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ARCHAEOLOGICAL TRACES FROM THE AIR IN THE DURRËS REGION (ALBANIA): KULLË, BASHTOVA, AND THE VIA EGNATIA CORRIDOR

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Abstract
This article presents a non-invasive archaeological approach based on historical aerial photography, satellite imagery, and infrared (IR) data to detect and assess archaeological traces in the *Durrës* region of Albania. The main focus is the *Kullë* area along the Erzen River corridor, where multi-temporal analysis reveals a coherent set of morphological, crop-, soil-, and moisture-related anomalies that are potentially associated with buried structures and planned spatial organisation. The most significant evidence includes an elliptical imprint measuring approximately 130 × 75 m, with an estimated arena of c. 60 × 40 m, which is cautiously interpreted as an amphitheatre-compatible signature. Additional traces suggest the possible presence of a monumental cultic building consistent with a pseudodipteral plan, as well as a c. 200 × 200 m quadrangular sector interpreted as a structured functional area, possibly comparable to horrea-type storage facilities or to a castrum-like installation. IR processing is used to enhance trace visibility and to reduce interpretive ambiguity caused by agronomic variability, hydrological disturbance, and modern landscape transformation. The study also considers weaker indicators, including a possible theatre-like trace in the hills of *Kullë* and low-contrast anomalies near the mouth of the Erzen River, all of which are treated as testable hypotheses rather than definitive identifications. A secondary case study, Bashtova and its connection to the *Via Egnatia* corridor, demonstrates the method's transferability for reconstructing routes and enhancing territorial connectivity. The article concludes by defining priorities for field survey, geophysical prospection, and targeted ground validation.

Keywords: *Aerial archaeology, Infrared imaging, Remote sensing, GIS, Albania, Erzen River corridor*

INTRODUCTION

Non-invasive archaeology has developed substantially in recent decades, a progress closely associated with the use of historical aerial photography and the increasing availability of satellite imagery. Such materials can reveal traces and signatures that are now faint or entirely invisible on the ground (Kaimaris et al., 2024).

Historical aerial archives may also preserve levels of legibility that have since been reduced by subsequent transformations, allowing major curvilinear monuments and their spatial logic to be recognised more clearly; the amphitheatre of Durrës provides an instructive example, comparable, on a methodological level, to the well-known case of Lucca (Ciampoltrini, 2016). In intensively cultivated landscapes, variations in vegetation growth, soil moisture, and soil texture may produce indirect indicators (crop/soil/moisture marks) compatible with buried structures (Materazzi et al., 2022; Masini et al., 2018). Multi-temporal analysis based on comparisons of acquisitions from different years and seasons helps distinguish persistent patterns from short-lived effects related to cultivation regimes, agricultural operations, and weather conditions (Alders et al., 2024; Vergnano et al., 2025). Within this framework, remotely observed evidence is treated as an exercise in critical appraisal, guided by explicit criteria of persistence, morphological coherence, and control for recent disturbance.

The aim is to reduce false positives and to formulate hypotheses that can be tested through field verification. On this basis, the present

study proposes an IR-assisted, multi-temporal approach applied to the village area of *Kullë* in the *Durrës* region (Albania), along the Erzen River corridor (Kocillari, 2025). The case study draws on a coherent set of indications compatible with settlement-scale planning and the presence of monumental structures. These include an elliptical imprint discussed as an amphitheatre-compatible signature (c. 130 × 75 m; estimated arena c. 60 × 40 m), traces attributable to a cult building consistent with a pseudodipteral layout (c. 70 × 30 m; estimated cella c. 45 × 18 m), and a quadrangular sector of approximately 200 × 200 m. This sector is interpreted as a structured enclosure and a functional area of the *horrea* type. For this component, infrared processing improves trace visibility and reduces interpretive ambiguity. Alongside these principal elements, the paper considers additional evidence that requires particular caution, including a possible theatre-like signature on the hills of *Kullë* and low-contrast traces near the mouth of the Erzen River. A secondary case is also introduced to assess the transferability of the approach: Bashtova and a segment connected to the *Via Egnatia*, where aerial and satellite observation may assist in reconstructing routes and related infrastructure within the historical landscape. This contribution aims to present and critically examine archaeological traces detected using aerial, satellite, and infrared data in the context of Kullë and, by comparison, Bashtova/*Via Egnatia*, while also defining interpretive criteria and operational priorities for subsequent ground validation.

MATERIAL AND METHODS

The analysis proposed in this study is grounded in the combined use of three principal classes of evidence: historical aerial photography, satellite imagery, and infrared (IR) data. These are treated not merely as a descriptive record, but as a documentary and spatial basis examined within a multi-temporal framework (Hill et al., 2020). Since the present article does not deal with ceramic assemblages, excavated artefacts, or physical samples, the term "material" is understood here in a non-invasive archaeological sense. The primary material of the study consists of remotely sensed evidence, cartographic documentation, and landscape indicators, rather than laboratory samples recovered from excavation. For this reason, petrographic analysis, XRF, SEM, FTIR, and other physico-chemical methods were not applied, as they are not relevant to the specific aims and dataset of this research.

Observing the same landscape across different years and seasons enables the assessment of trace recurrence. It also supports the recognition of signatures compatible with built features that are no longer visible on the ground (Poggi et al., 2025). The multi-temporal perspective is therefore not a secondary technical device: it is the principal means by which spatial organisation can be reconstructed, and a historical-archaeological reading of the landscape can be outlined, distinguishing persistence, transformation, and more recent interference (Dall'Aglio, 2011).

The selection of the analysed evidence followed a comparative and multi-temporal logic. Priority was given to images and traces that enabled observation of the same area under varying conditions of visibility, vegetation cover, soil moisture, seasonality, and modern land use. Within this framework, indications are regarded as more meaningful when they display a recognisable geometry and, above all, when their recurrence does not depend on a single image or on a momentary condition. Interpretation, therefore, privileges patterns showing morphological coherence: ellipses, rectilinear segments, repeated alignments, and enclosures that remain spatially stable across multiple acquisitions (Estanqueiro et al., 2023). By contrast, irregular, discontinuous, or intermittent signals are treated with caution, since they are more readily explained by alternative causes such as agricultural practices, minor pedological variation, or short-term weather effects.

Traces are also assessed through systematic control for the main sources of disturbance: modern canalisation and drainage, field boundaries, recent infrastructure, as well as fluvial dynamics and hydraulic modifications, which, in the Erzen corridor and adjacent plains, may produce visual signatures partly comparable to archaeological ones (Cigna et al., 2024). In this context, IR analysis is used as a diagnostic aid to increase contrast and to assess whether the observed patterns are compatible with differences in moisture or vegetation stress potentially linked to buried features, thereby reducing interpretive ambiguity (Materazzi et al., 2025). IR data are therefore not treated as independent proof, but as interpretive support whose value increases when

it confirms or clarifies patterns already visible in aerial or satellite imagery.

To ensure transparency, the evidence discussed in the following sections is accompanied by a qualitative assessment (high/medium/low) based on four parameters: multi-temporal persistence, morphological coherence, contextual compatibility, and control for disturbance (Ciccone et al., 2024).

These criteria also guide the distinction between stronger hypotheses, such as the amphitheatre-compatible ellipse or the quadrangular functional sector, and weaker or more preliminary indicators, such as low-contrast traces near the mouth of the Erzen River or the possible theatre-like signature in the hills of *Kullë*. The measurements reported, for example, 130 × 75 m, 70 × 30 m, and 200 × 200 m, are treated as estimates derived from imagery, intended to define order of magnitude and support typological comparison rather than to provide definitive metrics. On this basis, the contribution presents the principal signatures observed in the *Kullë* area, while more ambiguous elements are treated separately and with particular caution.

RESULTS

Kullë: Principal Archaeological Signatures and Contextual Framework

The *Kullë* area, along the lower Erzen River corridor, presents a set of archaeological indications that form a coherent grouping of traces rather than a series of isolated anomalies. Multi-temporal analysis indicates that certain patterns recur with relatively stable geometries and coherent spatial relationships. The ellipse, the quadrangular sector, rectilinear traces, and other monumental indications are not randomly dispersed, but tend to concentrate within a defined spatial setting (Fig. 1).

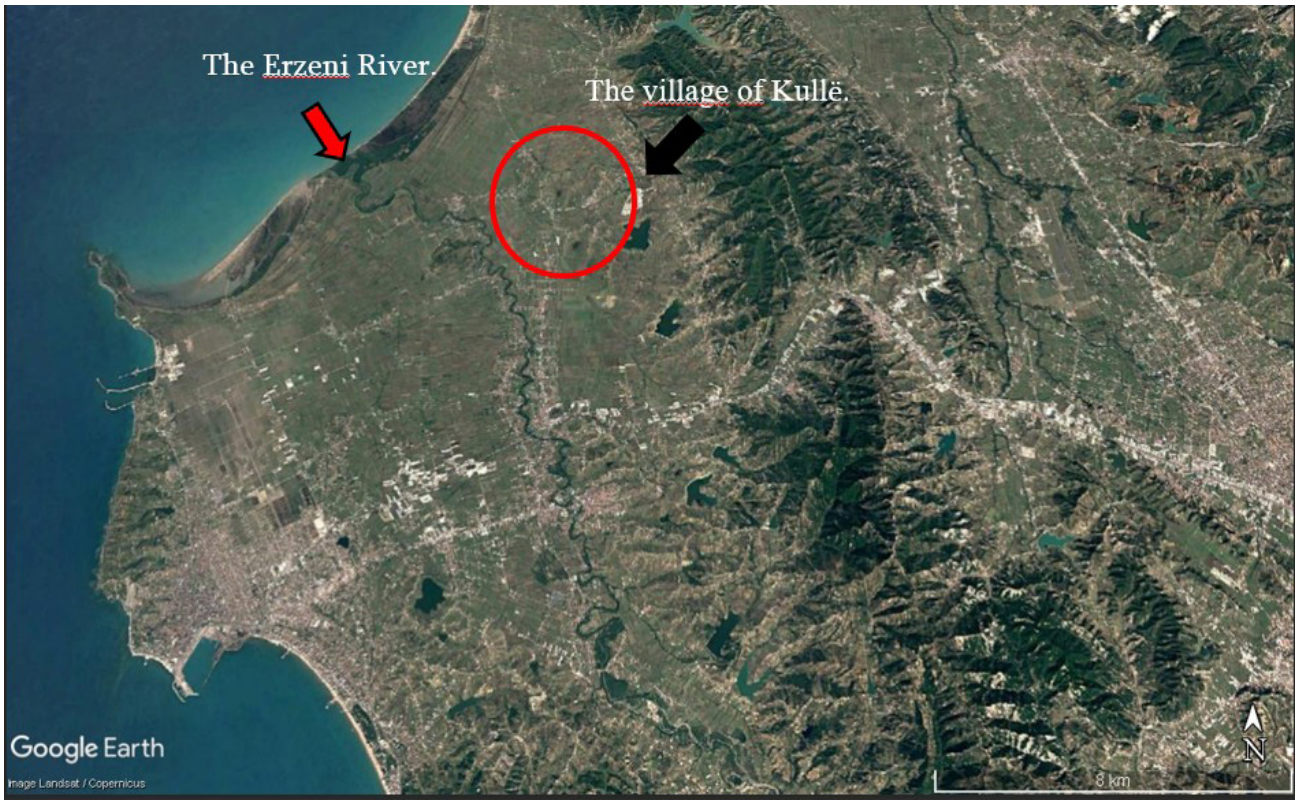

Fig. 1. The area of the village of Kullë and the Erzen River.

From this perspective, the plausibility of the hypothesis does not rest on a single element, but on the convergence of several indicators which, taken together, suggest a structured settlement context marked by multiple phases of occupation. Within a historical and territorial reading of the Erzen corridor, certain textual, ancient and medieval, and toponymic indicators help to reconstruct the area's historical framework.

In the classical tradition, Thucydides (1.24) places Epidamnos/Dyrrhachium at the entrance of the Ionian-Adriatic gulf and notes the proximity of the Taulantii, thereby underscoring the strategic character of the coastal sector:

Ἐπίδαμνός ἐστι πόλις ἐν δεξιᾷ ἐσπλέοντι ἐς τὸν Ἰόνιον κόλπον· πέλας δ' αὐτῆ Ταυλάντιοι βάρβαροι, Ἰλλυρικὸν ἔθνος.

"Epidamnus is a city situated on the right as one sails into the Ionian Gulf; near it live the Taulantii, an Illyrian people."

In the imperial period, Pliny mentions *Dendae* as *civium Romanorum* (Berger, 1953), suggesting the existence of a legally qualified community north of Dyrrachium and plausibly connected with the Erzen basin (*App. BCiv.* 2; *Plin. HN* 3.26: "*Dendae civium Romanorum*"). In parallel, the toponymic sequence *Arzenta/Fiollatae/Erzen* raises questions about navigability and the connection between the river mouth and the valley (Bereti et al., 2013). Ragusan acts of the late fourteenth century attest *Fiollata/Fiollatae* as a navigable watercourse linked to grain traffic and to logistical practices of loading and transport (*Acta Albaniae Iuridica*, I, doc. 601, Ragusa, 2 May 1398; Thallóczy, Jireček & Šufflay (eds.), *Acta Albaniae*, II, 1918, doc. n. X; Valentini (ed.), *Acta Albaniae Veneta*, I, 1968, doc. n. X):

…navigado ad flumen Fiollatae pro frumento … expedire de Ragusio et mittere recta via usque ad flumen Fiollate (Arsen)… illam charichare furmento quantum recettare poterit usque ad dictam…

"…sailing to the River Fiollata for grain … [one should] dispatch [a vessel] from Ragusa and send it directly as far as the River Fiollata (Arsen)… to load it there with as much grain as it can carry up to the said [place/amount] …"

Within this framework, *Epicaria/Fiollatae* at the river mouth and *Kullë/Dendae* inland outline a coast-valley chain that helps to frame long-term resilience in transit and control functions. In this sense, the medieval sources do not "prove" specific structures, but they do show the persistence of operational functions, movement, supply, and control, along the coastal-fluvial axis (Lawrence & Tomlinson, 1996).

On the cartographic side, portolans and Venetian cartography record the toponym *Epicaria* at the mouth of the Erzen (Mercator, 1589). Here it is interpreted first and foremost as a functional label, indicating a landing place, service point, and/or dues-collection point, rather than as a technical term of classical or imperial Greek. In a Byzantine setting, the name may have encouraged retrospective interpretations through lexical families such as *ἐπικαρπία* or *ἐπικράτεια*.

At the same time, in the medieval Latin sphere, a Latinisation of an operational toponym of administrative character remains plausible. Graphic affinities with forms such as *Pescaria*,

Fig. 2. Venetian map showing the toponyms Epicaria and Arzenta.

Spicaria, or *Episcopia* remain working hypotheses and do not replace a systematic palaeographic examination of the portolan tradition. In this study, *Epicaria* is therefore treated as a cartographic designation in use for a coastal node (Mercator & Hondius, 1630; Fig. 2).

The toponym *Kullë* (< Ottoman *kule*, "tower") belongs to an Ottoman naming pattern associated with control points along lines of transit. Nearby microtoponyms, such as *Pylli i Kullës* and *Çiflik/Çiflik*, further reflect a landscape of surveillance and late Ottoman landholding regimes. Other names may be treated cautiously as memory-toponyms or anthroponyms. The etymology of *Dendae* remains uncertain.

A cautious resemblance to Greek *δένδρον/δενδρο-* is possible, but equally plausible is the hypothesis of an Illyrian substrate later adapted into Roman usage. In both cases, any proposal must remain hypothetical and evidence-led (Hanson et al., 2017). Beyond the *Via Egnatia*, long-duration corridors such as *Dyrrhachium-Lissus* and the *Lissus-Naissus* axis suggest the existence of intermediate service routes linking *Kullë* to *Durrës* and to northern networks. Their verification must rely on targeted surveys, geomorphological readings, and non-invasive checks (Cuntz, 1990; *Itin. Ant.*; *Itin. Burd.*; Strabo, VII).

Taken together, classical testimony, toponymy, and Ragusan-Venetian documentation frame *Epicaria/Fiollatae/Kullë/Dendae* as operational anchors for a historically grounded assessment of the hypothesis of a minor Roman centre along the Erzen coastal-fluvial corridor (*Dio Cass.* 49). The most evident signal within this grouping is an elliptical morphology, documented both in historical aerial photographs from the IGM archive, the Italian Military Geographic Institute, in several frames dated between 1936 and 1941, and in more recent satellite imagery. In the IGM plates, the 1936 frame already shows a lighter trace in the centre of the field, elliptical in form. A further, faint curvilinear feature is also visible on nearby higher ground. It is discussed here only as a possible theatre-like trace, since similar shapes may also result from natural slope morphology (Fig. 3).

Fig. 3. IGM photograph from 1936, a) traces of an elliptical structure; b) possible traces of a theatre.

In the 1941 frame, the same area still shows a clearly legible trace with comparable geometry. These images also indicate that the surrounding ground preserves certain stable divisions, despite changes in the agrarian setting and subsequent landscape transformations (Fig. 4).

The methodological value of historical aerial archives is also illustrated by IGM material concerning *Durrës*, where the amphitheatre and its relationship with the surrounding urban fabric appear with a clarity that is now partly reduced (Storchi, 2025). In those plates, the monument's curvilinear perimeter and broader layout are readily appreciable. At the same time, the later

built environment and circulation lines seem to preserve, at least in part, an elliptical organisation around the structure (Fig. 5).

Fig. 4. IGM archive, traces of an elliptical structure.

Elements aligned with the principal axes are likewise discernible, while internal contrasts may be read cautiously as compatible with the monument's internal articulation and with the arena zone (Storchi, 2020). In this respect, the *Durrës* example recalls, on a comparative methodological level, the well-known case of Lucca, Italy, where the amphitheatre's outline continues to condition the surrounding built pattern (Ciampoltrini, 2016). The point of the comparison is not architectural equivalence but the demonstration that historical aerial plates can retain levels of legibility sufficient to strengthen the interpretation of large curvilinear signatures and their spatial logic, an approach equally relevant to reading the *Kullë* grouping.

Satellite imagery reveals a visible imprint measuring approximately 130 × 75 m. Within the outer ellipse, a second, smaller

Fig. 5. IGM and satellite images of Durrës showing the amphitheatre structure (a, b).

ellipse can be observed, recognisable through stronger contrast and compatible with an arena estimated at approximately 60 × 40 m (Fig. 6). The persistence of the pattern in different acquisitions and the stability of its geometry strengthen the observation against explanations based solely on cultivation or contingent conditions (Kocillari, 2025). Moreover, its relationship with other nearby elements, including additional anomalies and structural traces detected in adjacent sectors, suggests the possible insertion of the monument into a broader context that is coherent with the logic of a structured settlement layout.

From an archaeological point of view, the interpretation of the structure as an amphitheatre-compatible signature does not derive solely from its elliptical form, but from the combination of proportions, perimeter regularity, and

compatibility with dimensional ranges known for medium-sized provincial amphitheatres. In some acquisitions, further indications of internal articulation can also be observed in micro-contrasts and axial discontinuities. With due caution, these may be considered possible entrances and radial subdivisions, to be tested using non-invasive methods and ground verification (Santoro et al., 2024; Fig. 7).

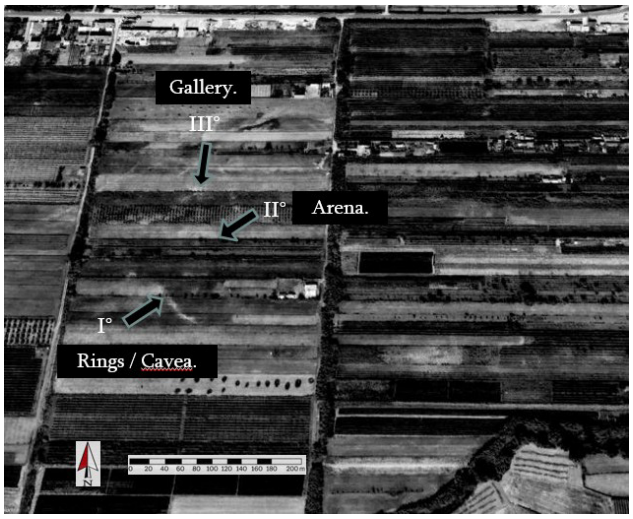

Fig. 6. Satellite photography, traces of the possible amphitheatre.

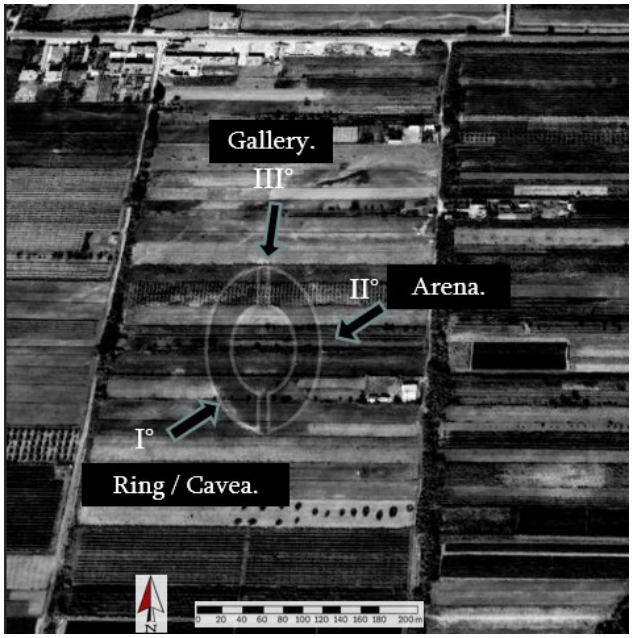

Fig. 7. Satellite photography, traces of the possible amphitheatre.

The ratio between the principal axes, approximately 1.73, falls within values documented for amphitheatres of comparable dimensions. At the same time, the peripheral location with respect to the nucleus of the "urban" anomalies is consistent with recurrent patterns of siting along access lines and settlement margins. Certain typological comparisons, understood as dimensional and planimetric parallels rather than demonstrations, may therefore be invoked selectively, for example, with *Dyrrachium/ Durrës*, *Carsulae*, *Tannetum*, as well as with cases of comparable arena size such as *Noviomagus Batavorum/Nijmegen*, *Grumentum*, and *Tibur* (Golvin, 1988; Storchi, 2014).

On this basis, the ellipse at *Kullë* defines a set of targeted checks, including geophysical surveys along the entrance axes and in areas connecting to the surrounding orthogonal traces. The aim is to test the coherence among the elliptical signature, possible accesses, and the organisation of the sector. The modular regularity of the layout and its coherence with possible organising axes reduce the likelihood that these are modern phenomena and, taken together, support an urban-scale reading referable to a possible civic-commercial sector (Greco, 2019).

To the north-east, approximately 3 km from the amphitheatre-compatible structure, the photographic traces are compatible with a pseudodipteral temple plan. The perimeter colonnade would measure approximately 70 × 30 m, while the rectangular *cella* (*naos*), with a possible *opisthodomos*, would measure approximately 45 × 18 m (Kocillari, 2025). The pseudodipteral hypothesis rests on the combination of proportions, module, and the setback of the *cella* from the outer perimeter, together with a *peristasis* scheme legible in plan (Fig. 8).

In classical typology, the "space" of the second colonnade is retained in the rhythm of the intercolumniation even in the absence of an actual double *peristasis*, according to a solution attested between the Late Hellenistic and Early Imperial periods (Foss, 1975). The proportions fall within the monumental class of provincial sacred complexes. Moreover, the distance and geometry in relation to the ellipse suggest a possible functional relationship between cult space and space intended for public performance, a feature characteristic of contexts in which ritual practices and civic cohesion could be closely connected (Gros et al., 2007). The planimetric reading of the structure suggests, with the necessary caution, a typological correspondence with pseudodipteral temple models, on account of the proportions of the central body and the articulation of the outer perimeter.

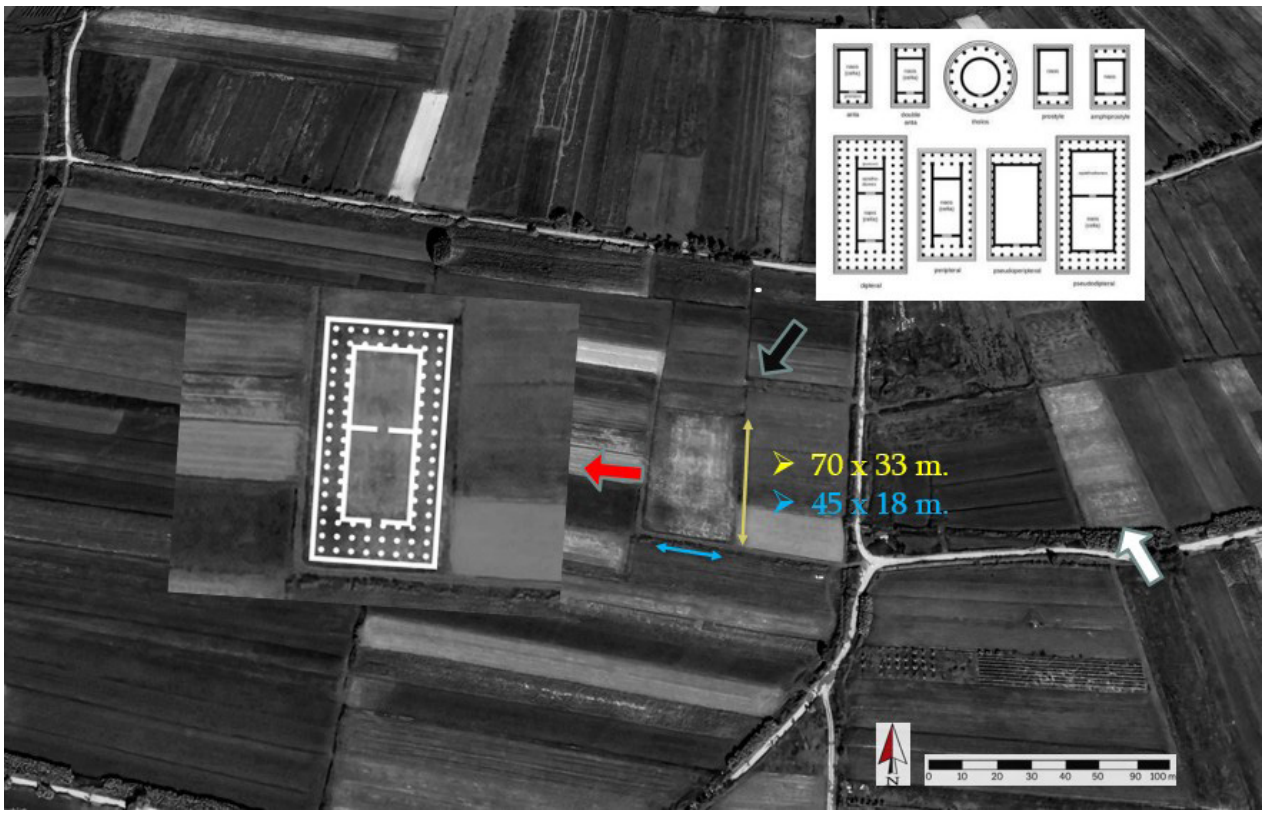

Fig. 8. The photographic traces may indicate a pseudodipteral temple plan.

The temple hypothesis is recognised in plan by the presence of a central *cella* set within a wider perimeter, with an outer colonnade placed at a distance that evokes the effect of a double *peristasis* while retaining only a single ring of columns. From this derives a clear hierarchy between inner nucleus and monumental envelope, a well-defined axial articulation, and proportions that distinguish the temple body from a simple enclosure or other rectangular structures (Harris, 1983). As with the ellipse, the assessment rests on multi-temporal recurrence and morphological coherence, avoiding single-frame readings (Waagen et al., 2025). The formulation remains deliberately cautious: the intention is not to identify an edifice with certainty, but to indicate a possible typological correspondence that, if confirmed, would prompt reconsideration of the functional hierarchy of the sector and its role within a broader urban landscape (Harris, 1983).

From a dimensional perspective, and without implying a direct architectural attribution, the pseudodipteral temples of Asia Minor offer a useful comparative horizon (Adak, 2023; *Vitr.* 3.2.6–7). The Temple of Artemis at Magnesia on the Meander, attributed to Hermogenes, has a plan of approximately 67 × 40 m, with an 8 × 15 colonnade and a *cella* of approximately 35 × 16 m (Humann et al., 1904). The Temple of Artemis at Sardis, in its Late Hellenistic and Roman phases, reaches approximately 105 × 50 m, with an outer colonnade of 8 × 20 (Ratté et al., 1986). Further planimetric comparisons may be drawn with the Hellenistic temples of Megara and with monumental complexes of Asia Minor, such as those at Priene and Didyma (Foss, 1975; Hoepfner et al., 1986). The monumentality that such a sacred building would suggest, should the hypothesis be confirmed, would point to the presence of organised religious spaces functional to the integration of local communities into imperial cults and Roman public practices (Chaniotis, 2020).

In the same area, further traces can also be observed, perhaps referable to funerary structures or circular features, which will require dedicated analysis. A crucial element for assessing the value of aerial analysis is a quadrangular sector of approximately 200 × 200 m, legible as a structured enclosure or organised functional area (Lindsay & Mkrtchyan, 2023). The primary interpretation considers it compatible with a *horrea*-type functional zone, including storage spaces, magazines, and internal organisation. At the same time, an alternative hypothesis brings it closer to a control installation of the *castrum* type.

Fig. 9. Aerial photograph of traces.

their definitive interpretation to archaeological verification (Fig. 9).

In an agricultural context, where canalisation and cultivation may produce misleading linear features, the fact that certain traces appear more coherent or persistent in IR visualisations strengthens the methodological argument of the present study (Fig. 10).

North of the amphitheatre-compatible structure, the analysis of aerial and satellite imagery reveals several additional traces. These include a central structure that may recall *insulae* or *tholos*-like forms, as well as more northerly features that might hypothetically suggest a stadium, a hippodrome, or a large basilica. Here, too, these remain preliminary indications and must be treated as testable hypotheses rather than as definitive identifications. A recently identified trace, located in the hills of *Kullë* and arranged in relation to the slope along an east-west line, presents a curvilinear morphology that allows it to be discussed as a possible theatre-like signature, or at least as an indication of a monumental structure of considerable scale. The aerial images show several traces: a) a central structure reminiscent of possible *insulae*; b) traces of an ancient road; c) traces of a swampy area; d) *tholos*-like shapes; e) a structure that could suggest a stadium, a hippodrome, or a large basilica (Fig. 11); and the possible theatre-like structure (Fig. 12).

At this stage, the evidence is treated with caution and without proposing definitive measurements, since its legibility depends on acquisition quality

The value of this element is not merely dimensional. What matters is the internal structure of the signal and its capacity to be read as an organised layout rather than as an amorphous mark (Agapiou & Gravanis, 2024; Kaimaris et al., 2023). In this case, satellite imagery and, above all, infrared analysis play a central role, since they make it possible to observe the traces in a more legible and contrasting form, while necessarily leaving

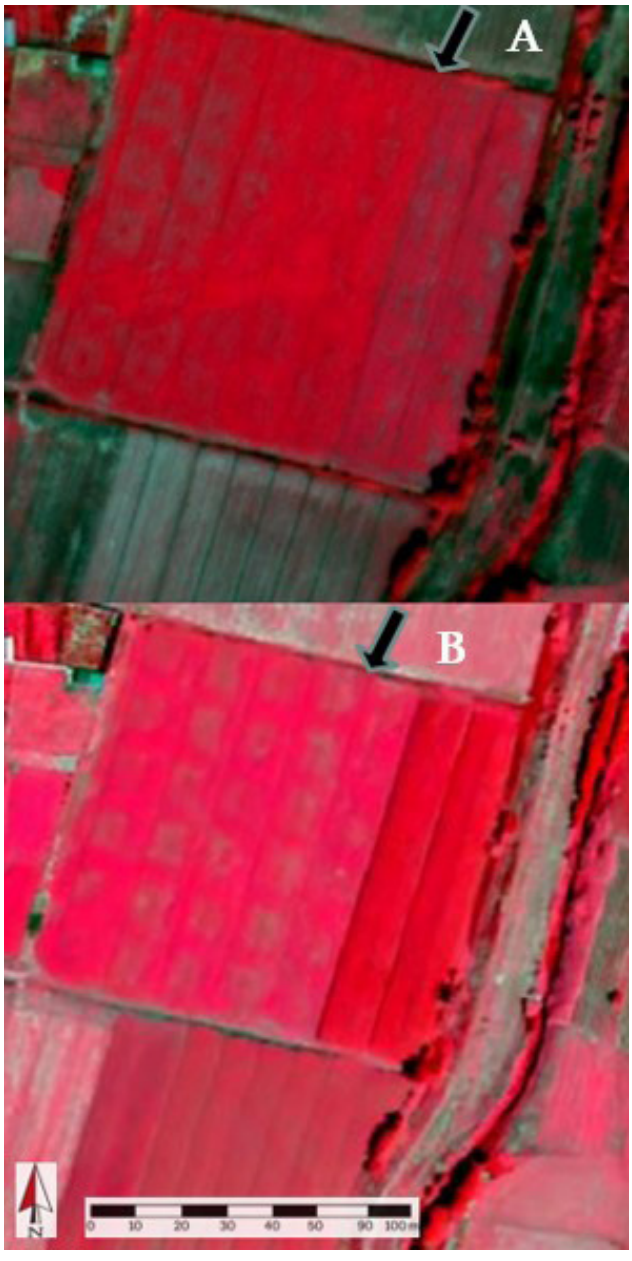

Fig. 10. Traces visible in infrared (IR) photography (a, b).

and requires further multi-temporal checks and field verification (Campana, 2018). In hilly contexts, legibility may be affected by vegetation cover, micro-erosion, and agricultural work, and the form may therefore be partly obscured (Opitz & Cowley, 2013).

Nevertheless, if the geometry remains stable across several acquisitions and exhibits consistent features, such as regular curvature, a possible *cavea*, and a coherent relationship with the slope, the indication becomes more relevant, as it would suggest a public function and a more complex organisation of the context (Sear, 2006). Should the theatre hypothesis be confirmed, formal parallels may be recalled with theatres and *odeia* across the Mediterranean, including Patras, Thessalonica, Assos, Nora, and Nysa (Clarke et al., 1902; Previato et al., 2022; Toma, 2018).

Fig. 11. Aerial images north of the amphitheatre.

In architectural terms, an ancient theatre is generally characterised by a semicircular or curvilinear *cavea* set on a slope, a central *orchestra*, and a stage building arranged along the frontal axis, within a configuration intended for collective viewing and public performance (Chlepa, 1999). Some of these characteristics appear to correspond, at a preliminary level, to the aerial reading, although field verification remains necessary (Campana, 2018). Taken as a whole, the picture emerging from *Kullë* shows how the convergence of historical aerial photography, satellite imagery, infrared data, toponymy, and historical sources makes it possible to construct a coherent and verifiable set of archaeological hypotheses.

Within the framework established by the *Kullë* case study, historical aerial photography, satellite imagery, and infrared (IR) data are likewise informative in adjacent sectors. In these areas, the archaeological record does not necessarily appear as large monumental forms, but rather as weaker traces, linear alignments, and spatial relationships that can be discussed in terms of territorial connectivity (Ducellier, 1976, 1981; Popović, 1984).

Fig. 12. Possible theatre-like structure.

Erzen, Bashtova, and the Claudiana Corridor: Archaeological Traces and Territorial Connectivity

The aim of this section is therefore not to advance new "strong" identifications, but to test the transferability of the approach across three contexts: the mouth of the Erzen River, the fortress of Bashtova, and the *Claudiana/Peqin* corridor connected with the *Via Egnatia* (Gjipali, 2005). In the area of the mouth of the Erzen River, imagery indicates low-contrast traces, partly curvilinear and partly rectilinear, within a setting strongly conditioned by fluvial dynamics and modern hydraulic works (Fig. 13). Some curvatures are compatible with palaeochannels and minor floodplain micro-relief (Estanqueiro et al., 2023). At the same time, more regular and sub-parallel lines may reflect drainage systems, field boundaries, local tracks, or the superimposition of natural features and human modification within the floodplain. The area is also relevant for questions of connectivity, as a zone of passage linking the coastal margin with inland routes. Given the high background variability of this environment, the objective here is not to identify buildings, but to delimit a field of signals that warrants multi-temporal checks and, where possible, IR inspection and targeted ground verification (Popović, 1984).

Fig. 13. Satellite photograph of the area north of the Erzen.

Bashtova occupies a strategic position within the coastal system, along routes connecting the littoral zone with the interior and with the southern sector of the Gulf of *Durrës* (Ducellier, 1981; Myrto, 1982). It provides a useful secondary case for assessing the approach's transferability. In this context, aerial and satellite imagery not only document the fortification itself, but also help to outline its relationships with the surrounding landscape and lines of communication. Bashtova should therefore not be treated as an isolated element, but as part of a wider network in which the fortress acquires significance for control, transit, and linkage to road axes connecting the coast and inland sectors (Karaiskaj, 1973).

The toponymic and documentary records further suggest meaningful stratification. The place is recorded as a node for grain traffic and as a commercial landing place under forms such as *Vrego/Briego*. In the sixteenth century, it appears as *Pastova* in the Ottoman cartography of Piri Reis, and later as *Basti* in the atlas of Camocio. Rather than deriving the toponym from a single etymon, it is preferable to emphasise this documentary layering and the functional continuity of the site as a landing place, an emporium, and a fortification embedded within Adriatic exchange (Ivetic, 2019; Malltezi, 2014).

Satellite imagery also suggests a route trace that may have linked Bashtova with the *Via Egnatia* corridor, plausibly through the node of *Claudiana/Peqin*. Although this observation must be approached with caution, it supports the view that the fortress belonged to a long-duration system of connections among the coastal zone, the inland section of the itinerary, and the routes leading from Apollonia towards *Epidamnos/Dyrrachium* (Thuc. 1.24; Kocillari, 2016).

The evidence further indicates that the castle walls should not be understood as a single, self-contained construction, but as the result of building activity that appears to incorporate earlier elements, partly preserved *in situ* and partly reused within later masonry. This observation, appreciable both in imagery and on the ground, supports the hypothesis that the visible fortress was superimposed upon an earlier phase, incorporating at least part of its structures and redefining its function within a new defensive and territorial arrangement (Karaiskaj, 1973; Myrto, 1982). Aerial and satellite imagery may also point to subsurface features not yet clarified. In the surrounding territory, Late Antique materials, indications of a bridge near the fortress, and Hellenistic finds in the area of *Vilë* have been reported (Myrto, 1984). In this perspective, Bashtova would merit new

Fig. 14. Satellite photo of Bashtova.

geophysical investigations and, where possible, a broader archaeological re-examination to clarify the relationship among the visible fortress, subsurface remains, and long-term routes. The following can be seen in Fig. 14: a) the fortress; b) the road that connects with the *Via Egnatia*; c) and d) traces of possible structures.

In some acquisitions, alignments may finally be discerned that could reflect land organisation referable to different phases. Here, too, interpretation must remain cautious and requires targeted verification (Saraçi, 1987). A further element of interest concerns *Claudiana*, identified with present-day *Peqin*. *Claudiana* is attested in the *Tabula Peutingeriana* and in itineraries as a *mansio*, that is, a station along the *Via Egnatia* axis (Talbert, 2010; Zheku, 1987). The significance of this evidence lies not solely in the road itself, but in the possibility of reconstructing the territorial logic connecting *Apollonia*, *Epidamnos/ Dyrrachium*, and the intermediate nodes of the itinerary (*Caes. BCiv.* 3; Santoro, 2008). In this framework, *Claudiana/Peqin* can be understood as a point of service, passage, and connection, consistent with the *mansio* function indicated by the sources (*Tab. Peut.*).

As for the modern toponym *Peqin*, it plausibly belongs to a later linguistic phase and may be related to eastern loanwords entering Albanian through Ottoman mediation (Duka, 2009). In the absence of a more secure philological basis, however, etymological proposals should remain working hypotheses. For the present argument, the convergence between itinerary sources, cartographic documentation, and the reading of aerial imagery remains more secure. The relationship between *Claudiana/Peqin* and Bashtova also clarifies this sector as a hinge between the coast and the interior. If *Bashtova* may be read as a point of coastal control and connection, *Claudiana* functions as a service and transit node along the principal axis of the *Via Egnatia*. In this respect, aerial imagery does not merely illustrate; it helps to visualise the possibility of continuity between the ancient route and later road landscapes, showing how certain segments may have been reused, transformed, or maintained over the long term.

Taken together, the evidence considered in this section, from the mouth of the Erzen River, Bashtova, and *Claudiana/Peqin*, shows that the approach developed for *Kullë* is transferable to contexts in which the archaeological record appears less monumental and more diffuse. The value of the analysis lies not in the precise identification of buildings, but in reconstructing connections, survivals, and spatial organisation. Remote observation thus supports a shift from the single site to a corridor-based reading, in which river mouth, fortification, and itinerary node can be discussed as parts of a long-duration system. On this basis, historical aerial photography, satellite imagery, IR data, historical topography, and itinerary sources constitute an effective means, when integrated with caution, for formulating verifiable archaeological hypotheses (Shpuza, 2009). The next step is to draw a concluding synthesis from these cases, clarifying the extent to which multi-temporal remote sensing contributes not only to the reading of sites, but also to the understanding of connective structures and territorial functions in the historical landscape.

CONCLUSION

The integrated use of historical aerial photography, satellite imagery, and infrared (IR) data, read within a multi-temporal framework and subjected to systematic control for geomorphological factors and modern disturbance, demonstrates how such tools can contribute to the archaeological reconstruction of the landscape and its long-term transformations.

Their value does not lie merely in rendering visible anomalies that are no longer perceptible on the ground (Ronchi et al., 2023). Rather, they enable the recognition of coherent sets of traces, spatial relationships, patterns of land organisation, and possible buried structures. When treated with caution and in relation to their historical setting, these indications provide a more detailed picture of territorial development. Above all, they help orient archaeological research more precisely, strengthen preliminary study, and guide targeted ground verification (Kadhim et al., 2023).

In the case of *Kullë*, this convergence of data proves particularly significant. Analysis of aerial photography and satellite imagery has identified a large elliptical imprint interpretable as an amphitheatre-compatible signature, measuring c. 130 × 75 m, with an estimated arena of c. 60 × 40 m.

It has also highlighted a structure that may be interpreted, as a working hypothesis, as a pseudodipteral cult building, c. 70 × 30 m, with an estimated *cella* of c. 45 × 18 m, and a large

organised quadrangular sector of approximately 200 × 200 m (*Vitr.* 3.2.6–7). This sector may be read as a functional area comparable to *horrea*, or as a control installation of the *castrum* type (Kocillari, 2025). Further linear and monumental traces suggest a broader articulation of space.

The northern traces and anomalies distributed across the surrounding area likewise indicate that the site should not be treated as an isolated point, but as part of a wider settlement system in which monumentality, spatial organisation, and connective logics are closely intertwined. In particular, the elliptical imprint is legible in a convergent manner in both historical IGM plates from the Italian Military Geographic Institute and satellite imagery, with interpretive reinforcement provided by IR analysis.

This multi-source and multi-temporal convergence reduces the likelihood of purely contingent phenomena and supports discussion of the trace as a monumental signature compatible with an amphitheatre. Alongside these principal elements, the presence of further traces to the north of the ellipse deserves emphasis. Rectilinear imprints and subdivisions compatible with blocks and *insulae*, circular traces, and one or more larger-scale imprints, cautiously referable to public structures not yet determinable, suggest a more extensive articulation of space (Campana, 2018). The coherence of alignments and the recurrence of sub-parallel axes further imply a possible ordering logic within the sector. This remains a working hypothesis, compatible with either agrarian organisation grids or organising axes of spatial organisation. Here too, verification must rely on targeted checks and geomorphological assessment.

A particular contribution is provided by IR analysis. In some instances, it enhances the legibility of traces already observed in historical and satellite imagery; in others, it provides additional support for recognising weaker or less immediately legible signals. IR does not operate as independent proof, but as a tool of control and interpretive reinforcement, showing how a multilayered reading of the landscape may reveal further information beyond a single acquisition (Campana, 2017). Most clearly, IR processing increases the visibility of internal structures and margins within the c. 200 × 200 m quadrangular sector.

This strengthens the discussion of its nature as an organised functional area, compatible with a *horrea*- or *castrum*-type installation, and reduces ambiguity regarding agronomic and hydrological disturbance. The curvilinear trace identified in the hills of *Kullë*, discussed cautiously as a possible theatre-like signature, is of particular interest. Should multi-temporal recurrence and morphological coherence be confirmed, it would strengthen the hypothesis of a more articulated public complex and of a functional hierarchy within the settlement system. Ground verification remains necessary (Kocillari, 2025).

The strength of the *Kullë* case also lies in the fact that these indications are not read in isolation, but within a broader historical-territorial network. The integration of historical sources, toponymy, cartography, and aerial imagery allows the site and the wider valley to be placed within a long-duration perspective. From this perspective, the Erzen corridor, the coastal zone, and inland routes emerge as key elements in understanding the area's development over time. Toponymy provides useful contextual support (Laurence et al., 2011). Designations such as *Kullë*, from Ottoman *kule*, "tower", together with cartographic and documentary names associated with the river mouth, *Epicaria/Fiollatae*, and the ancient tradition, *Dendae*, help frame the sector as a corridor of transit, control, and services in the long term, without substituting for archaeological verification. It is precisely in this convergence of visual and historical evidence that one of the study's main contributions may be seen: not only the identification of individual structures, but also the reconstruction of an overall territorial logic within which archaeological indications acquire greater plausibility and coherence (Horden & Purcell, 2006). Within this framework, the value of historical photographic archives as scientific resources should also be emphasised. In certain cases, they preserve levels of legibility that are now reduced and clarify the relationship between major curvilinear monuments and their surrounding fabric.

The example of historical plates concerning *Durrës*, where the amphitheatre is especially legible in its structure and in its spatial relations with the urban layout, confirms that archival aerial imagery can do more than document (Shehi, 2017). It can also reinforce the interpretation of monumental signatures and their spatial logic.

Methodologically, this underscores the importance attributed here to the systematic

rereading of historical acquisitions in contexts that have been altered over time. The cases of *Bashtova* and *Claudiana/Peqin*, considered in relation to the *Via Egnatia* corridor (Myrto, 1982), likewise confirm that the approach applied at *Kullë* is transferable to contexts where the archaeological record is less monumental and more diffuse. Near the mouth of the Erzen River, analysis has identified a field of weak but meaningful signals, useful above all for understanding the logic of connectivity among the coast, the valley, and inland routes.

Observations at the river mouth and in the Bashtova sector show that multi-temporal analysis can also isolate signal fields that contribute to the reconstruction of connectivity and territorial functions, despite weaker evidence and higher geomorphological noise (Luo et al., 2023). In the Bashtova case, aerial and satellite imagery indicate that the fortress should be comprehensively reassessed as a territorial node in relation to both pre-existing structures incorporated into its walls and the surrounding route system and landscape dynamics. Similarly, *Claudiana/Peqin*, attested in itineraries as a *mansio*, refocuses attention on the role of the *Via Egnatia* and on the long-duration persistence of connective axes, stations, and service points (Sherwin-White, 1973).

Taken together, these results show that historical aerial photography, satellite imagery, and IR data are not merely illustrative supports, but genuine research instruments capable of bringing to light structures, territorial relationships, and interpretive possibilities that would otherwise remain invisible or fragmented (Vinci et al., 2025).

Future ground verification, through targeted survey, selective geophysical investigations, and, where possible, stratigraphic verification, will clarify the nature of the proposed structures and the real extent of the identified system (Landauer et al., 2025). This is the principal value of the adopted approach: not to replace field archaeology, but to orient it more precisely, reducing arbitrariness in investigation and offering a more articulated reading of occupation, organisation, and connectivity in the historical landscape of the *Durrës* region.

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