CONTENTS

News
Pages 1-2: 472.0.01 Dancing Floor of Ares: Local Conflict and Regional Violence in Central Greece Workshop
Pages 2-3: 472.0.02 A good neighbour is better than a far-away friend: the Atheno-Boiotian relations from the 6th to 4th centuries B.C.E. Workshop

Work in Progress
Pages 3-7: 472.0.03 John Bintliff, Leiden Ancient Cities of Bocotia Project: 2017 season
Pages 7-13: 472.0.04 Alexandra Charami, Bryan Burns, Brendan Burke, Ancient Eleon Excavations 2016-2017
Pages 13-24: 472.0.05 Lieve Donnellan, The urban architecture at Haliartos. The contribution of drone photography and 3D photogrammetry

Bibliographies
Pages 24-27: 472.1.01-58 Historical
Pages 27-31: 472.2.01-71 Literary

NEWS

472.0.01 The following workshop took place at McGill University on 9 November 2017

The Dancing Floor of Ares: Local Conflict and Regional Violence in Central Greece

November 9, 2017 | McGill University | Thomson House Ballroom

9:15 Welcome and Introduction, Hans Beck (McGill University) and Fabienne Marchand (Université de Fribourg and McGill)

9:30 Chandra Giroux (McGill University)
Mythologizing Conflict: Memory and the Minyans

10:15 Hans Beck (McGill University)
Federalism and Local Violence in Classical Boiotia
11:00 Coffee Break

11:15 Jonathan Castex (Université de Montréal)
Military Oracles and the Battle of Leuktra: a captivating storytelling

12:00 Fabienne Marchand (Université de Fribourg and McGill)
Aspects of the Topography of Domination and Violence in Boiotia

12:45 Lunch

2:15 Roy van Wijk (Université de Fribourg)
Strategic Interests and Local Conflicts: Boiotia as a buffer in Athenian strategy

3:00 Peter Londey (Australian National University)
Patterns of Border Conflict between Phokis and Boiotia

3:45 Coffee Break

4:00 Concluding discussion with a response by Claudia Antonetti (Università Ca’ Foscari, Venice)

The workshop is part of the Old and New Powers Project and the Parochial Polis Research Program, and is sponsored by the Anneliese Maier Research Award and the Swiss National Science Foundation.

The following workshop took place at the University of Fribourg on 11 December 2017

A good neighbour is better than a far-away friend: the Atheno-Boiotian relations from the 6th to 4th centuries B.C.E.

09.45 – 10.00 Roy van Wijk (Université de Fribourg)
Welcome and general introduction

10.00 – 10.45 Valentina Mussa (Université Paris-Sorbonne - Paris IV)
Religious life and economic administration of a sanctuary on the borders between Attica and Boeotia: the case of the Amphiareion of Oropos during the 4th century BC

10.45 – 11.15 Pause

11.15 – 12.00 Amber Brüsewitz (Ghent University)
Good Faith makes good neighbours? The role of shared religion and culture during the Peloponnesian War

12.00 – 12.45 Thierry Lucas (Université Paris 1 - Panthéon-Sorbonne)
La fonction militaire de la frontière : protéger, contrôler, connecter

12.45 – 14.15 Lunch
14.15 – 15.00  Paul Grigsby (Warwick University)
I against my brother; I and my brother against our cousin; I, my brother and our cousin against the neighbours: The Athenians and the development of Boiotian identity

15.00 – 15.45  Marco Montalto Tentori (Université de Fribourg)
Inschriftliche Zeugnisse der Schlachten zwischen Athenern und Bootiern vor dem Peloponnesischen Krieg

15.45 – 16.15  Pause

16.15 – 17.00  Roy van Wijk (Université de Fribourg)
You were always on my mind: A re-appraisal of Boiotia’s place in Athens’ policy and memory

17.00 – 17.30  Final Remarks and Discussion

19.00  Speakers’ Dinner

Organised and sponsored by the Swiss National Science Foundation project Old and New Powers, with the support of the Association Alumni et Amis UniFR.

WORK IN PROGRESS

472.0.03  John Bintliff (University of Leiden) has sent the following report:

Leiden Ancient Cities of Boeotia Project: 2017 season

In 2017 two weeks of fieldwork and finds’ study took place in May and a further three weeks in August. The following tasks were achieved and will be presented in order below.

1. Restudy of surface survey finds in preparation for publication in the Project monograph series

The survey finds from the city of HALIARTOS and its territory were checked by all period specialists. Dr. K. Sarri noted the considerable richness and importance of the prehistoric phases at the ancient city and will re-examine the finds for drawing and photography in 2018, then the material is ready for analysis in a forthcoming monograph devoted to the site and its territory (Boeotia 5). A revisit to the acropolis of Haliartos was made by the roman and medieval pottery specialists to clarify the post-classical use of this fortification (see below) with clear results. The survey finds from the city and territory of HYETTOS were given their last restudy and are now being processed for maps and charts in connection with the next upcoming monograph, Boeotia 3 of the Project. The rural sites and offsite finds from the MAVROMMATI and PALAEOPANAGIA landscapes were studied but some specialists need to complete this work in 2018. PhD student D. Peeters restudied key parts of the survey collection from ancient TANAGRA city in connection with his doctorate on the Roman assemblages. Restudy of the finds from ancient KORONEIA city was delayed till 2018 as a key ceramic specialist was unable to participate this year.

2. Detailed recording of the ancient and prehistoric fortifications of ancient Haliartos

In 2016 a detailed map was made of the acropolis and lower town wall circuits, to identify their alignments and the different forms of walling, with a full photographic and GPS recording. In 2017 it was decided to take the best preserved examples of each wall type, and of particular
features such as gates and the coexistence of more than one phase in a locale, and subject these to a highly technical photogrammetric recording. This was achieved by research fellow Dr. L. Donnellan with the additional use of a drone to take images of wall sections difficult to study and to photograph alignments not clearly visible on the ground. The results allow of 3-D visualisation of important constructions in the walls. In addition features not easily recognized on the ground could be clearly recorded, most significantly what appears to be a large apsidal house of Early or Middle Helladic age enclosed by a quadrangular enclosure in the Greek historic era in the neighbourhood of the Archaic-Classical temple of Athena on the acropolis (Figure 1); we suspect this may be a hero shrine, perhaps one to Cecrops noted by Pausanias. Moreover this discovery enhances the rich Bronze Age ceramics and the contemporary acropolis fortification at the site.

The final phase of fortification on the acropolis was merely dated as post-classical by earlier investigators at Haliartos, and might have been assumed to be Late Roman, when many towns of the region were refortified with tile, mortar and cut stone walls. However the almost absence of Late Roman sherds from this plateau in the original survey by our team in the 1980s and the lack of the same on a specialist revisit in August 2017 brought the chronology forward into Medieval or Ottoman times. The August field visit with Dr. A. Vionis identified considerable scatters of Middle Ottoman sherds associated with several domestic longhouses on the acropolis, arguably a small agropastoral hamlet or ciftlik. But there were small numbers of medieval sherds, mostly identified as Crusader-Frankish in date. The presence of the well-known Crusader tower at the eastern entrance to modern Haliartos would seem to have made an additional fortification unnecessary, but certain features of this new enceinte suggests a new role for the acropolis in the 13th-14th centuries AD. The wall is associated at one prominent elevation with a substantial tower (Figure 3), which is so placed to be intervisible with the Haliartos feudal tower and a far larger example in the hills to the west at Ipsilanti. In 1805 it was far higher, as a contemporary print by Dodwell illustrates (Figure 2). Given the very slight numbers of sherds for this period we are led to suggest that while these other isolated towers were feudal residences dominating associated Greek peasant villages, the Haliartos acropolis walled site was rather a temporary fort used during war or the threat of war by a larger force of the Crusader Dukes of Athens.
3. **Locational analysis of rural sites in the hinterland of ancient Hyettos city**

Prof. J. Bintliff conducted a field analysis of the locational preferences shown in the distribution of rural sites of all periods in the hinterland of Hyettos (Figures 4-5), on the basis of detailed mapping of geology and soil types by Dr. K. Wilkinson in 2015. Clear choices could be identified per site and period regarding access, land use, insolation and favourable winds, and water management.

4. **Social anthropological research**

As in previous seasons Dr. H. Forbes continued his interviews and documentation of current economics and society in the rural communities of Bocotia, bringing a third generation of sociological insights in this province, following on the pioneer study of the village of Vasilika by E. Friedl in the 1960s and the work in the Bocotia Project’s survey regions in the 1970s-1980s by C. Slaughter and his doctoral students.
5. **Publication**


6. **Proposals for the 2018 seasons**

The most significant finds from Haliartos city dating from prehistory will be photographed and drawn for publication by Dr. Sarri. The older finds from the rural sites of the Mavrommati and Palaeopanagia districts will continue to be restudied by several ceramic specialists. The pottery finds from the Valley of the Muses survey will be subjected to selective photography and drawing in preparation for publication. The site locations of the Valley of the Muses district will be analysed in the field by Prof. J. Bintliff, in parallel with a geomorphological study of the evolution of the Valley’s topography by Prof. J. Luis Pena of the University of Zaragoza. Collaboration with the French School at Athens in the Valley will be a key feature of this year as these colleagues are carrying out important reanalysis of the French excavations in the Sanctuary of the Muses made at the end of the 19th century. At Haliartos collaboration will be carried out with a team from the University of Rome led by Dr. E. Farinetti, who are recording the visible surface remains of Hellenistic houses in the lower town. The third monograph of the Boeotia Project, dealing with the city and countryside of ancient Hyettos, will be prepared for publication.

![Figure 3: Rural sites in the hinterland of the ancient city of Hyettos (the gridded feature in the lower image).](image-url)
Alexandra Charami, Brendan Burke, and Bryan Burns have sent the following report:

Ancient Eleon Excavations 2016-2017

The Eastern Boeotia Archaeological Project (EBAP) concluded the second season of a three-year permit extension for excavation at the site of ancient Eleon in the village of Arma on July 8, 2017. The synergasia continued under the direction of Dr. Alexandra Charami (Ephorate of Antiquities of Boeotia) and co-direction of Brendan Burke (University of Victoria) and Bryan Burns (Wellesley College). Dr. Kiki Kalliga and Olga Kyriazi and are also key partners in our
research project. We are very grateful for the research funding we received in 2017 from an Insight Grant from the Social Sciences Humanities Research Council of Canada (#435-2012-0185), the Institute for Aegean Prehistory, and the University of Victoria and Wellesley College.

Excavations carried out since 2011 have identified four major periods of occupation at the site of ancient Eleon, located on an elevated plateau overlooking the Theban plain, en route to Chalkis and the Euboean Gulf (Figure 1). First, a prehistoric phase spans the early Mycenaean period (from the end of the Middle Helladic and beginning of the Mycenaean palatial period, ca. 1700-1450 BC). In the second period, toward the end of the Mycenaean age, we have substantial levels dating to the Late Helladic IIIIB and IIIC sub phases. The site seems to be abandoned by the Early Iron Age. The third phase is Post-Bronze Age that varies in levels of occupation, but the earliest recovered material is Late Geometric Euboean pottery of the 8th c. BCE. Eleon itself, however, seems not to be reoccupied in any substantial way until the 6th c. BCE. Also dating to the Archaic period is the construction of the large polygonal wall. After another long period of inactivity at the site we reach the fourth and latest archaeological phase in evidence: the Medieval period, from which material survives in surface levels and deeper pits only. These finds date consistently to the 15th and 16th centuries CE, which could indicate a relatively late date for the stone tower whose remains mark the western end of the site, beyond our permitted area of excavation.

Research Goals 2017: The majority of work in 2017 concentrated within and around an enclosure which we call the Blue Stone Structure (BSS), so named because of the polished blue limestone used to cap a large, rectangular perimeter wall (Figure 2). This structure was capped with a mound of clay marking an early Mycenaean cemetery of some significance dating to the formative period of Mycenaean society, ca. 1700 BCE. Our main goal in 2017 was to excavate as many burials in the Blue Stone Structure as possible within the northern half of the enclosure and to expose fully the perimeter wall, with particular focus on the long, eastern wall. One of our research questions addresses the relationship between the construction of the BSS perimeter wall and individual burials. Although our work is not yet completed, we believe the earliest tombs were dug and built within this demarcated space prior to the construction of the BSS, and then subsequent tombs were constructed inside.

Additional excavations were opened to clarify the northern continuation of an LH IIIC structure in our NW area, when concentrated moisture prevented us from working in the deeper trenches of the BSS. Previous work recovered material from earlier Mycenaean phases, and we are ever hopeful of locating settlement remains contemporary with the site’s Early Mycenaean burials.

Figure 2: Blue Stone Structure from the west. The second stele discovered in 2017 is in the middle.
Blue Stone Structure

The BSS is oriented roughly north-south with a length of approximately 17 meters, making it one of the largest Shaft Grave era constructions known in central Greece. In addition to excavating the burials inside the BSS, a major goal for 2017 was to better document the construction of the rectangular perimeter walls and the tumulus that then covered the entire monument.

Previously, just outside the south-east corner of the BSS, we identified rectangular slabs of clay, similar to unfired mudbricks, but with larger dimensions than we find in settlement architecture. Our 2017 excavations revealed the layers of clay that were built over the center of the BSS, easily seen in the northern baulk (Figures 3a-b). The shape of the tumulus is even better preserved to the east of the BSS (trench SEA1b), where a mass of clay sloped downwards sharply, from west to east on the structure’s exterior. Our trenches in this area also exposed the variation in the wall’s construction. A large triangular orthostate measuring at least 1.57 meters high marks the south-east corner, and a ten-meter stretch running north is consistently capped with pieces of the smooth blue limestone, flush with the exterior face of the wall (Figure 4). The northern end of this eastern wall was also marked with an orthostate block, with a height of 0.98 meter.

Figures 3a-b: Photographs of sections in SEA1b and NEA1a, revealing the preserved layers of clay that formed a mound covering the Blue Stone Structure.

Figure 4: Blue Stone Structure burial complex, from the southeast. The orthostate that begins the eastern long wall is visible on the left. Two standing grave stele are in the center.
In previous seasons we excavated four burials outside of the Blue Stone Structure and four tombs within the perimeter. The largest is the built chamber tomb (‘Tomb 5’), which includes an entrance chamber facing east, first mistakenly identified as a robbed tomb (‘Tomb 3’). In 2017, excavation of the remaining fill beneath Tomb 5 was completed to ensure all human remains had been removed the year before. We also initiated a new sampling protocol for micromorphological analysis and will continue to collect samples in 2018 to better understand the multiple uses of individual tombs, activities surrounding the burials, and the construction of the tumulus mound that eventually covered the BSS. Tomb 5 was also marked by an upright stele 1.36 meters high preserved in situ above its western wall. We had identified another upright stone to its north in 2016 and full excavation revealed it to be ‘Stele 2,’ another upright that measures 1.67 meters. Surrounding these stelae were other numerous other constructions that delineated the location of individual tombs and provided platforms for activity of the LH I community that interred its dead below (Figure 4).

We excavated three additional built tombs in 2017, described here in order of excavation. Tomb 6 is located in SE A1a, between the two grave stelae at a relatively high level (compared to the other tombs). The small rock lined cist held a single child, approximately 9.5 years old (Figure 5a-b). Finds from this tomb were not many but included a miniature Vapheio cup and a miniature pyxis both found near the child’s cranium and two copper alloy coiled rings.

![Figures 5a-b: Excavation of Tomb 6 capping stones and structure, from the west.](image)

Tomb 7 is the northernmost tomb of the BSS thus far identified, and it has a complicated forma and history. At some point in the past the tomb collapsed probably with the earliest phase of construction of wall 45 above it. We assume this wall was built to hide and protect the tomb itself but may have caused its collapse (Figures 6a-b).

![Figures 6a-b: Tomb 7 collapse and excavated, from the south.](image)
This tomb was discovered while we were removing the relatively clear fill above. The earth gave way suddenly and one of our student’s leg descended about 50 cm into the tomb chamber. The only way to safely excavate the tomb was to fully expose and clear away the wall above, since capping stones had already collapsed.

Commingled and friable remains were found throughout the unusually constructed stone-lined cist of Tomb 7. The minimum number of individuals is estimated at 8 currently, adults and subadults. It seems that there were several periods of use and that it served as a place for secondary burials as well as primary ones. Several interesting finds also emerged including some well-preserved complete vessels that all date within the LH I phase but are made in different ceramic traditions including Bichrome, Minyan, and Matt-painted (Figures 7a-c).

Tomb 8 had been partially exposed in earlier excavations, but could not be fully accessed until this year. It seemed to have been disturbed: we thought perhaps robbed along its short northern end. The southernmost capstone was however still in place (Figure 8a) and removed by mechanical means. We found the remains of a single individual, whose body was placed in the southwest corner of the tomb on a compact clay surface, positioned on the right side with the head to the south facing east. A preliminary assessment of the dentition indicates that the individual in Tomb 8 is roughly 7.3 years old with an age range of 6.1 to 8.7 years old. Like the child recovered from Tomb 6, this individual would have been very short for their age.

Tomb 8 contained an unpainted ring-handled cup (Figure 8b), and three copper alloy coiled rings were also found: two along the cranial base and appear to be positioned near the mastoid processes, roughly behind the ears, and one was found below the maxilla.

Finally, while trying to understand further the relationship of the second grave stele with the burials in the area, a secondary pit-burial was discovered in SEA1a. The child was again about 7 years old based on the collected teeth. The preservation of the epiphyses with this burial
suggests that it was carefully collected as a secondary burial. The commingled remains, including the inverted cranium, long bones to the north, and others placed near vertical, were redeposited in a small featureless pit.

Much of the ceramic evidence from all of the tombs of the BSS cannot be dated earlier than the LH I period, including the Vapheio cup, the Grey Minyan jug and the Bichrome jug. There are several problems that should be pointed out that prevent establishing a better chronology of the burials based on pottery finds:

a) there are only a few vessels per tomb;

b) most [if not all] pottery classes cannot be ascribed to a particular stage of the LH I period, like the Gray Minyan shapes, unpainted fine open shapes etc.;

c) lack of stratigraphic sequence for the MH/LH I transition at the site, which could address point b);

d) not a single tomb produced an assemblage that could be placed securely in late MH or, on the other hand, more advanced LH I or even LH II;

e) Presence of secondary burials (commingled and other) as opposed to a sequence of primary burials with associated offerings.

Our studies will continue to examine the human remains associated with the Blue Stone Structure, both within and without, which represent a population of early Mycenaeans at Eleon who physically separated select burials from a larger cemetery. This follows a pattern known from the great grave circles at Mycenae, which were also constructed amidst an earlier MH cemetery. Similarly, all recovered material from the BSS gives a date contemporary with the Shaft Grave era, that is, the late Middle Helladic and early Late Helladic periods.

Northwest trenches

We were encouraged to return to the Northwest sector of the site for limited excavations, when accumulated rain prevented work within the BSS (Figures 9a-b). The Northwest area has primarily yielded evidence for the LH III C settlement. The best-preserved settlement remains come from a burnt destruction level of the LH IIIC Early period and an unburnt sub-phase. We opened two five by five meter trenches along the north in 2017 and exposed the continuation of room construction although we did not expose the expected cross wall, which must lay further to the north in the baulk. Interestingly, we also uncovered some material culture of early Mycenaean habitation, with ceramics dating LH II. The deposits were mixed, not easily coordinated with architectural remains. It is therefore possible that the construction made use of fill material that contained early Mycenaean remains. This is intriguing as we are interested in finding the settlement that goes along with the burials of the BSS from the Early Mycenaean period.

Figures 9a-b: Northwest sector of the site at the conclusion of excavations in 2017.
The most compelling item among this earlier material is a bone disc, or “button,” with incised spiral decoration that has been described as an “S-scroll” motif (Figure 10a). Direct parallels were found—in large quantities and covered with gold foil—in the Shaft Graves at Mycenae (Figure 10b, G. Karo, Die Schachtgräber von Mykenai, 1930). Although far from the context of the Blue Stone Structure, it is another piece of evidence that suggests the Early Mycenaean population of Eleon may have held broad connections and high aspirations.

472.0.05 Lieve Donnellan (VU University Amsterdam), The urban architecture at Haliartos. The contribution of drone photography and 3D photogrammetry

Introduction

The ancient city of Haliartos has recently been the object of new archaeological research aiming at understanding the nature of the urban architecture and the urban fabric.1 The city of Haliartos is located on the south side of the now drained Lake Copais, ca. 20 km west of Thebes and to the NE of Mount Helicon (see fig. 1). Ceramic evidence indicates that the earliest human presence at the site dates to the Neolithic. Nearby, at the Cave of Seïdi, human activities are even as early as Epipaleolithic.2 It is likely that the site of Haliartos was continuously inhabited from the Neolithic until the Roman period, when the city was sacked by the Romans in 171 BCE.3 Preliminary analysis of the pottery, collected during the ceramic survey, shows that short-lived settlement reappeared during the Frankish period and in early modern times, subsequent to the foundation of the modern town of Haliartos, to the east of the ancient town in Middle Byzantine times.4

The new urban architecture survey project came into being as part of the longstanding and ongoing Boeotia Project, directed by John Bintliff and Anthony Snodgrass. A ceramic survey at the site was conducted already in 1984 by a team from Cambridge University,5 under Anthony Snodgrass and aerial photography was executed under Prof. B. Slapsak in 2006 (fig. 2).6 A campaign of geophysical survey took place in April 2006, under the direction of Apostolos

1 Project conducted by Lieve Donnellan (VU University), Anthony Snodgrass (Cambridge University), Yannick Boswinkel (Leiden University).
2 Schmid 1965.
3 Livy XL.11 56,63.
4 Bintliff 2016.
6 Haliartos City - unpublished report.
Sarris. A comprehensive and final publication of the research activities as Haliartos is currently in preparation.

During these previous research activities, the presence of large amounts of visible surface blocks, walls and stone architectural fragments had been observed. But no extensive work regarding the identification or systematic cataloguing of these remains had been undertaken. This led to the decision to dedicate a separate research project to the urban architecture at Haliartos.

Earlier studies on Greek architecture, such as the preliminary excavation reports of the Athena temple on the Haliartos acropolis, published by R.P. Austin and the later work by R. Scranton on Greek walls, referred already to the urban architecture of Haliartos. But these studies were limited and scope i.e. the excavation of the temple on the acropolis, and an entrance into the western acropolis wall or general observations on styles of wall building. These previous studies did not take the many other architectural remains that are visible on the surface into account. In addition, recent

---

8 Haliartos city - volume in preparation by John Bintliff and Athony Snodgrass.
9 Austin 1926a, 1916b 1931.
research on ancient Greek construction techniques has shed doubts on the rigid chronologies of building styles, as proposed by Scranton and others. As a result, the proposed chronology of the construction of the walls at Haliartos is no longer viable and the building history of the site needs a revision.

The aim of the urban architecture survey project at Haliartos is thus to provide a comprehensive corpus of urban architectural remains, to supplement the current studies on Boeotian architecture and Greek architecture in general, and to provide additional data for the Haliartos city study of the Boeotia Survey project. Even though Haliartos was not a centre of innovation in terms of ancient Greek urban architecture, the excellent preservation of the site makes it a unique case for the study of past building techniques and urbanised life. Large sections of the defence walls are still visibly preserved, sometimes even with walls standing for several courses. The presence of blocks of very different shapes in the walls indicates that the walls underwent multiple repairs and extensions. In addition, regularly built house blocks, intersected by streets, can be observed on the surface (fig. 3). The almost complete preservation of both the acropolis and the lower town thus allow for a very detailed study of the development of urbanised life throughout the ages. Only a limited part of the eastern-most part of the town is not preserved. An error in estimating the size of the ancient town at the time of establishing a protected area led to the overbuilding of the site by a number of contemporary houses. Also the eastern necropolis is overbuilt by the modern quarter, although that single plots in between the houses have been left void of construction, to allow for excavation.

Figure 3: Presumed house blocks and streets in the central lower town (picture taken by the author).

Two study seasons in the Spring and Summer of 2016 were dedicated to cataloguing and mapping systematically the visible surface urban and peri-urban architectural remains. Given the size of the site and the limited human resources, it was opted to conduct a qualitative

---

12 Preliminary communications on the two urban architecture survey campaigns took place at the IMSW (International Mediterranean Survey Workshop) at the NIA (Nederlands Instituut the Athene) Athens, February 28th, 2017 and during the conference Boeotia and the Outside world. Boiotian international relations from the Bronze Age to the Imperial period, at the University of Fribourg, Switzerland, June 7th-9th 2017.
13 In the Spring 2016 Lieve Donnellan and John Bintliff participated. In the August 2016, Lieve Donnellan, Anthony Snodgrass and Yannick Boswinckel were present.
survey aiming at cataloguing classifiable structures and features, rather than recording every single stone block on the site for a quantitative study. Both the lower town and the acropolis are littered with single blocks that might, or might not, have been originally part of built structures. Some of the blocks can be clearly classified as architectural, for their specific shape or carving, e.g. part of a column or column base. These were included in the catalogue. But it was not always possible to classify blocks due to their irregular shape and lack of clear association with a built structure or other architectural blocks. Even though it is quite likely that the vast majority of the blocks were originally part of built structures, later destruction and reuse has disturbed their context of use and no clear strategy of reuse or discarding can be associated with them today. Thus, unclassifiable blocks have been left aside in the Haliartos architecture survey. In 2018, a team of the university of Rome (Roma Trè) will undertake a detailed recording of surface walls of the lower town.

Classifiable architectural features, with or without archaeological context, were catalogued and mapped with an EGNOS corrected GPS. For each entry in the diary, observations on material, state of preservation, composition and visible size were entered, as well as a preliminary attribution in terms of cutting technique and chronology. All features were photographed with a standard, commercially available, digital camera to provide visual documentation for the catalogue of architectural features.

Several serious limitations in these conventional recording and image processing techniques, however, led to the decision to dedicate an additional study season to allow for more advanced recording of a number of selected structures. During a three-week season in the Summer of 2017, a drone was used for photographing these selected structures. The large size of the features had complicated the full documentation during the 2016 field seasons, e.g. the angle from which the conventional images were taken with a standard digital camera had distorted the image too much and thus the resulting image did not allow for a detailed evaluation of the feature afterwards. Very large features could also not be photographed from above at the standard height of a human body. In order to understand the lay-out and the relation to other, nearby structures, photographing from a higher distance became necessary. In addition, the site’s topography poses limits on photographing some structures: the northern city walls were built on the edge of a steep precipice which is very difficult to climb. Photographing these walls is therefore only possible using a special device. A drone overcomes all these limits posed to human hand-held cameras and was therefore selected as the appropriate instrument to record the more challenging urban architectural features of Haliartos.

In order to maximise the information that can be derived from architectural remains in terms of size, composition, location and construction technique, it was decided to make 3D photogrammetric reconstructions of a number of selected and better preserved features. In addition to the drone image collection, the summer 2017 study season therefore aimed at gathering the images needed for building photogrammetric models of the pre-selected architectural features.

Drone photography and 3D photogrammetry in Archaeology

In the fields of archaeology, art history, heritage management and museology, many different approaches for gathering images exist. A large part of these techniques have been known for decades, but recent advances in the development of hardware and software as well as the lower

---

14 A quantitative study was conducted for Khoroneia by Yannick Boswinkel: Boswinckel 2015.
15 Corrected with a satellite-based augmentation system. The GPS used was Trimble Pro 6T.
16 Donnellan, Snodgrass & Boswinckel (in preparation).
17 August, 3-24 2017, study executed by Lieve Donnellan.
18 An excellent overview of available techniques can be found in Verhoeven 2012.
cost of the equipment have made these techniques more generally available for archaeological field work projects.

Imaging is made possible because the surface of objects transmits radiation in varying ratios. The human eye and brain are the most common and best known instrument to capture these images. But through the years, special instruments have also been developed to capture optical radiation. Digital image capture systems use optical elements such as lenses, mirrors, prisms, gratings and filters to gather the radiation and focus them onto an imaging sensor. Digital photodetectors generate digital numbers, which can be stored in a device to be retrieved afterwards. Realistic images of objects can thus be generated and stored for later use. These techniques are therefore extremely useful for archaeologists. It allows them to document structures and objects in the field and reproduce images for further study and publication afterwards.

The desire to capture archaeological features from a higher distance has led to the development of special devices to do so. As early as 1899, balloons have been used to record archaeological structures, with the first known archaeological aerial photograph taken of the Forum Romanum by Giacomo Bonni. Air-borne remote-sensing instruments now gather the earth’s spatially, temporally, radiometrically and spectrally varying upwelling electromagnetic radiation and use this to generate (digital) images that can be used in archaeological studies. Oblique and vertical frame images can be acquired from low-altitude unmanned platforms. They exist in many types, brands, fly modes, camera mounds etc. Because of their low cost and easy use, drones are now one of the most common technologies that are used by archaeologists to record excavations and conduct regional survey.

The recent advances in image recording, possibilities for digital storage and high or low altitude recording are transforming the way in which archaeologists use imagery for recording, studying and publishing objects and natural or cultural features. However, noise sources are always present to a certain extent in the production of images. For example, a standard digital camera might generate identical RGB values for two object stimuli which mismatch the human visual system (and vice versa). A camera is thus not a very accurate colour recorder. Moreover, light conditions determine the radiation emitted by the object and captured by the device. When recording small objects, additional sources of light, placed at varying can be used. But this is not possible when recording larger features in the open air, where one is dependent on the sun as light source. In addition, the use of lenses to capture the optical radiation results in geometric distortions of the feature(s) that are being recorded because the geometric three-dimensional properties are mapped to a two-dimensional plane. This means that, even though the images produced by an archaeologist in the field look very realistic, it is important to keep in mind that they are always at least slightly distorted – even under ideal circumstances of sunlight and the angle from which the image was taken.

Nonetheless, even though conventional digital reflex cameras are not the most accurate instruments for capturing colour, and distort geometrically the feature that has been recorded, they are useful devices. They are cheap, non-invasive and accurate enough to produce images that can be used for further analysis. Moreover, special software has been developed to

---

19 See Verhoeven 2012, 2016 for a more detailed description of the underlying processes of radiation and techniques for capturing them.
20 Verhoeven 2013, 32 (with references) and Verhoeven 2009 for a general discussion of archaeological aerial photography.
22 In noise and different types of noise, see Verhoeven 2012, 13: 2016 154-5.
23 Verhoeven 2012, 15-16.
24 On light: Verhoeven 2012, 16.
25 See Verhoeven 2013 for a detailed discussion on the possible geometric distortions in image recording.
(partially) overcome these limitations. Systems for noise reduction and rectification of images can significantly improve the end result.

Almost all D-SLR image sensors generate a 2D digital photograph, but with the help of computer vision algorithms (structure from motion and multi-view stereo) and photogrammetric principles (such as bundle adjustment) images are increasingly being manipulated, combined, adjusted and adapted to produce orthophotos or 3D models. 3D models are very useful for archaeologists: they remove relief distortions from photographs and facilitate the interpretation of an object. Archaeology is essentially a spatial discipline, and therefore, the recording of a spatial component is important for research. Moreover, as has been pointed out, 3D models enable the extraction of information about dimensions and volume of objects and structures, and they also allow for spatial analysis and even permit the study of the degradation of structures over time. Fragile objects or structures can be manipulated non-destructively through virtual reproductions in software applications.

The user-friendliness and straightforwardness of photogrammetric software do not require extensive photogrammetric and computer vision knowledge. There are only standard photographic recording prerequisites. One simply needs to make sure that enough images with up to 80 % overlap are produced. In the case of aerial photography, this might involve flying one or more orbits of the scene of interest (for the oblique approach) or vertical strips. Other methods for recording other than photogrammetric approaches exist, such as laser scanning. Both have advantages and drawbacks.

New methods for image recording and manipulation prove to be highly useful for archaeological research. It is important, however, to be aware of the problems in accuracy in colour recording and geometric deformations, as well as the multiple manipulations the image undergo before a final, idealised, model is reproduced. Archaeological images are productions rather than reproductions and they are always subject to the interpretation of the producer(s) of the image.

Preliminary results of drone photography and photogrammetry for the study of the urban architecture at Haliartos

The limits posed by traditional digital image recording, regarding horizontal and vertical distance in reference to the object of interest, as well as the lack of spatial information in the output that is produced, led to the decision to deploy new techniques in image acquisition and manipulation in the Haliartos urban architecture survey, to enhance the already acquired visual and archaeological data, collected during previous fieldwork seasons.

Images were gathered with an unmanned remote-controlled low altitude platform with a digital camera attached to it. A commercially available low-cost device from the company DJI (model Phantom 4 advanced) was used. Many different types of drones in terms of camera mounds, flight modes and cost are available, thus the Phantom 4 advanced was selected for its price/quality relation. It is an easy to control device and is able to gather images of a sufficiently high quality to be used for further study and publication. A disadvantage of this drone type is, however, the lack of an automated flight mode that allows systematic survey of larger areas. Especially when attempting to record systematically a wider zone, this results in a rather unsystematic gathering of data and the need to mount additional flights to collect areas that have been missed during earlier flights.

26 Verhoeven 2012, 14.
27 Verhoeven et al. 2015, 165.
28 Verhoeven et al. 2015, 166; Bennet 2015.
29 Bennet 2015.
30 See e.g. the evaluation by Gonizzi Barsanti et al. 2013.
The drone nevertheless allows one to photograph a number of structures from a higher altitude and thus permits the documentation visually of the spatial lay-out within the landscape of that feature, as well as the relationship to other features nearby. Additionally, the drone can be used to collect images of the site, in order to allow for a more detailed recording of topographical elements. Previous aerial photographs did not allow one to produce an accurate DEM because the flights focussed on the archaeological features rather than the physical landscape. With the drone, multiple flights are enabled to document the local topography from different angles – in albeit a slightly unsystematic way, as was explained previously.

Most notably, with the remote-controlled drone, previously excavated but unpublished or only preliminary published cult sites on the acropolis of Haliartos could be documented. The drone produced images of the Athena sanctuary, excavated and preliminarily documented by Austin31 and situated it in its topographical setting (fig. 4). In addition, the relation to post-Antique use of the area could be documented in much more detail from the air than ground-level recording had achieved.

![Figure 4: Presumed house blocks and streets in the central lower town (picture taken by the author).](image)

The close relation to the Medieval defence system became very clear, as was the re-use of the sanctuary area for habitation in early modern times, and finally documented the marks left by earlier excavations.

An excavated but unpublished cult site on the acropolis, to the north of the Athena sanctuary, was rediscovered during the previous fieldwork seasons (fig. 5). This new cult site focuses on an apsidal foundation, built in a rubble masonry style with dimensions 4.70 x 4.35m and a NE/SW orientation. It was observed during the previous fieldwork season that the horse-shoe shaped building, whose construction is probably to be dated in the Early to Middle Bronze Age, was surrounded by a later quadrangular wall in Antiquity. With the drone, it became possible to document both structures visually, which had been very difficult with traditional approaches, due to the lack of height of the walls in question.

31 Austin 1926a, 1926b and 1931.
The drone also allowed for an easier recording of a number of city walls. Especially on the north side of the lower town, the city’s defence walls are located right on the edge of a steep cliff which also is heavily overgrown. Documenting large stretches of wall were seriously hampered by these difficult conditions. The drone, however, could easily overcome the limitations posed to humans and these walls could be examined now in a much more accurate way.

The good preservation of the northern city walls, up to several courses high, made a precise recording of them very important, because they are the only well-preserved stretches of city wall that allow for an attribution to masonry style and thus chronology.\textsuperscript{32} Even more important in the 2017 study season was the discovery, in the same north city wall, of a possible older wall (fig. 6) and a squared block that belonged to a gate. The latter was not in situ, but its location, close to the only gentler approach in the northern slope, is highly suggestive for the presence of an entrance into the city wall.

\textsuperscript{32} Dating walls based on construction technique is not as straightforward as archaeologists have believed until recently. See the thoughtful discussion by Müth 2016.
The earlier wall could be identified because of the presence of two parallel rows of blocks with a straight outer face and an irregular inner face, with a space in between for a fill with smaller irregular stones (emplekton) (fig. 7, 8 and 9).\(^{33}\)

---

\(^{33}\)Brasse & Müh 2016.
The older wall is only very partially preserved, but the city wall seems to have been built in front of it, while using the older wall as the back face. Understanding the role of the earlier structure is not easy. No traces of an earlier wall surrounding the entire lower city were found at any point. But perhaps the earlier wall was part of a simpler but still architecturally formalised entrance system onto the plateau that formed the lower town, or alternatively, the wall was a retaining wall, meant to keep the plateau in place. The drone images allowed to identify this wall, which had gone unnoticed during the previous survey activities.

A number of better preserved selected standing features were cleaned of dead leaves, covering plants, weeds, loose sand, cobwebs, dead snake skins, rubbish and so forth. Images were taken with a standard D-SLR camera, with an 80% overlap, in order to compute 3D models using PhotoScan Professional edition from Agisoft LLC. The software contains a number of standard measures for manipulating standard photographs from the feature under study. Images are aligned based on matching elements that are identified by the software. Then, a sparse point cloud is generated, then a dense point cloud. A geometrical mesh is then interpolated from point cloud data, after which models or a DEM (digital elevation model) can be build. One of the software’s main virtues is that it allows for the processing of images produced by common D-SLR cameras using conventional photography techniques.

3D images allow for a different sort of visual inspection than a 2D image does and given the importance of a spatial component of most archaeological features, this technique introduces a much enhanced comprehension of the object under study. A first and preliminary model was produced for the north city wall discussed previously.

The 3D photogrammetric model (see next page) allows for a clear spatial understanding of the remaining standing blocks and reproduces the complex stratigraphy of the wall as a result of different building phases. This type of documentation provides very clear details on volumes and the relation between different voluminous bodies, in a way that traditional archaeological documentary practices cannot achieve. Readers can manipulate the model within the pdf: it can be made larger, smaller and rotated by dragging with the mouse.

[Because of its size, the model is not included in the text; the 3D photogrammetric model can be downloaded from my academia.edu profile at: https://www.academia.edu/35077042/3D_photogrammetric_model_of_the_N_city_wall_at_Haliartos
The pdf needs to be downloaded as the preview mode does not support 3D viewing].

Perspectives

Using a drone to capture images of the urban architectural features at Haliartos has allowed for the production of additional data that are currently being studied in more detail. Most notably, the course of a polygonal defence system around the acropolis can now be much better understood and it has even been possible to suggest a location of an entrance into the southern acropolis. Not a single entrance or gate in the city wall or acropolis wall has been found until present and the movement through space – as defined by the urban architecture – at Haliartos therefore remains hypothetical. With the application of new analytical techniques, a much

34 For a detailed discussion: Verhoeven 2011.
35 Remondino et al. 2014.
36 Bennet 2015.
37 The model was generated with pictures aligned with the highest accuracy possible, and with medium accuracy for the dense cloud and mesh.
38 It is possible that readers need to allow their acrobat reader to open 3D data. The model might take a while to load, depending on the working capacity of the computer.
better understanding of the use of space at Haliartos and its formal definition through architecture can be achieved.

Photogrammetric models are in the course of production to allow for further analysis of the main acropolis wall, whose construction can be attributed to Mycenaean times, of a Frankish tower and wall, and of refurbishments of the Mycenaean wall, conducted throughout the Archaic to Hellenistic times.

Further study of these structures allows for the establishment of a much more detailed building history at Haliartos, while, at the same time, it permits to write a more accurate social and political history of the city — through its use of urban architecture.

Haliartos was clearly involved in local and regional networks along which technological and political innovations were acquired. The study of urban architecture at Haliartos therefore does allow to go beyond a mere typological inventory of building blocks and walls. Through a study of urban architecture, social interaction on a daily base can be reconstructed. Interesting in this sense are the shifts in focus that occur through time. Not only is there the well-known descending from living on the acropolis during the Bronze Age and Archaic times to the lower town in Classical/Hellenistic times, but also a shift from the NW to the SE can be observed. A gate into the Mycenaean wall was located in the western part of the acropolis. The location of other important Mycenaean centres around the Copais lake made this corner of the site the physical location of intervisibility, movement through space, daily and face-to-face and peer polity interaction. The gate was closed off in the Hellenistic period – if not earlier – but the focus of community building had shifted already to the southeast of the acropolis: impressive monumentalisation through the construction of a series of towers and a wall marked the relocation of interaction in late Archaic times. Further monumentalisation in the subsequent centuries all but confirmed this part of the site as the heart of commercial and civic life, formalised through the construction of buildings such as an agora and buildings for public administration defined space. Spatial politics in turn contributed to the production of social, economic and even gender distinction through differential use and access to space. The future work of the Boeotia Project aims at incorporating and elaborating these recent preliminary result into a more comprehensive study of the urban architecture at Haliartos.

References

Austin, R.P., 1926a, Excavations at Haliartos, BSA 27, pp. 81-91.
Austin, R.P., 1926b, Excavations at Haliartos, BSA 28, pp. 128-140.
Austin, R.P., 1931, Excavations at Haliartos, BSA 32, 180-212.
Bennet, M. J., 2015, Evaluating the Creation and Preservation Challenges of Photogrammetry-based 3D Models, Published Works 52.

http://digitalcommons.uconn.edu/libr_pubs/52

Boswinkel, Y., 2015, Architecture as an Archaeological Proxy. The site of Koroneia, Greece as a case-study for researching a multi-period site through architecture and the methodology of studying architecture from a survey context (unpublished MA thesis submitted to the Faculty of Archaeology, Leiden University).
DOI: 10.1002/arp.1569
Donnellan, L.; Snodgrass, A.; Boswinkel, Y. (in preparation), The urban architecture at Haliartos (to be submitted to Archeopress).


Verhoeven, G.; Doneus, N.; Doneus, M.; Stuhek, S., 2015, From pixel to mesh. Accurate and straightforward 3D documentation of cultural heritage from the Cres/Lošinj archipelago, *Izdanja hrvatskog arheološkog društva* 30, pp.165-176.


---

**BIBLIOGRAPHY 1: HISTORICAL** (see also 472.2.03, 472.2.06, 472.2.13, 472.2.22, 472.2.28, 472.2.31, 472.2.32, 472.2.39, 472.2.47, 472.2.49, 472.2.50)

**BOOKS**


472.1.08  M. Tentori Montalto, *Essere priimi per il valore: gli epigrammi funerari greci su pietra per i caduti in guerra (VII-V sec. a.C.)* (Pisa, Roma 2017) 238pp. [isbn: 978-88-6227-906-02], esp. nos. 10, viii, ix, D.
ARTICLES

472.1.09 P. Bes & J. Poblome, “Urban Thespiai: the Late Hellenistic to Late Roman pottery”, in 472.1.01: 317-349.


472.1.19 C. Grandjean, “The coins of Thespiai”, in 472.1.01: 374-386.


472.1.28 C. Müller, “The Roman fate of Thespiai (171 BC – fourth century AD), in 472.1.01: 231-239.

472.1.29 I. Nielsen, “Collective mysteries and Greek pilgrimage: The cases of Eleusis, Thebes and Andania”, in T. M. Kristensen & W. Friese, edd., Excavating


472.1.36 V. Stüssi, “The pottery of the Early Iron Age to the Hellenistic Periods”, in 472.1.01: 287-316.


472.1.38 A.K. Vionis, “The Byzantine to Early Modern pottery from Thespiai”, in 472.1.01: 351-274.


472.1.40 A.K. Vionis & C. Loizou, “The history of Thespiai and Bocotia from Late Antiquity to the Frankish Period”, in 472.1.01: 241-253.


REVIEWS

472.1.42 H. Beck & P. Funke, edd., Federalism in Greek Antiquity (452.1.01)

472.1.43 M.L. Del Barrio Vega, L’Eubée = Paradeigmata, Recueil d’inscriptions grecques dialectales II, 2 (461.1.03)

472.1.44 W. Mack, Proxeny and Polis (451.1.08)

472.1.45 P. Funke & M. Haake, edd., Greek Federal States and their Sanctuaries (441.1.05)


472.1.47 A. Muller, E. Laffi, dir., Figurines de terre cuite en Méditerranée grecque et romaine. 2 - Iconographie et contextes (461.1.06).

472.1.48 M. Mili, Religion and Society in Ancient Thessaly (451.1.09)

BIBLIOGRAPHY 2: LITERARY (see also 472.1.06, 472.1.12, 472.1.12)

BOOKS

472.2.05 B.B. Powell (trans.), Poems of Hesiod: Theogony, Works and Days, & the Shield of Herakles (Oakland 2017) xii &184pp. [isbn: 9780520292864].
472.2.06 E.G. Simonetti, A perfect medium? Oracular divination in the thought of Plutarch (Leuven 2017) 256pp. [isbn: 9789462701113].
472.2.08 C. Tsagalis, Early Greek Epic Fragments I. Antiquarian and Genealogical Epic (Berlin, Boston 2017) x & 477pp. [isbn: 978-3-11-053153-4].
ARTICLES

A. Míguez Barciela, “Pindaro y la ‘verdad’ del poema”, *Synthesis* 23 (2016) e003


472.2.29

472.2.30

472.2.31

472.2.32

472.2.33
D. Ferreira Leão, “Politeuma in Plutarch”, *Synthesis* 23 (2016) e007.

472.2.34

472.2.35

472.2.36

472.2.37

472.2.38

472.2.39

472.2.40

472.2.41

472.2.42

472.2.43

472.2.44

472.2.45

472.2.46

472.2.47
A. Sacco, “‘Come i malati di oftalmia’: funzioni e variazioni di un’immagine medica in Plutarco”, *Prometheus* 43 (2017) 211-228.


REVIEWS

Z. Adorjáni, Pindar’s sechste olympische Siegesode (451.2.01)

N. Bernstein, Seneca: Hercules furens (471.2.04)
- [r] J.-A. Shelton, CJ-Online 2017.10.10

H. Bottler, Pseudo-Plutarch und Stobaios (451.2.04)

B. K. Braswell, ed., trans., Didymos of Alexandria, commentary on Pindar (441.2.04)

V. Cazzato & A. Lardinois, edd., The Look of Lyric: Greek Song and the Visual (461.2.07)

M. Davies, The Theban Epics = Hellenic Studies Series 69 (462.2.03)

S. Hornblower, ed., transl., comm., intro., Lykophron: Alexandra (452.2.06)

B. Maslov, Pindar and the emergence of literature (452.2.08)

C. Mc Nelis & A. Sens, The Alexandra of Lykophron. A Literary Study (462.2.06)

C. Nobili, Corone di gloria. Epigrammi agonistici ed epinici (462.1.08)

T. Phillips, Pindar’s Library. Performance Poetry and Material Texts (461.2.15)

J. Roisman, I. Worthington & R. Waterfield, Lives of the Attic Orators: Texts from Pseudo-Plutarch, Photius, and the Suda (461.2.18)

C. Statius, Thebaid 8, ed., intro., transl., comm. A. Augoustakis (461.2.19)

I. Torrance, ed., Aeschylus and war: comparative perspectives on Seven against Thebes (471.2.19)

M. Trédé-Boulmer, Kairos. L’à-propos et l’occasion (462.2.12)