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Ditched and walled enclosures in Prehistoric Iberia (4th-3rd millennia cal. BCE): Like oil and water

Recintos fosados y murados en la Prehistoria de la península ibérica (IV-III milenio cal. ANE): como el agua y el aceite

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Abstract

Iberian Copper Age «ditched» and «walled» enclosure sites are often thought to represent two clearly distinguishable groups of sites. However, the discovery of sites where both ditches and walls are present («mixed sites») complicates things. There are good reasons to question whether the aforementioned dichotomy is real, or if, instead, it is largely an artifact of research, resulting from a combination of poorly preserved archaeological contexts and inadequate survey strategies and methods which missed the potential integration of both building techniques at the same sites. This paper will address this problem from a Pan-Iberian perspective, as we will compare type-sites across multiple Iberian regions. We shall formulate and test seven relevant hypotheses by undertaking multiple comparative analyses at various scales on top of a purpose-built database including 345 sites. Among others, we will address questions such as: How frequent or rare are mixed sites? Is the perceived duality of the archaeological record (ditched versus walled) a by-product of preservation issues or the differential availability of certain building materials? Did walled and ditched enclosures really coexist in space and time? We conclude that: (a) Chalcolithic Iberian enclosures are markedly dichotomous (ditched vs walled); (b) «mixed» sites are rare exceptions rather than the rule; (c) walled and ditched enclosures show important differences in key features (topographic setting, geographical distribution); (d) such differences cannot be solely attributed to geological factors. The

Resumen

Es frecuente en la literatura especializada que se distinga entre dos tipos de recintos en la Edad del Cobre de la península ibérica: «fosados» y «murados». Sin embargo, la existencia de sitios rodeados tanto por muros como por fosos complica la cuestión. Hay buenas razones para preguntarse si la mencionada dicotomía es real o si, por el contrario, es artificial, provocada por una combinación de mala conservación de los contextos arqueológicos e inadecuados métodos y técnicas de investigación, que han podido ocultar la integración de ambos tipos de técnicas constructivas en los mismos sitios. Este artículo aborda este problema desde una perspectiva panibérica, basada en la comparación entre yacimientos de numerosas regiones peninsulares. Se enuncian y ponen a prueba siete hipótesis al respecto mediante análisis comparativos a diferentes escalas, a partir de una completa y actualizada base de datos diseñada *ex profeso* e integrada por 345 yacimientos. Entre otras, se abordan cuestiones como: ¿cuál es la frecuencia de los sitios «mixtos» en el registro arqueológico? ¿Es la aparente dualidad del registro arqueológico (fosos frente a muros) consecuencia de problemas de conservación de la evidencia, o de la disponibilidad diferencial de ciertos materiales de construcción? ¿Realmente coexistieron en el espacio y el tiempo los recintos de muros y de fosos? Las principales conclusiones son: (a) existe una marcada dicotomía en los recintos calcolíticos peninsulares (fosos/muros); (b) los recintos «mixtos» son muy poco frecuentes; (c) los recintos murados y fosados presentan

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Los autores declaran que no hay conflicto de intereses.

paper will end with a discussion of possible explanations for this dichotomy.

Keywords. Copper Age; Iberian Peninsula; ditched enclosures; walled enclosures; spatial analysis; lithological analysis; geographical distribution.

importantes diferencias entre ellos en aspectos clave (ubicación topográfica, distribución geográfica); (d) tales diferencias no pueden únicamente atribuirse a factores geológicos. El artículo finalizará con una discusión de las posibles explicaciones para esta dicotomía.

Palabras clave. Edad del Cobre; península ibérica; recintos de fosos; recintos murados; análisis espacial; análisis litológico; distribución geográfica.

1. INTRODUCTION: DITCHED AND WALLED ENCLOSURES IN CHALCOLITHIC IBERIA

The archaeological record from the 4th millennium cal. BCE in the Iberian Peninsula features megaliths (such as chambered tombs), rock art, pit sites and ditched enclosures. Much of this was also common across Western Eurasia at the time. However, this changed in the 3rd millennium cal. BCE, a period of time that, in Iberia, is generally called the Chalcolithic or Copper Age. Roughly coinciding with the appearance of metallurgy in SW Europe, very significant changes took place in mortuary practices, settlement patterns and monument building that differed markedly from other

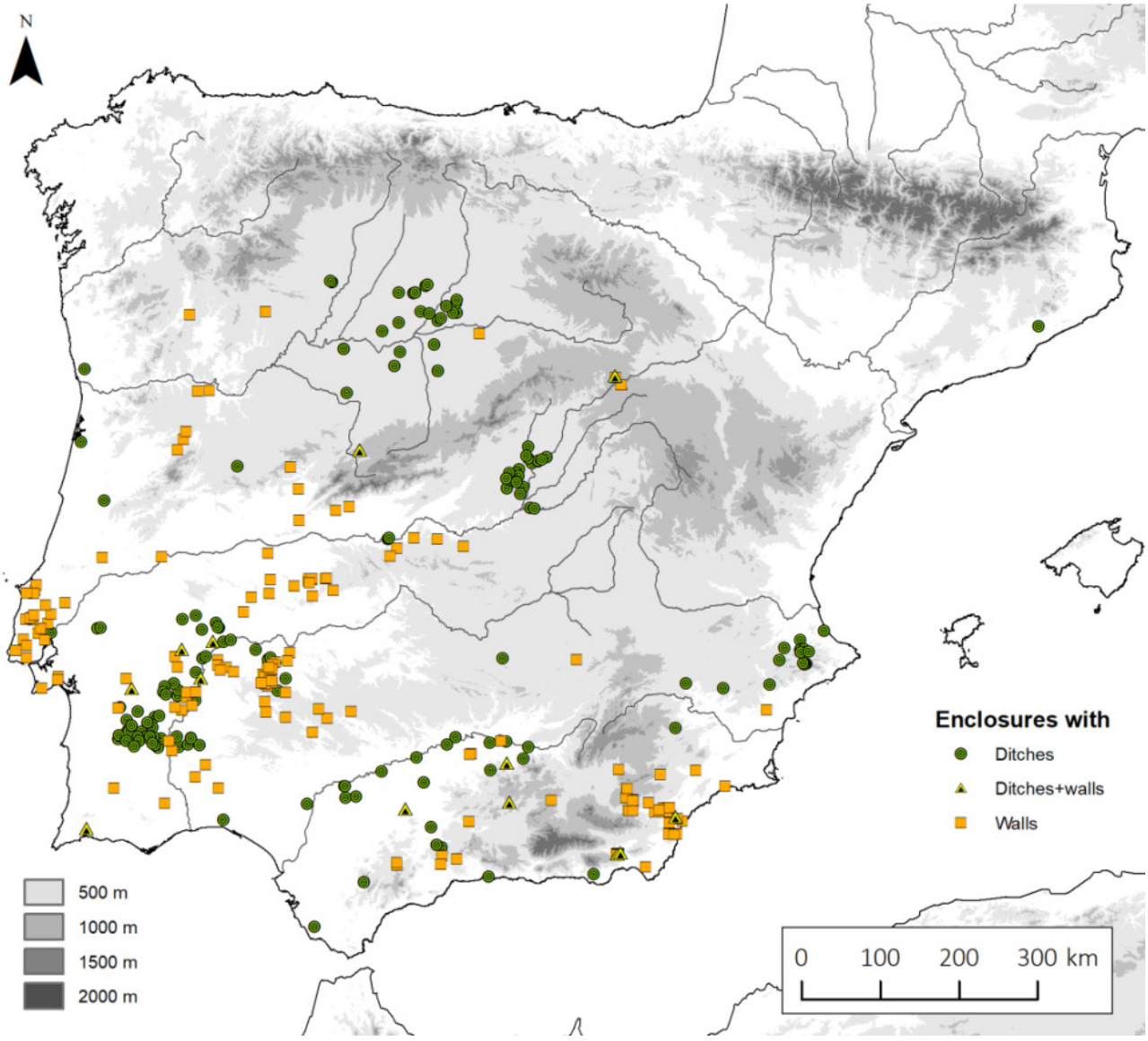

Figure 1: Location of the 345 Iberian enclosures analyzed in this paper

regions of Europe. For instance, an entirely new kind of megalithic tomb emerged: the *tholos*, a passage grave characterized by a corridor and a corbelled dome circular chamber. Trade networks expanded, and raw materials, in addition to rare or exotic finished objects, arrived at Iberia from many parts of Europe and the Mediterranean (for a summary with full references, see e.g. Lillios, 2019: ch. 5). More importantly for us, many ditched and walled enclosure sites appeared.

Ditched and walled enclosures coexisted in some way in Iberia between c. 3000 and 2200 cal. BCE (Fig. 1) (Balsera, Bernabeu Aubán *et al.,* 2015: 146-153). By «ditched enclosure» we mean an otherwise open space circumscribed by one or more, usually concentric, enclosing ditches (see e.g. Márquez-Romero & Jiménez-Jáimez, 2010) (Fig. 2), whereas by «walled enclosure» we mean a space delimited by stone enclosing walls (Fig. 3) (see e.g. Jorge, 1994). The history of research on Prehistoric Iberian ditched enclosures is quite different from that of walled enclosures. The first Chalcolithic walled enclosures in the Iberian Peninsula were identified and excavated in the last decades of the 19th century and therefore have a long history of research and interpretation (Chapman, 2003: 101-112).

By contrast, ditched enclosures were first recognised in Iberia almost a century later, and constitute a much younger topic of inquiry (Jiménez-Jáimez, 2015); there is still no consensus on how to interpret them (Chapman, 2008; Lillios, 2019: 186-189). For some, Copper Age ditched enclosures were densely populated permanent settlements where people lived all year round. Given their size, they must be considered the earliest large population centers in Iberian Prehistory

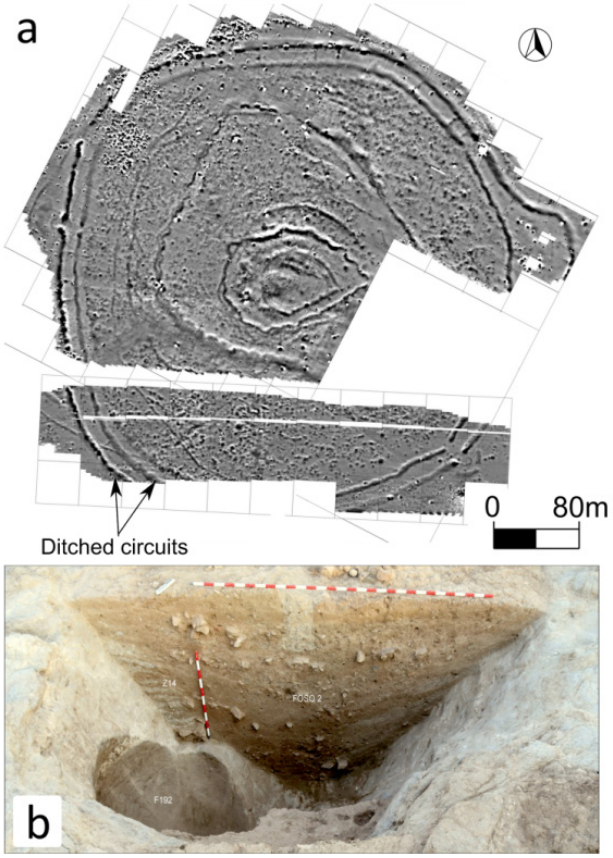

Figure 2: Two images of Perdigões (Reguengos de Monsaraz, Portugal), a paradigmatic example of Iberian Copper Age ditched enclosure site. (a) Magnetometry showing a number of ditched circuits (darker shades), in addition to countless pits (modified from Márquez-Romero *et al.,* 2011: fig. 5). (b) Section of Ditch 2 at Perdigões during excavation (Milesi García *et al.,* 2019)

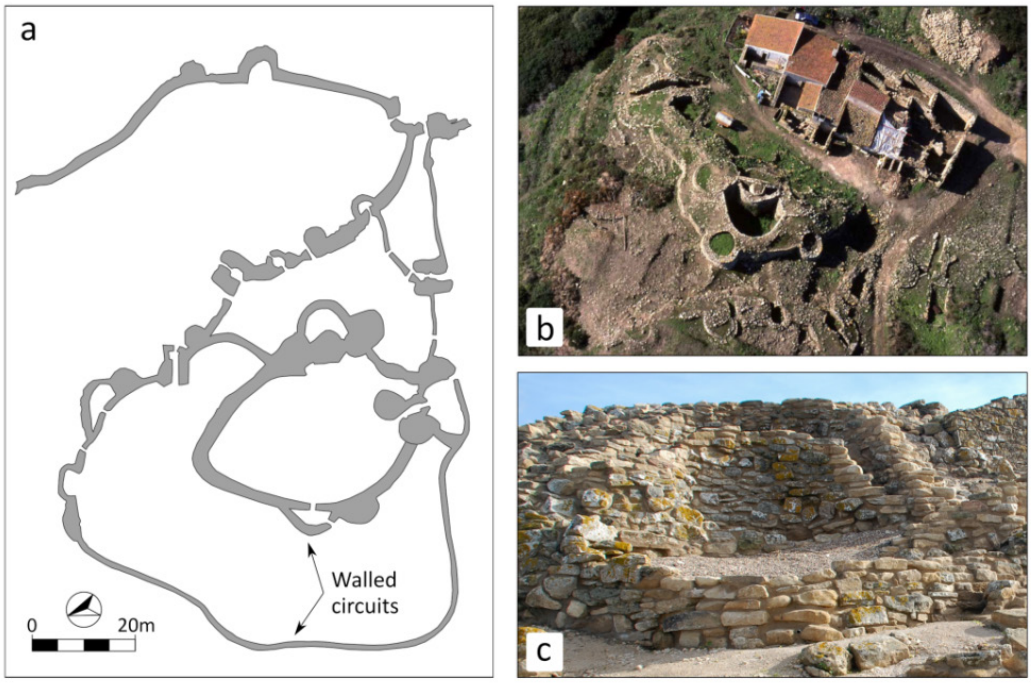

Figure 3: Three views of Zambujal (Torres Vedras, Portugal), an example of Iberian Copper Age walled enclosure site. (a) Simplified floor plan of Phase 2 (modified from Kunst, 2006: fig. 6.13). (b) The site in October 1994 from an elevated viewpoint (photo by Michael Kunst, CC BY-SA 3.0). (c) Stone masonry wall in situ (photo by Câmara Municipal de Torres Vedras, CC BY-NC-ND 2.0)

(Díaz-del-Río, 2004a, 2004b, 2013). Others go beyond this to postulate the existence of urban or proto-urban features as well. Accordingly, these ditched enclosures have been described as «power centers» in the context of highly unequal societies (e.g. Cruz-Auñón y Arteaga, 1999; López Aldana & Pajuelo Pando, 2001, 2011; Morán Hernández, 2014; Nocete Calvo, 2001, 2014). If true, they would represent the earliest state-level social organizations in Western Europe. Still other researchers view them as places for sporadic or periodic gathering, densely occupied only at certain times (Márquez-Romero, 2003, 2006; Márquez-Romero & Jiménez-Jáimez, 2010).

Ditched and walled sites are often thought to represent two clearly distinguishable groups of sites, not just due to their dissimilarities as regards building materials, but also because of differences in layout and internal features (Castro Martínez *et al.,* 1996: 85; Delibes de Castro *et al.,* 1988: 270; Gonçalves, 2003: 318-319; Gonçalves *et al.,* 2010: 539; Hurtado Pérez, 2008; Lillios, 2019: ch. 5; Márquez-Romero *et al.,* 2018; Márquez-Romero, 2003: 278-279; Márquez-Romero & Jiménez-Jáimez, 2010: 520-533; Risch, 2017; Sousa, 2010: 513-514; Valera, 2012: 167, 179; Valera, 2015: 414-416).

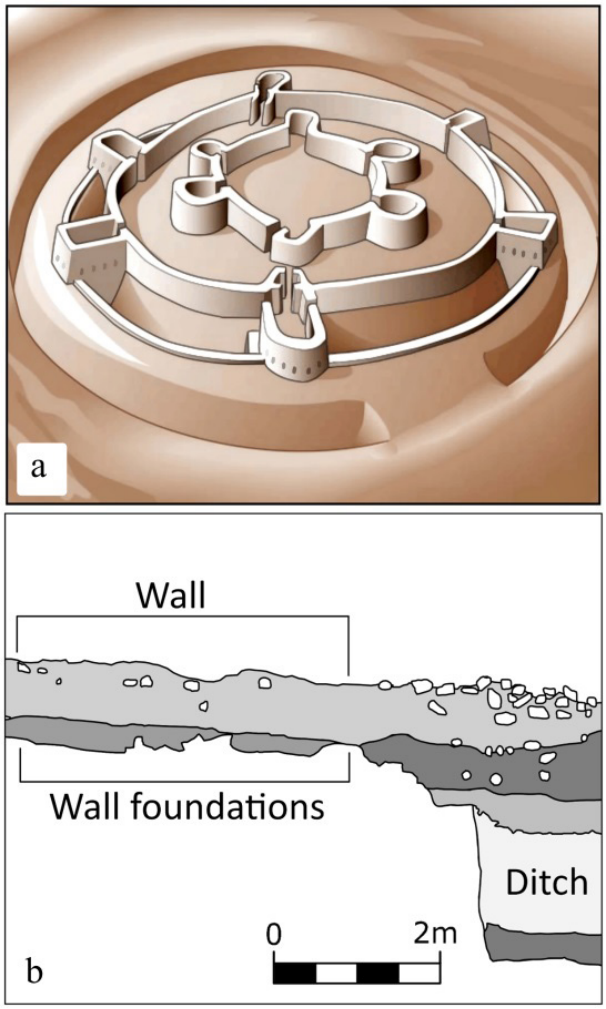

Figure 4: Two examples of mixed enclosure sites in Copper Age Iberia which combine ditches and walls. (a) Recreation of Fortín 1 Los Millares (Santa Fe de Mondújar, Almería, Spain), by GEPRAN and M. Salvatierra (Cámara Serrano & Molina González, 2013: fig. 5). (b) Stratigraphic profile of trench 25 (parcela 2-4, sector UA23) at Marroquíes Bajos (Jaén, Spain) (modified from Zafra de la Torre *et al.,* 1999: fig. 5)

However, the discovery of sites where both ditches and walls are present («mixed sites»), such as Monte da Ponte (Évora, Portugal) (Kalb & Höck, 1997), Marroquíes Bajos (Jaén, Spain) (Zafra de la Torre *et al.,* 1999) and San Blas (Badajoz, Spain) (Hurtado Pérez, 2004), complicates things (Fig. 4). There are good reasons to question whether the aforementioned dichotomy is real, or if, instead, it is largely an artifact of research, resulting from a combination of poorly preserved archaeological contexts and inadequate survey strategies and methods which missed the potential integration of both building techniques at the same sites (e.g. Arnaud, Diniz, Neves, & Martins, 2014: 12; Calado & Rocha, 2007: 41; Cámara Serrano, 2001: 182; Cámara Serrano *et al.,* 2011: 71; Cámara Serrano & Molina González, 2013: 106-109; Parreira in Gonçalves *et al.,* 2010: 548; Calado in Gonçalves *et al.,* 2010: 555; Gonçalves *et al.,* 2013: 91; Kalb & Höck, 1997: 421; Mataloto & Boaventura, 2009: 58-59; Ramos Millán, 2007: 44).

The present paper poses the following research question: does a categorical distinction between ditched and walled enclosures accurately describe the currently available archaeological evidence from the 3rd millennium cal. BCE in Iberia? Or are we, instead, artificially maintaining a useless dichotomy (walled vs ditched) where a continuum of practices existed? By doing that, are we creating a distorted image of the Copper Age in Iberia, because of the limitations of the archaeological record and our own biases?

In order to meet our objectives, we have conducted an exhaustive literature review and assembled a database including 345 sites and 248 bibliographic references[1]. To our knowledge, it is the most comprehensive and up-to-date database of Chalcolithic Iberian walled and ditched sites created thus far. Our approach will be Pan-Iberian. More specifically, we shall test some relevant hypotheses by undertaking multiple comparative analyses at various scales:

- Hypothesis 1: *sites comprising both walls and ditches (mixed sites) are much more common than generally assumed*.
- Hypothesis 2: *many mixed sites appear to us archaeologists as either ditched or walled sites because of inadequate research methods*.
- Hypothesis 3: *many mixed sites appear to us archaeologists as either ditched or walled sites because of preservation issues*.

1. To consult the supplementary data https://doi.org/10.6084/m9.figshare.27159378

- Hypothesis 4: *ditched enclosures were built where there was not suitable hard construction material to erect walls*.
- Hypothesis 5: *ditched, walled and mixed enclosures were all close in space and time*.
- Hypothesis 6: *the topographic settings of ditched and walled enclosures are different*.
- Hypothesis 7: *ditched and walled enclosures are homogeneous categories internally*.

The article will end with a return to the main research question in light of the results obtained: is the ditched-walled dichotomy real and worthy of further consideration? We will also discuss some possible explanations for our results and suggest future avenues of research. Nevertheless, before we begin, and in order to frame the discussion, it is necessary to briefly describe the most remarkable features of ditched, walled and mixed enclosures, and their interpretations in the current literature on the subject.

2. A SUMMARY OF THE ARCHAEOLOGICAL EVIDENCE

2.1. Ditched enclosures

Ditched enclosures are generally flat areas enclosed by one or more V or U-shaped ditches with an oval or roughly circular layout (Fig. 2). Enclosing ditches possess variable dimensions, but most are 1-3 m deep and 2-3 m wide. There are, nevertheless, individual features with outstanding size, reaching a width and/or depth of 7-8 m. Though still of overall subcircular appearance, some recently observed layouts include wavy or sinuous ditches (Valera & Becker, 2011), such as enclosure 6 at Valencina de la Concepción (Mederos Martín *et al.,* 2021: fig. 3). Although some causewayed enclosures are known (e.g. Delibes de Castro *et al.,* 2014), in most cases the ditches are continuous, except for few interruptions that may have served as entrances. At Perdigões, for example, 15 circuits have been documented, with 5 entrances clearly aligned with astronomic events such as sunrise at certain times of the year. Some entrances included additional fence-like ditch segments. Indirect traces of possible earthen banks and remains of palisades parallel to ditches have been recorded at Perdigões and other sites (Márquez-Romero *et al.,* 2011).

A quick look at the literature immediately suggests that they are usually placed in easily accessible, low-lying lands prone to flooding or in the proximity of watery locations. Sometimes the surroundings are at a higher level than the site area itself; e.g. at La Pijotilla or Porto Torrão. There are even examples of settings shaped like a Greek theater; e.g. Perdigões.

The area occupied by ditched enclosures, where known, is very variable, ranging from less than 1 ha to more than 100 ha, the latter often being described as «mega-sites». As an example, the outer ditch at La Pijotilla (Badajoz, Spain) (Hurtado Pérez, 2008) enclosed an estimated area of nearly 80 ha; Valencina de la Concepción (Seville, Spain) about 197-200 ha (Mederos Martín *et al.,* 2023: tab. 3); and Porto Torrão (Ferreira do Alentejo, Portugal) around 100 ha (Valera, 2018a); while Perdigões (Reguengos de Monsaraz, Portugal) covers 16 ha (Valera *et al.,* 2014).

The archaeological evidence at Iberian ditched enclosures consists mostly of underground features. In other words, within the area defined by the ditch systems, almost no standing or walled structures that can be directly associated with the ditches have been recorded. Instead, hundreds or thousands of apparently randomly distributed pits are generally found. Pit dimensions range from a few cm deep by 1 m in diameter, to 3 m in both diameter and depth, with rare exceptions exceeding 5 m in diameter. The fills of ditches and pits usually contain complex assemblages suggesting a wide range of activities: ceramic sherds, flint tools and knapping waste, quern stones, animal remains – sometimes complete – and human remains, amongst other artifacts and ecofacts. Some have been clearly placed deliberately, perhaps as part of rituals of some sort. Surface circular huts or houses, 3 to 6 m in diameter, sustained by narrow foundation trenches, have been recorded; this can be seen, for instance, at El Casetón de la Era (Delibes de Castro *et al.,* 2016: 391). Sunken features interpreted as houses have been identified, amongst other sites, at Valencina (Schuhmacher *et al.,* 2019).

Dating the construction of ditches is difficult; the meaning of radiocarbon dates can easily be misunderstood because the amount of time passed between the construction of the ditch and its upper fills is hard to determine (Aranda Jiménez *et al.,* 2016; Valera *et al.,* 2014: 14). Even so, radiocarbon dates can give us valuable chronological indications, especially in comparative terms, and particularly when the radiocarbon samples come from contexts that also contain artifact typologies consistent with those dates. With this in mind, data currently available suggests that the vast majority of ditches were filled between *c*. 3200 and *c*. 2000 cal. BCE (Balsera *et al.,* 2015: 148-153; Castro Martínez *et al.,* 1996: 88-91; Valera, 2013). However, fresh radiocarbon determinations point towards an earlier start date for this process in southern Iberia: as early as the second quarter of the 4th millennium cal. BCE in central Andalusia (García Sanjuán *et al.,* 2020), and *c*. 3500-3400 cal. BCE in the Portuguese Alentejo (Valera, 2018b: 30).

Sometimes, these sites exhibit rather complex internal sequences, with a high number of concentric ditches («circuits», as Oswald *et al.,* 2001 put it). When dated, most times these are proved to be the product of diachronic processes of ditch-digging. This suggests that these places were under use for a long time, an impression reinforced by the frequent recording of multiple re-cuttings of old ditches and a considerable number

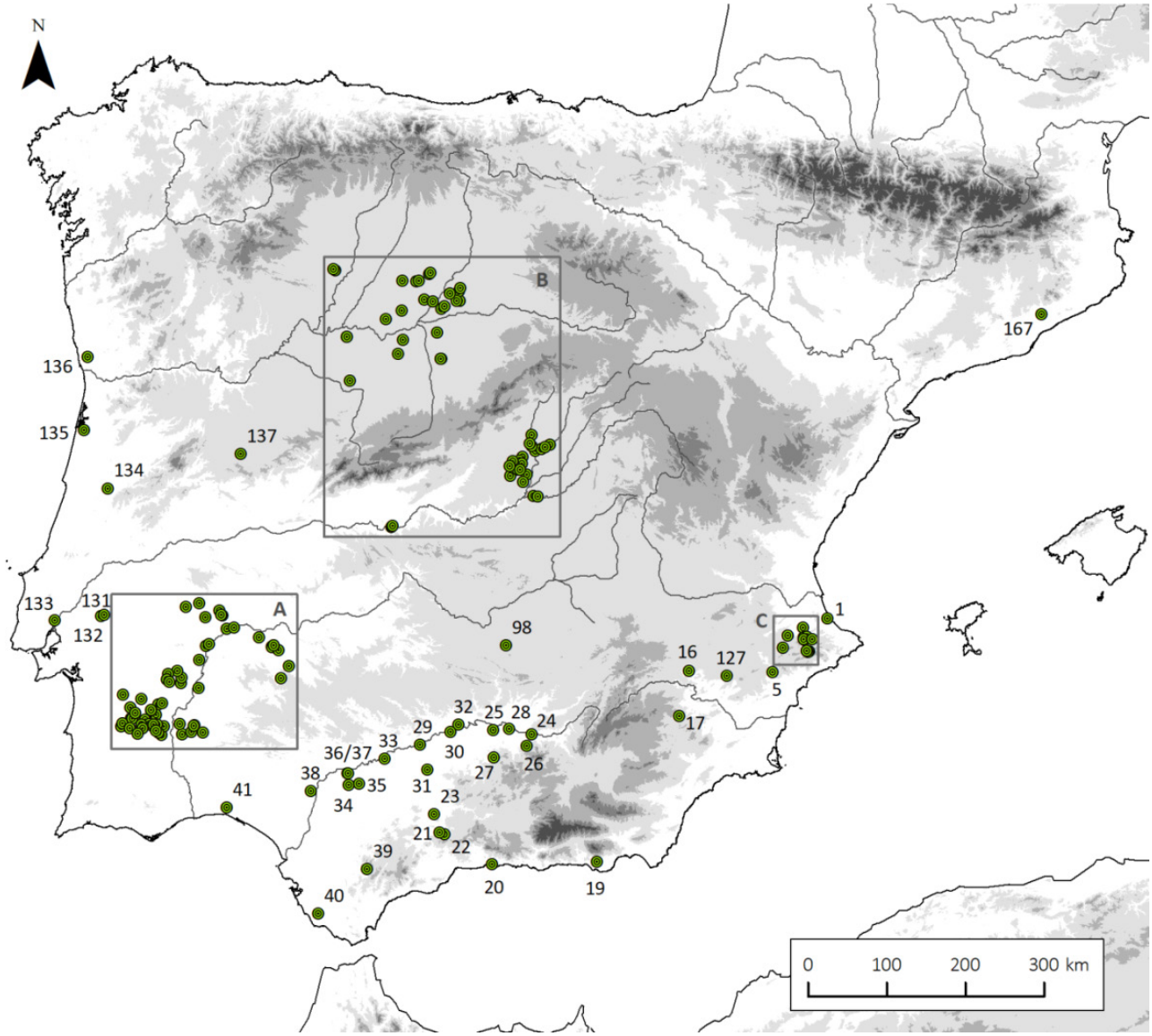

Figure 5: General map for the 167 ditched enclosures. Numbers refer to the «Label» field in the main dataset (supplementary data). Grey squares are amplified in Fig. 6

of intersecting pits with heterogeneous chronologies. Some, like Valencina, La Pijotilla, Perdigões and Porto Torrão, include chambered tombs – normally of the «passage grave» type –, rock-cut tombs and other funerary structures. The temporality of all these elements relative to each other is a key issue that remains unresolved in most cases.

Their geographical distribution reaches mostly the Guadiana and the Guadalquivir basins, the northern and southern Meseta and parts the Mediterranean coastal regions (Figs. 5-6).

2.2. Walled enclosures

Today, Chalcolithic walled enclosures are known to have existed, in addition to the initially recognised core areas – the Iberian South East and the Portuguese Estremadura –, in distant regions such as both sides of the Guadiana basin, the lower Douro valley, the central Tagus basin, the upper Guadalquivir and the highlands surrounding the central Iberian plateau (the Meseta) (Figs. 7-8).

The ground plans of Copper Age Iberian walled enclosures vary in shape, often in relation to the local topography. They may comprise more than one concentric walled line. Walls were built in stone masonry (Fig. 3). Sometimes, adjacent to the outer side of the walls, circular or semicircular buildings in the shape of «bastions» and «towers» are found. Occasionally, the existing passages or entrances are quite elaborate. Usual topographic locations for walled enclosures include flat hilltops, cliff edges and high rocky tors, so they generally possess a good degree of visibility of the surrounding landscape (and from it to the place itself). Most walled enclosures are small, as they do

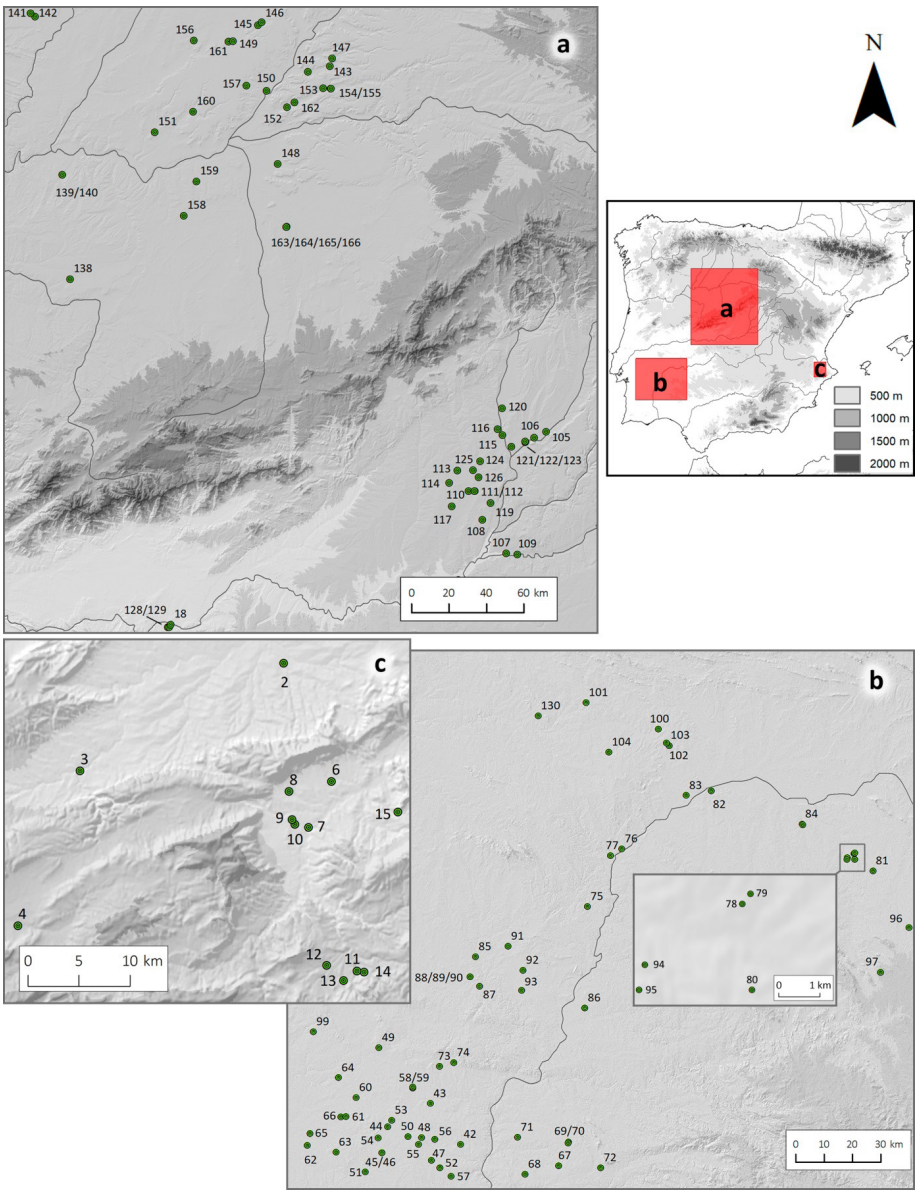

Figure 6: Detailed map of ditched enclosures indicated by grey squares in Fig. 5

not surpass 1 ha in size, although there are exceptions to this.

The enclosed space at walled enclosures is normally occupied by circular huts or houses with stone masonry foundations and floor deposits (Cámara Serrano *et al.,* 2022); walls and roofs are thought to have been made of perishable materials. Pits do exist, but seemingly to a much lesser extent than at ditched enclosures. The occurrence of special depositional practices is noticeably less obvious at walled sites. Human remains, for example, are rare within the enclosed areas, with few exceptions.

The earliest walled enclosures are dated considerably later than the first known ditched sites, i.e. *c*. 3000 cal. BCE, with slight regional differences. Some were unenclosed places before the construction of the walls, although these pre-enclosure phases will not be examined here. The disappearance of walled enclosures shows considerable regional variability: while a majority of sites in the SW were abandoned *c*. 2500, others in the SE were in use until *c*. 2200, and a few in northern Portugal saw significant activity in the 2nd millennium cal. BCE (already in the Bronze Age) (Balsera *et al.,* 2015: 146-148; Castro Martínez *et al.,* 1996: 80-81; Mataloto & Boaventura, 2009: 58-62; Molina González *et al.,* 2004; Valera, 2015: 411).

In short, while it is true that the material employed in their construction is the most visible difference between ditched and walled enclosures, it is not the only one by any means.

2.3. Mixed enclosures

In the last couple of decades, a number of sites that appear to have been enclosed by a combination of

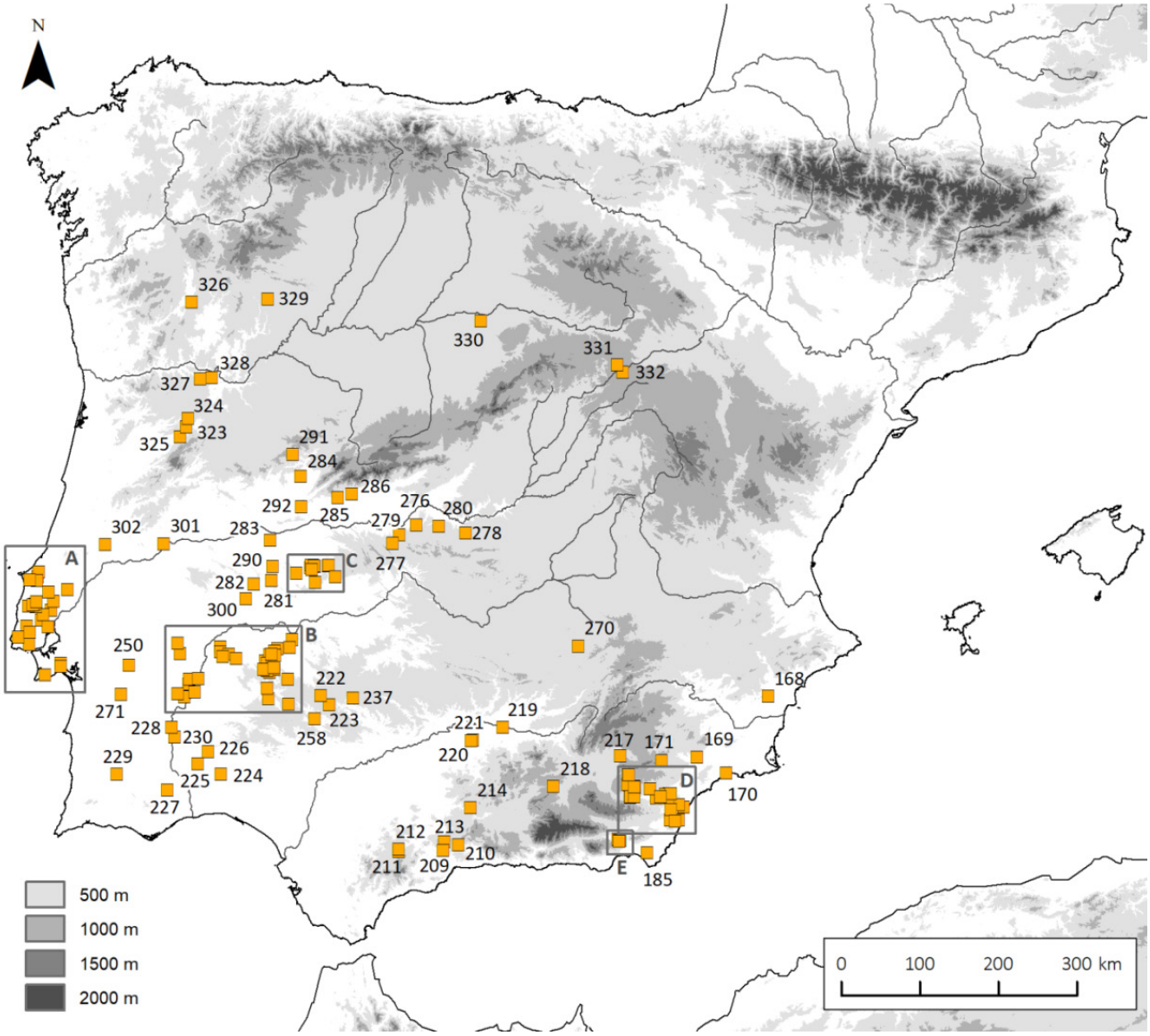

Figure 7: General map for the 165 walled enclosures. Numbers refer to the «Label» field in the main dataset (supplementary data). Grey squares are amplified in Figure 8

ditches and walls have been recognized (Figs. 4 and 9). We call them «mixed enclosures». In our review of the Iberian literature, we have been able to identify 13 mixed sites from the 3rd millennium BCE, most notably San Blas (Badajoz, Spain) (Hurtado Pérez, 2004); Alcalar (Portimão, Portugal) (Morán Hernández, 2014); Marroquíes Bajos (Jaén, Spain) (Zafra de la Torre *et al.,* 1999); or Los Millares and Fortín 1 Los Millares (Almería, Spain) (Molina González & Cámara Serrano, 2005) (for a comprehensive catalog of mixed enclosures, see the supplementary data).

Some of these can also be characterized as «megasites». For instance, the outer ditch at Marroquíes Bajos enclosed an estimated area of over 100 ha; San Blas, 30 ha; and Alcalar, some 20 ha.

Undoubtedly, there are important barriers to our understanding of mixed sites. With few exceptions, data about them is scarce, insufficient for our purposes, or not properly published. In some cases no excavations have been carried out. Still, it is clear that, not only walled and ditched enclosures, but also mixed enclosures, coexisted in Copper Age Iberia. Further than that, sometimes ditches and walls combined to form complex enclosing features that we call «mixed circuits». A good example of this is Fortín 1 at Los Millares (Fig. 4a). Here, ditches and walls worked together to create closely integrated architectures, whether for defensive purposes or otherwise.

3. CURRENT INTERPRETATIONS

In light of the review above, it is fair to wonder if ditched and walled enclosures should be conceptualized as discrete realities. We can group the answers given to this question into three distinct positions.

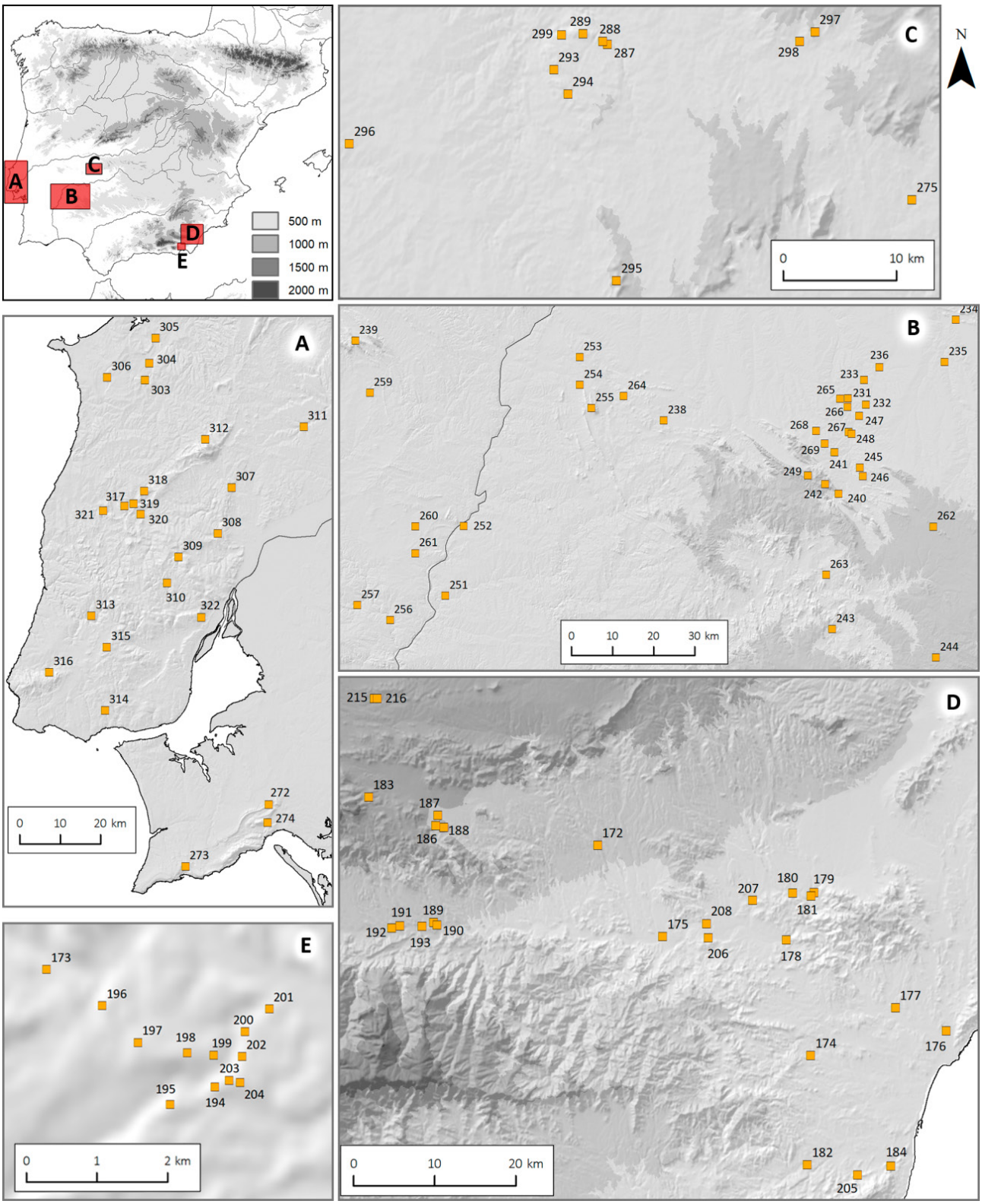

Figure 8: Detailed map of walled enclosures indicated by grey squares in Fig. 7

3.1. Position 1: the ditched/walled dichotomy does not exist

For some, the differences between ditched and walled enclosures are more apparent than real, a by-product of the limitations of the archaeological evidence and the methods that produce it (Calado & Rocha, 2007: 41). Thus, in this view, ditched and walled enclosures can be safely conflated into an unifying category (mixed enclosures). Contrasts between walled and ditched sites are

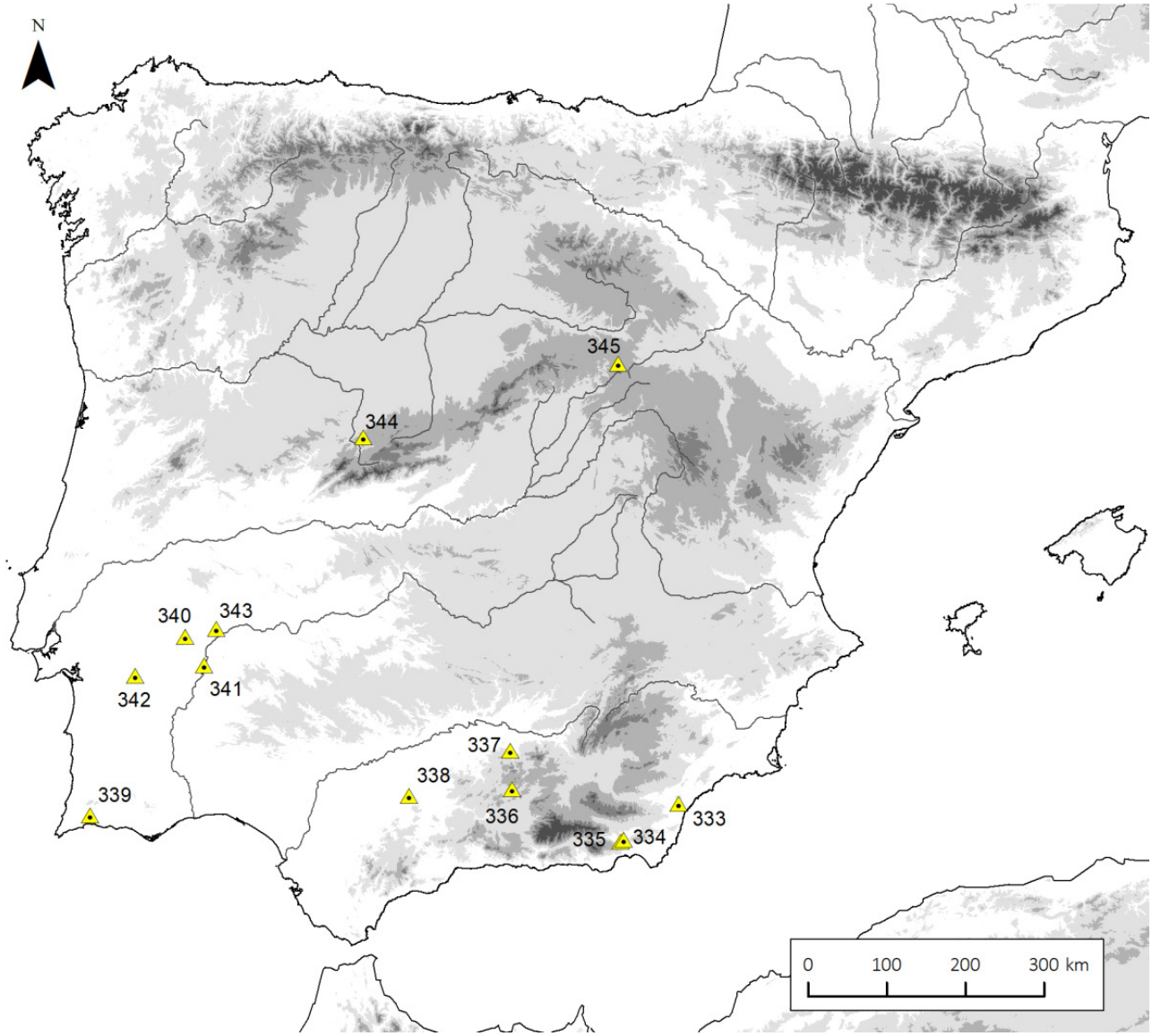

Figure 9: General map for the 13 mixed enclosures, i.e., those surrounded by both walls and ditches. Numbers refer to the «Label» field in the main dataset (supplementary data)

considered mostly a matter of archaeological visibility: stone-based walls would preserve much better long-term than the banks or palisades that might have accompanied ditches (e.g. Cámara Serrano *et al.,* 2011: 67).

3.2. Position 2: yes, they are different, but this does not mean much

For others, it is clear that there are sites with ditches but not walls, and sites with walls but no ditches. However, for them the distinction does not mean much: both walled and ditched sites were built by the same peoples, for the same purposes. The choice between enclosing using walls or using ditches was geologically determined: if there was enough suitable stone available in the proximity of the site, stone-based walls would be erected; if not, ditches, palisades, earthen banks or a combination thereof would be employed instead (Martín de la Cruz, 1997: 22; Hurtado Pérez, 2007: 14-15; Ramos Millán, 2007: 43-44; Calado in Gonçalves *et al.,* 2010: 555).

This position often develops in association with their interpretation as «fortified settlements». From this perspective, in both cases the circuits (walled or ditched) had a defensive purpose. The only difference between them would be the raw materials employed (Calado, 2000: 38; Cámara Serrano, 2001: 182; Cámara Serrano *et al.,* 2011; Mederos Martín, 2009; Nocete Calvo, 2001: 50). Similarities in their layout have been cited in support of this idea: the design of the ditches at certain sites, such as Venta del Rapa (Lechuga Chica *et al.,* 2014), somewhat resemble the patterns created by the occasional presence of horseshoe bastions at certain walled sites (Calado, 2000: 38; Cámara Serrano & Molina González, 2013: 106).

The idea that stone ramparts were preferable to earthen ones, particularly from the perspective of defensive effectiveness, is sometimes implicit here. Cámara Serrano *et al.* (2011) have suggested that Late Neolithic populations initially built fortifications based on ditches, palisades and banks, but these were substituted by stone-walled fortifications in the Chalcolithic because of the inherent weaknesses of timber-based defense systems, namely their flammable character.

3.3. Position 3: the walled/ditched dichotomy might be meaningful, even crucial, to understanding the Iberian Copper Age

The dissimilarities between ditched and walled enclosures go beyond the enclosing devices themselves, and have been highlighted on several occasions (Márquez-Romero & Jiménez-Jáimez, 2010: 522-525; Valera, 2012: 167). Some examples are: differences in their topographic settings, their size, and their design; the scarcity of pits at walled enclosures and its abundance at ditched enclosures; the rarity of houses at ditched enclosures; the different role they play in funerary and depositional practices, etc. For many, these differences warrant the establishment of two discrete and somewhat mutually exclusive categories of sites: ditched and walled enclosures. Nevertheless, there is considerable diversity in this approach.

Some see them as representative of separate aspects of the same social and cultural order. Thus, ditched and walled sites fulfilled different but complementary functions or roles within society. One such role could be that of fortified (walled) versus non-fortified (ditched) sites, perhaps in the context of settlement networks in which smaller fortified (walled) settlements defended the territories that depended politically on larger ditched enclosed settlements (García Sanjuán & Hurtado Pérez, 1997; Nocete Calvo, 2001; Hurtado Pérez, 2003, 2008; Soares, 2016).

Alternatively, it has been suggested that this duality might correspond to two culturally distinct groups, with differences in economy, technology and social organization (Gonçalves & Sousa, 2006: 248). This possibility has never been explored in depth, and preliminary assessments have rejected it (Mataloto & Boaventura, 2009: 58; Risch, 2017: 211).

A further hypothesis sees both types of enclosures as evidence of the coexistence of two competing cultural landscapes in Copper Age Iberia (Márquez-Romero & Jiménez-Jáimez, 2010: 530-533). In this view, ditched enclosures, the older and longer-lasting phenomenon, are understood as gathering places for periodic encounters of otherwise dispersed and mobile populations. Walled enclosures would appear later, in the 3rd millennium cal. BCE, and would act primarily as permanent settlements, representing new, more sedentary ways of life. These two contrasting ways of organizing society, economy and the symbolic realm would interact with each other, influencing one another, until both disappeared at the end of this period. Importantly, while the possibility that these cultural landscapes might correspond to different ethnic groups is not completely dismissed, the authors stress that this duality could be also explained simply as an internal process of accelerated change. Walled enclosures would be the materialization of that change towards more complex forms of social and political organization, whereas ditched enclosures would represent the traditional way of doing things, a sort of «resistance against change».

Also based on the idea of resistance, but understood and applied differently to this problem, is a suggestion made by Díaz-del-Río (2013: 70). In his view, Iberian Copper Age settlement systems might represent the materialization of a geography of resistance. Functioning as large aggregation centers where feasts often took place, ditched enclosures would be of crucial importance to leaders eager to organize communities politically at the regional level. The alliances forged there would create territories under the political influence of said leaders. Walled enclosures, on the other hand, would be smaller settlements where communities wary of the political influence of the larger sites settled; hence their location in supposedly marginal areas, on the periphery of such territories.

It is one thing to recognise the existence of mixed sites and circuits; it is quite another thing to outright reject the usefulness of the ditched-walled categorical distinction. This is especially true in light of the scarce and often ambiguous data available. First, a few questions need to be answered. How often do we see mixed sites? And mixed circuits? Did they really share the same places at the same time? If they are indeed the same thing, why did this dichotomy (walled vs ditched) come about in the first place? In what follows, we will try to find answers to some of these questions by critically examining seven hypotheses explicitly or implicitly considered by various researchers in the relevant literature.

4. TESTING HYPOTHESIS 1: SITES COMPRISING BOTH WALLS AND DITCHES (MIXED SITES) ARE MUCH MORE COMMON THAN GENERALLY ASSUMED

This hypothesis is based on the following reasoning: it is so glaringly obvious that walls and ditches coexisted at certain sites, such as San Blas, Marroquíes Bajos o Monte da Ponte (see above), that they must have coexisted in many other places as well; we have just mistakenly overemphasized the presence of one of these features (e.g. ditches) at the expense of the other (e.g. walls) at other sites (see references above). However, these claims have never been accompanied by proper statistical analyses. This is important because, without them, the risk of biased interpretations is considerably higher. This is due to the so-called *availability bias*

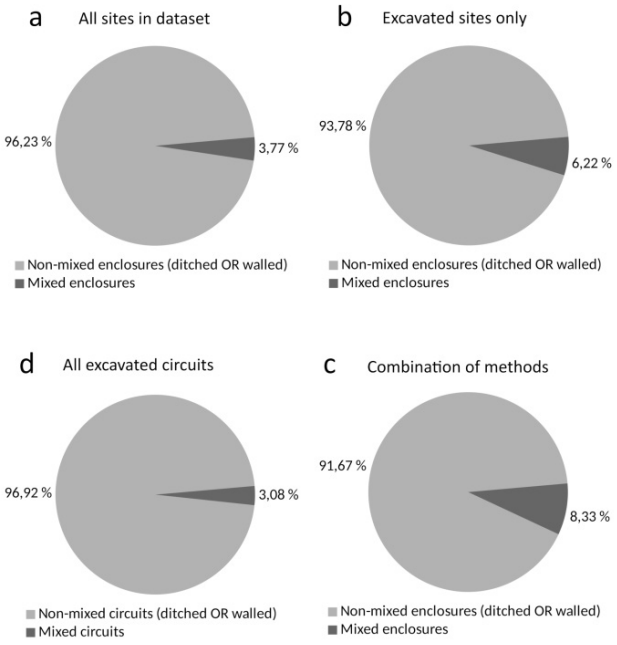

Figure 10: (a) Relative frequencies of non-mixed (ditched or walled) enclosures vs mixed enclosures (all records in our dataset are considered here). (b) Relative frequencies of non-mixed (ditched or walled) enclosures vs mixed enclosures (excavated sites only). (c) Relative frequencies of non-mixed (ditched or walled) enclosures vs mixed enclosures (only sites where two or more research methods such as aerial prospection, geophysical survey and excavation have been applied). (d) Relative frequencies of non-mixed (ditched or walled) circuits vs mixed circuits (excavated circuits only)

(Kahneman, 2012), whereby individual observers have a tendency to focus on salient or unusual examples (in our case, mixed sites), simply because they stand out in some way, rather than the less noteworthy, but perhaps more common counterexamples (ditched, walled sites).

In order to test this idea, we will examine the frequency at which Chalcolithic walls and ditches appear in the same places: what percentage of all known 4th-3rd millennia BCE enclosures in Iberia are either ditched or walled? In other words, how frequent or rare are mixed sites?

A prerequisite for this analysis was collecting all the necessary data through a comprehensive literature review. We have thus assembled a dataset of 345 Iberian walled and ditched sites (see supplementary data). We have focused on *c*. 3000-2200 cal. BCE as the main period of activity for Chalcolithic walled enclosures, and *c*. 3400-2200 cal. BCE as our target dates for the use of ditched enclosures. Any site dating from a period other than this has been discarded. To ensure a good statistical representation for our sample, we have included all sites that may reasonably meet our criteria, but we have also excluded a few, based on existing contradictions in the available information, lack of data, or because the features under consideration (ditches or walls) deviate from the norm in significant ways (the whole dataset, all the sampling decisions made, plus all the relevant bibliographic references are included in the supplementary data).

How frequent are mixed sites, then? Of the 345 records in our dataset, 165 are walled sites, 167 are ditched sites and 13 correspond to sites where both walls and ditches are present (mixed sites). In relative terms, walled and ditched sites make up 47.83% and 48.41% respectively of the overall sample, while mixed sites amount to just 3.77% (Fig. 10a).

These numbers seem to contradict Hypothesis 1. At the same time, they raise further questions. If Copper Age peoples in Iberia had the technical know-how to build stone walls, and to dig ditches, and they combined both methods in certain situations, why, then, are mixed sites so rare in the archaeological record?

5. TESTING HYPOTHESIS 2: MANY MIXED SITES APPEAR TO US ARCHAEOLOGISTS AS EITHER DITCHED OR WALLED SITES BECAUSE OF INADEQUATE RESEARCH METHODS

When we look at the history of research in all sites, we see an enormous variability in the methods employed, in the degree and objectives of their application, and in the quantity and quality of published data. Some have been the subject of meticulous aerial and geophysical surveys, and have been extensively excavated and published, whereas others have only been surveyed using fieldwalking techniques, and others are only known from non-academic sources. Because of this, we have a wealth of data on certain sites (e.g. Perdigões, Casetón de la Era) and very little on others (e.g. Unnamed site 1). This highlights a flaw in our analysis of Hypothesis 1: all sites in our dataset were given the same importance, regardless of how much we know about them. As our knowledge about Chalcolithic enclosures grows, does the frequency of mixed sites (relative to ditched and walled) increase or decrease?

Hypothesis 2 has never been explicitly stated in full in the existing literature. However, it appears to us as a plausible answer to the question of why mixed sites are so rare. It postulates that Chalcolithic peoples in Iberia regularly built mixed enclosures, but archaeologists have not been able to properly identify them due to important gaps in our knowledge caused by methodological deficiencies, particularly the traditional prevalence of sondages and other forms of small-scale excavations.

Should Hypothesis 2 be correct, mixed sites would be much more frequent in statistical analyses which take into account the particular history of research at each site than in those that do not. Thus, an appropriate question would be: what is the frequency of mixed sites among excavated / surveyed (aerial, geophysical…) sites?

We can begin by excluding the sites which have not been excavated. This is likely to give us a much more accurate representation of the reality of the

archaeological record than any of the metrics above: more often than not, excavation of an individual circuit will determine to a large degree whether or not it is a walled, a ditched or a mixed circuit. Among sites which have been excavated to some degree, walls are known at roughly half of the sites: walls occur in 74 cases (38.34%), ditches in 107 (55.44%) and walls and ditches together in only 12 enclosures (6.22%) (Fig. 10b). What about sites known through a combination of different methods (two or more of these: aerial prospection, geophysical survey and excavations)? There are 4 walled sites (8.33%), 40 ditched sites (83.33%) and 4 mixed sites (8.33%) (Fig. 10c).

An alternative way to deal with this is to indirectly weight sites relative to the degree of knowledge we have about them. This can be done by quantifying their individual circuits instead of the whole site. The logic is simple: all other things equal, poorly-known sites will usually yield a lower number of circuits than well-known sites. As an example, up to 15 ditched circuits have been identified at Perdigões, while only 4 have been recorded at the much less investigated Porto Torrão, despite the latter being presumably one of the largest Chalcolithic sites in Iberia. This approach puts the focus on the existence of complex or combined enclosing lines («mixed circuits»), that is, enclosing features that comprise both a wall and a ditch working together as a unit.

Thus, instead of «how frequent are mixed sites?», a more fruitful research question would be: «how frequent are mixed circuits among all excavated circuits?» We find that 195 of all the excavated enclosing lines are ditches (60%), 120 are walls (36.92%) and 10 are mixed (3.08%). In other words, 96.92% are either single walls or single ditches, and just over 3% are a combination thereof (Fig. 10d).

While survey bias may understate mixed sites to some extent, it is notable that in all our metrics their frequency revolves around 8% or lower. The aforementioned methodological shortcomings that traditionally have plagued this issue continue to be a problem, but recent research is compensating for this at a fast pace. In the future, we should expect the discovery of more mixed sites, or perhaps the recognition of walls on a previously considered ditched site, or vice versa. But even so, the image we are seeing now is unlikely to change much. Methodological deficiencies do not appear to be a significant factor in the relative proportions of ditched, walled and mixed enclosures in the archaeological record. Hypothesis 2 is not correct.

6. TESTING HYPOTHESIS 3: MANY MIXED SITES APPEAR TO US ARCHAEOLOGISTS AS EITHER DITCHED OR WALLED SITES BECAUSE OF PRESERVATION ISSUES

Hypothesis 3, just like Hypothesis 2, stems from the assumption that the low frequency of mixed sites is in large part caused by considerable gaps in our knowledge. Contrary to the previous one, in this hypothesis the key is not methodology but differential preservation. Since aboveground structures are generally more exposed to post-abandonment disturbances than underground features, it seems reasonable to believe that walls are more susceptible to damage or even total destruction than ditches. From this, it follows that many of the so-called ditched enclosures, completely devoid of stone walls today, may have had them in the past; they would have simply vanished through time and post-abandonment depletion.

On top of that, it is certainly possible –even probable– that ditched enclosures were accompanied by other types of walls, such as banks, or earthen walls of some sort. This would make them even more vulnerable to post-abandonment processes than stone walls, hence their archaeological invisibility. In short, according to this hypothesis, what we today categorize as ditched enclosures may originally have been mixed enclosures.

Following this logic, we should assume that sites which have been categorized as walled enclosures have not suffered severe damage, given the fact that the walls are clearly visible today. If Hypothesis 3 is accurate, these well-preserved sites should be composed of both walls and ditches. If there were any ditches, we should be able to see them. Basically, all walled enclosures should be mixed to some degree. There should be plenty of mixed enclosures in our dataset, and very few (if any) «pure» walled sites.

This is certainly an intriguing idea, but it does not match the archaeological evidence. Mixed enclosures are rare, as we have already shown. Conversely, walled enclosures (no ditches) are common. In 236 (94.78%) of all circuits where walls have been recorded (walled + mixed circuits), there are no known ditches. Even if we restrict this analysis to excavated circuits only, 120 (92.31%) show no traces of ditches. These numbers challenge the expectations of Hypothesis 3, and suggest that differential preservation, while no doubt important, must not be a critical factor in explaining the dichotomous character of the archaeological evidence. There must be something else.

To be clear, we are not denying that erosion and other post-abandonment processes have different effects on different materials, or that, in some specific cases, what we see today as ditched enclosures might have also exhibited walls. What we mean is that, by itself, differential preservation cannot explain the statistical patterns that emerge from the data analyzed here.

7. TESTING HYPOTHESIS 4: DITCHED ENCLOSURES WERE BUILT WHERE THERE WAS NOT SUITABLE HARD CONSTRUCTION MATERIAL TO ERECT WALLS

A basic premise of Hypothesis 4 is this: Chalcolithic peoples in Iberian built walled and ditched enclosures for essentially the same purposes. It is true that

architectures of the period were diverse, and that the categorical distinction between ditched and walled enclosures accurately describes a real phenomenon. But the hypothesis implies that in social, political and cultural terms this means nothing; it is just a reflection of the differential availability of resources in the various areas. Copper Age Iberian peoples were subject to the conditions of the environment; regardless of their preferences, they could not construct stone walls where there was no suitable material at hand. Where stone was readily available, they erected walls; where it was not, they dug ditches, and perhaps built earthen walls or banks, which are less visible archaeologically than stone-based walls.

Fully testing this hypothesis would require abandoning the pan-Iberian scale and descending into the regional and local levels. We would need to verify, site by site, whether or not there was suitable building material within a distance such that it would be feasible to quarry it, transport it and use it for this purpose. Regrettably, we cannot be absolutely certain about this unless we examine the environment of each and every site in our dataset, create dozens of isochrone maps, do cost-benefit calculations and so on. This obviously goes far beyond the scope of this paper, given the high number of sites in our dataset, even for selected regions, and the limited available space here (both in terms of text and images). Nevertheless, there are two things we can do. First, a pan-Iberian approximation to get a sense of where things could go when these more locally-focused analyses are carried out in the future. And second, taking advantage of already existing regional-scale analyses.

7.1. Pan-Iberian approximation

As a proxy, if Hypothesis 4 is correct, we should see a statistically significant correlation between certain lithologies and the location of the different types of enclosures: ditched enclosures should be located primarily on non-rocky soils, while walled enclosures should be prevalent in rocky soils.

For our tests we have looked at soil composition using the Geological Map of the Iberian Peninsula (Rodríguez Fernández *et al.,* 2015). To our knowledge, this is the only openly available dataset containing comparable data from both sides of the border (Portugal and Spain). Given the pan-Iberian scale of the study, and the nature of the questions we are asking here, we do not need highly detailed geological data, so this should suffice. Because our research question primarily concerns the presence/absence of suitable building material in the proximity of our sites, the lithological classes have been grouped in a binary system: a «0» class that corresponds to sedimentary soils where rock is scarce («Gravels, conglomerates, sands and silts»); and a «1» class that encompasses all other soils, where rock is more common. We have then cross-matched the location data of the main lithological classes with that of the archaeological sites in our database.

Do ditched and walled enclosures differ in the lithology of their locations? A quick look at the data gathered in Figs. 11 and 12a suggests that the answer is «very little»: all three categories of enclosures (ditched, walled and mixed) tend to be located on rocky soils. More importantly: were ditched enclosures primarily built where there was not suitable hard construction material to erect walls, as Hypothesis 4 maintains? The answer seems to be «no»: a majority of ditched enclosures (121 sites, or 72.5% of all known ditched enclosures) were built in places where there was some kind of rock available. Therefore, the fact that no stone walls were constructed must have been motivated by factors other than the scarcity of stone. By comparison, 138 walled enclosures are located on rocky soils (83.6% of all known walled sites). Thus, although there are more walled than ditched sites on rocky soils, the difference is relatively small. Again, we are aware that our Pan-Iberian approach might be too superficial, and therefore cannot be considered the last word on this issue by any means.

7.2. Regionally-focused analyses

Before we began preparing for the present study, there were already some relevant publications focused on the Middle Douro region. Taken together, they suggest that, even in sedimentary, non-rocky soils, stone was often available in one way or another for ditched enclosure builders.

A geo-statistical analysis of 27 ditched enclosures in the Northern Meseta, which are also included in our dataset, found that nine of them were located on sedimentary, non-rocky soils (Delibes de Castro *et al.,* 2014; García García, 2017). Using detailed geological data, the Mapa Geológico de Castilla y León at a scale of 1:50.000, the researchers looked at the presence of rocks in the surroundings as a proxy for potential land uses. They determined that 26 out of the 27 enclosures under study were within an hour or less on foot away from stone sources. In some cases, excavations have confirmed that some stone was used at these ditched enclosures, but, paradoxically, for purposes other than erecting walls. For instance, at El Casetón de la Era II, where no enclosing stone walls have been identified, the limestones that can be easily found at the top of nearby mesas were transformed into grinding stones, or turned into stone linings for large pits (Delibes de Castro *et al.,* 2009: 246, fig. 5).

By contrast, in the same area, the Middle Douro basin, there is only one walled enclosure: Pico de la Mora. Its settings are very similar to that of many ditched enclosures in the region, as it was constructed over a mesa surrounded by sedimentary lands. Thin slabs of limestone were employed to build enclosing walls, but no ditch has been found at the site (Villalobos

LITHOLOGY CLASSES	Ditched	Walled	Mixed	Total	Area (% Iberia)
Conglomerates, sandstones, clays and limestones. Evaporites	2 (1%)	2 (1%)	0 (0%)	4 (1%)	6.3%
Conglomerates, sandstones, limestones, plasters and versatile clays	0 (0%)	4 (2%)	2 (15%)	6 (2%)	2.5%
Conglomerates, sandstones, slates and limestones. Carbon	0 (0%)	3 (2%)	0 (0%)	3 (1%)	3.2%
Detrital limestones, calcarenites, marls, clays and limestones	9 (5%)	2 (1%)	0 (0%)	11 (3%)	1.5%
Dolomites, limestones and marls. Sandstone	0 (0%)	6 (4%)	0 (0%)	6 (2%)	7.8%
Gneisses	1 (1%)	5 (3%)	1 (8%)	7 (2%)	1,1%
Gravels, conglomerates, sands and silts	46 (28%)	27 (16%)	2 (15%)	75 (22%)	12.9%
Limestones, dolomites and marls. Sandstones and conglomerates	3 (2%)	13 (8%)	1 (8%)	17 (5%)	6.1%
Micaceous shales, phyllites, sandstones, marbles, limestones, dolomites and marls	4 (2%)	5 (3%)	0 (0%)	9 (3%)	2.2%
Other granitoids	10 (6%)	14 (8%)	0 (0%)	24 (7%)	6.2%
Quartzites, slates, sandstones and limestones	3 (2%)	19 (12%)	1 (8%)	23 (7%)	11.5%
Sandstones, conglomerates, clays; limestones and evaporites	61 (37%)	30 (18%)	3 (23%)	94 (27%)	23.2%
Sandstones, slates and limestones	2 (1%)	4 (2%)	2 (15%)	8 (2%)	3.3%
Serpentinites and peridotites. Basic and ultrabasic rocks	15 (9%)	4 (2%)	0 (0%)	19 (6%)	0.9%
Slates, grauwackas, quartzites and conglomerates	7 (4%)	16 (10%)	1 (8%)	24 (7%)	3.9%
Two mica granites	0 (0%)	10 (6%)	0 (0%)	10 (3%)	3.5%
Vulcanites and volcanoclastic rocks	4 (2%)	1 (1%)	0 (0%)	5 (1%)	0.8%
Other soils	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1.9%
Riverbeds	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1.2%
Total enclosures in rocky soils	**121 (72%)**	**138 (84%)**	**11 (85%)**	**270 (78%)**	**85.9%**
Total enclosures in non-rocky soils	**46 (28%)**	**27 (16%)**	**2 (15%)**	**75 (22%)**	**14.1%**
Total	**167**	**165**	**13**	**345**	**100%**

Figure 11: Table showing enclosures by type in each lithological class in the Iberian Peninsula (number and percentage). Percentages are relative to overall sites in each enclosure class (ditched, walled and mixed). The greyed row indicates non-rocky soils. «Area (% Iberia)» indicates the percentage of each lithology class' extent over the overall land surface of Iberia

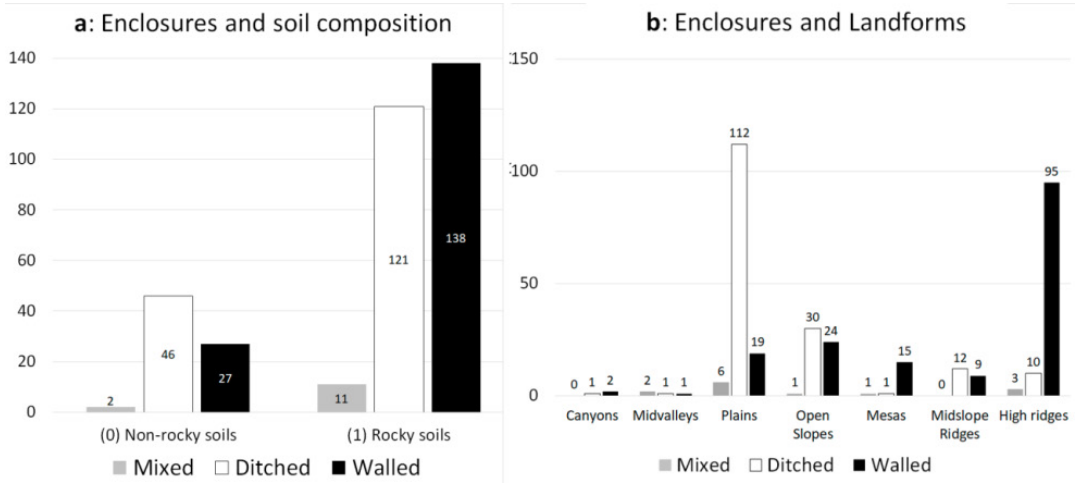

Figure 12: Enclosures and their setting: (a) unidimensional data of the number of enclosures per classified lithology classes (rocky and not-rocky soils); (b) enclosures per landform categories (following Weiss, 2001)

García & Rodríguez Marcos, 2018). As a way of comparison, if we go a bit further in time in the same region, during the Bronze Age (2nd millennium BCE) ditched enclosures disappeared, while the construction of walled structures became more common. Newly founded sites include La Plaza (Cogeces del Monte, Valladolid; Delibes de Castro & Fernández Manzano, 1981) and Cevico Navero (Palencia; Rodríguez Marcos, 1995). Changes in cultural practices and preferences, or perhaps in the social order, may have caused this. Certainly, not changes in the regional geology.

We can only conclude that, in the Middle Duero area, during the Copper Age, there is no support to the idea that ditched enclosures were much more frequent than walled sites because stone was scarce. The choice between using ditches or walls to enclose certain spaces was not geologically pre-determined.

Anecdotal evidence from other Iberian regions points in the same direction. A good example is the Guadiana basin, where walled and ditched enclosures are often close to each other. For instance, Monte da Tumba – a walled enclosure (Silva and Soares 1987) – and Horta do Pinheiro 6 – a ditched one (Valera *et al.,* 2017) – are less than 2 km apart from each other. Likewise, in a 14 x 9 km rectangle south of the Guadiana near Almendralejo (Badajoz), there are 6 ditched, 7 walled and not a single mixed site. They were all relatively close to sources of stone, so the geological constraints must have been similar to them all. And yet, they were constructed making use of two clearly distinct sets of materials and techniques: either ditches or walls, but not both.

7.3. Conclusion: is Hypothesis 4 correct?

Our results challenge the idea that the type of enclosure built was pre-determined by geology. Our approximate pan-Iberian analysis matches what is already evident in the regional data. In many instances, the builders of ditched enclosures could have erected stone walls instead of ditches; they simply did not do so for undetermined reasons. Likewise, the builders of walled enclosures could have dug ditches adjacent to the walls, but they almost never did (see testing of Hypothesis 3 above).

All things considered, until more fine-grained analyses confirming or contradicting these results become available, we must tentatively consider Hypothesis 4 to be false. For the most part, the absence of walls does not correlate with a lack of suitable building materials.

8. TESTING HYPOTHESIS 5: DITCHED, WALLED AND MIXED ENCLOSURES WERE ALL CLOSE IN SPACE AND TIME

Throughout most of the 3rd millennium BCE, the Iberian Peninsula saw the construction of numerous walled, ditched and, to a much lesser extent, mixed enclosures. There is no arguing that, at the scale of the Iberian Peninsula, they coexisted in space and time. The corollary of this is that, in any given region, ditched and walled enclosures were in close proximity to each other, and, more importantly, that their main periods of activity run simultaneously. In other words, that they coexisted within the same regions at the same time. Hypothesis 5 formalizes this idea. However, this has never been properly tested. For this, we need to look more deeply at both the geographical distribution and the chronology of Iberian enclosures.

If Hypothesis 5 is correct, then we should find no meaningful differences in the geographical distribution of walled and ditched enclosures across Iberian regions. We have tested this idea employing various statistical approaches. Again, although more fine-grained, region-level analyses, which looked at aspects such as relative altitude, accessibility, potential land use or visibility and inter-visibility, would be desirable, we believe that a pan-Iberian approach can be effective to reveal patterns that are harder to see at lower scales.

Are ditched and walled enclosures equally distributed in space? We have conducted several statistical and geographical tests to determine if the distribution of sites is random or if, instead, a statistically significant distribution that differs between enclosure types exists. First, the Average Nearest Neighbor test, which compares site distribution with an arbitrary sample, thus determining if grouping is random, clustered or dispersed (Clark & Evans, 1954; Hodder & Orton, 1976: 51-63). Second, the Ripley's K function, which shows whether sites exhibit statistically significant clustering or dispersion over a range of distances (each 25 km) up to a maximum of 250 km (Ripley, 1976). The parameters of the test include a «confidence envelope» that assesses if results are statistically significant, by performing 9 permutations of randomly distributed points (in the same number as the tested sites). Third, the Hot Spot Analysis tool by ArcGis, which indicates where there is clustering by calculating the Getis-Ord Gi*[2] (Getis & Ord, 1992) and returning a z score for each site. For statistically significant positive z scores, the larger the z score is, the more intense the clustering of high values (hot spot). Kernel density tool analysis was also performed in ArcGis for representation purposes as well as for better definition of clustering areas, since it calculates a magnitude-per-unit area from every site by using a search radio (100 km in this paper).

Both walled and ditched enclosures show clear clustering. The Average Nearest Neighbor test returns a ratio index (R) between the location of sites and a random distribution. If the index is less than 1, the pattern exhibits clustering, which is stronger the closer it

2. Para más información ver https://pro.arcgis.com/es/pro-app/latest/tool-reference/spatial-statistics/h-how-hot-spot-analysis-getis-ord-gi-spatial-stati.htm

gets to 0. When all enclosures are considered (R=0.71), clustering is less noticeable than when walled and ditched categories are tested separately: the former (R=0.55) are more clustered than the latter (R= 0.61). By contrast, the allocation of mixed sites does not differ from a random dispersion when tested independently (R=0.99); the sample of mixed sites is probably too small to draw any valid conclusions.

We have also looked at where clustering happens, i.e. how it changes when distance range increases (Ripley's K function). All patterns of distribution returned by the tests were statistically significant, since the observed K function was way over the confidence envelope (Fig. 13). The spatial distribution of all enclosures in our database remains clustered as neighboring distances grow, especially at distances of 75 to 125 km from each site. Again, there are differences when considering each enclosure category individually. Walled enclosures remain clustered in all ten tested distances (from 0 to 250 km), especially between 75 and 150 km, their «peak» being at 100 km. Ditched enclosures are particularly clustered at 75 km, while the observed K line tends to a dispersed pattern from 200 km and beyond. These results indicate that ditched enclosures tend to concentrate in smaller areas, so their neighbors are closer than those of walled enclosures. To sum up, our results point to clustering in small areas that are at the same time quite isolated from one another; these areas are narrower for ditched than they are for walled sites.

The Hot Spot analysis shows clear hot spots at different confidence levels, but mostly at 99% confidence (Fig. 14-Left). For ditched enclosures, the hot spots are in the Middle Douro valley (provinces of Valladolid and Palencia, in the northern Central Meseta), Madrid (Centre), Alicante (in the East) and lower Guadiana region (Spanish Badajoz and Portuguese Alentejo, in the South-West). Walled enclosures tend to concentrate in Portuguese Estremadura, the Setúbal peninsula, Alentejo and western Spanish Extremadura (South-West), and in the provinces of Almería and eastern Granada (South East). Importantly, the hot spots for both types of enclosures only overlap (partially) in the Middle-Lower Guadiana region. The Kernel density tool allows a more precise characterisation of said overlap (Fig. 14-Right): ditched enclosures concentrate in the Lower Alentejo (Beja district), while walled enclosures cluster at the eastern side of the border, in the province of Badajoz.

Copper Age enclosures have not received the same amount of attention in all Iberian regions, and research is clearly underdeveloped in areas such as the southern Meseta. This could explain some of the clustered patterning we are seeing. Nonetheless, the results presented here, based on the most comprehensive database of these types of sites produced to date, can hardly be explained by a lack of research in certain regions alone.

All in all, we can say with confidence that the geographical distribution of walled and ditched enclosures is almost completely mutually exclusive. In fact, we could define certain regions as typically «wall-friendly» and «ditch-averse» –the South East, the Portuguese Estremadura, the Setúbal peninsula and the Middle Tagus–, whereas others could be described as typically «ditch-friendly» and «wall-averse» –the Middle-Lower Guadalquivir, the southern and northern Mesetas, and the East (Alicante province)–. The tests performed confirm statistically what seems evident at first glance: walled and ditched enclosures avoid each other as oil and water.

Both walled and ditched enclosures are known in the Upper Guadalquivir, but, given the relatively

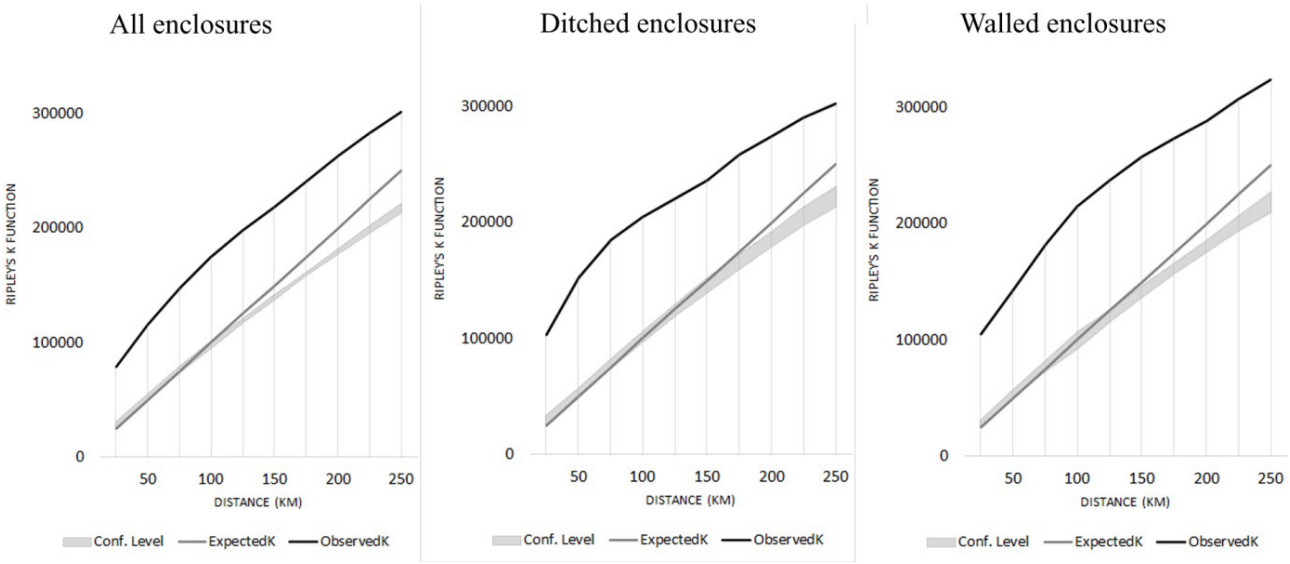

Figure 13: Results of Ripley's K function test for all the 345 enclosures, as well as for ditched and walled enclosures separately. Clustering occurs when the observed K function (vertical axis) is higher than the expected K function; on the other hand, an «ObservedK» line under the «ExpectedK» line indicates dispersion. When the «ObservedK» values are over the confidence level («Conf. Level» greyed area), clustering is statistically significant

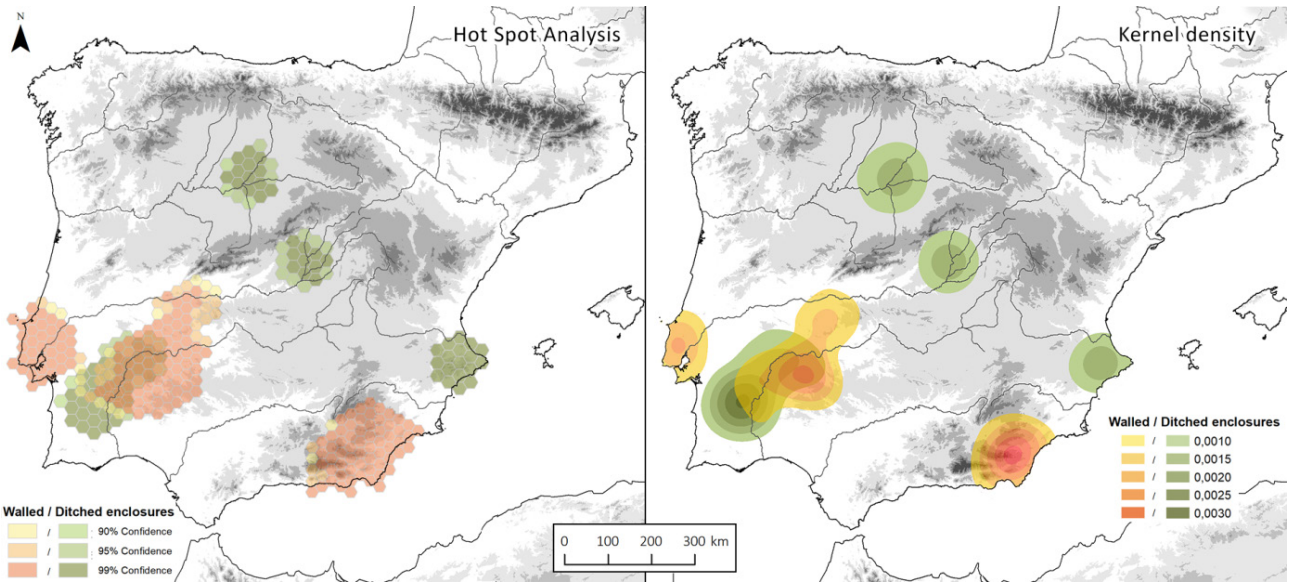

Figure 14: (Left) Results of the Hot Spot analysis from the dispersion of ditched and walled enclosures. The test returned no Cold Spots. (Right) Kernel density of ditched and walled enclosures. Higher values represent stronger clustering

few sites recorded so far in this area, their presence does not constitute a statistically meaningful concentration. Indeed, there is only one exception to this general picture: the Middle-Lower Guadiana basin in the South-West, where numerous walled and ditched enclosures are located.

Interestingly, the Guadiana is also a peculiar area in terms of chronology and temporality. Several recent studies on the chronology of Chalcolithic practices in the Guadiana have detected a marked decrease in the number of radiocarbon dates coming from ditches in the first half of the 3rd millennium cal. BCE (Gonçalves *et al.,* 2013: 54; Balsera *et al.,* 2015: 147-149; Aranda Jiménez *et al.,* 2016: 246). If some kind of relationship between the construction of ditched enclosures and the date of samples coming from their fills is accepted (see above for the challenges of dating ditched enclosures), then we would say that for about 400-300 years in the first half of the 3rd millennium cal. BCE very few ditched enclosures were constructed in the Guadiana area. They would only see significant building activity again later, in the second half of said millennium. The most interesting aspect of this possible «gap» is that it roughly coincides with the heyday of the walled enclosure phenomenon in the area, before they themselves began to fade towards 2500 cal. BCE (Mataloto & Boaventura, 2009: 60-62; Gonçalves *et al.,* 2013: 80-87; Valera, 2014: 302-303; Balsera *et al.,* 2015: 146; Valera, 2015: 411).

The data supporting this is still relatively scarce, and new dates might demonstrate the uninterrupted construction of ditched enclosures throughout the whole period. But if this assessment holds, then the existence of both walled and ditched sites in the Guadiana could be explained less as the materialization of a coherent territorial system and more as a temporal sequence specific to this area: (1) first ditched enclosures (second half of the 4th millennium); (2) later walled enclosures (first half of the 3rd millennium); and (3) finally ditched enclosures again (second half of the 3rd millennium cal. BCE), before they all disappeared (Márquez-Romero *et al.,* 2018: 40).

It is worth noting that the only region in the whole of Iberia where both ditched and walled enclosures have been documented in large numbers, the Middle-Lower Guadiana, is also, at the moment, the only area where a sequence like this appears plausible. Almost everywhere else, there are either ditched enclosures or walled enclosures, but not both. It is indeed remarkable that the differences in the geographical distribution of ditched and walled enclosures remained so stable for such a long period of time – in excess of 1300 years.

With this in mind, we can only conclude that Hypothesis 5 is false, for now at least.

9. TESTING HYPOTHESIS 6: THE TOPOGRAPHIC SETTINGS OF DITCHED AND WALLED ENCLOSURES ARE DIFFERENT

This hypothesis postulates that there is a correspondence between the type of topographic location of a site and the type of enclosing devices employed (ditches or walls) (e.g. Valera, 2012: 167). We have tested this by looking at location data for our sites and cross-matching it with existing landforms such as canyons, ridges, plains, slopes, etc. Our objective was to assess possible differences in the social processes of decision-making, particularly when it comes to choosing the location of a new site.

This set of tests focused on the topography of the places where enclosures were built, in relation to that of

their surroundings. We needed unified criteria to measure topographic features in such a large area – the whole of Iberia –, preferably with a numeric and continuous scale, so significance tests could be applied. For this, we created a Topographic Position Index (TPI) and a Landform map (Weiss, 2001). Both were constructed from the Digital Elevation Model (DEM) of the Iberian Peninsula (25 m of spatial resolution), derived from the ASTER Global Digital Elevation Model (V003) data by NASA (NASA/METI/AIST/Japan Spacesystems and U.S./Japan ASTER Science Team, 2019). It was appropriately filled to avoid hydrological errors.

9.1. Comparison of Topographic Position Index (TPI) for walled and ditched sites

Using the aforementioned DEM as base, it was possible to create a TPI map that classified landscapes considering both slope position (valley bottom, open slope, high ridge, etc.) and landform category (plains, canyons, open slopes, etc.). The calculation compared the height and slope value of each cell of the map to those of its surrounding cells. For example, if the height value of a cell is lower than that of nearby cells, the TPI value will be negative; how much lower than a «flat area» (TPI = 0) it is will be determined by the slope of said cell and its neighbors. Obviously this method depends on the scale of analysis, i.e., the number of surrounding cells to be accounted for in the classification. Our TPI map was generated in ArcGIS with a window of 11 cells using the model included in 'Topography Tools 10.3' (Dilts, 2015). From the resulting map (values from 223.15 to –175.01) we extracted values for each enclosure position, getting continuous values that allowed significance tests, such as variance.

Is the distribution of the Topographic Position Index (TPI) amongst walled and ditched enclosures different enough to be considered statistically significant? To answer this, the TPI values obtained went through an one-way analysis of variance (ANOVA) for independent groups in SPSS, which compared the mean distance between the various categories of enclosures and determined if it was statistically significant. Moreover, a Levene Test, which clarified if said variance is homogeneous, was carried out. In order to keep maximum comparability among classes of enclosures, the ANOVA test was applied exclusively to similar-sized groups (ditched and walled enclosures); the «mixed enclosures» group does not have a normal distribution and it returned a less robust test to the homogeneity of variances assumption, which occurs when the groups' sizes are very different (the mixed group comprises just 13 enclosures, while the ditched and the walled groups are composed of 167 and 165 sites respectively). The ANOVA test shows that there is a significant difference between the mean TPI values of ditched and walled enclosures (F= 167.84) with a small chance of error (p-value is less than 0.0001, specifically 2.5786×10^{-31}).

Walled enclosures have a higher mean in the TPI (18.04), which indicates that they tend to be located on prominents landforms, i.e., cells that are higher than their neighbors. By contrast, ditched enclosures are mostly located on almost flat positions (mean= 1.72). As for the Levene test, we can reject the homogeneity of variance (p-value= 0.0001) due to the internal variations in the group of walled enclosures (standard deviation= 15.30). Conversely, the values of the ditched group are homogeneous and generally lower (standard deviation= 5.52). There is therefore a clear pattern here: ditched enclosures were built primarily on flat areas, while walled enclosures tend to occupy more heterogeneous positions in the landscape, although mostly prominent spots.

9.2. Comparison of walled and ditched enclosures in the Landform map

As for the Landform map, it is a straightforward translation of TPI values into categories, in correspondence with major topographic features. There are 10 categories, from lower to higher: canyons or deeply incised streams (1); midslope drainages or shallow valleys (2); upland drainages or headwaters (3); u-shaped valleys (4); plains (5); open slopes (6): upper slopes or mesas (7); local ridges or hills in valleys (8); midslope ridges or small hills in plains (9); mountain tops or high ridges (10). Again, we used the model included in 'Topography Tools 10.3', which is a modified version of Jeff Jenness's Landform Classification Model (Tagil & Jenness, 2008). This method is scale-sensitive, because it uses 2 TPI maps at different scales, so its combination creates various landform types. For example, a high TPI value in a small neighborhood, combined with a low TPI value in a large neighborhood, would be classified as a local ridge or hill in a larger valley, while a low small neighborhood TPI plus a high large-neighborhood TPI would be classified as an upland drainage or depression. This characteristic allows us to maintain a balance between looking at the big picture (the whole of Iberia) and a more localized approach. We have chosen circular windows for the two starting TPI maps: a large neighborhood TPI of 11 cells and a window of 5 cells for the small neighborhood TPI. Thus, our results have been able to detect local ridges or small hills into larger features such as great valleys or depressions, for example. After extracting coincident values for enclosure location, we have obtained a discrete and categorical scale that facilitates interpretation.

The distribution of Landform categories between the three classes of enclosures is very much coincident with our results for the TPI test (Fig. 12b). First, we can see that Iberian 4th and 3rd millennia BCE enclosures do not occupy all categories of topographical landforms: upland drainages (3), U-shaped valleys (4) and local ridges (8) are absent from the Landform map

extraction. But surely the most outstanding data in Fig. 12b is the amount of ditched enclosures located in plain positions (5): 112, or 67% of them. Ditched enclosures were also built in open slopes (6) (30 enclosures, or 18%), which correspond to low and easily accessible ground as well. In contrast with this, as announced by the ANOVA test, walled enclosures show more diversity, but with a clear preference for outstanding, easier to defend, points in the landscape: plains (5) amount to just 11.5%, while high ridges (10), midslope ridges (9) and mesas (7) combine to reach 72.1% in total, being high ridges the class that concentrates more walled enclosures (95 enclosures, or 57.6%). Mixed enclosures are rather heterogeneous in their topographic settings as well, and the sample size is small; still, there seems to be a preference for plains (5) (46.2%).

9.3. Conclusion: is Hypothesis 6 correct, and what do these results mean?

In short, we got two sets of results from this analysis. The first indicates that there is a sound statistical relation between the architecture of the enclosures (walled or ditched) and the topographic features where they are placed. The walled group, while heterogeneous, had a clear preference for outstanding positions relative to their closest environment. By contrast, the ditched group clusters along almost flat locations relative to their surroundings. The second set of results refers to where enclosures are located within the Landform map. This analysis yielded the following picture: ditched enclosures are most often located in plains and open slopes, while walled enclosures were commonly built on prominent spots such as high ridges, midslope ridges and mesas.

Taken together, these numbers mean that Hypothesis 6 is correct: the topographic settings of ditched and walled enclosures are indeed different.

What do these results mean? One possible explanation might be that enclosure builders could not always choose where to place their sites, because there was a limited diversity of topographical locations in certain areas. In this hypothetical scenario, in lands devoid of suitable ridges or mesas they were forced to build on the plains. That, in turn, would have somehow pushed them to use ditches instead of walls as enclosure devices. Such an hypothesis would be deterministic, with regional relief (available topographical locations) being the determining factor here.

In our view, this would not be a satisfactory explanation, for many reasons. First, an absolute absence of suitable higher ground or prominent spots in the landscape is very rare; it is hard to find a ditched site located on a plain that is not relatively close to a hill or a mesa. The reverse is also true: most walled enclosures could have been built on lower, more accessible places; they just were not. Second, as we have shown above in section 7, most times there is nothing, not even local geology, preventing enclosure builders from erecting walls, even in lower ground. Third, this would paint an undoubtedly incorrect picture of prehistoric people as agency-less creatures, and enclosures as purpose-lacking places. In this scenario, people would have no regard for access to water and other natural resources, defense, visibility, intervisibility and many other features which in no small part depended on the topographical location of the places where they lived and/or carried out their daily activities.

An alternative and much more enticing explanation is the possibility that builders prioritized certain topographic environments for each type of enclosure. Human conscious decision-making and not geography would be the main force behind the statistical patterns identified here: the contrasting topographic locations of ditched and walled enclosures would be indicative of particular social and cultural decisions. In this scenario, then, walled and ditched enclosures were not built for the same purposes, and this is what created the differences in topographical settings that we see in the archaeological record in the first place. Such an hypothesis would fit rather well with the existing literature on landscape archaeology (e.g. Vicent García, 1991; Tilley, 1994; García García, 2017). It would also agree with previous claims about the dissimilarities between ditched and walled sites, which put the focus of features that we have not analyzed here: site size; layout of the ditched/walled lines; the presence/absence of pits; domestic architecture; depositional practices; funerary rites; etc. (Márquez-Romero & Jiménez-Jáimez, 2010: 522-525; Valera, 2012: 167).

With the data currently available, the question of why the topographical settings of ditched and walled enclosures are different cannot be confidently answered. Nonetheless, for the reasons we just described, the most plausible scenario is one in which the builders of Iberian Copper Age enclosures did prioritize specific topographic environments for each class.

10. TESTING HYPOTHESIS 7: DITCHED AND WALLED ENCLOSURES ARE HOMOGENEOUS CATEGORIES INTERNALLY

So far in this article, we have assumed that walled and ditched enclosures are homogeneous groups internally. This is highly simplistic. Differences within our groups have occasionally come out while we were exploring the contrasts between groups. In this section, we will devote some space to examine the internal variability of both classes by testing hypothesis 7: ditched and walled enclosures are homogeneous categories internally.

Now, this is an immensely complicated issue that would require its own dedicated study, so this section will only give us a glimpse of what could emerge in the future as data grows and new studies are made. What comes next is just one of the many ways in which this hypothesis could be put to the test.

Landform	Minimum Ditched Circuits			Minimum Walled Circuits		
	Count	%	Average per site	Count	%	Average per site
1 Canyons	1	0.3%	1.0	2	0.9%	1.00
2 Midvalleys	2	0.5%	2.0	1	0.4%	1.00
5 Plains	257	68.5%	2.3	26	11.7%	1.37
6 Openslopes	80	21.3%	2.7	32	14.3%	1.33
7 Mesas	1	0.3%	1.0	22	9.9%	1.47
9 Midridges	20	5.3%	1.7	11	4.9%	1.22
10 Ridges	14	3.7%	1.4	129	57.8%	1.36
Total	**375**	**100.0%**	**2.2**	**223**	**100.0%**	**1.35**

Figure 15: Table showing the number of minimum circuits per enclosures by landform or topographic class in the Iberian Peninsula (count and percentage per landform; average number of circuits per site)

We will focus on the investment of labor. Did people invest the same amount of work in building all ditched sites equally? What about walled sites? There is one piece of data in our dataset that can be utilized to find this out, and that is the number of circuits (enclosing lines) for each site. First and foremost, more circuits mean more work in general. And second, because the outer circuits of an enclosure are also the largest, sites with fewer circuits tend to be of smaller size than those with more circuits. The outer lines by definition have a longer perimeter than the inner ones, thus requiring more work to be built. Obviously, site longevity may play a role in this. But even so, the number of circuits at a site can function acceptably as a proxy for the amount of work put into its construction.

The No. of circuits per site at walled enclosures oscillate between 1 and 4. The standard deviation is 0.72. The coefficient of variation, defined as the ratio of the standard deviation (σ) to the mean (μ), is 53%, with anything below 30% being considered highly homogeneous. These figures suggest that walled enclosures are quite homogeneous as a category, in terms of circuits per site at least. Why? This question is particularly interesting in light of the topographic data collected here.

Building a walled enclosure required acquiring the material (suitable stone), and subsequently transporting it to the building site, plus preparing the building surface (terracing and so on). Thus, generally speaking, building a walled enclosure at the top of a ridge would entail a higher investment of labor than doing the same thing on a plain. It would require considerably more effort. Moreover, access to water and other essential resources would be more costly in terms of energy. If Chalcolitic people in Iberia simply followed a minimum cost/maximum benefit kind of logic, with no particular preferences beyond that, we should find a lower labor investment in walled enclosures located on prominent spots in the landscape than that in more easily accessible areas to compensate for the inherent problems of building in less accessible spaces.

Fig. 15 summarizes the relationship between the local topography and the No. of enclosing lines. We can see that Iberian Chalcolithic people, on average, built more or less the same number of walled lines at sites placed on higher, poorly accessible lands, than at sites located on lower and more easily accessible, richer in basic resources, spots. To put it another way, people put a lot of effort in order to compensate for the challenges posed by the physical environment. This is a strong signal of human agency, and a sign that perhaps a certain idea of what a walled enclosure should look like was pursued almost universally.

Ditched enclosures are a different story. The number of circuits per site at ditched enclosures varies between 1 and 22. Consequently, the standard deviation is much higher than that at walled enclosures: 2.6. The coefficient of variation within this class is 116%, with anything above 100% being considered highly heterogeneous.

We have to exert caution when using the No. of circuits in this way. The validity of this variable for our purposes is not the same for ditched enclosures as it is for walled ones, the reason being the contrasting effect of the history of research at walled and ditched enclosures (Jiménez-Jáimez, 2015). Ditches are hard to see from the ground, and therefore they can easily be missed by fieldwalking surveyors. As a result, the application (or not) of methods such as aerial photography or magnetometry may have a huge effect on the number of recorded ditched circuits at any given site. It is not by chance that the sites with the most ditched lines are those where these methods have been more systematically employed, by far. This makes the number of circuits at ditched enclosures a less reliable piece of data for the question we are trying to answer at this time. This issue is not nearly as problematic for walled sites, since stone walls are much more easily detectable on the surface, even in the absence of said methods.

Nonetheless, although conclusions based on the No. of circuits per site at ditched enclosures are subject to the biases we just mentioned, this piece of data remains noteworthy. Again, ditched and walled enclosures differ markedly in this parameter, as in almost all the metrics we have measured throughout this paper.

One interesting side note from Fig. 15 is that the ditched sites with the highest No. of circuits are all located on lower ground (plains or open slopes); the same can be said for the highest average per ditched site. This means that the largest and more complex ditched sites when the No. of circuits is considered emerged where there was more space for social aggregation, less barriers for communication and movement, more water and more productive soils. This has been suspected for quite some time, but whether this type of aggregation was permanent or transient has been long debated (see section 11.2 below).

To summarize, Hypothesis 7, as formulated, is incorrect. Whereas walled enclosures appear to be a rather homogeneous category, at least in terms of No. of enclosing lines, ditched enclosures do not.

11. CONCLUDING REMARKS

11.1. Conclusions of the study

This paper advances our understanding of the settlement dynamics of the Iberian Copper Age by questioning whether we are justified in classifying enclosed sites dating from the Iberian Chalcolithic into two discrete categories: «walled» on one side, and «ditched» on the other. After gathering data on 345 sites, we have put seven relevant hypotheses to the test.

We have shown that Hypothesis 1 (*sites comprising both walls and ditches (mixed sites) are much more common than generally assumed*) is incorrect. More than 96% of known enclosure sites were delimited using walls or ditches, but not both. Mixed sites appear to be no more than rare «outliers».

Hypothesis 2 postulated that many mixed sites appear to us archaeologists as either ditched or walled sites because of inadequate research methods. New and more refined statistical analyses, considering the history of research at every site, suggest that Hypothesis 2 is also inaccurate.

Hypothesis 3 (*many mixed sites appear to us archaeologists as either ditched or walled sites because of preservation issues*) stressed the effects of post-abandonment formation processes on the preservation of walls. Again, the data we have gathered run counter to what we should see in the archaeological record if this hypothesis was correct.

Hypothesis 4 (*ditched enclosures were built where there was not suitable hard construction material to erect walls*) has been tested employing a series of spatial analyses that compare the distribution of enclosures in space with lithological regions. With the data currently available, explanations that emphasize geological determinants for the construction of one type of enclosure over the other in a given area (local availability of suitable stone) seem to lack empirical support, even though the preferred lithologies of walled and ditched sites are slightly different. Some locally-focused studies undertaken in the Middle Douro region reinforce this conclusion. While more localized and fine-grained analyses considering cost-mobility, visibility and potential resources provided by the soil are necessary to confirm this, all current evidence, including such an analysis for the Middle Douro area, points to Hypothesis 4 being false.

Hypothesis 5 (*ditched, walled and mixed enclosures were all close in space and time*) has not been validated. Our spatial analysis further highlights the contrasts between Chalcolithic Iberian ditched and walled enclosures. To an extent, they seem to avoid each other as oil and water, with one prominent exception: the Middle-Lower Guadiana.

Hypothesis 6 (*the topographic settings of ditched and walled enclosures are different*) seems to be accurate, as demonstrated by the statistically significant differences detected. Unlike ditched enclosures', walled enclosures' locations are characterized by visual prominence, wide viewsheds and easy defense.

Lastly, Hypothesis 7 (*ditched and walled enclosures are homogeneous categories internally*) is incorrect. By examining the No. of enclosing lines per site, we have found that walled enclosures are a rather homogeneous category internally, but ditched sites are not.

Whichever way you slice this dataset, there appears to be strong evidence that mixed sites are rare, and certainly represent fewer than 1 in 10 of the sites. Let us not forget that we are dealing here with a very long time span (800-1500 years), and that some of the sites involved have a particularly intricate temporality, so that some degree of mixing should be expected as a result of different phases of activity (e.g. hypothetically, phases of a site where a ditch was constructed and subsequently abandoned, followed by a new phase where a wall was built, with no real cohabitation between the wall and the earlier ditch). Going back to our original research question, all signs point to the perceived architectural differences between walled and ditched enclosures being real and not a consequence of research bias or lack of data.

Therefore we conclude that:

a) Chalcolithic Iberian enclosures are markedly dichotomous, with two main categories of sites: walled enclosures and ditched enclosures.
b) Mixed sites are anomalous and remain poorly understood. Undoubtedly, as outliers, they deserve to be explained. However, they must not distract us from making the most pressing scientific questions.
c) Walled and ditched enclosures show important differences. This study has provided strong empirical support for some of the already proposed dissimilarities (e.g. differences in topographic setting) and a new one (geographical distribution).
d) Such differences cannot be solely attributed to geological factors, as the regional analysis focused on the Middle Douro area suggests.

e) Walled enclosures seem to be a surprisingly homogeneous category, even across the various topographic locations. By contrast, ditched enclosures are more heterogeneous regarding the No. of enclosing lines per site.

In a vacuum, the differences between a wall and a ditch are rather straightforward: they are built using different materials and employing dissimilar techniques. Thus, it might seem that what we are dealing with here is just a matter of style. However, this study has proved that the issue goes way beyond mere morphological details. The geographical distribution of walled and ditched enclosures is uneven and complementary.

Even if the local geology had some influence in the choice of materials, it does not explain much of the evidence: the proliferation of ditch-lacking walled enclosures, the abundance of pits at ditched sites and its scarcity at walled sites, the contrasts in domestic architecture, the deposition of human remains, etc. (see references above). All this suggests that ditched and walled enclosures served different purposes. But what purposes? What might this duality of sites mean in social, economic or symbolic terms?

11.2. Possible explanations for the walled/ditched dichotomy

As referenced earlier, some researchers maintain that ditched and walled sites fulfilled different social, economic or political roles. In this view, political territories would be structured around large ditched sites, and defended by smaller, peripheral walled sites (García Sanjuán & Hurtado Pérez, 1997; Nocete Calvo, 2001; Hurtado Pérez, 2003, 2008; Soares, 2016). Others maintain this notion of «territory», but see the dual character of the evidence as indicative of processes of resistance against the consolidation of emerging powers, with variants (Márquez-Romero & Jiménez-Jáimez, 2010: 530-533; Díaz-del-Río, 2013: 70).

All these models match relatively well with the presence and relative distribution of both types of enclosures in some areas (territories). Nevertheless, they find more difficulties to explain the wider Iberian distribution patterns, unless one postulates the existence and stability through time of rather large territorial units –the whole northern Meseta, most of the Guadalquivir basin and so on–, given the almost complete absence of walled enclosures in those areas. Another issue with these interpretations is that they require the simultaneous use of all these sites in a particular region, and this is far from certain with the current data.

Yet another problem with these models is the much discussed «defensive hypothesis». One interpretation in particular saw them as fortified settlements (walled sites), as opposed to non-fortified (ditched) (García Sanjuán & Hurtado Pérez, 1997). However, over the past few decades, the increasingly frequent discovery of Neolithic and Copper Age enclosures delimited by ditches has led to an expanded definition of the notion of «Chalcolithic fortification», which for many now includes these latter types as well.

There is some controversy regarding the military purpose of walled enclosures (see, for example, Jorge, 2003), but a majority of researchers today lean towards the defensive hypothesis (Gonçalves *et al.,* 2013). By contrast, opinions are more divided when it comes to ditched enclosures.

Some studies argue that ditched enclosures from the 4th and 3rd millennia BCE were permanently occupied sites defended by robust fortifications (e.g., Martín de la Cruz, 1997; Cruz-Auñón & Arteaga, 1999; Calado, 2000: 38; Mederos Martín, 2009; Zafra de la Torre *et al.,* 2010; Cámara Serrano *et al.,* 2011; Cámara Serrano & Molina González, 2013).

On the other hand, other authors have questioned the defensive nature of these sites, emphasizing instead their symbolic dimension as catalysts for various social dynamics and practices (e.g., Márquez Romero & Jiménez-Jáimez, 2010: 362-370; Valera, 2012, 2020; García Sanjuán *et al.,* 2017).

Lastly, we find a third perspective represented by researchers who acknowledge that ditched enclosures were permanently inhabited spaces, while simultaneously challenging the importance of war in the design of their architecture (e.g., Díaz-del-Río, 2004a: 111-114; Hurtado Pérez, 2003: 249-253; Delibes de Castro *et al.,* 2014: 126-128).

While our study will not solve these issues with the currently available data, it does highlight an aspect that has not been given enough attention thus far: generally speaking, the topographical location of walled enclosures would considerably enhance their effectiveness in terms of defense, while that of ditched enclosures would not (see Hypothesis 6 above).

Aside from the idea that large ditched sites were at the center of political territories, with smaller, peripheral walled enclosures acting as defensive outposts, it is difficult to find attempts at explaining the walled-ditched dichotomy in the literature. One of the few alternatives suggests that ditched and walled sites could be representative of two culturally discrete (ethnic?) groups (Gonçalves & Sousa, 2006: 248). Recent developments in archaeological methods such as DNA and stable isotopes analyses, in addition to more traditional bioarchaeological and material culture studies, should make it possible to test it.

In the current state of research, all these approaches leave major questions in the air. Only future studies will determine which of these narratives, if any, is an accurate description of the past. Any ambition to find a satisfactory answer to this is beyond the scope of this paper. Here, we have presented a lot of new data in favor of the existence of a duality of sites, but none of it will necessarily help us understand why this duality exists in the first place. Current data elsewhere is insufficient to solve the issue, as the intense debates that the

Iberian Copper Age generates attest. In any case, the situation must have been very dynamic, with changes over time. Investigating this complex situation is an endeavor that will take years or even decades.

Our results suggest that we must not conflate Iberian walled and ditched enclosures dating from the 4th and 3rd millennium BCE into one single category. Having said that, our pan-Iberian approach has limits. Regional and local studies are undoubtedly necessary to further advance our knowledge (see Hypothesis 4 above). More nuanced approaches would need to devote some attention to variables such as the size of the enclosed area, domestic architecture, the presence/absence of pits and their role in funerary and depositional practices. There is still a lot of work to be done.

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