

The topography of archaeological sites with smelting characteristics on the territory of the River Drava Basin

Summer school:

Land use and exploitation of natural resources in the 1st millennium AD -
New methods in archaeobotany, archaeometry and modelling

Poreč/Parenzo – Tar-Vabriga/Torre-Abrega – Crikvenica, Croatia,
25th-30th June 2018.

Ivan Valent, Muzej grada Koprivnice



Research project IP-06-2016-5047 - Croatian Science Foundation

Production of Iron Along the Drava River During Antiquity and Middle Ages: Creation and Transfer of Knowledge, Technology and Commodities

Project goals:

- I. To recognize the production of iron retrieved from the iron ore and the processing of iron in the River Drava Basin (Podravina)
- II. To define how and in which measure that production influenced on the identity of the communities and the formation and dynamics of the developement of different socio-cultural relations in the context of Antique and Medieval societies

In order to define the process and the importance of the production of iron, following tasks were set:

- 1. Defining the origin of the iron ore and the necessary resources (clay, water, wood)**
- 2. Defining the technology of the processing of the iron ore through different periods as well as the intensities of these productions**
- 3. Defining the influence of the production of the iron on a narrow and wider area within the context of the socio-culturological surrounding by means of following the production and distribution of products and semi-products (iron) which might allow the interpretation of economic, social and cultural contacts between several communities and societies during Late Antiquity and Medieval period**

Virje – Volarski breg, 2007. (T. S. Ivančan, IARH)







Picture: T. Tkalčec, IARH

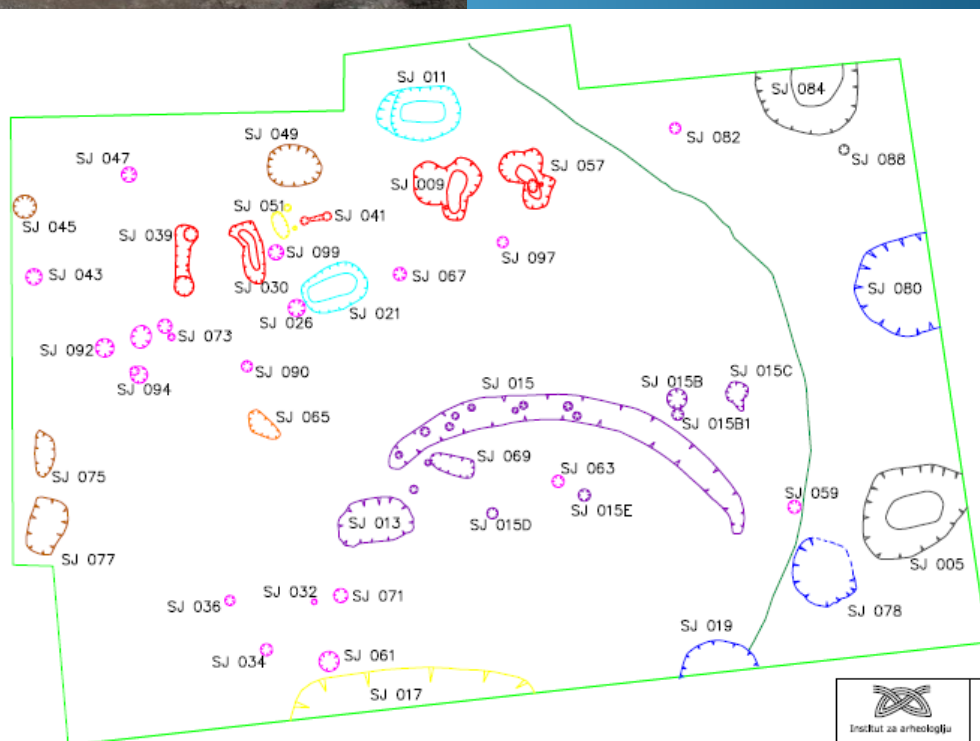
Trench 1 – 230 m²:

5 smelting furnaces *in situ*

4 dislocated remains of destroyed furnaces

5 pits with burned bottoms

1 fence and numerous postholes



Plan: K. Jelinčić, IARH

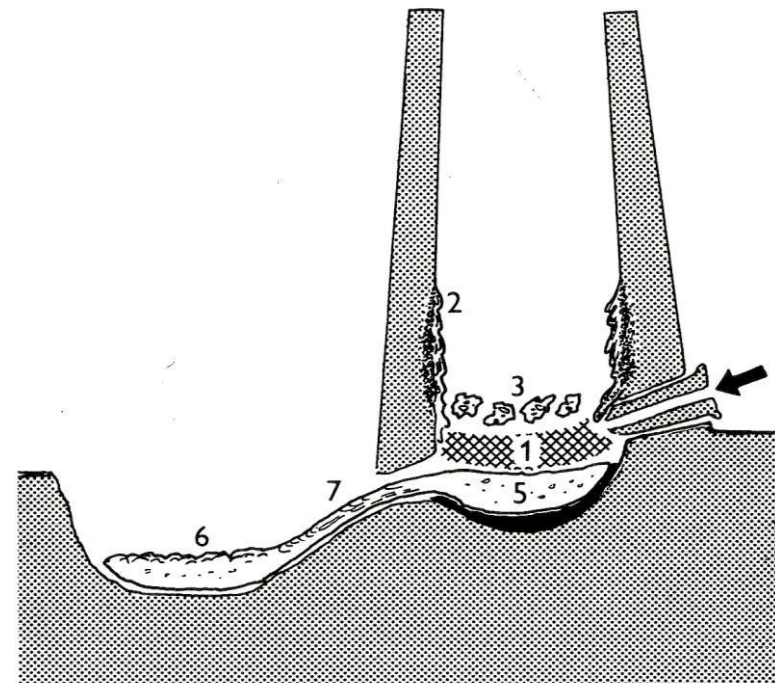


Virje – Volarski breg 2008. (T. S. Ivančan)



Tapped furnace – 3 parts:

1. fireplace – interior of the furnace with burned bottom within which the ore was mixed with charcoal /1-5/
2. Burned bottom of a small channel through which the slag was released from the furnace /7/
3. Small pit within which the slag accumulated /6/



Pleiner 2000: 258, Fig. 67, right; flat-hearth tapped furnace)



Virje – Volarski breg 2008. (T. S. Ivančan)

Virje- Volarski breg

Površina istražena magnetskom metodom

Arheološka sonda (rub sonde)

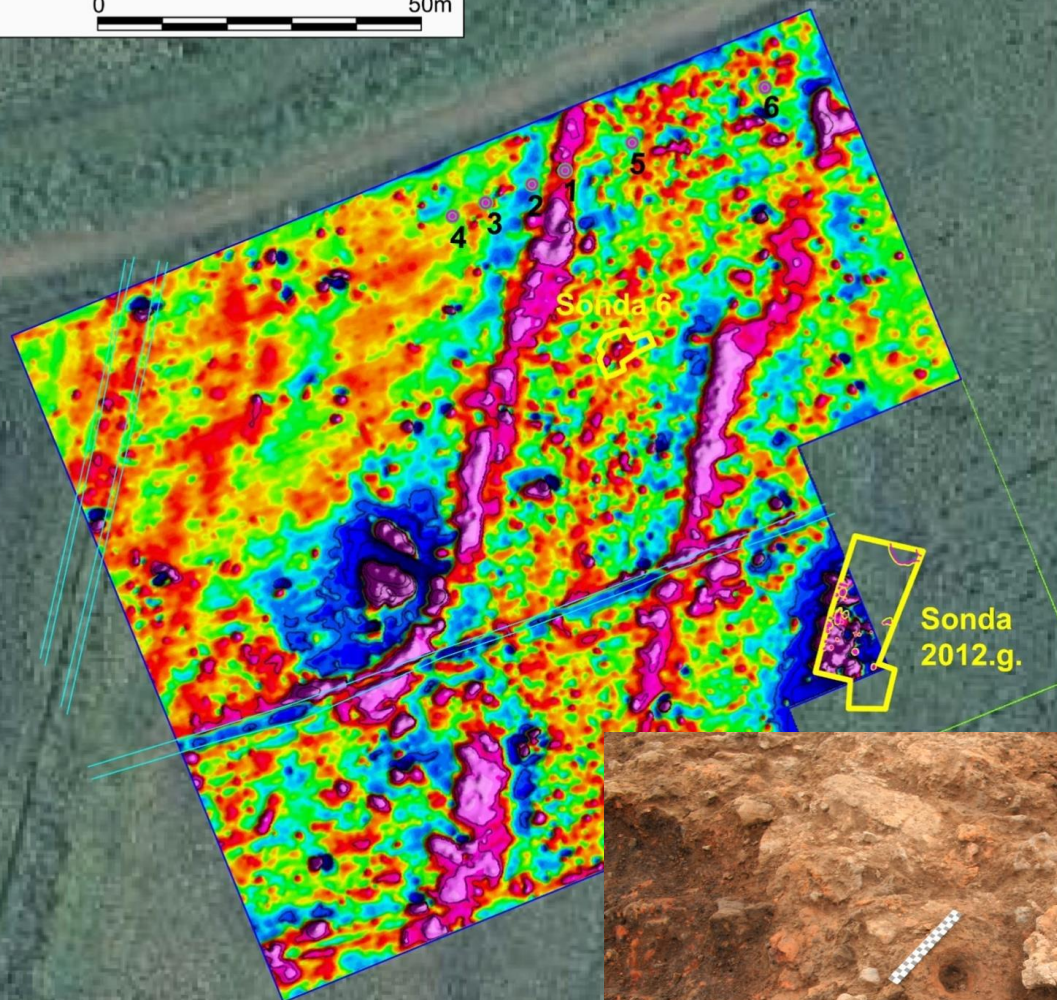
Suvremeni jarci na površini

1 Plitke bušotine (do ca. 1 m)

S

50m

0



Trench 5 – 202 m²
Over 1 tone of slag



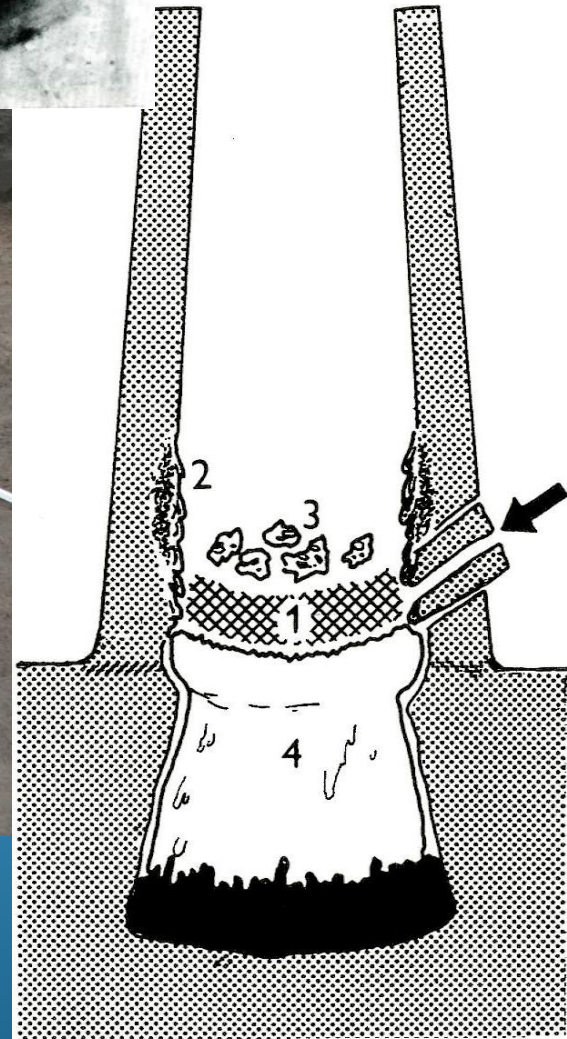
Virje – Sušine
2012.



(Pleiner 2000:
Pl. IX, Romano-
Barbarian sleg pit
furnaces in Jutland,
Drengsted,
Denmark)



(Pleiner 2000:
Fig. 67, Left,
sleg pit furnace)



Virje – Sušine 2013.

Stará huť, Adamov, Brno 2018.





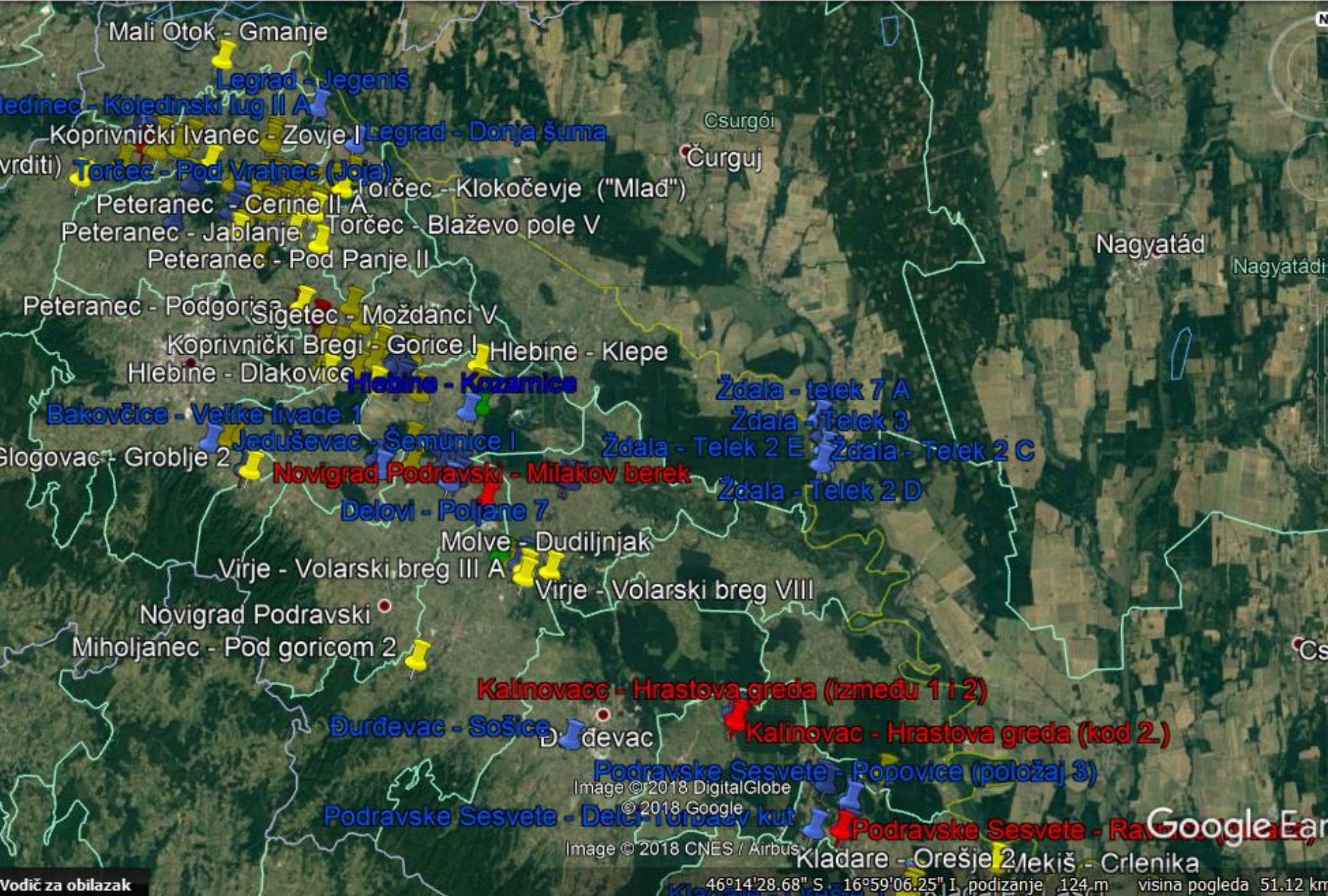
ZATYKO, Csilla. Settlement pattern.
Landscape use in medieval Berzence
(Hungary) / Obrasci naselja. Korištenje
krajolika u srednjovjekovnom Berzencu
(Mađarska), *Podravski zbornik* 39,
Koprivnica, 2013., 164-172.

BOG IRON ORE

Bacteria *Leptothrix*

Virje – Volarski breg
(T. S. Ivančan)

Limonite is an iron oxide that has a changeable amount of adsorbed and chemically bound water (which can, by the amount of water within be red, brown or yellow). It is firm, fragile or earthy-like and it is made by the attrition of iron-carbonates, in high iron percentage waters, during coagulation of the solution of the iron-hydroxide, with the aid of bacteria.



Total: 157 sites with metalurgical characteristics (slag, furnace parts, nozzles);
smelting: 56 (december 2017.)

Delovi - Poljane 1

Mjesto: Delovi

Općina: Novigrad Podravski

Županija: Koprivničko-križevačka



TK 1:25 000
Novigrad Podravski 272-4-4

Položaj: G.Š. 46° 07' 20"

G.D. 16° 58' 26"

Oko 1,4 km zapadno od farme za tov junadi koja se nalazi na sjevernom izlazu iz Delova i oko 350 metara jugoistočno od zabačenog plinske stanice Molve 13, na mjestu nekadašnjeg hangara.

Geografske karakteristike: ravničarski prostor; na mjestu talioničke radionice je blaga padina prema sjeverozapadu, prema manjoj potolini kroz koju je nekada tekao potok (n.v. 120 m).

Tip lokaliteta: naselje, talionička radionica

Vrsta nalaza: keramika, talionička zgura, metal

Datacija: rani srednji vijek (9.-11.st.), kasni srednji vijek

Uvjeti nalaza: rekognosciranje, 1973. g., S. Kolar, MGKc; probno iskopavanje, 1974. g., voditelj S. Kolar, MGKc, istr. pov 70 m²; zaštitno iskopavanje, 1983. g., voditelj Z. Marković, MGKc, istr. pov 110 m²; rekognosciranje I. i Z. Zvijerac; zaštitno iskopavanje, 2016. g., voditelj R. Čimin, MGKc, istr. pov. 500 m².

Smještaj nalaza: MGKc; Zbirka obitelji Zvijerac, Torčec

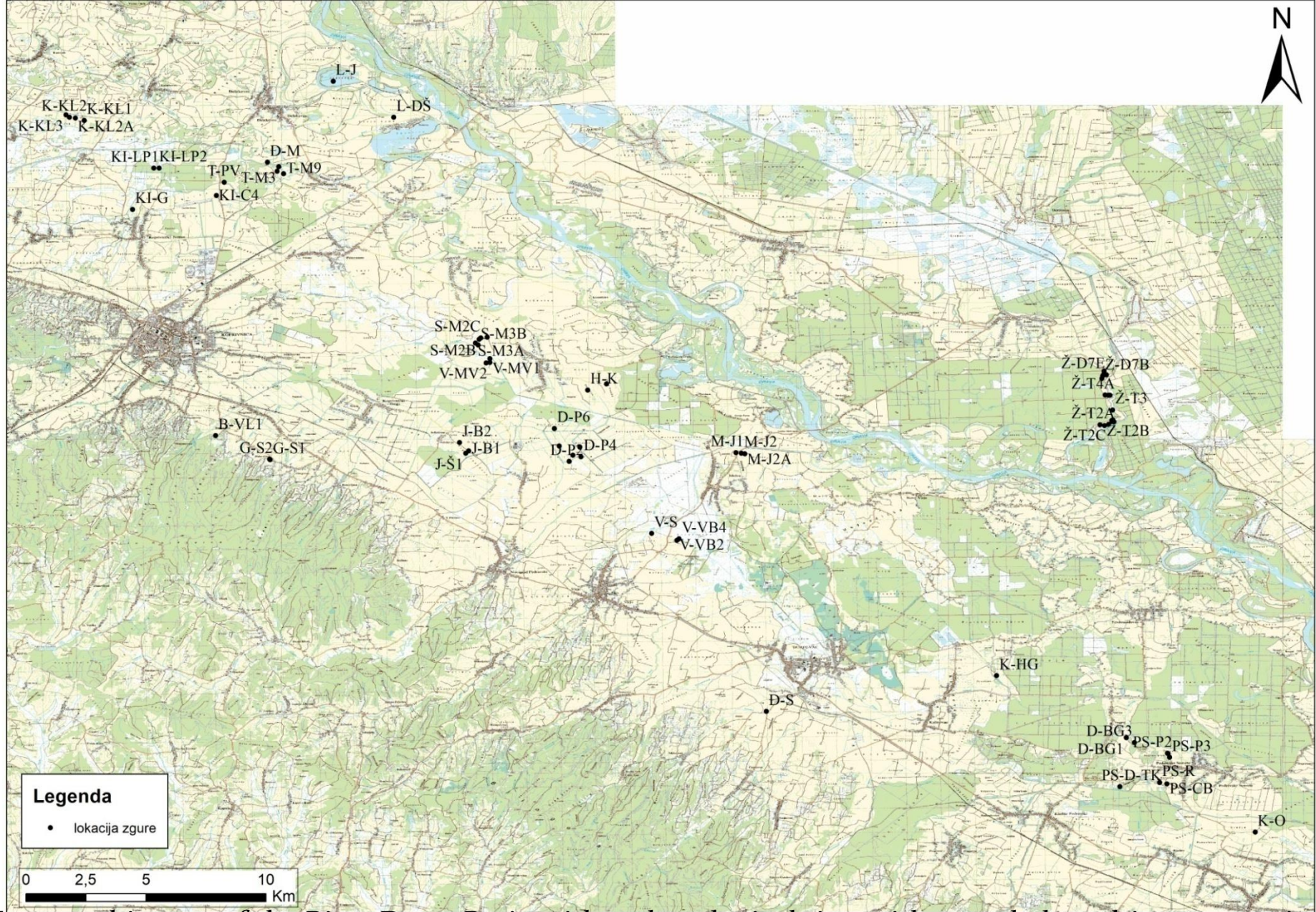
Literatura: Kolar-Sušanj 1973:172-173, T. XCI-XCIII; 1974: 58-60; Kolar 1976: 106,112; Marković 1980b: 324-330; 1984: 296-298,301; 1986c: 84; 1990b: 108; 1994: 113; 1997e:151; Sekelj Ivančan 1995: 137; 2001a, Pl. XVIII, 116; 2010: 21; Zvijerac 2000: 51, 56; 2008: 72; 2010: 12, 17, 18, 20, 22, 26; Valent 2016: 132; Valent et al. 2017: 15-16

Dodatna napomena: Na temelju prikupljenih površinskih nalaza i provedenih zaštitnih arheoloških istraživanja, na lokalitetu Delovi-Poljane 1 zabilježena su naselja iz kasnog brončanog doba, starijeg i mlađeg željeznog doba, te ranog i kasnog srednjeg vijeka. Tijekom triju provedenih istraživanja istraženi su objekti iz brončanog i starijeg željeznog doba te mlađeg srednjeg vijeka.

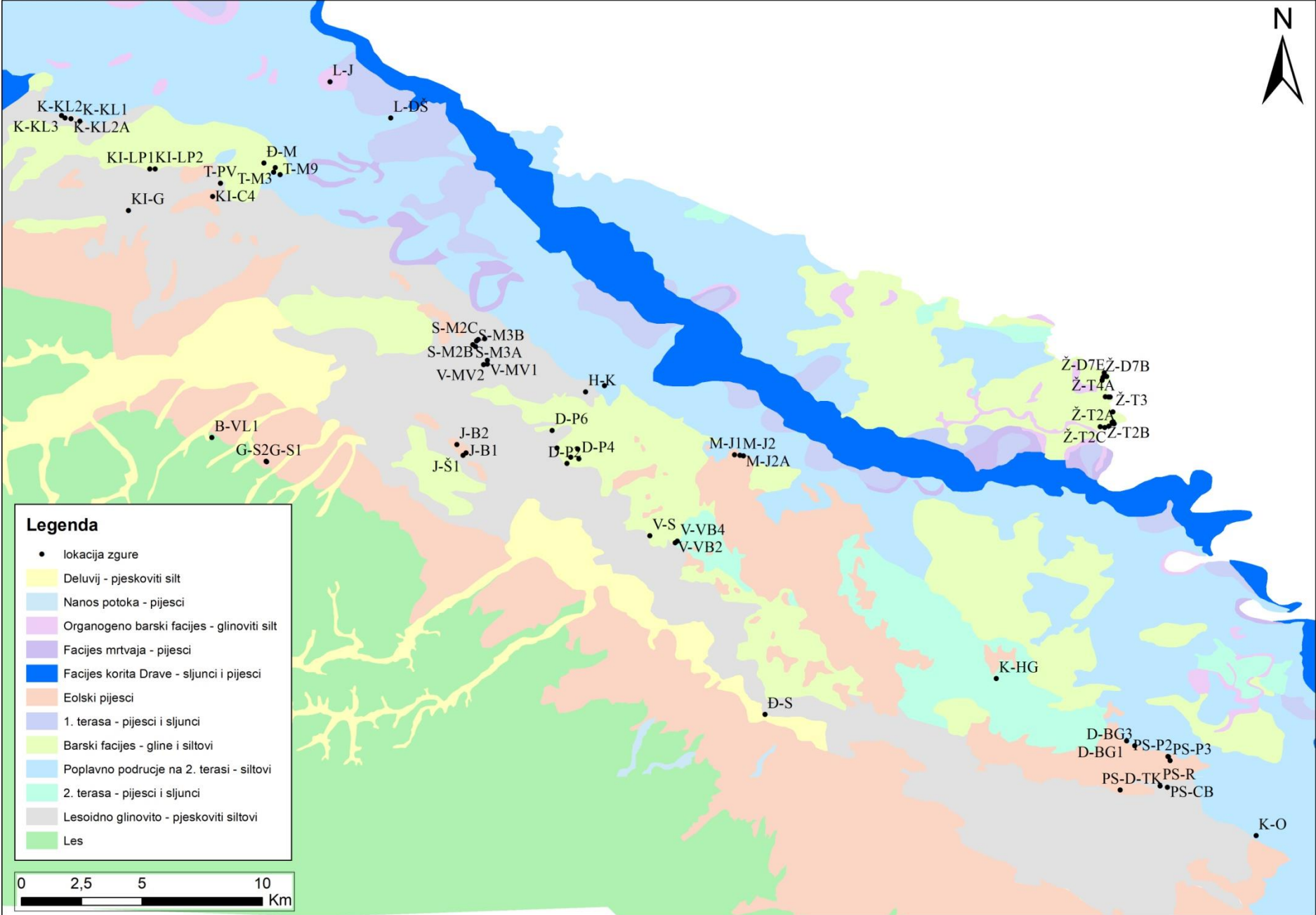


Delovi – Poljane (I. Valent)

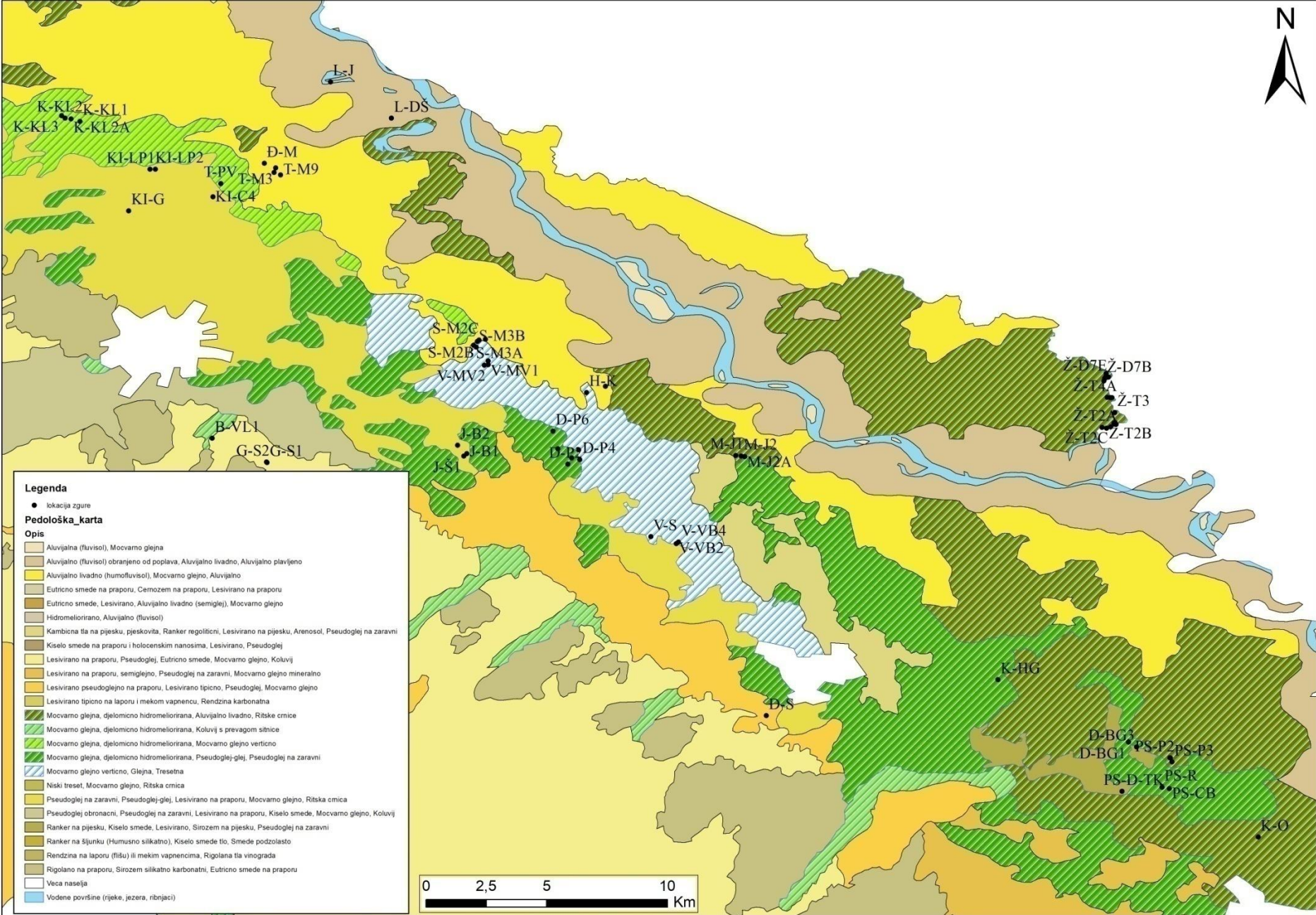




Topographic map of the River Drava Basin with archaeological sites with recorded smelting characteristics (by Tomislav Brenko University of Zagreb, Faculty of Mining, Geology and Petroleum engineering, Department for Minerology, Petrology and Mineral sources)

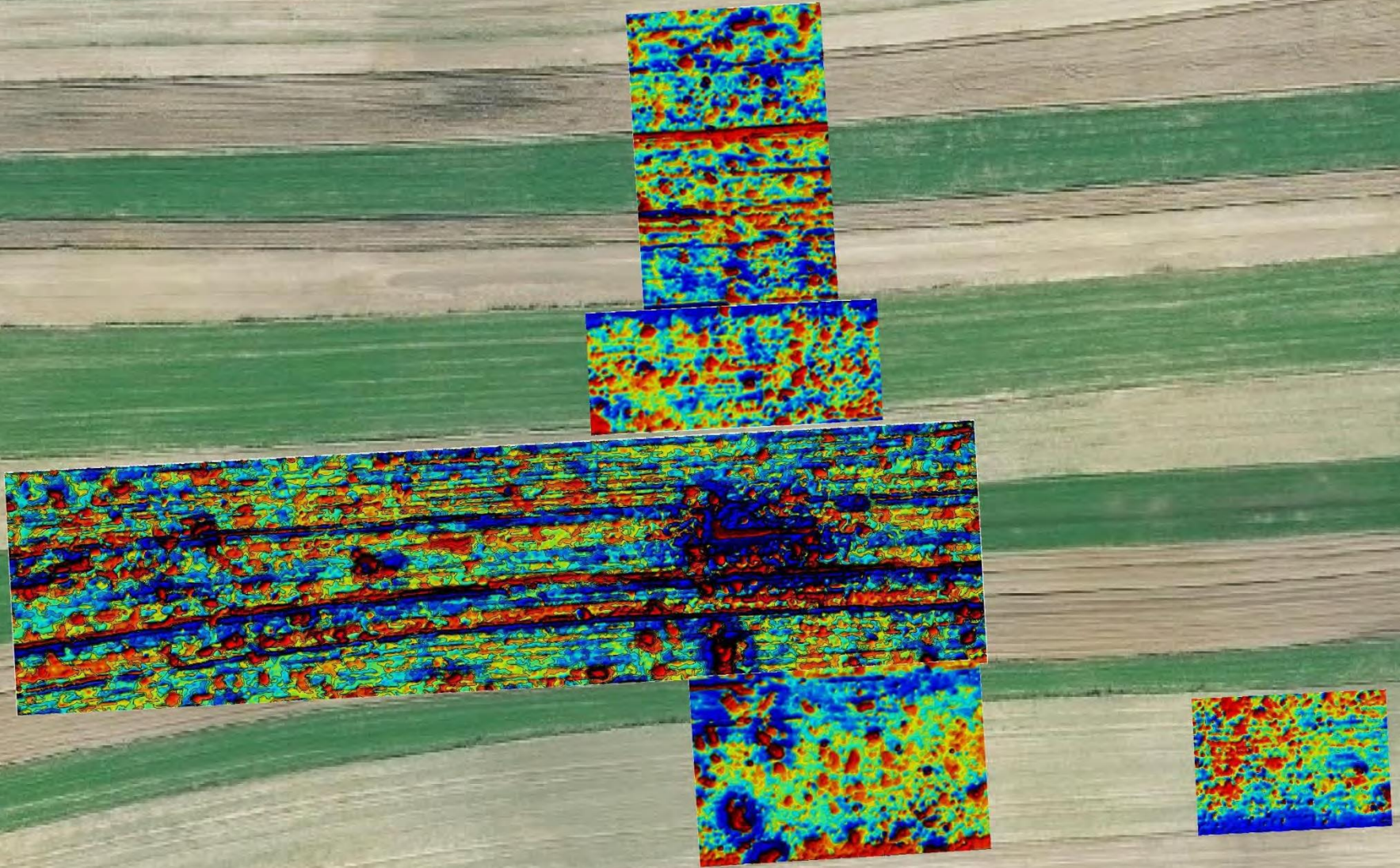


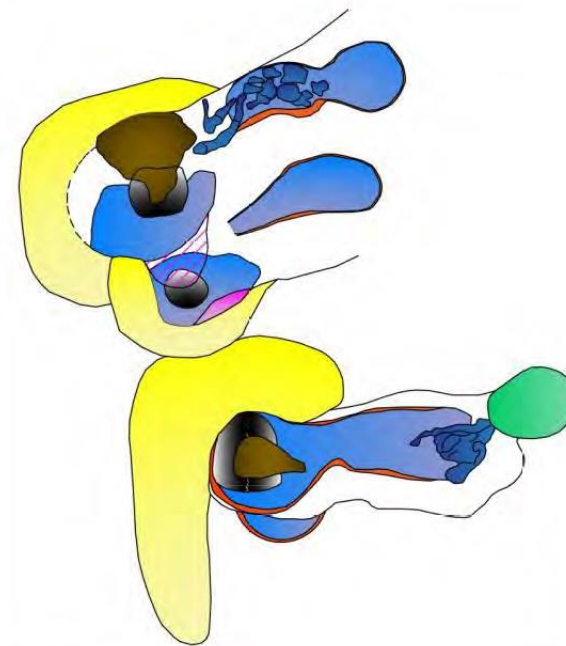
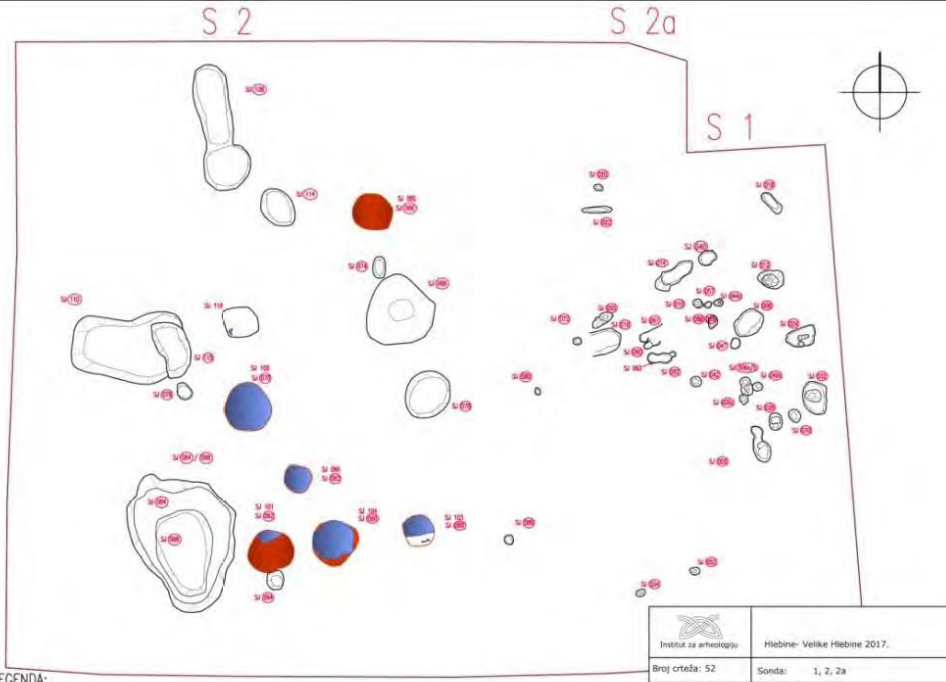
Geologic map of the River Drava Basin with archaeological sites with recorded smelting characteristics (by Tomislav Brenko)



Pedology map of the River Drava Basin with archaeological sites with recorded smelting characteristics (by Tomislav Brenko)

Hlebine – Velike Hlenine (B. Mušić, Univerza v Ljubljani, Filozofska fakulteta, Oddelek za arheologijo)





LEGENDA:

- jamica
- zapečeno dno peči
- zapečeni rub oko dna peči
- obrub vanjski zapečeni ložišta peči
- zapečena zemlja oko stijenske ložišta
- zapečena stijenska ložišta peči
- ugljen
- tekuta zgora
- skledica
- traska-dno peči

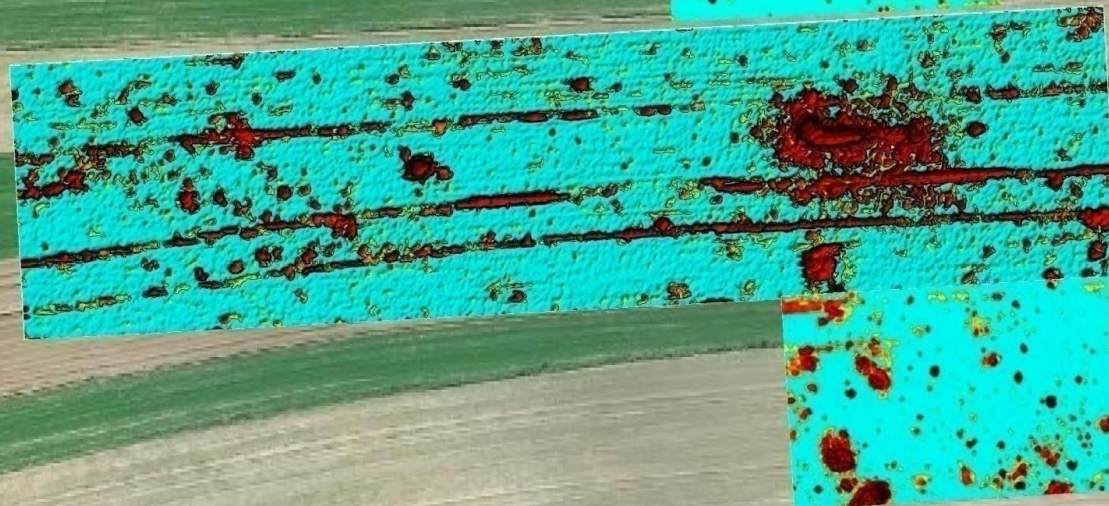
Institut za arheologiju	Hlebine- Velike Hlebine 2016.
Broj crteža: 45	Kvadranti: 1
Stratigrafska jedinica:	peči 1,2,3,4
Datum: 29.3.2017.	Autor crteža: Kristina Turkalj
Mjerilo: 1:150	0 10 50m

Institut za arheologiju	Hlebine- Velike Hlebine 2017.
Broj crteža: 52	Sonda: 1, 2, 2a
Stratigrafska jedinica:	Položaj ukopa unutar Sondi 1 i 2
Datum: listopad 2017.	Autor crteža: Kristina Turkalj
Mjerilo: 1:150	0 1 5 7m

LEGENDA:

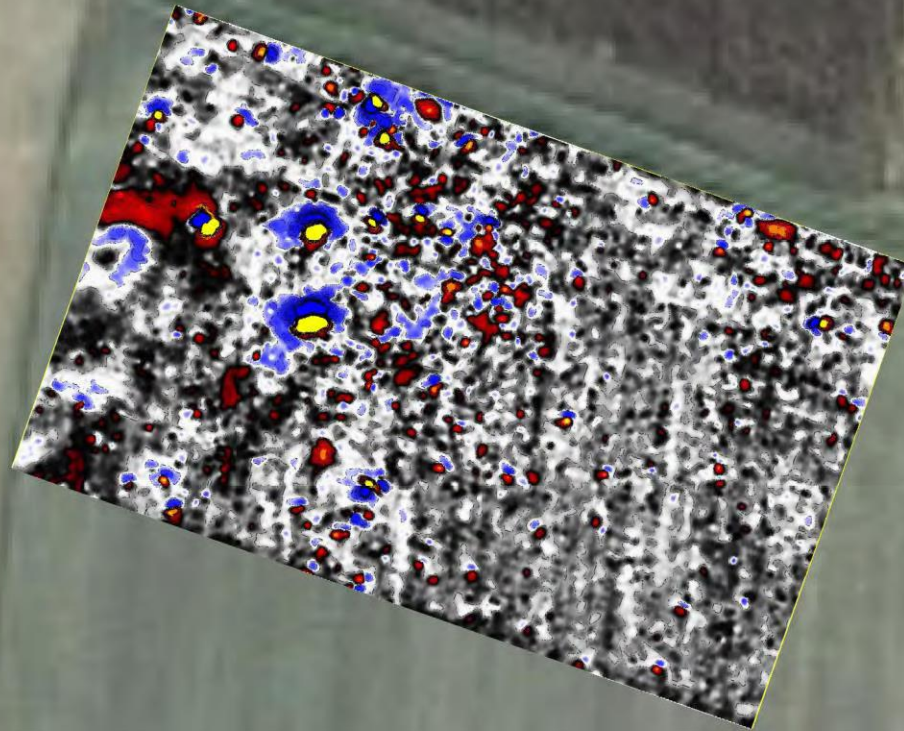
- zapečena zemlja
- jače zapečena zemlja

K. Turkalj, IARH

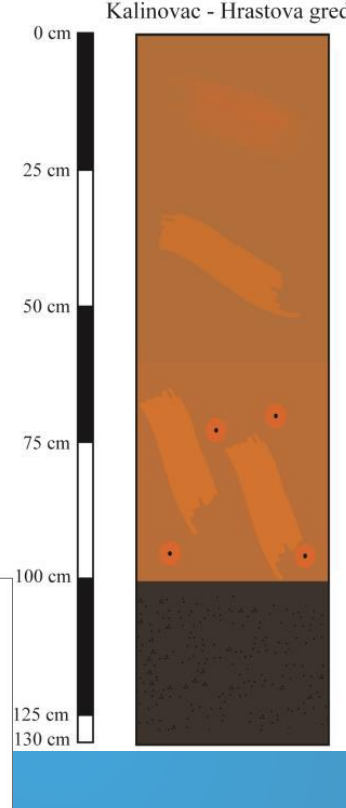
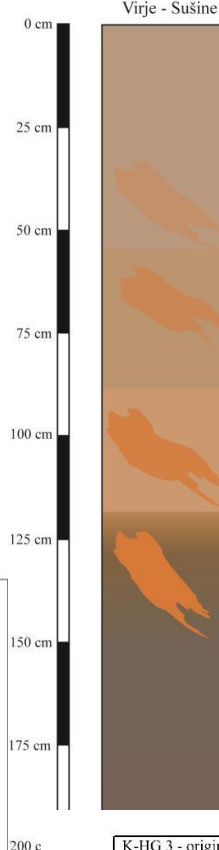
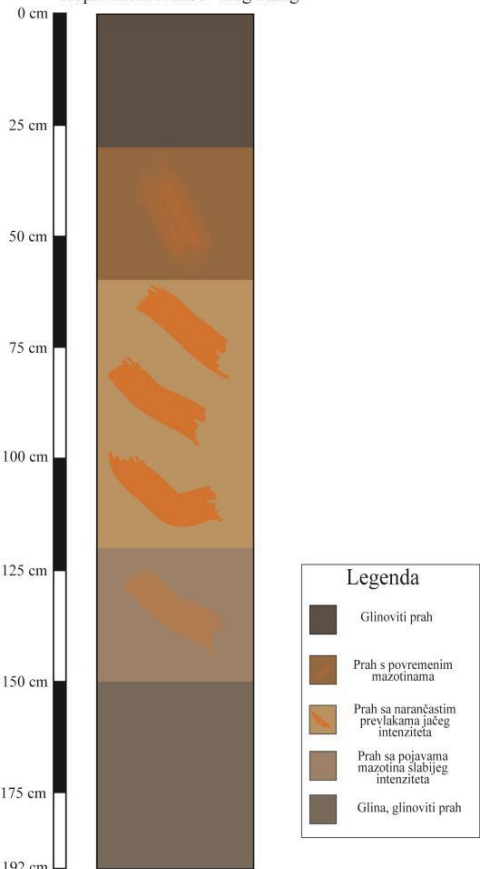


B. Mušić (Univerza v Ljubljani)

0 40m

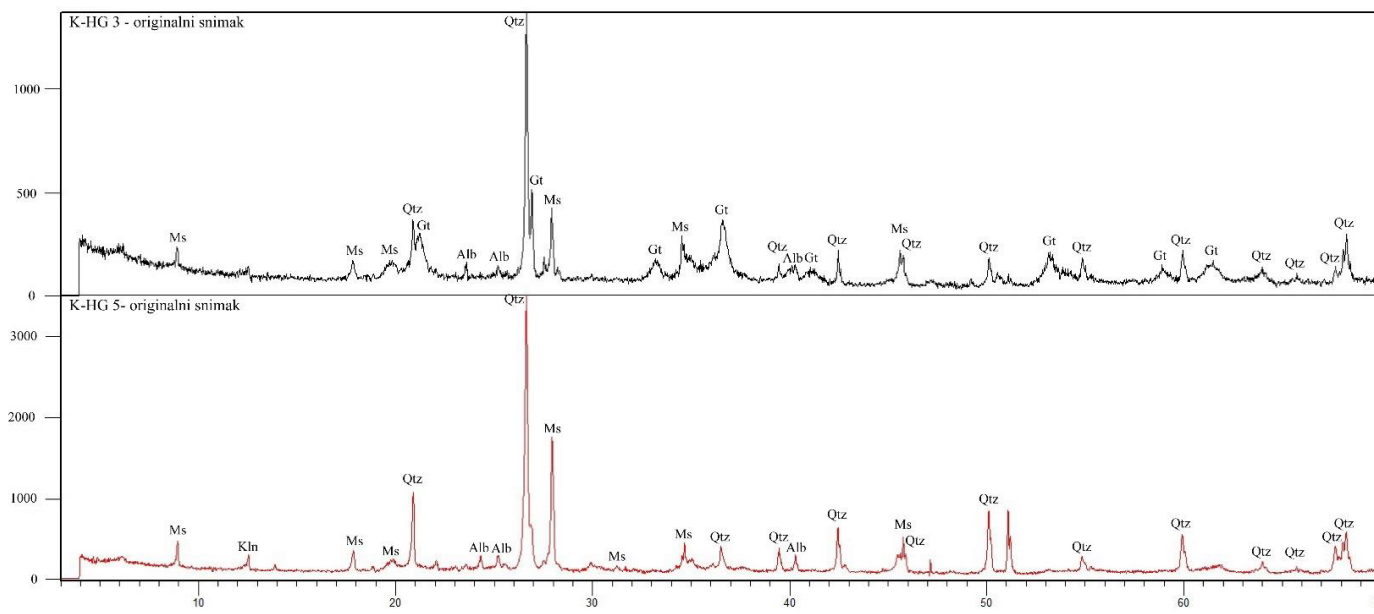


Koprivnički Ivanec - Log Parag



Tomislav Brenko

71 soil sample
8 soil and ore
samples



Drava Drava
Mrzla voda
Donesla me k tebi roda
Na početku prvog čina
Žufka slatka Podravina

The rest is yet to come...
Thank you for your attention!