 1660*. The beginning of its occupation, however, postdates that of the oversized structure for over a century (Table 7.2, Figure 7.3).Using the medians of the modelled dates as a base, it is possible to estimate that ca. 45 years separate the first and the second occupations of House 2. As in the case of House 1, this interval probably does not correspond to a period of vacancy, as there was no evidence of soil formation, bioturbation or slope-washed artefacts between the floors. Instead, the interval corresponds to the time elapsed between the first occupation and the remodelling of the structure with the addition of a bench.

Table 7.2 Modelled dates from House 2. All dates are rounded to the next 5 years. Dates marked with ** have long-tailed distributions; in these cases, only the 68% interval (1σ) is shown. m = median, A = agreement, C = convergence.

Stratum	Context	Lab. number	Conventional Radiocarbon Age BP	Δ13C‰	Cal A.D. (2σ)	m	A	C
Upper boundary					*1535-1660***	*1610*		96.9
Floor 2	Charcoal on floor	Beta 414092	360 ± 30	-22.5	*1515-1645*	*1580*	103	99.2
Floor 1	Charcoal from burnt floor	Beta 414093	320 ± 30	-26.6	*1490-1635*	*1535*	93.9	99.6
Lower boundary					*1465-1575***	*1515*		97.4

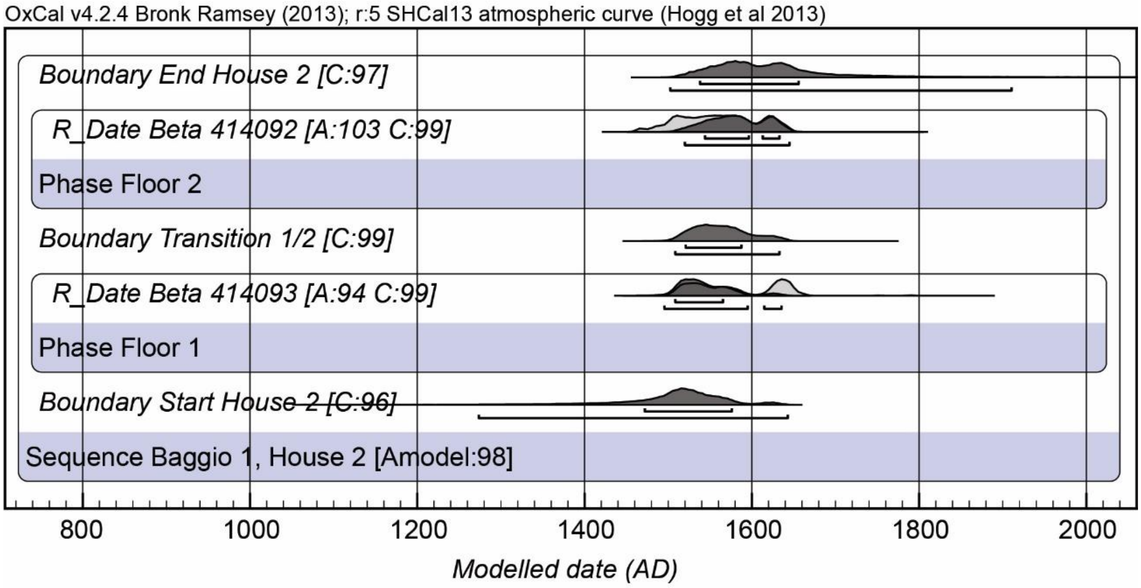


Figure 7.3 Bayesian model of the dates from House 2. The unmodelled probability distributions are shown as light grey areas, and the results of the Bayesian model appear as dark grey areas. Bars under each distribution represent 1σ and 2σ. C = convergence, A = agreement index of each date, Amodel = overall agreement index of the model

House 3

In House 3, four AMS dates were obtained. They were selected from Floors 1, 3, 8 and 9. The initial run of the model identified two dates (Beta 438287 and Beta 438286) as outliers based on the recommended agreement index threshold of 60%. The first date had the lowest agreement and was excluded from the next run of the model. The resulting model had a somewhat low agreement (59.5%), right at the recommended threshold. This was mainly due to Beta 438286, which still had a poor agreement index (43.2%). However, the results were coherent with the chronology of the neighbouring House 2. Thus, I decided to exclude only Beta 438287, which was irreconcilable with the model, and to give Beta 438286 the benefit of doubt. Bayesian modelling considerably narrowed the error ranges of the calibrated dates from an average of ± 71 years to an average of ± 42 years at a 2σ confidence interval, framing the occupation of House 3 between *Cal. A.D. 1525* and *1610* (Table 7.3, Figure 7.4). As in House 2, it certainly extends beyond the upper boundary, as the terminal floor was not dated. Houses 2 and 3 began their histories together, ca. *Cal. A.D. 1515-1525*, when the oversized House 1 had already been used for over a century.

Using the medians of the modelled dates as a base, it appears that very short intervals separate each use surface at House 3. As in House 1, the deepest floors of House 3 are separated by longer intervals, ca. 12 years, whereas the subsequent floors accumulated much more rapidly, with a new resurfacing episode in average every 6 or 7 years. As in the other houses, this interval probably does not correspond to a period of vacancy, as there was no evidence of soil formation, bioturbation or slope-washed artefacts between the floors. The earliest four surfaces were separated by thick, sterile clay fills that represented intentional episodes of sealing of the structure and preparation of a new surface, very similar to the earliest floors of House 1.

Table 7.3 Modelled dates from House 3. Dates marked with * are outliers and were not included in the final run of the model. Dates marked with ** have long-tailed distributions; in these cases, only the 68% interval (1σ) is shown. All dates are rounded to the next 5 years. m = median, A = agreement, C = convergence.

Stratum	Context	Lab. number	Conventional Radiocarbon Age BP	Δ13‰	Cal A.D. (2σ)	m	A	C
Upper boundary					*1585-1635***	*1610*		95.6
Floor 9	Charcoal on floor	Beta 438286	440 ± 30	-26.9	*1545-1625*	*1600*	43.2	99.1
Floor 8*	Charcoal on floor	Beta 438287	550 ± 30	-21.8	*1395-1450*	*1420*		96.9
Floor 3	Charcoal on floor	Beta 438289	330 ± 30	-27.4	*1515-1595*	*1560*	100.3	98.7
Floor 1	Charcoal from fire pit	Beta 438288	320 ± 30	-27.7	*1500-1590*	*1535*	95.2	98.5
Lower boundary					*1495-1570***	*1525*		95.7

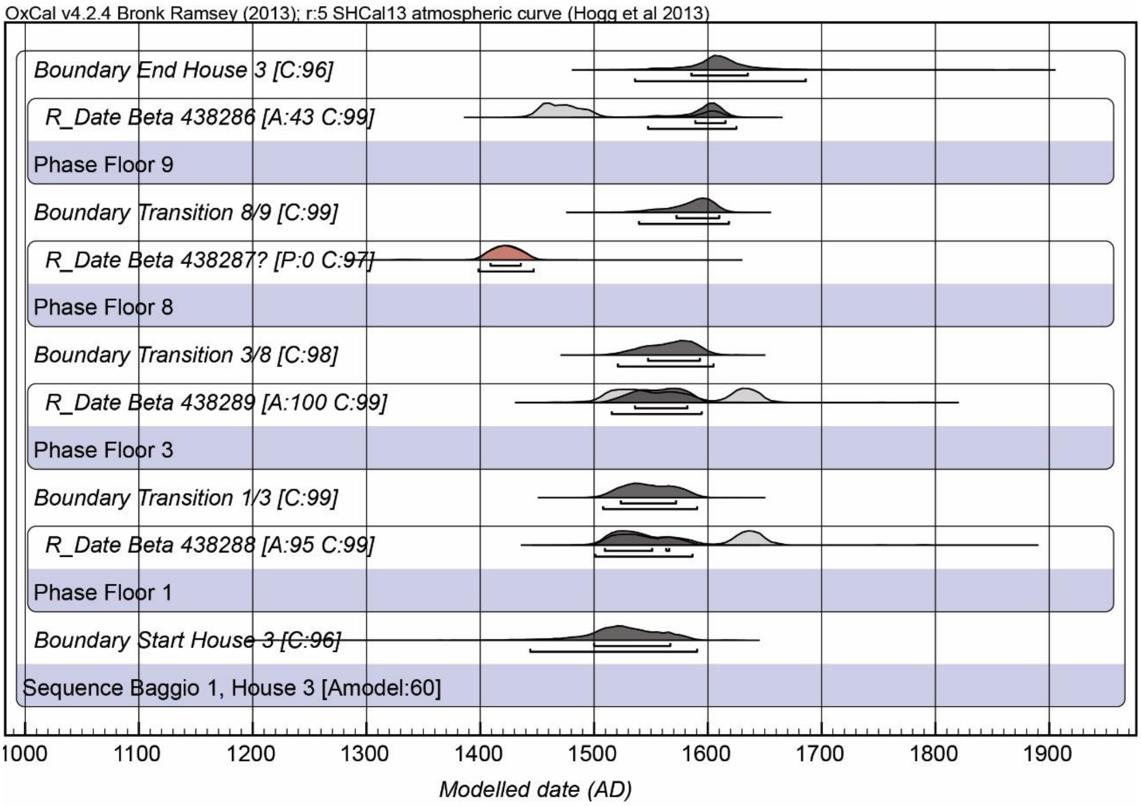


Figure 7.4 Bayesian model of the dates from House 3. The unmodelled probability distributions are shown as light grey areas, and the results of the Bayesian model appear as dark grey areas. Bars under each distribution represent 1σ and 2σ. Outliers, shown in red, have been calibrated but not included in the model. C = convergence, A = agreement index of each date, Amodel = overall agreement index of the model.

House 11

Three AMS dates were obtained for House 11, representing floors 1, 3 and 5. The Bayesian model had an overall agreement of 115.9%, narrowing the error ranges of the radiocarbon dates from an average of ± 130 years to ± 120 years at a 2σ confidence interval – unfortunately, not a considerable gain. The occupation of House 11 can be confidently framed between *Cal. A.D. 1535* and *1765*. The upper boundary and the modelled date for the terminal floor have long spans (so does the lower boundary), but the medians, set in the early to middle 18th century, make sense in the regional context: movements of traders along the *Caminho das Tropas* were more frequent after ca. 1750, when a number of guides for travellers are written; Lages was only founded in 1766 and elevated to the category of *vila* in 1771 (Herberts, 2009, p. 147). House 11 is the most recent of the dated structures at the site, starting some decades after Houses 2 and 3 and lasting until the colonial presence was consolidated in the highlands – after the structures of the inner precinct were long abandoned.

Using the medians of the modelled dates as a base, it can be estimated that the intervals between the floors of House 11 were somewhat longer than those of the other houses, but also more constant, with a new surface being occupied every 35 years. As in the other houses, there was no evidence of soil formation, bioturbation or slope-washed artefacts between the floors, suggesting that the intervals do not correspond to periods of vacancy.

Table 7.4 Modelled dates from House 11. All dates are rounded to the next 5 years. Dates marked with ** have long-tailed distributions; in these cases, only the 68% interval (1σ) is shown. m = median, A = agreement, C = convergence

Stratum	Context	Lab. number	Conventional Radiocarbon Age BP	Δ13C‰	Cal A.D. (2σ)	m	A	C
Upper boundary					*1670-1880***	*1765*		96.6
Floor 5	Charcoal on floor	Beta 438292	170 ± 30	-25.8	*1660-1955*	*1715*	101.3	99.7
Floor 3	Charcoal on floor	Beta 438291	300 ± 30	-24.2	*1525-1795*	*1645*	126.5	99.9
Floor 1	Charcoal on floor	Beta 438290	330 ± 30	-27.2	*1500-1655*	*1575*	100.3	99.4
Lower boundary					*1485-1645***	*1535*		97.5

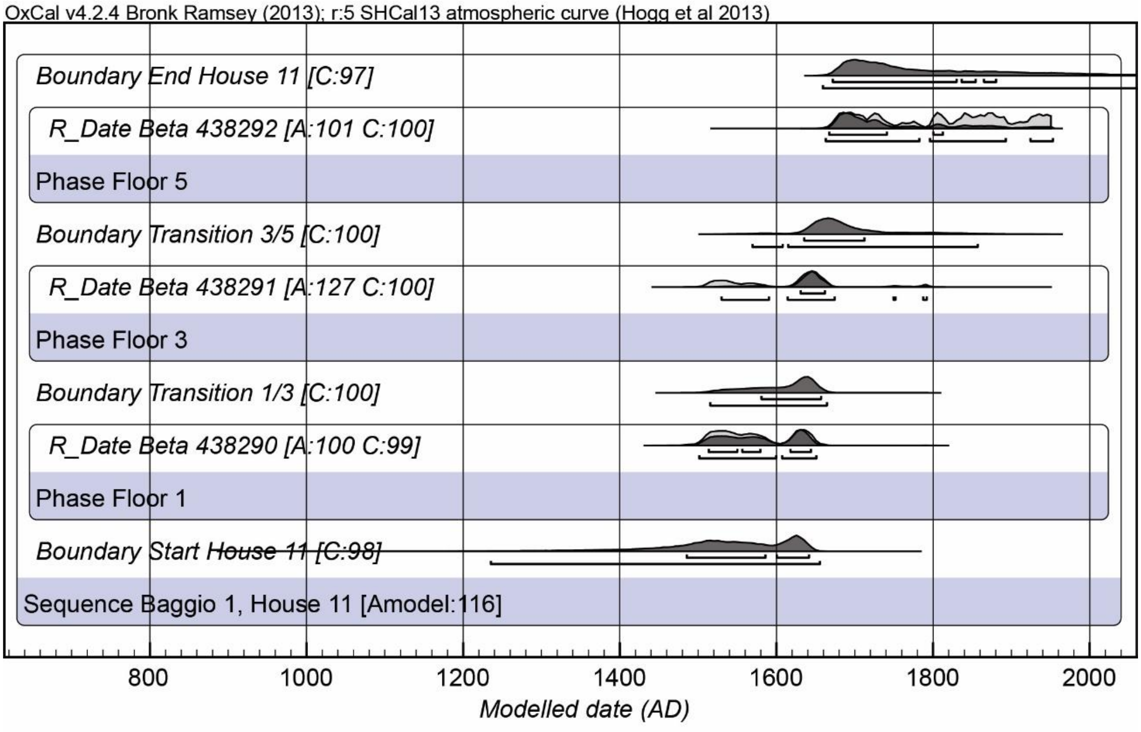


Figure 7.5 Bayesian model of the dates from House 11. The unmodelled probability distributions are shown as light grey areas, and the results of the Bayesian model appear as dark grey areas. Bars under each distribution represent 1σ and 2σ. C = convergence, A = agreement index of each date, Amodel = overall agreement index of the model.

External areas of the inner precinct and Mound A

In addition to the sequences of dates obtained from the stratified pit houses, two more contexts were dated in the external areas of the inner precinct. Charcoal recovered in between the rocks of the fire pit in unit 88/115 provided a conventional date of 390 ± 30 B.P., Cal. A.D. 2σ 1455-1630 (Beta 414094). Unfortunately, the shape of the calibration curve at the point where it intercepts this date is ambiguous, resulting in a very broad time window that could correspond to any of the floors of House 1, except for the eariest. It also spans all the occupation of Houses 2 and 3. Therefore, although the feature is certainly contemporary with the pit houses of the inner precinct, it cannot be linked to any specific phase of their occupation.

Another external fire pit, located in unit 106/91, was also dated. Surprisingly, it provided a conventional radiocarbon age of 840 ± 30 B.P., Cal.

A.D. 2σ 1185-1280 (Beta 414095). As I mentioned when discussing the outlier dates of House 1, old wood effects and redeposition are always a problem to keep in mind when dating wood charcoal. Although this could explain why the date of the fire pit in unit 106/91 is so much earlier than that of the pit houses in the inner precinct, there is another, more intriguing possibility: the Southern Proto-Jê groups could have been using the Baggio 1 hill for camping and other activities long before they established a permanent settlement there. This practise has been observed in the neighbouring region of São José do Cerrito (Chapter 3), where a similar stone-lined fire pit located beneath the embankment of a pit house in site SC-CL-43 turned out to be 2000 years older than the domestic structure (Schmitz and Rogge, 2013, p. 12).

Finally, a date was obtained for Mound A. Charcoal from the small feature that cut the basalt layer in Trench B provided a conventional radiocarbon age of 600 ± 30 B.P, Cal. A.D. 2σ 1315-1435 (Beta 438293). This date, which provides a *terminus ante quem* or maybe *ad quem* for the construction of the mound, has the same calibrated range as the unmodelled date for the first floor of House 1 (Table 7.1), lending further support to the hypothesis that the mound was built with materials resulting from the excavation of the oversized structure.

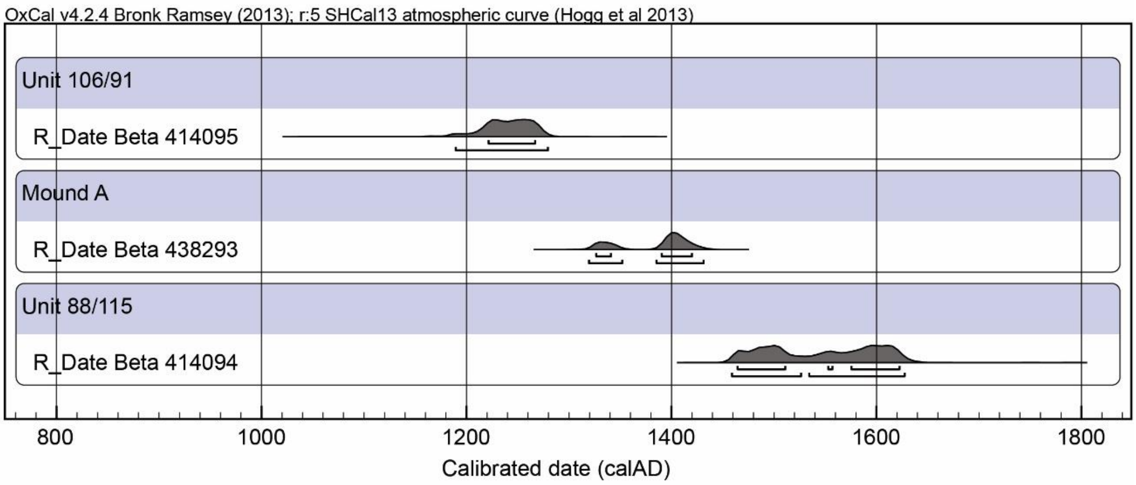


Figure 7.6 Calibrated age ranges for the external areas of the inner precinct and Mound A.

Chapter 8
Artefact analysis

In this chapter, I will present the analysis of lithic and ceramic artefacts from Baggio 1. The aims of the analysis were (1) to identify possible variations in the assemblage composition of the different structures and areas of the site; and (2) to examine possible chronological trends within each structure. Additionally, a comparison with other sites of the southern Brazilian highlands can help to identify site function and whether the assemblage from Baggio 1 resembles or differs from other pit house settlements. All artefacts collected from the excavation were deposited at UNISUL (Universidade do Sul de Santa Catarina), Tubarão, Santa Catarina state. This is the institute responsible for storing the finds from the *Jê Landscapes* project. All artefacts were inventoried according to site, structure, unit, level and an individual collection number, and are publicly accessible for future research (Appendix III).

Methodology of ceramic analysis

Ceramic sherds were classified and profiles were reconstructed according to the main attributes and procedures described in the relevant literature (Arnold, 1989; Rice, 1987; Rye, 1981; Shepard, 1954; Sinopoli, 1991) and applied to other areas of the highlands, including in my own previous work, so as to obtain comparable results (Copé, 2006, p. 284-307; De Souza, 2009; Saldanha, 2005,

p. 42-57). The attributes include temper, shaping method, firing atmosphere and surface finish.

1. Temper: Most of the temper in Taquara/Itararé ceramics are minerals occurring naturally in the highlands' silty clays, and thus are more appropriately described as non-plastic inclusions (Shepard, 1954, p. 161-162; Sinopoli, 1991, p. 16). Some of the ceramics contain ground or crushed rocks that can be considered as intentionally added constituents (Miller, 1967, p. 20; Shepard, 1954, p. 161-162).

2. Shaping method: The shaping methods reported for Taquara/Itararé ceramics are either coiling or modelling (especially for the bases), but the small thickness, irregular fracture, and absence of clear indicators such as coil negatives in most sherds obscure the building technique. Given some historical descriptions of southern Jê pottery-making, it is possible that multiple techniques including drawing, punching and slab-building were in place (Shepard, 1954, p. 54-65; Silva, 2006, p. 84-89; Sinopoli, 1991, p. 17-19). The technique of paddle-and-anvil, by which the potter supports the interior of the vessel while beating its exterior to shape it, has not been described in ethnographic accounts of the southern Jê, but has been identified in some archaeological ceramics and confirmed by radiographies (Parellada, 2008, p. 107; Saldanha, 2005, p. 46; Shepard, 1954, p. 59-60).

3. Firing atmosphere: The firing atmosphere was inferred from the colour of the sherds' cross-sections. Those with clear colours throughout the cross-section were considered fully oxidised, whereas sherds with a dark core and clear colours closer to the surface were classified as incompletely oxidised, and those with a dark colour throughout the cross-section were interpreted as reduced (Figure 8.2) (Rice, 1987, p. 343-345; Rye, 1981, p. 116; Shepard, 1954, p. 104-107). Given the complex interplay between clay composition, firing temperature and colour, this visual assessment must be considered tentative.

4. Surface finish: Smoothing or polishing is the standard finishing technique for Taquara/Itararé ceramics, but other techniques are recorded.

Colour can be added by surface coatings such as thin red slips applied either before or after firing, produced with a suspension of clay in water, the colour resulting from the iron oxide content (Rice, 1987, p. 149-151; Shepard, 1954, p. 67-69; Sinopoli, 1991, p. 26-27). Smudging, the addition of a black colour by causing charcoal to deposit on the surface, usually through immersion on a sooty smoke, is also frequently observed (Shepard, 1954, p. 88-91). Decoration on Taquara/Itararé ceramics is achieved by plastic techniques. These include cord marking, stamping, gouging with the nail, impressing with baskets and continuous stamping with dentate instruments – techniques that normally lead to the patterning of the entire vessel's surface (Rice, 1987, p. 144-145; Shepard, 1954, p. 193-195; Sinopoli, 1991, p. 26). Amongst the plastic techniques, cutting techniques (incisions), done while the clay is leather-hard, usually cover only a portion of the vessel and result in motifs that are more free and "decorative" in nature than the surface texturing accomplished by the previous techniques (Rice, 1987, p. 146-147; Shepard, 1954, p. 195-202; Sinopoli, 1991, p. 26).

In addition to the attributes listed above, morphological attributes have been considered in the case of rims from which vessel shape could be reconstructed. The rims were classified according to their elaboration: angle and direction (direct, introverted or everted), presence of thickening or reinforcement, and type of lip – rounded, tapered or flat (trimmed) (Rice, 1987, p. 212-214; Shepard, 1954, p. 245-248; Sinopoli, 1991, p. 62). In terms of vessel shape, Taquara/Itararé ceramics tend to be spherical, cylindrical, conical or ovaloid, and to have simple or inflected contours without corners and complex forms (Rice, 1987, p. 212-220; Shepard, 1954, p. 225-244). In the description of vessel shapes, I will sometimes make use of a common terminology to describe form in association with function, so that "plates" and "dishes" are shallow, unrestricted vessels with heights less than one third of the diameter; "bowls" are vessels that may or may not be restricted and that have a height between one third of the diameter and equal to it; finally, jars and vases are taller than broader, the first being distinguished by the presence of a collar (Rice, 1987, p. 215-217; Shepard, 1954, p. 225; Sinopoli, 1991, p. 60-63). The functional implications of the different ceramic shapes are based on a correlation between intended use and attributes such as morphology, structure, capacity, stability and ease of access to contents (Rice, 1987, p. 210-216, 236-424). For example, from a purely functional perspective, it is assumed that cooking pots will have contours without angles (to facilitate heat exposure and avoid breaking), wide openings to facilitate manipulation of the content, and small constrictions to avoid spilling, whereas serving dishes will be open to facilitate access to content, and may be burnished or slipped for impermeabilisation; the dimensions of the vessels are commonly correlated with the number of individuals involved in preparation/consumption (Rice, 1987, p. 210-242). Since the actual function of a vessel may differ from its presumed function, I have taken note of alterations caused by use, such as carbon deposits (sooth in vessels that were used on fire) and organic residues (carbonised food remains) that are expected to occur in cooking pots (Rice, 1987, p. 234-236; Skibo, 1992). This approach has been fruitful in the southern Brazilian highlands in the past, leading to the establishment of common vessel typologies associated with particular functions (Copé, 2006, p. 289-307; Saldanha, 2005, p. 48-57), to which I will refer below.

Because many technological and stylistic attributes – namely firing atmosphere, surface treatment and size – frequently co-occurred in the ceramics of Baggio 1, I further subdivided it into types, understood as broad, relatively standardised classes where the same diagnostic traits tend to appear associated (Dunnell, 1971). Admittedly, this approach resembles the type-variety method (Gifford, 1960; Smith et al., 1960), but the ceramic types here were only intended to be a convenient tool in comparing ceramic assemblages within Baggio 1. As such, they were extremely useful, but are not meant to be a proposal for all Taquara/Itararé ceramics or as an apology of typological approaches, which suffer from numerous shortcomings (Ball, 1979; Peebles, 1979; Smith, 1979).

Results of ceramic analysis

A total of 1049 ceramic sherds were recovered from the excavations at Baggio 1. Over half of this sample (*N* = 602) comes from House 1. Both technologically and stylistically, the ceramics from Baggio 1 resemble other Taquara/Itararé ceramics recorded in the neighbouring regions – grouped in the Guatambu, Guabiju and Xaxim phases (Beber, 2004, p. 46-64; Corteletti, 2012, p. 101-117; De Masi, 2005, p. 135-176; Piazza, 1969; Reis, 2007, p. 164-176; Ribeiro and Ribeiro, 1985; Rohr, 1971; Saldanha, 2005, p. 42-57; Schmitz, 1988; Schmitz et al., 2013a, p. 180-188). These are small, thin ceramics with mineral inclusions of quartz, mica, calcite, hematite and others naturally occuring in the region's clays, reduced or incompletely oxidised firing, and irregular fractures that mask the shaping technique – assumed to involve a combination of coiling and paddle-and-anvil, as confirmed by radiographies of complete vessels (Parellada, 2008, p. 107; Saldanha, 2005, p. 46).

Figure 8.1 Red ware from House 1.

Red ware (Figure 8.1): this was the most distinctive type identified in Baggio 1, albeit not very frequent (*N* = 123). Its defining trait is the presence of a very thin and fragile red slip on the external surface. In most of the cases (66%), the internal surface of the vessel was smudged, creating a contrast between the red coating outside of the vessel and its blackened interior. This type was distinguished not only by the surface treatment, but also by its technological characteristics: most of the sherds (63%) were fully or incompletely oxidised, whereas the remaining types showed a clear tendency for the reduced firing (85%). This relationship between firing atmosphere and surface treatment was found to be statistically significant (χ^2 (2, N = 658) = 130.38, $p < .05$)[1].

[1] All statistical tests were performed with IBM SPSS Statistics 22.

Furthermore, red ware sherds were found to be thicker than average. Mean thickness for the red sherds was 9.27 mm (*SD* = 2.93) whereas the remaining types had an average thickness of 6.5 mm (*SD* = 1.9), a difference that was proven to be statistically significant ($t(139.76) = 10.07$, $p < .01$). Because there is a correlation between thickness and diameter, we can also assume that red slipped vessels were larger, even though only two rims were recovered and thus an insufficient number of shapes for this ceramic type could be reconstructed. This ceramic type was frequently used in food processing, as 37% of the sherds exhibited some use wear associated with use over fire (burning and sooth) as well as carbonised residues adhered to them. As will be shown below, red ceramics were more frequent in the lower levels of House 1, although they also occurred in House 2. One important observation is that, in House 2, red ceramics are smaller, not differing from the other types.

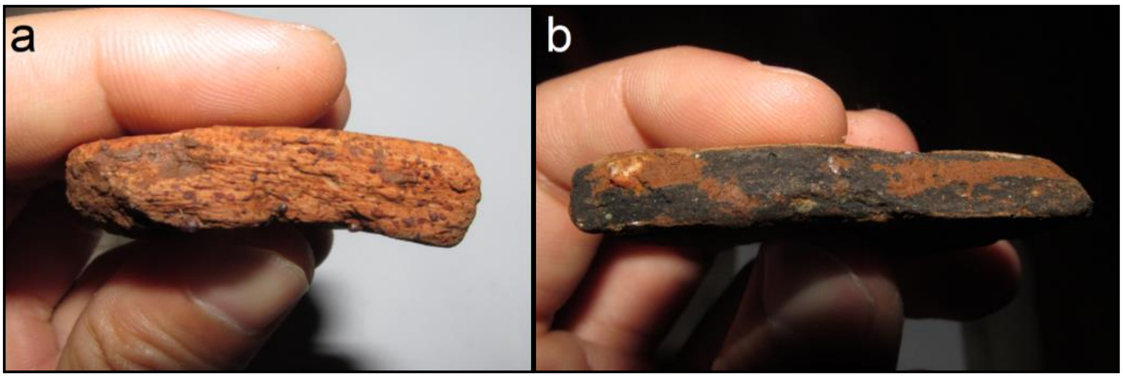


Figure 8.2 Cross sections of sherds from House 1 illustrating differences in firing atmosphere. a) Completely oxidised, orange throughout the fracture; b) Reduced, grey throughout the fracture.

Red slipped ceramics are rarely found in Southern Proto-Jê sites; when they do, it is usually in a very small quantity, and the red slip is restricted to the internal surface of bowls (Miller, 1971, p. 44-49). In the region of Campos Novos, not far from the study area, it would seem that red slipped ceramics are more frequent. Judging from the graphs in De Masi (2005, p. 171), red coatings (either in the internal or the external surface) are particularly common at the ceremonial complex SC-AG-12, where they comprise almost 60% of the assemblage. In

Vacaria, Rio Grande do Sul, Schmitz et al. (2002, p. 89) tabulate some red ceramics among the finds at site RS-A-27, but their frequency is low – except, surprisingly, for one of the smallest houses excavated, where it contributed with 37% of the sample. Apart from those areas, red slipped vessels are only commonly mentioned in the Paraná state, but, otherwise, the ceramics of that region are too different in technological and stylistic aspects to suggest any specific link with Baggio 1 (Beber, 2004, p. 66-95; Chmyz et al., 2003, p. 42-57; De Souza, 2009, p. 17-32; 2011, p. 6-7; Schmitz, 1988, p. 100-110).

Figure 8.3 Black ware from House 1.

Black ware (Figure 8.3): the defining trait of this ceramic type is an intense smudging and burnishing of the vessel's surface, giving it a glossy black colour. This is the same technique applied to the interior of the red ware vessels. This treatment has long been considered a diagnostic feature of Taquara/Itararé ceramics. It appears in virtually every site and region in different proportions (Beber, 2004, p. 46-64; Chmyz et al., 2003, p. 42-57; Copé, 2006, p. 284-307; Saldanha, 2005, p. 42-57; Schmitz et al., 2002, p. 80-89). De Masi (2005, p. 139) calls it a "black slip", counting it as the most common surface finish in the region of Campos Novos. The technique by which the shiny black surface is created was recorded historically, as it persisted even among 20th century Kaingang potters: the vessels were intensely burnished for days using maize husk, after which they were immersed in a thick dark smoke. The carbon from the smoke, penetrating the surface of the walls, gave them the black colour (Miller Jr., 1978, p. 7-13). This technique is called smudging (Shepard, 1954, p. 88).

Black ware appeared in moderate proportions in Baggio 1, constituting 21% of the sample. Smudging seems to be an optional treatment for otherwise "regular" ceramics, as I could find no statistically significant differences whatsoever in attributes such as thickness, vessel diameter, or firing type between black ware and plain ware. Furthermore, only 7% of the sherds exhibited use wear associated with food processing over fire.

Plain ware: out of the ceramics whose surface finish could be identified, this is the most abundant type (47%) in Baggio 1. The common ceramics of Baggio 1 is thin (*M* = 6.66 mm, *SD* = 1.92), small to medium in diameter (*M* = 18.53 cm, *SD* = 1.91) and predominantly fired in a reduced atmosphere (82%). The surface is finished with a slight polishing, but not intense enough to give it the distinctive lustre of the black type. The later treatment, however, was applied to the interior of the plain vessels in a moderate number of cases (33%). Overall, those are typical characteristics of Taquara/Itararé pottery. As in the case of black ware, only a small proportion (9%) of plain ceramics exhibited sooth, burning or carbonised residue. As a comparison, we must notice that Corteletti (2012, p. 112) found that over 50% of the ceramic sherds associated with a large combustion structure at the Bonin site exhibited some use wear. This potentially indicates that, in the case of Baggio 1, both plain and black ceramics were mostly used in serving, consumption and storage activities, with only a small quantity of vessels directly involved in food processing over fire.

Decorated ware: this category was created to encompass all varieties of plastic decoration. Because their diversity is high, but their frequency is low, it was found that subdividing it by decoration type would create more problems than it would solve. Only 51 sherds (5% of the total) showed any form of plastic decoration.

Figure 8.4 Decorated ware from Baggio 1, incised motifs. a) Parallel (House 1); b) Crosshatched (House 1); c) Zigzag (House 2).

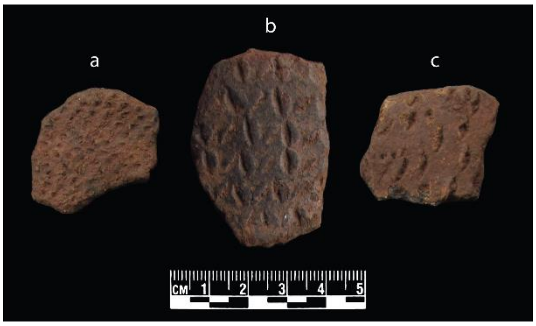


Figure 8.6 Decorated ware from Baggio 1, punctate motifs. a) Punctate (House 1); b) Finger pinched (House 2); c) Fingernail impressed (House 1).

The following decorative patterns could be identified: (1) incised – repetitive geometrical motifs including parallel lines, crosshatches, zigzags (Figure 8.4); (2) punctate – these can be dots but also include fingernail marks (Figure 8.6); (3) impressed – whereby the impression of a basket or woven cord is left on the clay (Figure 8.5a); (4) stamped – consisting in repetitive imprints made by a dentate instrument (Figure 8.5b). In many instances, it is evident that the decoration did not cover the entire vessel, but was restricted to a band around its centre, which, admittedly, accounts for the rarity of decorated sherds. All of the plastic decorations in Baggio 1 are common to the Taquara/Itararé tradition (Beber, 2004, p. 46-64; Da Silva, 2001, p. 59-77), many of them being found in the pottery of the regions around Campo Belo do Sul (Corteletti, 2012, p. 104-105; De Masi, 2005, p. 140-150; Saldanha, 2005, p. 47; Schmitz et al., 2013a, p. 180-188). At Baggio 1, decorated pottery tends to be thinner and, consequently, smaller than average (M = 5.18 mm, SD = 1.21), a difference that was found to be significant in relation to the more common plain ware ($t(66.27) = 6.4$, $p < .01$). Finally, only 2% of decorated ware exhibited use wear related to food processing activities.

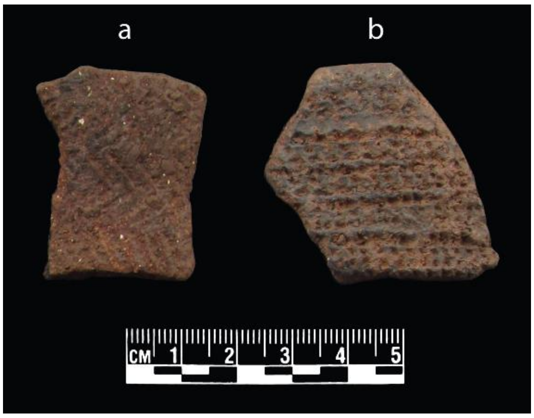


Figure 8.5 Decorated ware from Baggio 1. a) Basketry impressed; b) Stamped. Both from House 1.

Vessel forms

The complete or nearly complete vessels that can be seen in the published literature and collections point to a low diversity of forms in Taquara/Itararé ceramics, except when one compares different regions or periods – which confirms the chronological and geographical variation represented by the phases defined in the 1960s and following decades (Beber, 2004, p. 46-95; De Souza, 2009, p. 25-27; 2011, p. 7; Schmitz, 1988). When examining a single region or site, the low diversity of forms makes it relatively straightforward to infer vessel shapes even from rim fragments. In the case of Baggio 1, I have defined five forms (Figure 8.7). These are common forms for the Taquara/Itararé Tradition as found in the literature. All forms have equivalents in the classifications presented in previous works (Copé, 2006, p. 289-307; Saldanha, 2005, p. 48-57; Schmitz et al., 2002, p. 82-86) from which my reconstructions also benefited[2]. My Form I corresponds to Forms 1 and 4 in Copé (2006, p. 289-290), Type 1 in Saldanha (2005, p. 48-50) and Group B in Schmitz et al. (2002, p. 85). My Forms II and III are equivalent to Forms 2 and 3 in Copé (2006, p. 290-291), Types 2 and 3 in Saldanha (2005, p. 51-55) and Group A in Schmitz et al. (2002, p. 84). Finally, Form IV corresponds to the Group C of Schmitz et al. (2002, p. 86), whereas my Form V does not have obvious equivalents in those works, although similar shapes are subsumed under the Form 4 of Saldanha (2005, p. 55-57) and the Group B of Schmitz et al. (2002, p. 85).

[2] In my own previous work (De Souza, 2009, 2011), I analysed ceramic forms (including both complete or nearly complete vessels and diagnostic sherds) in collections from all three states of southern Brazil. This also helped me to understand the variability of Taquara/Itararé ceramics and to know which profiles could be inferred from diagnostic rim fragments.

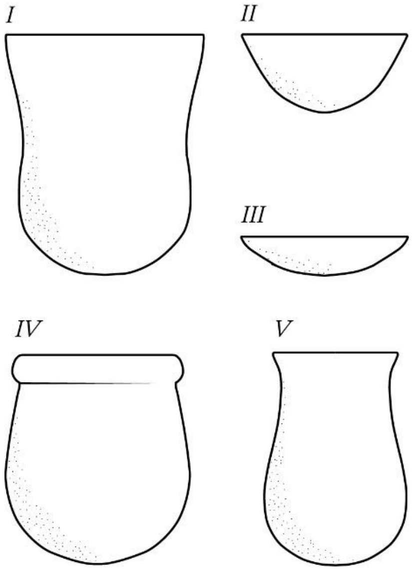


Figure 8.7 Ceramic forms reconstructed for Baggio 1.

Form I comprises vessels that can be described as vases: they tend to be taller than wider, with a slightly inflected cylindrical contour. This appears to be the single most common shape throughout the Canoas-Pelotas basin and neighbouring areas in Rio Grande do Sul, and its ubiquity, use ware and morphology – unrestricted opening, rounded shape, lack of angles - point to its use as the main cooking pot (Copé, 2006, p. 289-301; Corteletti, 2012, p. 103-113; Corteletti et al., 2015; De Souza, 2009, p. 21-22; Saldanha, 2005, p. 48-50; Schmitz, 1988; Schmitz et al., 2002, p. 82). This form sometimes exhibits plastic decoration, which is restricted to a band at the inflection point.

Form II can be described as a bowl, with a height equal to or up to a third of its diameter. This form is hemispherical, with simple contour and unrestricted opening. This is the most common form after the previous one, and is equally popular in other Taquara/Itararé areas. Its morphological characteristics point to its use as serving bowls; the set of Forms I and II would account for most recipients used for food processing and consumption.

Form III probably represents a continuum from the previous one. The only difference is that it would be classified as a dish or plate under traditional terminology – its height being less than a third of its width.

Form IV is extremely rare – in fact, it is represented by only one rim from House 1. This is a small, cylindrical or ovoid vessel whose defining trait is its thickened rim – all previous forms having direct rims. Decoration is stamped and covers the whole body of the vessel. Although rare in Baggio 1, this form is predominant in collections of sites located further south, in Rio Grande do Sul state, and, judging from the available dates, belonging to an earlier period (Beber, 2004, p. 51-54; De Souza, 2009, p. 21-28; 2011, p. 6-7; Miller, 1967; Schmitz, 1988). In Vacaria, Schmitz et al. (2002, p. 81-88) find a similar distinction between his Forms A-B (corresponding to Forms I-III of my classification) and Form C (equivalent to my Form IV). The latter would belong to the highly decorated Taquara phase, whereas the former would be classified within the Itararé phase, although both styles are mixed in all sites excavated (Schmitz et al., 2002, p. 81-82). A similar miscellany occurs in other areas, but the published data give the impression that the highly decorated Form IV becomes rarer as one moves from south to north, and from earlier to more recent periods (Brochado, 1984, p. 122-123 and Fig. 4; Copé, 2006, p. 290-304; De Masi, 2005, p. 166-170; Schmitz et al., 2013a, p. 184-188). Although the sample is insufficient for a more assertive conclusion, it is interesting that this form is only found in the earliest floor of House 1 (*Cal. AD 1315-1430*), suggesting that it was falling out of fashion and disappeared from the local repertoire after the turn of the 15th century.

Form V is also rare, represented by only two rims in the latter periods of House 1. This is an ovoid vessel that could be described as a jar or jug. The opening is constricted by an inflection that forms a slight neck, and the rims are everted. This is the typical ceramic form of the Itararé phase and related complexes, and is ubiquitous in Paraná and São Paulo states, but rarer further south (Beber, 2004, p. 66-95; Chmyz et al., 2003, p. 44-56; Chmyz et al., 2008, p. 156-158; Chmyz et al., 1999; Robrahn, 1988; Schmitz, 1988, p. 100-110). It does, however, appear in the immediacies of the study area (Reis, 1980, p. 175-176; Schmitz et al., 2013a, p. 184-188). In House 1, the dimensions of the ceramics of Form V are so reduced that it is more reasonable to see them as vessels for individual consumption rather than for food processing or storage; similar small drinking vessels appear in the ceremonial mound and enclosure complex PM01 at Eldorado, Argentina (Iriarte et al., 2008, p. 955; Iriarte et al., 2010, p. 34).

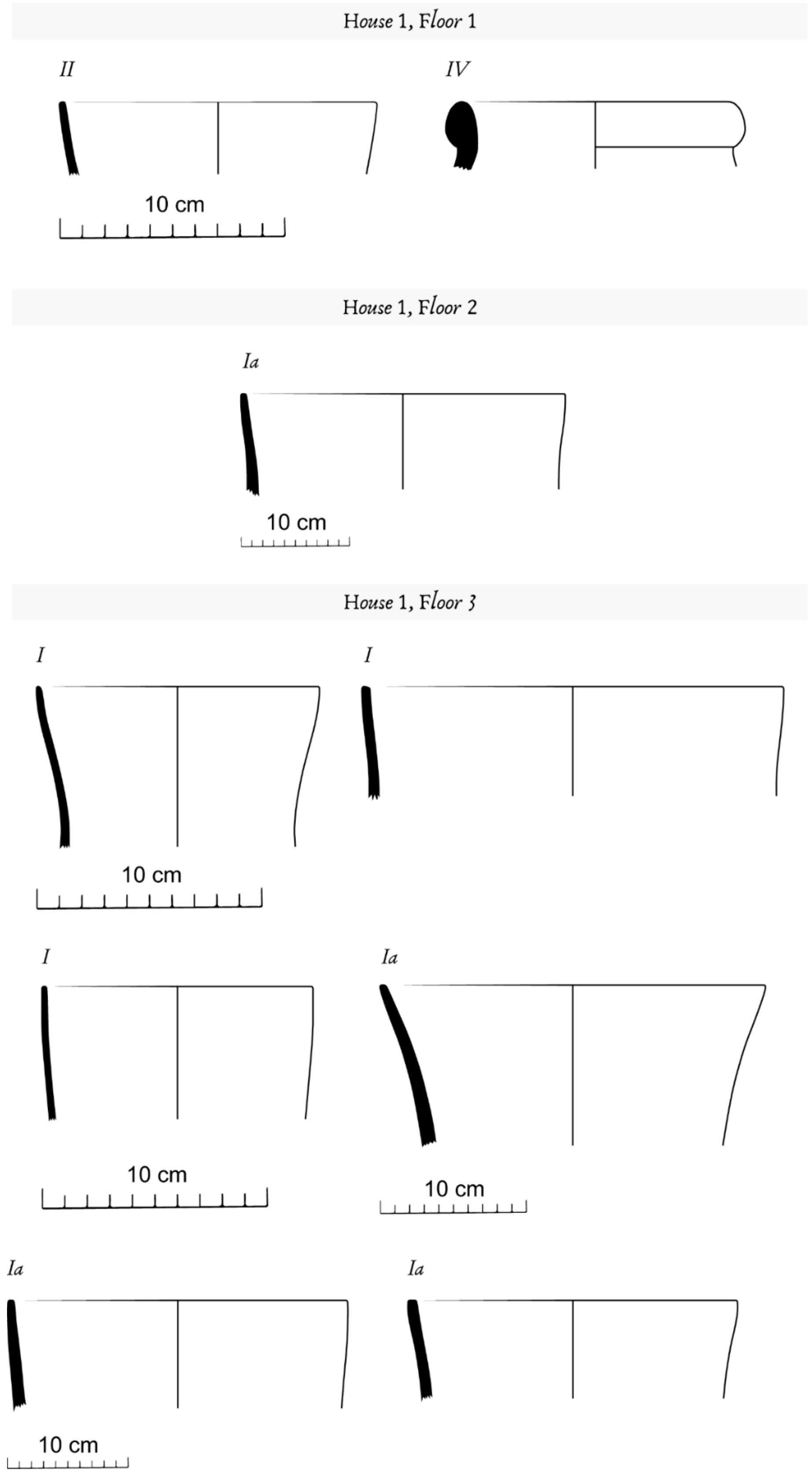


Figure 8.8 Ceramic forms reconstructed for Floors 1-3 of House 1.

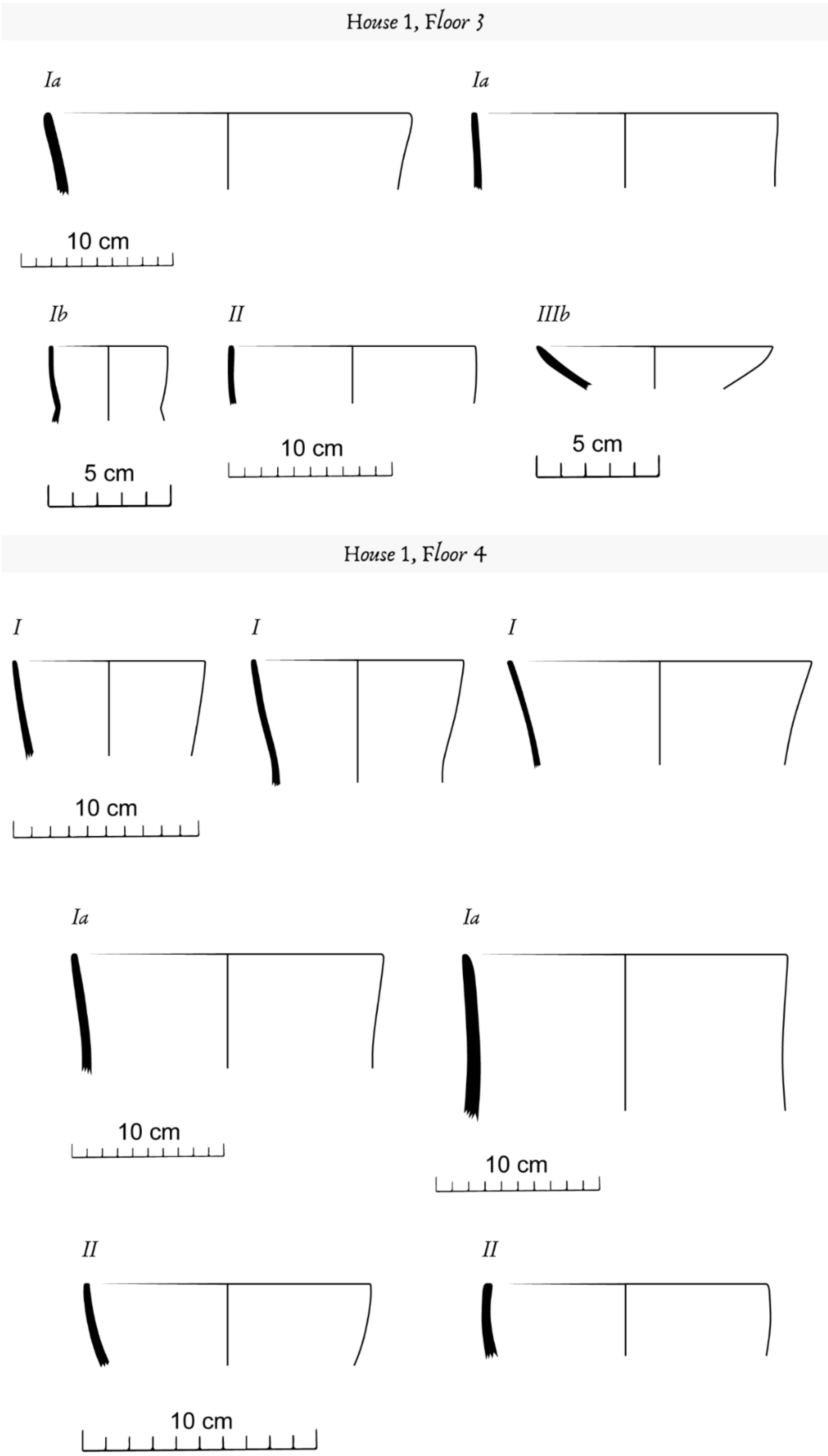


Figure 8.9 Ceramic forms reconstructed for Floors 3-4 of House 1.

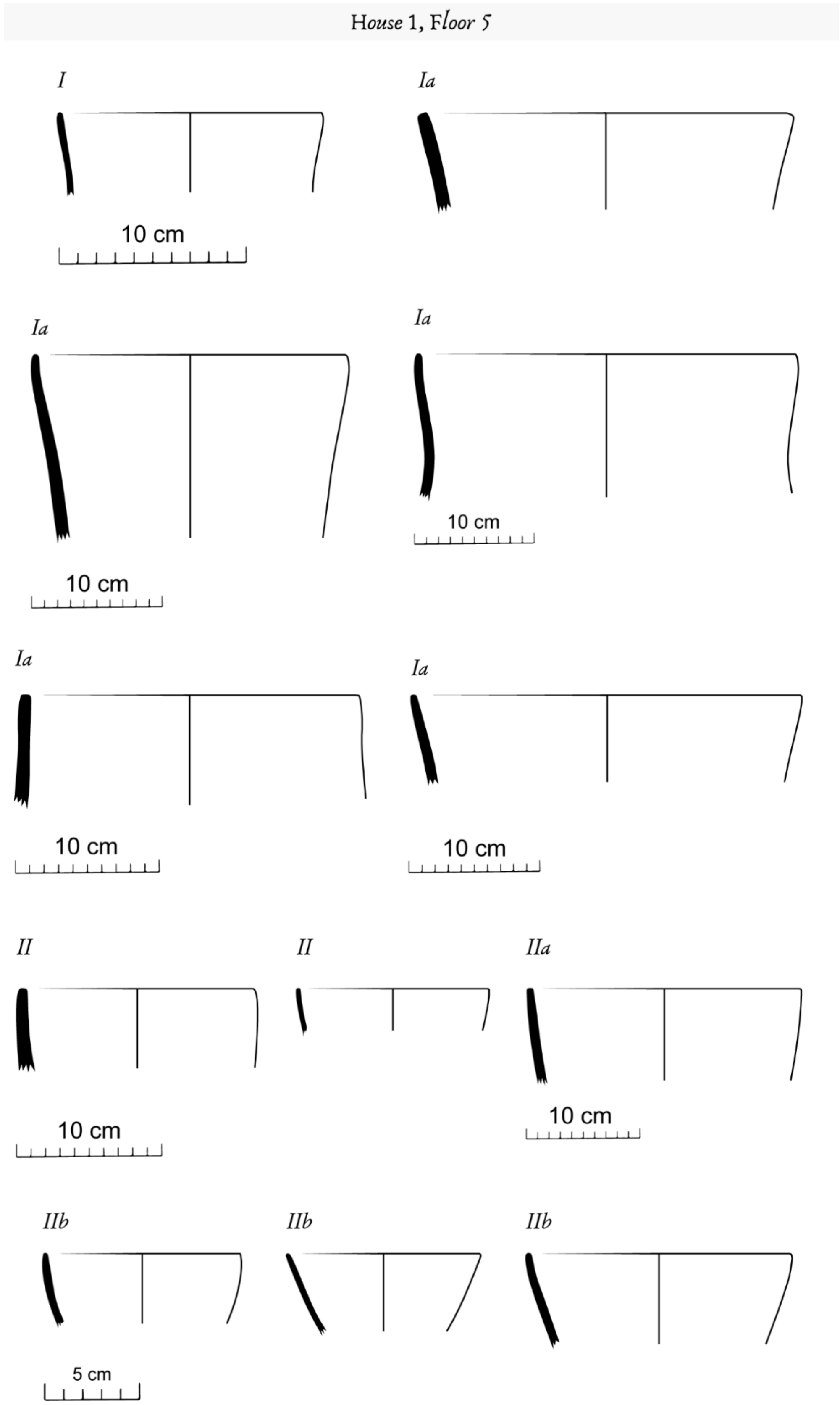


Figure 8.10 Ceramic forms reconstructed for Floor 5, House 1.

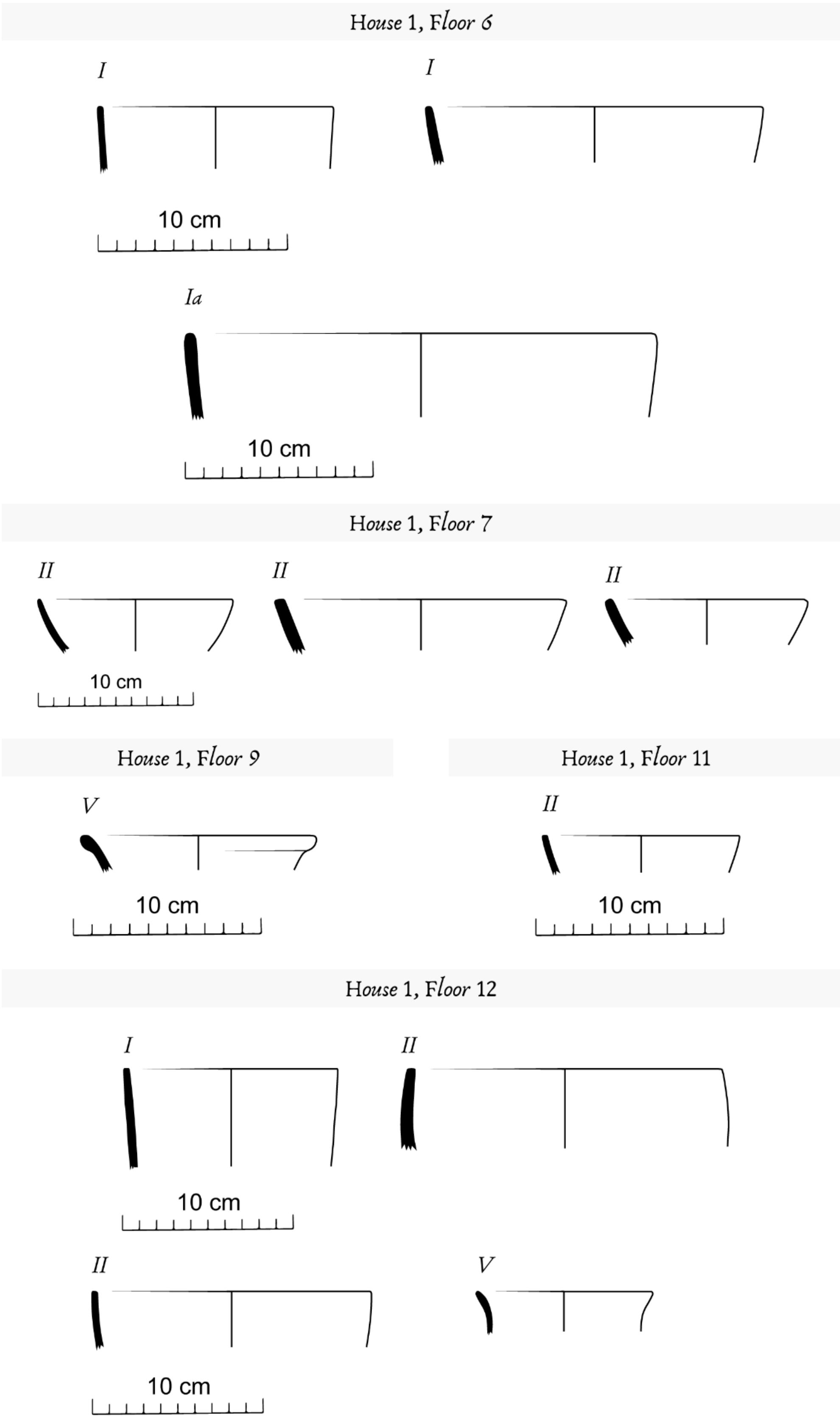


Figure 8.11 Ceramic forms reconstructed for Floors 6-12, House 1.

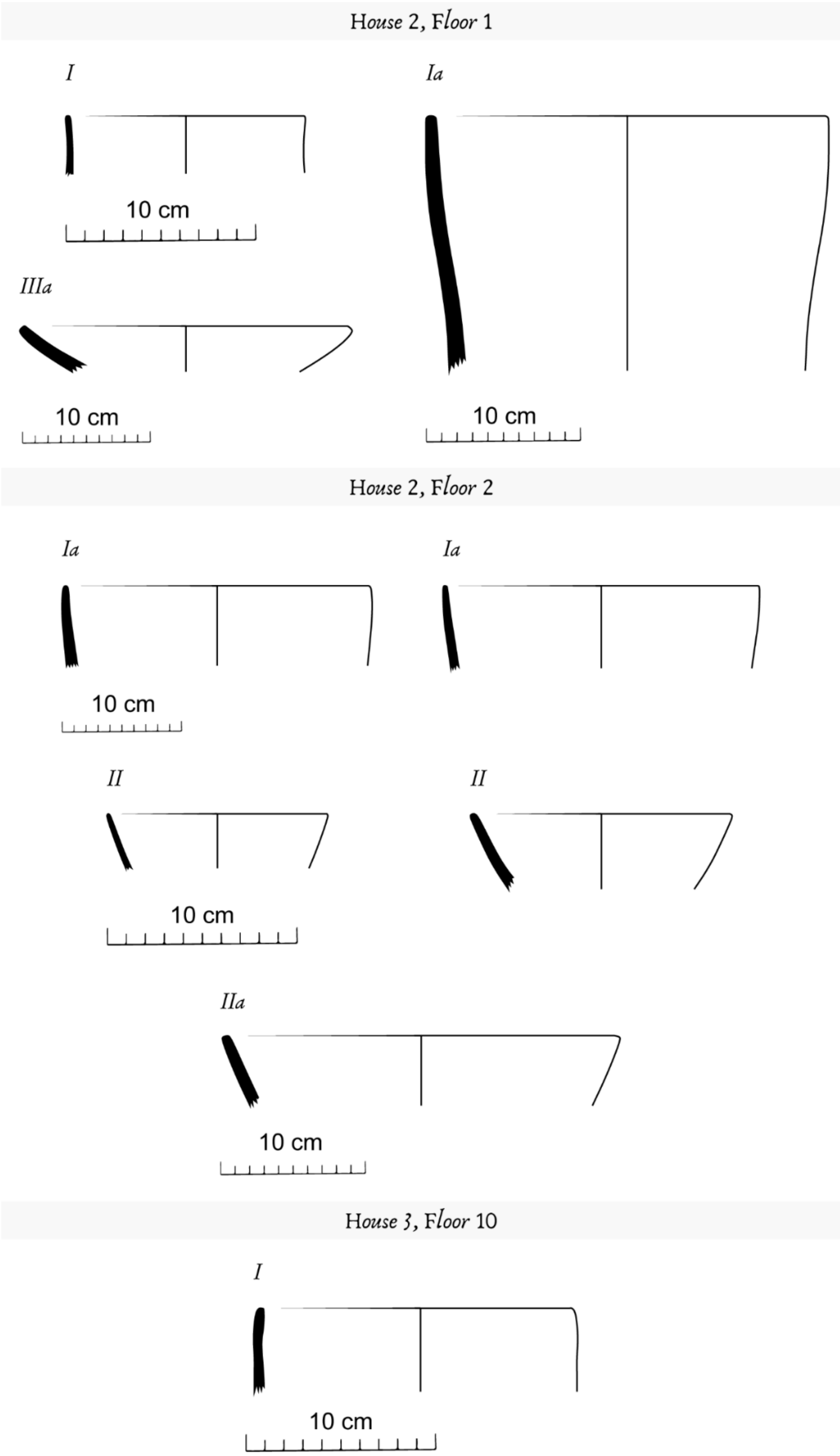


Figure 8.12 Ceramic forms reconstructed for Houses 2 and 3.

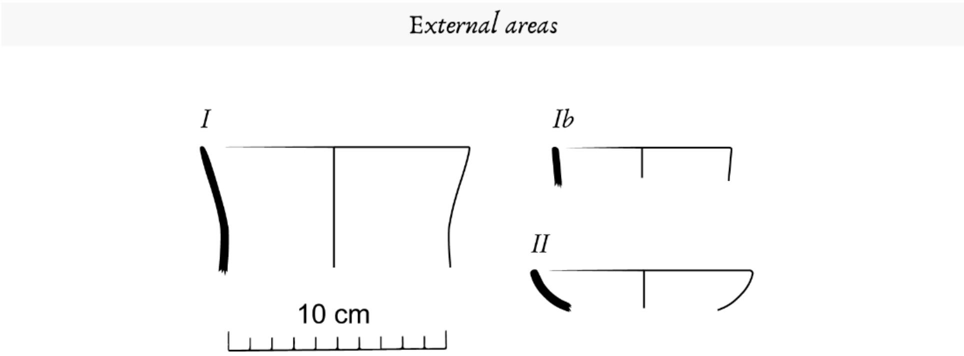


Figure 8.13 Ceramic forms reconstructed for the external areas.

Figure 8.8-Figure 8.13 above present all the vessel shapes that could be reconstructed from rims in Houses 1, 2, 3 and the external areas of the inner precinct. The numbers on top of each vessel correspond to its assigned form. I have further identified whether a vessel is (a) oversized (diameter larger than 20 cm) or (b) miniature (diameter smaller than 10 cm).

Chronological trends in House 1

The long, well dated stratigraphic sequence of House 1, coupled with the large sample obtained during the excavations, provides a unique opportunity to examine ceramic changes over time. To the best of my knowledge, no attempt has been made so far to identify possible changes in material culture over the history of a single pit house. Figure 8.14 shows the proportions of the different ceramic types for each floor of House 1.

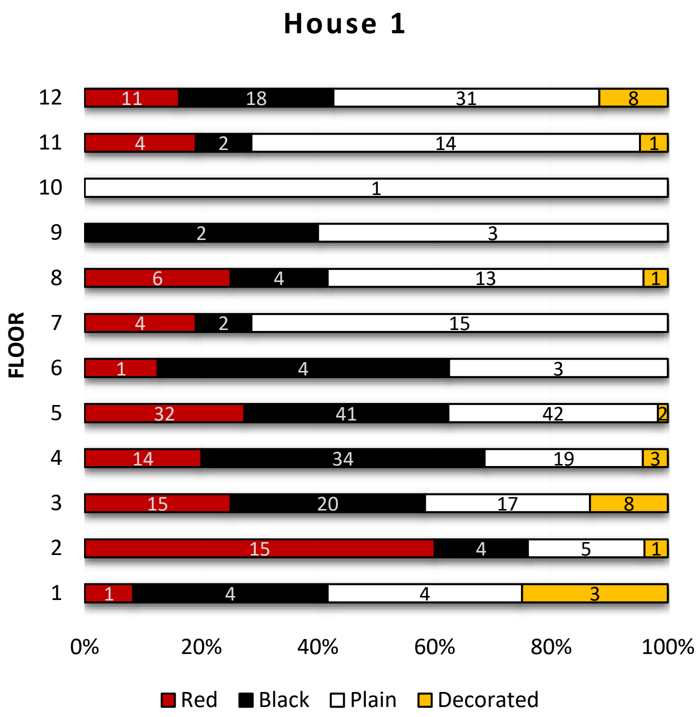


Figure 8.14 Ceramic types per floor in House 1.

Some tendencies become apparent in the graph above. For instance, earlier floors include higher proportions of red ware. Plain and black ware have roughly similar proportions during the earlier periods, but plain ware becomes predominant in later periods. Decorated ware is overall rare, but tends to be more frequent right at the beginning and at the end of the sequence. However, the extremely reduced sample for some of the floors means that one must be cautious when interpreting those results. To test whether there is any chronological trend in the distribution of ceramic types, we can compare the floors with the largest samples for different periods – Floor 5, the last in the sequence of early burnt floors (*Cal. AD 1510-1585*), and Floor 12, the terminal occupation before abandonment of House 1 (*Cal. AD 1625-1675*). When those two floors are compared, a significant difference in the proportion of the various ceramic types can be demonstrated (χ^2 (3, N = 185) = 12.37, $p < .01$). Furthermore, when we compare all of the burnt floors (*Cal. AD 1315-1585*) against the later unburnt floors (*Cal. AD 1520-1675*), the difference is still significant (χ^2 (3, N = 432) = 24.29, $p < .01$). In summary, it can be demonstrated that plain ware gains preference over time at the expense of the red and black types.

Other changes accompany that trend. Ceramics tend to become thinner and smaller in the later periods (Figure 8.15). This was demonstrated by a comparison of sherd thickness between Floor 5 (M = 7.79 mm, SD = 1.74) and Floor 12 (M = 6.26 mm, SD = 1.94) (t(226) = 6.14, $p < .01$). Again, this trend was confirmed when all the burnt floors (M = 7.45, SD = 2.1) were compared against the unburnt floors (M = 6.35, SD = 1.92) (t(505) = 5.84, $p < .01$). Because vessel thickness is significantly related to rim diameter (r = 0.73, N = 55, $p < .01$), it was expected that this variable would also show a significant difference between early and later floors. Indeed there is such a difference between Floor 5 (M = 19.87 cm, SD = 7.45) and Floor 12 (M = 14.2 cm, SD = 3.19), although it could not be proven to be significant at the 95% level (t(19) = 1.63, p = .12). However, when the vessel diameters of all burnt floors (M = 17.95 cm, SD = 7.25) are compared against those of the unburnt floors (M = 13 cm, SD = 3.76), a significant difference becomes clear (t(36.83) = 3.09, $p < .01$).

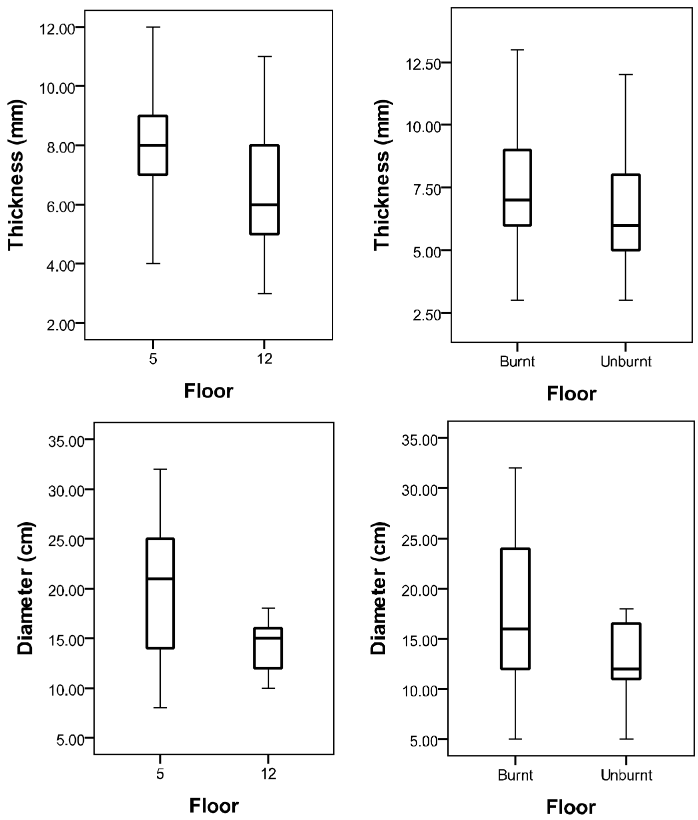


Figure 8.15 Box plots comparing ceramic thickness and rim diameter between Floors 5 and 12 (left) and between the total of the burnt floors against the unburnt floors (right).

Chronological trends in House 2

After House 1, this is the pit house with the largest number of sherds. When the vertical distribution of the various ceramic types is examined (Figure 8.16), fewer changes than in House 1 can be observed. In fact, none of the fluctuations seen in Figure 8.16 can be shown to be statistically significant. Overall, plain ware and black ware appear in similar proportions, followed by red ware and, finally, by decorated ware. When the metric attributes of the ceramics – sherd thickness, rim diameter – are taken into consideration, they also do not exhibit any variation over time that can be shown to be significant. The short occupation of less than a century at House 2, when compared to the more than two centuries at House 1, may account for this lack of variation.

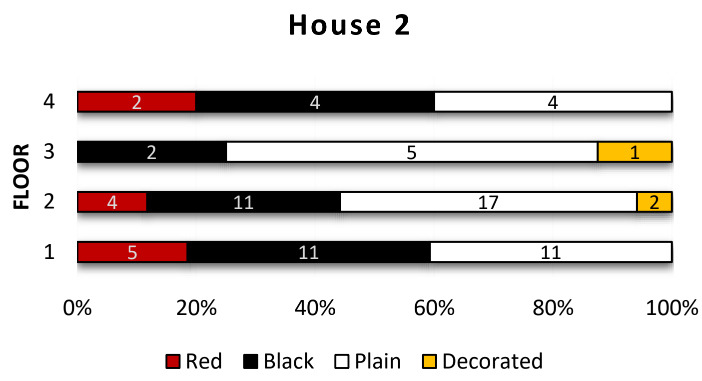


Figure 8.16 Ceramic types per floor in House 2.

Chronological trends in House 3

House 3 has a very small sample (N = 29). Many floors had no ceramics on them, or only unidentifiable types. Nevertheless, I present the distribution of the various wares per floor in Figure 8.17. Plain and black ware predominate in roughly equal proportions, as is the case in House 2. Red ceramics eventually appear. Given the small number of sherds, it is not possible to demonstrate that those fluctuations are due to anything but the vagaries of sampling.

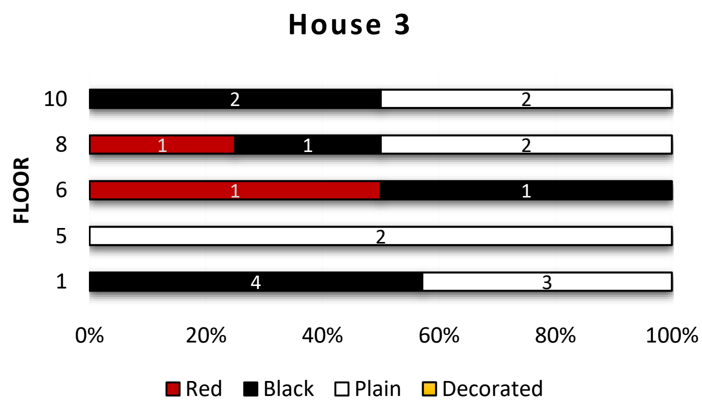


Figure 8.17 Ceramic types per floor in House 3.

Spatial trends

So far, I have focused on ceramic changes *within* each structure. Now, I turn to the variability found *between* structures and areas of the site (Figure 8.18). House 1 contains a higher proportion of red slipped ceramics when compared to Houses 2 and 3. These two houses, in their turn, show similar proportions of all the types, except for decorated ware, which is absent at House 3. However, this might be due to the small sample size of that structure, since ceramics with plastic decoration are overall the rarest type. The differences between Houses 1 and 2 could not be shown to be statistically significant at the 95% level, although they should not be overlooked (χ^2 (3, *N* = 511) = 5.12, p = .16). Differences between those structures and House 3 are not significant. One important observation is that red ware in House 1 is more common in the first half of the sequence (Figure 8.14). Because Houses 2 and 3 started to be occupied when House 1 was half-way through its history, even the slight variations observed between House 1 and the other two structures could be due to temporal trends.

The scenario changes when the external areas of the inner precinct and Mound A are taken into account. By examining Figure 8.18, it is evident that the distribution of types in those areas is very discrepant from that of the pit houses, a difference that is statistically significant (χ^2 (12, *N* = 762) = 105.55, p < .01). Especially intriguing is the absence of red ware in the last two areas. I will restrain from offering an interpretation at this stage, as a full discussion of formation processes can be found in the next chapter. For now, I suggest that the following hypotheses could account for the variations observed: (1) different ceramic types were used in each area, with discard occurring in the context of use; (2) the same ceramic types were used in all areas, but were discarded according to different patterns – red ceramics always being dumped inside pit houses; (3) the external areas (and maybe Mound A) were secondary refuse deposits, but not all artefacts were discarded there – again, red ware remained inside pit houses.

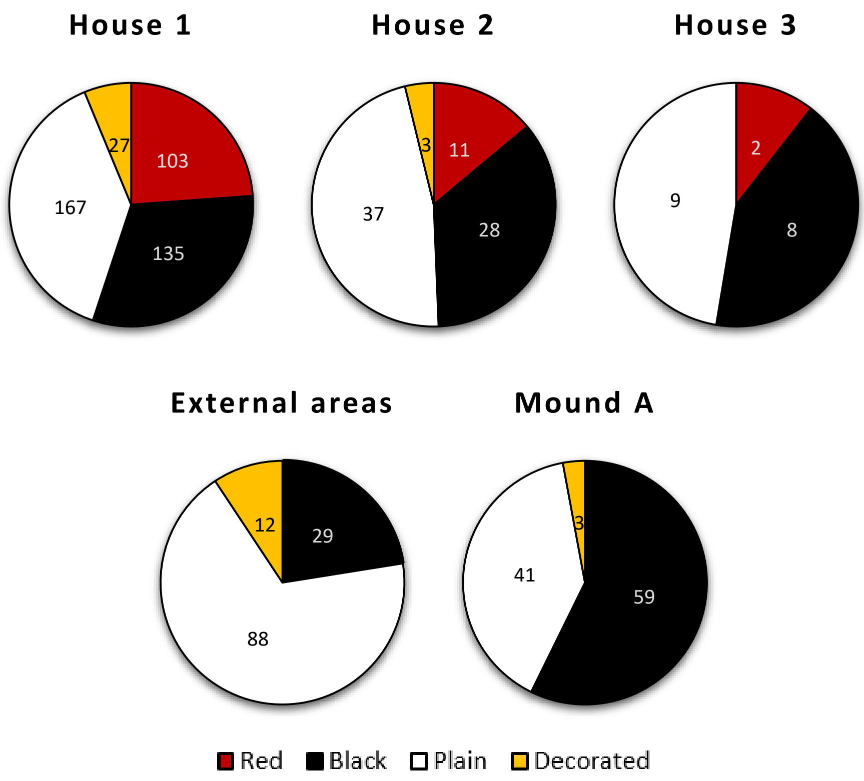


Figure 8.18 Ceramic types per structure/area at the Baggio 1 site.

It is instructive to consider other studies of ceramic distribution across pit houses of the same site. An examination of the tables published by Schmitz et al. (2002, p. 89) shows that, at sites RS-A-27 and RS-A-29, there is more variation between pit houses than at Baggio 1. In most houses, the plain type dominates, but in some of them decorated ware can contribute with up to 66% of the assemblage. Others have exceedingly high numbers of red ware, up to 37%. These tend to be the houses with a smaller sample size – although it must be noticed that, at Baggio 1, even the poorly represented House 3 showed a similar composition to that of Houses 1 and 2. The dates do not point to any chronological trend in the variations observed. External areas had similar proportions of the various types to that found in the neighbouring pit houses, which reinforces the hypothesis that some of them are dump areas (Schmitz et al., 2002, p. 100).

Methodology of lithic analysis

Lithics were initially classified according to raw-materials and technological types, differentiating between by-products of *débitage* and tools (Andrefsky Jr., 2005, p. 74-77). The first comprised unmodified flakes, cores and debris – fragments with no discernible surfaces (Andrefsky Jr., 2005, p. 127-128). Tools were divided in bifaces, unifaces and retouched flakes. Even though microscopical analyses have not been undertaken, the flakes with macroscopical use-wear were classified among the instruments as modified flakes, which does not imply that other flakes have not been utilised (Andrefsky Jr., 2005, p. 78-81). A particular class of flakes has been classified as biface thinning flakes: they were thin, curved and exhibited a multifaceted percussion platform with previous scars from the edge of the instrument being thinned or rejuvenated (Andrefsky Jr., 2005, p. 120-126). The presence of biface thinning flakes is significant, as it indicates that tools were being manufactured or maintained in a site.

In addition to the preliminary typological classification, attributes such as the quantity of cortex on the surface of flakes and tools, and their metric attributes such as length and thickness, have been computed so as to locate the artefacts as part of a lithic reduction sequence. This approach considers that lithic production is a chain of raw-material acquisition, production, use, maintenance and discard. Each step results in an end product and a number of by-products. Collins (1975, p. 7-23) summarises the stages as 1) acquisition of raw-material; 2) core preparation and initial reduction; 3) primary trimming; 4) secondary trimming and shaping; and 4) maintenance/modification. Similarly, Callahan (1979) divides the sequence into 1) blank; 2) edged biface; 3) thinned biface; 4) preform; and 5) finished tool (see also Andrefsky Jr., 2005, p. 188-190). The by-products are as useful as the finished product to identify each stage, so that cortical flakes are related to the early steps of raw-material preparation, biface thinning flakes result from the trimming and shaping of tools, and small pressure flakes are related to the refinement of the edges. This approach is useful for understanding whether all steps of lithic reduction were performed in one place, or whether there were specialised sites for lithic production. It must be said, however, that the Southern Proto-Jê lithic industry is very expedient and might not be adequately described by methods developed for the curated bifacial industries of Palaeoindian/Archaic North America.

Results of lithic analysis

The number of lithics recovered from the excavations at Baggio 1 was relatively small, consisting of only 237 artefacts. Other pit house sites described in the literature include lithics in more or less the same proportion as ceramics, or even in larger number (Copé, 2006, p. 311; Schmitz et al., 2002, p. 90). This is also true of my own previous experience with pit houses – and, in fact, even with ceremonial sites (De Souza, 2012b, p. 60-73). The fact that all the sites in question are earlier than Baggio 1 might account for that phenomenon, if ceramics became more abundant with time. This hypothesis has indeed been considered by Schmitz in a number of publications (Schmitz and Rogge, 2011, p. 197; 2013, p. 10-11; Schmitz et al., 2013b, p. 94-95). Because only House 1 contained an appreciable quantity of lithics, I will not discuss temporal changes in Houses 2 and 3 or inter-house variation. House 2 included only 17 artefacts, all of which were *débitage*, whereas House 3 had a mere 7 artefacts, mostly *débitage* but also including a single basalt bifacial tool. Before moving to the discussion of the chronological trends in the assemblage of House 1, I will make some observations regarding the lithic industry at the site level, and how it compares with other Southern Proto-Jê pit house settlements.

In terms of raw-material selection, the area of Campo Belo do Sul, as most of the highlands, is dominated by the basalts of the *Serra Geral* Formation, formed by magma eruptions during the Jurassic and Cretaceous periods (CPRM, 2015; Da Silva et al., 2003, p. 71-74; Milani et al., 2007, p. 267; Peate et al., 1992, p. 120-123). Most of the raw-materials used for lithic manufacture come from the top of the flood, which is exposed in numerous outcrops, composed by vesicular amygdaloidal basalt with cavities filled by quartz, chalcedony, and other minerals

(Fernandes et al., 2010, p. 76; Pinto and Hartmann, 2011, p. 427-432; Reis et al., 2014, p. 160-162). Basalt blocks, quartz geodes and chert[3] nodules are thus the main sources of raw-material used in Baggio 1 and in most other sites of the highlands (Copé, 2006, p. 315-316; De Masi, 2005, p. 177-205; Saldanha, 2005, p. 60-61; Schmitz et al., 2002, p. 89-90). In the stratigraphy of the *Serra Geral* basalt flows, the topmost amygdaloidal basalt is superimposed onto columnar basalt formed by vertical fractures during the cooling of the magma (Gomes, 1996, p. 25-27; Petry et al., 2005, p. 39; Reis et al., 2014, p. 160-162). Prisms of such columnar basalt were eventually retouched and used as tools (Figure 8.19) (Saldanha, 2005, p. 71; Schmitz et al., 2002, p. 92). In the Paraná sedimentary basin, the basalt of the *Serra Geral* Formation is found on top of or intercalated with various sandstone formations, and in the points of contact, silicified sandstone was formed (Fernandes et al., 2010, p. 77; Hartmann, 2014, p. 175). This has also been occasionally used as a raw-material in the region (Copé, 2006, p. 316; Schmitz et al., 2013b, p. 88-89). However, columnar basalt and silicified sandstone are overall rare in the uppermost parts of the highlands, as they can only be found in those areas where the lower strata of the *Serra Geral* flows are exposed. The local origin of most of the raw-materials at pit house sites has been recognised as pointing to a low degree of mobility even by those who do not see pit house settlements as completely sedentary (Schmitz and Rogge, 2013, p. 15).

Figure 8.19 Basalt prism from House 1.

An examination of the frequency of technological types and raw-materials in the whole assemblage of Baggio 1 (Figure 8.20) shows an absolute dominance of *débitage*, with flakes being the most common product, followed by debris and cores. Tools are very rare, with retouched flakes as the most common type, and

[3] Southern Brazilian archaeologists commonly refer to these as “chalcedony”. Araujo (1991) correctly points out that this usage of the term is incorrect, as chalcedony refers to a mineral, not to a rock, and prefers the term “silexite”. For simplicity, I will use the very inclusive term “chert” to refer to these mycrocristalline and cryptocristalline rocks.

only minor quantities of unifacial or bifacial instruments. Quartz is the preferred raw-material, with basalt and chert appearing in roughly similar proportions.

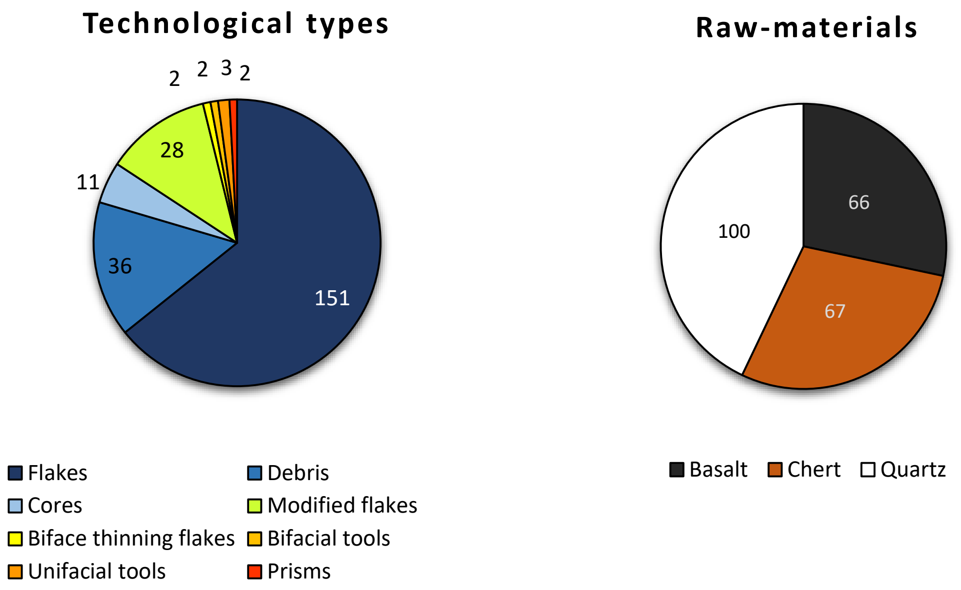


Figure 8.20 Technological types and raw-material selection for the whole assemblage of the Baggio 1 site.

The assemblage composition of Baggio 1 is not different from those of other pit house sites in the literature. They are all dominated by *débitage* and retouched flakes, whereas tools as well as the evidences of their manufacture are rare (Copé, 2006, p. 312-315; De Souza, 2012a, p. 127-128; Schmitz et al., 2002, p. 89-90). Specialised sites with abundant lithics, including large tools, are reported in different areas of the highlands (Copé, 2007, p. 26-27; De Masi, 2006, p. 54-55; Saldanha, 2005, p. 116). In the *chaîne opératoire* of the Southern Proto-Jê groups, finished tools were used and discarded mostly in those specialised areas, outside of the pit house

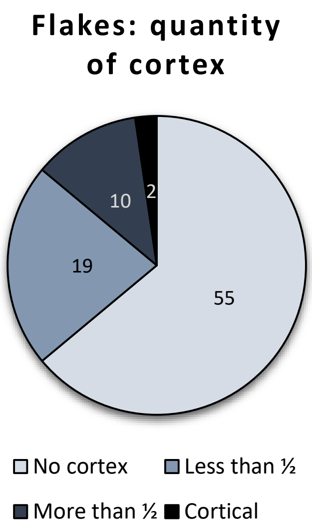


Figure 8.21 Quantity of cortex on the dorsal surface of flakes from Baggio 1.

settlements. There is also evidence that the first stages of the reduction sequence must have taken place in special locations, where cores were prepared and initial reduction was performed, as has been noticed in other sites (Copé, 2006, p. 317-318). Very few cortical flakes are present in the assemblage of Baggio 1, and most flakes have their dorsal surfaces free of cortex (Figure 8.21).

Tools found in Southern Proto-Jê pit houses are usually described as being informal, quickly produced with local raw-materials and intended for immediate use and discard (Schmitz et al., 2013a, p. 182-183; 2013b, p. 89-90). From a reduction sequence perspective, few tools would be classified beyond Callahan's stage 2 (edged biface) or Collins' step 3 (primary trimming) (Andrefsky Jr., 2005, p. 187-188; Callahan, 1979; Collins, 1975, p. 17-18). The tools from Baggio 1 are not different in that regard (see Figure 8.28, Figure 8.29). They can be described as expedient or situational, in the sense that they were probably produced for immediate ends, with little investment and few modifications, and were soon discarded after use (Andrefsky Jr., 2005, p. 31; Binford, 1979, p. 264-266). Facing the risk of incurring in oversimplification, I tentatively associate those characteristics of the lithic industry to a low degree of mobility (Andrefsky Jr., 2005, p. 39-40), which is reinforced by the already mentioned preference for locally abundant – even if poor-quality – raw-materials.

Interestingly, the main difference between Baggio 1 and other pit house sites is in raw-material selection, as the first is dominated by basalt and chert, whereas most sites reported in the literature show a preference for basalt (Copé, 2006, p. 315-316; De Souza, 2012a, p. 127-128; Schmitz et al., 2002, p. 89-90). However, as the vertical distribution of raw-materials at House 1 will demonstrate, this could be due to a chronological trend, considering that most of the dates of Baggio 1 are recent – a fact that, as I mentioned earlier, could also explain the abundance of ceramics (cf. Schmitz and Rogge, 2013, p. 15). I will now examine these changes in House 1.

Chronological trends in House 1

Figure 8.22 Chert and quartz flakes, House 1.

As in all other areas of the site, lithics in House 1 consist mostly of *débitage* – cores, flakes and debris (Figure 8.22). Among the tools, retouched flakes are dominant, although formal unifacial and bifacial tools eventually occur. A basalt scraper was found on terminal Floor 12 next to the fire pits (Figure 8.24). The fact that biface thinning flakes are sometimes present in the assemblage suggests that instrument edges were being re-sharpened inside the house. Two prisms of columnar basalt found laying side by side on Floor 3 defy classification. They were retouched on one of their edges, but not in a systematic manner, and I consider them as a category of their own. An examination of the assemblage composition per floor (Figure 8.23) does not show any major trend – at least in those floors with a sufficiently large sample. In fact, a chi-square test shows no significant difference between Floors 5 and 12, or even for the whole of burnt floors in comparison with the unburnt floors.

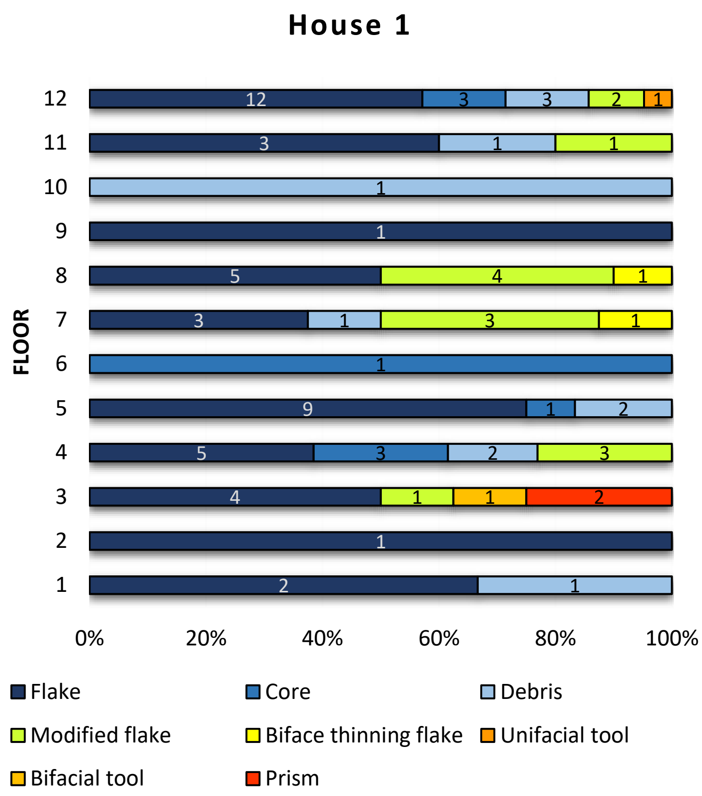


Figure 8.23 Lithic technological types per floor in House 1.

Figure 8.24 Basalt scraper from House 1.

On the other hand, when raw-material selection is considered, some clearer patterns emerge (Figure 8.26). Looking at the graph, it is apparent that earlier floors contain a higher proportion of basalt as the preferred raw-material, whereas chert and quartz dominate in the later periods. As in the case of ceramics, we can compare the floors with the largest assemblage for different periods – Floors 5 and 12. Although they do exhibit a difference in raw-material selection, it could not be proven to be significant at the 95% level (χ^2 (2, N = 33) = 4.35, p = .11). However, if we follow the procedure of dividing the house into two periods and compare all burnt *versus* all unburnt floors, the variation becomes significant (χ^2 (3, N = 86) = 10.11, $p < .05$). By the very nature of the raw-material sources, quartz occuring in crystals and chert in small nodules, those can only produce small flakes, whereas basalt is preferred for larger flakes and instruments. The lithic industry of House 1 was, at the beginning, directed towards the extraction of large basalt flakes that could be retouched or shaped into tools (Figure 8.25). Although these continued to be manufactured, the assemblage in general becomes dominated by small quartz and chert flakes during the later periods.

Figure 8.25 Large basalt flake from House 1.

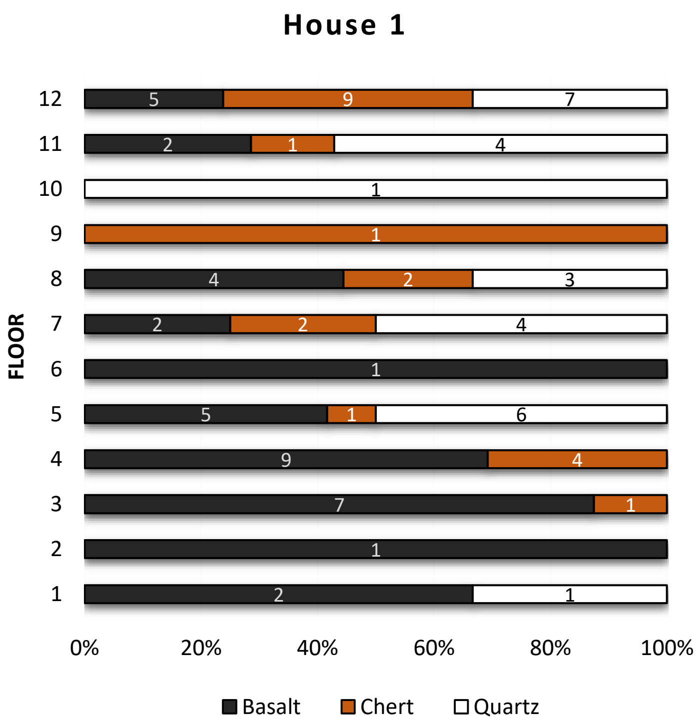


Figure 8.26 Raw-material selection per floor in House 1.

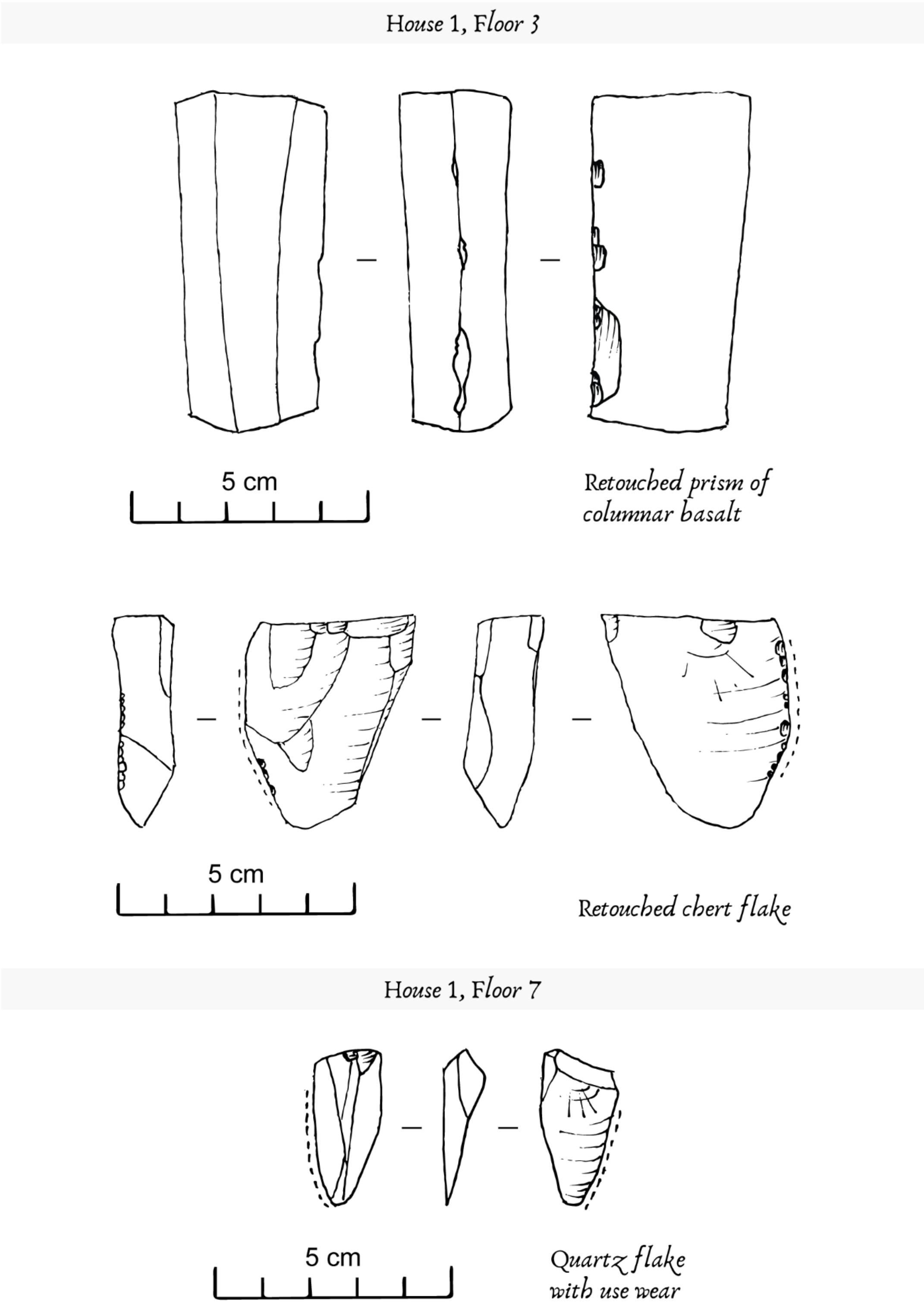


Figure 8.27 Basalt prism and modified flakes from House 1.

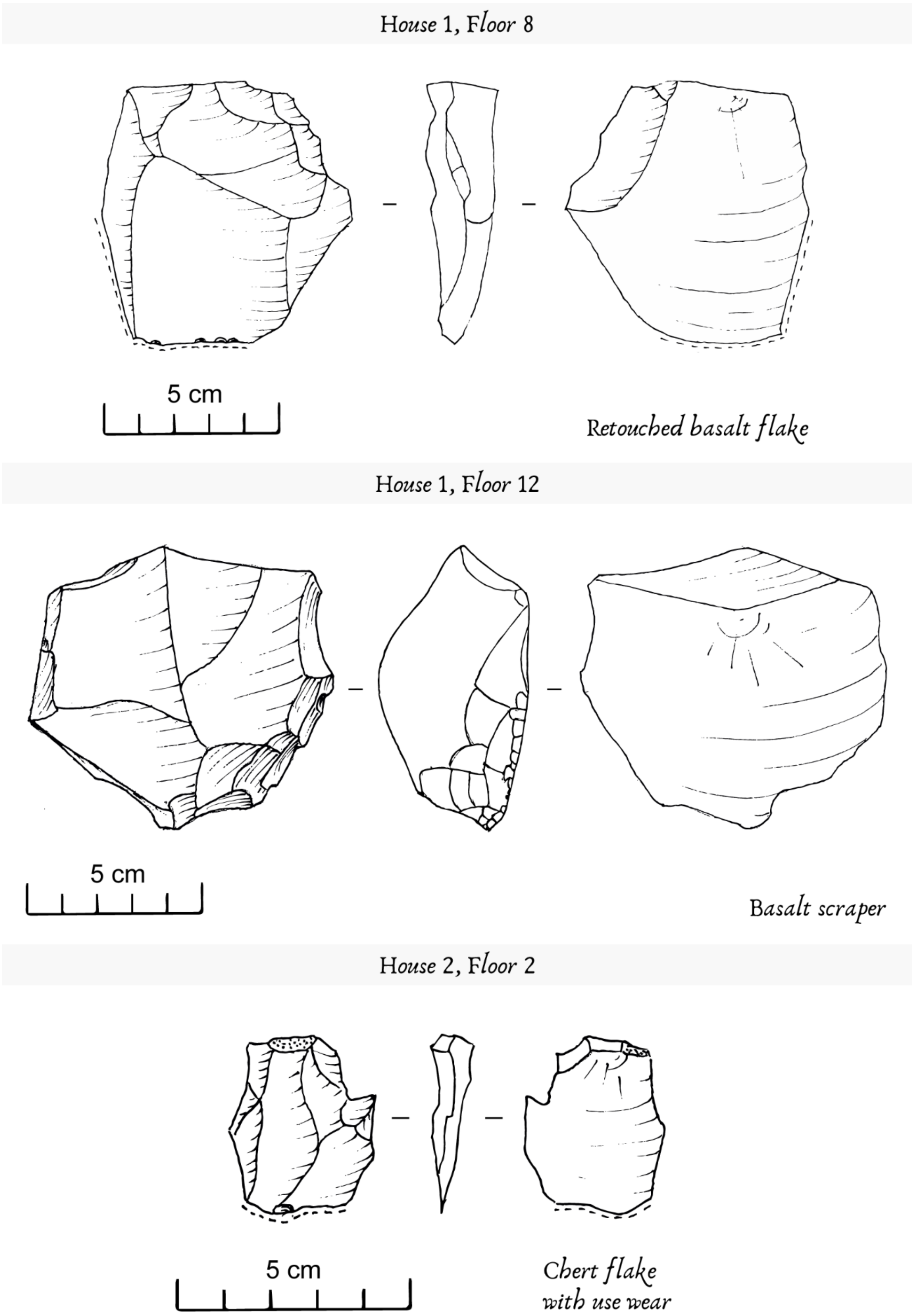


Figure 8.28 Tools and modified flakes from Houses 1 and 2.

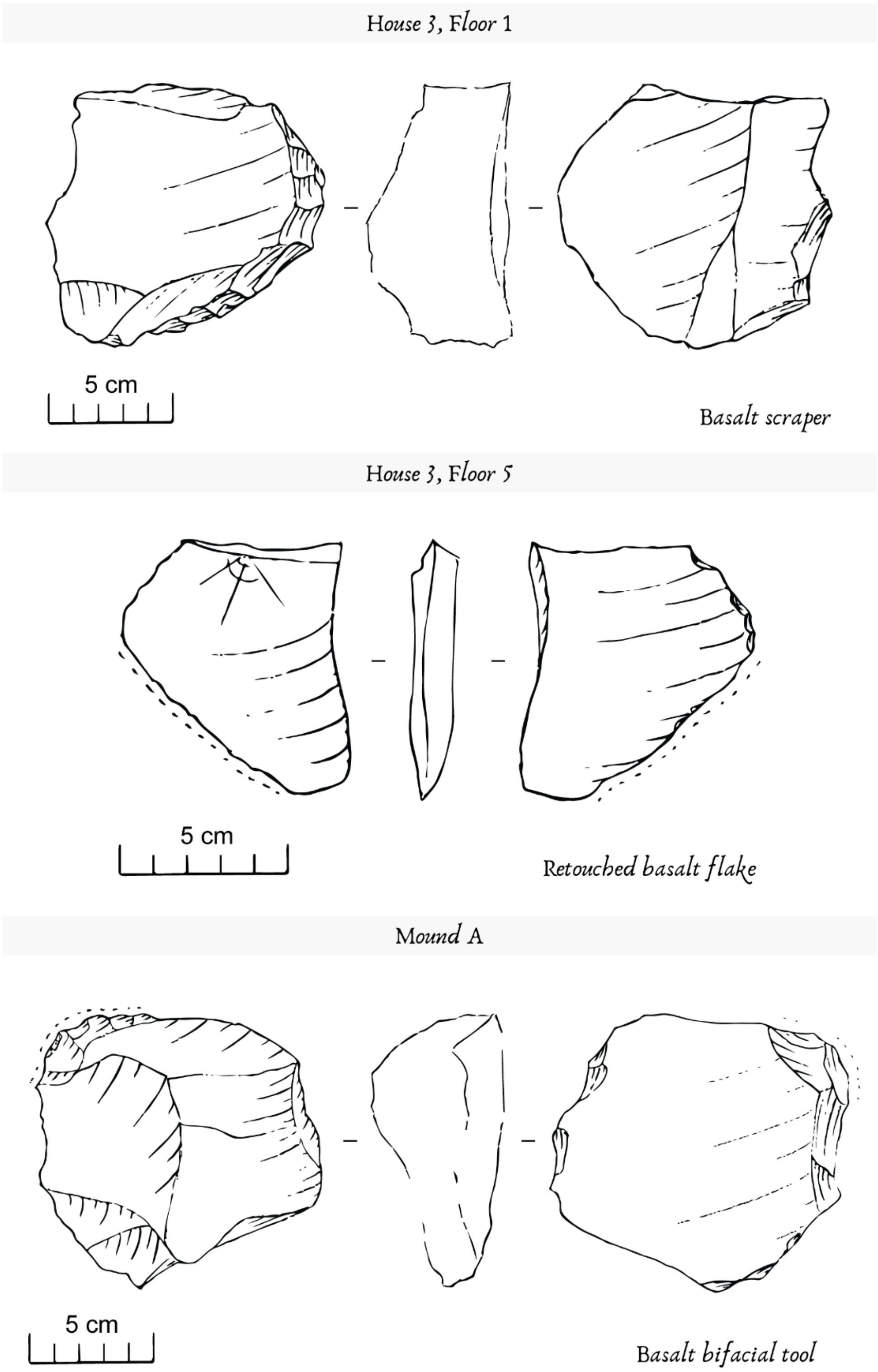


Figure 8.29 Tools and modified flakes from House 3 and Mound A.

Summary

The ceramic assemblage of Baggio 1 is comparable to those of other pit house sites in the highlands. As in other sites, it is dominated by inflected vases that comprised the majority of cooking pots, followed by a small number of serving bowls and dishes for consumption (Chmyz et al., 2003, p. 42-57; Copé, 2006, p. 297-304; Corteletti, 2012, p. 103-108; Corteletti et al., 2015, p. 49-51; Saldanha, 2005, p. 48-57; Schmitz et al., 2002, p. 81-87). The assemblage from Baggio 1, as in the case of other pit house sites, strongly contrasts with that of ceremonial and funerary complexes. For example, at the PM-01 mound and enclosure complex, the reconstructed shapes belonged to small drinking or serving cups, presumably used for consumption of beverages during mortuary feasting events (Iriarte et al., 2008, p. 955; Iriarte et al., 2010, p. 34). Ceramics found in mounds directly associated with burials tend to present the same recurrent shapes, in the form of miniature drinking cups and serving shallow bowls, probably offerings for the dead (De Masi, 2005, p. 137-151; 2009, p. 107; De Souza, 2012b, p. 60-69; Herberts and Müller, 2007; Müller, 2008, p. 42-48; Saldanha, 2005, p. 87-92). The same miniature sizes and low diversity of forms have been identified in funerary rock shelters, where special care was applied to the polishing and black burnishing of the vessels (Copé, 2006, p. 345-346; Saldanha, 2001). The ceramic assemblage from Baggio 1 is thus closer to those of domestic contexts than to ceremonial sites. Its only peculiarity is the moderate frequency of red slipped oversized vessels in the early phases of House 1, associated with burning events. I will explore this topic in the next chapter when examining formation processes.

The lithic assemblage of Baggio 1 also resembles other pit house sites, consisting almost completely of the products of *débitage*, with few tools or evidences of the initial stages of lithic reduction (Copé, 2006, p. 312-315; Schmitz et al., 2002, p. 89-90). These must have been carried out in special locations. As in the case of the ceramics, there is a consistency in the composition of the lithic assemblages of sites with different functions in the highlands (Saldanha, 2005, p. 111-113). For example, away from pit house sites, there are often special activity areas with assemblages dominated by large bifacial and unifacial basalt tools and no ceramics (Copé, 2007, p. 26-27; Copé et al., 2002, p. 124-126; De Masi, 2006, p. 55; Saldanha, 2005, p. 103-110). In contrast, ceremonial mound and enclosure complexes have few, if any, lithics. There are exceptions: one site contained an assemblage identical to pit house sites, suggesting that the same activities were taking place (De Souza, 2012a, p. 127-128). In another case, the lithic assemblage was very unusual, consisting almost completely of quartz flakes and micro-flakes, an indication of the special character of the activities performed at some mortuary sites (De Souza, 2012a, p. 127-128). In any case, the assemblage from Baggio 1 is more similar to other pit house settlements than to surface sites or mound and enclosure complexes reported in the literature.

If the material culture from Baggio 1 is overall typical of other pit house sites, when we examine it at a finer scale, spatial and chronological differences between the several pit houses and areas of the site become apparent. For example, House 1 was distinguished by the uncommon amount of red ware during its early periods, a change from larger to smaller vessels over time, and an increase in the exploitation of chert and quartz for the production of small flakes. More intriguingly, whereas the structures of the inner precinct had a relatively large density of finds, House 11 and its surroundings in the peripheral area were virtually devoid of artefacts. Before an explanation of such variability is offered, it is necessary to consider the formation processes that resulted in the site's assemblages. The next chapter will be dedicated to that question.

Chapter 9
Understanding formation processes

The excavation, chronology, and artefact data presented in the previous chapters pointed to major differences between the pit houses of Baggio 1 – and, in fact, to changes within each structure over time. However, one must not derive conclusions before first understanding the formation processes that were at work at the site. In this chapter, I discuss the possible behaviours behind the formation of the artefact assemblages recovered from Baggio 1, as well as the site's stratigraphic peculiarities – namely, the burning events at House 1.

The formation of floor assemblages

The importance of understanding formation processes prior to making any inferences about differentiation amongst the structures of a site can be illustrated by Schiffer's (1983, p. 694-696; 1987, p. 294-297) reappraisal of the work of Lightfoot and Feinman (1982). As has been reviewed in Chapter 5, Lightfoot and Feinman (1982) found a significant correlation between quantity of exotic items and pit house size in the Mogollon villages of southwester U.S., believing this result to confirm the existence of early forms of leadership held by upper-status occupants of larger dwellings, who would have engaged in long-distance trade networks. This conclusion, however, was questioned by Schiffer (1983, p. 694-696; 1987, p. 294-297), who pointed out that, for such correlation to be valid, it would be necessary first to ascertain that the deposits on the pit house floors were all predominantly *de facto* refuse. In other words, one must first be sure that all of the artefacts found in the pit houses were indeed utilised by the occupants of those structures. Reviewing the primary data, Schiffer (1983, p. 694-695; 1987, p. 294-296) demonstrated that many of the assemblages were fill deposits containing secondary refuse that was washed or dumped into the pit houses. These deposits were disorganised and composed of a diversity of types and phases higher than any floor. Schiffer (1983, p. 696; 1987, p. 297) reached a more mundane conclusion about the correlation between exotic artefacts and pit house size: because exotic goods were rare and their discard occurred rarely, the probability of finding such items increases with the quantity of refuse that is sampled. Larger pit houses, due to their dimensions, are preferable dump areas and will inherently contain more secondary refuse than the small houses; in addition to that, their larger perimeter means that more artefacts will be washed into them after abandonment, all of which characteristics increase the probability of finding rare exotic artefacts in them (Schiffer, 1983, p. 696; 1987, p. 297).

Although these conclusions do not invalidate other correlations found by Lightfoot and Feinman (1982), such as that between larger pit houses and close proximity to *kivas* (see Chapter 5), they do call our attention to the relevance of understanding site formation processes. In fact, one point in which most researchers agree is that floor assemblages at domestic sites do not reflect normal use and discard processes, but are the product of the phase of abandonment, which normally changes those practices (Deal, 1985, p. 250-253; LaMotta and Schiffer, 1999, p. 22). As noted by numerous authors, the most relevant factors to understand the floor assemblages of a purported domestic structure are (i) whether its final abandonment was gradual or abrupt; and (ii) whether return was anticipated or not (Deal, 1985, p. 250-253; Graham, 1993, p. 31-37; Hayden and Cannon, 1983, p. 153-157; Joyce and Johannessen, 1993, p. 138-139; Stevenson, 1982).

It is known from ethnography that, in sedentary and semi-sedentary societies (living in the same settlement for at least one season), regular maintenance in the family's living space tends to keep the house free of debris during the occupation of a site (Deal, 1985, p. 260; Hayden and Cannon, 1983, p. 126-130; Murray, 1980, p. 496-498; Schiffer, 1972; Stevenson, 1991). Floors are regularly swept, and the refuse is discarded in the "toft" area surrounding houses and patios, or in nearby dumps. Furthermore, in highly sedentary societies, not only house floors are swept clean, but activity debris are also removed from outside areas without architecture, such as patios (Robin, 2003, p. 314). This means that, as noticed by Hayden and Cannon (1983, p. 138), artefact distribution in sedentary or semi-sedentary settlements is the least reliable indicator of activity areas. Because special effort is made to remove hazardous, cutting items such as glass or knapping debris (Clark, 1991; Hayden and Cannon, 1983, p. 159), archaeologists must be cautious when comparing lithic assemblages from households.

That does not mean that primary refuse is non-existent: small objects (2-3 cm) usually escape from sweeping (Deal, 1985, p. 260; Hayden and Cannon, 1983, p. 134, 156; Schiffer, 1976, p. 32; Stevenson, 1991). In silty clay floors, these objects can be trampled and ground into the matrix between sweeping or resurfacing episodes (Deal, 1985, p. 260; Joyce and Johannessen, 1993, p. 150-151; Stevenson, 1991; Winter, 1976, p. 27). In an experimental study, Gifford-Gonzalez et al. (1985) showed that artefacts directly trampled on a sandy silt surface migrated up to 2 cm downward; the constant trampling created a loose matrix that entrapped smaller items.

If small objects ground into living floors are the best candidates for representing primary refuse, what about the large, broken artefacts that are sometimes found in domestic contexts? They tended to be interpreted as *de facto* refuse and therefore indicators of activity areas (Flannery and Winter, 1976, p. 41-45), but the most likely explanation comes from the concept of "provisional discard": broken objects can be stored or cached in corners, along walls, or under furniture in the hope of being repaired or used in the future, or just awaiting for a large quantity to accumulate and be dumped elsewhere (Deal, 1985, p. 253-259; Hayden and Cannon, 1983, p. 131-138; LaMotta and Schiffer, 1999, p. 22). In one ethnoarchaeological study, it was found that provisionally discarded pottery contributed to 21% of a household's inventory (Deal, 1985, p. 258).

Small, primary refuse items trapped into floors and large broken artefacts that had been provisionally discarded are the ones archaeologists most frequently recover from abandoned settlements; together with secondary refuse in dump locations, these are the classes of vestige least affected by abandonment processes (Joyce and Johannessen, 1993, p. 151). Once a decision is made to abandon a site, the normal practices of maintenance and discard change, although they vary depending on the abandonment mode, i.e. how quickly it takes place, and if there is an expectation to return (Deal, 1985, p. 250-253; Graham, 1993, p. 31-37; Hayden and Cannon, 1983, p. 153-157; Joyce and Johannessen, 1993, p. 138-139; LaMotta and Schiffer, 1999, p. 22-23; Stevenson, 1982). When gradual, planned abandonment occurs, most useful objects and all valuable ones are taken, leaving behind only trash, discarded items or items that were overlooked (Deal, 1985, p. 268-270; Graham, 1993, p. 35-37; Stevenson, 1982). Debris may be left to accumulate in areas that would otherwise be clean. If return to the site is expected, items that are not immediately necessary, but still usable, can be cached in an orderly manner for recovery upon return (Deal, 1985, p. 268-269; Graham, 1993, p. 31-35; Joyce and Johannessen, 1993, p. 148-149; Stevenson, 1982, p. 254). These caches can be easily mistaken for activity areas.

If the abandonment happens in rapid, unplanned circumstances, more *de facto* refuse will be left behind, including complete ceramic vessels and stone tools in close spatial association with their activity loci (Deal, 1985, p. 269-270; Flannery and Winter, 1976, p. 43; Stevenson, 1982, p. 255-259). Valuable items will tend to be depleted at the expense of other objects, although some may be left at the site if return is expected (Deal, 1985, p. 269-270; Stevenson, 1982, p. 255-259). Portability also plays a major role when deciding what will be taken: larger objects are usually left behind and show the clearest spatial association with activity areas (Rothschild et al., 1993, p. 136); when speed and time are important factors, portable objects of immediate utility may be preferred even to those of greater value (Deal, 1985, p. 269-270; Stevenson, 1982, p. 244).

In summary, sites abandoned gradually and in a planned manner will have little to none *de facto* or primary refuse, and little spatial association between objects and their original context of use. Sites abandoned hastily will contain more of those items, but even in these cases the inventory will not be representative, as valuable items are unlikely to be left behind. In addition to very small debris trapped in floors through trampling, provisionally discarded objects are the only ones likely to remain at the site regardless of the conditions of abandonment (Deal, 1985, p. 253-255). To complicate things further for the archaeologist, usable or valuable items cached or forgotten at an abandoned site may be removed by scavengers (Deal, 1985, p. 271-272; Diehl, 1998, p. 620-621; LaMotta and Schiffer, 1999, p. 25; Montgomery, 1993, p. 158), and abandoned structures – especially pit houses – can serve as dumps for secondary refuse that introduces foreign objects in their fill (Deal, 1985, p. 273; Diehl, 1998, p. 620-621; Montgomery, 1993, p. 158).

Formation processes at Southern Proto-Jê pit houses

How is the formation of floor assemblages normally understood in the Southern Proto-Jê pit houses? This question has been dealt with to various extents by previous archaeologists working in the area, but often it remains implicit. The earliest excavations in Southern Proto-Jê pit houses during the 1960s identified a number of features – hearths, fire pits, post holes – and artefacts in their interior, but detailed excavation plans were rarely published, and the role of *de facto*, primary, or secondary deposition in the formation of those assemblages was not explicitly debated (Schmitz et al., 1988). This started to change in the late 1970s with the first processual approaches in the region by Reis (2007). In the excavations of SC-CL-52, she interpreted the levels with high quantity of ceramics as occupation layers. Although not explicitly stated, this would imply that debris was being discarded in its domestic context of use. That is not necessarily so: as is clear from most of the floors of House 1, occupation levels might actually be the ones with fewer artefacts if cleaning was constantly performed by the dwellers. On the other hand, Reis (2007, p. 174) recognises that possibility, noticing that most of the ceramics occur outside of the pit house, which could represent secondary refuse deposits in the immediacy of the dwellings.

In the early 2000s, Schmitz et al. (2002) presented some conclusions drawn from the excavations of several pit houses in Vacaria, Rio Grande do Sul state. They recurrently found thick layers of charcoal and artefacts at the centre of the structures, interpreting them as resulting from repeated occupations. The way the artefacts were densely distributed throughout the layers led them to believe that debris was not swept. The conclusion that discard occurred inside the houses, in its context of use, is reinforced in the opinion of Schmitz et al. (2002, p. 100) by the fact that they could not identify any external secondary dump areas. The hypothesis that cleaning was rarely performed in the Southern Proto-Jê pit houses, leading to massive accumulation of primary debris in the houses' floors, was maintained by the same author in later publications (Schmitz, 2006, p. 15, 37).

Later works elaborate on those concepts and present a more sophisticated understanding of the formation of floor assemblages in pit houses. Saldanha (2005, p. 93), based on his excavations in Pinhal da Serra, Barra Grande region, Rio Grande do Sul (see Chapter 3), agrees with Schmitz et al. (2002) and assumes that most finds in pit houses correspond to primary refuse, resulting from immediate discard in the context of use. However, he presents important differences between pit houses and surface lithoceramic sites. In the latter, artefact clusters in the far periphery of hearths are interpreted as the result of sweeping debris towards the edges of temporary shelters (Saldanha, 2005, p. 96-97). Pit houses, on the other hand, show high density of artefacts within or in the immediate surrounding of central hearths, leading to the conclusion that they are primary refuse discarded at the location of use, with little cleaning being practised. Further reinforcing that interpretation, Saldanha (2005, p. 78-82) finds a recurrent association of knapping debris in the northern half of the structures and formal tools in the south – with ceramics discarded in the central hearth. This pattern was found in three pit houses excavated at the same site (Leopoldo 5), two of which had reoccupations (all showing the same spatial associations). This frequent disposition is interpreted as relating to well-defined male and female activity areas – in fact, this is a line of investigation that proved fruitful since the beginnings of household archaeology (cf. Flannery and Winter, 1976, p. 42-43). In summary, for Saldanha (2005), discard of artefacts inside pit houses occured predominantly in the context of use, around hearths, and these were left to accumulate without systematic cleaning, resulting in well-defined concentrations of primary debris that allow the identification of areas where different activities (male and female) took place.

In Bom Jesus, also Rio Grande do Sul, Copé (2006) draws important conclusions about the formation of pit house floor assemblages. In the smaller House C of site RS-AN-03, she notices that most of the artefacts were concentrated in the upper levels, an evidence that systematic sweeping was practised during the early periods of occupation of the structure, but not in the latter periods. This is consistent with a model of gradual abandonment in which debris is allowed to accumulate before the site is left vacant (Deal, 1985; Graham, 1993; Joyce and Johannessen, 1993; Stevenson, 1982). For those final moments in the history of House C, Copé (2006, p. 250) presupposes that discard occurred in the context of use. As in the analysis of Saldanha (2005), she finds a cluster of knapping debris to the north of the central hearth, in contrast to the high density of ceramics and formal tools to the south, a disposition thought to reflect male and female activity areas. The western half of the pit house was clean, suggesting a resting area, whereas the eastern half had abundant scattered debris and charcoal, which Copé (2006, p. 327-332) interprets as resulting from the cleaning of the central areas. Thus, although regular sweeping must have taken place, debris was in general left to accumulate in its context of use.

In the oversized House A at the same site, several instances of cleaning were evidenced: Copé (2006, p. 205-206) finds numerous instances of lenses of degraded basalt, in one case clearly covering a hearth, which she interprets as a practise of floor maintenance. Furthermore, the quantity of artefacts recovered is not proportional to the monumental dimensions of the structure, and the densities of different classes of finds do not reveal the neat patterns observed in House C. Thus, it is likely that House A experienced more regular maintenance than the smaller structure. However, most of the artefacts are clearly concentrated in the immediacy of hearths, pointing to the accumulation of primary refuse in the context of use (Copé, 2006, p. 333-340). In summary, Copé (2006) shows an interplay between constant primary refuse accumulation and periodic sweepings in the formation of pit house floor assemblages. Two important conclusions are that the oversized structure was more heavily maintained, and that refuse was left to accumulate prior to abandonment.

Finally, Corteletti (2012) presents a very different deposition context for a pit house. A stone oven with fire-cracked rocks covered the entirety of the depression at House 5, Bonin site; charcoal was dispersed throughout the structure, and large ceramic sherds with carbonised residue and sooth, belonging to many reconstructable vessels, lay on top of the stones. Corteletti (2012, p. 74-81) identifies some compartments in this large stone oven, such as a cluster of formal stone tools and retouched flakes on one of its corners. The finds were exposed in the very first levels of the excavation, corresponding to the last moment of occupation of the pit structure. Overall, the impression is that the dwellers of the site left several pots and utensils *in situ* on the oven as they rapidly evacuated the place. This would be an example of *de facto* refuse in Southern Proto-Jê pit houses, and its rarity confirms that the practise was restricted to events of rapid, unplanned abandonment.

Formation processes at Baggio 1

In the Baggio 1 site, each excavated pit house has undergone different processes that resulted in the formation of their floor assemblages and the distribution of finds as they were recovered by the excavations. House 11, needless to say, must have been subject to systematic cleaning during its whole history – the two small ceramic sherds and the two flakes recovered from it must have been trampled into the floors and escaped sweeping. The reduced sample tells us very little, if anything, about the general houses' inventory during its use and the activities that took place therein. I will proceed with the discussion of the formation of the assemblages of Houses 1-3, as well as the external area of the inner precinct.

In House 1, most of the floors posterior to the conflagration events (Floors 6-11) were kept systematically clean, with a few small artefacts escaping sweeping and being incorporated into the floor matrix before subsequent resurfacing events. Small caps of degraded basalt also were used for maintenance of parts of the floors, similarly to what was observed by Copé (2006, p. 205-206) at the oversized house of site RS-AN-03. Also resembling the case studied by Copé (2006, p. 327), at the moment of terminal abandonment of the structure, its dwellers stopped cleaning the floor and allowed refuse to accumulate. Among the unburnt floors, the terminal Floor 12 had the largest number of ceramics (*N* = 80) and lithics (*N* = 21), most of them small finds that are usually considered good indicators of activity areas (Deal, 1985, p. 263; Joyce and Johannessen, 1993, p. 150-151; Stevenson, 1991; Winter, 1976, p. 27). To illustrate the spatial distribution of such finds and their association with features on the floor, I have constructed density maps[1] (Figure 9.1, Figure 9.2).

[1] All density maps in this chapter were constructed with the kernel density tool of ArcGIS 10.2 using a search radius of 0.5 m. The results are presented as finds per square metre.

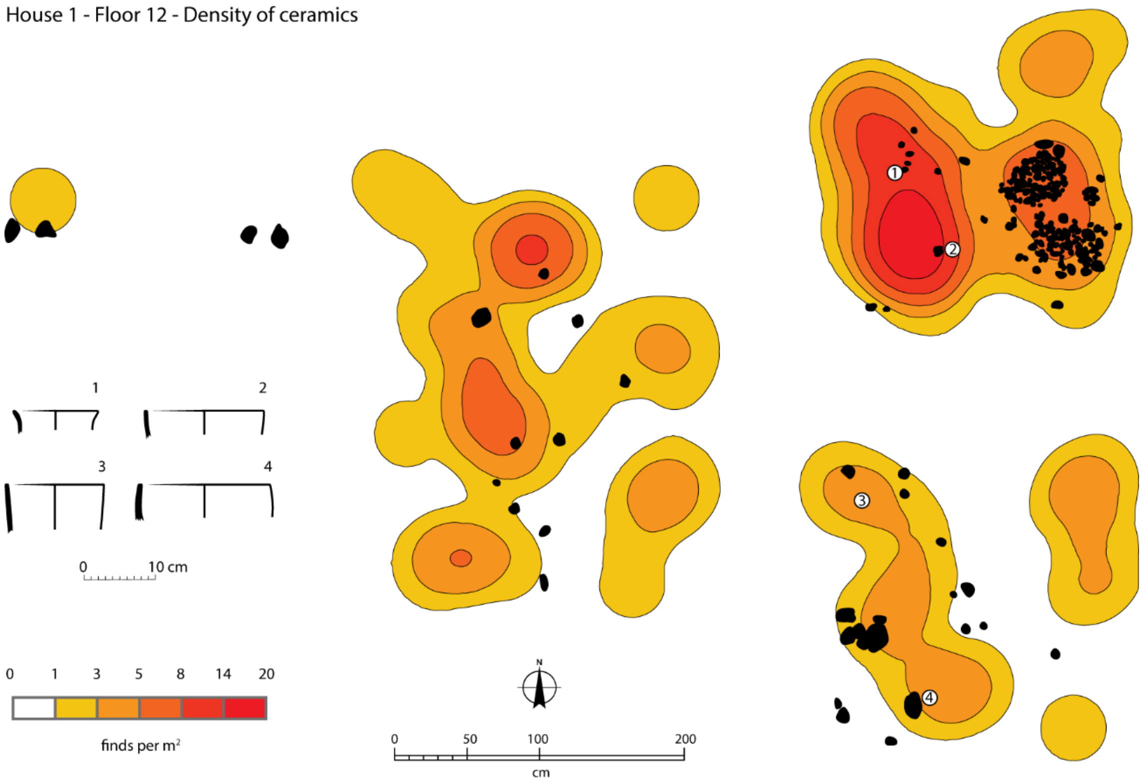


Figure 9.1 Density of ceramic finds on Floor 12, House 1.

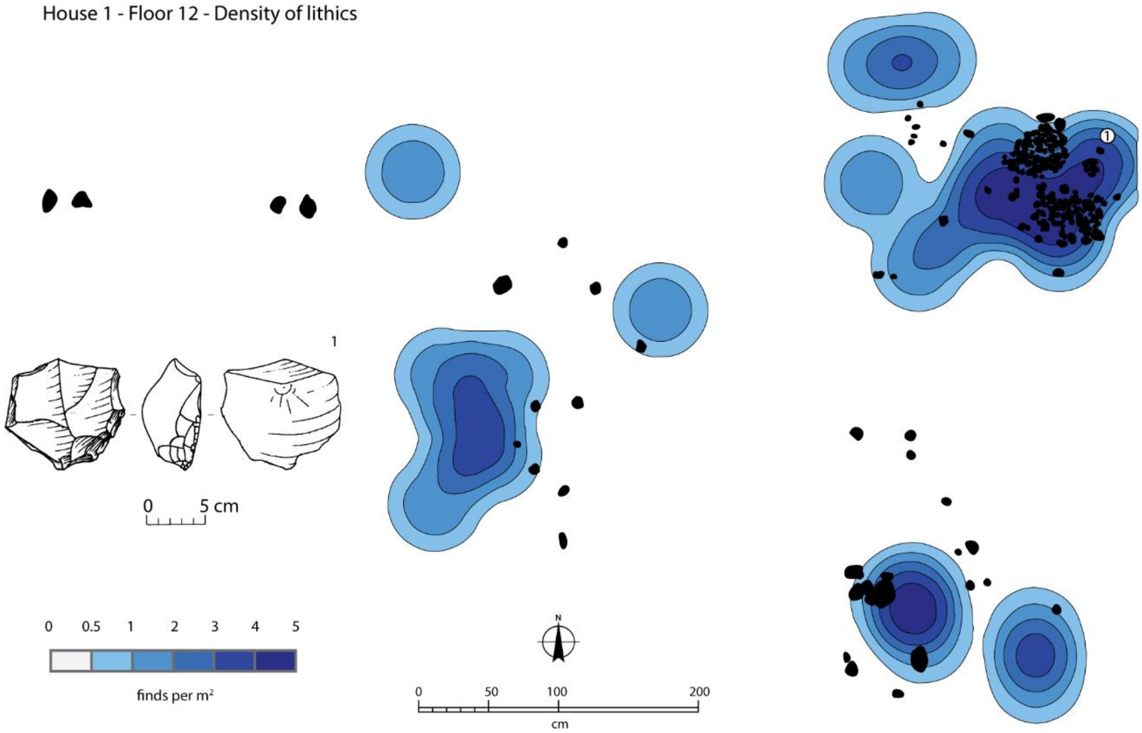


Figure 9.2 Density of lithic finds on Floor 12, House 1.

Examining the density maps of Floor 12, it is clear that both ceramic and lithic finds are clustered near the fire pits of Area B, close to the centre of the house. The highest density of ceramics, most of it consisting of small sherds, occurs in the vicinity of those features (Figure 9.1), resembling a drop zone (Binford, 1983, p. 153-159). Few ceramic forms could be reconstructed, but this floor includes very small vessels appropriate for individual consumption, concentrated near the fire pits and in the centre of the house (Figure 9.1). The lithic assemblage on this floor is composed almost completely of *débitage* and, unlike ceramics, the artefacts are clustered directly inside the fire pits, where the only tool of this floor – a single basalt scraper – has also been found (Figure 9.2). The clustered distribution of artefacts in association with fire pits confirms their nature as primary refuse, configuring clear activity areas. We can conclude that most of the mundane activities of food preparation (indicated by the lithics and fire pits) and consumption (indicated by the small ceramic vessels) occurred at the centre of House 1, whereas its periphery was devoid of debris, suggesting its use as a circulation or rest area. Thus, the internal organisation of space at House 1, at least during its terminal occupation, presents some similarities with other pit houses where spatial analyses have been carried out (especially RS-AN-03, cf. Copé, 2006, p. 333-340 and previous section). It is interesting to point out that, although "systemic maintenance" was practised over most of the history of House 1 – in agreement with its use as a long-term residence – by the final period of its occupation, reflected in Floor 12, its dwellers turned to an "expedient clearing" behaviour closer to the drop zone model of Binford (1983, p. 153-159), suggesting that they were envisaging their permanence there as short-term and had no expectations to return (Sakaguchi, 2007, p. 43).

Because of the more intensive maintenance practised on the previous floors, the number of artefacts is very small, and density maps for individual levels could be misleading. However, to account for the low density of finds and to test whether a significant pattern could emerge from repeated activities at the same locations over time, I amalgamated all the levels from Floors 6 to 11, producing density maps for the sum of those levels (Figure 9.3, Figure 9.4).

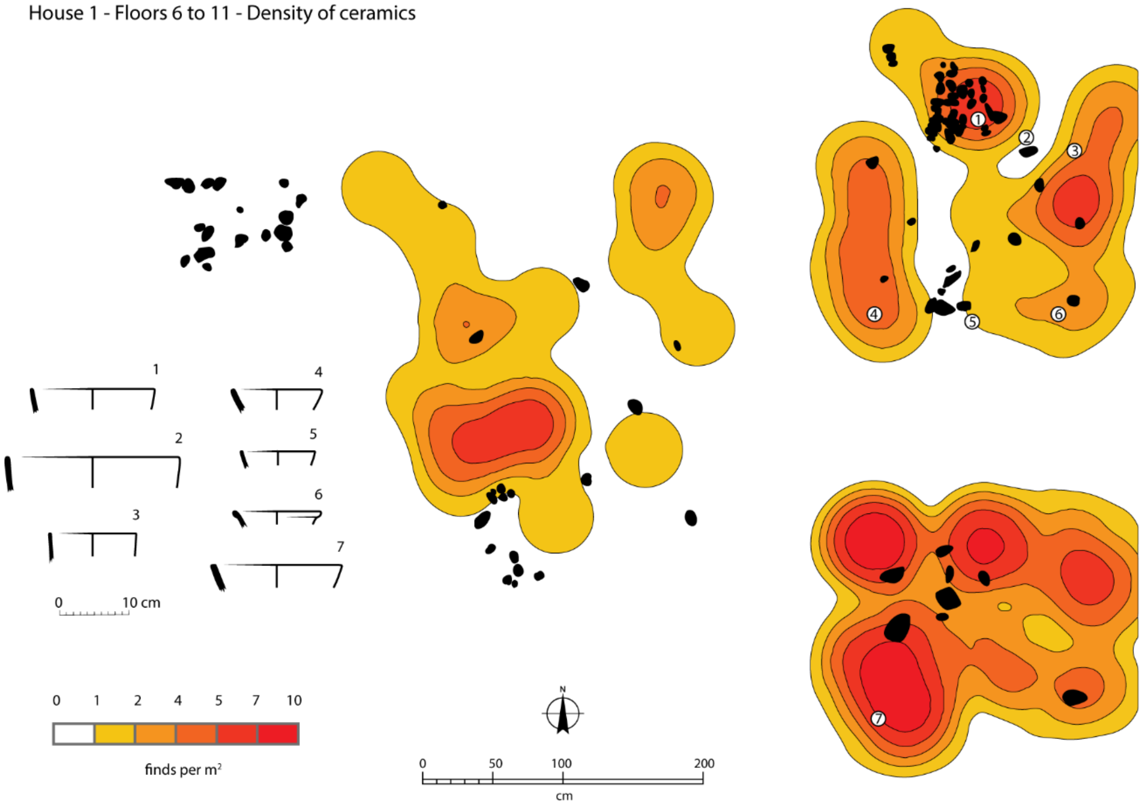


Figure 9.3 Density of ceramic finds on Floors 6 to 11, House 1.

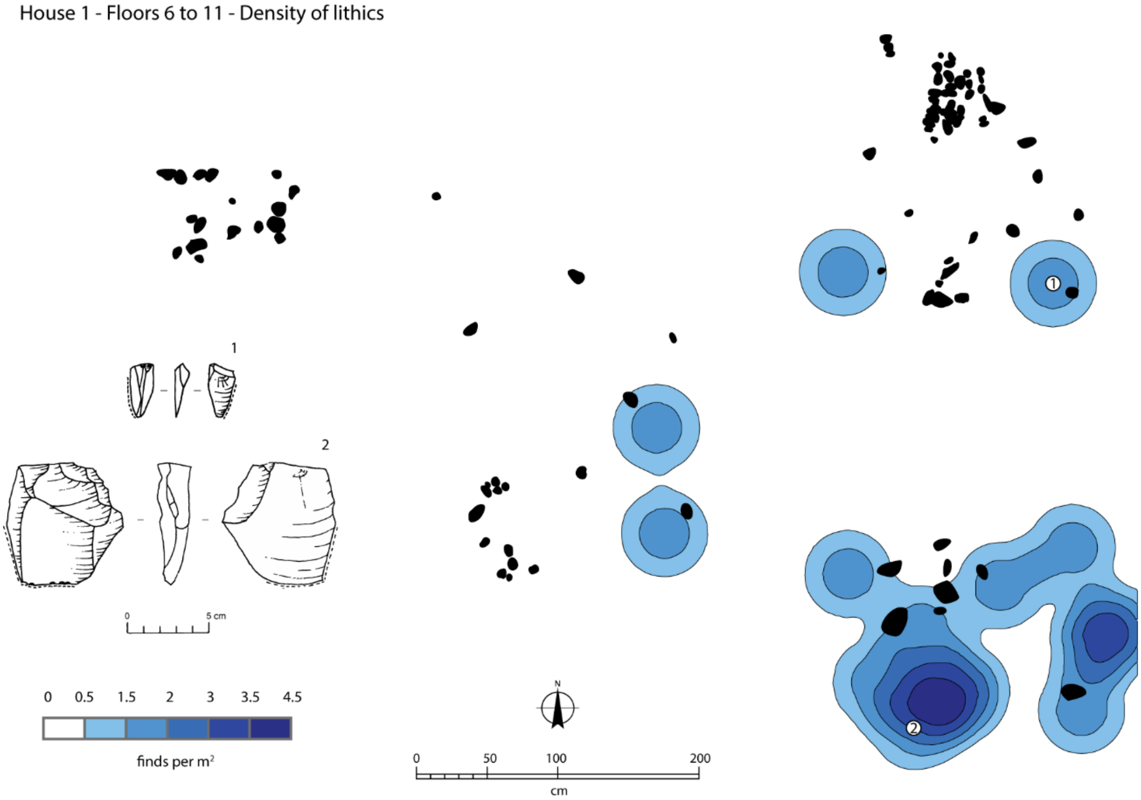


Figure 9.4 Density of lithic finds on Floors 6 to 11, House 1.

Both ceramics and lithics are not evenly scattered, but form discrete clusters throughout Floors 6 to 11. Ceramics are most densely distributed at the very centre of the house, in Area A, but there are also discrete concentrations in other areas. In all cases, the spots of high ceramic density coincide with hearths and fire pits or their immediate periphery (Figure 9.3). Interestingly, ceramic shapes, the majority of which were reconstructed from rims located in Area B, belong mostly to small vessels possibly associated with activities of serving and individual consumption (Figure 9.3). Because the same situation was noticed on Floor 12, it is possible that most of the meals were roasted directly over the fire and not boiled in ceramic vessels. The distribution of lithics is even more restricted, almost completely restrained to the centre of House 1, coinciding with the periphery of a hearth (Figure 9.4). Most of the lithics from these floors belong to the by-products of *débitage*, and no tools have been recovered except for modified flakes (some of which are shown in Figure 9.4). Overall, the lithic and ceramic finds throughout Floors 6 to 11 exhibit the same clustered distribution associated with features that have been noticed on Floor 12. I believe this pattern results from the repeated performance over time of the same activities at specific locations, and in that sense we can understand the densities of Figure 9.3-Figure 9.4 as a representation of the average or cumulative primary debris related to those activities. Therefore, I partly agree with the scenario of non-intentional accumulation of debris over repeated occupations proposed by Schmitz et al. (2002), although I do not agree with the same authors that discrete activity areas cannot be identified. I believe the persistent association of artefacts with features, as well as the differential distribution of both classes of finds – with lithics almost completely restricted to the periphery of the central hearth of Area A – confirms the spatial division of tasks observed in other pit house contexts (Copé, 2006, p. 327-332; Saldanha, 2005, p. 78-82).

Houses 2 and 3 present a different situation from House 1. This is because their small floor area means that the artefacts are scattered over such a restricted space that the distribution of different classes of finds is sometimes difficult to isolate. Nevertheless, previous attempts of spatial analysis in pit houses of similar dimensions have been successful at identifying meaningful patterns (Saldanha, 2005, p. 78-82). In Figure 9.5, I present the density of ceramics and lithics on Floor 2 of House 2. This is the context with the largest number of artefacts.

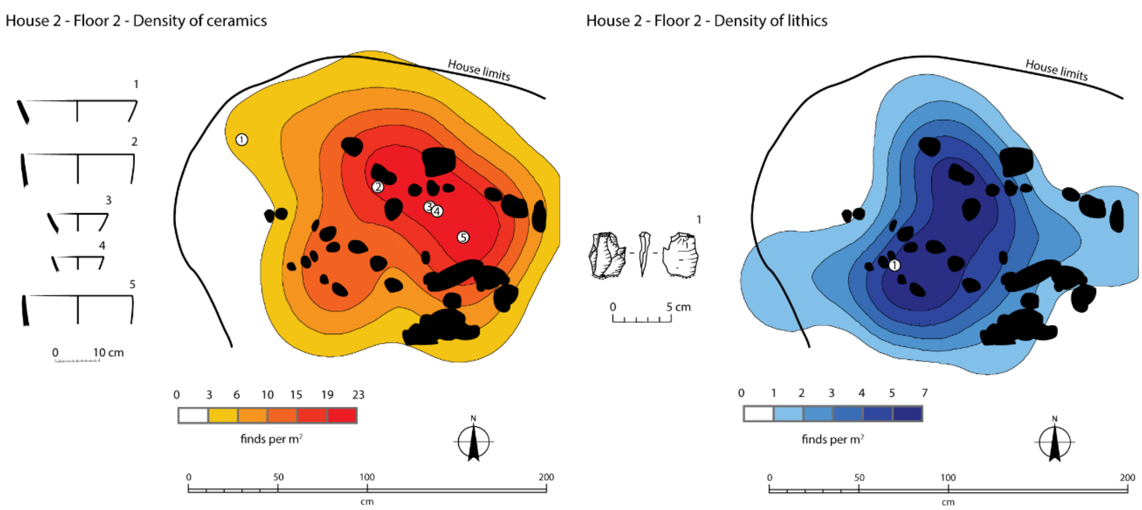


Figure 9.5 Density of ceramic (left) and lithic (right) finds on Floor 2, House 2.

The second floor of House 2 contained a large assemblage of ceramics and lithics scattered amidst the charcoal and rocks of the central fire pit. The highest density of both classes of artefacts coincides with this central feature (Figure 9.5). Ceramic shapes include large vessels for cooking and serving, as well as small dishes, therefore containing a complete assemblage for food processing and consumption (Figure 9.5). Interestingly, most of the sherds scattered in the low-density zone around the periphery of the fire pit are small, whereas large sherds occur clustered at the bottom of the fire pit (see piece plots on Chapter 6). The lithic assemblage is dominated by the by-products of *débitage*; the only tools present are two modified flakes. Their concentration coincides with the central fire pit, but is slightly dislocated to the southwest in relation to the ceramic cluster (Figure 9.5). I interpret the distribution of finds on Floor 2 of House 2 as a primary context, in which artefacts (small lithics and broken ceramic sherds) were being discarded in their context of use – although some of the large, non-articulated sherds found at the bottom of the fire pit could represent secondary depositions (Sakaguchi, 2007, p. 34-35).

House 3 presents a situation similar to House 2. Most of the floors, however, were kept clean, with a few small ceramic sherds and lithics eventually trampled in the matrix. Many floors of House 3 contain no artefacts, others include as few as two ceramic sherds. The basal floor constitutes an interesting exception: a well-defined fire pit with large ceramic sherds and lithics both inside the feature and scattered over its immediate periphery. The density of artefacts on this floor is presented on Figure 9.6. Ceramics, mostly small sherds, are concentrated around the fire pit on the northern half of the floor. No shapes could be reconstructed. Lithics, on the other hand, occur inside the feature amidst fire-cracked rocks and abundant charcoal, and include a large bifacial tool (Figure 9.6). As in the case of House 2, I interpret the small sherds around the fire pit as primary debris, whereas larger sherds and lithics located directly inside the fire pit could represent secondary refuse deposited during the hearth's abandonment (Sakaguchi, 2007, p. 34-35).

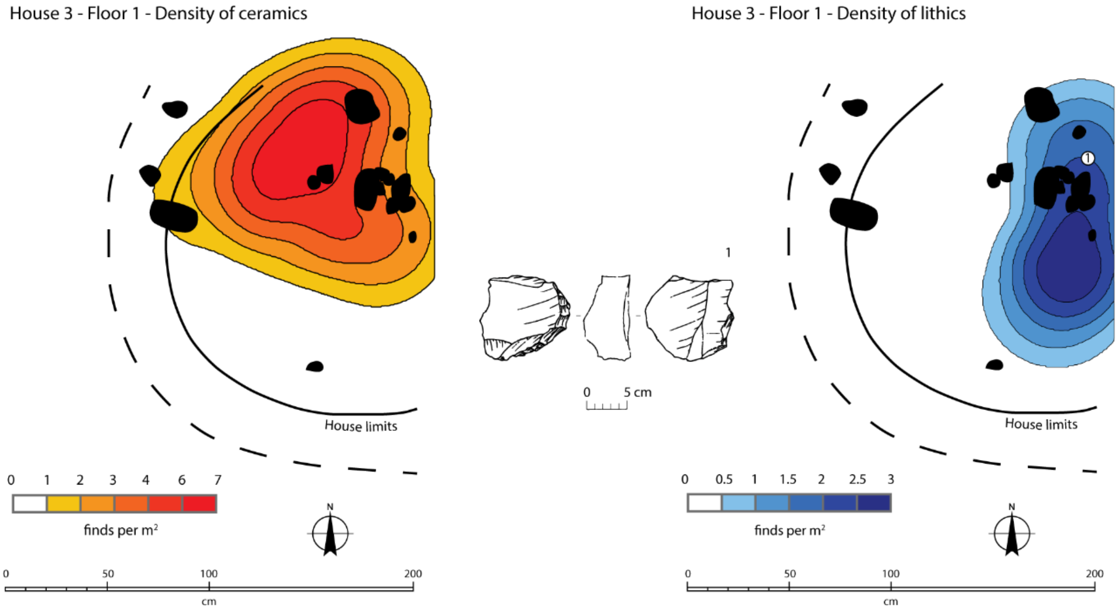


Figure 9.6 Density of ceramic (left) and lithic (right) finds on Floor 1, House 3.

Thus, the basal floor of House 3 and the second floor of House 2 resemble the pit houses excavated by Saldanha (2005, p. 78-82), especially because many ceramics and lithics were directly discarded inside and around the hearths where they were used. Similar recurrent spatial associations were found, with distinct distributions for different classes of finds: large lithic tools and sherds inside cooking facilities, smaller artefacts scattered around it. In all three houses analysed, ceramic and lithic finds tend to be clustered in different areas, potentially as a result of specific activities being carried out repeatedly in the same locations. However, unlike Saldanha (2005, p. 154), I would not associate thesm with specific male / female activity areas in the case of the very small Houses 2 and 3, but rather as a result of an interplay between distinct discard behaviours: primary deposition of small artefacts in the “drop zone” around the features and secondary deposition of larger debris by “tossing” it inside the abandoned hearths (Sakaguchi, 2007, p. 34-35).

Finally, I examine the distribution of finds in the external areas of the inner precinct. External areas in pit house settlements have been targeted by many excavations in the past (Copé, 2006, p. 212-215; Saldanha, 2005, p. 83; Schmitz et al., 2002, p. 24-25) and usually uncovered numerous debris and associated features. The question of whether these are activity areas, secondary refuse deposits, or a combination of both still remains open (Reis, 2007, p. 174). For Schmitz et al. (2002, p. 24-25) the regular distribution of artefacts and presence of hearths in the external areas suggests activity areas, not dumps. The same evidences of activity areas were recovered by Copé (2006, p. 254-256).

In Figure 9.7 I present the distribution of ceramics and lithics in the test-pits of the inner precinct, also indicating the location of hearths and fire pits. It is clear that the dispersion is not even, with a high concentration of finds in the area to the west of House 1, between the oversized structure and the smaller Houses 2 to 4. This spot of high density of finds coincides with the location of two small hearths. Ceramic shapes reconstructed for this area include small vessels related to food processing and consumption (Figure 8.13). The distribution of debris in the test-pits around the hearths (see piece-plot in Figure 6.50) is similar to the model of drop-zone / toss-zone and recalls the dispersion of artefacts in surface sites where large debris is swept or tossed away from hearths (Binford, 1983, p. 153-159; Copé et al., 2002, p. 127; Sakaguchi, 2007; Saldanha, 2005, p. 96-97). Another concentration of artefacts, mostly lithics, occurs around the large fire pit to the northwest of House 1 (Figure 9.7). It is likely that the stone-lined facility served for roasting meals directly over the heated rocks, without involving ceramic containers for boiling. Ethnographies of southern Jê groups describe the use of such stone ovens. The Xokleng lined a hole with rocks and lit a fire on top of them; when the rocks were red hot, they placed pieces of meat wrapped in palm leaves, buried the structure and let it cook slowly (De Paula, 1924, p. 120). The absence of ceramics for cooking in contexts where such large stone ovens are present has already been noticed by Iriarte et al. (2008, p. 957). In summary, the evidence from the external debris in the inner precinct shows a spatial structure consistent with activity areas, not secondary refuse deposition.

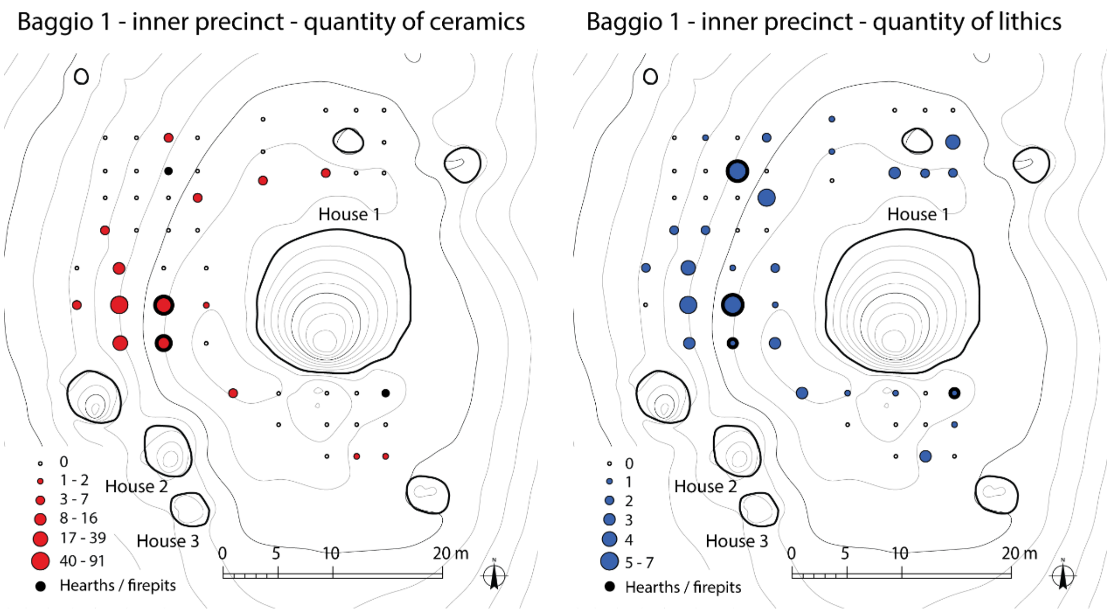


Figure 9.7 Quantity of ceramic (left) and lithic (right) finds in the external areas of the inner precinct.

Rites of conflagration and entombment

In the previous section, I have examined the spatial distribution of refuse on Floors 6 to 12 of House 1. The earlier burnt floors, especially Floors 3 to 5, contain a much higher quantity of finds. But can we interpret them in the same manner as the other assemblages? The fact that these artefacts were deposited *after* the burning of the house seems to imply different processes than could be explained by the simple refuse classification and maintenance practises reviewed above. I turn now to the interpretation of the earlier periods of House 1.

All of the considerations about formation processes reviewed in the beginning of the previous section are based on practical issues: how often to clean living spaces, where to dump the refuse, how abruptly a site is abandoned, and whether return is anticipated or not. However, LaMotta and Schiffer (1999, p. 23-24) have called our attention to a process that is often overlooked – that of ritual abandonment. Of course, not all buildings are ritually abandoned. Some situations, such as the death of an important individual, may call for the ritual closure of a dwelling (Nash, 2009, p. 242). Ritual termination may involve the purposeful collapse of the house, smashing of pots, deposition of objects and other actions that can be mistaken for garbage disposal (Nash, 2009, p. 242-243). Interestingly, in the same way as areas of provisional discard can be mistaken for activity loci, some ritual practices can mimic the effects of other modes of abandonment, making them hard to recognise. I believe two such practices are of relevance to understand the earliest strata of House 1: conflagration and entombment.

Completely burnt settlements and houses are frequently assumed to reflect accidental fires or warfare events; if large assemblages of complete, usable artefacts are found in them, they are assumed to represent *de facto* refuse representative of household inventories (e.g. Diehl, 1998, p. 627). However, ethnography and many archaeological case studies point to the fact that the purposeful setting on fire of houses and whole settlements is a common cross-cultural phenomenon (LaMotta and Schiffer, 1999, p. 23). One example is the Chodistas pueblo analysed by Montgomery (1993). Her study begins with the logical assumption that structures left vacant longer will be depleted of any usable objects by scavengers, at the same time that they will be used for dumping secondary refuse; therefore, the ratio of complete pots (actual floor inventories) to sherds (embedded in the fill) should provide an index of time of abandonment. However, Montgomery (1993, p. 159-161) noticed that the Chodistas pueblo, which was completely burned, violated that assumption, as its rooms contained a high quantity both of whole vessels and of disorganised sherds. She concludes that the burning in that case represented ritual behaviour, and that the objects found at the rooms were intentional fill deposits symbolically connected to the "death" of the settlement and to the burial of the household belongings.

In Anasazi pit structures analysed by Wilshusen (1986), there was a correlation between the mode of abandonment of a structure and its purported function as inferred from architectural features. Some pit structures had their roofs set on fire: these are interpreted as ceremonial facilities due to the presence of central vaults that fulfilled ritual functions according to ethnohistorical sources.

Wilshusen (1986, p. 251) explains the purposeful burning of ceremonial pit structures as a form of destroying and sealing evidences of secret ritual activities. In fact, cases of deliberate burning of *kivas* appear to be frequent in the American Southwest. Walker (2002, p. 166) points to examples with sequences of abandonment strata marked by burnt roofs. The multiple, superimposed burnt strata make it unlikely that one is dealing with a catastrophic event, but suggest an intentional, ritual mode of abandonment. We must recognise that stratigraphy may hold evidences of prehistoric ritual activities (Walker, 2002, p. 165).

The deliberate burning of houses, probably for symbolic reasons, is also an ubiquitous phenomenon in the Neolithic of South-eastern Europe (Stevanovic, 1997). Although previous explanations focused on the accidental character of fires, or on the burning of settlements during conflicts, Stevanovic (1997, p. 363) demonstrates that houses were burned individually and at the end of their use lives. It is argued that the burning and subsequent collapse of houses, filled with complete household inventories, was an organised effort intended to completely seal off the old dwelling from future utilitarian purposes. For Stevanovic (1997, p. 385-387), conflagration was a ritualised act that brought the houses to a closure, possibly after the dead of a household head. Houses were often rebuilt in the same location or nearby, in such a way that the burnt dwelling provided a foundation for new ones, ensuring the continuation of lineages in the same spot – a “symbolic continuation of place” (Stevanovic, 1997, p. 388).

Not only the intentional destruction of dwellings and ceremonial structures by fire, but also the ritual deposition of objects (which could be mistaken for *de facto* refuse) on abandoned floors is a documented practice (LaMotta and Schiffer, 1999, p. 23-24). Lightfoot (1993, p. 174) has called this practice “abandonment assemblage enrichment” and suggested, as an example, that in cases where abandoned structures or sites were utilised as graves, funerary offerings may in fact enrich the refuse assemblages. I believe the concept, however, would not apply to household assemblages that are deliberately left on floors during conflagration rites (Montgomery, 1993, p. 160-161; Stevanovic, 1997, p. 382) but only to *foreign* objects that are cached there during the ritual abandonment. They might include what Walker (1995) called “ceremonial trash” – objects utilised in rituals and discarded afterwards. Burning and, to a minor extent, burying are the preferred treatments given to ceremonial objects that need to be discarded (Walker, 1995, p. 74-75). They should not be mistaken for “sacrificial deposits” – objects such as grave goods, that are still functional but directly diverted into the archaeological record as part of rituals (Walker, 1995, p. 76). Both ceremonial trash and sacrificial deposits could enrich the assemblages of ritually abandoned structures.

As an example, Walker (1995, p. 77-78) analyses a Hopi large *kiva* whose roof had been burned and later filled with refuse that included unusual objects such as a complete vessel and a canid skull. On the floor, crystals and an elaborate bowl were found. Walker (1995, p. 77) interprets the finds as sacrificial deposits related to the disposal of the structure. Moreover, he finds that, unlike the majority of domestic structures, *kivas* were ritually burned during abandonment, and could also be used as dumps for ceremonial trash after their closure (Walker, 1995, p. 78). Interestingly, an ethnoarchaeological study by Joyce and Johannessen (1993, p. 150) showed that buildings with specialised functions, including religious ones, tended to be left intact after abandonment. These are crucial observations, since they raise the possibility that the types of artefacts discarded in abandoned structures may not be random with respect to the past function of those structures (LaMotta and Schiffer, 1999, p. 25).

From all of the above, it seems that fire, as an agent of destruction but also of creation, had an important cross-cultural meaning in the ritual closure of houses and other buildings. Another major practice is that of entombment, by which buildings are intentionally filled or buried. This practice is common in Mesoamerica, where temples were filled with “recycled” broken pottery, lithics and midden remains before expansion (McAnany and Hodder, 2009, p. 11). In Çatal Höyük, abandoned houses were cleaned and filled before a new one was built exactly on top (McAnany and Hodder, 2009, p. 12). Interestingly, the process of entombment creates strata that are entirely social, and McAnany and Hodder (2009, p. 7-8) call attention to the fact that many deposits that appear “natural” might actually be the result of human intervention – a process of "stratigraphy-making". Besides relating to cyclical renewal rituals, the entombment of a house with the subsequent construction of a new one creates earth-bound genealogies, inscribes memories in the landscape, builds links with the past and creates "architectural trends" that weave generations together (McAnany and Hodder, 2009, p. 13-15; Rodning, 2007, p. 465). One example is the Neolithic site of Sesklo in Greece, where the superimposition of houses only occurs in the upper sector of the site, possibly among higher-status dwellings whose occupants were more concerned with marking continuity between the generations (McAnany and Hodder, 2009, p. 8).

In an emblematic Mississippian period settlement, the King site, Hally (2008) demonstrates how status was expressed in residential architecture not only by the spatial arrangement and size of the structures, but also by the number of rebuilding episodes. Interestingly, rank was correlated with time of residence in the site, the original founders holding an upper status – hence the number of rebuilding events. Some elite houses were reconstructed up to 16 times in the same place, showing a strong interest in tracing the household's existence to the past and perpetuating the elite identity over time (Hally, 2008, p. 528-532).

In the site of Xaltocan, basin of Mexico, De Lucia and Overholtzer (2014) encountered a comparable situation. Some of the houses belonging to the period prior to the Aztec empire had up to six levels of stratified floors. By Aztec time, the influx of a new population led to increasing status differentiation at the site: descendants of the original dwellers of the settlement (whose houses were rebuilt on the same spot for generations) became wealthier, embellishing their houses with plaster floors and making conspicuous use of decorated ceramics. In contrast, the newcomers, established at the periphery of the site, lacked the kin network that could make them prosper. Thus, the theme of "newcomers *versus* founders" appears once again, this time materialised by the longevity of the founders' residences.

The chronological longevity of elite dwellings, hand in hand with their greater architectural elaboration, is also clear in the Moche site of coastal Peru.

Van Gijseghem (2001, p. 260) shows how upper-status dwellings evidence a sustained occupational history in the form of superimposed construction phases and development of annexes, subdivisions and remodelling. In contrast, low-status houses, besides sheltering a small number of people, have a single construction phase, being abandoned after just one floor. This is a sign, for Van Gijseghem (2001, p. 268-270), that elite extended families were economically stable across generations, and invested in dwelling construction as a strategy of household social reproduction.

Practises of rebuilding are not restricted to ordinary dwellings, but are equally attested in ritual structures. The burying of ceremonial buildings appears to have been a common phenomenon cross-culturally. This practice was originally named “temple entombment” in the Andes, and refers to the intentional and careful burial of religious structures with a minimum of destruction (Izumi and Terada, 1972, p. 304). In the Andean case, as originally defined for the chambers of the Kotosh and Mito traditions, the covering of buildings which were still in good conditions points to a non-utilitarian motive, and the repetitious pattern of building and rebuilding that is often found suggests that entombment relates to cyclical rituals of renewal (Burger, 1995).

In the Nasca centre of Cahuachi, Silverman (1993, p. 181) has documented the ritual interment of a sacred building: the floor was clean, but the structure had been deliberately packed with sand containing sherds, as well as later offerings. In the coastal formative ceremonial centre of Cerro Lampay, the complex chain of events and the several activities that ended in the entombment of architectural features were analysed by Vega-Centeno (2007). The floors previous to entombment were found to contain discrete burned areas and trash deposits. Vega-Centeno (2007, p. 165-168) interprets these features as remnants of consumption activities followed by cleaning and disposal of refuse that would have taken place before the filling of the structures. He believes these activities represent “work feasts” promoted by prospective leaders in order to mobilise labour in the construction of the temples.

A final comment about such "work feasts" is necessary, as this practise is also attested during the building and rebuilding of houses. In Chapter 5 I briefly mentioned the case of Chachapoyas, Peru, where the gathering of many people for construction of elaborate dwellings was the main distinction of the elite households. However, Guengerich (2014, p. 13) adequately asks how could a household convince others to invest energy in helping with house construction? The answer lies in the ethnographic Andean villages, where construction or re-roofing of houses is a collective endeavour accomplished in a "festival-like atmosphere", in which food and alcohol are provided by the household whose dwelling is being (re)built (Guengerich, 2014, p. 13).

Stratigraphy-making at Baggio 1

Based on the discussion and examples above, I argue that the earliest five periods of House 1 must be understood as marked by cycles of conflagration and entombment. These were long cycles, initially occurring every 60 to 65 years, judging from the modelled radiocarbon dates. The burning of the pit house was followed by structured depositions of ceramics and other artefacts. Thus, the assemblage of the first five floors of House 1 is not necessarily a representative inventory of its material culture while in use, but must be rather understood as secondary deposits of a very special type, the "abandonment assemblage enrichment" posited by Lightfoot (1993, p. 174) – although "abandonment" is not the best term to use in this case, since the house is ritually closed and renewed for a continued occupation. In that case, the significant differences in material culture between the burnt and the unburnt floors (Chapter 8), instead of revealing a chronological trend, could be related to the special nature of the artefacts selected for ritual deposition. This might explain the high frequency of the oversized red vessels that are less common in the subsequent floors, rare in Houses 2 and 3, and completely absent from the external areas of the inner precinct (Chapter 8). On the other hand, the objects ritually scattered on the burnt floor might not be completely unrelated to House 1 or at least to the activities that immediately preceded its closure (LaMotta and Schiffer, 1999, p. 25). Both hypotheses are not mutually exclusive: the oversized red ceramic vases and bowls could have been used to prepare and distribute food and beverages during large, communal events of conspicuous consumption similar to “work feasts” preceding the conflagration and entombment of House 1 (Guengerich, 2014, p. 13; Vega-Centeno, 2007, p. 165-168). That would lead to the interpretation of the assemblages at the early floors as “ceremonial trash” in the definition of Walker (1995). If those artefacts were immediately broken and discarded on top of the burnt house, before its sealing, this would explain the complete absence of those ceramic types outside of House 1, in the exterior areas of the inner precinct. Houses 2 and 3 did have access to similar red slipped pottery, but it tended to be smaller and thinner (Chapter 8), perhaps intended to be used by smaller social units.

I tentatively link the events of termination and renewal at House 1 to prolonged social calendars and ordered ritual stages (Dillehay, 2004, p. 253-257) of Southern Proto-Jê domestic rituals. So far, this seems to be unique to Baggio 1. The only similar case described for Southern Proto-Jê pit houses comes from the neighbouring region of São José do Cerrito. In the oversized house of site SC-CL-52, Schmitz et al. (2013, p. 143) describe a continuous charcoal layer on top of the first floor of the pit house. They also interpreted it as a burnt roof due to the aspect of charred fibres, not wood, that the charcoal exhibited (Schmitz et al., 2013, p. 143). The date obtained for the floor beneath the burnt roof is 860 ± 30 ^{14}C B.P. (Cal. A.D. 2σ 1175-1275) (Beta-357350), at least a century (and probably more) before the first conflagration of House 1. Interestingly, this was an isolated event at SC-CL-52, whereas at Baggio 1 the burning of the oversized house occurred repeated times. To the best of my knowledge, this is the only case comparable to Baggio 1 – all the more significant because of its geographical proximity. However, roofs that collapsed and burned under different circumstances have been excavated at site RS-AN-03, Rio Grande do Sul, by Copé (2006, p. 201). At the oversized House A, a continuous, thick layer of charcoal interpreted as the burnt roof was exposed immediately beneath the post-abandonment strata. The date, 250 ± 50 ^{14}C B.P. (Cal. A.D. 2σ 1505-…) (Beta-178134), early in the colonial period, confirms that this was the last event to occur at the pit house, and its inhabitants never returned to the site. The same situation was observed in the smaller House C: a roof deposit, including complete burnt posts, occurred immediately beneath the post-abandonment strata, and was dated to 80 ± 50 ^{14}C B.P. (Cal. A.D. 2σ 1685-…) (Beta-178134). Thus, unlike the oversized House 1 at the Baggio 1 site, the roofs of site RS-AN-03 collapsed and burnt (purposefully or not) as a final event in the history of the site during the colonial period – not as a cycle of house renewal.

Although unrelated to the Southern Proto-Jê contexts, I would like to briefly call attention to the only other known case of burnt houses in southern Brazil: it comes from Guarani settlements in the Santa Catarina coast. Milheira (2010) found settlements with completely burnt houses, completely littered by charcoal and ashes, and containing whole usable toolkits – *de facto* refuse. The dates of those settlements, between 440 ± 40 ^{14}C B.P. (Cal. A.D. 2σ 1430-1625) and 430 ± 40 ^{14}C B.P. (Cal. A.D. 2σ 1435-1630), suggested to Milheira (2010, p. 164-170) that they represent events of violent village burning associated with the Portuguese incursions on the coast.

In conclusion, the repetitive burning of Baggio 1 may well be unique to that site, but it may also be a regional phenomenon restricted to the Caveiras basin (as hinted by the scanty evidence of SC-CL-52), or even more widespread. Answering that will demand careful stratigraphic excavations at a larger number of oversized structures throughout the highlands.

Chapter 10
Discussion and conclusions: rethinking households, communities and status in the southern Brazilian highlands

In the previous chapters, I presented the empirical evidence from the excavations, artefact analysis and radiocarbon dating of Baggio 1. I then offered a brief analysis of the main formation process acting at the site, helping to contextualise the assemblages recovered from the houses' floors. In this chapter, I offer my interpretation of the settlement's history. Initially, I discuss two questions immediately posited by the data: how permanent were Southern Proto-Jê sites, and whether we can interpret all pits as houses. Following that discussion, I examine the changes in community patterns at Baggio 1 during three periods based on the modelled radiocarbon dates. I recapitulate the theoretical framework defined in Chapter 5 to confront the archaeological record of each period with the expected correlates of communal integrative facilities, elite dwellings, and corporate *versus* aggrandising pathways to power.

Site permanence in the southern Brazilian highlands

Over 15 years ago, the question of “village size and permanence in Amazonia” was being debated in the pages of *Latin American Antiquity* (Heckenberger et al., 1999). The idea that settlements in Amazonia could have long-term occupations confronted over 50 years of the cultural ecology paradigm in Brazilian archaeology, which envisaged the tropical forest cultures as highly mobile due to the limitations of swidden cultivation in the poor soils of Amazonia (Meggers, 1954, 1971, 1972; Steward, 1946, 1949). Now, a paradigm shift has happened in Amazonian archaeology, and most researchers consider that large, permanent settlements could be sustained, as evidenced by anthropogenic soils (Erickson, 2003; Neves et al., 2004; Schmidt and Heckenberger, 2009).

Outside of Amazonia, within the same cultural ecology paradigm, the Jê peoples of the southern Brazilian highlands were classified as part of the marginal tribes: politically undifferentiated, small mobile groups that lacked any agriculture (Métraux, 1946; Steward, 1947, p. 90-94; 1949, p. 672). As I reviewed in the introductory chapters to this thesis, we now have enough archaeological and historical data suggesting formalised leadership and a range of cultivated products among the southern Jê (Corteletti et al., 2015; De Masi, 2007, 2009; Iriarte et al., 2008; Noelli, 2005). Nevertheless, the idea that pit house settlements resulted from a palimpsest of short-term occupations interspersed with long periods of abandonment is still a frequent assumption in the literature (Schmitz and Rogge, 2011, p. 192-194; Schmitz et al., 2013b, p. 91-92; Schmitz et al., 2002, p. 100-102). The frailty of this model lies in the insufficient number of radiocarbon dates on which it was based: most of the discussions about site permanence in the southern Brazilian highlands revolve around single dates from selected strata of pit houses at different sites.

One example is site RS-A-29, a dense settlement with 40 pit houses and a mound. Only a single stratum from each of four different pit houses were dated, resulting in dates between 710 ± 60 ^{14}C BP (Cal. A.D. 2σ 1230-1405) and 370 ± 50 ^{14}C BP (Cal. A.D. 2σ 1455-1645) (Beber, 2004, p. 181-189; Schmitz et al., 2002, p. 65). These dates are interpreted by Schmitz et al. (2002, p. 100-102) as resulting from long cycles of periodic abandonment and reoccupation of the site: during each return to the settlement, new houses were built as the others laid abandoned (the opinion is repeated in Schmitz, 2006, p. 18). However, if only a single date exists for each of a small sample of houses, how can we preclude the possibility that old houses were continuously occupied as the village grew and new dwellings were built in their vicinity?

A similar view is maintained for the state of Paraná by Chmyz et al. (2003; 2008). Based on the thin floor deposits, intercalated with sterile levels, found in every pit house they excavated, they argue that the duration of the occupations was short, probably seasonal, although recognising the possibility of periodic cleaning (Chmyz et al., 2003, p. 96). At the site PR-CT-93, a medium-sized (6.3 m diameter) isolated house located near Curitiba, the most complex stratigraphy was found, with 13 superimposed floors separated by sterile deposits. Those deposits were interpreted as resulting from periods of abandonment (Chmyz et al., 2003, p. 99-100). Furthermore, Chmyz et al. (2003, p. 99) dated five of those floors, obtaining a chronology between 940 ± 70 ^{14}C BP (Cal. A.D. 2σ 1020-1265) and 680 ± 70 ^{14}C BP (Cal. A.D. 2σ 1235-1430). Although they estimate ca. 330 years of occupation at the site, this is thought of as discontinuous, and Chmyz et al. (2003, p. 99-100) interpret the intervals between the floors as resulting from periods of site vacancy.

On the other side of the debate, those who argue for a permanent occupation do not necessarily substantiate their views with radiocarbon dates. For example, Saldanha (2005, p. 73) and Iriarte et al. (2013, p. 84) point out that the careful planning evident in some pit house site layouts, track-ways, and previously built terraces, point to the contemporaneous occupation of multiple dwellings over a long period of time, but the absence of a robust chronology for the sites in question hampers a definitive evaluation of that hypothesis. Copé (2006, p. 253) also argues for continuity in pit house occupation, basing her argument on the stratigraphies and radiocarbon dates of two pit houses at site RS-AN-03 (see Chapter 5). In House C, the smallest of the excavated pits, dates were obtained for the base and the top of the occupation level, delimited by a continuous, thick hearth visible on the profile (Copé, 2006, p. 186-188). Based on the two dates obtained, 1070 ± 70 ^{14}C BP (Cal. A.D. 2σ 880-1180) and 550 ± 40 ^{14}C BP (Cal. A.D. 2σ 1325-1455), Copé (2006, p. 192) argues for over five centuries of occupation at the site. Although the data are promising, a larger number of dates, ideally from all identified strata, would reinforce that hypothesis.

The work on Baggio 1 was the first to fill that gap in pit house chronology. This is especially true for House 1, where eleven dates were obtained for twelve successive floors, revealing an uninterrupted occupation for three centuries (De Souza et al., 2016b). The results show the importance of programmes of intensive dating of individual structures, and question the assumptions of long periods of abandonment that are often based on isolated dates for pit houses selected from different sites (e.g. Schmitz et al., 2013b, p. 91-92; Schmitz et al., 2002, p. 102). The chronology of House 1 shows that discussions about regional population dynamics that are often based on few dates per site should be approached with extreme caution.

As I stressed when discussing the stratigraphy of the structure, the intervals between the dates are unlikely to correspond to periods of abandonment, but rather to resurfacing episodes. The importance of stratigraphy for inferring length of occupation in pit houses has already been stressed by De Masi (2005, p. 102). He suggests that dating is not the best way of distinguishing between permanence and periodic abandonment due to the uncertainties of radiocarbon dates. He believes that stratigraphy is a more reliable indicator of occupation dynamics, although, as reviewed in Chapter 9, one must take into account practises such as periodic cleaning. However, in the case of Baggio 1, it is exactly the interplay between absolute dates refined through Bayesian modelling and stratigraphic information that bases my conclusions: the fill materials between the dated floors were homogeneous and point to a rapid construction of each remodelling, utilising single, culturally sterile clay sources. The distinct boundary between the floors and their construction fill evidences the continuous occupation of the structure without periods of vacancy that would result in bioturbation, soil formation or other deposition, such as slope wash – which indeed occurred in the topsoil formed after abandonment.

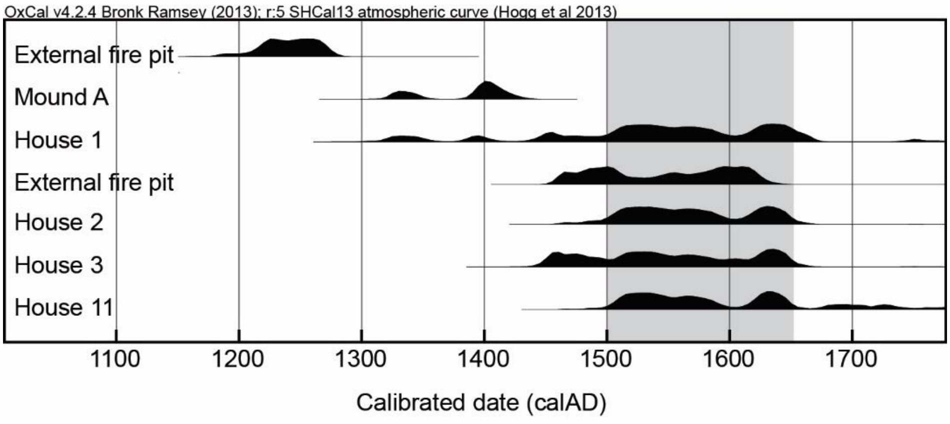


Figure 10.1 Complete chronology for Baggio 1. The sum of the calibrated probabilities is presented in the case of structures with multiple dates. The external fire pit dated Cal. A.D. 1185-1280 might represent a pre-pit house component. The shaded area, Cal. A.D. 1500-1650, is the period when all dated pit houses appear to be contemporary.

The dates for Baggio 1 show not only long periods of uninterrupted use of each structure – particularly of House 1 – but also demonstrate that all excavated pit houses were contemporaneous after ca. Cal. A.D. 1500 (Figure 10.1). That was a major question pertaining to the significance of dense settlements (Chapter 3). Other sites, with fewer dates, had already hinted at that possibility: it was shown that some structures can be earlier than others, and many structures are indeed abandoned as others continue in use; however, during a certain interval in a site's history, all pit houses appear to be occupied simultaneously (e.g. RS-AN-03, cf. Copé, 2006, p. 257; SC-AG-107, cf. Müller, 2007, p. 4). In fact, a closer look at the data published by Schmitz contradicts his own claims about the palimpsest nature of pit house settlements: the proportion of structures with overlapping calibrated dates varies from 40% to 60% (Beber, 2004, p. 172-189; Schmitz et al., 2013b, p. 77-87; Schmitz et al., 2002, p. 22-23) (see also Chapter 3). The fact that single dates were obtained for most structures prevents enhancing their precision through Bayesian modelling. Nevertheless, if that sample is representative, we can estimate that a site like Rincão dos Albinos, with 107 pit houses, could have had over 60 structures in use at one time.

Coupled with the decisive evidence from Baggio 1, the evidence from Rincão dos Albinos and other sites strongly undermines the view that pit house clusters result from cycles of short-term occupations interspersed with long periods of abandonment, and reinforces the hypothesis that they are in fact well-planned compounds. However, calling such compounds “settlements” or “villages”, as I have done over the course of this thesis, implies that most structures would have functioned as dwellings. As the data from the excavations, artefact analysis, and formation processes at Baggio 1 demonstrated, there is enormous variability in the activities that were performed in different pit houses, as well as changes in every structure over time. With that in mind, in the next section I will return to some of the ideas discussed in Chapter 5 about household archaeology to address the problem of what really constitutes a household in a Southern Proto-Jê pit house site.

When a house is not a household: the meaning of pit house compounds

In Chapter 5, when discussing the theoretical foundations of household archaeology, I stressed that, although a household frequently shares a single dwelling, it can also be divided into a number of neighbouring structures with various functions – different houses, kitchens, storage facilities, patios (Ashmore and Wilk, 1988, p. 6; Pluckhahn, 2010, p. 334; Rogers, 1995, p. 10; Wilk and Rathje, 1982, p. 620-621). An archaeological “house” does not equal the anthropological concept of household as a unit engaged in shared production, consumption, transmission of property and other corporate functions (Ashmore and Wilk, 1988, p. 3-5; Rogers, 1995, p. 8-10; Wilk and Rathje, 1982, p. 618).

Nonetheless, pit houses in the southern Brazilian highlands are frequently interpreted *a priori* as dwellings (e.g. Copé, 2006; Rogge and Schmitz, 2009;

Schmitz et al., 1988; Schmitz et al., 2002, p. 99). The sheer abundance and ubiquity of those structures in the highlands is one of the reasons pointed by Reis (2007, p. 186) for a likely domestic function, coupled with the evidence of domestic debris in those structures that have been excavated. Nevertheless, a closer scrutiny at the evidence shows that the contents recovered from pit houses are anything but homogeneous. Some structures have large, formal central hearths associated with post holes and many *in situ* activity areas, including discrete zones of food production, consumption and trash deposits (e.g. House C, site RS-AN-03; Copé, 2006, p. 186-198). Others are empty, with no internal features and barely any artefacts, suggesting a “minimal occupation” (e.g. Houses 1 and 2, site RS-A-77; Rogge and Schmitz, 2009, p. 32-33). In terms of material culture, some structures lack ceramics (which led to the hypothesis of a pre-ceramic period, Schmitz et al., 2013b, p. 92), but contain abundant lithic *débitage* disposed in clearly defined knapping areas (e.g. House 7, site RS-A-27; Schmitz et al., 2002, p. 33-34). At the extreme opposite, others structures contain over two thousand ceramic sherds (e.g. site SC-Urubici-11; Rohr, 1971, p. 20). When the whole evidence is considered, it becomes clear that the neat model of a Southern Proto-Jê pit house with central hearths, post holes and domestic debris is in reality based on findings from a minority of sites.

The immense variability in the pit houses’ contents is, evidently, paralleled by the diversity in their dimensions and architecture. The original architecture of a pit house is not so easily inferred from its modern appearance, and without excavations it is impossible to ascertain the original profile of a structure’s walls or its initial floor area. Summarising the known shapes of pit houses that were excavated until the 1980s, La Salvia (1983, p. 20) divided their architecture into two patterns: 1) medium-sized structures tended to have slightly sloping walls ending in a bench around the centre of the dwelling; 2) small structures with up to 3 m diameter, on the other hand, tended to have steep vertical walls and no bench. More recently, Schmitz et al. (2002, p. 65-70) noticed that some houses did not exhibit vertical walls, but rather a hemispherical section with one side being steeper and the other forming an entrance ramp. Similar ramps were noted by Chmyz et al. (2003, p. 24-33) in pit houses of the state of Paraná. Other houses excavated had a section described as resembling an “inverted hat”, i.e. with gentles slopes and a pronounced central bench (Beber, 2004, p. 210-211). This variability is present even among different pit houses of the same site. In Baggio 1, none of the excavated houses was the same as the others in terms of architecture, practises of floor renewal, features, or material culture. Furthermore, even within a single structure, there were significant changes in all those aspects throughout the history of the site. Let us briefly review the biography of each structure as reconstructed from the excavation data.

House 1 was initially constructed as a circular depression with ca. 16 m diameter and 3.4 m depth from the original terrain surface. Its profile was between hemispherical and the “inverted hat” described by Beber (2004, p. 210-211), with sloping walls and barely any flat surface except for the very centre of the structure. This inner area was lined with small cobbles and contained a central, deep fire pit. In five successive occasions the structure was set on fire and the remains of the collapsed burnt roof were covered by clay to prepare new living floors. Initially, the conflagration took place every 60-65 years[1], but later the cycles were shorter, in average every 15-30 years. The floor surfaces themselves were heavily maintained, but caches of large red-slipped ceramics and other artefacts were deposited on top of the burnt remains before the laying of a new floor. After the fifth conflagration event, new practises of floor renewal were adopted. In the subsequent periods, floors continued to be kept systematically clean, but burning was no longer practised. Resurfacing was still periodically accomplished by the addition of clay fills and patches of degraded basalt to prepare new floors, which happened seven times in short intervals of 10-25 years. Soon before the house was ultimately abandoned, around the middle of the 17th century, cleaning stopped being performed and debris was left to accumulate on the floor around small fire pits.

[1] All intervals are based on the medians of the modelled dates and should be considered a *relative* approximation (see Chapter 7).

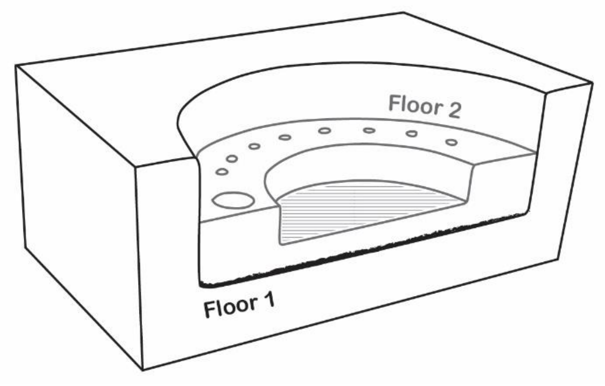


Figure 10.2 Schematic three-dimensional cross-section of House 2, showing the major changes in its architecture.

House 2 was initially constructed as a circular pit with ca. 3 m diameter and 1 m depth from the original terrain surface. Unlike House 1, its walls were vertical (Figure 10.2). As in House 1, the first occupation of the structure ended with the complete burning of the floor, but unlike the cyclical conflagrations of the oversized structure, this event occurred only once in the history of House 2. In a later occupation, dated 45 years after the burning of the structure, a considerable architectural shift happened: the pit house was remodelled with the addition of a bench supporting the roof and potentially another, smaller wooden structure around a central fire pit. Interestingly, there would have been very little space to move inside the pit itself. By the time of its abandonment in the early 17th century, House 2 had been modified by two more events of resurfacing with clay fills, becoming nearly flat and very shallow.

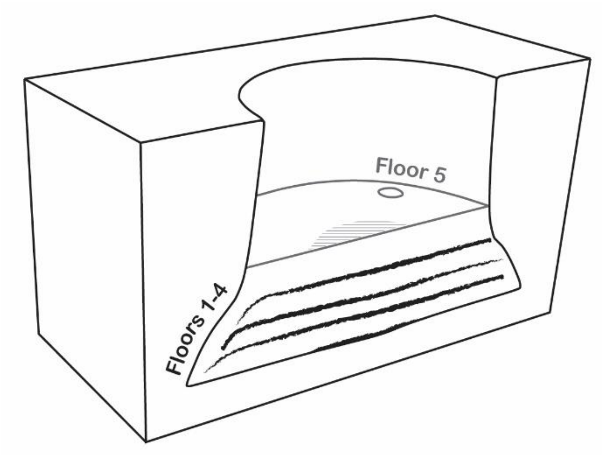


Figure 10.3 Schematic three-dimensional cross-section of House 3, showing the major changes in its architecture.

House 3 was initially constructed as a circular pit with ca. 2 m diameter and 1.8 m depth from the original terrain surface. Unlike Houses 1 and 2, its walls were originally bell-shaped, with an estimated basal diameter of ca. 3.3 m, wider than the opening of the pit (Figure 10.3). The base of the structure contained a large fire pit in its centre, but – as in the case of the second floor of House 2 – the amount of space to move around the fire pit inside the structure would have been extremely reduced. This initial floor was sealed by a thick clay layer – a practise that was repeated three subsequent times, in average every 12 years, between use events. By the fifth remodelling of the structure, it was considerably shallower and its walls became vertical. From this point on, it was resurfaced five times to prepare new floors. Remodelling of this structure happened over a much faster pace than in the previous ones, in average every 6-7 years. Some of the later floors accommodated small hearths, but in general they were kept clean. As in the case of House 2, by the time of its abandonment in the early 17th century, House 3 was nearly flat and very shallow.

House 11 started as a circular pit with 4 m diameter, nearly vertical walls, flat bottom and 1.6 m depth from the original terrain surface. Either fewer activities took place in this structure, or its floors were kept cleaner than in the other excavated pit houses. Unlike the previous structures, the floors of House 11 did not incorporate fire pits, post holes or other features. The initial floors, however, were more formally capped with a surface of compact, red clay. Resurfacing took place in average every ca. 35 years during five consecutive occasions, without significant changes in the house architecture. By the middle of the 18th century, House 11 was abandoned and started to accumulate modern debris.

Potential alternative functions: storage rooms and kitchens?

House 3 is the structure whose profile is the least suggestive of a residence. However, the bell-shaped walls of House 3 may be more common than they first seemed. La Salvia (1983, p. 17) already reported the existence of pit houses with a similar contour to House 3. According to him, chambers carved in the walls, also called *niches* by La Salvia, were not a common feature, but they did occur in a number of pit houses (Figure 10.4). He interpreted them as possible deposits, noticing that they were found only in parts of the walls, not their whole circumference. Similarly, Rohr (1972, p. 34-35) describes a chamber carved in one of the walls of a small pit house at the site SC-Urubici-4, adding that the floor diameter of the bottom of the structure was larger than its opening. In the same region, the site Canadas 2, reported by Corteletti (2012, p. 260), consisted of two pit houses, the smaller of which is described as having a base wider than its opening. In Caxias do Sul, state of Rio Grande do Sul, Corteletti (2008, p. 106) describes another pit structure with similar architecture: according to him, at site RS-77, the western wall of Structure B was apparently excavated in such a way as to give the structure a wider circumference at its bottom than at the opening. In all cases listed, it is worth mentioning that the bell-shaped or chambered pit houses are found in the vicinity of larger structures with more typical hemispherical or vertical walls. One exception is the site SC-AG-107, where eight out of nine structures revealed the same bell-shaped profile (Müller, 2007, p. 2363). According to Müller (2007, p. 2-3), the levels at the "expanded" base of the pit houses contained the same types of finds as the upper levels – nothing indicating their use as deposits. The hypothesis favoured by her is that the bell-shaped construction offered a gain in the amount of internal space at the base of the structures, which Müller (2007) still interprets as dwellings.

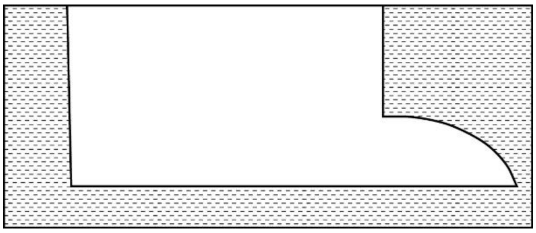


Figure 10.4 Profile of a chambered pit house according to La Salvia (1983, p. 17).

One possibility that must be taken seriously is that bell-shaped structures such as the ones described above, including House 3, were storage facilities (at least during part of their history). The hypothesis that some Southern Proto-Jê pit structures were not dwellings, but had a storage function, has been entertained by some researchers. For example, Reis (2007, p. 195-196) has suggested that possibility for cases where pit houses of different sizes – one large, one small – are adjacent to each other. In such situations, the smaller of the pits could have served as an annex for storage or other special activities.

Perhaps the researcher that gave most attention to the possible storage function of pit structures was De Masi (2005, p. 102; 2006, p. 55-57). As I summarised in Chapter 3, De Masi attempted to delineate a model of settlement systems for the region of Campos Novos in the Lower Canoas Valley. In his proposal, each basic territorial unit of the model should contain a village (surface ceramic site), an area of swidden cultivation (lithic sites with large bifacial tools), and locations for storage (pit houses). This scheme was partly influenced by the elements of hunter-gatherer settlement systems in the “collector” side of the spectrum described by Binford (1980, p. 10-12). However, (De Masi, 2005, p. 95) also bases the interpretation of pit houses as storage facilities on the fact that there were more evidences of activities in the immediate periphery of the structures than in their interior.

It is worth mentioning that storage was indeed practised by the historical Kaingang and Xokleng. The Kaingang filled baskets with *Araucaria* nuts (*pinhão*) collected during the autumn months, placed them in a stream for a couple of days, dried them in the sun, and then smoked them, a process that allowed their preservation during the winter months (Castro, 1957, p. 204). Another technique, reported by Mabilde (1899, p. 141), consisted in filling baskets with *Araucaria* cones before the seeds detached, and then burying them in moist ground where they could last for the winter months. Similarly to the first method, the Xokleng stored *pinhão* inside baskets lined with leaves so as to keep them impermeable, submerging them in small streams, where they could be preserved for a month and a half (De Paula, 1924, p. 121). Even today, the technique recommended in manuals for storing *pinhão* is to place them in dark, ventilated places and/or soaking the seeds in cold water during warm days (Martino, 1972). For De Masi (2005, p. 213), this is another indication that pit houses, at least those whose depth is close to the water table, could provide a moist environment adequate to the preservation of *Araucaria* seeds.

It is unlikely that all pits in the southern Brazilian highlands functioned as storage facilities. The immense variability in pit house size, architecture, and associated debris precludes against that possibility. However, given the archaeological and ethnographic evidence, it is likely that some pits could have had that function, especially in the case of very small structures, with 3 m diameter or less (although dwellings with such reduced dimensions are perfectly possible and attested, even as pit houses, e.g. Flannery, 1972, p. 34-36; Flannery, 2002, p. 419-420; Smith, 2003, p. 172). At this point, I would like to call attention once again to the layout of the *dense settlements* described in Chapter

3 (see Figures 3.3., 3.6, 3.10). In many of those cases, to which we may now add Baggio 1, very small pits are found adjacent to larger ones – a pattern identical to that of the pit house villages of British Columbia, where external storage pits and roasting pits are found in the immediate vicinity of houses (Hayden and Spafford, 1993, p. 112-113; Prentiss et al., 2008, p. 63-64).

I suggest that the architecture of House 3, at least in its early phases, is highly suggestive of a storage facility. The bell shape, with a bottom larger than the opening, is found in archaeological and ethnographic storage pits worldwide (DeBoer, 1988, p. 3-4; Gronenborn, 1997, p. 433-435; Sakaguchi, 2009, p. 296; Smith, 2003, p. 178; Winter, 1976, p. 28). In fact, bell-shaped storage pits are as ancient as plant domestication itself, being attested since the Natufian in the Near East (Gronenborn, 1997, p. 434). Other shapes of storage pits are possible and do occur, but the bell shape is ideal: it provides a low surface-to-volume ratio to minimise decomposition, while facilitating periodic but sporadic opening, as well as concealment of the stores (DeBoer, 1988, p. 3).

Evidently, the main difficulty for that interpretation are the contents and stratigraphy of House 3 and other bell-shaped pits that were excavated in the southern Brazilian highlands, as they do not always show significant differences from other pits (La Salvia, 1983, p. 18; Müller, 2007, p. 3). However, one must keep in mind that the contents inside a storage facility are rarely going to be recovered from the archaeological record – not only for taphonomic reasons, but also because the intention behind storing resources is to be able to retrieve them in the future (Ames et al., 2008, p. 14; DeBoer, 1988, p. 4; Howey and Frederick, 2016, p. 40; Kadowaki et al., 2015, p. 408). Storage pits are also prone to changes in function and even shape throughout the occupation of a site: they can be re-dug, intentionally filled, or reused – as refuse bins, burial chambers, or roasting pits, for example (DeBoer, 1988, p. 4; Gronenborn, 1997, p. 436-437; Kadowaki et al., 2015, p. 408; Smith, 2003, p. 178). In pit house villages, even those structures that once had a clear domestic function may be abandoned and reused as roasting oven features (Prentiss et al., 2014, p. 45).

That House 3 could have served multiple functions over its history is suggested by the existence of a large fire pit that occupied most of the basal floor. A similar situation occurs during the second phase of occupation at House 2. Both structures could have been used as roasting pits or pit ovens during some periods, but not necessarily through all their history. Similar cases exist elsewhere in the highlands: in the site Urubici-31 (Bonin), Corteletti (2012, p. 69-81) excavated two structures that were part of a tight cluster of three small pit houses (3.8 to 4.9 m diameters). Both structures contained cooking facilities that spread over the whole surface of their terminal floors. They were completely lined with pebbles and fire-cracked rocks associated with abundant charcoal. On top of the rocks lay many large sherds from several vessels that could be partly reconstructed (Corteletti, 2012, p. 111-113; Corteletti et al., 2015, p. 50-51). The ceramics were undoubtedly used for cooking, as they had carbonised residue adhered to them. Micro-botanical analysis from the residue in those vessels revealed diagnostic starch grains and phytoliths of a variety of cultigens, including maize, beans, manioc and squash (Corteletti et al., 2015, p. 51-54). It is clear that, at least during the final moments of habitation at the site, those two pits were not utilised as dwellings, but rather as specialised food-preparation facilities. As originally suggested by Reis (2007, p. 195), and more recently by Schmitz et al. (2010, p. 18), Corteletti (2012, p. 66-70) agrees that tight clusters of small pit houses might have functioned as a single compound, sharing the same roof. In such cases, it is possible that different pits functioned as rooms of a compartmented house, each with a specialised function.

Based on the data reviewed above, including the new evidence from Baggio 1, my conclusion is that southern Proto-Jê pit house compounds consist of modules where one or more domestic structures are surrounded by smaller compartments that may serve as storage facilities or roasting pits. Such pit house modules are dynamic, with structures shifting function over time. However, this organisation is a peculiarity of dense settlements, and is not found in the majority of sites, which consist of one to three medium-sized pits of roughly the same dimensions (Reis, 2007, p. 120-121). When more than one dwelling is present in a compound, there may be disparities in their dimensions: for example, the two pit houses excavated by Copé (2006, p. 186-207) at site RS-AN-03 exhibited evidence of domestic activities, but one was an oversized structure (18 m diameter) and the other was medium-sized (7 m diameter). It is possible that the two unexcavated, smaller pits in their vicinity (see plan in Chapter 5, Figure 5.2) served specialised functions not present in the other houses. Another important insight comes from the work of Schmitz et al. (2002) at the site RS-A-29. Even though I disagree with their idea of discontinuous occupations, I support one of their conclusions: “It appears that, at each moment, there was a large house that sheltered most of the group; how the small houses are related to the large ones is still unknown” (Schmitz et al., 2002, p. 101). Indeed, a look at the plan of that site (Figure 5.1) confirms the existence of such modules.

Finally, I would like to elaborate on the consequences for settlement patterns. In Chapter 4, I observed that the almost mutually exclusive distribution of surface litho-ceramic sites and pit houses in Campo Belo do Sul – each in a particular topographic and environmental compartment – was indicative of functional variation. If dense pit house sites incorporated both domestic and storage (as well as other specialised) functions, there is no need to adopt the model of De Masi (2005, p. 256), according to whom surface sites were the remnants of the actual Southern Proto-Jê villages[2]. My interpretation is closer to that of Saldanha (2005, p. 115-116), who sees surface sites as special activity areas related to swidden farming. Although he is specifically addressing lithic sites near the margins of the Pelotas River, I believe ceramic scatters in similar positions (as in the case in Campo Belo do Sul) could be connected to the same activities, maybe as “field houses” (Kohler, 1992, p. 619-620). Alternatively, one could argue for a seasonal cycle – e.g. surface sites as summer camps and pit house sites as winter aggregation villages where storage played a major role (Gilman, 1987, p. 541; Hayden and Spafford, 1993, p. 108-110). However, given the evidence for uninterrupted occupations (De Souza et al., 2016b) and year-

[2] Although De Masi (2005, p. 249) does not completely reject the use of some pit house sites as residential bases.

round cultivated products (Corteletti et al., 2015) at pit house sites, I am inclined to adopt the first interpretation.

Pathways to power: emergence, growth and collapse

The precise chronology obtained for Baggio 1 – although not covering all the structures of the site – allows me to examine the changes in community configuration over the history of development of the site. This approach leads to a better understanding of village size, residential patterns, and inter-household spatial organisation. As has been demonstrated for other pit house sites, in the case of Baggio 1, some structures were constructed earlier, others emerged later, but most of them were contemporary during the peak of occupation at the site (Figure 10.1). It is likely that archaeologists working in settlements with multiple pit houses are dealing with similar superimposed temporal layers. This means that, even if some site layouts seem unordered at a first sight, well-defined spatial arrangements may become clear when each period is considered separately (Prentiss et al., 2008, p. 73-75).

With those considerations in mind, I will now offer a summary of each major phase of the site's history. Based on the dates presented in Chapter 7, how they support changes in site layout, and the transformations occurring in individual structures, I have divided the chronology of Baggio 1 into three main periods: (1) the emergence of the pit house settlement ca. *Cal. A.D. 1385-1515*, when only House 1 was occupied; (2) its growth to maximum size and architectural complexity ca. *Cal. A.D 1515-1660*, when all structures were in use and the division between the inner precinct and the peripheral area became formalised; and (3) its decline between ca. *Cal. A.D. 1660* and *1765*, when only the peripheral area continued to be inhabited. In the section that follows, I recapitulate the main finds as presented in the previous chapters in order to support my interpretation of the major socio-political trends for each period. I will return to the theoretical framework discussed in Chapter 5, specifically focusing on the household material correlates of aggrandising *versus* corporate models of emergent complexity. Before I move on to this discussion, however, I would like to stress that the history of the Baggio 1 site might have begun centuries before its establishment as a pit house village. This is suggested by the date of the feature at unit 106/91 (840 ± 30 B.P., Cal. A.D. 2σ 1185-1280). As I mentioned previously, this situation has been found at other sites (Schmitz and Rogge, 2013, p. 12) and, if such dates are not the result of old wood effects or redeposition, they could mean that pit house locations were sometimes in use for long periods as camp sites or for other activities before people decided to move to them permanently. In spite of this possible “pre-pit house phase”, I will limit my discussion to the periods for which there is solid evidence of a Southern Proto-Jê presence at the Baggio 1 site, starting with the foundation of House 1.

Phase 1: A lonely oversized dwelling (Cal. A.D. 1385-1515)

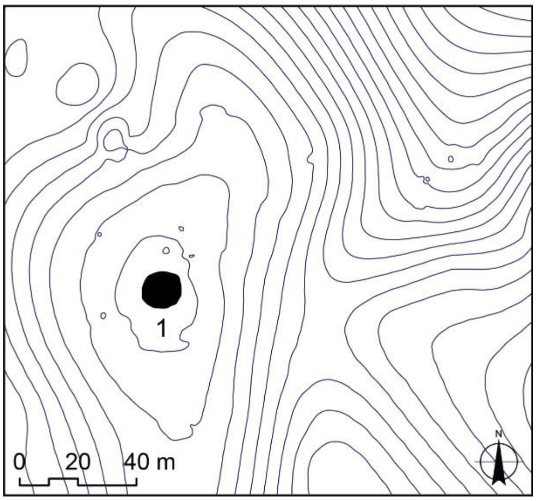


Figure 10.5 Hypothetical plan of the Baggio 1 site during phase 1 (Cal. A.D. 1385-1515).

During the first period of occupation of Baggio 1, beginning ca. *Cal. A.D. 1385*[3], the oversized House 1 was established at the most prominent part of the site, on a hilltop, and earth from its construction was used to shape Mound A. For over one hundred years, House 1 and its accompanying mound were the only structures of the site. This means that, in its initial phase, Baggio 1 was not different from other sites in the highlands that contain a single, oversized pit house associated with large platform mounds (e.g. site SC-CL-52, Schmitz et al., 2013a, p. 141-156). The most intriguing aspect of this period are the practises of

[3] The dates are based on the medians of the modelled upper and lower boundaries for the pit houses as presented in Chapter 7, and should be considered approximations. The same is true for the proposed intervals between burning or resurfacing events, which are estimated based on the intervals between the medians of the modelled dates for each floor.

renovation that took place for three successive occasions. In average every 60-65 years, the dwellers of House 1 set the structure on fire and covered the remains with thick, hard-packed clay deposits to prepare new living floors.

Archaeologists often interpret such completely burnt structures as a consequence of warfare or accidental fires. However, in such cases, complete household inventories should be found amidst the charcoal and ashes, and village abandonment is to be expected (e.g. Milheira, 2010, p. 164-170). Instead, in House 1, broken ceramics and lithic artefacts were deposited *on top* of the burnt surface, just before it was sealed by the new floors. Moreover, the fact that burning was not an isolated event, but occurred repeatedly without the house ever being abandoned, begs for a different interpretation. I view these events as rituals of conflagration and entombment similar to those described for other houses and temples cross-culturally (Izumi and Terada, 1972; LaMotta and Schiffer, 1999; McAnany and Hodder, 2009; Stevanovic, 1997; Wilshusen, 1986). I suggest that the cycles of conflagration and entombment were connected to prolonged social calendars and ordered ritual stages (sensu Dillehay, 2004) that demanded the closure and renewal of the house, perhaps after the death of important members of the community – a practise attested elsewhere (LaMotta and Schiffer, 1999, p. 23). In that sense, the estimated interval of 60-65 years, or roughly two human generations, is revealing.

The artefacts deposited on top of the burnt floors consisted mostly of broken ceramics. A large number of ceramic vessels could be reconstructed, showing a great diversity of shapes and sizes. Out of the five forms that I identified based on the Baggio 1 assemblage and the literature, four were present during the early burnt floors of House 1, comprising vases, bowls and plates. The diversity points to a wide range of activities involving food preparation and consumption. Moreover, both miniature drinking vessels, typical of ceremonial contexts (Iriarte et al., 2008), and large cooking vessels, typical of domestic contexts (Corteletti et al., 2015), are present. However, most of the sherds from the early phase of occupation at House 1 belonged to large, thick vessels, many of which were red slipped. Despite the investment in surface treatment, 37% of red slipped sherds showed use wear such as soot and carbonised residue, indicating their use on fire for food processing. The average diameters of the containers from the early floors of House 1 were found to be relatively large for Taquara/Itararé standards, especially when compared to later periods at the same site (see Chapter 8). Coupled with the extensive stone-lined feature and associated fire pit at the basal floor of House 1, we can envisage the production and consumption activities inside the structure as being of a communal nature involving a high number of participants. I will comment on this interpretation when discussing the change towards smaller vessels during the next phase.

I believe the assemblages recovered from the early burnt floors of House 1 represent the actual domestic inventory of the structure, purposefully destroyed before its conflagration and deposited as caches for the termination and renewal of the dwelling. In that sense, they approach the concepts of ceremonial trash of Walker (1995) and abandonment assemblage enrichment of Lightfoot (1993). Therefore, I interpret the site during Phase 1 as consisting of a single extended-family dwelling that was also a locus of domestic ritual. Counterparts to Baggio 1 in the region would be site SC-CL-52, ca. 15 km away (e.g. site SC-CL-52, Schmitz et al., 2013a, p. 141-156), dated Cal. A.D. 1050-1255 with similar evidences of burning, and possibly other oversized pit houses of Campo Belo do Sul, some of which are located just over 3 km from Baggio 1 (see Chapter 4). The interpretation of House 1 as an extended-family dwelling stems mainly from two observations. First, the artefact assemblage consists of a range of utilitarian lithic tools and ceramic forms no different from smaller pit houses with clear domestic characteristics (e.g. Copé, 2006, p. 285-294; Corteletti, 2012, p. 101-117; Saldanha, 2005, p. 45-71). That the assemblages from oversized pit houses are reminiscent of typical domestic debris has been noticed before (Copé, 2006, p. 341). Second, I believe the argument of Reis (2007, p. 189-194) continues to be valid: it would be uncommon for an integrative facility of the “ritual house” type (Chapter 5) to persist for over a century without any residences in its surroundings; cross-culturally, public buildings tend to be established after a village has been growing for some time, or concomitant with its foundation (e.g. Byrd, 1994, p. 643-644; 2000, p. 89-91).

Returning to the theoretical framework presented in Chapter 5, I propose that power during the first phase of Baggio 1 was expressed *via* a corporate strategy. Labour for the construction and renewal of the oversized House 1 was directed to community purposes, involving an extended family and its domestic rituals. During the more than one hundred years when House 1 stood solitary on the hilltop, access to it would have been unrestricted both as a dwelling and as a focus of cyclical renewal rites. However, one cannot preclude the possibility that some form of leadership was present in the sponsorship of the activities of conflagration and entombment, similar to the Andean work feasts (Burger, 1995, p. 45-46; Guengerich, 2014, p. 13; Vega-Centeno, 2007, p. 165-168). In fact, such incorporation of ceremonial functions by some dwellings can lead, in the long run, to the development of social distinctions and emergent inequalities, setting the scene for the reorganisation of the site during the next phase.

Phase 2: Site growth, architectural reformulation, and the making of a ranked community (Cal. A.D. 1515-1660)

The next phase in the settlement's history, beginning ca. *Cal. A.D. 1515*, saw a major reformulation of community space. Judging from the earliest dates of Houses 2 and 3, my hypothesis is that, during the first few decades of this new period, the smaller pit houses and other earthworks of the inner precinct were rapidly added to the surroundings of House 1. Only after the formation of the hilltop core of the site, expansion continued downhill, as confirmed by the dates of House 11, which are later than the other structures. During this period of expansion, the division between the *inner precinct* and the *peripheral area* became well-established. Indeed, we can visualise the history of the site as one of growth outwards and downhill from the oversized House 1. Interestingly, this pattern of expansion from higher to lower elevations has been noticed in at least one other site, Rincão dos Albinos, where many houses have been dated (Novasco, 2013, p. 65-67). An important observation by Novasco (2013, p. 84-85) is that the priority of higher elevations could relate to avoidance of the water table, as pit houses built in lower slopes face the risk of being flooded at least during part of the year.

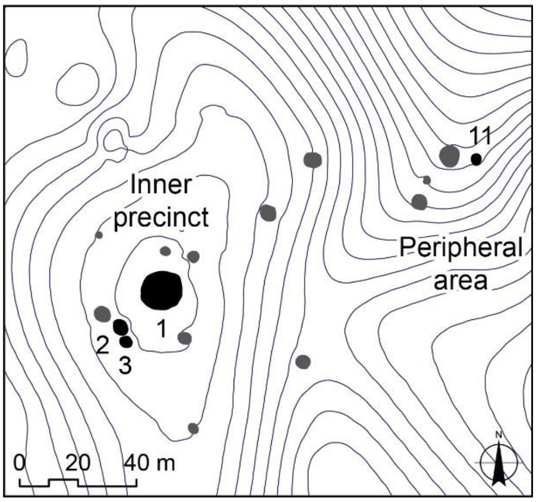


Figure 10.6 Hypothetical plan of the Baggio 1 site during phase 2 (Cal. A.D. 1515-1660). Pit houses in black (labelled) are the ones directly dated, whereas structures in grey are suggested to belong to the same period.

During this relatively short period of about one and a half centuries, important changes happened in the inner precinct, with shifts in the function and architecture of Houses 2 and 3, while the cycles of conflagration and entombment at House 1 ceased around *Cal. A.D. 1545* after two new events of burning. Subsequently, the dwellers of the oversized structure renewed the house's floor seven times by recapping it with thick clay deposits. This happened on a much faster pace, in average every 10-25 years, probably for more mundane concerns than the previous long cycles. With the end of the cycles of burning at House 1, floors were kept systematically clean, but eventual debris trampled on the clay floors tended to accumulate in the surroundings of features. I interpreted these as primary contexts similar to drop zones around hearths, revealing discrete activity areas – particularly evident on the terminal floor when sweeping was no longer performed, probably in anticipation of abandonment (Chapter 9).

Not only the lavish communal rites of conflagration and entombment are abandoned, but also material culture becomes directed to more individual practises. Ceramics become significantly thinner and smaller, with mean diameters of 13 cm, even though the same types and forms are represented as in the previous periods. The internal features of House 1 during the new phase also bespeak of a restructuring in household activities: unlike the basal floor of the oversized pit house, features from the later periods consist of small hearths and stone-lined fire pits. Copé (2006, p. 341) interprets similar groups of small hearths on the floor of an oversized house (Figure 5.3) as signalling the structure's simultaneous use by multiple nuclear families or members thereof.

Evidently, the relationship between vessel dimensions and household composition deserves a deeper analysis. Turner and Lofgren (1966, p. 123-127) originally proposed a straightforward correlation between volume of cooking jars and household size in the American Southwest, based on the simple assumption that vessel dimensions are determined by the number of people who eat from them. One crucial observation of Turner and Lofgren (1966, p. 127) is that oversized pots (with capacities of 8 litres or more) were associated with *kivas* and possibly used in communal gatherings. In spite of later challenges to the original formulation of the hypothesis, the fact is that a number of ethnographic studies seem to support it. For example, Nelson (1981, p. 110-112; 1991, p. 169) found little correlation between number of vessels and household size among the Maya, but a significant correlation between ceramic dimensions and the size of the food-consuming group. One of the most important observations is that social variables beyond mere family size also have an influence on the volume of containers. For example, Nelson (1981, p. 112) mentions the preparation of food for a large number of people during ritual occasions, and the fact that leaders have to provide meals for visitors during meetings. Similarly, Tani (1994, p. 52-58) found that among the Kalinga there was no correlation between household size and the number of vessels in use. However, the volume of pots and the number of broken pots did show a correlation with household size.

More recently, Hildebrand and Hagstrum (1999, p. 34-36) tested the same model with ethnographic data from the Wanka of Peru, confirming a positive correlation between household size and average volume of cooking vessels. Finally, in lowland South America, the works of DeBoer and Lathrap (1979, p. 105-110) and DeBoer (2001, p. 223-228) offer a similar perspective on the ceramic assemblages of the Shipibo-Conibo, Upper Amazon. Beyond the ordinary medium-sized vessels for everyday cooking and serving, the Shipibo-Conibo also produce miniature forms for individual consumption during travels and oversized ceramics (mainly brewing jars and drinking mugs) for communal feasts. Thus, the ethnographic data confirms a correlation between ceramic vessels of greater volume and larger food-consuming groups. These are not only large households, but also groups of people involved in public gatherings, ceremonies and feasts, supporting the interpretation of the reduction in ceramic size in House 1 as signalling an attenuation of the early extended family, community-oriented practises.

As I made clear over the course of this thesis, the hypothesis of Reis (2007, p. 189-195) that transformations in pit house dimensions indicated the replacement of extended by nuclear families does not hold to the current chronological evidence. The case studies reviewed in Chapter 5 clearly show that oversized pit houses tend to appear late in the Southern Proto-Jê history, after Cal. A.D. 1000. The oversized structure at Baggio 1 does not emerge until the late 14th century. Moreover, House 1 continued to be occupied as smaller pits were added to the site, and the contemporaneity of pit houses with marked disparities in size (but all domestic in function) is attested at sites like RS-A-29 and RS-AN-03 (see Chapter 5). If one follows the reasoning of Reis under the light of the new evidence, a plausible explanation would be that both extended and nuclear-family residential groups could be found side-by-side in some Southern Proto-Jê settlements after the turn of the second millennium A.D. This has important consequences for incipient inequalities, given the social, economic and ideological advantages of larger households (see Chapter 5).

However, how to interpret the change towards more individual practises in House 1? This does not represent a contradiction. Rather, I believe that, at the same time that disparities in household sizes emerged, extended-family residential groups could have developed more competitive and hierarchical relations within their own dwellings. This is partly supported by the Kaingang and other Jê ethnographic data that will be reviewed below, but for now I would like to allude to the similarities with the British Columbian pit houses analysed by Hayden and Spafford (1993, p. 125-132). They noticed that, unlike smaller structures, the largest pit houses tended to have separate domestic areas on their floors, with individual hearths, tools and other facilities. Oversized dwellings were also distinguished by exotic fauna, wealth items, higher storage capacity and other status markers. Crucially, Hayden and Spafford argue that the individualised internal organisation of large dwellings was compatible with the higher status of their inhabitants and with their quest for surplus and wealth. In the words of the authors, “the emphasis on individual family versus communal activities is more consistent with a competitive ethic and attitude associated with socioeconomic hierarchies” (Hayden and Spafford, 1993, p. 132). In summary, I argue that the reorganisation of activities inside House 1 relates to the “break down” of the early extended family and its communal orientation into more individual components, but still functioning as a corporate residential group. At the same time, smaller nuclear families started to gravitate around the oversized dwelling. These transformations occurred in a period when other signs of incipient hierarchies appeared at the settlement.

During Phase 2, the clusters of small pits added to the inner precinct probably represented an extension of the original household (House 1) with smaller huts and specialised compartments. These spaces were dynamic: as I described above, House 2 started as a typical vertical-walled small house, later turning into a cooking facility. House 3 follows the opposite trajectory, starting as a bell-shaped structure and later acquiring the shape and internal features of a small pit house. Domestic structures, including pit houses with such reduced floor areas are attested in a number of cases worldwide, normally sheltering nuclear families or even fewer individuals (Flannery, 1972, p. 34-36; 2002, p. 419-420; Smith, 2003, p. 172). Although the reduced floor space of Houses 2 and 3 hampers the identification of discrete activity areas, I interpreted the spatial distribution of their finds as relating to both primary and secondary contexts of deposition around hearths. In that sense, the recovered artefact assemblages would be representative of the inventory in use during the structures' lives. Curiously, no significant difference in ceramic and lithic types was found between the small houses of the inner precinct and House 1. The external areas, however, were distinguished by the absence of red ware and by the miniature size of the reconstructed vessels, appropriate for individual consumption. The spatial association of debris with features outside the pit houses confirms that these were not merely zones of secondary refuse deposition, but represent actual activity areas. One large stone-lined fire pit was dated Cal. A.D. 2σ 1455-1630, which is a wide probability range but reasonably fits within the second phase of the site's history. The use of such cooking facilities explains the absence of large cooking vessels (Iriarte et al., 2008, p. 957) and suggests the external areas performed a complementary function to the activities occurring inside the pit houses.

I interpret the inner precinct during Phase 2 as consisting of one or more household compounds where some structures were dwellings, but others fulfilled special functions such as cooking and storage. The proliferation of structures in the inner precinct most likely resulted from the growth of House 1, but it is not impossible that an influx of migrants also had a role in the enlargement of the settlement. The lack of differentiation in material culture between the pit houses of the inner precinct indicates unrestricted access to goods and suggests that similar activities were performed in all parts of the compound. Furthermore, the use of the external areas between the pit houses for food preparation and consumption also points towards broad sharing within this sector of the site. This is another evidence that the whole hilltop compound functioned as a single household in the anthropological sense: a socio-economic unit with shared production, consumption and other corporate functions (Ashmore and Wilk, 1988, p. 3-5; Rogers, 1995, p. 8-10; Wilk and Rathje, 1982, p. 618). In sedentary villages where private ownership of resources is the norm and sharing is not practised between houses of a settlement, permanent facilities for cooking, grinding and storage tend to be kept inside dwellings, not in patios (Byrd, 1994, 2000; Flannery, 1972, 2002).

House 1 must have preserved its role as an epicentre of ritual and social life at least during the early parts of Phase 2, when cycles of conflagration and entombment continued to be performed. If the architectural elaboration of the inner precinct resulted from the growth of House 1, we can hypothesise a scenario in which the younger lineages of the smaller structures in the compound maintained social and ceremonial ties to the senior lineages of the oversized dwelling (Gomart et al., 2015, p. 244-245; Hayden and Spafford, 1993, p. 136; Weismantel, 1989). However, as mentioned previously, the most fruitful comparisons may be drawn from different neighbourhoods of a pit house site. In the case of Baggio 1, we must contrast the inner precinct with the peripheral area. The dates of House 11 indicate that this sector of the site was the last to emerge, as the final stage of the growth outward and downhill from House 1. Although the architecture of House 11 is typical of other pit houses, the near absence of artefacts and lack of defined internal features, coupled with the emptiness of its external areas, lead me to suggest that the peripheral sector was completely dependent on the activities performed at the inner precinct.

I interpret the restructuring of the site in Phase 2 as signalling a change towards aggrandising strategies by the dwellers of House 1. I propose that the larger kin network of the oversized house’s inhabitants, as well as their senior position in the direct line of descent from the settlement founders, conferred them a higher status than their neighbours. Recapitulating the discussion in Chapter 5, the following evidence must be considered:

1. Elaborate residential architecture: Given that production at the household level is the basis of economic disparities in early complex societies, extended families have an advantage over smaller units, and high status households typically count with more members (Hayden and Cannon, 1982; Netting, 1982; White, 2013). The artefact assemblages and internal features of House 1 during Phase 2 confirm its domestic function, similarly to other oversized structures in the highlands (Copé, 2006). In such cases, the disparities in the size of pit houses coexisting in the same settlement must be attributed to differences in the number of inhabitants, conferring the members of extended households a productive advantage (Flannery, 2002, p. 424-425). Not only the dimensions of House 1 are impressive, but also the elaborate practises of floor renewal, involving the combustion of the structure, deposition of artefact caches, and entombment (although restricted to an early period in the structure's history). Moreover, the whole inner compound centred on House 1 probably incorporated a range of specialised functions, from cooking to storage.

2. Chronological longevity: One concern of elite dwellings cross-culturally is to mark continuity between generations by constant renewal or rebuilding of houses in the same place (De Lucia and Overholtzer, 2014; Lesure and Blake, 2002; McAnany and Hodder, 2009). Even though the cycles of burning were abandoned over the course of Phase 2, the inhabitants of House 1 never left the structure, superimposing new floors on top of the ancient ones and showing a sense of memory and connection to the founders of the site. Using the words of McAnany and Hodder (2009, p. 13-15), the "earth-bound" genealogies of House 1 inscribed the memory of its occupants in the landscape, built links with the past and created "architectural trends" weaving generations together. Moreover, the status of descendants from a settlement's first dwellers is often a criterion of social distinction (De Lucia and Overholtzer, 2014; Gomart et al., 2015; Preucel, 2000). In my view, the dwellers of House 1 constituted a long-lived residential corporate group (sensu Hayden et al., 1996) that, over the site's history, gradually accumulated status through the sponsorship of domestic rituals

(Chiang, 2015), direct descent from the founding ancestors of the site (De Lucia and Overholtzer, 2014) and advantages of a larger kin group (White, 2013).

3. Community layout: The final clue to the changes in social organisation assumed by Baggio 1 during Phase 2 is the restructuring of site layout. Community plans often encode inequality, with elite dwellings positioning themselves in a central location, close to the social and ceremonial core of the settlement, or in strategic locations such as hilltops (Carpenter et al., 2012; DeMarrais, 2001; Preucel, 2000; Van Gijseghem and Vaughn, 2008). At the Baggio 1 site, the hilltop compound exhibits the hallmarks of an upper-status neighbourhood in contrast with the lower peripheral area. The first has formal architectural arrangement, with small pit houses clustered around the central House 1. This sector of the site contains a variety of earthworks, from Mounds A and B to the small enclosure. The chronology obtained for House 11, the only sampled in the periphery of the site, show that its occupation began after the structures of the inner precinct were in place, demonstrating that as the settlement grew, new dwellers were increasingly being pushed downhill and further away from House 1. Furthermore, as noticed by Novasco (2013, p. 84-85), upper slopes or hilltops are preferred pit house settings for a very practical reason: the avoidance of flooding. This means that the peripheral area of Baggio 1 was relegated to the least desirable location of the settlement. Another evidence comes from the comparison of the views from each sector of the site (Figure 10.7): while House 1 has a panoramic view of a large territory in its surroundings, including important sites like Abreu Garcia, the view from the peripheral area is blocked in most directions. In addition, while the peripheral area can be completely visually controlled by House 1, the opposite is not true (Figure 10.7). With all the evidence so far, I interpret the peripheral area during Phase 2 as a low-status neighbourhood socially dependent on the inner precinct compound, and especially on the senior lineage of House 1.

Figure 10.7 Above: a view from House 1 towards the northeast (a). Notice the visual control over the peripheral area downhill and the prominence of the Abreu Garcia site in the horizon. Below: views from the peripheral area towards the northwest (b) and southwest (c). The view towards most directions, as in (c), is blocked by the surrounding higher terrain.

Deriving status from household asymmetries among the Jê

Before moving to the final period of the site's history, I examine now the social processes that could have led to the creation of inequality using examples from the ethnography of the Jê peoples. This approach gives full weight to the historical particularities of the societies in question, complementing the cross-cultural framework developed in Chapter 5. Unfortunately, the historical accounts about Southern Jê households are not as instructive as the ones about their funerary practises. Also, the Kaingang and Xokleng village and household organisation have not been studied in the same depth as the Central and Northern Jê groups because it was thought that "they had died out, or at least that their way of life was extinct" (Maybury-Lewis, 1979). However, analyses of the traditional organisation of Southern Jê households have been published more recently, showing many commonalities with their Central Brazilian relatives (Fernandes et al., 1999).

It is clear from the ethnographies that extended family households formed a basic social and economic unit among virtually all Jê societies of Brazil, including the Southern Jê. The household organisation of the central and northern branches of the Jê family – particularly the Xavante and the Kayapó – have been studied in more detail (Maybury-Lewis, 1979). Of these, the analysis of the Kayapó society by Terence Turner (1979b, 1992, 2003) deserve to be explored in detail, as they show that inequality pervades the Jê households. A Kayapó dwelling ideally shelters three generations of an extended family: (1) an elderly couple, who are the household heads; (2) their married daughters with their respective husbands; and (3) their grandchildren – all living under the same roof. Residence is uxorilocal, so that men move to live with their wives' families. A clear asymmetrical, hierarchical structure exists between the sons-in-law and their father-in-law, who is the head of the household. In the model developed by Turner, the elder exerts actual coercion by exploiting the work of newly married couples, having access to the surplus produced by the new conjugal families. The ideal of young men is one day to become fathers-in-law themselves and exploit the work of their daughters and sons-in-law. Interestingly, inequality is projected from the house to the public sphere of the village: larger families produce more surplus and can sponsor expensive name-giving ceremonies. In those ceremonies, their children receive "beautiful names" and become "beautiful people", a category that differentiates them from the majority of the people in the village, who are just "commons". A certain degree of status inheritance is in place, as parents can transmit their "beautiful names", privileges and ornaments to their children. This is extremely important, as it confirms the cross-cultural pattern seen in Chapter 5: in societies where inequality is not yet institutionalised, larger households with more kin have an advantage in terms of surplus production and competition for prestige.

The model of the Kayapó society described above has been generalised by Turner in a theoretical paper (Turner, 1979a) as being basic to all Jê societies of Central Brazil. However, only recently the household organisation of the Southern Jê has been subject to the same systematic study, confirming the model

(Fernandes et al., 1999). The Kaingang also favoured the uxorilocal residence pattern and developed a similar relationship of domination by the father-in-law over his sons-in-law. In the Jê societies, larger extended families mean more recently-married couples can work for the household and enhance the elders' prestige. As observed by Fernandes et al. (1999), the status of a household head was dependent on making other men gravitate around himself. Household heads exerted great authority and had the loyalty of the members of their own houses, making villages and regional alliances extremely unstable, prone to fissioning along household lines (Fernandes et al., 1999). Moreover, different elders' houses tended to vie for prestige beyond their communities, alternating their role as regional political centres in a process of cycling.

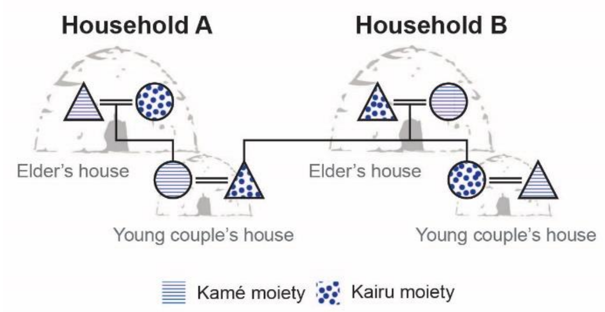


Figure 10.8 A model of the historical Kaingang households. Elders' houses also incorporated other economic and political functions, like storage, gatherings and receiving visitors. Based on Fernandes et al. (1999).

In terms of the spatial organisation of settlements, the Kaingang provide a key to the interpretation of pit house compounds (Figure 10.8). According to (Fernandes et al., 1999), historical Kaingang villages consisted of a series of dwellings around the house of an elder couple. The elders' residence had an annex building called "house of fire" where they received visitors, gathered with other elders, and stored their crops.

In summary, I propose that the trajectory towards inequality at Baggio 1 as delineated above fits our understanding of the household dynamics of Jê societies. The dwellers of House 1 could have derived their status from a larger kin group with many nuclear families producing surplus in benefit of the household head(s). I propose that during Phase 2 the inner precinct incorporated political and economic functions similar to the Kaingang elders' compounds. The external areas for food preparation and consumption, the specialised facilities for cooking and storage, and the ceremonial role of the oversized house (at least in the beginning of this phase) mean that the hilltop sector became an epicentre of social, economic and ritual life at the settlement. However, given the absence of disparities in material wealth or differential access to prestige goods like exotic raw materials and fine ceramics[4], it is unlikely that high-status households ever developed into a formalised upper class. In that sense, I interpret the socio-political organisation of the settlement during Phase 2 as similar to other ranked societies where status is based on social capital – larger kin network, differential access to labour, pursuit of prestige – rather than on accumulation of wealth (Guengerich, 2014; Lesure and Blake, 2002; Maschner and Patton, 1996). As in the Kaingang case described by Fernandes et al. (1999), this phase of the settlement was destined to be short-lived.

Phase 3: decline and abandonment (Cal. A.D. 1660-1765)

The last phase in the history of Baggio 1, after *Cal. A.D. 1660*, witnessed the abandonment of the inner precinct. In contrast, the peripheral area, judging from the dates of House 11, continued in use until the middle of the 18th century. However, the terminal floors of the structure were still inconspicuous in artefacts and features. Thus, activities seem to have been ephemeral during the century before the definitive abandonment of the site.

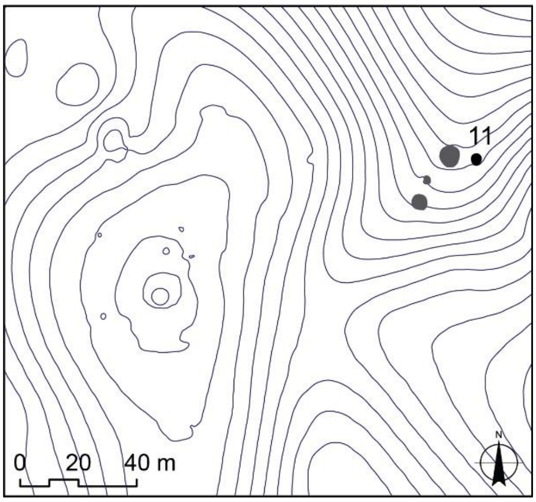


Figure 10.9 Hypothetical plan of the Baggio 1 site during phase 3 (Cal. A.D. 1660-1765).

The persistence of the site well into the colonial period should come as no surprise, since the Portuguese presence in the southern Brazilian highlands was

[4] One could argue that the red slipped ceramics, which were restricted to the pit houses of the inner precinct, could have fulfilled that role. However, red ware was present in all excavated houses of that sector, showing that access to it was not exclusive of House 1. The scarcity of artefacts in the peripheral area prevents further comparisons.

practically non-existent. Although the highlands were crisscrossed by trading routes, accounts from the first half of the late 18th century mention no colonial towns or villages in the region. A few farms, many of them abandoned and in ruins, were described as the only safe places for the traveller to rest (Herberts, 2009, p. 138-147). The city of Lages, now the largest in the region, only began to be settled in 1766 (Herberts, 2009, p. 147). Thus, it is not implausible that the southern Jê groups remained relatively undisturbed in Campo Belo do Sul until such a late date. The demise of the inner precinct, and with it the ranked organisation at the site, can be explained as a result of internal and external factors. As an internal force, we must consider the inherent instability of early ranked societies, as summarised in the concept of cycling by (Anderson, 1994). Key in that process are factional competition, fissioning, warfare and the ability of commoners to “vote with their feet”. As I mentioned above, factionalism and fissioning along household lines were common among the historical southern Jê groups. On the other hand, as an external factor, the indirect impact of the European conquest cannot be underestimated. The outskirts of the highlands were being settled by Jesuit missions (and visited by slave raiders) since the first half of the 17th century, and epidemics that devastated a large portion of the indigenous population were recorded during this period (Noelli, 1999, p. 241-260; Noelli and Soares, 1997).

The trajectory of Baggio 1 in its regional context

The historical circumstances behind the demise of Baggio 1 in the mid-18th century are easier to unveil than those at the beginning of the settlement’s history. Nevertheless, in this final section I will attempt to contextualise the development of Baggio 1 in the broader Southern Proto-Jê occupation of the highlands. As is clear from the chronology obtained, the foundation of the settlement occurred in a relatively recent period, beginning ca. *Cal. A.D. 1385*, when the Southern Proto-Jê groups were already established in the neighbouring regions for many centuries (see Chapter 3). On the other hand, the turn of the

15th century A.D. is when a true peak in the number of dates and sites is seen in those regions and in the southern Brazilian highlands as a whole (Iriarte and Behling, 2007, p. 122; Iriarte et al., 2016, p. 9). I argue that it is in this scenario of regional growth that the development of a complex site like Baggio 1 must be understood. In what follows, I return to two points that were briefly discussed in Chapter 5 relating to environmental and social circumstances behind the appearance of ranked villages among the Southern Proto-Jê: the spread of *Araucaria* forests and the arrival of new cultural groups to the highlands, both of which are somewhat intertwined with population growth and landscape infilling.

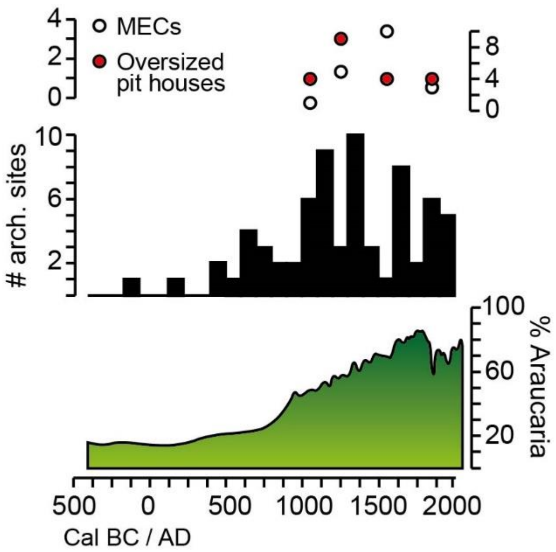


Figure 10.10 Composite graph with the dates of all Southern Proto-Jê sites (histogram), mound and enclosure complexes and oversized pit houses (circles), and *Araucaria* pollen curve from the Cambará do Sul record (Behling et al., 2004). Modified from Iriarte et al., 2016, p. 9.

The transformations in the environment of the southern Brazilian highlands with the spread of mixed *Araucaria* forests at the expense of grasslands were well established when Baggio 1 was first settled. The onset of this phase of rapid forest expansion varies from Cal. A.D. 850 to 1050 according to various pollen records (Behling, 1995, p. 131-149; Behling et al., 2001, p. 633-638; Behling et al., 2004, p. 281-295), and the coincidence of this period with an explosion in the number of dated Southern Proto-Jê sites has been noticed a few times in the literature (Bitencourt and Krauspenhar, 2006, p. 112-113; Iriarte and Behling, 2007, p. 122-124; Iriarte et al., 2016, p. 8-9). However, there is more to the period in question than just an increase in site number: during the centuries preceding the foundation of Baggio 1, Southern Proto-Jê territories reached their maximum extent, from the Atlantic Coast to the Paraná River, and settlement systems became diversified with a peak in the variety of site types. Most importantly, new expressions of monumental earthen architecture emerged with the mound and enclosure complexes and oversized pit houses. Although the sample of dated oversized pit houses is still small, they all postdate Cal. A.D. 980-1050, concomitant with the forest spread (Copé, 2006, p. 202; Schmitz et al., 2013a, p. 148; Schmitz et al., 2002, p. 22) (Figure 10.10). I argue that the chronological coincidence between the appearance of oversized dwellings and the expansion of *Araucaria angustifolia* is an indicative that large residential groups were forming in order to control a new resource, ensuring corporate rights over the most productive locations, similarly to the control over *Araucaria* exploitation territories by different chiefs in the 19th century (Mabilde, 1899, p. 142-144). Over time, the storable surplus could be diverted through ideological means (communal feasting and domestic rituals) to the enhancement of these early extended families' own wealth and status in detriment of smaller families, newcomers, or those with access to less productive locations, providing the foundations of socio-economic power and inequality (Hayden, 1997; Hayden and Spafford, 1993). The emergence of Baggio 1 occurs late in this context, when the processes in question had been in place for centuries, which might explain its rapid ascension as a ranked settlement. At the same time, it shows that, even by the 14th century, Southern Proto-Jê groups were still growing, fissioning, settling in new areas and experiencing their own trajectories towards socio-political complexity.

Arguably, the expansion of *Araucaria* forests was also connected with the arrival of public ceremonial and mortuary architecture – mounds and enclosure complexes – providing the surplus necessary for new investments in monumental construction and feasting. However, other explanations have been provided, emphasising the second millennium A.D. as a period when unprecedented ethnic contacts took place in southern Brazil and adjacent regions. The gradual infilling of the landscape and the formation of a mosaic of archaeological cultures during this era turned the region into a highly contested zone where multiple traditions met, interacted, and competed (De Souza et al., 2016a; Iriarte et al., 2016; Iriarte et al., 2008). I argued in a recent article that one of the unforeseen consequences of the formation of such enclaves was to provide aspiring leaders with an avenue to power, manifested in the inscription of chiefly lineages in the landscape (mounds) as a symbol of active resistance to outsiders (De Souza et al., 2016a, p. 209). How the different expressions of power in mound and enclosure complexes and oversized dwellings compare to each other is a crucial question for future investigation. In the case of Campo Belo do Sul, I find it significant that the dates of Abreu Garcia (Chapter 4) point to the onset of activities at the mound and enclosure complex during the transition to the second phase of Baggio 1. This is the time when the pit house site starts to exhibit the hallmarks of a ranked village and, as I argued above, the corporate group residing in House 1 was probably on the verge of consolidating its power. As Abreu Garcia becomes the focus of mortuary ceremonies, the rites of conflagration and entombment at the oversized House 1 are abandoned, suggesting that regional aggrandisers were engaged in more public, landscape-level displays on the distant hilltop. The emphasis on referencing particular ancestors in the landscape through monumental burials is thus compatible with the movement towards household disparities and individualised practises seen during the apogee of Baggio 1.

Summary and conclusion

The aim of the excavations at Baggio 1 was to understand the function of large-scale domestic architecture in pit house villages and their role in the possible emergence of complex societies in the southern Brazilian highlands. The investigation at the site revealed significant differences between structures of distinct sizes, as well as between different sectors of the site.

My current interpretation of the site is that House 1 began and persisted as an epicentre for the social and ritual life of the community for over three centuries, stating ca. *Cal. A.D. 1385*. In the early phase of occupation, dwellers of House 1 adopted a corporate strategy focused on community-oriented ceremonies of conflagration and entombment. These were later replaced by the simple maintenance of living floors, but there was no rupture in the occupation of the house and associated material culture. I suggest that, as generations went by, the long-lived corporate group inhabiting the oversized dwelling started to accumulate prestige through their connection with the founders of the site symbolised by the persistent occupation of the monumental house. Gradual changes in material culture and lack of gaps in the stratigraphy of the subsequent floors suggests the same corporate group kept inhabiting the structure.

The surrounding, smaller pits (Houses 2 and 3) appear to have been part of a compound that incorporated specialised facilities (e.g. for cooking and storage) and small huts in the vicinity of House 1. These structures were very dynamic, with constant changes and remodelling in architecture. The smaller houses of the inner precinct appears to be later than House 1, maybe splitting from it at the moment when ritual burning was about to be abandoned ca. Cal AD 1515. In the peripheral area, as witnessed by the excavations at House 11 and surroundings, the scarcity of findings, lack of elaborate floor renewal, and lower topographic position contrast with the finds in the inner precinct on the hilltop. I propose that at this moment the occupants of House 11 shifted to an aggrandising strategy, consolidating their status through their larger kin network and privileged position as the lineage of founders of the site. However, the ranked organisation materialised in the new settlement layout would be short-lived, eventually collapsing in the middle of the 17th century.

The results of this project allowed me to shed new light on the Southern Proto-Jê oversized pit houses. For the first time, I documented the complete history of one of such structures and compared it to the surrounding pit houses. The oversized House 1 can be envisaged as a centre for communal life located in privileged positions and periodically renewed by burning and entombment. Even when such conspicuous practices were abandoned, House 1 continued to, most likely by the same corporate group. I believe the inhabitants of House 1 kept the structure as an important, permanent reference in the landscape, providing links with the past through which they could derive an upper status in relation to other sectors of the site. In conclusion, the new data from Baggio 1 show a complex interplay between corporate and aggrandising strategies over the long term in the southern Brazilian highlands.

Appendix I

List of Southern Proto-Jê sites in the Canoas and Pelotas River Basins

Abbreviations

NAME: Site name. This is usually a code adopted in Brazilian Cultural Resource Management that follows the format “State – River Basin – Site Number”. Alternatively, when the site has not yet received a code, the most common practise is to identify it by the name of the land owner.

TYPE: 1) Pit house; 2) Surface litho-ceramic site; 3) Mound; 4) Mound and enclosure complex.

X and Y: Coordinates of the site. All of the coordinates are in UTM format, zone 22J, datum WGS 84.

N: Number of features. Applies to earthworks only. It refers to the number of pit houses, mounds or enclosures in the site.

DLA: Diameter (m) of the largest pit, in the case of pit houses, or of the largest enclosure, in the case of mound and enclosure complexes.

DSMA: Diameter (m) of the smallest pit, in the case of pit houses, or of the smallest enclosure, in the case of mound and enclosure complexes.

DAVG: Average pit diameter (m). This variable was computed for pit houses only, for the analyses performed in Chapter 2.

REF: Bibliographic reference.

Region: Barra Grande

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
Ademir Maté	1	484506	6913639	1	15.00	15.00	15.00	Copé, 2006
Ari Duarte 2	1	483298	6920046	3	7.00	2.00	4.33	Copé, 2006
Ari Duarte 3	2	483098	6920444					Copé, 2006
Ari Duarte 4	1	483190	6920389	1	5.00	5.00	5.00	Copé, 2006
Artino	1	482060	6919855					Copé, 2006
Avelino 1	1	480993	6921429					Ribeiro and Ribeiro, 1985; Copé, 2006
Avelino 4	1	481167	6921806	1	6.00	6.00	6.00	Copé, 2006
Borges	1	485842	6915634	1				Copé, 2006
Celso Cardoso	1	479848	6921419	5				Iriarte et al., 2013
Chico Carneiro 1	1	484006	6921692	12				Iriarte et al., 2013
Chico Carneiro 2	4	484224	6921850	2				Iriarte et al., 2013
Gine	4	483757	6921769	2	25.00	20.00		Iriarte et al., 2013
Guri Pereira 1	1	482047	6919896	2	10.00	10.00	10.00	Copé, 2006
Guri Pereira 2	1	482064	6919816	9				Copé, 2006
João Fidencio 1	4	484494	6918817	1	25.00	25.00		Iriarte et al. 2013
João Fidencio 2	4	484398	6919181	1	20.00	20.00		Iriarte et al. 2013
Leopoldo Alves 1	1	481919	6921793	1	8.00	8.00	8.00	Copé, 2006
Leopoldo Alves 3	1	481371	6921695	11	5.00	3.00	4.00	Copé, 2006
Leopoldo Alves 4	1	481273	6922031	1	8.00	8.00	8.00	Copé, 2006
Leopoldo Alves 5	1	482181	6922539	8	5.00	3.00	4.00	Copé, 2006
O. Duarte 1	1	486454	6921222					Iriarte et al. 2013
O. Duarte 2	4	486401	6920698					Iriarte et al. 2013

Region: Barra Grande (cont.)

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
P05	2	479255	6920575					Copé, 2006
P14	2	485506	6918508					Copé, 2006
Posto Fiscal	4	481743	6921155	4	30.00	20.00		Iriarte et al. 2013
RS-PE-10	1	485083	6918434	23	8.00	3.00	5.13	Ribeiro and Ribeiro, 1985
RS-PE-12	2	483005	6920519					Copé, 2006
RS-PE-21	4	482326	6922396	2	20.00	15.00		Copé, 2006
RS-PE-29-1	4	481194	6921615	1	80.00	80.00		Ribeiro and Ribeiro, 1985
RS-PE-29-2	4	481184	6921875	2	35.00	15.00		Ribeiro and Ribeiro, 1985
RS-PE-29-3	4	480952	6921934	2	20.00	20.00		Ribeiro and Ribeiro, 1985
RS-PE-29-4	4	480954	6922008	1				Ribeiro and Ribeiro, 1985
RS-PE-31	4	482449	6920174	3	40.00	20.00		Ribeiro and Ribeiro, 1985
RS-PE-41	1	483664	6919854	10	8.00	3.00	5.85	Copé, 2006
SC-AG-100	4	482276	6929152	1	40.00	40.00		Caldarelli, 2008
SC-AG-105	2	482356	6929275					Caldarelli, 2008
SC-AG-106	2	487822	6933969					Caldarelli, 2008
SC-AG-107	1	488182	6934143	9	7.00	3.00	4.00	Caldarelli, 2008
SC-AG-108	4	488352	6934113	2	17.00	15.00		Caldarelli, 2008
SC-AG-109	1	488081	6934512	3	5.50	5.50	5.50	Caldarelli, 2008
SC-AG-110	1	486882	6932243	2				Caldarelli, 2008
SC-AG-111	1	487463	6929786	7	6.50	2.90		Caldarelli, 2008
SC-AG-113	1	488647	6926094	11	6.80	3.60		Caldarelli, 2008
SC-AG-114	4	489275	6934153	2	19.00	15.00		Caldarelli, 2008
SC-AG-115	2	488449	6934454					Caldarelli, 2008
SC-AG-117	2	487583	6932400					Caldarelli, 2008

Region: Barra Grande (cont.)

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
SC-AG-95	4	482809	6928495	1	42.00	42.00		Caldarelli, 2008
SC-AG-98	4	482343	6929251	1	34.00	34.00		Caldarelli, 2008
SC-AG-99	4	483314	6929274	2	50.00	30.00		Caldarelli, 2008
SC-UP-430	1			2	5.70	4.30	5.00	Naue et al., 1989
SC-UP-432	1			3	4.00	3.00	3.50	Naue et al., 1989
SC-UP-433	1			13	4.20	2.00	2.59	Naue et al., 1989
SC-UP-436	1			34	10.00	1.00	2.60	Naue et al., 1989
Vargas	1	478057	6915453	2	6.00	6.00	6.00	Copé, 2006

Region: Campos Novos

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
SC-AB-04	1	486062	6947088	5	6.00	4.00	5.60	De Masi, 2005
SC-AB-05	2	486197	6947084					De Masi, 2005
SC-AB-07	1	486170	6946742	2	6.00			De Masi, 2005
SC-AB-08	1	486006	6946529	1	3.00	3.00	3.00	De Masi, 2005
SC-AB-104	2	494785	6943201					De Masi, 2005
SC-AB-108	2	495912	6943348					De Masi, 2005
SC-AB-11	2	485678	6946779					De Masi, 2005
SC-AB-111	2	494675	6943526					De Masi, 2005
SC-AB-14	1	485682	6946611					De Masi, 2005
SC-AB-20	1	485311	6945915	1	2.50	2.50	2.50	De Masi, 2005
SC-AB-29	1	484690	6945261	6	4.00	2.00	2.91	De Masi, 2005
SC-AB-31	1	484985	6945366					De Masi, 2005
SC-AB-34	1	485610	6946084	4	4.50	1.50	2.93	De Masi, 2005
SC-AB-42	2	487030	6944907					De Masi, 2005
SC-AB-43	2	487738	6945063					De Masi, 2005
SC-AB-46	2	487888	6945320					De Masi, 2005
SC-AB-48	2	488165	6945444					De Masi, 2005
SC-AB-49	1	488030	6945523					De Masi, 2005
SC-AB-50	2	487706	6945895					De Masi, 2005
SC-AB-51	2	487746	6946210					De Masi, 2005
SC-AB-55	1	488342	6945890					De Masi, 2005
SC-AB-56	2	489014	6946252					De Masi, 2005

Region: Campos Novos (cont.)

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
SC-AB-60	1	489634	6944292					De Masi, 2005
SC-AB-62	2	489836	6943798					De Masi, 2005
SC-AB-66	1	490574	6944134					De Masi, 2005
SC-AB-73	1	492051	6942603					De Masi, 2005
SC-AB-75	1	491659	6941105					De Masi, 2005
SC-AB-76	1	491558	6941071					De Masi, 2005
SC-AB-77	1	491758	6941177					De Masi, 2005
SC-AB-79	2	493501	6942838					De Masi, 2005
SC-AB-80	1	494278	6942518					De Masi, 2005
SC-AB-81	2	494435	6942714					De Masi, 2005
SC-AB-83	1	494791	6943104					De Masi, 2005
SC-AB-85	1	495300	6942989					De Masi, 2005
SC-AB-86	1	496035	6943255					De Masi, 2005
SC-AB-87	1	496506	6943005					De Masi, 2005
SC-AB-88	1	496706	6942852					De Masi, 2005
SC-AB-91	1	498080	6942914	6	8.00	2.50	4.50	De Masi, 2005
SC-AB-93	1	498295	6943106	6	12.00	5.00		De Masi, 2005
SC-AB-95	1	498008	6943600	14	18.00			De Masi, 2005
SC-AB-96	4	495209	6943573	4	20.00	15.00		De Masi, 2005
SC-AB-99	1	485212	6945500					De Masi, 2005
SC-AG-02	1	499125	6942405					De Masi, 2005
SC-AG-03	1	498202	6942184					De Masi, 2005
SC-AG-04	1	497624	6942098					De Masi, 2005
SC-AG-05	1	497505	6942166					De Masi, 2005

Region: Campos Novos (cont.)

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
SC-AG-06	1	497254	6941905					De Masi, 2005
SC-AG-07	1	497025	6942146					De Masi, 2005
SC-AG-08	1	496804	6941906					De Masi, 2005
SC-AG-09	1	497102	6941817					De Masi, 2005
SC-AG-10	1	496513	6942171					De Masi, 2005
SC-AG-11	2	495981	6942394					De Masi, 2005
SC-AG-112	4	489050	6936441	1	29.00	29.00		Caldarelli, 2008
SC-AG-116	4	488256	6935342	1	19.00	19.00		Caldarelli, 2008
SC-AG-12	4	497738	6940261	2	60.00	30.00		De Masi, 2005
SC-AG-13	2	495172	6942456					De Masi, 2005
SC-AG-16	1	495919	6941411					De Masi, 2005
SC-AG-18	2	495273	6940834					De Masi, 2005
SC-AG-19	2	495336	6940713					De Masi, 2005
SC-AG-23	2	494760	6940897					De Masi, 2005
SC-AG-25	1	494150	6941394					De Masi, 2005
SC-AG-40	2	485410	6944378					De Masi, 2005
SC-AG-42	2	485843	6944483					De Masi, 2005
SC-AG-47	1	481001	6945117					De Masi, 2005
SC-AG-50	2	485175	6943847					De Masi, 2005
SC-AG-64	2	489060	6943544					De Masi, 2005
SC-AG-65	2	490266	6942947					De Masi, 2005
SC-AG-68	1	492049	6943949					De Masi, 2005
SC-AG-75	4	493466	6940444	2	20.00	15.00		De Masi, 2005
SC-AG-76	1	491100	6942798	1	10.00	10.00	10.00	De Masi, 2005

Region: Campos Novos (cont.)

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
SC-AG-77	4	491551	6942913	1	60.00	60.00		De Masi, 2005
SC-CN-01	2	468633	6948506					De Masi, 2005
SC-CN-02	1	467497	6947984	1	3.50	3.50	3.50	De Masi, 2005
SC-CN-03	1	468723	6948207					De Masi, 2005
SC-CN-05	1	479754	6946528					De Masi, 2005
SC-CN-06	2	475367	6947129					De Masi, 2005
SC-CN-07	1	475302	6947068					De Masi, 2005
SC-CN-09	1	468803	6947800					De Masi, 2005
SC-CN-10	1	466915	6948075	2	7.00	3.00	5.00	De Masi, 2005
SC-CR-03	2	467932	6946188					De Masi, 2005
SC-CR-04	2	479501	6942566					De Masi, 2005
SC-CR-05	1	478217	6943249					De Masi, 2005
SC-CR-06	4	479702	6942378	1	50.00	50.00		De Masi, 2005
SC-CR-10	2	477297	6941483					De Masi, 2005
SC-UP-410	1			1	5.70	5.70	5.70	Naue et al., 1989
SC-UP-414	1			2	7.00	5.30	6.15	Naue et al., 1989
SC-UP-416	1			3	2.00	2.00	2.00	Naue et al., 1989
SC-UP-417	1			1	5.70	5.70	5.70	Naue et al., 1989
SC-UP-418	1			12	6.90	1.30	4.47	Naue et al., 1989
SC-UP-419	1			4	7.00	2.60	4.95	Naue et al., 1989
SC-UP-420	1			40	10.00	2.00	5.18	Naue et al., 1989
SC-UP-421	1			1	9.40	9.40	9.40	Naue et al., 1989
SC-UP-422	1			1	6.00	6.00	6.00	Naue et al., 1989
SC-UP-427	1			3	6.80	4.80	5.96	Naue et al., 1989

Region: Campos Novos (cont.)

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
SC-UP-429	1			1	6.00	6.00	6.00	Naue et al., 1989
SC-UP-431	1			2	14.50	3.00	8.75	Naue et al., 1989
SC-UP-434	1			3	20.30	11.50	14.43	Naue et al., 1989
SC-UP-435	1			19	7.60	3.00	4.69	Naue et al., 1989
SC-UP-440	1			2	6.50	5.80	6.15	Naue et al., 1989
SC-UP-441	4			2	32.00	30.00		Naue et al., 1989
SC-UP-442	1			1	3.00	3.00	3.00	Naue et al., 1989
SC-UP-443	1			1	11.50	11.50	11.50	Naue et al., 1989
SC-UP-446	4			1	30.00	30.00		Naue et al., 1989

Region: São José do Cerrito

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
SC-CL-41	1	543390	6933737	2	7.50	5.00	6.25	Reis, 2007; Beber, 2013
SC-CL-42	1	545333	6935688	2	9.00	3.50	6.25	Reis, 2007; Beber, 2013
SC-CL-43	1	540600	6942297	4	6.00	4.40	5.25	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-43a	1	540477	6942336	1	5.00	5.00	5.00	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-44	1	540176	6941648	8	7.60	1.75	3.98	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-45	1	539691	6942530	13	10.00	3.80	5.64	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-46	1	539505	6942492	2	11.00	8.50	9.75	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-47	1	539727	6942531	1	7.50	7.50	7.50	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-48	1	539127	6942573	5	7.00	3.00	4.70	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-50	1	539117	6942878	4	12.00	6.00	10.50	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-51	1	538923	6942946	5	8.00	4.00	5.40	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-52	1	538315	6942871	1	20.00	20.00	20.00	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-56	1	540328	6942445	2	12.50	2.50	7.50	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-58	1	542036	6946883	18	8.00	3.00	4.77	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-59	1	540372	6942815	2	8.00	3.00	5.50	Reis, 2007; Schmitz et al., 2010; Beber, 2013
SC-CL-63	1	527738	6946770	2	15.80	13.00	14.40	Reis, 2007; Beber, 2013
SC-CL-63cf	1	527611	6947066	5	10.00	3.00	5.60	Reis, 2007; Beber, 2013
SC-CL-64	1	527427	6947429	1	15.00	4.00	9.50	Reis, 2007; Beber, 2013
SC-CL-65	1	528176	6942083	1	5.50	5.50	5.50	Reis, 2007; Beber, 2013
SC-CL-67	1	517471	6961103	3	10.00	5.00	7.16	Reis, 2007; Beber, 2013
SC-CL-68	1	533627	6953374	6	6.40	4.00	4.83	Reis, 2007; Beber, 2013
SC-CL-69	1	533792	6953294	12	6.00	4.00	4.63	Reis, 2007; Beber, 2013

Region: São José do Cerrito (cont.)

NAME	TYPE	X	Y	N	DLA	DSMA	DAVG	REF
SC-CL-70	1	536776	6955086	36	8.00	2.00	4.66	Reis, 2007; Beber, 2013
SC-CL-71	1	536646	6954775	68	8.00	2.00	4.42	Reis, 2007; Beber, 2013
SC-CL-74	1	535115	6950878	2	6.50	5.00	5.75	Reis, 2007; Beber, 2013
SC-CL-74b	1	535041	6950865	2	12.00	8.00	10.00	Reis, 2007; Beber, 2013
SC-CL-75	1	535407	6957206	1	4.00	4.00	4.00	Reis, 2007; Beber, 2013
SC-CL-76	1	535592	6957325	1	10.50	10.50	10.50	Reis, 2007; Beber, 2013
SC-CL-81	1	530771	6961637	1	6.50	6.50	6.50	Reis, 2007; Beber, 2013
SC-CL-82	1	530727	6961748	1	10.00	10.00	10.00	Reis, 2007; Beber, 2013
SC-CL-83	1	529365	6962237	1	8.00	8.00	8.00	Reis, 2007; Beber, 2013
SC-CL-84	1	528818	6954039	14	5.00	3.00	4.00	Reis, 2007; Beber, 2013
SC-CL-85	1	529684	6954800	4	4.50	4.50	4.50	Reis, 2007; Beber, 2013
SC-CL-86	1	531298	6957177	20	5.00	3.00	4.00	Reis, 2007; Beber, 2013
SC-CL-87	1	530189	6958001	9	10.00	4.00	6.33	Reis, 2007; Beber, 2013
SC-CL-88	4	531243	6958248	1	80.00	80.00		Reis, 2007; Beber, 2013
SC-CL-89	1	533479	6957144	1	4.00	4.00	4.00	Reis, 2007; Beber, 2013
SC-CL-90	1	533553	6957254	4	4.80	3.20	4.15	Reis, 2007; Beber, 2013
SC-CL-91	1	534109	6956868	2	3.90	3.80	3.85	Reis, 2007; Beber, 2013
SC-CL-92	1	533813	6943330	2				Schmitz et al., 2010; Beber, 2013
SC-CL-93	1	542348	6937365	2	10.00	5.00	7.50	Schmitz et al., 2010; Beber, 2013
SC-CL-94	4	540300	6942089	2	20.00	15.00		Schmitz et al., 2010; Beber, 2013
SC-CL-95	4	528766	6960879	1	80.00	80.00		Beber, 2013
SC-CL-96	1	542917	6947114	1	10.00	10.00	10.00	Beber, 2013
SC-CL-97	1	542399	6947294	2	11.00	12.00	11.50	Beber, 2013

Appendix II

Description of Southern Proto-Jê sites surveyed in the pilot area (Campo Belo do Sul, Santa Catarina state)

1. **Abreu Garcia 2 (UTM 22J 525219 6939470)**: Isolated pit house on the same hilltop (914 m) as the Abreu Garcia mound and enclosure complex, ca. 200 m to the northwest of it.

2. **Airton Ribeiro 1 (UTM 22J 0517895 6934691)**: A small mound, with 4 m diameter and 50 cm height, located on a forested hilltop (952 m). No other features or artefacts were found in its surroundings.

3. **Airton Ribeiro 2 (UTM 22J 0518077 6934177)**: A pit house with 6 m diameter located on a forested hilltop (960 m). A few ceramic and lithic scatters were found on the surface of an adjacent maize field.

4. **Alceu 1 (UTM 22J 520769 6942322)**: Surface site in a maize field, approximately 1 km to the northeast of the Plinio site. The site is located on a narrow ridge (893 m) with good visibility towards the valley of one of the major tributaries of the Caveiras River. Pottery sherds and flint flakes were found on the surface.

5. **Alceu 2 (UTM 22J 521778 6943003)**: Surface site in a field located approximately 100 m from the margins of the Caveiras River, in very low elevation (731 m). The land owner reports finding pottery in the area ever since he was a child, as well as polished axe heads. Only one sherd and a few flint flakes were identified during field walking.

6. **Antônio Branco (UTM 22J 523268 6942289)**: The site is located approximately 200 m downhill from the Gilmar da Silva site, near the valley bottom (780 m). Nowadays it is covered by a eucalypt plantation, obstructing visibility of the soil. The land owner reported having found pottery in this area in the past when it was a cultivated field. He also keeps in his house two polished axe heads that he found in the surroundings.

7. **Antônio Nilson 1 (UTM 22J 0520882 6933563)**: A cluster of three pit houses. One structure (6 m diameter) is isolated, whereas the other two are very close to each other, measuring 4 and 6 m diameter. The area, a hilltop (948 m) covered by forest and pasture, was used for agriculture in the past, and ceramic sherds were found on the surface.

8. **Antônio Nilson 2 (UTM 22J 520763 6933144)**: A pit house with 12 m of diameter located on an upper slope (958 m) covered by thick, old growth forest. We found no other earthworks in the proximity.

9. **Baggio 1 (UTM 22J 522124 6935653)**: A cluster of 17 pit houses in a pasture area, approximately 4.7 km from Abreu Garcia and with good visibility towards the hill where that site is located. The largest pit house (approximately 16 m in diameter) is situated on the hilltop (948 m) and is surrounded by smaller houses. A possible enclosure, 14 m in diameter, is located next to the large pit house. Down the hill, an elongated mound has been found; it appears to have two “wings”, giving it a U shape, aligned in the direction of the large pit house.

10. **Baggio 2 (UTM 22J 522024 6936168)**: A cluster of three pit houses and one mound, very closely spaced. The site is located on a hilltop (941 m) approximately 500 m north of Baggio 1. Two of the pit houses are very deep and have trees growing inside them, contrasting with the surrounding pasture.

11. **Baggio 3 (UTM 22J 521859 6936936)**: A single mound on a hilltop (935 m) presently used for agriculture, approximately 780 m northwest of Baggio 2.

12. **Baggio 4 (UTM 22J 522867 6937488)**: A large pit house that was filled in order to level the terrain for mechanised agriculture. Its location, on a hilltop (935 m), was pointed by the land owner. A crop mark is visible in the satellite imagery, showing a large circular feature where the pit house originally was.

13. **Baggio 5 (UTM 22J 0521723 6936009)**: A cluster of 5 pit houses in a forest, on a hilltop (935 m) approximately 350 m from Baggio 2. The largest structure has 8 m diameter and 1.2 m depth.

14. **Baggio 6 (UTM 22J 0521440 6936744)**: An isolated mound located on an upper slope (926 m) covered by pasture. No other earthworks were found in the surroundings.

15. **Carlos Rossetto (UTM 22J 521719 6940110)**: Six features resembling pit houses, but somewhat shallow and not well defined. Two possible small mounds were found next to one of the largest depressions. Two pits appear to have been dug over a single terrace or berm, giving them the appearance of more typical pit houses, and reinforcing the anthropogenic nature of the features. The site is located on a hilltop (895 m) covered by secondary forest.

16. **Cassiano Matos (UTM 22J 519652 6940914)**: Surface site in a soybean field, located on a hilltop (907 m) approximately 700 m south of the Clarinda site. Soil visibility was low in most of the field, but flint and quartz flakes, as well as pottery sherds, occurred in the proximity of a road.

17. **Célio Marques (UTM 22J 0524171 6935101)**: A surface site located in a maize and bean field in a valley (815 m), cut by a small stream. Artefacts, consisting of ceramic sherds and basalt and flint flakes, were found on both sides of the stream.

18. **Clarinda de Moraes (UTM 22J 519797 6941755)**: Extensive surface site in a maize field located on a hilltop (908 m). Pottery sherds, flint and quartz flakes, and basalt bifacial tools were identified.

19. **Davi (UTM 22J 520539 6932653)**: The largest pit house so far recorded in Campo Belo do Sul (18.5 m diameter). It is located on an upper slope (959 m), in a patch of woodland close to a eucalypt plantation, where we found, downslope, a small mound adjacent to a very small pit house. This site is located less than 300 m from Luís Carlos 4.

20. **Di Carle 1 (UTM 22J 0520189 6932995)**: A large pit house, measuring 15 m diameter and 2.8 m depth. Two mounds were located near the structure, in a radius of 20-40 m. The pit house is located on an upper slope (965 m) covered by forest. One bifacial tool was found on the surface.

21. **Di Carle 2 (UTM 22J 0520108 6933122)**: A single pit house with 9 m diameter and 1.5 m depth, located on a forested hilltop (969 m). The site is approximately 150 m away from Di Carle 1.

22. **Divercino da Silva (UTM 22J 523671 6942216)**: A surface site on an upper slope ridge (793 m), now used for agriculture, approximately 300 m to the southeast of the Gilmar da Silva site. Pottery sherds as well as flint and basalt flakes were located on the surface.

23. **Donisete (UTM 22J 0518055 6934901)**: A pit house with 5 m diameter, very shallow, located on a hilltop (952 m) presently covered with a eucalypt plantation.

24. **Edmilson 1 (UTM 22J 0516739 6935334)**: Two pit houses located on an upper slope (991 m) used for pasture, very close to the land owner's house. The largest pit house measures 7 m in diameter and is surrounded by a terrace, whereas the smaller structure has approximately 3 m diameter.

25. **Edmilson 2 (UTM 22J 0516937 6935380)**: A relatively large pit house, originally measuring 12 m in diameter, but now completely levelled by the land owner. The structure is located on an upper slope (987 m) used for pasture. The land owner reported finding polished stone tools at the place.

26. **Ernani Garcia (UTM 22J 523851 6939185)**: Mound and enclosure complex on a hilltop (931 m) to the west of Abreu Garcia. The enclosure is 30 m in diameter and has been almost levelled, but the central mound is still prominent. No other earthworks were found. A possible mound, located 80 m to the northeast of the main structure, was said to be the result of piling up rocks and logs after the clearing of the area for agriculture. The site is visible in satellite imagery, with the enclosure and mound appearing in lighter shades late in the growing season.

27. **Gilmar da Silva (UTM 22J 523436 6942429)**: Surface site in a maize field, with scatters of pottery sherds and flint and quartz flakes. The field occupies part of a hilltop and its upper slope (798 m), but the land owner reports having found pottery in an adjacent area on the hilltop proper that is now covered by pasture. When climbing an elevation formed by a rock outcrop, one can see the hill where the Abreu Garcia site is located.

28. **Hélio Camargo (UTM 22J 0516835 6936913)**: Two pit houses associated with a mound in a pasture located on a hilltop (915 m). The pit houses measure 3 and 4 m in diameter. The mound, located 40 m from the structures, has 5 m

diameter and is surrounded by a ditch. A few lithic and ceramic scatters were located near the structures.

29. **João da Silva 1 (UTM 22J 0517779 6931177)**: An extensive surface site in a field used for agriculture near the João da Silva 3 pit houses. Many lithic and ceramic artefacts were identified on the surface. The site occupies a lower slope (967 m) and extends to the adjacent hilltop (999 m).

30. **João da Silva 2 (UTM 22J 0517740 6931665)**: An isolated mound with 8 m diameter and 75 cm height. The site is located on a hilltop (992 m) near a mixed forest. Some lithic and ceramic scatters were found in the pasture.

31. **João da Silva 3 (UTM 22J 0517741 6931397)**: A cluster of 15 pit houses and one mound. The houses measure between 2 and 8 m diameter, most of them not exceeding 4 m. The structures are located on a lower slope (975 m) covered with sparse *Araucaria* woodland. The site is divided into two groups of 7 and 8 pit houses separated by a small stream.

32. **José Maria Rodrigues (UTM 22J 525233 6932328)**: Surface site in a maize field, with scatters of flint flakes and pottery sherds. The land owner keeps a polished axe head that he collected from this field. The site is in a valley (809 m) facing the hilltop where the Reni Camargo site is located.

33. **José Varela (UTM 22J 0516870 6935938)**: A cluster of six shallow structures very close to each other. They are located in a forested slope (958 m) and measure between 3 and 5 m in diameter.

34. **Juvenil (UTM 22J 518429 6942091)**: An extensive and well preserved surface site in a maize field. The site is located on a broad ridge (817 m) overlooking the valley of one of the tributaries of the Caveiras river. Relatively large pottery sherds were found on the surface, together with many flint flakes, basalt flakes, and a complete polished axe head.

35. **Luís Carlos 1 (UTM 22J 0519716 6932693)**: A pit house associated with a large mound, located on a forested upper slope (976 m). The pit house has 8 m diameter and 2 m depth, surrounded by a broad terrace. The mound has ca. 10 m diameter and 2 m height and is surrounded by a shallow ditch.

36. **Luís Carlos 3 (UTM 22J 0519397 6932243)**: A mound and enclosure complex located on a hilltop (981 m) presently used for pasture and with a panoramic view of all the surroundings. The enclosure measures approximately 33 m in diameter, with a shallow central mound ca. 60 cm high.

37. **Luís Carlos 4 (UTM 22J 520261 6932541)**: A large pit house (14 m diameter) in a patch of woodland almost cut by a dirt road. The house, located on an uppers slope (959 m), has been used as a trash deposit. Nearby, in a pasture, we located a flat, nearly rectangular platform mound approximately 2 m high.

38. **Manno 1 (UTM 22J 0518241 6931686)**: A cluster of four pit houses and two mounds on a forested upper slope (996 m). Two of the structures are medium-sized (between 7 and 8 m diameter), associated with smaller structures between 3 and 4 m diameter. The site is located ca. 200 m from the surface site Manno 2.

39. **Manno 2 (UTM 22J 0518415 6931752)**: Surface site with lithic and ceramic scatters in a soybean field. The site is located on a slope (977 m) less than 200 m from the Manno 1 pit house site.

40. **Milton da Silva (UTM 22J 525328 6936283)**: Surface site in a maize field occupying the upper slope of a hill (854 m). Flint flakes and pottery sherds were found during field walking, but the land owner keeps a polished axe head that he had collected from the same field two months before our arrival.

41. **Moisés (UTM 22J 522096 6940401)**: Surface site in a maize field. Flint, quartz, and basalt flakes were found, as well as a unifacial basalt tool and many pottery sherds, including decorated ones. The site is in an upper slope (843 m) approximately 450 m downhill to the northeast of the Carlos Rossetto site.

42. **Pedro Oliveira 1 (UTM 22J 0521162 6936084)**: A mound and enclosure complex with 15 m diameter located on a hilltop (908 m). The site is not far from the pit houses of Baggio 1, 2 and 5.

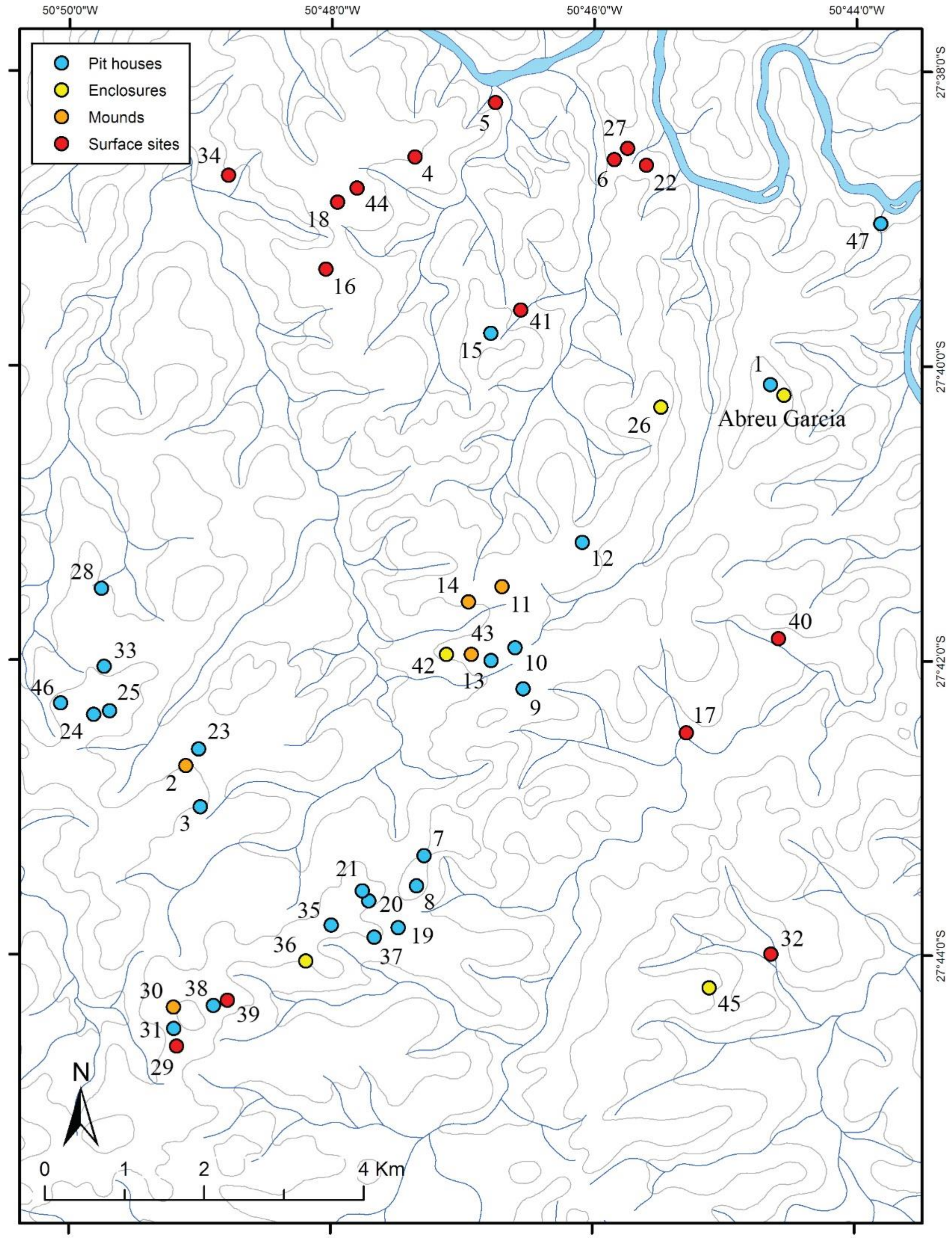
43. **Pedro Oliveira 2 (UTM 22J 0521475 6936085)**: A small, isolated mound on a hilltop (922 m) ca. 300 m from Pedro Oliveira 1.

44. **Plinio Luerce (UTM 22J 520042 6941930)**: Surface site in a maize field located on a hilltop (909 m) approximately 200 m northeast of the Clarinda site. Pottery sherds and flint flakes were found on the surface.

45. **Reni Camargo (UTM 22J 524457 6931907)**: Enclosure visible in satellite imagery. Originally it would have measured approximately 40 m in diameter. The hilltop where the structure is located (913 m) is planted with soybean, and it was very difficult to locate the enclosure. Apparently only portions of it survive in the form of elongated earthworks.

46. **Sebastião Costa (UTM 22J 0516323 6935478)**: A single pit house (6 m diameter) located on a slope (983 m) presently covered by pasture.

47. **Travessão (UTM 22J 526632 6941476)**: A tight cluster of 12 small pit houses in a forest. The site is located on a lower slope (757 m) not far from the Caveiras River. The houses were built on a terrace that was apparently previously levelled, delimited by an outer bank.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Appendix III

Artefact catalogue from Baggio 1

Ceramics

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area A	Floor 12		Wall		R	5	RS	BB
House 1	Area A	Floor 12		Wall		PO	6	P	P
House 1	Area A	Floor 12		Wall		R	7	I	P
House 1	Area A	Floor 12		Wall		R	5	N	P
House 1	Area A	Floor 12		Wall		R	6	BB	P
House 1	Area A	Floor 12	17	Wall		PO	10	E	P
House 1	Area A	Floor 12	21	Rim	12	R	5	E	E
House 1	Area A	Floor 12	22	Wall		R	5	P	P
House 1	Area A	Floor 12	22	Wall		R	4	P	P
House 1	Area A	Floor 12	23	Wall		R	6	BB	P
House 1	Area A	Floor 12	24	Wall		R	9	P	P
House 1	Area A	Floor 12	24	Wall		R	5	N	P
House 1	Area A	Floor 12	24	Wall		R	8	P	P
House 1	Area A	Floor 12	24	Wall		R	6	P	P
House 1	Area A	Floor 12	25	Wall		PO	5	P	BB
House 1	Area A	Floor 12	26	Wall		R	4	BB	BB
House 1	Area A	Floor 12	26	Wall		R	5	I	BB
House 1	Area A	Floor 12	27	Rim	18	R	9	P	P
House 1	Area A	Floor 12	52	Wall		R	6	P	RS
House 1	Area B	Floor 12		Wall		O	4	BB	E

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area B	Floor 12		Wall		PO	6	P	P
House 1	Area B	Floor 12	8	Wall		R	9	E	P
House 1	Area B	Floor 12	9	Wall		PO	5	P	P
House 1	Area B	Floor 12	10	Wall		R	5	BB	P
House 1	Area B	Floor 12	12	Wall		R	6	E	E
House 1	Area B	Floor 12	22	Wall		R	6	BB	BB
House 1	Area B	Floor 12	23	Base		R	8	E	E
House 1	Area B	Floor 12	24	Wall		R	7	P	P
House 1	Area B	Floor 12	25	Wall		R	5	BB	BB
House 1	Area B	Floor 12	26	Wall		R	5	P	P
House 1	Area B	Floor 12	30	Wall		PO	8	E	E
House 1	Area B	Floor 12	31	Wall		PO	8	E	E
House 1	Area B	Floor 12	32	Wall		R	7	P	BB
House 1	Area B	Floor 12	33	Wall		PO	8	E	E
House 1	Area B	Floor 12	34	Wall		R	4	P	P
House 1	Area B	Floor 12	35	Wall		R	5	P	BB
House 1	Area B	Floor 12	36	Wall		R	6	E	E
House 1	Area B	Floor 12	40	Wall		R	7	E	P
House 1	Area B	Floor 12	41	Wall		R	6	E	BB
House 1	Area B	Floor 12	42	Wall		R	8	BB	BB
House 1	Area B	Floor 12	44	Wall		O	10	E	RS
House 1	Area B	Floor 12	49	Wall		R	6	E	E
House 1	Area B	Floor 12	51	Wall		R	9	P	P
House 1	Area B	Floor 12	53	Wall		O	4	RS	RS
House 1	Area B	Floor 12	54	Wall		R	6	P	P
House 1	Area B	Floor 12	56	Wall		R	5	E	E
House 1	Area B	Floor 12	57	Wall		PO	10	P	BB
House 1	Area C	Floor 12		Wall		R	5	I	P
House 1	Area C	Floor 12		Wall		R	4	BB	BB
House 1	Area C	Floor 12		Wall		R	6	P	BB
House 1	Area C	Floor 12		Wall		R	8	BB	BB
House 1	Area C	Floor 12		Wall		PO	8	RS	E
House 1	Area C	Floor 12		Rim	15	R	5	BB	BB
House 1	Area C	Floor 12		Wall		PO	7	BB	BB
House 1	Area C	Floor 12		Wall		PO	10	P	P
House 1	Area C	Floor 12		Wall		O	4	PC	P
House 1	Area C	Floor 12		Wall		PO	8	RS	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area C	Floor 12		Wall		R	3	S	P
House 1	Area C	Floor 12		Wall		PO	11	E	E
House 1	Area C	Floor 12		Wall		R	8	BB	P
House 1	Area C	Floor 12		Wall		R	4	P	P
House 1	Area C	Floor 12		Wall		R	6	P	P
House 1	Area C	Floor 12		Wall		R	4	P	P
House 1	Area C	Floor 12		Wall		R	11	RS	BB
House 1	Area C	Floor 12		Wall		R	5	BB	BB
House 1	Area C	Floor 12	2	Wall		PO	13	RS	BB
House 1	Area C	Floor 12	4	Wall		R	4	P	BB
House 1	Area C	Floor 12	5	Wall		R	6	BB	BB
House 1	Area C	Floor 12	12	Wall		R	6	BB	BB
House 1	Area C	Floor 12	13	Wall		R	5	P	E
House 1	Area C	Floor 12	17	Wall		R	5	P	P
House 1	Area C	Floor 12	20	Wall		R	5	BB	BB
House 1	Area C	Floor 12	20	Wall		R	9	P	BB
House 1	Area C	Floor 12	21	Wall		PO	5	P	P
House 1	Area C	Floor 12	22	Wall		PO	5	P	BB
House 1	Area C	Floor 12	23	Wall		R	4	I	P
House 1	Area C	Floor 12	24	Wall		R	4	RS	BB
House 1	Area C	Floor 12	25	Wall		R	4	P	BB
House 1	Area C	Floor 12	28	Wall		O	5	E	E
House 1	Area C	Floor 12	29	Wall		PO	5	E	BB
House 1	Area C	Floor 12	30	Wall		PO	9	RS	BB
House 1	Area C	Floor 12	33	Wall		O	9	RS	BB
House 1	Area C	Floor 12	33	Wall		R	4	BB	BB
House 1	Area C	Floor 12	34	Wall		R	8	RS	P
House 1	Area C	Floor 12	34	Wall		O	8	RS	BB
House 1	Area A	Floor 11		Wall		PO	9	RS	BB
House 1	Area A	Floor 11	20	Wall		R	5	P	P
House 1	Area A	Floor 11	21	Wall		R	5	RS	P
House 1	Area A	Floor 11	22	Wall		R	11	P	P
House 1	Area A	Floor 11	24	Wall		PO	6	P	P
House 1	Area A	Floor 11	28	Wall		O	5	BB	BB
House 1	Area A	Floor 11	28	Wall		R	6	E	E
House 1	Area A	Floor 11	29	Wall		PO	6	PC	P
House 1	Area A	Floor 11	29	Wall		R	6	P	E

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area A	Floor 11	29	Wall		R	4	BB	P
House 1	Area A	Floor 11	32	Wall		R	5	E	E
House 1	Area A	Floor 11	32	Wall		R	5	E	E
House 1	Area A	Floor 11	33	Wall		R	6	E	BB
House 1	Area A	Floor 11	33	Wall		R	4	P	P
House 1	Area A	Floor 11	33	Wall		R	9	P	P
House 1	Area B	Floor 11	5	Wall		PO	6	E	E
House 1	Area B	Floor 11	8			PO	9	RS	P
House 1	Area B	Floor 11	13	Wall		R	10	P	P
House 1	Area B	Floor 11	30	Wall		R	4	E	P
House 1	Area B	Floor 11	54	Wall		PO	12	RS	BB
House 1	Area B	Floor 11	55	Wall		R	5	P	P
House 1	Area B	Floor 11	58	Wall		PO	5	P	P
House 1	Area B	Floor 11	60	Wall		R	7	E	E
House 1	Area B	Floor 11	61	Wall		R	7	P	P
House 1	Area B	Floor 11	63	Wall		R	6	P	P
House 1	Area B	Floor 11	63	Wall		PO	5	P	P
House 1	Area B	Floor 11	65	Wall		R	5	P	P
House 1	Area C	Floor 11	36	Wall		PO	5	P	P
House 1	Area C	Floor 11	37	Wall		R	5	E	E
House 1	Area A	Floor 10	36	Wall		R	8	E	E
House 1	Area A	Floor 10	37	Wall		R	7	P	BB
House 1	Area C	Floor 10		Wall		R	5	E	BB
House 1	Area B	Floor 9		Wall		R	4	P	P
House 1	Area B	Floor 9	17	Wall		R	3	P	P
House 1	Area B	Floor 9	18	Wall		R	8	BB	BB
House 1	Area B	Floor 9	33	Wall		R	5	BB	BB
House 1	Area B	Floor 9	36	Wall		R	6	P	P
House 1	Area C	Floor 9	39	Wall		R	5	E	E
House 1	Area A	Floor 8		Wall		R	9	RS	BB
House 1	Area A	Floor 8		Wall		R	5	P	P
House 1	Area A	Floor 8		Wall		R	4	P	P
House 1	Area A	Floor 8		Wall		O	5	P	P
House 1	Area A	Floor 8		Wall		R	6	P	P
House 1	Area A	Floor 8		Rim	12	R	6	BB	P
House 1	Area A	Floor 8	37	Wall		PO	7	E	E
House 1	Area A	Floor 8	41	Wall		R	5	BB	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area A	Floor 8	43	Wall		PO	5	S	E
House 1	Area A	Floor 8	48	Rim	32	R	7	P	P
House 1	Area A	Floor 8	49	Wall		R	5	E	E
House 1	Area A	Floor 8	51	Wall		R	6	P	P
House 1	Area A	Floor 8	51	Wall		R	5	P	P
House 1	Area A	Floor 8	52	Wall		R	8	P	P
House 1	Area A	Floor 8	56	Wall		R	7	BB	BB
House 1	Area A	Floor 8	57	Wall		PO	7	RS	E
House 1	Area A	Floor 8	58	Wall		PO	9	RS	P
House 1	Area A	Floor 8	61	Rim		R	9	P	P
House 1	Area A	Floor 8	63	Wall		R	9	RS	BB
House 1	Area A	Floor 8	65	Wall		R	8	RS	BB
House 1	Area B	Floor 8	69	Wall		R	5	P	P
House 1	Area B	Floor 8	70	Wall		R	7	P	P
House 1	Area C	Floor 8	40	Wall		PO	11	P	E
House 1	Area C	Floor 8	41	Wall		R	5	BB	BB
House 1	Area C	Floor 8	43	Rim	5	R	5	P	P
House 1	Area C	Floor 8	44	Wall		PO	13	RS	BB
House 1	Area A	Floor 7		Wall		PO	4	E	BB
House 1	Area A	Floor 7	67	Wall		R	8	BB	BB
House 1	Area A	Floor 7	68	Wall		R	7	P	P
House 1	Area A	Floor 7	69	Wall		R	6	P	P
House 1	Area A	Floor 7	77	Wall		O	5	P	P
House 1	Area A	Floor 7	78	Wall		O	5	E	BB
House 1	Area A	Floor 7	81	Wall		R	6	P	P
House 1	Area A	Floor 7	83	Wall		PO	7	RS	BB
House 1	Area A	Floor 7	84	Wall		R	9	RS	BB
House 1	Area A	Floor 7	85	Wall		R	7	P	BB
House 1	Area A	Floor 7	86	Wall		R	8	RS	P
House 1	Area A	Floor 7	86	Wall		O	5	BB	P
House 1	Area A	Floor 7	87	Wall		R	6	P	P
House 1	Area A	Floor 7	88	Wall		R	7	RS	P
House 1	Area B	Floor 7		Wall		R	7	P	P
House 1	Area B	Floor 7	22	Wall		R	6	E	E
House 1	Area B	Floor 7	71	Wall		R	6	P	BB
House 1	Area B	Floor 7	72	Wall		R	6	P	P
House 1	Area B	Floor 7	72	Wall		R	5	P	P

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area B	Floor 7	73	Wall		R	5	P	P
House 1	Area C	Floor 7		Wall		R	5	E	BB
House 1	Area C	Floor 7	46	Wall		R	8	P	P
House 1	Area C	Floor 7	47	Wall		PO	10	P	P
House 1	Area C	Floor 7	48	Wall		R	12	P	P
House 1	Area C	Floor 7	49	Wall		R	8	P	P
House 1	Area A	Floor 6		Wall		R	8	BB	P
House 1	Area A	Floor 6		Wall		R	4	P	P
House 1	Area A	Floor 6		Wall		R	4	BB	BB
House 1	Area A	Floor 6	91	Wall		PO	7	E	E
House 1	Area A	Floor 6	91	Wall		PO	5	E	BB
House 1	Area B	Floor 6		Wall		R	5	E	E
House 1	Area B	Floor 6	25	Wall		PO	10	RS	P
House 1	Area B	Floor 6	47	Wall		O	10	E	E
House 1	Area B	Floor 6	48	Wall		PO	5	BB	BB
House 1	Area C	Floor 6		Wall		PO	6	E	E
House 1	Area C	Floor 6		Wall		R	4	BB	BB
House 1	Area C	Floor 6		Wall		PO	6	P	P
House 1	Area C	Floor 6	53	Wall		PO	6	E	E
House 1	Area C	Floor 6	55	Wall		R	8	P	P
House 1	Area A	Floor 5		Wall		R	5	P	P
House 1	Area A	Floor 5		Wall		R	4	P	P
House 1	Area A	Floor 5		Rim	8	R	5	P	P
House 1	Area A	Floor 5	79	Wall		R	5	RS	BB
House 1	Area A	Floor 5	84	Wall		R	8	P	P
House 1	Area A	Floor 5	94	Wall		PO	12	RS	P
House 1	Area A	Floor 5	95	Rim	24	R	9	BB	P
House 1	Area A	Floor 5	96	Wall		R	13	RS	E
House 1	Area A	Floor 5	99	Wall		PO	5	E	E
House 1	Area A	Floor 5	99	Wall		R	8	RS	BB
House 1	Area A	Floor 5	99	Wall		R	9	BB	P
House 1	Area A	Floor 5	99	Wall		O	9	E	E
House 1	Area A	Floor 5	99	Wall		PO	10	RS	P
House 1	Area A	Floor 5	99	Wall		R	5	E	E
House 1	Area A	Floor 5	99	Wall		R	8	BB	BB
House 1	Area A	Floor 5	99	Rim	16	R	8	P	P
House 1	Area A	Floor 5	99	Rim	16	R	9	BB	P

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area A	Floor 5	100	Wall		R	7	P	P
House 1	Area A	Floor 5	101	Wall		PO	8	E	E
House 1	Area A	Floor 5	104	Wall		PO	8	RS	E
House 1	Area A	Floor 5	105	Wall		R	7	E	E
House 1	Area A	Floor 5	108	Wall		O	9	RS	P
House 1	Area A	Floor 5	109	Wall		PO	7	RS	BB
House 1	Area A	Floor 5	110	Wall		O	10	E	E
House 1	Area A	Floor 5	111	Wall		R	7	RS	BB
House 1	Area A	Floor 5	113	Wall		PO	9	E	RS
House 1	Area A	Floor 5	115	Wall		PO	10	RS	BB
House 1	Area A	Floor 5	116	Wall		R	12	P	P
House 1	Area A	Floor 5	116	Rim	20	R	9	P	P
House 1	Area A	Floor 5	117	Wall		R	9	BB	BB
House 1	Area A	Floor 5	117	Wall		R	9	BB	BB
House 1	Area A	Floor 5	118	Wall		O	10	RS	BB
House 1	Area A	Floor 5	119	Wall		PO	11	P	E
House 1	Area A	Floor 5	120	Wall		R	9	BB	RS
House 1	Area A	Floor 5	121	Wall		O	14	RS	BB
House 1	Area A	Floor 5	122	Wall		O	9	RS	P
House 1	Area A	Floor 5	123	Wall		PO	8	BB	BB
House 1	Area A	Floor 5	124	Wall		O	10	E	BB
House 1	Area A	Floor 5	125	Wall		O	9	RS	BB
House 1	Area A	Floor 5	126	Wall		PO	7	RS	BB
House 1	Area A	Floor 5	127	Wall		R	8	RS	BB
House 1	Area A	Floor 5	128	Wall		R	7	RS	BB
House 1	Area A	Floor 5	128	Wall		PO	11	RS	BB
House 1	Area A	Floor 5	129	Wall		PO	8	RS	BB
House 1	Area A	Floor 5	130	Rim	14	R	5	BB	P
House 1	Area A	Floor 5	131	Wall		R	8	P	P
House 1	Area A	Floor 5	132	Wall		R	9	P	BB
House 1	Area A	Floor 5	132	Wall		R	5	BB	BB
House 1	Area A	Floor 5	133	Wall		R	7	P	P
House 1	Area A	Floor 5	135	Wall		PO	5	E	P
House 1	Area A	Floor 5	135	Wall		PO	12	RS	P
House 1	Area A	Floor 5	137	Wall		PO	10	RS	BB
House 1	Area A	Floor 5	139	Rim	30	R	8	P	P
House 1	Area A	Floor 5	141	Wall		R	5	P	P

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area A	Floor 5	142	Rim	14	R	6	BB	BB
House 1	Area A	Floor 5	143	Wall		R	9	RS	BB
House 1	Area A	Floor 5	144	Wall		R	9	P	E
House 1	Area A	Floor 5	145	Rim	24	R	10	P	P
House 1	Area A	Floor 5	146	Wall		R	10	RS	BB
House 1	Area A	Floor 5	147	Wall		R	10	E	P
House 1	Area A	Floor 5	148	Wall		R	8	E	E
House 1	Area A	Floor 5	149	Wall		PO	4	PT	BB
House 1	Area A	Floor 5	150	Wall		R	11	RS	BB
House 1	Area A	Floor 5	151	Wall		PO	5	PT	BB
House 1	Area A	Floor 5	152	Rim	10	R	5	BB	BB
House 1	Area A	Floor 5	153	Wall		R	8	E	P
House 1	Area A	Floor 5	154	Wall		O	12	E	BB
House 1	Area A	Floor 5	154	Rim	14	R	5	P	P
House 1	Area A	Floor 5	154	Rim	14	R	5	E	E
House 1	Area A	Floor 5	155	Wall		R	7	E	E
House 1	Area A	Floor 5	156	Wall		PO	13	E	E
House 1	Area A	Floor 5	156	Wall		PO	8	E	E
House 1	Area B	Floor 5		Wall		PO	7	E	BB
House 1	Area B	Floor 5		Wall		R	5	E	E
House 1	Area B	Floor 5		Wall		R	9	RS	BB
House 1	Area B	Floor 5	34	Wall		R	6	P	P
House 1	Area B	Floor 5	35	Wall		R	8	BB	BB
House 1	Area B	Floor 5	36	Wall		R	6	BB	P
House 1	Area B	Floor 5	38	Wall		R	6	BB	BB
House 1	Area B	Floor 5	39	Wall		R	9	E	E
House 1	Area B	Floor 5	40	Wall		R	9	P	P
House 1	Area B	Floor 5	41	Base		R	16	BB	BB
House 1	Area B	Floor 5	43	Wall		R	9	BB	BB
House 1	Area B	Floor 5	45	Wall		R	9	P	BB
House 1	Area B	Floor 5	46	Wall		R	7	BB	BB
House 1	Area B	Floor 5	47	Wall		R	8	BB	BB
House 1	Area B	Floor 5	48	Wall		R	9	BB	BB
House 1	Area B	Floor 5	50	Wall		R	6	P	RS
House 1	Area B	Floor 5	51	Wall		R	7	P	BB
House 1	Area B	Floor 5	51	Wall		R	7	P	BB
House 1	Area B	Floor 5	52	Wall		R	8	P	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area B	Floor 5	53	Wall		R	9	BB	E
House 1	Area B	Floor 5	53	Wall		R	9	RS	BB
House 1	Area B	Floor 5	53	Wall		R	8	BB	P
House 1	Area B	Floor 5	54	Wall		PO	8	RS	BB
House 1	Area B	Floor 5	54	Wall		R	9	BB	P
House 1	Area B	Floor 5	55	Wall		R	10	RS	BB
House 1	Area B	Floor 5	56	Wall		PO	15	RS	BB
House 1	Area B	Floor 5	56	Wall		R	10	P	P
House 1	Area B	Floor 5	57	Wall		O	8	RS	P
House 1	Area B	Floor 5	57	Wall		R	10	BB	P
House 1	Area B	Floor 5	57	Rim		R	10	E	E
House 1	Area B	Floor 5	76	Wall		R	5	BB	BB
House 1	Area B	Floor 5	77	Wall		R	10	P	P
House 1	Area B	Floor 5	78	Wall		R	5	P	BB
House 1	Area B	Floor 5	79	Wall		R	6	P	BB
House 1	Area B	Floor 5	80	Wall		PO	6	RS	E
House 1	Area B	Floor 5	88	Wall		R	10	BB	P
House 1	Area B	Floor 5	91	Wall		R	6	BB	BB
House 1	Area B	Floor 5	100	Wall		R	7	BB	BB
House 1	Area C	Floor 5		Rim		R	7	BB	P
House 1	Area C	Floor 5		Wall	28	R	7	E	P
House 1	Area C	Floor 5		Wall		R	7	P	BB
House 1	Area C	Floor 5		Wall		R	8	E	BB
House 1	Area C	Floor 5		Wall		R	8	E	P
House 1	Area C	Floor 5		Wall		R	7	P	BB
House 1	Area C	Floor 5		Wall		R	8	BB	P
House 1	Area C	Floor 5		Wall		R	8	BB	P
House 1	Area C	Floor 5		Wall		R	7	BB	P
House 1	Area C	Floor 5		Wall		R	7	P	P
House 1	Area C	Floor 5		Wall		R	7	E	P
House 1	Area C	Floor 5		Wall		R	7	BB	BB
House 1	Area C	Floor 5		Rim	26	R	6	P	BB
House 1	Area C	Floor 5		Wall		R	7	E	P
House 1	Area C	Floor 5		Wall		R	7	E	P
House 1	Area C	Floor 5		Wall		R	7	E	P
House 1	Area C	Floor 5		Wall		R	7	E	P
House 1	Area C	Floor 5		Wall		R	8	P	P

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area C	Floor 5		Wall		R	8	P	P
House 1	Area C	Floor 5	57	Wall		R	6	E	E
House 1	Area C	Floor 5	58	Wall		PO	6	BB	P
House 1	Area C	Floor 5	60	Wall		R	8	RS	BB
House 1	Area C	Floor 5	60	Wall		R	9	P	P
House 1	Area C	Floor 5	62	Wall		R	5	BB	BB
House 1	Area C	Floor 5	63	Wall		PO	6	P	P
House 1	Area C	Floor 5	64	Wall		R	7	E	BB
House 1	Area C	Floor 5	65	Wall		R	9	P	BB
House 1	Area C	Floor 5	65	Wall		R	8	P	BB
House 1	Area C	Floor 5	65	Wall		R	8	P	BB
House 1	Area C	Floor 5	67	Wall		R	8	P	P
House 1	Area C	Floor 5	67	Wall		R	7	P	P
House 1	Area C	Floor 5	69	Wall		R	8	P	P
House 1	Area C	Floor 5	70	Rim		R	8	BB	P
House 1	Area C	Floor 5	71	Wall		R	8	BB	P
House 1	Area C	Floor 5	71	Wall		R	7	BB	P
House 1	Area C	Floor 5	71	Wall		PO	8	E	P
House 1	Area C	Floor 5	73	Wall		R	8	BB	BB
House 1	Area C	Floor 5	73	Wall		R	8	BB	BB
House 1	Area C	Floor 5	73	Wall		R	8	BB	BB
House 1	Area A	Floor 4		Wall		R	5	BB	BB
House 1	Area A	Floor 4	157	Rim	16	R	4	BB	BB
House 1	Area A	Floor 4	158	Wall		PO	9	RS	P
House 1	Area A	Floor 4	159	Wall		R	9	BB	BB
House 1	Area A	Floor 4	160	Wall		R	11	RS	P
House 1	Area A	Floor 4	161	Wall		R	5	BB	BB
House 1	Area A	Floor 4	163	Wall		R	5	BB	P
House 1	Area A	Floor 4	164	Wall		R	8	P	BB
House 1	Area A	Floor 4	168	Wall		PO	5	BB	BB
House 1	Area A	Floor 4	169	Wall		R	10	E	E
House 1	Area A	Floor 4	171	Wall		R	5	P	P
House 1	Area A	Floor 4	172	Wall		R	5	P	P
House 1	Area A	Floor 4	173	Rim	10	R	5	P	P
House 1	Area A	Floor 4	174	Wall		R	6	E	E
House 1	Area A	Floor 4	177	Wall		PO	13	RS	E
House 1	Area A	Floor 4	178	Wall		R	9	RS	P

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area A	Floor 4	179	Wall		R	5	BB	BB
House 1	Area A	Floor 4	179	Wall		R	6	BB	BB
House 1	Area A	Floor 4	180	Base		PO	6	RS	BB
House 1	Area A	Floor 4	181	Rim	12	R	5	BB	BB
House 1	Area A	Floor 4	186	Wall		R	6	BB	BB
House 1	Area A	Floor 4	187	Wall		R	10	BB	E
House 1	Area A	Floor 4	189	Wall		R	7	BB	BB
House 1	Area A	Floor 4	190	Wall		R	8	RS	P
House 1	Area A	Floor 4	191	Wall		R	6	P	P
House 1	Area A	Floor 4	192	Wall		PO	5	RS	BB
House 1	Area A	Floor 4	193	Rim	11	R	4	BB	P
House 1	Area A	Floor 4	194	Wall		PO	7	P	P
House 1	Area A	Floor 4	195	Wall		O	13	E	E
House 1	Area A	Floor 4	196	Wall		R	6	P	BB
House 1	Area A	Floor 4	197	Wall		R	9	BB	BB
House 1	Area A	Floor 4	198	Wall		PO	8	RS	BB
House 1	Area A	Floor 4	206	Wall		R	8	P	BB
House 1	Area A	Floor 4	207	Wall		R	8	P	BB
House 1	Area A	Floor 4	208	Wall		R	9	BB	BB
House 1	Area A	Floor 4	209	Wall		R	6	BB	P
House 1	Area A	Floor 4	209	Wall		O	6	RS	BB
House 1	Area A	Floor 4	209	Wall		R	6	BB	BB
House 1	Area A	Floor 4	210	Wall		R	6	E	BB
House 1	Area A	Floor 4	211	Wall		R	6	P	BB
House 1	Area A	Floor 4	212	Wall		R	8	BB	BB
House 1	Area A	Floor 4	213	Wall		R	5	E	E
House 1	Area A	Floor 4	214	Wall		R	7	P	P
House 1	Area A	Floor 4	216	Wall		R	5	P	BB
House 1	Area A	Floor 4	218	Rim	20	O	7	BB	BB
House 1	Area A	Floor 4	219	Wall		R	6	P	BB
House 1	Area B	Floor 4		Wall		R	5	BB	BB
House 1	Area B	Floor 4		Wall		R	5	P	BB
House 1	Area B	Floor 4		Wall		R	4	BB	BB
House 1	Area B	Floor 4	55	Wall		R	14	RS	BB
House 1	Area B	Floor 4	57	Wall		R	5	BB	P
House 1	Area B	Floor 4	58	Wall		R	5	E	E
House 1	Area B	Floor 4	58	Wall		R	6	RS	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area B	Floor 4	59	Wall		R	8	P	P
House 1	Area B	Floor 4	60	Wall		R	7	RS	BB
House 1	Area B	Floor 4	61	Wall		R	6	P	P
House 1	Area B	Floor 4	62	Wall		R	5	BB	BB
House 1	Area B	Floor 4	63	Wall		R	6	BB	E
House 1	Area B	Floor 4	64	Wall		R	7	BB	BB
House 1	Area B	Floor 4	65	Wall		R	8	BB	BB
House 1	Area B	Floor 4	66	Wall		R	8	BB	BB
House 1	Area B	Floor 4	67	Wall		R	8	E	P
House 1	Area B	Floor 4	82	Wall		PO	8	RS	BB
House 1	Area B	Floor 4	82	Wall		R	10	P	P
House 1	Area B	Floor 4	83	Wall		R	7	BB	BB
House 1	Area B	Floor 4	84	Wall		R	6	N	BB
House 1	Area B	Floor 4	87	Base		R	4	BB	BB
House 1	Area B	Floor 4	89	Wall		R	7	PC	BB
House 1	Area B	Floor 4	92	Wall		R	8	P	BB
House 1	Area B	Floor 4	97	Wall		R	5	E	E
House 1	Area B	Floor 4	97	Wall		R	6	BB	BB
House 1	Area B	Floor 4	98	Wall		R	6	E	E
House 1	Area B	Floor 4	99	Wall		R	6	E	E
House 1	Area B	Floor 4	100	Wall		R	7	I	E
House 1	Area B	Floor 4	101	Wall		R	9	P	P
House 1	Area B	Floor 4	102	Wall		R	6	BB	BB
House 1	Area B	Floor 4	103	Wall		PO	16	RS	E
House 1	Area B	Floor 4	106	Base		R	4	BB	BB
House 1	Area B	Floor 4	108	Wall		R	4	BB	BB
House 1	Area B	Floor 4	111	Wall		R	4	BB	BB
House 1	Area A	Floor 3		Wall		R	8	P	P
House 1	Area A	Floor 3		Wall		PO	13	E	E
House 1	Area A	Floor 3		Wall		PO	7	P	BB
House 1	Area A	Floor 3		Wall		R	12	BB	P
House 1	Area A	Floor 3		Rim	26	O	9	RS	RS
House 1	Area A	Floor 3		Wall		R	3	PT	P
House 1	Area A	Floor 3		Wall		R	7	BB	BB
House 1	Area A	Floor 3		Wall		R	7	P	BB
House 1	Area A	Floor 3	199	Rim	20	R	9	P	P
House 1	Area A	Floor 3	200	Wall		O	8	E	E

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area A	Floor 3	201	Wall		O	6	P	E
House 1	Area A	Floor 3	202	Wall		R	4	BB	BB
House 1	Area A	Floor 3	204	Wall		R	5	BB	P
House 1	Area A	Floor 3	220	Wall		R	4	I	P
House 1	Area A	Floor 3	221	Rim	5	R	4	N	E
House 1	Area A	Floor 3	222	Base		R	8	BB	BB
House 1	Area A	Floor 3	223	Rim	12	R	4	BB	P
House 1	Area A	Floor 3	224	Wall		R	8	RS	BB
House 1	Area A	Floor 3	224	Rim		R	6	BB	BB
House 1	Area A	Floor 3	226	Rim	19	R	6	P	P
House 1	Area A	Floor 3	226	Rim	20	PO	5	BB	P
House 1	Area A	Floor 3	228	Rim		R	7	E	E
House 1	Area A	Floor 3	230	Wall		R	7	BB	BB
House 1	Area A	Floor 3	231	Wall		R	13	P	BB
House 1	Area A	Floor 3	233	Wall		O	12	E	E
House 1	Area A	Floor 3	233	Rim	10	R	5	E	P
House 1	Area A	Floor 3	235	Rim	15	R	5	BB	E
House 1	Area A	Floor 3	236	Wall		R	7	P	BB
House 1	Area A	Floor 3	237	Wall		R	5	P	BB
House 1	Area A	Floor 3	238	Wall		PO	10	RS	BB
House 1	Area A	Floor 3	239	Wall		R	13	P	BB
House 1	Area A	Floor 3	239	Wall		R	9	RS	P
House 1	Area A	Floor 3	240	Wall		R	5	P	P
House 1	Area A	Floor 3	241	Rim	28	R	9	BB	E
House 1	Area A	Floor 3	245	Wall		R	7	P	P
House 1	Area A	Floor 3	251	Wall		PO	8	RS	BB
House 1	Area A	Floor 3	253	Wall		R	15	BB	P
House 1	Area A	Floor 3	254	Wall		R	8	BB	P
House 1	Area A	Floor 3	255	Wall		R	6	BB	BB
House 1	Area A	Floor 3	255	Rim	28	R	9	BB	P
House 1	Area A	Floor 3	256	Wall		R	5	I	BB
House 1	Area A	Floor 3	257	Wall		PO	12	RS	P
House 1	Area C	Floor 3		Rim		R	9	E	BB
House 1	Area B	Floor 3	203	Wall		O	9	RS	E
House 1	Area B	Floor 3	207	Wall		R	7	BB	E
House 1	Area B	Floor 3	208	Wall		PO	5	I	E
House 1	Area B	Floor 3	209	Wall		PO	5	P	E

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area B	Floor 3	210	Wall		R	10	RS	E
House 1	Area B	Floor 3	212	Wall		R	9	BB	E
House 1	Area B	Floor 3	214	Wall		PO	9	RS	E
House 1	Area B	Floor 3	218	Wall		R	9	P	E
House 1	Area B	Floor 3	219	Wall		PO	10	RS	E
House 1	Area B	Floor 3	223	Wall		R	6	P	E
House 1	Area B	Floor 3	224	Rim	24	R	5	I	E
House 1	Area B	Floor 3	225	Wall		R	5	S	E
House 1	Area B	Floor 3	226	Wall		R	11	RS	E
House 1	Area B	Floor 3	227	Wall		R	6	RS	E
House 1	Area B	Floor 3	235	Wall		PO	8	RS	E
House 1	Area B	Floor 3	236	Wall		R	6	P	E
House 1	Area B	Floor 3	239	Wall		R	9	E	E
House 1	Area B	Floor 3	240	Wall		R	5	BB	E
House 1	Area B	Floor 3	241	Wall		O	8	RS	E
House 1	Area B	Floor 3	242	Rim		R	7	BB	E
House 1	Area B	Floor 3	242	Wall		R	4	BB	E
House 1	Area B	Floor 3	243	Wall		R	5	S	E
House 1	Area B	Floor 3	244	Wall		R	7	P	E
House 1	Area B	Floor 3	245	Wall		R	9	RS	E
House 1	Area B	Floor 2	246	Wall		PO	11	RS	BB
House 1	Area B	Floor 2	247	Wall		R	10	BB	BB
House 1	Area B	Floor 2	248	Rim		R	6	BB	BB
House 1	Area B	Floor 2	249	Wall		R	11	P	BB
House 1	Area B	Floor 2	250	Wall		R	8	E	E
House 1	Area B	Floor 2	254	Wall		PO	11	E	BB
House 1	Area A	Floor 2	258	Wall		R	5	P	BB
House 1	Area A	Floor 2	259	Rim	30	R	11	BB	BB
House 1	Area A	Floor 2	259	Rim		R	5	P	P
House 1	Area B	Floor 2	269	Wall		R	9	P	BB
House 1	Area B	Floor 2	270	Wall		R	4	PC	BB
House 1	Area B	Floor 2	274	Wall		PO	9	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	279	Wall		PO	15	RS	BB
House 1	Area B	Floor 2	280	Wall		R	12	BB	BB
House 1	Area B	Floor 2	281	Wall		R	11	P	P
House 1	Area A	Floor 1		Wall		R	7	PT	BB
House 1	Area A	Floor 1	260	Wall		R	8	S	BB
House 1	Area A	Floor 1	263	Wall		PO	5	P	BB
House 1	Area A	Floor 1	264	Wall		PO	7	P	BB
House 1	Area B	Floor 1	300	Wall		R	6	E	E
House 1	Area B	Floor 1	301	Wall		PO	8	E	E
House 1	Area B	Floor 1	302	Base		R	5	BB	E
House 1	Area B	Floor 1	303	Wall		R	8	BB	BB
House 1	Area B	Floor 1	304	Wall		R	6	BB	BB
House 1	Area B	Floor 1	305	Wall		R	10	E	BB
House 1	Area B	Floor 1	306	Wall		R	7	P	BB
House 1	Area B	Floor 1	311	Wall		R	6	BB	BB
House 1	Area B	Floor 1	313	Wall		R	7	S	BB
House 1	Area B	Floor 1	314	Wall		R	5	E	BB
House 1	Area B	Floor 1	315	Wall		R	7	P	BB
House 1	Area B	Floor 1	316	Wall		R	5	E	BB
House 1	Area C	Floor 1		Wall		R	6	RS	E
House 2		Floor 4	1	Wall		R	9	BB	P
House 2		Floor 4	2	Wall		PO	10	E	P
House 2		Floor 4	2	Wall		PO	6	RS	P
House 2		Floor 4	3	Wall		PO	10	E	E
House 2		Floor 4	3	Wall		PO	6	RS	E
House 2		Floor 4	4	Wall		R	9	P	BB
House 2		Floor 4	4	Wall		O	7	E	E
House 2		Floor 4	5	Wall		R	5	P	P
House 2		Floor 4	5	Wall		R	6	P	P
House 2		Floor 3	6	Rim		R	6	BB	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 2		Floor 3	7	Wall		R	9	P	P
House 2		Floor 3	8	Wall		PO	9	P	P
House 2		Floor 3	8	Wall		PO	5	E	E
House 2		Floor 3	10	Wall		R	8	E	E
House 2		Floor 3	11	Wall		R	7	BB	P
House 2		Floor 3	12	Wall		R	6	PC	BB
House 2		Floor 3	13	Wall		R	7	P	P
House 2		Floor 2		Wall		R	5	E	E
House 2		Floor 2		Wall		R	4	I	BB
House 2		Floor 2		Wall		R	4	BB	BB
House 2		Floor 2		Wall		R	8	E	BB
House 2		Floor 2		Wall		R	5	BB	BB
House 2		Floor 2		Rim	28	R	10	P	BB
House 2		Floor 2	1	Wall		R	7	P	P
House 2		Floor 2	3	Wall		PO	9	RS	BB
House 2		Floor 2	6	Wall		PO	9	RS	BB
House 2		Floor 2	7	Rim		PO	5	E	E
House 2		Floor 2	8	Wall		R	6	P	E
House 2		Floor 2	9	Wall		O	7	E	E
House 2		Floor 2	12	Wall		R	6	P	P
House 2		Floor 2	12	Wall		R	4	BB	BB
House 2		Floor 2	13	Wall		R	7	E	E
House 2		Floor 2	13	Wall		R	9	BB	BB
House 2		Floor 2	14	Wall		PO	10	E	P
House 2		Floor 2	14	Wall		R	6	P	P
House 2		Floor 2	14	Rim		R	7	P	P
House 2		Floor 2	15	Wall		R	6	E	E
House 2		Floor 2	16	Wall		R	8	E	BB
House 2		Floor 2	16	Wall		R	7	P	P
House 2		Floor 2	17	Wall		R	7	P	BB
House 2		Floor 2	18	Wall		R	6	RS	P
House 2		Floor 2	19	Wall		R	5	P	P
House 2		Floor 2	19	Wall		O	5	E	E
House 2		Floor 2	20	Wall		R	4	E	E
House 2		Floor 2	20	Wall		PO	7	E	E
House 2		Floor 2	20	Wall		R	10	BB	BB
House 2		Floor 2	21	Wall		R	3	E	E

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 2		Floor 2	22	Wall		R	9	BB	P
House 2		Floor 2	23	Wall		R	6	E	E
House 2		Floor 2	24	Wall		PO	5	E	E
House 2		Floor 2	24	Wall		R	5	P	BB
House 2		Floor 2	25	Wall		PO	10	P	BB
House 2		Floor 2	25	Wall		R	7	P	P
House 2		Floor 2	26	Wall		R	8	P	P
House 2		Floor 2	27	Rim	14	R	6	BB	BB
House 2		Floor 2	28	Rim	26	R	9	BB	P
House 2		Floor 2	28	Wall		PO	5	E	E
House 2		Floor 2	29	Wall		PO	5	E	E
House 2		Floor 2	30	Wall		PO	6	E	E
House 2		Floor 2	31	Wall		R	9	P	P
House 2		Floor 2	33	Wall		R	8	P	E
House 2		Floor 2	34	Wall		R	9	BB	BB
House 2		Floor 2	36	Rim	12	R	4	BB	BB
House 2		Floor 2	37	Rim	28	R	8	BB	P
House 2		Floor 2	38	Wall		PO	10	P	BB
House 2		Floor 2	40	Wall		R	9	P	BB
House 2		Floor 2	41	Wall		R	5	I	BB
House 2		Floor 2	42	Wall		PO	5	E	BB
House 2		Floor 2	43	Wall		PO	9	RS	P
House 2		Floor 2	44	Wall		O	4	E	E
House 2		Floor 1		Wall		PO	5	BB	BB
House 2		Floor 1		Wall		R	8	RS	BB
House 2		Floor 1		Wall		O	10	RS	BB
House 2		Floor 1		Wall		PO	4	BB	P
House 2		Floor 1		Wall		PO	4	RS	RS
House 2		Floor 1		Wall		R	5	P	RS
House 2		Floor 1		Wall		PO	5	BB	BB
House 2		Floor 1		Wall		R	10	BB	BB
House 2		Floor 1		Wall		R	5	P	BB
House 2		Floor 1		Wall		R	6	BB	E
House 2		Floor 1	45	Wall		R	9	P	BB
House 2		Floor 1	48	Wall		R	6	P	BB
House 2		Floor 1	49	Wall		R	8	BB	BB
House 2		Floor 1	51	Rim	26	R	11	BB	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 2		Floor 1	70	Wall		R	8	BB	BB
House 2		Floor 1	71	Wall		R	7	P	BB
House 2		Floor 1	72	Wall		O	6	RS	P
House 2		Floor 1	73	Wall		R	9	P	BB
House 2		Floor 1	74	Wall		R	7	P	BB
House 2		Floor 1	75	Wall		R	6	P	BB
House 2		Floor 1	76	Wall		R	9	BB	P
House 2		Floor 1	77	Rim	20	R	5	P	P
House 2		Floor 1	78	Wall		R	5	E	E
House 2		Floor 1	79	Wall		O	5	BB	RS
House 2		Floor 1	80	Rim	12	O	4	BB	P
House 2		Floor 1	81	Wall		O	10	RS	P
House 2		Floor 1	82	Wall		R	5	P	BB
House 2		Floor 1	83	Wall		R	4	E	RS
House 2		Floor 1	84	Wall		R	5	P	BB
House 3		Floor 5		Wall		PO	12	E	P
House 3		Floor 5		Wall		R	7	P	RS
House 3		Floor 5		Rim		R	4	P	RS
House 3		Floor 4		Wall		PO	7	E	P
House 3		Floor 3		Wall		PO	3	E	BB
House 3		Floor 1		Wall		PO	7	BB	BB
House 3		Floor 1		Wall		R	4	P	P
House 3		Floor 1		Wall		R	4	BB	P
House 3		Floor 1		Wall		R	5	E	P
House 3		Floor 1		Wall		R	5	P	P
House 3		Floor 1		Wall		R	10	P	BB
House 3		Floor 1		Wall		PO	10	BB	BB
House 3		Floor 1		Wall		O	8	E	BB
House 3		Floor 1		Wall		PO	9	BB	P
House 3		Floor 10		Rim	16	R	5	P	P
House 3		Floor 10		Wall		R	9	BB	P
House 3		Floor 10		Wall		R	9	BB	P
House 3		Floor 10		Wall		PO	6	P	BB
House 3		Floor 8		Wall		PO	5	E	E
House 3		Floor 8		Wall		PO	7	RS	BB
House 3		Floor 8		Wall		PO	7	P	P
House 3		Floor 8		Wall		PO	6	P	P

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
House 3		Floor 8		Wall		PO	6	E	P
House 3		Floor 8		Wall		R	6	BB	BB
House 3		Floor 7		Wall		PO	3	E	BB
House 3		Floor 6		Wall		R	6	BB	BB
House 3		Floor 6		Wall		PO	4	RS	BB
House 3		Floor 6		Wall		PO	5	E	BB
House 3		Floor 6		Wall		PO	5	E	BB
Mound A		Level 1		Wall		R	9	P	E
Mound A		Level 1		Wall		R	5	P	P
Mound A		Level 1		Wall		R	4	BB	BB
Mound A		Level 1		Wall		R	5	P	P
Mound A		Level 1		Wall		R	5	BB	BB
Mound A		Level 1		Wall		PO	3	P	P
Mound A		Level 1		Wall		R	4	E	E
Mound A		Level 1		Wall		R	5	E	E
Mound A		Level 1		Rim	20	R	6	BB	BB
Mound A		Level 1		Rim	11	R	6	P	BB
Mound A		Level 1		Rim		R	4	BB	BB
Mound A		Level 1		Rim	10	PO	4	BB	BB
Mound A		Level 1		Rim		R	4	P	P
Mound A		Level 1		Wall		O	5	I	BB
Mound A		Level 1		Wall		R	4	BB	BB
Mound A		Level 1		Wall		R	4	BB	P
Mound A		Level 1		Wall		R	4	BB	BB
Mound A		Level 1		Wall		R	9	BB	P
Mound A		Level 1		Wall		R	5	P	P
Mound A		Level 1		Rim		R	4	P	P
Mound A		Level 1		Wall		R	5	P	P
Mound A		Level 1		Wall		PO	6	P	P
Mound A		Level 1		Wall		PO	5	P	BB
Mound A		Level 1		Wall		O	5	E	E
Mound A		Level 1		Wall		PO	9	P	RS
Mound A		Level 1		Wall		R	6	BB	BB
Mound A		Level 1		Wall		R	5	BB	BB
Mound A		Level 1		Wall		O	4	P	BB
Mound A		Level 1		Wall		PO	4	BB	BB
Mound A		Level 1		Wall		PO	5	BB	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
Mound A		Level 1		Wall		PO	5	BB	BB
Mound A		Level 1		Wall		PO	4	BB	BB
Mound A		Level 1		Wall		PO	4	BB	BB
Mound A		Level 1		Wall		PO	4	BB	BB
Mound A		Level 1		Wall		PO	5	BB	BB
Mound A		Level 1		Wall		PO	5	BB	BB
Mound A		Level 1		Wall		PO	5	BB	BB
Mound A		Level 1		Wall		PO	5	BB	BB
Mound A		Level 1		Wall		PO	5	BB	BB
Mound A		Level 1		Wall		PO	5	BB	BB
Mound A		Level 1		Wall		PO	4	P	BB
Mound A		Level 1		Wall		PO	5	BB	BB
Mound A		Level 1		Wall		R	4	P	P
Mound A		Level 1		Wall		PO	4	BB	BB
Mound A		Level 1		Wall		PO	4	P	BB
Mound A		Level 1		Wall		PO	5	P	BB
Mound A		Level 1		Rim	16	PO	5	BB	BB
Mound A		Level 1		Rim	18	R	5	BB	BB
Mound B		Level 2		Wall		PO	7	BB	BB
Mound B		Level 2		Wall		PO	7	BB	BB
Mound B		Level 2		Wall		PO	7	E	E
Mound B		Level 2		Wall		R	6	E	E
Mound B		Level 2		Wall		PO	7	P	BB
Mound B		Level 2		Wall		PO	7	P	BB
Mound B		Level 2		Wall		R	7	PC	BB
Mound B		Level 2		Wall		PO	6	P	BB
Mound B		Level 2		Wall		R	6	E	E
Mound B		Level 2		Wall		R	6	E	E
Mound B		Level 2		Rim		PO	7	E	E
Mound B		Level 2		Wall		PO	7	E	E
Mound B		Level 2		Wall		PO	5	E	E
Mound B		Level 2		Wall		R	5	BB	E
Mound B		Level 2		Wall		R	4	BB	E
Mound B		Level 1		Wall		R	4	E	E
Mound B		Level 1		Wall		R	4	P	BB
Mound B		Level 1		Wall		PO	7	P	BB
Mound B		Level 1		Wall		PO	8	P	BB

Structure	Unit	Stratum	Find #	Class	Rim Ø (cm)	Burning	Thickness (mm)	Ext. surface	Int. surface
Mound B		Level 1		Wall		PO	7	P	E
Mound B		Level 1		Wall		PO	8	P	BB
Mound B		Level 1		Wall		PO	8	P	P
Mound B		Level 1		Wall		PO	8	P	BB
Mound B		Level 1		Wall		PO	7	P	BB
Mound B		Level 1		Wall		R	4	P	P
Mound B		Level 1		Wall		PO	7	P	BB
Mound B		Level 1		Wall		PO	7	P	BB
Mound B		Level 1		Wall		PO	7	P	BB
Mound B		Level 1		Wall		PO	7	P	E
House 11		Floor 4		Wall		R	5	P	P
House 11		Floor 1		Wall		PO	8	E	P

Abbreviations used: 1) For burning atmosphere: R = Reduced, O = Oxidised, PO = Partly oxidised; 2) For surface treatment: P = Polished, BB = Black burnished, RS = Red slipped, I = Incised, N = Nail impressed, S = Stamped, PT = Punctate, PC = Pinched, E = Eroded.

Lithics

Structure	Unit	Stratum	Find #	Class	Raw material	Modifications	Qt. cortex	Dimensions (cm)
House 1	Area A	Floor 12	16	Flake	Quartz	Retouch	< 50%	3 x 1.4
House 1	Area A	Floor 12	18	Core	Basalt		< 50%	12.3 x 13.4 x 10.2
House 1	Area A	Floor 12	20	Flake	Quartz		> 50%	1.6 x 1.6
House 1	Area B	Floor 12		Flake	Quartz		0%	1.1 x 0.9
House 1	Area B	Floor 12	19	Flake	Chert	Use wear	< 50%	2.2 x 2
House 1	Area B	Floor 12	21	Flake	Chert		< 50%	2 x 2
House 1	Area B	Floor 12	28	Flake	Chert		0%	2.6 x 1.5
House 1	Area B	Floor 12	36	Uniface	Basalt	Retouch	0%	8 x 7.9 x 4.2
House 1	Area B	Floor 12	38	Debris	Chert		0%	
House 1	Area B	Floor 12	39	Flake	Quartz		< 50%	1 x 0.9
House 1	Area B	Floor 12	39	Debris	Basalt		0%	
House 1	Area B	Floor 12	46	Flake	Basalt		< 50%	9.8 x 7
House 1	Area B	Floor 12	55	Flake	Chert		0%	4.4 x 2.7
House 1	Trench 1	Floor 12		Quartz	Flake		< 50%	1.1 x 1 x 0.6
House 1	Area C	Floor 12	3	Chert	Flake		0%	2.5 x 2 x 0.3
House 1	Area C	Floor 12	8	Quartz	Flake		0%	1.6 x 1.4 x 0.3
House 1	Area C	Floor 12	18	Chert	Debris		0%	
House 1	Area C	Floor 12	19	Quartz	Flake		< 50%	2.3 x 1.5 x 0.5
House 1	Area C	Floor 12	26	Chert	Core		0%	4.4 x 2.5 x 2
House 1	Area C	Floor 12	31	Chert	Core		< 50%	2.9 x 2.7 x 1.5
House 1	Area C	Floor 12	32	Basalt	Flake		0%	7.9 x 11.5 x 1.5
House 1	Area A	Floor 11	28	Flake	Quartz		> 50%	1.4 x 0.7
House 1	Area A	Floor 11	29	Flake	Basalt	Retouch	0%	7.3 x 5.1
House 1	Area A	Floor 11	30	Flake	Basalt		> 50%	4.5 x 4
House 1	Area A	Floor 11	30	Flake	Chert		< 50%	2.6 x 2.6
House 1	Area B	Floor 11		Debris	Quartz		< 50%	
House 1	Area B	Floor 11	51	Flake	Quartz	Use wear	0%	2 x 1.2
House 1	Area C	Floor 11	38	Quartz	Flake	Use wear	0%	1.7 x 1 x 0.4
House 1	Area C	Floor 11	42	Basalt	Flake		< 50%	9.3 x 6.3 x 1.8
House 1	Area C	Floor 11	45	Basalt	Flake		0%	2 x 2.6 x 0.5
House 1	Area A	Floor 10		Debris	Quartz		< 50%	
House 1	Area A	Floor 9	42	Flake	Chert		0%	2.3 x 1.9
House 1	Area A	Floor 8		Flake	Chert	Retouch	0%	3.5 x 2.9
House 1	Area A	Floor 8		Flake	Chert		0%	2 x 1
House 1	Area A	Floor 8	55	Flake	Quartz	Use wear	> 50%	3 x 1.9
House 1	Area A	Floor 8	60	Flake	Basalt	Retouch	0%	6.7 x 4.2

Structure	Unit	Stratum	Find #	Class	Raw material	Modifications	Qt. cortex	Dimensions (cm)
House 1	Area A	Floor 8	64	Flake	Basalt	Use wear	0%	8.1 x 7.7
House 1	Area A	Floor 8	80	Flake	Quartz		< 50%	3.2 x 1.6
House 1	Area B	Floor 8	71	Flake	Basalt		0%	3 x 3.2
House 1	Area C	Floor 8		Quartz	Flake		0%	1.1 x 0.8 x 0.3
House 1	Area A	Floor 7		Flake	Quartz		> 50%	1.9 x 1.3
House 1	Area A	Floor 7		Flake	Chert		0%	2.2 x 1.5
House 1	Area A	Floor 7		Flake	Basalt		0%	4.6 x 4.8
House 1	Area A	Floor 7	66	Flake	Quartz		< 50%	1.4 x 1.3
House 1	Area A	Floor 7	74	Flake	Quartz	Retouch	0%	2.1 x 1.2
House 1	Area A	Floor 7	76	Debris	Chert		0%	
House 1	Area A	Floor 7	82	Flake	Basalt	Retouch	< 50%	8.1 x 6.6
House 1	Area B	Floor 7	70	Flake	Quartz	Use wear	> 50%	3.1 x 1.3
House 1	Area B	Floor 6	50	Core	Basalt		> 50%	12.2 x 9.2 x 7.1
House 1	Area A	Floor 5		Flake	Basalt		0%	2.3 x 4.3
House 1	Area A	Floor 5	92	Debris	Quartz		0%	
House 1	Area A	Floor 5	93	Core	Quartz		< 50%	1 x 1.5 x 2.5
House 1	Area A	Floor 5	103	Flake	Basalt		0%	7.3 x 5.2
House 1	Area A	Floor 5	114	Flake	Basalt		0%	4.8 x 4.5
House 1	Area A	Floor 5	138	Flake	Basalt		0%	7.8 x 5.5
House 1	Area A	Floor 5	140	Debris	Chert		> 50%	
House 1	Area A	Floor 5	167	Flake	Basalt		0%	8.6 x 8
House 1	Area B	Floor 5	30	Flake	Quartz		0%	1.7 x 2.3
House 1	Area B	Floor 5	79	Flake	Quartz		> 50%	1.8 x 1
House 1	Area C	Floor 5	59	Quartz	Flake		0%	2.2 x 0.9 x 0.3
House 1	Area C	Floor 5	61	Quartz	Flake		0%	2 x 0.9 x 0.4
House 1	Area A	Floor 4	8	Debris	Basalt		0%	
House 1	Area A	Floor 4	17	Flake	Basalt	Use wear	0%	5 x 3
House 1	Area A	Floor 4	17	Flake	Basalt		0%	1.5 x 3.2
House 1	Area A	Floor 4	17	Flake	Chert		0%	1.6 x 1.9
House 1	Area A	Floor 4	88	Flake	Basalt	Retouch	0%	6.9 x 6
House 1	Area B	Floor 4		Flake	Basalt		0%	6.4 x 3.4
House 1	Area B	Floor 4		Flake	Chert	Use wear	0%	3.5 x 1.3
House 1	Area B	Floor 4	56	Flake	Basalt		0%	4.1 x 4.5
House 1	Area B	Floor 4	88	Core	Basalt		> 50%	15.7 x 15.7 x 9.5
House 1	Area B	Floor 4	94	Core	Chert		0%	4.4 x 3.3 x 2.2
House 1	Area B	Floor 4	96	Flake	Basalt		0%	6.2 x 4.9
House 1	Area B	Floor 4	107	Core	Basalt		> 50%	13.2 x 8 x 8.4

Structure	Unit	Stratum	Find #	Class	Raw material	Modifications	Qt. cortex	Dimensions (cm)
House 1	Area B	Floor 4	110	Debris	Chert		< 50%	
House 1	Area A	Floor 3	232	Flake	Basalt		0%	4.3 x 3.3
House 1	Area A	Floor 3	226	Flake	Basalt		0%	2.9 x 5.3
House 1	Area A	Floor 3	243	Prism	Basalt	Retouch	0%	18 x 5.7 x 4.5
House 1	Area A	Floor 3	244	Prism	Basalt	Retouch	0%	6.9 x 3 x 2
House 1	Area B	Floor 3	202	Flake	Chert	Use wear	0%	4.5 x 3.5
House 1	Area B	Floor 3	216	Flake	Basalt		0%	8.7 x 5.8
House 1	Area B	Floor 3	217	Flake	Basalt		> 50%	8.9 x 7.1
House 1	Area B	Floor 3	238	Biface	Basalt		< 50%	13.2 x 7.5 x 4.4
House 1	Area B	Floor 2	271	Flake	Basalt		0%	7.6 x 10.7
House 1	Area A	Floor 1		Quartz	Flake		100%	1.5 x 1.6
House 1	Area A	Floor 1	261	Basalt	Flake		0%	3.4 x 2.5
House 1	Area A	Floor 1	261	Basalt	Debris		0%	
House 2		Floor 4	5	Basalt	Flake		0%	6.3 x 7.5
House 2		Floor 2		Quartz	Flake		100%	2.1 x 1.2
House 2		Floor 2		Basalt	Flake		0%	2.0 x 2.9
House 2		Floor 2		Basalt	Flake		0%	2.0 x 2.8
House 2		Floor 2	4	Chert	Flake		0%	1.3 x 0.7
House 2		Floor 2	4	Chert	Flake		0%	1.6 x 1.1
House 2		Floor 2	15	Chert	Flake	Thermal	0%	1.8 x 2.2
House 2		Floor 2	16	Chert	Flake	Use wear	0%	1.7 x 1.2
House 2		Floor 2	18	Basalt	Debris		0%	
House 2		Floor 2	18	Chert	Flake		0%	1.8 x 1.4
House 2		Floor 2	19	Basalt	Flake		0%	6.2 x 4.8
House 2		Floor 2	21	Basalt	Debris		0%	
House 2		Floor 2	22	Chert	Flake	Use wear	< 50 %	3.8 x 3.2
House 2		Floor 2	26	Basalt	Debris		0%	
House 2		Floor 2	27	Quartz	Core		< 50 %	1.7 x 1.0
House 2		Floor 2	35	Chert	Flake		0%	2.0 x 1.1
House 3		Floor 8		Quartz	Flake		> 50%	2.2 x 2.2 x 0.7
House 3		Floor 8		Quartz	Flake		< 50%	2.1 x 2.8 x 0.9
House 3		Floor 7		Quartz	Flake		> 50%	2.4 X 1 X 0.6
House 3		Floor 5		Chert	Flake		< 50%	4 x 2.4 x 0.6
House 3		Floor 5		Basalt	Flake	Use wear	0%	7.1 x 6.2 x 1.3
House 3		Floor 1		Basalt	Biface	Retouch	0%	9 x 9.9 x 4.1
House 3		Floor 1		Chert	Flake		0%	2.1 x 2.1 x 0.6

Structure	Unit	Stratum	Find #	Class	Raw material	Modifications	Qt. cortex	Dimensions (cm)
Mound A		Level 1		Basalt	Uniface	Retouch	0%	11 x 12 x 5.1
Mound A		Level 1		Basalt	Uniface	Retouch	0%	8.5 x 6.6 x 3.1
Mound A		Level 1		Basalt	Flake		0%	9.9 x 4.3 x 2.1
Mound A		Level 1		Chert	Flake		< 50%	1.1 x 0.9 x 0.4
House 11		Floor 4	5	Basalt	Flake		0%	6.8 x 6.8 x 2.8
House 11		Floor 3	12	Basalt	Flake	Thermal	0%	7.8 x 5.8 x 2.2

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