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**Seascape archaeology of the harbour of Constantinople  
at Küçükçekmece Lake basin  
– land and underwater surveys, communication  
and economical networks, mobility**



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## ABSTRACT

The aim of the project is to investigate the largest port of Byzantine Constantinople (from the 6th to the 14th century) as requested by the postulates of the so-called 'seascape archaeology'. This project approaches 'seascapes' as the synergy of maritime and landscape archaeology. We use 'seascape' as a holistic term to describe the depth and complexity of human relations with the sea, the modes of human habitation of the sea, the importance of the sea to maintaining livelihoods, and the connections between land and sea.

The archaeological sites that are the source basis of our study are located in the basin of Lake Küçükçekmece, connected by the Myrmex Strait to the Sea of Marmara, 18 km west of the Bosphorus, behind the walls of Constantinople, in the European part of Thrace. The complex of port sites situated in the basin of Lake Küçükçekmece forms the largest port of Constantinople. The total length of its quays exceeds 3 km. It is larger than all previously known ports of the imperial capital put together. This huge port complex of Constantinople was previously completely unknown to the scientific world.

We will carry out our research in the field of the seascape archaeology in the Küçükçekmece lake basin within of two zones, i.e. land and water (lake basin and sea coast). This research goal will be achieved through the examination of the following research problems:

(1) What were the physical features and chronology of the port in the Lake Küçükçekmece basin? In order to obtain this data we intend to register and document both onshore and underwater sources using the methods of modern land and underwater archaeology.

(2) What were the directions and how extensive were the port's communication and trade networks? This research aims to investigate (a) the network of shipping links and (b) the network of commercial links of the port in the Lake Küçükçekmece basin. We intend to reconstruct the shipping network on the basis of typological and petrographic analyses of the anchors (mainly stone elements of the anchor load) deposited in the harbour zone. The reconstruction of the commercial network of the port will be carried out on the basis of analyses of movable monuments discovered during excavations. One of the most important categories of sources particularly predisposed to this type of research are the very numerous finds of amphorae, from the analysis of which we can establish both the approximate area of their origin and the time of their making. The reconstruction of the port's trade links will also be carried out on the basis of finds and analyses of rock materials, coins, scales, oil lamps and other imported artefacts.

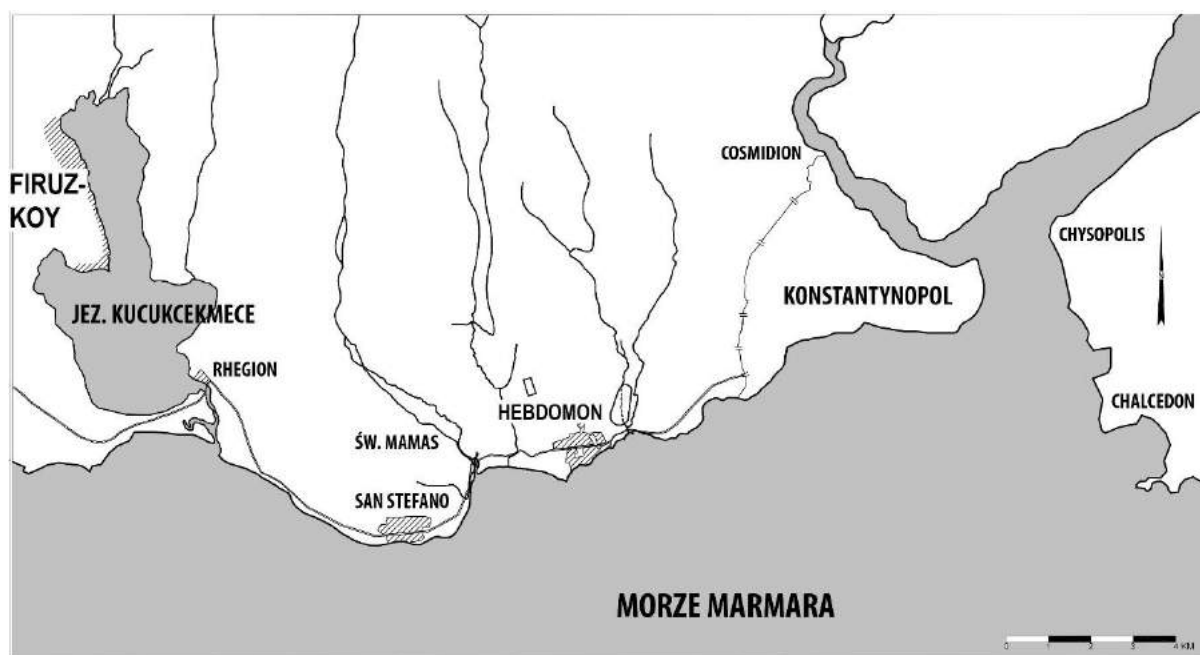
(3) Where did the people who met in the harbour come from? This research will be based on human remains previously registered in two cemeteries on the Firuzköy peninsula. We will use strontium and oxygen isotope analyses to determine the areas from which the dead came. The mobility studies offers a new perspective on the social context of life within of the harbour, seafaring and commercial exchange too.

The sources recorded and studied will provide a basis for interpreting the culture of the users of the port located in the Küçükçekmece Lake basin according to the approach of seascape archaeology.

This is the interdisciplinary project that combines archaeology, underwater archaeology, bioarchaeology, theoretical archeology and history too.

## 1. Research project objectives

The aim of the project is to investigate the large port of Constantinople (from the 6th to the 14th century) as requested by the postulates of the so-called ‘seascape archaeology’. This project approaches ‘seascapes’ as the synergy of maritime and landscape archaeology. We use ‘seascape’ as a holistic term to describe the depth and complexity of human relations with the sea, the modes of human habitation of the sea, the importance of the sea to maintaining livelihoods, and the connections between land and sea. Recent archaeology has highlighted seascape as a resource locus as well as a formative influence on identity, sense of place, and life history. ‘Seascape’ has also been invoked to invert traditional land-centred views in archaeological interpretation (the above demands were formulated by P. McCall Howard and C. Wickham-Jones – the organisers of the session “Seascape: anthropological and archaeological approaches to the human habitation of the sea”, organized by the Association of Social Anthropologists of the UK in 2009 in Bristol).



The archaeological sites that are the source basis of our study are located in the basin of Lake Küçükçekmece, connected by the Myrmex Strait to the Sea of Marmara, 18 km west of the Bosphorus, behind the walls of Constantinople, in the European part of Thrace. The complex of port sites situated in the basin of Lake Küçükçekmece forms the largest port of Constantinople. The total length of its quays exceeds 3 km. It is larger than all previously known ports of the imperial capital put together. Previously only small relics of the harbour quays were known to have been unearthed within the city of Rhegion, located on the south-eastern shore of the lake, excavated in 1938-1942 and 1948 (Ogan 1939; Ogan, Mansel 1942). The largest part of the port foundation as well as the ecclesiastical complex was discovered in 2007 on the

Firuzköy peninsula on the western shore of the lake (Aydingün, Öviz 2008; 2009). Further wharves were discovered as a result of underwater sonar surveys, aerial photography and surface and excavation research carried out across the lake basin between 2014 and 2021 as a result of Turkish-Polish research projects including the project financed by the National Science Centre (Öviz 2017; Stanisławski, Aydingün, Öviz 2016; Stanisławski 2017; Stanisławski, Aydingün 2021; Stanisławski, Szymański 2021).

This huge port complex of Constantinople was previously completely unknown to the scientific world. Based on searches of Byzantine written sources, we have established that this port was referred to as ἐπίγειον...τῆς πόλεως "port of the City" – a port belonging to/under the jurisdiction of the City i.e. Constantinople, as recorded in the 6th century by Agathias in "Historiae" (v. 24-25, p. 167). Its location behind the walls of the capital follows a similar pattern of Athens and the port of Piraeus, Rome and Ostia. It is also a unique site in the whole Mediterranean zone, from where only single better excavated port sites are known so far. These include Marea in Egypt studied by Polish archaeologists (Babraj 2013; Babraj, Szymańska 2013), Aquileia on the Natisone River flowing into the Adriatic Sea in Italy (Arnaud-Fassetta, et al 2003; Groh 2012; Pratali Maffei, Canevese, De Gottardo, Pizzol 2019) and Thessaloniki (Βασδραβέλλη 1963; Vickers 1970; Φωτιάδης 1999-2000).

We will carry out our research in the field of the seascape archaeology in the Küçükçekmece lake basin within of two zones, i.e. land and water (lake basin and sea coast). This research goal will be achieved through the examination of the three following research problems:

**PROBLEM #1: What were the physical features and chronology of the port in the Lake Küçükçekmece basin?**

We will be interested in the characteristics of the port such as its size, spatial layout, quay construction, time of construction and period of operation. In order to obtain this data we intend to identify and document both onshore and offshore sources. This data is to be obtained using standard survey and documentation methods in modern archaeology and underwater archaeology.

**PROBLEM #2: What were the directions and how extensive were the port's communication and trade networks?**

The source base for the research carried out within the framework of this task will firstly consist of artefacts discovered as a result of our excavations carried out directly in the harbour, and secondly of artefacts discovered as a result of previous excavations. To date, a very large number of amphorae have been discovered on the Firuzköy peninsula and in the basin of Lake Küçükçekmece (currently our source base consists of several thousand artefacts; the project will use about a thousand better preserved amphorae) and several dozen other imported artefacts. On the basis of the analysis of these finds, we intend to establish their areas of origin and their chronology (the places and times of production of the different types of amphorae are quite well developed in the literature) (Kassab Tezgör, Inaishvili eds. 2010).

**PROBLEM #3: Where did the people who met in the harbour come from?**

This research will be based on human remains previously unearthed in two cemeteries on the Firuzköy peninsula. We will use strontium and oxygen isotope analyses to determine the

areas from which the dead came (Bentley R.A. 2006). The mobility studies offers a new perspective on the social context of life within of the harbour, seafaring and commercial exchange.

The sources recorded and studied will provide a basis for interpreting the culture of the users of the port located in the Küçükçekmece Lake basin according to the approach of seascape archaeology.

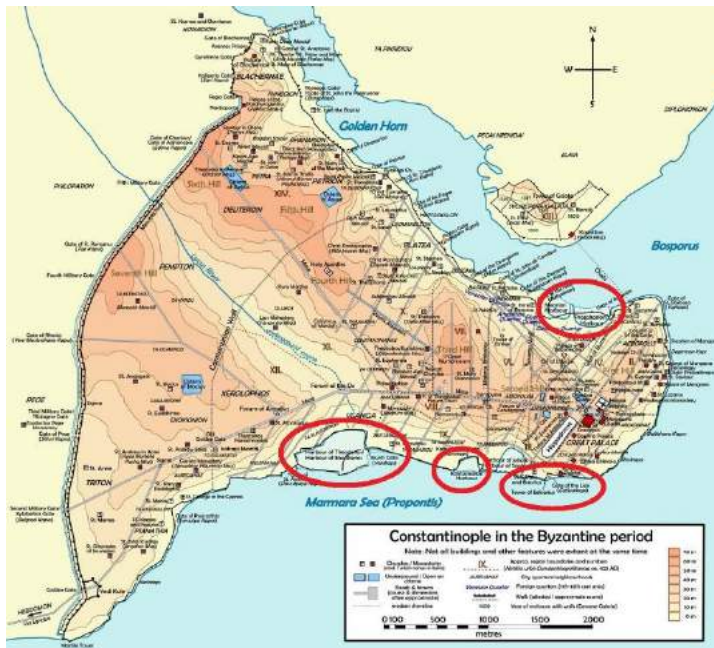
The planned research concerns the period from the sixth to the fourteenth century. However, the analysis of the sources and their research will be carried out by dividing them into four fundamental periods of port functioning in the Küçükçekmece lake basin, which we have identified earlier (Stanisławski, Aydingün 2021). These are: period I – dated to the 6th-7th century, period II – the 8th-9th century; period III – lasting from the turn of the 9th and 10th centuries until around the mid-11th century, period IV with chronological coordinates covering the second half of the 11th century and the 12th century; and period VII – dated to the 13th and the beginning of the 14th century.

This is the interdisciplinary project that combines archaeology and history too. This is because we also plan to make use of the rich collections of written and cartographical sources that relate both to the area around Lake Küçükçekmece and to its wider settlement context, which consists of the suburbs of Constantinople located on the shores of the Sea of Marmara (Külzer 2004; 2008; 2010; Stanisławski, Aydingün 2018; Aydingün, Stanisławski, Kaya, Aydingün, Enez, Öviz 2019; Aydingün, Kaya, Stanisławski, Aydingün, Enez, Özdemir, Öviz 2020; Aydingün, Külzer, Aydingün, Makaroğlu, Öviz, Kaya, Stanisławski, Enez 2020). We have collected and analysed these sources previously (e.g. Węglarz 2017a; 2017b), notably in two monographs currently in print (Stanisławski, Aydingün 2021; Stanisławski, Szymański 2022).

## **2. Significance of the project**

### **The current state of knowledge**

The basis of our knowledge of the ports of Constantinople to date was for a number of years the fundamental work by W. Müller-Wiener entitled "Die Häfen von Byzantion-Konstantinopolis-Istanbul" (Tübingen 1994). Conclusions made mainly on the basis of written sources and, to some extent, the still partially preserved Julian port and the imperial harbour of Bukoleon, as well as the relatively few archaeological sources known at the time, boiled down to the following findings. Constantinople had five main ports, two of which were legacies of the Greek Byzantine period, i.e. the ports of Bosphorion and Neorion located in the bay of the Golden Horn, as well as the ports built later on the Marmara coast, i.e. the ports of Leo/Zophia, the port of Theodosius and the imperial harbour of Bukoleon.



The main harbours of Byzantine Constantinople  
 (Cplakidas, Wikipedia.org, 2008, [https://commons.wikimedia.org/wiki/File:Byzantine\\_Constantinople.png](https://commons.wikimedia.org/wiki/File:Byzantine_Constantinople.png) [2.05.2020])

The complete breakthrough came when excavations were initiated in Istanbul's Yenikapı district, carried out in connection with plans to build an underground railway line connecting the European and Asian parts of the city under the Bosphorus. The location of the main station was planned in Yenikapı. As a result of the large-scale excavations carried out over many years, huge areas of the port of Theodosius have been uncovered there, 38 perfectly preserved wrecks of various types of Byzantine boats, ships and vessels, as well as millions of antiquities (Kiziltan 2010; Kocabaş 2010; 2012; Kocabaş, Özsait Kocabaş 2012). These sources have been systematically compiled and published. They now form the basis of studies on the material culture of the community of Byzantine Constantinople. The results of these studies have also become the basis for discussions held in international scientific circles during specialist scientific conferences (of particular importance in this respect was the "BETWEEN CONTINENTS. 12th International Symposium on Boat and Ship Archaeology", organized in Pera Museum in Istanbul on 12-16.10.2009) and scientific studies drawing a new image of the maritime face of Constantinople - its ports, navigation, boatbuilding and sea trade.

Polish scholars are also active participants in this discussion. This is reflected in the chapter by K. Marinow dedicated to ports published in a fundamental work of Polish Byzantinist studies in recent years entitled "Constantinople New Rome. City and People in the Early Byzantine Period" edited by M.J. Leszka, T. Wolińska (Warsaw 2011) and the scientific symposium organised in Szczecin in 2014 and the resulting publication 'City at the Crossroads of Seas and Continents. Early and Middle Byzantine Constantinople as a port city', edited by M.J. Leszka and K. Marinow (Łódź 2014) with an introduction by M.J. Leszka entitled "Constantinopolitan ports of the 4th-12th centuries", summarising the state of research in this area at the time.

This theme was also developed internationally, in a work entitled "Die Byzantinischen Häfen Konstantinopels", edited by F. Daim (Mainz 2016), where it was also extended to the issue of the smaller ports of the capital, located on its periphery such as the ports of the suburb of Hebdomon, the harbours in the district of St. Mamas and Hierapolis on the Bosphorus.

However, all the above fundamental publications are silent about the largest port of the capital of the Byzantine Empire!

The first discoveries of traces of settlement on the Firuzköy peninsula were made in 2007 as a result of surface investigations carried out by the "Istanbul Prehistoric Survey Project". Excavations were initiated in 2009 with the 'Küçükçekmece Lake's Basin Bathonea Excavations' project. Both research programmes are led by Prof. Sengül Aydingün of Kocaeli University, Turkey (Aydingün 2013a; 2013b; Aydingün and Öniz 2008; 2009; Aydingün, Güldoğan, Heyd, Öniz, Planken 2009; Aydingün, Aslan, Kaya 2013).



*Contemporary aerial photograph of the Firuzköy Peninsula in the winter taken from the south-east (photo by M. Öztürk)*

From 2014, the Küçükçekmece Lake basin has also been an area of joint Turkish-Polish archaeological research, carried out on the Polish side by the Institute of Archaeology and Ethnology of the Polish Academy of Sciences and the Institute of Classical, Mediterranean and Oriental Studies of the University of Wrocław. In 2015-2018, the project 'Constantinople-Küçükçekmece – the destination port of the route from the Varangians to the Greeks, the Rus' Byzantinization centre' was implemented, the results of which were summarised in two monographs (Stanisławski, Aydingün 2021; Stanisławski, Szymański 2021) and a number of articles (Stanisławski 2017; 2018a; 2018b; Stanisławski, Aydingün, Öniz 2016; Stanisławski, Aydingün 2018; Stanisławski, Aydingün, Enez, Szymański 2020; Węglarz 2017a; 2017b). The research in Eastern Thrace is currently being conducted within the framework of the research task "IOTA-CHI – Christianisation of the cultural landscape of Thracian periphery of Constantinople in the Byzantine period, in the face of modern civilisation, social and political

challenges", funded by IAE PAS, University of Wrocław and partners from Turkey (Stanisławski, Aydingün, Enez, Szymański 2020). In recent years we have also carried out extensive reconnaissance of the water areas within the Bosphorus Strait and the Küçükçekmece and neighbouring Büyükçekmece lakes. Relics of a harbour and a dam were also discovered there (Aydingün, Külzer, Aydingün, Makaroğlu, Öniz, Kaya, Stanisławski, Enez 2020) and the ruins of the Byzantine settlement of Episkopia (Aydingün, Stanisławski, Kaya, Aydingün, Enez, Öniz 2019; Aydingün, Kaya, Stanisławski, Aydingün, Enez, Özdemir, Öniz 2020) and the ruins of Athyra (Stanisławski, Aydingün 2018).

As a result of the research we have carried out to date on the Firuzköy peninsula, relics of monumental religious buildings have been discovered there. These are the basilica church, the bathhouse, the martyrium with the grave of an unidentified saint. Thousands of artefacts have also been unearthed. This huge complex is defined by two functions, i.e. sacral and port (Stanisławski, Aydingün 2021).

The relics of the harbour quays extend over a total length of more than 3 km. They can be found on both sides of the lake. The centre of the harbour area was located on the Firuzköy peninsula. In addition, the harbour located directly in the town of Rhegion and the harbour part serving most probably for the unloading of grain ships already located directly on the shore of the Sea of Marmara in Beylikdüzü (Öniz, Kaya, Aydingün 2014), identified with Angurina, were important elements of this establishment. Many of the above relics of the harbour quays are preserved in ruins and perfectly visible. Others are submerged and located within the lake basin. Still others lie underground in the inland belt. Within the basin of the lake, directly at the quays, there are also numerous artefacts, mainly broken amphorae, but also marble architectural details including elaborately decorated stone ship anchors, two marble sarcophagi. As a result of our underwater sonar survey we also discovered relics of sunken lighthouse foundations, sunken quays and iron anchors lying on the bottom. The survey of the Marmara Sea in the area near Küçükçekmece Lake led to the recording of several shipwrecks lying on the bottom.



*Beylikdüzü-Angurina: relics of the port most likely to serve ships carrying grain, view from the sea (after H. Öniz)*



### **Undertaking the postulated research problem is dictated by the following considerations:**

1- Constantinople and the areas in its immediate vicinity were, apart from Rome, one of the most important centres of the formation of our civilisation. Therefore, there is an exceptional concentration of sources concerning the history and culture of Europe.

2- The settlement complex discovered on the Firuzköy peninsula on Lake Küçükçekmece is the largest archaeological discovery in Istanbul since the Yenikapı district survey.

3- This site is researched every year by a joint Turkish-Polish research mission since 2014 carried out by IAE PAS and the Institute of Classical, Mediterranean and Oriental Studies at the University of Wrocław.

4- Archaeological research conducted by us in recent years in this area, under the Polish-Turkish cooperation (Grant of the National Science Centre, 'Constantinople-Küçükçekmece – the destination port of the route from the Varangians to the Greeks, the Rus' Byzantization centre') (Stanisławski, Aydingün, Öniz 2016; Stanisławski 2017a), resulted in discovering a vast wealth of sources concerning the Byzantine culture.

5- The results of both previous and planned research significantly enrich the educational offer, being a topic of discussion during lectures conducted in the field of 'Archaeology of Byzantium', which have been in the study programme of the Institute of Classical, Mediterranean and Oriental Studies of the University of Wrocław for several years. Students of both faculties also participated in form of practice in the excavations conducted on the Firuzköy Peninsula and in field studies, the purpose of which was to collect sources concerning the Byzantine settlement in the discussed area. On the materials obtained in this way, one master's thesis at the Institute of Classical, Mediterranean and Oriental Studies of the University of Wrocław was written and doctoral theses are being implemented and planned.

6- The significance that Turkey has in today's world and in Europe makes the history, heritage and culture of this country draw more and more interest in our country. An expression of this are specialist studies in the field of Turkology, covering learning the Turkish language, which was initiated in 2018 at the Institute of Classical, Mediterranean and Oriental Studies of the University of Wrocław. The submitted project will create opportunities for students of this field of study, by participation in planned studies, of contacts with contemporary Turkish culture and language.

### **Justification of the innovatory nature of the research:**

The researcher undertaking today the study of ports of late antiquity and the early Middle Ages, and especially of the Byzantine area, feels helpless because the state of these studies is vestigial. Apart from the port of Marea, we do not have any detailed studies of their construction. Consequently, we have almost no comparative material. Consequently, any research on the ports of the Byzantine period is almost pioneering.

The programme includes both excavations on land and underwater research. In this case we intend to transplant our experience gained previously in the Baltic Sea area for research on the harbours of early medieval Wolin to the Turkish and Mediterranean area. These were carried out in the 1990s jointly by the project author and George Indruszewski of the Maritime Museum in Roskilde, Denmark (Indruszewski 2004).

Byzantine archaeology is still dominated by studies of a typological and comparative nature and it is difficult to discern any newer theoretical reflection. Therefore, the application of port

research methodologies from seascape archaeology will undoubtedly have an innovative character.



*Firuzköy: site II in the aerial photograph (photo by M. Öztürk)*

Mobility studies using strontium and oxygen isotope analyses are still innovative. Although this method has been known for a long time, its use is still rare. This is due, among other things, to the relatively high cost of analyses in past years and the lack of widespread access to laboratories. The small number of studies also meant that the necessary comparative material characterising different areas, which is necessary to interpret the results obtained for a given site, was not available.

The broad interdisciplinary study of different categories of sources from different environmental contexts (land and water), the use of different research methods (land excavation, underwater research) documentation (photogrammetry, the digitalization and modelling of space, objects and artefacts), analysis (typological-comparative, isotopic analysis), methodology (seascape) proposed in this project can lead to the creation of an original scientific study. It may become a problematic, methodological and theoretical model for the study of ports, shipping, communication and exchange in the future. This proposal may be particularly interesting in view of the almost complete lack of comprehensive studies of Mediterranean ports of late antiquity and the Middle Ages.

The excavations planned in the harbour will be carried out using the stratigraphic method. Consequently, the discovered artefacts will form assemblages with specific chronological parameters, occurring in specific stratigraphic contexts. This is a new quality in the Byzantine archaeology of the Mediterranean, where the exploration of objects without taking stratigraphy into account is predominant. Therefore, the excavation results will be of particular value for comparative studies for researchers working on other settlements.

Subsequent AMS 14C dating of the Firuzköy peninsula settlement (in combination with the results of stratigraphic studies and the compilation of various categories of artefacts) will result in one of the better radiocarbon dated sites stratigraphically studied from the Constantinople

area and Byzantine settlements of the entire Mediterranean, given our previous 14C analysis and stratigraphic studies.

Due to the stature of the position and the problematic nature of the research, the results of our study are likely to be published in mainstream journals or editors and reach a wide audience.



*Firuzköy: plan of the relics of the port quay buildings (drawing by A. Kubicka)*

### **The importance of project results for the development of a given scientific field, discipline and the development of civilisation:**

A huge value of the project are extremely rich and important for our culture and civilisation sources constituting the research base. The result of the project will be the discovery, documentation and study of a large number of sources of fundamental importance for studies on European and Byzantine culture.

The project will broadly expand the currently relatively poor knowledge about the suburbs of Constantinople.

We will learn a completely unknown and unique dimension of the Byzantine culture.

Methodological grounds, following the accomplishments of contemporary humanities, will open up completely new cognitive spaces for studies on the Byzantine culture, which will enrich our knowledge of man, his culture and our civilisation to a large extent.

The Byzantine heritage is not particularly popular amongst the Turkish scientific and conservation circles because it is perceived as foreign, both religiously and culturally (implicitly 'Greek'). Polish-Turkish scientific cooperation contributes to changing this attitude.

The submitted project has an interdisciplinary character, which results from the scope of the studied sources (archaeological, architectural, natural, onomastic, philological, written ones) and planned methods of documentation, analysis and research. It covers studies in the field of archaeology, architecture, bioarchaeology, history, photogrametric and digital methods of documentation and analysis, exact sciences (AMS 14 C dating of masonry mortars), Greek and Latin philology as well as history (studies of ancient, Byzantine and Latin written sources; inscriptions, sphragistics and onomastics).

Isotopic studies of human remains will provide important new data on mobility in the Mediterranean (and perhaps beyond) world during the Late Antiquity and Byzantine periods. The analyses will furthermore provide data that will expand the world database on the isotopic characteristics of the extremely important and indeed not infrequently crucial region of Constantinople. They will undoubtedly be used in any further studies on mobility in the Mediterranean zone as well as in the wider area.

The planned project is integrated with the student education system in the field of culture, archaeology, history and Byzantine philology, as well as studies on contemporary Turkish

culture and language in Institute of Classical, Mediterranean and Oriental Studies University of Wrocław.

The project will continue the activities of the ‘Turkish-Polish Network of Historical Dynamics and Social Evolution’ established in 2017 by a number of Polish (Institute of Archaeology and Ethnology of Polish Academy of Sciences in Wrocław, Institute of Classical, Mediterranean and Oriental Studies of the University of Wrocław, Institute of Archaeology of the Nicolaus Copernicus University in Toruń, Laboratory of Absolute Dating in Skala and Turkish (Department of Archaeology of the University of Kocaeli, Department of Archaeology of the Selçuk University in Konya, Department of Art History of the Selçuk University in Konya, Centre for Underwater Studies in Kemer, Institute for the Study of Mediterranean Civilizations in Antalya, the Medeniyet University in Istanbul, the Bilgi University in Istanbul) scientific institutions. This organization is the infrastructural base for Polish-Turkish research carried out in Turkey.



*Firuzköy: relics of the port quay (photo by B. Stanisławski)*

### **3. The concept and work plan**

#### **State of preliminary and initial research:**

The first excavations in the areas lying around Lake Küçükçekmece were conducted on the south-eastern shore of the basin by E. Mamboury in 1930. The researcher identified the settlement relics discovered there on the basis of ancient sources as the city of Rhegion (Ogan, Müfid Mansel 1942).

The subsequent archaeological research in the Küçükçekmece Lake basin, described above, was only initiated in 2007. They also include joint Turkish-Polish research projects, summarised in a recent book entitled "The Byzantine settlement in the Firuzköy Peninsula near Constantinople" (Stanisławski, Aydingün 2021).

Due to the spectacular discoveries of several monumental religious buildings that have been unearthed on the Firuzköy peninsula, they have also been the main focus of our research work on the Firuzköy peninsula so far in the past years. The large harbour area has so far only been documented in spots and only photographically. Exceptions to this are the segmental sounding reconnaissance of the quays at several locations on the peninsula and a 50 m long section of the quay, which we excavated in 2014, documented with a digital three-dimensional model and on aerial photographs.

**Plan of research:**

The plan for realizing this project is presented in the following:

**TASK #1 (regarding problem #1): Recognition and examination of the relics of the harbour (within of the land, lake and sea areas), preparation of their documentation and description;**

The archaeological investigations of the harbour are planned to be divided into:

1.a. Searching of written sources on Küçükçekmece Lake, its harbour and navigation; search of ancient and Ottoman cartographic sources in the collection of the Ottoman Archives in Istanbul (they are an important and interesting source of information on changes in the shoreline and extent of the lake basin); search of artefacts and scientific documentation from pre-war and rescue archaeological investigations in Rregion in the collection of the Istanbul Archaeological Museum.

1.b. Completion of technical documentation of the site and all relics of harbour wharves still preserved and visible in the field (both on land and submerged within the lake), occurring within the Küçükçekmece Lake basin and the adjacent Marmara Sea area in Beylikduzu, and plotting them on a master plan.

The surface documentation will include the following elements: design and measurement of the survey grid; establishing in field a grid of fixed reference points related to the local coordinate system, by arranging a dozen or so black and white HDS targets (these points will be used to precisely locate architectural relics scanned 3D in the field); creation of a contour map (hypsoetry with applied contour lines); creation of a Digital Surface Model, containing information on the landform, texture of the site and elements of natural origin found there, as well as those originated as a result of human activity; creation of an orthophotomap; creation of a virtual terrain model of selected major areas.

The architectural harbour remains and archaeological objects discovered as a result of this work, as well as the settlement points and individual artefacts will be documented: a) by GPS and scanned. The discovered artefacts will be catalogued, documented in photographs, selected in drawings, described; b) documenting and describing the location of individual architectural structures present in the studied area on contour plan, Digital Surface Model and orthophotomap; c) documenting of architectural structures in the form of 3D models, created with the use of photo scanning, consisting in processing of images into 3D models and orthoimages (plans and elements of preserved walls), description of them; d) recognition of spatial layout and stratigraphy of selected major architectural structures by means of archaeological test trenches.

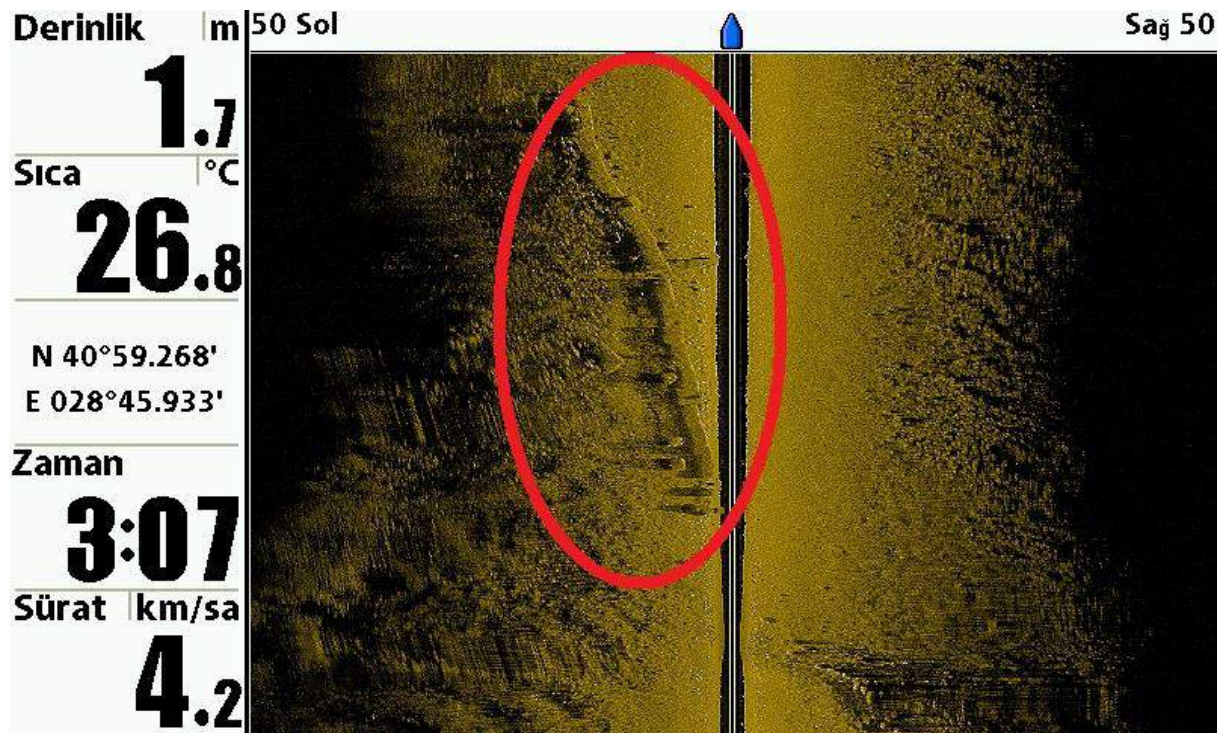
1.c. Carrying out "surface" research of the near shore zone of the lake (a strip of shallows approx. 5 m wide from the shore) in order to register the monuments lying there (including two sarcophagi, marble architectural details, stone elements of anchors, amphorae), to map them using the planigraphic method, to prepare their drawing and photographic documentation, description and analysis.

1.d. Archaeological excavation of the harbour area planned in the central part of the settlement complex on the Firuzköy peninsula at Site II. The planned trench will measure 5 m by 50 m. The excavations will be carried out using a stratigraphic method. The aim is to 1) expose, document and study the construction of the harbour quays in its centre, and 2) record the assemblages of movable material cultural artefacts that were handled within the harbour.

1.e. A detailed underwater sonar survey of the coastal zones (approximately 100 m from the shore) in all areas of the stone harbour quays within the Küçükçekmece Lake basin. The aim of the survey is to record and document the artefacts lying there.

1.f. An archaeological underwater survey (classical underwater survey) in the coastal area of the Sea of Marmara in the vicinity of the Strait of Myrmex and the port of Beylikduzu to investigate and document the known wrecks of six ships in this area.

In order to carry out the above task, we plan to conduct two months of field research each year, which will include excavation and underwater surveys.



*Küçükçekmece-Rhegion: relics of sunken walls recorded during underwater sonar research (after H. Öniz)*

**TASK #2 (regarding problem #2): What were the directions and how extensive were the port's communication and trade networks?**

The next stage of the research aims to investigate (a) the network of shipping links and (b) the network of commercial links of the port in the Lake Küçükçekmece basin.

We intend to reconstruct the shipping network on the basis of typological and petrographic analyses of the anchors (mainly stone elements of the anchor load) deposited in the harbour zone.

The reconstruction of the commercial network of the port will be carried out on the basis of analyses of movable artefacts discovered during excavations carried out on the Firuzköy peninsula and archival material from the Rhegion excavations.

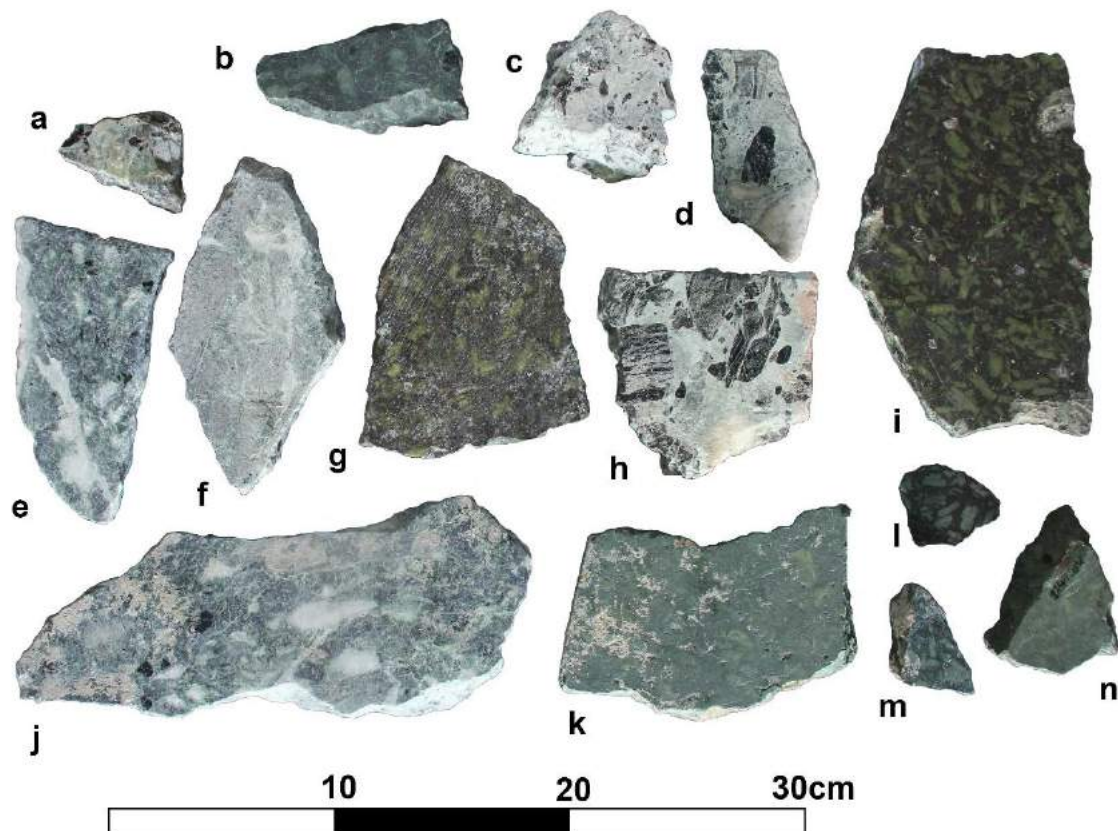


*Firuzköy: amphora discovered during excavations in the 2020 season (photo by B. Stanislawski)*

One of the most important categories of sources particularly predisposed to this type of research are the very numerous finds of amphorae, from the analysis of which we can establish both the approximate area of their origin and the time of their making. So far, fractions of several thousand amphorae have been discovered on the peninsula. Our research will be carried out on the basis of about 1000 amphorae that are best preserved. On the basis of our preliminary research to date, we were able to establish the occurrence of amphoras in the harbour from Palestine, Cyprus and Cyprus, the islands of Chios and Kos, Ephesus and Sardes, North Africa from the area of Tunis and Egypt and from the area of Georgia.

The reconstruction of the port's trade links will also be carried out on the basis of finds and analyses of rock materials, coins, scales, oil lamps and other imported artefacts. Finds of 'African Red Slip' pottery, which was produced in North Africa in what is now Tunisia, are very numerous. Rock materials were imported from outside: for example *verde antico* marble, which was quarried near the town of Atrax in Thessaly, in Karystos and Laconia. Another species of marble discovered on the peninsula of Firuzköy comes from the island of Naxos. Porphyry, on the other hand, has been excavated in Egypt. A bright yellow *giallo antico* marble

imported from the Tunis area is an import. Very numerous architectural details made of white marble imported from the island of Prokonnes in the Sea of Marmara bear witness to local contacts. Bitumen is also imported. A cross made of amber is an exception. It has close analogues among the findings from Novgorod in Rus. Several coins were minted in Thessalonica. An inscription on a fraction of an amphora is a record of some kind of transaction, possibly acceptance or release of goods. The evidence of trade is a lead seal and a weight for scales and a fragment of a balance. The inscription of *John apo eparch* on one of the seals can be connected hypothetically with the eparch - an imperial official responsible for trade and the stay in the harbour of foreigners engaged in trade.



*Firuzköy: imported fragments of marble monuments (photo by B. Stanisławski)*

**TASK #3 (regarding problem #3): Investigation of harbour mobility by isotopic analyses (oxygen and strontium) of human remains buried in cemeteries excavated on the Firuzköy peninsula**

The mobility of people who visited the harbour on the Firuzköy peninsula is to be investigated on the basis of the remains of people whose burials were unearthed on the peninsula. So far, the remains of 56 individuals have been discovered buried within two cemeteries. Their state of preservation is mostly very good. The remains of these people will be examined using the strontium and oxygen isotope analysis method. This method makes it



possible to determine approximately the area where the individual spent his first years of life. The study will be based on samples taken from 35 individuals and 20 animal bone and rock samples to determine the local isotopic background.

**Strontium isotopes** – stable strontium isotopes studies can identify indigenous people and first-generation migrants who have come from other areas. Based on this type of research, one can also approximately try to determine the area they came from. Such studies can help determine the mobility of a population - whether they lived in the places where they were born and spent their childhood, or whether they moved between regions. It can also help to determine whether those buried in the cemetery were strangers or local. Strontium research uses the presence of different strontium values in different areas, which results from the diversity of the geological substrate (different strontium content depending on the type and age of the rocks).



*Firuzköy: skeletal graves discovered on the peninsula*

**Oxygen Isotopes** – stable oxygen isotopes studies are used to determine the local or foreign origin of the deceased. They are based on the different proportion of oxygen isotopes present in water, which is due to climate differences. The samples are taken from tooth enamel. The combination of the results of both studies usually gives the best results. In this case, the studies of strontium and oxygen isotopes are made from the same samples.

The initial stage of the work will consist in selecting osteological material for isotopic analyses. For research on the origin (strontium and oxygen), human teeth should be taken (samples are taken from the enamel) – 1 sample, 1 tooth, preferably M1 (1 molar) or P1/P2 (premolars). In order to determine whether a person has changed place of residence during their lifetime, the optimal result can be obtained based on the analysis of the M1 tooth (the first to

mineralise) and M3 (the last molar, the last to mineralise). Strontium and oxygen studies are best performed on the same teeth. The sample is prepared together, and then the strontium and oxygen studies are performed separately. Since stable carbon isotopes are also obtained during oxygen examination, they can also be used for mobility testing in combination with strontium isotopes.

The skeletons from which the samples (teeth) for isotopic analyses will be taken, will then be described in terms of their inventory, state of preservation and characteristics of biological profiles (i.e. sex, age, lesions). The archaeological context of the selected skeletons will also be studied, based on archival documentation from excavations. Photographic documentation will also be made. A separate selection process will concern the archaeozoological materials from excavations and samples of local rocks, based on which the local isotopic signature (background) will be established. Isotopic analyses will be performed at the Isotope Laboratory of the University of Adam Mickiewicz in Poznań.

We intend to examine using isotope analyses (strontium and oxygen isotope analyzes) (Bentley 2006) selected 35 individuals and 20 samples of animal bones (of species that migrate little) discovered during excavations and local rocks in order to determine the local isotope signature (background) for Firuzköy, necessary for the interpretation of the obtained results. The obtained results of the analyses will be compared with mainly in relation to the results of our own research and the source database for the Anatolian region and the Mediterranean area, collected as a result of mobility studies carried out by means of isotope studies (mobility studies of Byzantine dead buried in the area of the ecclesiastical and pilgrimage centre at Hierapolis in Anatolia), conducted by Megan Wong from Simon Fraser University in Canada (Wong, Brandt, Ahrens, et al 2018; Wong, Grimes, Steskal, et al 2021).

The mobility studies offers a new perspective on the social context of life within of the harbour, seafaring and commercial exchange.

#### **TASK #4: Interpretation and conclusions**

The sources recorded and studied will provide a basis for interpreting the culture of the users of the port located in the Küçükçekmece Lake basin according to the approach of seascape archaeology.

### **4. Methodology and research schedule**

The following methods and tools will be used at individual stages of the project implementation.

In order to design and measure the geodetic grid, make contour maps of selected areas, establish net of coordinates systems and a fixed georeference grid of sites by total station (necessary for georeferencing the Digital Surface Model, orthophotomap, 3D models of architectural relics and 3D documentation of test trenches), a TOPKON laser total station will be used. This equipment is in the possession of IAE PAS.

In order to determine the geographical coordinates of the georeference points of created maps, the Digital Surface Models, orthophotomaps, the location of architectural relics which

will be recorded at the stage of excavations, as well as mapping and determining the location of other features and plans, GPS RTK Reach RS + will be used, which was currently purchased for the needs of IAE PAS.

In order to make the Digital Surface Model, orthophotomaps, three-dimensional models and orthoimages of relics of architectural structures preserved in the field and current documentation of historic structures unearthed during planned excavations of test nature, the short-range photogrammetry method will be used. Digital Surface Model and orthomaps will be made using a specialized NIKON digital camera (owned by IAE PAS), based on photos obtained by means of drone. At the stages of photo processing carried out to make the Digital Surface Model, orthophotomaps, orthoimages, 3D models and 3D documentation of sources discovered during excavations, the AGISOFT METASHAPE – PHOTOSCAN PRO graphic program for photogrammetry processing of images will be used (which licence was purchased by the IAE PAS in Wrocław). 14C dating will be done in the Absolute Dating Laboratory in Ankara using the accelerator method, which currently enables obtaining more precise results. An analysis of 15 samples is planned.

We intend to document shipwrecks and other underwater relics of harbour constructions and monuments using a photogrammetric method and 3D models. This method, applied to the documentation of underwater sources, has been tested previously with very good results by our research team.

In the underwater exploration phase, we will use the classic method, sonar surveys and the Robotic Underwater Vehicle (RAV).

Threats: The project will be implemented with the consular support of the Embassy of the Republic of Poland in Ankara and the Consulate of the Republic of Poland in Istanbul, which has been taking care of our scientific activities carried out in the Küçükçekmece Lake basin for several years with the active participation of the Polish ambassadors (Mr. Maciej Lang and Mr. Jakub Kumoch).

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