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SCUOLA ARCHEOLOGICA ITALIANA DI ATENE

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# ITALIAN-GREEK UNDERWATER ARCHAEOLOGICAL RESEARCH IN LEMNOS. PRELIMINARY REPORT OF THE 2022 CAMPAIGN\*

BARBARA DAVIDDE PETRIAGGI – STAVROULA VRACHIONIDOU – SALVATORE MEDAGLIA –  
THEOTOKIS THEODOULOU – CARLO DE DOMENICO – GIOVANNA BUCCI – MARCO CIABATTONI –  
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FILOMENA LUCCI – ANGELO MICHELE RAGUSO – ANDREAS SOTIRIOU –  
GIORGOS TSIMPOUKIS – ALEXANDROS TOURTAS

**Riassunto.** Nel maggio 2022, la missione archeologica italo-greca, costituita dalla Soprintendenza Nazionale per il Patrimonio Culturale Subacqueo e dall'Istituto Centrale per il Restauro (Ministero della Cultura), dall'Eforia alle Antichità Subacquee e dall'Eforia alle Antichità di Lesbo (Ministero greco della Cultura e dello Sport), sotto gli auspici della Scuola Archeologica Italiana di Atene, ha condotto ricognizioni subacquee sull'isola di Lemno presso i siti costieri di: Ormos Pournias, Capo Hekaton Kephales, Ormos Tigani, Ormos Palaiopolis, Kotsinas, Agios Charalambos, Ayia Sotiras, Neftina, Trigyes, Poliochni e Stvi. Nel corso di tali attività sono stati individuati i resti di alcuni naufragi e sono state investigate diverse strutture murarie attualmente sommerse. Particolare attenzione è stata dedicata all'area litoranea dell'antica città di Efestia e al suo sistema portuale.

**Περίληψη.** Τον Μάιο του 2022, η Ιταλο-Ελληνική αρχαιολογική αποστολή, αποτελούμενη από την Εθνική Εφορεία Ενάλιας Πολιτιστικής Κληρονομιάς και το Κεντρικό Ινστιτούτο Συντήρησης και Αποκατάστασης (Ιταλικό Υπουργείο Πολιτισμού), την Εφορεία Εναλίων Αρχαιοτήτων και την Εφορεία Αρχαιοτήτων Λέσβου (Υπουργείο Πολιτισμού και Αθλητισμού), υπό την αιγίδα της Ιταλικής Αρχαιολογικής Σχολής Αθηνών, πραγματοποίησε υποβρύχιες έρευνες στο νησί της Λήμνου στις παράκτιες τοποθεσίες: Όρμος Πουρνιάς, Ακρωτήριο Εκατό Κεφαλές, Όρμος Τηγάνι, Όρμος Παλαιόπολης, Κότσινας, Άγιος Χαράλαμπος, Αγία Σωτήρα, Νεφτίνα, Τρύγη, Πολιόχνη και Στβι. Κατά τη διάρκεια αυτών των δραστηριοτήτων, εντοπίστηκαν τα κατάλοιπα αρκετών ναυαγίων και διερευνήθηκαν αρκετές βυθισμένες σήμερα τοιχοποιίες. Ιδιαίτερη προσοχή δόθηκε στην παράκτια περιοχή της αρχαίας πόλης της Ηφαιστίας και στο λιμενικό της σύστημα.

**Abstract.** In May 2022, the Italo-Greek archaeological mission, comprised of the National Superintendency for Underwater Cultural Heritage and the Central Institute for Restoration (Italian Ministry of Culture), the Ephorate of Underwater Antiquities and the Ephorate of Antiquities of Lesvos (Greek Ministry of Culture and Sport), under the auspices of the Italian Archaeological School at Athens, conducted underwater research on the island of Lemnos at the coastal sites of Ormos Pournias, Cape Hekaton Kephales, Ormos Tigani, Ormos Palaiopolis, Kotsinas, Agios Charalambos, Ayia Sotira, Neftina, Trigyes, Poliochni and Stvi. During these activities, the remains of several shipwrecks were identified and several currently submerged wall structures were investigated. Particular attention was paid to the coastal area of the ancient city of Hephaistia and its port system.

## 1. UNDERWATER ARCHAEOLOGICAL RESEARCH IN LEMNOS: AN INTRODUCTION

### 1.1 The launch of a multidisciplinary program to study and assess the state of conservation of the Underwater Cultural Heritage of Lemnos Island

The idea of starting an underwater archaeological research program in the Island of Lemnos was conceived in 2019, when the writer, then director of the Underwater Archaeological Operation Unit (NIAS)

\* The Italian-Greek underwater archaeological mission on the island of Lemnos took place within the framework of the *synergiasies* of the Italian Archaeological School at Athens, in collaboration with the National Superintendency for Underwater Cultural Heritage and the Central Institute for Restoration (Italian Ministry of Culture), the Ephorate of Underwater Antiquities and the Ephorate of Antiquities of Lesvos (Greek Ministry of Culture and Sport). Underwater surveys were conducted at the coastal sites of Ormos Pournias, Cape Hekaton Kephales, Ormos Tigani, Ormos Palaiopolis, Kotsinas, Agios Charalambos, Ayia Sotiras, Neftina, Trigyes, Poliochni and Stvi between May 16<sup>th</sup> and June 1<sup>st</sup> 2022, under the scientific direction of Barbara Davidde Petriaggi (National Superintendent of Underwater Cultural Heritage), Stavroula Vrachionidou (Ephorate of Underwater Antiquities, Thessaloniki) and Pavlos Triandafyllidis (Director of the Ephorate of Antiquities of Lesbos). The

underwater field activities were conducted under the direction of Salvatore Medaglia (Central Institute for Restoration, external collaborator) and Theotokis Theodoulou (Ephorate of the Underwater Antiquities); Giovanna Bucci (National Superintendency for Underwater Cultural Heritage) has been the coordinator of the archaeological materials documentation, and Carlo De Domenico (State University of Milan - Italian Archaeological School at Athens) has been the coordinator for the IASA of the Italian-Greek team and the responsible for the land topographical survey. Taking part in the mission on the Italian side were: Marco Ciabattini (Central Institute for Restoration), Gianpaolo Colucci (Central Institute for Restoration, external collaborator), underwater technical assistant, Gabriele Gomez de Ayala (Central Institute for Restoration, external collaborator) and Filomena Lucci (Central Institute for Restoration, external collaborator), responsible for the documentation and

of the Central Institute for Restoration (Rome), henceforth ICR, was invited by the Director of the Italian Archaeological School at Athens, henceforth IASA, to start a collaboration with the ICR's NIAS and include in IASA's researches in the Island of Lemnos a program devoted to the archaeological documentation of underwater sites and the assessment of their state of conservation. One of the purposes of this research project was also to study systematically and in-depth the harbours of Lemnos in ancient times.

During a joint inspection carried out in the spring of 2019, I was able to note that this scientific work was as required and useful as ever. The high risk of loss that characterizes the underwater archaeological heritage, due to climate change and coastal erosion, makes it as urgent as ever to develop programs of archaeological documentation to be carried out also with the support of new technologies and to systematically start cataloging of archaeological data and of the state of conservation of underwater archaeological sites.

The method developed during the research program could have flowed into an intervention protocol to be used as a model/good practice for other ancient Italian and Greek coastal sites. To fund the program, the ICR made available funds from the European project *i-Mareculture*, which provided for the possibility of carrying out exchange activities and sharing of methodologies and good practices for the documentation and enhancement of underwater cultural heritage, devised by the ICR as partner of the project<sup>1</sup>.

The triennial project was approved by the Greek Ministry of Culture and Sports and the underwater archaeological research were scheduled for the summer of 2020. Unfortunately, due to the SARS-CoV-2 pandemic, fieldwork was not possible and the campaign was postponed to May 2021.

Meanwhile, in December 2020, the National Superintendence for Underwater Cultural Heritage was established in the Italian Ministry of Culture, and the writer had the duty and the honour of being designated as the director of this new institute of the Italian Ministry of Culture<sup>2</sup>.

Given the institutional tasks of the National Superintendency for Underwater Cultural Heritage, it was possible to include the underwater research program in Lemnos in its scientific activities, and indeed, the previously proposed program was expanded by further in-depth archaeological studies that were not limited to the analysis of the harbours sites but they were also dedicated to wrecks and wreckages, including instrumental investigations (see below) financed with funds from the Italian National Superintendency.

Then on May 2022 this three-year underwater research program was updated and begun its activities under the auspices of the Italian Archaeological School at Athens, conducted and financed by the National Superintendency for Underwater Cultural Heritage of Taranto, the Central Institute for Restoration of Rome, the Ephorate of Underwater Antiquities of Greece, in collaboration with the Ephorate of the Antiquities of Lesbos.

The underwater archaeological research took place from May 16 to June 1, 2022, and covered the coastal areas of the peninsula of Hephaestia – Ormos Pournias Bay, Palaiopolis Gulf, Cape Hekaton Kephales, Ormos Tigani –, Poliochni Bay, Koukonisi, Ayia-Sotira, Keros Bay, Haghios Charalambos and Stvi Bay (Fig. 1).

After a brief overview of the archaeological activities conducted on the Island by the Ephorate of Underwater Antiquities, the Ephorate of Antiquities of Lesbos and the Italian Archaeological School at Athens, this article is aimed at providing a report of the activities with the preliminary results.

*Barbara Davidde Petriaggi*

## 1.2 The previous underwater research of the Ephorate of Underwater Antiquities

Since the beginning of the Ephorate of Underwater Antiquities, henceforth EUA, in 1976, Lemnos had never been the target of a systematic underwater research. Most of the underwater inspections on the

3D underwater survey, Fabrizio Mauri (Central Institute for Restoration, external collaborator), in charge of the marine geological surveys, Fabio Morfea (Central Institute for Restoration, external collaborator), in charge of the marine geophysical surveys, Angelo Michele Raguso (National Superintendence for Underwater Cultural Heritage). On the Greek side, Spyros Moureas (Ephorate of the Underwater Antiquities), Andreas Sotiriou (Ephorate of the Underwater Antiquities) Theotokis Theodoulou (Ephorate of the Underwater Antiquities) - Alexandros Tourtas (Ephorate of the Underwater Antiquities). The Italian-Greek team is pleased to thank the director of the IASA, Emanuele Papi, for the

invitation to participate in the Italian School's research on the island of Lemnos and for facilitating every aspect of the mission. We would also like to thank the Ephorate of Underwater Antiquities and the Ephorate of Antiquities of Lesbos, together with their staff, for their fundamental support at every stage of the research and for their excellent collaboration.

<sup>1</sup> For the *i-mareculture* project see <https://imareculture.eu/>. The coordinator and project manager of the project for ICR is Barbara Davidde.

<sup>2</sup> For the activity of the National Superintendency for Underwater Cultural Heritage see DAVIDDE PETRIAGGI 2022.

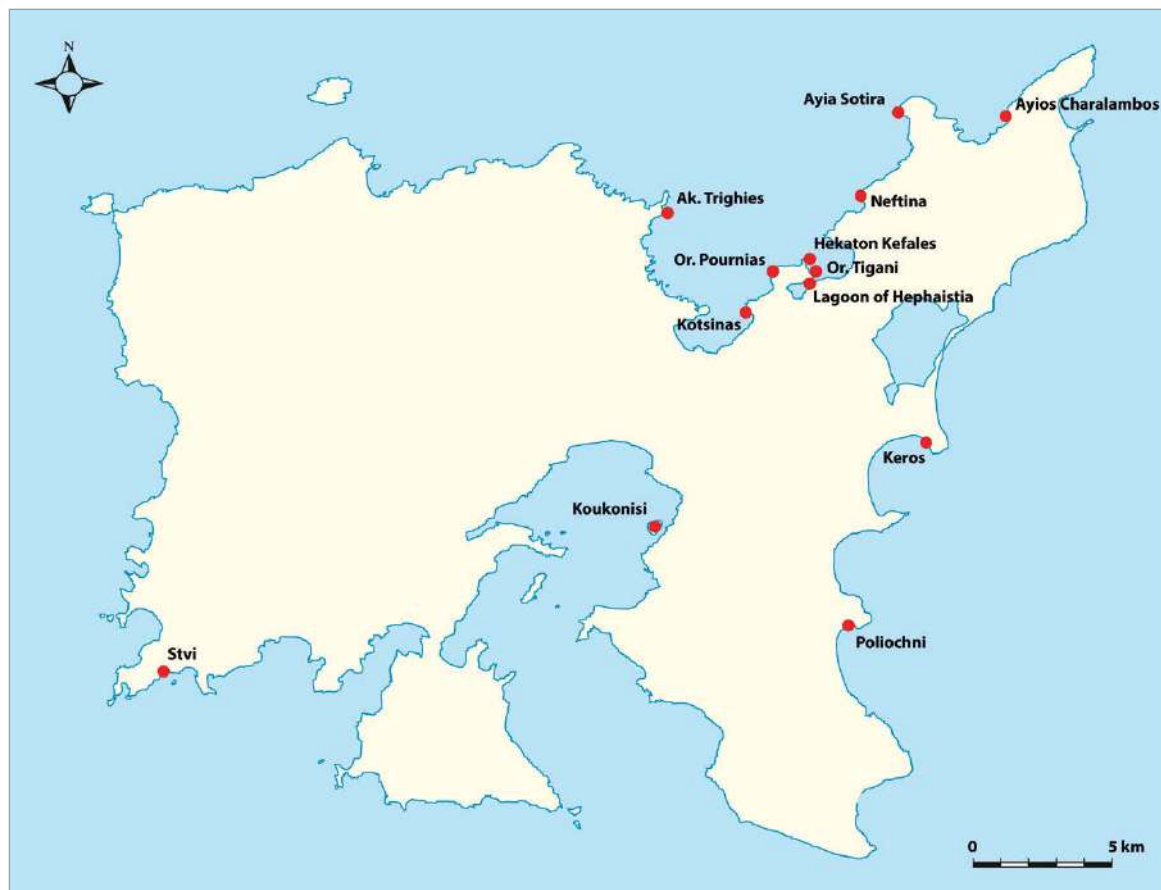


Fig. 1. Plan of the sites investigated during the 2022 mission (el. S. Medaglia; © Archivio disegni SAIA NIG 8516).

island were dictated by various planned constructions (like harbour works and biological sewage treatment plants) at several parts of the Lemnian coasts.

In 1995 a shipwreck of about 50 iron canons and two huge anchors was found in a depth of m 8 NE of Lemnos at the Methones reef. It probably belongs to the time of the Orlof upheavals in Greece (1770). Due to the harsh weather conditions, it was not possible to acquire photographic documentation. The length of some canons was measured (from m 2.90 to 3.10) and the dimensions of one of the anchors (length m 5.60, width m 3.60). West of the Anaphani cape at Myrina, where the sanctuary of Artemis has been excavated, a rubble mound structure of unknown chronology has been seen in the sea m 50 away from the coastline. At the beach of Thanos to the south many shards have been seen. At the nearby bay of Stvi first research of an underwater rubble mound structure took place, after its discovery from Agallopoulou and Kalliontzis<sup>3</sup>. Between the structure and the coast two fragments of columns have been seen on the sandy seabed. In 2001, an underwater and coastal survey that took place on the modern harbour of Kotsinas (which had been the medieval capital of Lemnos), brought to light a plethora of shards and architectural remnants inside the sea as well as four columns in a depth of m 1, while around the whole perimeter of the hill remnants of the fortification walls could be seen. In 2005, remains of ancient walls and a large quantity of shards were found around the prehistoric site of the islet Koukonisi. In the same year, a probable ancient rubble mound harbour work structure at the beach in front of the site of prehistoric Myrina was located. Its photographic documentation took place 5 years later (2010), together with that of other known harbour works like the one at Ayia-Sotira, Neftina, Thanos bay and Hephaistia<sup>4</sup>.

*Stavroula Vrachionidou*

<sup>3</sup> Agallopoulou and Kalliontzis had found prehistoric shards and tools on the hill that defines the bay of Stvi from the east, see AGALLOPOULOU-KALLIONTZIS 1988; ΣΙΜΩΣΙ 1995, 850;

ΑΡΧΟΝΤΙΔΟΥ-ΑΡΓΥΡΗ - ΚΟΚΚΙΝΟΦΩΡΟΥ 2004.  
<sup>4</sup> www.limenscope.ntua.gr.



## 2. METHODOLOGY

The multidisciplinary program included systematic underwater surveys aimed at the topographical study of submerged and semi-submerged coastal sites, with particular reference to the remains of possible harbours and landings places and the identification and study of ancient wrecks. Along with the archaeological study, the state of preservation of the submerged sites was assessed using the ICR-SAMAS System (Scheduling submerged archaeological artifacts)<sup>5</sup>.

During the works, for each submerged site identified, instrumental surveys, geological and bathymorphological mapping of the seabed, graphic and photographic documentation, archaeological and state of preservation cataloging, direct and indirect surveying, photogrammetry, and 3D reconstructions were carried out<sup>6</sup>.

The research included the use of aerial drones for large-scale documentation of the geomorphological context and ortho-photographic positioning of coastal emergences, multibeam for seabed surveys, and video cameras for underwater photogrammetry.

At the main archaeological features at the sites of Poliochni and Ormos Pournias (Hephaistia), detailed surveys and 3D processing were carried out, to reconstruct the complete mapping of the investigated seabed. As will be seen below in more detail, coastal research has made it possible to accurately identify both little-known, and unpublished structures found on the shoreline and in the waters of Ormos Pournias. Georeferenced digital plans were produced, and the wall units were analyzed according to the canonical patterns of scientific archaeological research with cards, matrixes, and analysis of construction techniques.

All artifacts identified on the seafloor were rigorously georeferenced by total station and GPS and were entered into IASA's topographic monitoring network, which is already active thanks to the onshore excavation campaigns. Georeferencing of the submerged sites was carried out using the total station, integrated drone GPS, and multibeam survey simultaneously.

All archaeological sites were entered into a GIS called *The Underwater Cultural Heritage of the Island of Lemnos*.

*Barbara Davide Petriaggi*

## 3. HEPHAISTIA

### 3.1 A topographical overview of the peninsula

Hephaistia was one of the most interesting sites of the Greek-Italian underwater research in Lemnos. All the coastal areas of this ancient centre, a short peninsula in the northern side of the island, which has been excavating for 97 years from the Italian Archaeological School at Athens, were investigated by underwater surveys for the first time in 2022. Before presenting the results of the first maritime research, a topographical overview of the site of Hephaistia is presented here, in order to integrate the new data with the already acquired archaeological knowledge on the urban development of the peninsula.

Hephaistia can be seen as a symbolic case study from a topographical standpoint. The archaeological evidence and the material culture brought to light by the Italian excavations allow us to reconstruct the evolution phases of an eastern Mediterranean centre from a *longue durée* perspective (Fig. 2)<sup>7</sup>.

Two features, unvarying over time, ensured that the centre of Hephaistia was settled as early as the Bronze Age and gradually acquired an urban form: the geographical position and orography on the one hand and the availability of building material on site on the other. Hephaistia stood on a fertile peninsula

<sup>5</sup> PETRIAGGI-DAVIDDE 2005.

<sup>6</sup> The activities included underwater archaeological surveys by trilateration; 3D underwater surveys by laser scanner and photogrammetry; topographic surveys by total station and/or GPS; low-altitude topographic surveys by non-professional drone; direct underwater archaeological prospecting (including with the use of scooters) and instrumental; Rov, Multibeam, SBP and Side Scan Sonar; targeted underwater prospecting through the use of metal detectors; scheduling and documentation (graphic and photographic) of

archaeological finds; video-photographic documentation; lithic sampling for archaeometric and geological purposes; coring of marine sediments, authorized by Greek Authorities; geological and bathymorphological mapping of the seabed; scheduling of the state of preservation using.

<sup>7</sup> For a general overview of the excavations of the Italian Archaeological School of Athens at Hephaistia, see MESSINEO 2001, GRECO-PAPI 2008, and FICUCIELLO 2013.





Fig. 2. Updated general topography of Hephaishtia. Archaeological sites investigated by the Italian Archaeological School at Athens since 1926 (el. C. De Domenico - R. Di Cesare; © Archivio disegni SAIA NIG 7137).



Fig. 3. Flight over Hephaistia (drone photo F. Mauri; © Archivio fotografico SAIA U/13348).

in the middle of the island, naturally shielded on three sides (Fig. 3). It was sheltered, to the north and the west, by a cliff, bordered to the east and the west, by the gulfs of Pournias and Palaiopolis, possible landing points. To the south, it was linked to the continent by a narrow isthmus only m 500 wide. It occupied a pivotal position on the island of Lemnos and formed part of the maritime trade networks of the Aegean Sea. The presence of calcarenite, conglomerate and shell limestone was exploited for building purposes for more than twenty centuries. Stone quarries have been identified at various points on the peninsula, such as those at Cape Hekaton Kephales in the NE tip and the immediate vicinity, such as those of basalt stone in the present-day village of Romanou<sup>8</sup>.

The settlement space, of course, is functional for the society that defines and occupies it. Over time, a series of variables related to the inhabitants' needs progressively expressed and transformed the settlement of Hephaistia.

### 3.1.1 Late Bronze Age (XIV- XII centuries BC)

The earliest evidence of occupation dates back to the end of the Bronze Age. Based on the available excavated data, during this phase only the area of the isthmus was likely occupied. (Fig. 2, No. 2) By analogy with the Bronze Age centres of Myrina (Richa Nera)<sup>9</sup>, Koukonisi<sup>10</sup> and Poliochni<sup>11</sup>, the settlement choice at Hephaistia also seems to have been dictated by its proximity to the sea and landings in connection with commercial activities and navigation. Excavations have discovered architectural remains and Mycenaean pottery, which may have been imported. However, it is still being determined whether Hephaistia hosted a Mycenaean *emporion* or whether a local community used such pottery<sup>12</sup>.

### 3.1.2 Early Iron Age and Archaic period (XI-VI centuries BC)

The settlement phase, of which we have the most data, is between the 11<sup>th</sup> and 6<sup>th</sup> centuries BC, the expression of the culture of a local population. The Early Iron Age and Archaic period society, as shown

<sup>8</sup> On the Hephaistia quarries, see CAMPOREALE *et alii* 2008 [S. Camporeale] and PANSINI-PASSALACQUA 2019.

<sup>9</sup> ΑΡΧΟΝΤΙΔΟΥ-ΑΡΓΥΡΗ - ΚΟΚΚΙΝΟΦΩΡΟΥ 2004

<sup>10</sup> BOULOTIS 2009.

<sup>11</sup> BERNABÒ BREA 1964 and 1976.

<sup>12</sup> See, in this regard, GRECO 2012 and COLUCCIA 2017.

by the excavation data, seems to occupy the peninsula more extensively than in the Bronze Age. This allows us to read the inhabited space organisation through certain cult places, houses, fortification, and necropolis. The north hill, i.e., the Archaic acropolis, was the highest point built and was the focal point of religious, liturgical and votive activities. A great sanctuary stood there, dedicated to a female divinity named the *Great Goddess Lemnos* by Stephanus of Byzantium, sometimes represented as a *potnia theon*, and connected to various spheres, such as weaving, navigation, and music. It comprised a liturgical building and one with a votive deposit linked by a forecourt<sup>13</sup>. In addition to numerous imported ceramics from all over the Aegean, hundreds of offerings characterised the votive deposit, including clay sirens and local, orientalising figurative ceramics that expressed a figurative culture distinctive to the island (Fig. 2, Nos. 12-13). These data describe the formation of a highly developed settlement in which craftsmanship flourished, as evidenced by the oldest local grey pottery and the production of geometric pottery<sup>14</sup>. Moreover, metallurgical activities are documented on the hill of the acropolis, in the levels that existed prior to the installation of the Archaic sanctuary<sup>15</sup>.

According to recent research, the settlement on the hill seems to date from the early Iron Age and to have continued later near the Archaic sanctuary. Houses were found in other parts of the peninsula. One of them was researched by the team of the University of Siena in the 2000s, in which numerous food storage containers and a wine production facility were brought to light (Fig. 2, No. 4)<sup>16</sup>.

Recent excavations by the Italian Archaeological School at Athens have also identified Archaic structures in the easternmost area of the peninsula, in the Gulf of Palaiopolis, under the structures of an early Byzantine basilica (Fig. 2, No. 15)<sup>17</sup>. Two other shrines are located on the theatre hill<sup>18</sup>, under structures of the Classical period (Fig. 2, No. 8), and another near the isthmus (Fig. 2, No. 2)<sup>19</sup>. Currently, archaeological data do not allow us to determine whether the settlement occupied the entire peninsula or whether it was formed of several *nuclei* interspersed with open spaces. Remarkable is the plurality of cult places and their closeness to houses. The southern limit of the settlement in the Archaic period was formed by the isthmus, which was cut by a fortification wall at the point where it was built between the 10<sup>th</sup> and 8<sup>th</sup> century BC above the Bronze Age settlement (Fig. 2, Nos. 1-2)<sup>20</sup>. The isthmus separated the city of the living from the community of the dead. To the south of it stood the incineration necropolis of the society that lived in Hephaestia in Archaic times (Fig. 2, No. 18)<sup>21</sup>.

### 3.1.3 Classical period (V-IV centuries BC)

A new phase in the structuring of the centre begins with the Athenian conquest of the island and the foundation of the cleruchy. This takes place with Miltiades at the end of the 6<sup>th</sup> century BC and is completed with Kimon between 475 and 460 BC<sup>22</sup>. Hephaestia now becomes an Athenian polis and requires functional spaces specific to a Greek city. Compared to the Archaic period, the city retains the location of the necropolis across the isthmus to the south, but the urban structure indicates a discontinuity with the pre-existing settlement fabric. Even though the planning of the new town dates from the 5<sup>th</sup> century BC, the construction of individual buildings and of different sectors, is completed over time, following the plans put together and decided from the outset.

Considering the scant archaeological evidence brought to light so far, the reconstruction of the urban layout is possible thanks to the geophysical and geomagnetic prospecting conducted by the University of Siena over a large part of the Hephaestia peninsula in the 2000s<sup>23</sup>. The city presented a standard layout *per strigas*, with blocks m 29 wide, oriented NW-SE, bordered by *plateiai* and *stenopoi*. It was protected to the N and NE by a curtain wall, interspersed with towers and posterns, whereas the cliffs defended it to the N

<sup>13</sup> On the recent excavations by the Italian Archaeological School at Athens, in collaboration with the University of Foggia, at the sanctuary of the Archaic acropolis of Hephaestia, see DI CESARE 2018; 2019 and DI CESARE-SARCONI 2021. For the iconography of the goddess, see recently SARCONI 2019.

<sup>14</sup> On grey ware ceramics and geometric or G 2-3 at Hephaestia and Lemnos, see DANILE 2011 and SARCONI 2020.

<sup>15</sup> For the Early Iron Age settlement on the site of the Archaic acropolis, see DI CESARE-SARCONI 2021. For the metallurgical activities, see BESCHI 2009.

<sup>16</sup> CAMPOREALE *et alii* 2008; 2010; CARUSO 2016; 2017.

<sup>17</sup> DE DOMENICO *et alii* 2019, 496-497.

<sup>18</sup> ARCHONTIDOU 2004, 40-41.

<sup>19</sup> CORREALE 2008 and GRECO-CORREALE 2017.

<sup>20</sup> For the isthmus wall and its chronology, see COLUCCIA 2017, 40; GRECO 2018, 15.

<sup>21</sup> MUSTILLI 1932/33. This necropolis can be dated between 8<sup>th</sup> and 7<sup>th</sup> c. BC. Ancient sources have variously named the inhabitants of the island before the Athenian settlement: see lastly DE DOMENICO 2023, 39-40, 43-45.

<sup>22</sup> On the foundation of the Athenian cleruchy in Lemnos, see GRECO 2010 and CULASSO GASTALDI 2020.

<sup>23</sup> PAPI *et alii* 2002 and CERRI 2008.



and NW. To the south, the presence of an Attic type funerary *peribolos* around the isthmus indicates the city's southern limit, just as in the Archaic period (Fig. 2, No. 2).

The new polis provided for the typical Greek conceptual tripartition of space: public - δημόσιον, i.e., of the polis and thus of the demos, - ἴδιον, private - i.e., the dwellings -, sacred - ἱερόν, i.e., the sanctuaries.

The theatre, a civic gathering place for performances but also for the assemblies of the *ekklesia*, is the most significant public monument and today, after its reconstruction by the Ephorate of Antiquities of Lesbos, dominates the skyline of Hephaistia (Fig. 2, No. 8)<sup>24</sup>. After an initial wooden phase –i.e., *ikria*, its construction would have been canonised in stone, at least in the 4<sup>th</sup> century BC.

The agora was likely located south of the theatre, not far from the Gulf of Pournias, according to the recent geophysical prospections conducted by the University of Siena in collaboration with the Italian Archaeological School at Athens<sup>25</sup>. The inhumation necropolises were scattered along the west coast south of the isthmus and were characterised by the same funeral customs used in the *Demosion Sema* of Athens (Fig. 2, Nos. 19-20)<sup>26</sup>. They were the burials of those Athenians who had moved to Lemnos following the deduction of the cleruchy.

However, the area of the Gulf of Palaiopolis, subject of recent research by the Italian Archaeological School at Athens, was occupied even in the Classical period, as documented by a building with storage *pitthoi*, possibly referable to a farm (Fig. 2, No. 15)<sup>27</sup>. The area appears unprotected by the city walls, and the presence of this agricultural structure suggests that it was already in the *proasteion*.

The settlement expanded in the area between the Gulf of Pournias, the theatre, and the western slope of the northern hill. Achille Adriani had identified a neighbourhood of houses included in the urban planning scheme in the centre of the peninsula (Fig. 2, No. 9)<sup>28</sup>. Following the 2021 excavations by the University of Foggia in collaboration with the Italian Archaeological School at Athens, a new settlement area was identified to the west of the sanctuary of the Archaic acropolis (Fig. 2, No. 21)<sup>29</sup>. This area, inhabited from the 5<sup>th</sup> century BC through the Hellenistic period, was located between the Archaic acropolis and the western elevations and communicated with the gulf of Pournias via a road axis that crossed the valley.

However, from the classic phase of Hephaistia no sacred space is yet known. The highest area of the peninsula, the Klas, a m 64 high relief whose summit is a plateau surrounded by some terracing walls, visible from some surveys, could be the site of a poliadic sanctuary. As of today, this area has yet to be investigated.

### 3.1.4 Hellenistic Age (III-I centuries BC)

Despite numerous inscriptions attesting to a fully active centre, there is little archaeological documentation of the Hellenistic period. Along the eastern slope of the isthmus, in a terraced area accessible via a ramp, a thermal complex with a heated tholos room and terracotta baths has been identified (Fig. 2, No. 5)<sup>30</sup>. This fits perfectly with the urban network already established by the prospecting.

Also documented are artisanal areas for the production of Megarian bowls and other terracottas items, reoccupying some of the sacred spaces of the archaic period on the northern hill (Fig. 2, No. 12)<sup>31</sup>. From recent prospections traces of artisanal areas have been identified along the east coast towards the port.

### 3.1.5 Roman period (I-IV centuries AD)

Very little is known of the *forma urbis Hephaestiae* from the Roman and Late Antique periods. An inscription reused in the Mitropolis of the nearby town of Kontopouli mentions Flavius Philostratus, who, apart from being an exponent of the Second Sophistic and author of the *Vitae Sophistarum*, was a native of Hephaistia and a priest of the cult of Hephaestus, evidently still practised in Roman times<sup>32</sup>.

The only structures identified in the town date back to late antiquity and refer to three private dwellings: 1) the first, a peristyle *domus*, excavated on the isthmus to the north of the funerary *peribolos* of the Classical period (Fig. 2, No. 3)<sup>33</sup>; 2) the second, of which two rooms and a collapsed column is preserved, built

<sup>24</sup> ARCHONTIDOU 2004; GRECO 2014; TRAFFICANTE 2019.

<sup>25</sup> PAPI *et alii* 2002; PAPI 2008; CERRI 2008; FICUCIELLO 2013, 229, 232.

<sup>26</sup> SAVELLI 2018.

<sup>27</sup> DE DOMENICO 2021, 148-157.

<sup>28</sup> MESSINEO 2001.

<sup>29</sup> DI CESARE-SARCONE 2021.

<sup>30</sup> GRECO-VITTI 2013.

<sup>31</sup> MASSA 1992.

<sup>32</sup> IG XII.8.27. On Flavius Philostratus, cf. CIVILETTO 2002.

<sup>33</sup> GRECO *et alii* 2009, 1182-1201 [L. Coluccia].

immediately to the east of the Hellenistic baths (Fig. 2, No. 6)<sup>34</sup>; 3) the third, identified in 1926, probably converted into a basilica in the early Byzantine period, of which all traces have been lost (Fig. 2, No. \*)<sup>35</sup>.

### 3.1.6 Byzantine Times (IV-XIII centuries AD)

The Byzantine urban layout of Hephaistia has yet to be discovered. Apart from a few houses that stood on the Hellenistic baths, partially destroyed during excavations in 1927<sup>36</sup>, a house workshop in the area of the eastern plateau was identified and studied by the team of the University of Siena (Fig. 2, No. 4)<sup>37</sup>. A wall structure, probably from Byzantine times, surrounded the isthmus in the same line as the archaic fortification (Fig. 2, No. 1). Based on the available data, it appears that the city now gravitated towards the central-eastern part of the peninsula and along the gulf of Palaiopolis, the site of an ecclesiastical complex, the subject of recent research by the Italian Archaeological School at Athens: a proto-Byzantine basilica and a cruciform church, built in the mid-Byzantine period on the ruins of the basilica, abandoned in the 13<sup>th</sup> century AD (Fig. 2, No. 15)<sup>38</sup>. Sources mention Hephaistia as a bishopric until the 7<sup>th</sup> century AD. In addition to the basilica of the Gulf of Palaiopolis – vulgarly called “of the eastern harbour” until the new underwater investigations presented here – and the basilica built on the ruins of the large, lost Roman building mentioned above, a third Christian building is preserved, namely the cemetery basilica at Bouda, southwest of the isthmus, which stood on the necropolis from the Classical period and incorporated several early Christian burials (Fig. 2, No. 20)<sup>39</sup>.

The new underwater research programme, ongoing in Hephaistia since 2022, aims to extend, verify and integrate the knowledge of the urban layout of the city near the coast in its diachrony, and in particular, to locate the port structures, which current research has not yet identified. The preliminary results of the study, presented below, were conducted along the west coast of the peninsula, in Ormos Pournias, around the promontory of Hekaton Kephales and in Ormos Tigani, in the north-eastern portion of the Hephaistia, and at the Mesohaline lagoon of the eastern gulf, also known as Palaiopolis.

*Carlo De Domenico*

## 3.2 Ormos Pournias

### 3.2.1 Notes on marine and coastal geology

The coastal geomorphology of the site is a low debris coast bordered by two cliffs located to the N and S and is characterized by the presence of Oligocene flysch – a sequence of shales rhythmically interbedded with thin, hard, fine grained and well assorted sandstones – from the Fissini-Sardes and Hephaistia units<sup>40</sup>, clearly observable both near the cliffs (Fig. 4) and in the stretch of sea in front; in the latter case, the flysch appears semi-emerged and eroded, forming a sort of rectilinear “walls” perpendicular to the coastline (Fig. 5). The sedimentary contact between the two units is separated by a normal fault found to the north, near the cliff (Fig. 10).

Still near the N cliff, there are (Fig. 6) numerous spherical aeolian sandstone concretions<sup>41</sup>; these formations are often eroded/fractured by exogenous agents in the form of peculiar “rounded frame” or “helmet” structures (Fig. 7). On the top of the cliff, near the top layers of the flysch of the Hephaistia unit, it is possible to find a thick coarse conglomerate layer.

Given the orientation of the strata and the conformation of the coast, also by visually analyzing the photogrammetric models acquired, one can guess the presence of a possible synclinal type fold (Fig. 8) that surrounds the investigation site, whose sides would be positioned in the near the cliffs to the north and south of the site (in correspondence of the previously mentioned straight “walls”), while the hinge zone would represent the structurally lowest area, covered by a thick sedimentary layer.

The rock formations composed of finer sedimentary rocks (sandstones, siltstones) present in the cliffs tend to fracture on almost parallel and perpendicular planes thanks to the phenomena of *diacclasis* (Fig. 9)<sup>42</sup>.

<sup>34</sup> FICUCIELLO 2013, 38-39.

<sup>35</sup> This building is mentioned in DE DOMENICO 2018, 567.

<sup>36</sup> GRECO *et alii* 2002, 974-993.

<sup>37</sup> CAMPOREALE *et alii* 2008.

<sup>38</sup> DE DOMENICO 2018; DE DOMENICO *et alii* 2019; DE DOMENICO

2021 and Carlo De Domenico *et alii* in this *Annuario*.

<sup>39</sup> SAVELLI 2018, 45-47.

<sup>40</sup> INNOCENTI *et alii* 2009.

<sup>41</sup> McBRIDE 2003; INNOCENTI *et alii* 2009.

<sup>42</sup> FOSSEN 2016.





Fig. 4. Ormos Pournias. Aerial overview of the site (drone photo F. Mauri; © Archivio fotografico SAIA U/13349).

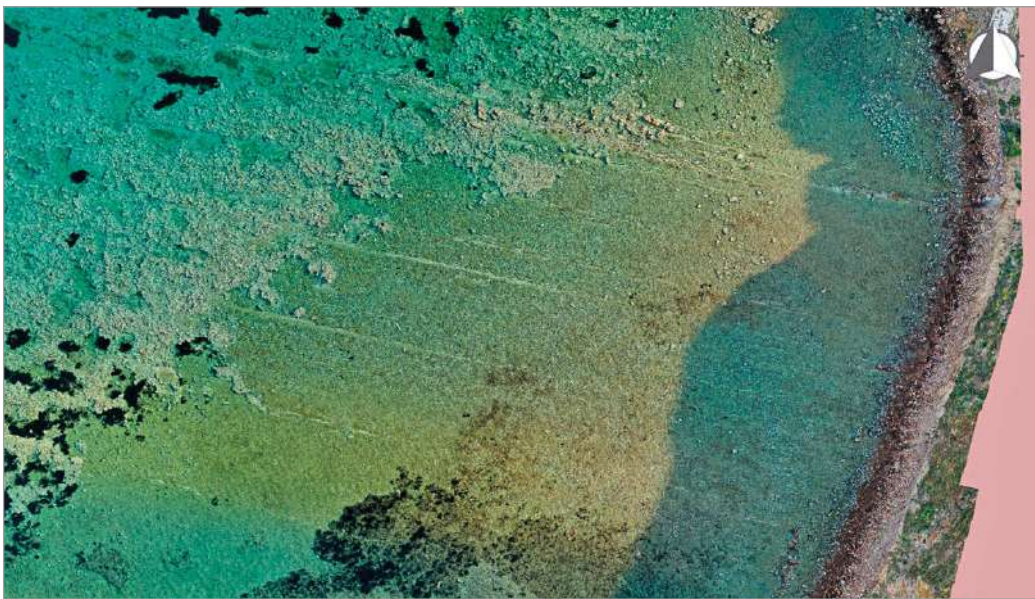


Fig. 5. Ormos Pournias. Detail of the “big walls” generated by the flysch erosion of the Fissini-Sardes Unit (drone photo F. Mauri; © Archivio fotografico SAIA U/13350).

The central portion of the site is represented by a detrital beach with large boulders (metric and ultra-centimetric in size) resulting from the dismantling of the coast due to the mechanics of wave motion. The lithological composition of the deposit follows that of the Fissini-Sardes and Hephaistia units<sup>43</sup>, except for some scattered extra-basin volcanic clasts mainly consisting of volcanic Trachytes and Dacites (Fig. 10). Most of the rock clasts are covered by a characteristic greenish-gray oxidative patina, while the peculiar “block” shape that they assume is due to the mentioned *diacclasis* (Fig. 11).

<sup>43</sup> INNOCENTI *et alii* 2009.





Fig. 6. Ormos Pournias. Photos of the crag N of the site (drone photo F. Mauri; © Archivio fotografico SAIA U/13351).



Fig. 7. Ormos Pournias. A typical “helmet” split globular concretion (photo F. Mauri; © Archivio fotografico SAIA U/13352).

In the seabed it is possible to find the presence of a marine abrasion terrace characterized by an almost flat-parallel bathymetric trend (Fig. 15), with modest depths in the order of m 0.5-1.5 and whose composition is represented by polymictic and polygenic conglomerates of marine transgression<sup>44</sup> with clasts from the dismantling of the overlying units (Fig. 13). This formation is emerged or semi-emerged near the foot of the cliff north of the investigated site.

The terrace is surrounded by a sedimentary accumulation, in structural relief, consisting of large clasts of metric size and lithologies belonging to the adjacent geological-structural units. This geometry in the shape of a “beveled right angle” ridge is cemented in its central axis and characterized by loose deposits of clasts of dimensions ranging from ultra-centimeters to metrics amassed in several points, along the sides and downstream (out to sea). The most significant accumulation is located just south of the ridge closure

<sup>44</sup> INNOCENTI *et alii* 2009.



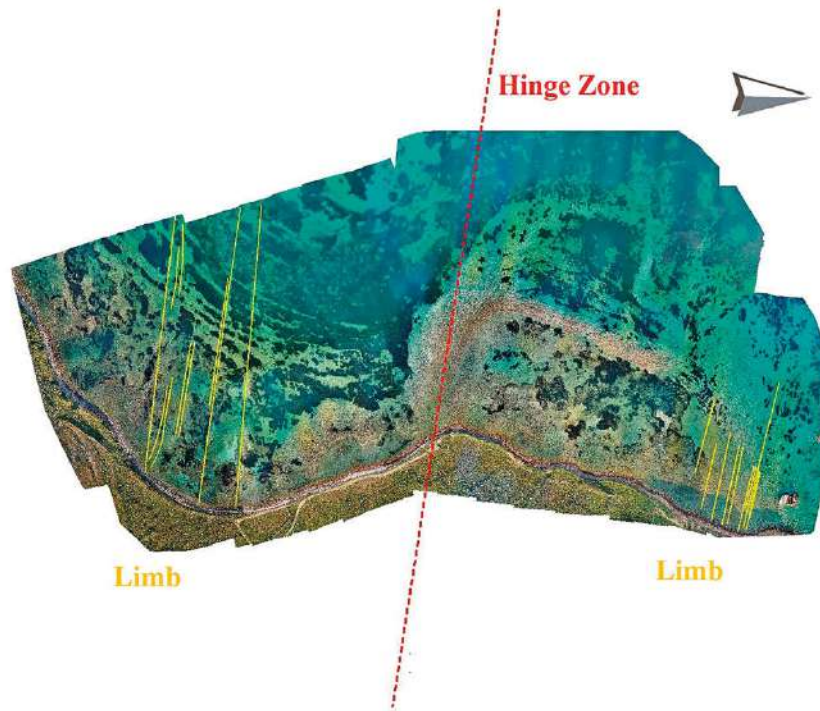


Fig. 8. Ormos Pournias. Hypothetical geological-structural configuration of the site (top, by F. Mauri; © Archivio fotografico SAIA U/13353) and relative schematization below. The yellow lines traces the submerged walls made of the eroded flysch layers (after FOSSEN 2016).



Fig. 9. Ormos Pournias. Examples of diaclasis attested on the cliff of the survey site (unit of Hephaistia). In particular, at the top, a typical globular sandstone concretion of aeolian origin can be observed (photo F. Mauri; © Archivio fotografico SAIA U/13354).



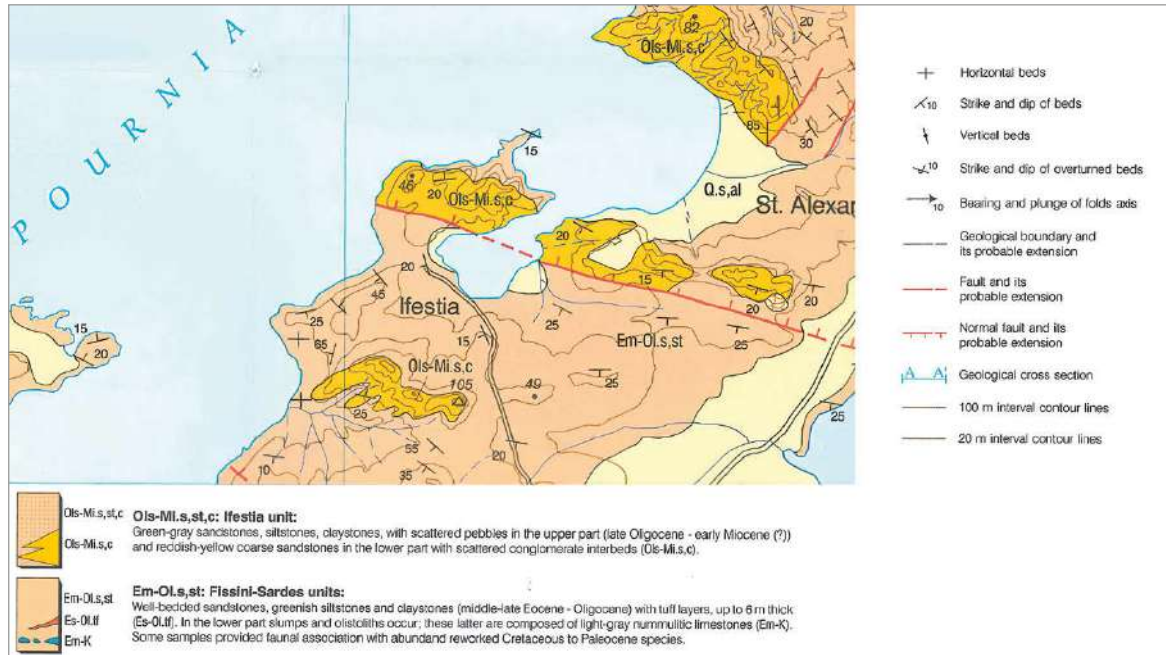


Fig. 10. Detail of the geological map of Lemnos relating to the area of Efestia (after INNOCENTI 2009 *et alii*).



Fig. 11. Ormos Pournias. One of the detachment points of the parallelepiped-shaped clasts from the Fessini-Sardes unit (photo F. Mauri; © Archivio fotografico SAIA U/13355).

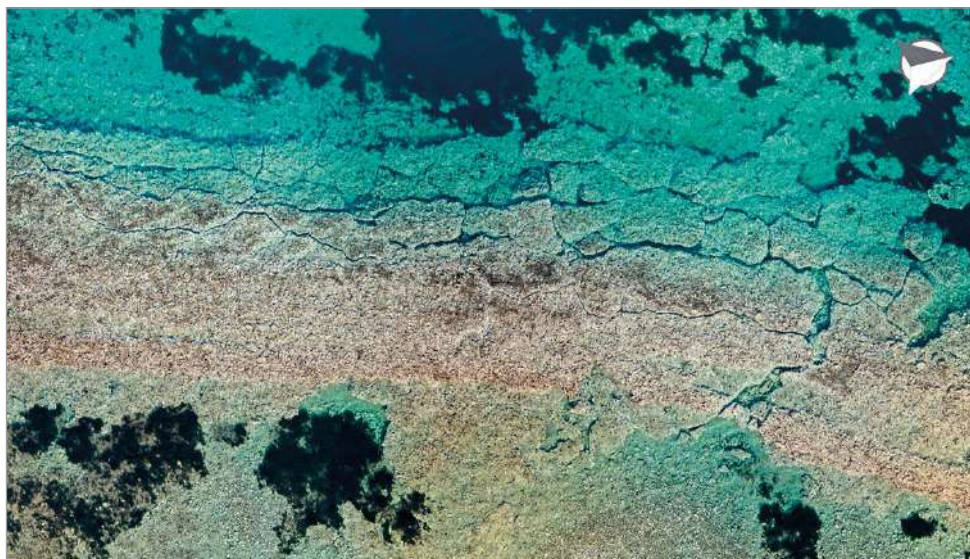


Fig. 12. Ormos Pournias. Detail of the fractured conglomeratic ridge (drone photo F. Mauri; © Archivio fotografico SAIA U/13356).



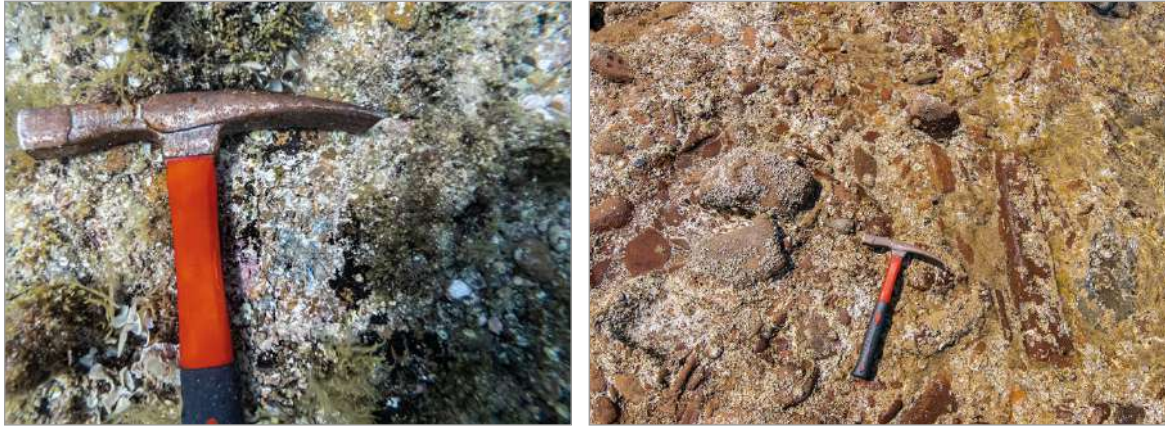


Fig. 13. Ormos Pournias. Photos of the polymictic conglomerates that make up the abrasion terrace; the photo on the left was taken underwater, while the one on the right was taken in the emerged portion (tidal plain) near the foot of the cliff north of the site (photo F. Mauri; © Archivio fotografico SAIA U/13357).



Fig. 14. Ormos Pournias. The accumulation of loose clasts in the south, at the base of the hypothetical rooting cliff (photo F. Mauri; © Archivio fotografico SAIA U/13358).

(Fig. 14). The cemented portion is split into several points (probably due to the seismic action combined with marine erosion, Fig. 15)<sup>45</sup>, as well as under-excavated by the action of the backwash in its innermost part. Inside the terrace, two structures of anthropic origin were found, which will be discussed in detail later (Fig. 15). About m 50 southeast of the southern limit of the structural survey just described, it is possible to find a twin ridge, smaller and with similar characteristics.

According to the accepted model of the Holocene eustatic level rise<sup>46</sup> and the coring data in the nearby Ormos Tigani and Alikí<sup>47</sup>, we can hypothesize a relative rise of the mean sea level with values of about m 1-2 in the last 2000 years. The ridges analyzed up to now must therefore have largely emerged in the classical era, as, moreover, the traces of the masonry structures that used the base as a foundation unequivocally indicate.

<sup>45</sup> KONSTANTINOY 2017.

<sup>47</sup> PAVLOPOULOS *et alii* 2013.

<sup>46</sup> LAMBECK 1995; 2004; LAMBECK-PURCELL 2005; LAMBECK *et alii* 2011.



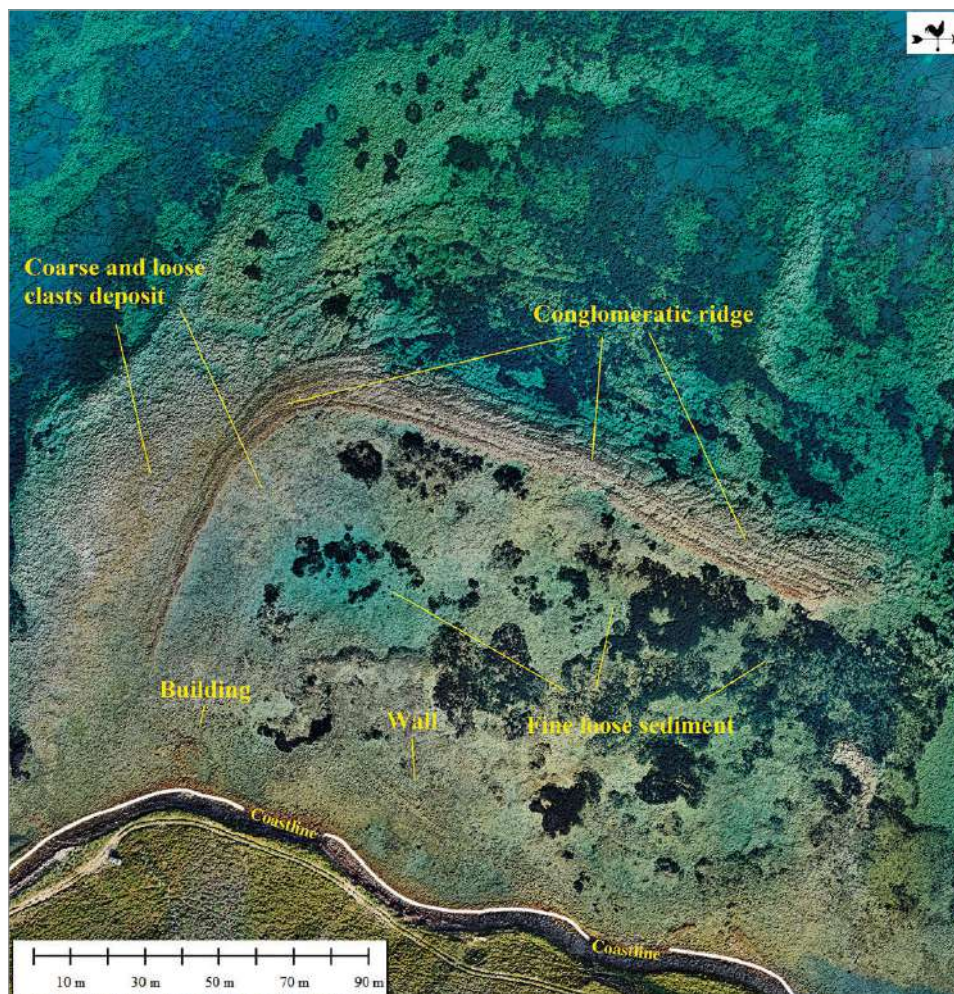


Fig. 15. Ormos Pournias. Example scheme, on 3D relief, of the major conglomerate ridge (el. F. Mauri; © Archivio fotografico SAIA U/13359).

Given the peculiar geometries (difficult to explain with the natural mechanics of coastal erosion and deposition, Fig. 15) and the relative scarcity of deposits in large blocks in the internal area of the lagoon, which leave room for areas of finer sediment and patches of *Posidonia*, it can be hypothesized an anthropic intervention of modeling of the natural abrasion platform. The sedimentary accumulations with large clasts located downstream, in the external portions of the two ridges could be the result of their dismantling by wave motion and, partially, the result of an artificial stacking. Within the lagoon area, it is possible to detect the presence of fine mobile sediment which could be the result of rapid late Holocene sedimentation (the thickness of which should be investigated by core drilling and geophysical investigations).

*Fabrizio Mauri*

### 3.2.2 The underwater survey of the National Superintendency for Underwater Cultural Heritage

During the underwater investigations of May 2022, most of the research activities were carried out in the bay of Ormos Pournias, more precisely in the marine stretch located on the western side of the peninsula of Hephaestia. The side of this sector of the peninsula – geologically afferent to the formation of Fissini-Sardes and Hephaestia – shows, especially along the cliff walls, large dynamics of retreat which also affect some archaeological structures exposed by settlements and collapses (Figs. 16-17)<sup>48</sup>. There is also a trace of this long-lasting erosive phenomenon along the seabed in front, mainly detrital, with a terrace of marine abrasion

<sup>48</sup> VITTI-VOZA 2008, 128-129, figs. 5-6.





Fig. 16. Ormos Pournias. Remains of walls along the eroding cliff (photo G. Bucci; © Archivio fotografico SAIA U/13360).



Fig. 17. Ormos Pournias. Remains of block structures along the eroding cliff (photo G. Bucci; © Archivio fotografico SAIA U/13361).

(Fig. 14) the external limits are made up of a conglomerate relief that surrounds the geological formation. It is precisely on this plateau, currently submerged, that the walls still stand (Fig. 19, Nos. 1-2)<sup>49</sup>.

The interest in this marine area for the purpose of reconstructing the topographic layout of Hephaistia is linked to the supposed presence of an ancient harbour area. It was here that Charles Picard and Adolph Joseph Reinach landed in the summer of 1910 to visit the island by locating a Hephaistian “port auxiliaire”<sup>50</sup>. The two archaeologists even came to postulate, somewhat naively, that this port of call served as the landing point of Miltiades coming from the Thracian Chersonese (D.S. IX.10.6) and of Otanes when he occupied Lemnos (HDT V.26). However, it was Domenico Mustilli who reported in the early thirties of the twentieth

<sup>49</sup> See *infra*, § 2.2.3.

<sup>50</sup> PICARD-REINACH 1912, 326.

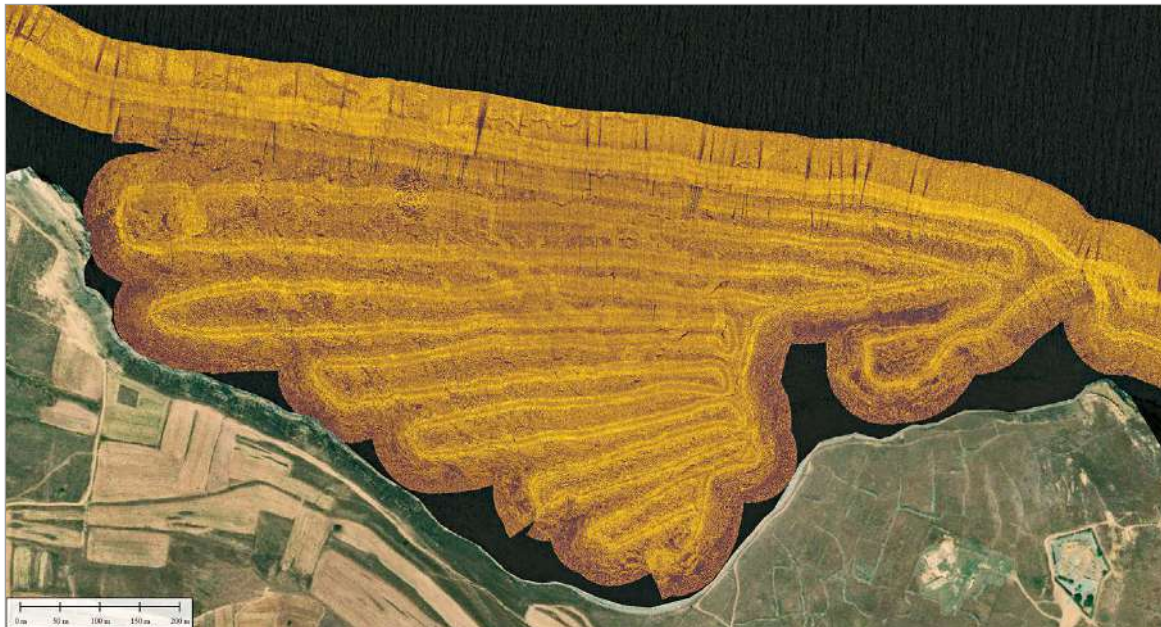


Fig. 18. Extract from the Side Scan Sonar survey relating to the Ormos Pournias landfall area (el. F. Morfea; © Archivio fotografico SAIA U/13362).

century the details on this stretch of coast: «a long series of very large blocks, covered by water» – still visible today<sup>51</sup>: he assigned to a harbour this structure, while not failing to observe that «that the distance of the current coast, probably not different from the ancient one, since buildings were excavated a very short distance from the sea, is relatively very short and that better sheltered from the winds was the landing on the other side of town»<sup>52</sup>. In the 1980s, still in the 20<sup>th</sup> century, P. Agallopoulou and N. Kalliontzi, while not mentioning these structures, nevertheless located in the inlet of Pournias, noted the presence of a vast pier whose external limits, coinciding with the perimeter curb of the abrasion terrace marina mentioned above, with an enclosed a basin open to the south. The merit of this work is to have reported for the first time the long wall with a northeast – southwest trend on which G. Bucci focused the 2022 survey<sup>53</sup>.

The prospecting, therefore, involved this entire coastal strip to validate or not the previous hypotheses on the maritime topography of the western side of the Palaiopolis. From a methodological point of view, the investigations envisaged the following stages: 1) Side Scan Sonar survey along the coast of Ormos Pournias, from the mesohaline lagoon of Hephaistia, i.e. the eastern Gulf of Palaiopolis, to the port of Kotsinas, for a total of about 4 nautical miles (for the surveys a Lowrance HDS 7 -2nd gen; sonar was used with Structure Scan 3D transducer operating at 400 KHz and lateral range set at 50 m) (Fig. 18); 2) detailed submarine geological characterizations are reported by scuba diving; 3) photogrammetric surveys with high resolution drone from which a Digital Surface Model has been drawn; 4) detailed underwater surveys were completed; 5) three-dimensional underwater surveys were carried out in two phases: in the first, a scan of the seabed was carried out using a pair of panoramic stereo-cameras in gray scale in order to produce a basic morphological map of the entire area; in the second, detailed three-dimensional surveys were created for each point of interest, which then merged into the general map; 6) topographic positioning of all the submerged evidences using a Topcon GPT 7001L total topographic station connected to the polygonal network of the archaeological site of Hephaistia; 7) manual surveys of submerged masonry units has been recorded for all the main structures.

The results of the underwater prospecting, which we propose here in a very preliminary way, have shown how a great part of the seabed in the Pournias area is interested by the dispersion of clay archaeological artifacts – mostly amphorae and ceramics – which are located in some areas with high concentrations within a bathymetry of m 4 (Fig. 19). In total, 148 fragments dating from the Hellenistic to Byzantine

<sup>51</sup> They are the USMM 1-8, see *infra*.

<sup>52</sup> MUSTILLI 1932/33, 4-5. About such structures, identified as pier, see also MESSINEO 2001, 29; VITTI-VOZA 2008, 128, fig. 4;

FICUCIELLO 2013, 99.

<sup>53</sup> AGALLOPOULOU-KALLIONTZIS 1988, 174, fig. 5.



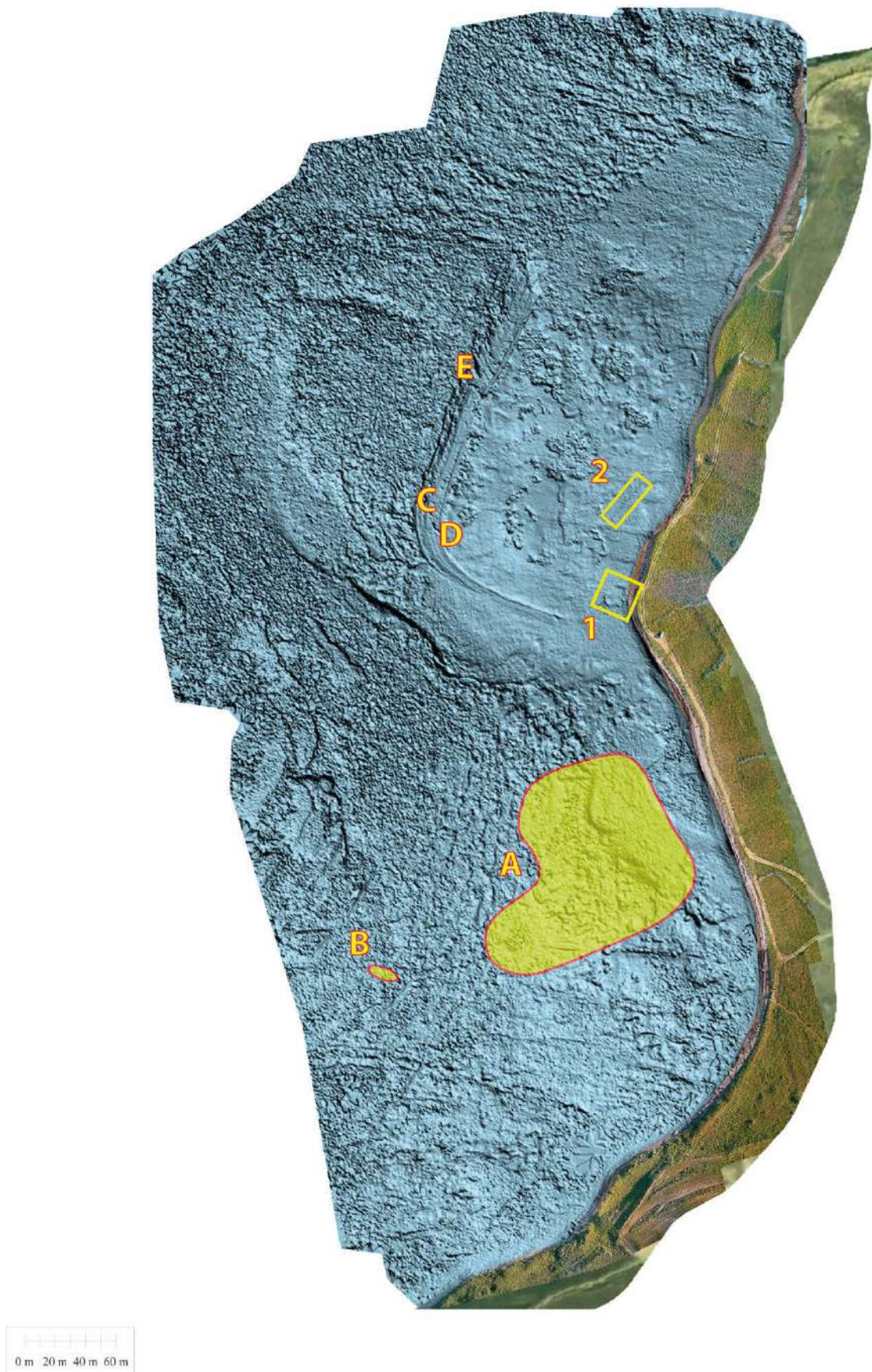


Fig. 19. Landing place of Ormos Pournias. Map of underwater evidence positioned on DTM of the seabed (el. F. Mauri - S. Medaglia; © Archivio fotografico SAIA U/13363).



periods were placed and recovered, demonstrating how this body of water most likely hosted activities related to the movement of goods, without excluding the presence of some shipwrecks. It should be noted that not all the archaeological material present on the seabed has been recovered: the collection of the fragments not hidden by the banks of *Posidonia* or not covered by sediments that could be at risk of theft was privileged in the sampling.

The first identified areas with a concentration of archaeological material are located outside the geological platform. At depths varying between m 0.7 and 2.5, an area has been documented which yielded fragments of pottery and amphorae of probable Hellenistic age dispersed in a narrow rocky gully that runs parallel to the base of the conglomerate formation (Fig. 19, No. E).

Moving towards the south, about a hundred meters away, a second dispersion area was identified which covers a sector of about 40 square meters with fragmented material attributable to ceramic and amphora artifacts from the Roman-Imperial age which are arranged around a point where the barrier of polymithic and polygenic conglomerates forms a sort of relief (Figs. 19, No. D, 20).

Where the sedimentary accumulation forms a showy fold towards the east, attached to the rocks, there is an accumulation of walls of small amphorae (Figs. 19, No. C, 21). These are poorly diagnostic walls that appear to be closely interlocked with each other to form compact blocks within which the fragmented material sometimes appears disoriented (Fig. 22). The accumulation, which in some points assumes a thickness of about cm 30, occupies a total area of a couple of square meters and is partly under-excavated by the current.

South of the natural barrier, in the stretch of sea in front of the point where the coast forms a small inlet, a vast area of clay materials has been identified, mainly consisting of amphorae with higher percentage attestations for the imperial and late antiquity age (Figs. 19, No. A, 23-24). The material unevenly covers an area of several hundred square meters at depths between m 0.50 and 4.5. Sometimes the artifacts emerge from the sandy blanket according to rather sparse textures, other times the concentration becomes very high to suggest that substantial archaeological basins can be hidden beneath the sediment (Figs. 25-26). In one case, for example, in an area of m 1.50x1.50 at a depth of m 3, amphorae and table pottery from late antiquity were documented associated with remains of animal bones, perhaps attributable to scraps from the onboard kitchen (Fig. 27).

To the west of this vast area, at a depth of m 4.5, on a narrow and long rocky outcrop where Oligocene flysch formations emerge surrounded by extensive banks of *Posidonia*, an area of dispersion of amphorae and pottery from the Roman age has been identified (Fig. 19, No. B). These are somewhat isolated and distant discoveries suggesting that the artifacts can be attributed to what remains of the cargo of a wreck (Figs. 28-29).

*Salvatore Medaglia*



Fig. 20. Ormos Pournias. The topographic peak around which the materials of the clay fragment area are distributed. Some walls of amphorae are visible in the lower part of the photo (photo S. Medaglia; © Archivio fotografico SAIA U/13364).



Fig. 21. Ormos Pournias. Walls of amphorae concreted in the rocks of the seabed (photo S. Medaglia; © Archivio fotografico SAIA U/13365).

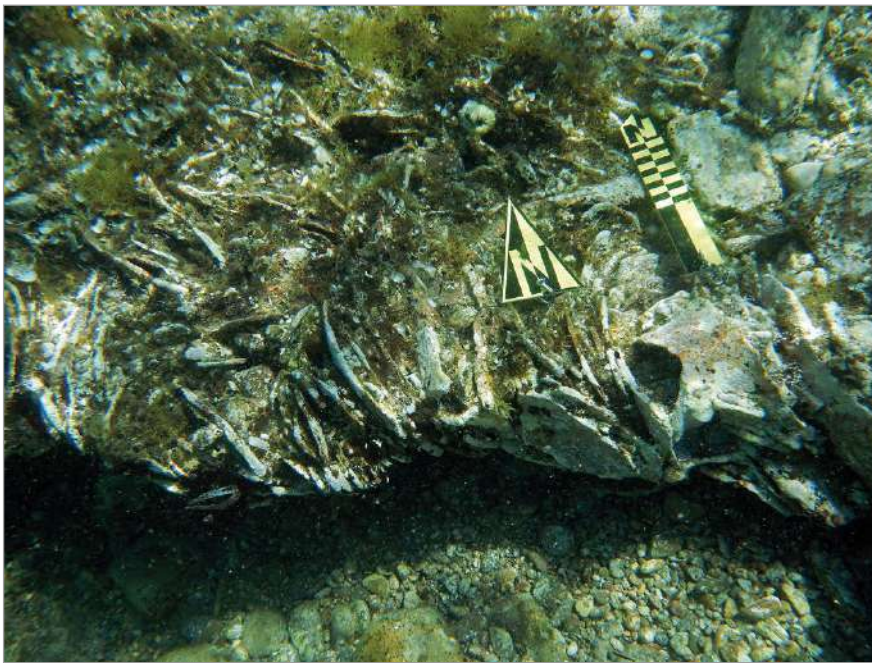


Fig. 22. Ormos Pournias. Detail of a block of pottery. Below the rock formation appears underexcavated (photo G. Bucci; © Archivio fotografico SAIA U/13366).

### 3.2.3 Submerged and semi-submerged structures

In the ambit of the work of the Joint Italian-Greek Mission 2022, some series of coastal underwater surveys have been completed in the maritime area of Ormos Pournias, where unpublished or only partially known *in situ* wall structures are attested<sup>54</sup>. The autoptic research in immersion was performed up to a

<sup>54</sup> The surveys in this sector were carried out with the collaboration of Carlo De Domenico (University of Milan - IASA), Marco Ciabattoni

(ICR), and the writer. Some of the investigated structures are mentioned briefly by Vitti and Voza (VITTI-VOZA 2008, 128).





Fig. 23. Ormos Pournias. Recovery phase of the amphorae OII 72 and 73 (photo S. Medaglia; © Archivio fotografico SAIA U/13367).





Fig. 24. Ormos Pournias. Labeling phase of the amphorae OII 57, 58 and 59 (photo G. Bucci; © Archivio fotografico SAIA U/13368).



Fig. 25. Ormos Pournias. Labeling of the amphora OII 79 (photo A. Raguso; © Archivio fotografico SAIA U/13369).



Fig. 26. Ormos Pournias. The amphora OII 77 just before the recovery (photo S. Medaglia; © Archivio fotografico SAIA U/13370).

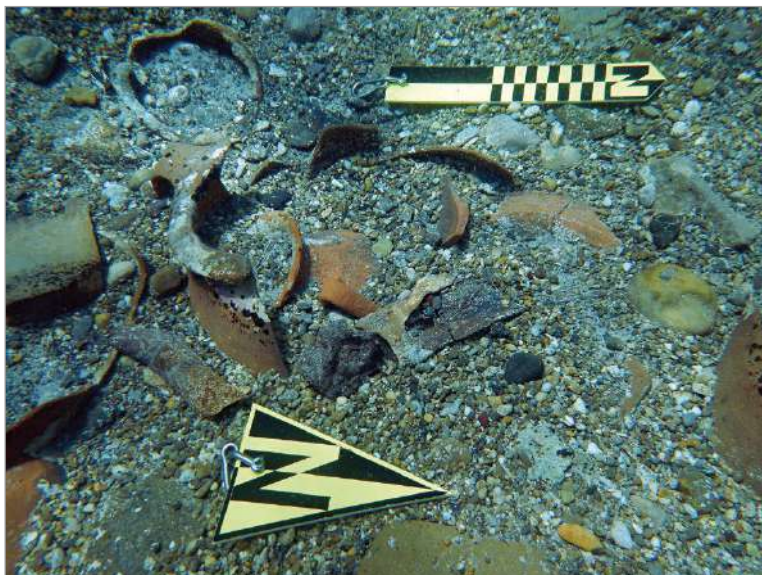


Fig. 27. Ormos Pournias. High concentration of archaeological material consisting of fire and table pottery, amphorae and animal bones (photo G. Bucci; © Archivio fotografico SAIA U/13371).



Fig. 28. Ormos Pournias. Some of the amphorae belonging to a shipwreck located in the westernmost sector of the bay (photo S. Medaglia; © Archivio fotografico SAIA U/13372).

depth of approximately m 6 (scuba and free diving), ascertaining the presence of fragments of structures in the shallow waters (Fig. 30).

The geological context of the investigation area is characterized by a large plateau made up of conglomerate with pebbles of heterogeneous dimensions, stratified almost horizontally; the complex plunges towards S-SW and reveals a morphological high that tends to emerge from the waters, extending for about m 200 in the N-S direction and m 150 in the E-W direction<sup>55</sup>.

The S slope of the submerged plateau is wider and ends with an accumulation of pebbles and coarse rubble dipping towards the south. The natural excavation process of the plateau resulting from the waves

<sup>55</sup> About the geological framework of Lemnos: MARAVELIS *et alii* 2007; INNOCENTI *et alii* 2009, 123-124; EFSTRATIOU *et alii* 2014; CHALKIOTI 2016.





Fig. 29. Ormos Pournias. Recovery of one of the amphorae belonging to the shipwreck located in the westernmost sector of the bay (photo M. Ciabattoni; © Archivio fotografico SAIA U/13373).



Fig. 30. Lemnos, Ormos Pournias. Panorama of the investigation site: walls emerging from the sea; metrical reference close to the USM 1 (photo G. Bucci; © Archivio fotografico SAIA U/13374).

and currents entering the bay of Ormos Pournias<sup>56</sup> does not exclude a de-rocking process that could have involved human activity, contributing to the accumulation of natural material at the southern end of the geological formation.

Our investigations detected eight main wall stratigraphic units belonging to different periods, superimposed on each other and insistent on an area of about m<sup>2</sup> 100, near the coastline (Figs. 19, No. 1, 31). The shoreline is formed by a natural layer of pebbles, mainly ovalized, extending to the whole bay of Ormos

<sup>56</sup> A summary of the studies concerning the influence of sea storms and northern currents on the territory of Lemnos is presented in ΧΑΛΚΙΟΤΗ 2013, 210-222.

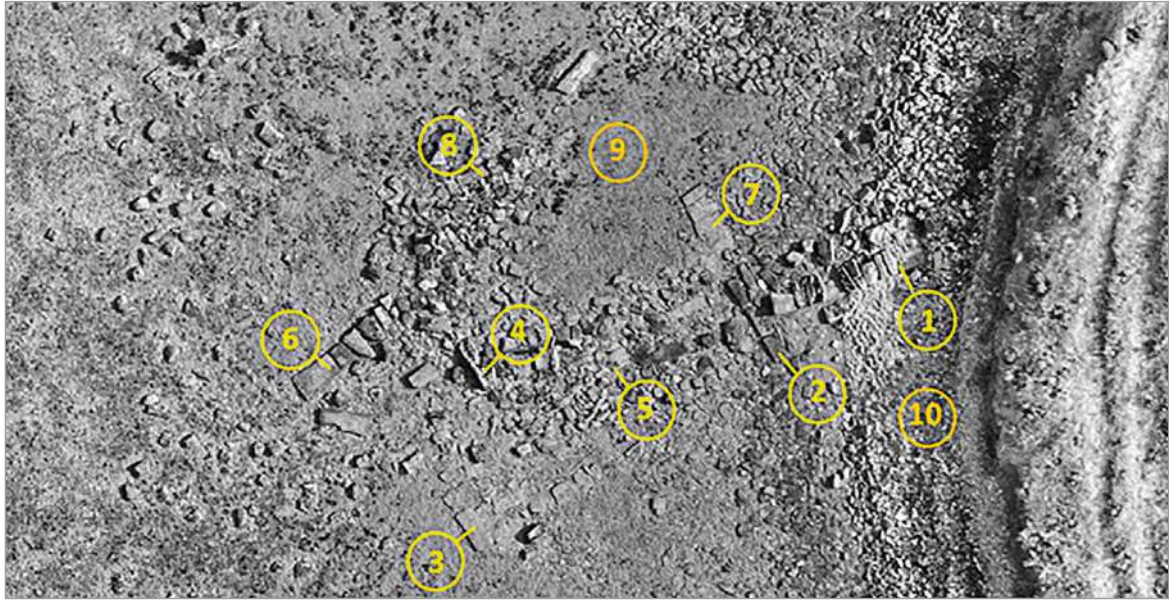


Fig. 31. Lemnos, Ormos Pournias. Orthophoto, details of the structures with wall stratigraphy units' indication (photo F. Mauri; el. G. Bucci; © Archivio fotografico SAIA U/13375).

Pournias (US 10). This layer characterizes breaking area of sea surf and partially covers the seabed (US 9), made up of a sedimentary rock formation with slight depressions characterized by a dispersion of pebbles, sand, silt, and clay with algae and *Posidonia*; the unit extends into the internal bay of the arm of the sea partially enclosed by the natural level of conglomerate, lying at an average depth of cm -50 -70. The surfacing from the sea of the partially known structures constituted the starting point of the on-site investigations.

The wall stratigraphic units in the water are concentrated in the sector between the coordinates 39°57'45.78"N, 25°18'52.84"E e 39°57'45.48"N, 25°18'52.87"E, and they appear as follows: USM (Unity Stratigraphy of Masonry) 1, preserved wall for a length of m 5.70, with a thickness of m 1.87, preserved visible height of approx. m 0.25, consists of 10 asymmetrical megalithic sandstone elements with different natural shapes, juxtaposed to form a large structure bag made with huge parallelepipeds, diatons and orthostats; the *emplekton* is formed from pebbles without binder. Currently, only one course is readable. The interspaces between the blocks change as a result of the variation of the morphology of the construction elements arranged in contact with the resulting interspaces, linked to the asymmetrical shape of the element itself; gaps of cm 1-1.5 were measured. Although visible at present, the eastern portion of the wall, made up of 3 large blocks, looks like a headboard, which suggests the presence of an opening to the E. The module of the construction elements of the facing is variable: the SE corner block measures cm 81x62x30(?), immersed in a layer of pebbles US 10; the corner block SE2 measures cm 80x30, while the module of the pebbles of the filling can be traced back to two prevailing formats: cm 48.0x16.5x20.0 and cm 38.0x14.5x20.0. The wall structure, oriented 240° N, is aligned with USM 3 (W of USM 1). Direct connections cannot be read as USM 2 crosswise overlaps USM 1 evidently in a later phase.

USM 2 is a wall preserved for a length of m 3.35, with a thickness of m 0.93, the maximum visible height is m 0.30; it consists of 12 partially rough-hewn blocks of asymmetric sandstone, juxtaposed to form a sack structure made with parallelepipeds, diatons, and orthostats; the *emplekton* consists of pebbles without a binder; only one course is readable. The interspaces between the elements change following the variation of the morphology of the construction elements, arranged in contact with the resulting interspaces, linked to the asymmetrical shape of the element itself; gaps of less than one centimeter have been measured. The S end looks like a headboard or jamb for opening. The North end is destroyed (or stripped). The module of the construction elements of the facing is variable: block 1 SW cm 93x51x20 ca.; block 2 SE cm 169x43x20 (?); block 3 (diaton) 86x65xh not relievable. The USM 2 wall, oriented 320° N, cuts the USM 1 structure, probably inserting itself above the foundation of the latter (Fig. 32).

USM 3 is an L-shaped masonry structure preserved in the E-W section for a length of m 6.00 with a thickness of m 1.48 with a measured h of m 0.20 and in the N-S section it is visible for a length of m 2.35, with thickness m 1.60 and h m 0.15. The wall is made up of parallelepiped blocks, partially smoothed and rough-hewn sandstone, juxtaposed to form a structure probably like a sack with *emplekton*



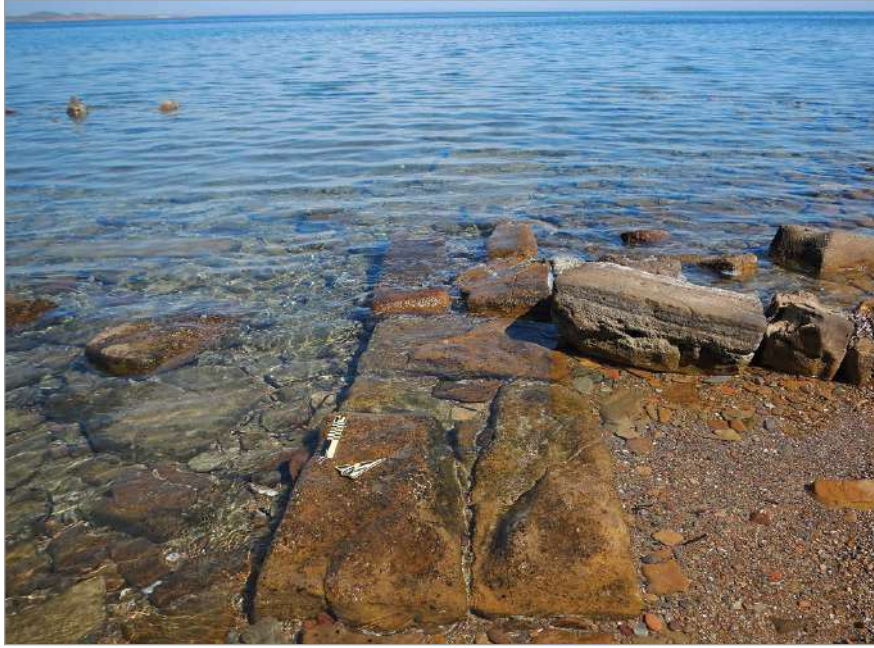


Fig. 32. Lemnos, Ormos Pournias. Wall USM 2 (photo G. Bucci; © Archivio fotografico SAIA U/13376).

of medium-small pebbles (diam. approx. cm 10). Currently, only one course is readable. The spaces between the elements also vary in relation to the very precarious state of what remains of the structure. The module of the building elements of the wall is variable. In the EW sector, one of the main blocks measures cm 91x65x16 (h visible), while in the NS sector larger measures are noted: cm 108x66x18 (h visible). It is a perimeter wall structure or a stylobate. The apparently smooth blocks on the surface could be traced back to a walkable section.

USM 4 is a portion of a wall preserved for a length of m 1.90 with a thickness of m 0.55 and a height of m 0.57. It consists of parallelepiped blocks, partially rough-hewn sandstone, very heterogeneous in size, juxtaposed to form a structure with N-S trend, perpendicular to the ideal extension of USM 1 and subparallel to USM 2. It is a sack wall with *emplekton* of medium-small pebbles (diameter approx. cm 10). The spaces between the elements also vary in relation to the very precarious state of what remains of the structure. The wall seems to be grafted onto a previous phase extending for a total length of m 5.28 with a slight variation in orientation, which passes from 320° N to 340° N. It is probably a partition belonging to a more recent phase than USM 1.

USM 5 is what remains of a wall structure preserved for a length of m 5.15 with a thickness of m 1.46 and a preserved visible height of m 0.44; it is made up of parallelepiped and polyhedral sandstone blocks, partially rough-hewn heterogeneous in size, juxtaposed to form a structure with an E-W trend, almost on the ideal extension of USM 1. It is a sack wall with *emplekton* of large pebbles (diam. cm 20-30 ca.), characterized by the presence of a parallelepiped element, inserted vertically in the center of the wall. A vertical stone element, perhaps a twin, is found to the S of the complex under study, to the S of the junction on the shoreline of the conglomerate plateau. The spaces between the elements also vary in relation to the very precarious state of what remains of the structure. Offset by a few degrees from USM 1 with which it may have been connected in a recent phase. The module of the elements that make up the masonry foundation is variable; the longest blocks reach approx. cm 72.

USM 6 consists of an alignment of 7 sandstone blocks slightly spaced from each other, arranged over a length of m 6.03 with an orientation of 60° N. These are heterogeneous lithic elements in size and shape, perhaps attributable to a recent arrangement. Their module is variable cm 225x96x25.2; 118x56x32 ca. Perhaps 2 large blocks immediately S of the same are also to be associated with the unit, residues of spoliation, and demolition of the foundation walls.

USM 7 is a preserved wall for a length of approximately m 3.00, with a thickness of m 1.00, and maximum visible h preserved of m 0.10. Currently, 6 parallelepiped blocks are visible, squared, smoothed on the surface, juxtaposed, all diatons of slightly different dimensions from each other with an orientation of 320° N; the largest module, block 1 SO measures approx. cm 100x50x20; the wall USM 7 may be in phase



Fig. 33. Lemnos, Ormos Pournias. Blocks on secondary layering (photo G. Bucci; © Archivio fotografico SAIA U/13377).

with USM 3 and belong to the same structure. In fact, they are made of the same material with the same cut and juxtaposition.

N of the surveyed structures is USM 8, what remains of a stripped wall made up of 7 unworked stone blocks, NE-SW aligned; the unit is affected by collapse and destruction caused by wave motion. Around the few elements, in a secondary layering (Fig. 33), there are the remains of the structure with chaotic spreading over an area of about  $m^2$  30; the material obscures what remains of the previous structures.

The eight units of masonry are developed in different phases, especially USM 3 and USM 7, similar in size, module, and construction elements can be traced back to the same structure, of which the northern sector is not currently visible<sup>57</sup>. The set of walls defined as a pier in the known bibliography, according to the data relating to the ancient coastlines and the dimensions currently surveyed, seems rather attributable to a tower, by virtue of the observation of the presence of a further accumulation, the probable residue of robbing/destruction, immediately N of the structures examined.

A m 30 long NE-SW oriented wall consisting of a single row of diatonic elements was also documented using an aerial drone with a video camera (Fig. 19, No. 2). The structure rests directly on the seabed, probably already on the compact rocky sediment. Approximately in the center, there is an enlargement with a second row, which could be attributable to the foundation of an additional turret or buttress.

NE of the structural complex (USM 1-8) the presence on the coast of three wells should be noted, one larger to the N and two smaller ones to the S (as confirmed by the study of the Sentinel-2 L2A satellite images - and the visualization of the site from Google Earth, accessed 09/12/2022). The system of wells almost aligned along the current seashore, following the slope of the hill of Hephaistia, could be connected to a cistern tower that must have been located near the paleo-shore (of which the vestiges now remain). On the seabed, we detected the presence of natural freshwater springs, which suggests that the site might have been a strategic point for the supply of fresh water for the boats. The presence of three wells, perhaps for water compensation or reserve, connected to a structure with a quadrangular base as a final collector point, together with the discovery of large clay pipes suitable for water transport (in dispersion in the area S of the structures), lead to the hypothesis of the presence of water supply systems, such as aqueducts and cisterns (Fig. 34)<sup>58</sup>.

<sup>57</sup> Comparisons regarding methodologies and construction techniques in large blocks in Lemnos can be found in CAMPOREALE *et alii* 2008; FICUCIELLO 2010, 75; 2013, 100-101, 179.

<sup>58</sup> About the systems of coastal aqueducts on the edge of the slopes: ANGELAKIS-VOUDOURIS 2014.





Fig. 34. Lemnos, Ormos Pournias. Clay pipe in the sandy southern area (photo G. Bucci; © Archivio fotografico SAIA U/13378).

The sea level was formerly lower, as evidenced by Chalkioti, explaining how, at the beginning of the 5<sup>th</sup> millennium BC, the average level of the northern Aegean was at least m 5 lower (perhaps even m 10 in some areas); the reconstruction of the paleo-coast of Lemnos shows how the island now has different shorelines, especially on the eastern side<sup>59</sup>; the structures, therefore, had to be out of the water.

The whole investigation area and the structural complex surveyed are strongly modified by natural agents and human interventions documented by the shedding of clay material that reaches, from a chronological point of view, up to Late Antiquity. The maritime segment on the submerged plateau revealed no object dispersion; all the finds are found in the sector near the southern blocks and pebbles accumulation, on the edge of the plateau, and on the seabed adjacent to it, demonstrating how the wave motion, the currents and the possible human action of de-rocking acted simultaneously, leaving us particularly complex evidence to interpret<sup>60</sup>.

A systematic campaign of excavations will be able to account for the real function of the structures, contributing to the identification of the chronology, which is currently difficult to understand with satisfactory periodization.

*Giovanna Bucci*

### 3.2.4 Provisional conclusion on the Italian survey at Ormos Pournias

Summing up the results of the investigations at Pournias, we can reasonably assume that the investigated maritime area hosted in ancient times a seasonal, i.e., temporary, harbour functional to the activities of the city of Hephaistia. Moreover, the morphology of this stretch of coast of the Palaiopolis makes it unsuitable for landing due to the poor conditions of exposure to winds, especially those from the north. The large marine abrasion plateau - which, as we have already said, served as a platform for the foundations of some masonry structures - evidently emerged in ancient times. Furthermore, the data appears to be confirmed both by the studies on the sea level variations on Lemnos in the last 2000 years and by the underwater geological observations carried out in May 2022.

The supposed theory that the L-shaped arm of conglomerate encloses an area of the basin used as a port which then gradually became underground must therefore be rejected, as well as the hypothesis that

<sup>59</sup> It should be emphasized that the E-NE side of Lemnos was mostly affected by Holocene alluvial deposits, which makes the reconstruction of the coast more complicated (see XAKIOTH 2013, 295-301), in particular fig. 7.5, *Carta di Lemnos* with a hypothetical reconstruction of ancient coastlines. Regarding the rise of the Eastern Mediterranean:

INNOCENTI *et alii* 2009; VACCHI *et alii* 2014; CHALKIOTI 2016; YASUR-LANDAU *et alii* 2021.

<sup>60</sup> About the interpretative complexity of the history of the Hephaistia: GRECO-FICUCIELLO 2010, 150-152.



Fig. 35. Ormos Pournias. Drone orthophoto with the submerged remains of the long wall erected on the abrasion platform (el. F. Mauri; © Archivio fotografico SAIA U/13379).

some of the structures that stand above it must be rejected are to refer to a pier (Figs. 19, No. 2, 35). It is in fact to be believed that the terrace, extending out into the sea in a westerly direction, immediately created a protected sea area to the south so that boats could carry out loading and unloading operations. Clearly, it was not a real harbour, but a roadstead moderately sheltered from the winds of the first quadrant and with an adequate seabed where it was possible to moor seasonally and only in good weather and sea conditions. With the continuation of the investigations, it will be evaluated whether in ancient times the ends of the terrace had been reinforced with further castings of loose stones to increase the volume of the ridge on the seafront to better face the storm surges (Fig. 36).

The presence of such a large quantity of materials on the bottom of the bay south of the terrace leaves no doubt that this body of water was used as a mooring bay. The clay material is mainly made up of transport containers and artifacts inseparably connected to transmarine traffic (Fig. 37). First, evaluating the position of the archaeological materials on the seabed, it seems to be in the presence of the typical harbour garbage dump in which, over the centuries, heterogeneous materials were voluntarily thrown away because they were discarded or because they were the result of shipwrecks accumulated (Fig. 38).

It will be necessary to wait for the continuation of the research and above all for the classification and consequent chrono-typological classification of all the materials recovered in order to be able to sketch a first picture of the goods, their origin, and the commercial routes that affected Hephaistia (Fig. 39).

*Barbara Davidde Petriaggi – Salvatore Medaglia*





Fig. 36. Ormos Pournias. Detail of the outermost sector of the loose clasts that are arranged south of the marine abrasion platform (photo S. Medaglia; © Archivio fotografico SAIA U/13380).



Fig. 37. Ormos Pournias. Some materials attested in the vast area of clay fragments located south of the marine abrasion terrace, among which a large clay tubulus stands out (photo G. Bucci; © Archivio fotografico SAIA U/13381).





Fig. 38. Ormos Pournias. OPI 34 and 35 just found and not yet labelled (photo S. Medaglia; © Archivio fotografico SAIA U/13382).



Fig. 39. Ormos Pournias. The fragmentary amphora OPI 60 found on a bank of Posidonia and partially incorporated in the Posidonia mat (photo S. Medaglia; © Archivio fotografico SAIA U/13383).





Fig. 40. The cape of Hekaton Kephales seen from the southwest (photo drone F. Mauri; © Archivio fotografico SAIA U/13384).

### 3.3 Cape Hekaton Kephales

#### 3.3.1 The work of National Superintendency for Underwater Cultural Heritage in the quarry area

The site of Hekaton Kephales consists of a spit of land that forms a narrow and long promontory that juts out into the bay of Tigani reaching a maximum elevation of about m 5 above sea level (Fig. 40). The geology of the area consists of terrace deposits pertaining to a medium-grained porous calcareous sandstone bank of probable Pleistocene age<sup>61</sup> which was long exploited in ancient times as a quarry, probably due to its lightness and ease of modeling. The arenaceous bank of *poros*, locally called Pournias, is interspersed with amalgamated conglomerate layers with clasts of various sizes coming from the adjacent and underlying geological units, among which there is that afferent to the Fissini-Sardes unit of the Late Oligocene/Early Miocene<sup>62</sup>. That of Hekaton Kephales was undoubtedly the largest cultivation area serving the ancient city, even if there are three other quarry areas identified by the University of Siena in as many sectors of the Hephaestia promontory<sup>63</sup>.

The open-air quarry of Hekaton Kephales has run out and some witnesses remain of it who demonstrate that the power of the stratum was originally at least m 4.5<sup>64</sup>. In the sector, now completely exhausted, which is located along the northern seafront and measures about m 350, the signs of the quarry related to the removal of blocks and column drums of different sizes are visible (Fig. 41). A substantial part of the quarry front cultivated in ancient times is currently located in the intertidal zone and is reached by the wave, thus finding itself in condition of being submerged by a few centimeters of water.

The 2022 investigations had the objective of ascertaining whether the cultivation area continued towards the north even below the current sea level. In this regard, a capillary underwater reconnaissance was carried out which involved, for a length of about m 500, the entire seafront which currently lies beyond the slender string of rocks that surround the quarry area and which marks what must have been the limit of the promontory towards the north-west in ancient times. The surveys have ascertained that along the seabed, in continuity with the geological unit of the promontory, there are no traces of submerged cultivation.

<sup>61</sup> PAPI *et alii* 2002, 996.

<sup>62</sup> INNOCENTI *et alii* 2009, 125.

<sup>63</sup> CAMPOREALE *et alii* 2008, 198, fig. 1.

<sup>64</sup> PANSINI-PASSALACQUA 2019, 518.





Fig. 41. Hekaton Kephales. Traces of column drum extraction in the rocky bank (photo G. Bucci; © Archivio fotografico SAIA U/13385).



Fig. 42. Hekaton Kephales. Block with traces of mining activity collapsed into the sea (photo S. Medaglia; © Archivio fotografico SAIA U/13386).

At the eastern end of the promontory, in correspondence with a curb of rocks that rises above the remaining plateau, a large sandstone element was identified at a depth of about m 1.5, which takes on a stepped profile with unequivocal traces of squared machining and signs of removal of stone masses. However, it is not in place but rather belongs to a wreck of the ancient bank that collapsed into the sea (Fig. 42). So, we can be certain that at least as far as the north-western seafront is concerned, the open-air cultivation area ends in correspondence with the current emerged profile of the promontory.

*Barbara Davidde Petriaggi – Salvatore Medaglia*

### 3.3.2 The Ephorate of Underwater Antiquities at Hekaton Kephales

In the area of Hekaton Kefales, the EUA conducted reconnaissance dives along the coast at an average depth of m 15, in order to locate and identify any signs of the archaeological record that could indicate nautical activity in the area (Fig. 43). Diving commenced in Tigani bay, in the northwestern side of which the divers relocated and documented a circular rubble mound structure – known from previous surveys – app. m 25 radius – interpreted either as a breakwater or a mole (Fig. 44). During the following dives around the cape divers spotted ceramic shards belonging to several types of vessels, mostly amphorae, dating from the Classical-Hellenistic periods to the Byzantine era. More specifically, the following artifacts



Fig. 43. Dive routes (© Ephorate of Underwater Antiquities).



Fig. 44. Rubble mound structure (© Ephorate of Underwater Antiquities).





Fig. 45. Byzantine amphora (© Ephorate of Underwater Antiquities).



Fig. 46. Byzantine cooking pot  
(© Ephorate of Underwater Antiquities).



Fig. 47. LRA2 amphora (© Ephorate of Underwater Antiquities).

have been identified: a) the body of a transport amphora (Classical-Hellenistic); b) ribbed transport amphora, probably of the Günsenin 1 type (Byzantine, 9<sup>th</sup>-11<sup>th</sup> c. AD, Fig. 45); c) part of a cooking pot (Byzantine, Fig. 46); d) LRA2 late roman amphora (5<sup>th</sup>-7<sup>th</sup> c. AD, Fig. 47); e) the rim of another amphora and f) part of a Chian amphora (second half of 4<sup>th</sup> c. BC, Fig. 48). Lastly, a wooden feature with a bolted iron nail resembling part of a wooden boat was found in the narrow waters of Tigani bay close to the shore (Fig. 49).

*Alexandros Tourtas*



Fig. 48. Chian amphora (© Ephorate of Underwater Antiquities).



Fig. 49. Wooden feature (© Ephorate of Underwater Antiquities).

### 3.4 Ormos Tigani

#### 3.4.1 Investigations along the south-eastern side of the bay

As part of the investigations involving the Hephaistia area, an underwater survey was carried out along the south-eastern coast of the Ormos Tigani bay. More precisely, the surveys involved the stretch of coastline between the tip of Hekaton Kephales and the mouth of the mesohaline lagoon of Hephaistia, maintaining a bathymetric band between 0 and 3 meters. The bay of Ormos Tigani – whose mouth is exposed to the winds of the fourth quadrant – looks like a large and deep half-moon inlet of about 170 hectares bounded by the mentioned cape of Hekaton Kephales and that of Calogeros to the north.

Considering the smallness of the bathymetry and the excellent visibility, the explorations were conducted without breathing apparatus and involved a stretch of coastline whose overall extension is just under one kilometer.

A first datum has emerged about a hundred meters south of the point of Hekaton Kephales where rare clay fragments have been identified that cover a vast chronological period ranging from the



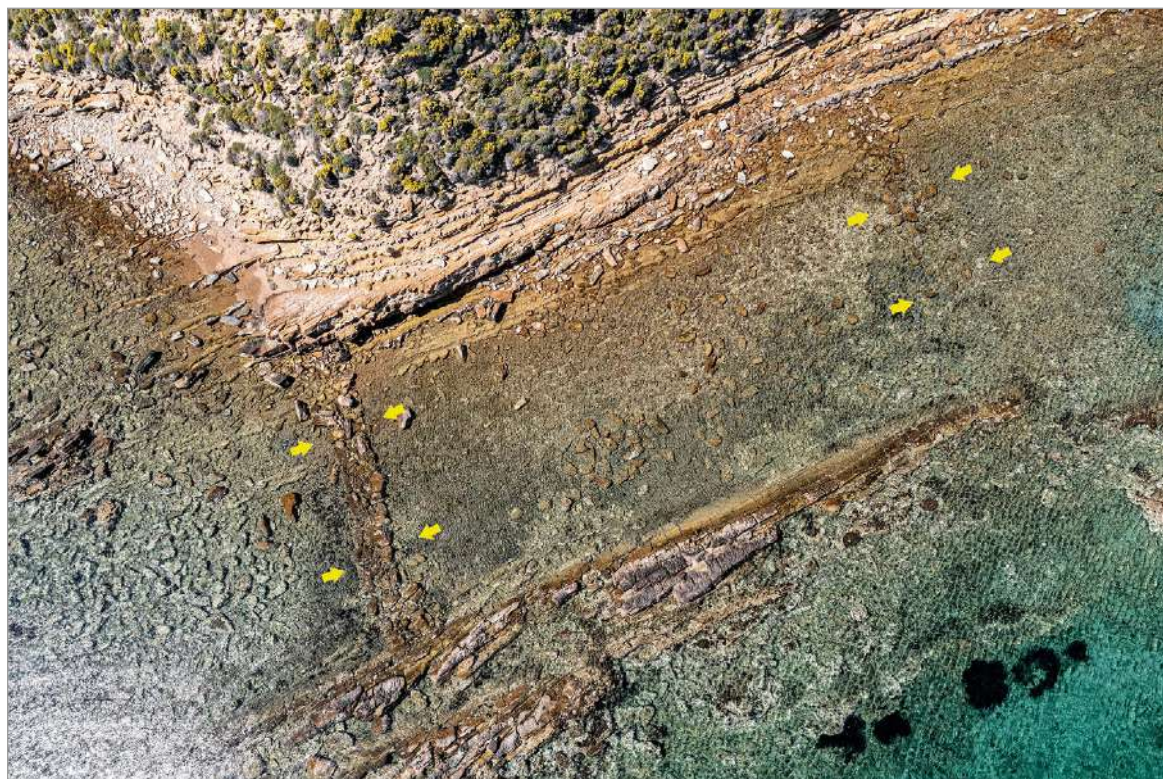


Fig. 50. Ormos Tigani. Traces of masonry grafting into the flysch formation (photo drone F. Mauri; © Archivio fotografico SAIA U/13387).

Classical-Hellenistic to the Byzantine age. The materials, however, were scattered over a rather large area and lacked a clear context.

Further south-east, in the body of water in front of the half-moon beach which outlines to the east the point where the promontory of Hekaton Kephales reaches its maximum bottleneck, a sporadic wooden element has been documented at about m 1.5 deep with a metal pin fixed to be attributed to a hull of unspecified age. No other evidence has been found inside.

Continuing along the coastal arch in a south-south/east direction, right on the southern edge of the mentioned beach, the underwater and aerial reconnaissance using drones have highlighted, in correspondence with a low promontory, the presence of a particular rectangular coastal morphology, placed on the flysch seabed under the foot of the cliff, a few centimeters deep. Specifically, this structure is placed between the cliff coastline and the opposite and parallel semi-emerged curb pertaining to the natural outcrops of flysch. In this point the natural geology was evidently exploited through an anthropic modeling intervention with which it was intended to close the structure laterally with what appear to be low walls running in a perfectly perpendicular direction with respect to the flysch outcrops (Fig. 50). Observing them in detail, it is possible to note that these walls are assembled through the juxtaposition of debris blocks pertaining to the geological unit of Fissini Sardes (Fig. 51).

The eastern one is preserved along its entire length, while of the western one only the graft at the foot of the cliff survives. It should be noted that within this sort of basin or environment, there is a relative lack of coarse debris which has evidently been dismantled and removed. The function of the structure, worthy of future investigations, is currently uncertain. On the external side of the geological formation which acts as a barrier with the sea, at less than a meter deep, several ceramic fragments wedged in the rocky ravines or welded to the rocks of the flysch seabed have been identified, which at this point has an inclination of approximately 20 degrees to favor the creation of cavities. These are mostly fragments of amphorae walls and, in one case, a plate bowl. Among the diagnostic fragments, some rims of Late Roman 1 and a rim with part of a bend of a Kapitän 2 can be recognized. The dispersion area, with low concentration, covers about m 50 of the seafront. A 3D survey was created of the underwater area in question.

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Fig. 51. Ormos Tigani. Detail of one of the submerged walls taken from above with a drone (photo F. Mauri; © Archivio fotografico SAIA U/13388).

### 3.5 Mesohaline Lagoon of Hephaistia or Ormos Palaiopolis

South-east of the ancient city of Hephaistia there is a large mesohaline lagoon basin that occupies a depression inside which there are stagnant waters with high deposition and high evapotranspiration (Fig. 52). The coastal limits of the basin are marked by sedimentary formations belonging to the geological units of Fissini-Sardes and Hephaistia while the beaches, especially those located in the south-west and south-east sectors, are characterized by evaporite deposits (sabkha)<sup>65</sup>. The lagoon basin has a width of approximately 38 hectares and is separated from the sea by coastal strips which give rise to channel-like tidal inlets which open to the northeast in the adjacent Ormos Tigani bay. In recent times, just outside the coastal barrier, two masonry piers of different widths have been built on the sides of the entrance, which give shelter to small boats with a reduced draft.

Where the lagoon narrows near the outlet to the sea, A. Conze, who visited the island in 1858, in his *Reise auf den Inseln des Thrakischen Meeres* stated that «at the point of the narrowest entrance to this inland bay, by now completely silted up, I noticed under the surface of the water a stretch of wall that crosses it far and wide, evidently an old construction to further close off the bay of the port»<sup>66</sup>. This structure, which was already transformed into a breakwater («eine Mole»)<sup>67</sup> in Karl Lehmann-Hartleben's *Die antiken Hafenanlagen des Mittelmeeres*, was glimpsed again and summarily documented in 1993 by G. Messineo on the occasion of the creation of a scale plan 1:2000 of the ruins of the ancient city<sup>68</sup>. The presence of this

<sup>65</sup> INNOCENTI *et alii* 2009.

<sup>66</sup> CONZE 1860.

<sup>67</sup> LEHMANN-HARTLEBEN 1923, 263, fn. 148.

<sup>68</sup> DI VITA 1992/93, 410-411, tav. IX; MESSINEO 2001, 29, tav. I.





Fig. 52. The Mesohaline lagoon of Hephaistia seen from above (photo drone F. Mauri; © Archivio fotografico SAIA U/13389).

sort of barrier on one side and the natural characteristics of the mesohaline bay on the other have meant that since the first Italian studies on Lemnos the location of an *archaio limani* in the lagoon was postulated<sup>69</sup>. It would have had the connotation of the internal port of Hephaistia serving the eastern side of the peninsula of Palaiopolis which, on the opposite side, could instead benefit from another landing place located in the gulf of Ormos Pournias<sup>70</sup>.

However, the results of paleogeographic investigations carried out recently by a Greek-French research group in the north-eastern sector of Lemnos weigh on the hypothetical connotation of the bay of Palaiopolis as an internal harbour<sup>71</sup>. Taking advantage of palaeoenvironmental data provided by samplings of foraminifera dated by radiocarbon and of a series of lithostratigraphic analyzes of the Holocene sediments, in turn duly cross-referenced with the sea-level index points of Hephaistia with the Lambeck and Lambeck and Purcell models<sup>72</sup>, the researchers were able to reconstruct the paleoenvironmental picture of the Palaiopolis coastal lagoon between 7050 and 990 cal BP. The microfauna shows that this bay between the Late Bronze Age and the Classical Age was, like today, a mesohaline lagoon or at most a shallow bay with silty sand sediments and microfauna from lagoon environments that lived in an environmental context with low energy processes. This proves that during this long period there could not have been a harbour in the bay which, on the other hand, can be assumed in the first and middle Bronze Ages when foraminifera indicate the presence of a shallow marine environment with freshwater inflow<sup>73</sup>.

To verify the nature of the submerged artifact during the underwater survey of May 2022, a sub-bottom profiler campaign was prepared. However, it was not completed due to the water level of the lagoon which, due to the particular drought, in May was extremely low. The boat that was supposed to support the sub-bottom profiler on the side, therefore, did not have a sufficient draft to operate. To overcome this inconvenience, the activities were rescheduled, and the investigation of the site was carried out with hyperspectral surveys, drone surveys, and manual measurements and surveys (Figs. 53-54). This last activity was carried out by inserting some metal rods in the muddy seabed in

<sup>69</sup> MUSTILLI 1932/33, 4.

<sup>70</sup> AGALLOPOULOU-KALLIONZIS 1988, 174, fig. 5; FICUCIELLO 2013, 99-100, 227.

<sup>71</sup> PAVLOPOULOS *et alii* 2013.

<sup>72</sup> LAMBECK 2004; LAMBECK-PURCELL 2005.

<sup>73</sup> PAVLOPOULOS *et alii* 2013, 87-88.





Fig. 53. Mesohaline Lagoon of Hephaistia. The arrows indicate the trace of the submerged wall in an oblique drone photo (photo F. Mauri; © Archivio fotografico SAIA U/13390).

search of the limits of the wall and proceeding with their georeferencing by GPS RTK with centimeter precision and differential correction by means of the stations belonging to the Greek permanent network HEPOS. The survey made it possible to map the course of the wall in a very precise manner, which is approximately 155 m long and has a N-NW/S-SE orientation with an inclination of  $347^{\circ}$  N. No trace of it has been found in the points where it should have been grafted onto the two banks perhaps due to the deepening of the unequal altitude to which it is subject. In the points examined, the row of stones of which the wall is made is in fact placed with respect to the level of the lagoon (as of May 2022) at a depth of a few tens of centimetres (Fig. 55). Some underwater photographs show the characteristics of the composition of the wall in relation to the row of stones, apparently ranged without mortar, emerging from the muddy layer (Fig. 56). In order to determine the function of the long wall – for which the hypothesis has been put forward that it may belong to «a system of barrier





Fig. 54. Mesohaline Lagoon of Hephaestia. Trace of the submerged wall  
(photo drone elaborated by G. Gomez De Ayala; © Archivio fotografico SAIA U/13391).



Fig. 55. Mesohaline Lagoon of Hephaestia. Elevated plan (with respect to the depth of the lagoon) with the rough positioning of the limits of the long wall on a Google Earth satellite photo (el. F. Morfea; © Archivio fotografico SAIA U/13392).





Fig. 56. Mesohaline Lagoon of Hephaistia. Outcropping portions of the wall (el. G. Gomez De Ayala; © Archivio fotografico SAIA U/13393).

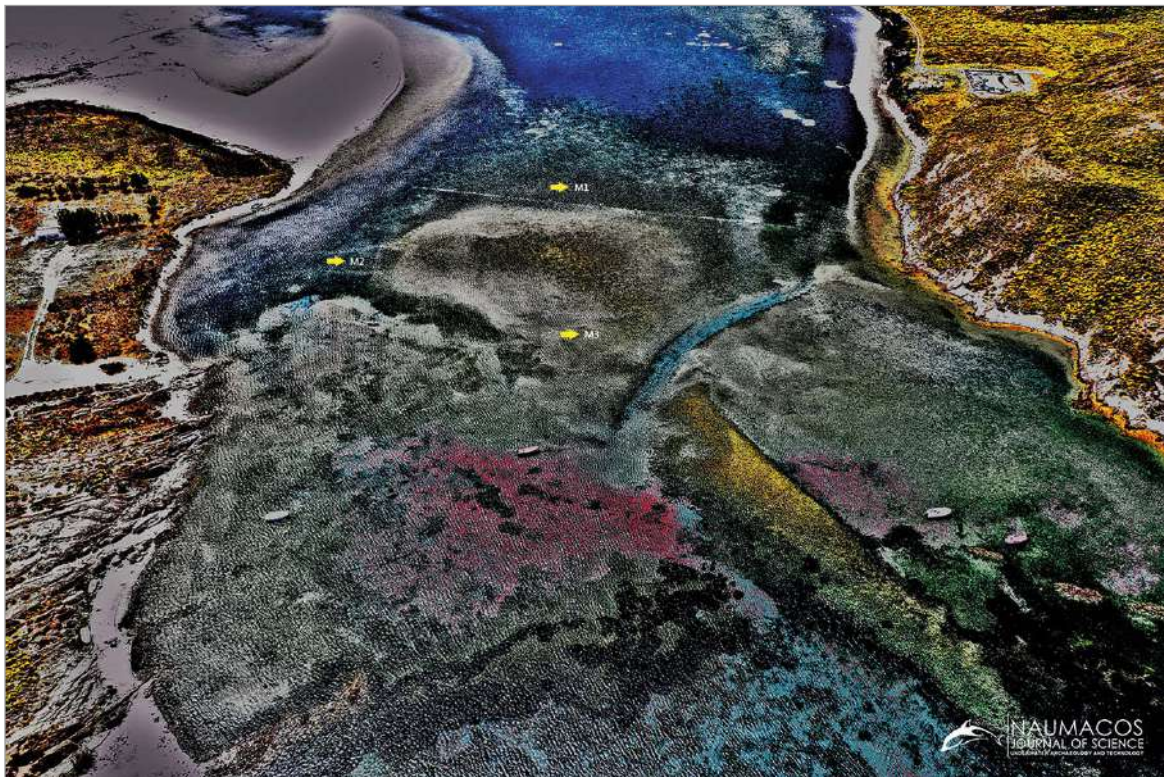


Fig. 57. Mesohaline Lagoon of Hephaistia. Hyper-spectral survey with anomalies to investigate (el. by G. Gomez De Ayala; © Archivio fotografico SAIA U/13394).



or regulation of access to the internal harbour»<sup>74</sup> – it will be better to wait for further investigations which will have to include the study of other two anomalies, called M2 and M3, captured by the hyper-spectral sensor with which the drone was equipped just east and south-east of the submerged wall. The bands of the electromagnetic spectrum have in fact returned some traces that could refer to the presence of structures in the outermost stretch of the lagoon (Fig. 57).

*Barbara Davidde Petriaggi – Salvatore Medaglia – Gabriele Gomez de Ayala – Filomena Lucci – Fabio Morfea*

#### 4. POLIOCHNI

##### 4.1 The work of National Superintendency for Underwater Cultural Heritage

During the activities of May 2022, some underwater reconnaissance was conducted in the western sector of Poliochni bay and more precisely in the stretch of sea south of the Voroskopos promontory which extends between the Italian Mission House and the site where the city of Bronze Age. Here in the past years, amphorae in fragments were repeatedly reported, some of which had been recovered and kept in the warehouse of the Mission of the Italian Archaeological School.

In fact, underwater prospecting confirmed this data, allowing the identification, at a distance between 50 and 80 meters from the current shoreline, of a rather sparse concentration of archaeological material scattered over a seabed area of approximately m<sup>2</sup> 100 (Fig. 58).

In the investigated area, the geology of the seabed is characterized by flysch sedimentary rock layers of the Fissini-Sardes geological unit (sandstones, marls, siltstones, and argillites) with a trend mostly perpendicular to the coast. The characteristic inclination of these Oligocene flysch formations generates a series of ravines in which the ceramic remains that otherwise would have been swept away by the force of the waves have become entangled and sometimes cemented.

A total of 13 clay fragments were recovered in an area of the seabed between 1.9 and 3.2 meters deep (Fig. 59). The latter was positioned with GPS and then recovered after having first created a 3D plan of the site. As we said, the seven clay fragments that had been recovered from the same submerged area some years ago must also be traced back to this same context.

Summing up, we must observe how a consistent group of fragments, attributable to at least ten different containers, appears to be composed of Aegean amphorae Late Roman Amphora 2A-B dated between the 5<sup>th</sup> and about the 6<sup>th</sup> century AD and characterized by reddish-brown pastes, a globular belly, a short conical neck, a flared funnel-shaped rim, and arched lugs set between the neck and the shoulder over which run dense horizontal grooves (Figs. 60-61)<sup>75</sup>. Among the other materials recovered, it should be mentioned at least a fragment of an amphora which appears to be characterized by an almond-shaped rim, a short, slightly swollen cylindrical neck and ear loops with an oval section that set just below the rim. This last fragment with a dark hazelnut paste can be compared to the Adamsheck RC 22 typology which, isolated for the first time among the materials of the port of Kenchreai – and probably originating from the Aegean Island of Ikaria – circulated during the 5<sup>th</sup> century<sup>76</sup>.

However, some materials from the same submerged area seem to differ chronologically from the others, placing themselves in a later phase, demonstrating how the material recovered in the Poliochni bay is by no means homogeneous. For instance it is possible to mention the finding of an example of the so-called Byzantine “globular amphora”<sup>77</sup>, which can be dated between the late 7<sup>th</sup> to the 9<sup>th</sup> centuries AD<sup>78</sup>. Two specimens of amphorae, of which the upper portion of the globular body is preserved with two small handles with ears welded at the top directly on the rim, in fact recall the Günseinin I types generally dated between the 10<sup>th</sup> and 12<sup>th</sup> centuries and whose production can be placed in the areas Thracian islands gravitating around the northern coast of the Sea of Marmara (Fig. 62)<sup>79</sup>.

Pending the study and classification of all the fragments, it does not seem improbable to argue, albeit entirely preliminary, that the main nucleus of the clay artifacts relating to the LRA 2A-B can be attributed

<sup>74</sup> VITTI-VOZA 2008, 131.

<sup>75</sup> PEACOCK-WILLIAMS 1986, 182-184 (Class 43); PIERI 2005, 86-93.

<sup>76</sup> ADAMSHECK 1979, 117, Rc 22c-22d. See also ARTHUR 1998, fig. 9, No. 1; SLANE-SANDERS 2005, 262, fig. 5, No. 2.17;

DOBREVA-RICCATO 2016, tav. 1, No. 8.

<sup>77</sup> VROOM 2017; ARTHUR 2018.

<sup>78</sup> POULOU 2018.

<sup>79</sup> GÜNSENIN 1989; 1993; 2018.



Fig. 58. Poliochni. Documentation of clay materials (photo A. Raguso; © Archivio fotografico SAIA U/13395).



Fig. 59. Poliochni. One of the fragments of amphora LRA 2 (ITOA 1) still welded to the rocks of the seabed (photo A. Raguso; © Archivio fotografico SAIA U/13396).

to the same shipwreck of the early Byzantine period of which unfortunately has been preserved nothing else due to the mainly rocky bottom and the shallow depth of the position.

*Salvatore Medaglia*

#### 4.2 The work of the Ephorate of Underwater Antiquities at Poliochni's north bay

In the area of Poliochni, after performing a short reconnaissance snorkeling dive at the shallows in front of the land archaeological site, the EUA was decided to survey the deeper waters (at a contour of m 10-20) of the northern side of the bay, as well as around cape Vroskopos (Fig. 63). The sea bottom in this area is mostly sandy, covered by large sea-grass patches in the shallows and extended *Posidonia oceanica* meadows in the deep. During the first dive, at a distance of about m 900 east of the land site, the divers spotted a large metal four-fluked anchor almost m 2 long at a depth of m 9 (Fig. 64). Besides this anchor no other features of cultural importance were present along the ap. km 3 long dive route. There was information provided by the locals about a WWI aircraft wreck on the northern side of Vroskopos cape that was however not verified during the dives.

*Stavroula Vrachionidou – Alexandros Tourtas*





Fig. 60. Poliochni. The amphorae LRA 2 ΠΟΑ 15 and 17 (photo F. Mauri - S. Medaglia; © Archivio fotografico SAIA U/13397).

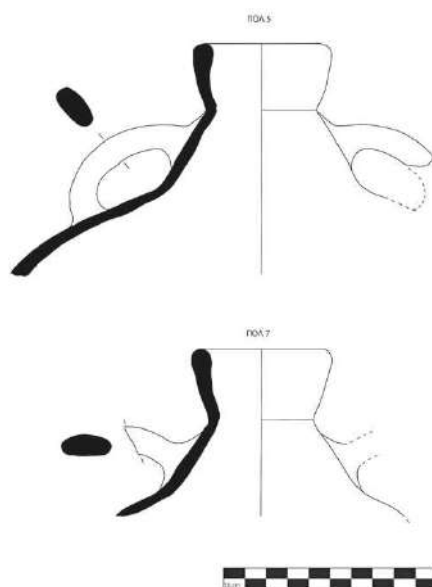


Fig. 61. Poliochni. The amphorae LR 2A ΠΟΑ 5 and 7 (drawing D. Zumerle; © Archivio disegni SAIA NIG 8517).



Fig. 62. Poliochni. The Günsenin I amphora (ΠΟΑ 4) still in situ (photo S. Medaglia; © Archivio fotografico SAIA U/13398).

## 5. OTHER SITES ON THE ISLAND. THE WORK OF THE EPHORATE OF UNDERWATER ANTIQUITIES

### 5.1 Kotsinas

#### 5.1.1 The Shipwrecks

After the research of the shallows in the bay of Kotsinas we decided to check the western and eastern promontory that define the bay from the north for possible archaeological remains (Fig. 65). We started by swimming around the northeastern promontory, called Ran. According to some information coming from locals there supposedly existed inside the bay and at a depth of about m 4 a cargo of amphorae, some of which bore stamped handles. The seabed consisted of long stripes of slate rocks and stripes of sand. Although the visibility was fair, the weather conditions were not optimal that day, since it blew quite a strong wind. We didn't manage to spot any trace of human-made activity in the area. Subsequently we



Fig. 63. Diving routes at the northern Poliochni Bay and around Cape Vroskopos (© Ephorate of Underwater Antiquities).



Fig. 64. Anchor (© Ephorate of Underwater Antiquities).

moved to the northwestern promontory, called Pournias promontory. At the tiny creek west of Pournias promontory, between the west side of the promontory and the next one westwards lies a reef consisting of three parallel rocky outbursts, whose highest parts are no more than cm 20-30 submerged under the sea surface (Fig. 66). Between the first and the second of these outbursts a concentration of broken amphorae was detected, that signals irrefutably the presence of a shipwreck. There has been information from the locals about a concentration of broken jars in this area as well<sup>80</sup>. The cargo of the shipwreck is located at a depth of 1.5 to 3 meters and is scattered within an area of about m 70 (Figs. 67-68). The ceramic vessels

<sup>80</sup> The information about the existence of two shipwrecks, the one near Ran promontory and the other west of Pournias promontory comes from Fanis Pinakis, resident of Kotsinas, lighthouse keeper and

speargun fisherman. He gave us also further information about other shipwrecks at the north coast of Lemnos that has to be checked.





Fig. 65. Map with the two promontories of Kotsinas Bay (© Ephorate of Underwater Antiquities).

are all broken, a fact that makes their accurate identification difficult. The first impression is that the boat carrying that cargo could not be very big. It probably crushed against the dangerous ridge during a storm, while trying to find protection inside Kotsinas bay. The shards lie in the coves of the rocky seabed, which consists of oblong plates of fragmented slates. At first sight, it can be macroscopically identified that the vessels were made of two different kinds of clay: the first clay is bright red/red-orange, while the second is pale yellow/ochre. From the diagnostic pieces, one can distinguish three variations of the general category of LR2 amphorae. LR2 amphorae are generally dated from the 4<sup>th</sup> to the early 7<sup>th</sup> c. AD. The first variation is made of red/orange clay and its body is ridged at least at some part. It forms a tiny conical base ending to a knob (Fig. 69). Its neck is relatively short and cylindrical with vertical smooth handles<sup>81</sup> attached just under the ring-shaped rim (Fig. 70). The type is close to the Agora G199 type, dated from the 1<sup>st</sup>-4<sup>th</sup> c. AD and originating from the Aegean islands, but also to the Agora M272 type, dated to the end of the 4<sup>th</sup> c. AD<sup>82</sup>. Same upper part as the Agora M272 type and Peacock's Class 43 type, that is, a cup-shaped rim attached to a conical neck, wherefrom the two loop-shaped handles sprout, disposes of our second variation, made from both the red/orange and the ochre-colored clay (Fig. 71). The height of the rim can vary, while in some cases it is stressed by a groove or a ridge under it (Fig. 72). In a third variation, made of the red/orange clay, the groove is maintained but the neck is cylindrical (Fig. 73). In all the variations the neck and shoulders are not ridged and the same applies for the toe of the first variation. This fact, together with the smooth handles and a certain degree of care in the construction of the amphorae, constitute elements of early chronology, that could allow the dating of the shipwreck in the fourth century AD. There are no clues for the content of the jars so far and no traces of other loaded products are found at the present point of research.

<sup>81</sup> As far as the upper part of the body is concerned, this variation is closer to the LR1 type of amphora, dated at the same period as the LR2 type. See PEACOCK-WILLIAMS 1986, 185 (Class 44).

<sup>82</sup> See SCIALLANO-SIBELLA 1991; PEACOCK-WILLIAMS 1986, 182-183 (Class 43). The Agora M272 type has though a different rim.



Fig. 66. The site of the classical shipwreck seen from Pournias promontory (SE-NW) (© Ephorate of Underwater Antiquities).



Fig. 67. Roman shipwreck orthophoto (© Ephorate of Underwater Antiquities).



Fig. 68. The Late Roman shipwreck (© Ephorate of Underwater Antiquities).





Fig. 69. LR2 amphora, base with knob (first variation, Late Roman shipwreck) (© Ephorate of Underwater Antiquities).



Fig. 70. LR2 amphora, upper part (first variation, Late Roman shipwreck) (© Ephorate of Underwater Antiquities).



Fig. 71. LR2 amphora, upper part (second variation, Late Roman shipwreck) (© Ephorate of Underwater Antiquities).



Fig. 72. LR2 amphora, upper part (second variation, Late Roman shipwreck) (© Ephorate of Underwater Antiquities).



Fig. 73. LR2 amphora, upper part (third variation, Late Roman shipwreck) (© Ephorate of Underwater Antiquities).

At a distance of about m 80 northeast of the late Roman shipwreck and in a depth of around 4.5 to 6 meters we came across a second shipwreck. It consists of four concentrations of amphorae together with about eight smaller ones as well as some isolated fragments (Fig. 74). It is more dispersed but less fragmented than the previous one. The vessels are located in a similar rocky formation as the late Roman shipwreck but now the seabed is interrupted by large stripes of sand together with some patches of *Poseidonia* (Fig. 75). According to some diagnostic shards it contained at least two types of amphorae. The first one, made of orange/red clay, consists of a spherical body, with a tiny conical base. The outer part of the base is flat with a semicircular deepening in the middle (Fig. 76). The neck is cylindrical, relatively short, topped by a large protruding mushroom-shaped rim, while the strapped vertical handles begin at some distance under the rim and end in the middle of the sloping shoulder (Fig. 77). These characteristics match perfectly the

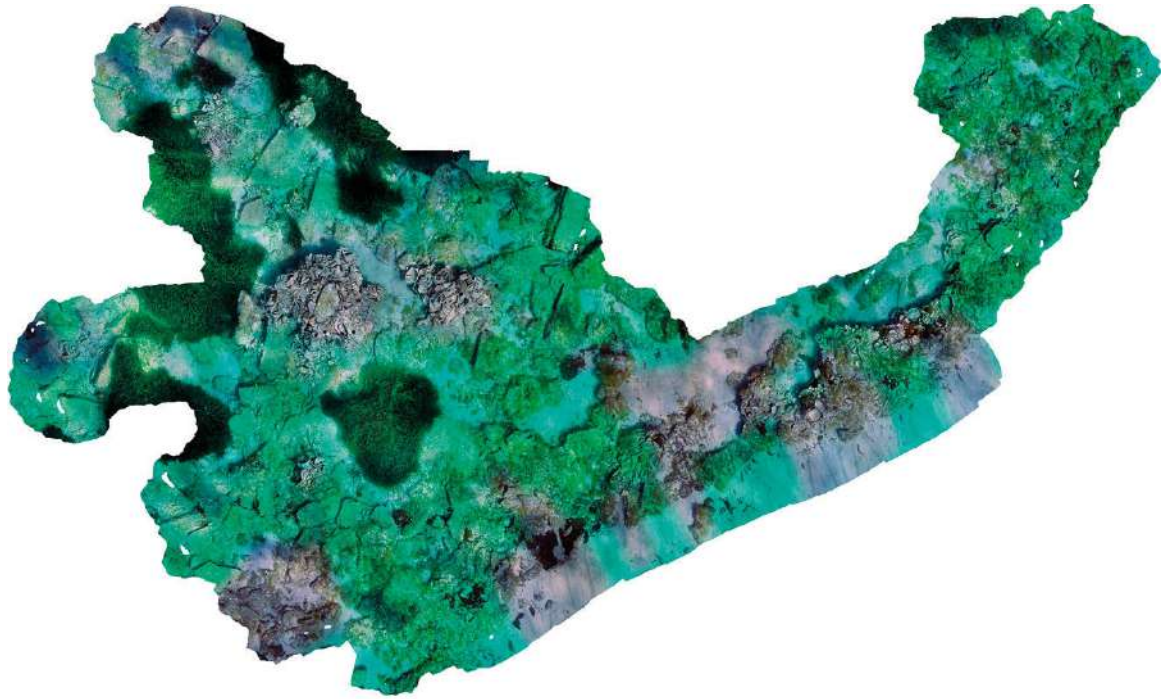


Fig. 74. Classical Period shipwreck orthophoto (© Ephorate of Underwater Antiquities).



Fig. 75. The Classical Period shipwreck (© Ephorate of Underwater Antiquities).

Solocha I type of amphora, whose chronology ranges from the end of the 5<sup>th</sup> c. BC until the beginning of the 3<sup>rd</sup> c. BC<sup>83</sup>. Many places have been proposed as production centers of the Solocha I amphorae, like Kos<sup>84</sup>, Rhodos, Samos or Knidos<sup>85</sup> in the SE Aegean, Klazomenai<sup>86</sup>, Teos, Ephesus<sup>87</sup>, Athens or even Skopelos and Alonnesos islands in the Sporades<sup>88</sup>. Workshops producing of the Solocha I amphorae have been in many of these places. The variety in the clay texture corroborates the fact that there must have been

<sup>83</sup> VRACHIONIDOU 2019, 234-236; DOULGERI-INTZESSILOGLOU *et alii* 1990, 387, fig. 35.

<sup>84</sup> AVRAM 1989; KANTZIA 1994, 334-337.

<sup>85</sup> *Ibid.*

<sup>86</sup> *Ibid.*

<sup>87</sup> GASSNER 2005, 40.

<sup>88</sup> EMPEREUR-PICON 1986; DOULGERI-INTZESSILOGLOU *et alii* 1990, 361-393; ΦΙΛΗΣ 2011, 248-249.





Fig. 76. Solocha I amphora, lower part with toe (Classical Period shipwreck) (© Ephorate of Underwater Antiquities).



Fig. 77. Solocha I amphora, upper part with mushroom rim and strapped handle (Classical Period shipwreck) (© Ephorate of Underwater Antiquities).

in many areas of production. Concerning our shipwreck, the type of mushroom-shaped rim as well as the fact that the handles are not attached just under the rim but a little lower on the neck advocate for a rather late stage of the evolution of these amphorae well into the 4<sup>th</sup> century BC, which dates subsequently the shipwreck at that period of time.

The second type of amphorae found in the shipwreck is also made of orange/red clay and is characterized by a ring-shaped rim, relatively long cylindrical neck, vertical oval-shaped handles that begin a little lower than the top of the neck, and a flaring toe with a convex bottom surface, provided with a shallow deepening in the middle (Figs. 78-79). The toe is composite with the body that probably has an oval shape, but with a belly with differentiated size. The type seems to belong to the Peparethos I type (identified with the Solocha II type), produced during the 4<sup>th</sup> c. BC in the islands of Skopelos (ancient Peparethos) and Alonnesos (ancient Ikos) of the Sporades, in the North Aegean<sup>89</sup>. For the Solocha II amphorae, a narrower chronology in the second quarter and in the middle of the 4<sup>th</sup> century B.C. has been proposed<sup>90</sup>. The examples coming from Ikos and Peparethos have all orange/red clay, similar to the one from our shipwreck that is making the provenance of our Peparethos I amphorae from these islands probable. The fact that the Solocha I amphorae of the shipwreck, are made of similar clay, strengthens the possibility of a common provenance for both types. The fact that the two types of amphorae were found mixed together on the seabed floor, makes it reasonable to assume that they were both loaded from the same port simultaneously on the ship, the narrower Peparethos I type put in the voids left by the bulkier Solocha I type. Admitting a late stage of evolution for the Solocha I type and bearing into mind the mid 4<sup>th</sup> century BC as the latest possible chronology for the Peparethos I type, we could possibly narrow down even further the chronology of this late classical shipwreck, setting it in the middle of the mid-4<sup>th</sup> century BC.

*Stavroula Vrachionidou*

### 5.1.2 The Harbour works<sup>91</sup>

At the area of Kotsinas the investigation with snorkeling and aerial mapping was conducted around the hill where the relics of the medieval castle are located (Fig. 80). Kotsinas became an important harbour of Lemnos during Venetian times with its castle attributed to Byzantine times<sup>92</sup>. It must be noted, however, that

<sup>89</sup> DOULGERI-INTZESIOGLOU *et alii* 1990, 368-382 and figs. 32-33; VRACHIONIDOU 2019, 236.

<sup>90</sup> BRAŠINSKIJ 1965.

<sup>91</sup> During the 2022 first mission of the cooperative project for the underwater survey and mapping of Lemnos waters, the team of the Ephorate of Underwater Antiquities conducted underwater survey and aerial mapping at the harbours and shipwreck sites described at

the present article. Orthophoto maps have been produced, with pictures taken from an UAV (DJI 4 PRO) for all of the harbor sites, and underwater 3D models of the shipwreck sites that were identified, along of course with other relevant land or underwater photographic documentation.

<sup>92</sup> PENNAS 2011.



Fig. 78. Peperethos I amphora, upper part (Classical Period shipwreck) (© Ephorate of Underwater Antiquities).



Fig. 79. Peperethos I amphora, lower part part (Classical Period shipwreck) (© Ephorate of Underwater Antiquities).



Fig. 80. Orthophoto map of Kotsinas area (proceeded by I. Ktistakis; © Ephorate of Underwater Antiquities).

the surviving defensive walls are constructed in many cases with ashlar blocks that are definitely in second use and they may witness ancient structures at the same area. At the sea around the castle, a shallow zone reaching m 60 away from shore seems to be a submerged terrestrial zone. Inside the modern fishing shelter, two rubble patches are in fact relics of disintegrated buildings as the dispersed blocks and a surviving segment of a wall foundation indicate. Dispersed blocks are also present especially at the northwest of the hill, while at the north, just opposite the defensive tower there are the foundations of a submerged building with an apse at its north/northeast side (basilica?). At the west of the hill, northeast of the modern jetty there is a cavity that must have been the harbour basin of the site with its entrance looking northwest and embraced by rubble mound breakwaters. At the northwest of the basin a later rubble mound jetty perpendicular to the coast, with a branch going southwest formed probably in attempt to keep the basin in use after the submergence of the previous harbour works. To the south-east of the castle hill, where the defensive wall ends, a submerged thick row of big semi-worked boulders may have been the foundation of an ancient wall, a breakwater to protect the defensive wall encircling the hill, or a *porporella* to keep away enemy ships.

*Theotokis Theodoulou – Andreas Sotiriou*



## 5.2 Tryghies: the sarcophagi shipwreck

The Tryghies promontory extends to the north coast of Lemnos, north of Haghios Ermolaos village, in a rural and isolated area. At its southern end is found a sandy bay defined by a small anonymous promontory to the east (Figs. 81-82). This promontory becomes an underwater reef that extends several meters eastwards. At the point where it meets the sea surface, it is steep and vertical to a height of approximately two meters. Some information about an alleged shipwreck at this location was taken into account, as the area seems dangerous for navigation, so we decided to search the spot<sup>93</sup>. Although the first dive took place on a pretty windy day it was successful, since we managed indeed to detect the shipwreck. It comprises a cargo of sarcophagi that was revealed at this exact steep point of the promontory (Fig. 83). In our second dive we were luckier, because the weather was ideal. Before diving, we documented the whole area of the promontory by drone. We photographed the shipwreck but the photogrammetric documentation proved difficult since the cargo slid on the sloping slate rock and many of the sarcophagi stood almost vertically against it. The shipwreck is located at a depth ranging from 1.5 to 7.3 meters. The cargo consists of two types of sarcophagi: rectangular sarcophagi and Lenos type sarcophagi (rounded corners), all of them incomplete. The rectangular sarcophagi were provided with lids that are lying also on the sea bottom (Fig. 83). The majority of them are broken, so it is difficult to certify their exact number at this stage of research. We can make an estimation of about four to five rectangular sarcophagi and three to four of the lenos type. Only one sarcophagus of the lenos type is reserved intact (Fig. 84). Its length is about m 1.20, its width about m 0.50, while the thickness of its wall comes up to m 0.07 approximately. It has two extrusions in one of the long sides, probably meant to be turned, when finished, to lion heads. The sarcophagi with lion heads are divided into the ones with gaping mouths and into those where the lions hold a ring between their jaws. In addition, sarcophagi with lion heads can be of the strigilated or decorated type<sup>94</sup>. All the sarcophagi of the shipwreck are made of white marble, the texture of which recalls the Thasian marble, but without a closer inspection and further analysis, it is impossible to have an accurate answer to the question of provenance. Thasos was renowned during the Roman period for the production of lenos sarcophagi, produced mainly in the quarries of Saliara and Vathy, and it is known that they were not used locally but exported to the Roman markets<sup>95</sup>.

Sarcophagi made of white marble and exported to areas of the Roman world originate also from the island of Proconnesos in the Marmara region. Some examples made of Pentelic marble are known as well, but they are quantitatively fewer. Considering the geographical proximity of Lemnos to the island of Thasos and Proconnesos it is plausible to assume a provenance for the sarcophagi of our shipwreck from either one or both of these areas. The features of the sarcophagi date the wreck well into the 3<sup>rd</sup> c. AD.<sup>96</sup>

Apart from the sarcophagi, a few fragments of ceramics were found, buried mostly at the deepest areas of the shipwreck. They concern mostly amphorae. Two types are distinguished. The first one, of which an upper part is visible, is characterized by a long conical neck with tapering body and an upright narrow rim united to the neck through a groove. The arched handles start from the upper part of the neck and are lifted higher than the rim (Fig. 85). These features identify the amphora with the Kapitän II type, whose date range spans through the 3<sup>rd</sup> and 4<sup>th</sup> centuries AD<sup>97</sup>. Its origin seems uncertain, but on quantified distributional grounds an Aegean origin seems more likely. Samos and the region around Ephesus have both been suggested<sup>98</sup>. The second type concerns an amphora with a biconical neck cohesive with the flaring rim, provided with massive handles that bear a double ridge on the outer surface (Fig. 86). The type has not yet been identified nor documented adequately, but according to its features, it most likely belongs to the roman – late roman times.

It is not the first time that a sarcophagi shipwreck comes to light in the Greek seas. The Sapienza shipwreck near Methone in the Peloponnes, dated between 180 and 250 AD ca.<sup>99</sup>, carried similar sarcophagi, both rectangular and of the lenos type. Four granite sarcophagi were found in a depth of m

<sup>93</sup> The information comes from the chief safety guard of the Hephaistia archaeological site Mr. Photis Bezas, Fanis Pinakis from Kotsinas shipwreck was also aware of the shipwreck.

<sup>94</sup> STROSZEK 1998.

<sup>95</sup> For roman sarcophagi and sarcophagi in general see KOCH 1993; KOCH-SICHTERMANN 1982; ΠΑΠΑΓΙΑΝΝΗ 2007.

<sup>96</sup> CHIARLO 1974.

<sup>97</sup> PEACOCK-WILLIAMS 1986; KEAY 1984; MARTIN-KILCHNER 1990.

<sup>98</sup> GRACE 1979; BEZECZKY 2005.

<sup>99</sup> DAVIDDE PETRIAGGI *et alii* 2018, 112.



Fig. 81. Map of the Tryghies promontory with the spot of the shipwreck (© Ephorate of Underwater Antiquities).



Fig. 82. The site seen from the coast (SW-NE) (© Ephorate of Underwater Antiquities).

10 almost intact and decorated with relief garlands. They originated from the area of Troas<sup>100</sup>. Another Roman cargo of around 15 marble sarcophagi was found SW of Andros island in the Cyclades. They were made of white marble and were transported also semi-finished to Italy<sup>101</sup>. There are two more similar shipwrecks found in Italy near Taranto, the first one from San Pietro in Bevagna<sup>102</sup> and the second

<sup>100</sup> THROCKMORTON-BULITT 1963, 16-23; THROCKMORTON 1969; NANETTI 2011; DAVIDDE PETRIAGGI *et alii* 2018, 108-112.

<sup>101</sup> ΣΑΜΙΟΥ-ΛΙΑΝΟΣ 2000.

<sup>102</sup> GIANNOTTA *et alii* 2012.





Fig. 83. Rectangular sarcophagi and lids (photo S. Medaglia; © Archivio fotografico SAIA U/13399).



Fig. 84. Lenos type sarcophagus (photo G. Colucci; © Archivio fotografico SAIA U/13400).

from Torre Sgarrata<sup>103</sup>, both loaded with sarcophagi. Closer to our shipwreck seems the 3<sup>rd</sup> century AD San Pietro shipwreck, since it also carried rectangular and lenos type of sarcophagi of various sizes, also unfinished, made of Thasian marble.

From the beginning of the 2<sup>nd</sup> until the end of the 3<sup>rd</sup> c. AD a remarkable increase in the production of marble and stone sarcophagi is noticed in the Roman world. The three main areas of production are Rome, Athens and Dokimion in Phrygia, but many other local centers stand out for a significant production as well. It is clear that the Roman markets had shown a special interest for marble originating from North Aegean and the Asia Minor coasts.

*Stavroula Vrachionidou – Salvatore Medaglia*

<sup>103</sup> GABELLONE *et alii* 2003; CALIA *et alii* 2003.



Fig. 85. Kapitän II amphora  
(© Ephorate of Underwater Antiquities).



Fig. 86. Unidentified amphora  
(© Ephorate of Underwater Antiquities).

### 5.3 Ayia Sotira, Neftina, Ayios Charalambos, Keros, Stvi, Koukonisi: The harbour works

#### 5.3.1 Ayia Sotiria

At the west site of Ayia Sotira promontory an ancient breakwater first reported by P. Agallopoulou and N. Kalliontzis<sup>104</sup> is currently operating forming a harbour basin still in use as a refuge by local fishermen. The breakwater about m 410 long extends southwest from the northeast and then curves southeast in the shape of a sickle. A small natural cape on the coast extends to the west forming the leeward breakwater and the entrance (Fig. 87). On top of it, there is the Ayia Sotiras' (Savior) chapel that gives the name to the broader area, the harbour, and the promontory. The artificial breakwater is made of large schist boulders probably quarried from the neighboring area. At its tip, the riprap reaches a depth of m 6. The medium width at the surface is about m 10 while at the seabed it reaches m 70, becoming quite thicker at the northern half which is more exposed and shifted by the weather. The height over the water is about m 1-1.5 at most of its length, with the exception of the middle part of the construction where it is mostly destroyed by waves. A narrow and shallow channel at the point where the breakwater meets the shore may be a modern attempt for a secondary exit at the point or possibly what survives from a larger channel left in purpose for the natural cleaning of the harbour basin. Being at the site, the divers checked the information given by a local speargun fisherman that there the pottery of a shipwreck (?) south of the harbour entrance but nothing was located at least near the entrance.

#### 5.3.2 Neftina

Three kilometers southwest of Ayia Sotira, at the tip of the next promontory, there are similar remnants of another breakwater, with the same orientation, shape and size (width, length, height) extending the promontory for about m 450 to the south-southeast. Almost its entire basin is now silted and a modern house has been constructed inside it (Fig. 88). It is just the southern tip of the breakwater that extends for about m 50 out to the sea ending in a depth of m 3 in the sandy bottom. The rest of the breakwater, however, can be followed up to the end of the promontory from the western seaward side. The only difference with the harbour of Ayia Sotira is the kind of boulders: in Neftina they are more rounded as analogous material bridging the Nisi promontory to the coast of Lesbos at Antissa<sup>105</sup>. Similar natural, rounded boulder

<sup>104</sup> AGALLOPOULOU 1996. See also THEODOULOU forth.

<sup>105</sup> SIMOSI 1998.





Fig. 87. Panorama of Ayia Sotira harbour from north (proceeded by I. Ktistakis; © Ephorate of Underwater Antiquities).

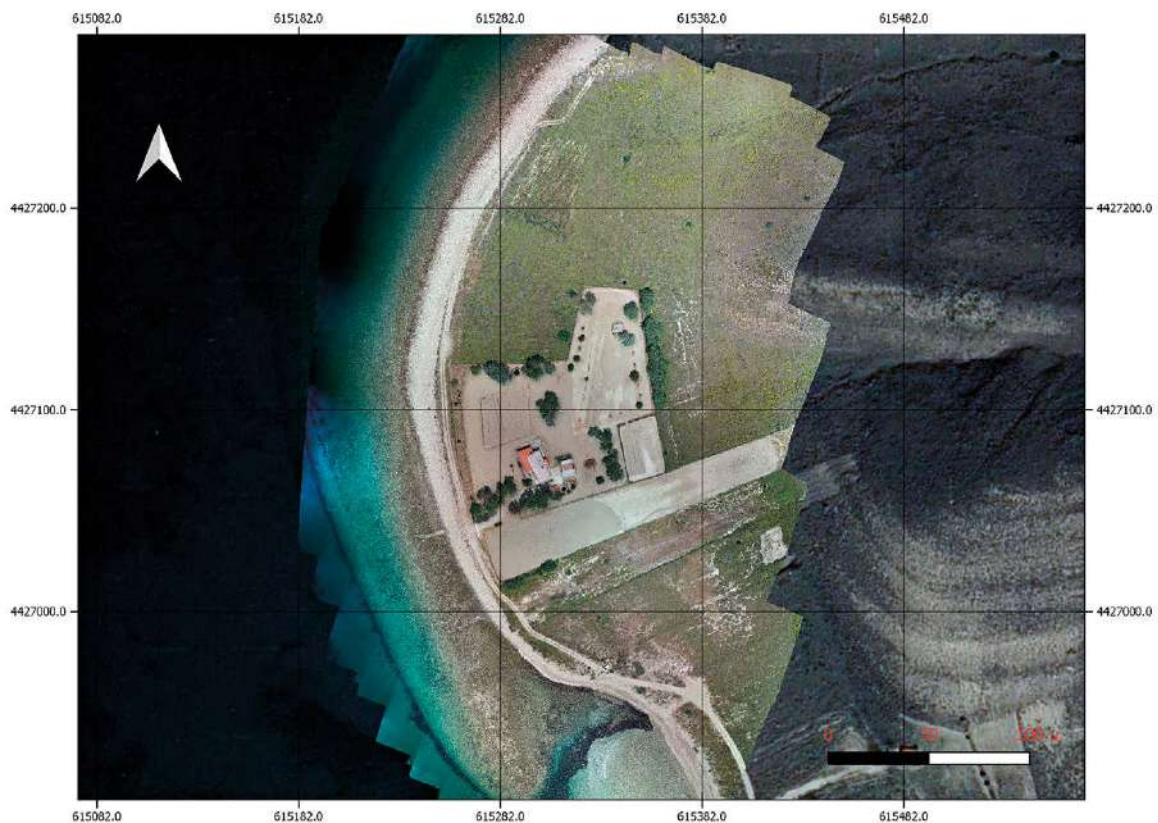


Fig. 88. Orthophoto map of Neftina harbour with its silted basin (proceeded by I. Ktistakis; © Ephorate of Underwater Antiquities).

are also met further north at Ayios Charalambos bay, where they are breaking from the natural schist rock and get their rounded shape due to the shifting from the waves. A similar process can be assumed for the boulders at Neftina.

### 5.3.3 Ayios Charalambos

The team visited the bay of Ayios Charalambos on the eastern side of Ayia Sotira promontory where there is information given by the local antiquities' guard Photis Bezas, according to which remnants of a prehistoric settlement exist at the area of Aspies. The divers covered the coastal zone of the eastern half of the bay without locating anything of archaeological interest but a couple of pottery shards at the shore. The survey, however, must be extended to the western half too, where more protection from north-western prevailing winds may indeed left Bronze Age inhabitants to establish a settlement.



Fig. 89. Aerial view of Keros area with the artificial breakwater at the left and Ayia Paraskevi chapel at the right (© Ephorate of Underwater Antiquities).

#### 5.3.4 Keros

Checking information given by Mr. Bezas for the presence of a possible artificial rubble mound structure at the promontory of Keros the team searched the area underwater and mapped it from the air. The results show the presence of a natural schist rock starting from the coast in front of Ayia Paraskevi's chapel, extending northwest (Fig. 89). At its northwestern edge a perpendicular rubble mound structure running northeast constructed with medium size stones seems like it is human-made, although similar material covers the sides of the rest of the underwater rocky formation. Its dimensions are about m 50 in length and m 25 in width. Its height from the seabed is about m 1 and reaches a level just under the surface. Its orientation and shape conduce to the protection from the northwest from where the prevailing winds blow. Although there are no traces of any settlement adjacent to this area, like Ayia Sotira and Neftina, small boats find refuge there even today. If that was the case about the natural structure for the rest made of similar material that lies southern, it can be hypothesized that it was the initial set on top of the natural formation and it was washed inside the harbour due to the waves' action.

#### 5.3.5 Stvi

The cove of Stvi is the second embayment from the east of the southwestern cape of Lemnos. It is neighboring the hill of Plagisou Molos where Agallopoulou<sup>106</sup> located evidence for a prehistoric settlement and reported the breakwater remarking its similarity to those of Ayia Sotira and Neftina. The western side of the cove is embraced by the breakwater extending a natural formation with a southwest-northeast orientation. It is about m 100 in length with a considerable width of about m 50 at its base, which was probably relevant to its depth of foundation. Its base is at about m 6 depth at the tip of the structure and its height exceeds by little the water surface (Fig. 90). The breakwater is constructed with rounded boulders. At the point where it meets the coast, there is a segment with smaller rough stones forming possibly a later

<sup>106</sup> AGALLOPOULOU 1996.



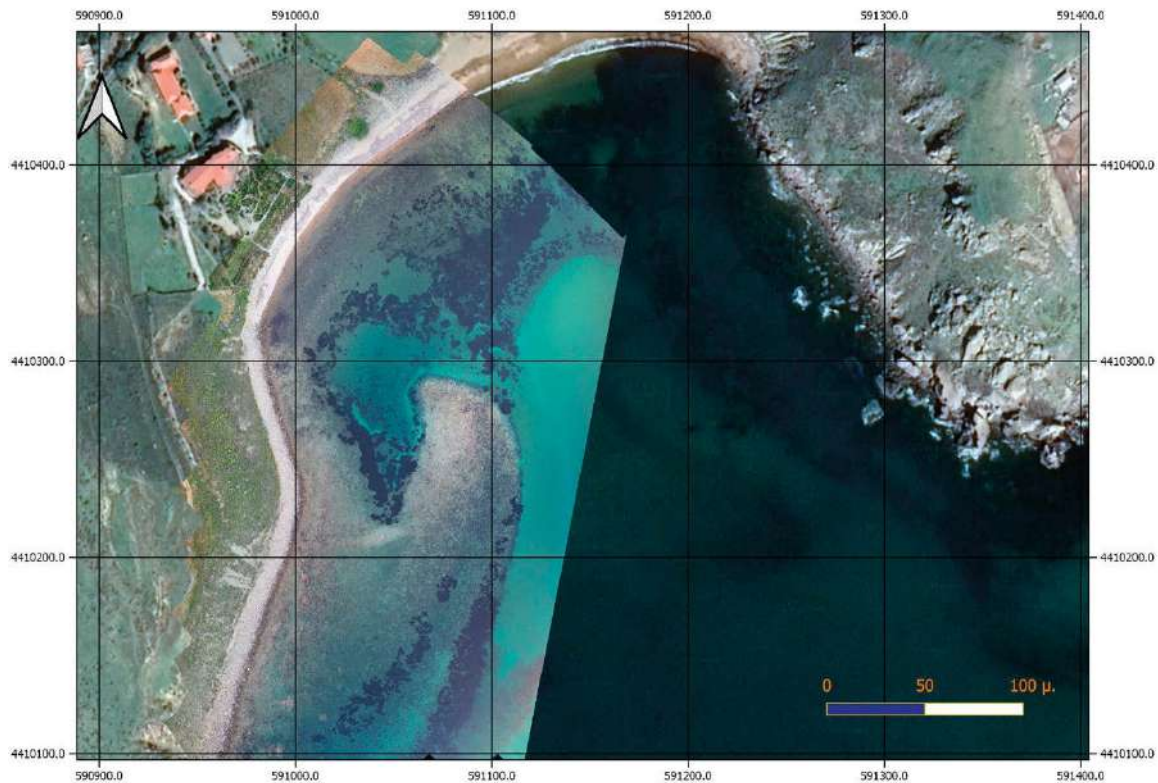


Fig. 90. Orthophoto map of Stvi harbour (proceeded by I. Ktistakis; © Ephorate of Underwater Antiquities).

addition. The survey around the breakwater did not produce any pottery findings that could give any clue of chronology apart from a handle of a possible Hellenistic cylix from the shore.

### 5.3.6 Koukonisi

At the gulf of Moudros there is the small islet of Koukonisi where the excavations of Ch. Boulotis uncovered relics of prehistoric settlement dated from 3200/3000 to at least 1200 BC<sup>107</sup>. We did not have the chance to snorkel around the islet but mapping its perimeter of it from the air gave us the chance to locate anthropogenic relics that look like breakwaters at the northeast of the islet. The area needs more thorough investigation in future missions.

*Theotokis Theodoulou – Giorgos Tsimpoukis*

## 5.4 General remarks about the harbour works

Our first expedition mainly to the northern part of Lemnos gave us the chance to better understanding the relics of harbours we roughly knew from previous reports<sup>108</sup> and also investigating new sites like the ones at Keros, Ayios Charalambos and partially Koukonisi. Although the study of the results is in a primitive stage and of course more investigation and research is needed, some initial assumptions can be made.

At the northern side of the island, namely the broader bay of Pournias, there are harbours in about every km 3-4, taking into consideration Ayia Sotira, Neftina and Kotsinas. In the three first ones, the shape and orientation are the same. These harbours have also a similar stage of preservation of the height of the breakwaters protruding about m 1 over the water surface. They also have only one windward breakwater extending a natural formation and then curving towards the coast to shape the entrance of the harbours at the south. No matter the differences these harbours seem to belong to a common

<sup>107</sup> ΜΠΟΥΛΟΤΙΣ *et alii* 2017.

THEODOULOU *forth.*

<sup>108</sup> ΑΓΑΛΛΟΠΟΥΛΟΥ-ΚΑΛΛΙΟΝΤΖΙΣ 1991; ΑΓΑΛΛΟΠΟΥΛΟΥ 1996;



Fig. 91. Orthophoto map of Kotsinas harbour (© Ephorate of Underwater Antiquities).

harbour network. Similar to Ayia Sotira and Neftina there is also the breakwater at Stvi, which despite its size and altered orientation due to its location at the south-west part of the island bares same characteristics. The latter harbour of Kotsinas is different from the rest in shape and construction material (Fig. 91). They are two breakwaters shaping the entrance at the west but this is reasonable because the entrance is protected from the cape closing Pournias bay from the west. The constructing material is not the same in all harbours. At Ayia Sotira and Neftina the breakwaters are made of big boulders, and the same happens at Stvi breakwater. At Hekaton Kefales, Kotsinas and Keros the breakwaters are made of rubbles with quite smaller stones.

On the other hand, Kotsinas is the only harbour with a clear relation to an adjacent settlement. All the rest, including Stvi at the south, seem to have been constructed in isolated areas. If this is not just a gap in the research, then what was the need of such a network of harbours in constant distance mainly on the northeastern side of the island? This is in fact the flattest area of the island and most appropriate for the cultivation of the famous Lemnian cereals<sup>109</sup>. Given their location on the northern side of the island along with the stage of their preservation yet over water, while at neighboring Lesvos ancient harbours are submerged i.e. Mytilene, Methymna, Antissa, Eressos<sup>110</sup>, a plausible explanation could be the trade of cereals for the Byzantine capital of Constantinople. It would be more effective to load the cargoes of wheat and barley from the place of their production instead of transferring them via land to one specific harbour. Kotsinas is considered as the Byzantine main harbour of Lemnos<sup>111</sup>. Moreover, Lemnos was important for the nautical routes of the northern Aegean as well as for the Byzantine navy which operated as a naval base<sup>112</sup>.

*Theotokis Theodoulou*

<sup>109</sup> PLANTZOS 2022, 102.

<sup>110</sup> THEODOULOU-KOURTZELLIS 2019.

<sup>111</sup> PENNAS 2011.

<sup>112</sup> PLANTZOS 2022, 112-117.



## 6. CONCLUSIONS

This joint Greek-Italian mission represents the continuity of the studies begun a century ago by the IASA and Greek Institutions in the Island of Lemnos and it represents an important event for the history of Italian underwater archeology since it constitutes the first Mission abroad funded by the National Superintendency for Underwater Cultural Heritage.

The underwater archaeological works have been characterized by a strong multidisciplinary approach that yielded new information for both archaeological and geo-morphological data of the island and it will be interesting to relate them to the results of the research conducted to date.

The historical context in which the underwater research was carried out proved to be of particular interest both because of the long history of the island of Lemnos and because of the habitation continuity of coastal sites, characterized by man's interaction with the sea over the centuries.

The large number of submerged and semi-submerged structures that have so far seen only partial study, now has been the subject of systematic research and even if it is necessary in some cases to deepen the archaeological investigations, they already offer interesting ideas and food for thought for understanding the harborage of the island in ancient times. The chance to evaluate the state of conservation of these remains will give the Ephorates the tools to evaluate protection strategies.

The archaeological and geological investigations conducted near the promontory of the ancient city of Hephaistia, where there is a Mesohaline lagoon once interpreted as the city's harbour, have documented a wall structure that constitutes a bridgeway, the function and chronology of which need to be studied.

At the settlement of Hephaistia extending to the southwest on a promontory overlooking the gulf called Ormos Pournias, the remains of imposing defensive walls can be discerned overlooking the sea. Coastal research had made it possible to precisely identify both little-known structures (once referred to as the "remains of a pier") and unpublished structures on the shoreline and in the waters in the gulf of Ormos Pournias. Geo-referenced digital plans were produced, and the wall units were analysed; several phases are attested, leading to various hypotheses on the fragments of the structure in the sea, which are currently being examined in depth.

From a geomorphological point of view, a large, probably natural structure of Quaternary conglomerate outcropping on the surface of the water has aroused considerable interest. Offshore, two different accumulations of transport containers have been identified, i.e. what remains of two shipwrecks: to the north a possibly Hellenistic wreck, and to the south a cargo with late Roman transport containers.

To the south of the geological structure, four macro-areas of great archaeological interest have also been identified relating to what could prove to be other shipwrecks, as well as evidence scattered on the seabed of artefacts belonging to the daily life of the sailors who frequented the bay when their ships were anchored. These findings confirm the centuries-long frequentation of the bay of Ormos Pournias dating back to at least late antiquity.

Diving surveys were also carried out at the so-called protohistoric harbours east of the promontory of Hekaton Kefales, in the bay of Ormos Tigani. The prospections yielded traces of a probably late antique settlement and sporadic fragments of amphorae near the coastline; the presence of a possible wreck cannot be ruled out, given the discovery of wooden fragments that could perhaps be interpreted as the remains of an ancient ship.

In the waters of Poliochni, where the IASA had previously uncovered a Bronze Age fortified settlement of equal importance to nearby Troy, the Italian-Greek underwater mission identified the remains of a shipwreck of an *oneraria* ship with its cargo of late antique amphorae.

Moreover, research conducted by the EUA team led to the detection of three important shipwrecks. The first two were found at a short distance from one another to the west end of the Kotsinas bay. The first is located at a depth of m 1.5-3 and consists of a late roman LR2 transport amphorae cargo, while the second lies at a depth of m 4.5-6 and consists of late classical transport amphorae cargo, belonging to Solocha I and Peparethos I type. The third shipwreck was found just against the Tryghies promontory and comprised rectangular semi-finished sarcophagi and sarcophagi of the lenos type, possibly belonging to the 3<sup>rd</sup> c. AD<sup>113</sup>.

The same team conducted several research to inadequately known or unknown harbour (?) structures, in order to define their nature. In that framework structures in Neftina, Ayia-Sotira, Keros, Stvi, Haghios Charalambos and the bay of Kotsinas have been now more thoroughly documented.

<sup>113</sup> From Poliochni and Ormos Pournias 148 objects were sampled, mainly transport containers and table ceramics, datable to a chronological span ranging from the Hellenistic age to Late Antiquity.

Moreover, the design and implementation of the GIS *The Underwater Cultural Heritage of the Island of Lemnos* constitutes an excellent tool for cataloging and managing the underwater cultural heritage.

This joint Greek-Italian mission was carried out to the utmost satisfaction of the Authorities and participants, the scientific synergy, the commonality of purpose aimed at the knowledge of the history of the Mediterranean, and the excellent iteration skills among all the scholars meant that the international experience brought new discoveries and highlighted an extraordinary underwater archaeological potential. Given the results achieved after only a few weeks of working together, it shows how scientific synergy represents an excellent basis for obtaining good scientific results.

The scientific synergy, the commonality of purpose aimed at the knowledge of the history of the Mediterranean, and the excellent iteration skills among all the scholars meant that the international experience brought new discoveries and highlighted an extraordinary underwater archaeological potential of the Lemnos Island.

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