Sacred landscapes of the southern Brazilian highlands: Understanding southern proto-Jê mound and enclosure complexes

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A B S T R A C T
Fieldwork involving survey, detailed topographic mapping, and excavations in Pinhal da Serra, Rio Grande do Sul, Brazil, has revealed a highly-structured landscape revolving around funerary/ceremonial structures that began around A.D. 1000. This paper focuses on the results of detailed topographic survey of mound and enclosure complexes and their interpretation in light of southern Jê ethnohistorical and ethnographic data. We compare the architectural patterns of mortuary architecture from this study with fundamental spatial features of historic Kaingang’s social organisation, mortuary rituals and cosmogony myth. Our results suggest historical continuity in the organisation of space in cardinal directions (E-W), topography (low and high places), and in circular/concentric spatiality revealed in the southern proto-Jê mound and enclosure complexes. It is argued that small paired mound and enclosure complexes are associated with the material representation of a dual ranked opposition materialised in proto-Jê moiety cemeteries where important persons were buried.

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Introduction

Archaeologists studying the Formative period in the Americas and the Neolithic in the Old World have long been concerned with the study of the economic, social and ideological roles associated with the arrival of burial monuments and the creation of built sacred landscapes in intermediate level societies (Barrett, 1996; Beck, 1995; Bradley, 1998; Carr and Case, 2005; Iriarte, 2006; Dillehay, 2007; Fleming, 1973; Scarre, 2002). Traditionally, the debate has focused on how these processes reflected changes in subsistence, population growth, territoriality and the rise and development of social distinctions (Binford, 1971; Renfrew, 1973; Tainter, 1978). More recently, discussion has turned to aspects related to the perception, memory, ideology, and underlying structural principles and meanings of monumental landscapes (Ashmore and Knapp, 1999; Barrett, 1996; Bradley, 1998; DeBoer, 1997; Dillehay, 2007; Edmond, 1999; Feinman, 1999; Thomas, 1999; Thompson and Pluckhahn, 2012; Tilley, 2007). Several authors have emphasised the importance of the landscape as a means of encapsulating and transmitting historical memory (Bender, 1993, 2002; Santos-Granero, 1998, 2004), as well as a crucial factor in polity-formation associated with more complex social formations and the appropriation of new territories (Dillehay, 1995, 2007; Heckenberger, 2002, 2007; Siegel, 1999; Zucchi, 2002).

The southern Brazilian highlands is one of the few regions in the world where mortuary rituals associated with mound-building have been recorded among the southern Jê groups in early European accounts during the 17th–19th centuries and investigated by ethnographers during the 20th century in the Kaingang (Baldus, 1937; Becker, 1976; Crépeau, 1994; Henry, 1964; Maniser, 1930; Métraux, 1946; Nimuendajú, 1993 [1913]; Paula, 1924; Veiga, 2000, 2006). Importantly, funerary and post-funerary rituals are reported to be their most important ceremony, when these groups gathered together showing their dual organisation (Baldus, 1937; Crépeau, 1994; Métraux, 1946; Nimuendajú, 1993 [1913]; Veiga, 2006). These events included the burial of important chiefs, secondary burials, the inheritance of the chiefly office by the eldest son of the deceased chief, initiation rites, name-giving ceremonies, performance and re-creation of the cosmogony myth, and feasting (Da Silva, 2001; Iriarte et al., 2008; Maniser, 1930; Métraux, 1946; Veiga, 2006). Therefore, the emergence and development of the
pre-Columbian southern Jê mortuary tradition in the southern Brazilian highlands during the second millennium AD presents an exceptional case study to understand the role of mortuary practices, feasting, and the creation of built landscapes related to the emergence of social hierarchies (Dietler and Hayden, 2001; Dillehay, 2007; Gumerman, 1997; Hayden, 2009; Iriarte et al., 2008; Kertzer, 1988). Combining archaeology, ethnohistory and ethnographic studies among the Kaingang provides a unique opportunity to assess the long-term transformation of the principles of social and political organisation materialised in the layout of mortuary earthworks and the structure of the built landscape.

In this article, we focus on the investigation of the architectural layout of funerary and ceremonial structures concentrating on the following questions: (a) What is the spatial patterning of mortuary earthworks at the landscape level in the Pinhal da Serra region? More specifically, how were these mortuary earthworks structured in the landscape in relation to topography, prominent landforms, direction of view, intervisibility and transit routes? (b) What is the relationship between ceremonial sites and residential pit-house villages? And (c) What are the patterns in the architectural design of mound and enclosure complexes? What are the potential meanings expressed in the layout of these ceremonial sites in terms of the cognitive associations of the forms and their positioning in the landscape?

To address these questions we carried out an opportunistic survey across the Pinhal da Serra region (Figs. 1 and 2); producing detailed topographic models of mound and enclosure complexes with differential GPS and conducted out geophysical survey and excavation of select sites during two field seasons in 2009 and 2011. Our work built upon the long-term project of the Núcleo de Pesquisa Arqueológica da Universidade Federal do Rio Grande do Sul under the direction of Silvia Moehlecke Copé (SMC). In the first section of this paper, we will briefly introduce the archaeology of the pre-Columbian southern Jê groups (southern proto-Jê), followed by a history of archaeological investigation of mound and enclosure complexes, after which we will present the new results of our study. The second section will focus on the discussion and interpretation of archaeological patterns from the southern proto-Jê in light of the ethnohistorical and ethnographic information.

The archaeology of the southern proto-Jê

Following Da Silva (2001) in this article we referred to the broadly defined Taquara/Itararé archaeological tradition (Beber, 2005) with the name of southern proto-Jê groups. We used southern proto-Jê groups because (a) we wanted to emphasise the historical continuity of these groups in the southern Brazilian highlands from at least the start of the first millennium A.D. to the present and (b) we are not attempting to connect the archaeological record from the Late Holocene with any particular historically-defined southern Jê group, like the Kaingang or the Xokleng (see discussion in Da Silva, 2001). Dating back to around 2220 cal. yr BP, the southern proto-Jê occupied the southern Brazilian highlands and the Atlantic forest of the Brazilian states of southern São Paulo, Paraná, Santa Catarina, Rio Grande do Sul, as well as Misiones, Argentina and Paraguay (Fig. 1). Linguistic (Maybury-Lewis, 1979; Urban, 1992; Wiesemann, 1978) and archaeological (Araújo, 2001; Noelli, 2000, 2005) studies suggest that the historic Kaingang and Xokleng groups belonging to the Macro-Jê linguistic stock and, more specifically, to the languages of the Akwen (Xakriabá, Xavante, Xerente) and the Apinayé in the states of Minas Gerais, Mato Grosso and Goiás (Noelli, 2005: 178), migrated to the southern Brazilian highlands from Central Brazil during the Late Holocene. The southern proto-Jê practiced a mixed economy combining hunting, fishing and collecting Paraná pine nuts with slash and burn agriculture at lower altitudes dominated by subtropical semi-deciduous forest, where maize (Zea mays L.) was part of the diet (see Gessert et al., 2011: 35). They are broadly identified archaeologically by their diagnostic ceramics, the construction of pit houses, and their elaborated mound and enclosure complexes (hereafter MEC). Ceramics, the most diagnostic material culture item of the southern proto-Jê are characterised by simple, tall, small vessels exhibiting fine walls. They are generally

![Figure 1](https://example.com/image1.png)
tempered with sand and hematite grains, have homogenous paste, and reduced firing. Decoration is more frequent in the southern Taquara phases and includes several incised types, punctuations, as well as finger nail and basket impressions (Beber, 2005).

Different types of archaeological sites are associated with the southern proto-Jê including subterranean structures known as pit houses, open air sites, geometric MEC, collective burials in caves and petroglyphs. Constructed on lateritic soils and decomposed basalt, pit houses occur above 400 m a.s.l., but are concentrated between 600 and 1200 m a.s.l., closely overlapping with today’s distribution of Araucaria (Paraná pine) forest. These subterranean structures are generally located in the upper slope and flat tops of interfluvial ridges close to small streams. The diameter of a pit houses ranges between 2 m and 20 m, but the majority do not exceed 5 m. Pit houses are habitation sites containing the remains of everyday activities including hearths, post-holes, ceramic sherds, lithic tools and debris, and charred Araucaria seeds (Beber, 2005; Copé, 2006; Corteletti, 2008; Ribeiro, 1999/2000; Schmitz, 1999/2000). The overall form of pit-house settlements is varied, and pit-houses can be found in isolation or forming villages containing more than fifty houses (Schmitz et al., 2010). The ground plan of pit-house villages may exhibit a linear layout, arranged in parallel lines or form an approximate circle (Prous, 1992: 313), and, as will be described below, some of them appear to be well-planned settlements. The northern extent of pit-house distribution presently recorded is Paraná state (Araújo, 2001; Paralellada, 2005).

Surface sites have been interpreted as probable special-activity areas such as agricultural plots and quarries (e.g., Beber, 2005; De Masi, 2005; Ribeiro and Ribeiro, 1985; Saldanha, 2005). At lower
altitudes, in the upper river valleys and the southern escarpment of the plateau where Araucaria forest is sparser and semideciduous forest dominates, pit houses become rare and surface sites are more abundant. In areas like the lower Antas and Pardo rivers, situated below 600 m elevation, southern proto-Jê surface sites are characterised by discrete circular patches of dark earth (terra preta) forming villages that cover up to 4000 m² (Miller, 1967: 20; Miller, 1971; Beber, 2005). Many regions of the southern Brazilian highlands also exhibit collective burial in natural caves, some of which are extensive, as the Abrigo do Matematico, where a minimum of 34 individuals were laid (Brentano and Schmitz, 2010).

Beyond the general label of southern proto-Jê and its shared material culture, there is increasing recognition that this broadly defined tradition encompasses a remarkable range of more local variability in social and ritual organisation in different regions like the Canoas and Pelotas river basins (Copé, 2007; De Masi, 2009; de Souza and Copé, 2011), Misiones Province, Argentina (Iriarte et al., 2008, 2010; Menghin, 1957), the Atlantic coast (Silva et al., 1990), north of Paraná state (Aráujo, 2001; Paralellada, 2005), and the southern portion of the southern Brazilian highlands (Copé, 2006, 2007; Corteletti, 2008; Schmitz, 2002; Schmitz et al., 2002). This is particularly so for one site type, the MEC, that is apparently concentrated along the Canoas and Pelotas river basins (Fig. 1). MEC are characterised by circular, elliptical, rectangular, and key-shape earthworks containing one or more mounds, which are generally located in the most prominent hills of the area. Circular rims are 0.3–0.5 m tall, 3–4 m wide, and 20–200 m in diameter. When they contain one mound, it usually occurs in the centre of the ring. Where more than one mound occurs, there is variation in their spatial arrangement (see also de Souza, 2007). Mounds contain single, multiple, primary and secondary cremated burials. Burial offerings in the form of ceramic vessels have been excavated in association with the cremated remains in several sites like RS-PE-21 (Fig. 2) (see Iriarte et al., 2008: 951, Fig. 3), SC-AG-100 (Müller, 2008: 122), SC-AG-12 (De Masi, 2009), most of which exhibit small mouth diameters that do not surpass 15 cm. The next section will describe in greater detail the archaeological features found in these contexts, while also reviewing the history of archaeological investigation on MEC sites.

**Brief history of archaeological investigations on southern proto-Jê mound and enclosure complexes**

The nature of southern proto-Jê mound and enclosure complexes has been until recently a matter of controversy mainly due to the lack of archaeological research. They were first documented by Menghin (1957) at El Dorado, Misiones Province, Argentina, where a complex that once consisted of eight circular enclosures, two of which contain central mounds was identified spread over an area of 200 ha (Iriarte et al., 2008, 2010; Menghin, 1957; Wachtin, 1984). Site PM01, the largest and best preserved of these enclosures, is characterised by a central mound (20 m in diameter and 3 m high) located on the highest ground of a gentle hill facing a smaller mound (10 m diameter) located 45 m to the south-east. Framing the mounds there is a 180 m-diameter circular earthen embankment (with banks 6 m wide and 30–40 cm high), called Circle I, that was connected to a 400 m-long and 18 m-wide avenue marked by parallel earthen embankments (Iriarte et al., 2008, 954, Fig. 5). Menghin’s (1957) excavation of the bank of PM01 Circle I yielded discrete pavement-like stone clusters. He interpreted them as the remains of a possible sacred fence, which was later replace by the circular embankment on top of which, he hypothesised, a palisade may have been built. He interpreted the central mound as funerary in nature. Menghin (1957) mentioned the potential interpretation of the site as a circular plaza village with a central cemetery, like the ones built by the Jê of central Brazil, but he discarded this hypothesis due to the lack of domestic refuse in the interior of the circular embankment. He associated these earthworks with the southern Jê groups since mound and enclosure complex 8 (Iriarte et al., 2010, 29, Fig. 3) is very similar to the examples described amongst the historic Kaingang groups (e.g., Métraux, 1946; Müller, 2008), consisting of a single mound with a surrounding ditch.

Similar sites were later discovered in Paraná and Santa Catarina states, Brazil, by Chmyz (1967; Chmyz and Sauner, 1971) and Rohr (1971), respectively. In Paraná, Chmyz and Sauner (1971) documented site PR-UB-4 in the Piquiri River, which is constituted by a central mound exhibiting a peripheral ditch and surrounded by six pit houses. In the central and basal part of the mound he discovered a layer of burnt clay containing ashes, metal slag and calcined bones. He suggested that the mound was funerary in nature, comparing it with the historical record of Kaingang burial mounds.

In Santa Catarina, Rohr (1971) documented numerous mound and enclosure complexes positioned in the top of prominent hills. Rohr (1971) found artefacts in the interior of the rings and interpreted these sites as fortified circular villages. He also divided these sites into two size categories. The first category consisted of small embankments of 15–20 m diameter encircling a mound, while the other category was made up of large circular embankments of 65–70 m diameter without mounds. In the Pinhal da Serra region the first MEC were described by Ribeiro and Ribeiro (1985) who, following Rohr, interpreted them as palisade villages. In the same region, the excavation by co-author SMC and her team of site RS-PE-21 uncovered a hearth with calcinated human bone remains surrounded by burnt earth underneath a mound, which evidenced clearly for the first time the presence of human bones, and therefore, the funerary nature of this type of site (Copé and Saldana, 2002; Saldana, 2005). Survey of the Pinhal da Serra region in the context of salvage archaeology (Copé, 2007; Copé and Saldana, 2002; Saldana, 2005) also documented numerous mound and enclosure complexes which, as previous studies have noted, were carefully positioned on top of prominent hills (Fig. 2). Using a digital elevation model based on 1:50,000 topographic maps (IBGE/SC-22-Y-D-VI-4/Pinhal da Serra) and GIS, Saldana (2008, 2005) also explored visibility and intervisibility of sites showing that all MEC in the region have wide viewsheds, are inter-visible among one another, but have restricted visibility of other site types such as pit houses and open air sites. Saldana found that pit houses are located in least cost paths, while MEC are located where these paths converged, that is, on the nodal points of transit through the landscape (Copé, 2007; Saldana, 2005). He also noted that settlement patterns in the region are characterised by settlement clusters containing domestic sites (pit-house clusters), open air sites possibly related to specific-activity areas and funerary structures. He suggested that each of these settlement clusters represent a local community and that small funerary structures possibly represent village cemeteries (Saldana, 2008, 2005). Similar funerary/ceremonial structures were later excavated along de Pelotas (Herbert and Müller, 2007; Müller, 2008) and Canoas rivers (De Masi, 2005, 2006, 2009) in Santa Catarina state, and continued work in the Pinhal da Serra region further confirmed the funerary nature of the MEC in this region (de Souza and Copé, 2011).

Careful excavation of burial mounds along with the analysis of cremated human bones also began to reveal a diversity of funerary practices including primary and secondary of either individual or multiple cremated burials, as revealed by the excavations of site SC-AG–12 by De Masi (2005, 2006, 2009). SC-AG–12 consists of a pair of rings, Circle I and II, being 30 m and 60 m in diameter respectively. The central mound of Circle I contains the cremated burial of an adult and an infant, and the central mound of Circle II contain six collective cremated burials (De Masi, 2009). These cremated burials are accompanied by offerings including cups,
food vessels, lip plugs and ceramic figurines. In Circle I, in the area between the mound and the embankment, he excavated discrete stone clusters arranged in crescent-shape format facing the central mound, which are similar to the ones found by Menghin at El Dorado that were interpreted as earth ovens by Iriarte et al. (2008). De Masi (2009) argues that the two individuals, an adult and an infant, buried in the mound of the larger ring, had a higher social status with regards to the six individuals buried collectively in the smaller ring of this site. In the northern side of the Pelotas River, in the Anita Garibaldi municipality, rescue archaeology by Scientia documented several mound and enclosure complexes in hilltops and plateaus bearing funerary structures (Müller, 2008). The analysis of skeletal remains and associated features from site SC-AG-100 suggest the cremation of a flexed individual whose vertebral spine was vertical in relation to the ground and during the process of cremation fell into the funerary pyre. Similar analysis at site SC-AG-108 suggest that cremation took place in situ with the bodies in flexed position and legs and arms close to the body (see details in Müller, 2008: 120–131). In Pinhal da Serra, excavations at the central mound of Avelino Structure 3A (Fig. 7) show that the mound was built over the remains of a funerary pyre containing a primary cremated burial. In the same mound, a secondary burial was uncovered, where the body has been cremated in another locality and then collected, possibly in a basket, transported and deposited in a pit that was later covered with earth, forming a mound (de Souza and Copé, 2011: 111, Figs. 5 and 6).
At the same time, renewed excavations at site PM01 in Eldorado (Iriarte et al., 2008, 2010) produced further new interpretations. The excavation of a series of eight discrete stone clusters at the base of a portion of the rim of site PM01 were interpreted as earth ovens. Phytolith analysis from charred residues of four ceramic sherds associated with the stone clusters document the presence of maize cob phytoliths (Pearsall et al., 2003), suggesting these ceramics were used to drink maize-based beverages. Iriarte et al. (2008, 2010) believe that the vast plaza area of Circle I at site PM01, the numerous earth ovens accumulated through time and their associated ceramics, indicate that large numbers of participants came together regularly at this notable ritual structure to feast on meat delicacies and maize beverages associated as part of post-burial funerary practices.

In terms of MEC size and its interpretation, following the size distinction first proposed by Rohr (1971), De Masi (2006) interpret the small MEC as cemeteries and the large MEC as dance grounds ("danceiros" in Portuguese). The small MEC, where he uncovered cremated burials are interpreted as cemeteries by ethnohistoric analogy with the Xokleng groups, who practice cremation until the beginning of the 20th century. De Masi also recovered a lip plug at site SC-AG-12 and interpreted the large circular enclosures as the place where the Xokleng carried out initiation ceremonies which involve the perforation of the lip to use a lip plug, something that is described in the ethnohistory of the Xokleng (Paula, 1924). More recently, following Adler and Wilshusen (1990), de Souza and Copé (2011) interpret small paired MEC as low-level integrative facilities built and visited by the inhabitants of nearby pit-house villages, where they undertook the internment of secondary inhumations and participated in collective funerary rites, reinforcing community ties. Instead, they interpret large MEC as high-level social interaction facilities, mobilising labour of different communities dispersed across the region.

As seen from this brief introduction the interpretation of the MEC has progressed from determining their use(s) (village vs. ceremonial/funerary), to becoming aware of how they are an integral part of a highly-structured landscape, appreciating their architectural diversity and realising the variety of funerary practices that were carried out in these locations. Current archaeological investigation suggest that the larger concentration of mound and enclosure complexes are restricted to the Pelotas and Canoas river basins that flows into the Uruguay River and to the east up to the Paraná River (Fig. 1). As shown in Table 1 and Fig. 3 most MEC in the Pelotas/Canoas river valleys date between around 1000 A.D.
and the present. The beginning of these funerary tradition coincides with a more intense Late Holocene occupation of the southern Brazilian highlands by the southern proto-Jê groups as evidence by an increase in the frequency of archaeological sites (Iriarte and Behling, 2007: Fig. 7). Significantly, these cultural changes are broadly contemporaneous with the abrupt expansion of Araucaria forest (Paraná pine), the rapidity and timing of which raises the possibility of an anthropogenic cause (Bitencourt and Krispenhar, 2006; Iriarte and Behling, 2007; Behling et al. 2005, 2007).

Methodology

During the 2009 and 2011 field seasons we carried out more intensive archaeological survey, detailed topographical mapping of all major sites with earthen architecture, as well as geophysical survey and test excavations in selected sites. In order to complement previous survey work in the region (Saldanha, 2005, 2008; Copé, 2007), all hill tops in the study area were informally surveyed to search for new MEC and interviews with property owners were carried out. Full systematic survey of the region is prevented in some locations by the presence of extensive, dense understory, which in some cases only allows for less than a few metres of visibility, as well as accessibility issues. The lack of a full systematic survey means that we do not possess a complete inventory of southern Jê sites in the region. However, we are confident that most MEC and pit-house clusters have been detected due to their high visibility. To enable a better understanding of the patterns in the architectural design of MEC in the southern Brazilian highlands we also carried out topographical survey using efficient differential GPS technology (Leica System 1200) and preliminary topographic contour level maps were produced using Leica Geofence and Listocad software. Final maps were drawn by co-author MF where relief is showed by using hachures, following the British landscape tradition (Bowden, 1999). We produced detailed topographic maps of the following sites from the Pinhal da Serra region: Leopoldo (RS-PE-21) (Fig. 9), Avelino (RS-PE-29) (Fig. 7), Reco (RS-PE-31) (Fig. 11b), Chico Carneiro, Giny (Fig. 10a), João Feliciano (10b), and Posto Fiscal (Fig. 11a). In addition, we mapped the Abreu and Garcia site (Cerro Negro Municipality, Santa Catarina state) (Fig. 12).

Multi-sensor geophysical surveys were also conducted at Avelino, Leopoldo, Chico Carneiro and Posto Fiscal, including gradiometry and magnetic susceptibility, which were used to identify localised changes in magnetic properties of the soil and subsurface features such as burning, digging, heaping, and infilling (Johnson, 2006). Electrical resistance and electromagnetic conductivity targeted areas of differential moisture retention, compaction, and other changes to physical properties associated with human activity (Gaffney and Gater, 2003). In addition, test excavations (Figs. 11a and 13) were carried out at Posto Fiscal to understand the use, chronology and construction history of mound and enclosure complexes showing a rectangular annex. This paper concentrates on the results of the topographic survey of MEC with reference to the patterns and interpretation of their architectural layout, and we will only briefly refer to the results of the geophysical and excavations. We have temporarily called the sites that do not have formal inventory name yet with the name of the owner of the property where the site is located, i.e. Chico Carneiro.

Results

The data collected from the 2009 and 2011 field seasons yielded new patterns at different spatial scales. The presentation of the results will proceed from the description of settlement patterns at the landscape level to the features of particular sites. The data gathered during these field seasons show the importance of surveying sites in their entirety using differential GPS technology. This is particularly evident for the Avelino and Leopoldo localities as described below.

Location of sites in the landscape

As previously noted by Saldanha (2008, 2005) MEC are located in the top of prominent hills that today exhibit wide, panoramic...
view sheds. However, the present study has demonstrated that they are not located on the very highest crests of these hills, but in adjacent saddle-shape basins like in sites RS-PE-21, RS-PE-29, RS-PE-31, Chico Carneiro, Giny and João Feliciano (Fig. 4a and b). Several of these MEC are positioned in relation to localised natural features such a rock outcrops (Fig. 4a, b and Fig. 5b), which mark the highest spot of these hills. These could be related to the integration of natural elements possibly related to “myths” and social memory of these places as we discuss below. It should be noted that MEC have also been found in lower positions in the landscape in the lower Canoas River (De Masi, 2009) and Urubici (Rohr, 1971; Corteletti, 2010).

Knowledge of the regional past vegetation should be taken into consideration when carrying out visibility analysis. The closest pollen records to this region are Serra de Rio Rastro, Morro da Igreja and Cambará do Sul (Behling, 1995), all of which show like in the rest of the southern Brazilian highlands (Iriarte and Behling, 2007) an expansion of Araucaria forest (Paraná pine) at the expense of grasslands starting around 900 cal. yr BP. Therefore, it is reasonable to assume that the MEC were possibly built in a forested landscape dominated by mixed Araucaria forest. Despite this forested landscape the MEC may have exhibited wide panoramic views. The topography of Pinhal da Serra is not a flat or gently rolling landscape, but has a rugged physiography in which plateaus and

Fig. 7. The Avelino plateau showing potential alignments between mortuary/ceremonial mounded architecture and the pit-house village.
hill ridges are dissected by deep creeks and river valleys. Therefore, the location of MEC on the top of these hills might have allowed for wide-ranging views downslope. In addition, if MEC were located amidst mature Paraná pines with tall, branchless trunks, people might have only needed to clean the understory to enhance visibility. It should be noted that most MEC are rather inconspicuous, people might have been aware of the ceremonies that were taking place from afar, but not the earthworks themselves.

Orientations and alignment of sites along entire plateaus and ridges

The detailed topographical survey of complete plateaus and ridges has allowed a number of novel insights to be made into the formation of these complex site formations showing the complexity of sites. In the Avelino plateau (Fig. 7), we found an unexpected number of alignments between the different site types. These alignments only consist of three earthworks per linear alignment, but in each case the detailed mapping indicates that they were so carefully aligned that the spatial relationship focuses on the central mound of each mortuary earthwork. A key nodal point in these alignments is the solitary pit house which forms the central point of three of the six identified alignments, and potentially identifies this as one of the most important points on the hill. One interpretation would be that this structure was utilised as part of ritual or ceremonial activity on the hill, or housed a key person within that activity sequence. This discovery may also have an important bearing on the preliminary findings of the Chico Carneiro mortuary structures (Fig. 4a), which could not be surveyed or explored fully, but where an isolated pit house earthwork was identified alongside at least two and potentially more MEC, and may therefore have fulfilled a comparable function to that on the Avelino plateau (Fig. 7). A point of import is that the pit-house village is incorporated directly on the operational route, weaving around the Leopoldo pit-house village, track-way has been created by a significant volume of traffic requiring more detailed investigation, particularly as excavation of these sites has traditionally focused on the visually distinct pit-house features. One particular alignment westwards of the village references both the entranceway and central rise of the large mound and mound enclosure, and as such this linear arrangement only actually refers to two distinct mortuary earthworks, but again this indicates a direct visual relationship between these two zones of activity. This ability of detailed topographical survey when pursued at both a micro and macro scale, as in this case, to reflect on potential future excavation strategies further highlights the importance of this form of investigation.

It is not immediately explicable how these alignments were physically developed at the Avelino plateau. The longest alignment was drawn out over a length of nearly 500 m, and not all the sites would be inter-visible between all three constituent components. The pit-house village in particular is located on a lower, eastward-sloping terrace from the MEC features situated on the upper plateau, although the isolated pit house may have formed a connecting point from which all these sites were visible. Since we currently do not have a local reconstruction of the contemporary vegetation in the Avelino plateau, we cannot assess the extent to which a potential mature Araucaria forest would have hampered or enabled the development of these alignments. This evidence of inter-structure alignments was not encountered at other site groups in the Pinhal region, although different forms of complexity were recorded.

On the Leopoldo plateau (Fig. 9) alongside a small cluster of four MEC structures were what appears to be a number of sections of low linear banks or slight terraces up to 75 m in length and roughly following the contours of the hill slope. Although none of these features physically interfaced with any of the MECs, their alignments do appear to loosely reference the position of those enclosures. To the south of the longest section of bank was a small pit earthwork just over 1 m in diameter, situated on the alignment of the bank but 20 m beyond the point at which it had faded out as an earthwork feature. These linear features were not explicable in terms of more recent agricultural activity, and are likely to therefore form part of the development of that ritual complex.

A small, linear pit-house village complex is located 150 m north-east of the MEC enclosures of the Leopoldo area. Alongside this small settlement is another earthwork feature that again defies clear explanation. Several sections of a track-way were recorded running along the western and southern sides of the village before descending rapidly to the north-west on the east side of the settlement, although this section was not surveyed. The depressed track-way has been created by a significant volume of traffic reusing this route, weaving around the Leopoldo pit-house village, and between it and the complex of MECs. The topographic evidence for the track comes to an abrupt stop at both ends and did not link between any form of observable ‘site’, but hypothetically
it may have been connected to the pre-Columbian Leopoldo complex, potentially as a carefully defined processional way. However, such an interpretation is complicated by the fact that the track does not actually link to either settlement or ritual enclosure, although this may itself be relevant, for instance if it was used by other communities rather than the inhabitants of the Leopoldo plateau. At the northern edge of the Avelino plateau, close to one of the smallest MECs, another short but broad depressed track was recorded as an earthwork feature. These are not the only recorded trackway associated to funerary structures. Chmyz and Sauner (1971) recorded a possibly indigenous trackway leading to the central mound of site PR-UB-4. At larger site like ElDorado in Missiones Argentina, Menghin (1957) recorded a 17 m wide, 400 m long, entry causeway leading to the 180 m in diameter larger ring of site PM01 and a similar entry causeway was recorded at site SC-CL-37 exhibiting a 120 m diameter ring (Reis, 1980). As we discuss below these track-ways and avenues may be related to the formal circulation of persona in the contexts of mortuary rituals. It is becoming increasing clear, however, that the built environment of these communities may not simply have consisted of pit houses and ring enclosures, but also an array of what appear to be more subtle features. Further investigation of these features is required to establish their artificial southern proto-Jê nature, and to understand if these alignments match with more distant sites or landscape features at a regional level.

Association of mound and enclosure complexes with other sites

Most of the MECs are associated with pit-house villages located in the upper slopes of hills like in the case of the Avelino site (Fig. 7), Leopoldo (Fig. 9) and Chico Carneiro. As suggested by Saldanha (2005, 2008) and de Souza and Copé (2011), the spatial association between the villages and the sites suggest that the small funerary structures may have served the population of these pit-house villages. These funerary structures are likely to have served local communities. They possibly set the stage for ceremonial activities carried out by smaller groups, perhaps in a more focused, closed setting.

Differences in size among MEC

As previously noted by other researchers working in the region (De Masi, 2009; de Souza and Copé, 2011; Rohr, 1971) MEC appeared to be divided in two size categories. The compilation of 36 circular enclosure diameters from known sites in Argentina and Brazil shows that they can be broadly separated in two categories according to size (Fig. 6a). Smaller rings have a diameter ranging between 10 and 40 m, are far more numerous, are generally arranged in pairs, exhibit low and narrow rims, and most of them contain a shallow central mound or a pair of mounds. Larger rings between 70 and 180 m diameter, are fewer and exhibit higher, wider and easily visible rims up to 1 m in height. In some of the larger rings, like the one we have been investigating in ElDorado, Misiones, Argentina (Iriarte et al., 2008, 2010) or site SC-CP-37 in Santa Catarina (Reis, 1980) are more complex than a simple circle layout, including entry avenues and associated attached ringlets.

Internal structure of small paired mound and enclosure complexes

Below, we described some of the architectural features of small paired mound and enclosures complexes.

Dual architecture

The majority of MEC sites in this region exhibit dual patterns of architecture. In the Pinhal da Serra region there are five paired rings including RS-PE-29 Structures 2 and 3 (Fig. 7), RS-PE-21 (Fig. 9), Giny (Fig. 10a), and João Feliciano (Fig. 10b). As we discussed below, the presence of dual patterns in public architecture, such as the presence of paired mounds and their associated minor ringworks may be the material representation of the dual social organisation characteristic of Jê societies.

SW–NE alignments

It should be noted that the alignment of the mound and enclosure is certainly a cultural choice. The alignment of MEC sites is not constrained by topography since they are located in flat areas that would have allowed all the combinations of alignments possible. As previously noted by de Souza (2007) most MEC show a SW–NE orientation. We obtained the alignment of small paired MEC by drawing a line between the centres of the mound from each enclosure. Five out of six of the paired ring enclosures in the Pinhal da Serra and adjacent Campos Novos region (sites SC-AG-12, SC-AG-108) (De Masi, 2009) are aligned in SW–NE direction (Fig. 6b). In our study area, only Giny does not follow this pattern and is aligned SE–NW. It is interesting to note that the small paired MEC of Abreu and Garcia and SC-CL-94 that are located more than 50 km from Pinhal da Serra have different alignments. Alignments are not only seen on paired rings but also on more complex forms of ritual architecture like keyhole-shaped enclosures. For example, the rectangular annex at the RS-PE-31 site (Reco) is on a roughly similar alignment (perhaps closer to ESE-WNW), with the rectangular annex again on the eastern side of the Posto Fiscal site (Fig. 11). However, in these more complex sites the mound in the centre of the main circular rings is not aligned with the “satellite” circular rings on the same orientation. At the Posto Fiscal site, they are aligned in roughly SSW–NNE line and at the Reco site they are aligned SE–NW. An important aspect is that the SW–NE alignment corresponds to the shadow alignment of sunrise during the winter solstice and the shadow alignment of sunset during the summer solstice. The alignment of dual structures may have been related to the passage of the sun or other celestial bodies as a means of clocking agricultural and ritual cycles.

Distance between paired enclosures

We found a recurrent pattern in the distance between small paired mound and enclosure complexes. Three of them, Leopoldo, Structure 2 of Avelino and Abreu and Garcia are separated by about 33 m. Coincidentally, the Structure 3 of Avelino is half of this distance reaching about 16 m. Furthermore, at the Posto Fiscal site the central circular rim is 33 m from mound and enclosure located to the north-east of the site.

Size prominence of the ring located on the W

It is remarkable, that in the five sites with SW–NE alignment, all larger structures are located to the west including RS-PE-21, RS-PE-29 2 and 3, SC-AG-12 and SC-AG-108.

Topography of paired rings

Another noteworthy pattern is that in small paired structures, the larger structure is always located in a slightly topographically higher position than the smaller structure. This rule appeared to be respected even in sites like Giny where the larger ring is located in the eastern sector of the site (Fig. 4a). Paired enclosures appear to have been built using the natural slope of the terrain to create this elevation difference.

Topography of individual mound and enclosure complexes

The rims of small paired rings are relatively shallow standing below 30 cm above the ground. These are not imposing mortuary monuments that were built to be seen from far away. It appears that they were built to demarcate the space in order to include or exclude people in social terms, but obviously not in physical
terms. The banks are modest and the boundaries were actually rather permeable. They suggest that if movement was constrained, it was by custom and convention. The topography of sites showed that enclosures are not always situated in a levellled flat terrain, so that within the interior part of the ground level appears to have been terraced away as part of the construction process. This is in part the result of the extraction of sediments from the A horizon of the internal sector of the site to build the rim, but also convert the internal sector of these sites into a shallow, small sunken court (Fig. 5a). The lowering of the internal part of the ring has also been observed in the MECs of the neighbouring region of Anita Garibaldi (Müller, 2008: 17).

Potential entrances

Another important new pattern found is that not all circular enclosures are closed, but some exhibit clear breaks around the perimeter that could represent entrances. This was particularly apparent in the Structure 1 and Structure 2A at the Avelino plateau (Fig. 7). Visual inspection and geophysical survey also suggest the intentional use or utilisation of in situ natural stones as construction material or to mark particular sector of the enclosures. Fig. 8 illustrates near-surface remote sensing data for Avelino Structure 2 A. Magnetic susceptibility data (Fig. 8a) locates the outer ring and a probable central mortuary feature. Electromagnetic conductivity data (Fig. 8b) indicate the potential for inner rings that have no surface expression, as well as a linear anomaly bounded by stones, intersecting the eastern portion of the circles, and suggesting a possible ceremonial entrance way. Both data sets indicate the location of large individual stones and stone clusters that may have been intentionally placed. More excavation is needed to determine the nature of these anomalies. The complete geophysical survey of all of the sites in the region will be the focus of a separate article.

Keyhole-shaped sites

Detailed topographical survey has also enabled more conclusive observations to be made about the sequence of earthwork development in keyhole-shaped earthworks. An important part of this process is a move from circular to rectilinear architectural forms. This progression is most effectively demonstrated at the Reco site (RS-PE-21) (Fig. 10a) where the first construction consisted of a small MEC. A second, larger MEC to the south-west can stratigraphically be shown on the basis of the earthwork evidence alone to be a later addition as its ring can physically be observed overlying the edge of the smaller, earlier enclosure. On the east side of the later mound is a rectangular, embanked enclosure with a small, central mound which adjoins directly to the larger circular ring, although no clear stratigraphic relationship can be recorded in this case. It is possible, therefore, that the rectangular section was an even later addition to the complex, or that it and the larger ring were constructed together, and it is interesting that the mound of the circular ring is elongated east–west along the same alignment as the rectilinear enclosure.

A rectangular enclosure was also added at the Posto Fiscal site (Fig. 10b), although the overall development in this case is significantly different. In this example a row of three circular enclosures were built on a roughly NW–SE alignment. A major change occurred when a large rectangular enclosure was added again to the eastern side of the central, slightly larger ring. In this case the eastern side of the large ring was removed to provide clear access between it and the rectangular annexe. The mound of the MEC was potentially raised, and two additional mounds were constructed on an E–W alignment leading into the rectangular enclosure. The two satellite rings were not enhanced in any way and their mounds, if they ever had any, may have been levelled. In this case we therefore have evidence of a major break in the ritual structure of the site, with the earlier alignment of the three MECs abandoned and potentially defaced, in preference of the near E–W alignment based upon the new rectangular form of enclosure. This appears to represent further evidence of movement towards more complex and diverse forms of architecture, although in some sites we see no development of new forms and in others such as Avelino we simply see further monumentalisation of the circular form with the construction of its large ring and mound. The evidence at Posto Fiscal for possible degradation of the mounds of the smaller circular rings may have bearing elsewhere as many of the rings had apparently levelled mounds, perhaps indicating that many sites may have been purposefully damaged and socially ‘erased’.

Pit-house villages

The topographical survey of the sites themselves has also brought dividends in terms of the re-evaluation and re-interpretation of these habitation earthworks. Detailed mapping of the village complexes in the past has tended to be limited, often focusing on a count of the overall number of individual pit-house earthworks and their respective sizes, with an emphasis upon the relevance of the largest examples. Little attention has been given, in general, to the more subtle complex of features associated with the pit houses and to the understanding of community patterns. In the case of the pit-house villages in the Pinhal de Serra region it is possible on the basis of this evidence collected that the pit houses could be linked by a series of defined track-ways, indicating carefully controlled directions of movement as at the Avelino, Leopoldo and Aribalzinho pit-house villages (Figs. 7, 9 and 14). The settlements themselves could also be defined by low terraces on their downhill slopes that are artificial (see also Saldanha, 2005). It is possible that these outer enclosure terraces may form part of a defensive rampart, especially if they were crowned by a timber palisade. However, in all the examples surveyed at Pinhal it was found that the terrace was only visible around the down slope side of settlement, although it is possible that evidence of a palisade could survive archaeologically if these areas were to be explored through geophysical survey or excavation. There are also interesting variations in the overall form and composition of the village sites, which could range in scale from a single pit house to a sprawling village complex. At the Chico Carneiro site a single large pit house was linked to a number of small ancillary pits and surrounded by a low terrace enclosure, which is very similar in form to the northern section of the Leopoldo village, and contrasts with the southern section of Leopoldo which is more like Avelino in terms of consisting of a number of similar pits linked by a track-way. As discussed above in relation to the alignments on the Avelino plateau, a broad, low mound was recorded incorporated into the village in that area which appears to have been of some significance in terms of its relationship to the nearby MECs. Potentially comparable features were recorded at the Museum site in the form of two mounds that bound a large open area in part of the site which, in terms of its accessibility via identified track-ways, is at the heart of the village, although these are not presently linked to any wider landscape alignments. This further reinforces the diversity and complexity of settlement forms that were developing in the Pinhal da Serra region, which clearly warrant further research. As with the MEC sites, the methodology employed here also highlights the need to employ topographical mapping techniques that are able to capture the range and complexity of archaeological earthwork features that survive.

Brief report of excavations at the Posto Fiscal site

Excavations in the 2011 season at the Posto Fiscal site have further highlighted the internal complexity of the MECs in the project area. The overall site architecture of Posto Fiscal consists
of three circular MECs, with an apparent second phase of construction in the offset addition of a rectangular MEC appended on to the east side of the largest circular MEC (Fig. 11b). Three large mounds survive inside the latter ‘keyhole’ structure aligned in a row, which consist of the centre point of the original circular MEC, one on the interface between the circular and rectangular sections and one inside the rectangular section of the enclosure. The excavations in 2011 centred on the second mound, called Mound B, which also stands on the line of the circular bank as it would have passed through this area prior to the addition of the rectangular annex, although there was further sample excavations of the interior of the circular MEC immediately west of the excavated mound, and a section taken through the northern side of the circular enclosure.

The results have proved unexpected and revelatory, and open up a range of new questions and potential research avenues. At the top of the mound a range of artefacts and cultural deposits were encountered, most prominently a burnt earth patch (1.5 m diameter) containing charcoal and small pieces of unidentified cremated bones dated to 330 ± 30 and 370 ± 30 14C yr BP (1460–1650 and 1440–1650 cal. yr A.D., respectively) (Fig. 13a). Lithic debitage, ceramic shards, charcoal and stone clusters were also found in the upper layers. Toward the base of the mound, however, an area of mixed soils including a significant quantity of what appears to be natural red clays and sands derived from the local drift geology which capped a group of large pits (Fig. 13b). This capping layer was cut through by at least two deep post-holes of c.0.2–0.3 m diameter, one of which was immediately upright (Fig. 13b1), the other being set at near 45° and leaning northwards (Fig. 13b2). The post holes may be representing wooden poles put on top of burials as the ones described by Maniser (1930). In and around the capping layer several clay imprints were identified, consisting of small rings c.0.1 m in diameter, one of which showed the clear impression of a basket weave (Fig. 13c). Beneath the capping layer were three large, sub-rectangular, flat-bottomed pits that were cut between 0.35 and 0.45 m into the natural drift geology (Fig. 13b3–5), and a smaller fourth circular pit (Fig. 13b6). None of the sub-rectangular pits were intercutting and all three were orientated on rough variations of E–W. As we will describe below, the orientation of the pit matches the ethnohistorical and ethnographic information that described Kaingang burials where the body was lain in E–W direction. The long, thin central pit measuring 2 m by 0.35 m did cut through an earlier, deeper circular pit measuring 0.4 m in diameter which contained no finds but degraded charcoal flecks were observed in its fill, particularly at the base of the feature. The northern pit contained very few finds, with a larger number recorded in the southern pit. However, the central mound included the most finds, including the broken fragments of a complete ceramic bowl which, unfortunately, did not retain any evidence of residues adhering (Fig. 13d).
The interpretations of these pits must at this stage be tentative. Their overall form would suggest that they may have been dug with the intention of inhumation, which may be further supported by the recovery of the votive dish from the central mound. In opposition to this interpretation is that despite careful excavation no evidence of human remains were identified or recovered, although it is not impossible that bodies were not re-exhumed, or that they were only temporarily placed in these pits before being moved to a permanent burial position. There is also a question of the relative function of the circular pit to the larger sub-rectangular pits. These larger pits, although varying in form and exact orientation seem to have been knowingly dug so as not to intercut, or alternatively they may all have been created in a single episode. One further issue that was not resolved during the excavation was the relationship between these cut features and the ring of the MEC, although it would seem likely that they were cut through that earlier ring, but not necessarily before the addition of the rectangular MEC annex to the east. Prior to the construction of the heightened mound on this site, this position was still utilised for social activity, as evidenced by the circular impressions found in a number of positions above and around the earlier pits. The indication from one of the ring impressions would suggest this is linked to the placing of basket vessels at these points, although it is notable that there was otherwise little cultural material recovered from this area. The two deep post holes, one upright and the other at a diagonal, would also imply this area was being marked out, potentially by the placement of two or more massive posts. Subsequently the circular mound was built up, on the crest of which cultural debris

Fig. 9. The Leopoldo plateau.
would suggest a new episode of social activity taking place on the site, at a point where the MEC appeared to have reached its fullest extent. The excavation of a trench in the northern sector of the circular ring yielded a date of 1070 ± 70 14C yr BP (890–1030 cal. yr A.D.) supporting the fact that the circular ring is earlier than Mound B.

The excavations on this small portion of the Posto Fiscal site reveal a complex sequence of activity and changing architectural form that encapsulates the complexity of MEC development, a sequence that is both revelatory but also highlights how little these features are understood. It is only through further investigation on both the Posto Fiscal and comparable sites that we will be able to better understand the processes and social activity evident in the excavated evidence. For instance, how common was the process of pit digging and subsequent activity seen at Posto Fiscal at other sites? And were these features simply a stage in a more complex funerary or social procession? This is without asking about how and why the architecture of the MECs at sites such as Posto Fiscal developed, and what this tells us about the complexity of indigenous social groups.

Discussion

Fundamental structural features of historic Kaingang mortuary rituals

The southern Brazilian highlands is one of the few regions in the world where mortuary rituals associated with mound-building
have been recorded among the southern Jê in early European accounts during the 17th–19th centuries and investigated by ethnographers in the 20th century (e.g., Baldus, 1937; Becker, 1976; Crépeau, 1994, 2002; Maniser, 1930; Métraux, 1946; Nimuendajú, 1913; Paula, 1924; Da Silva, 2001; Veiga, 2000, 2006). Importantly, as mentioned before, funerary and post-funerary rituals are reported to be their single most important ceremony when the entire tribe gathered together showing their dual organisation (Baldus, 1937; Crépeau, 1994; Métraux, 1946; Nimuendajú, 1993 [1913]; Veiga, 2006). Furthermore, this is such a fundamental rite for these groups that the Kaingang community from Xapecó choose to take up again the cult of the dead to reinforce their identity in opposition the surrounding national society during the second part of the last century (Veiga, 2000). Unlike other Jê groups of Central Brazil, modern Kaingang do not build circular villages and therefore they do not demarcate space in terms of centre/periphery, masculine/feminine, public/private. However, Kaingang do establish a relationship between the halves and the E–W cardinal points. This spatial relationship is not apparent today in quotidian life, but becomes evident during the cult of the dead (Veiga, 2006: 81).

In this regard, the archaeology of the southern proto-Jê provides one area of especially fruitful research based on the fact that the long-term continuity of southern Jê groups and the construction of their funerary structures have been established (Crépeau, 1994; Laroque, 2000; Da Silva, 2001; Veiga, 2000, 2006; Zuch Días, 2005). Although we need to be aware that the MEC from the first half of the second millennium AD and the circumstances in which they arose are very different from the ones reported during the 17th–20th centuries for the profoundly transformed southern Jê as a result of the European colonisation of the region, there are general ideological and structural arrangements that appeared to be constant over time. In this section, we summarise aspects of Kaingang social and political organisation, their myth of origin and their cult of the dead that we deemed important in an attempt to interpret the highly structured archaeological patterns of southern proto-Jê mound and enclosure complexes documented archaeologically through reasoned analogies with the ethnohistorical and ethnographic record.

Contemporary Kaingang villages occur in the Brazilian states of São Paulo, Paraná, Santa Catarina and Rio Grande do Sul. They are one of the more numerous indigenous groups in Brazil today consisting of about 20,000 people according to 1994 estimations (Ricardo, 1995). These groups exhibit dual social organisation characterised by exogamic, patrilineal moieties called Kamé and Kainru. Kaingang moieties only represent the social aspect of an otherwise comprehensive dual conception of the universe. All beings, object and natural phenomena are divided in two cosmological categories, one link to the Kamé ancestral twin and the other to the Kainru ancestral twin. To understand Kaingang dual conception of the world we need first to briefly describe the Kaingang cosmogony myth. Although there is some controversy about the number and functions of sub-groupings within moieties (see discussion in Veiga, 2006: 80–95), in this article we only refer to the founding mythical moieties Kamé and Kainru.

The summary version of the origin myth presented below is mainly based in Veiga (2000). In the origin myth, the first world, corresponding to the mythical time, was destroyed by a catastrophic flooding, which covered all the earth with water except for the top of the Krinjijimbe mountain. The catastrophic flooding resulted in the drowning of the ancestral fathers, Kamé and Kainru, whose souls went to live in the interior of the Krinjinjimbe mountain. From the mountain they went out through two different paths, Kamé by the west and Kainru by the east. Kamé was born where the sun sets and Kainru was born in the hills where the sun rises (Veiga, 2000: 224). These two revived heroes rebuilt human society with their own hands and from charcoal ashes, recreating night and some important mammals. This second time is then marked by the return of the heroes of the world of the dead.

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**Fig. 11.** Mound and circular enclosures with a rectangular annex showing their similar orientation. (A) Posto Fiscal. (B) RS-PE-31 (Reco).
As Veiga (2000) points out, the creation of the world of the living is the deed of dead spirits.

This dualist cosmological conception emphasises the complementarity and fertility of these two principles perceived as opposites. Based on the ethnographic works on the Kaingang groups of Nonai, Iraí and Porto Alegre, Da Silva (2001: 101) proposed the following binary oppositions that express Kaingang dualism that are shown in Table 2. Kaingang moieties are complementary, but also asymmetrical and the archaeological and ethnohistoric records suggest the presence of sizeable, regionally organised, hierarchical societies (e.g., Crépeau, 1994, 2002; Fernandes, 2004; Laroque, 2000). There are several elements in the archaeological and ethnohistoric records that points to a certain degree of social complexity in the southern proto-Jê groups. In terms of political organisation, the account of Mabilde (1983) indicates that there were main chiefs and subordinate chiefs. Some big chiefs like the Cacique Braga were reported to be in command of 23 tribes (Becker, 1976: 111). Similarly, Fernandes (2004) describes how Kaingang groups were organised in factions in what he asserts is a classical example of a segmentary society, whose different segments have the capacity to articulate and act together. Each of these divisions of society consists of a local group formed by a group of families that were politically autonomous and holds their own territory. Regional integration of these segments was mediated by the principal chiefs, which governed over the subordinate chiefs responsible for each local group. Mabilde (1983) describes how each village can have more than 200 members and Borba (1908 apud Fernandes, 2004) describes how each sub-tribe could be composed of 50, 100 or even more members.

**Fig. 12.** Abreu and García mound and enclosure complex.
In terms of the funerary practices themselves, Mabilde’s account (1983) indicates that the construction of a mound was reserved for principal chiefs, while the funerary rites associated with subordinated chiefs were far simpler. When a Kaingang chief died, his subordinates were notified and appeared in the house of the dead chief. The transfer of the chiefly office to the dead chief’s eldest son during the burial ceremony also indicates an inheritance of the chiefly office. Fernandes (2004: 103) also highlights the role that festivities and rituals, in particular the ones of funerary nature, played in the integration of the different groups at a regional level. Overall, these historic records point to an established, moderate degree of political complexity in the Kaingang.

The dual social organisation of the Kaingang is particular shown during the *kiki*, Kikikoi or cult of the dead ceremony. The following synthesis of the *kiki* is based on information mainly summarized from Veiga (2000, 2006) on the Kaingang of the Posto Indígena de Xapecó in 1993, but also Crépeau (1994, 2002). Unlike other traditional societies, where the genesis of diseases is associated to disturbed social relations, such as witchcraft, the Kaingang believe that diseases originate outside the social world; more specifically they believe that their genesis is related to the world of the dead. Diseases come from the *numbê*, the village of the dead. Kaingang mortuary rituals emphasise a relationship of respect and fear to the spirit of the dead including body painting, purification of the widow(er), destruction of the deceased individual’s belongings and, importantly, the incorporation of the deceased to the world of the dead. All these actions take place during the *kiki* ritual, whose main purpose is to ensure the separation of the dead from the world of the living.

The *kiki* was recorded by Padre Montoya as early as 1628 (Veiga, 2000: 243). The first one to record the cult of the dead with certain detail was Maniser (1930) who assisted to it in 1915 among Kaingang of the São Paulo. The ritual integrated different groups and was carried out to “pray” for the dead and remember the creation of the world. It represents the integration of the deceased to the society of the dead through party/festivities that last at least 10 days and get together all communities link through consanguine and affinity bonds.

According to Veiga (2006) the tempo of the ritual is marked by the making of the three fires that takes place during three different nights. During the first fire, they cut down a Paraná pine, called *kõkêi*, that serves as the container for the ritual beverage. The trunk of the Paraná pine symbolises the dead, whose soul has weakened, dies detached from its roots, rots and is transformed into food. The *kõkêi* embodies the dead and is laid out in the dancing group in the same position as the dead in their burial place—head to the west, feet to the east (Veiga, 2000: 259).

Throughout the second fire they prepare the fermented beverage in the *kõkêi* and the third fire marks the climax of the ritual with the arrival of the neighbouring communities to the feast, following the path of the ancestral twins coming from the east and from the west. Importantly, each of these three consecutive fires consists of six hearths placed in a line on the dancing ground; three of them are located on the western side of the dancing ground belong to the Kamê and the other three on the eastern side belong to the Kainru. As we propose in the next section, it is tempting to make a parallel between these aligned fires where ritual feasting with food and beverages takes place during the *kiki* ceremony.
and the series of earth ovens and hearths excavated from sites PM01 and SC-AG-12.

In Xapécó, Veiga (2000) observed that during the first night, a feast took place around fires during which the participants recalled the first deeds of the ancestral fathers including the making of fire and the creation of animals from the ashes. By re-enacting the creation of the world, it is noteworthy that they are envisioning the mountain and its hole, called nga’dor, the latter representing the place from where founding twins emerged. Veiga (2000) argues the nga’dor, that also means burial place, represents the axis mundi breaching the world of the living and the dead. There is a powerful parallel here with the circular, concentric spatiality with a strong focus on the central burial mounds in southern proto-Jê MEC. As briefly mentioned before, during the first stages of the kiki, a Paraná pine is cut down and made into a recipient kõkëi where the beverage is going to be fermented. Unfortunately, the first accounts do not describe in detail the spatial relationship of the moieties Kamé and Kainru in cemeteries as described from historic Kaingang groups. Only the account of Mabilde (1983) from the Kaingang of Rio Grande do Sul provides information showing that during the burial ritual social space was demarcated around a circle following consanguine and gender lines. Mabilde (1983: 93) describes how after laying the deceased body of an important chief in the selected spot on the ground, the men form a circle around the corpse. The women and children of the deceased stayed inside the circle, with the eldest son staying close to the head of the dead. The women and children of subordinated tribes were only allowed outside the circle.

Several authors (Veiga, 2000; Crépeau, 1994; Da Silva, 2000) observed that during the kiki ritual in contemporary Kaingang cemeteries there is a spatial separation of both moieties between east and west. In the Kaingang of Xapécó, Veiga describes that this separation is related to the remembrance of how the ancestors walked out from the mountain during the recreation of the cosmogony myth. The dancing ground is a circle divided in halves by a row of ferns, which set apart the Kamé on the west and the Kainru on the east. During dawn of the third night, the moieties go to the houses of the kin of the deceased for whom the kiki is celebrated to get the crosses that represent the dead. Nowadays, a cross painted with the signs of the dead is a symbol of the dead. In the

Table 2
Dual opposition in Kaingang moieties (based on Da Silva, 2001).

<table>
<thead>
<tr>
<th>Ancestral twin Kamé</th>
<th>Ancestral twin Kainru</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second to come out of the earth</td>
<td>First to come out of the earth</td>
</tr>
<tr>
<td>Symbol of strength and power, hardness</td>
<td>Fragil, agil</td>
</tr>
<tr>
<td>West</td>
<td>East</td>
</tr>
<tr>
<td>Masculine</td>
<td>Feminine</td>
</tr>
<tr>
<td>Body painting: stripes, lines, open shapes</td>
<td>Circles, closed shapes</td>
</tr>
<tr>
<td>Paraná pine (Araucaria angustifolia)</td>
<td>Sete sangria (Symptococcus parviflora)</td>
</tr>
<tr>
<td>Sun</td>
<td>Moon</td>
</tr>
<tr>
<td>Day</td>
<td>Night</td>
</tr>
<tr>
<td>Thick body</td>
<td>Slim body</td>
</tr>
<tr>
<td>Large feet</td>
<td>Small feet</td>
</tr>
<tr>
<td>Persistent</td>
<td>Less persistent</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Permanence</td>
<td>Transformation</td>
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Fig. 14. Detailed topography of the Avelino plateau pit-house village.
well-known drawing of the cemetery of the Kaingang of São Paulo, Maniser (1930) included a wooden pole labelled with the words *ka kônguru* meaning painted pole, and again there is the temptation to link this to the deep post holes recorded at the excavations of Posto Fiscal site in 2011. Veiga (2000: 163–164) suggests that the change of the pole for a cross is a Christian adaptation. Body painting plays a crucial role during the mortuary ritual. Pain was believed to have rendered people invisible to the spirits of the dead protecting them from diseases and even death caused by the *vein kuprin* (the souls of the dead). As noted by Veiga (2000), in this context, painting is multi-referential. It strengthens people, scares away the dead, recalls the creation of the ancestral twins and classifies people in relation to their name, descent or ceremonial function.

At the cemetery, the service is conducted reciprocally between halves. The *Kamê* get the crosses of the *Kainru* and vice-versa. The crosses are brought to the cemetery and leaned against the *kôkêi* before being taken to the cemetery to be put in the burial places (Veiga, 2000: 233). When walking to the cemetery with the crosses, the *Kamê*, who are considered stronger in relation to the spirits of the dead, lead the way. At the cemetery, each moiety’s members pray over the burial places of the members of the opposite moiety. At that time, the neighbouring groups come from the east and from the west and this is also the time where the dead living in the *numbê* assists the *kiki*. During this phase of the ritual, the dead and the living are in the same space and transgression of social rules is allowed (Veiga, 2000: 227).

The existence of specific ritual figures like the *pein* and *tamper* clearly shows this emphasis of separating the dead from the living. During the *kiki* the only ones that are allowed to trespass a moiety’s boundaries are the “servers”, a ceremonial personage called *pein*. The *pein* employ two types of painting, and they are allowed to drink around both moiety fires (Veiga, 2000: 231). They are considered to have a special force, and therefore, the only ones who can touch the dead and dig the burial pit. They are chosen from infancy and they are given a particular name through an initiation rite where they receive a bath with herbs from the forest. Since Kaingang represent humans as coming from the interior of the earth, the *pein* are named with an “earth” suffix. The *pein* make the fires, perform the body paintings, chop the Paraná pine trunk to transform it into a drinking vessel, show the ingredients of the beverage to the prayers, mix the ingredients, attend the fermentation of the beverage and serve the participants of the feast. They also indicate the burial place of the recently dead where the prayers will dance and pray, carry the crosses, and remove the marks on the crosses in the final stage of the ceremony. There is another ceremonial personage or ritual specialist, the dancer or *tamper*. The *tamper* ceremonial group dances together with the role of impeding the dead from drinking *kiki*, a drink that is prepared for the living.

During the interment of the dead, Mabilde (1983: 93) describes the final placement of the body oriented with the feet to the west and the head to the east. The dead are buried with the head turned to the west so they can surely go to the *numbê*. Serrano (apud Becker, 1976) indicates that Kaingang groups lay a vessel close to the head of the dead and light a slow-burning fire close to the feet. The material possessions of the dead are also destroyed. As described by Veiga (2000: 155): “To prevent the dead for coming back to get what they belong to them, their swidden plots are destroyed, their vessels broken, their animals sacrificed and their personal objects buried with them.” This act of detachment from the world of the living also included revoking the name of the dead and the return of his or her name to the pool of names available for each moiety.

During the mortuary feast they would make ceremonial fermented beverages and invite neighbours to build the mound by carrying dirt loads in baskets until the mound attained a pyramidal shape. These are protracted, “time-extended” (sensus Dillehay, 1995) funerals. After the internment of the body and the construction of the mound, the burial place was periodically visited to clean the area of vegetation and to remember the dead with lamentation, dancing, songs and drinking. The German ethnographer Baldus (1937: 49) studying the Kaingang from Las Palmas noted that these large gatherings were cyclical and took place in autumn between April and June when maize is ripe, Paraná pine seeds are ready to collect and the beehives are full of honey (see also Maniser, 1930; Veiga, 2000: 224).

Crépeau (2002) notes that contemporary Kaingang cemeteries are always located to the east of the village. They consist of a fenced rectangle divided into an east–west axis demarcated by a shallow, thin, linear bank. On the westernmost side of this line is located the door of the fenced cemetery, which protects it from the intrusion of cattle. On the easternmost side of the earth line there is a large cross in front of the entrance. The members of each moiety are buried on the designated side of this line. In the community of Xapecozinho, Crépeau found that the *Kamê* are buried on the south side and the *Kainru* on the north side. However, in the neighbouring community of Pinhalzinho, the reverse is true, the *Kamê* are buried on the north and the *Kainru* on the south (Veiga, 2000: 74). Importantly, Crépeau (2002) also notes that the space at the cemetery is segregated in terms of low and high places.

After dancing in the cemetery, the moment when the dead are sent to the *numbê*, the Kaingang return to the dancing ground to perform the final dance. It is at this stage in the ceremony that the halves that were until this moment separated come together. They dance until the body paintings are undone and consume the remaining food and beverage as a single group. The last action of the ritual is to promise that they will not fight each other, which is symbolised by clasping the hands around the *kôkêi* and rolling it down once the entire beverage has been consumed.

In this section, we mainly described the *kiki* or cult of the dead described by Veiga, but the ethnohistorical and ethnographic accounts show that there was a diversity of rituals. Veiga (2000: 250) argues that there are at least three festivities called *kiki* or *kikkoia*. Another ritual consisted of remaking the mounds of the dead as described by Barbosa (1947; see also summary in Veiga (2000: 248–250)). Another ritual was concerned with secondary burials as described by Hansel (1928, see summary in Veiga (2000: 247–248)). As recorded by Hensel (1928: 69–70): “it is custom of the Indians [Kaingang] to disinter the bones of the chief, burying them in another place, once the flesh has rotten (…) they informed me, that next month they were going to make a big party, possibly to celebrate the transfer of the bones.” The third ritual is carried out to celebrate marriages, when boys are declared adults and the widow(er)s are ritually purified, allowing them to marry again.

Many of these fundamental organisational features appear to be pan-Jê characteristics of mortuary rituals, including burying the dead in a chamber pit with their belongings, building a mound on top of the burial, and practicing protracted mortuary ritual to detach the dead from the living (de Souza, 2007; Müller, 2008; Da Silva, 2001).

Despite the historical continuity of southern Jê groups in the region it is difficult to make direct extrapolation from the ethnohistorical and ethnographic records to the mound MEC that began to be built during the first millennium A.D. However, there appear to be some fundamental features of Kaingang social organisation and mortuary rituals that can help us interpret the southern proto-Jê MEC. There are some general principles related to the organisation of space in cardinal directions (E–W), topography (low and high places), dominant symbols possibly related to the cosmogony.
myth like the mound-mountain association and the circular and concentric spatiality with a central focus on the mound that can helps us assign meaning to the southern proto-Jê MEC.

**Interpretation of southern proto-Jê MEC**

In this section, we focus on the interpretation of small paired mound and enclosure complexes using general organisation principles extracted from contemporary Kaingang mortuary rites described in the previous section.

We interpret the small southern proto-Jê MEC as the material representation of a dual ranked opposition materialised in proto-Jê moiety cemeteries where important persons associated with local groups and communities were buried. As shown previously, the majority of small MEC along the Pelotas and Canoas river basins exhibit dual patterns of architecture. The presence of dual patterns in public architecture, such as the presence of paired mounds appears to be related to the material representation of the dual social organisation characteristic of these Jê societies. Furthermore, most of these paired sites show a SW–NE alignment, structures of unequal size with the larger structure generally located on the west side and on a slightly higher topographical location. Kaingang moieties though complementary are asymmetrical (Crépeau, 1994, 2002, 2005; Veiga, 2006). The Kamê moiety, the preeminent half, which is associated with more positive aspects like being stronger and more intelligent, is coincidently associated with a W cardinal direction where most larger rings are located. This ritual separation of space in southern proto-Jê small paired funerary structures, similar to the ones described in modern Kaingang cemeteries (Crépeau, 1994, 2002; Veiga, 2000), appears to be representing a dual ranked opposition.

The circular enclosures of small MEC represent the creation of a bounded area in which to undertake mortuary rites. The rims of small paired rings are relatively shallow standing below 0.3–0.5 m above the ground. These are not imposing mortuary monuments that were built to be seen from far away. They were built to demarcate the space in order to include or exclude people in social terms, but not in physical terms. The banks are modest and the boundaries were rather permeable. They indicate that if movement was constrained, it was by custom and convention. The topography of sites shows that enclosures are not always constructed on a levelled terrain. The interiors of the small enclosures are often lower than their exteriors. This could be in part related to the removal of soil from the internal sector of the site to build the rim, but it is more likely the intentional transformation of the interior sector of the ring into a shallow, small sunken court (Fig. 5a). The circular shape of the funerary structures “resemble” the historic observation showing that people from different tribes came to the funeral and formed a circle surrounding the deceased (Métrax, 1946). As described in Mabilde’s account (1983) circles around the funerary mound may have represented the segregation of space along consanguineal, age and gender lines. Their circular spatiality and concentric arrangement of space have a focus on the centre of the ring. This is consistent with the suggestion of Veiga (2000) that identifies the mound as the recreation of the Krimijimbe in what she calls the “mound-mountain” symbol. Veiga (2000: 227) hypothesises that the traditional Kaingang may have built a mound to reproduce the shape of a mountain peak in relation to the myth of cosmogony. The centre of these funerary structures represents the axis mundi connecting the living and the dead. In Veiga (2000: 227) own words: “The place of interment represents an invisible door that links two “planes” of Kaingang world: on the ground the mortals and below ground, the mythical level of the ancestral world.” It is unsurprising that the inner part of the circle where the mound is constructed is also in a lowered plane, resembling a small sunken court that augments the higher position of the mound. MEC are also positioned in relation to natural localised features such as rock outcrops, which occupy the highest spot of these hills. This may also be related to the cosmogony myth in which the ancestral twins emerged from the top of the mountain. It is tempting to imagine as illustrated in Fig. 4c, which shows a view of the hills behind the larger mound of Abreu and García, that the mounds may have been constructed with the idea of mimicking the mountains in the background, in a similar way on how Andean pyramids imitates the Apus (e.g., Moore, 1996).

At a landscape level, the intervisibility of mound and enclosure complexes and the number of alignments found at the Avalino plateau suggests planning at an inter-MEC scale, pointing to the construction of a highly structured built landscape revolving around mortuary earthworks. The construction of the southern proto-Jê mound and enclosure complexes suggest the desire to present human remains in a staged environment within the landscape that appeared to be associated with prolonging the social life of certain individuals by burying them in funerary structures. This is consistent with ethnographical accounts (Mabilde, 1983), which narrates that the construction of a mound was reserved for principal chiefs, while the funerary rites associated with subordinate chiefs were far simpler. The staging of the dead in the landscape and the construction of funerary structures, which are likely associated with the origin myth suggest a connection of the dead with the ancestors. It appears that in the past these funerary structures where in part used to venerate the ancestors.

The number of small MEC, many of which are associated with pit house villages, indicates as previously noted by Saldanha (2005, 2008) and de Souza and Copé (2011) that these are funerary structures associated with local groups. However, they appear to be the cemeteries for important local chiefs and not village cemeteries. We tentatively interpret them as cemeteries of important persons likely associated with the moiety ancestor cult. These funerary structures likely served for the veneration of past chiefs, which in turn, symbolically associated living chiefs with ancestral chiefs.

Larger mound and enclosure complexes appeared to be highly integrative facilities, as postulated by de Souza and Copé (2011), which brought together larger groups of people. It is interesting to note that only at these larger enclosures have entrances been identified (PM01 and SC-AG-37), and so far it is only in these sites that rows of earth ovens have been recovered, as at PM01 and SC-AG-12.

Our research has also shed new light on the construction history of these mortuary structures. We have presented evidence that the introduction of rectangular enclosure architecture occurred in the context of re-developing existing circular enclosure groups. This suggests a conscious effort to establish continuity with earlier ancestral lineages even if there had been dramatic changes in social worldviews. To our knowledge, there are no enclosure complexes that were developed in this area as rectangular from the beginning, and these additions may represent significant, but not yet fully understood, changes to these social formations.

**Conclusions**

Complete maps of all previously-known and newly-discovered sites indicate that the ceremonial/mortuary mound and enclosure complexes in Pinhal da Serra have been positioned in carefully chosen locations, exhibiting recurrent paired oppositions, and showing potential significant alignments, orientations and diverse viewsheds. Detailed topographical surveys of entire plateaus are revealing a cultural landscape in which funerary/ceremonial structures and habitation pit-house villages were carefully oriented and aligned. However, much more topographical and excavation work...
remains to be done to understand southern proto-Jê built landscapes and the mortuary features at MEC.

MEC were the arena of key mortuary rituals integrating processes, dancing and feasting in ceremonies that integrated communities at different scales, validated social distinctions and possibly restated cosmogonies. Small paired MEC appear to have been the cemeteries for important local chiefs and were likely associated with moiety ancestor cults. That these mortuary rituals and the burial of important persona took place in these specially prepared places, staged on prominent locations in the landscape, which were likely related to ancestor cult, indicates the importance of these rituals in creating and legitimising power.

Our analysis shows that, despite the tragic consequences of the arrival of Europeans to the region, continuities between the ethnographic, ethnohistorical and archaeological lines of evidence can be still seen for the southern Jê groups. However, the evidence also shows major changes. Interpretation of the mound and enclosure complexes constructed during the first half of the second millennium AD and the circumstances in which they arose differ from those reported during the 17th–20th centuries. While the latter mainly described the construction of a single mound with a surrounding ditch for the burial of an important chief (Métraux, 1946; Müller, 2008), mounting archaeological data from the Pelo-tas and Canoas river basins suggest the construction of a highly structured, built landscape revolving around mortuary earthworks much more elaborated in architectural terms than the ones described in post-Columbian times. This opens a whole new avenue of research to move beyond interpretations that simply match the ethnographical/ethnographic accounts toward more nuanced interpretation of these complex phenomena in the future.

Overall, recognition of the distinctiveness of southern Jê built sacred landscapes and mortuary architecture in relation to other Andean (Dillehay, 2007; Schwarz and Scott Raymond, 1996) and South American lowland groups (Cabral and Saldanha, 2008; Bono-mo et al., 2011; De Blasis et al., 1998; DeBoer, 1997; Heckenberger et al., 2008; Iriarte et al., 2004; López Maz, 2001; Redmond and Spencer, 2007; Schaan, 2012; Siegel, 1999) contributes to the comparative study of the rise and dynamics of complex societies in lowland South America and elsewhere where similar funerary complexes have been documented (Bradley, 1998; Carr and Case, 2005; Mainfort and Sullivan, 1999; Thompson and Pluckhahn, 2012). More importantly, this study presents new data and interpretations bearing on the conditions responsible for creating different forms of cultural complexity and the appearance of ceremonial architecture in Early Formative societies in the Americas.

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