# Archaeology of Death
# 3 Basics of field methodology, burial contexts and funerary areas

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c___t____s_____

# Funerary Sites Survey

Visual recognition

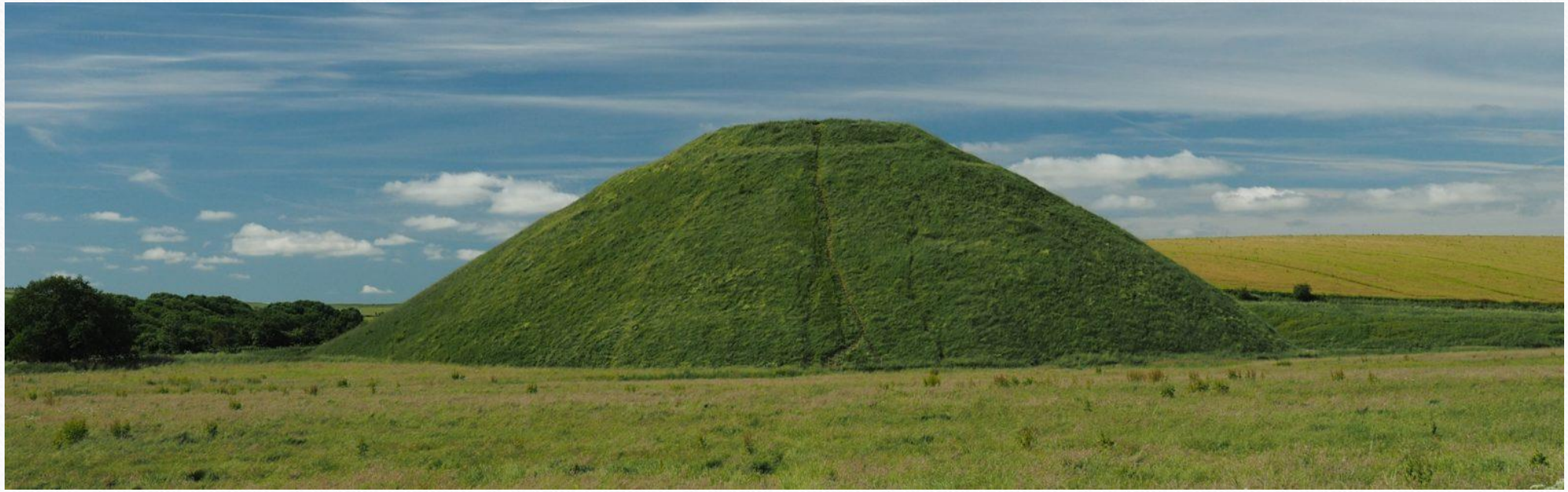
Surface survey – artefact scatters on damaged cemeteries

Remote sensing

Geophysical prospection

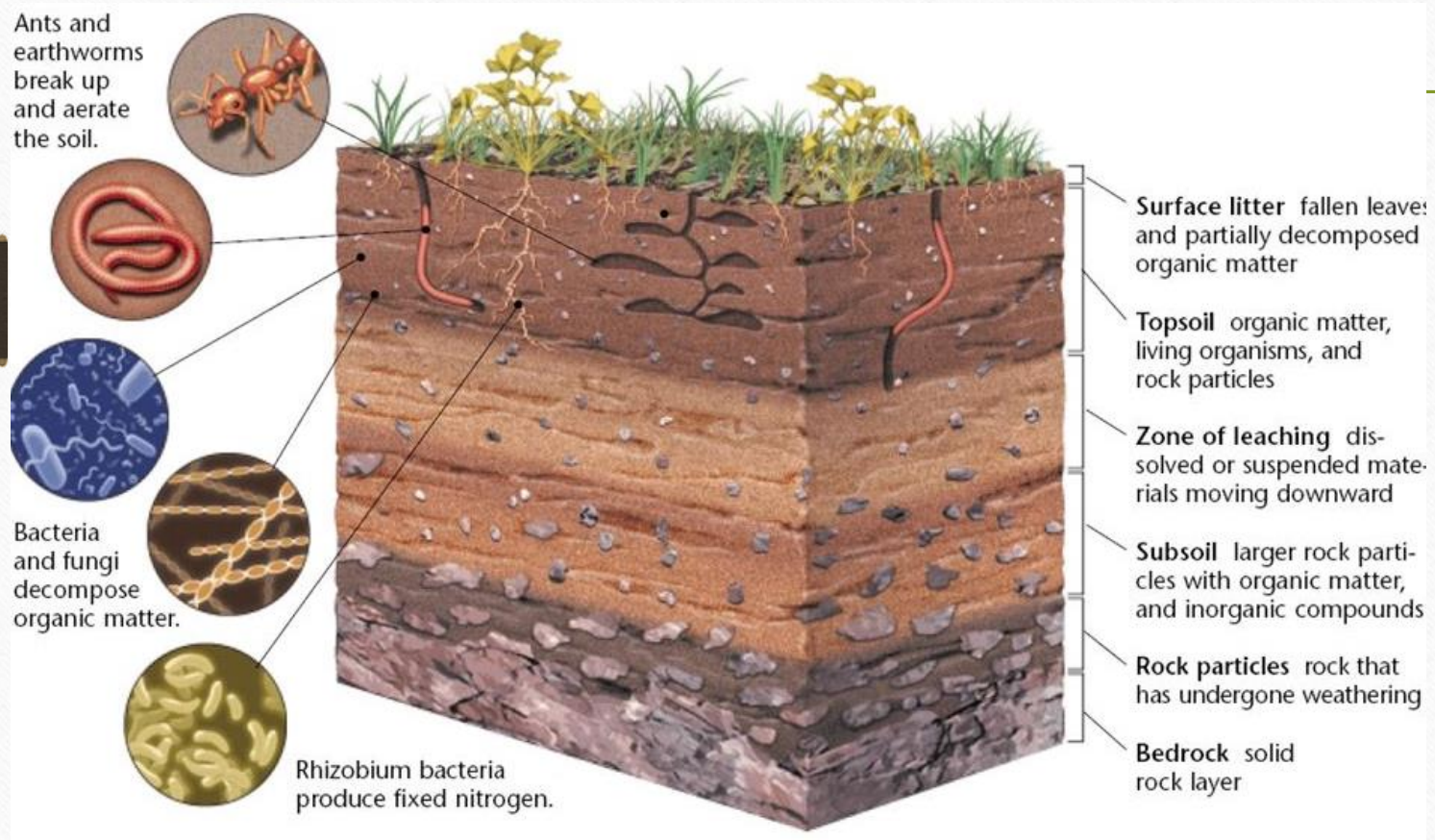
Geochemical prospection

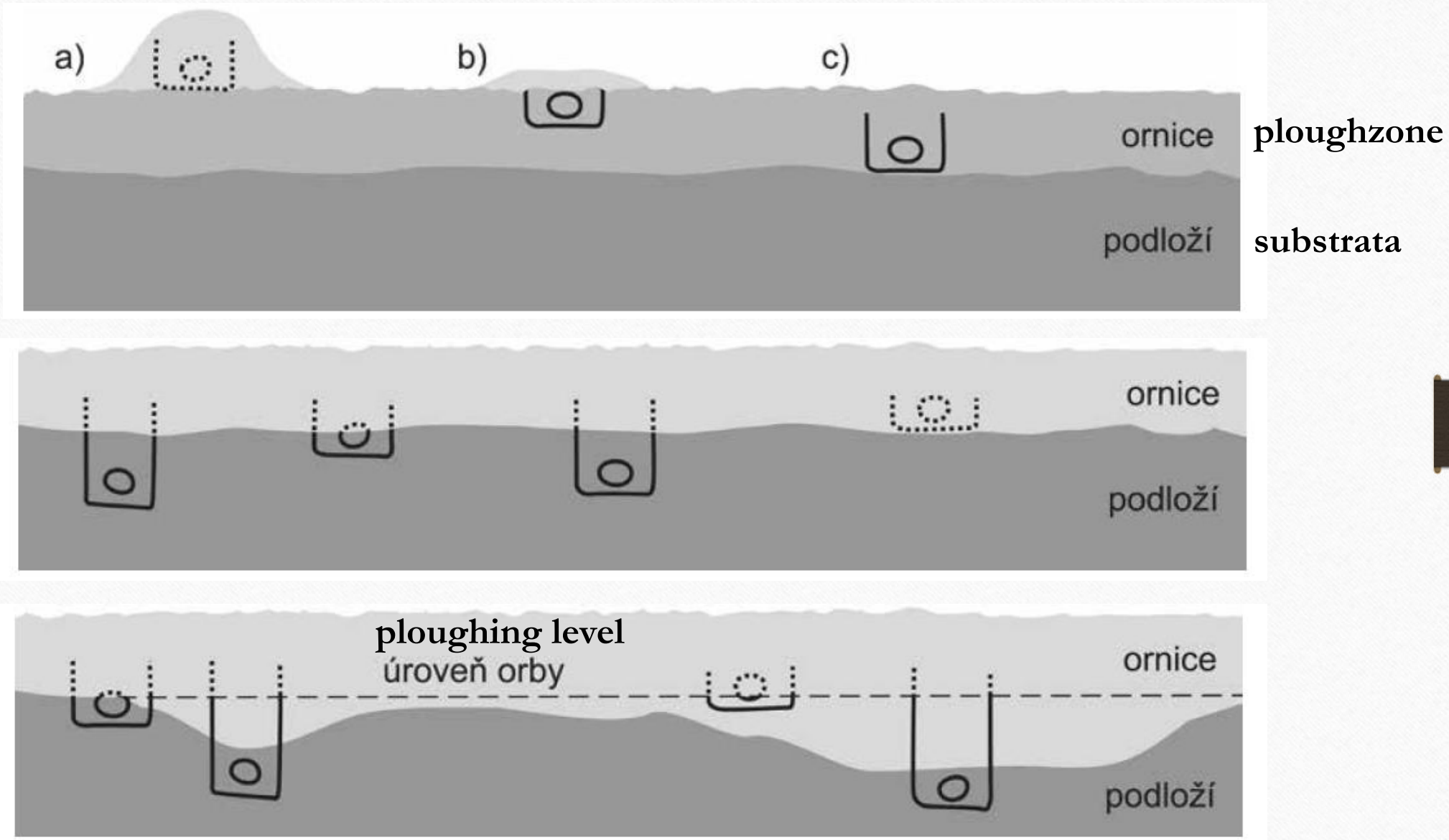
# Visual recognition



# Field walking - Surface survey

## deep ploughing & artefact scatters on dmaged cemeteries



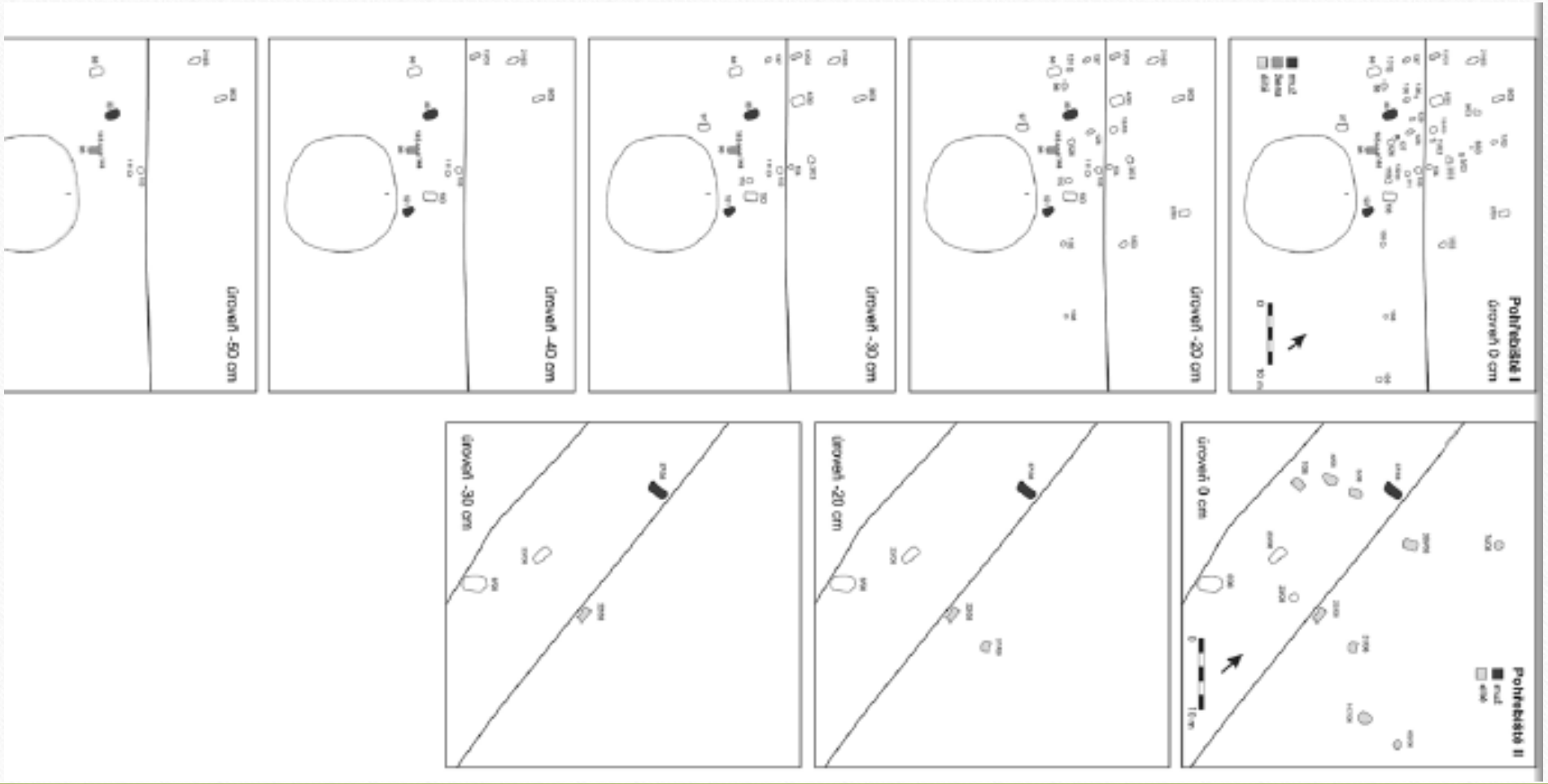




ploughzone

substrata

# Levels of striping the topsoil affecting preservation of burials

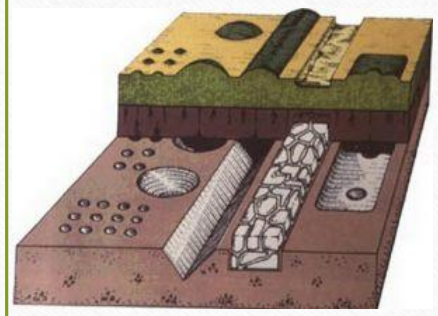
## Tuněchody (Tichý – Kolert 2016)

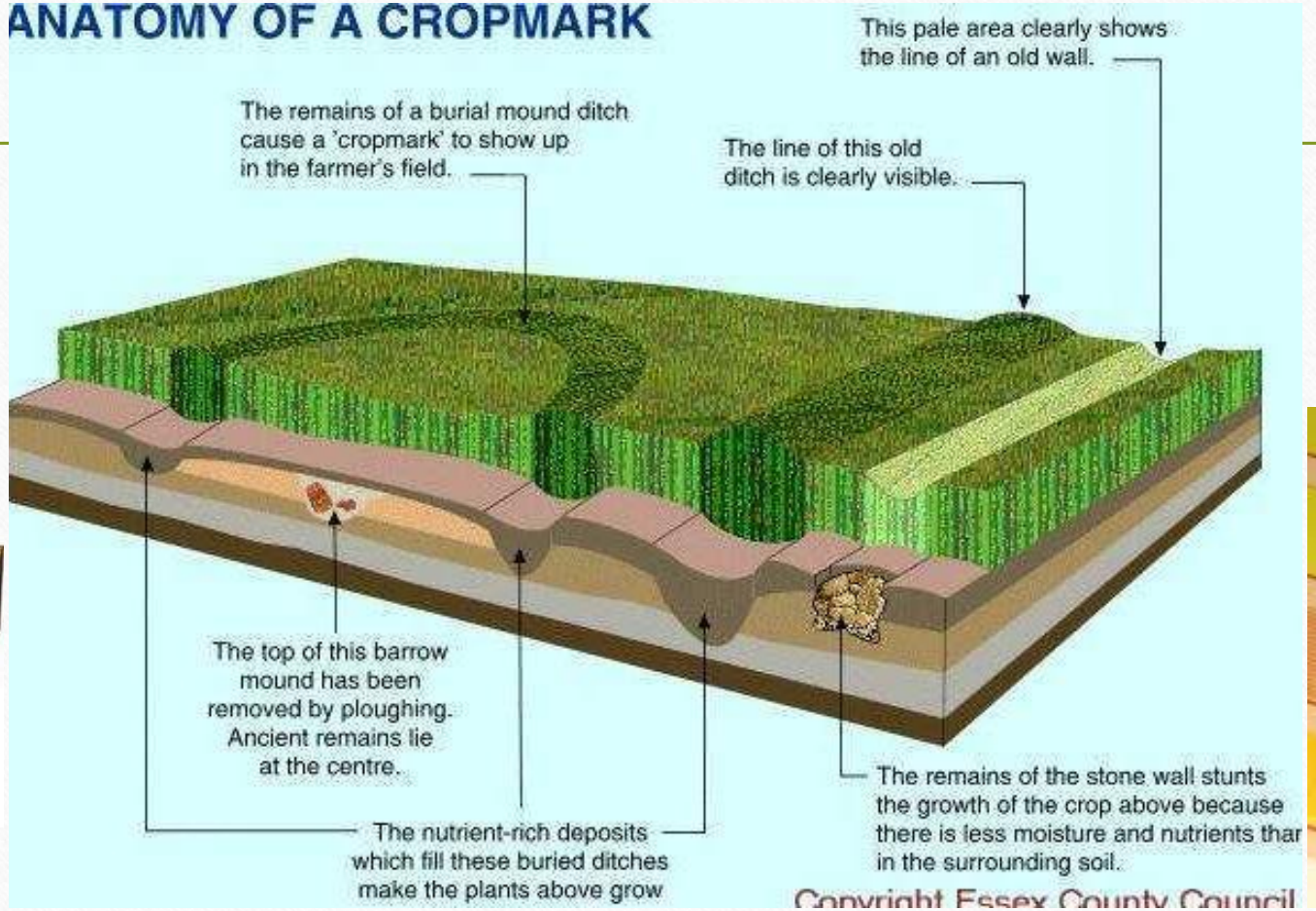


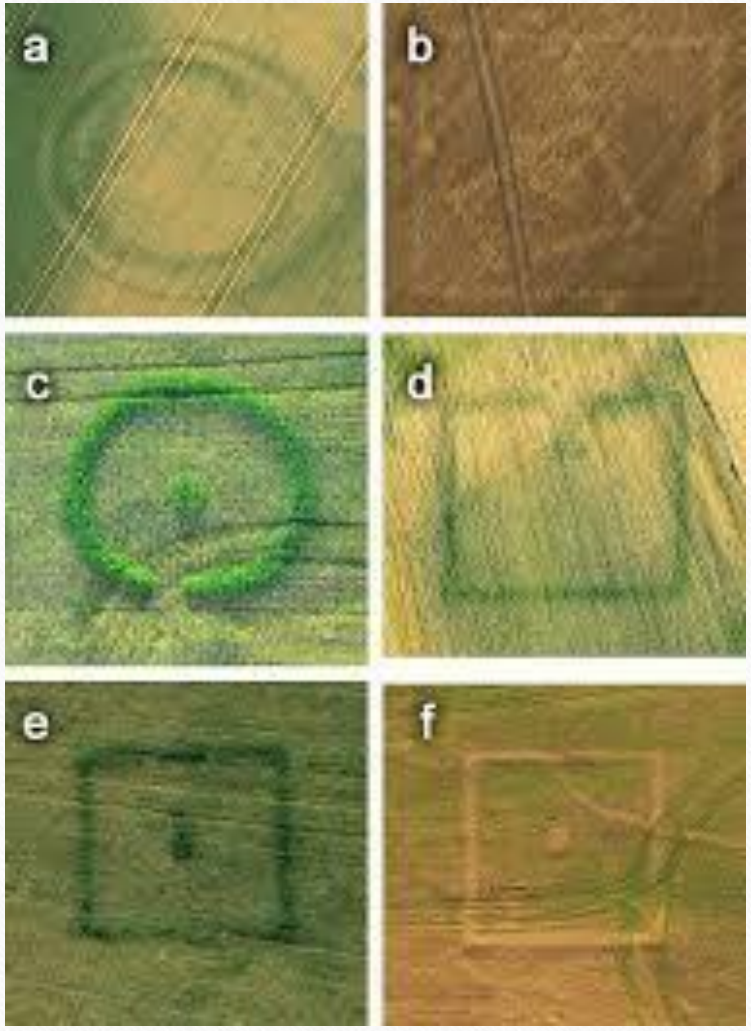
# Remote sensing

After M. Gojda

# Principles – soil/crop marks

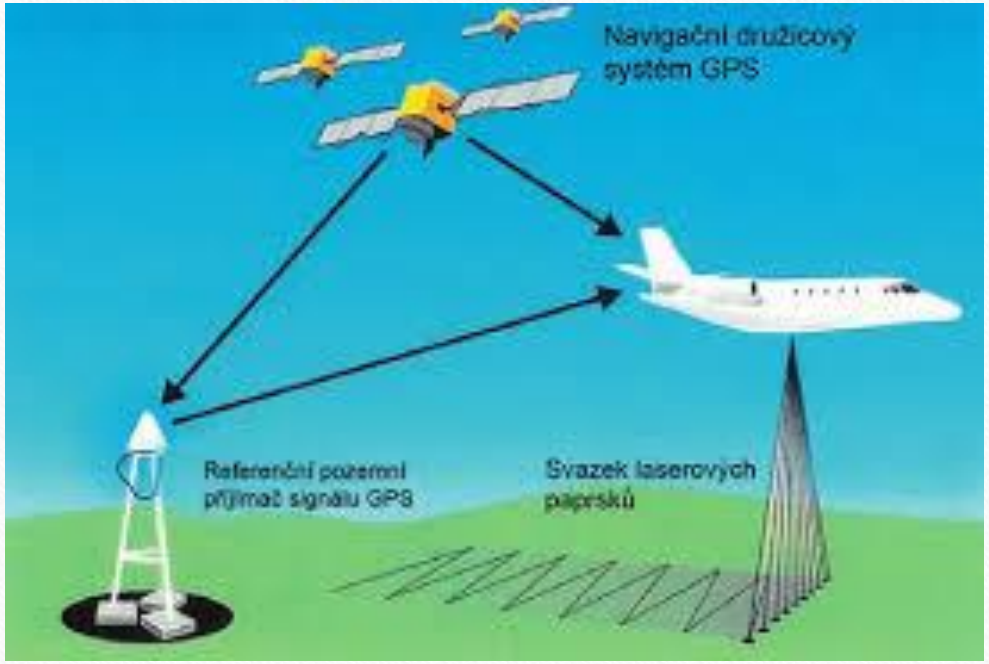


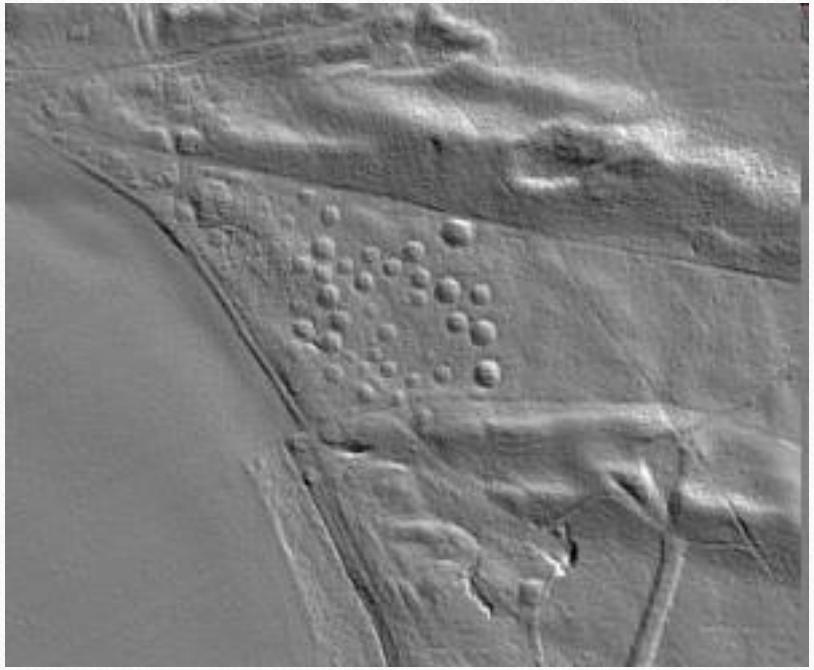


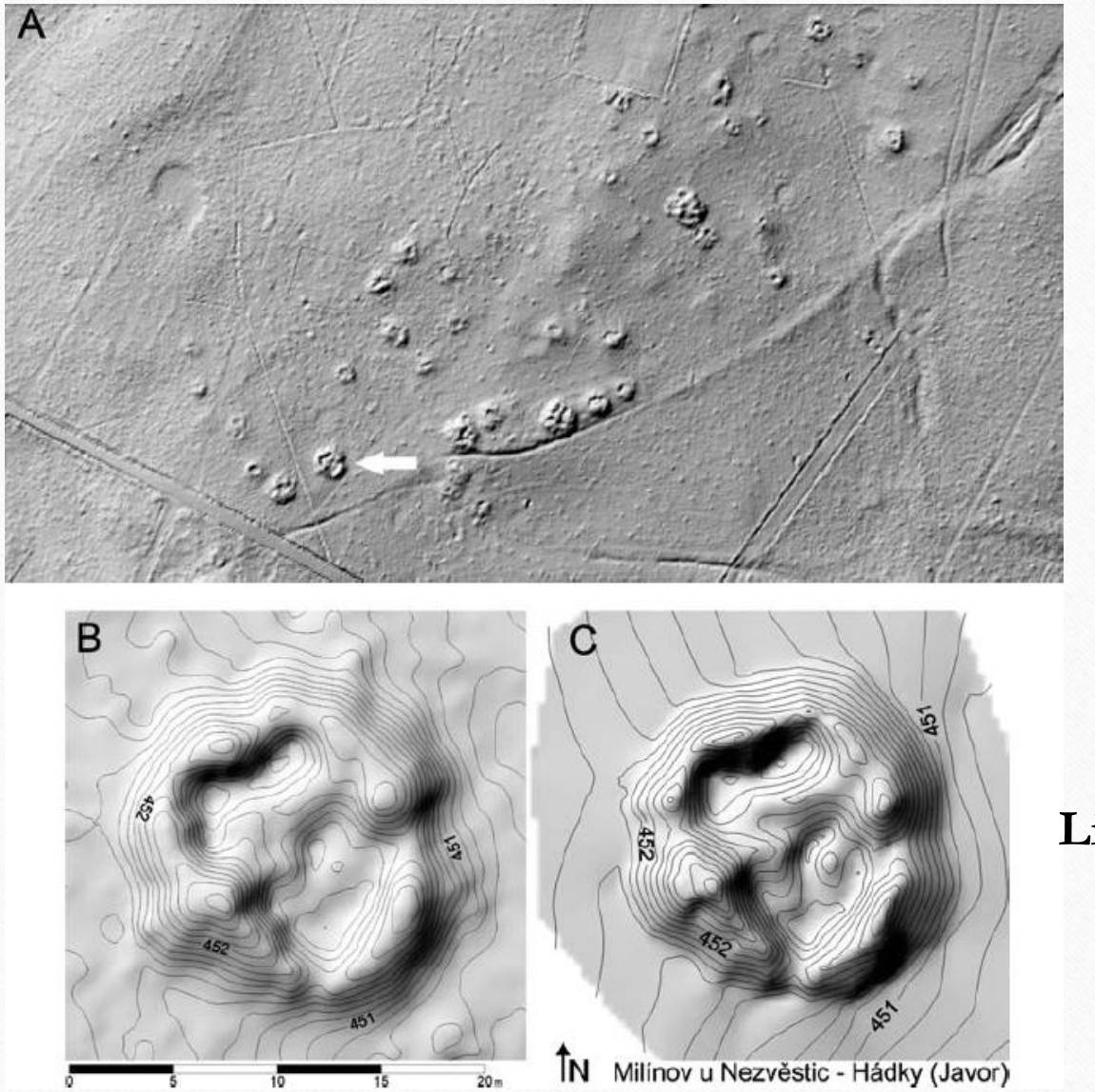


a
b
c
d
e
f

Funerary monuments and settlement near Eynsham, Oxfordshire, have become visible during the hot summer. Photograph: Damian Grady/Historic England

# LIDAR
# (Light Detection and Ranging)
# Remote sensing

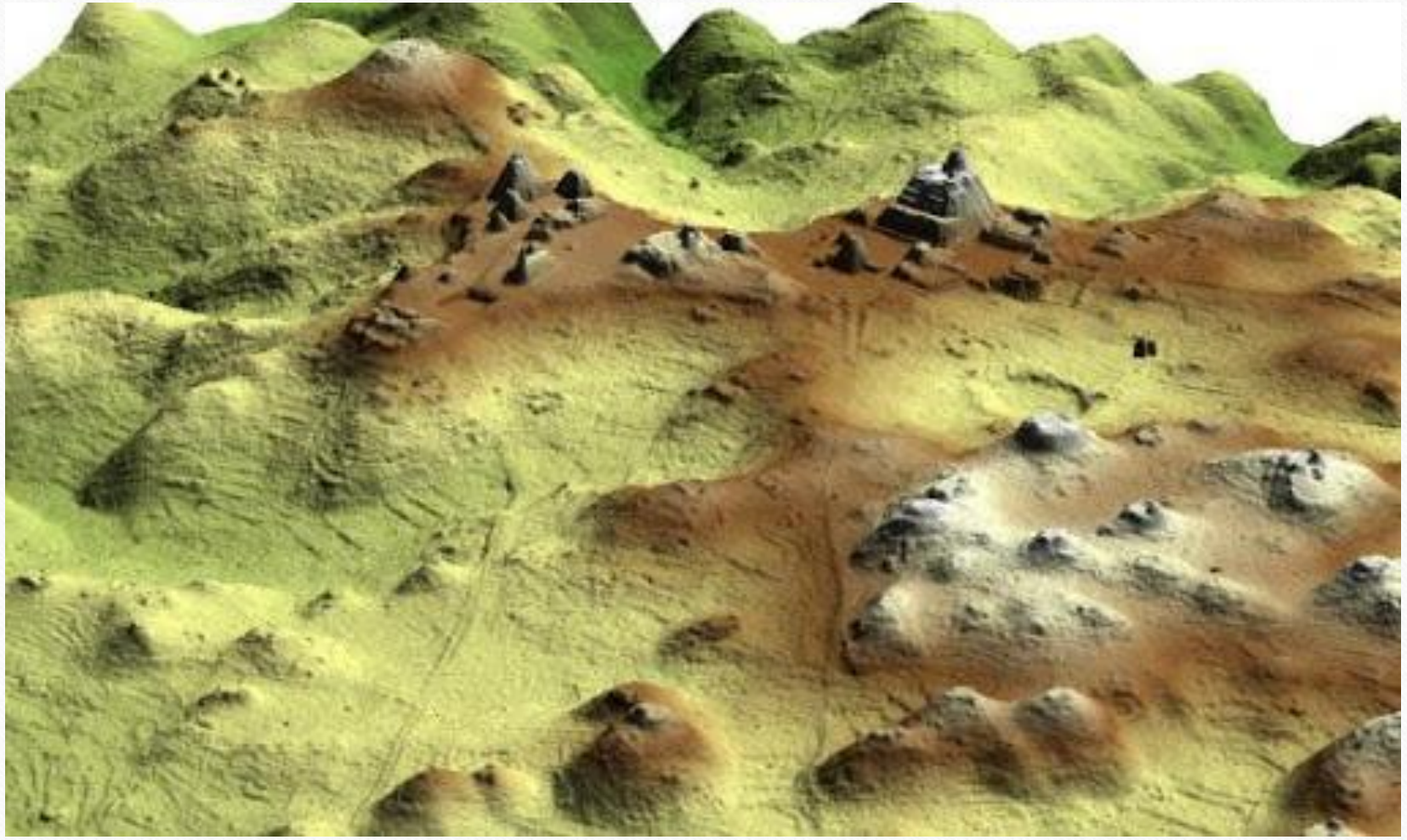


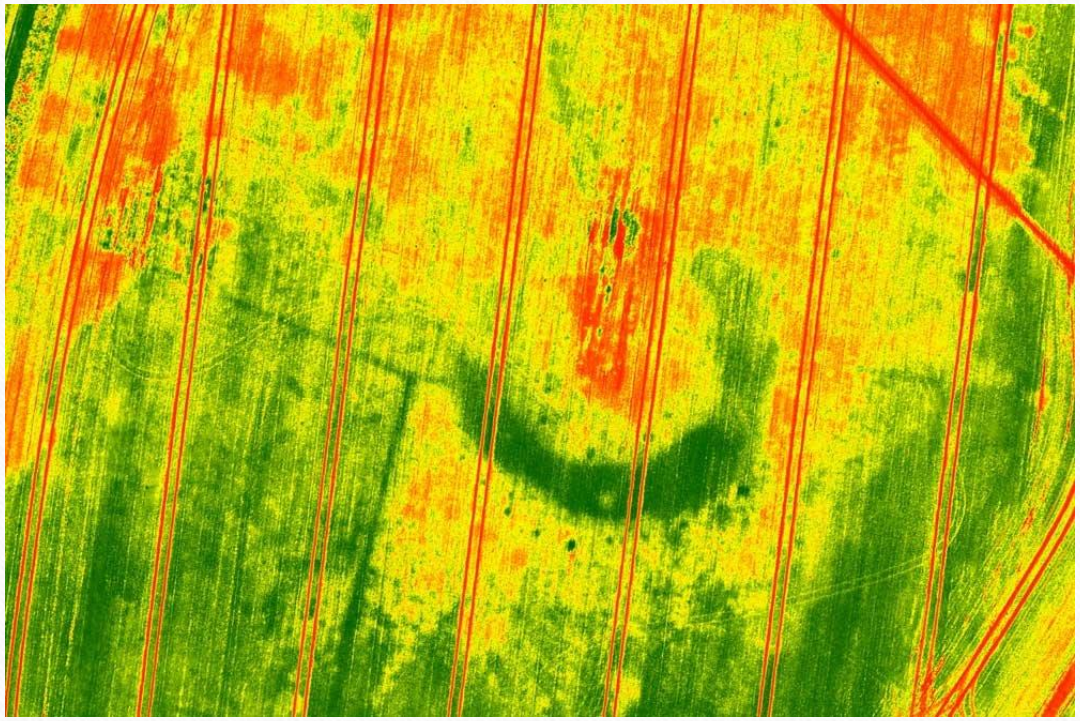


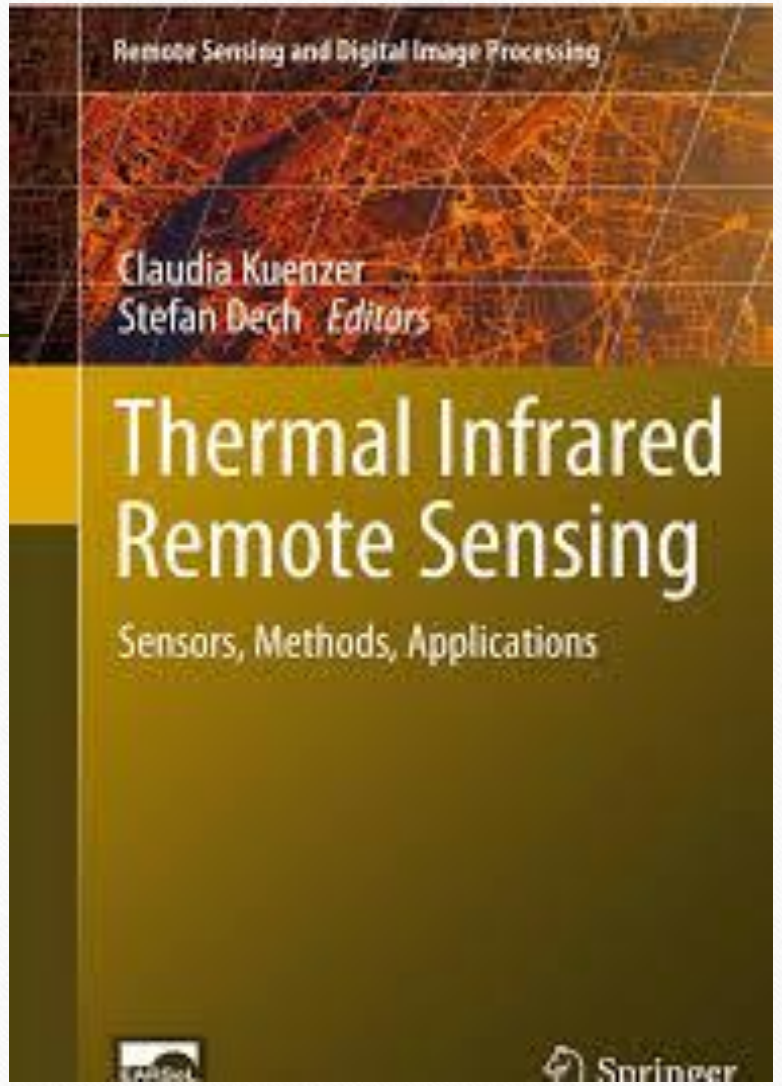

geodetic contour plan

Lidar based contour plan



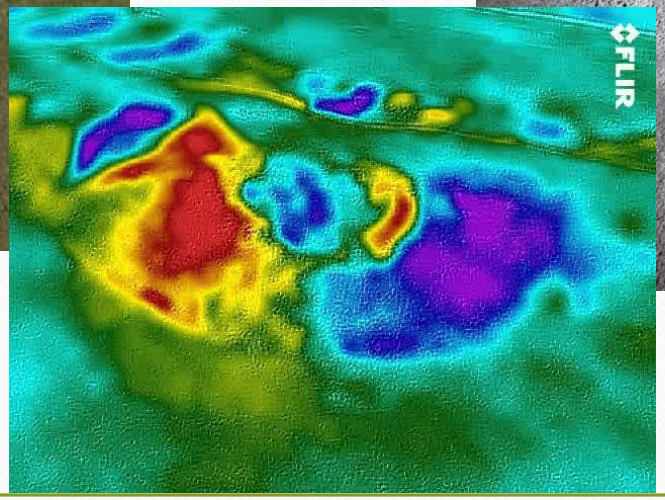
# Thermal Infrared Remote sensing



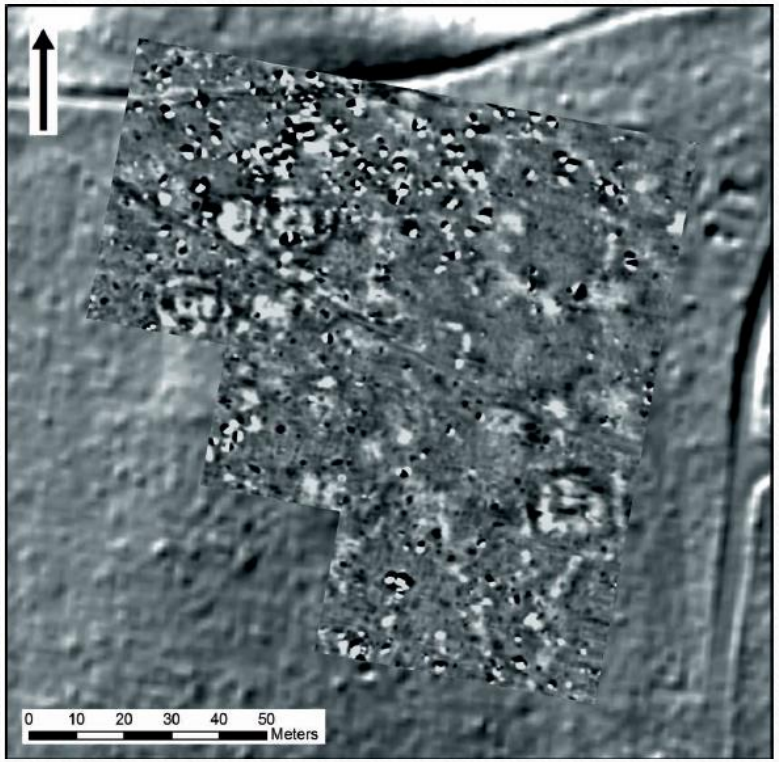


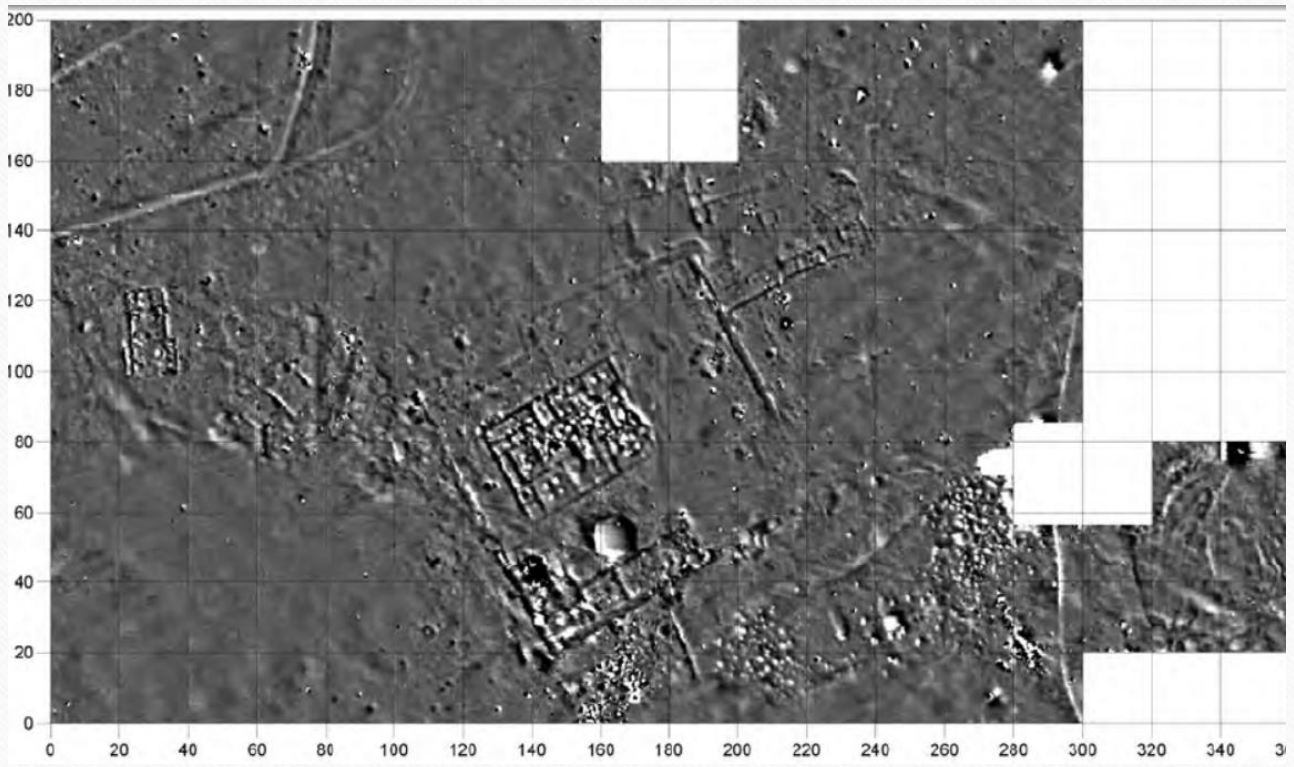
# Thermal Infrared

A – The Toots Long Barrow, Selsley Common (Gloucestershire)
B - Near infrared (720nm filter) in sunlight
C - Thermal infrared in sunlight. The soil was still moist in places because of the cool days and near freezing nights. The air temperature was 13°C and the relative humidity ~55% (After John Wells 2019).




# Geophysical prospection



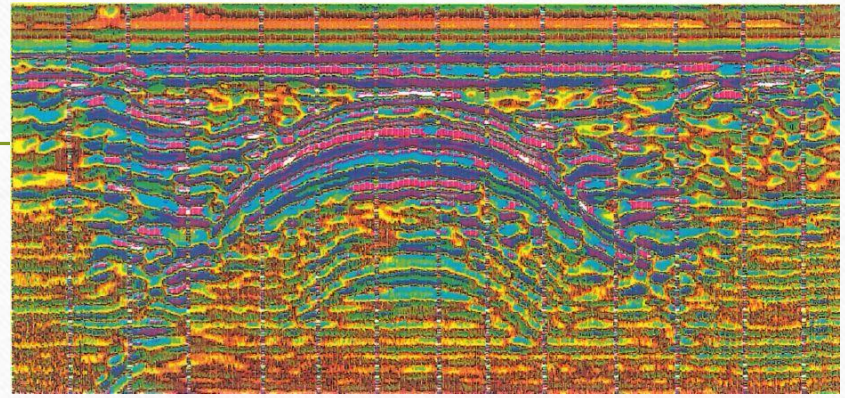



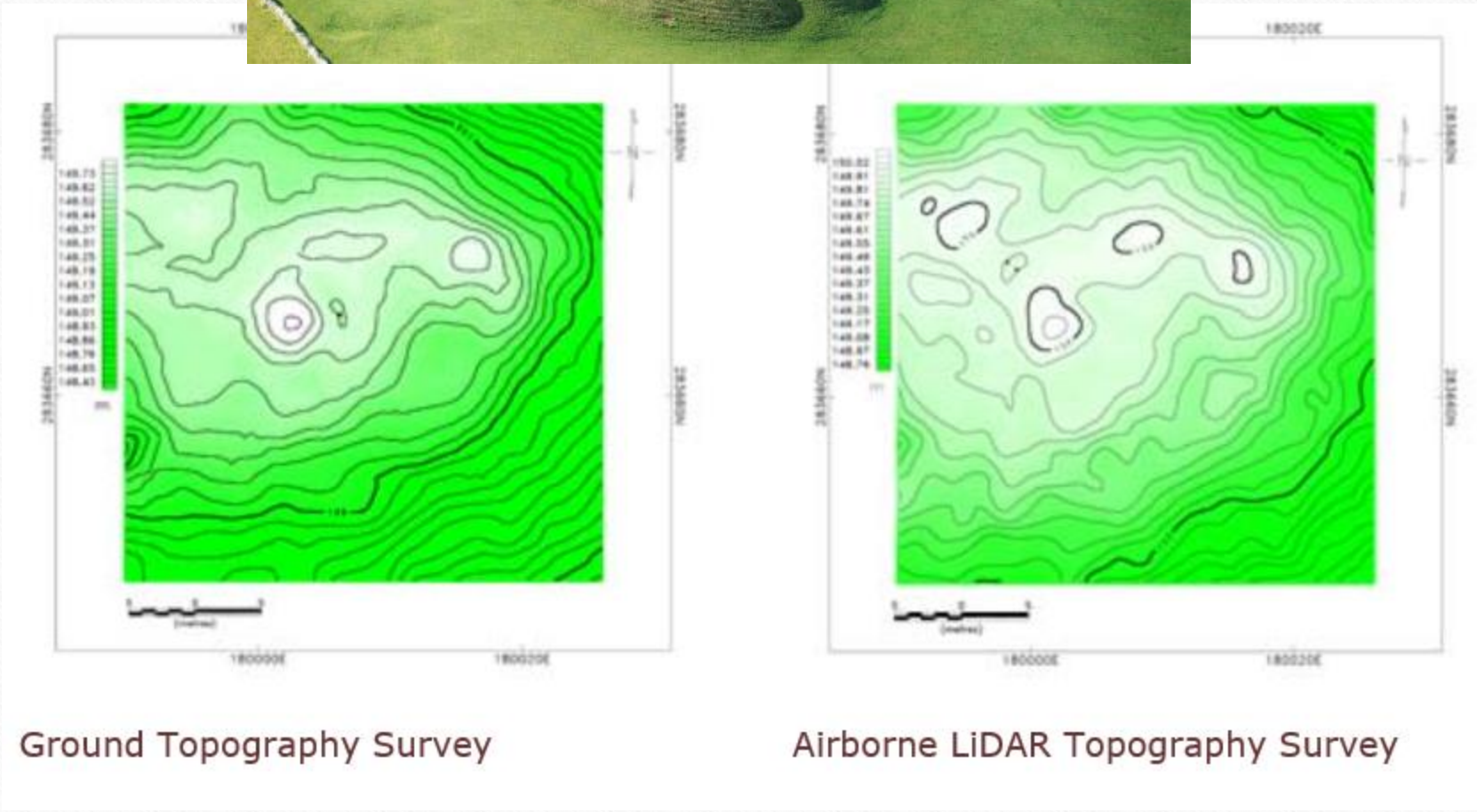

gradiometer

## Electric resistance


## Geomagnetic survey

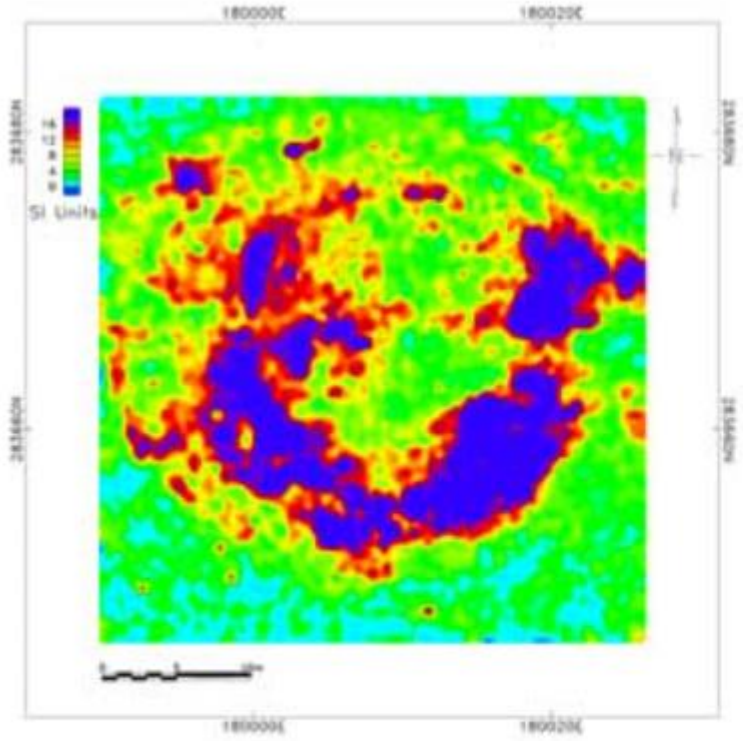
# Ground Penetrating Radar (GPR)



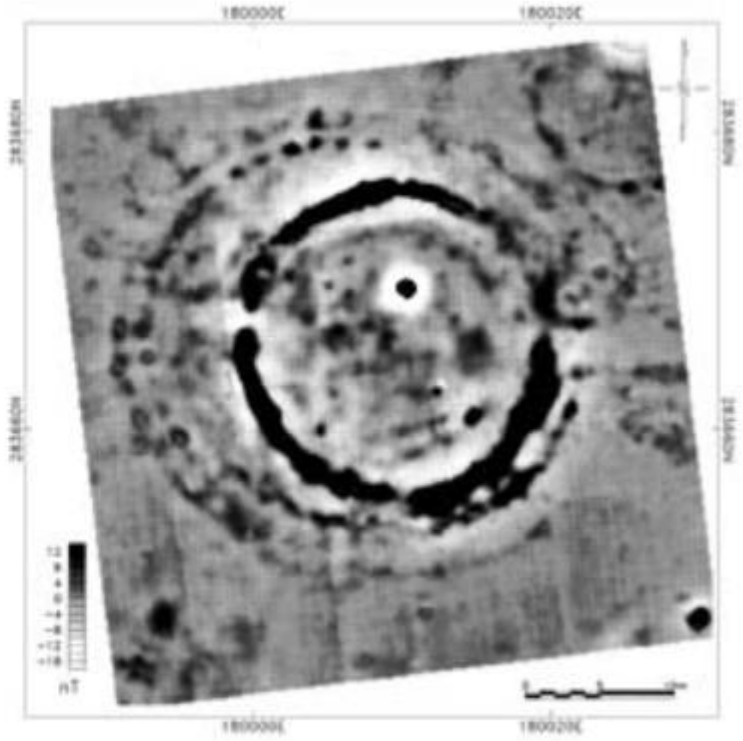


Ground Topography Survey

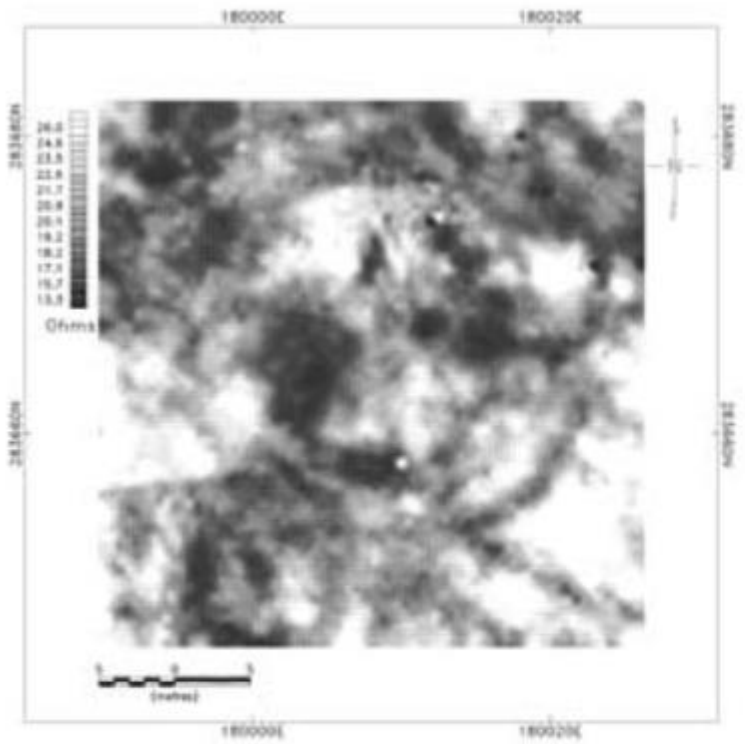
Airborne LiDAR Topography Survey

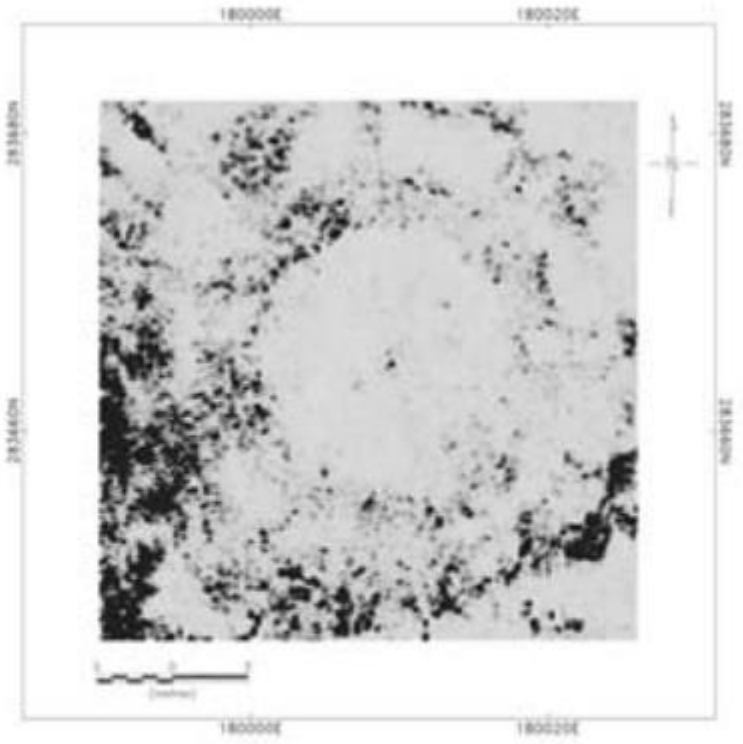



Detailed Magnetic Susceptibility




Detailed Magnetic Gradiometry




Detailed Earth Resistance

Detailed Ground Penetrating Radar

Multiple survey techniques on the summit of Rathcroghan Mound, Co Roscommon. (after Barton and Fenwick, 2005 & Barton, 2012a, Barton, 2012b)

# Coring environmental samples or periscope into Etruscan tombs

# Geochemical prospection

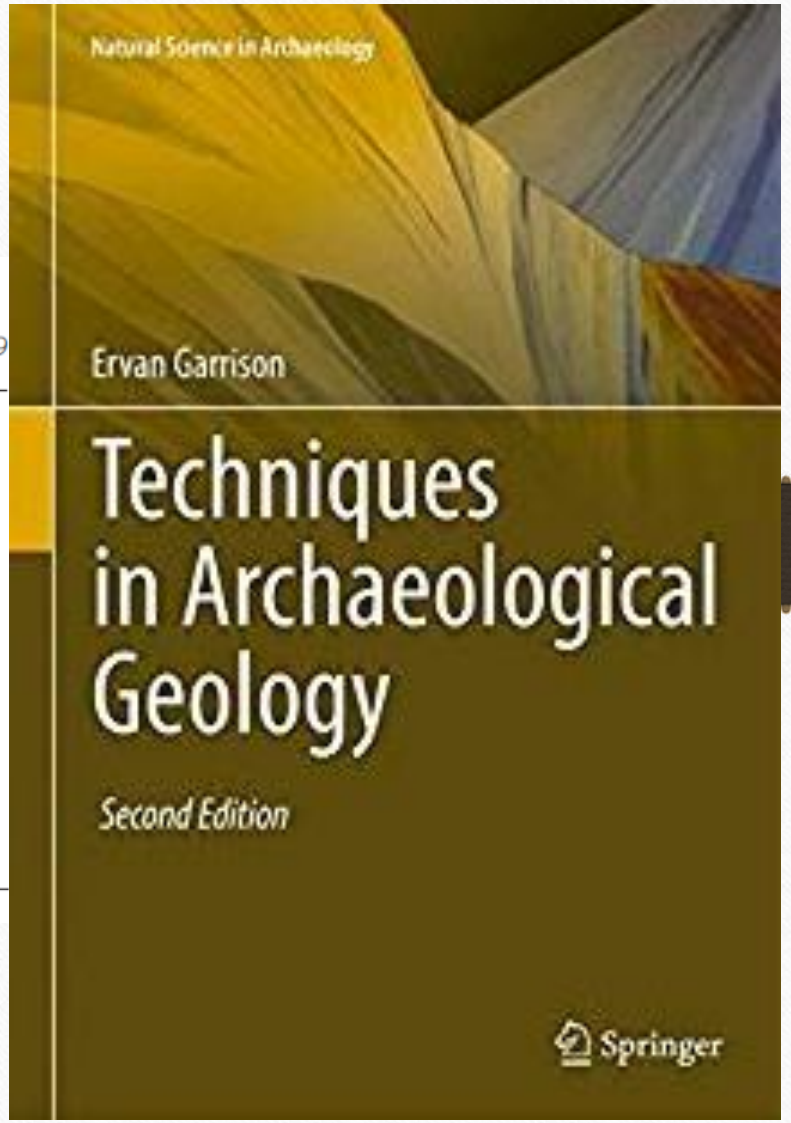
journal of computer applications in archaeology

Cannell, R J S, et al. (2018). Delineating an Unmarked Graveyard by High-Resolution GPR and pXRF Prospection: The Medieval Church Site of Furulund in Norway. *Journal of Computer Applications in Archaeology,* 1(1), pp. 1–18, DOI: https://doi.org/10.5334/jcaa.9

RESEARCH ARTICLE

## Delineating an Unmarked Graveyard by High-Resolution GPR and pXRF Prospection: The Medieval Church Site of Furulund in Norway

Rebecca J. S. Cannell*, Lars Gustavsen†, Monica Kristiansen† and Erich Nau†



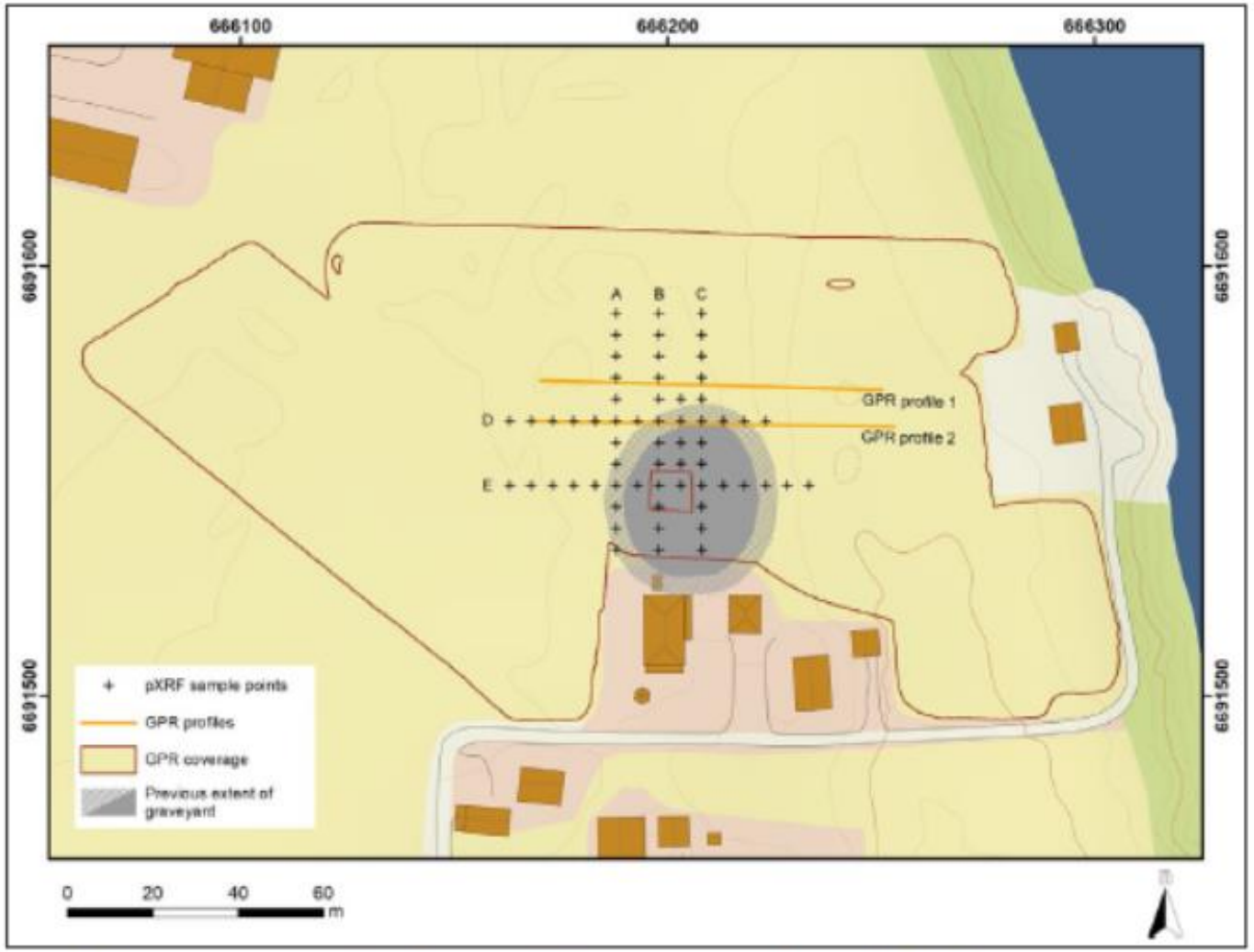



**Figure 3:** GPR survey area, GPR profile lines and pXRF sample points at Furulund. The GPR area encompasses approx. 1.8 hectares. The pXRF samples were taken in five main transects across the site.
Map source: The Norwegian Mapping Authority, Geovekst and Municipalities, 2018.

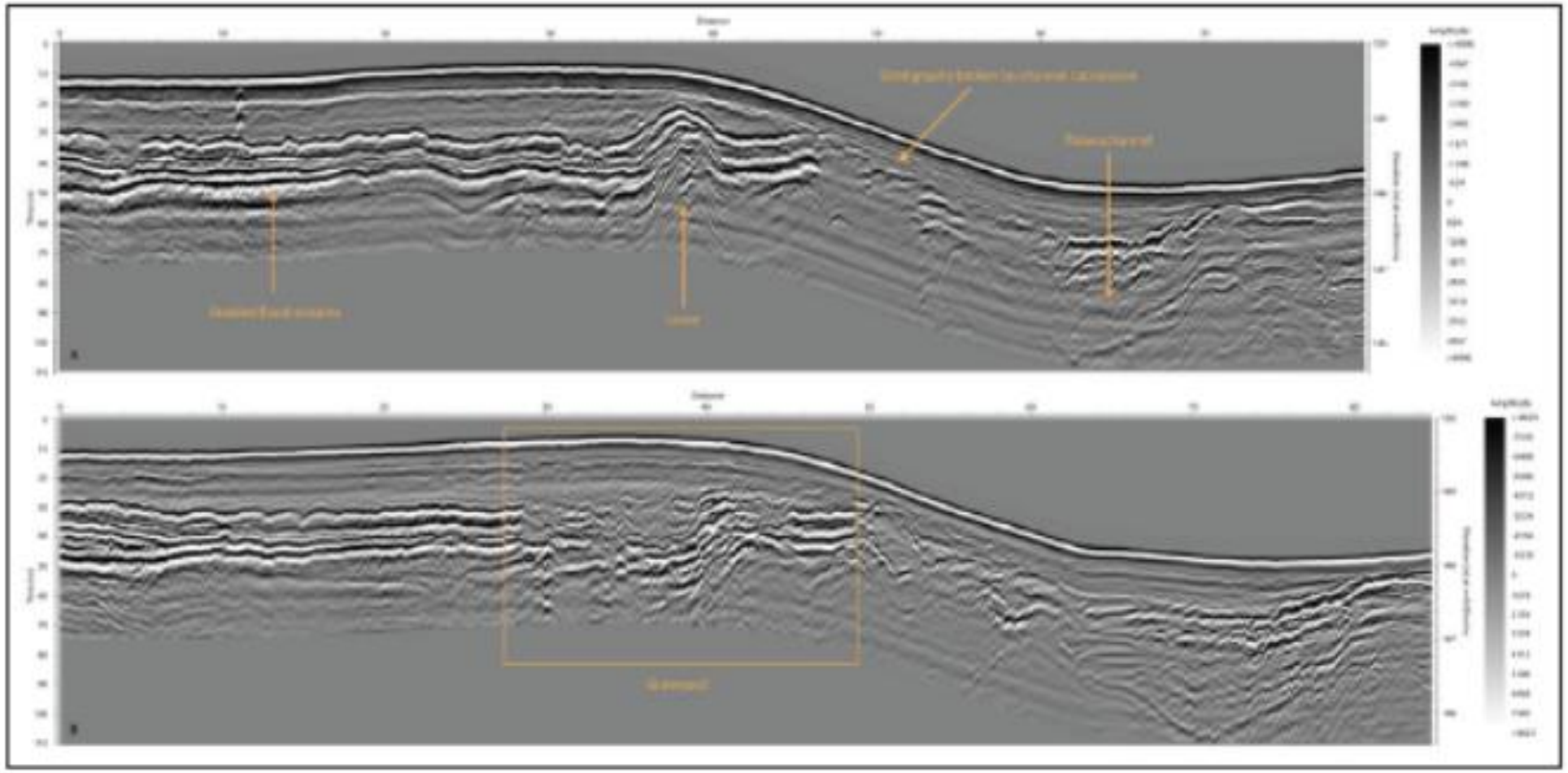


**Figure 4:** A: GPR profile 1, running across the area north of the graveyard and showing the natural stratigraphy of the area. B: GPR profile 2, running across the graveyard, indicating that the graves are cutting the natural stratigraphy – see Figure 3 for the profiles' position in relation to the graveyard.

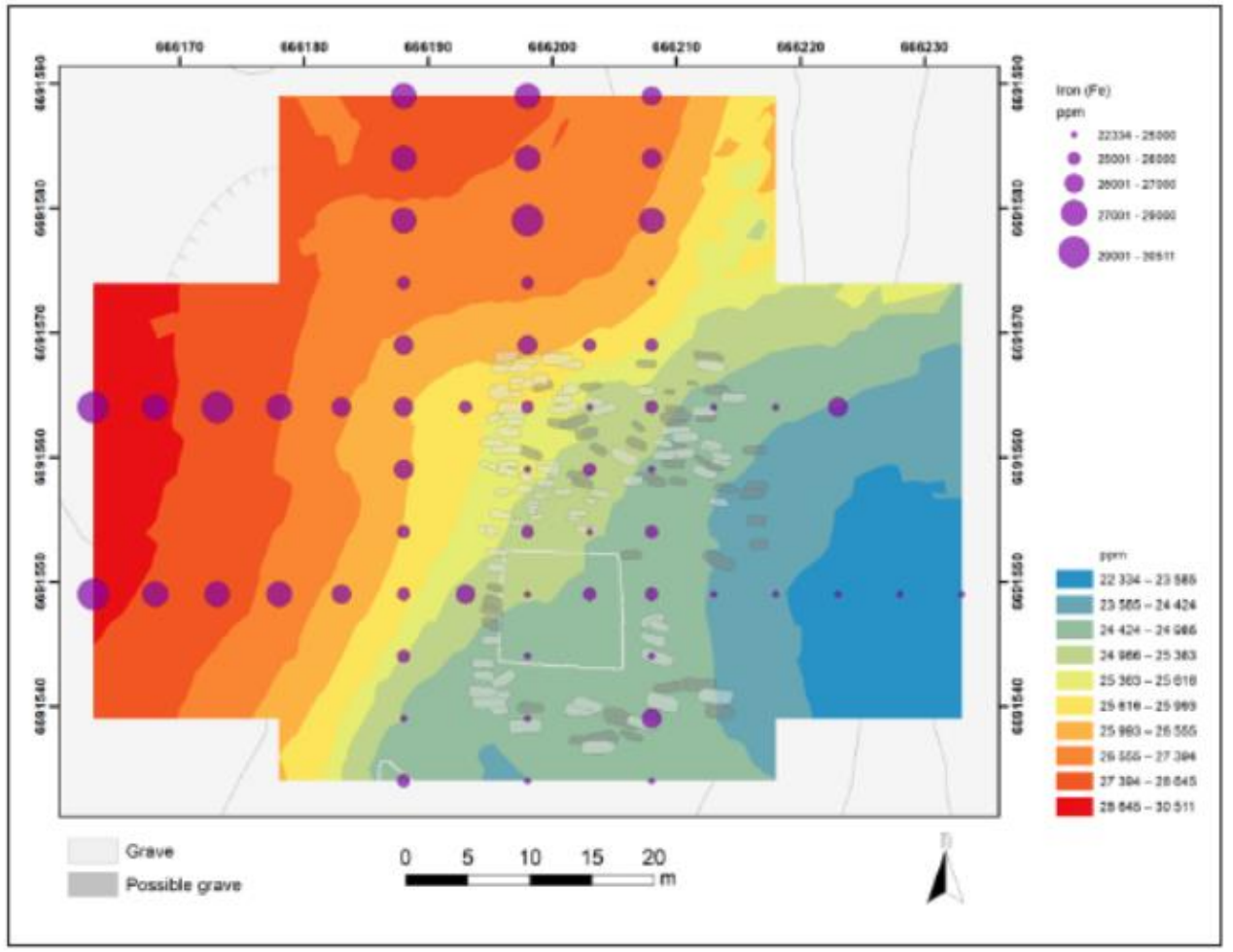



**Figure 6:** Interpolated distribution of Fe (ordinary kriging), with the sample points as graduated circles overlaid over the GPR interpretations.

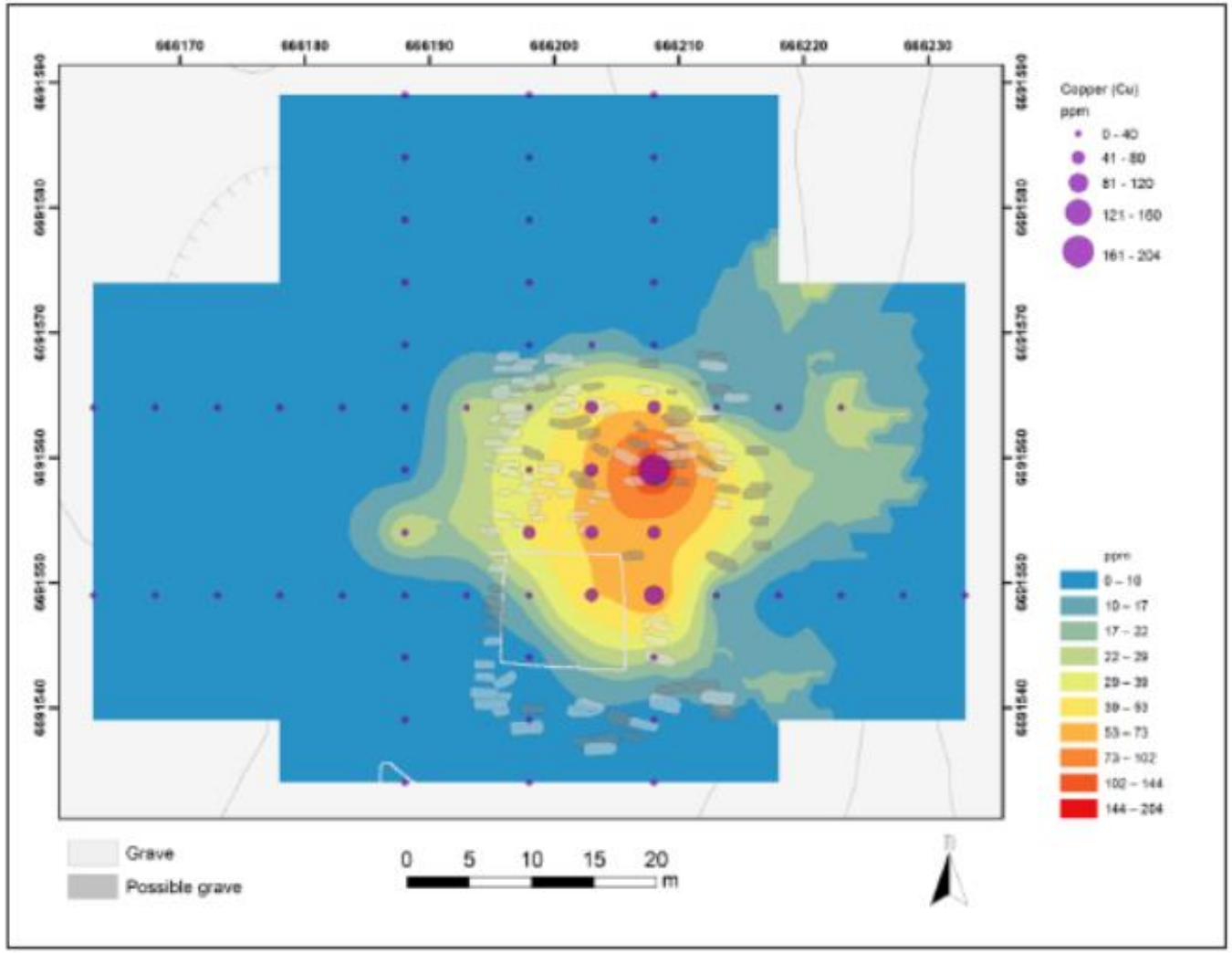



**Figure 7:** Interpolated distribution of Cu (ordinary kriging), with the sample points as graduated circles overlaid ove the GPR interpretations.

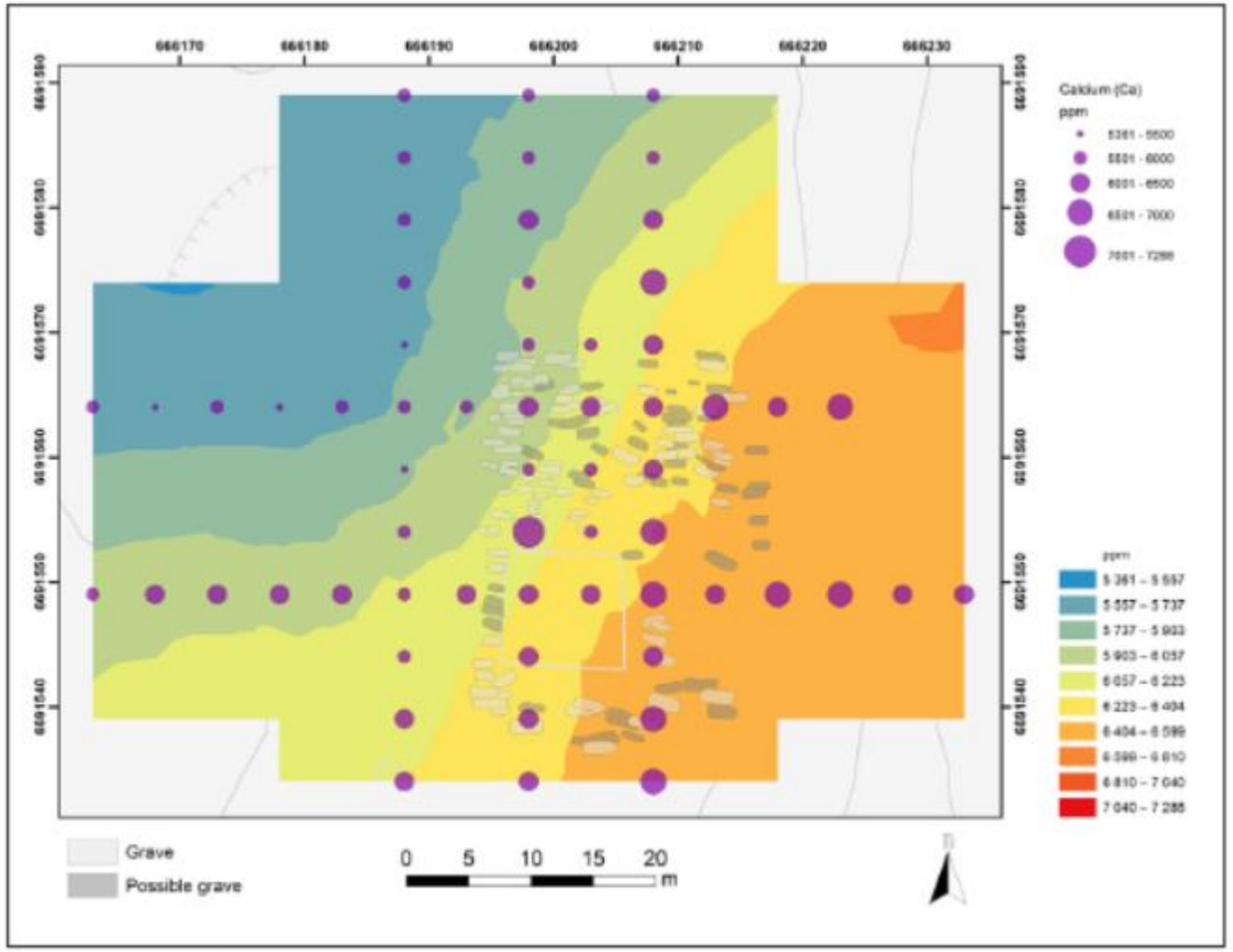



**Figure 8:** Interpolated distribution of Ca (ordinary kriging), with the sample points as graduated circles overlaid over the GPR interpretations.

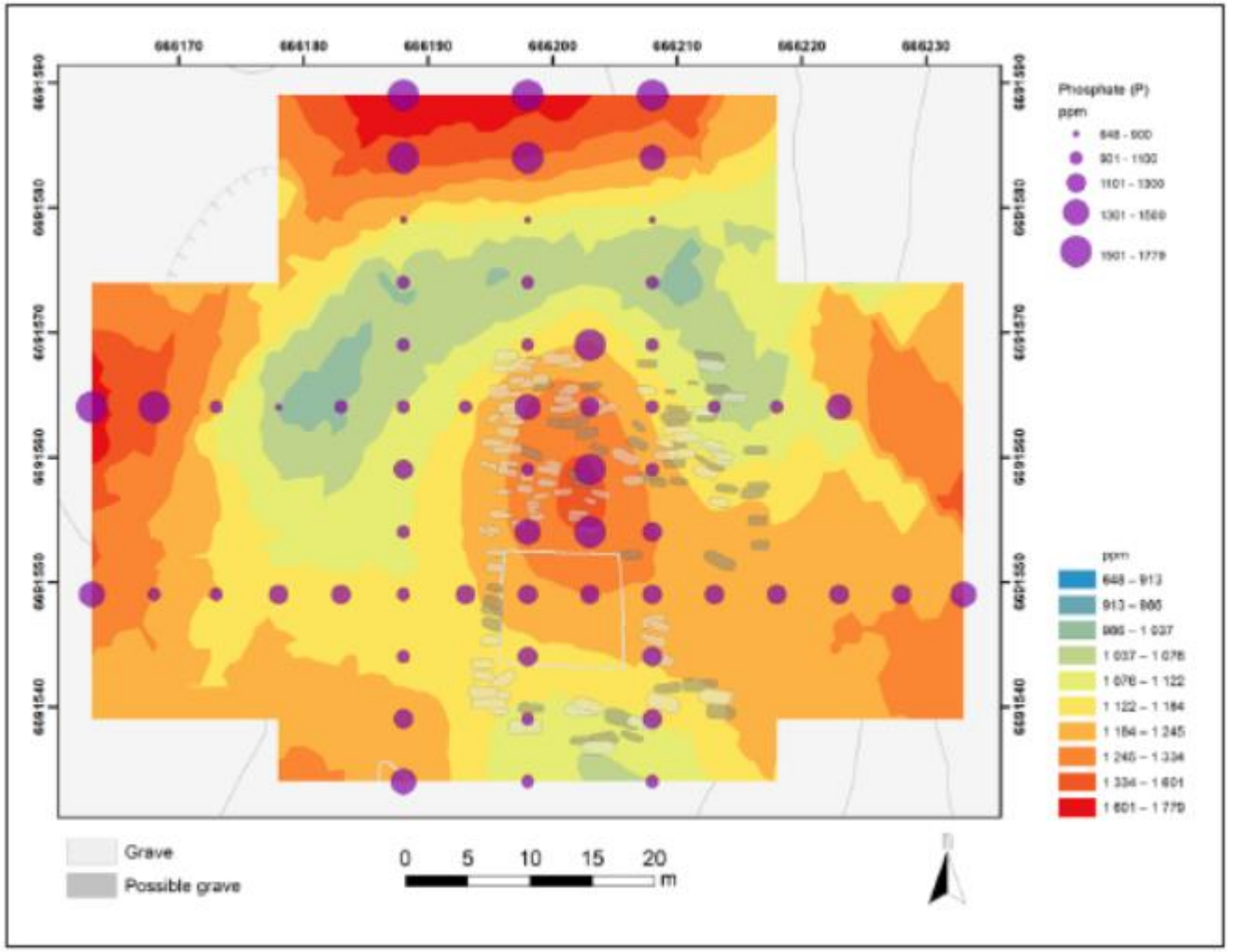
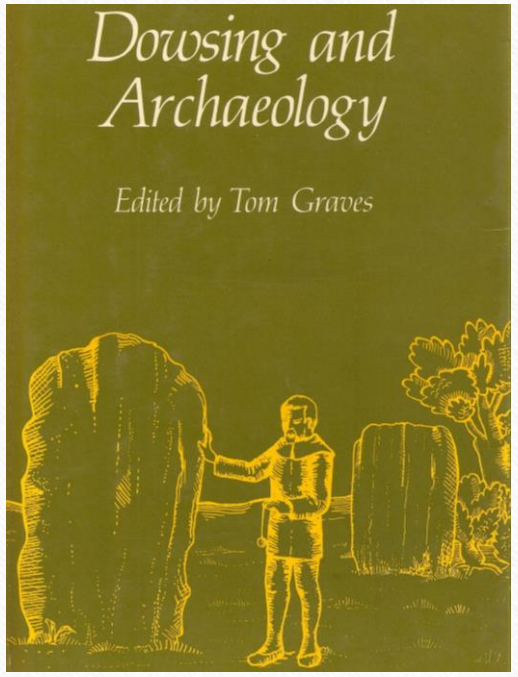



**Figure 9**: Interpolated distribution of P (ordinary kriging), with the sample points as graduated circles overlaid over th GPR interpretations.

# Dowsing Survey




# Excavation methods & Site record

**Taphonomy**

Including application of detailed geochemical and geophysical methods

**Recording – surveying, leveling**, photogrametry, digital plans, data for 3D reconstruction

# Dřevohostice Bell Beaker barrows – Case study

Contents lists available at SciVerse ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

## What questions can be answered by chemical analysis of recent and paleosols from the Bell Beaker barrow (2500–2200 BC), Central Moravia, Czech Republic?

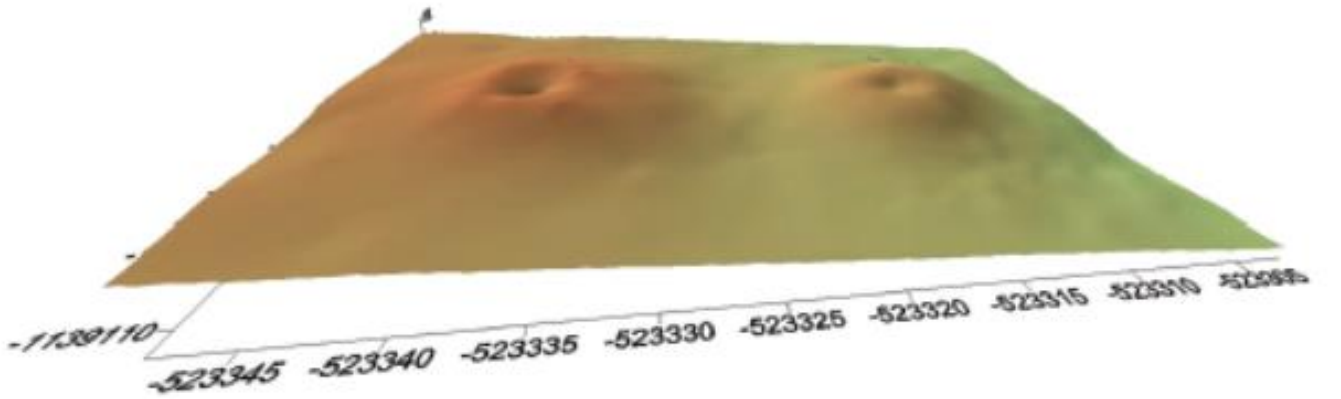
Michal Hejcman [a,b,*], Kateřina Součková [a], Petr Krištuf [c], Jaroslav Peška [d,e]

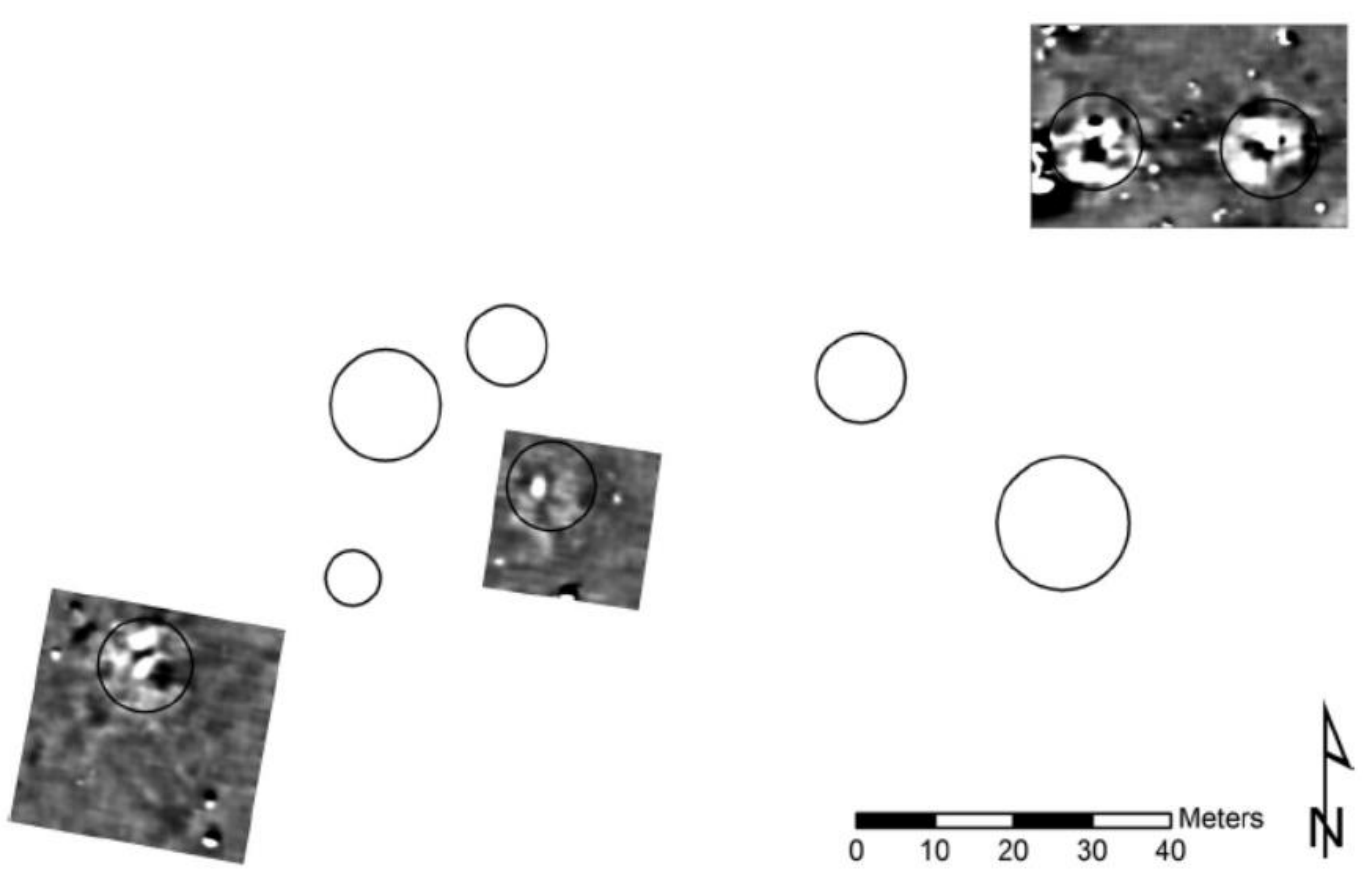
Peška J., Trampota F. (eds.), Otázky neolitu a eneolitu 2011, Mikulov – Olomouc 2012, 67–77

## Archeologický výzkum eneolitického mohylníku v Dřevohostickém lese: výsledky první sezóny

*Archaeological Excavation on Eneolithic Burial Mound Cemetery in Dřevohostice Wood: Results of the First Season*

Petr Krištuf[a], Jaroslav Peška[b], Ladislav Rytíř[c]



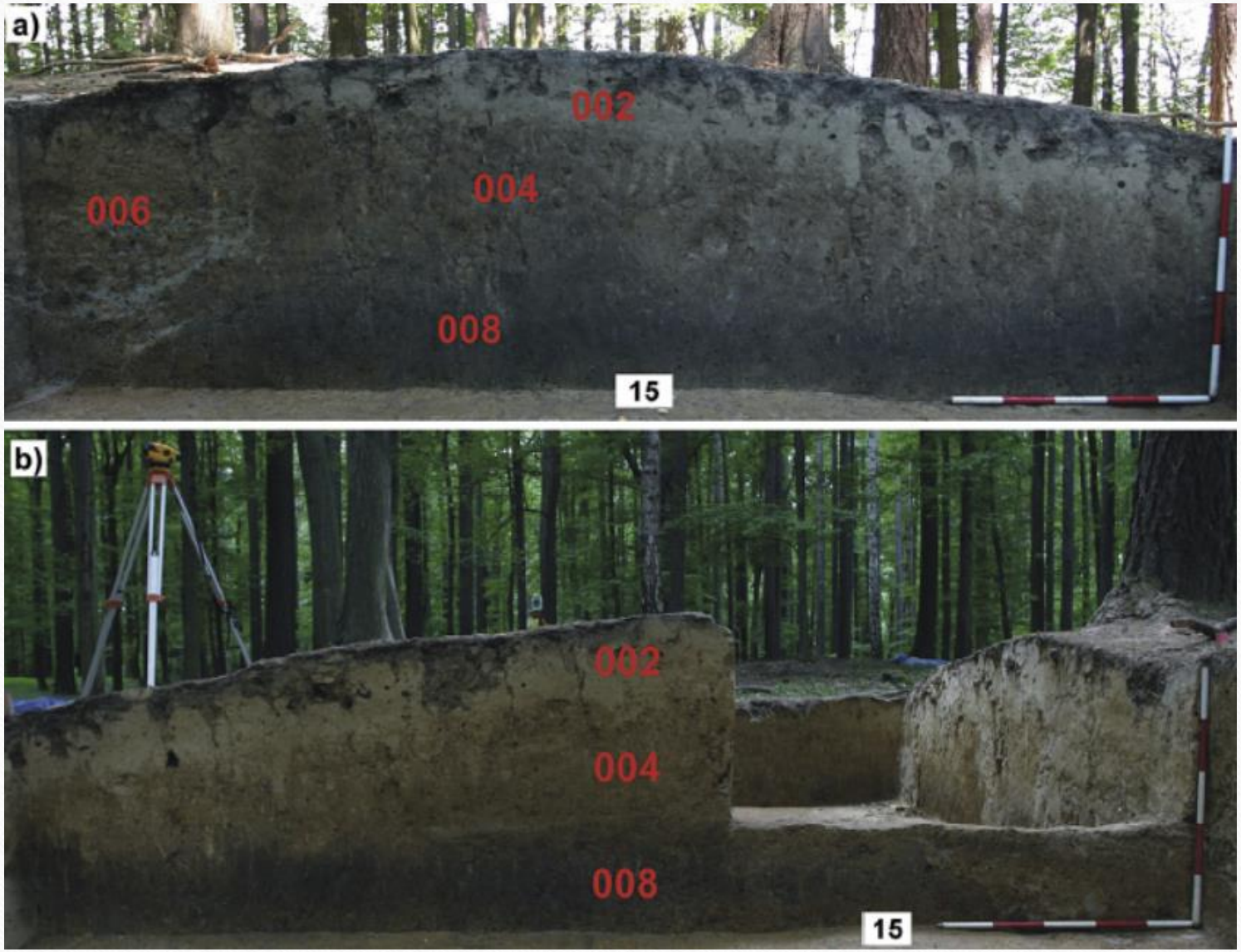


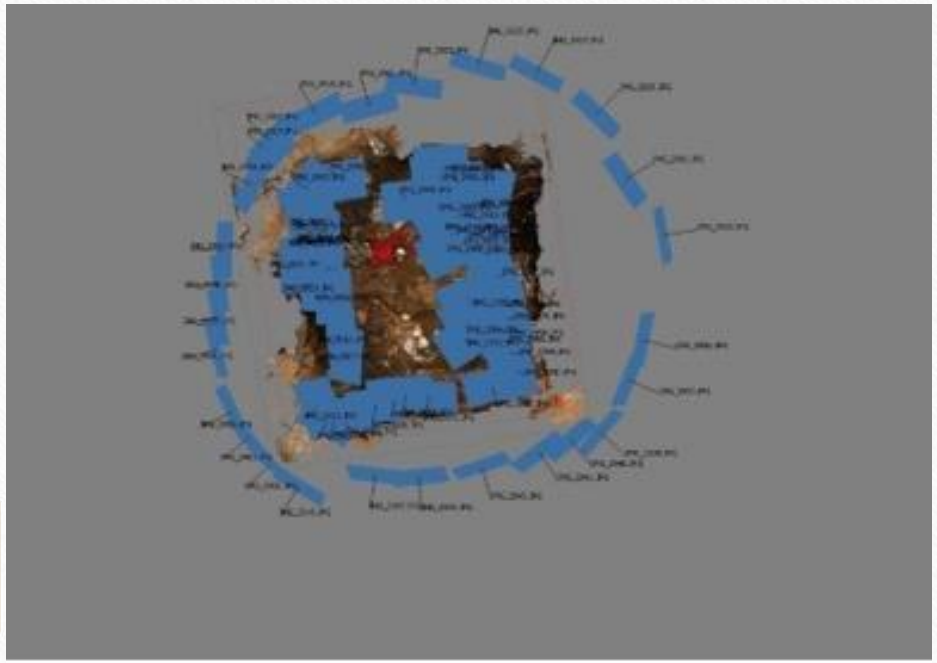

Obr. 6 Dřevohostice – Dřevohostický les. Výsledky magnetometrického průzkumu (provedl a zpracoval P. Milo).

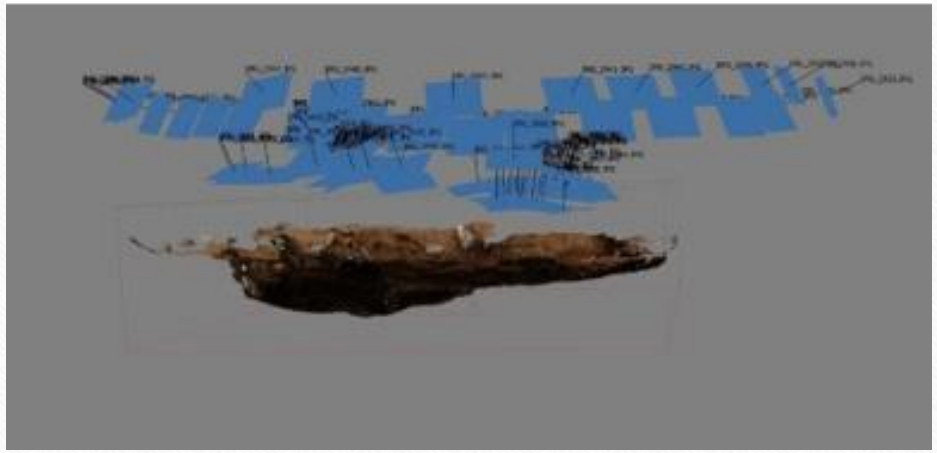
Figure 6. Dřevohostice – Dřevohostice wood. The results of magnetometric survey (P. Milo).


a)
Barrow 7
Barrow 8
24
33
34
13
14
15
16
6
Meters
0 2 4 6 8 10


b)
15
14
13


a)
002
004
006
008
15
b)
002
004
008
15





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Thesis Full-text available

# Digital Close-Range Photogrammetry – A Modern Method to Document Forensic Mass Graves

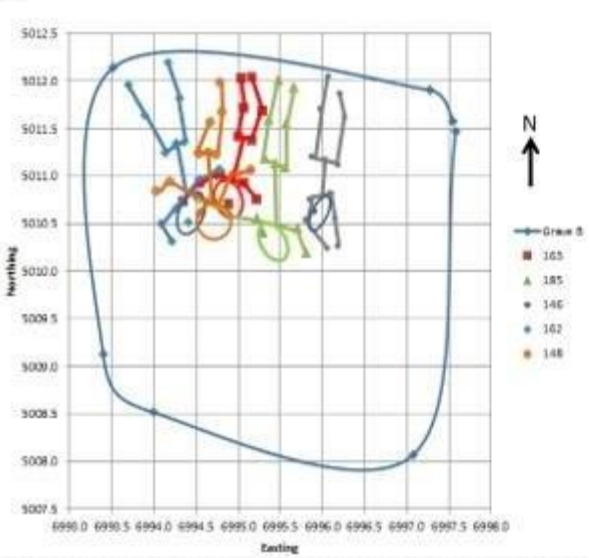
June 2016

DOI: 10.13140/RG.2.1.1668.7603

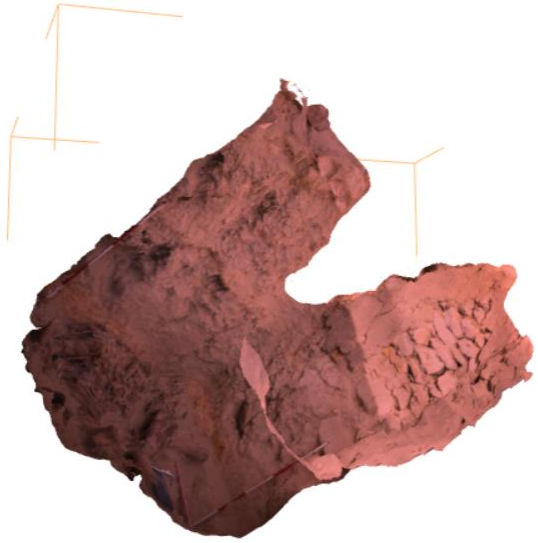
Thesis for: Master of Arts (Archaeology) · Advisor: Matti Kurkela and Mika Lavento

Project: MA in Archaeology

Anni-Helena Ruotsala

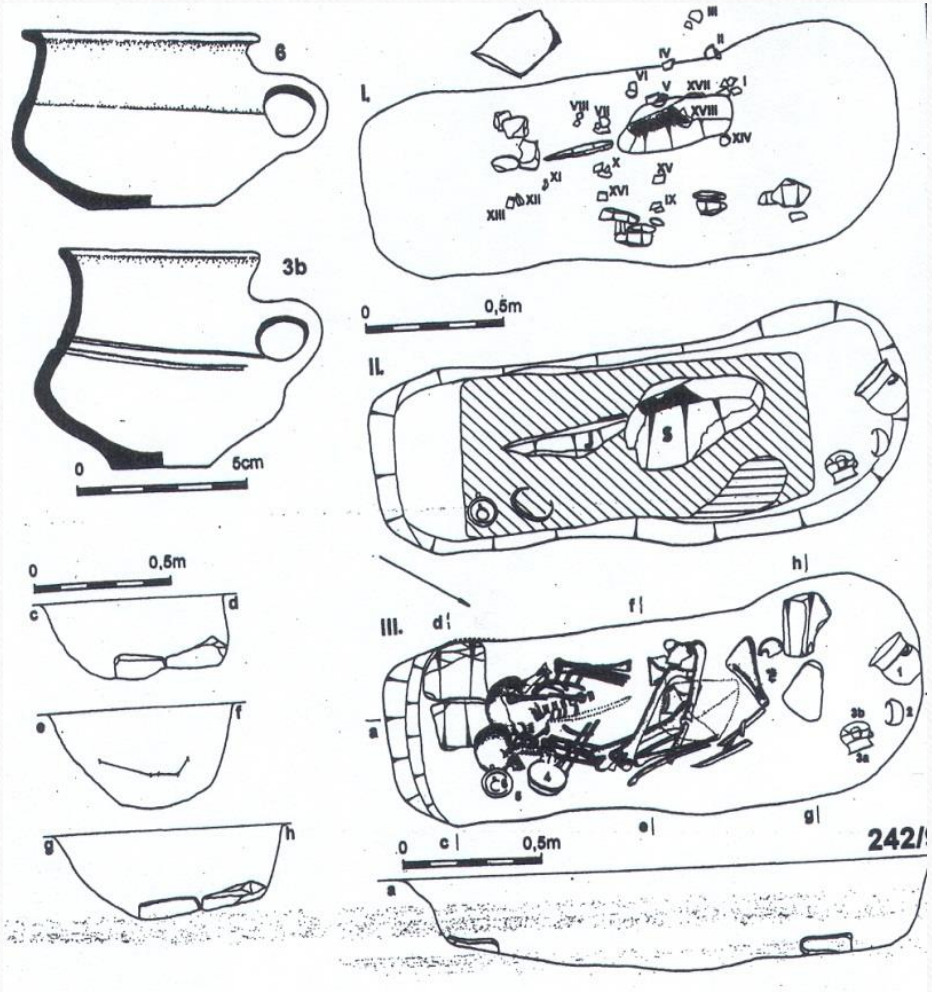


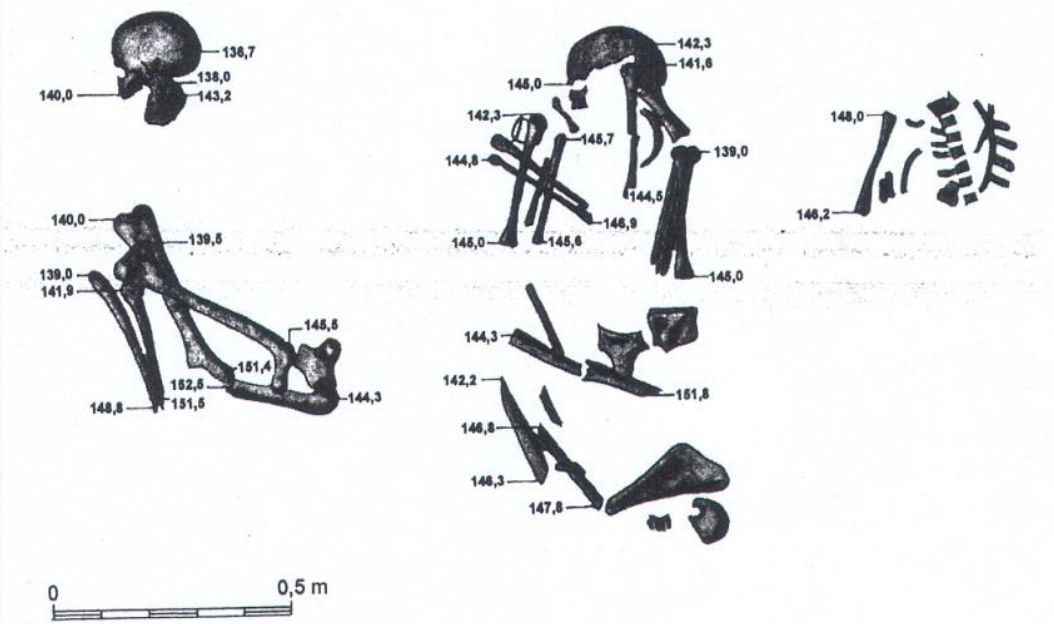

# 3D Photogrametry



Shaft in Abusir, Egypt
After Ladislav Bruna
Czech Institute of Egyptology
Laboratory of Geoinformatics J.E.Purkyne University

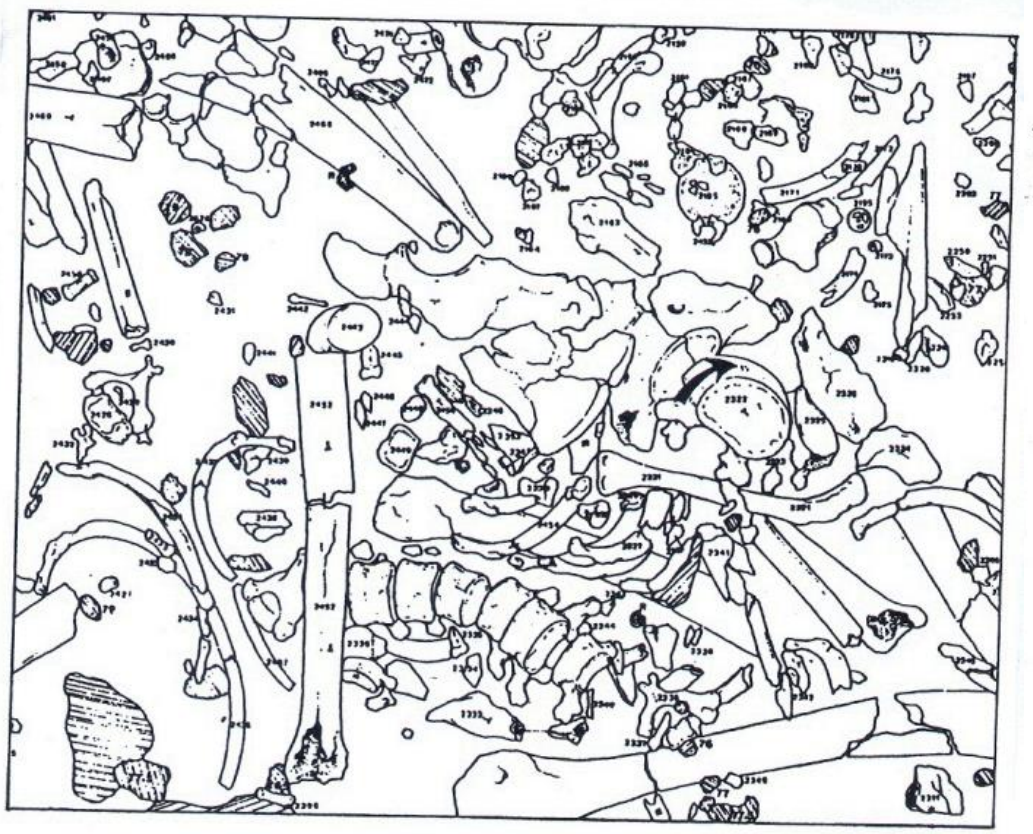
# Basics of taphonomy
# Post-depositional processes



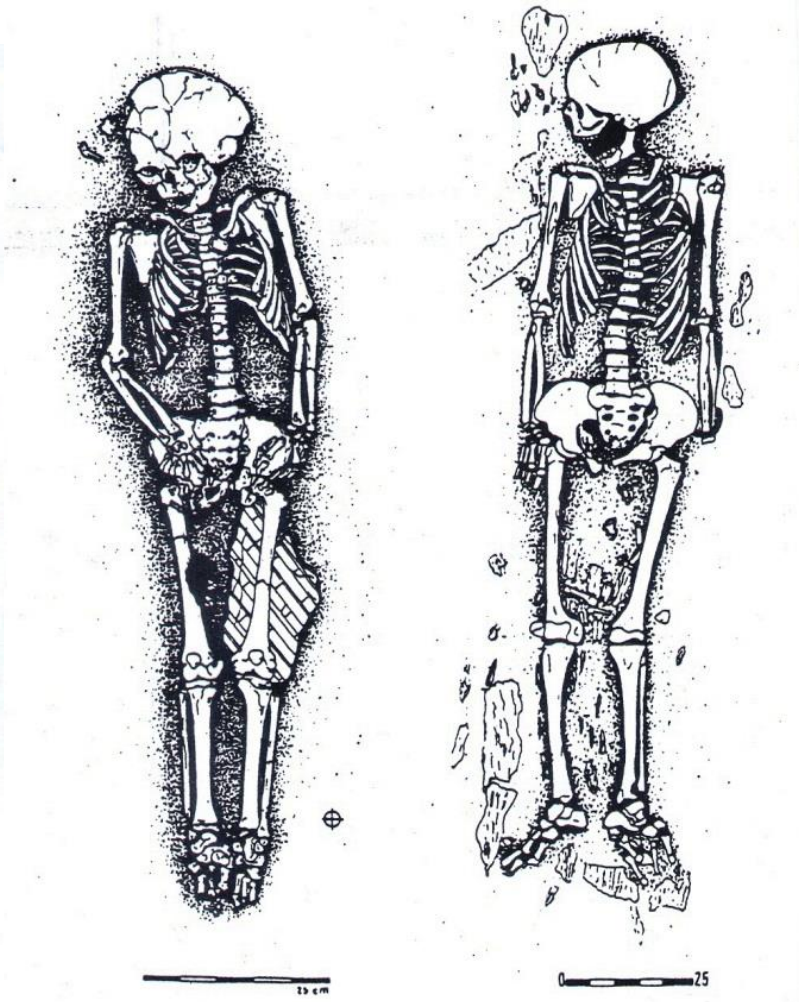




Obr. 7. Tři fáze odkryvu skeletů s měřením relativního převýšení. – *Drei Phasen der Ausgrabung mit den Maßen der relativen Höhen.*

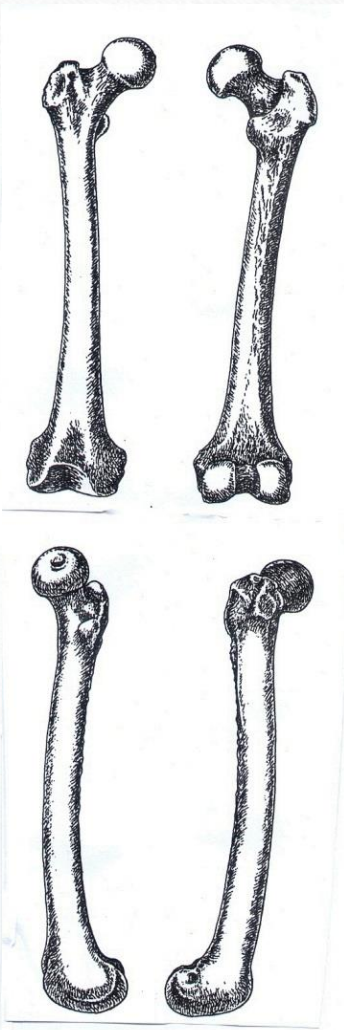
# Recording human remains & taphononmy



Obr. 2. Eneolitický kolektivní hrob v dolmenu Peirières na lokalitě Villedubert v jižní Francii; převzato z *Duday 1987a.*

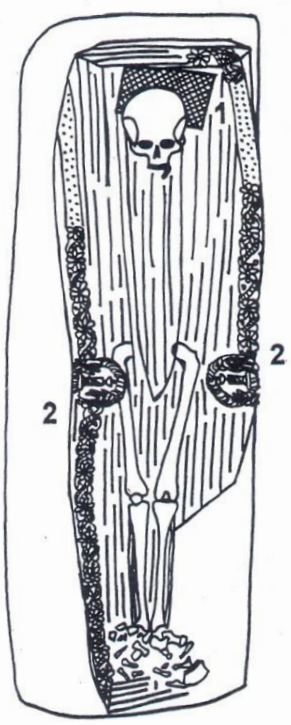


Obr. 4. Příklad pohřbů v dekubitu dorzálním. Vlevo okolí pohřbu zaplněno sedimentem, vpravo pohřeb v prostoru dutém (rakvi); převzato z *Duday et al. 1990.*

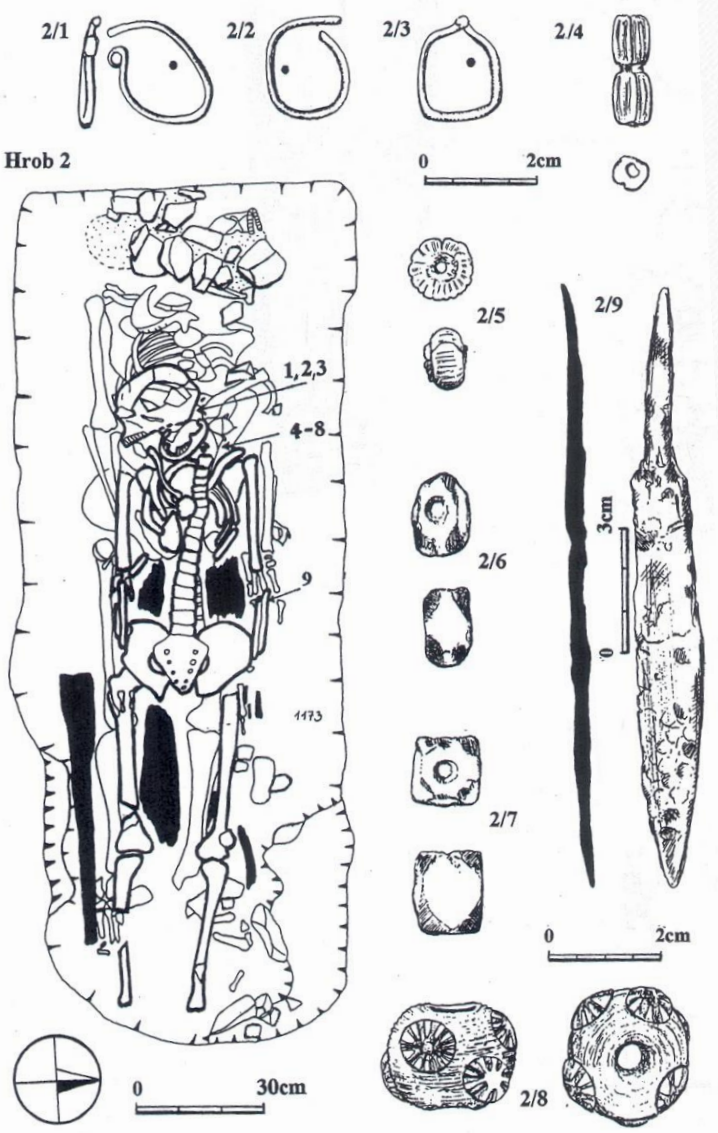


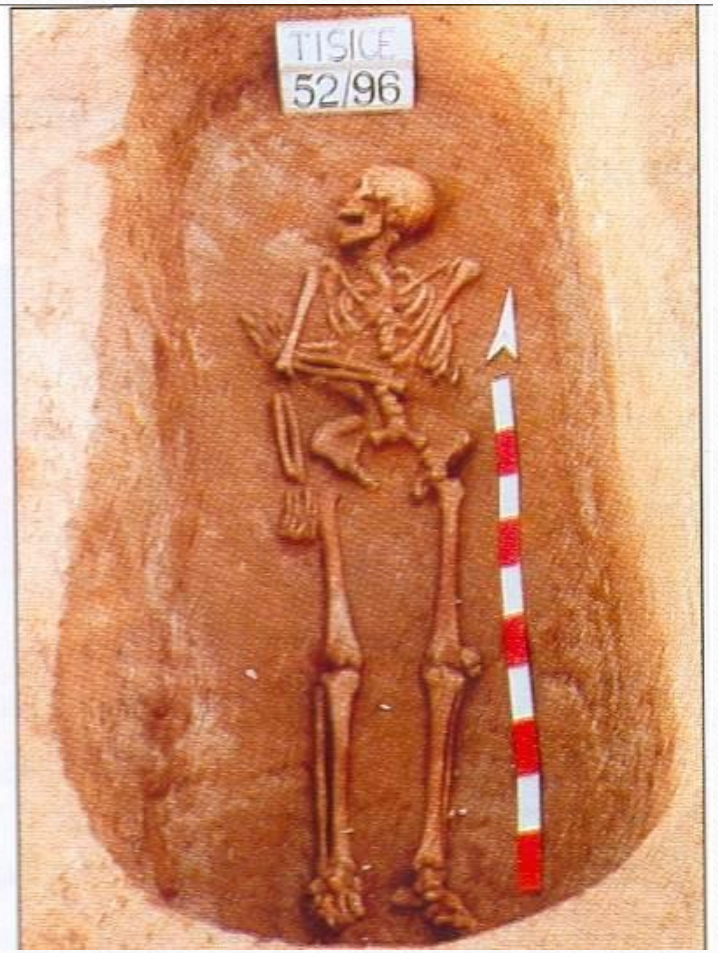
Zleva anteriorní, posteriorní, mediální, laterální.

Kost stehenní (femur) ve 4 základních aspektech.




Obr. 5. Praha 7–Holešovice. Hřbitov u kostela sv. Klimenta. Hrob 29: 1 – hliněná deska, 2 – pásy ozdobného kování rakve. — Fig. 5. Prague 7–Holešovice. The cemetery at the Church of St Clement. Grave 29: 1 – clay cover. 2 – bands of ornamental coffin fittings.

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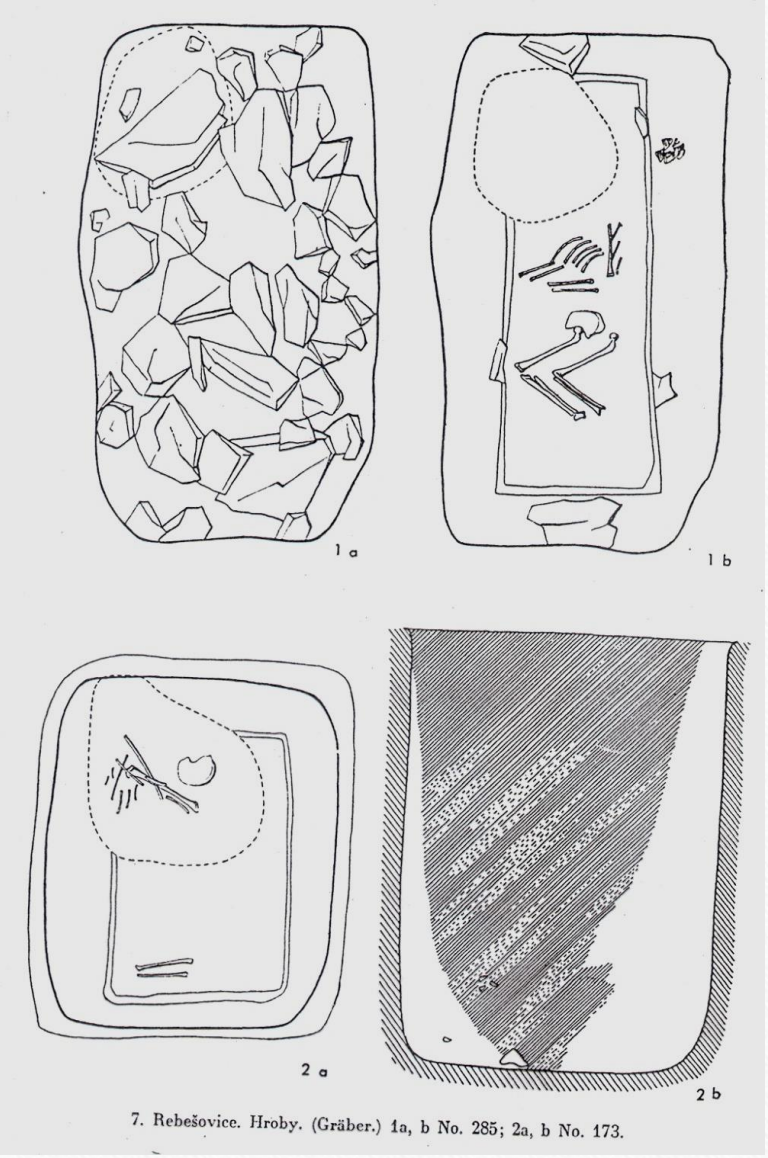
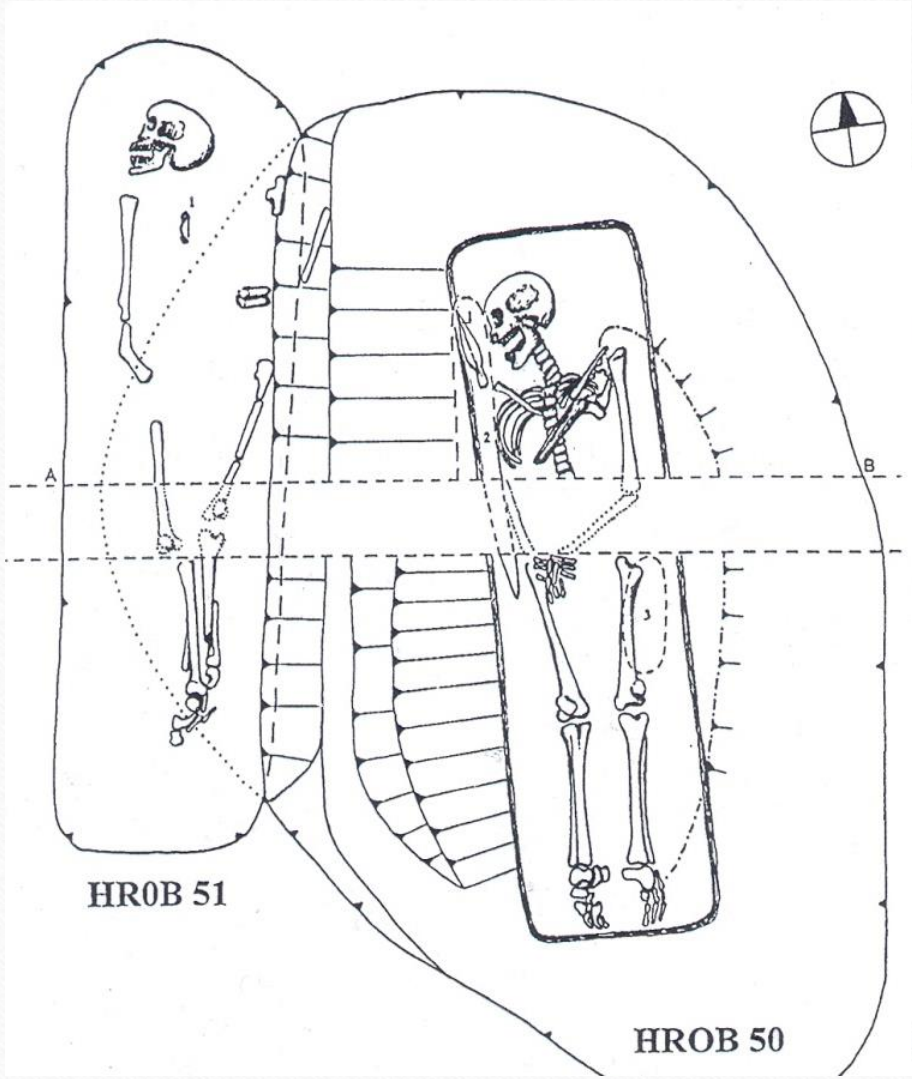
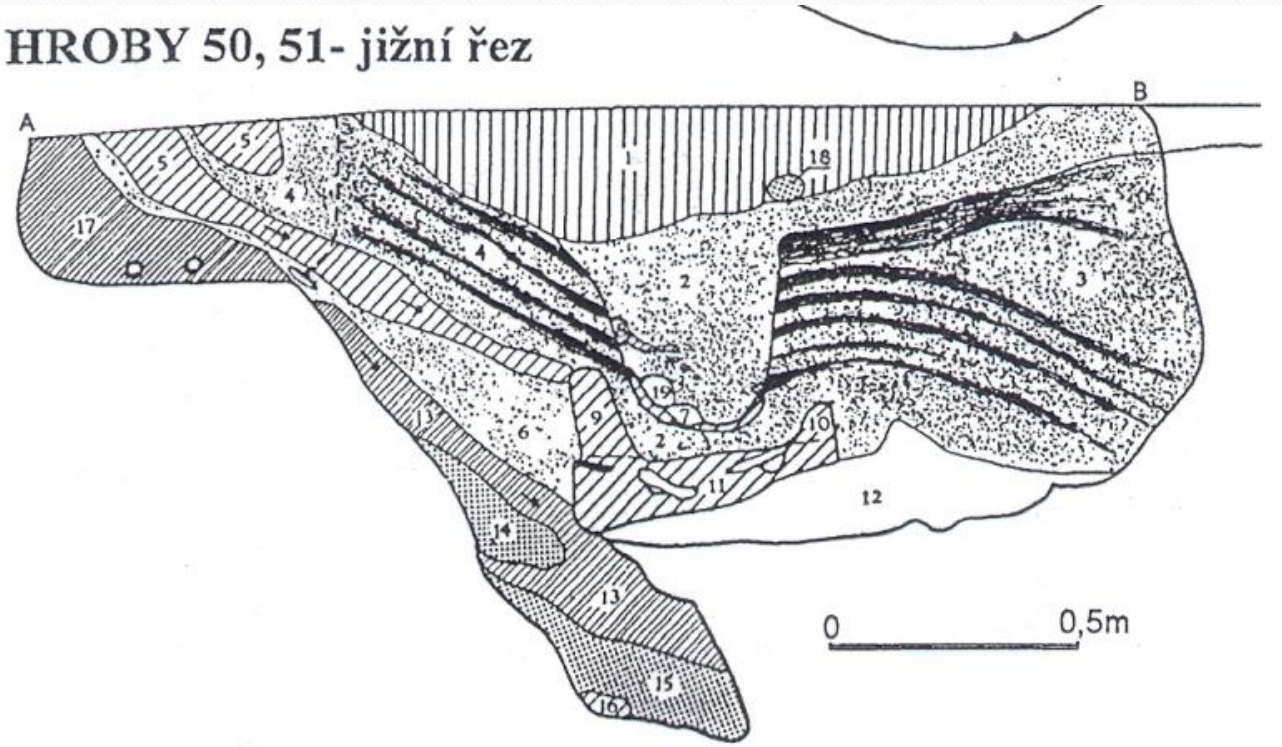
52/96




7. Rebešovice. Hroby. (Gräber.) 1a, b No. 285; 2a, b No. 173.

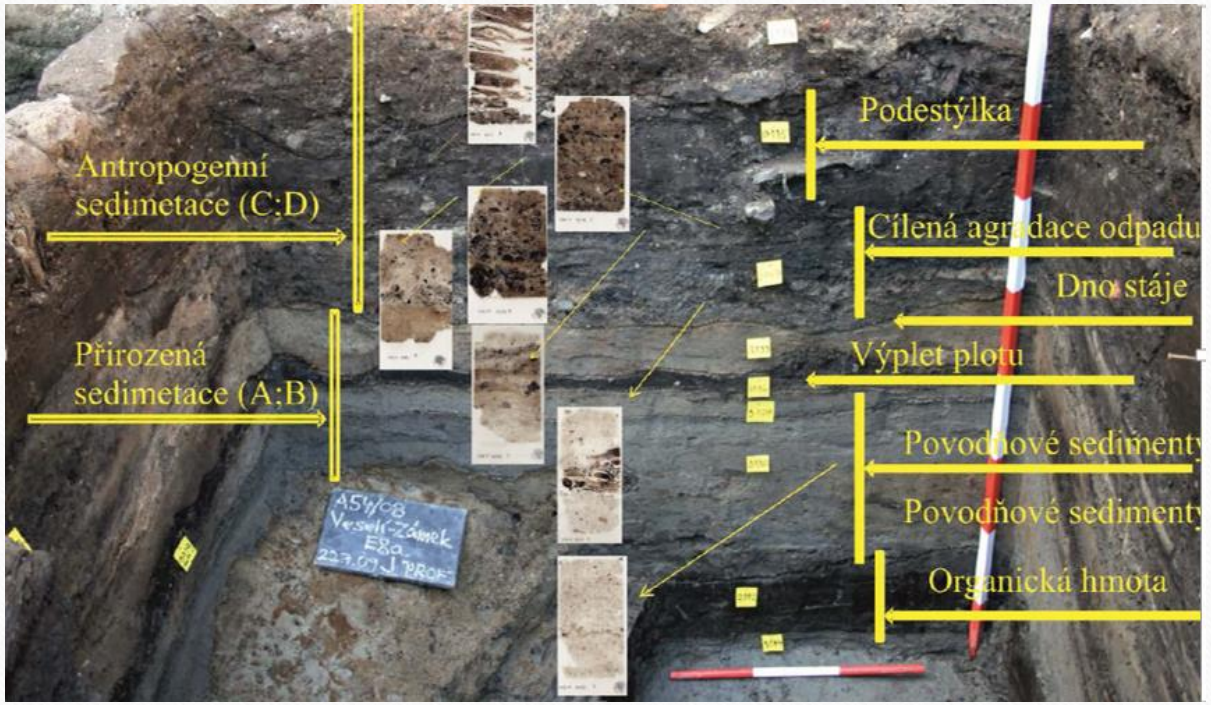


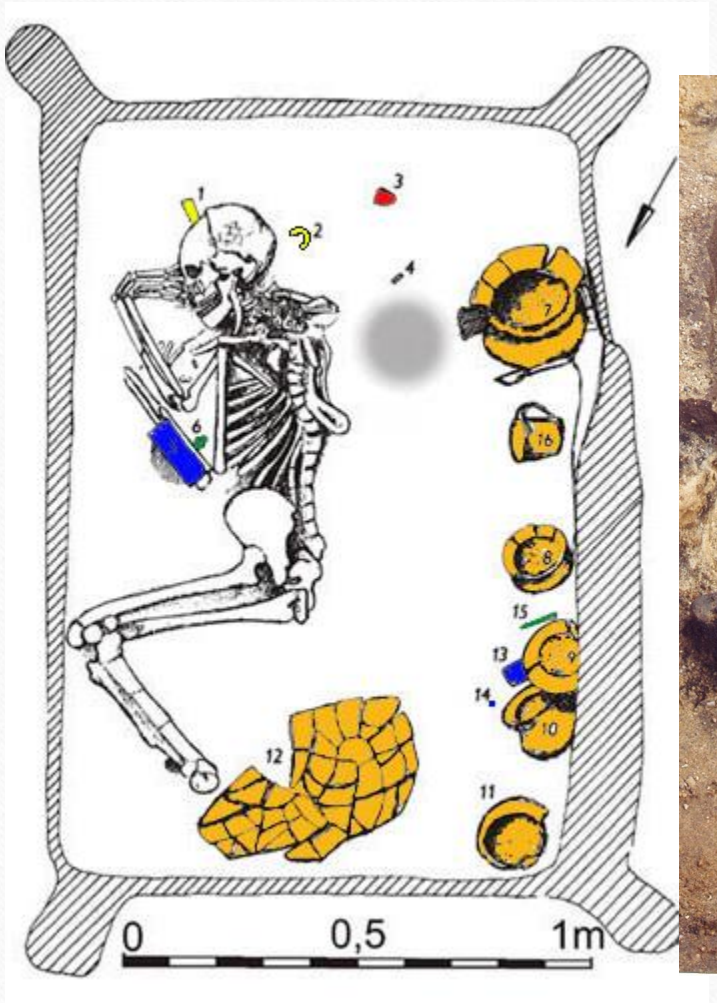

*hroby č. 50 a 51. - Tišice, graves no. 50, 51.*

# Soil Micromorphology

## Reconstruction of: constructions, funerary events as well as postdepositional processes

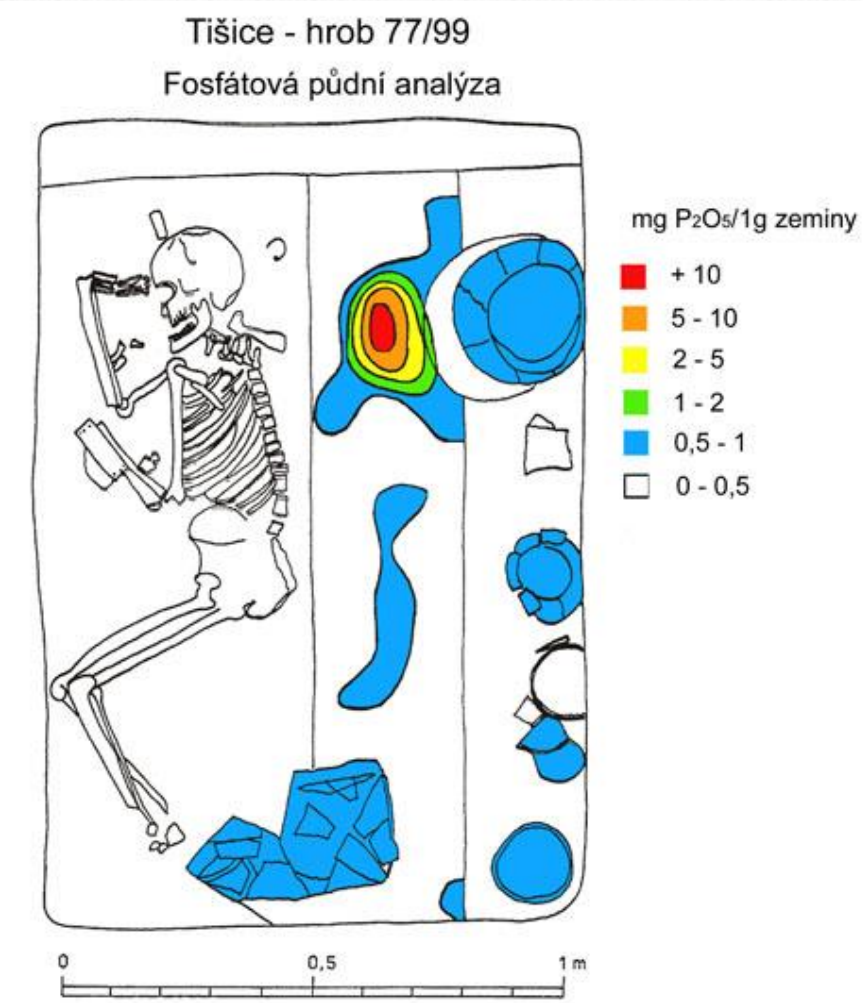


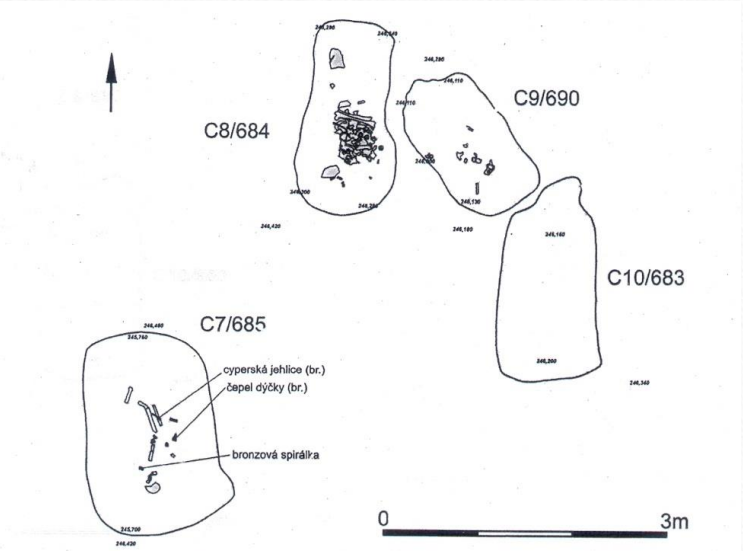
# Phosphate Analysis ($P_2O_5$)



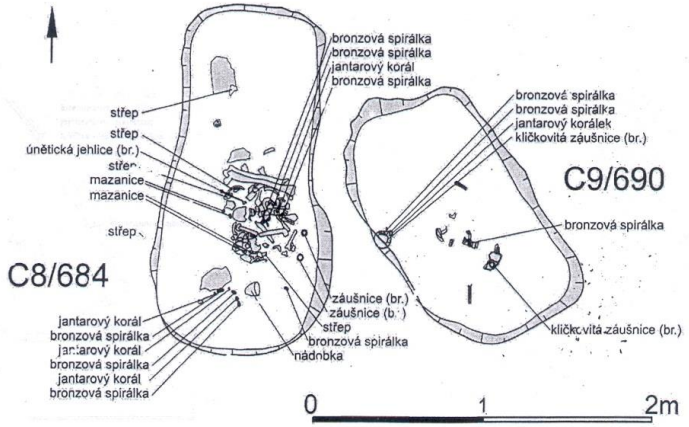


geodetic contour plan



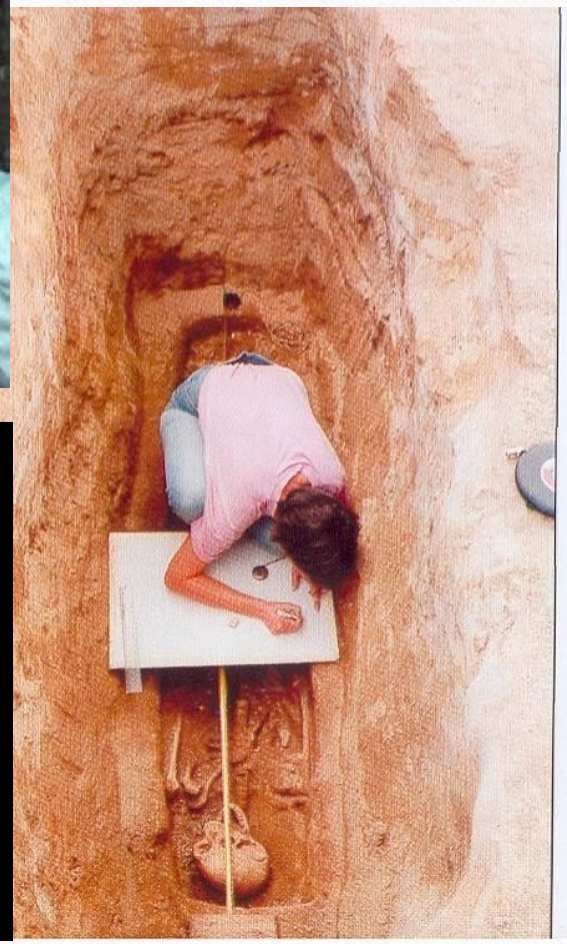


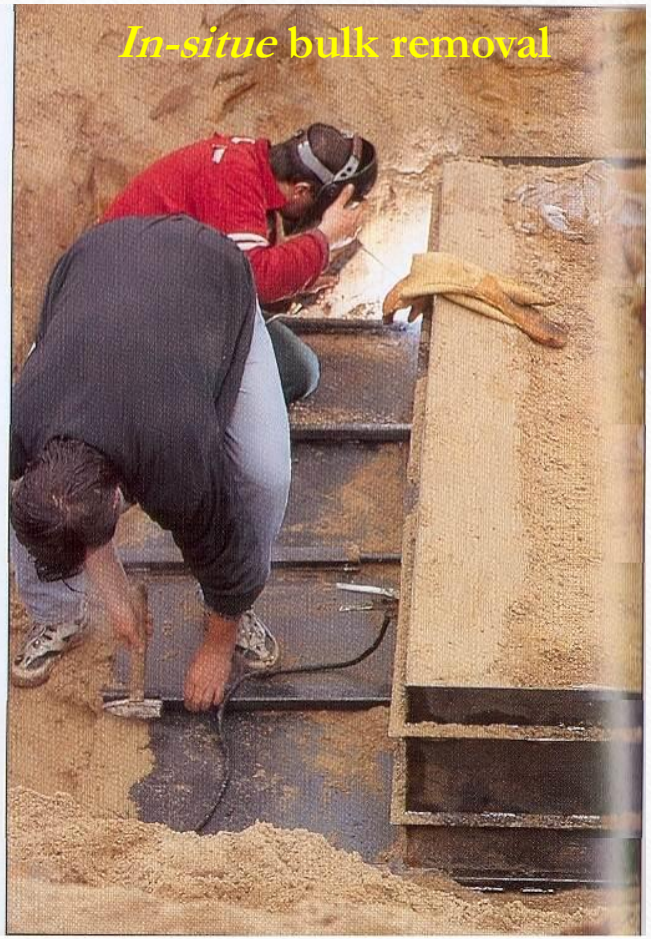

Obr. 2. Praha 9 – Miškovice. Skupina hrobů C. Na obrázku jsou vyznačeny obrysy hrobových jam, kosterní pozůstatky pohřbených jedinců, milodary a kameny v hrobě C8. — Abb. 2. Praha 9 – Miškovice. Grabgruppe C. Auf dem Bild sind Abrisse der Grabgruben, Skelettüberreste von begrabenen Individuen, Beigaben und Steine im Grab C8 markiert.



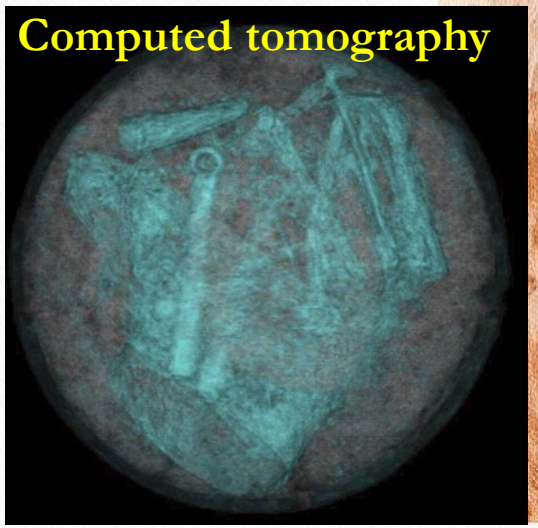

Obr. 3. Praha 9 – Miškovice. Hroby C8 a C9. Kromě hrobových jam je vyznačena poloha kosterních pozůstatků pohřbených jedinců, milodarů a zjištěných kamenů. — Abb. 3. Praha 9 – Miškovice. Gräber C8 und C9. Außer den Grabgruben sind Lage der Skelettüberreste von begrabenen Individuen, Beigaben und festgestellter Steine markiert.

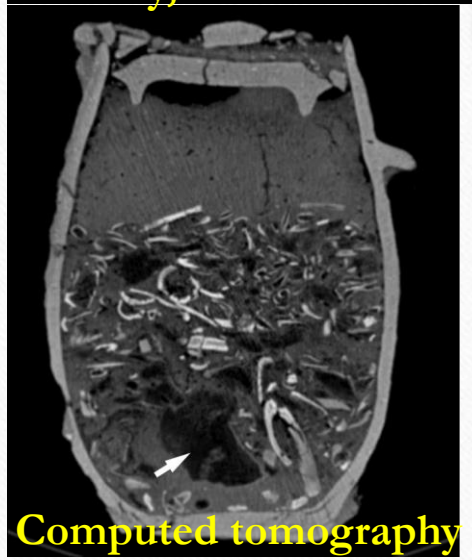
# *In-situ* Micro-geophysics & scanning

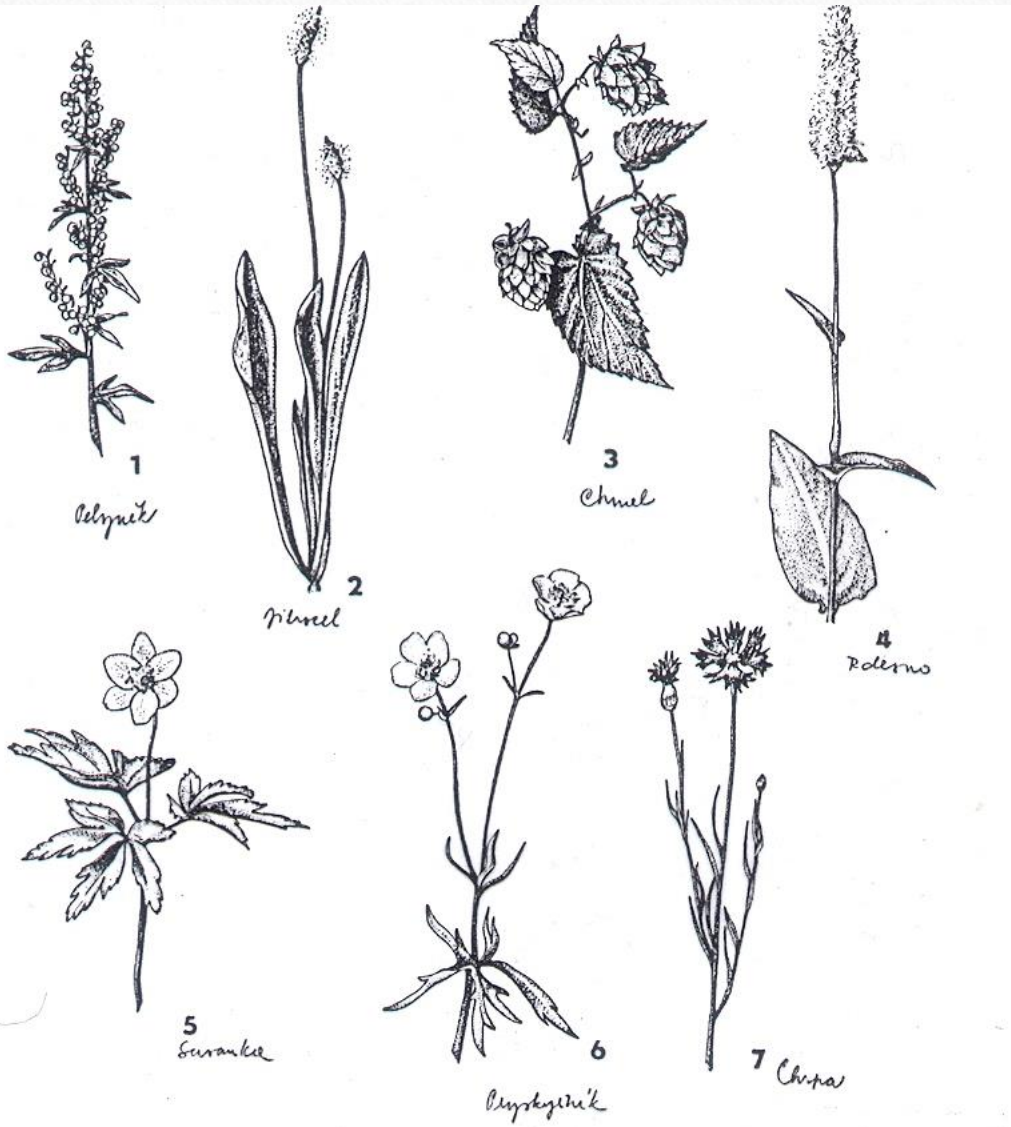






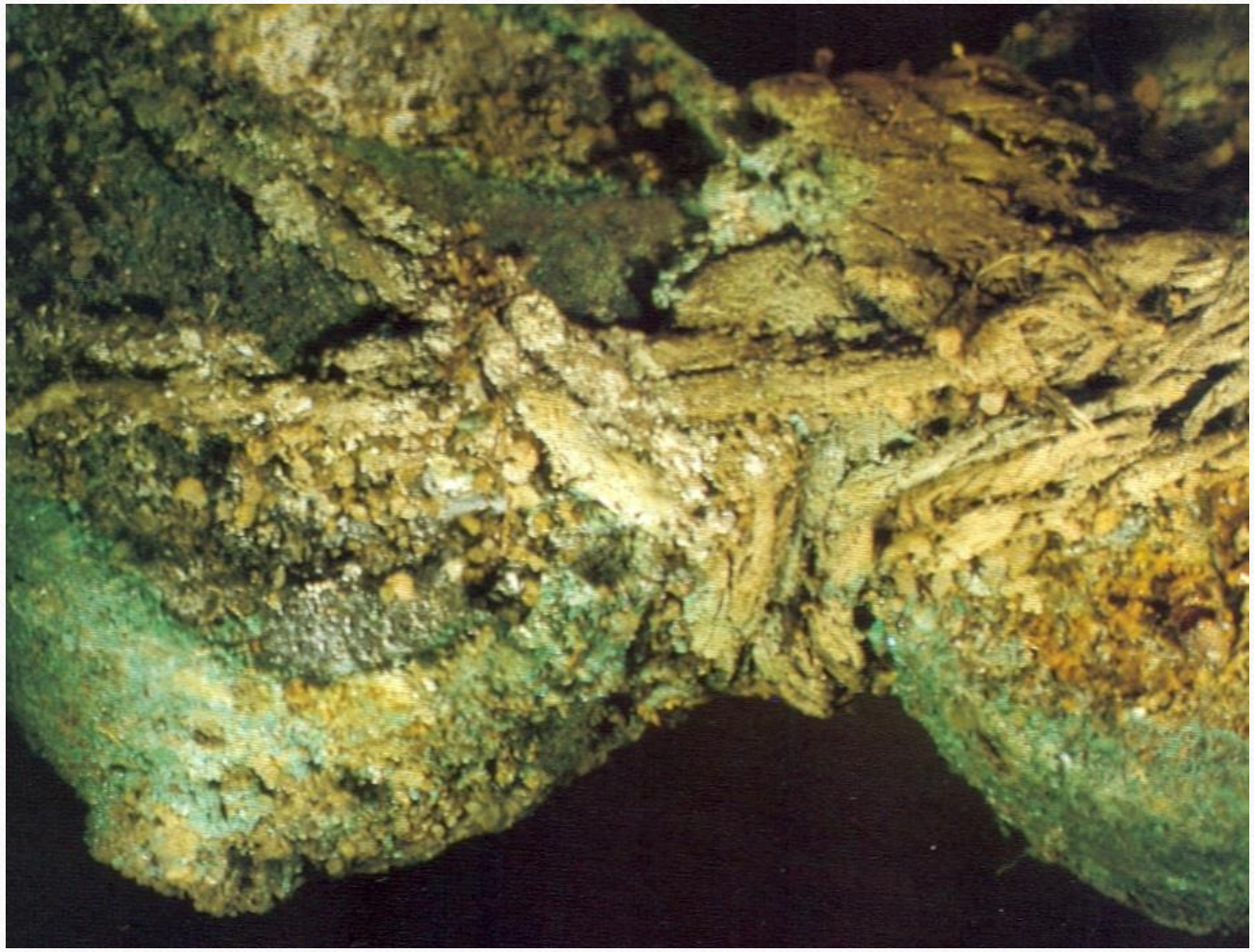



# Environmental analysis: Archaeobotany, Palynology, Malacology, Palaeoparasitology



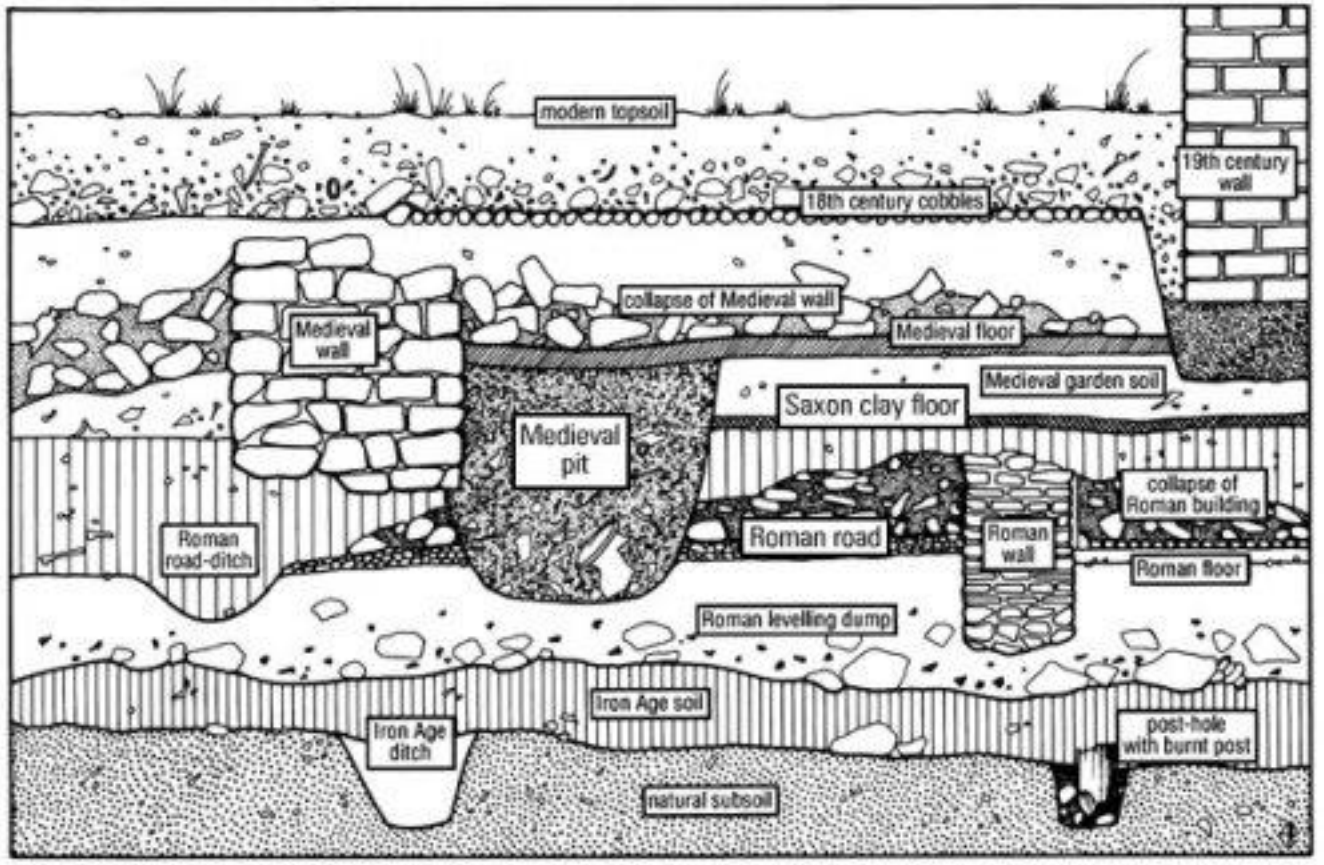

*Prostřednictvím palynologie v hrobech č. 9 a 53 u Tišic na Mělnicku zjištěné rostliny: 1/ pelyněk (9x), 2/ jitrocel (3x), 3/ chmel (7x?), 4/ rdesno (1x), 5/ sasanka (1x), 6/ pryskyřník (1x), 7/ chrpa (1x); růžovité nezobrazeny.*

# Conditions for pollen grains preservation



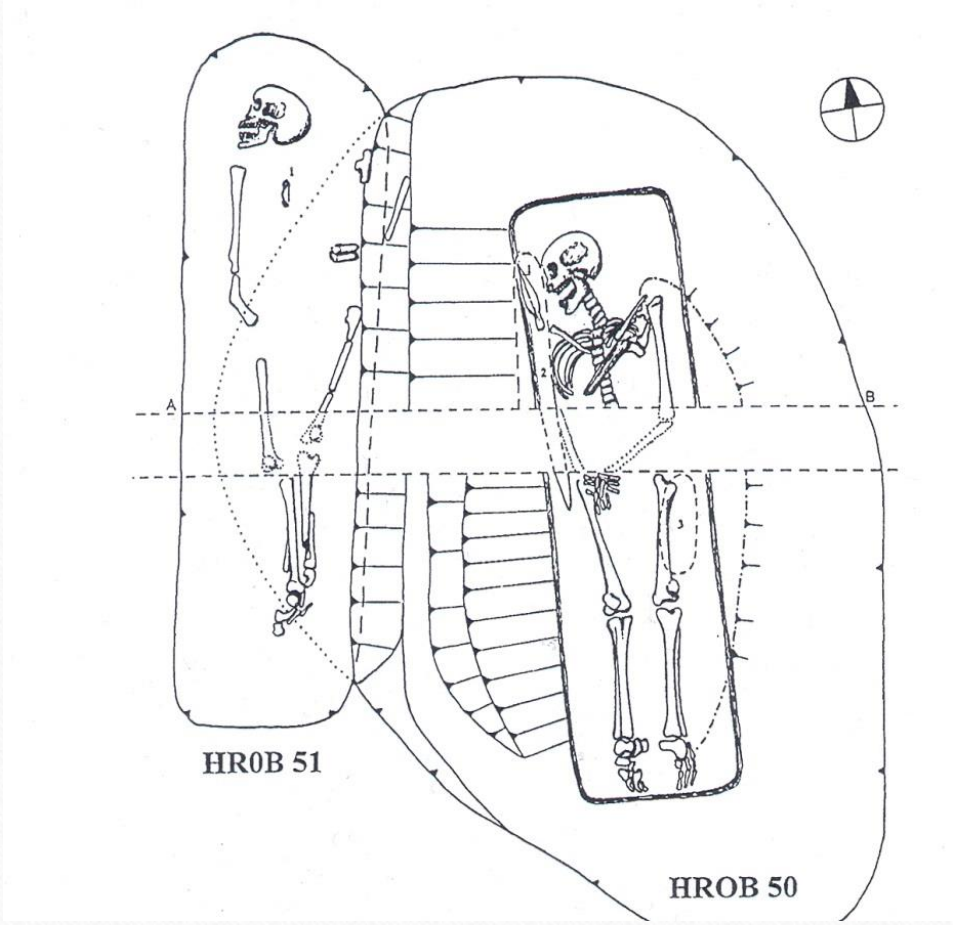
# Field dating methods - Relative dating

## Vertical Stratigraphy

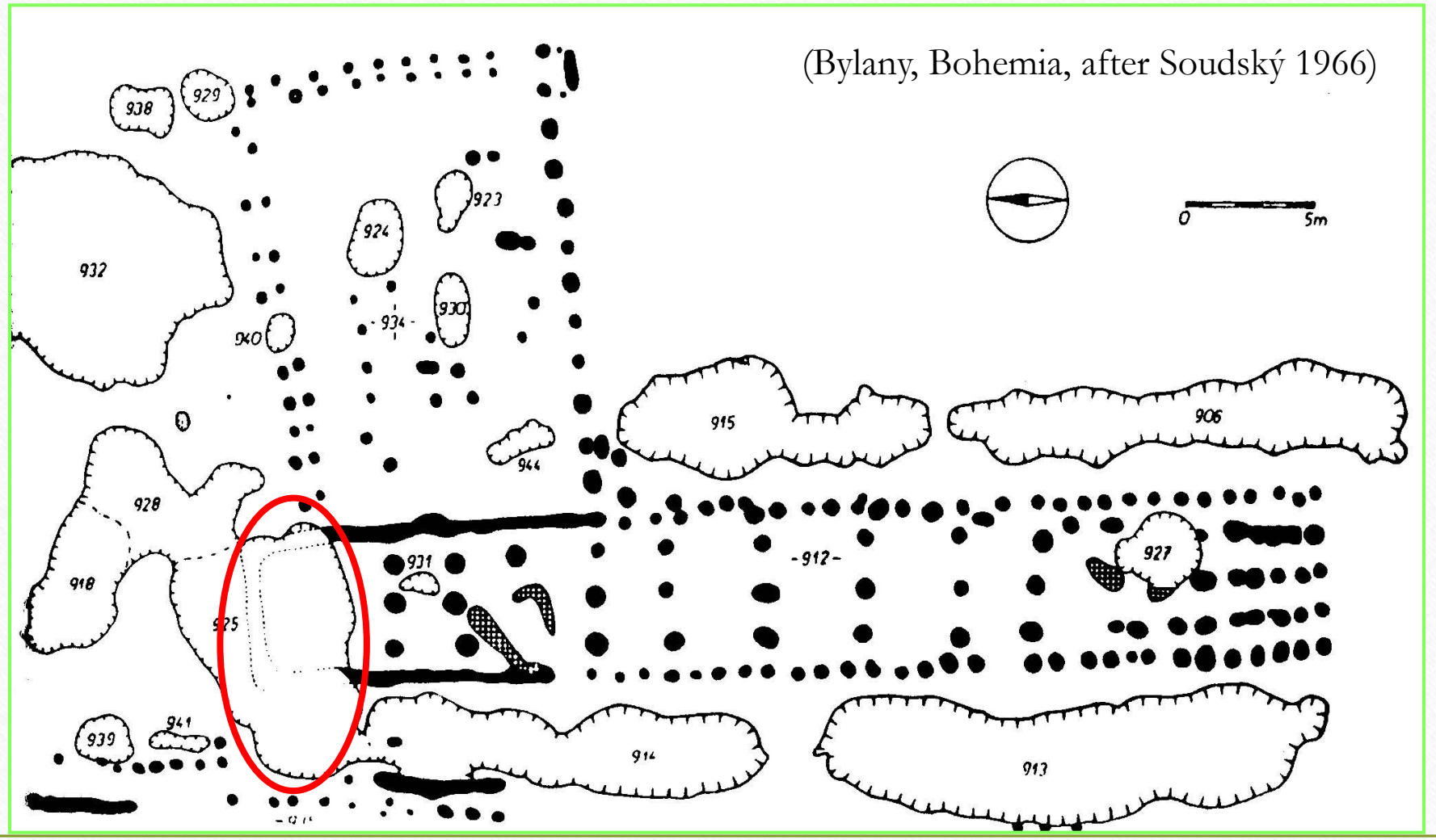


# Field dating methods - Relative dating

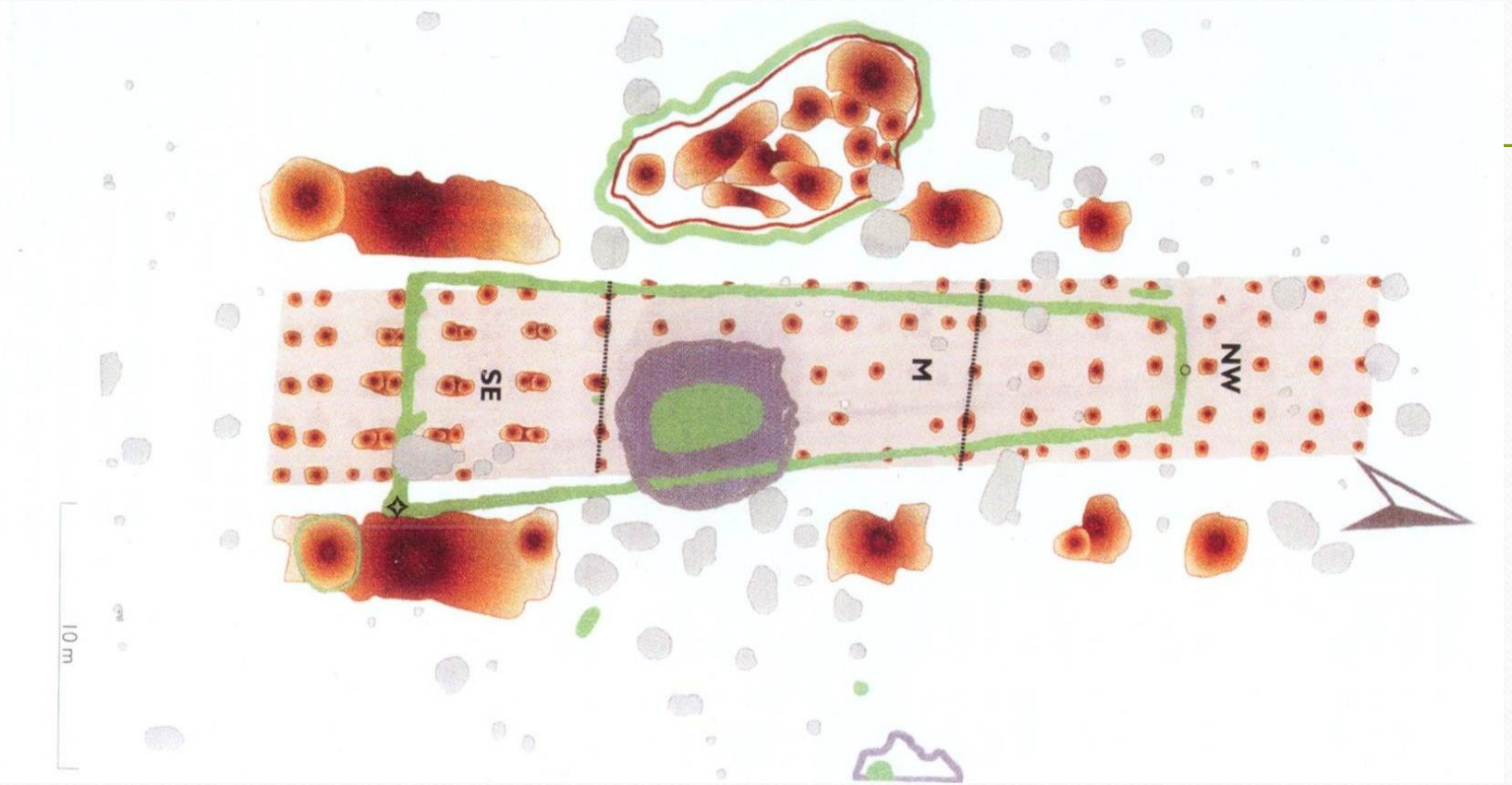
## Horizontal Stratigraphy



# LBK longhouse truncated by a later pit



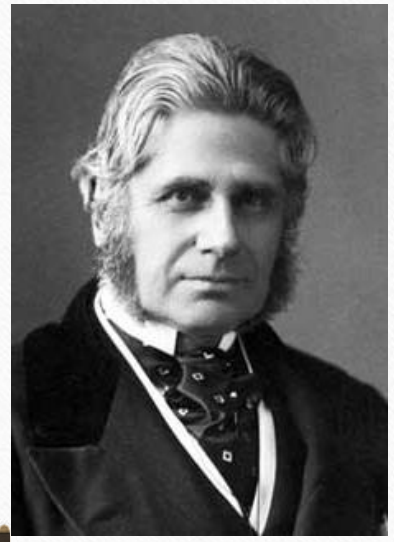
# A Lengyel barrow overlaps an earlier LBK house



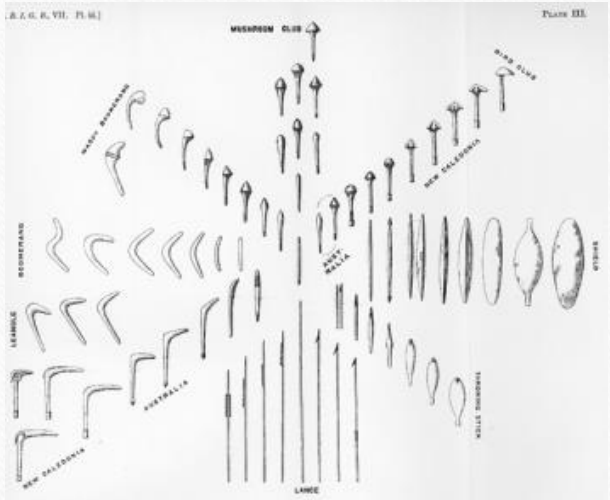

(Bożejowice, Poland - after M. Midgley 2005)

# Field dating methods - Relative dating

## Assemblage typology

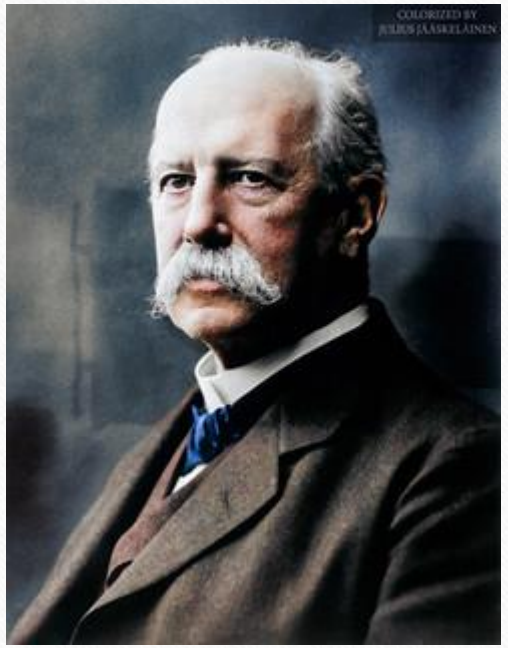


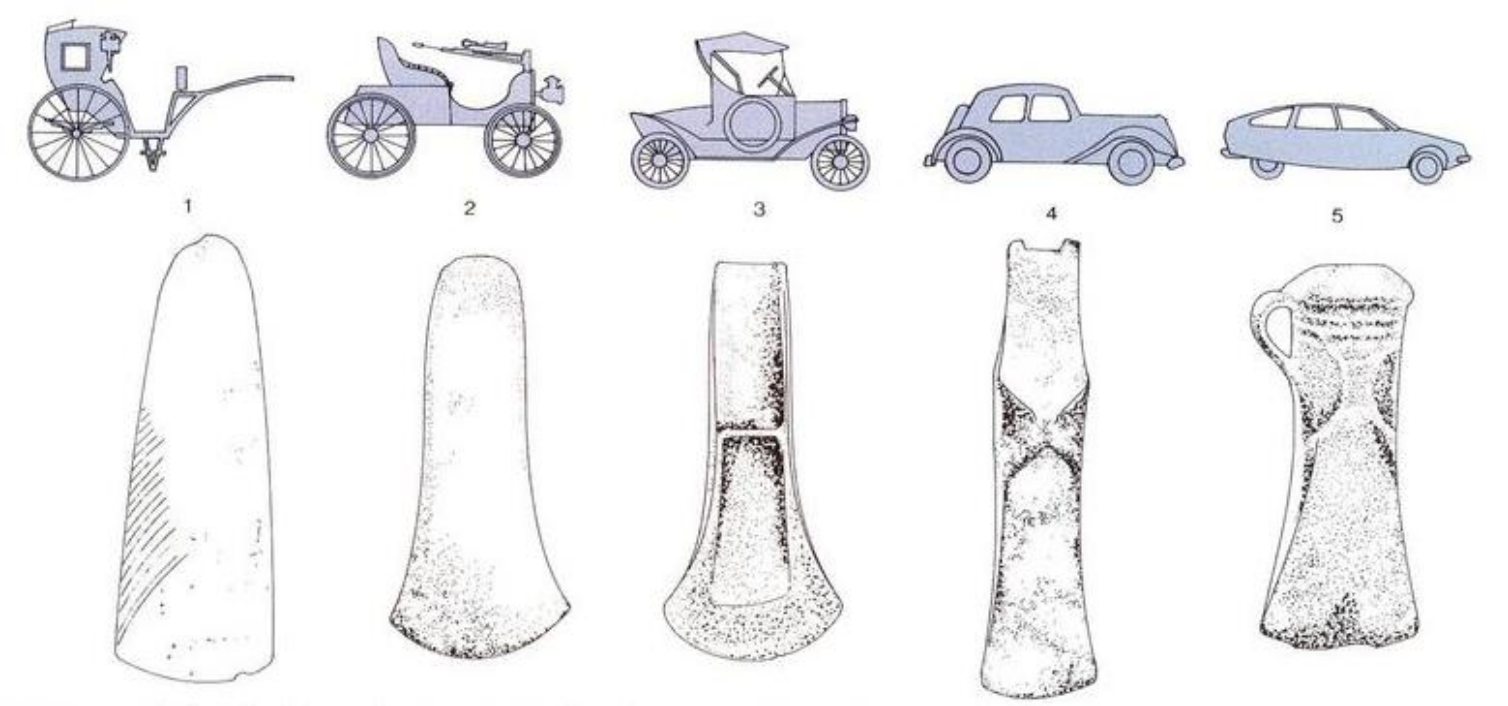
Augustus Pit Rivers 1827–1900

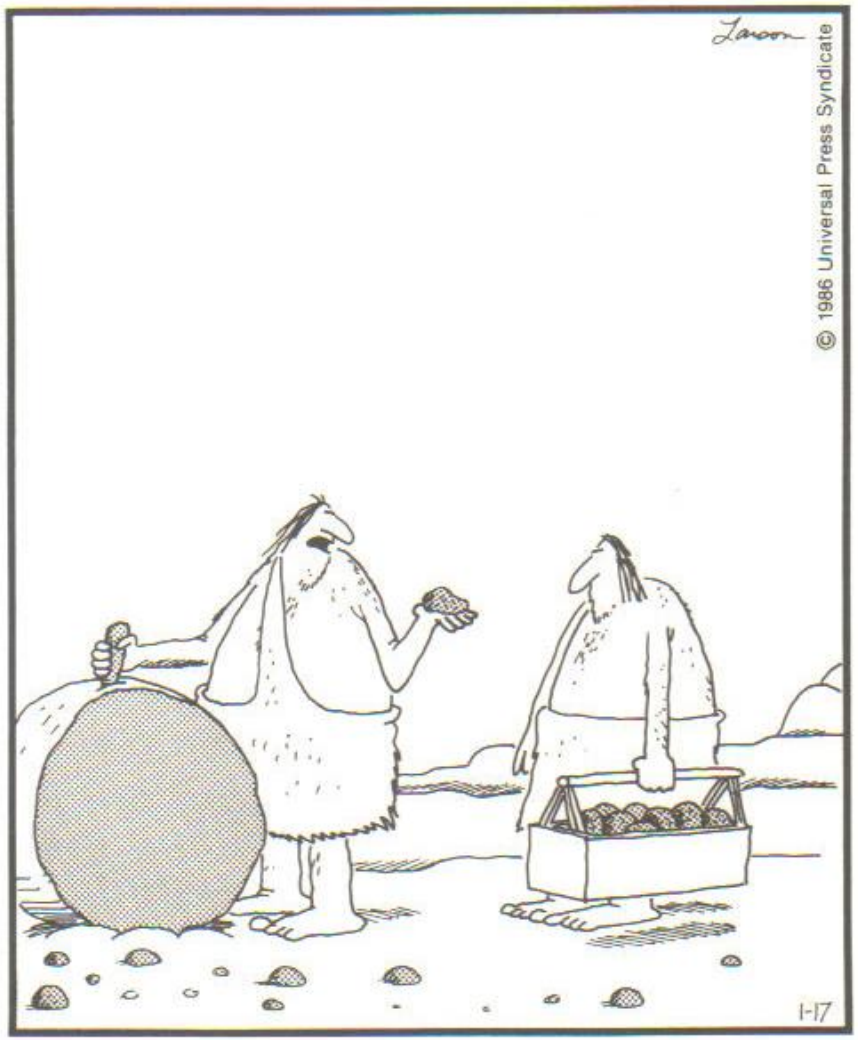



# Chronological artefact typologies

## Oscar Montelius 1843-1921






"So what's this? I asked for a *hammer!* A hammer! *This* is a crescent wrench! ... Well, maybe it's a hammer. ... Damn these stone tools."

# Indirect site dating Synthesis of environmental data

Palynology

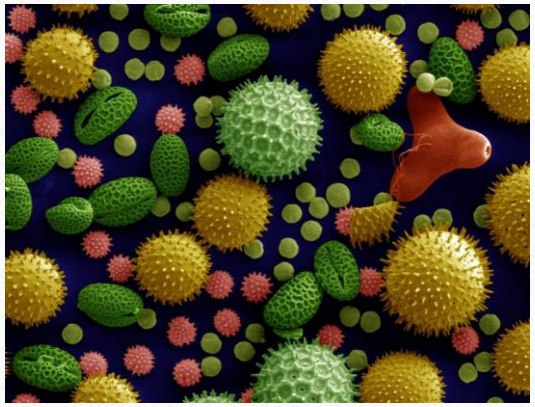
Malacology

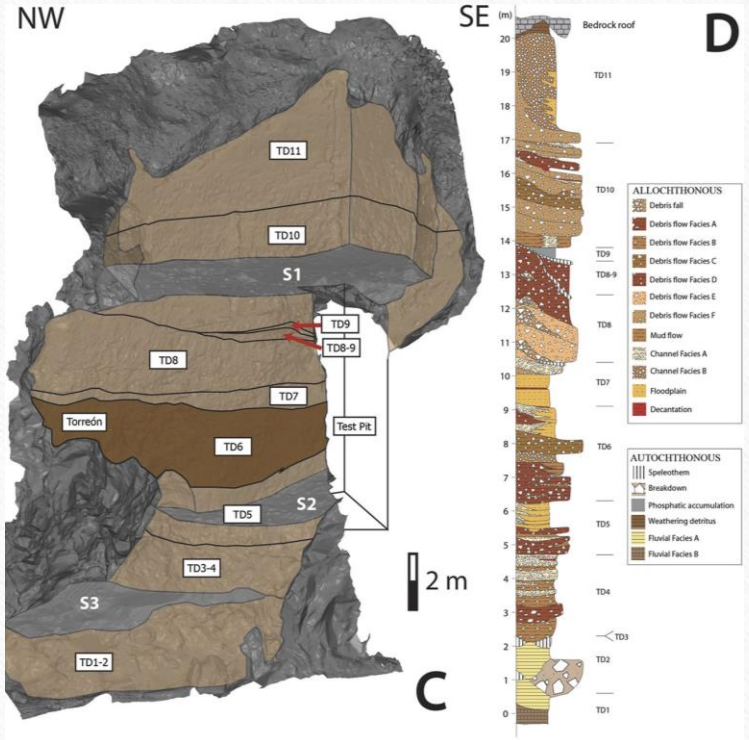
Hydrology

Archaeobotany

Sedimentology

Tectonics



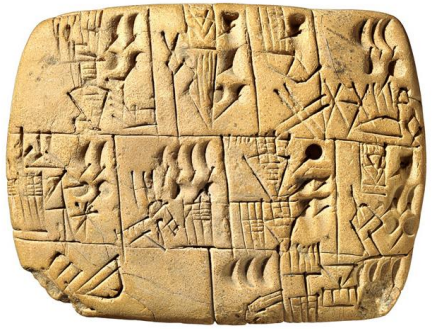


# Field Dating methods

## Absolute dating - History

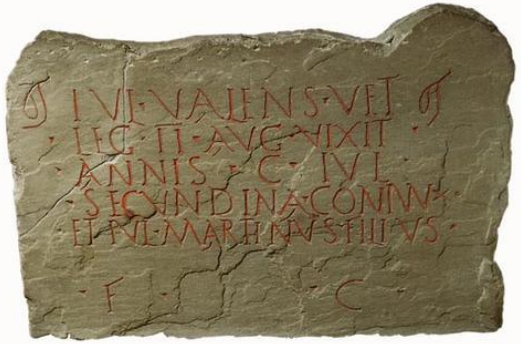
### Historical sources

- Written sources
- Oral tradition



### Artefacts of historical periods

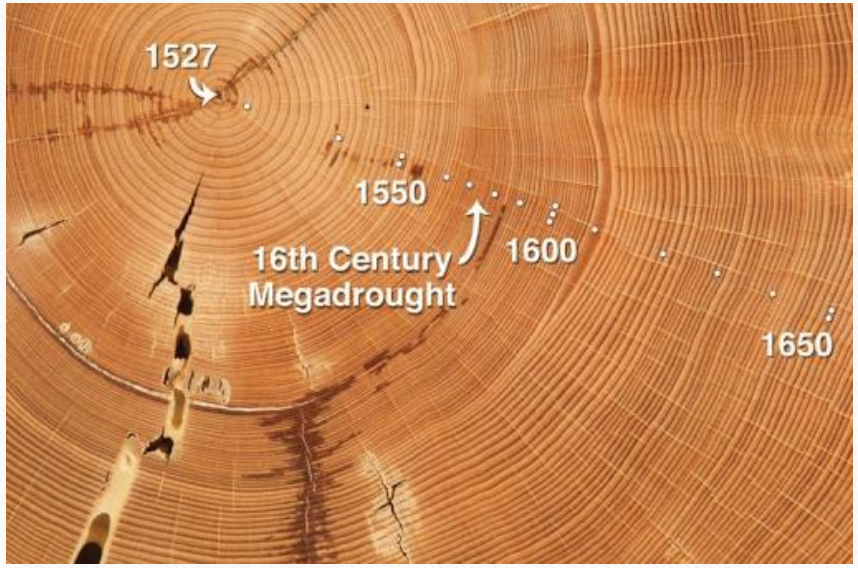
- Coins
- Epigraphics



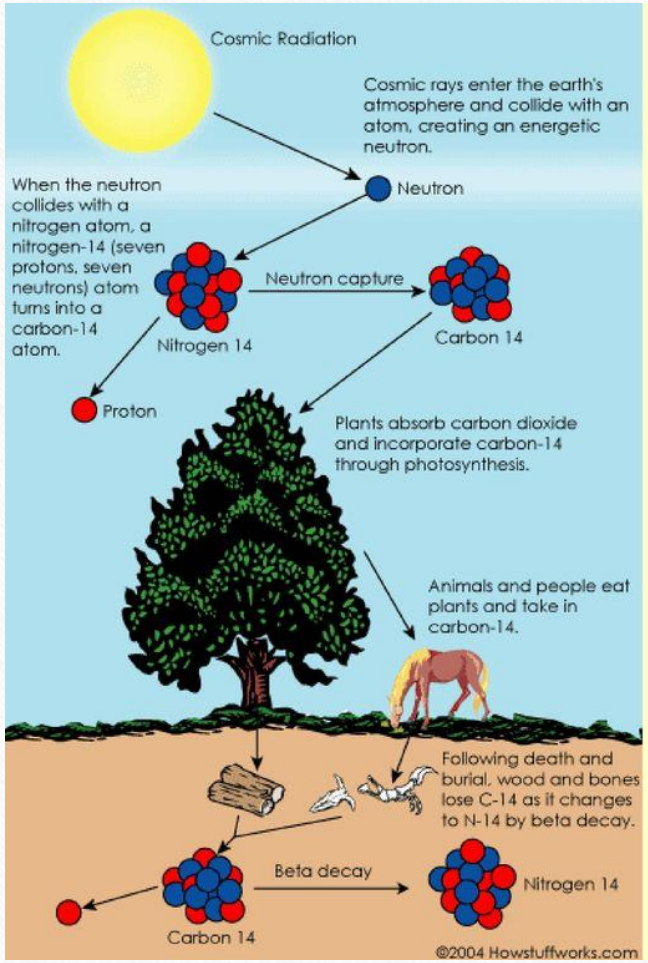
# Field Dating methods

## Scientific dating

- **Radiocarbon ($^{14}C$: half-life reliable only to 50,000 years BP)**
- **Calium/Argon (potassium-40: half-life 1.3 billion years BP)**
- **Dendrochronology–tree rings (curve reaches max. 11,000 BP)**




## Absolute dating - Science




### How Carbon-14 is made

- $^{14}N$: 7 p, 7 n
- $^{14}C$: 6 p, 8 n

- C-14 production:

$$^{14}N + n \rightarrow {}^{14}C + p$$

- C-14 decay:

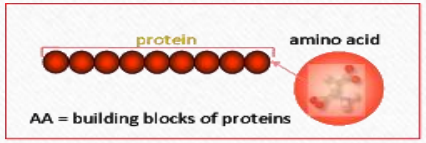
$$^{14}C \rightarrow {}^{14}N + e^{-}$$

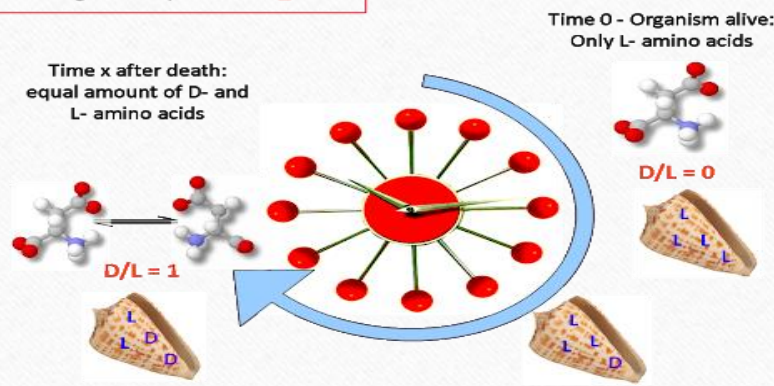
(Beta decay)

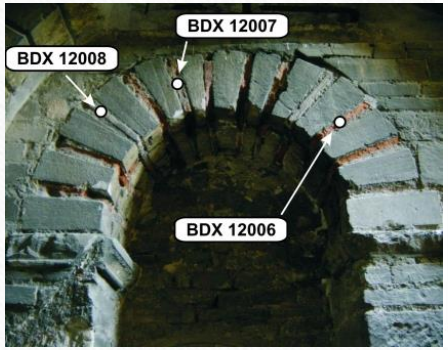
http://science.howstuffworks.com/carbon-141.htm

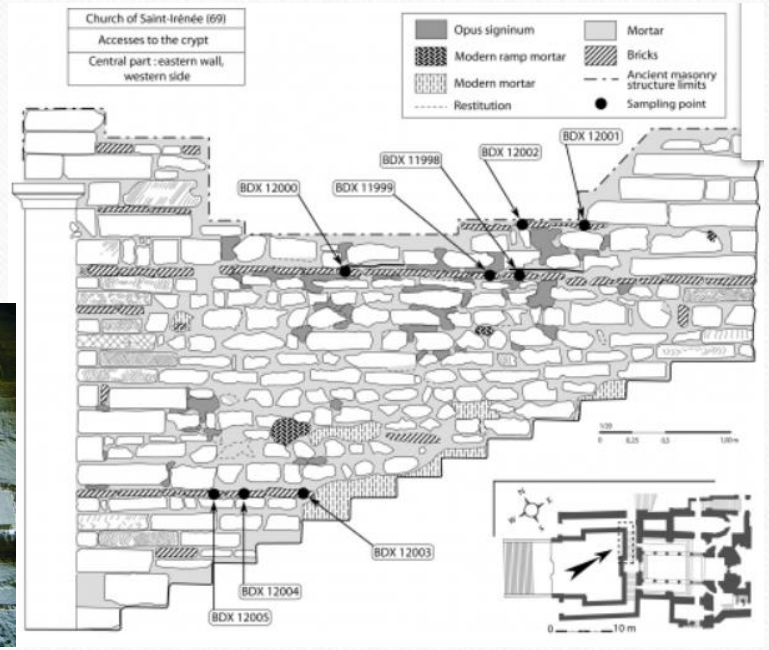
# Trapped-charge dating:

- Termoluminiscence (TL)
- Optically stimulated luminiscence(OSL)
- Magnetic pole orientation
- Pottery Rehydoxylation
- Amino acid dating




# Thank you for your attention!

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**https://cuni.academia.edu/JanTurek**