Insights on field surveys in coastal fortified hilltop sites of southern Albania

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Abstract
The paper deals with the integrated methodology applied to fieldwalking and topographic surveys of fortified hilltop sites in southern Albania. The geomorphological peculiarities of these upland contexts, along with the challenges related to accessibility and visibility, make data collection and interpretation demanding. The preliminary results of field surveys at three such sites, namely, Badhra, Karos and Kukum, show how these issues were overcome to enhance the available documentation and better understand their function and development dynamics from a diachronic perspective.

Keywords
Hillforts, upland archaeology, Albania, Chaonia

Introduction

The wide coverage of mountain reliefs extending from north to south up to the coastline has deeply influenced population dynamics in ancient times in southern Albania. As it guaranteed a direct connection between the seacoast, mountain slopes and river valleys, this asset conditioned both the communication system, which focuses on the narrow alluvial valley floors in between mountain ranges, and the population and settlement dynamics flourishing just partially in valleys and mostly along hillsides. This pattern favored summit paleosurfaces, hillside plateaus, river terraces or steep spurs of rock because of the swamping phenomena that easily evolved in those few plains formed by the main hydrographic basins and river mouths. Therefore, uplands became one of the few places in the region suitable for living and, not surprisingly, also one of the main topics of archaeological research. This is well illustrated by the region between the modern centers of Dhërmi and Lukovë, where the mountain range once known as the Acroceraunian Mountains directly overlooks the Ionian Sea while extending in a series of hilly ridges down to the Gulf of Sarandë. Several narrow water streams cut through these ridges, flowing into the sea and creating both narrow access routes to the inland and small flat areas along an otherwise entirely mountainous coastline, thus allowing the connection with the main natural north-south communication routes connecting the Shushica, Drinos and Kalasa River valleys. Among them, particularly relevant is the Kudhësi stream, which takes the name Qeparos in its final stretch, that empties just south of the bay of Porto Palermo after separating from the Kalasa River. Only one mountain ridge separates the Kudhësi-Qeparos river from the Borsh stream and its alluvial plain, which marks the point where the coastline begins to reclaim its space allowing easier access to the hinterland. The relevant role of the Kudhësi-Qeparos and Borsh rivers as natural communication routes, together with the convenient presence of several promontories and low hills, has favored the development of settlement strategies over time in this area.

This partially explains why the territory between the modern centers of Dhërmi and Lukovë is known for the widespread presence of archaeological heritage and for the over twenty fortified sites crowded along the coast and the immediate hinterland. The fortifications are rubble walls realized with uneven building stones selected on the sole basis of what material was available on site, described by Thucydides with "λογάδην δὲ φέροντες λίθους" (Th. IV, 4.2). The ease in building, which does not require any specific technical knowledge, makes this a "universal archetype" (Felici 2020, 412-413) as a versatile and shared construction technique that can be found across very different historical periods and locations. At the same time, however, these specific features also condition its conservation over centuries since these hillforts are easily exploited as a source of construction stone, and they are inevitably more inclined to scattering given the absence of binding agents. Although often invisible at sight, fortified hillforts in southern Albania are one of the most common archaeological features of the region, a constant presence marking the territory and spanning over a wide, almost seamless, chronological timeframe. Their development, starting as far as in the Middle Bronze Age, can be considered as an inevitable adjustment to the distinctive geomorphological features of these lands. However considerable, scientific research on most of these sites has yielded little information on their development over time due to the same peculiar geomorphological features, which have prevented effective fieldwork through the years. In 2023, the FortNet Project (University of Bologna, Sapienza University of Rome) was launched to revise available data by bringing the most up-to-date and widespread practices of landscape and upland archaeology through the implementation of a broad range of non-invasive methodologies for fieldwork. The final aim of the project is to build a new geographical database to provide both the scientific community and bodies responsible for conservation and enhancement with updated information on the cultural heritage of this region. The fieldwalking and topographic surveys conducted in 2023 and 2024 in three such coastal fortified sites, namely Karos, Kukum and Badhra, are presented in this contribution to highlight how even sites that have been already extensively investigated in the past can still benefit from the integration of new field surveys, remote sensing application and a critical review of legacy data (Fig. 1).

Research background: upland landscapes, survey challenges and open questions

The overall geographical setting of southern Albania has had significant consequences for the application of traditional theoretical and methodological approaches in ancient topography and landscape archaeology to upland contexts. Both the accessibility of sites and the visibility of the archaeological record are compromised by several factors, which in turn hamper intra-site research and the sound interpretation of contexts. In this respect, the methodological difficulties encountered here echo those addressed by comparable projects. Their strategies offer a useful comparative framework, and their relevance lies partly in a shared focus on upland settings, partly in the fact that some concern regions geographically close to, and broadly similar to, the present study area. Yet it extends further, to the development of an integrated methodology suited to the simultaneous use and management of legacy data, historical cartography and photographs, and modern and contemporary remote-sensing data (Davis *et al.* 2003; Orengo *et al.* 2015; Gassiot Ballbé *et al.* 2016; Galaty, Bejko, Deskaj 2019; Bernardini and Vinci 2020; Angelucci *et al.* 2023; Knodell *et al.* 2023; Palet *et al.* 2023, 180–182; Apostolou *et al.* 2024).

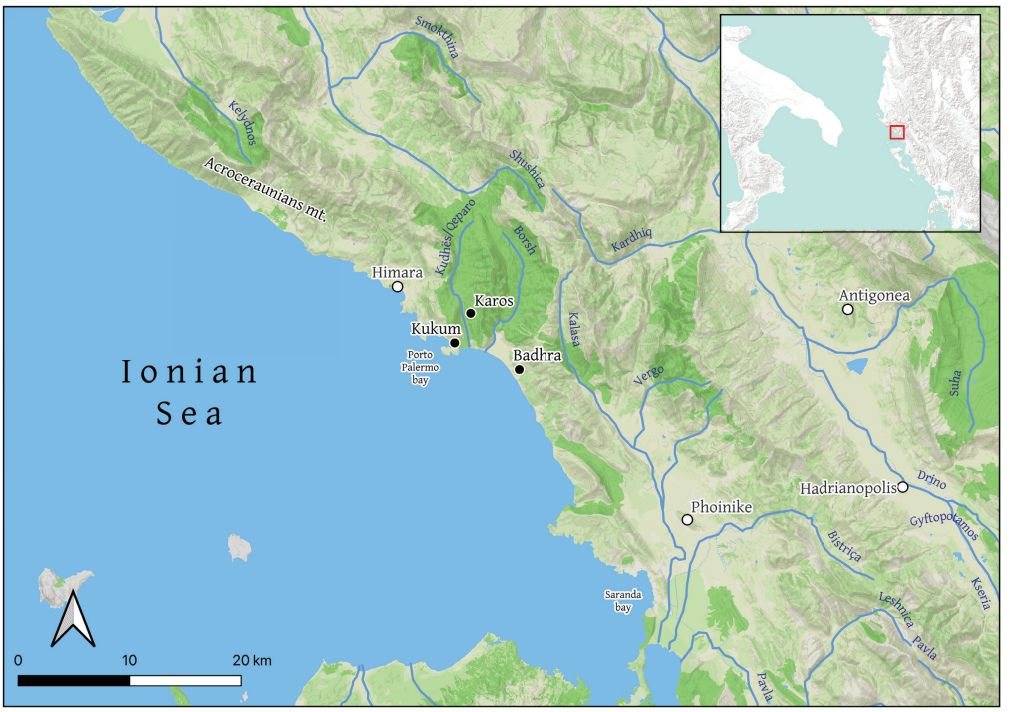


Figure 1. The research area in southern Chaonia. Principal archaeological sites (white) and hillforts investigated through field surveys (black).

Accessibility is often reduced by the location of hillforts on uneven ground at high altitudes and along the steep, rocky slopes of mountain ranges that become even more impassable as their use for grazing declines and wild vegetation and shrubs spread. Visibility, in turn, is diminished by hillside erosion and runoff, by the deposition of fluvial sediments in the plains, and by the precarious state of preservation of the hillforts themselves, all of which have scattered the archaeological record and substantially altered an already fast-changing landscape. Recovering finds in secure contexts, which could help define the chronology and function of these hillforts, becomes increasingly difficult where archaeological deposits are shallow, a condition produced by the widespread exposure of bedrock. This further complicates the use of collection strategies beyond surface survey, including point sampling, which has proven effective in comparable contexts (Tartaron 2003; Tartaron 2004, 69; Gerogiannis 2021, 199–204; Stek and Waagen 2022; see also Carbotti *et al.* 2024, 9–11; Carbotti *et al.* 2025, 81–82). Here, however, such an approach is poorly suited: with little stratified material to target, a systematic, continuous fieldwalking strategy was preferred instead, as detailed below. Other constraints are equally specific to the region. Although LiDAR coverage is available, it can be consulted only as a Web Map Service, that is, a served raster rather than downloadable raw data; this permits visual inspection but precludes the generation of custom derivatives, such as tailored hillshades or morphometric analyses. Nor are these conditions stable: seasonal vegetation growth and shifting land use can alter both access and ground visibility between field seasons, so that a site reachable and rich in surface finds one year may

prove inaccessible or yield almost nothing the following year. Taken together, these factors point to some differences in certain respects, even though the present study area remains broadly comparable to those addressed by the comparative projects mentioned above. Such differences do not diminish the value of that framework in preparing this survey, but rather require an approach that builds on the methods adopted elsewhere, adapting them where the specific demands of southwestern Albania require it.

Past excavations and field surveys in some representative sites in the area (Budina 1971; Ceka 1985; Koçi 1991; Prendi 1993; Gjipali 2009; Cabanes *et al.* 2008; Giorgi, Bogdani 2012) have dated the most ancient occupation between the Early Bronze Age and the Early Iron Age and identified the Middle and Late Bronze Age as the period of construction of the fortifications. However, most of the considerations on the overall territory and other sites not included in this targeted research still rely mostly on the comparison of construction techniques. As a consequence, they lack direct analysis of material found in deposits with secure stratigraphy because of the challenges posed by research in this territory. A striking example is given by the sites of Karos and Kukum, located in the hinterland and at the mouth of the Kudhësi-Qeparos river, respectively. Twelve trenches were dug in Kukum, all bearing copious ceramic material (Koçi 1991, 44-49; Prendi 1993, 18-24; Giorgi, Bogdani 2012, 242-243). This allowed the division into three chronological phases of site occupation: Kukum I in the Early Bronze Age, related to the construction of the first fortification and inner buildings; Kukum II between Middle and Late Bronze Age; Kukum III in the Late Bronze Age, when new buildings were added outside the fortification. Similarly, the results of fieldwalking surveys and study of surface finds in Karos have brought the division into two phases of occupation: a first phase in the Late Bronze Age, so-called Karos I, and a second phase in the Early Iron Age up to the 9th century BCE, so-called Karos II (Koçi 1976; Ceka 1985, 30-31; Koçi 1991, 38-44; Prendi 1993, 18-24; Cabanes *et al.* 2008, 49-50; Giorgi, Bogdani 2012, 241-242). The positive results of fieldwork have made these sites the main reference points for dating the settlement development of several other rubble wall hillforts not only in their immediate surroundings, but also in the whole region of southern Albania[1]. It goes without saying that this approach does not meet the requirements of up-to-date and scientific research standards and that it could need some major improvements, such as the ones given by recent field surveys (Çipa 2016; Çipa, Meshini 2016). Some progress has been made thanks to the absolute chronology proposal for the timeframe between Mesolithic and the Iron Age in Albania, which however unfortunately still does not fully comply with a thorough representation of the country, as most of the samples included in the study come from archaeological sites in northern Albania (Ruka, Galaty 2022).

Materials and methods

Given these premises, choices related to research methodology and site selection had to be balanced between availability of legacy data, site visibility and accessibility, and feasibility of fieldwork. For these reasons, the area located between the mouths of the Kudhësi-Qeparos and Borsh rivers, near the modern villages of the same name, was selected as a starting point for the surveys. Three sites were sampled for their positive response to given criteria, namely Karos, Badhra and Kukum. Although differences in accessibility have influenced

[1] The chronology of Koleza, Kepi i Stilit and Mursi, in southern Albania, and Ephyra, in Greek Epirus, was only subsequently assessed. See Koçi 1991, 52; Lima 2013, 35-37; Hernandez 2020, 238-241; Papadopoulos, Papadopoulou 2020.



Figure 2. Fieldwalking survey in Kukum.

fieldwork, legacy data and publications over time show how these sites are among the few whose architectures and surface finds have been extensively analyzed. Thus, they seemed an appropriate starting point to conduct a comprehensive analysis that could more easily allow for a thorough consideration of both data acquired from past activities and new results, while also ensuring a modern approach to field research. Field walking and topographic surveys were consequently adapted to the specific site features. Coverage and intensity varied according to site accessibility, as well as to ground visibility, which changed between 2023 and 2024: if possible, a first broad survey with a wider survey interval between surveyors (5 m ca) was made, covering both the inside and the immediate proximity of the hillforts (Fig. 2). In a second stage, transects were delimited for a more in-depth survey (between 2 and 3 m survey interval), whose selection depended on the possibility to verify legacy data concerning functional purpose of certain areas or if particular types of surface finds were recovered during the broader site survey. In this regard, the collection of finds during fieldwalking surveys was necessary to assess both the functional and chronological questions posed by these sites. For this reason, both diagnostic and non-diagnostic finds were collected and systematically documented through pictures, recorded, quantified, and, in the case of particularly significant recoveries, also inventoried for future reference. Topographic and photogrammetric surveys were needed to ensure the accurate framing of sites in an absolute coordinate system, for the understanding of the site's current extent, and for the acquisition of remote sensing products



Figure 3. Topographic survey with GNSS in Karos.

essential to conduct comparisons with aerial photographs and historical satellite imagery. These were conducted using a drone (DJI Mavic Air 2) with ground markers measured via a GNSS antenna (Emlid Reach) operating in RTK mode (Fig. 3). All pictures were acquired at a steady height of 30 m above the site and later processed through Agisoft Metashape. A comparison was made between the orthoimages and new plans produced after this study and those published from previous research. This was undertaken, in addition, with the use of available historical photographs and satellite images freely accessible through the Albanian national geoportal (https://geoportal.asig.gov.al/en) and Google Earth. While fieldwork in Kukum and Badhra could take place in both 2023 and 2024, albeit with different outcomes due to changing environmental conditions, it was limited to 2023 in Karos, as vegetation growth prevented access to the site.

Fieldwork and results

Karos

Located at 480 m a.s.l., the hillfort of Karos is placed at the top of the Mali i Karosit, extending only on its eastern flanks while taking advantage of the cliff on the western side, which overlooks the Kudhësi-Qeparos River valley (Fig. 4). The construction of its three concentric rounds of walls has been divided into two phases thanks to the results of previous field surveys: the first of which is set during the Late Bronze Age, while the second during the Early Iron Age, up to probably the 9th century BCE (Koçi 1976; Koçi 1991, 38-40; Ceka 1985, 30-31).



Figure 4. Drone picture of Karos.

Moreover, a brief occupation of the area was detected both for the 4th century BCE and in particular for the 6th century CE (Koçi 1976, 240-241). Karos is the most complex to access among the three sites considered in this study, as the high slopes of the mountain flanks and the rock formation emerging from the ground clearly alter both accessibility and visibility of archaeological records. In fact, fieldwork was widely affected by these environmental features, as it was not possible to organize systematic survey lines. For these reasons, activities focused on the identification of the hillfort remains and on the topographic documentation of the whole area. Both on-site inspection and the new orthoimages allowed us to recognize only two rounds of fortifications with a good degree of certainty, which could be recognized as the same as those visible in the original plan published by J. Koçi (1976) and the 1999 aerial photographs (Fig. 5). The good state of conservation in elevation can probably be attributed to the demanding position of the hillfort, although the later reoccupation and its use as pasture in modern times may have prevented its complete dismantlement. Finds collection concentrated in the area crossed to reach the upland summit (three surveyors at 5 m interval moved SE-NW for 300 m), was very limited in quantity (only 4 pieces) but also unhelpful in establishing the chronology of occupation (Fig. 6). A single handle of coarse ware pottery has been identified, however it does not provide sufficient elements to determine its original shape and dating. At present and given the wide diffusion of this fabric in the region, it may only be stated that it belongs to a local production characterized by micaceous inclusions.

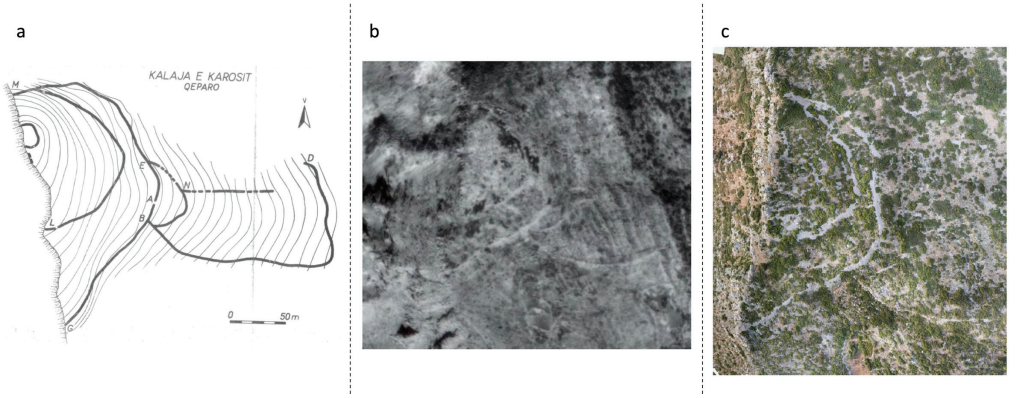


Figure 5. a. plan of Karos (Koçi 1976); b. aerial photograph from 1999 (ASIG); c. orthoimage of Karos from the new drone survey.

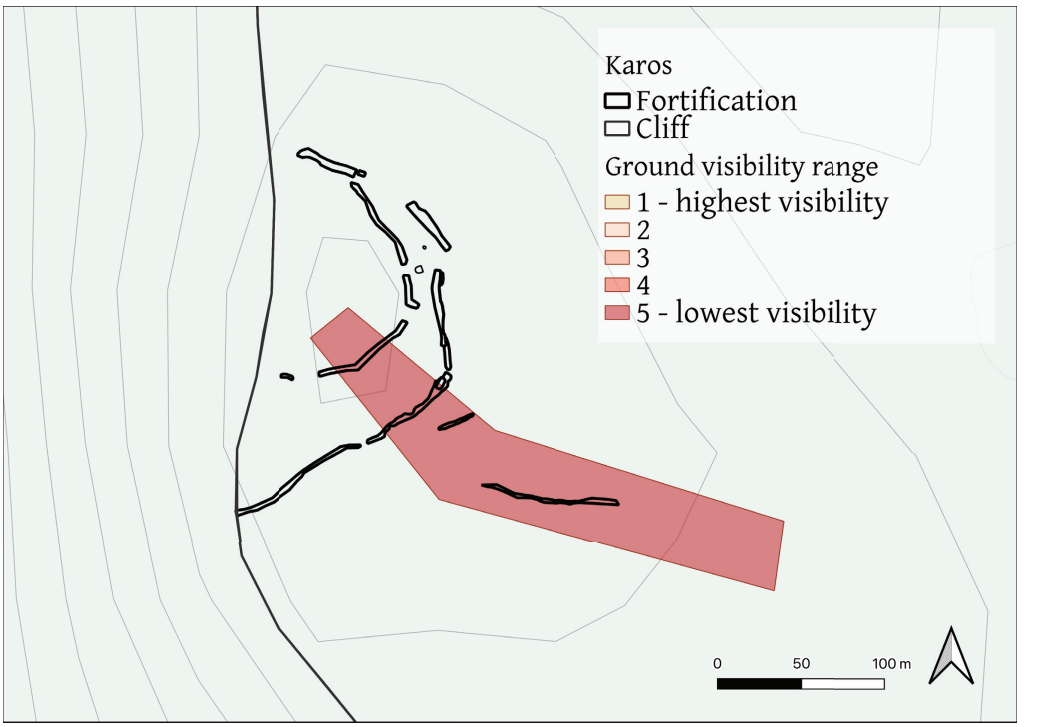


Figure 6. Plan of Karos with extension and ground visibility of the transect surveyed during fieldwork.

Badhra

Differently from Karos, Badhra is located on a low hill easy to reach, directly overlooking the Ionian Sea and the mouth of the Borsh river. The single, sub-circular line of the fortification is discontinuous, and it is traditionally dated to the Late Bronze Age, given its similarity with the so-called first phase of Karos (Fig. 7). Past field surveys and excavations (Hammond 1967, 122;



Figure 7. Drone picture of Badhra.

Korkuti 1982, 236-237; Ceka 1985, 30-31; Baçe, Bushati 1989, 6-13; Koçi 1991, 57; Prendi 1993, 18-23; Cabanes *et al.* 2008, 41; Giorgi, Bogdani 2012, 229) could locate Late Bronze Age pottery near the entrance to the circuit and fifteen buildings interpreted as houses outside the fortification. Given the gentle slope, site accessibility was straightforward and only ground visibility partially suffered from the presence of the widespread underbrush, which affected survey in 2023 less than it did in 2024. Aside from the general survey in the immediate surroundings and inside the fortification, which highlighted the good state of conservation of the elevation on the eastern side of the hillfort (Fig. 8), three more in-depth transects were analyzed. Two were located to the west of the fortification, the first (80x15m) with a E-W orientation and the second (25x65m) with a N-S orientation, partially overlapping on the easternmost and southernmost portion, respectively (Fig. 9). Their survey had the aim to further analyze both a sample area where possible houses were detected in the past and an area where, on the contrary, none were identified in order to verify if there were any that could have been ignored by previous research. The result was negative, as possible buildings were located only at a later time after the post-processing of the UAV survey. This was probably due not only to scarce ground visibility conditions, but also to the progressive demolition of these structures, which were apparently last clearly visible at the beginning of the 2000s, as witnessed by 2007 satellite images (Fig. 10). The analysis of processed orthoimagery also helped in detecting two more possible entrances in the fortification that had not previously been identified, one along its north-east side and the other along the south-west side. The third survey transect



Figure 8. Visible elevation of the hillfort along its east side in Badhra.

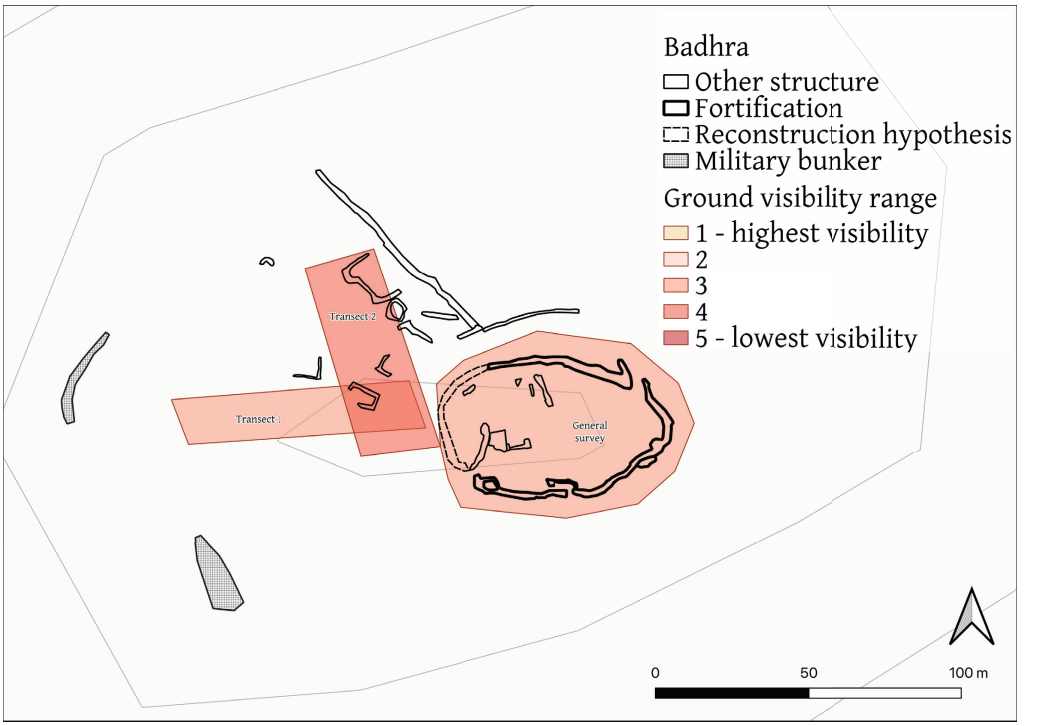


Figure 9. Plan of Badhra with extension and ground visibility of the transects surveyed during fieldwork.

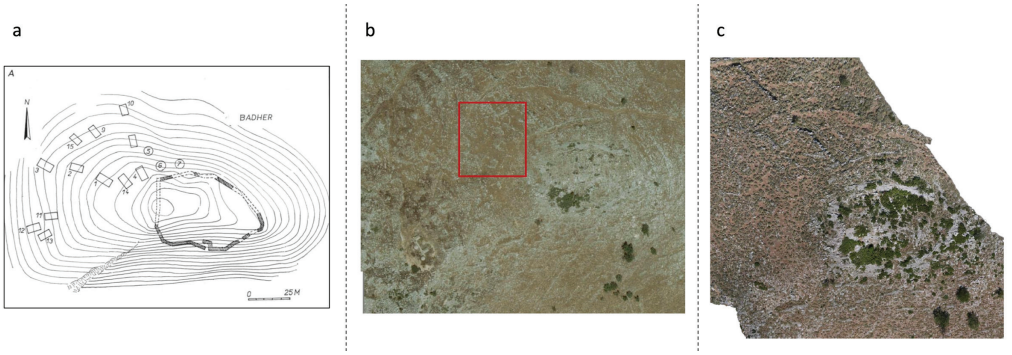


Figure 10. a. plan of Badhra (Ceka 1983, tab. I); b. satellite image from 2007 (ASIG) with signs of the possible dwellings in the red rectangle; c. orthoimage of Badhra from the new drone survey.



Figure 11. Drone picture of the structure found during the survey of Transect 3 in the saddle connecting Badhra and the modern road.

(25x90m) was set in the saddle that connects the hill of the fortification and the modern road because there were hints of the presence of possible structures, which the subsequent survey confirmed. The first is a building with a square plan, measuring about 6x6m, whose outer perimeter was more clearly visible than the inner articulation, as it was covered with shrubs. These outer walls, preserved at the height of the current ground level, are apparently made of dry stonework and employ semi-finished blocks of small and medium size. To the SW of this structure and parallel to its outer limit runs in an E-W direction a short wall septum, visible for a length of just under 2 m and about 40 cm thick, whose outer and inner faces can be clearly identified as they are both made with small and medium-sized semi-finished blocks, apparently dry-bonded (Fig. 11). Finally, finds collection (158 pieces) was more effective than in Karos (Fig. 12). The majority of collected materials is still represented by coarse ware

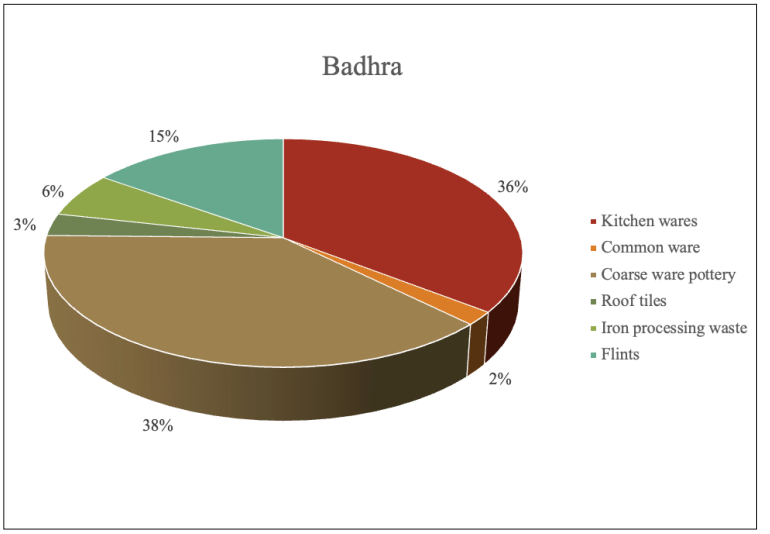


Figure 12. Quantity in percentage of typologies of finds collected during field surveys in Badhra.



Figure 13. Fragments from iron processing waste.

pottery (38%), immediately followed by kitchen wares (36%) that were found in particular in the transects related to the so-called housing area. Their poor state of conservation does not allow us to state more information about their chronology at the moment, although the fabric hints again at a local production. Three other typologies of finds were recorded, namely unworked flint fragments (15%), to be probably associated with the natural geological deposit of the area, roof tiles (3%), and possible fragments from iron processing waste (6% - Fig. 13). These latter were collected during the survey of the transect located on the saddle, they are characterized by a round shape, and some fragments seem to be wrought. Their proximity to the newfound structure opens the possibility of a connection between the two, although the origin from nearby modern military bunkers still cannot be completely ruled out before proper analysis of their composition.



Figure 14. Drone picture of Kukum.

Kukum

Kukum is located on a low hill in front of the Porto Palermo Bay, over the mouth of the Kudhësi-Qeparos River (Fig. 14). It is considered one of the most ancient sites in the area, as its first occupation is attested from the Early Bronze Age up to the Late Bronze Age (Koçi 1991, 44-49; Prendi 1993, 18-24; Giorgi, Bogdani 2012, 242-243). The site underwent excavations between the 1970s and the 1980s, when twelve trenches were dug both inside and outside the fortification, returning high quantities of pottery, and several buildings interpreted as houses were discovered outside the fortification. Given its position and the low steepness of the hill flanks, the site is easily accessible and a systematic field survey was made possible. However, ground visibility conditions drastically changed between the two years of fieldwork, as in 2023 the whole area had been affected by a fire that burnt the underbrush, while in 2024 it had naturally regrown. Like Badhra, Kukum was investigated first by a broader survey on the area inside and immediately outside the fortification, as well as on the southern side of the hill's summit plateau. Three more transects were surveyed by three surveyors for each during fieldwork, two inside the fortification (*Griglia 1* - 10x10 m and *Griglia 2* - 10x15m) and one outside (*Griglia 3* - 10x10 m), as the optimal visibility conditions encouraged a more in-depth analysis (Fig. 15). The first survey highlighted that the state of conservation of the hillfort, which was already reported as critical during the excavations, had worsened over time. The elevation of the fortification was not visible anymore and could be understood only by the

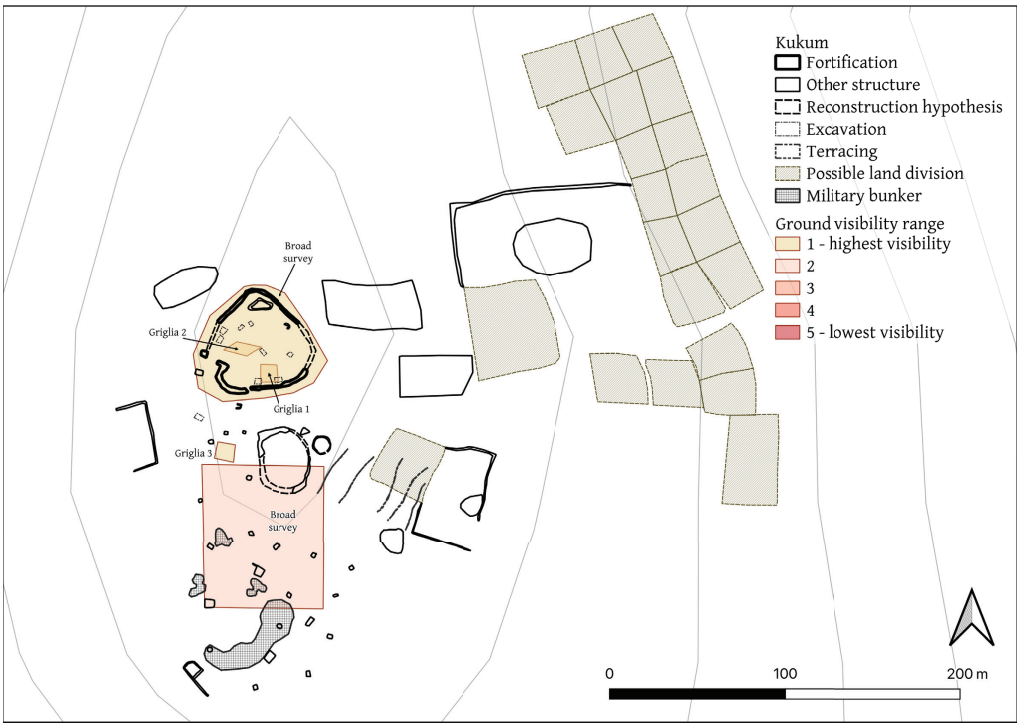


Figure 15. Plan of Kukum with extension and ground visibility of the transects surveyed during fieldwork.

crumbling of the walls that allow us to reconstruct its overall perimeter. No records of the so-called houses were collected, either on site or during the later post processing of the drone survey. However, it was possible to provide evidence for the military facilities and several modern structures that are located on the southern side of the plateau for the first time. The analysis of satellite images over time has highlighted that several of these latter were probably established between 2007 and 2015, thus implying recent work on site that could have further altered the conservation of ancient records (Fig. 16). Through the cross analysis of the orthophotos obtained from the new photogrammetric survey and the satellite images, it was possible to identify, both along the eastern flank of the hill and on the southern slopes, a series of pseudo-rectangular traces, with dimensions varying from 20 to 30 meters on each side, bordered by what appear to be medium-sized, unworked stones arranged in a row on the ground. The hypothesis that these traces may be traced back to an agrarian land division is plausible. However, given the extensive impact of the modern military occupation on the entire area, the possibility that these traces are also contemporary with the bunkers that dot the southeastern front of the site immediately abutting the coastal slope cannot be ruled out. Finds collection yielded a noteworthy quantity of materials (484 pieces), if compared with the other two sites previously listed (Figs. 17-18). Coarse pottery, whose function is still difficult to determine, is the most represented (66%), followed by kitchen wares (13%), amphorae (10%), flints (3%), and fragments of tiles (1%). Among these, a Late Bronze Age lug handle (Koçi 1991, tab. II, 51), fragments of Roman Greco-Italic amphorae of Adriatic production and Late Roman

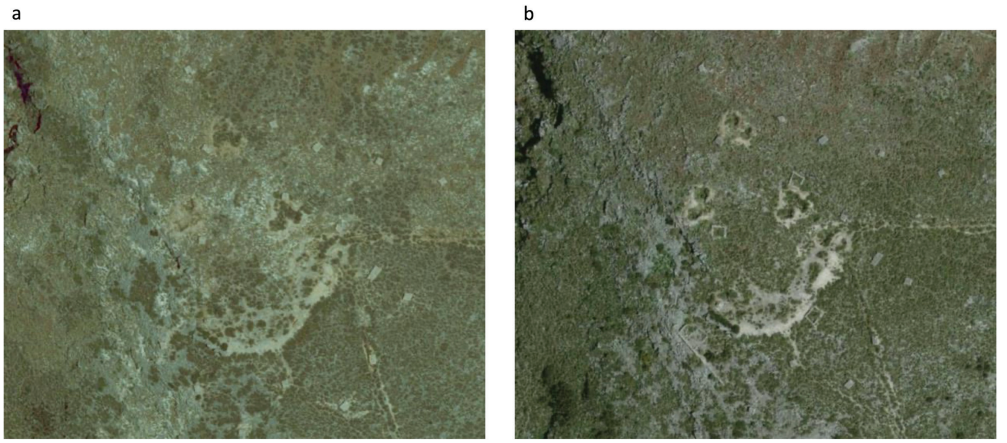


Figure 16. Satellite images of the area occupied by the military bunkers in Kukum in a. 2007 and b. 2015 (ASIG).

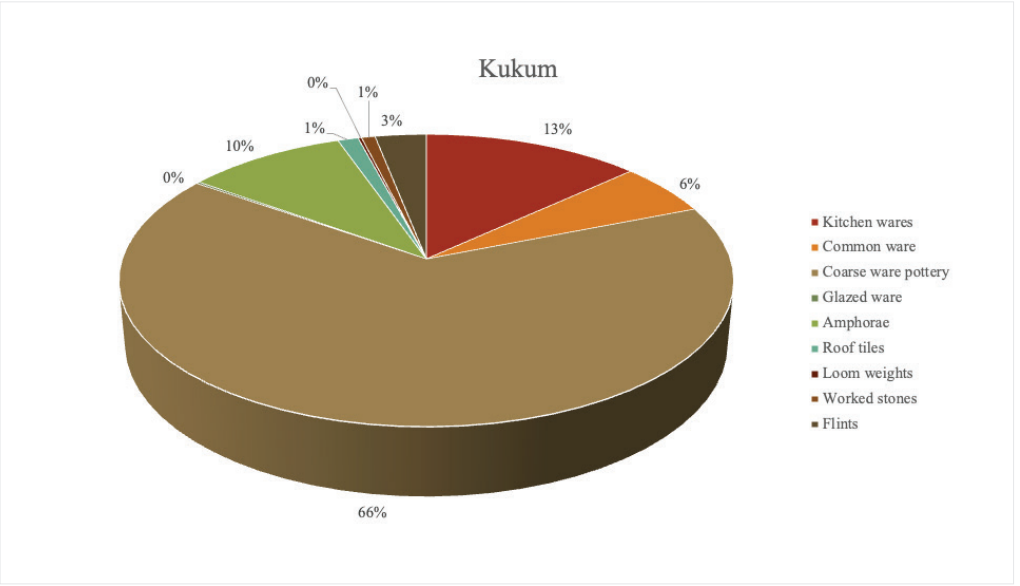


Figure 17. Quantity in percentage of typologies of finds collected during field surveys in Kukum.

amphorae, along with a possibly trilobate rim of fine, highly refined, grey common ware, and a sherd of glazed pottery, are the most interesting finds that testify to a longer occupation than previously known[2].

[2] Koçi (1991: 47) recalls the finding of "ancient pottery" in Trench B, later than the Bronze Age pottery, however he does not specify a possible chronology for these materials.



Figure 18. Some of the findings recovered during fieldwork in Kukum.

Conclusion

While accurate and updated chronological considerations must await new archaeological excavations and sampling, southern Albania is nevertheless a useful case study for highlighting the close relationship between hillforts and the strategic and deliberate use of the mountain environment. The differences in accessibility and visibility conditions have affected the unfolding and results of the fieldwalking and topographic survey, as primarily demonstrated by Karos, which is a striking example of the challenges posed by topography in this territory and how surveys can be affected by it. Nevertheless, it is still possible to assess that these sites have developed to meet both resource exploitation (e.g., pastures, mining, marginal lands) needs and the control of communication routes, as well as to have protected places available in case of danger. Moreover, this adds to bringing to light the gradual social and economic differentiations between local communities, thus justifying the need to exploit topographically dominant positions by also visually marking their area of relevance (Gjipali 2007, 123; Gjipali 2009, 213-214; Shpuza 2014, 116-117) through hillforts or tumuli, equally attested in the region (Bejko 2016, 76-77; Oikonomidis, Papayiannis, Tsonos 2018; Bejko 1994, 117-119). Specifically in the context of the southern coast of Albania, while the fortifications generically dated to the Early Bronze Age, such as Kukum and Badhra, are located on low hills as they are exclusively for pastoral use, fortifications like Karos are already projected towards the protection of communication routes and thus assume the role of regional defense (Koçi 1991, 58-61). At the same time, these all seem to be part of a wider network in which settlements and hillforts coexist side by side and apparently share the same material culture, rights for the exploitation of pastures, fields and natural communication routes, and the obligations linked to the control and protection of their territory (Gjipali 2007, 123; Gjipali 2009, 213-214; Çipa, Meshini 2016, 76-77). This opens a whole new series of possibilities on the exploitation of these hillforts and shoreline both during the Late Bronze Age and in later times, which will be one of the subjects of future research for the project.

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