

A multi-embankment Chalcolithic walled enclosure: new insights from the usage of remote sensing in archaeological surveys (Ota, Western Portugal)

André Texugo^{1,2,3}, Ana Catarina Basílio^{3,4}, Pedro Pina⁵, Gabriel Goyanes^{1,6},
and Gonçalo Vieira¹

¹ Centre for Geographical Studies (CEG), IGOT, Lisbon, University of Lisbon, Lisbon, PT; andrelopes@campus.ul.pt

² Centre for Archaeology (UNIARQ), FLUL, Lisbon, University of Lisbon, Lisbon, PT

³ Foundation for Science and Technology (FCT), Lisbon, PT

⁴ Interdisciplinary Center for Archaeology and Evolution of Human Behaviour (ICArEHB), FCHS, Faro, University of Algarve, Algrave, PT

⁵ Department of Earth Sciences, Institute of Astrophysics and Space Sciences, University of Coimbra, Coimbra, PT

⁶ Centre of Natural Resources and Environment (CERENA), IST, University of Lisbon, Lisbon, PT

ABSTRACT - *Ota, a key part of the Chalcolithic walled enclosure phenomenon in Portuguese Estremadura, represents a unique settlement strategy within the actual territory of Portugal. The architecture and social dynamics of this site remained largely unexplored until 2019. This study marks a significant shift in its study, utilizing a synergistic approach of archaeology and geotechnologies, embodied in the using an Unmanned Aerial Vehicle equipped with LiDAR. This innovative combination successfully penetrated the dense vegetation, revealing 21 previously unknown archaeological features. The results from the fieldwork unveiled a novel type of walled enclosure at Ota, characterized by a series of four embankments. This discovery prompts a re-evaluation of the roles and practices of 3rd millennium BC communities in Portuguese Estremadura. Furthermore, the proven efficacy of this methodology paves the way for its application in similar archaeological contexts. The paper presents a comprehensive analysis of the recent fieldwork, integrating interpretations from LiDAR data, material studies and ¹⁴C dating.*

KEY WORDS – *remote sensing; archaeological methodology; Chalcolithic walled enclosures; Portuguese Estremadura; LiDAR analysis; Unmanned Aerial Systems (UAS)*

Bakrenodobno obzidje z več nasipi: nova spoznanja o uporabi daljinskega zaznavanja pri arheoloških raziskavah (Ota, zahodna Portugalska)

IZVLEČEK – *Ota, ključni del fenomena bakrenodobnih ograd v Estremaduri, predstavlja edinstveno strategijo poselitve na ozemlju Portugalske. Arhitektura in družbena dinamika tega najdišča sta ostali skoraj neraziskani do leta 2019. V študiji predstavljamo pomemben premik v raziskavah, ki temeljijo na sinergiji arheologije in geotehnologije in uporabi drona, opremljenega z LiDARjem. Inovativna kombinacija je omogočila prodreti skozi gosto vegetacijo in odkriti 21 doslej neznanih arheoloških struktur. Te predstavljajo nov tip ograjenega prostora z nizom štirih nasipov. Odkritje omogoča novo oceno delovanja in praks skupnosti iz 3. tisočletja pr. n. št. v portugalski Estremaduri. Dokazujemo učinkovitost te metodologije in utiramo pot njeni uporabi v podobnih arheoloških kontekstih. V prispevku celovito predstavljamo nedavno terensko delo, ki vključuje interpretacijo lidarskih podatkov, analizo materialne kulture in ¹⁴C datiranja.*

KLJUČNE BESEDE – *daljinsko zaznavanje; arheološka metodologija; bakrenodobne ograde; portugalska Estremadura; LiDAR analiza; dron*

The 3rd millennium BC walled enclosure phenomenon in Portuguese Estremadura, focusing on the Ota archaeological site

Archaeology is continually propelled forward by the development of new theoretical frameworks, technologies, and methodologies. However, some areas of study prove more resistant to change, primarily due to the absence or invisibility of data. This is particularly true for the study of the 3rd millennium BC walled enclosure phenomenon in Portuguese Estremadura. During the Chalcolithic period, profound anthropogenic changes occurred in this region's landscape, manifested in new sites characterized by strategic hilltop locations offering extensive visual control over their surroundings (Soares 2013).

These sites, known as walled enclosures, were typically connected to watercourses that served not only as food and raw materials sources, but also as means of communication and connection with other areas and

social networks (Kunst 2010). The architectures and construction techniques of these sites are distinctive, giving rise to a phenomenon that encloses sites up to five hectares in area with walls, towers and gates, made with the use of the dry-stone technique, putting stone on stone without binding elements (Cardoso 2010).

To date, twenty-two such enclosures have been identified in Portuguese Estremadura. However, the phenomenon is not limited to this region, with sporadic examples in northern and southern Portugal, such as Castanheiro do Vento (Ramos-Pereira et al. 2020), São Pedro (Mataloto 2010), and Santa Justa (Gonçalves 1989). A similar pattern emerges in Spanish Extremadura, particularly in Tierra de Barros (Badajoz Comarca, Spain), which hosts approximately five dozen walled enclosures. Due to their size or complexity, sites like Cortijo Zacarías, Las Mesas, San Blas, and Palacio Quemado have gained some fame (Hurtado, Odrizola 2009).

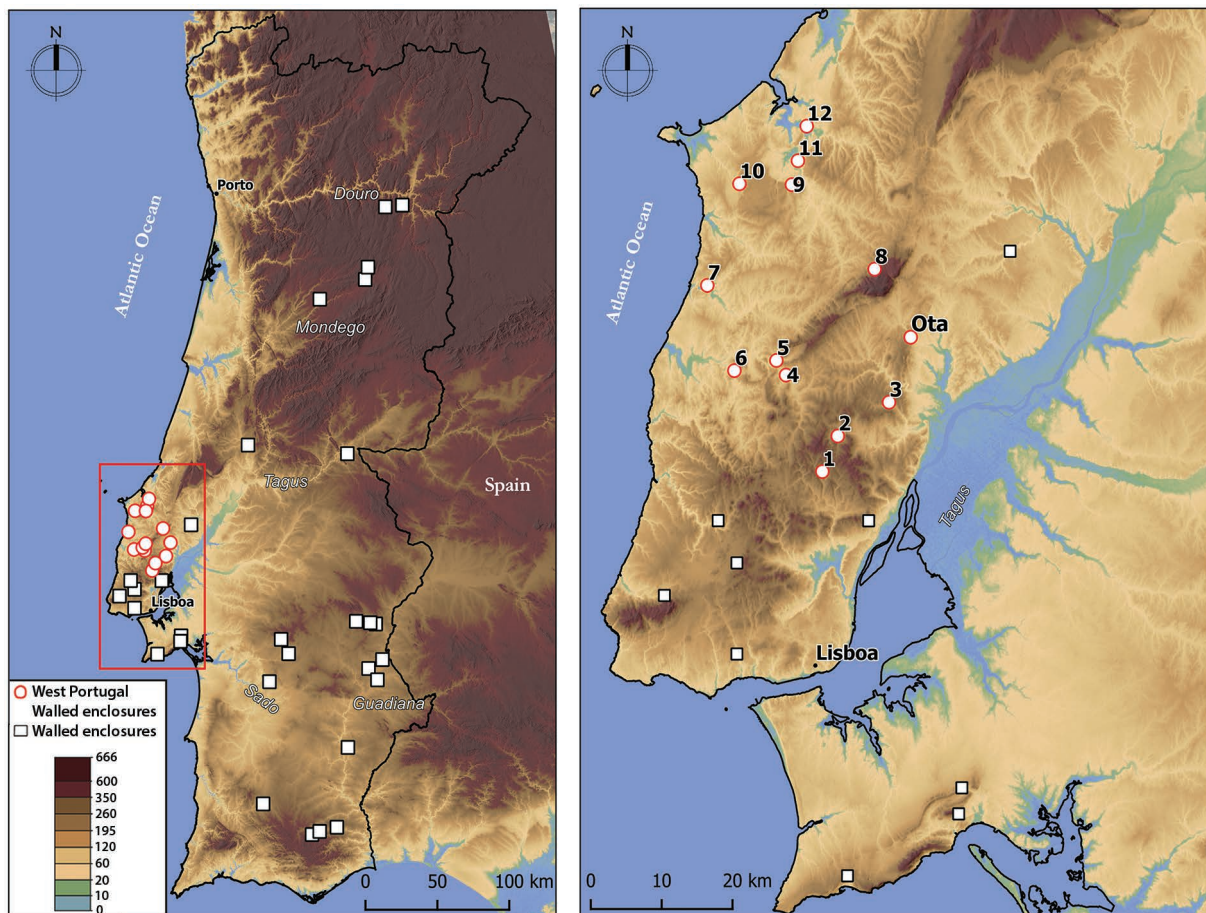


Fig. 1. Distribution of walled enclosures in Portugal (a) zooming in on the western cluster (b), where the Ota archaeological site is located. The sea level reconstruction is based on Lord et al. (2011). 1 Moinho do Custódio; 2 Castelo; 3 Pedra d'Ouro; 4 Penedo; 5 Fórnea; 6 Zambujal; 7 Pitagudo; 8 Pragança; 9 Columbeira; 10 Paço; 11 Outeiro de S. Mamede; 12 Outeiro da Assenta.

Besides these regions, Andalusia (Spain) is also notable, housing the second-largest aggregation of such sites, including prominent enclosures like Cabezo de los Vientos de la Zarcita and Los Millares (*Molina, Camara 2005*). In other Spanish regions, namely Murcia, Valencia, and Castilla y León, fewer than five enclosures have been detected.

The common characteristics that these sites exhibit across Estremadura were identified in the early phases of Portuguese archaeology. Consequently, the documentation and excavation of many of these sites date back to the transition between the 19th and 20th centuries, which complicates new interpretations of the archaeological contexts. The age of the data also influences interpretative approaches to these sites, predominantly suggesting that walled enclosures represented settlements marking the commencement of a sedentary path in prehistoric communities, with increased social complexification (*Gonçalves et al. 2013*). Adding to this idea, most scholars who have studied this phenomenon suggest it is related to the emergence of ideas of ownership and borders, used to justify possible intergroup tensions. This is thought to create a hostile environment, hence the need for 'defensive walls' (*Kunst 2006*).

Recent data, mainly retrieved from the Walled enclosure of Ota (Alenquer, Portugal), illustrates that there seems to have been an overvaluation of specific contexts and data from already excavated sites (such as Zambujal, in Torres Vedras). By using new excavation and recording methodologies, the archaeological site of Ota has shown that new narratives might apply to this social phenomenon, with a lot of data sources still hidden under the dense vegetation.

Refocusing on the Portuguese Estremadura, although this could be understood as a cohesive cultural whole during the 3rd millennium BC, it can also be subdivided into sub-regions to allow a more focused assessment of regional and social dynamics. Even though these divisions are mainly defined by contemporary and artificial criteria, they also materialize past socio-cultural behaviours.

One such area is the western region, the focus of the current study. Here a minimum of ten sites with walled enclosure features were identified, thereby constituting the largest cluster of the entire Portuguese Estremadura. However, while mimicking the broader Estremadura walled enclosure phenomenon, some more

localized behavioural patterns can be noted, possibly influenced by the Montejunto Hill. This 666-metre-high hill forms a significant NE-SW geological feature that not only shapes the landscape but also plays a central role in the cultural milieu of the surrounding areas (*Basílio, Texugo 2017*).

Montejunto's prominence is also crucial, as it sources many of the rivers in the western area, such as the Judeu stream and the Ota, Real and Alcabrichel rivers. These watercourses played a decisive role in shaping the human landscape of the 3rd millennium BC, with several wall enclosures built along their courses. Montejunto was also recognized as a symbolic landmark of rituality, ancestry, and death during the 3rd millennium BC, with its natural caves playing an active funerary role since at least the 5th millennium BC, as noted at Algar do Bom Santo (*Carvalho et al. 2019*).

The archaeological site of Ota

Located in the Portuguese Estremadura, the archaeological site of Ota is, along with 22 other sites, part of the 3rd millennium BC walled enclosure phenomenon. Dominated by Mesozoic sedimentary rocks interspersed with Cenozoic sediments, the hilltop in which Ota is located provided the raw materials – limestones, sands, and clays – that shaped the area's architectural and artefactual history (*Ramos-Pereira et al. 2020*). The landscape itself, characterised by a mix of mountains, hills, plateaux, plains, and coastal platforms, especially pronounced around Montejunto Hill in the west, plays a significant cultural and physical role (*O.c.*).

Paleoenvironmental studies from the early Holocene indicate initial meaningful anthropogenic impacts on regional vegetation around 5400 BC, marked by the onset of cereal growing. This period also saw stable sea levels and coastlines from 9300 BC to 2900 BC, with notable periodic floods that evolved with ongoing marine transgression (*Lord et al. 2011*). The Chalcolithic climate was similar to the modern climate of Estremadura: a hot-summer Mediterranean climate, with average temperatures around 17°C and annual precipitation ranging from 700mm to 900mm (*Mora, Vieira 2020*).

Vegetation over the hilltops, including at Ota, consists predominantly of thin soils specimens, namely dense thickets of *Quercus coccifera*, *Olea europaea var sylvestris*, *Rubus ulmifolius*, and *Pinus pinaster*, with occasional *Eucalyptus globulus*.



Fig. 2. Ota's vegetation cover and implantation. Left, view from the west towards Ota; right, aerial view.

Historically speaking, Ota archaeological site was discovered and excavated in 1932 by a local archaeology enthusiast, Hipólito Cabaço. At the time, the vegetation that covered the archaeological site was less dense due to the community grazing practices. While Cabaço's excavation efforts remain largely undocumented, later references by archaeologist Ernâni Barbosa (1956) provided some insights into the site's material culture, structures and possible context, yet without specific geographical details.

Post-1956, Ota has been intermittently referenced in academic discussions concerning specific artefacts, with comprehensive studies focusing exclusively on the site architectures and social dynamics. The recent re-engagement with Ota, initiated through Alenquer Municipality's Participatory Budget, aimed to fill the gaps in this knowledge by focusing on its Chalcolithic context, thought to be linked to the broader walled enclosure phenomenon (Texugo, Basílio 2018).

The results confirmed the existence of several occupation phases, with the most visible period corresponding to the 3rd millennium BC, alongside Roman Imperial materials. Sporadic occupations can be traced to Bronze and Iron Age, with some Medieval artefacts (Texugo 2016). New field surveys have managed to relocate eight structures and georeference 150 classifiable materials, with the findings still falling short when compared to the descriptions reported by Barbosa (1956).

Methodology

Aerial photography

Given the limited visibility due to dense vegetation at Ota, historical aerial photographs from the 1956-1958 USA Army Map Services Flight B were analysed. These photographs, taken at a 1:10500 scale from an altitude

of 5000 to 9000 metres, have been digitized in TIFF format with a resolution of 21 microns. This dataset, along with open-access historical and current aerial images and topographic maps, allowed for the collection of detailed historical, landscape, and cultural data about the site. This proven methodology (Ortega et al. 2013; Pérez et al. 2014) was applied on an intra-site scale to identify preserved architectures at Ota.

Field surveys

Field surveys were conducted following the identification of potential archaeological anomalies. A 50x50m grid was established over areas of highest potential, with selective and systematic surveys conducted only in areas where anomalies were identified (Foard 1980). Surveyors maintained a parallel spacing of 5m, moving in a south-north orientation. Despite potential occurrences of anomalies, visibility was significantly hindered by dense vegetation.

Aerial surveys

The use of Unmanned Aircraft System (UAS) platforms facilitated the development of a Digital Surface Model (DSM) for the site. A DJI Phantom 4 Pro captured images, which were processed in DroneDeploy to standardize photograph settings. The 3D model generated via photogrammetry provided centimetric resolution, allowing detailed analysis of the site's surface features.

LiDAR (Light Detection And Ranging) technology was also employed using a DJI Matrice 600 Pro equipped with a Phoenix LiDAR Scout-8. This system scanned the site, producing a detailed digital terrain model (DTM) from which 201 495 048 data points were generated across three returns, with a point density of 367 points per square metre. Post-processing involved classifying points using SpatialExplorer 5.0.2, with additional steps to refine the data (Zhang et al. 2016).

Field confirmation

Field confirmation of LiDAR interpretations involved targeted archaeological surveys and excavations at detected anomalies, following methodologies established by Barker and Harris (*Harris 1989; Barker 1993*). These excavations aimed to understand the architectural and chronological context of the anomalies, with each area being meticulously recorded and described.

Results

Integrating various remote detection products provided a solution to the dense vegetation at the Ota archaeological site, essential for selecting excavation areas in 2019 and 2020. By leveraging traditional and innovative technological approaches and methodologies, this approach made it possible to overcome the challenges posed by Ota's dense vegetation and complex terrain, simultaneously bringing to light new data concerning the presence and preservation rate of hidden prehistoric features. With this method, 21 anomalies with high archaeological potential were identified. Three of them correlate with earlier 20th century excavations, one might correspond to a wall-like structure, and the remaining 18 correspond to so far unknown archaeological features with different typologies. Initial field campaigns attested the archaeological significance of five of these anomalies:

Structures 1 and 2 (Anomalies 1 and 2)

The first field campaigns began with the site's most prominent and visible feature: the large encircling wall, crucial for understanding the site's role during the 3rd millennium BC. With two distinct survey areas, spaced 150 metres apart and covering a total area of 38m², the wall's external face was revealed, alongside construction solutions with regard to bedrock manipulations to achieve greater structural stability. Other modifications included possible efforts to redesign the structure, or even abandonment phases.

The wall's architecture, as detected at Survey 1, involved a gently sloping limestone layer topped by a five-metre wide wall of large limestone blocks on its exterior face, filled with smaller stones, replicating regio-



Fig. 3. LiDAR data acquisition system: a, b in-site base station; c Data acquisition with a DJI Matrice 600 Pro.

Mission	Total points (x10 ⁶)	Ground points (x10 ⁶)	Ground Points %	Area (km ²)	Ground Points/m ²
Ota	201	35	17.4	0.1	64

Tab. 1. File statistics from the UAV LiDAR mission.

nal construction methods. This setup suggested multiple construction phases, akin to the findings at Zambujal. More than just walls, the findings at Ota include embankments that, while linking it to other walled enclosures, also set it apart due to their unique implementation and functionality.

Survey 2 aimed to clarify the relationship between the wall (Structure 1) and a potential tower (Structure 2). The complex dynamics where these structures met also highlighted the different construction techniques: Structure 1 was made almost exclusively out of stones, while Structure 2 was made from a combination of limestone and clay levels. The excavation area also showed unstructured stone clusters, suggesting that there might be an extended façade beyond the survey limits. Like Survey 1, the second survey confirmed anthropic modifications to the bedrock.

Structure 3 (Anomaly 20)

Structure 3, identified as a negative structure via field surveys and LiDAR, corresponds to a feature already examined by Hipólito Cabaço, though records of its original discovery remain elusive. This circular structure incorporates both natural limestone and constructed elements, using techniques already seen in

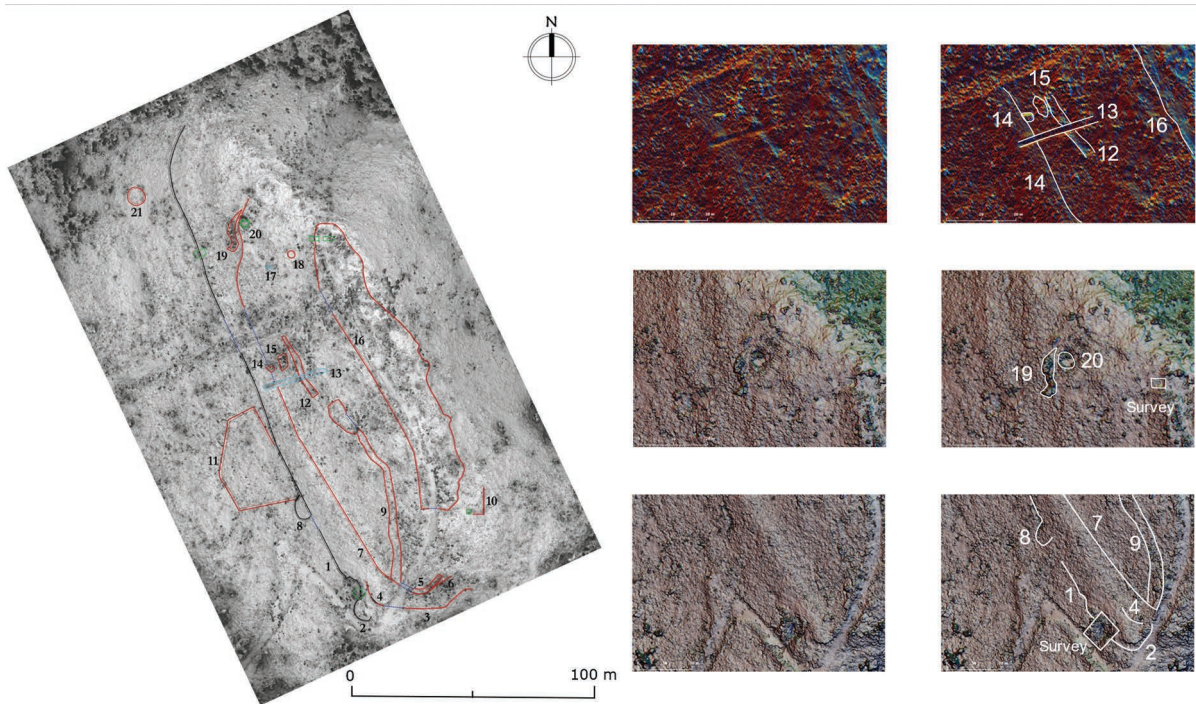


Fig. 4. LiDAR anomalies at Ota, mentioned in the text, with three close-up examples. **a** Cabaço's intervention; **b** possible negative structures; **c** anomalies detected in the site's access area.

Structure 1. Its excavation aimed to clarify the earlier dig processes and gather any remaining data, revealing a still well-preserved clay level that had shielded the base and parts of the structure's walls.

The analysis of surrounding detritus confirmed the selective past excavation practices: undecorated sherds and unidentified faunal remains. This artefactual set deeply contrasts with Cabaço's collection, composed

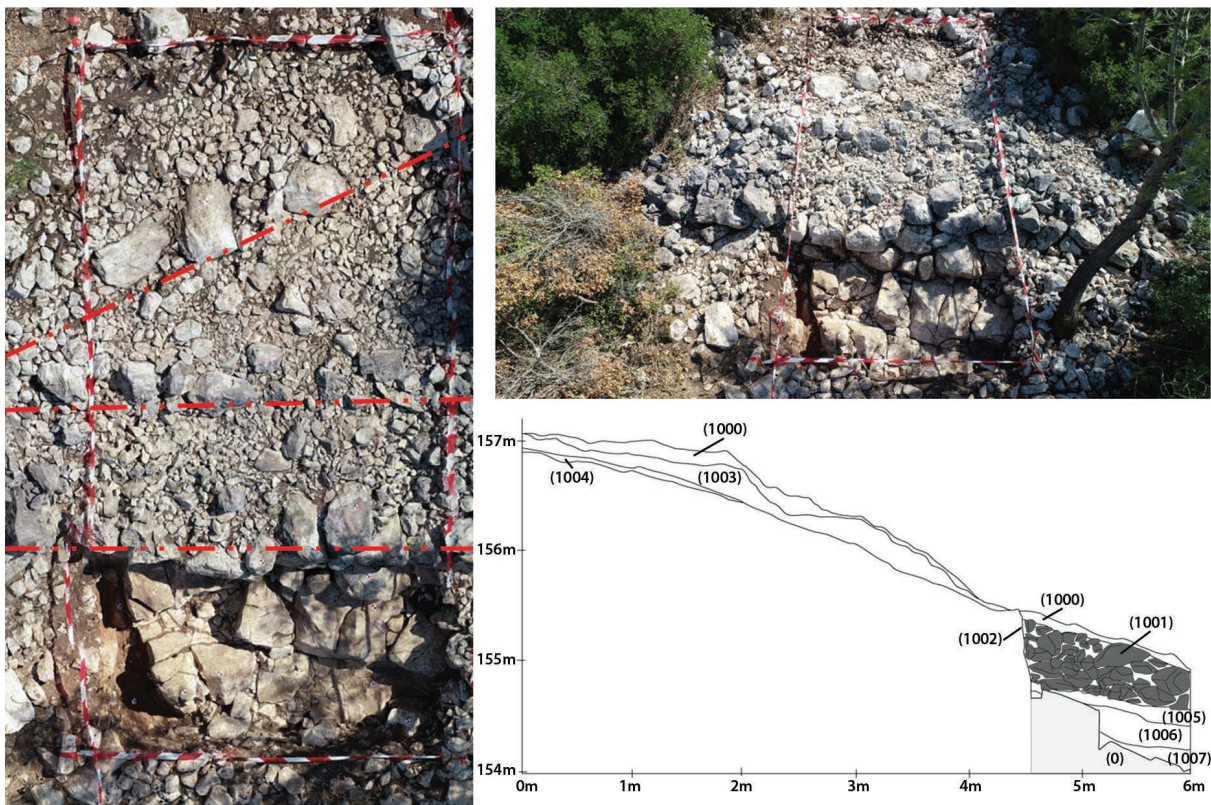


Fig. 5. Possible wall alignments and final records of Structure 1 (Survey 1) (photo/section).

by exceptional artefacts, highlighting a disconnection between field findings and archived pieces.

Structure 8

On the hilltop, Structure 8 was part of a cluster identified in the lower part of the elevation, notable for its stone agglomerations forming circular patterns. The excavation faced challenges, due to altered contexts and soil compositions caused by a recent fire. This hampered analysis of the structure's function and dating, but the lack of prehistoric materials suggests a more recent origin.

Structure 9 (Anomaly 16)

LiDAR data prompted the Structure 9 survey, to attest the existence of preserved stratified deposits and confirm the relationship between natural and constructed features. Situated between two terraced levels, the excavation did not reveal significant deposits but highlighted the adaptive reuse of natural limestone formations for structural purposes, indicative of sophisticated prehistoric architectural strategies.

Remaining LiDAR anomalies

Further LiDAR analysis revealed roads cutting through the site, one possibly dating back a century and ano-

ther serving as a historical access route. These features, along with detected negative reliefs, suggest more complex site dynamics than previously understood, potentially linked with unrecognized structural elements or past interventions. These structures are currently being studied on an ongoing research project.

Discussion

Cabaço's archaeological campaigns at Ota made it possible to build an extensive material collection, which lacks contextual information (*Barbosa 1956; Álvarez, Pérez 2013; Basílio, Texugo 2017*). Still, and only based on the materialities of the site, it is possible to comprehend that Ota has:

- A wide material diachrony, from the Chalcolithic to the Medieval period;
- A Chalcolithic human occupation that develops at the top and west side of the hill with;
- The exclusive presence of decorated materials;
- Specialized production of flint tools;
- Habitat materials and possible funerary elements;
- Presence of metallic tools;

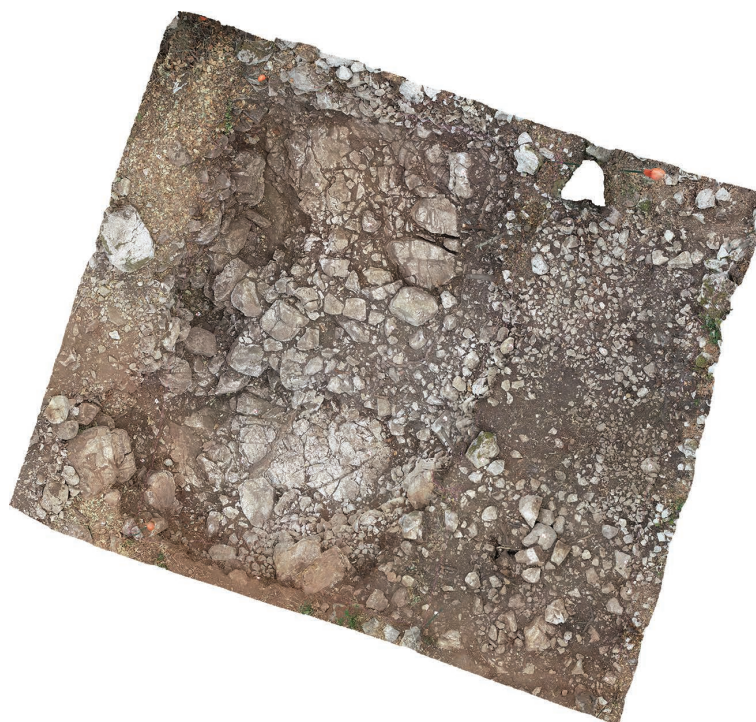


Fig. 6. 3D model of Ota's Structure 1, from Survey 2, with the beginning of Structure 2 in the bottom section of the image.



Fig. 7. 3D model of Ota's Structure 3.

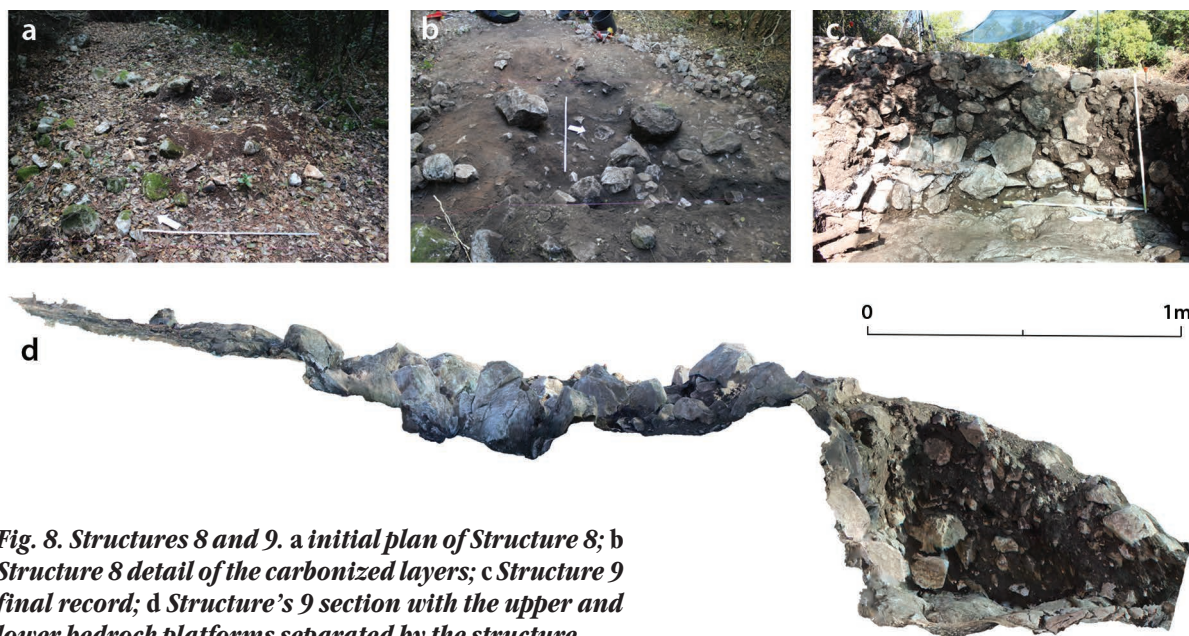


Fig. 8. Structures 8 and 9. a initial plan of Structure 8; b Structure 8 detail of the carbonized layers; c Structure 9 final record; d Structure's 9 section with the upper and lower bedrock platforms separated by the structure.

- A Late Bronze Age presence (five axes and two spearheads);
- A Roman occupation, as the second most significant presence on the site, with Republican and Imperial materials and imported ceramics and metallic elements.

This interpretive framework has undergone profound changes, with new fieldwork and LiDAR results, which complexify the image of the Chalcolithic communities of Ota's archaeological site. Adding to it, it was possible to access and confirm the suitability of the methods applied here. By combining traditional archaeological techniques and geotechnologies, different architectures were unveiled under the vegetation, enlarging the number of possible archaeological anomalies and the existing knowledge of past communities. As such, and since this methodology has proven its value in the Ota case study, it is currently being applied in other regional walled enclosures.

Walls, terraces, and entrances

The narratives built for sites with similar architectures to Ota have historically focused on the role of walled enclosures as defensive mechanisms, reflecting the tumultuous social dynamics of the Portuguese Estremadura during the 3rd millennium BC. This perspective posits the structures as fortifications against social ten-

sions exacerbated by demographic shifts (Kunst 2010; Gonçalves et al. 2013). However, recent findings suggest these structures could have served various functions, reflecting significant periods of construction and adaptation rather than a single period of fortification in response to warfare.

At Ota, Structure 1 was previously considered a straightforward defensive wall. Current evidence, however, indicates it underwent multiple transformations that reflect broader regional trends of architectural and social complexity (Jorge 2003; Kunst, Arnold 2011). This structure not only delineated space but also served as a communal focal point throughout various occupational phases, including a Roman period that repurposed materials from earlier structures.

Lab.	Sample	Context	BP date	Cal BC (2 σ)
Beta-561854	<i>Ovis/capra</i> rib	Structure 1 [1006]	3960±30	2571-2516 (32,8%) 2502-2400 (52,7%)
Beta-568786	<i>Capra hircus</i> horn	Structure 3 [1103]	3970±30	2383-2347 (10%) 2574-2444 (87,6%) 2424-2404 (3,3%)
Beta-612398	<i>Sus</i> sp. phalanx	Structure 3 (exterior) [1120]	3860±30	2379-2350 (4,6%) 2460-2276 (80,3%) 2256-2206 (15,1%)
Beta-612399	<i>Bos</i> sp. phalanx	Structure 3 [1115]	3990±30	2577-2459 (95,4%)
Beta-612400	<i>Sus</i> sp. cranium	Structure 3 (exterior) [1120]	3980±30	2576-2454 (93%) 2372-2356 (1,4%) 2418-2408 (1%)
Beta-612401	<i>Sus</i> sp. tooth	Structure 3 (exterior) [1120]	4000 ± 30	2579-2463 (95,4%)

Tab. 2. Radiocarbon dates from Ota.

The dynamic reuse and modification of Ota's structures suggest a continuous, layered history of occupation and functionality, challenging the notion that these were exclusive throughout its whole architectural life. The complex construction patterns that have been observed – marked by different use, abandonment and repurposing phases – align Ota with other regional sites, indicating a shared architectural and cultural heritage across Estremadura. That needs to be seen through new, less warlike, lenses.

The layout of Ota, particularly Structure 1, points to a sophisticated history of use, possibly aligned with both defensive and social needs. The structure's strategic placement and construction techniques reflect a nuanced understanding of landscape and community safety. The presence of this structure at a key vantage point suggests it could have been integral not just for defensive purposes, but possibly to control local resources, routes and social practices.

Moreover, the architectural similarities between Ota and other regional sites underscore a possible shared cultural identity and unity that contradicts the hypothesis of widespread social unrest due to external threats. These enclosures likely facilitated complex social interactions, including trade and cultural exchanges, rather than merely serving as barricades against invaders.

The interpretation of Ota's embankments and terraces through LiDAR surveys reveals an adaptive approach to environmental and social challenges. These features, possibly unique to Ota, highlight an advanced capability with regard to modifying landscapes to suit agricultural and habitation needs, suggesting a socially organised community capable of significant engineering projects.

This perspective is reinforced by the discovery of multiple terraces and interconnected structures that highlight the integration of natural and anthropogenic features at Ota, with a balance between environmental adaptation and cultural development.

The reconsideration of Ota's structures, particularly the multi-functional use of what were once thought to be purely defensive walls, offers new insights into the social and architectural sophistication of Chalcolithic Estremadura. This case study not only challenges traditional interpretations of prehistoric settlements but

also highlights the importance of integrating technological advances like LiDAR with archaeological methodologies to uncover deeper understandings of past societies.

Reevaluating Ota's funerary context: the case of Structure 3

If there seems to be a monothematic research interpretation for walled enclosures as defensive sites, it is also accepted that there is a clear spatial segregation between the world and structures of the living and those ascribed to the dead, like funerary sites (*Kunst 2010; Cardoso 2010; Sousa 2010; Gonçalves et al. 2013; Texugo 2022*). This perspective reflects, once again, modern biases more than ancient realities. The recent findings in Ota challenge this dichotomy, revealing a more nuanced interplay between life and death within these ancient communities.

Structure 3, initially undistinguished in its role, has prompted a significant rethinking of the site's use. Unlike other structures within the enclosure, it uniquely combines architectural features and artefacts typically associated with funerary contexts – such as Palmela arrowheads, zoomorphic figures, and human remains – suggesting it served as a burial site (*Álvarez, Pérez 2013*). Its circular design, crafted through careful manipulation of the bedrock and enhanced with a clay covering, points to intentional construction for ritualistic purposes. This is further supported by radiocarbon dating, aligning it chronologically with other late Chalcolithic contexts within Ota, and with other funerary contexts.

The discovery of Structure 3 offers a compelling case for reconsidering other ambiguous structures throughout Estremadura. Sites like Olelas, Penha Verde, and Pedra de Ouro, previously reinterpreted as non-funerary despite early evidence of burial practices, may need reevaluation considering the findings at Ota. This shift could signify a broader pattern of funerary practices within these enclosures, suggesting a complex relationship between the living and the dead that has been overlooked in previous research.

Ota's case illustrates the potential misinterpretations caused by modern assumptions and highlights the need for a more flexible agenda when studying Chalcolithic social structures. The ongoing investigations into Structure 3 and similar sites will continue to challenge and refine our understanding of these ancient

communities, potentially redefining the function and significance of walled enclosures in the Chalcolithic landscape of Portuguese Estremadura.

Conclusions

The symbiosis between archaeology and geotechnologies has dramatically altered the perception of the Ota archaeological site. Even with limitations, the effectiveness of remote sensing using LiDAR technology was once again attested with this study, meaning that these methods and techniques can be used for the identification of intra-site architectures in other archaeological sites in densely vegetated Mediterranean landscapes (Cerrillo-Cuenca, Bueno-Ramirez 2019).

As for the Ota archaeological site, we show that it has distinct characteristics and rhythms:

- Instead of the typical walls, Ota has at least two confirmed embankments, which increase and stabilise the usable area within the site;
- The terraces show different biographies and have undergone distinct taphonomic processes. The embankment delimited by Structure 1 seems to be dated from somewhere before the 3rd quarter of the 3rd millennium B.C.
- In Ota, human resilience over time is materialized in a symbiosis between natural realities and anthropic structures;
- Within the enclosure defined by Structure 1, a possible funerary architecture has been identified (Structure 3), reflecting a so far unknown social practice in enclosures of the same period.

The interpretation presented for Ota does not set it apart from the Chalcolithic walled enclosure pheno-

menon of the Portuguese Estremadura (Gonçalves et al. 2013). On the contrary, it serves as an example of an alternative interpretation of the structures and the cultural environment when these sites appeared, were used, and collapsed (Jorge 2003).

Ota's excavated area is still small. However, as with other archaeological phenomena, the inscription and belonging to the same sociocultural reality can be expressed in multiple ways, Ota being an example of this multiplicity and plurality, as well as how different sciences and methods can work together and be applied to the development of the existing knowledge about past communities.

Geolocation information

Ota is located at 39.114983, -9.000754 (datum WGS 84) at Alenquer municipality on Lisbon district - 50km to the north.

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