COMMUNITIES, LANDSCAPES, AND INTERACTION IN NEOLITHIC GREECE
International conference. RETHYMNO, CRETE 29-30 May 2015

Opening a New Frontier in the Neolithic Settlement Patterns of Eastern Thessaly, Greece.

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Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο
ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΟΥ ΜΑΘΗΣΗ
επένδυση στην κοινωνία της γνώσης
ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ, ΠΟΛΙΤΙΣΜΟΥ & ΑΘΛΗΤΙΣΜΟΥ
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ
ΕΣΠΑ 2007-2013
πρόγραμμα για την ανάπτυξη
ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

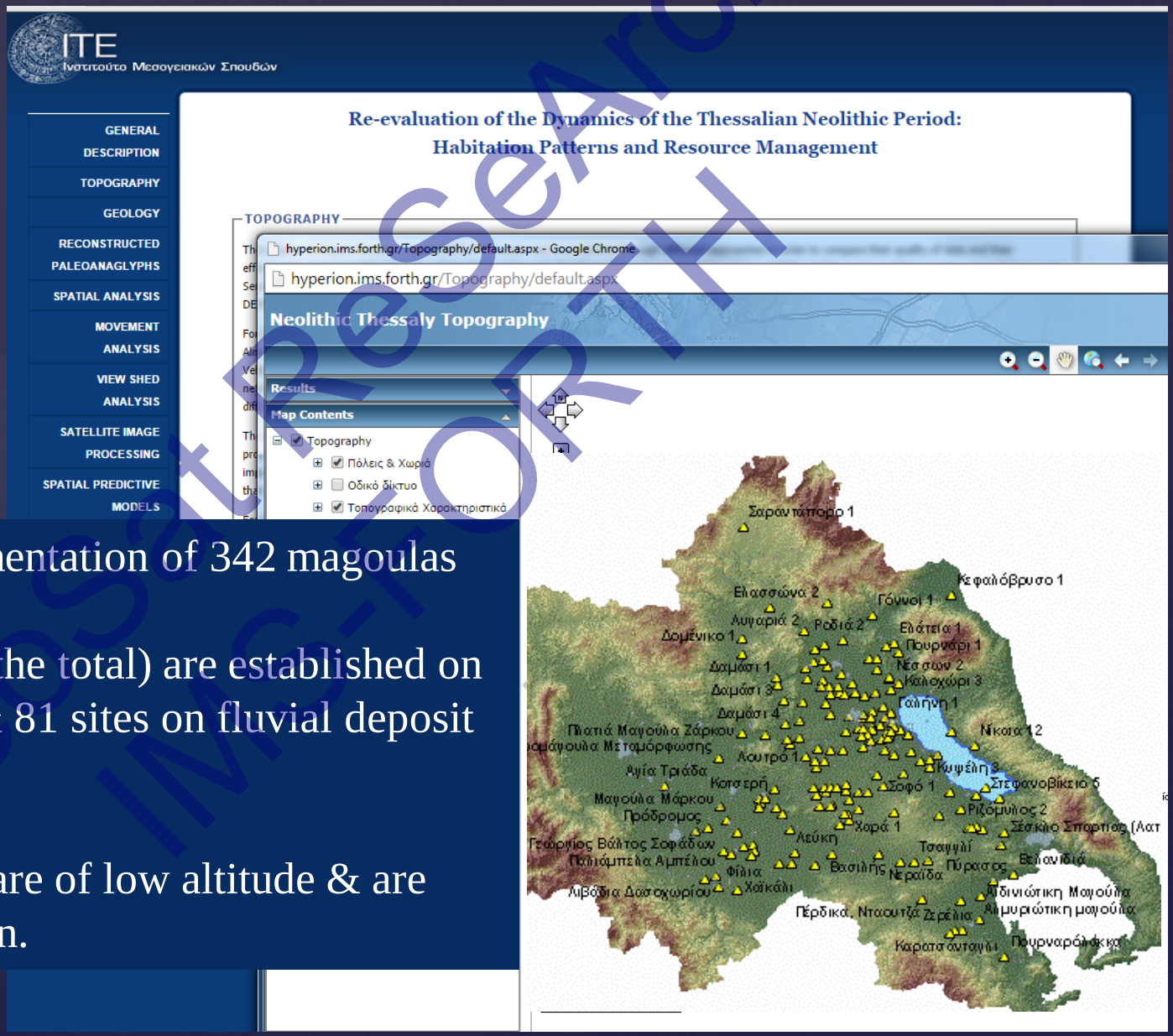
Status of knowledge of the Neolithic Landscape in Thessaly

Registration and mapping of Neolithic settlements, VHR/HS Space imagery & GIS spatial analyses

for

Regional site distribution patterns among ecological and topographic zones of Thessaly.

http://neolithicthessaly.ims.forth.gr/



- GPS/Aerial documentation of 342 magoulas
- 181 sites (53% of the total) are established on alluvial deposits & 81 sites on fluvial deposit areas.
- These formations are of low altitude & are ideal for cultivation.

Habitation Patterns of the Neolithic Agricultural Villages in Eastern Thessaly (Greece) Through Remote Sensing Applications

This paper presents part of the results of a multi-year geophysical and remote sensing fieldwork campaign to study the physical landscape dynamics of Neolithic settlements within the coastal hinterlands of eastern Thessaly (Greece).

IGEAN (Innovative Geophysical Approaches for the Study of Early Agricultural Villages of Neolithic Thessaly) project, is implemented under the "ARISTEIA" Action of the "Operational Programme Education And Lifelong Learning" and is co-funded by the European Social Fund (ESF) and National Resources (2013-2015).

AIMS: Application of non-destructive, remote sensing techniques to explore multiple settlements & extract new archaeological data on an extensive scale, to analyze the broader characteristics of Neolithic habitation in Thessaly.

The project has been successful in documenting the diachronic development of Neolithic sites from core habitation mounds (≤ 1 hectare) to large, sprawling communities several hectares in size.

Methodologies – Multi-magnetometer Techniques

Sensorik & Systemtechnologie (SENSYS) MX Compact system

8 multi-channel measurement system Equipped with FGM600 fluxgate gradiometers separated by 0.25-0.5m & connected to a DGPS navigation system

Ideal for large-scale scanning

Bartington single sensor unit also in use in thick vegetation areas

Methodologies – Ground Penetrating Radar (GPR) & Electromagnetic Techniques

Penetration Depth ~2.5m

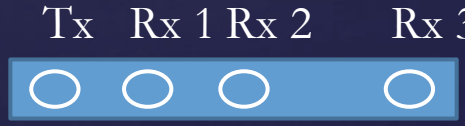
8 channels MALA MIRA GPR,
400 MHz antennas
Sampling 10 x 2.5 cm

Sensors & Software
Noggin Plus System with 250 MHz antennas
Sampling 50 x 2.5 cm

GEM2 - Geophex

GEM2: HCP 2.5 m Conductivity /
1.7 m susceptibility

CMD Mini explorer– GF Instruments



CMD: HCP 2 m Conductivity /
1 m susceptibility

Methodologies – Magnetic Susceptibility Measurements_ Soilscapes

Coring and soil analysis

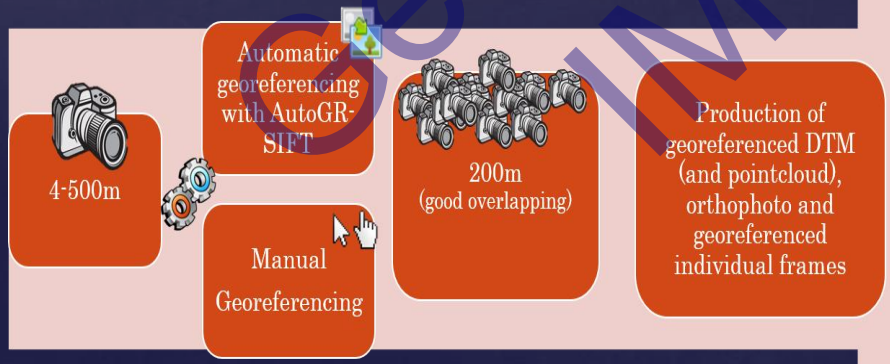
Bartington MS2B

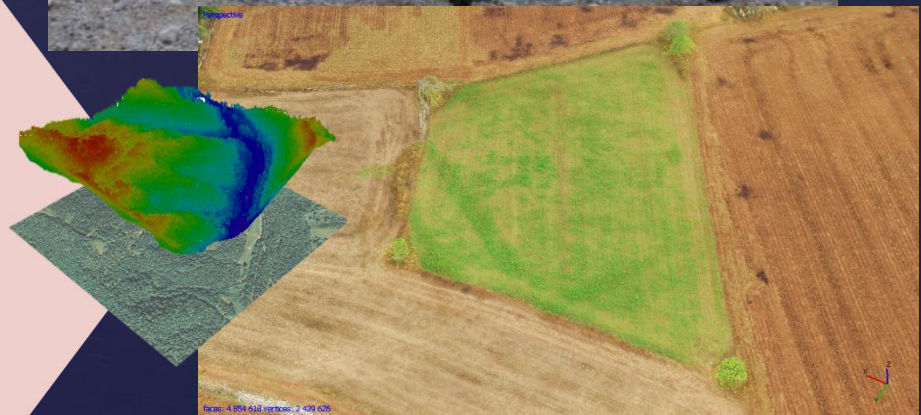
Low & High Frequency susceptibility & Phosphate analysis

Methodologies – Aerial Photography

Quadrocopter DroidWorx CX4

- DJI navigation, viewpoint and failsafe
- Average altitude 100-200 m above surface
- Autonomy ~13-15min with camera load





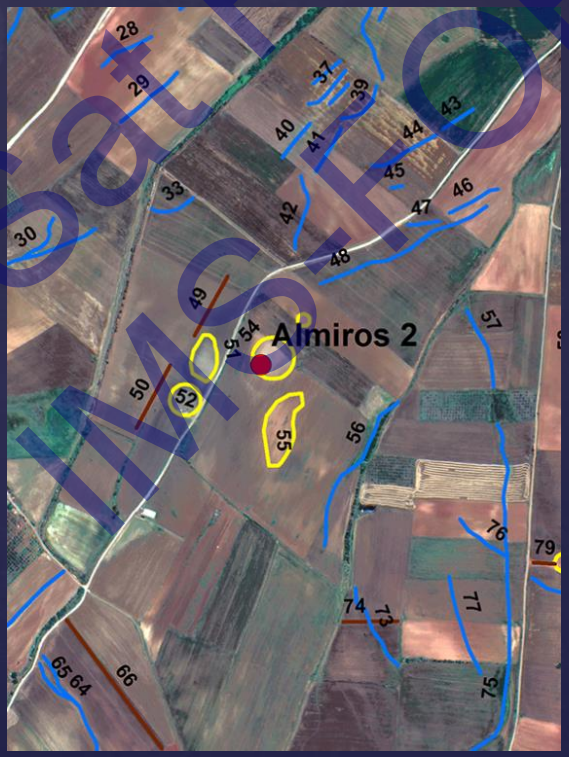
	SITE	PERIOD	COVERAGE (in hectares)	
			Magnetics	UAV
1	Agios Demetrios	EN, MN	0.39	N/A
2	AgiosNikolaos	LN	N/A	N/A
3	Almiriotiki	EN-LBA	8.38	20.7
4	Almiros2	EN-MN	6.63	8.12
5	Bakalis	FN-beyond	0.46	8.15
6	Belitsi	EN, MN	2.00	11.73
7	Dexameni	N, EBA	0.20	2.56
8	Eleuterochori	undefined	N/A	N/A
9	Kamara	MN	1.55	N/A
10	Karatsangliou	LN	2.94	13.07
11	Karatsantagli	EN	2.67	12.38
12	Kastro Kokkinas	LN, FN & historical	1.01	6.77
13	Nikonanou	MN-EBA & Byzantine	2.95	4
14	Perdika1	EN, MN, MBA	5.39	3.06
15	Perdika2	MN	3.89	12.21
16	Perivlepto Kastraki2	EN, MN	3.94	24.51
17	Rizomilos2	N, EBA	10.58	6.52
18	Vaitsi Mylos	EN- MBA	3.16	11.40
19	Velestino(3) Mati	EN-MN & EBA & historical	3.22	2.45
20	Velestino4 - Visviki	MN-LBA	5.91	1.74
21	Zerelia	EN-LBA & historical	4.87	29.23
	SUM		**69.84**	**178.6**


Rizomilos 2
Perdika 2
Perdika 1
Almiriotiki
Almiros 2
GeoSat Research
IMS-FORTH

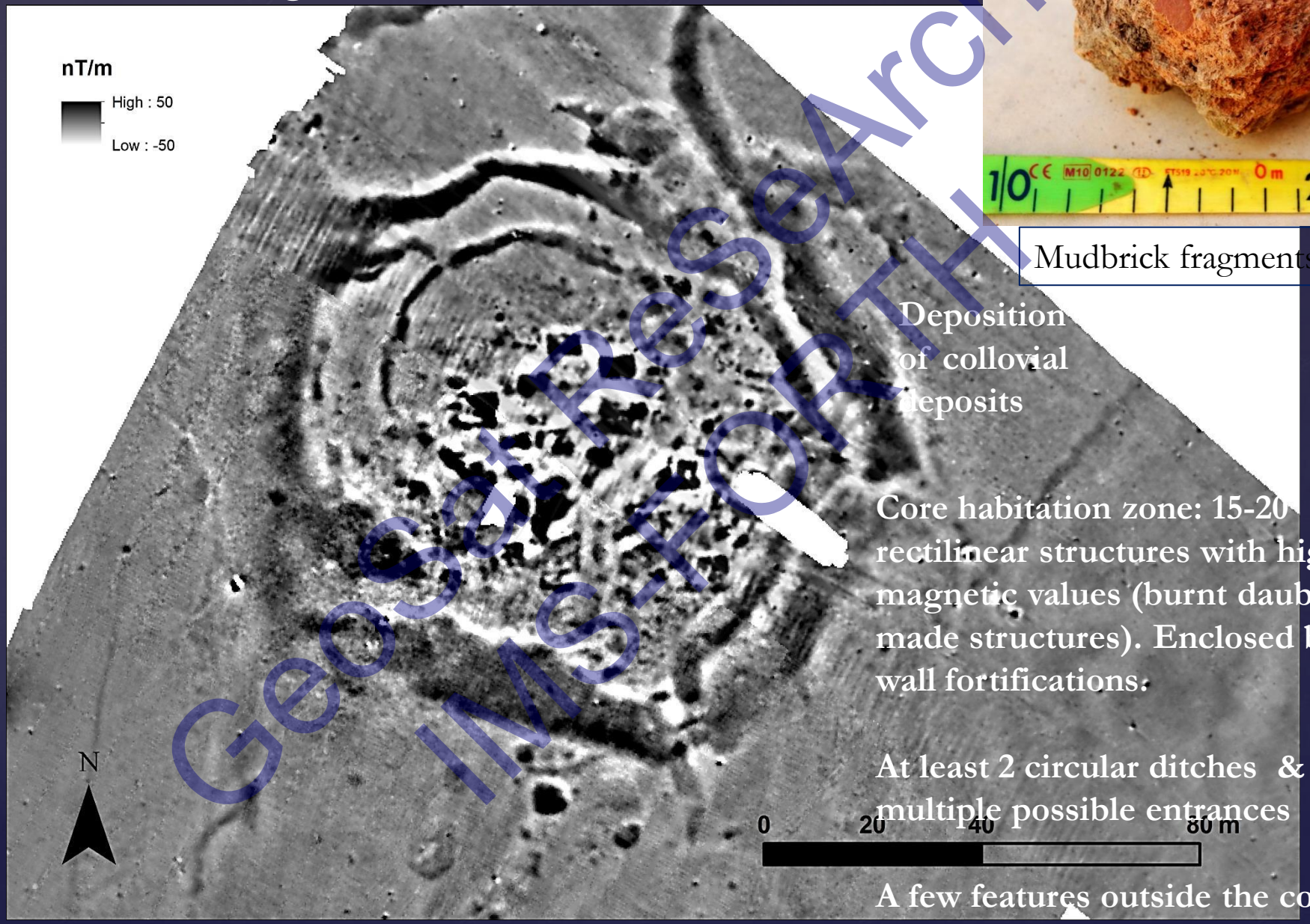
Almiros 2 (EN-MN)

Aerial 1960

WV-2 2012



Almiros 2 – Magnetics



Mudbrick fragments

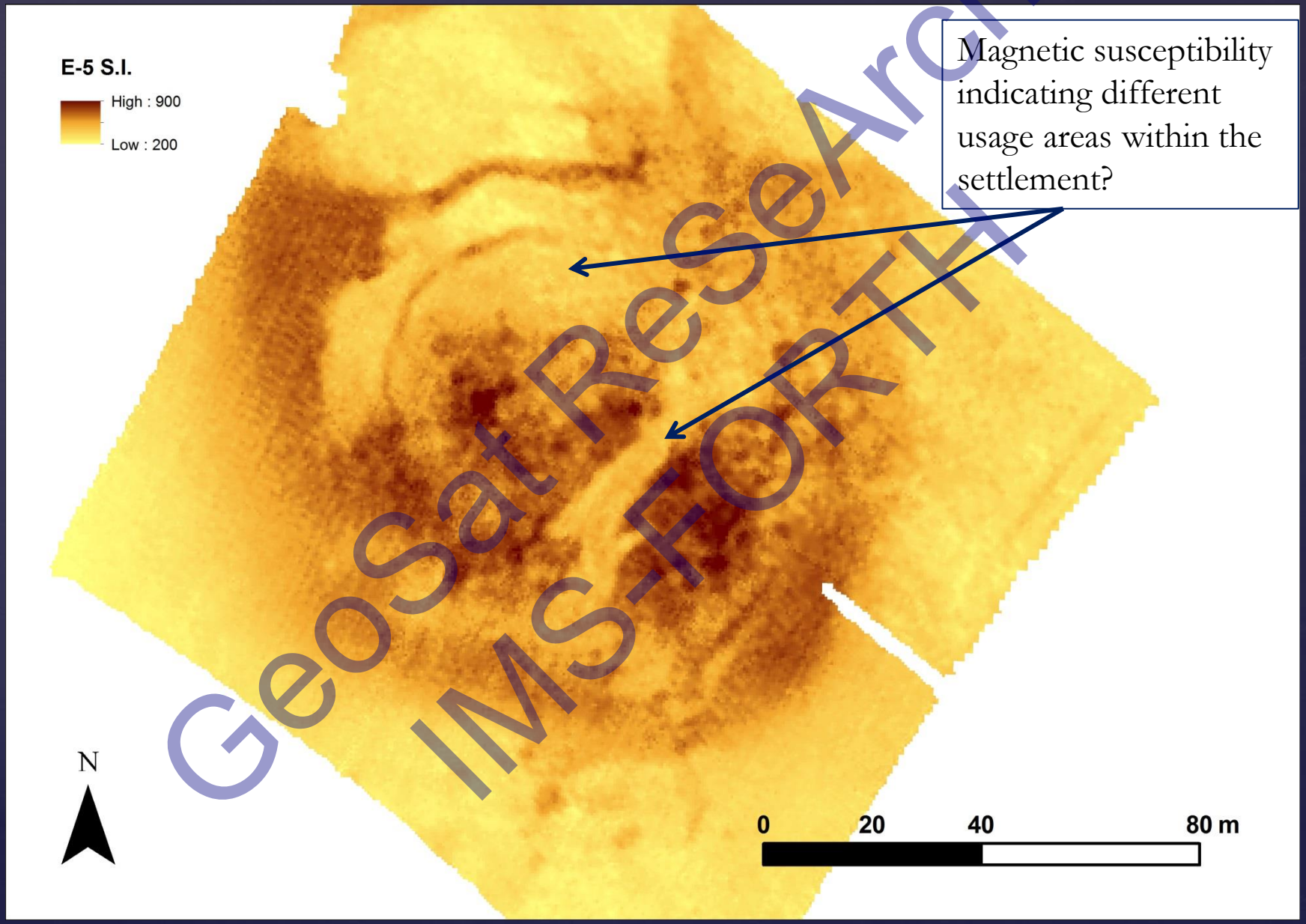
Deposition of collovial deposits

Core habitation zone: 15-20 rectilinear structures with high magnetic values (burnt daub made structures). Enclosed by wall fortifications.

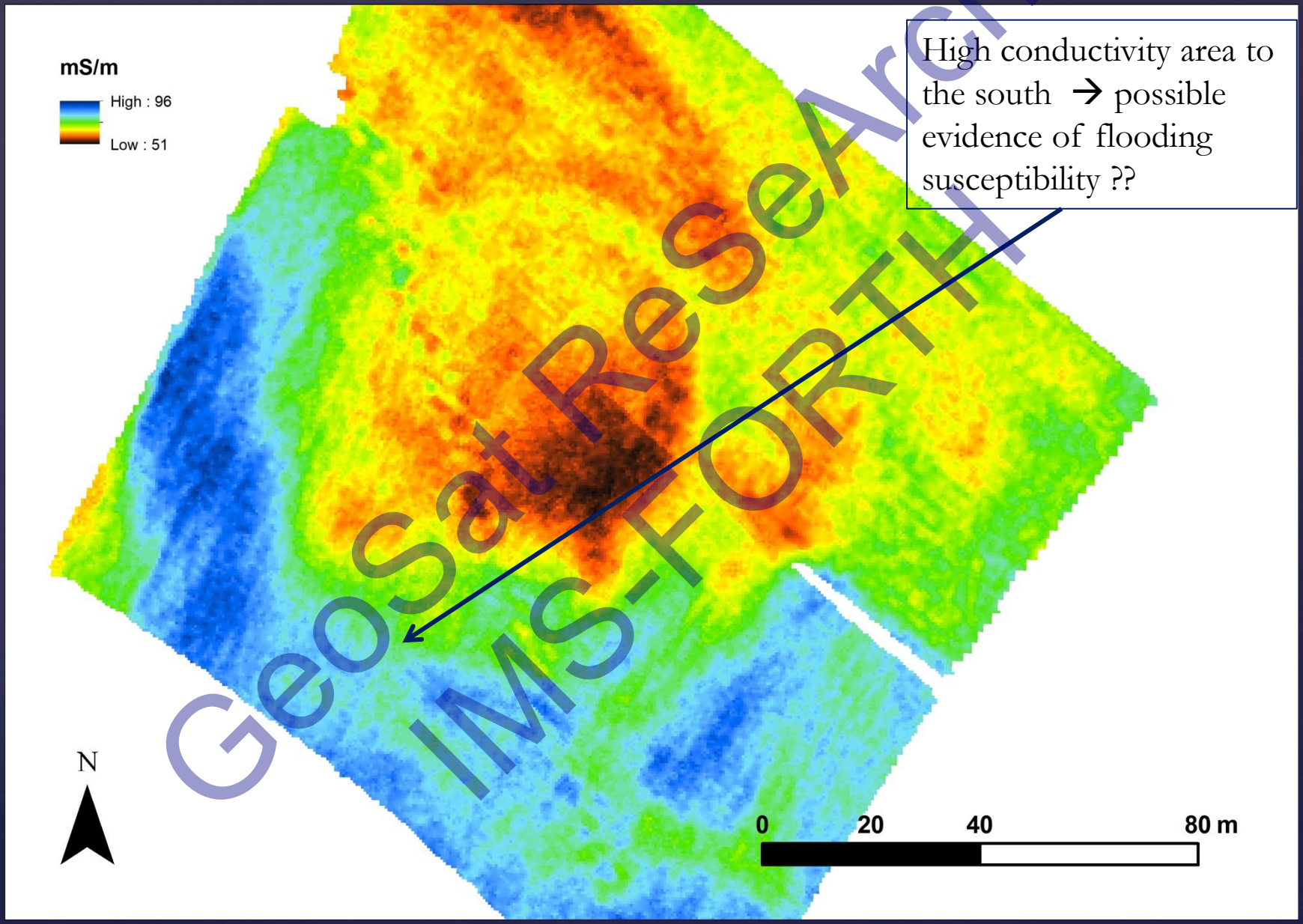
At least 2 circular ditches & multiple possible entrances

A few features outside the core habitation zone.

Almiros 2 – EM Susceptibility (HCP for 0-1.7 m depth)



Almiros 2 – EM Conductivity (HCP for 0-2.5 m depth)



Magoula Rizomilos 2

(N – EBA)

Multiple concentric ditches

with various breaks that represent entrances.

Enclosure walls at the center

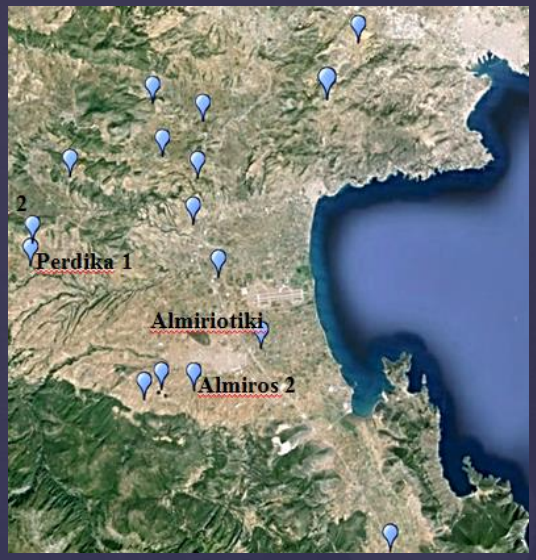
Flooding marks

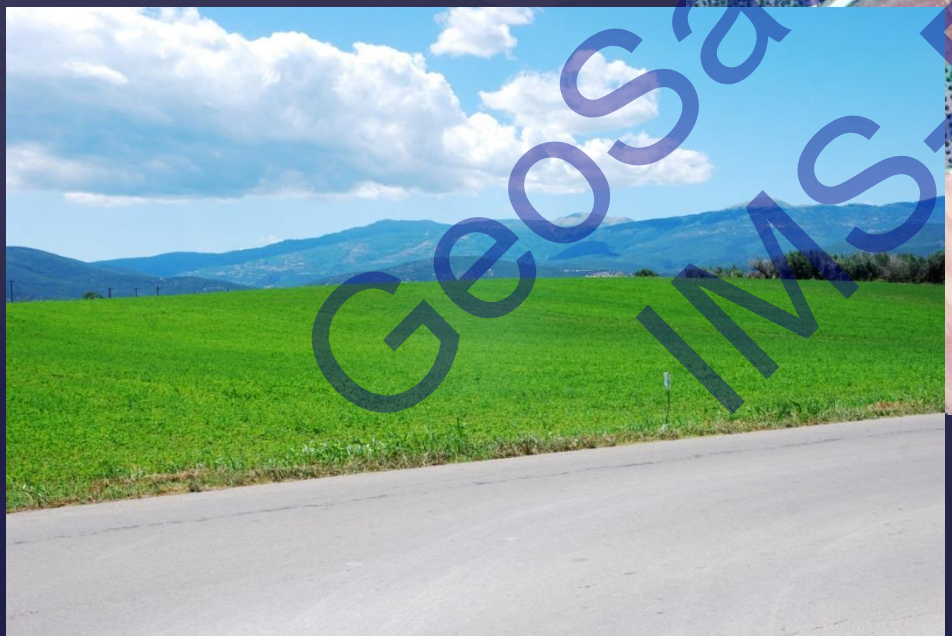
Another smaller pre-existing settlement to the east

with each own system of ditches & enclosure walls

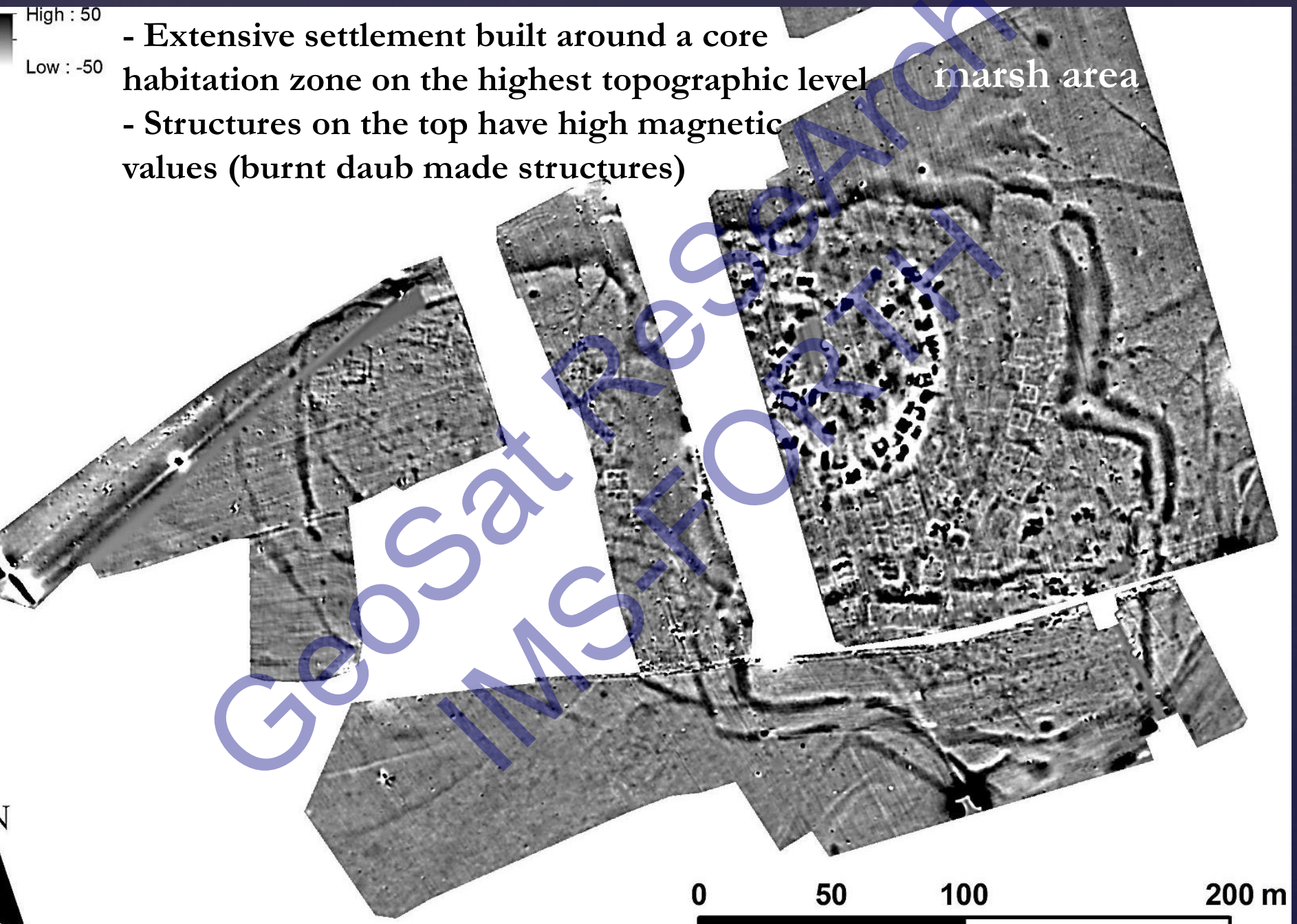
Magoula Almiriotiki

EN- LBA

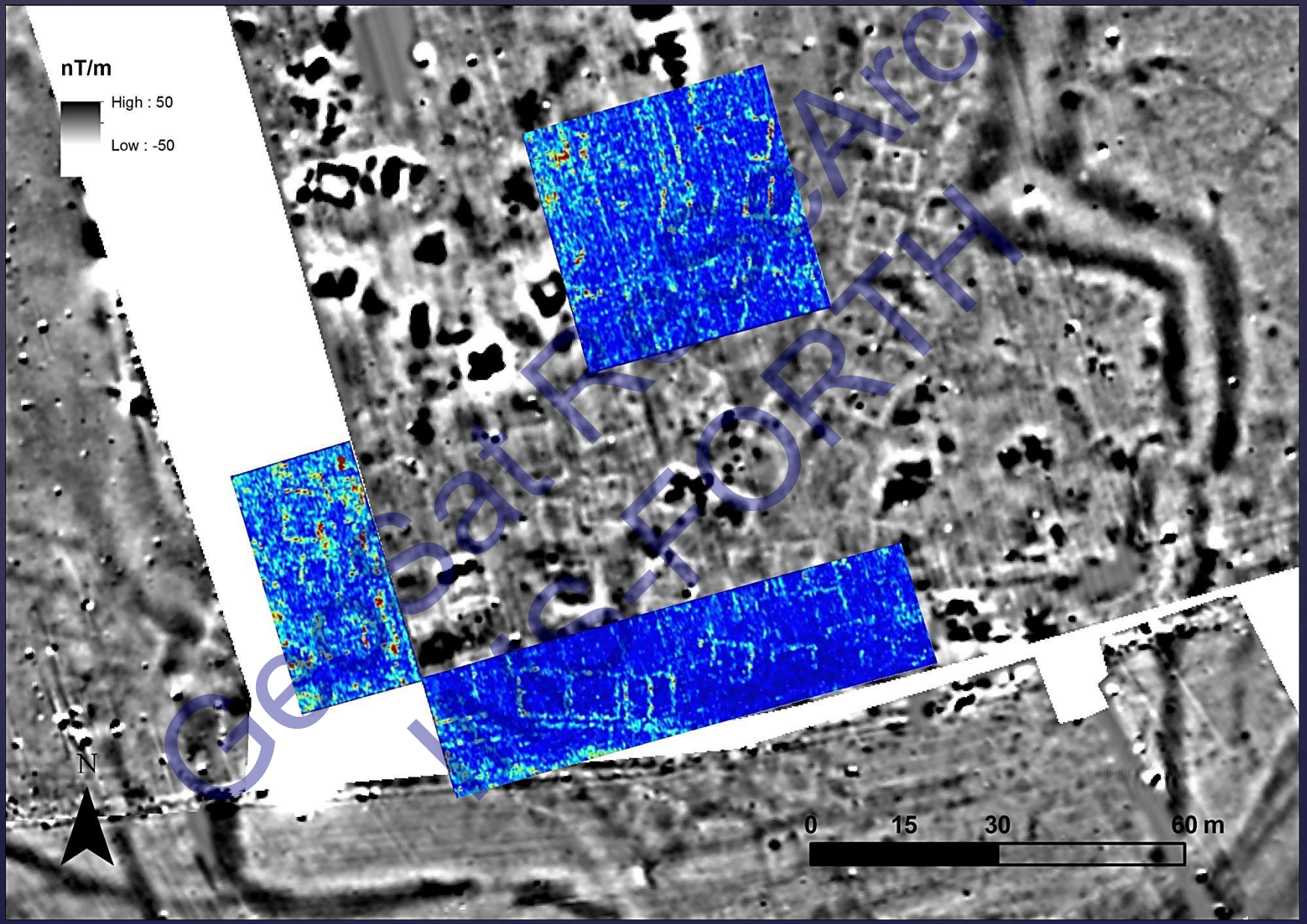




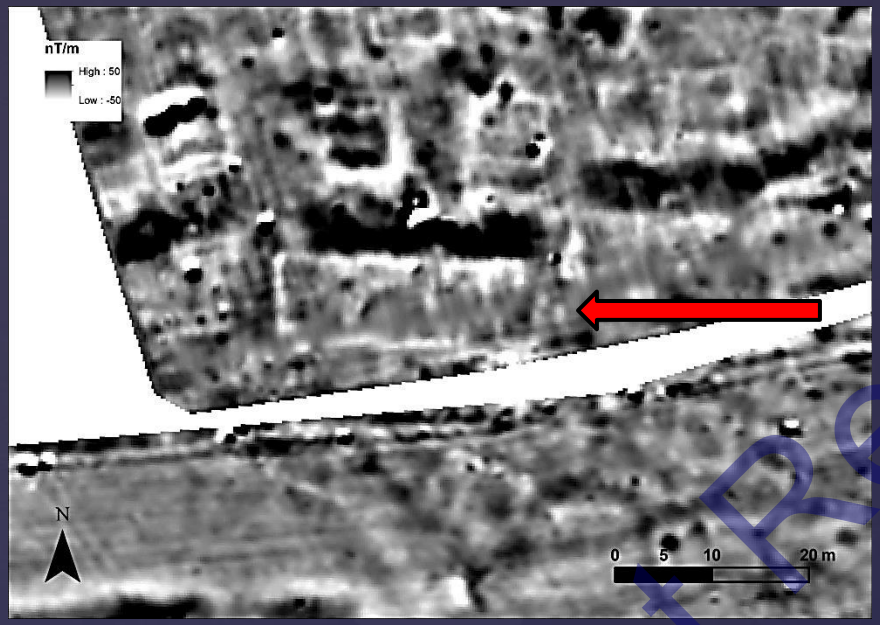
Magoula Almiriotiki – Magnetics



Magoula Almiriotiki – GPR (depth 0.7-0.8 m)

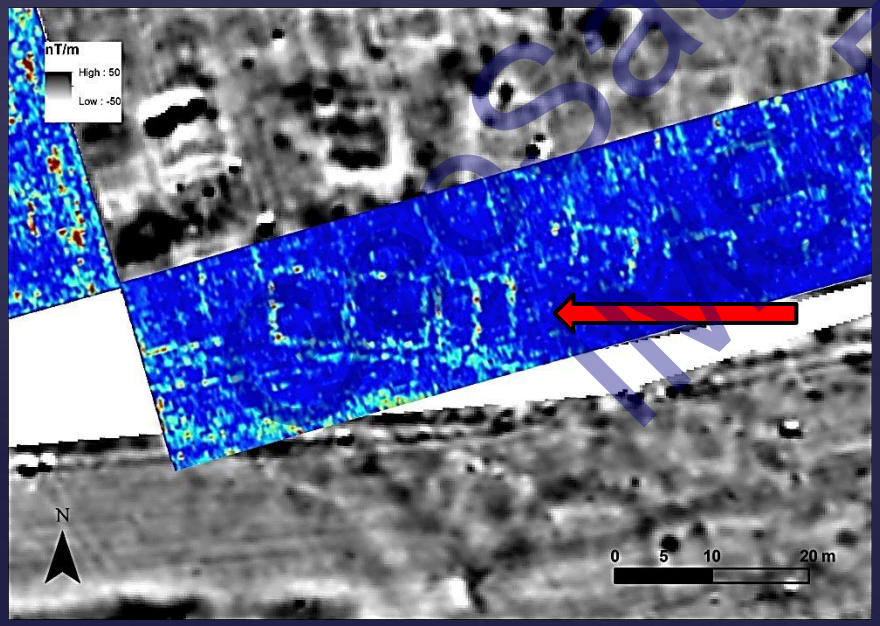


Magoula Almiriotiki – Details of Structures

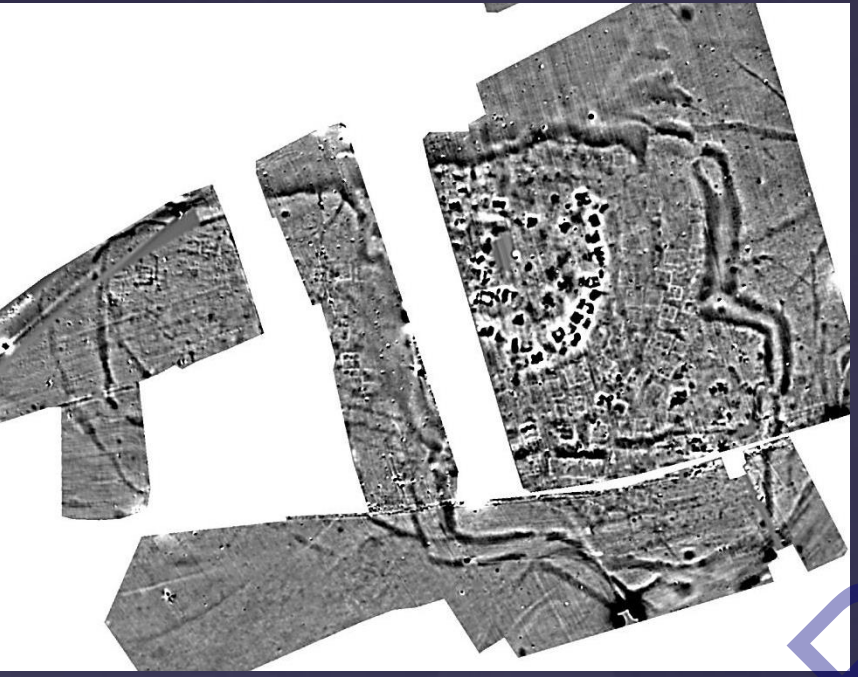


- Low magnetic value probably indicates that the structure(s) has stone foundations

- Rectilinear form 38 m by 10 m.



- In GPR, the large "megaron" type structure appears to be formed from three separate structures built side by side.



Magoula Almiriotiki
Early Neolithic – Late Bronze Age

Outside the core zone:

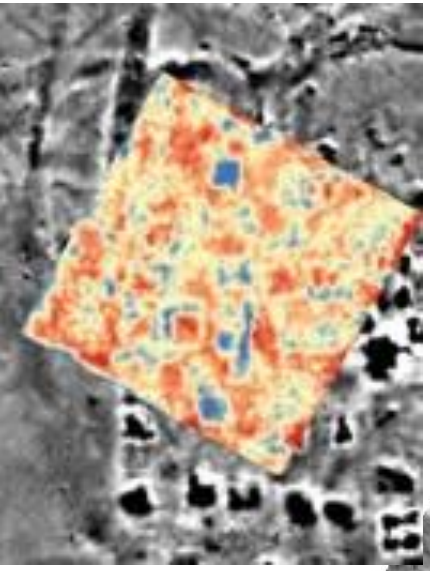
- 60+ rectilinear structures

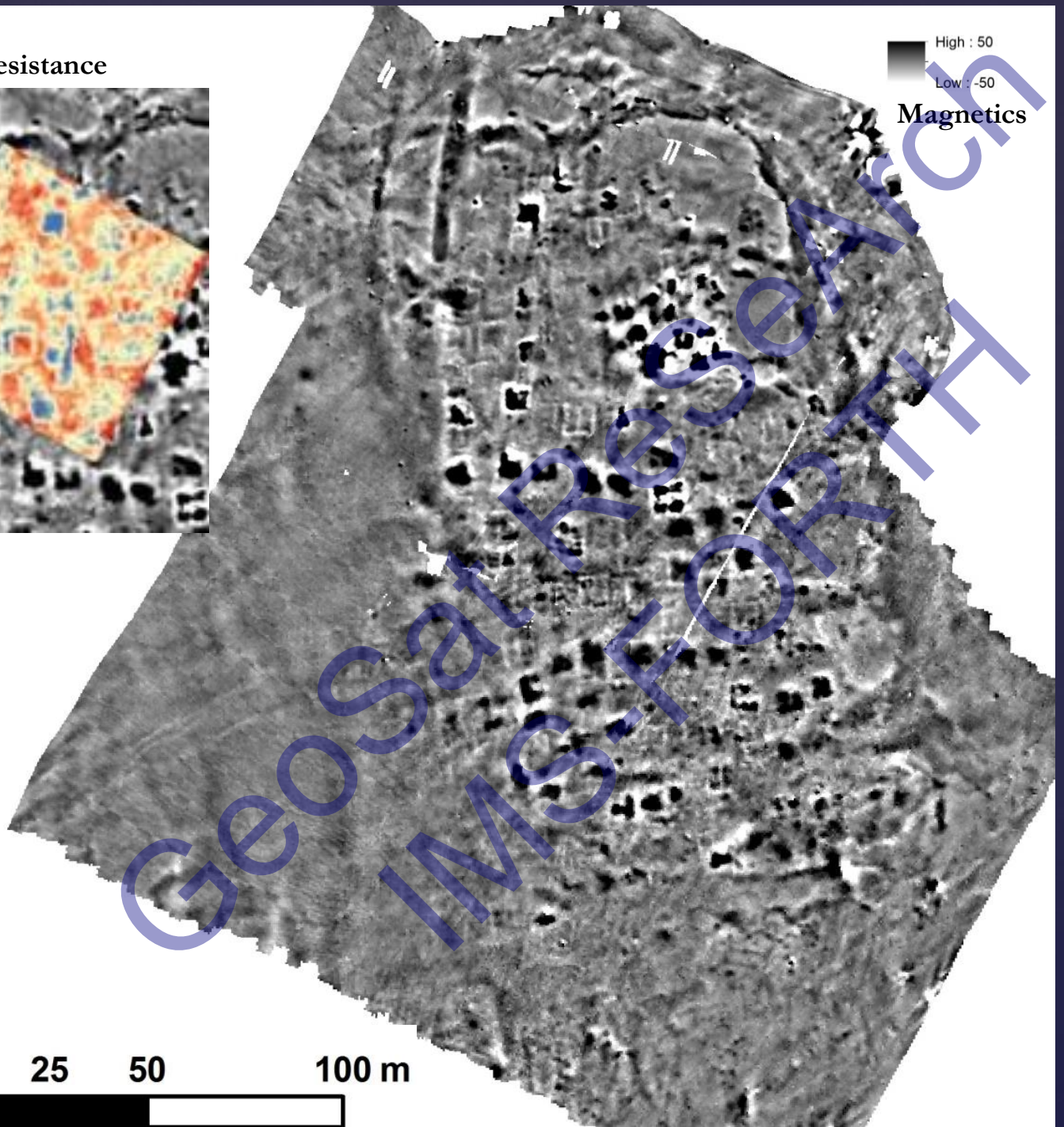
- Structures with low magnetic values (stone built) have 2-3 rooms

- Extensive network of ditches (at times double) surround the settlement

Perdika 1 (Dautza) (EN-MN & MBA)

Soil Resistance





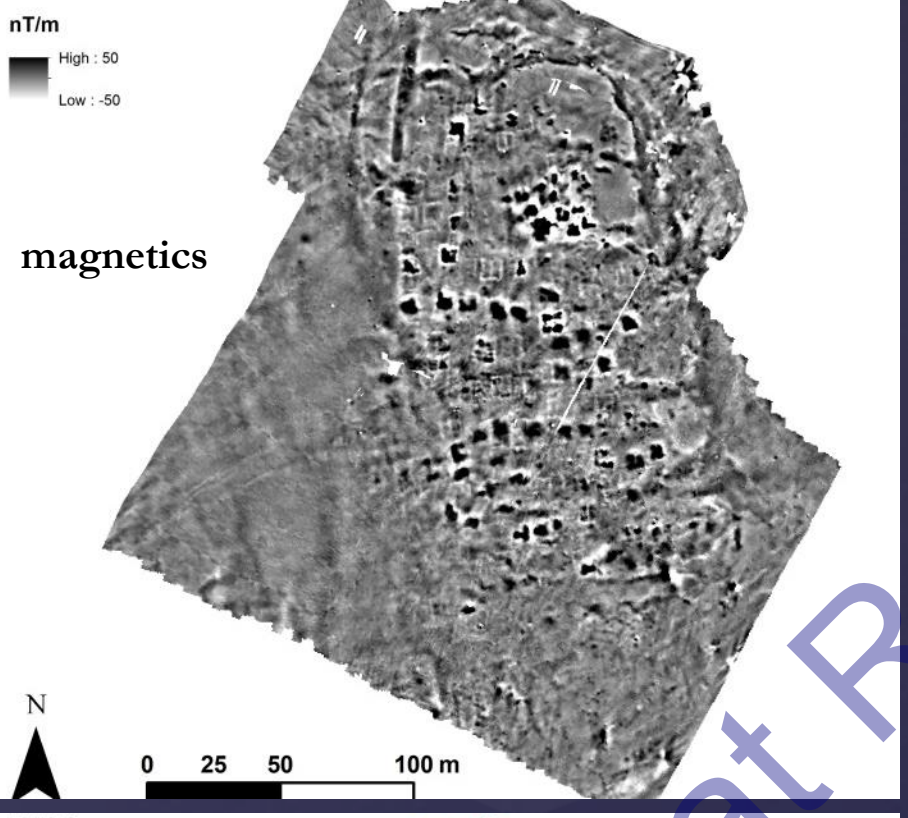
N 0 25 50 100 m

Perdika 1
(EN-MN, MBA)

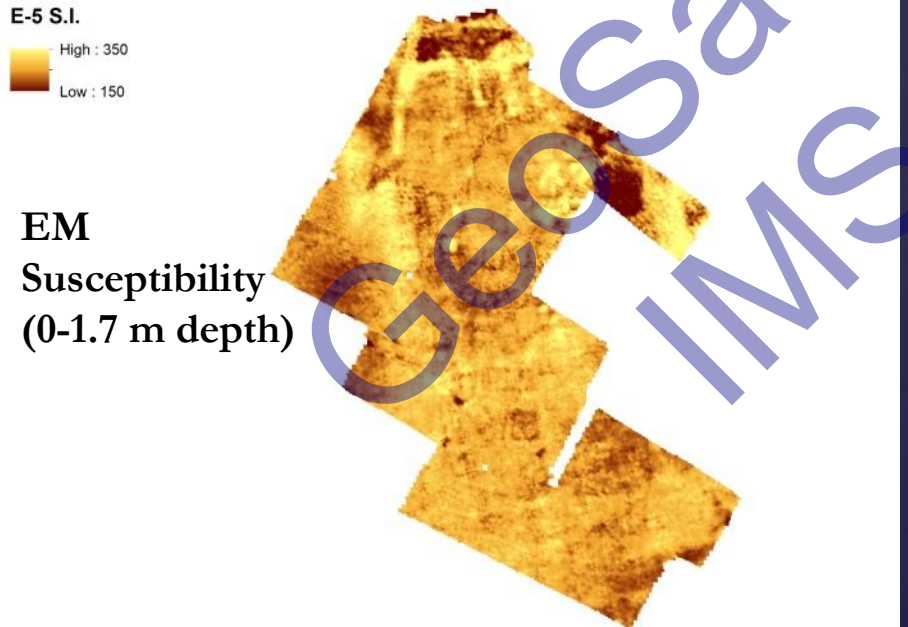
Extensive settlement (>200x100m) that greatly expands beyond a core habitation zone on the highest elevation.

Perdika 1

Early Neolithic – Middle Bronze Age



magnetics



EM Susceptibility (0-1.7 m depth)

- 13 burnt daub structures within the core zone and "empty" area to the East.

- 50+ rectilinear stone-built structures

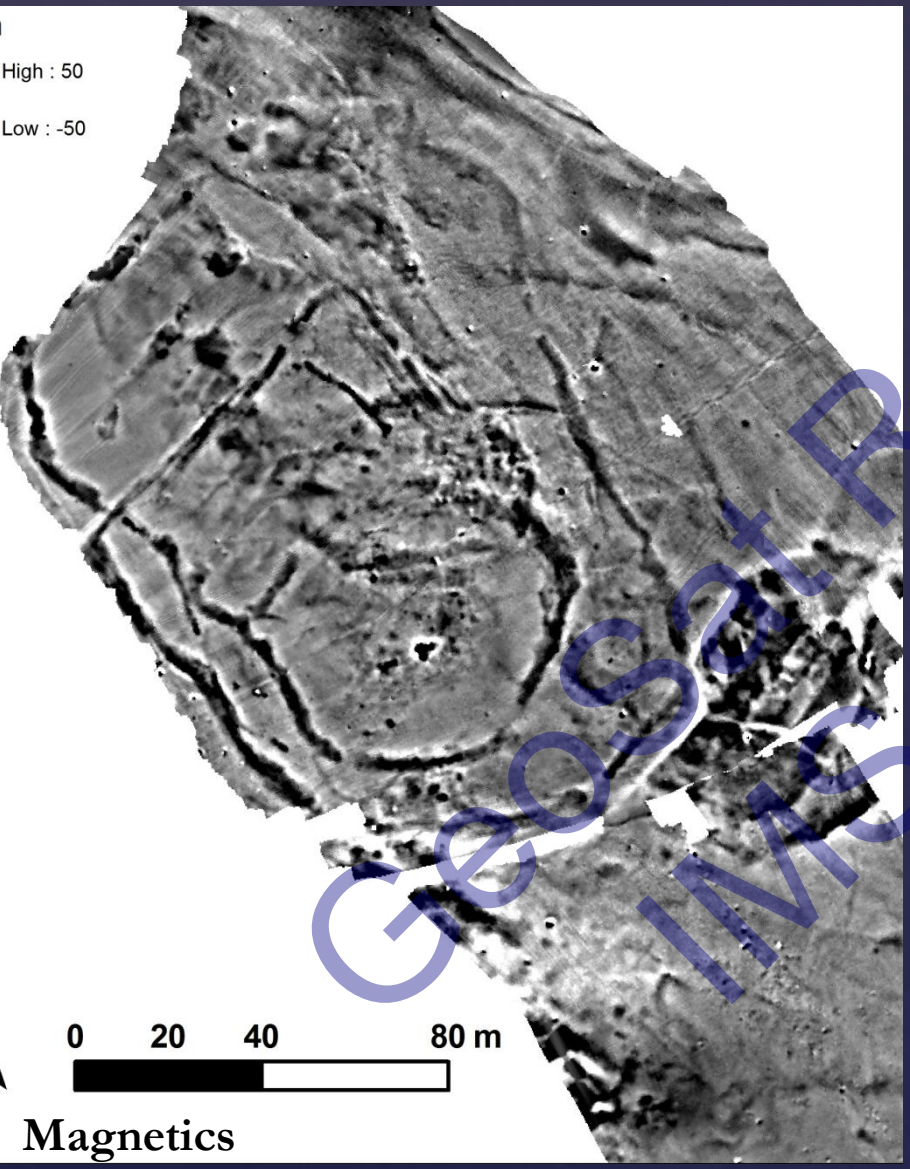
- The majority of structures have high magnetic values (burnt daub structures), but others have low magnetic values (stone) with 2-3 rooms (similar to Almyriotiki). 3 phases?

- Ditches and or walls preserved on the northern side of the settlement

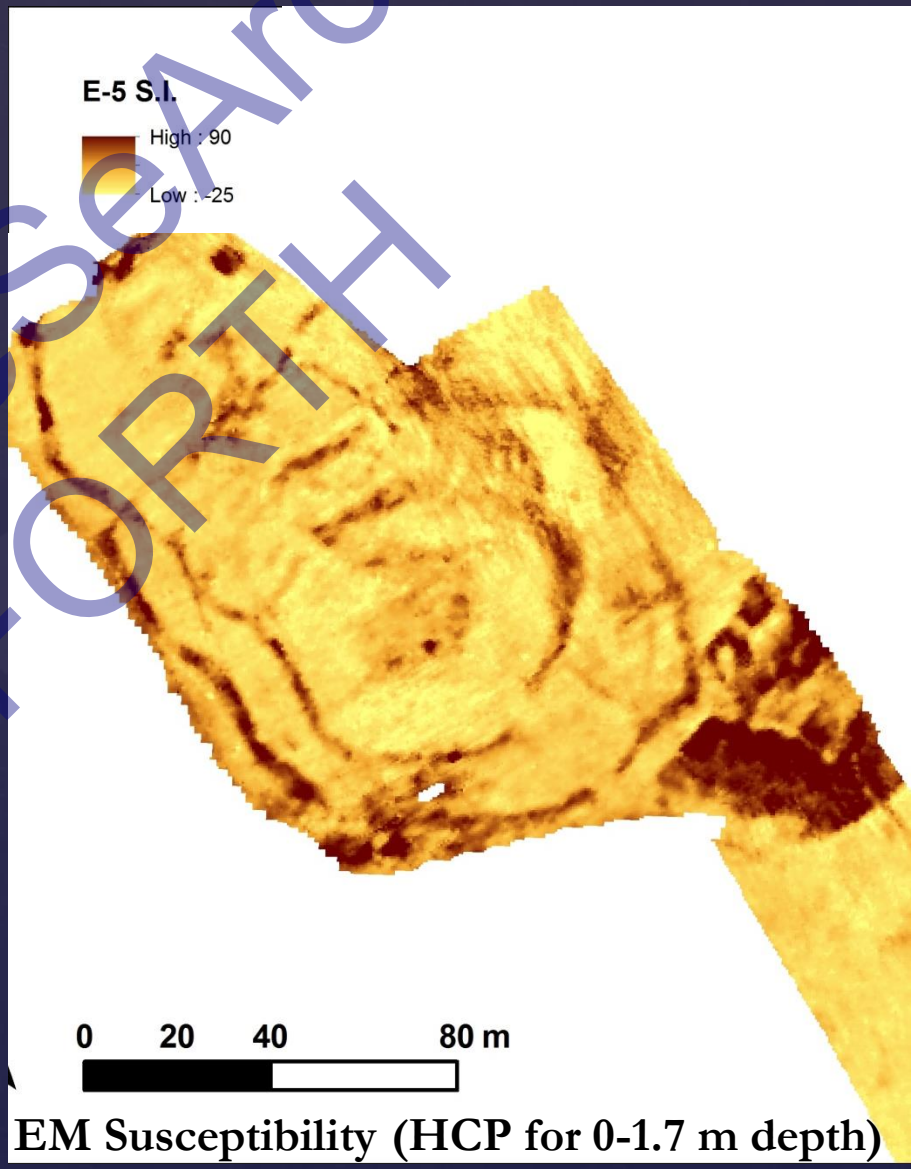
Perdika 2 (MN)

Perdika 2

- Extensive network of ditches built on a natural hilltop
- A sequence of openings that gave access into the settlement
- Little evidence for individual structures (some have high magnetic values)

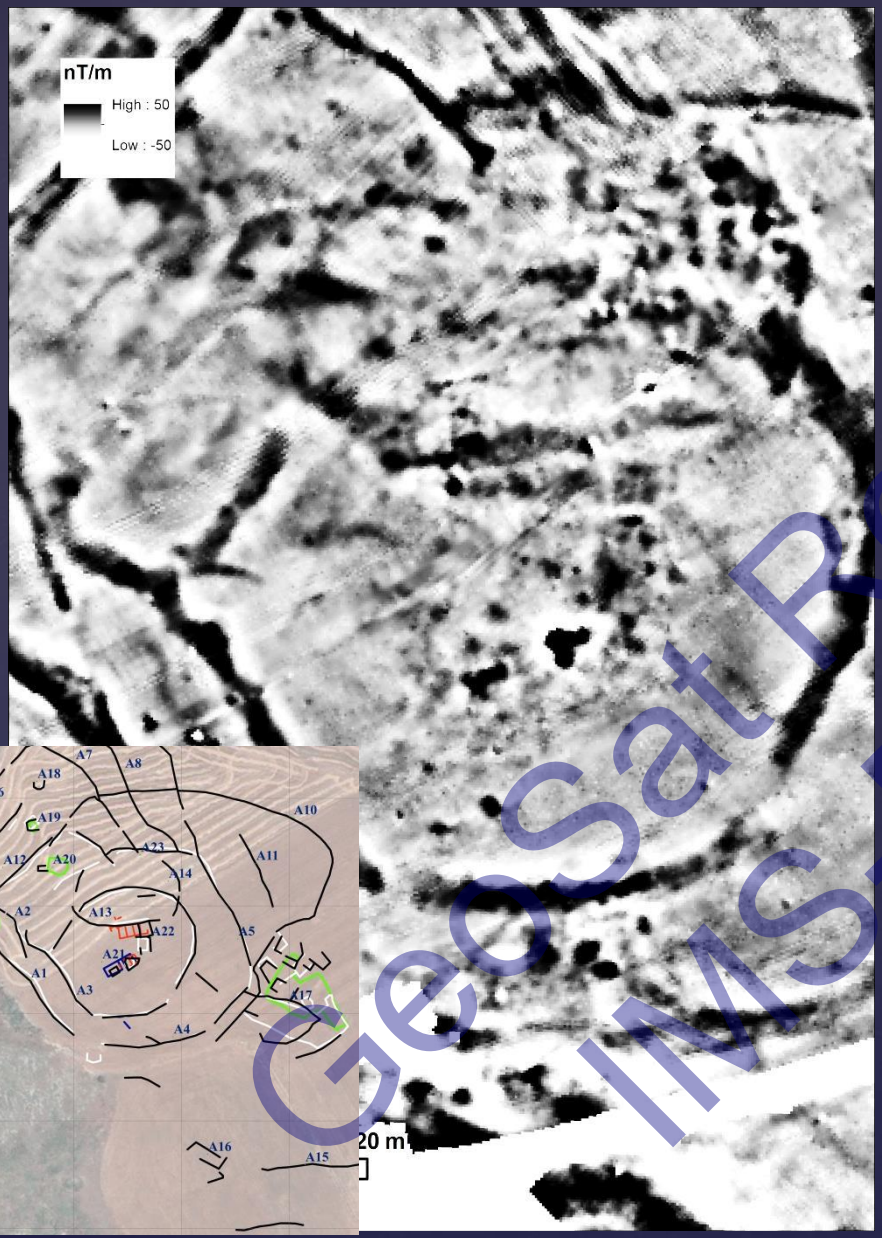


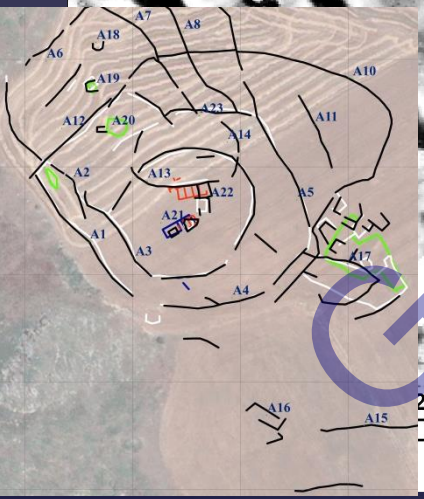
Magnetics

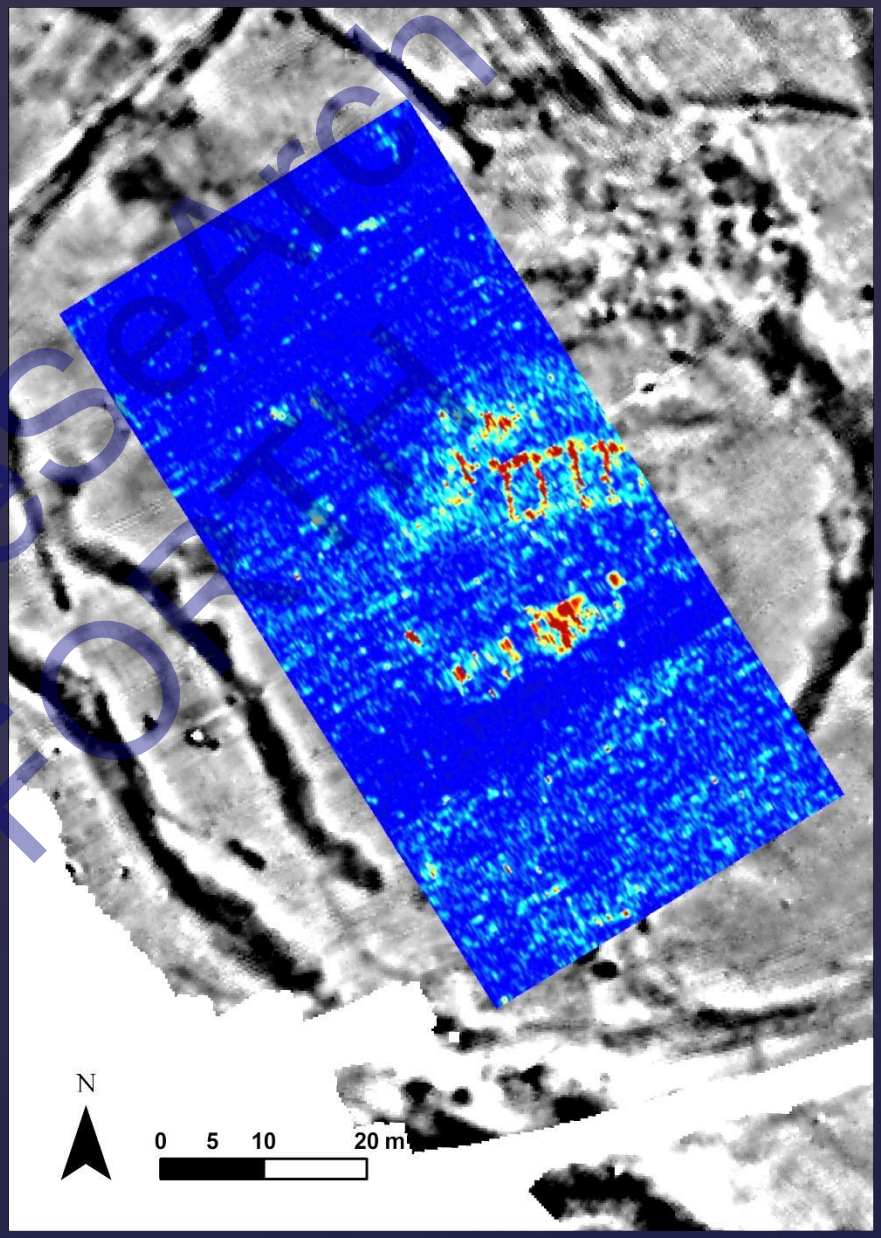


EM Susceptibility (HCP for 0-1.7 m depth)

Perdika 2 – Magnetics (left) and GPR 0.7-0.8 m depth (right)







- Large rectilinear structures with low magnetic value (stone foundations?) were identified with GPR

Concluding Remarks

- **Successful Employment of Geophysical and Satellite remote sensing techniques** – Importance of using an arsenal of various approaches (**manifold geophysics**)

What can we get out of these results ?

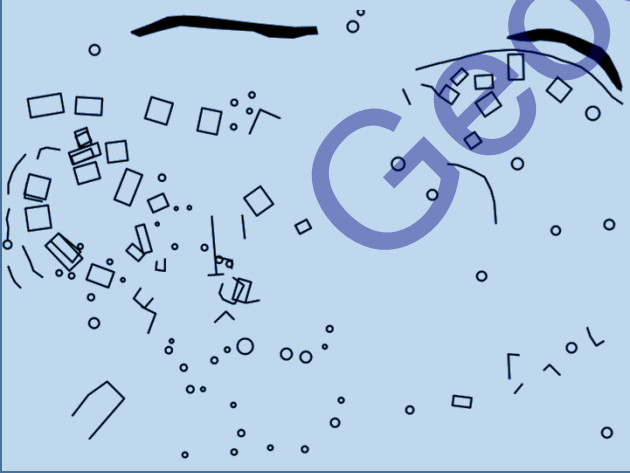
Karatsantagli

Velestino - Nikonanou

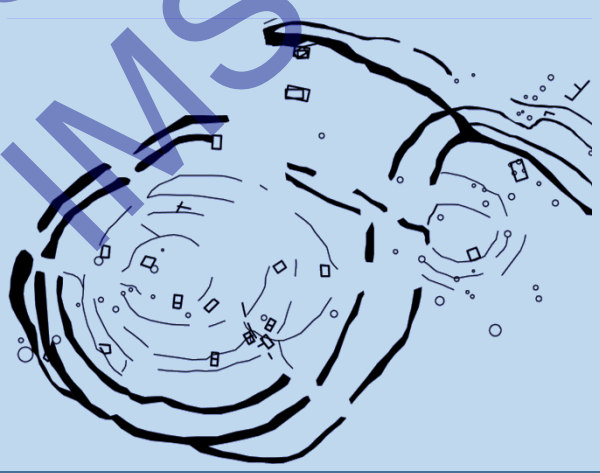
Perdika 1

Perdika 2

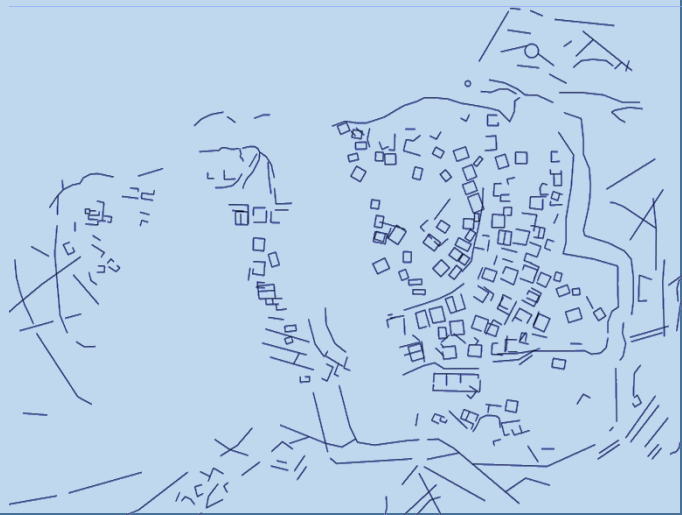
Velestino - Mati



Rizomilos

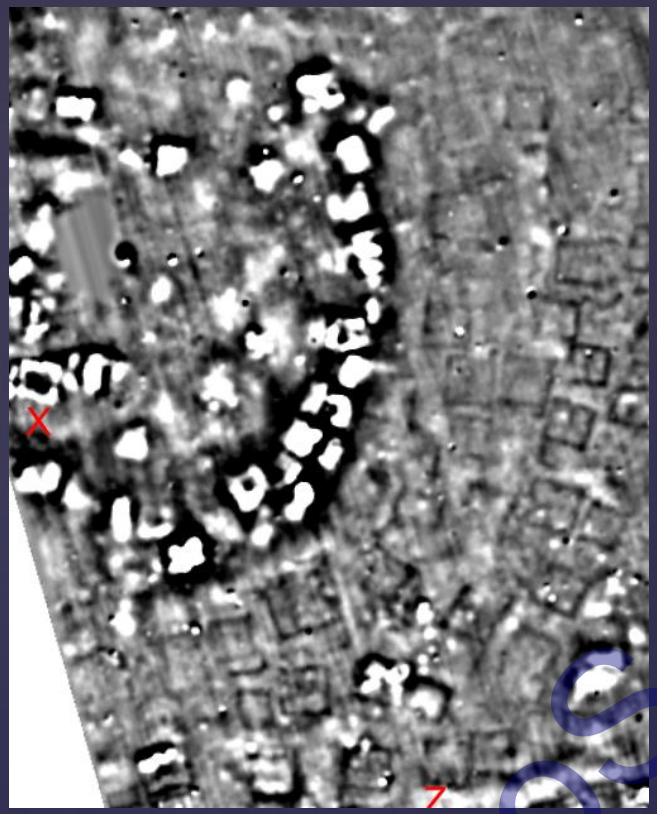


Almyriotiki

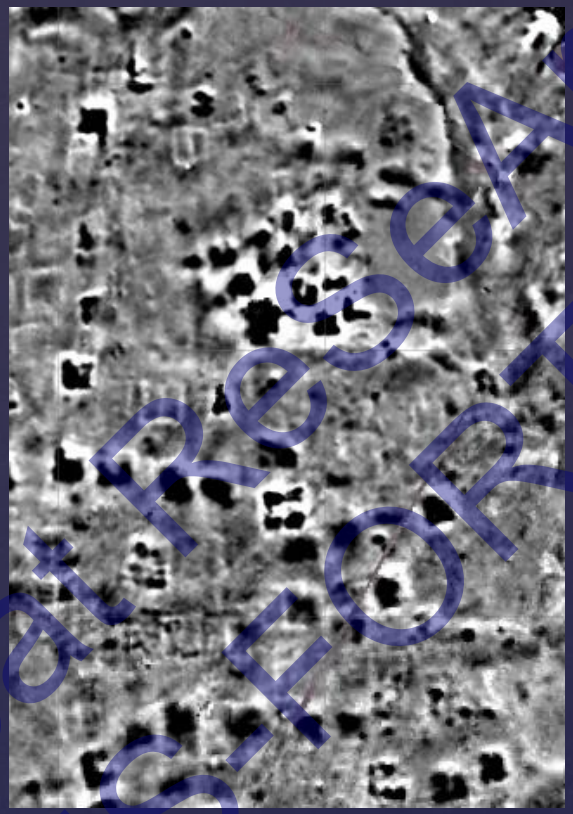


Extent & Internal Organization of Settlements

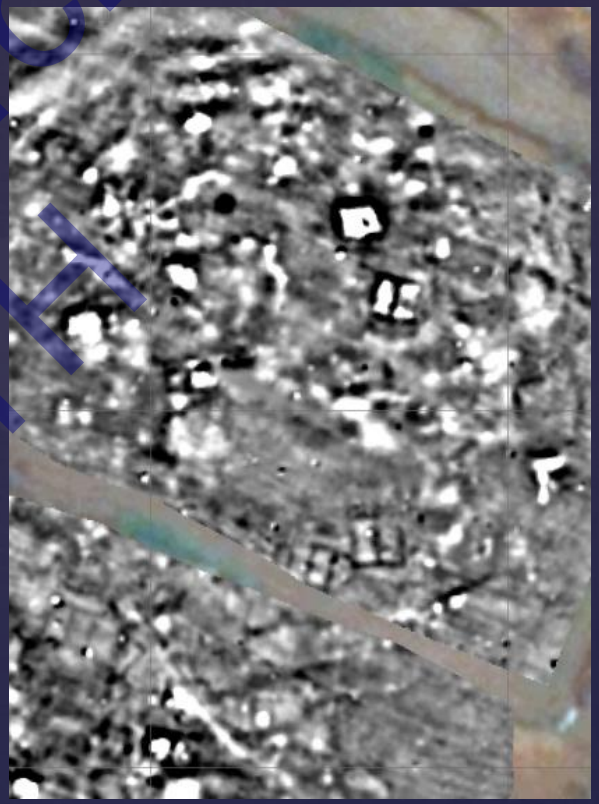
Almyriotiki



Perdika 1



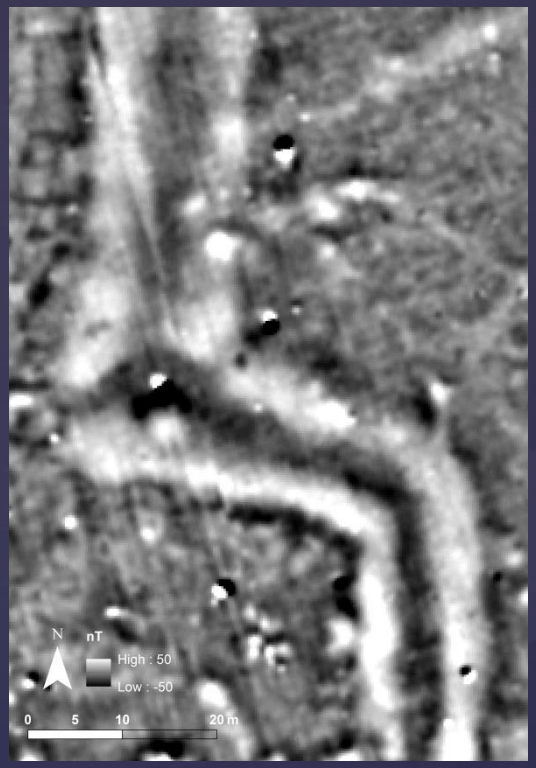
Karatsantagli



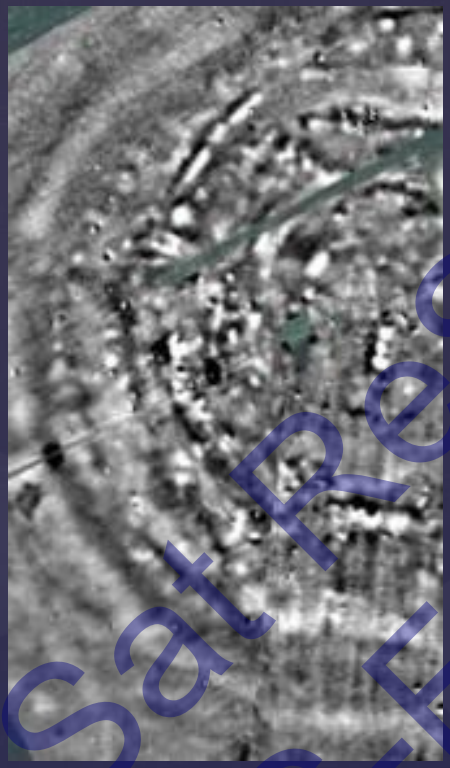
- **<u>Conceptualize a landscape of variation</u>: Similar and divergent characteristics of settlements in planning and structural materials**)
- Dimension of settlements and structures
- Internal organization of the structures, clusters of structures
- burnt and unburnt structures / mudbrick & stone structures
- open/unbuilt spaces, pits, a.o.

Neolithic Ditches

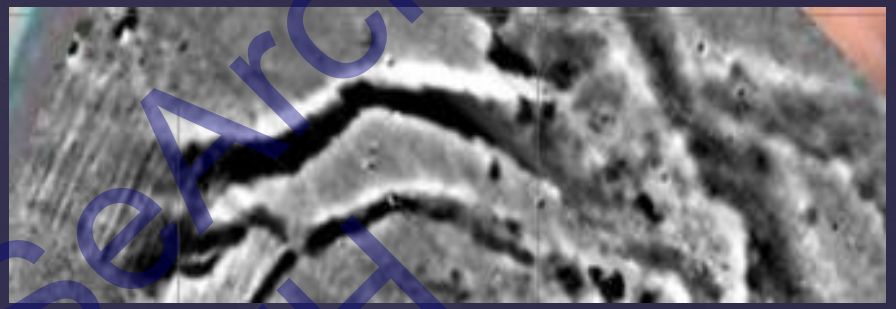
Almyriotiki



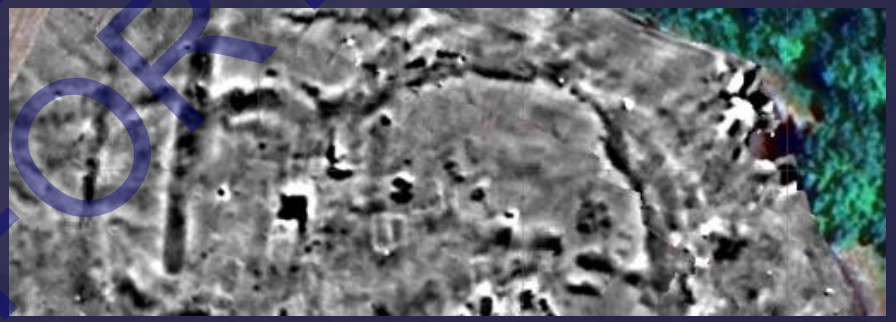
Rizomilos 2



Almyros 2



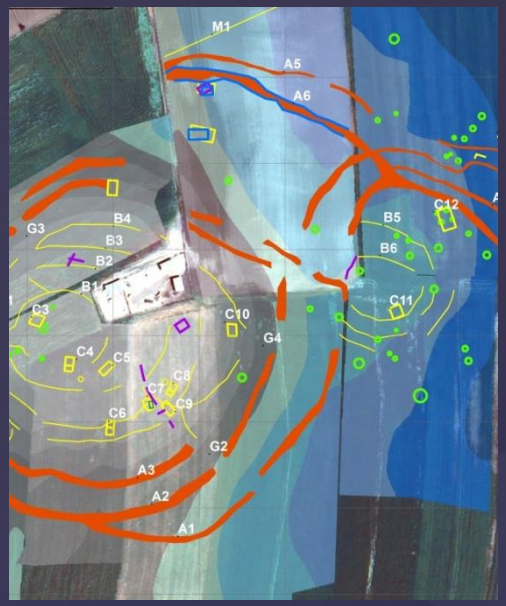
Perdika 1



- **Neolithic Ditches**
- Existence of enclosures: internal fortifications and external ditches
- Sustaining terracing walls at more abrupt slopes and hilly terrains
- Corridors and entrances

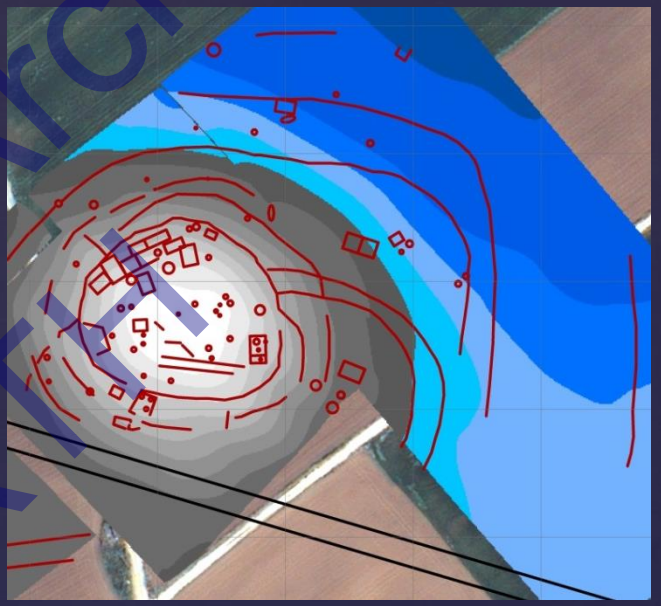
Flooding Simulation

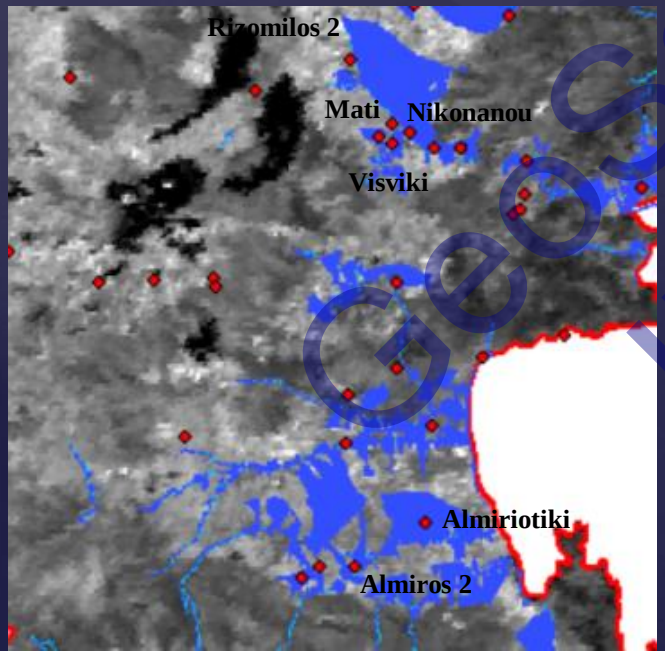
Rizomilos 2



Karatsangliou

Velestino 4 - Visviki





- Existence of ditches in terms to the surrounding geomorphologic features (e.g. proximity to palaeochannels and to prone flood areas).
- Persistence of habitation even in flood prone areas and the existence of multiple enclosures and ditches around these settlements may suggest counter measures against periodic flooding events.

A New Perspective in the Neolithic Settlement Organization

- Implications regarding the sustainable population, the study the spatial context and organization – intra site, local and regional level, the chronological continuation of habitation, persistency in occupation, etc. → still able to make some reconstruction of Neolithic landscape and organization of the settlements.

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Opening a New Frontier in the Neolithic Settlement Patterns of Eastern Thessaly, Greece.

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