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Documenting a hilltop settlement: methodologies and preliminary results of the joint Albano-Italian project at Çuka e Ajtoit (Albania).

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Introduction

The archaeological site of Çuka e Ajtoit (lit. “mount of the eagle”) is located at the southern fringe of the Albanian territory, a few kilometres from the Greek border, on the top of a conical hill with very steep slopes (Fig. 1). Its sharp profile dominates the lowland area extending from Butrint in the north, a World Heritage site by UNESCO, to the valley of Kalamas, ancient *Thyamis* in the south (Fig. 2). The area, known as Cestrine or Cammania during Antiquity (Bogdani 2022) was located in a highly significant geographical position, along the channel of Corfu, opposite to the city of Corcyra, along the maritime route connecting Balkan Greece to



Figure 1 - View of the hill of Çuka e Ajtoit (ÇAj Project)

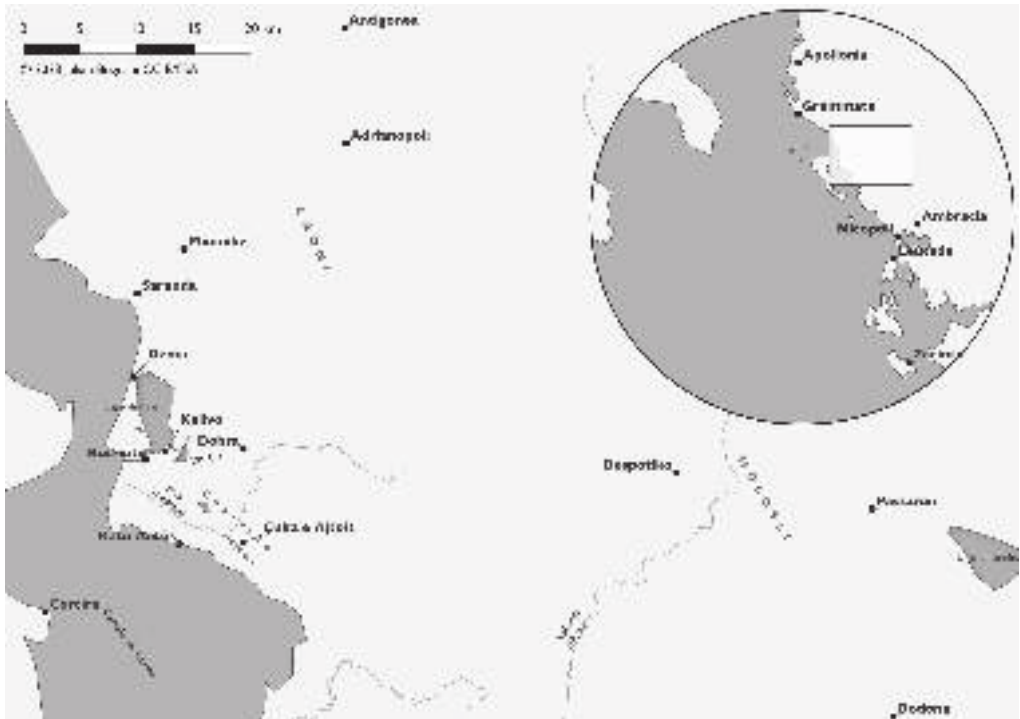


Figure 2 - Map of the ancient region of Cestrine (Çaj Project)

Sicily and *Magna Graecia*. This geographical position determined an early interest of the Greek poleis of Corinth first, and Corcyra after, in this area, materialised in the presence of the site of Butrint since the Archaic period (Hernandez 2017; Aleotti et al. 2023) and the definition of a *peraea* of Corcyra on the opposite side of the channel (Carusi 2011). Since 2021 a new joint Albano-Italian project by the Albanian Institute of Archaeology and Sapienza University of Rome has been active on the site, renovating the field research and the study of the site in a diachronic view (Bogdani and Meta 2022; Bogdani and Aleotti 2024; Bogdani 2023).

The first archaeological investigations in the site of Çuka e Ajtoit were launched by the Italian Archaeological Mission of Luigi Maria Ugolini working in Butrint (Fig. 03). In 1929, a few members of the mission, including Alfredo Nuccitelli (photographer), Dario Roversi Monaco (topographer), and certainly Ugolini himself moved to the village of Çiflik at the feet of Çuka e Ajtoit and dedicated a few months of fieldwork to the site. The Italian team investigated the Hellenistic and Medieval fortifications, some residential units, the area of the so-called 'Palace' located on the western slopes, outside the fortifications and the necropolis of the site. These activities were never published by the researchers: the findings have disappeared and manuscript and notes, including the 1:500 detail map of the site by Roversi Monaco (Fig. 4) were forgotten at the archives of the Mission at Museo della Civiltà Romana in Rome where they were discovered and published by the Butrint Foundation team (Hansen, Gilkes, and Crowson 2005; Hernandez and Hodges 2020).



*Figure 3 - Luigi Maria Ugolini at Çuka e Ajtoit
(Archive of the Albanian Institute of Archaeology in Tirana)*



*Figure 4 - 1:500 map of Çuka e Ajtoit by Dario Roversi Monaco,
Archive of Museo della Civiltà Romana, Rome*

After the Second World War, the reprisal of the archaeological activities in Albania was coordinated by the Soviet Archaeological Mission directed by Vladimir Blavatsky and involved also the site of Çuka e Ajtoit (1958-1959) where a joint expedition followed the steps of the Italian mission and investigated the 'Palace' and the fortification, also producing the first map of the site ever published (Budina 1971, 318 fig. 31). The rupture of the international relations between the Soviet Union and Albania determined the interruption of the scientific collaboration between the two countries and the loss of the documentation of the field research in Çuka e Ajtoit and other archaeological sites (Gilkes 2020). Once more, the archaeological

knowledge of the site was still at the starting point. Other field campaigns were organised by the Albanian Institute of Archaeology under the direction of Selim Islami in 1973 and 1979 and produced only a few articles about specific topics, such as the Mediaeval fortifications (Lako 1982), few considerations on residential architecture (Baçe and Bushati 1989) and minor considerations on the Hellenistic fortifications (Ceka 1976). The excavations of the ‘Palace’ (a residential area located outside the fortified area and extending more than 2,500 square meters) and those of other residential units in 1979 were partially published posthumously (Islami 2008 in Albanian; 2020 in English). In the early 1980s a questionable effort was put in place, disassembling from the site the lithic staircase and gate, featuring a corbel arch, and re-assembling it in the newly opened Historical Museum in Tirana, where it is still visible (Fig. 5).

Few other studies have been published after the archives of Ugolini were made available and based on limited field verification (Bogdani 2006; 2009).

The new project

Considering the complicated history of field research and publications, where successive researchers had a very faint idea (if any) of previous operations, resulting in each step being the first and at the same time progressively destroying the archaeological deposit of the site with no benefit to the scientific community, it was clear that general assessment of our knowledge of the site was fundamental. The re-publication of the manuscripts of L.M. Ugolini



Figure 5 - Polygonal staircase and corbel-arch entrance of the so-called ‘Palace’ of Çuka e Ajtoit in the courtyard of the Historical National Museum of Tirana (ÇAj Project)

system, including several databases at various scales dealing with the different aspects of the represented context. (Fig. 6).

Methodology of the topographical survey and further implementations

Dalla bassa pianura della Kestrine, ove le acque indugiano a lungo, sorge isolate Monte Aetòs (i.e. Çuka e Ajtoit), che di lontano appare nella lontana forma di un cono, mentre da vicino, per i suoi ripidissimi fianchi tormentati e coperti da scoscesi roccioni calcarei, e per la sua cima ridotta ad una strettissima e digradante cresta disseminata di rocce e massi, cambia profondamente aspetto; tanto da rivelarsi come un immenso cumulo di sassi, povero d'erbe, spoglio di alberi. Tale sua natura rende particolarmente pesante il lavoro del rilevatore (Gilkes 2020 quoting Dario Roversi Monaco; see also Roversi Monaco 1934).

As the above-quoted words of Dario Roversi Monaco stress, the terrain of the hill of Çuka e Ajtoit is very difficult, characterised by very steep slopes with significant erosion that has determined the almost total loss of the archaeological deposits, the collapse of the built structures and the exposure of the natural bedrock. The rubble produced by the disintegration of the bedrock and the debris resulting from the collapses covers almost entirely the surface of the hill. There are few trees, yet the vegetation is quite intense, consisting mainly of the typical Jerusalem sage (*Phlomis fruticosa*), an evergreen shrub very difficult to eradicate and highly irritating to the upper respiratory tract. This landscape makes it very difficult to properly document archaeological features: the visibility is limited by the slope that does not offer optimal observation points; the rubble and the vegetation, on the other hand, are a serious obstacle to the reading of the planimetry of the complexes. Finally, traditional topographic instruments, such as Total Stations are complicated to use in this difficult terrain, since numerous setups are required to cover rather small areas. The same is true for the laser scanner methodology, which requires rather bulky instruments that are very difficult to handle on rough terrains. Just as in Total Stations, a great number of setups are needed to cover relatively small areas with very low visibility.

On the other hand, the photogrammetric methodology proved to be a very flexible surveying technique, especially if applied to drone-captured images, even if it is not unproblematic (Campana 2017; Fiz et al. 2022).

In these three years of topographical surveying (2021-2023), the general workflow has been more or less the same, but our research questions have changed over time, also producing significant novelties in the field methodologies.

The canonical workflow is rather straightforward: (1) images are acquired using drones making sure to guarantee a good overlap (>60%, actually ~80%) between single images in both directions (sides and front/back). (2) Images are processed using commercial Structure from Motion (SfM) software (Agisoft Metashape) to create 3D models to use as the basis for more “traditional” outputs such as orthophoto mosaics and digital elevation models (DEM). (3) These data are further analysed in a GIS environment, where certain and presumed archaeological features are vectorised and annotated together with paramount natural features. (4) All annotated features are part of the preliminary map of the site and are made objects of ground truthing and on-field detailed documentation. This is a fundamental passage that often

determines substantial corrections to the remotely surveyed map, in terms of new features visible in the field and for many reasons not distinguishable in the 3D model, and the other way round, on features seemingly anthropic on the 3D model that are recognised as natural after an autoptic exam.

As anticipated, this rather standard workflow is often susceptible to changes. Step (1) regarding image collection might be enhanced with the inclusion of the photographs of ground control points (GCP), whose exact coordinates are measured using GNSS instruments with centimetric precision. This enhancement greatly helps the alignment process of the images, producing a more accurate 3D model and also provides a higher metric accuracy of the overall georeferencing of the model. While this was not fundamental to the aims of the brief campaign of 2021, which mainly focused on acquiring a general knowledge of the site, it was an important prerequisite for the successive, high-resolution acquisitions. During 2022 and 2023 GCPs were used in each image acquisition and their coordinates were captured with GNSS instruments paired with RTK error correction, a service offered by the Albanian Authority for Geospatial Information (ASIG).

A second major issue regards the final ground resolution of the model and, as a consequence, the resolution of the resulting orthophoto mosaic. The resolution depends on the sensor of the camera, but also — and most importantly to our work — on the distance of the camera from the terrain surface being photographed: the greater the distance, the lower the final resolution. This is not a big issue for flat areas being surveyed, but becomes highly relevant for steep slopes, where near if not consecutive photographs might present quite different resolutions. Slopes also drastically reduce the overlapping areas between the images, given the same flight parameters in comparison to flat areas (Fig. 7). These considerations have deeply conditioned the data collection process at Çuka e Ajtoit, where high-resolution models

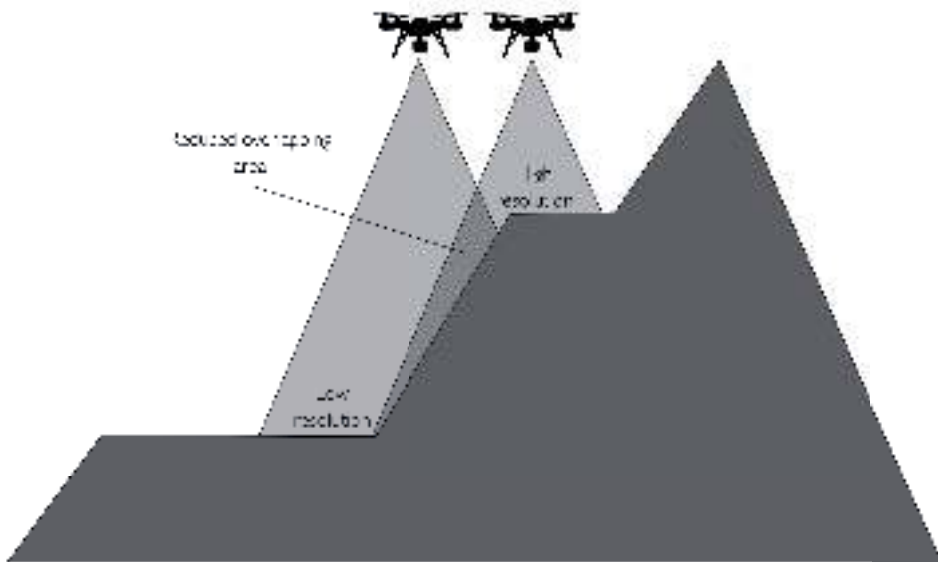


Figure 7 - Visual example of the variable ground resolution and reduced overlapping area issues during the same flight

(~1 cm) can be obtained only for limited areas, while site-scale models are at present available with a medium (~3-5cm) resolution.

Another issue regards the desired output: if a plane projection (map) is required, then nadir images with a good overlap (~80%) are sufficient, but if also the documentation of vertical planes is needed (prospects and front-views) then these images are quite unsatisfactory for a proper 3D model. Oblique and frontal images of each vertical surface are needed having the same overlap policy, and this drastically lengthens the data acquisition process.

Both these issues prevent the use of built-in functionalities in modern drone applications to plan and automatize the acquisition process and require fully manual management of this phase.

At Çuka e Ajtoit the need to document the vertical surfaces of the ancient structures was paramount in the 2023 campaign where the topographical survey of the defensive system was the main focus. Both Hellenistic and Medieval fortifications are sometimes preserved for a height of several meters, bearing useful information on the building techniques that needed to be documented and studied. In this case, a much more detailed survey was undertaken, multiplying by many factors the number of images required for a “normal” planar representation (Fig. 8).

In conclusion, photogrammetry is quite a flexible, expeditious and inexpensive methodology able to provide high-resolution and highly precise three-dimensional data for archaeological



Figure 8 - A bird's eye view of a section of the Mediaeval fortifications from the digital 3D model, making use of oblique photographs

documentation. Yet, it is not a one-shot solution for the topographical documentation, but rather an aim-oriented methodology, requiring a good knowledge of the tool, the terrain and the aims of the research to provide reliable results.

The topographical naming system and the database of the archaeological complexes

As already anticipated, the ground truthing of the remote survey is a fundamental step, capable of overturning our understanding of the survey. It is also the very basis of the archaeological description of the structures and their understanding. The field verification depended on the definition of an identification and naming system for the archaeological features that need to be intuitive, flexible, extensible and easy to use in the field.

To this end, the surface of the hill and its immediate surroundings were divided into seven regions named after the cardinal points (N, NE, NW, E, S, W), except for the summit area, enclosed by the Hellenistic fortifications named F (= fortified area). Easily distinguishable features, such as the fortification circuit, military trenches or roads act as inner borders between these areas. Smaller units identified by a progressive number (starting from 1 in each major area) were defined within those areas, using similar features (mainly military trenches) as borders (Fig. 9). Each of these smaller areas serves as a ‘container’ of one or more *complexes*, ie. a topographical unit of archaeological interest, perceived as unitary. Complexes are therefore not strictly defined, and both a small domestic unit and ‘the Palace’ are considered complexes, since, during our fieldwork, these were perceived as autonomous functional units. It is clear that contexts



Figure 9 - General view of areas and subareas

are strictly connected to the archaeological understanding of the area and are susceptible to future change when deeper knowledge is available. What initially was believed to be a single context may be split into two or more, if the archaeological investigation brings more data into the discourse. On the other hand, what was interpreted as not connected structures might be revealed to belong to a unitary building, and so originally different contexts might be merged. Inside each small area, the count of the complexes starts from 1. Following this, the typical name of a complex is F1-05, where F identifies the area defended by walls; 1 identifies its most western part (between the Hellenistic and the Mediaeval fortifications); 05 is the fifth identified complex of the area. The last number is typically assigned in the field and does not follow any specific logic except the order of the identification.

Special complexes also exist, mainly connected to the fortification system: G01 - G06 identify the gates or posterns in the city walls (both Hellenistic and Mediaeval), while FHell-01 - FHell12 and FMed-01 - FMed-10 identify the different stretches of respectively the Hellenistic and Mediaeval fortifications. Few more particular contexts regard areas that do not preserve structural remains, but that have yielded ceramic fragments that have been collected, such as NW-01.

As already mentioned, this identification and naming system is fully extensible with the future identification of new complexes and must not be considered immune to change (by merging or splitting) following a deeper study or the availability of new data.

The surface pottery collection: morphological and fabric study

This naming system is also the fundamental base for another important field activity, which is the collection of ceramic fragments available on the surface of the hill. The collection of the pottery was performed contextually with the ground-truthing activities, during which complexes were identified, named and documented. We have already underlined the strong erosion that the site has undergone and is still experiencing. To this, the disturbing activity of the previous undocumented archaeological research should be added. Finally, the deep impact of the military activities during the last phase of life on the site, the Socialist period, when it was converted into a military base and observation point, has also impacted the surface distribution of the pottery. The excavation of the many trenches, the implantation of bunkers and the construction of pillboxes and artillery positions are the most relevant legacy of this period. All these factors make it very clear that any attempt to date a single context based on the surface pottery collected on it lacks any scientific soundness. Yet, a statistical use of the pottery-related data on a site level is most likely to bring new information. While later events, both natural and anthropic might have changed the topographical position of the ceramic fragments, there is no doubt that all collected fragments were used and broken on the hill, in a position most likely not too distant from where these were found. In other words, it is impossible to infer new information on a context-level detail, but on a small-, and better on a large-area-level surface pottery analysis might be significant.

Finally, since surface pottery is usually very fragmentary and worn out, the morphological, stylistic and technological analysis can be performed only on a small percentage of the collected samples. To overcome this an archaeometric study of the ceramic fabrics of all samples is put forward. As a first step, all samples have undergone an autoptic macroscopic analysis aimed at defining clusters of ceramic fabrics presenting the same (or very similar)

features. Selected samples of each group have been selected and are being analysed from the petrographic and chemical points of view, an activity carried out in collaboration with the GeomLab: Laboratory for the Archaeological Characterisation of Geomaterials of the Sapienza University of Rome. This approach seems very promising and, despite the work being still ongoing, has already yielded some significant results.

Some preliminary results

The new field activities in Çuka e Ajtoit are still in an early stage, with only two effective campaigns of the duration of one month, nevertheless, some important results are readily apparent. Even if these need some more fine-tuning to be fully comprehensible, their brief presentation might be of interest to the general understanding of the site.

One of the most important contributions of the new general map of the site, although its drafting is still ongoing and probably new features will be added in future campaigns, is the certainty that the site has been intensively occupied by what seem to be residential units of different sizes and planimetries. Albeit previous research on domestic architecture had already included some limited examples from Çuka e Ajtoit (Baçe and Bushati 1989), with a particular focus on planimetric typology and limited interest in urban layout, the picture that the latest research is providing is much more articulated. In particular, the area of the so-called Palace, a huge residential complex extending on more

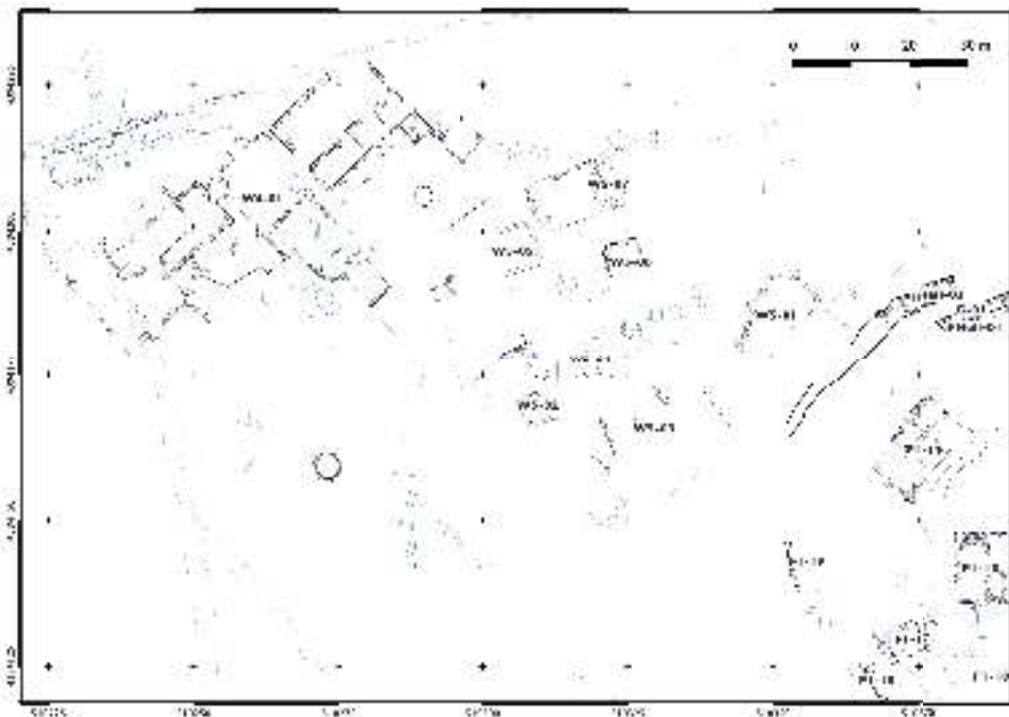


Figure 10 - detailed view of the W5 area

than 2,500 square meters and located on the western slopes of the hill on a rather plain ridge halfway to the hilltop appears in the light of recent research far away from being disconnected from the fortified 'upper town'. In the W5 area, located between the Palace (W4-01) area and the western section of the Hellenistic fortifications, where Gate 1 (G-01) is found (Fig. 10), seven complexes have been identified (W5-01 – W5-07) presenting very different preservation states. The better legible (W5-07, W5-06 and W5-01) define rather big terraces, with the upland (SE) part excavated in the bedrock and the lowland (NW) part built in polygonal masonry. It is therefore clear that the residential occupation of the site was not limited to the fortified area, and the 'Palace' was far from being isolated from the 'main' site.

The greater relevance of the residential function of the site, as compared to previous studies can be observed in the fortified area, as well. In particular, in the western area between the Hellenistic fortifications and the Mediaeval ones (F1), the four or five residential units excavated by Selim Islami in 1979 are part of a much more intensively occupied layout, although the poor state of preservation of many units has determined the almost destruction of the built structures and the conservation of the cut/carved parts (Fig. 11).

We can be sure, moreover, that even the updated map is a very partial view of the ancient situation since other residential units might have entirely disappeared resulting in rather flat, completely eroded areas, which are not uncommon in this area.

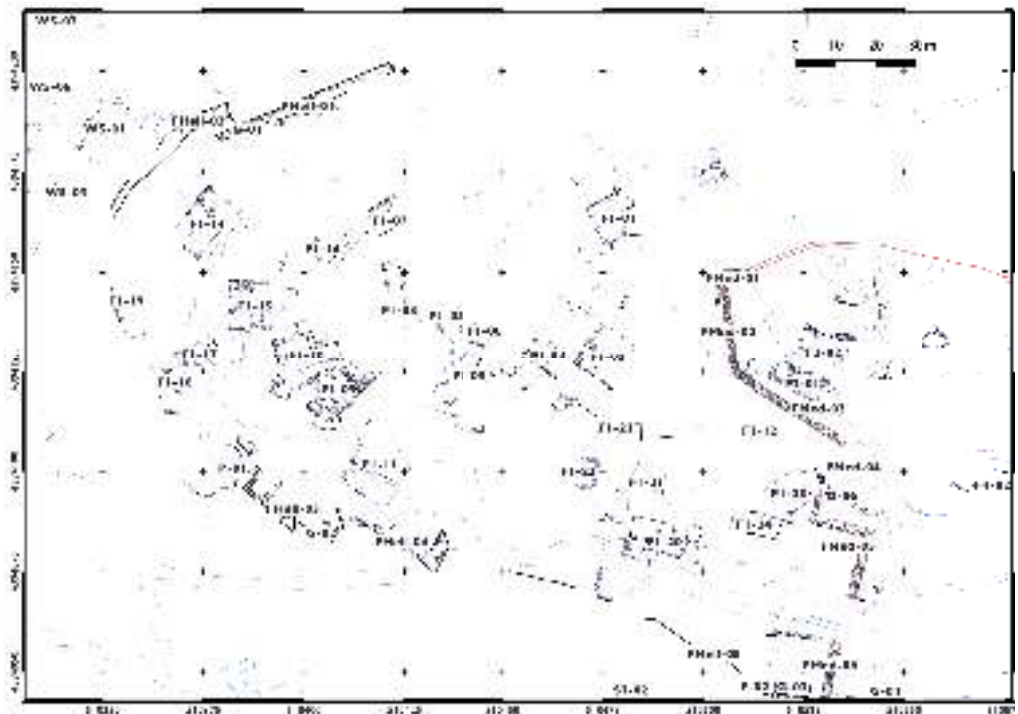


Figure 11 - Detailed view of the F1 area

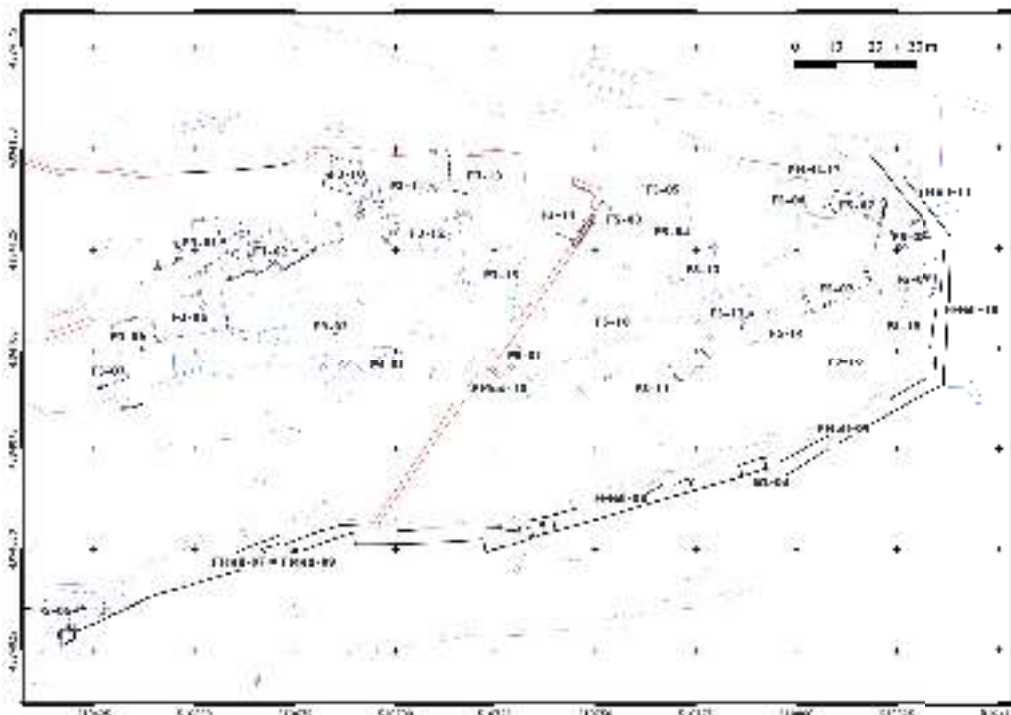


Figure 12 - Detailed view of the F3 and F5 areas

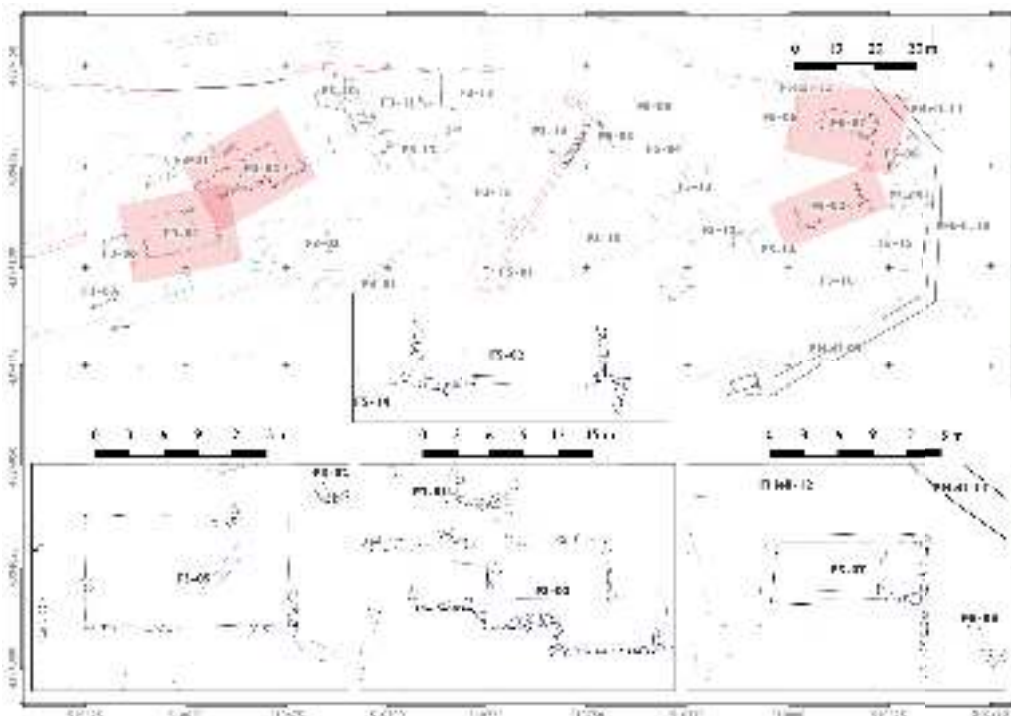


Figure 13 - Detail of complexes F3-02, F3-05, F5-02, and F5-07

The same considerations are valid for other parts of the fortified area, particularly the F3 and F5 areas, in the eastern part of the site (Fig. 12), the visibility being here further limited by the gentler slopes of the hill that have determined a limited use of the rock-cut for the construction of the buildings and a more important recourse to built-up structures, whose destruction has determined the current 'lunar' landscape. This different state of preservation, mostly determined by the different geomorphology of the hill, is therefore the main reason for our poor knowledge of the western part of the site. A second important reason is the physical difficulty of accessing this area from the east, which is today the preferred access to the site: the few brave visitors who climb up the site today will never go (down) east of F2.

The gentler slope of the western part is not only a negative factor for the state of preservation of the archaeological structures, but it also offers easier and wider ground for construction, which has determined the building of some rather big complexes, such as F3-02, F3-05, F5-02, F5-07, etc. (Fig. 13). Their poor condition of preservation strongly prevents us from determining their precise extension and detailed planimetry, yet the layout resulting from the preliminary analysis of their fragmented maps differentiates these structures from the rather typical residential units of the eastern area (F1).

To complete this very rough overview of the topography of the site, it is important to stress that the narrow and elongated hilltop does not seem to have ever been occupied and built. The highly irregular rocky shape of this sector surprisingly has not been cut and shaped to host buildings, nor it has been used as a quarry site for the lower construction, which is a rather common feature in hill sites of various dimensions (Grillini, Minguzzi, and Gurini 2007). The reason for this we do not comprehend for the time being, and the inability of local masons to technically handle this task seems not valid justification.

If we turn our attention from topographical considerations to the analysis of the archaeological finds, some important, although preliminary, results can be briefly presented. Firstly, some fragments of ceramic shards have been collected presenting coarse fabric and polished surfaces that might be compared to late Bronze Age pottery found in nearby sites (mainly Butrint, Cape Stillo and Mursi) in recent years (Lima 2016; 2020). At Çuka e Ajtoit these finds are not concentrated at a single spot but have been evenly documented on the entire surface of the site (Fig. 14). The theoretical premises on which the analysis of the spatial distribution of the pottery fragments has already been discussed, and the dispersal of these few recognised fragments reports for a distributed presence of this ceramic typology, rather than a unitary single deposit. If the still ongoing study of the pottery fragments will confirm their dating to the late Bronze Age, this could be the first evidence of a pre-Hellenistic settlement at Çuka e Ajtoit.

The analysis of the pottery has also confirmed the presence of a statistically significant number of amphorae fragments dating from the Classic period. These are mainly Corinthian A, A1 and B types dated between the 5th and the 4th centuries BCE. Once more, these fragments have an even distribution covering the entire surface of the site, including the western slopes (the 'Palace' area). Amphorae are a rather heavy, utilitarian type of pottery and their presence on the hilltop of Çuka e Ajtoit should be related to the presence there of a settlement that was importing and consuming the wine and oil contained in the amphorae. Weather and to what

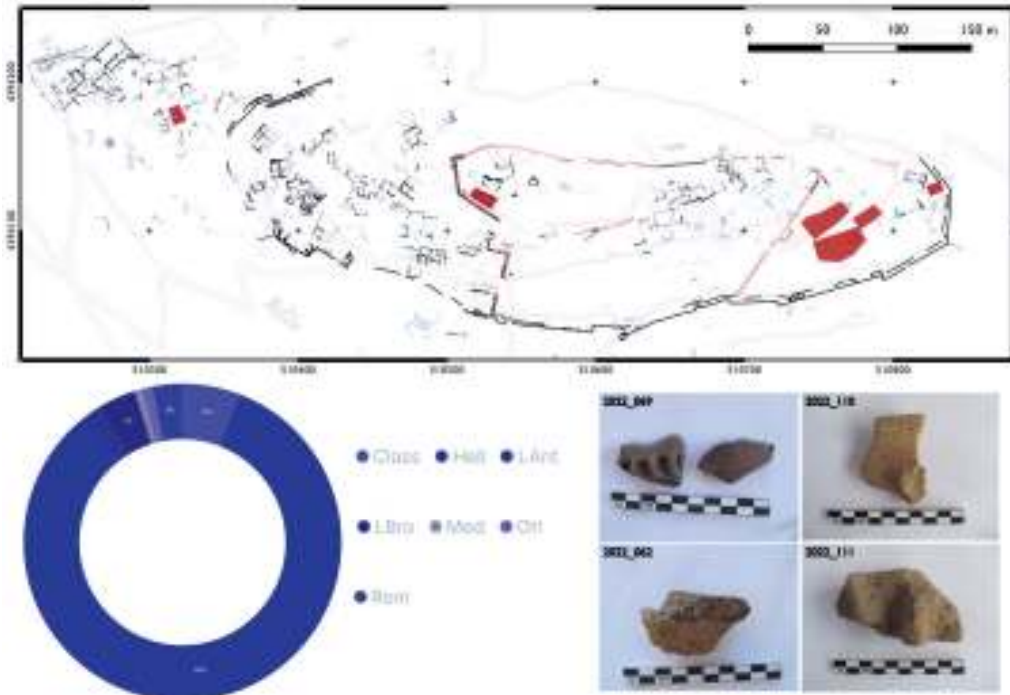


Figure 14 - Photographs, positioning and statistical contextualisation of some Late Bronze ceramic fragments

extent this settlement should be connected to the actual presence of Corcyra on the opposite shore of the channel of Corfu (Carusi 2011) the archaeological data cannot resolve. The nature and topography of the settlement itself remain unclear since most of the ceramic fragments are not connected to any archaeological stratigraphy or actual structures. Nevertheless, we should not forget that up to the present, no structure of the site of Çuka e Ajtoit has been dated on stratigraphical ground. The dating to the Hellenistic period of the major part of the archaeology of the site is statistically supported by the finds, and yet it leaves the ground for further discussion.

An emblematic example of this general model is represented by the first results of two trenches of limited dimensions excavated in 2022 and 2023 in complex W4-01, the so-called Palace (Fig. 15. Location of the excavation trenches in W4-01). The trenches investigated the structure of two different terraces featuring different masonry styles and were located in two rare areas untouched by previous excavations on the site. The excavations revealed important technical details about the building of polygonal terracing walls and indicated the mid-third century BCE as the most probable date for their construction. Furthermore, the presence of residual Corinthian A and A1 amphorae fragments further confirms the new chronological model of the site. The discovery of ritually disposed terracotta figurines finally documents the presence of probably domestic cults within the ‘Palace’ area.

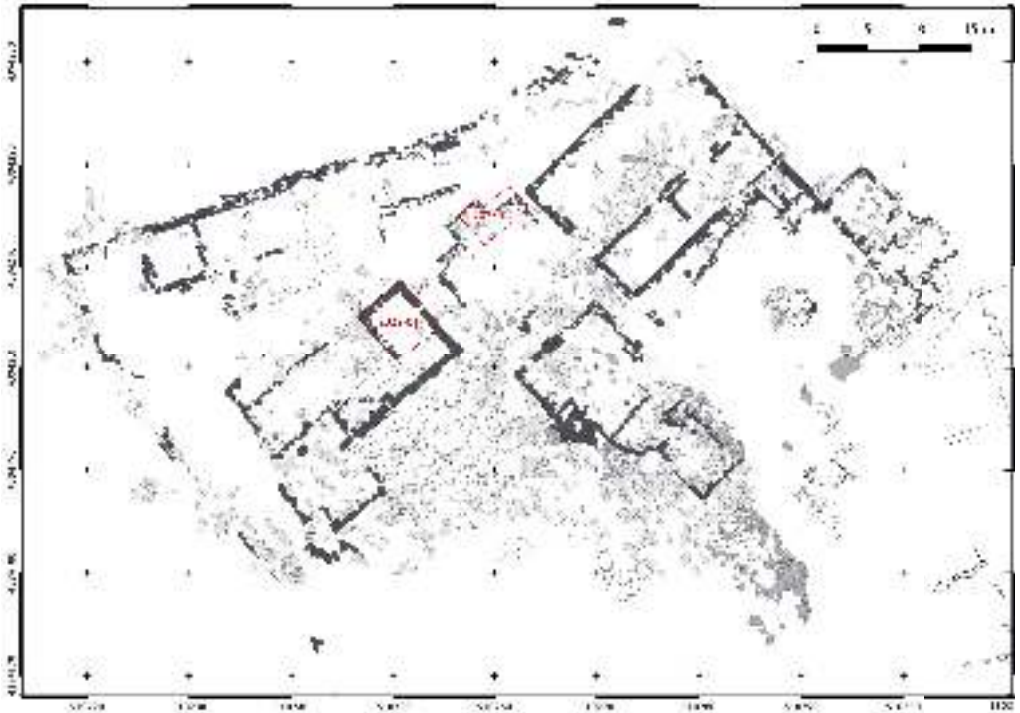


Figure 15 - Location of the excavation trenches in W4-01

A final original contribution to the chronological model of Çuka e Ajtoit regards the later phases of the 16th century and onwards. There is no clear evidence of the occupation of the hill in this period, but on the northeast feet of the hill, where a low and rather flat plateau extends towards the lowland many traces of houses built in stone blocks and slabs, sometimes with clear evidence of use of mortar are reported. The houses seem to be very similar to each other, with a simple rectangular planimetry (ca. 10x5m) with a middle division wall on the long side, often separating two different levels. About 20 similar units can be observed, with variable visibility, debris, collapsed material, and vegetation being the main disturbance. Local people connect the ruins of this village to the migrations of the Chams, Albanian-speaking Muslim people who were forced to leave their homes in nowadays Greece after the definition of the Albano-Greek border in 1912 and 1919 and after the First World War, mainly in 1945 (Péchoux and Sivignon 1989; Dépret 2009, 129 ff.). While it is possible that some of these ruins were reoccupied by those people it is highly dubious that in such tough times, the refugees had the time to build stone wall constructions.

Moreover, these structures are visible as ruins in the 1937 aerial imagery of the area by the Italian Geographical Military Institute (Traversi 1965). As a trench of limited extension made clear these houses were in use in the 16-19th centuries. If the results of the limited trench can be extended to the other structures, then this is probably the most recent occupation of the site of Çuka e Ajtoit dating to the Venetian and Ottoman periods (Fig. 16). As the toponym



Figure 16 - Planimetry and image of complex NE-12

clearly shows, the modern village of Çiflik originates from a chiftlik (Ottoman Turkish *çiftlik*) commonly a farmhouse and the basis of the land management system during the late Ottoman Empire.

Conclusions

The approach used until present in Çuka e Ajtoit is strongly determined by the highly irregular and steep terrain, the strong erosion of the site, and the general state of preservation of the structures. Indisputable logistic difficulties and the substantial lack of archaeological stratigraphy, with the natural bedrock exposed, make the most of the hill quite unfitting for extensive excavations. What is left is a 'light' archaeological approach, making extensive use of modern technologies for the detailed documentation of the remains. Paired with ground-truthing campaigns and 'traditional' field documentation it makes a very powerful tool. The collection and analysis of surface pottery adds a new link to the chain of knowledge production. Ceramic-related data have a resolution constraint: they are not very useful and can be deceiving on a small scale, but can provide important information on the big one.

For this reason, we are not analysing pottery data for the context scale, yet they throw an important light on the macro-area and the site scale. The chemical and petrographic analysis of the fabrics, moreover, can overcome identification issues due to the small dimensions of the fragments, that prevent the morphological analysis. These can be very informative on the identification of different imports and possibly the identification of local productions.

Inevitably, this is an approach that works through attempts and successive approximations and requires fine-tuning of the field methodologies as research questions change. Yet it proved to be quite effective on our end and most importantly quite stimulating from the scientific point of view. The continuation of the field and laboratory work is expected to further articulate and enrich the current picture.

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