# CONTEMPORARY ISSUES IN CULTURAL STUDIES

## **Editors**

Maciej Kołodziejski

**Mehmet Ali Icbay** 

**Hasan Arslan** 



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## MAGNETIC MAPPING OF THE HELLENISTIC CITY WALLS IN TEOS AND THE RESULTS

## Rahşan TAMSU POLAT<sup>1</sup>, Yusuf POLAT<sup>2</sup>, Christian HUBNER<sup>3</sup>

#### Introduction

Defense systems surrounded the ancient city to be reveal in a long time due to limited large scale area. Therefore, it is one of the difficult issues to be studied. However, in recent years, along with archaeologists active in their common work of geophysicists, this type of structure plans unexcavated identification and determination of the area to be excavated (special structures such as towers, gate) are provided.

The ancient city of Teos was situated at the center of Ionia in Asia Minor. Teos lay on the isthmus of a small peninsula and had two harbours, one on each side. The northern harbour, called *Geraiidai* or *Geraesticus* according to ancient sources (Strabon, XIV, 30), is still used by the inhabitants of the village of Sığacık unlike the southern harbour, which has been embanked. With its two well-sheltered harbors it is a city of major importance in terms of military, politics and commerce. Phokaia, in the North, Miletus, in the South, and Chios and Samos islands are cities mark the far corners of the region. Urla Peninsula, on which Teos is built, extends into Aegean, and is the most Western point of Anatolia. Teos resides on the point where this peninsula meets the mainland in the South.

The city was inhabited since Protogeometic Period (11<sup>th</sup> Century BC) and among its important ruins are the temple (hecatompedon?) -not yet completely identified- and an altar in the *acropolis*, the ancient theatre in the south of the acropolis, *agora* and *agora temple* in the southeast, the *Dionysus Temple* which is believed to be the work of Hermogenes who is one of the most important architects of Hellenistic Period, *bouleuterion*,

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*cistern*, remains of ancient South harbor, the chapel constructed on the harbor, and city walls from Hellenistic Period.

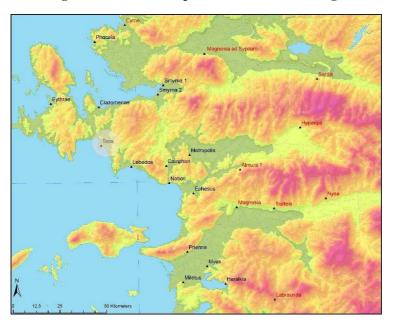


Figure 1- The Ionia Map (commons.wikimedia.org)

Teos, one of the twelve Ionian cities, was first studied by the English Society of Dilettanti in the 19 th century, then, by the French in 1924 and later, between 1962 and 1966, by Yusuf Boysal and Baki Öğün, members of the Faculty of Letters of Ankara University. Between 1980 and 1992 architect D. Mustafa Uz, conducted limited soundings in the sacred area of Dionysus Temple and the Archaic Temple. Numan Tuna of the Middle East Technical University also carried out brief surveys between 1993 and 1996. Since 2010, Prof. Musa Kadıoğlu from the University of Ankara, Faculty of Languages, History and Geography, Classical Archaeology Department, has been conducting archaeological excavations and restorations at the site.

To the northeast, the bowl of the theater, built into the southern slope of the acropolis hill, is the most visible ruin from the temple. Skirting a couple of grain fields, you arrive at the *skene* and the *parodoi* of the

structure. Unearthed in the 1920s, they are the only parts of the building to remain largely intact.

Moving again back through the orchards, heading to the southeast of the theater, you pass by wells and field walls containing many architectural blocks and more inscriptions. Finally, exiting the orchard, you find yourself at the *bouleuterion*. Uncovered by the French in 1924, this is the most remarkably well-preserved structure from the ancient city. Located near the northeastern corner of the agora, there is no mistaking the identification of this building.

Figure 2- The City Wall in the West of Dionysus Temple (Photo by Y. Polat)



Historically, an important part of the city wall is identified in the West of Dionysos Temple in 1924 by French Researchers, which is then followed by unearthing the internal facade of the city wall facing the city in 1962 by Y. Boysal and B. Öğün (Boysal, 1965; Boysal & Öğün, 1964; Öğün, 1964) from Ankara University. By then, the length of the city wall was reported as 6 km by the national and international researchers who have studied the city (Bean, 1992; Tuna, 1995; Texier, 2002; Ersoy & Koparal, 2008). However aerial photographs overlaid by the coordinates, and surface surveys and drills supported by geophysics studies show that

Teos' Hellenistic Period walls are not 6 km, but in fact are 4 km long, surrounding an area of 65 hectares. It is found that the narrowest section of the city is the South Wall being 230 m long with its 185 m can be observed on the surface. East Wall follows the coastal line and is 800 m long. West Wall is 1100 m long. Hellenistic North Wall cannot be traced very well since city have expanded in this direction during the Roman Era, and old Sığacık Road overpassed the area.

The archaeological excavations are re-initiated in 2010 under the conducted of Prof. Dr. Musa Kadıoğlu, staff member of Faculty of Languages, History and Geography, Ankara University, which involve excavation, and documentation studies of buildings inside the city as well as excavation, research, and documentation studies of Teos' Hellenistic Period city walls, latter being the theme of my presentation (Kadıoğlu *et al.*, 2011; Kadıoğlu *et al.*, 2012).

The integrated use of geophsical methods has developed rapidly in the last fifteen years in archaeological prospection (Drahor, 2006; Casana *et al.*, 2008). The combined application of different geophysical techniques supplies useful information about buried archaeological contexts, particularly ancient citys archaeological settlements. The aim of such studies is to help archaeologists conduct fast, effective and economical excavations by providing probable architectural plans, structural characteristics and locations of archaeological settlements (Drahor, 2009).

#### Methods

In this aim of a magnetic survey was conducted on the ancient settlement Teos in August 2012 and 2014. A high resolution Förster Gradiometer with four sensors and a sensitivity of 0,1 nT (Nanotesla) was used for this magnetometry survey. Up to 20 measurements per second were recorded by the sensors. The sensors were positioned 30 cm above the ground, the lines were spaced 50 cm apart. Thus the surveyor is able to obtain a regular measurement grid of 20 cm in line and 50 cm cross line. Following various steps of data processing (such as position and heading effect correction, coordinates transformation, limitation of the dynamics

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range) the collected data are then presented in grayscale magnetogram using a Geographic Information Systems (GIS) computer program<sup>4</sup>



Figure 3- The Studying of Magnetometry (Photo by Y. Polat)

When only archeological excavation studies are used, outlining the wall plans, and determining the positions of defense towers and gates on city walls requires to spend a lot of time, cost, and manpower. This mandates other reliable sciences to support archeology. The primary science that can support archeology is geophysics. In our study, the area to excavate is determined by geophysics magnetic mapping technique. For this purpose we have initially cleaned off of all grasses and large stones from the area to be scanned. Then the area to be scanned magnetically is marked on the plan with DGPS (Differential Global Position System) data, and is divided into 50 m strips. The scans are carried out by making two runs between areas of 4 meters, created by the strings laid 4 m apart between the 50 m strips. Visual analysis is made possible after the obtained data is corrected, enriched with geographic statistics, converted for coordinate system, and processed on the plan by the use of ESRI ArcGIS 10.2 software. The visual outcome is analyzed by classifying the blacks & dark colors under positive

<sup>&</sup>lt;sup>4</sup> This study was supported by Anadolu University Scientific Research Projects Commission under the grant no: **1307E289** 

anomalies, and the whites & light greys under negative anomalies. We have worked with DGPS, Coordinate System, WGS\_1984\_UTM\_Zone\_35N.

#### Results

Through the data obtained from the geographic studies held between 2012 and 2014 tower-like structures are identified on the Hellenistic Era Wall, i.e. West Wall, which is built on the West of the city. A drill of 2.20 by 5.00 m is set on the coordinates of one of the identified buildings. The drill took place in 185 m north of the Dionysus Gate which is in the west of Dionysus Temple.

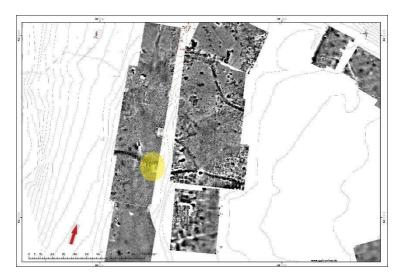


Figure 4- The Results of Magnetometry (C. Hübner)

In the area named Hellenistic Wall West 5 (HS-B5) the excavations started 14.69 m above sea the level where 7 rows of wall blocks are unearthed at the level of 13.27 m. The drill is extended to 2.45 by 9.25 m following the rest of the wall blocks of North-South Wall. These blocks which stretch along with the Wall are found to be part of the Tower, and the studies focused in the East of the drill for locating the point where the Tower is connected to the Wall. Later the excavation continued in a 3.00 by 7.20

m drill area with the same purpose. The front of the tower faces the West, and is 7.85 m wide, with an 8.25 m wide North face. The point where the Tower is connected to the body of the Wall is identified as the North side. Marks of agricultural machinery is observed on the wall blocks scattered around the Tower.

Figure 5-This Tower is Founded From the Excavations (Teos Excavation Archive)



This helped us to conclude that the data obtained from geophysical techniques are compatible with data from archaeological excavations. This outcome is quite important since it proves that geophysics can bring and will bring substantial contributions to archaeology.

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