

# History of cultural landscape: Research methods

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[home.czu.cz/fantav](http://home.czu.cz/fantav)



fzp.czu.cz

# Introductory notes

- You do not have to memorize this
  - Neither the technical terms
  - Understanding of principles
  - You should have an idea that such things exist
- PDF will be available
  - [home.czu.cz/fantav](http://home.czu.cz/fantav) → teaching
- When in doubt, ask me
  - I am here to answer
- If you will disagree, tell me
  - I may be wrong

# History of cultural landscape

## 1. Research methods

- Cultural landscape
- How to study history
- Methods 1: Historical geography
- Methods 2: Remote sensing
- Methods 3: Archaeology, paleobotany, geology

## 2. History of cultural landscape of the Czech lands

- Main changes
- Causes and consequences

# Lecture objectives

- To show bestiary of landscape history research methods
- Possibilities of various research methods
- Advantages and disadvantages

# 1. Cultural landscape

# What is cultural landscape?

A



B



C



D



# What is cultural landscape?

- Definition: cultural landscape is landscape affected by man
- Influence of man



- How did/do people affect the landscape?
- When did it started?
  - Industrial revolution?
  - Medival colonization?
  - Roman Empire?
  - Neolithic revolution?

# Typology of cultural landscapes

UNESCO (2008) definitions:

1. landscape designed and created intentionally by man
2. organically evolved landscape
  - a) a relict (or fossil) landscape
  - b) a continuing landscape
3. associative cultural landscape

Full description: <https://whc.unesco.org/archive/opguide08-en.pdf#annex3>, page 86



# Typology of cultural landscapes

UNESCO (2008) definitions:

- 1. landscape designed and created intentionally by man**



# Typology of cultural landscapes

UNESCO (2008) definitions:

## 2. organically evolved landscape



# Typology of cultural landscapes

UNESCO (2008) definitions:

## 3. associative cultural landscape

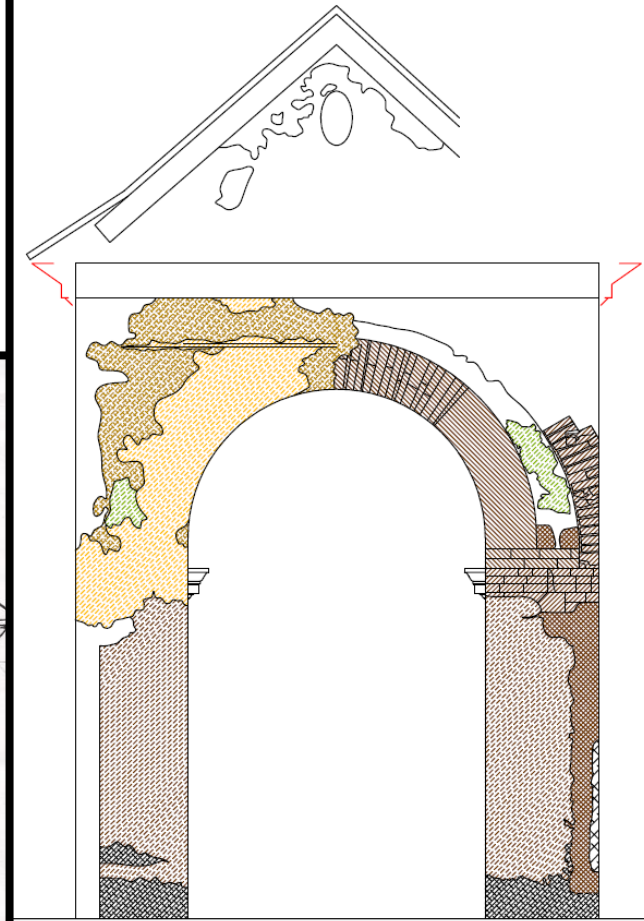
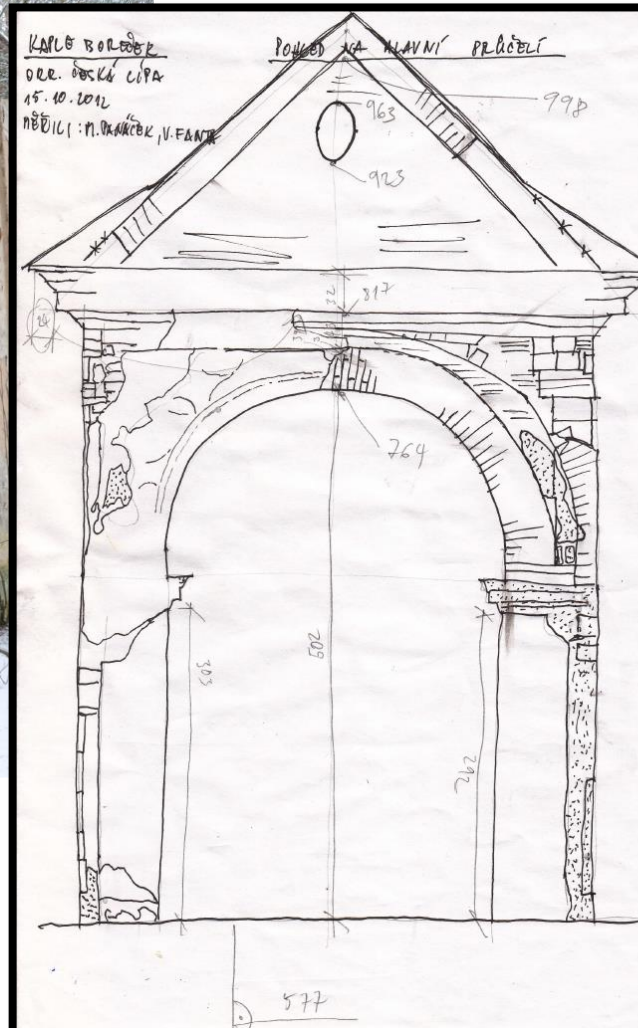


## 2. How to study history

# How do we study history?

- Historical reality **X** history
- Process:
  1. Complex **historical reality** (something happened)
  2. Part of the reality is recorded in **historical sources** (somehow, by someone)
  3. The historical sources (partially) survive until...
  4. ...someone (historian) reads them, **interprets** them and shares the interpretation with the public → **history**

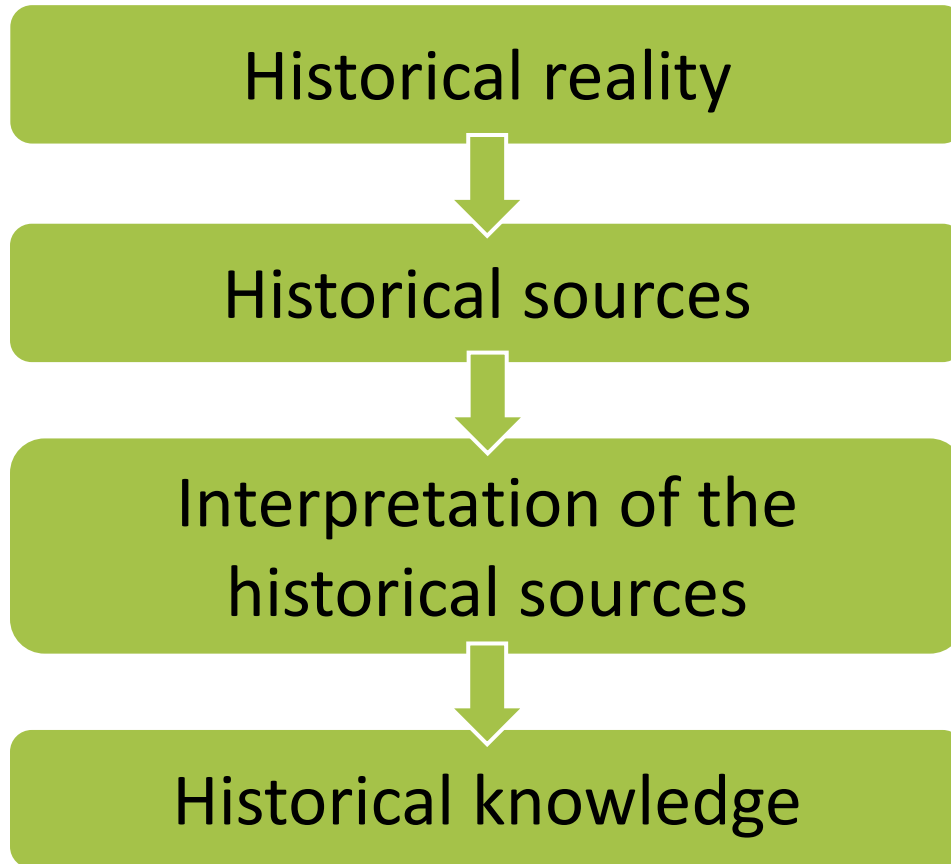
# Interpretation of historical artefacts



## Popis povrchů a omítek a jejich hypotetické časové zařazení.

- Okrová omítka s červenou kresbou, Pravidločbná renovace r. 1904.
- Bílá pekovaná omítka, podklad pro okrovou. Teoreticky může pocházet z renovace r. 1904, ale spíše půjde o pozůstatky starší omítky. Není vykoučeno, že spadá do konce 18. nebo počátku 19. století.
- Čihelno zdivo původního kostela (1712), odeskáno při ubourání lodí (cca za Josefa II.).
- Kamenné zdivo původního kostela (1712), odeskáno při ubourání lodí (cca za Josefa II.).
- Soklové partie s degradovanou omítkou či obzvláště specifickým povrchem.
- Jádřová vrstva okrové omítky (okrová omítka v degradovaném stavu).
- Běhá omítka v relativně dobrém stavu, teoreticky může být barokní.
- Čihelno zdivo býv. vnitřního obvodu původního kostela s dostřednou ložnou spárou (1712), neoddeskáno.
- Kamenina po vypáčení zdiva.

# How do we study history?



a chapell was built

layout, constructions, materials and decorations

accurate documentation, architectural, archaeological and historical survey

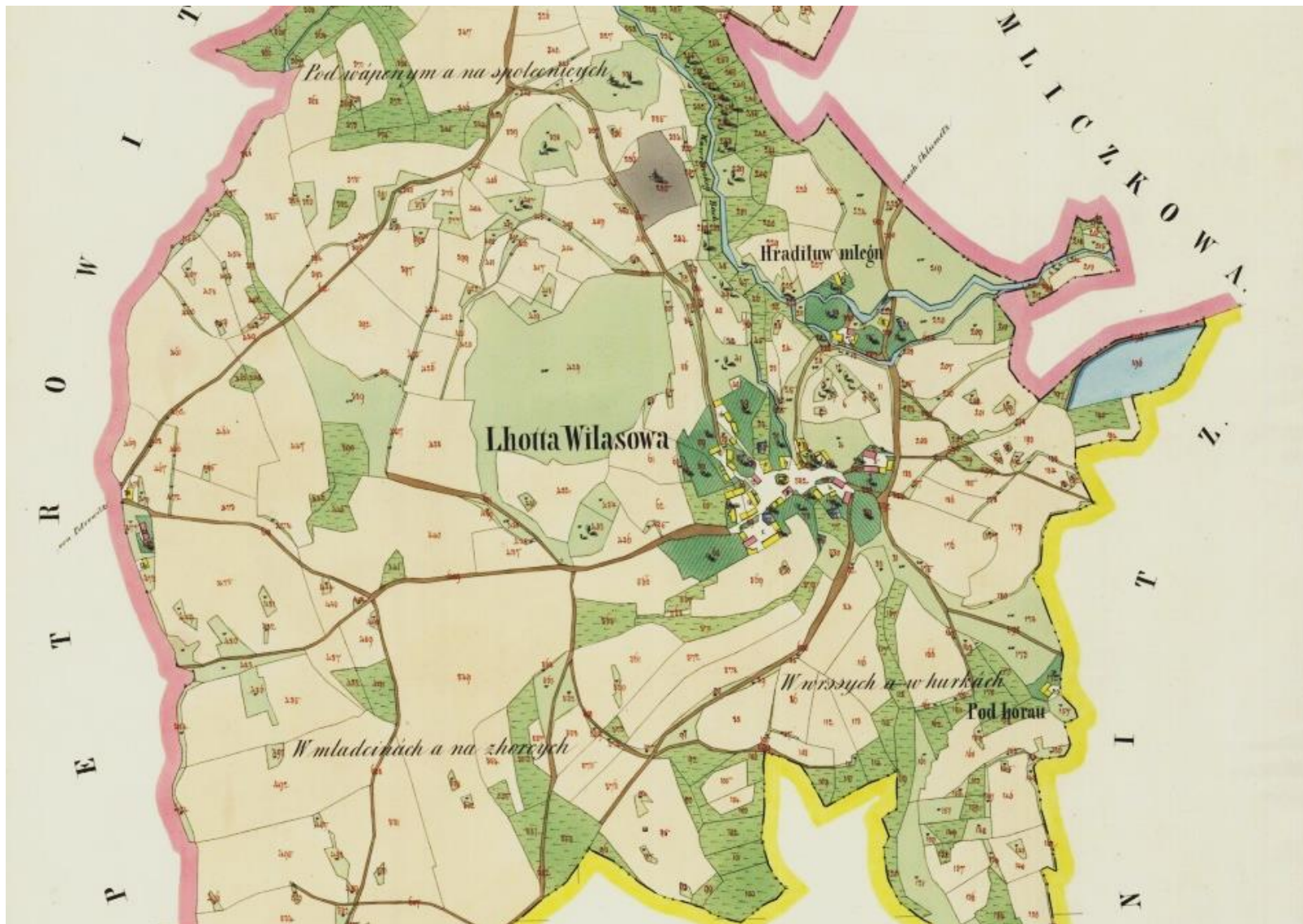
„we know the chapell was built in 1823 by Sherlock Holmes and financed by James Watson“

# 3. Methods 1: Historical geography



*Pictured: Ms 107, Bréviaire de Renaud de Bar (1302-1304), fol.-89r-127v, Bibliothèque de Verdun. Pictured: Royal 10 E IV f. 62, British Museum*





Archiválie Ústředního archívu zeměměřictví a katastru

# Characteristics

- Subjects: old maps, plans, photos, drawings...
- Temporal period: 18<sup>th</sup> – 20<sup>th</sup> century
- What can we learn: land use, extent of forests, size of towns, position of ponds, shape of roads...
- Level of details: towns and villages, even individual houses
- Availability: on-line
- Difficulty of interpretation: easy, laymen can do that
- Reliability: differs
- Limitations: historical mapping activities were usually single actions
- Beware:
  - regional differences
  - every source is individual case
  - errors in maps

# Historical geography

- Boundary between H and G, social sciences X natural sciences
- Multidisciplinary, cooperation with archaeology, GIS...
- Temporal and spatial component
- Topics:
  - physical geography, environmental history, influence on civilization
  - old maps
  - historical events in time and space
  - territorial development of countries
  - settlement history
  - historical road network
  - historical cultural landscape, protection
  - etc.

*Semotanová 2006*

# Overview

## Historical sources

- written sources
- artefacts (archaeology)
- narrative sources (oral history)
- history of urbanism
- pictures/maps/photos
  - individual
  - comparative



*veduty.bach.cz, oldmaps.geolab.cz*

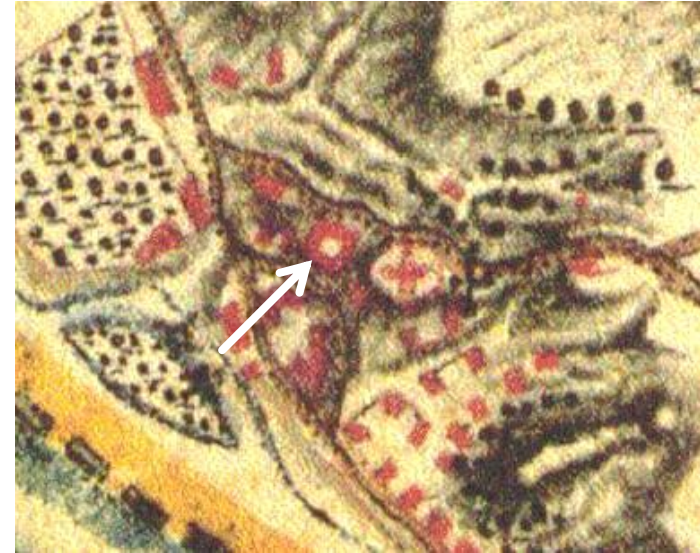
## Specific context of origin!

# Motivation for mapping

- financial, taxes payment
- administrative, economical
- strategic, military
- representative
- etc...

**Context of mapping → interpretation (understanding)**  
of a historical source

# Interpretation of old maps

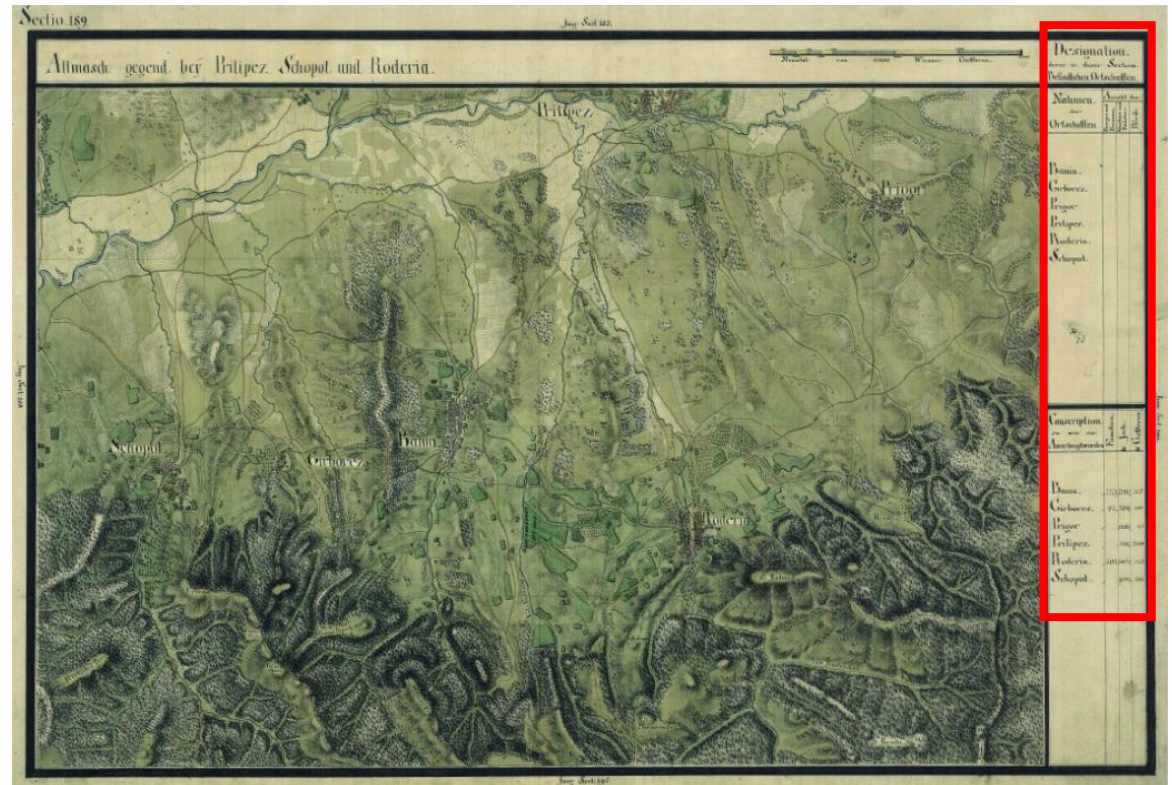


castle Chvatěruby

*hrady.cz, oldmaps.geolab.cz,  
archivnimapy.cuzk.cz*

*M. Rykl, pers. comm.*

- Written description
  - “attribute table”
  - strategic/ economic description



*commons.wikimedia.org*

# Important maps

- Müller's map of Bohemia (1720), Müller's map of Moravia (1716)
- Maps of dominions (for some areas only, 18<sup>th</sup> century)
- Military mapping (approx. 1780, 1840, 1870)
- Stable cadastre (approx. 1840)
- Aerial ortophotographs (since 1930s)



# Müller's map of Bohemia (1720), Müller's map of Moravia (1716)

- Military and administrative reasons
- Scale 1:132 000, resp. 1:180 000
- Geodetic inaccuracy
- Digitalized

→ [oldmaps.geolab.cz](http://oldmaps.geolab.cz)



[oldmaps.geolab.cz](http://oldmaps.geolab.cz)

# Maps of dominions (18<sup>th</sup> century)

- Administrative and economic reasons
- Different scales
- Only some of them digitalised
- No central depository
- For some areas only



*zdroj: SOkA Nymburk, foto autor*

# First military mapping (1760s and 1780s)

- Military reasons
- Whole Habsburg Empire
- Scale 1:28 800
- Geodetic inaccuracy
- With text description

→ [oldmaps.geolab.cz](http://oldmaps.geolab.cz)

→ [mapire.eu/en](http://mapire.eu/en)



*oldmaps.geolab.cz*

# Mapire.eu

mapire About Maps English

Subscribe

Opacity: 100% More maps

Königreich Böhmen (1764-1767) - First Military Survey

Königreich Ungarn (1782-1785) - First Military Survey

Galizien und Lodomerien (1779-1783) - First Military Survey

Großfürstentum Siebenbürgen (1769-1773)

Europe in the XVIII. century

- Administrative Maps of Hungary (1914)
- Europe in the XIX. century
- Europe in the XIX. century (with the Third Military Survey)
- Europe in the XVIII. century
- Galicia and Bucovina (1861-1864) - Second military survey of the Habsburg Empire
- Galizien und Lodomerien (1779-1783) - First Military Survey
- Habsburg Empire (1869-1887) - Third Military Survey (1:25000)
- Habsburg Empire (1869-1887) - Third Military Survey (1:75000)
- Habsburg Empire - Cadastral maps (XIX. century)

## Europe in the XVIII. century

Base maps

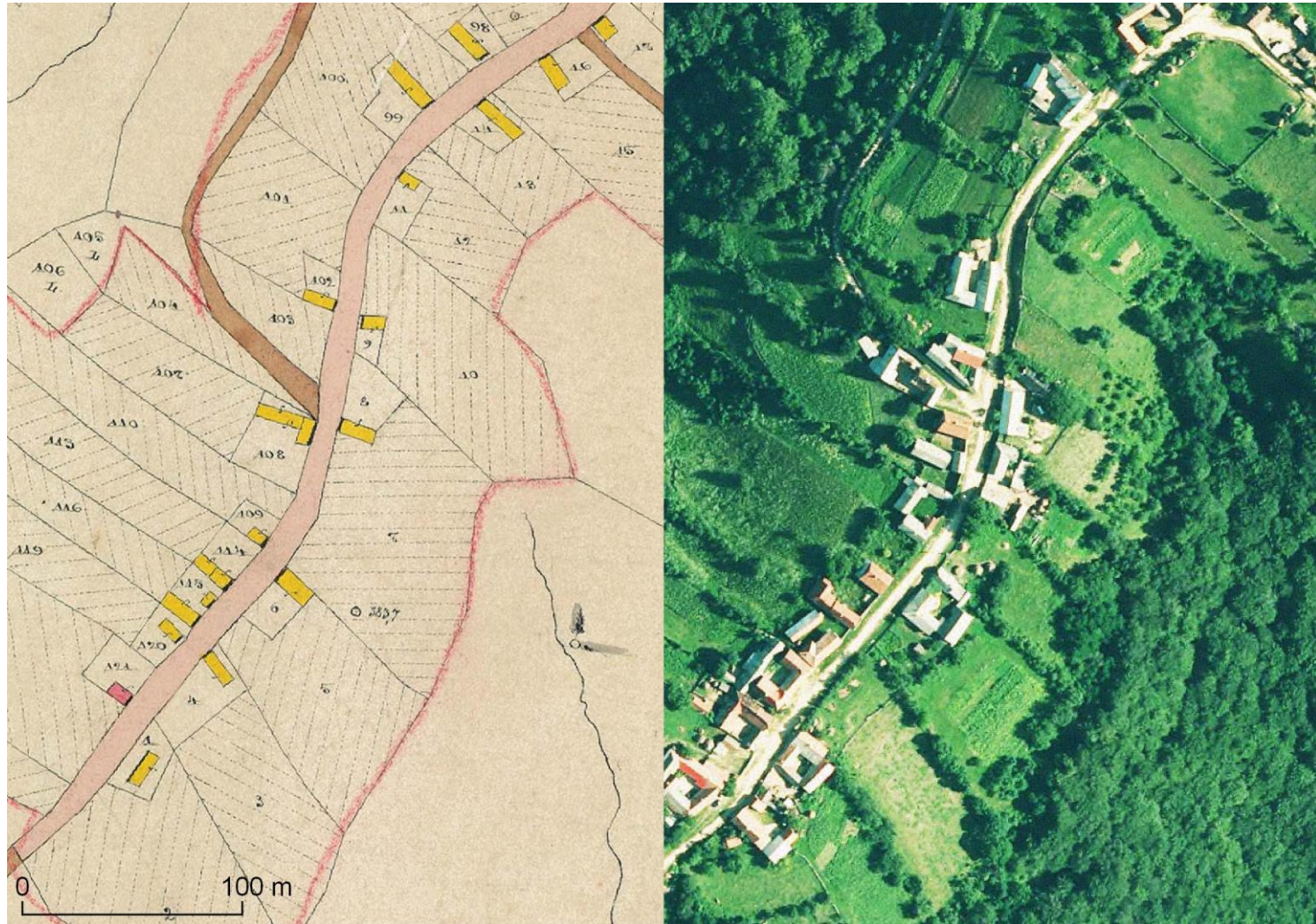
# Stable Cadastre (1824 – 1843)

- Administrative reasons, tax payment
- Whole Habsburg Empire
- Scale 1:2880, 1:1440, 1:720
- High geodetic accuracy
- With text description
- [archivnimapy.cuzk.cz](http://archivnimapy.cuzk.cz)
- [mapire.eu/en](http://mapire.eu/en)

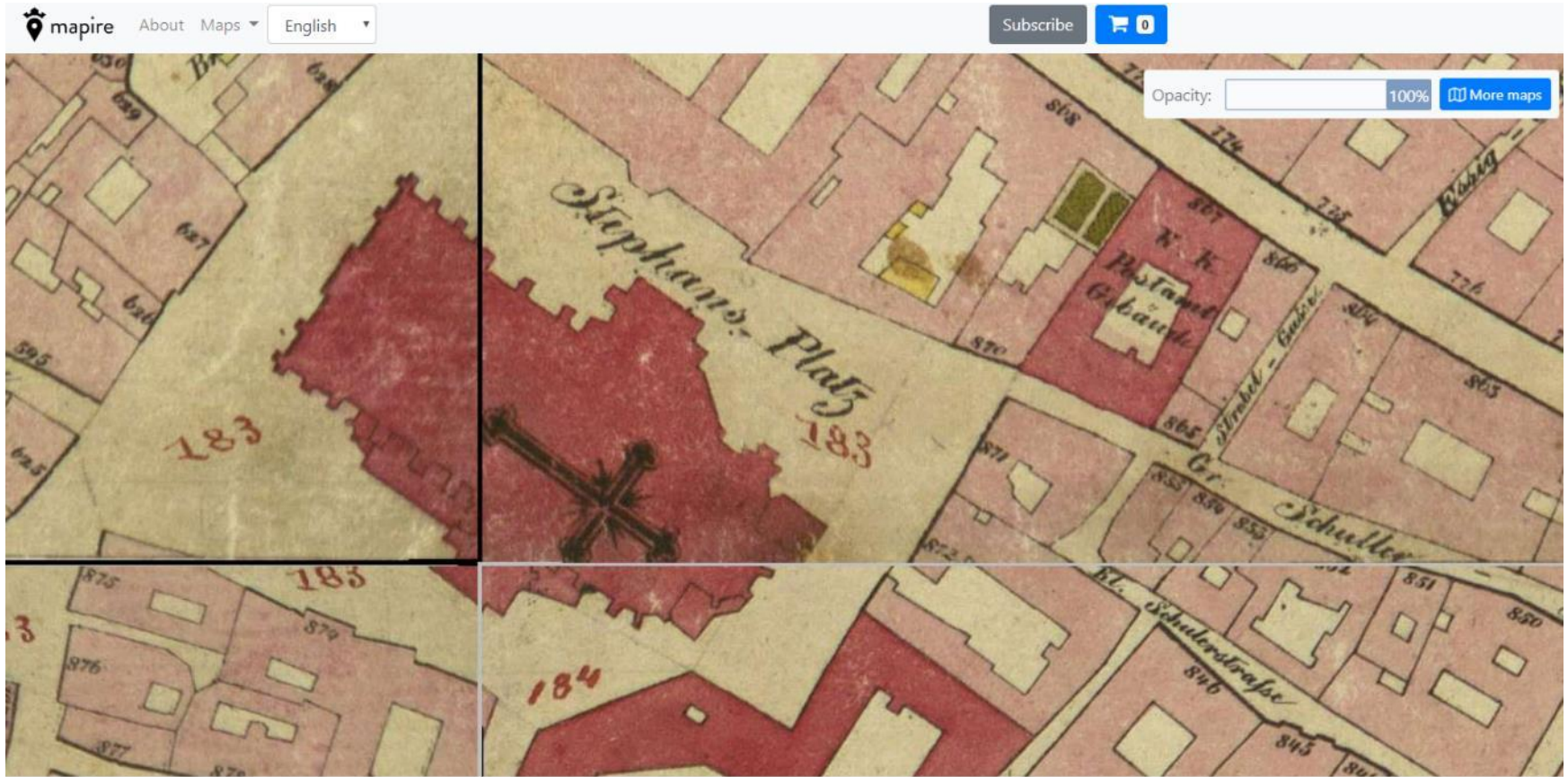


zdroj: archivnimapy.cuzk.cz

# Stable Cadastre – Romania



# Mapire.eu

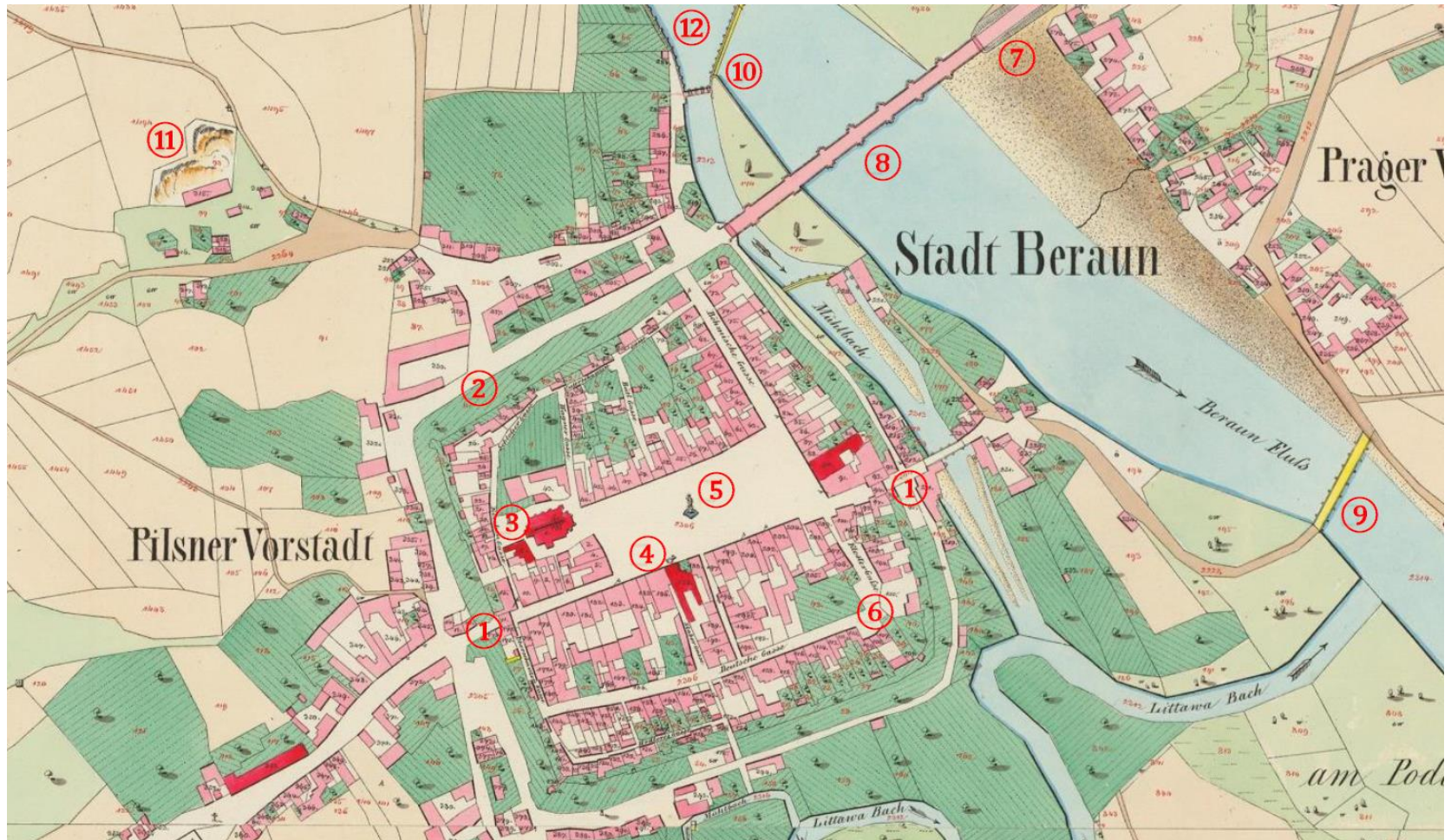


**Habsburg Empire - Cadastral maps (XIX. century)**

Base maps



# Historical urbanism



1 – towngates  
2 – layout of city wall  
3, 4 – dark red –  
municipal buildings

7 – road with  
embankment  
8 – stone bridge  
9 – wodden bridge  
10 – weir

*Hauserová & Poláková 2015*



# Stable Cadastre (1824 – 1843)

order of map	name	modifications
1.	indication sketch	yes
2.	original map of SC	yes
3. (-5.)	imperial imprint	no

*after M. Ebela (2011)*



[archivnimapy.cuzk.cz](http://archivnimapy.cuzk.cz)

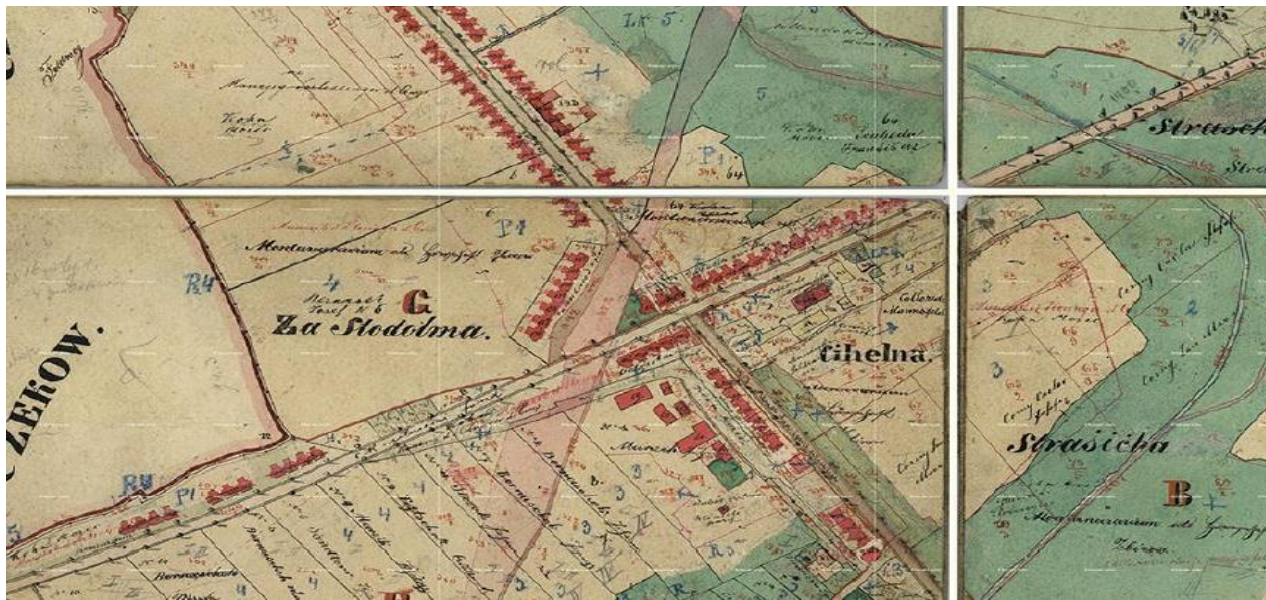
# Imperial imprint X indication sketch



Imperial imprint  
1839

Kařez

- wooden houses, agriculture
- imperial road Praha – Plzeň



Indication sketch –  
modified 1879

- industrial development
- Workers' houses
- layout of railway line Praha – Plzeň

# Vedutas

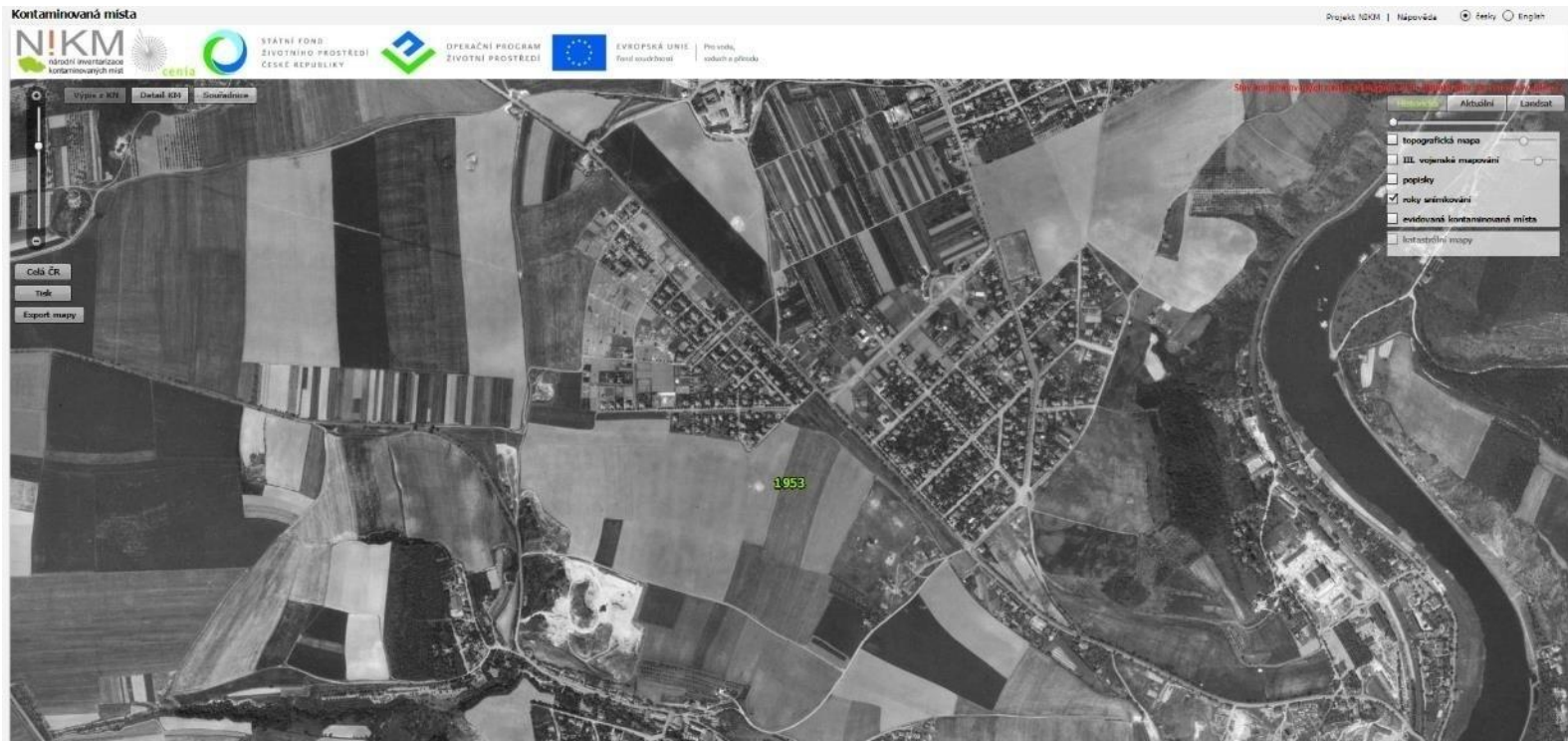
- List of vedutas untill 1850

→ [veduty.bach.cz/veduty](http://veduty.bach.cz/veduty)



# Aerial ortophotographs (1950s)

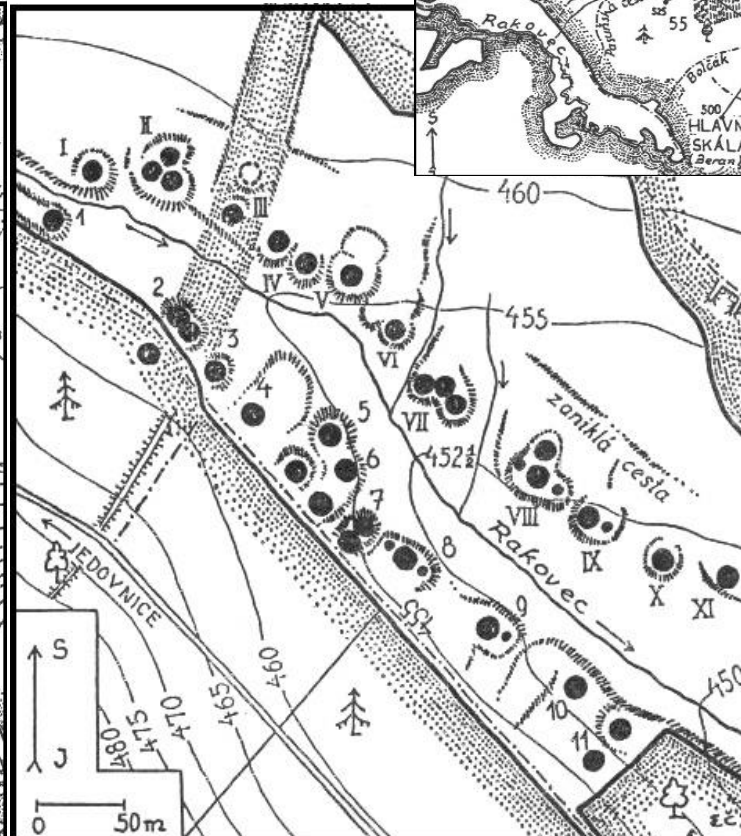
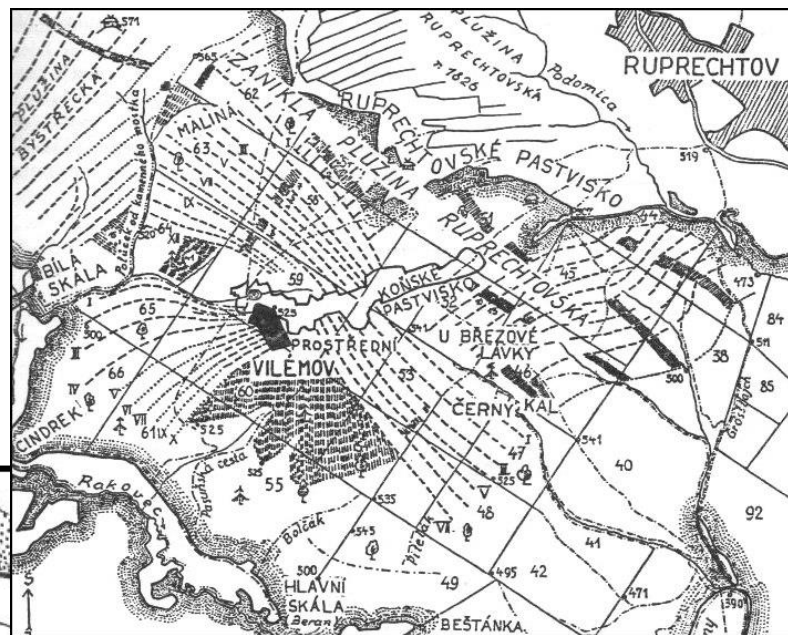
- 1930s – military reasons
  - 1950s – whole country
- **kontaminace.cenia.cz** (currently out of order)
- [https://lms.cuzk.cz/lms/lms\\_prehl\\_05.html](https://lms.cuzk.cz/lms/lms_prehl_05.html)



# Examples of historical-geographical researches

ERVÍN ČERNÝ

VÝSLEDKY VÝZKUMU  
ZANIKLÝCH  
STŘEDOVĚKÝCH  
OSAD



Kolektiv autorů

Vladimír Brůna, Ivan Buchta, Lenka Uhlířová

IDENTIFIKACE HISTORICKÉ SÍTĚ PRVKŮ  
EKOLOGICKÉ STABILITY KRAJINY  
NA MAPÁCH VOJENSKÝCH  
MAPOVÁNÍ

[oldmaps.geolab.cz](http://oldmaps.geolab.cz)



## B.2 Stáří vybraných krajinných prvků

1:30000

0 500 1000 1500 m

### LEGENDA

řešené území

vrstevnice (E = 5 m)

Typy krajinných prvků

vizualizace vlastnických vztahů

cesty

rybníky

lesy

sídla

Stáří krajinných prvků  
od LS50 do současnosti

od SK do LS50

od 1VM do SK

před 1VM

Poznámka: Tato mapa zobrazuje všechny krajinné prvky zachycené v příslušných mapových podkladech, tj. včetně zaniklých. Důvod zobrazení i zaniklých prvků je různá míra jejich "dochovanosti" (celek / relikt / stopa apod.).

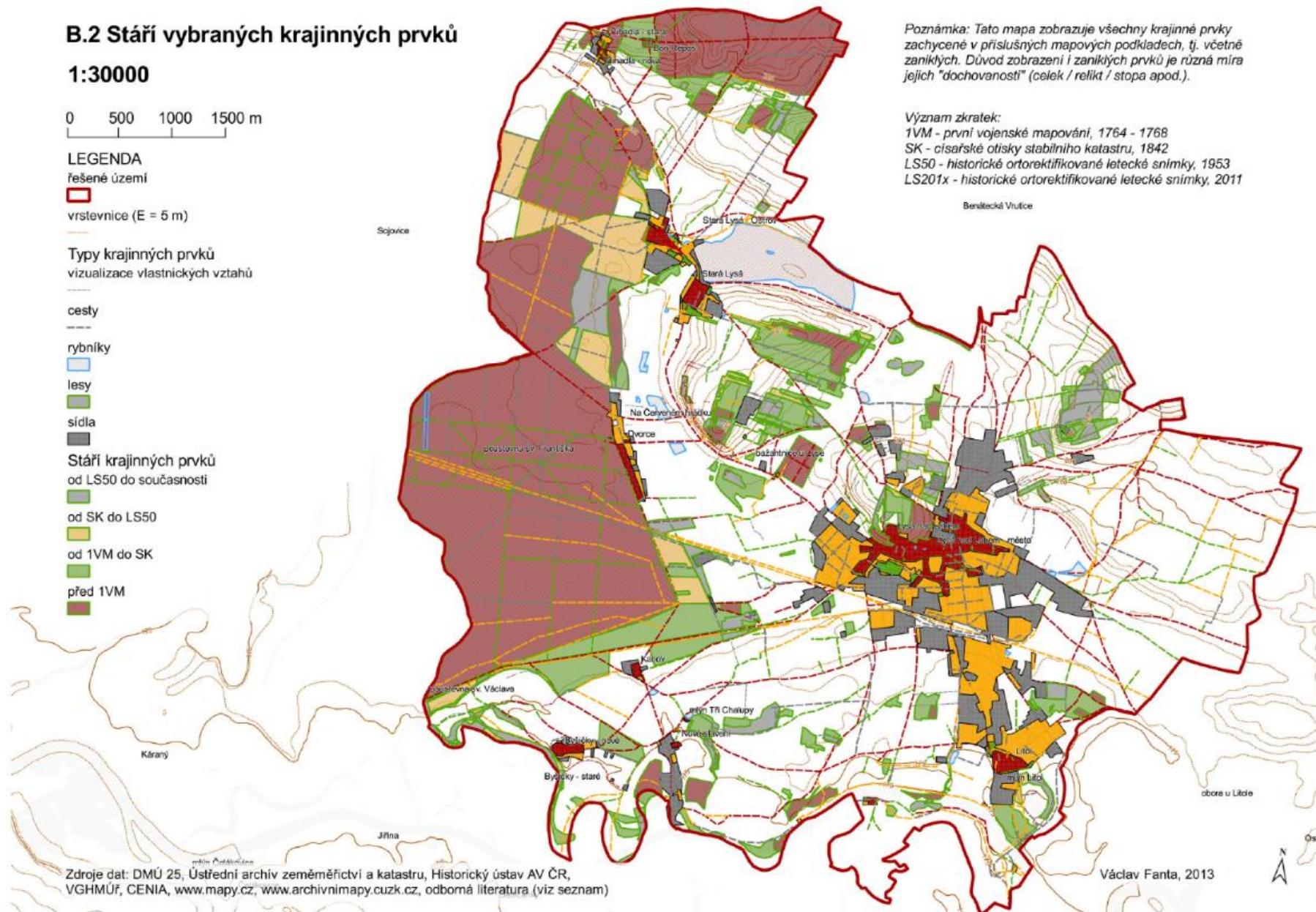
Význam zkratk:

1VM - první vojenské mapování, 1764 - 1768

SK - císařské otisky stabilního katastru, 1842

LS50 - historické ortorektifikované letecké snímky, 1953

LS201x - historické ortorektifikované letecké snímky, 2011



Zdroje dat: DMÚ 25, Ústřední archiv zeměměřictví a katastru, Historický ústav AV ČR, VGHMÚF, CENIA, [www.mapy.cz/](http://www.mapy.cz/), [www.archivnimapy.cuzk.cz/](http://www.archivnimapy.cuzk.cz/), odborná literatura (viz seznam)

Václav Fanta, 2013

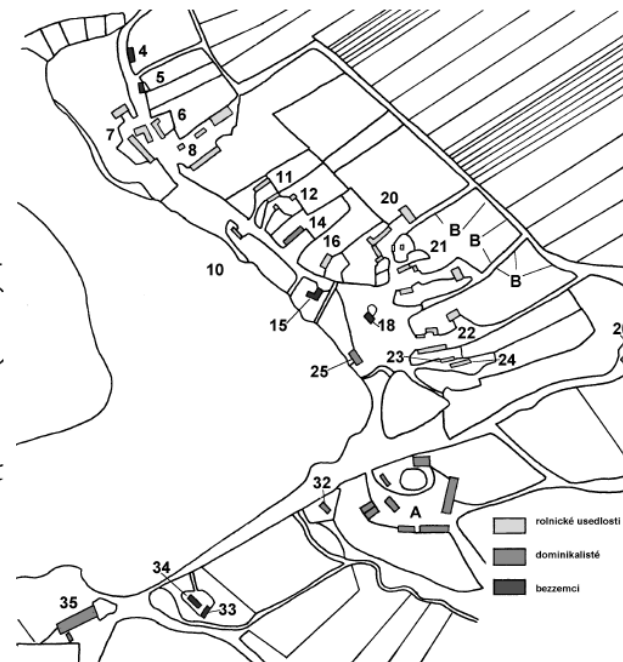
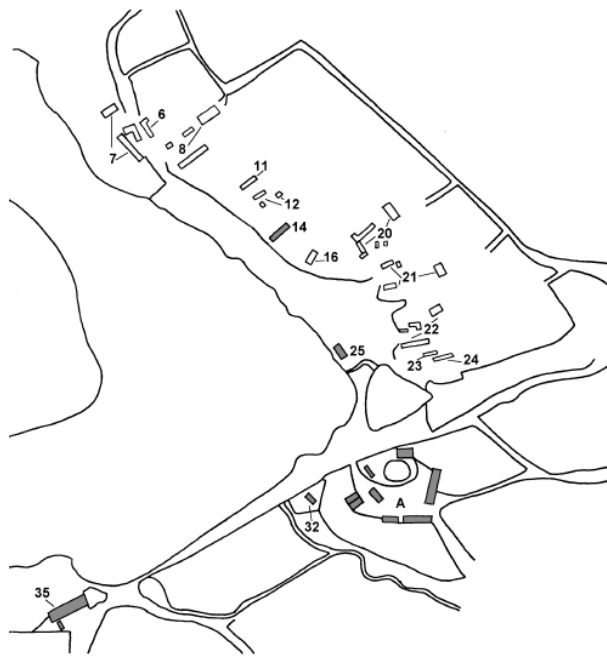
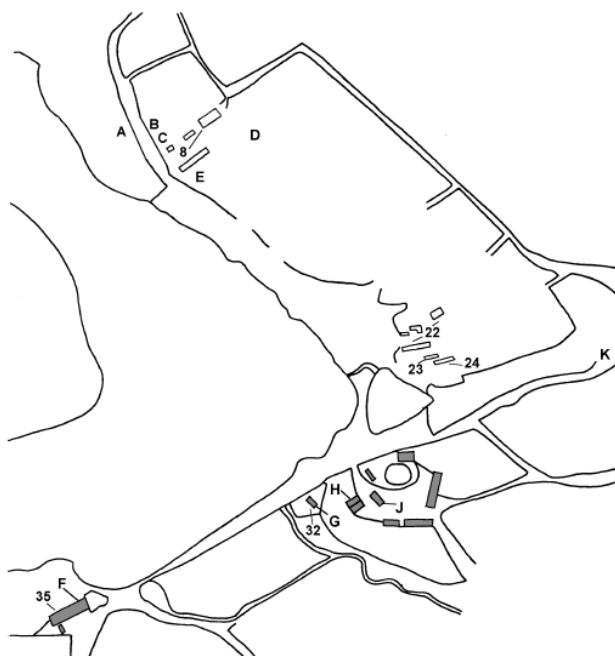
Fanta 2013



Martin Dohnal

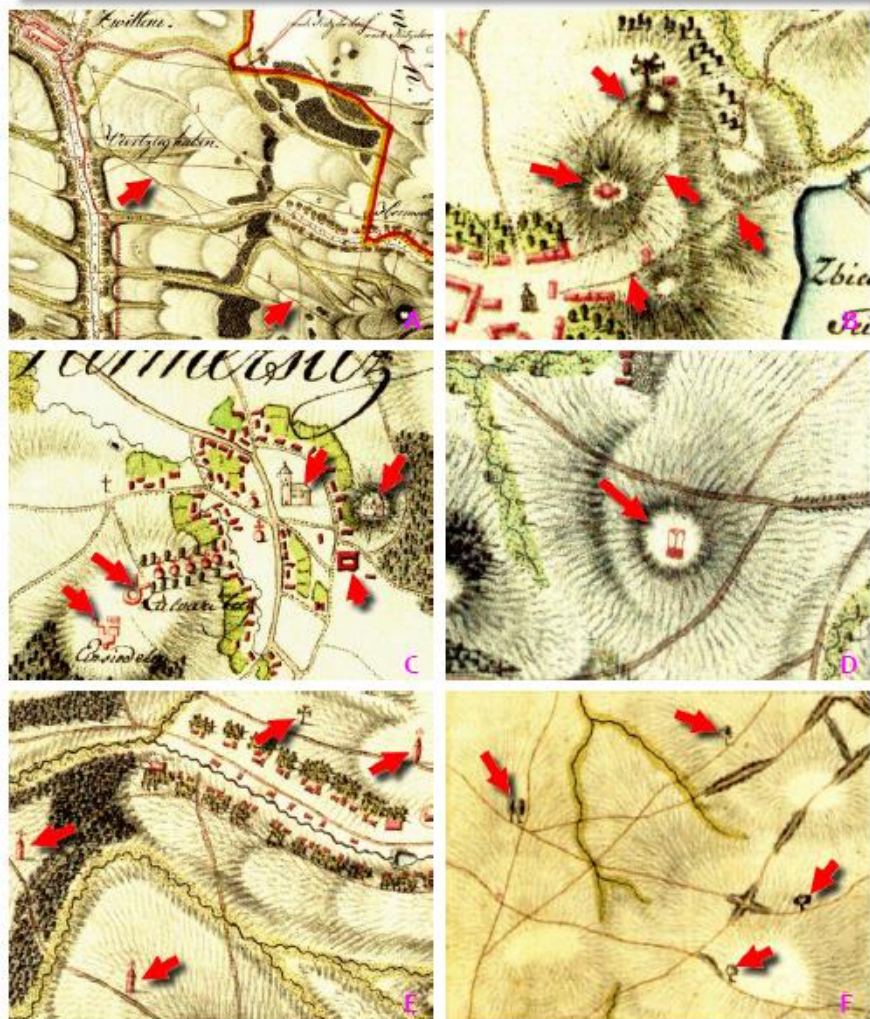
# HISTORICKÁ KULTURNÍ KRAJINA V NOVOVĚKU

## Vývoj vsi a plužiny v Borovanech u Bechyně



# MODERNÍ METODY IDENTIFIKACE A POPISU HISTORICKÝCH CEST

J. Martínek a kolektiv



Obr. 19: Identifikace cest a významných objektů na mapě I. vojenského mapování. A) Část dálkové komunikace směřující ze Svitav na Křenov a dále na Jevíčko. B) Identifikace svazků cest u obce Plumlov. C) Významné objekty podél cest (tvrz, kostel, dvůr atd.) v Jaroměřičich. D) Šibenice poblíž rozcestí u Boskovic. E) Příznaky cest (boží muka a kříže) v okolí Kamenné Horky u Svitav. F) Významné solitérní stromy či skupinky stromů jako orientační prvky v krajině západně od obce Křenov na Olomoucku.



Obr. 22: Analogie v současnosti – stopy po dobytku na pastvinách. A,B) Prvotní fáze vzniku pěšin. C, D) Průhony/draha. E,F) Struktura pěšin na leteckých snímcích – na obrázku F lze vidět výrazně vyšlapané plochy v okolí sloupů elektrického vedení.

# Archeologie 19. a 20. století

Přístupy - Metody - Téma

PAVEL VAŘEKA (ed.)



# Archeologie 19. a 20. století

Přístupy - Metody - Tém

PAVEL VAŘEKA (ed.)



## 4. Methods 2: Remote sensing



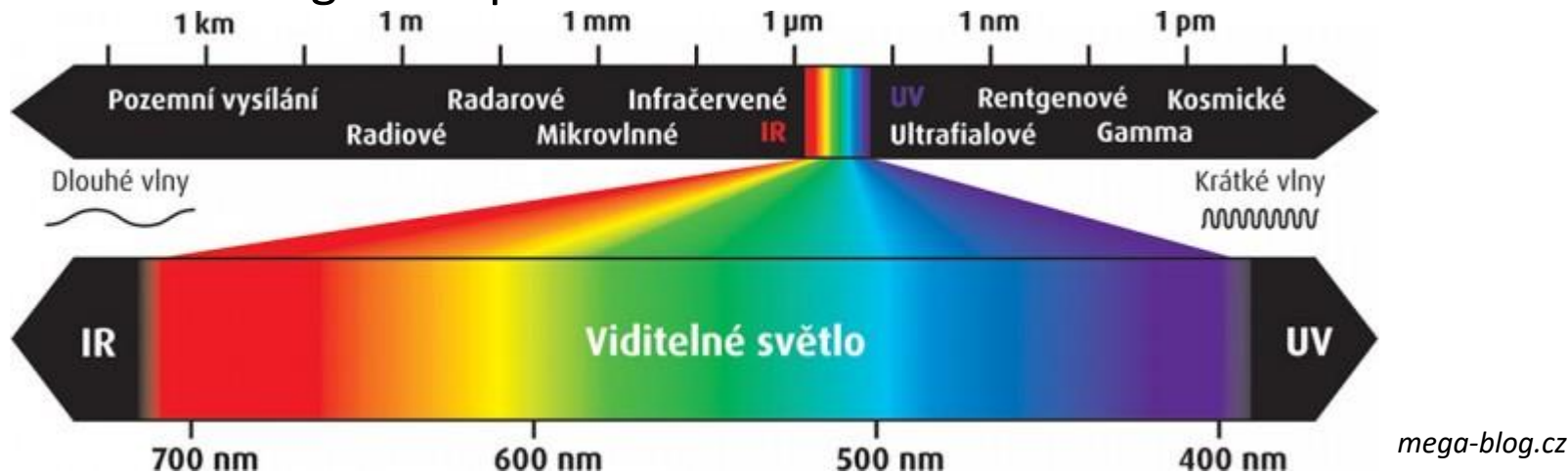
*Pictured: Ms 107, Bréviaire de Renaud de Bar (1302-1304), fol.-89r-108r, Bibliothèque de Verdun*

# Characteristics

- Subjects: aerial and satellite images, lidar
- Temporal period: end of 20<sup>th</sup> century, present
- What can we learn: global overview, minor terrain structures
- Level of details: even tens of cm
- Availability: on-line, sometimes for free
- Difficulty of interpretation: some thinks easy, some very difficult
- Reliability: very reliable
- Limitations: data from the present period

# Physical backgrounds of RS

- Remote sensing = not contact
  - advantages: easy acquisition of data from vaste areas in same quality
  - disadvantages: data are less detailed
- Balloons, aircrafts, helicopters, UAV, satellites
- Electromagnetic spectrum:



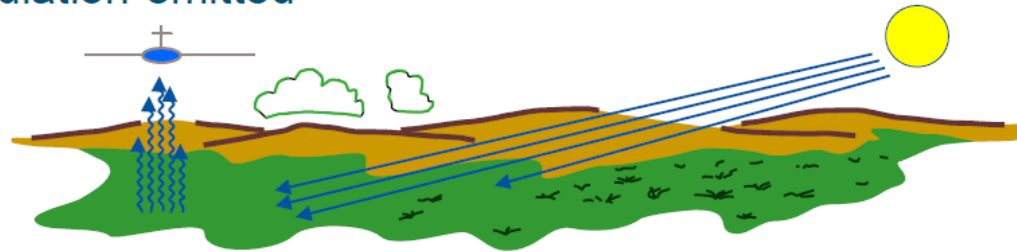
- Data properties: ([https://en.wikipedia.org/wiki/Remote\\_sensing](https://en.wikipedia.org/wiki/Remote_sensing))
  - Spatial resolution (pixel size)
  - Spectral resolution (sensitivity to specific wavelengths of EM radiation)
  - Radiometric resolution (sensitivity to specific intensity of radiation)
  - Temporal resolution (time interval between two exposures of the same area)

# Active X passive RS

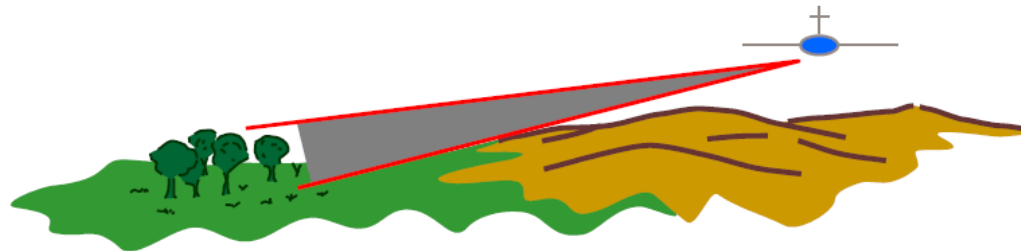
RS using reflected  
solar radiation:  
(PASSIVE)



RS using radiation emitted  
by objects:  
(PASSIVE)



ACTIVE RS:





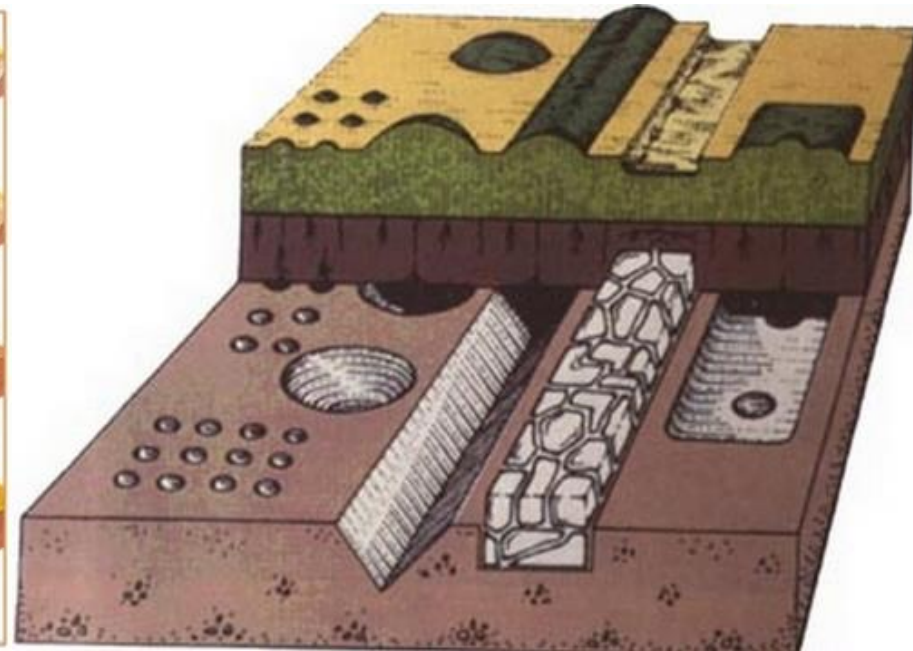
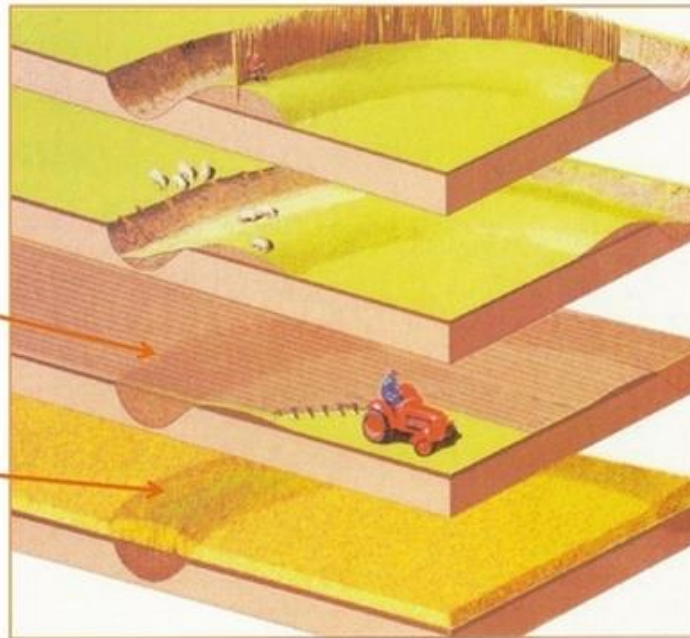
# Orthophoto (orthophotograph)





# Vegetation signs

- Remnants of historical structures (walls, banks, ditches, pits etc.) → crops color and grow



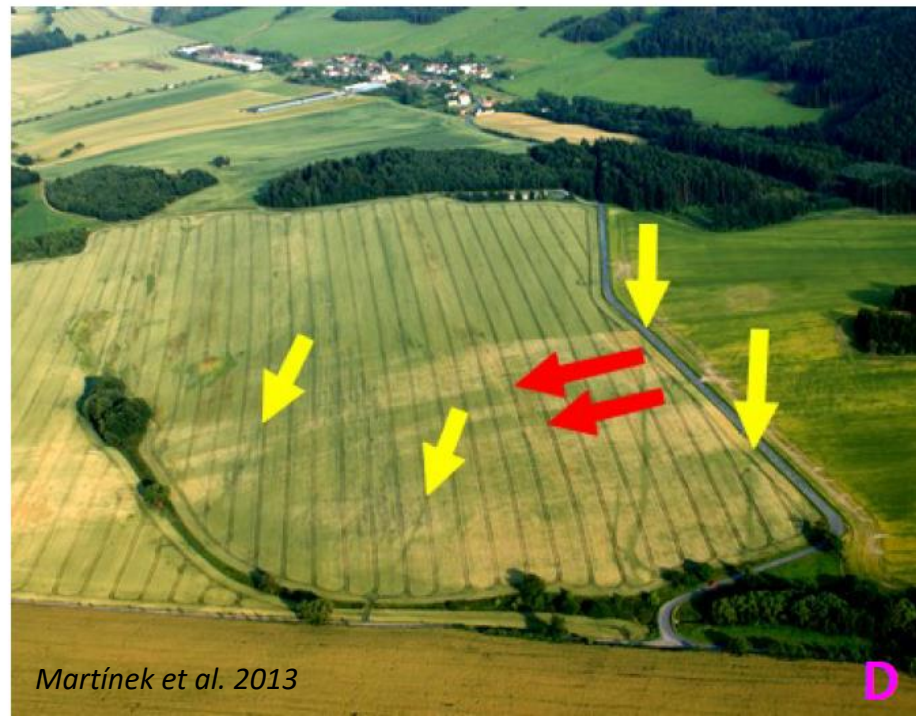
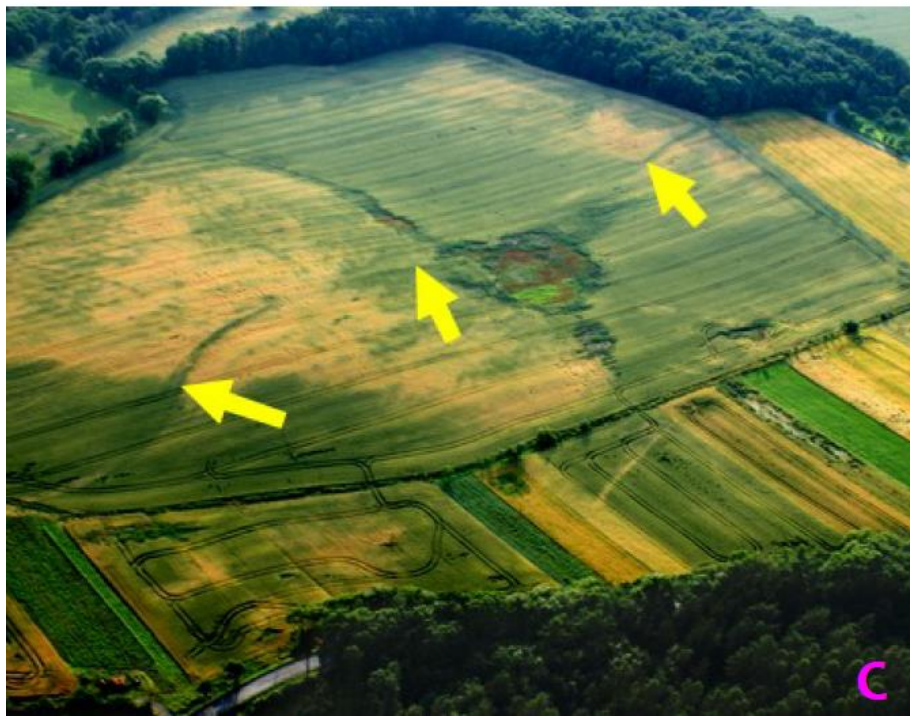
# Oblique aerial photographs



XVI.2. Poohří – Hradiště. Detailní téměř kolmý pohled na část zviditelněné linie zaniklé cesty s vysazenou alejí (zdroj: ARÚ – Archiv leteckých snímků)

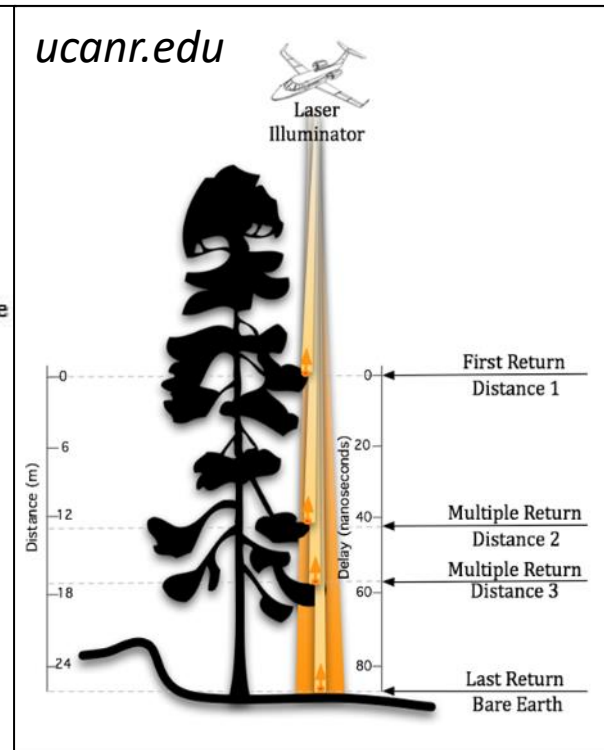
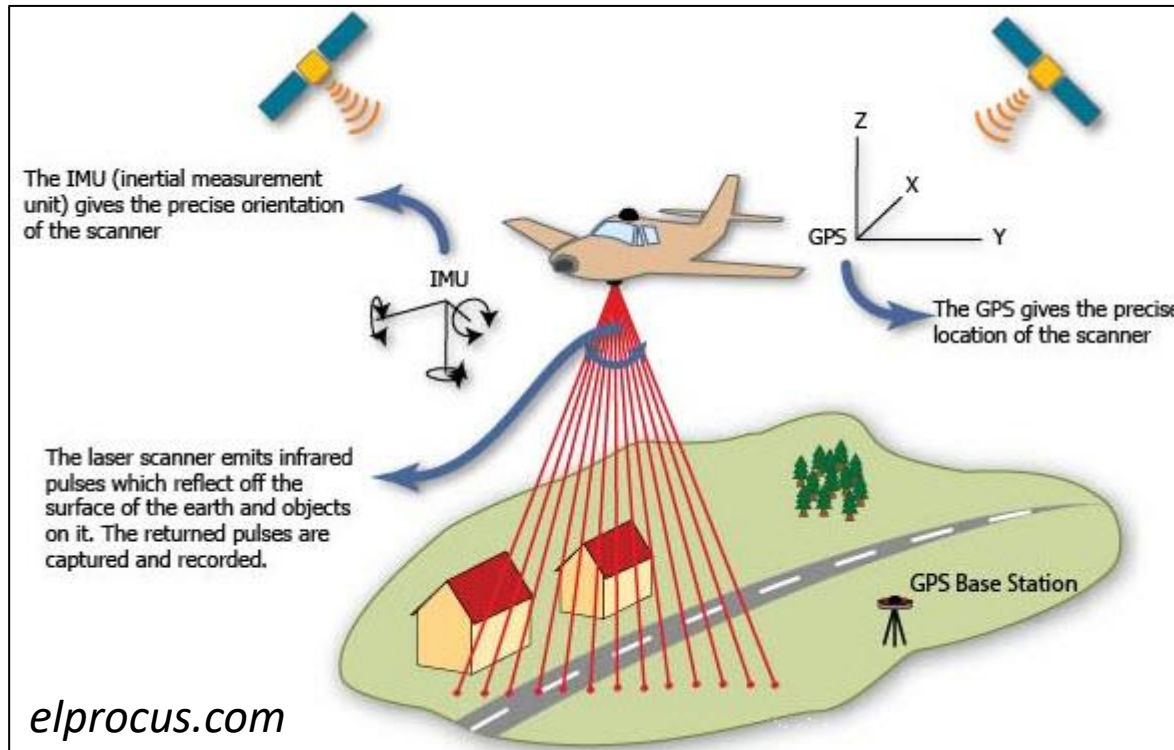


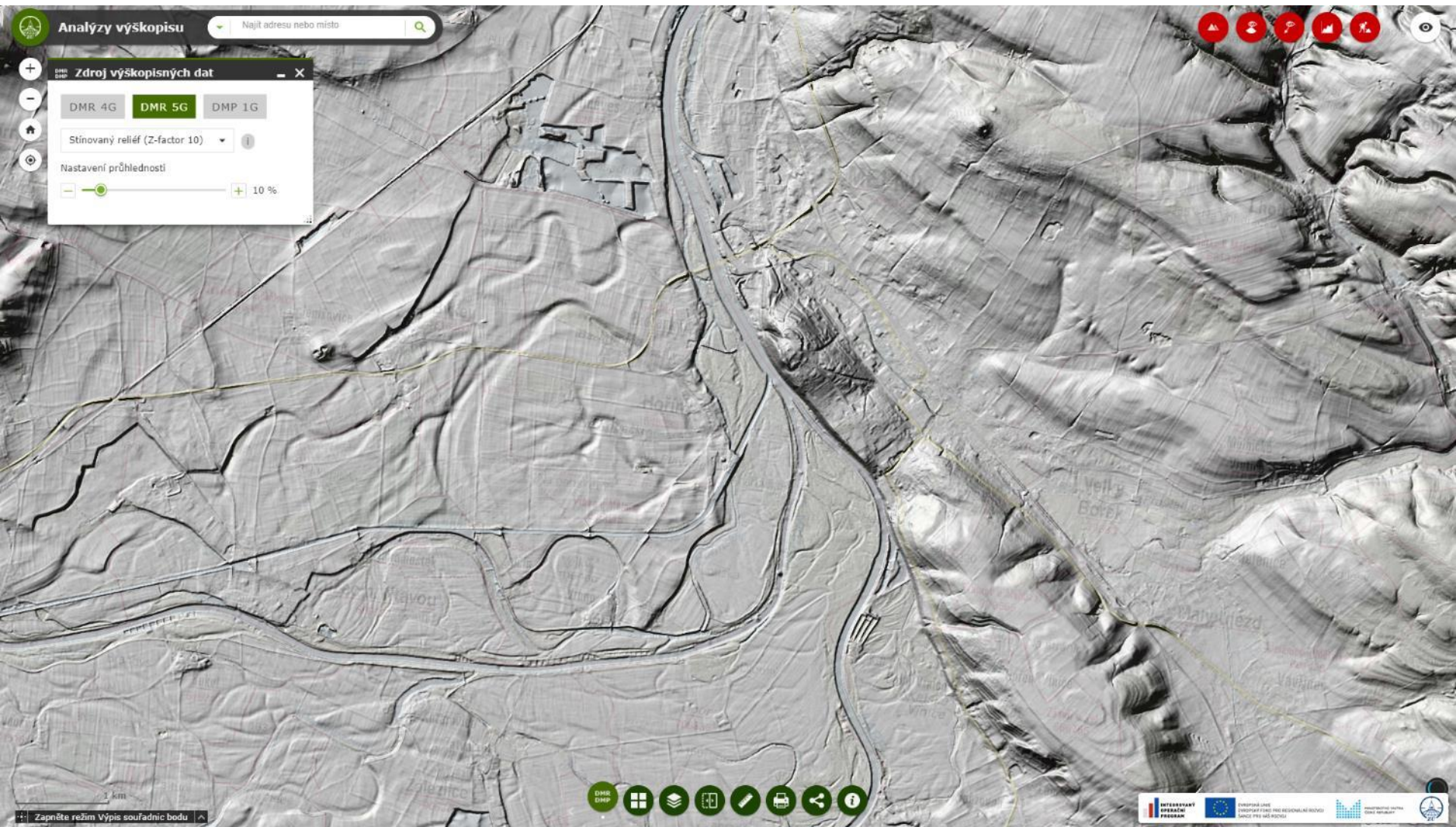
XVI.3. Poohří – Hradiště. Dnes zaniklá cesta s alejí na katastru Hradiště ve výřezu z II. vojenského mapování



# LIDAR

Light Detection And Ranging, airborne laser scanning  
Spatial resolution – tens of cm

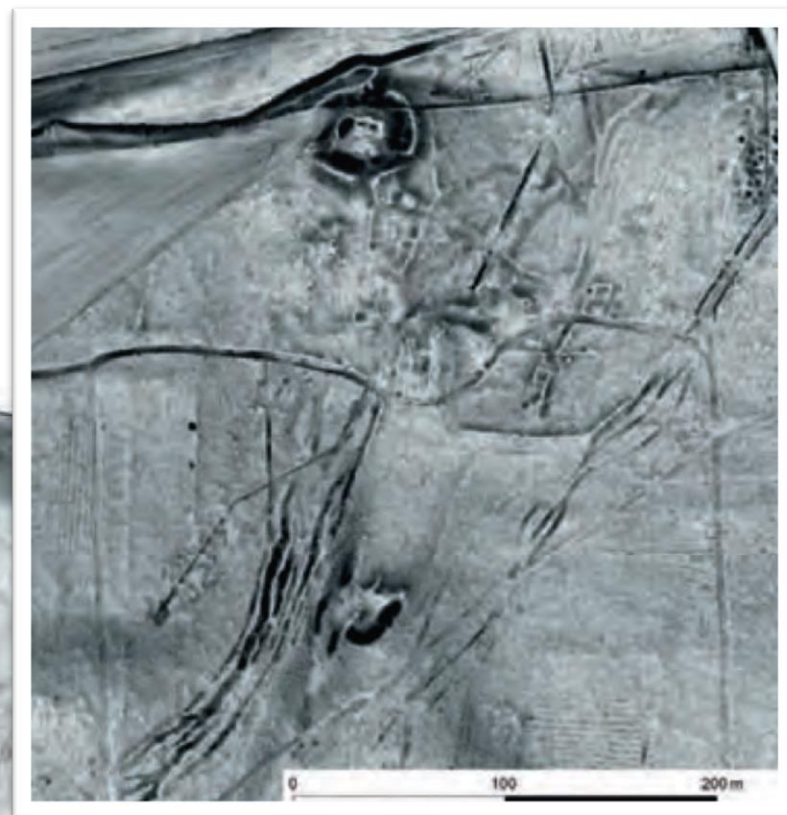




# Archeologie a letecké laserové skenování krajiny

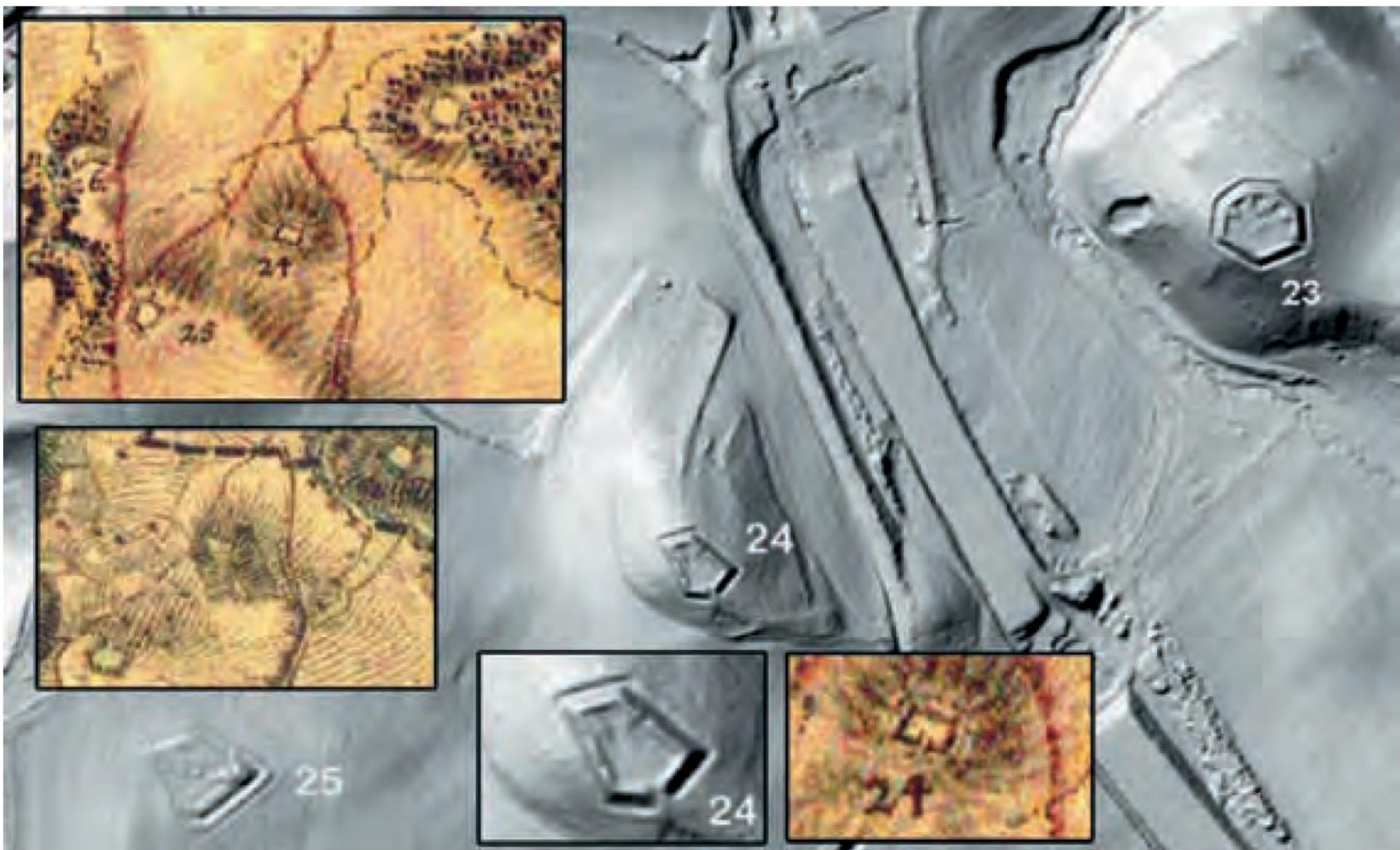
Archaeology and airborne laser scanning  
of the landscape

Martin Gojda – Jan John a kol.



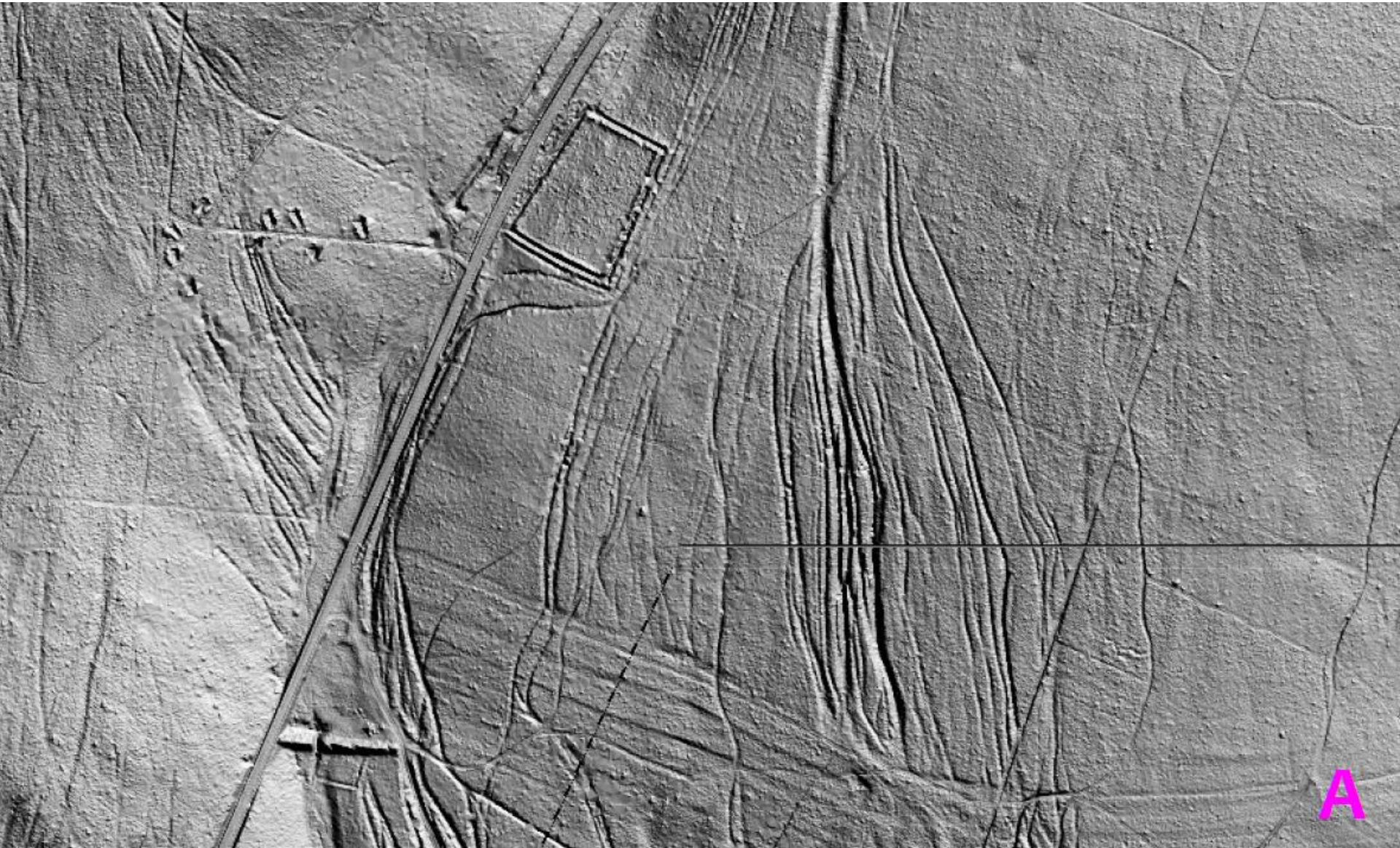
Obr. 6 – Vladař u Záhovic (okr. Karlovy Vary). DMR zobrazený pomocí faktoru výhledu (sky view factor).  
Fig. 6 – Vladař u Záhovic (Karlovy Vary region). DTM – using sky view factor.





**Obr. 7** – Areál Habrovany – Žim (okr. Ústí n.L.). Srovnání současného stavu redut v zájmovém areálu prostřednictvím DMR odvozeného z lidarových dat a jejich zobrazení na mapách 1. a 2. vojenského mapování.

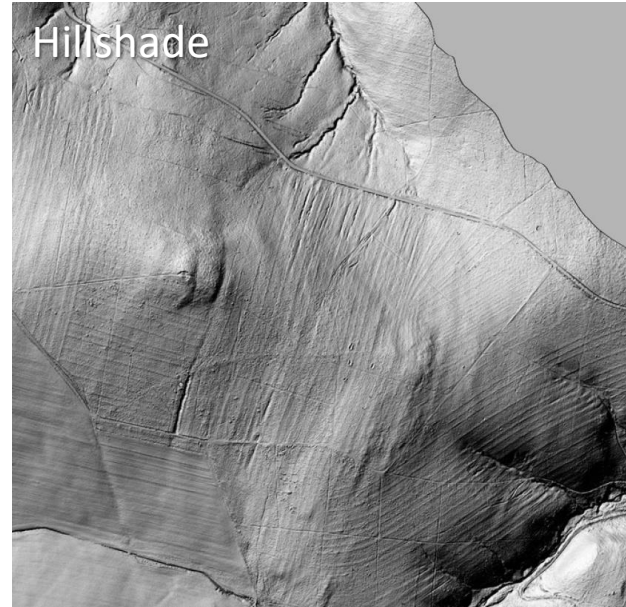
**Fig. 7** – The site of Habrovany – Žim (Ústí nad Labem region). A comparison of the present day state of the redoubts in the study area on a DTM derived from LIDAR data and their depiction on the maps of the 1<sup>st</sup> and 2<sup>nd</sup> military mapping.



A

# Depiction

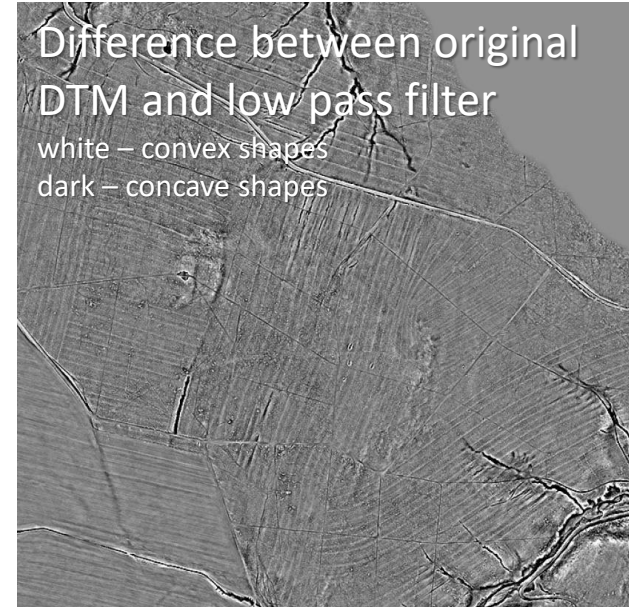
Hillshade



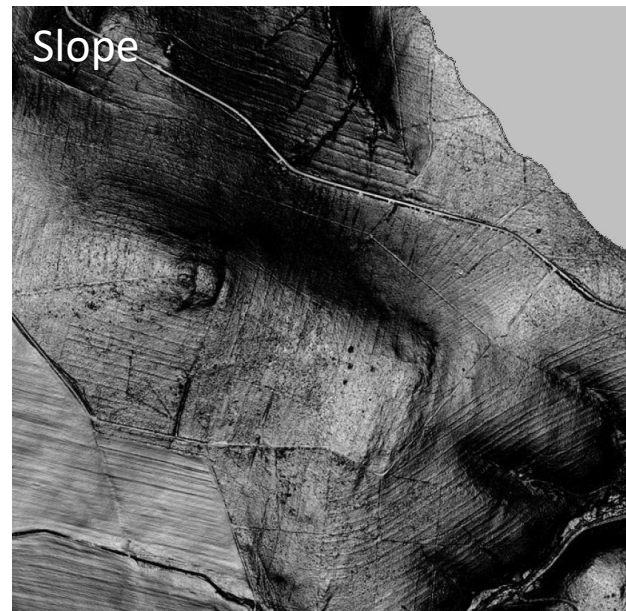
Aspect



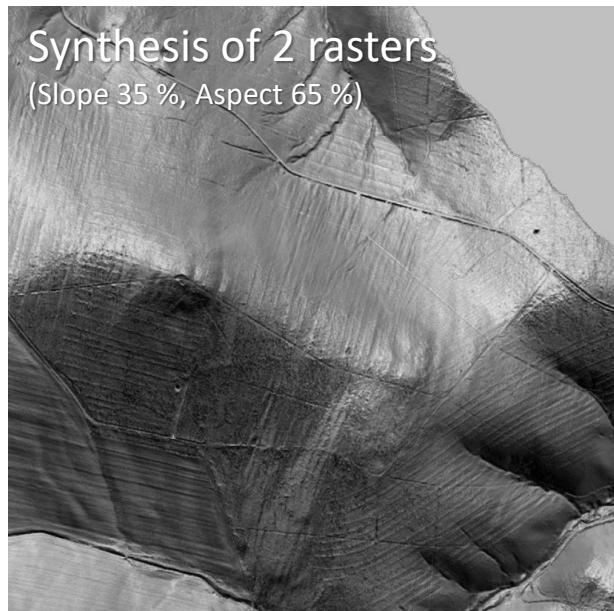
Difference between original  
DTM and low pass filter  
white – convex shapes  
dark – concave shapes



Slope



Synthesis of 2 rasters  
(Slope 35 %, Aspect 65 %)



# Satellite images – visible light

- Very high spatial resolution (WorldView-3 – even 30 cm)
  - usually not for free
  - [gisat.cz/content/en/satellite-data/supplied-data/very-high-resolution](https://gisat.cz/content/en/satellite-data/supplied-data/very-high-resolution)
- Lower spatial resolution (Sentinel 10 m, Landsat 15 – 30 m), but long time series (Sentinel since 2015, Landsat since 1972)
  - Landsat and Sentinel available for free
  - [earthexplorer.usgs.gov](https://earthexplorer.usgs.gov)
  - [scihub.copernicus.eu](https://scihub.copernicus.eu)
  - [gisat.cz/content/en/satellite-data/supplied-data/high-resolution](https://gisat.cz/content/en/satellite-data/supplied-data/high-resolution)
- More info:
  - [en.wikipedia.org/wiki/Landsat\\_program](https://en.wikipedia.org/wiki/Landsat_program)
  - [en.wikipedia.org/wiki/Copernicus\\_Programme](https://en.wikipedia.org/wiki/Copernicus_Programme)



Area : Maracanã Stadium  
2016 Olympics  
Rio De Janeiro, Brazil  
Sensor : WorldView-3  
Resolution : 30cm



[www.satimagingcorp.com](http://www.satimagingcorp.com)

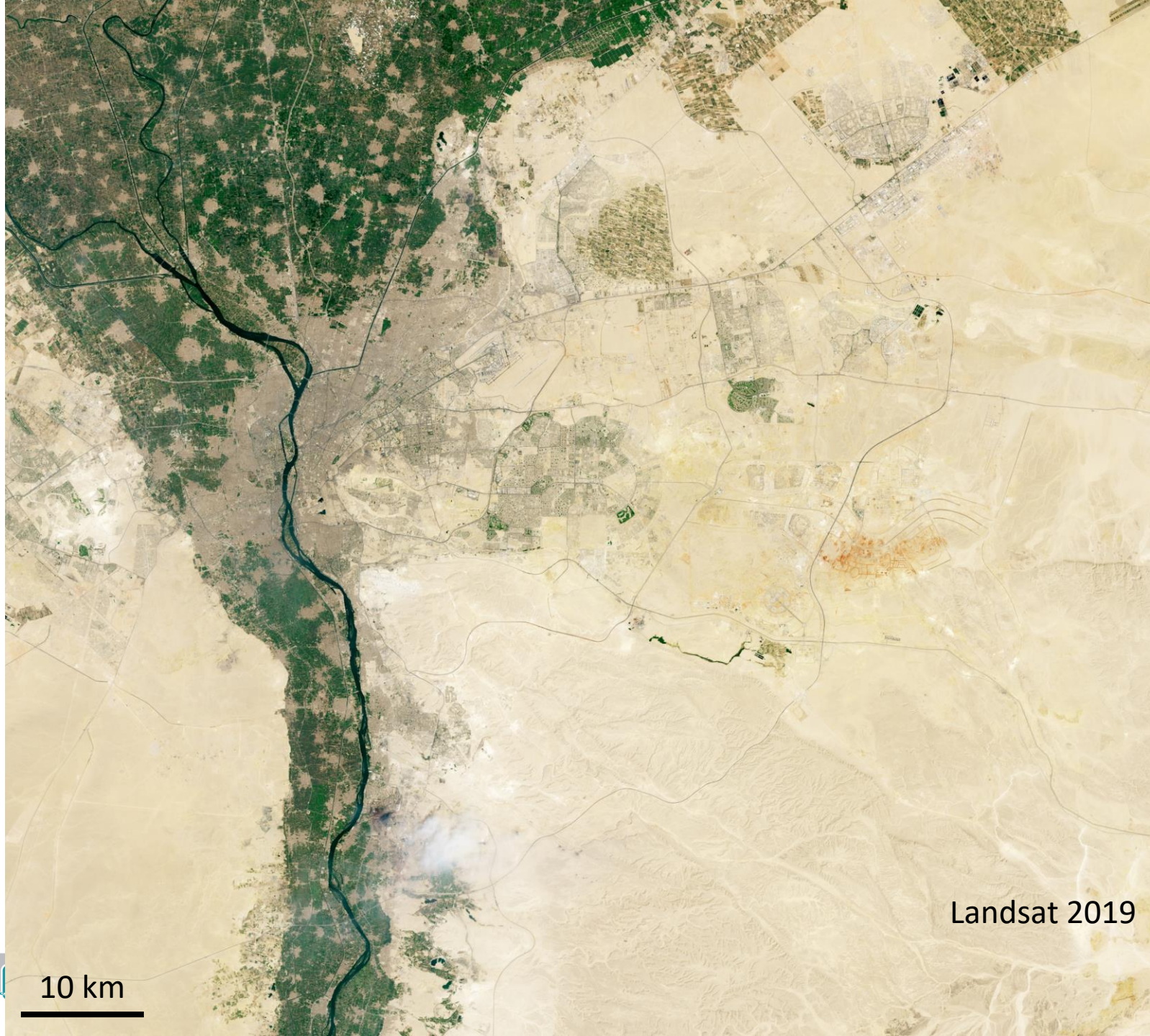
DigitalGlobe Copyright © 2015 DigitalGlobe. All rights reserved.





Landsat 1984

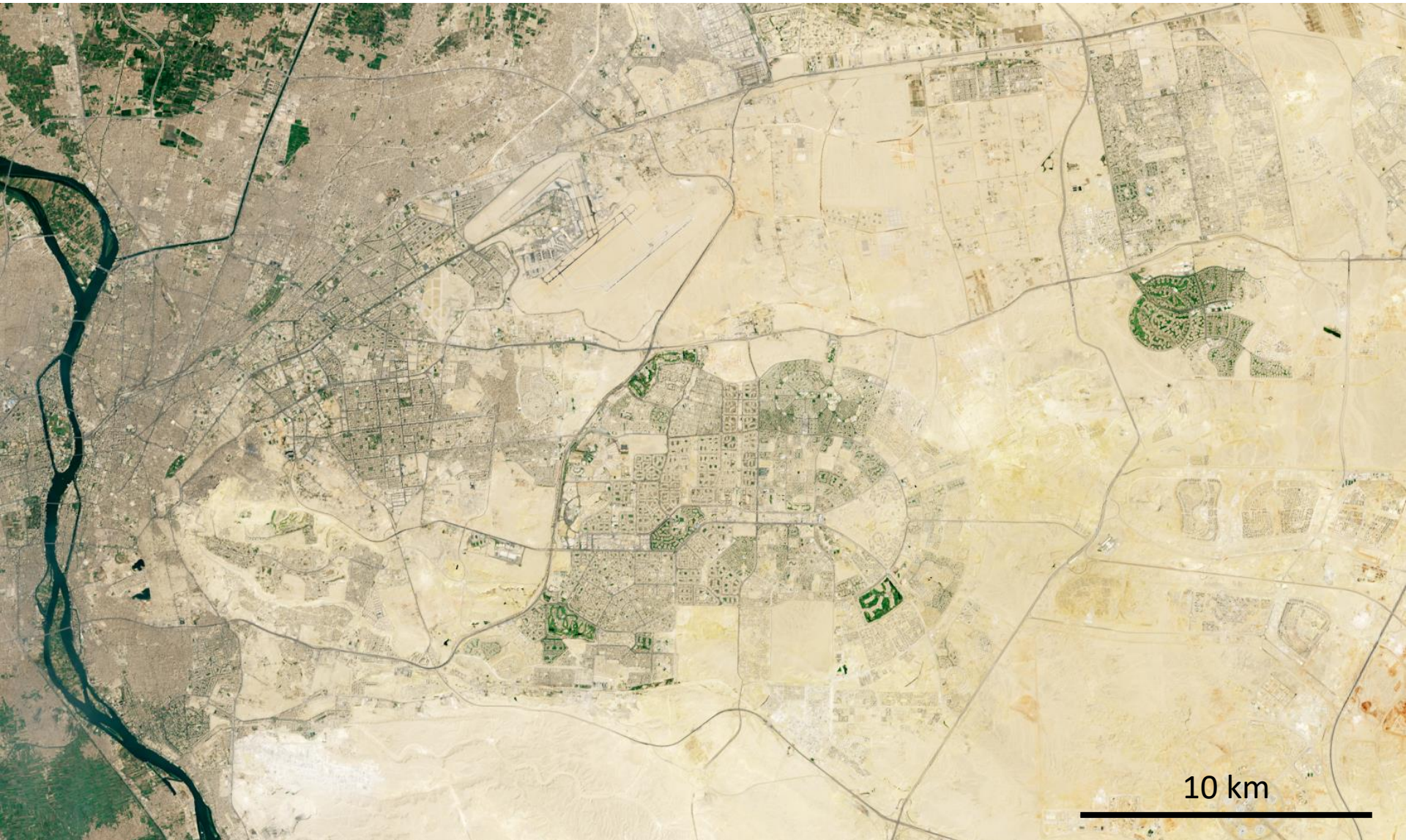
10 km



10 km

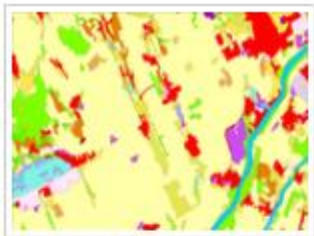
Landsat 2019



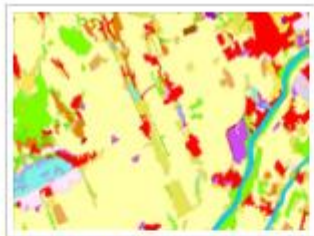


# Ready-to-download products

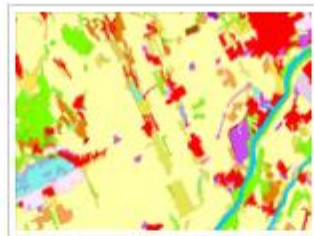
- CORINE Land Cover (CLC)
  - 1990, 2000, 2006, 2012, 2018
  - 44 classes
  - [land.copernicus.eu/pan-european/corine-land-cover](https://land.copernicus.eu/pan-european/corine-land-cover)



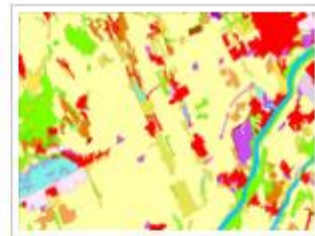
CLC 1990



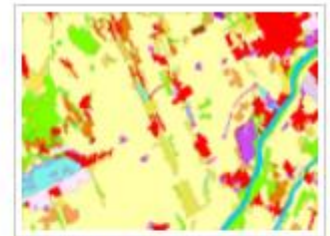
CLC 2000



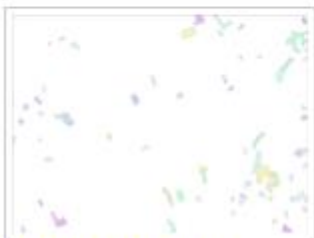
CLC 2006



CLC 2012



CLC 2018



CHA 1990-2000



CHA 2000-2006



CHA 2006-2012



CHA 2012-2018

# Copernicus Global Land Service (CGLS)

[land.copernicus.eu/global](http://land.copernicus.eu/global)

## From medium to high resolution

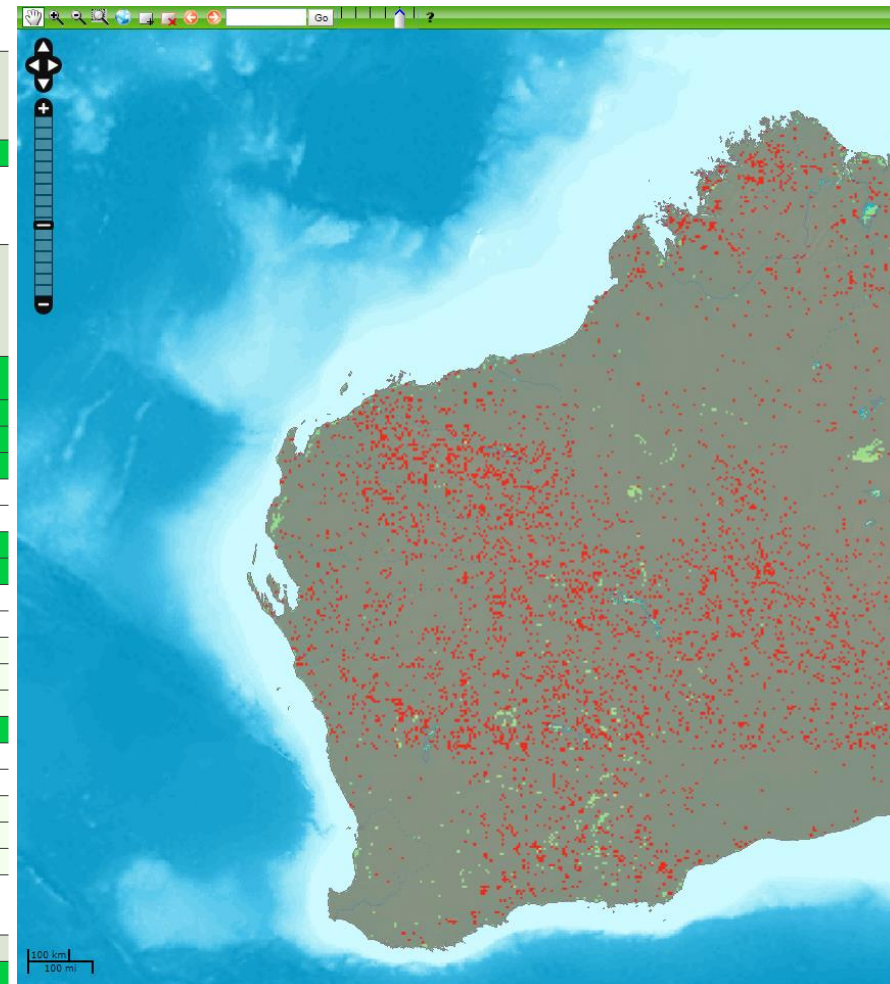
Theme	Variable	Spatial Resolution
Vegetation	Land Cover	Moderate 100m In production

## From coarse to medium resolution

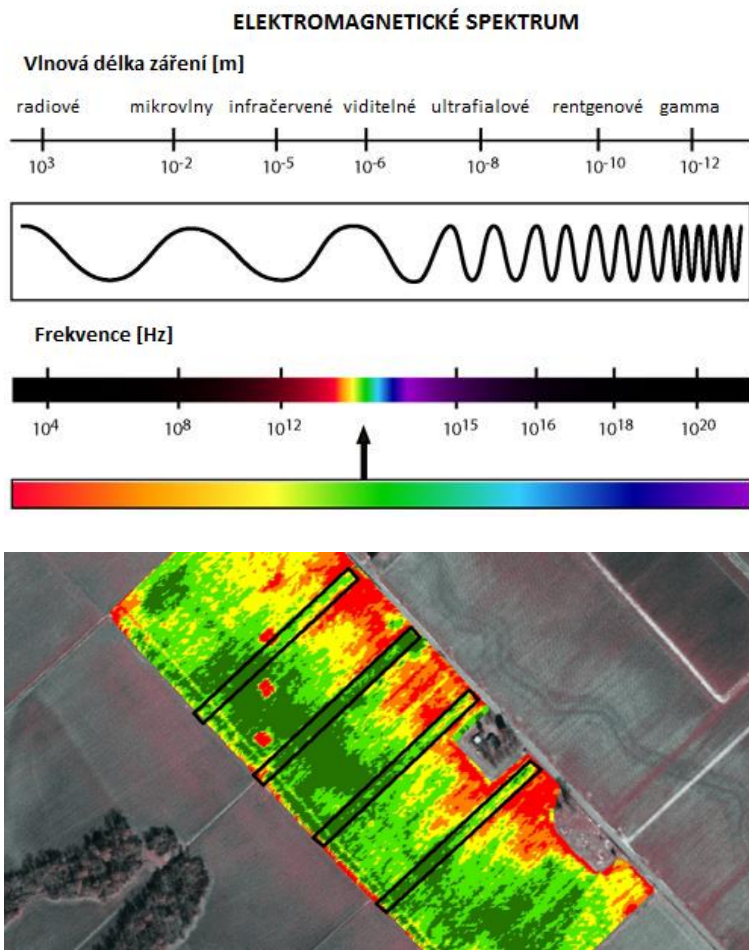
Theme	Variable	Spatial Resolution	
		Coarse >=1km	Medium 300m
Vegetation	Fraction of photosynthetically active radiation absorbed by the vegetation	In production	In production
	Fraction of green vegetation cover	In production	In production
	Leaf Area index	In production	In production
	Normalized Difference Vegetation Index	In production	In production
	Vegetation Condition Index	In production	
	Vegetation Productivity Index	In production	
	Dry Matter Productivity	In production	In production
	Burnt Area	In production	In production
	Soil Water Index	In production	
	Surface Soil Moisture	In production	
Energy	Land Surface Temperature	In production	
	Top Of Canopy Reflectance	In production	
	Surface Albedo	In production	
Water	Water Bodies	In production	In production
	Lake Surface Water Temperature	In production	
	Lake Water Quality	In production	
Cryosphere	Lake Ice Extent	In production	
	Snow Cover Extent	In production	
	Snow Water Equivalent	In production	

## Non-gridded products

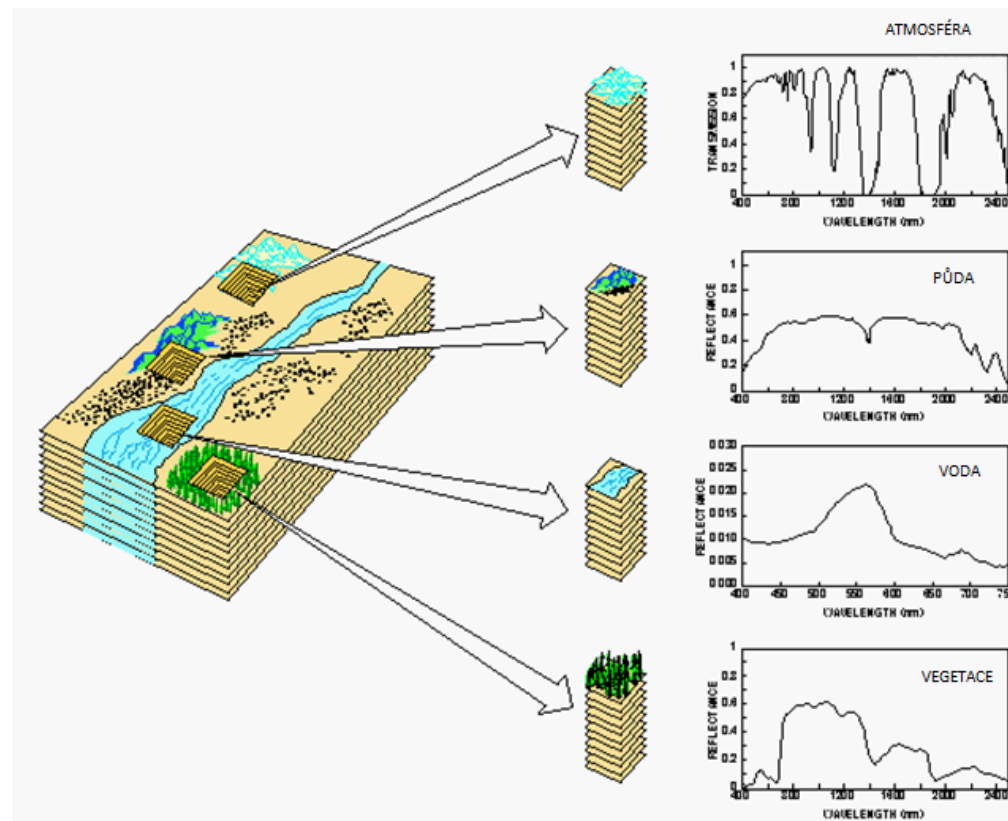
Theme	Variable	Rivers and Lakes
Water	Water Level	In production



# Satellite images – multispectral data



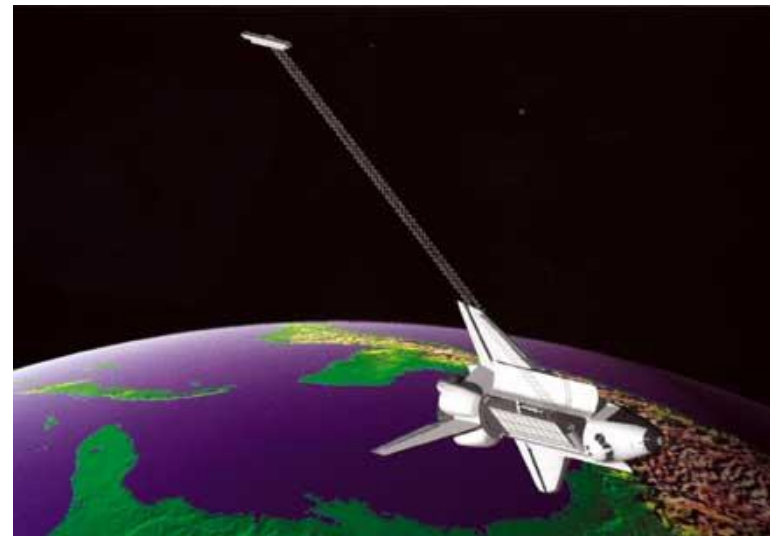
NDVI index



*copernicus.gov.cz, precisionagriculture.re*

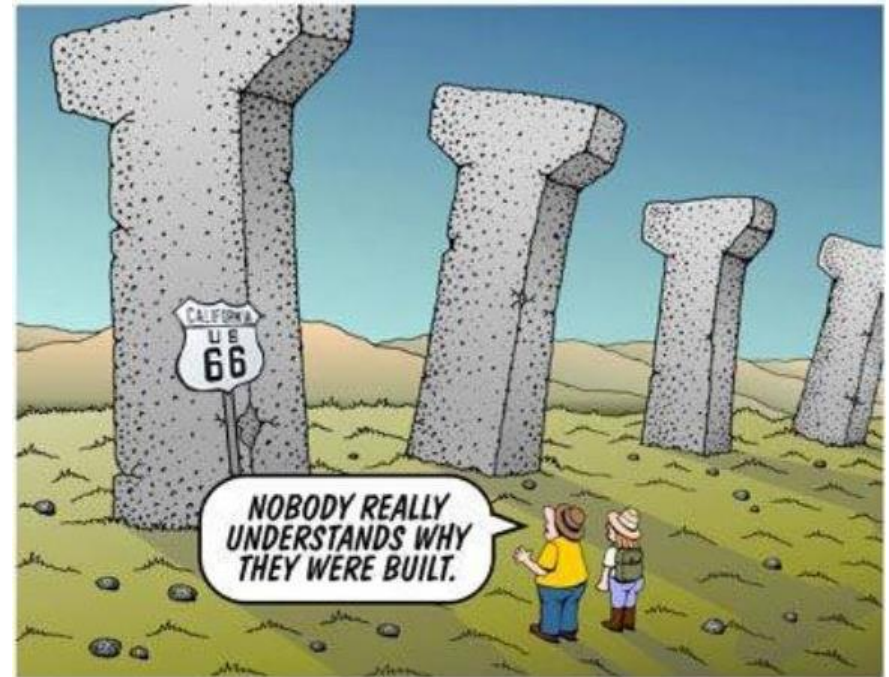
# RADAR

- RAdio Detection And Ranging, radar imaging
- Spatial resolution – tens of m
- [gisat.cz/content/cz/produkty/digitalni-model-terenu](https://gisat.cz/content/cz/produkty/digitalni-model-terenu)
- SRTM (Shuttle Radar Topography Mission) DEM
  - resolution 90 m
  - whole planet (except for polar regions)
  - available for free ([gisat.cz/content/cz/produkty/data-ke-stazeni](https://gisat.cz/content/cz/produkty/data-ke-stazeni))



Wikipedia

# 5. Methods 3: Archaeology, paleobotany, geology



Archaeology  
3000 AD

[jokejive.com/topic/archaeology](http://jokejive.com/topic/archaeology)

# Characteristics

- Subjects: independent fields of science
- Temporal period: the Holocene (and older)
- What can we learn: detail information on settlement/vegetation/environment
- Level of details: single boreholes
- Availability: hidden in journals and books, sometimes on the internet
- Difficulty of interpretation: for experts only
- Reliability: depends on interpretation
- Limitations: multidisciplinary cooperation necessary
- Beware:
  - simplified interpretations

# Archaeology

- Study of remnants of past human activities
- Environmental archaeology – environmental context, history of the environment

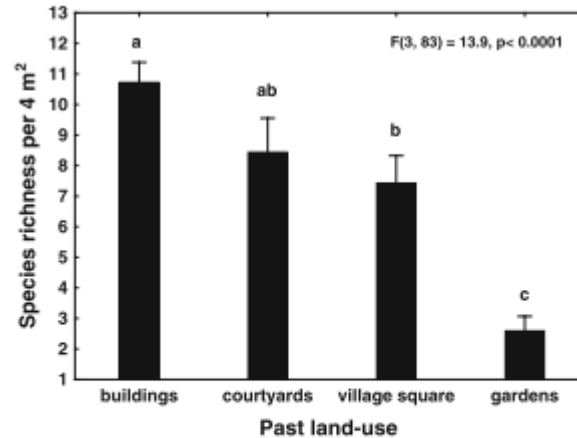
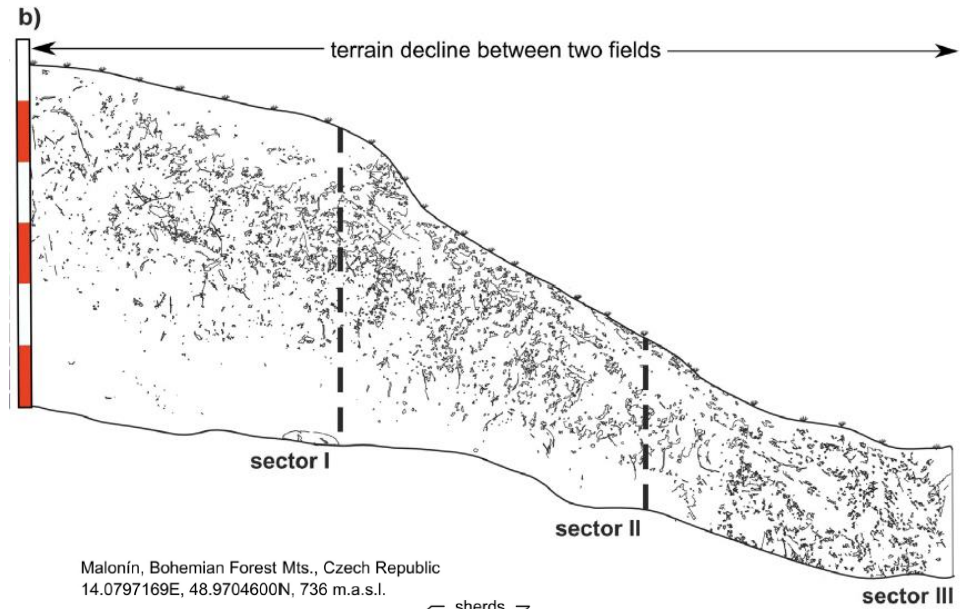


Figure 3. Effect of the former land-use type on species richness of herbaceous plants. Bars represent mean values and error bars the standard error of the mean (SE). Result of one-way ANOVA is provided in the graph. Using the Tukey HSD test, the former land-use types with the same letter were not significantly different.

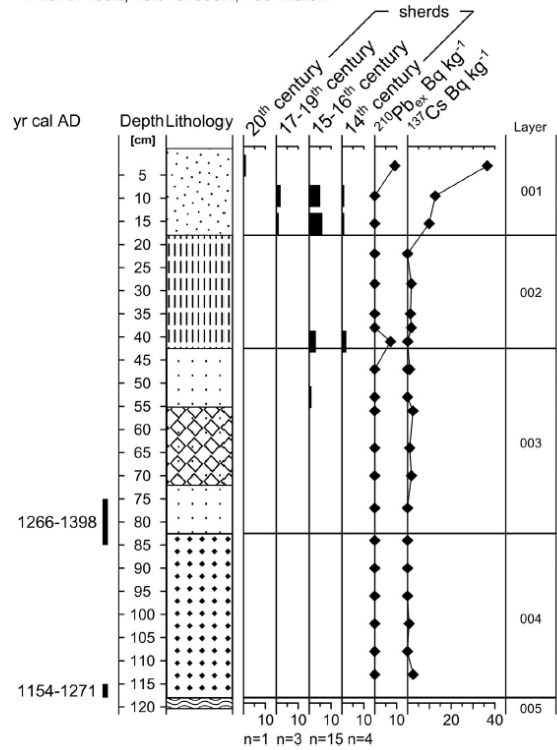


# Medieval field patterns





Malonín, Bohemian Forest Mts., Czech Republic  
 14.0797169E, 48.9704600N, 736 m.a.s.l.



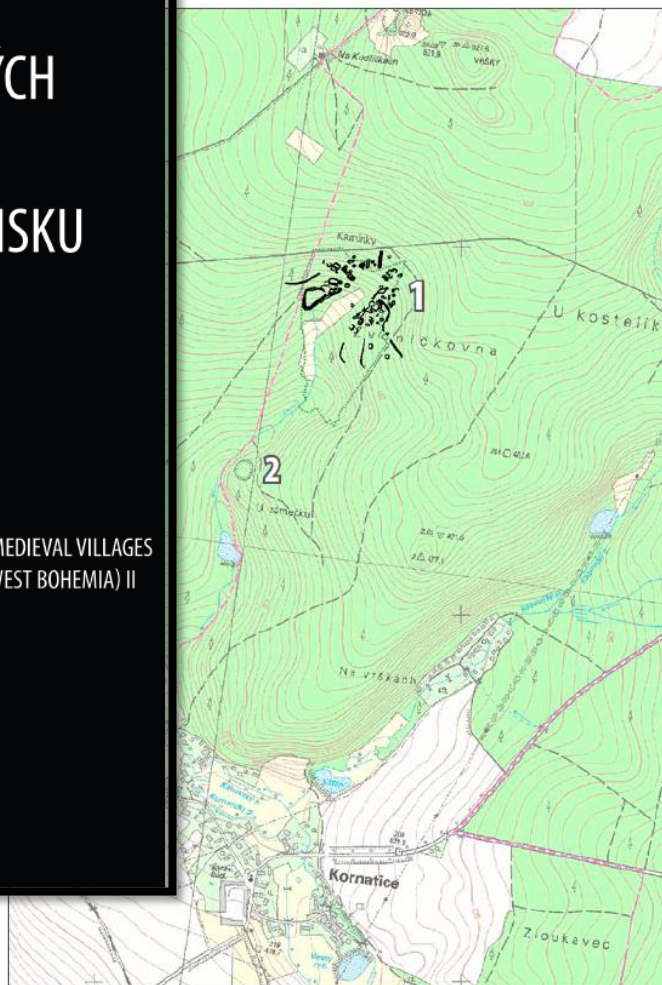
Houfková et al. 2015

fzp.czu.cz

# ARCHEOLOGIE ZANIKLÝCH STŘEDOVĚKÝCH VESNIC NA ROKYCANSKU II

ARCHAEOLOGY OF DESERTED MEDIEVAL VILLAGES  
IN THE ROKYCANÝ - REGION (WEST BOHEMIA) II

PAVEL VÁŘEKA A KOLEKTIV



Obr. 2: Javor. Poloha sídelního areálu. 1 – zaniklá ves, 2 – tvrzíště (podle [geoportal.cenia.cz](http://geoportal.cenia.cz)).



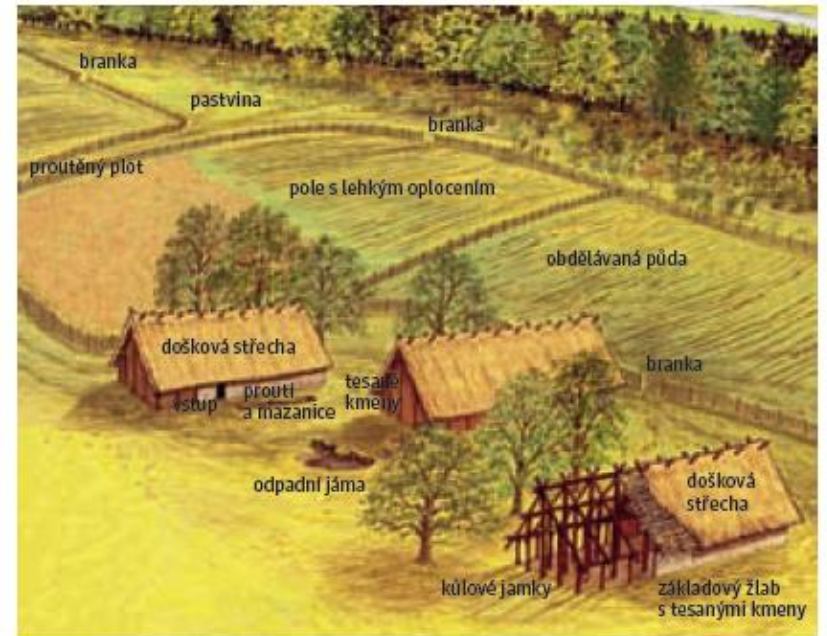
Obr. 11: Javor. Rozdělení objektů podle předpokládané funkce. 1 – blíže nespecifikovaná stavba, 2 – cesta, 3 – drobná vodní nádrž, 4 – dům, 5 – mlýn, 6 – nespecifikovaný recentní objekt, 7 – rybník, 8 – terasa, 9 – těžba (plán R. Veselá).

### I.3b NEOLITICKÉ OSÍDLENÍ V OKOLÍ BYLAN U KUTNÉ HORY



- objekt zaměřený na povrchu
  - příkop zjištěný geofyzikálním výzkumem
  - I/65 sonda
  - ▨ prozkoumaná plocha v lokální síti
- 0 500 m

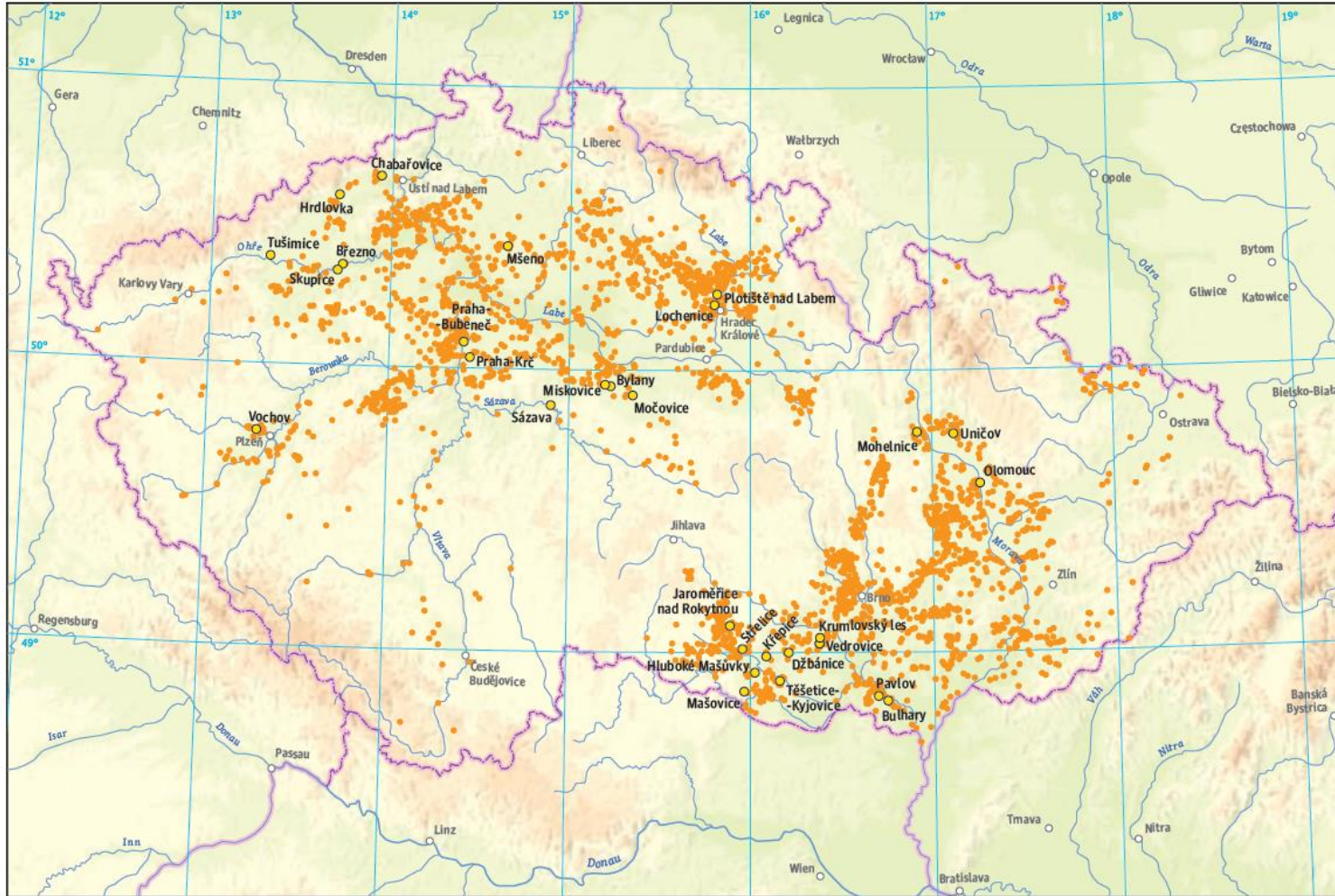
Rozmístění sídelních poloh zkoumaných kontinuálně ve druhé polovině minulého století na katastru Bylany u Kutné Hory. Uprostřed se nachází tzv. rondel, pravděpodobně ceremoniální shromažďovací objekt, složený z dvojitého příkopu se vstupy orientovanými ke světovým stranám a obklopený vnějším přibližně kruhovým příkopem, který je v superpozici s dalším, v tomto případě trojdiálním kruhovým ohrazením, zachovaným pouze částečně. V poloze Miskovice 2 bylo odhaleno největší středoevropské pohřebiště, čítající kolem 60 birituálních - kostrových a žárových - pohřbů z období mladoneolitické kultury s vypíchanou keramikou



České země v pravěku  
Martin Gojda

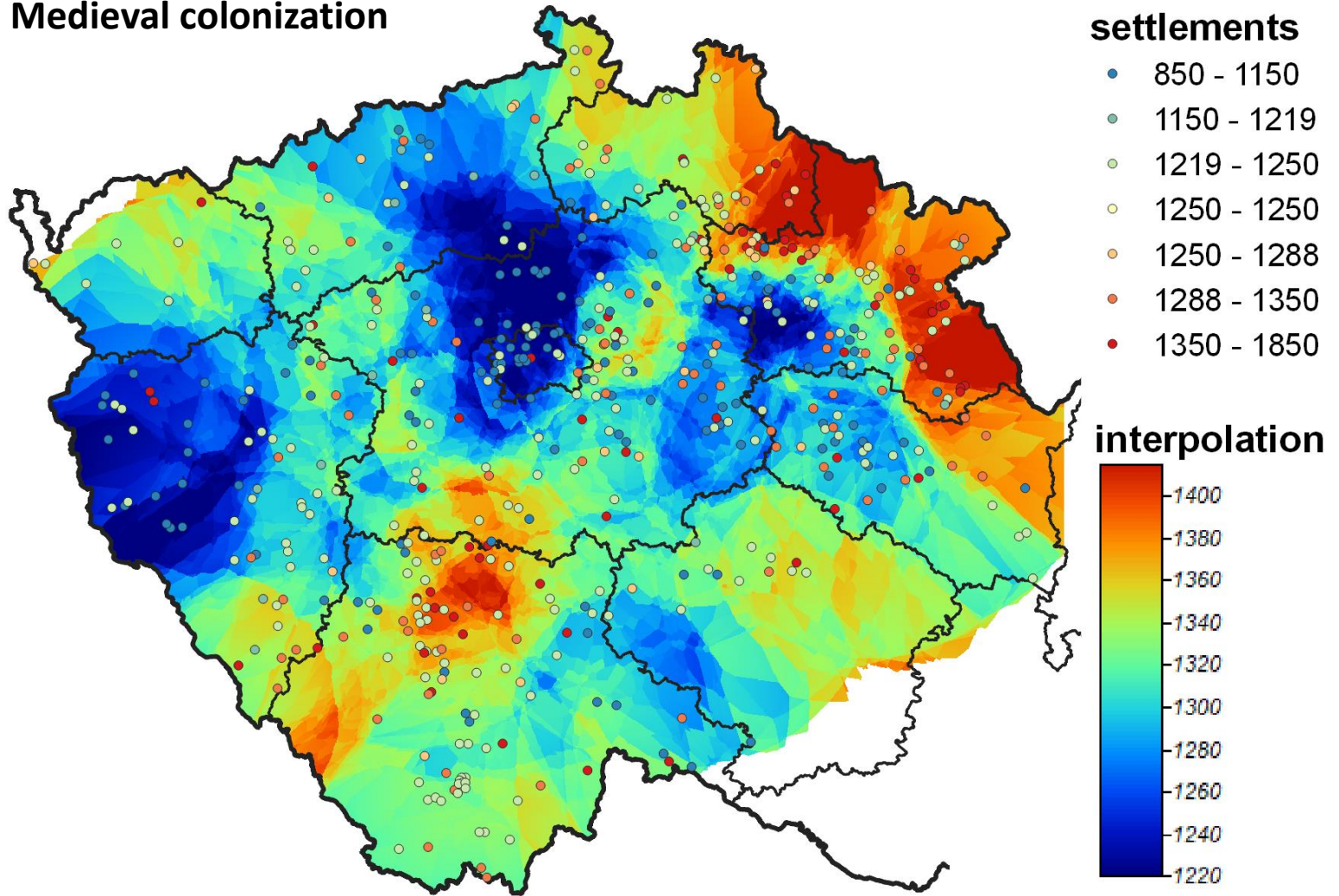
I.3-3. Takto vypadaly nejstarší zemědělské osady a jejich zázemí ve středoevropském prostoru (kultura s lineární keramikou, druhá polovina 6. tisíciletí př. n. l.)

I.3a OSÍDLNÍ ČESKÝCH ZEMÍ V NEOLITU (MLADŠÍ DOBĚ KAMENNÉ; 5500–4300 PŘ. N. L.)



České země v pravěku  
Martin Gojda

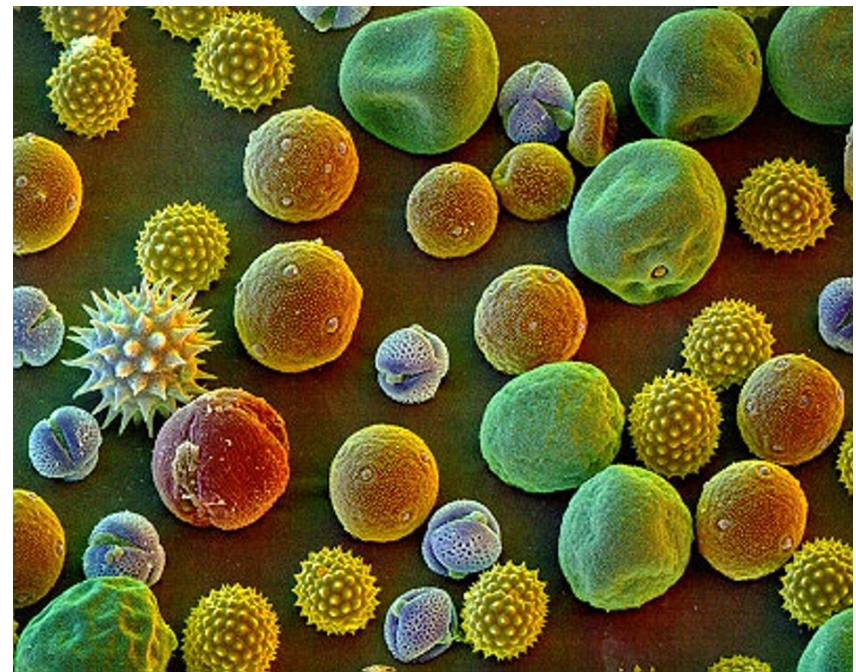
# Medieval colonization



Fanta et al. 2020

# Paleobotany

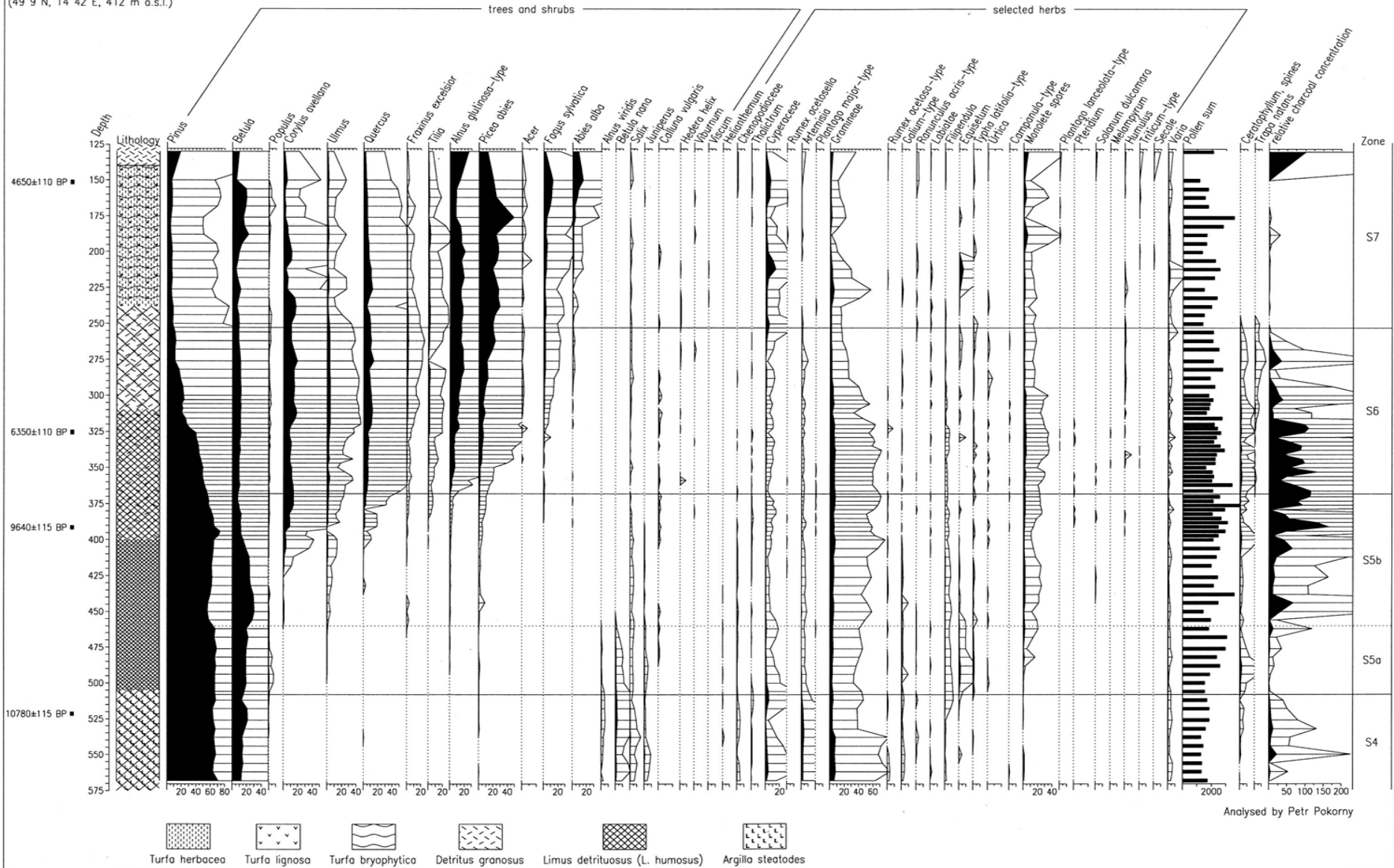
- Vegetation history
- Palynology
  - different species have different shape of pollen
  - preservation of pollen in wet environment (lake sediments, peat, wet cultural layers)
  - sampling → determination of composition of pollen spectrum → ecological interpretation



*Pokorný 2012*

# Svarcenberk, Czech Republic: main profile Holocene pollen diagram

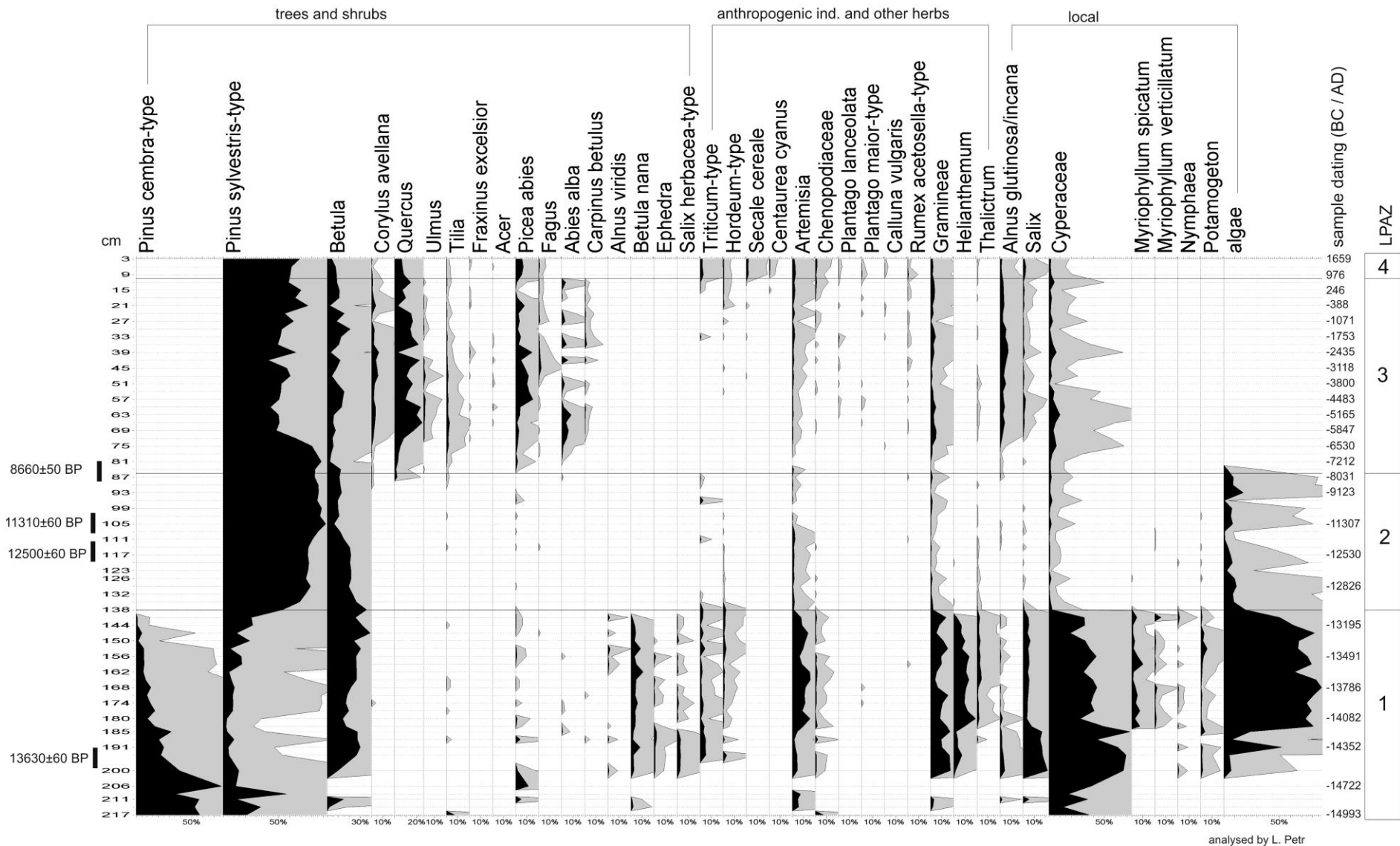
(49° 9' N, 14° 42' E, 412 m a.s.l.)



Pokorný 2012



# Hrabanovská černava

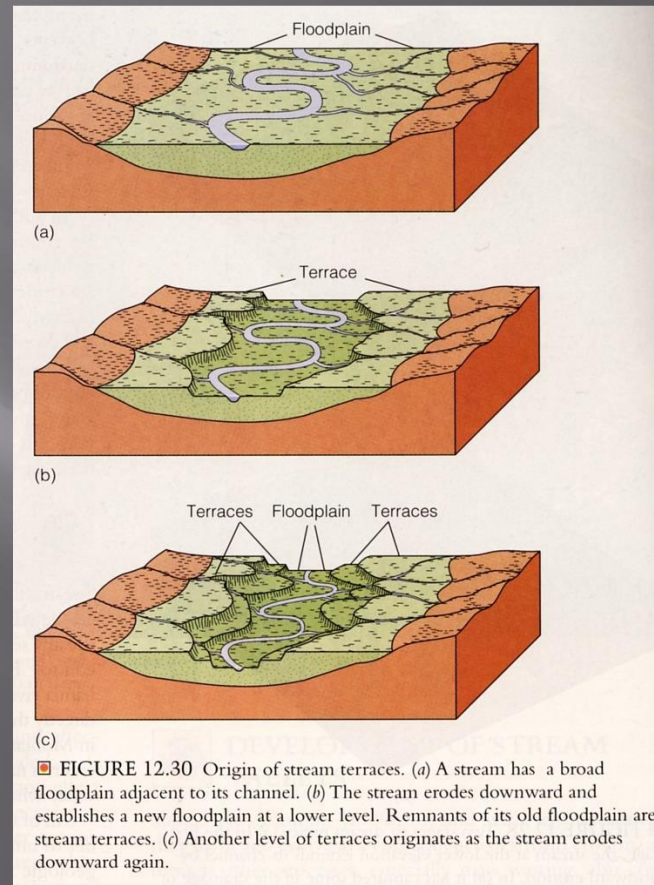


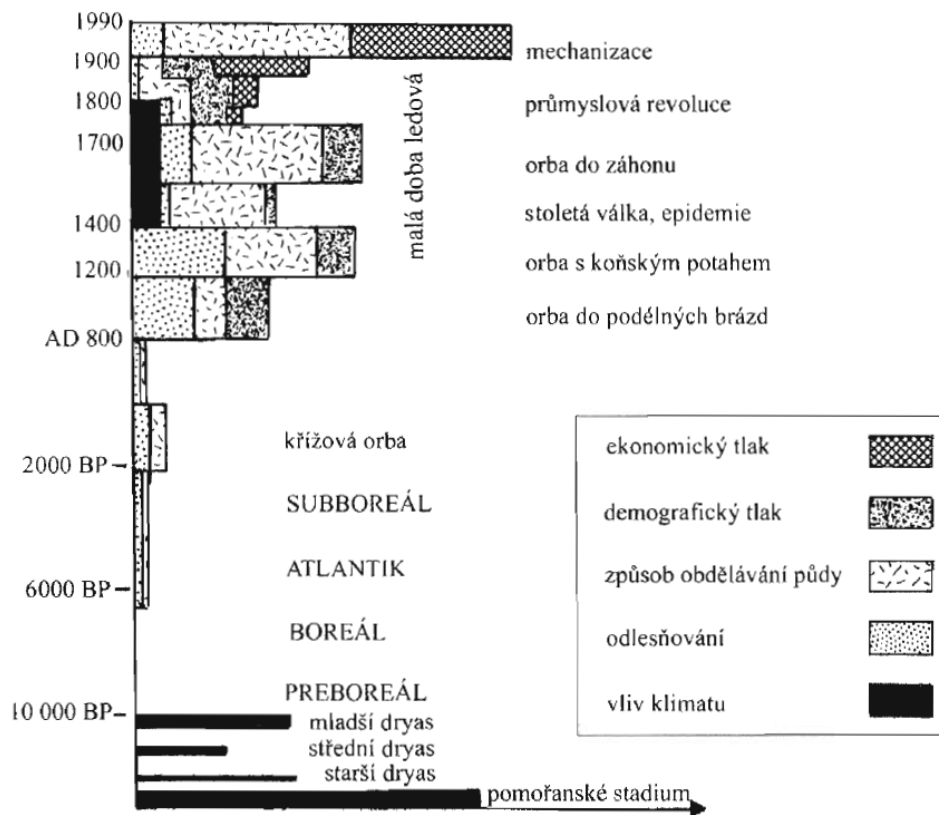
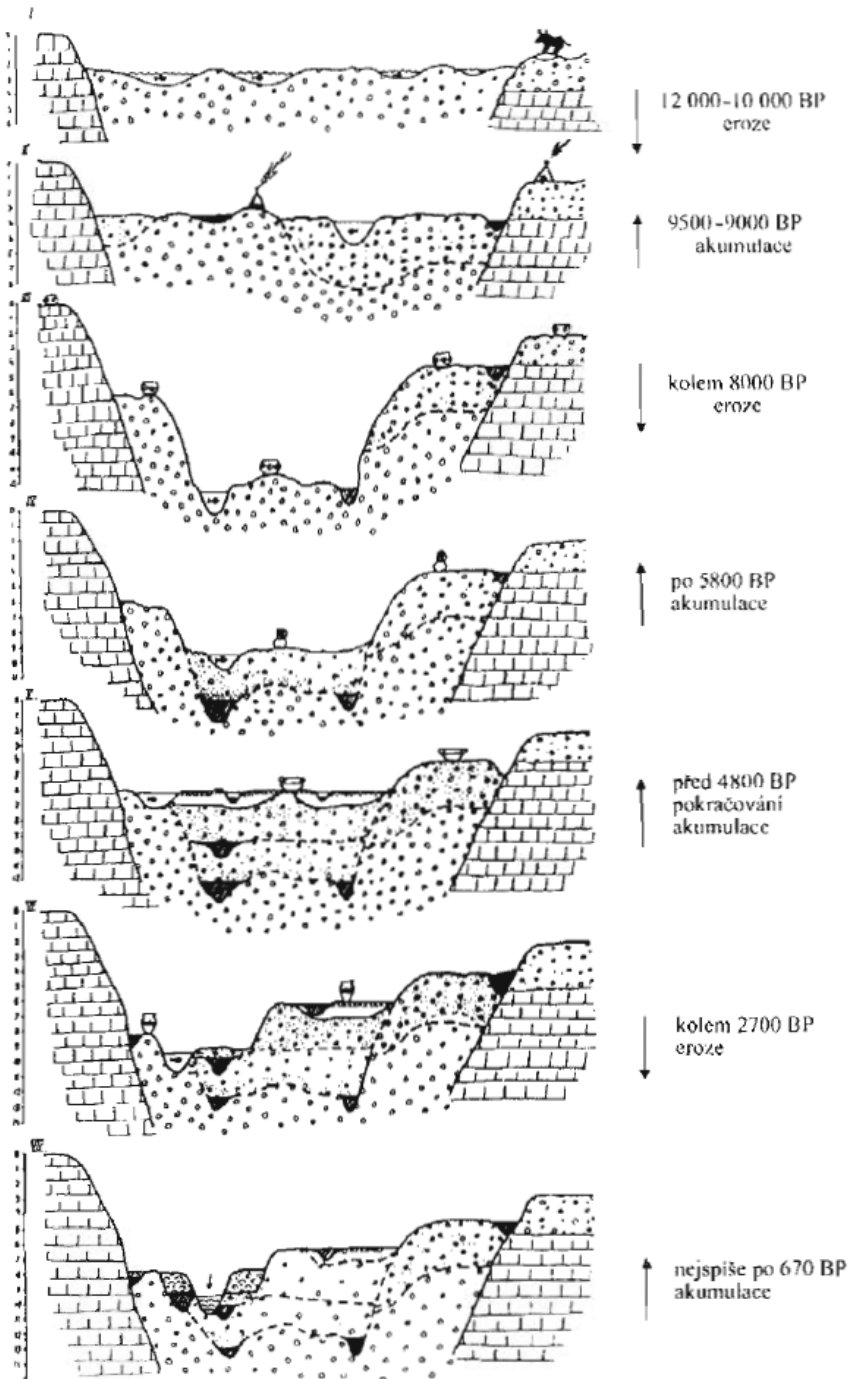
analysed by L. Petr

PALYCZ 2012

# Geologie

Alpské schéma:  
Günz, Mindel, Riss, Würm





Obr. 2.7. Odhad intenzity holocenní eroze půdy v západní Evropě a podíl různých klimatických a antropogenních faktorů. Podle: Van Vliet-Lanoe et al. 1992. – Fig. 2.7. An estimate of the intensity of Holocene soil erosion in Western Europe and the contribution of various climatic and anthropogenic factors thereto. After Van Vliet-Lanoe et al. 1992.

# 6. Conclusion

# Conclusion

- Cultural landscape
  - landscape affected by man
  - landscape designed / organically evolved / associative
- Historical research
  - reality → sources → interpretation of the sources
- Historical geography
  - old maps
  - motivation for mapping, interpretation
  - military mappings (end of 18<sup>th</sup> and 19<sup>th</sup> century), stable cadastre (half of 19<sup>th</sup> century), aerial ortophotographs (2<sup>nd</sup> half of 20<sup>th</sup> century)
- Remote sensing
  - orto- and oblique aerial photographs, vegetation signs
  - lidar – laser scanning
  - satellite images – spatial resolution X length of time series (Landsat, Sentinel)
  - ready products – CORINE Land Cover
- Archaeology, paleobotany, geology

## Václav Fanta

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[researchgate.net/profile/Vaclav\\_Fanta](https://researchgate.net/profile/Vaclav_Fanta)

[home.czu.cz/fantav](http://home.czu.cz/fantav)