Session A12
Detecting the Landscape(s) - Remote Sensing Techniques from Research to Heritage Management

Walking over Magoula: Mapping Neolithic Tell Settlements in Thessaly (Greece) Using Integrated Archaeo-geophysical Techniques

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CONTENTS

• Introduction
• Methods
• Results
• Conclusion
The Greek term given to prehistoric manmade mounds is a *tell*. Originated by long-term accumulation of debris produced by Neolithic occupation, it can have possible multi-phase sequences (e.g., Neolithic to Iron-age). Different degrees of preservation (more or less truncated) are observed. 

**WHAT IS A MAGOULA?**

**INTRODUCTION**

**METHODS**

**RESULTS**

**CONCLUSION**
Thessaly (Central Greece) is well known for the concentration of these prehistoric sites.
INTRODUCTION

THE STUDY AREA
The 342 Thessalian magoulas documented are located at the alluvial plains. 181 sites (53% of the total) are established on alluvial deposits. 81 sites on fluvial deposits areas with intense morphologic relief. These formations are of low altitude & are ideal for cultivation.
Thessaly played a key role in the introduction of the Neolithic culture in Europe and contains some remarkable archaeological sites.

**INTRODUCTION**

**THE SIGNIFICANCE OF THE AREA**

**NEOLITHIC THESSALY (6800-3200 BC)**

**Sesklo**
Early Neolithic (7th millennium BC) - Middle Bronze Age, with its peak in Middle Neolithic (5th millennium BC)

**Dimini**
Late Neolithic period (end of the 5th millennium BC) - Late Bronze Age
OPEN QUESTIONS ON NEOLITHIC THESSALY

extent, mounds, character, occupation, sites, layout, settlements, establishment, tell-sites, Neolithic, tell, distribution, patterns, human-occupation, archaeological, origination, prehistoric, gap, development, fertile, accumulation, debris, flood-plain, habitation, origin, Greece, multi-phase, landscape, Thessaly, originated, term, man-made, questions, reconstruct, Tell, long-lasting, origination, produced, understand, development.
The on-going project IGEAN focuses on the investigation of several magoulas in eastern Thessaly.

It aims to reconstruct the major habitation patterns of the Neolithic farming groups in the area using high resolution, cost-effective & non-destructive geophysical, satellite and aerial remote sensing innovative techniques.

The key objective is to compare data collected from as many sites as possible and to interpret them in accordance with the known information.

After a century of research on Neolithic Thessaly, it is the first time that a large amount of comparable data is available.
MAGOULA’S LOCATION

The IGEAN Project
METHODS

THE INTEGRATED GEOPHYSICAL SURVEY

1. Multi-technique
2. Multi-sensors/arrays
3. Routine instrumentation

Complementary data
More enhanced interpretation

UAV Aerial Survey & Photogrammetry
Digital Elevation Model (DEM)
Satellite & Aerial Remote Sensing

Increased area coverage
High resolution surveys
At more difficult terrains
METHODS

MAGNETOMETRY
MAGNETOMETRY
METHODS

FREQUENCY DOMAIN
ELECTROMAGNETIC INDUCTION

@ Magoula Kastro Kokkina
GROUND-PENETRATING RADAR (GPR)
METHODS

GROUND-PENETRATING RADAR (GPR)

@ Magoudo Velestino
DATA COLLECTION
DATA COLLECTION
METHODS

DATA PROCESSING

Magnetometer Data (Magoula Almiriotiki)

Clipped Data

Processed Data
DATA PROCESSING

GPR Data (Magoula Almiriotiki)

Raw Data

Processed Data
ALMIRIOTIKI

MAGNETOMETRY

GROUP A
- Strong magnetic anomalies (burning?, destruction phase?, workshops?)
- ~ 34 rectangular structures
- Walls, openings, orientation

GROUP B
- Negative magnetic anomalies (sedimentary building materials, non-burnt daub?)
- ~ 55 rectangular structures
- Internal divisions

GROUP C
- Positive linear magnetic anomalies (enhanced susceptibility of fill materials)
- Double ditch enclosure
ALMIRIOTIKI

MAGNETOMETRY & FDEM
ALMIRIOTIKI

GROUND-PENETRATING RADAR (GPR)
GROUND-PENETRATING RADAR (GPR)

- Detailed structures
- Depth information
- Highly conductive soil...wait for dry conditions
- Single channel NOGGIN system provided better results than the multi-channel MALA GPR
RESULTS

Overlapping DEM & Magnetometer Data

INTRODUCTION

METHODS

CONCLUSION

ALMIRIOTIKI

Almiriotiki
OTHER MAGOULAS

Rizomilos
OTHER MAGOULAS

Perdika 1
INTRODUCTION

RESULTS

OTHER MAGOULAS

Zerelia

Zerelia
• This on-going project has already surveyed 16 magoulas, covering a total area of ~96ha in 29 days.

• Future work will include further surveys, analysis of satellite data, soil geochemical analyses of particular features & ground-truthing.
• This research is providing with key information related to the structural layout of tell sites in Thessaly as well as shedding light on questions relating to their origin & long-lasting character.

• ...but it is also allowing a methodological assessment on the use of archaeo-geophysics that will provide with a tool-box to be used in the future. Therefore, developing the discipline in the study of such type of prehistoric sites.

All in a cost-effective & non-destructive manner
THANK YOU