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Iron-Age-Danube

EARLY IRON AGE LANDSCAPES OF THE DANUBE REGION

EDITED BY MATIJA ČREŠNAR AND MARKO MELE

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Illustration, front cover:
Early Iron Age tumulus in a landscape under agricultural cultivation at Süttő – Sáncföldek, Hungary (aerial photo by Zoltán Czajlik)

Illustrations, back cover, left:
Mosaic landscape with circular ditches of Early Iron Age denuded tumuli on a loess plateau at Érd/Százhalombatta, Hungary;
middle: Early Iron Age hilltop settlement
and tumuli on the right bank of the Danube between Neszmély and Süttő;
right: Denuded Early Iron Age tumuli at Érd/Százhalombatta, Hungary
(aerial photos by Zoltán Czajlik)

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Foreword

In 2017 the **Iron-Age-Danube** project — its full title is "Monumental Landscapes of the Early Iron Age in the Danube Basin" — was initiated by 20 partners and associated partners from five countries in the Danube region.[1] The project was co-financed within the framework of the Interreg Danube Transnational Programme with EFRE funds in the amount of € 2,169,200. One of the major focuses of the project was the exploration of the rich archaeological heritage of the Early Iron Age (i.e. Hallstatt Period) in the Danube region using modern archaeological methods. For that purpose, a new format, the Archaeological Camps, was introduced to the region. This format for the first time combined various types of activities and comprised, in addition to research campaigns, a wide variety of heritage protection activities as well as actions to promote the inclusion of Iron-Age landscapes into the touristic offers of these regions. The camps were organized in four countries at selected locations within the nine preselected micro-regions and lasted one or two months. In this period the institutions involved had the opportunity to combine their technologies, methodologies and expertise as well as to exchange their experiences and views.

In Austria activities focused on Großklein and Strettweg near Judenburg, in Slovenia on Poštela and Dolenjske Toplice, in Croatia on Jalžabet and Kaptol and in Hungary on Százhalombatta, Süttő and Sopron. These sites and their surrounding landscapes are embedded in a variety of environments in the Danube region (*fig. 1*), which fact had a strong impact on the populations settling in these areas in the Early Iron Age, as well as on the archaeological research approaches. Combining their knowledge and specific skills, the experts have in this intensive cooperation established new strategies, which are tailored to each of the micro-regions. One result of this cooperation is the monograph *Researching Archaeological Landscapes across Borders* (Budapest: Archaeolingua, 2019), which should help other researchers and heritage experts with planning their projects on archaeological landscapes. The second important outcome, which is more archaeologically specific, is the present publication, putting in print the studies on the included micro-regions. In the main focus of the project as well as of the presented papers are archaeological landscapes and their visible and hidden monuments of the Early Iron Age. The studies have a broad span in their interpretative approaches; however, they all bring important new results on the Early Iron Age landscapes of the Danube region and present a fundament for further research of archaeological landscapes in the region and beyond.

Marko Mele and Matija Črešnar

[1] http://www.interreg-danube.eu/approved-projects/iron-age-danube

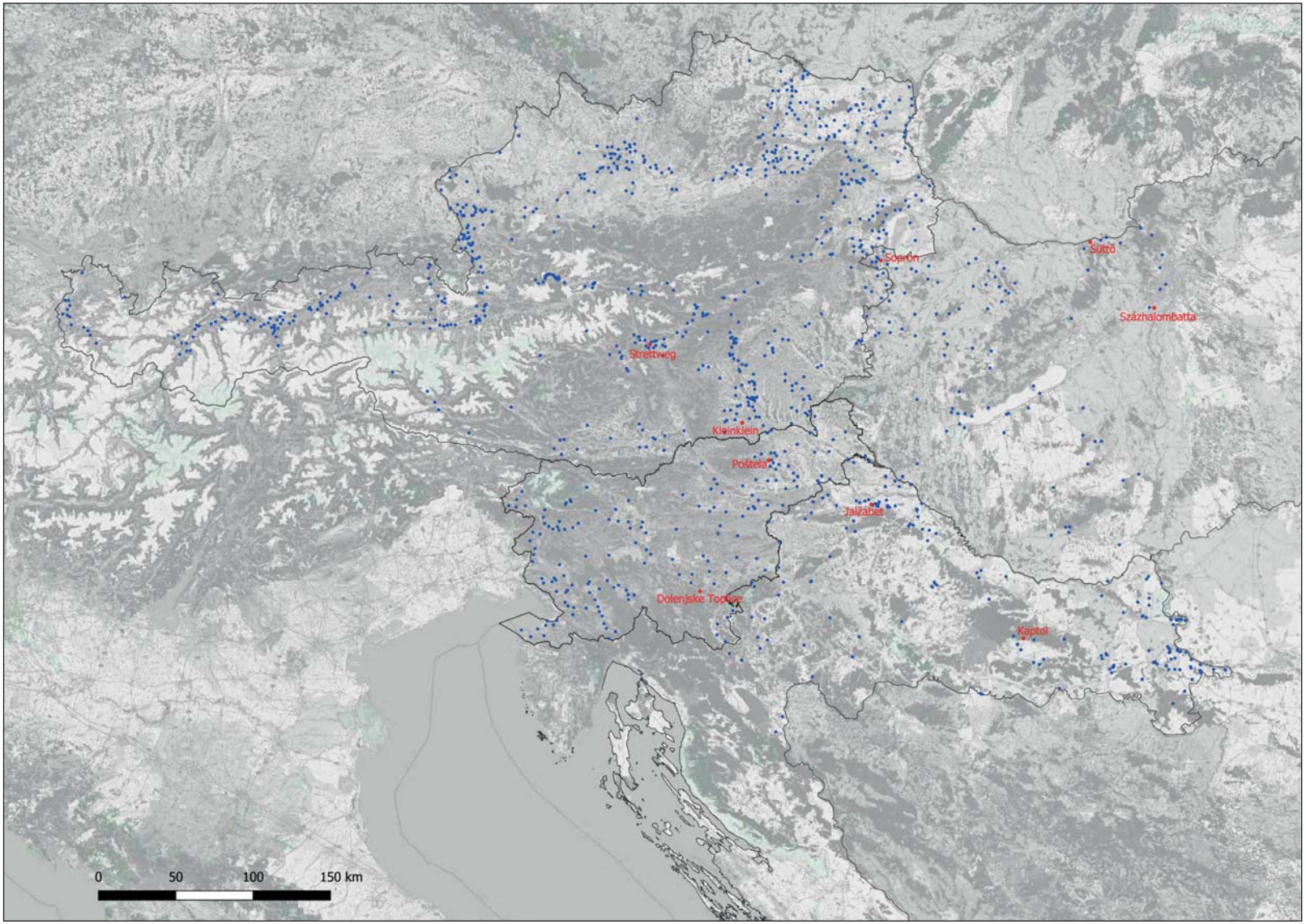

Fig. 1: The Iron-Age-Danube project area with the locations of the studied archaeological landscapes

Settlement dynamics in the Sulm valley (Austria, Styria) – new results of the Iron-Age-Danube project

by Anja Hellmuth Kramberger, Marko Mele and Daniel Modl

Abstract
The micro-region of Großklein with its famous Sulm valley necropolis, the princely tumuli in Kleinklein and the hilltop settlement on Burgstallkogel is one of the most prominent European Early Iron Age landscapes. It has been in the focus of researchers since the end of the 19th century and still is today. In 2017, the EU-project *Iron-Age-Danube* enabled researchers from the Universalmuseum Joanneum to focus intensively on the region again. New methods, like systematic evaluation of ALS data and extensive geophysics, were used in addition to archaeological excavations. The focus of the research was not on the main settlement and the tumulus cemeteries around Burgstallkogel, but also only on other important points in the micro-region that showed potential for human activities in the Early Iron Age, as for example the settlement at Königsberg near Heimschuh. The new data enabled us to do extensive mapping and a discussion on settlement dynamics of the Sulm valley, also from the viewpoint of the Central Place Theory.

1. Man and his landscape in the Iron Age – definition of space and natural environment

At no time in any epoch have humans and their natural environment been two separated entities. On the one hand, humans as part of the environment adapted to their respective conditions, while on the other hand consciously influencing and changing them. So, humans are not only part, but also designers of landscapes.

The term "landscape" has not only a geographical definition, but also describes other consensus-based, limited spaces.[1] A major challenge for archaeology remains the exploration of human interaction in and with prehistoric landscapes, which is usually attested by the term "landscape archaeology".[2] Manifold are the traces that humans have left behind in the landscape. Some of these traces are the result of various human activities, such as communication routes or plough trails, while others were intentionally placed into the environment. A good example are burial mounds or tumuli, which were not only burial places and places of remembrance of the ancestors, but also potential territorial markers.[3] Locations for settlements were also very deliberately chosen, since they not only needed to provide good access to resources, but were also often placed on strategically favourable locations. Decisive factors could be, for example, a good connection to (natural) traffic routes, but often also special fortification conditions. Tumuli and fortified hilltop settlements represent two typical "markers" of the Iron Age cultural landscape of the so-called Eastern Hallstatt circle ("Osthallstattkreis").[4] Geographically, the range of this imprecisely defined conglomerate of various heterogeneous cultural groups can be roughly

1 Haupt 2012, 13ff.
2 E.g. Schade 2000; Steuer 2001; Meier 2009; Bebermeier et al. 2012; Meier 2009.
3 E.g. M. Kuna 2006; Galanakis 2012; Borgna/Müller Celka 2012.
4 Latest discussion on spatial and content limitations: Keller 2015, 17–38.

outlined as within the eastern and south-eastern pre-alpine area extending from South Moravia, Lower Austria, Burgenland, Styria, Carinthia, Northern Transdanubia and Slovenia to north-eastern Croatia. While burial mounds and fortified hilltop settlements are man-made connecting elements of this space, the natural space also has largely similar conditions. The sites are particularly common in the foothills of the mountainous regions covered by forests at the transition to the lowlands such as the Vienna Basin or the Little Hungarian Plain, which have access to main water arteries – the Danube and its tributaries.

One of the micro-regions which has been subjected to a detailed examination in the framework of the Iron-Age-Danube project is the micro-region of Großklein, which extends across the districts of Leibnitz (L) and Deutschlandsberg (D) in southern Styria with the 16 municipalities Ehrenhausen an der Weinstraße (L), Eibiswald (D), Gamlitz (L), Gleinstätten (L), Großklein (L), Heimschuh (L), Leibnitz (L), Leutschach an der Weinstraße (L), Oberhaag (L), Sankt Johann im Saggautal (L), Sankt Martin im Sulmtal (D), Sankt Peter im Sulmtal (D), Schwanberg (D), Strass in der Steiermark (L), Tillmitsch (L) and Wies (D) (*fig. 1*). The working area is dominated by two rivers: the Sulm, a right tributary of the river Mur, and river Saggau. Its borders are oriented in the east to the river Mur, in the south to the Austrian-Slovenian border and in the west to the so-called Radlpass. In the north, an arbitrary boundary was defined which follows the Sausal high-hills approximately 3 to 3.5 miles north of the course of the river Sulm.

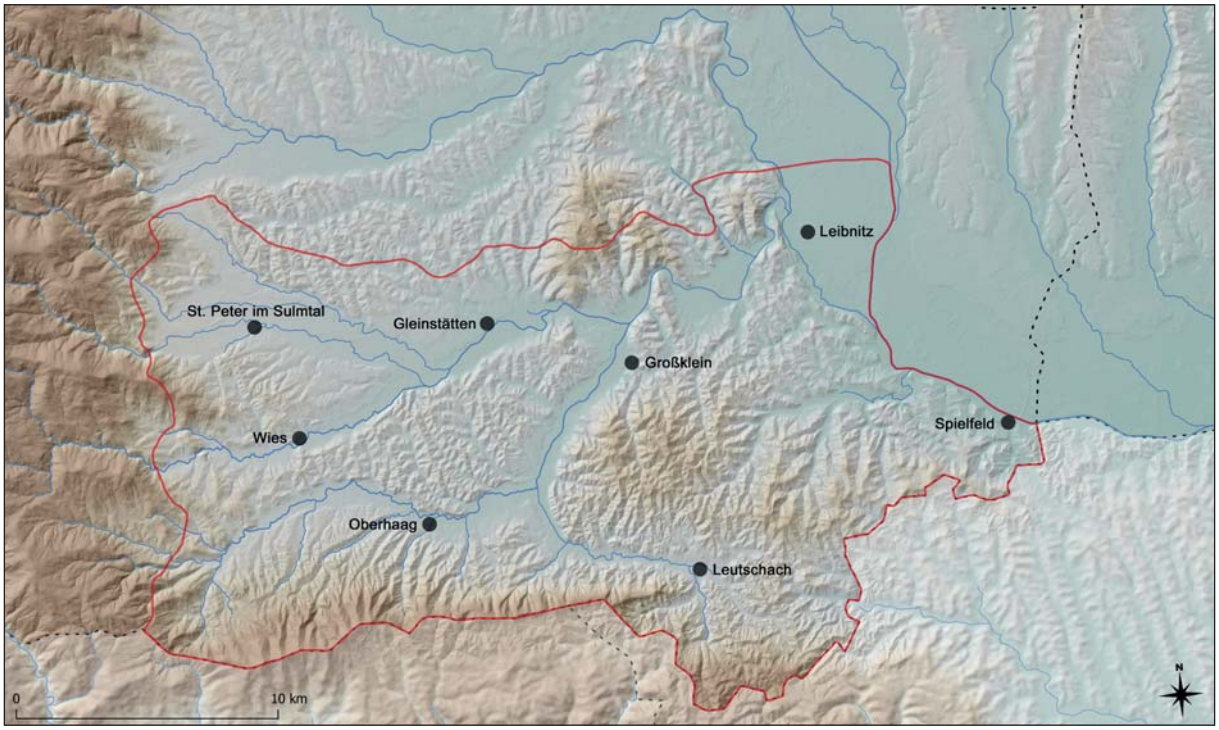

Fig. 1: Geographical map of the micro-region Großklein

1.1 Landscape division and geology

The micro-region Großklein lies in the south-eastern Alpine foothills and shares several natural spatial entities, namely the West Styrian hills, the Sausal and the Windische Büheln (Slovenske Gorice). These low mountain ranges are intersected by the Sulm valley, running from west to east, and the Saggau valley, running from south-west to north-east. The region is enclosed by the mountain ranges of Koralpe and Poßruck (Kozjak) in the west and south as well as by the river valleys of Laßnitz and Mur in the north and east (*fig. 1*).[5]

The landscape relief of valleys and hills, a characteristic of the region, is the result of marine and mountain-building processes that began about 18 million years ago. The West Styrian hill country and the Windische Bühel are part of the so-called "Neogene Styrian Basin (Styrian Tertiary Basin)[6]" in geological terms (*fig. 2*). This is a basin formed by subsidence in the Lower Miocene, which was subsequently flooded by the primoridal sea (Paratethys) and filled with sediments. Simultaneously with the sinking of the basin, the uplifting of the mountains on the edges took place, followed by the erosion of the local rocks. Since then, enormous amounts of gravel, sand and clay have been transported to the Styrian Basin. These deposits, which are 100 m thick in the western part of the basin, today determine the relief of the western Styrian hills and the Windische Bühel. While loosely or partly solidified sediments from the Neogene (Tertiary) are present on the slopes and ridges of the hills, glacial or younger gravel and fine sediments form the bottom of the valley.

Geologically, the Sausal high hills are to be distinguished from the rest of the hill country. They are part of the 300 to 350 million years old Palaeozoic basement, which came to light during the subsidence of the Styrian Basin and formed, after the sea flooded the basin, a chain of islands and shoals with reefs. This north-south-widening ridge is called the "Middle Styrian Swell" (Mittelsteirische Schwelle) and is marked today by the mountain ranges Plabutsch, Sausal and Remschnigg-Poßruck/Kozjak. The Sausal mountain range today protrudes some 100 meters out of the surrounding area, its highest elevation being the Demmerkogel (671 m). The Sausal consists of weakly metamorphic, clayey-sandy slates and on its eastern flank of Leitha-limestone, which are often superficially covered by sediments.

Due to the described geological situation, the few mineral raw materials of the region that were accessible and usable in the Early Iron Age, namely hematite, limonite (ochre, bolus) and graphite, are concentrated on the southern edge of the Sausal, in particular in the area marked-out by the villages of Mantrach, Großklein, Heimschuh and Kitzeck.[7]

The hematite, which was briefly mined from the middle of the 19th into the second half of the 20th century, had a Palaeozoic age and is found in metamorphic, sandy

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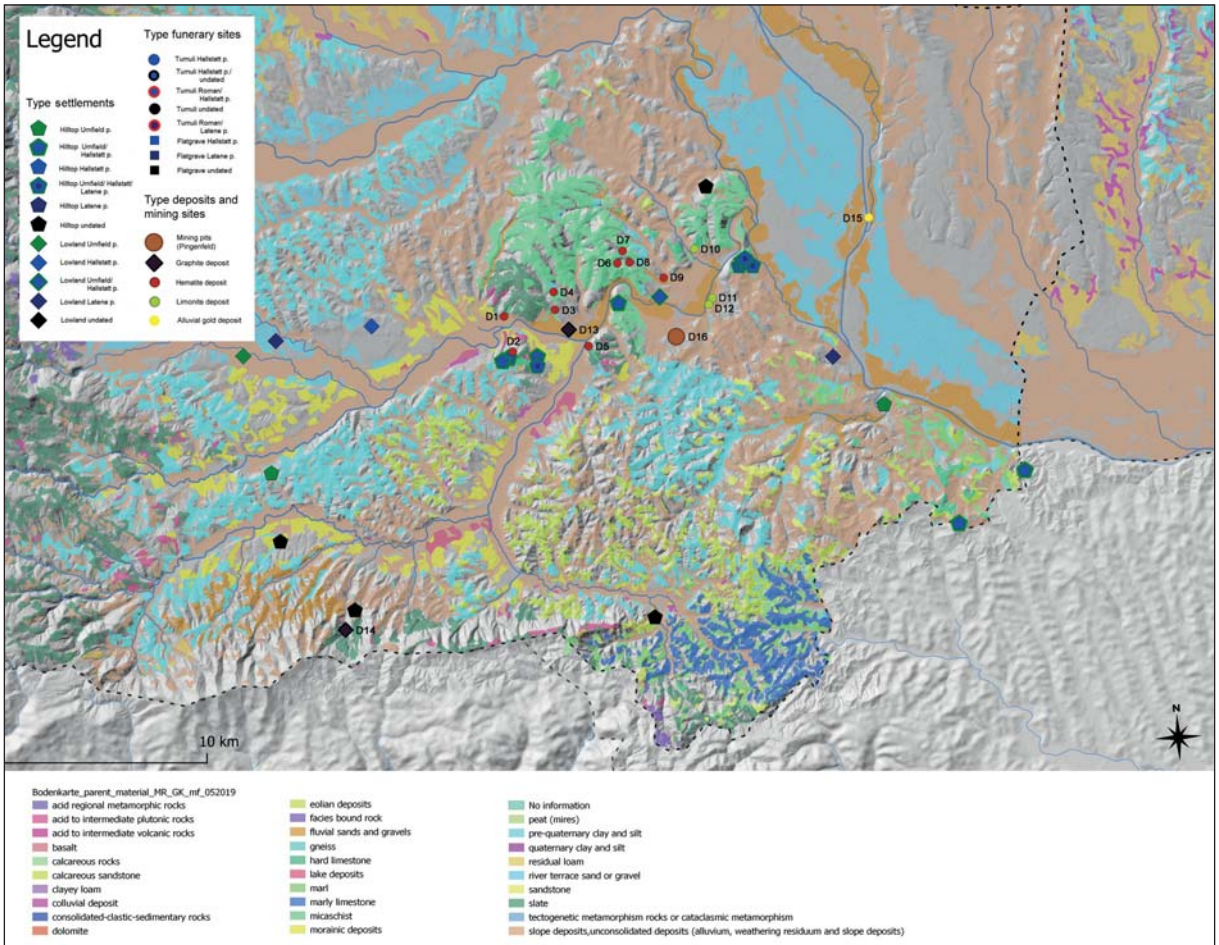
5 For the landscape division of Western Styria, see: Lieb 1991, 16, 24, 26–28.

6 For the geology of the "Styrian basin", see: Ebner/Sachsenhofer 1991; Gross et al. 2007, 117–193.

7 See the interactive Resources Information System (interaktive RohstoffInformationsSystem) IRIS-Online by Geologische Bundesanstalt, Vienna (https://www.geologie.ac.at/0/webapplikationen/iris-interaktives-rohstoffinformationssystem/).



Number	Name	Coordinates WGS 84	Coordinates WGS 84	Resource
D1	Maierhof	15,405	46,762	Hematite deposit
D2	Burgstallkogel (Grillkogel)	15,408	46,75	Hematite deposit
D3	Zaufengraben	15,43	46,763	Hematite deposit
D4	Brudersegg I	15,43	46,769	Hematite deposit
D5	Mattelsberg	15,445	46,75	Hematite deposit
D6	Steinriegel	15,462	46,777	Hematite deposit
D7	Kleingauitsch	15,465	46,781	Hematite deposit
D8	Steinbach (Stumpfgraben)	15,468	46,777	Hematite deposit
D9	Heimschuh	15,484	46,771	Hematite deposit
D10	Muggenau (Muckenau)	15,5	46,78	Limonite deposit
D11	Waldhüter	15,507	46,763	Limonite deposit
D12	Ehrenhofjäger (Ernhofjaga)	15,505	46,761	Limonite deposit
D13	Fresing	15,436	46,756	Graphite deposit
D14	Lieschen	15,317	46,661	Graphite deposit
D15	Leibnitz	15,586	46,786	Alluvial gold deposit
D16	Kleinheimschuh, Unterer Fahrenbach	15,488	46,751	Mining pits, undatable

Fig. 2: Soil types in the micro-region Großklein with the position of the prehistoric settlements and ore deposits (map: M. Fera)

to clayey slates with occasionally interbedded green schists and diabases. From west to east these are the deposits of Maierhof near Gleinstätten, Burgstallkogel (Grillkogel), the Zaufengraben and Brudersegg I near Fresing, Mattelsberg near Großklein, Steinriegel, Kleingauitsch and Steinbach or Stumpfgraben near Kitzeck and Heimschuh (*fig. 2*).[8]

Other usable iron minerals in the region are blackish brown limonite-manganese concretions, which often occur in loamy layers of the glacial high terraces (Helfbrunner Terrace) of the Sulm and Saggau valley.[9] Likewise ferrous are the reddish clay sediments, which were probably formed in the Neogene and were mined in the 19th century at Muggenau (Muckenau) by Muggen and Waldhütter and Ehrenhofjäger (Ernhofjaga) near Seggauberg for (earth) colour production.[10] The short exploit graphite mines of the area, which can be found in Fresing and further southwest in Lieschen near Eibiswald, dates back in the 19th century and provides only inferior graphite.[11]

1.2 Flora and fauna in the micro-region of Großklein

In October 2016, the EU-project "Paleo-landscape of Styria and its Biodiversity from Prehistory to the Discovery of the New World (PaleoDiversiStyria)"[12] was launched, combining the latest scientific findings from archaeology and archaeobotany and making them usable for the general public. The project "PaleoDiversiStyria" was prepared by the Universalmuseum Joanneum with partners from Austria and Slovenia and submitted to the open call within the cooperation program Interreg V-A Slovenia-Austria 2014–20, which is funded by the European Regional Development Fund (ERDF). The project included the identification of original plant species in archaeological contexts and their revitalization, as well as the development of new tourism products. In the first phase of the project, extensive archaeobotanical investigations were carried out in Styria and Slovenia, which also provided new insights into the fauna and flora of our micro-region. Samples from the settlements on Burgstallkogel near Großklein and Königsberg (Nestelberg) near Heimschuh and a burial mound in the so-called Haiblwaldgruppe near Burgstallkogel could be examined.[13]

Evidence of the use of certain crops during the Late Bronze Age and Early Iron Age, as well as trees, grasses, weeds etc., were obtained from the samples taken in 2016 and 2017 during the research done by the Universalmuseum Joanneum in the prehistoric settlement on the Königsberg (Nestelberg) near Heimschuh.[14] For archaeobotanical investigations, samples from nine stratigraphic units from both excavation years were

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8 Weiss 1973, 90–94; Weber 1997, 345.
9 Weber 1965, 101; Dobiat 1980, 40.
10 Weber 1965, 102–106; Weiss 1973, 95.
11 Scharfe 1981, 118.
12 https://www.museum-joanneum.at/archaeologiemuseum-schloss-eggenberg/projekte/palaeodiversistyria (accessed 08.07.2019).
13 Detailed archaeobotanical data of the PalaeoDiversiStyria project can be accessed here: http://www.interarch-steiermark.eu.
14 Monument protection activity number 2016: 66147.16.01 und 66147.16.02; Monument protection activity number 2017: 66147.17.02. For more information on the site and results of the excavations on Königsberg, see below and in Mele 2019, 368ff.

floated[15] and analysed by Andreas G. Heiss and Silvia Wiesinger,[16] Austrian Academy of Sciences, and Michaela Popovchak,[17] University of Vienna (*fig. 3*). The sediment samples were taken from the burned layer in the wall area (2017 / SE 04, 05, 06), the hearth / fireplaces discovered in the settlement (2016 / SE 34; 2017 / SE 14, 24), a post hole (2017 / SE 27), a cultural layer (2016 / SE 30) and a suspected cultural layer (2017 / SE 31).

A number of revealing results were achieved from four layers: hearth SE 034 and cultural layer SE 030 from the 2016 excavation and burned layers SE 04 and 05 from the 2017 excavation. In the sample from hearth SE 034, real millet / broomcorn millet (*Panicum miliaceum*), foxtail millet (*Setaria italica*) and lentil (*Lens culinaris*) were identified. The burned layers SE 004 and SE 005 in the wall area also provided evidence for the use of barley (*Hordeum vulgare*) and an unspecified wheat species (*Triticum sp.*). In the crop plants spectrum, weeds, which occur in root crops and summer cereals fields, were also identified. In the hearth dated to the Early Iron Age, two seeds of real millet / broomcorn millet (*Panicum miliaceum*) were discovered. A surprise was presented by the post hole (2017 / SE 27) in which, in addition to the real millet / broomcorn millet (*Panicum miliace*um) and lens (*Lens culinaris*), naked wheat (*Triticum aestivum s.l./durum/turgidum*), emmer / spelt (*Triticum dicoccum/spelta*) and pea / field bean (*Pisum/Vicia faba*) were also detected.

Among the charred seeds and fruits of wild plants that are likely to be attributed to prehistoric use, white goosefoot (*Chenopodium album*), common knotweed (*Persicaria lapathifolia*), hazelnut (*Corylus avellana*), cinquefoil/strawberry (*Potentilla/Fragaria*), blackthorn (*Prunus spinosa*), raspberry (*Rubus idaeus*) and common sorrel (*Rumex acetosa*) were also identified. Berries and nuts, in particular, probably enriched the diet of the Late Bronze and Early Iron Age inhabitants.

The settlement excavations in 2013 and 2015 on Burgstallkogel near Großklein and the tumulus excavation from the so-called Haiblwaldgruppe, located to the northwest from the settlement, provided additional samples for archaeobotanical investigations of the Early Iron Age period in our micro-region. The excavations were on the one hand monument protection measures, caused by tree falls in winter 2012 and a conversion of an old vineyard in 2015, and on the other hand research excavations done in 2014 and 2016.

In the settlement, samples from a large settlement pit (SE 046) on the first settlement terrace and from a smaller pit (SE 010) on the edge of the second terrace were selected for archaeobotanical investigations. In the samples from two pit fillings in the settlement area a total of 411 plant residues could be identified. Among the cultivated plants, the high percentage of real millet / broomcorn millet (*Panicum miliaceum*) is particularly striking. Both the inclusion of the not clearly assigned cultivated sorghums in this taxon and their disregard, the panicle millet clearly dominates the find – with at least 44% and at most 63% of the total number of

[15] Floatation was done by Sebastian Scherzer in the frame of the PaleoDiversiStyria project.
[16] SE 034, 030, 04, 05. Detailed charts with results are available in the publication of the project PalaeoDiversiStyria and are accessible at http://www.interarch-steiermark.eu.
[17] SE 06, 14, 24, 27, 31.

finds. All other crops occur only sporadically in the find, but still cover a large part of the Iron Age spectrum: spelt barley (*Hordeum vulgare*), naked wheat (*Triticum aestivum/durum/turgidum*), spelt (*T. spelta*), foxtail millet (*Setaria italica*), lentil (*Lens culinaris*) and probably also flax (*cf. Linum usitatissimum*).

The composition of the crops in the two pits SE 010 and 046 also shows some differences. While in the large pit SE 046 on the terrace besides millet a wider range of other crops is present (spelt, naked wheat, lentil…), in the pit SE 010 millet clearly dominates. The differences could be attributed to the sample conditions or different usage. Given the proportions, it can be assumed that at least sample 3 from SE10 could be a millet stock. This interpretation is also supported by some disturbance elements: dominant in this group is the wild foxtail millet which can occur as weed in millet fields. The same applies to the peach-leaved knotweed (*Persicaria maculosa*). Other groups of wild plants, apart from the indeterminate grasses (*Poaceae*), hardly play a quantitative role in the two pit fillings.

From the tumulus no. 10 of the Haiblwald group, samples for archaeobotanical investigations were taken from the superficially distributed charcoal layer (SE 031) and from the grave pit (SE 033). Almost half of more than 25,000 plant remains are charred amorphous objects with their typical bubble structure, which can be classified as cereal products. Slightly fragmented loose grains represent just over 1,200 additional unspecified cereal residues. So far, a bromes species (*Bromus sp.*) and millet (*Setaria italica*) have been found as components. At the present time, due to the small sample size, it is just as difficult to make any statements about the proportions of these and any other components as well as about intention that might have led to the admixture of the bromes. Without anticipating further investigations, which are in any case still necessary, reference should nevertheless be made to possibly comparable finds such as the Late Bronze Age “Hirsotto” from Stillfried, as well as to the stock find of rye brome (*Bromus secalinus*) from the Kulm near Trofaiach.[18]

Among the wild plants, grasses are clearly dominant: rye brome (*Bromus secalinus*) together with an indeterminate brome (*Bromus sp.*), grasses (*Panicoideae*) and undefinable sweet grasses (*Poaceae*). Other wild plants occur only in small numbers.

During the latest excavations in the micro-region Großklein, surprisingly, almost no animal bones were discovered. So the major reference to the animal spectrum on Burgstallkogel remains the research published by Joris Peters and Regina Smolnik, which analysed the bone material from the excavations of Claus Dobiat at Burgstallkogel.[19]

The results show a dominance of cattle and goat/sheep over wild animals. It remains striking that these animals on Burgstallkogel were slaughtered at a younger age and not after using them for years for milk, wool or transport. It seems the inhabitants of the prehistoric settlement could afford the best of meat, which might indicate their prestigious position in the region.[20]

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[18] Stika 2000, 163–168; Kohler-Schneider 2001.
[19] Peters, Smolnik 1994, 147–158.
[20] Peters, Smolnik 1994, 157.

Archäobotanische Proben-Nr.	1	2	3	4	5	
Fläche	1	1	1	1	2	
SE	06	14	24	27	31	
Archäologischer Befund	ev. Wall-schüttung? unter Brandschicht	Feuerstelle unter Wall-schüttung	Brandstelle (?)	Pfostenloch	Gewachsen-er Boden, Geologie	
Datierungsvorgabe	BZ?					
Sedimentmenge, in Liter	20	4,5	3,5	29	8	
Holzkohlereste, in ml	3	8	0,4	27	<0,1	
— " —, in g	0,9	2,3	0,125	9,21	0,034	
KULTURPFLANZEN						
Hordeum vulgare s.l.	1		K		K	Saat-Gerste i.w.S.
Panicum miliaceum	1	2	E	6	E	Echt-Rispenhirse
Triticum aestivum s.l./ *durum/turgidum*			I	1	I	Nacktweizen
Triticum dicoccum/spelta			N	1	N	Emmer/Dinkel
Hirse indet.			E	1	E	unbestimmte Hirse
Lens culinaris				2		Kultur-Linse
Pisum/Vicia faba				1		Erbse/Ackerbohne
WILDPFLANZEN						
Bromus sp.				1		Eine Trespe
Chenopodium album				2		Weiß-Gänsefuß
Corylus avellana, Bst.				2		Gewöhnlich-Hasel, Haselnuss
Fallopia convolvulus	1					Acker-Flügelknöterich
Persicaria lapathifolia				2		Ampfer-Knöterich
Pinaceae, Nadelfragment	1					Föhrengewächse
Plantago major				1		Breit-Wegerich
cf. *Poaceae*		1				wahrscheinlich Süßgrä
Potentilla/Fragaria				2		Fingerkraut/Erdbeere
Prunus spinosa				1		Schlehe
Rubus idaeus				1		Himbeere
Rumex acetosa				1		Wiesen-Sauerampfer
Indet.	1					Unbestimmte
Fundzahl, Σ	5	3	-	25	-	
AOV					3 Bst?	= amorphe Objekte verkohlt
Mäusekot, verkohlt				2		

Fig. 3: Analysis results of sediment samples from Königsberg at Heimschuh SE 06, 14, 24, 27, 31 (by Michaela Popovchak)

2. Landscape research – history of research, strategies and approaches

In the middle of the micro-region Großklein lies one of the most important and well-known Early Iron Age hilltop settlements of the Eastern Hallstatt Zone, the Burgstallkogel or Grillkogel, with its associated, extensive tumulus cemeteries, the Sulm valley necropolis, which includes several hundred still visible burial mounds. The Burgstallkogel and Sulm valley necropolis first attracted the interest of archaeological researchers at the beginning of the 19th century[21] and became prominent with the discovery of imposing grave goods in the princely tumuli in Kleinklein. In recent years, various publications have been issued on the history of research in the micro-region Großklein, and it can be referred to them at this point.[22] While the numerous groups of tumuli are relatively well researched,[23] there are some gaps in the knowledge of the settlement structures.[24] Accordingly, it has not yet been clarified as to what extent the settlement on the Burgstallkogel possessed a specific position within the region or, with a view to the enormous wealth of the so-called princely tumuli, whether it could even be considered a central settlement. This is questionable, since in a distance of just 10 km, following the Sulm in the direction of the Mur, there are two further hilltop settlements, the Königsberg near Heimschuh and the Frauenberg / Seggauberg near Leibnitz[25] (*fig. 4/S17-23)*, which were at least partially simultaneously occupied.[26] In addition to the deviations in size and occupation, also superficially identifiable monuments[27] are visible not only in their immediate surroundings, but also between the settlements' core areas. An obvious difference is also the presence of a fortification on the Königsberg, while a fortification in the form of a rampart on the Burgstallkogel[28] has not been proven. Vice versa, the settlement terraces of the Burgstallkogel have no equivalents on the Königsberg. It must be pointed out that for the Burgstallkogel, although no structure in form of a palisade, a rampart or a wall was found, at least on the northern slope a system of ditches was identified, which together with the height differences of the terraces, was a clear

[21] Due to the long tradition of research, literature on the subject is extensive and only the most important publications and studies published in recent years may be mentioned here: Radimsky 1883; id. 1885; id. 1887; Radimsky/Szombathy 1888; Szombathy 1890; Schmid 1933; Dobiat 1980; id. 1990; Kramer 1981; Tomedi 1992; Smolnik 1994; Hack 2002; Egg/Kramer 2005; Hansen 2007; Egg/Kramer 2013; Egg/Kramer 2015; Mele 2019; Egg 2019.

[22] Bernhard/Weihs 2003, 7–16, 215; Tiefengraber 2005, 7–12; Mele 2012; Egg/Kramer 2013, 5–13; Mele 2015, 498ff.; Mele 2019, 354ff.

[23] Although only 5% of burial mounds were excavated, most of them in the 19th century (Egg/Kramer 2013, 407).

[24] Regarded for the whole of Styria, G. Tiefengraber notes an improvement in the knowledge of the settlement system of the Hallstatt period (Tiefengraber 2015b, 552ff.).

[25] Egg/Kramer 2013, 413–415, 413 fig. 189.

[26] Cf. Egg/Kramer 2013, 414; Egg/Kramer 2016, 226. – A settlement during the Urnfield and Hallstatt period is indicated for both the Königsberg and Frauenberg (Königsberg = Felgenhauer 1977/78; Egg/Kramer 2013, 413; Mele 2019, 368ff.; Frauenberg = Geigenbauer 2008a; id. 2008b; Bartl 2008; Groh/Sedlmayer 2005; Tiefengraber 2015b, 621).

[27] Here, the quantitative distribution of demonstrable Iron Age tumuli in the immediate vicinity of the hilltop settlements should be considered. Other human legacies recognizable in the LiDAR scans, such as old pathways or extraction areas, bear little insight, without any indications as to their dating.

[28] Dobiat 1990, 65f.; Egg/Kramer 2013, 412.

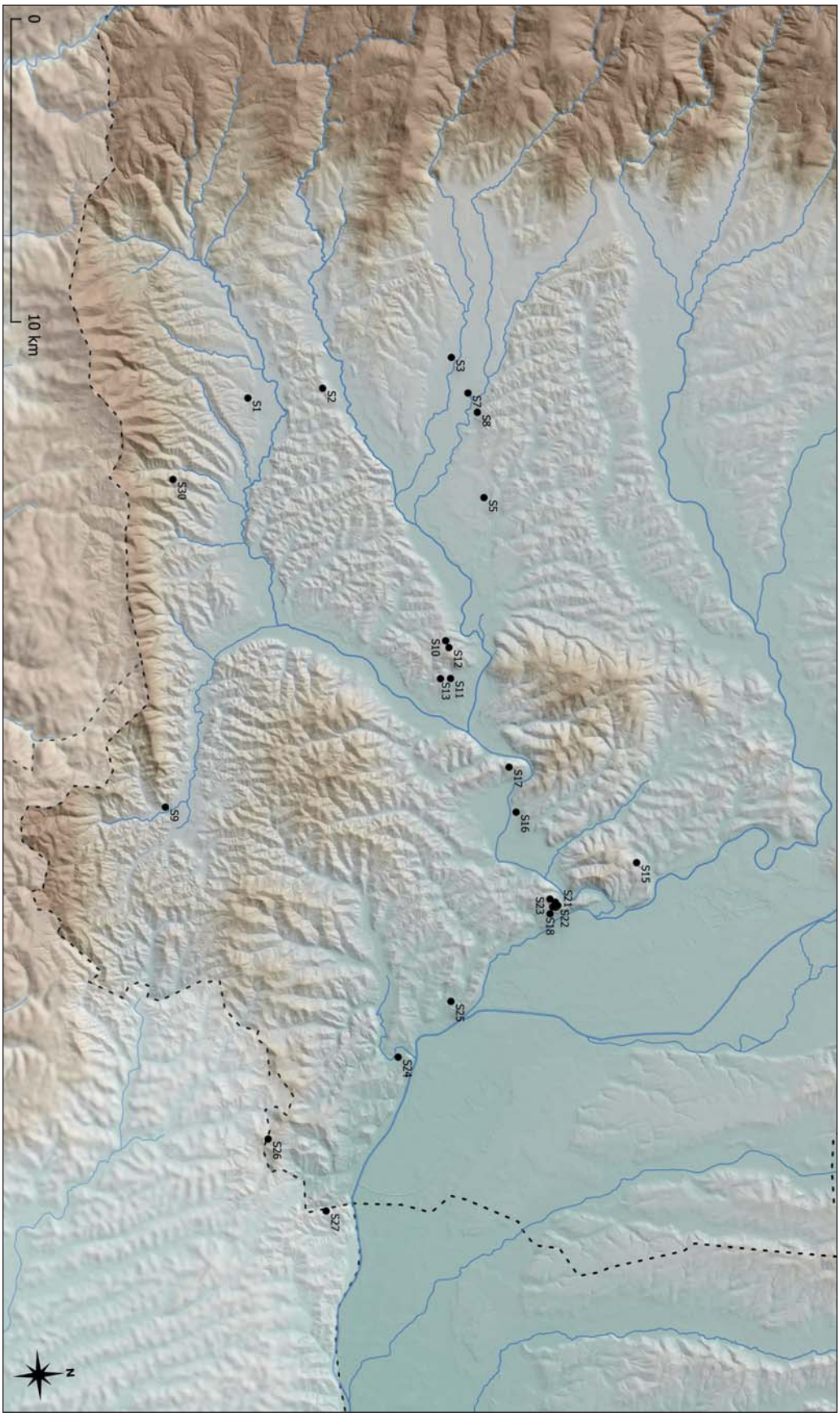

Fig. 4: Settlements in the micro-region Großklein (map: M. Fera)

obstacle[29] that might have had a fortification purpose. Referring to ethnology, A. Reymann points to the fact that the topography of a place and the option to obtain an even more effective defence by way of slight modifications is more important than generally assumed.[30] The construction of complex fortification systems is merely the most extreme form of modification of natural conditions.

Almost completely unclear is the situation of Iron Age lowland settlements in the micro-region. The only known Hallstatt period lowland settlement was found west of Gleinstätten near Dietmannsdorf in the municipality of Sankt Martin im Sulmtal (*fig. 4/S5*).[31] The only two further settlements, which have been recently archaeologically examined and can well be dated back to the Early Iron Age with a pre-existing Late Bronze Age occupation, are in the Austrian-Slovenian border area: the "Platsch" at Graßnitzberg[32] and the settlement with an associated tumulus cemetery on "Hoarachkogel / Herrschaftswald" on Bubenberg near Spielfeld (*fig. 4/S26-27*).[33] A Late Bronze Age hilltop settlement was found on the Schlossberg Ehrenhausen.[34] For other sites such as the Kigerlschneiderkogel near Aug[35] or the "Montikogel" / Schlossberg east of Remschnigg[36] a Late Bronze and Early Iron Age occupation is assumed, but has not been surely proven. At first sight this shows a strong imbalance in the distribution of Iron Age settlements, but probably has to do with the state of research.

Tumulus cemeteries are more or less evenly distributed throughout the area, but their chronology is often unclear, as they could originate from the Roman period (*fig. 5*).[37] Since older Early Iron Age tumuli can also be found between Roman period

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[29] Dobiat 1990, 66f., fig. 24. – Dobiat dates the construction of the ditch system to a time after its destruction in the Late Bronze Age.

[30] Reymann 2018, 207ff. – These comparisons also show that the presence of a fortification does not per se implicate the existence of a hierarchically structured society (ibid. 215ff, 219).

[31] Hebert 1987, 224; Hebert 1988, 1988, 286–287. – For the trench system of Forst at Gleinstätten in a forest area named "Bauernhölzer" researched by W. Modrijan (Modl 2012a, 65) an Iron Age dating was suspected. Our investigations in the framework of the Iron-Age-Danube project have provided no evidence of Iron Age or prehistoric occupation.

[32] Kramer 1981, 218; Črešnar et al. (eds) 2015. – For La Tène period coin finds from "Platsch" see: Dembski 1972, 61; Kramer 1994, 54; Paulsen 1974, 122; Pink 1974, 57; Schachinger 2006, 25, 29.

[33] Selected publications: Schmid 1937, 16; Baš 1953, 181ff.; Lamprecht 1954, 66–72; Pahič 1966, 104, 128–136, 138f, T. 4; Kramer 1981, 218; Črešnar et al. (eds) 2015.

[34] Hebert 1993, 703.

[35] Hebert 1991, 258; Tscherne 1983, 16. – A survey from August 23, 1991 revealed that vineyards had largely destroyed the limiting ramparts of the plateau, so that only remnants in the eastern part were still recognizable. Late Bronze Age scattered finds from the area are kept in the Burgmuseum Deutschlandsberg. A re-commissioning took place during the Iron-Age-Danube project in March 2017, where the situation from the early 90s was confirmed.

[36] Fuchs 1988, 74.

[37] Z.B. Radimsky 1883; id. 1885; id. 1887; Radimsky/Szombathy 1888.

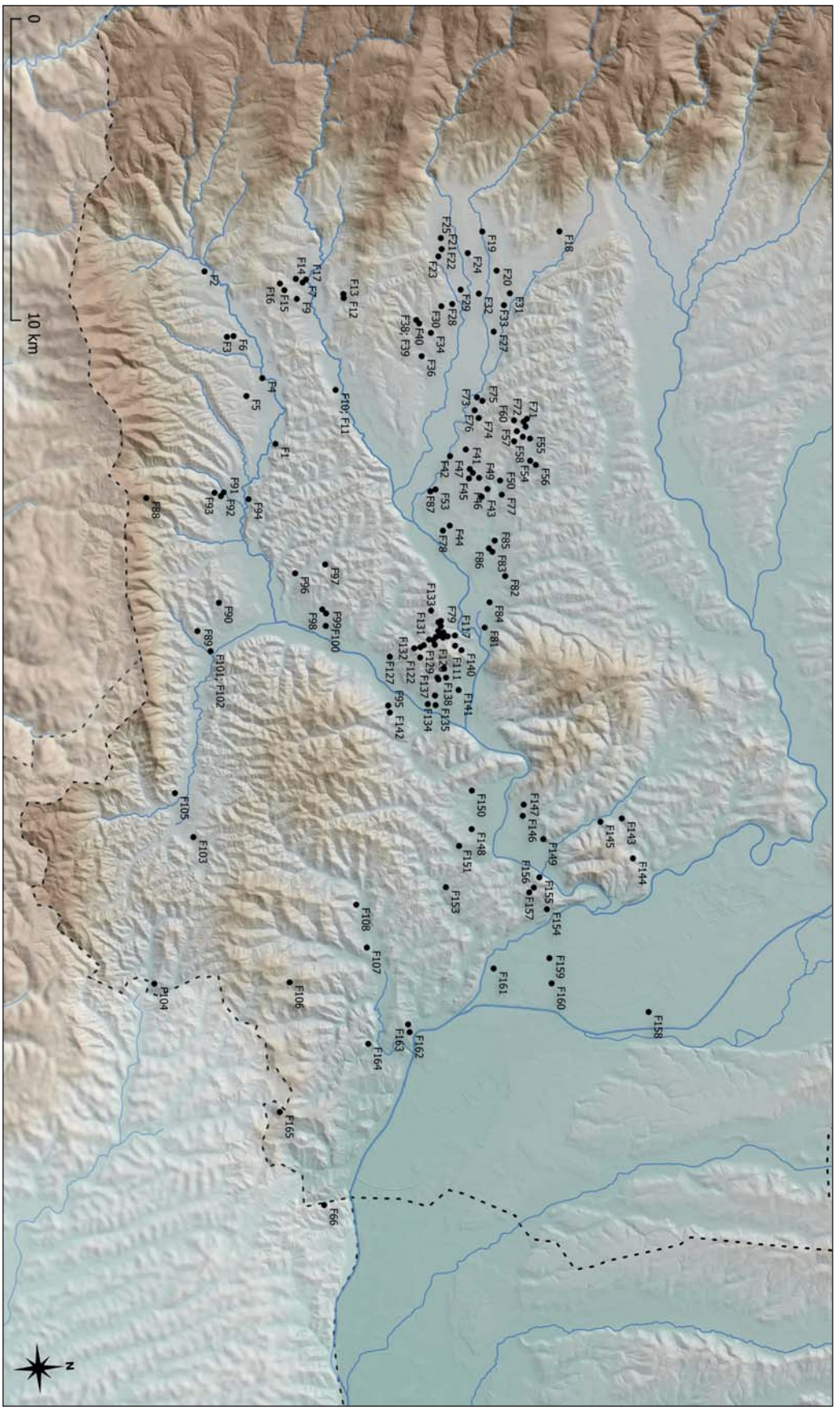

Fig. 5: Tumulus graves in the micro-region Großklein (map: M. Fera)

tumuli, as for example in Altenmarkt near Leibnitz[38] east of Frauenberg/Seggauberg, and are visually indistinguishable,[39] all identifiable tumuli groups of the micro-region were mapped.[40]

The micro-region Großklein was analysed in the context of the aforementioned questions. The analysis is based on a collection of references in a database.[41] The data on sites was collected by researching Joanneum's register of sites, publications, the evaluation of LiDAR scans and ortho-photos (GIS-Styria), field surveys, geophysical prospections and small trial-excavations.[42]

3. Settlement pattern analysis in relation to chronological framework, settlement proportions, necropolises, resources and communication

This chapter focuses on considerations about a settlement system or a hierarchy between the known Late Bronze Age and Early Iron Age settlements, so it seems appropriate to provide a brief overview of the research topic. The research of settlement systems, settlement hierarchies, cultural spaces, central locations and theoretical approaches such as the Central Place Theory has in the last 40 years been a focus in German-speaking and Anglo-Saxon research.[43] Mostly, the archaeological research of central places refers to the work of the geographer Walter Christaller, the founder of the Central Place Theory, from the 1930s.[44] The core of the Central Place Theory is the idea that in a homogeneous space a central place exists that has a surplus of meaning as well as resources and features (e.g. goods, services) that are missing in the surrounding places, therefore fulfilling central functions for a specific environment or territory.[45] Originally developed from an economic-geographic point of view, the Central Place Theory offers a good approach to the exploration of archaeological

[38] Selected publications: Fuchs 1996, 105ff.; Hudeczek 2003, 195ff.; Hampel 2005/2006, 223–279. – On the subject of the "Noric-Pannonian" tumuli and a (Hallstatt) "Renaissance" of this grave form see also: Hudeczek 2004, 533f and Porod B. and Porod R. 2010, 206–216. On a "Thrako-Cimmerian" dagger from the Gollikogel near Leibnitz see: Metzner-Nebelsick 2001b, 148.

[39] Pahič 1972; Hudeczek 2004, 533, fig. 11–12.

[40] Corresponding groups of tumuli, for which a dating to the Roman period has been indicated, are marked accordingly in the lists and maps.

[41] See Appendix (Lists and Catalogue / Tables). The collection of sites for the micro-region Großklein was created by P. Raggam and A. Hellmuth Kramberger. M. Fera (Vienna) was responsible for the creation of the maps in QGIS.

[42] Not only the results of surveys, geophysical prospections and excavations were used within the framework of the Iron-Age-Danube project, but also the research results of M. Mele on and around the Burgstallkogel from 2010 as well as those within the EU Projects "InterArch-Steiermark" between 2011–2013 and "BorderArch-Steiermark" between 2014–2015. The evaluation of LiDAR scans and ortho-photos (GIS-Styria) was carried out as part of "BorderArch-Steiermark" by S. Kiszter.

[43] See: Nakoinz 2008; Nakoinz 2009; Nakoinz/Steffen 2008, 381ff.; Krausse/Steffen 2008. Selected German studies: Fehn 1970, Denecke 1973, Gringmuth-Dallmer 1996, Müller 2006; Krausse/Nakoinz 2009. Selected Anglo-Saxon studies: Clarke 1977; Hodder 1977; Hodder/Orton 1976; Renfrew/Level 1979.

[44] Christaller 1933.

[45] Nakoinz 2009, 362; Nakoinz 2014.

landscapes or settlement systems. It is possible to integrate various older paradigms, as discussed in connection with the Iron Age princely seats and trading places (such as fortifications, imports, precious materials, rich graves in the environment, etc.),[46] as "key functions" in the model.[47] In addition, the central places can be examined as to their relation to their surroundings as well as their relations to other central places. In this context, the identification or demarcation of the territories of the central places plays an important role in providing information on the interaction spaces of the people in the catchment area of the respective central location and on its periphery.[48] One way of determining territories is to compute Thiessen polygons[49] or Voronoi diagrams, but these are ideal territories or an optimal spatial distribution that ignores natural conditions[50] and socio-cultural factors. Accordingly, the identification of ideal territories based on factors such as natural space or topographical landscape elements is closer to potential real territories.[51] As a reliable method of determining territories, more frequent mapping of site density is considered.[52]

As far as the identification of settlement hierarchies is concerned, it is first necessary to pre-define indicators that are based on the specific spectrum of material remains of the examined period and the examined area.[53] In addition to factor analysis as a method of multi-variant statistics, mathematical methods such as cluster analyses offer further possibilities in this context. If sufficient data is available for a group of similar settlements, then network analysis is a good choice. In contrast to Central Place Theory, which focuses on regional connections in a smaller area, network analysis highlights transregional interactions.[54] Thus, while the former is especially suited for observations in micro-regions, the latter is suitable for an analysis of the relationships between the micro-regions with their respective settlement system.[55]

Based on the initial questions concerning a settlement system or a settlement hierarchy in the micro-region Großklein, the present study will provide a GIS-based spatial analysis of settlement patterns in relation to various factors such as time, settlement size, distribution of necropolises, location of natural resources, fertility of soils and communication paths.

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[46] See, for example, Kimmig 1969. Gringmuth-Dallmer (1996) also defines similar central functions: 1. Dominion, 2. Protection, 3. Trade, 4. Raw materials and crafts, 5. Cult. In this sense, with reference to Kimmig, for example, fortifications would be synonymous for protection, prestige goods for domination, and imports for trade (see Nakoinz 2009, 364, Nakoinz 2014, 336).

[47] Nakoinz 2009, 362.

[48] Id. 364; Nakoinz 2014, 336.

[49] Thiessen 1911.

[50] For natural space factor analysis see: Nakoinz 2008, 392ff.

[51] Nakoinz/Steffen 2008.

[52] Nakoinz 2009, 365.

[53] Nakoinz 2009, 369ff.; Nakoinz 2014, 336.

[54] Nakoinz 2009, 370ff., 374; Nakoinz 2014, 336f.

[55] The supraregional integration of the Burgstallkogel in a network of Hallstatt power centres was last discussed by M. Egg and D. Kramer (see Egg/Kramer 2013, 419ff.).

3.1 Chronological framework

The Iron-Age-Danube project focuses on the Hallstatt period dated in our region from the turn of the 9th/8th century BC to the middle of the 5th century BC (Ha C0-Ha D3) (*fig. 6*).[56] The transition from the Late Bronze Age, the Urnfield period, to the beginning of the Early Iron Age, a time period between about 1000–700 BC, is in the Circumalpine area and in the Carpathian Basin characterized by a complex interaction process between local population groups and (cultural) communities from the North Pontic Steppe area to the Ciscaucasus.[57] Therefore both periods, Urnfield and Hallstatt period, cannot be considered as detached from each other, so we also included in our consideration sites from the (late) Urnfield period.

The name of the period (e.g. Iron Age, Early Iron Age, Hallstatt A...)	Beginning	End	unique_name (IAD Database Chronology)
Early Urnfield culture/period (Bz D)	1300	1200	Austria | Styria | Early Urnfield culture/period (Bz D)
Older Urnfield culture/period (Ha A1)	1200	1100	Austria | Styria | Older Urnfield culture/period (Ha A1)
Middle Urnfield culture/period (Ha A2)	1100	1050	Austria | Styria | Middle Urnfield culture/period (Ha A2)
Younger Urnfield culture/period (Ha B1)	1050	950	Austria | Styria | Younger Urnfield culture/period (Ha B1)
Late Urnfield culture/period (Ha B2/3)	950	800	Austria | Styria | Late Urnfield culture/period (Ha B2/3)
Early Hallstatt culture/period (Ha C0)/Podzemelj 1-2	800	720	Austria | Styria | Early Hallstatt culture/period (Ha C0)/Podzemelj 1-2
Older Hallstatt culture/period (Ha C1)/ Sticna 1	720	670	Austria | Styria | Older Hallstatt culture/period (Ha C1)/ Sticna 1
Older Hallstatt culture (Ha C2)/ Sticna 2	670	600	Austria | Styria | Older Hallstatt culture (Ha C2)/ Sticna 2
Younger Hallstatt culture/period (Ha D1)/ Serpentine fibula-horizon	600	540	Austria | Styria | Younger Hallstatt culture/period (Ha D1)/ Serpentine fibula-horizon
Younger Hallstatt culture/period (Ha D2)/Certosa fibula-horizon	540	500	Austria | Styria | Younger Hallstatt culture/period (Ha D2)/Certosa fibula-horizon
Younger Hallstatt culture/period (Ha D3)	500	450	Austria | Styria | Younger Hallstatt culture/period (Ha D3)

Fig. 6: Chronology table of the Late Bronze and Early Iron Age in Styria (Austria)

If we look at the dating of the known settlements in our working area (*fig. 7*), it becomes clear that the majority of known and better researched hilltop settlements along the Sulm between Leibnitz and Gleinstätten have a longer settlement history, partly dating back to the Copper Age. For us, the settlements with continuity from the Late Bronze Age to the Early Iron Age are of relevance. This applies also to the "Platsch" near Graßnitzberg and the settlement at the "Hoarachkogel / Herrschaftswald" in

[56] With regard to the structure of the Hallstatt period and the discussion about absolute data of individual stages, which are relevant for the micro-region Großklein, we would like to refer in particular to the following publications: Teržan 1990; Metzner-Nebelsick 2001; Hennig 2001; Trachsel 2004; Dular 2013; Teržan/Črešnar 2014. A summary for Styria can also be found in: Tiefengraber 2015a, 465; id. 2015b, 593. The relevant chronological studies also served as the basis for the chronology used in the Iron-Age-Danube database: https://iron-age-danube.eu/browsing/periods

[57] Metzner-Nebelsick 2001, 475–493, 488 fig. 212.

Bubenberg near Spielfeld in the Austrian-Slovenian borderland, which have also been recently archaeologically researched.[58] Mostly the settlements were not founded in the Hallstatt period, but already established beforehand and longer used. For all those settlements in the western part of the micro-region, i.e. west of Gleinstätten, which are assigned to only a single period of time, such as the Kigerlschneiderkogel near Aug, the research situation is usually poor and an assessment therefore problematic. This is even more obvious for those hilltop settlements in the southern part of the micro-region, where no reliable data on their dating is available.

There is an ongoing lively discussion on the chronological framework of the settlement

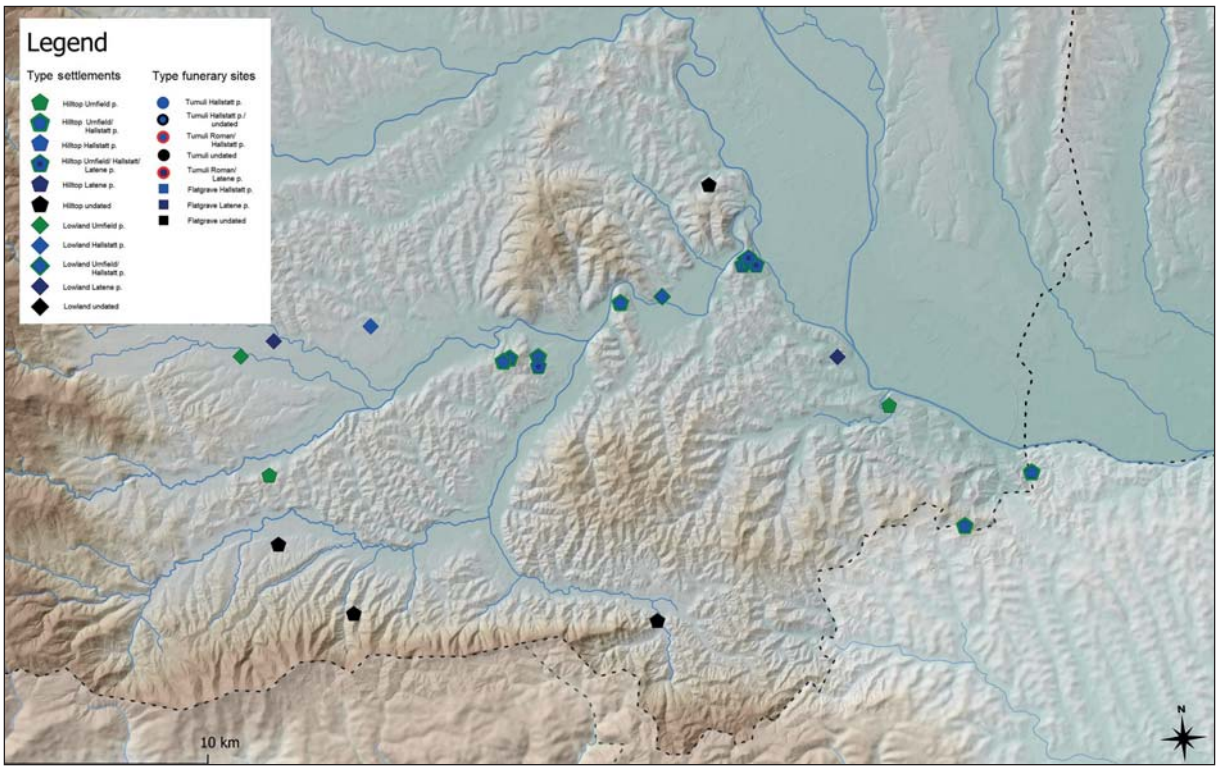

Fig. 7: Chronological classification of the settlements in the micro-region Großklein (map: M. Fera)

on Burgstallkogel and the occupation of the Sulm valley necropolis, which will only be summarized very broadly here, for general understanding.[59] As far as the occupancy of the necropolis is concerned, according to the current state of knowledge, a

[58] See below and Črešnar et al. (eds) 2015.

[59] Information on the absolute chronology of the Hallstatt period and naming of the Hallstatt periods in early research / older literature (such as Schmid 1933, 272ff.) shall not be referred to below, since this aspect of the history of research has no relevance to the questions asked here; summaries of the chronology in the context of the princely graves can be found in: Egg/Kramer 2013, 389ff., Table p. 391 and Egg/Kramer 2016, 203ff., 205 Table 3.

continuous development from a Late Urnfield period substrate is assumed.[60] Based on typo-chronological comparisons of the metal and ceramic forms, Dobiat has identified three phases of occupancy for the Sulm valley necropolis. Referring to the Slovenian chronology of the Štajerska and Dolenjska groups, the oldest tumuli, such as the Höchschusterwald graves 24 and 32, were placed in an Urnfield-period tradition, compared with the late graves of the Ruše group (group of Maria-Rast) and parallelised with the oldest phase in Podzemelj 1-2 or Ha B3 (according to Müller-Karpe).[61] According to currently valid terminology, the Podzemelj 1-2 stage, which is comparable with the HaC0 level defined by H. Hennig for southern Germany,[62] forms a transitional horizon between the Late Urnfield period phase Ha B2/3 and the Early Hallstatt period Ha C1 (Stična 1 for Štajerska and Dolenjska group) (see *fig. 6*).[63] Recent studies show that the earliest Urnfield period flat graves of the Masser-Kreuzbauer necropolis of Kleinklein date to Ha B1 at the latest.[64] In absolute chronological terms, it moves between the middle of the 10th century BC to the last quarter of the 8th century BC.

The ceramic material, which was discovered in the central area of the settlement on the Burgstallkogel, was described by Dobiat as well comparable, respectively, similar to that which was known at that time from numerous other hilltop settlements in Eastern and Western Styria, as well as from find complexes which belong to Late Urnfield cultural groups in the northwest-Alpine and middle Danubian area.[65] The earliest occupation on the Burgstallkogel is assumed for the time horizon of the late Urnfield-period phase Ha B2/3 (according to Müller-Karpe), whereby this chronological position needs to be corrected to a slightly later date, according to the oldest Urnfield-period graves. For the "transition" to the Hallstatt period, Dobiat emphasized a continuous development in the material culture.[66] Remarkably, in spite of the continuous development in the material culture with respect to ceramics, several cultural strata could be separated from one another by burned layers.[67] The first burned layer on Burgstallkogel was temporally associated with just that phase of the "transition" from the Late Urnfield period to the Early Hallstatt period. At a time when many other hilltop settlements in Styria were abandoned.[68] On the Burgstallkogel, however, it did not lead to an end of the settlement occupation

[60] Dobiat 1980, 166ff. – Studies of the 50s and 60s, such as R. Pittioni (1954, 723ff.) and G. von Mehrhart (1969), focused mainly on the dating of outstanding items such as the bronze cuirasses.

[61] Dobiat 1980, 166–168. For the Late Urnfield grave in Tumulus 24 in the Höchschusterwald group see also: Lippert 2007, 40.

[62] Hennig 2001, 88–89.

[63] Teržan 2008/2010, 293, fig. 42; Teržan/Črešnar 2014, 723, fig. 44, 724.

[64] A total of four graves of the Masser-Kreuzbauer necropolis of Kleinklein were dated in Ha B, whereby grave 11 is supposed to coincide with the transition from Ha A2 / B1 (ibid. 37, cf. Bernhard 2003, 83f., 109ff., Pl, 1–2; 14,3–9; 20,1; 21,2; 22,3–6; Tiefengraber 2005, 193). Also tumulus 17 in Forstwald and in Precklwald grave 14 have strong elements from the Urnfield period (Smolnik 1994, Gleirscher 2006, 92). Extensive flat grave cemeteries dated to the Late Bronze Age are still missing.

[65] Dobiat 1990, 62; Smolnik 1994.

[66] Dobiat 1990, 68f.

[67] Ibid. 61f., 63 table 4, 68f.

[68] Ibid. 64.

or hiatus, but the destroyed houses were renewed and the settlement continued, just to become victim of a new catastrophic fire shortly thereafter.[69] Based on the excavation results, Dobiat presumed only for the period after the second destruction that a reduction of the settlement area occurred during the Early Hallstatt period.

Of particular importance are the results of radiocarbon dating, which could be obtained in the course of the research on Königsberg in the frame of the Iron-Age-Danube project. First research of the settlement on Königsberg was carried out in the 1960s by the Institute of Prehistoric and Historical Archaeology of the University of Vienna, but the results of the excavations remained completely unpublished.[70] In 2016, research was restarted by the Department of Archaeology & Coin Cabinet at the Universalmuseum Joanneum.[71] While the investigations in 2016 focused on the northern part of the northern settlement terrace near the first rampart, in 2017, a test trench was dug in the southern part of the northern terrace in the area of a strong geomagnetic anomaly[72] as well as in the area of the rampart of the passage to the southern settlement terrace and central plateau (*fig. 8*).

While the northern settlement terrace is today forested, the southern is used as arable land.[73] Due to the recent use of the passage to the arable land on the central plateau, the rampart at this point is massively threatened by erosion. The work at the rampart in excavation trench 1 focused on cleaning the rampart profile and the recognition of its structure, while the work was supported by the results of a geoelectric profile

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[69] A destruction horizon with traces of fire was also discovered in the course of the excavations in 2013–2014 by the Universalmuseum Joanneum under the direction of M. Mele in the area of the northwestern terraces (Mele 2019, 358f.). The remains of a burnt down building came to light in 2015 in the vineyards on the southwestern flank of the Burgstallkogel (ibid. 359ff.). The extensive remains of charred beams and burned clay testify to the fact that it was a log cabin, built directly on the natural bedrock, with a stamped clay floor (and clay-plastered walls) dating back to the late 7th / early 6th century BC (Ha C / D1), which was destroyed by fire.

[70] In the archives of the Bundesdenkmalamt Österreich a report from Univ. Prof. Dr. Fritz Felgenhauer from the University of Vienna is preserved. The locations of the excavation trenches were able to be identified with the help of the land owners and are partly still visible.

[71] The title of the project was "Der Königsberg bei Heimschuh – eine prähistorische Festung über der Sulm" / "The Königsberg near Heimschuh – a prehistoric fortress above the Sulm". In the course of the project involving the Universalmuseum Joanneum and the Institute of Archeology of the Karl-Franzens-University Graz, archaeological excavations and a geophysical survey were carried out in the area of the ramparts and in the inner area of the settlement as part of an international excavation camp.

[72] Mele 2019, 368 fig. 14. – The geomagnetic anomaly proved to be of geological origin, whereby the increased magnetic susceptibility of the geological material in this area can be explained by a higher proportion of iron minerals in the rock. Archaeological findings in the form of stone foundations, post holes or settlement pits could not be documented, only in the upper layers SE 001 and SE 002 individual small ceramic fragments were recovered, which date to modern times.

[73] During field visits in the frame of the preparation for the excavations in spring 2017, only a few fragments of prehistoric ceramics were discovered on the surface. At the northwestern corner of the central plateau, fragments of burned clay were spotted on the outer side of the rampart in summer 2018.

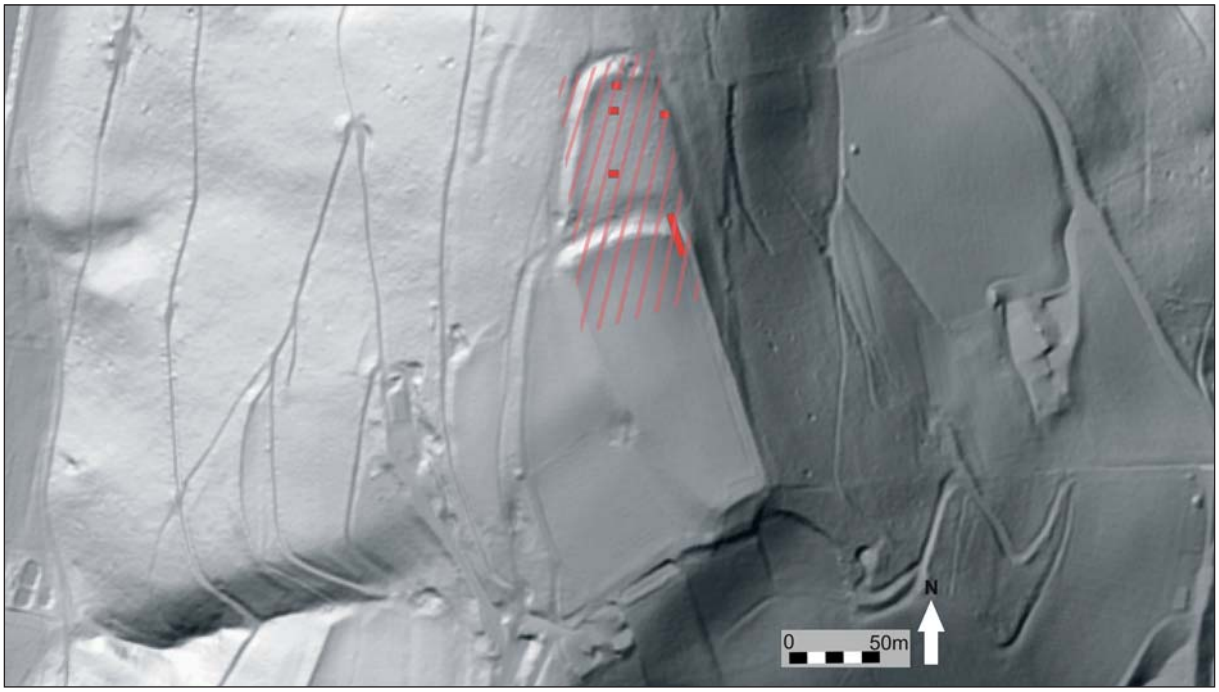

Fig. 8: Königsberg, geomagnetic measurements and excavation trenches 2016–2017

(ERT 3) made in 2016.[74] The passage itself was excavated only within a very narrow strip of about 1 m in width. The measurements of the geophysical surveys on the northern terrace revealed weak positive and negative anomalies that can be interpreted as foundations of stones, communication routes, or trenches filled with rock material.[75] Stronger magnetic anomalies (of the thermoremanent type) may indicate areas with burnt clay, however, in the case of trench 2 which was aimed to investigate one of those strong anomalies in 2017, this suspicion could not be confirmed. In the three test trenches of the year 2016, culture layers with pits, post holes and stone layers were found, ceramic finds were recovered only in very small quantities and in a poor state of preservation.[76] Charcoal samples for radiocarbon dating were taken from a pit (SE 034 - 2016), which may have been a hearth due to the fired clay, and a culture layer (SE 030 - 2016).[77] Both samples gave a time window between approx. 1000–800 BC (*fig. 9*), for the sample from the culture layer SE 030-2016 with 95.4% probability between 976–831 BC and for the sample from the pit SE 034-2016 with a probability of 95.4% between 893–795 BC. The geoelectric profile (ERT 3) on the inner rampart between the core of the settlement and the outer bailey had in 2016 displayed areas with high resistance values in which the high

[74] Mele 2017 (Bericht B zur Geophysik und Grabung Königsberg 2016 (66147.16.01 und 66147.16.02).
[75] Ibid.
[76] Diagnostic material was not available.
[77] The sample from SE 034-2016 (34066) was analysed in the Curt-Engelhorn-Centre Archaeometry Mannheim, the sample from SE 030-2016 (KIA-52333) in the Leibniz-Laboratory for Radiometric Dating and Stable Isotope Research, AMS 14C-Laboratory, Kiel. – Compare also Mele 2019, 368f.

resistance values (3000–5000 ohm) at the top of the rampart were interpreted as the remains of a stone wall and its ruins at the foot of the rampart.[78] The excavations in 2017 helped to clarify the structure of the rampart and also revealed a destructive horizon (burned layer) (*fig. 10*). It turned out that the rampart was a construction of (quarried) stones and sand / earth with a small ditch positioned in front of it, which had been built on the geological underground.[79] In the profile, several (at least four) phases were registered as well as subsequent erosion processes, which can be brought into line with the geoelectric profile. From the burned layer SE 04-2017, several charcoal samples were taken for which radiocarbon dates were obtained.[80] All samples gave with 95.4% probability a time window between the early 10th–9th century BC (*fig. 9*).[81] The dating to the Late Urnfield period / Early Hallstatt period, indicated by the radiocarbon dates, is also reflected in the ceramics, although only a few diagnostic pieces were found (*fig. 12*).[82]

		CO_2 / Graphit	pMC†	Radiokarbonalter	$\delta^{13}C$‡
KIA-52329	**1) I-A-D Königsberg, Brandschicht** Holzkohle / Laugenrückstand	1,2 mg C / 1 mg C	71,12 ± 0,24	2738 ± 27 BP	-26,4 ± 0,3 ‰
KIA-52330	**2) I-A-D Königsberg, Brandschicht** Holzkohle / Laugenrückstand	1,2 mg C / 1 mg C	71,06 ± 0,23	2744 ± 26 BP	-26,8 ± 0,2 ‰
KIA-52331	**3) I-A-D Königsberg, Feuerstelle** Holzkohle / Laugenrückstand	1,4 mg C / 1 mg C	73,79 ± 0,24	2442 ± 26 BP	-24,7 ± 0,2 ‰
KIA-52332	**4) I-A-D Königsberg, Feuerstelle** Holzkohle / Laugenrückstand	1,1 mg C / 1,1 mg C	74,15 ± 0,23	2403 ± 25 BP	-26,7 ± 0,2 ‰
KIA-52333	**5) I-A-D Königsberg 16, Kulturschicht** Holzkohle / Laugenrückstand	1,6 mg C / 1,1 mg C	70,93 ± 0,23	2759 ± 26 BP	-24,8 ± 0,1 ‰
KIA-52334	**6) I-A-D Lieschen, Kulturschicht** Holzkohle / Laugenrückstand	1,4 mg C / 0,9 mg C	96,37 ± 0,26	297 ± 22 BP	-28,2 ± 0,2 ‰

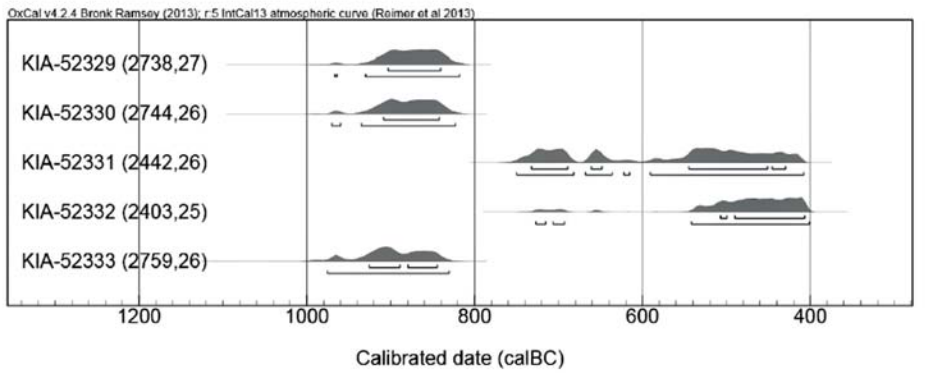

Fig. 9: Königsberg 2016–2017, radiocarbon dates

[78] Mele 2017.

[79] Mele 2019, 368f.

[80] The sample 34065 was analysed in the Curt-Engelhorn-Centre Archaeometry Mannheim, the samples KIA-52329 and KIA-52330 in the Leibniz-Laboratory for Radiometric Dating and Stable Isotope Research, AMS 14C-Laboratory, Kiel. – Compare also Mele 2019, 368.

[81] Sample 34065 with 95.4% probability between 996–843 BC, KIA-52329 with 95.4% probability between 967–819 BC and KIA-52330 with 95.4% probability between 971–824 BC.

[82] Compare Mele 2019, 369 fig. 16. – For example shallow bowls with inverted rim, with and without fluting, or a pot with a finger impression-decoration on the rim and plastic ledge with finger impression can be named.

Fig. 10: Königsberg, cleaned profile of the rampart with burned layer and technical plan of the surveying

Fig. 11: Hallstatt period fireplace at Königsberg

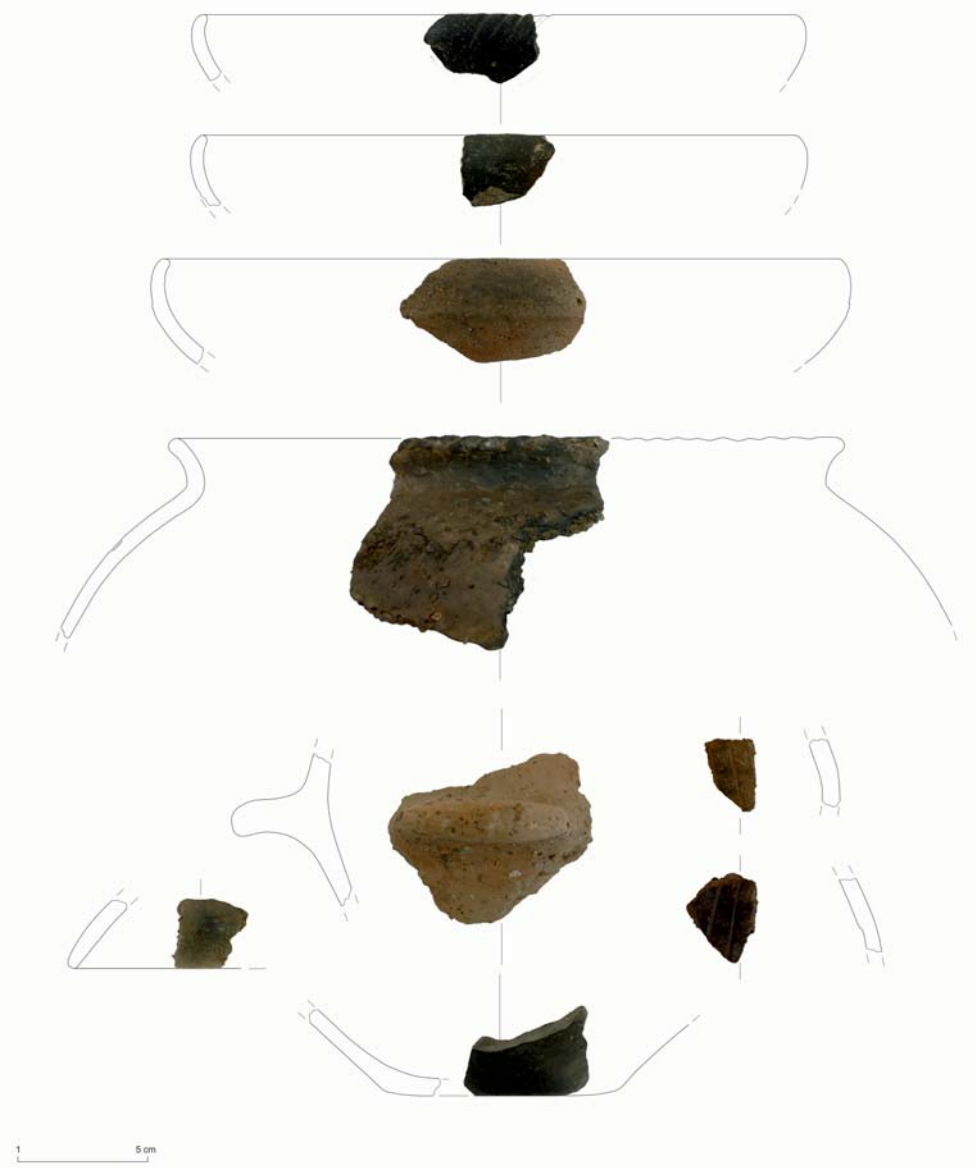

Fig. 12: Königsberg, ceramics from excavation trench 1

In contrast to the Burgstallkogel, the settlement on Königsberg does not show a comparable continuity during the Hallstatt period. Characteristic Hallstatt-C/D ceramic was not found during our research. A fireplace (SE 14-2017) (*fig. 11*), which was overlaid by eroded material from the rampart, yielded two dating results extending into the time frame of the "Hallstatt-plateau" between 800–400 BC (*fig. 9*).[83]

Regarding the settlement on the Frauenberg, the situation seems to repeat itself, even if the current state of research leaves many questions unanswered. N. Geigenberger notes that there are especially massive settlement strata for the late Urnfield-period, whereas strata for the following Iron Age seem to be much weaker.[84]

[83] The samples KIA-52331 and KIA-52332 from SE 14 were analysed in the Leibniz-Laboratory for Radiometric Dating and Stable Isotope Research, AMS 14C-Laboratory, Kiel.
[84] Geigenbauer 2008a, 3.

3.2 Settlement proportions

In the study of settlement systems and hierarchies, attention is generally paid to the size of the settlements and these are linked to the existence of central settlements, secondary centres and satellite settlements.[85] Due to the inadequate state of research on settlements in our micro-region (Großklein), it is only possible to make vague statements about the size or the actual extent of the populated area of the hilltop settlements dated to the Urnfield and Hallstatt period.

For the Burgstallkogel it was long assumed that the settlement mainly comprised the central plateau and the northwestern terraces as well as the western slope towards the recent quarry, as the use of these areas was proven on the basis of excavations.[86] An occupation of the settlement-friendly southern slopes was already suspected by Dobiat,[87] but could only be confirmed in the course of the excavations by the Universalmuseum Joanneum in 2015.[88] An extensive archaeological construction supervision between 2018 and 2019 showed that settlement activities also took place on the eastern slope.[89] It seems that a populated area of approximately 17.8 hectares can be expected (*fig. 13*),[90] although it remains unclear how densethe (simultaneous) occupation in the individual areas actually was and where the boundaries of the populated areas ran in the different time periods. The latter is mainly due to the fact that the settlement on Burgstallkogel has no visible defence system in the form of a rampart, which could provide evidence of a limitation of the settlement area. On the LiDAR scan, the central plateau and the northwestern terraces, which cover approximately 4.9 hectares (*fig. 13*), nevertheless distinctly emerge as an area transformed by human hand, and it is conceivable that it was used most intensively in different time periods. By contrast, the more or less steep slopes in the south and east are more likely to be interpreted as a sporadically used[91] space in the sense of an outer settlement. The spatial extent of this presumed central settlement area corresponds approximately to the size of the central settlement areas, usually the central plateau, of the fortified "princely seats" of the Late Hallstatt period in southwestern Germany, Switzerland and eastern France, which also had an additional, different sized outer settlement area.[92]

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[85] As an example, see case studies for the Early Iron Age southern Etruria (Amoroso 2016, 88ff.) or the Late Hallstatt and Early La Tène period in southwestern Germany (Pare 2008, 70ff.).

[86] Dobiat 1990, 19ff.; Mele 2019, 357 fig. 2.

[87] Ibid. 19.

[88] Mele 2019, 359ff.

[89] The archaeological construction supervision was led by M. Mele and P. Raggam under "Energie Burgstallkogel 2018 (66003.18.02)" and "Energie Burgstallkogel 2019 – Erweiterung Benda (66003.19.01)".

[90] C. Dobiat estimated the populated area to be 15–20 hectares (Dobiat 1990, 19).

[91] For the building (log cabin) on the southern slope, which was excavated in 2015, a short period of use towards the end of the Hallstatt settlement on the Burgstallkogel is assumed (Mele 2019, 366).

[92] Pare 2008, 70. – Pare cites, with reference to the respective relevant literature for example 3 hectares of settlement area for the Heuneburg central settlement area, 2.35 hectares for the Ipf near Bopfingen, 4–5 hectares for the Bitzgyberg or 4 hectares for the hilltop settlement Châtillon-sur-Glâne near Freiburg. The situation is different in Western Central Italy during

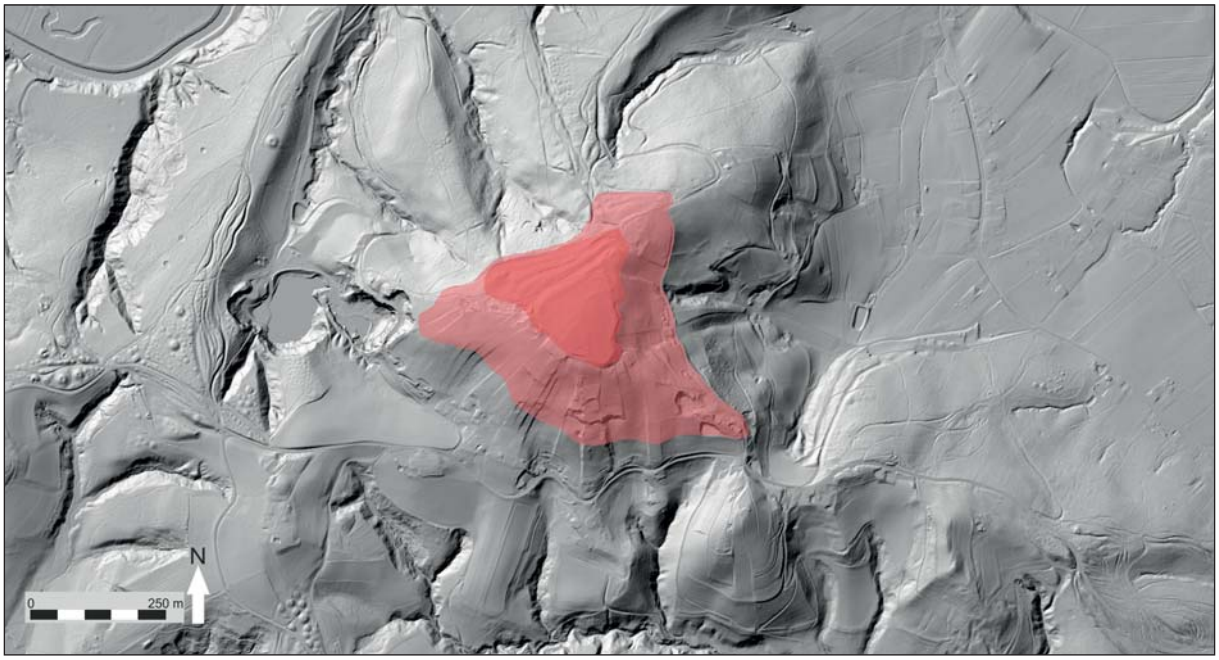

Fig. 13: Burgstallkogel with the presumed extent of the outer settlement areas (approx. 17.8 hectares) and the central settlement area (approx. 4.9 hectares)

Fig. 14: Frauenberg (approx. 13.4 hectares)

the Early Iron Age, for example, where the size of the proto-urban central settlements is between 85–185 hectares (southern Etruria) and 40–90 hectares (Lazio Vetus) (Amoroso 2016, 88, 90). Early Iron Age settlements with a size of 3–5 hectares represent the smallest unit here and are referred to as satellite settlements.

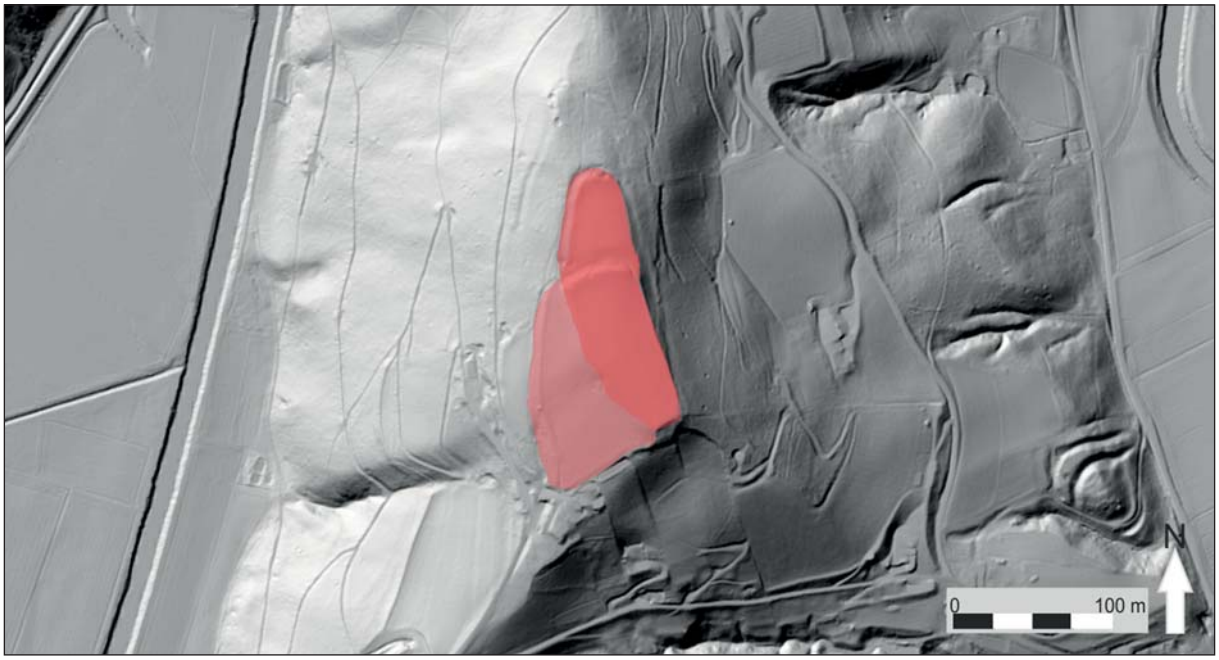

Fig. 15: Königsberg with central settlement area (approx. 1.5 hectares) and the presumed extent of the outer settlement areas (approx. 2.8 hectares)

Even more problematic is the situation on Frauenberg. Although there are traces of settlement activities from the Urnfield and Hallstatt period known for various areas,[93] especially on the top and the northern slopes, the exact extent of the settlement during those periods is completely unclear. The boundary of the settlement area on the top of the hill was estimated on the basis of still recognizable sections of a rampart,[94] which are also at least partially visible in the LiDAR scan (*fig. 14*). This area comprises approx. 13.4 hectares. With a view to the Burgstallkogel, it is assumed for the Urnfield and Hallstatt period that Frauenberg was also a central and more densely populated area as well as an outer part of the settlement. However, as there are too many unclear variables, it is not possible to say whether the populated area on Frauenberg was actually smaller than that on Burgstallkogel.

Despite all the research done in the last three years[95] our knowledge about the long-known prehistoric hillfort Königsberg in Nestelberg near Heimschuh is still limited, however, due to the good state of preservation of the ramparts a spatial limitation of the settlement area is clearly recognizable (*fig. 15*). For the Urnfield period we can assume with great probability that the central plateau and the adjacent northern terrace, an area of about 1.5 hectares, were populated. So far, there is no evidence of the use of the western slope as a settlement area on Königsberg, but in the LiDAR scan more rampart-like structures are recognizable, which may not only be related to the recent agricultural use of the area. If we included the western slope as a potential part of the settlement, it would result in an area of about 2.8 hectares for the Urnfield

[93] Geigenbauer 2008; Bartl 2008.
[94] Artner 1999, fig. 2; Geigenbauer 2008, 13 fig. 6; Tiefengraber 2015b, 622.
[95] Mele 2019, 367ff.

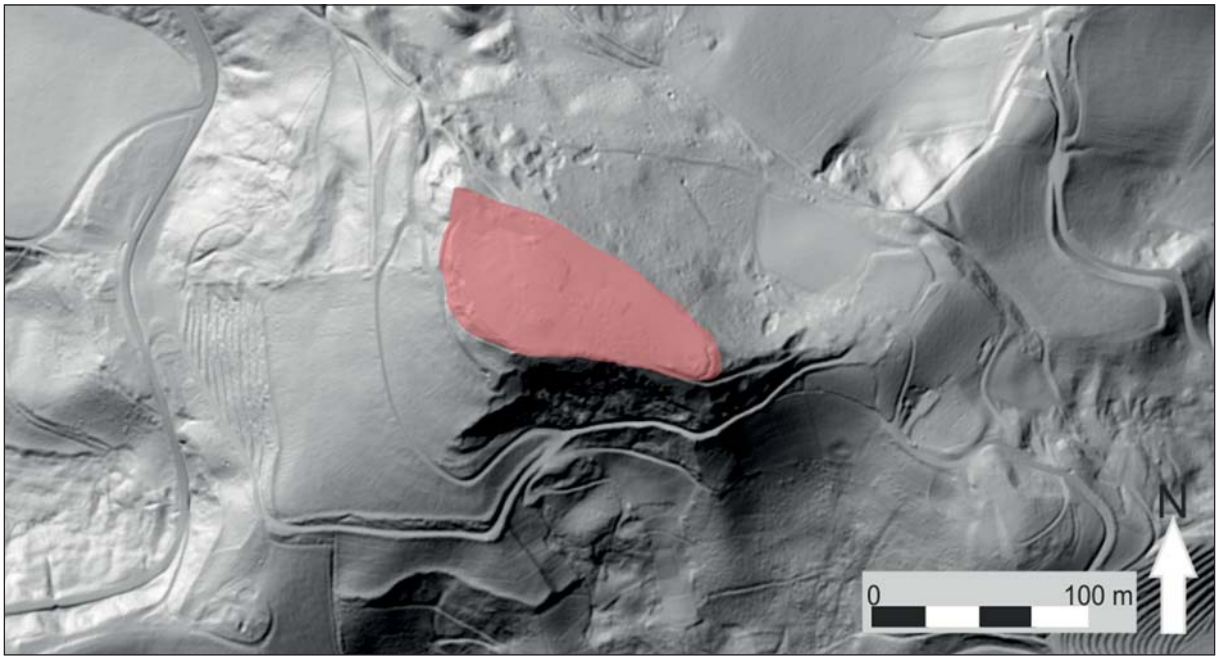

Fig. 16: Platsch with central settlement area (approx. 1.8 hectares)

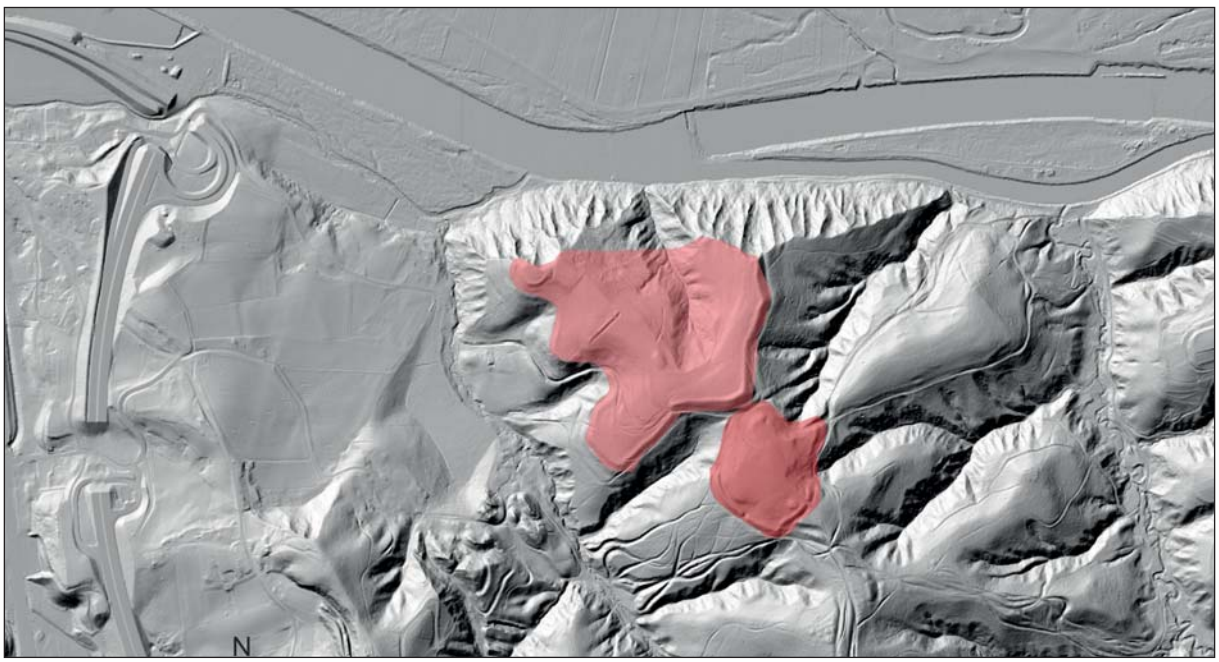

Fig. 17: Bubenberg (Hoarachkogel)-Novine with central area and outer settlement area (approx. 12.5 hectares)

period settlement with a central and an outer settlement area (*fig. 15*). As far as the use in the Hallstatt period is concerned, according to current findings, it was less intensely or even only occasionally used at certain points.

A similarly large area as Königsberg, 1.8 hectares, encircles the central plateau of the Urnfield and Hallstatt period settlement on the Platsch (*fig. 16*) southeast of Frauenberg in the Mur valley.[96] This settlement is associated with the nearby hilltop settlement of Bubenberg (Hoarachkogel)-Novine. Despite the branched form of the settlement, which is partly a consequence of landslides, the ramparts make a reliable estimation possible (*fig. 17*). The settlement on the Bubenberg consist of the core settlement area with approx. 9.4 ha[97] and a smaller fortified area in front of the main access point to the settlement with approx. 3.1 ha, which is dated to Lt D and can´t be considered as part of the Hallstatt-period settlement.[98]

Generally we are dealing with two types of settlements according to size: 1. Larger central places with more than 5 ha and 2. Smaller outpost with 1.5-2.5 ha. Between these types some chronological differences can be observed, since on Platsch and Königsberg the settlement activities are much more intensive in the Urnfield period but the sites remain in use in the Hallstatt period and the type 1 settlements have more intensive Hallstatt period settlement activities. It is also interesting to observe the straight-line distances between the settlements (*fig. 18*). The smaller settlements of type 2 lie in our cases in the vicinity or between bigger settlements. Platsch is 3.5 km away from Bubenberg, and the Königsberg between Frauenberg and Burgstallkogel at a distance of 4.5 km from each. The bigger settlements of type

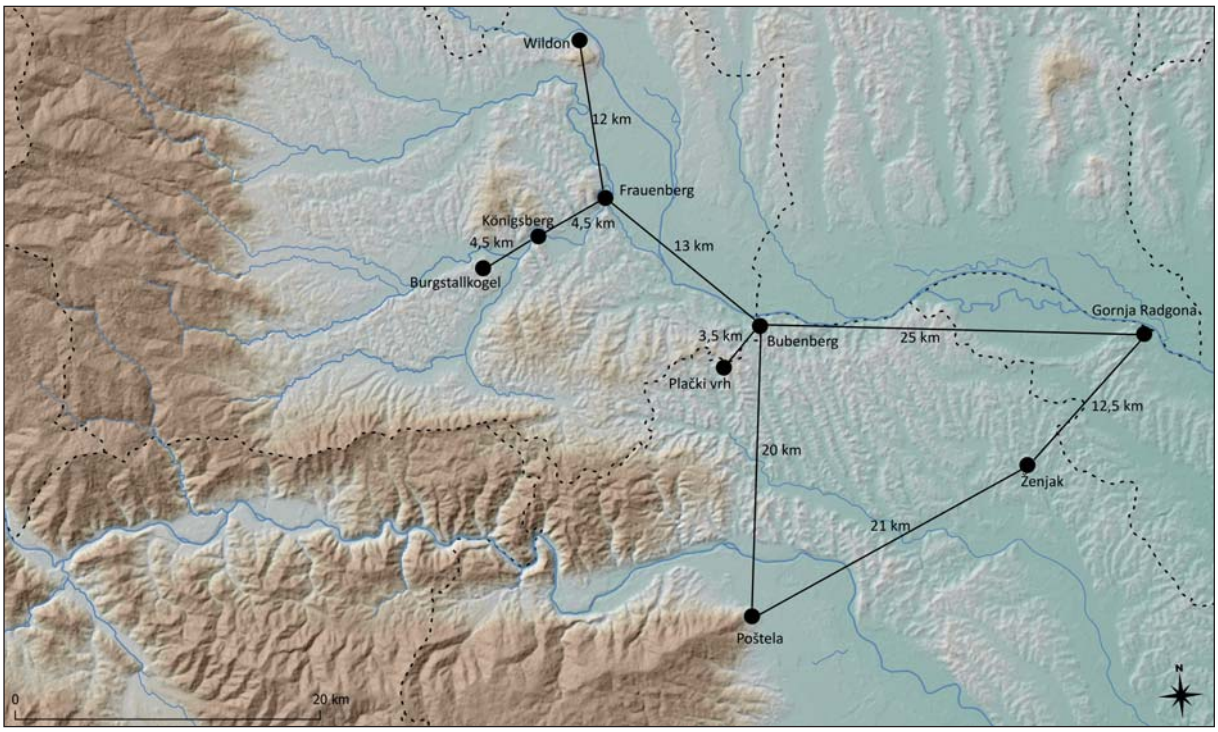

Fig. 18: Distances between settlements in the micro-region Großklein

[96] Gaberz/Kiszter/Mele 2015 a and b; Vinazza/Nanut/Mihelič/Črešnar 2015 a and b.
[97] The core settlement covers around 6 ha, if the part with the landslide is not considered.
[98] Vinazza/Nanut/Mihelič/Črešnar 2015a, 173–175.

have longer distances between them: Bubenberg to Frauenberg is around 12.5 km and Frauenberg to Burgstallkogel approx. 9.5 km.

3.3 Necropolises

When looking at the distribution of the necropolises (*fig. 19*), the concentration of tumulus-necropolises or groups of burial mounds around the Burgstallkogel settlement is overwhelming.[99] Beyond that within a radius of a bit less than 5 km around the Burgstallkogel, there are some other barely known tumuli, which are undoubtedly dated to the Hallstatt period. The few other groups are either completely undated or belong to the Roman period according to older data, as for example tumuli to the south in Nestelberg near Großklein or those to the northwest near Pistorf.[100] If we look eastwards, we discover the nearest tumuli in Nestelberg near Heimschuh.[101] The burial mounds are located about 1.4 km southeastward at the foot of Königsberg and it is conceivable that they are associated with the settlement, although their dating is unclear. The distance also seems relatively large considering the fact that no closer positioned groups are known. However, a little more than 1 km to the east of the burial mounds, there is a likewise undated material extraction area "Unterer Fahrenbach"[102] and it would also be conceivable that the small tumulus group and the extraction pits are related to a hitherto undiscovered flat land settlement. Towards the northeast, the closest tumuli are situated near Heimschuh on a ridge called "Teichwald"[103] at a distance of 1.8 km from Königsberg. These burial mounds are also undated and it seems questionable whether they can be linked – especially in view of their location on the other side of the river Sulm and behind a ridge – to the settlement on Königsberg.

In the western part of the micro-region, to the west of Gleinstätten especially in the municipalities of St. Peter im Sulmtal and St. Martin im Sulmtal, there are concentrations of tumuli found around Kerschbaum, Bergla, Dietmannsdorf im Sulmtal, Otternitz and Graschach (*see fig. 19*). Many of these tumulus groups have already been recorded by V. Radimsky as part of his research on prehistoric sites in the area around Wies,[104] but many of them were assigned to the Roman period[105] or are undated. Of particular interest are several groups of burial mounds in the Hartwald north of Graschach, since here, as noted above, the only known Hallstatt-period flat-

[99] Dobiat 1980. – Regarding the recent surveying of the Sulm valley-necropolis, compare Mele 2012.

[100] Radimsky 1883.

[101] The burial mounds were identified by S. Kiszter during the analysis of LiDAR scans in GIS Styria as part of the project BorderArch Steiermark and designated as "Tumulus Group 67".

[102] See also below in connection with the mineral raw materials (compare Artner 1998/99, 223, Kramer 2013, 18, Supplement 21, Egg 2013, 433, Supplement 24).

[103] In the so-called "Teichwald-group", traces of illegal excavations were detected in the year 1996/97 and afterwards inspections by the BDA (Bundesdenkmalamt) took place. Two groups of tumuli were designated as "Tumulus Group 65" and "Tumulus Group 66" by S. Kiszter as part of the BorderArch Steiermark project. The burial mounds were also inspected during a survey in the frame of the Iron-Age-Danube project in spring 2017.

[104] Radimsky 1883.

[105] Urban 1984.

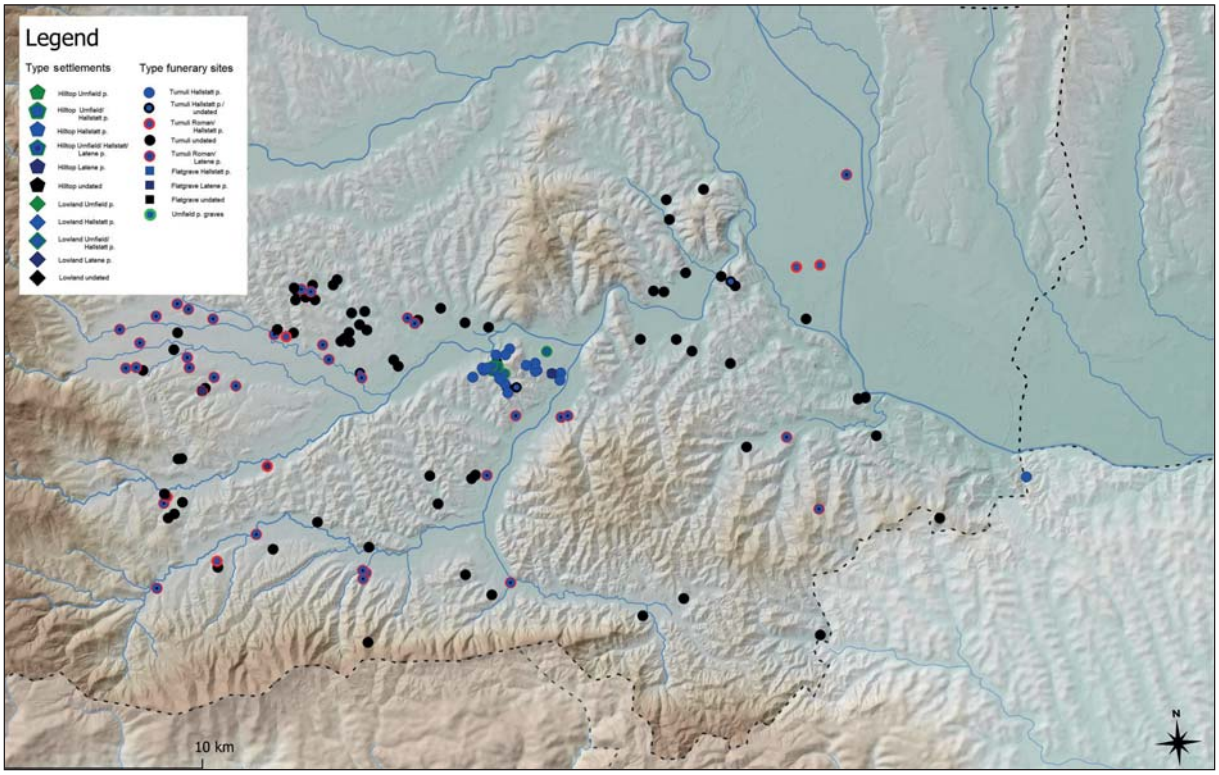

Fig. 19: Site chronology in the micro-region Großklein – burials (map: M. Fera)

land settlement is documented.[106] The distance to Burgstallkogel is slightly less than 6 km.

The tumulus cemeteries in the southern part of the micro-region in the Saggau valley, in the municipalities of Oberhaag and Eibiswald, have similar problems considering their dating. Most of the burial mounds are either undated or presumed to originate from the Roman period. Quantitatively, their numbers are much lower as in the Sulm valley. Groups of tumuli, which date undoubtedly to the Hallstatt period, are not proven here and the same applies to the settlements.

3.4 Natural resources

Exploitation and utilization of mineral resources is one of the main factors for settlement activities in any landscape. In particular, ores, as well as the subsequent trade with raw metal or finished products, play an important role in the Bronze and Iron Age. Considering the importance of the settlement on the Burgstallkogel and the material wealth of its inhabitants, which is clearly expressed in the burials of the Sulm valley necropolis, it is surprising that so far no evidence for Iron Age mining of the numerous iron ore deposits in the area exists (*fig. 2*). However, traces of Early Iron Age mining could have been destroyed by the intensive mining in the 19th century, especially on the northern side of the Burgstallkogel (KG Mantrach, plots 302 and 303), where from 1856 to 1883 a dense, quartz- and mica-rich hematite

[106] Kramer 1981, 128f.; id. 1987, 224; id. 1988, 286–287; Bernhard/Hebert 2000, 91–99; Raab 2006, 257–286; Tiefengraber 2015c, 556–560.

was mined.[107] The same applies to mining pits (Pingenfeld) south of Heimschuh in the district "Unterer Fahrenbach". Mining of deposits of bog iron ore in the Iron Age was assumed there repeatedly,[108] however, due to the good state of preservation of the pits, mining probably took place in later times.[109] Since the ore deposits in the region Sulmtal-Sausal represent the only significant iron ore deposits in southern Styria and the Hallstatt period, central settlements and "princely seats" often sought to be close to such deposits,[110] the presence of mineral resources on Burgstallkogel was decisive for the choice of this location for a settlement – which is actually off the main trading route along the Mur. Beside mining traces, the micro-region also lacks any indications of iron ore smelting or forging during the Early Iron Age. So far, the only evidence for metallurgic activity in the Early Iron Age was found on the plateau of the Burgstallkogel, where five slags were discovered, but these are assigned to non-ferrous metal processing.[111] How the settlement on the Burgstallkogel was supplied with raw copper and bronze is also completely unknown. One possibility is trading contacts to Upper Styria, where numerous copper ore deposits exist, which might have been exploited even in the Early Hallstatt period.[112]

In view of the fact that in the burials of the Sulm valley necropolis jewelry made of gold was found, even if we have to regard them as imports,[113] the alluvial gold deposits in the Mur near Leibnitz must be mentioned.[114]

Of minor importance as a raw material are mineral pigments such as limonite (ochre, bol / bolus) and graphite. Characteristic of many vessels from the Sulm valley necropolis are red engobes and black-grey graphite paintings.[115] The raw material for this could come from the Sulm valley, where between Heimschuh and Seggauberg several deposits of earth colours are known,[116] as well as near Fresing a small occurrence of graphite.[117]

Another important aspect for the establishment of a settlement besides access to water was the availability of mineral resources, topography and strategic position, also the usability of soils for agricultural activities. Of course, the current status cannot be transferred to the Late Bronze Age and Iron Age, nevertheless, a mapping of the settlements against the background of today´s soil conditions was carried out on a

[107] Weiss 1973, 90f. and 93f.; Dobiat 1980, 39; Dobiat 1990, 19, 48.
[108] Artner 1998/99, 223; Egg/Kramer 2013, 18, Supplement 21 and 433, Supplement 24.
[109] Tiefengraber 2015a, 572. See also chapter "Landscape division and geology".
[110] Examples include the Falkenberg near Strettweg / Judenburg in Austria (see Tiefengraber 2015a, 571f., Tiefengraber 2015d, 543f.) and the Cvinger hilltop settlement near Dolenjske Toplice in Slovenia (see Črešnar et al., 2017, 79–93). Also, in the surroundings of the Early Iron Age central settlement closest to the Burgstallkogel, in the area of Wildon, there are iron ore deposits as well as undated mining pits (see Hiden 2008, 5f., fig. 1, 3).
[111] Hebert/Preßlinger 1990, 48f., fig. 13–15; Modl 2012b, 107.
[112] Modl 2012b, 100f., fig. 11; Eibner – Preßlinger 2014, 13f.
[113] Dobiat 1980, 148f.
[114] About alluvial gold in the Mur: Urban 2009, 22–27. See also the distribution map of the gold deposits for Austria in Niedermayr/Seemann 1975, 24f., fig. 11 with a reference to alluvial gold deposits in the area around Leibnitz.
[115] Dobiat 1980, 127f.; Egg/Kramer 2013, 364f.
[116] Weber 1965, 102–106; Weiss 1973, 95.
[117] Scharfe 1981, 118.

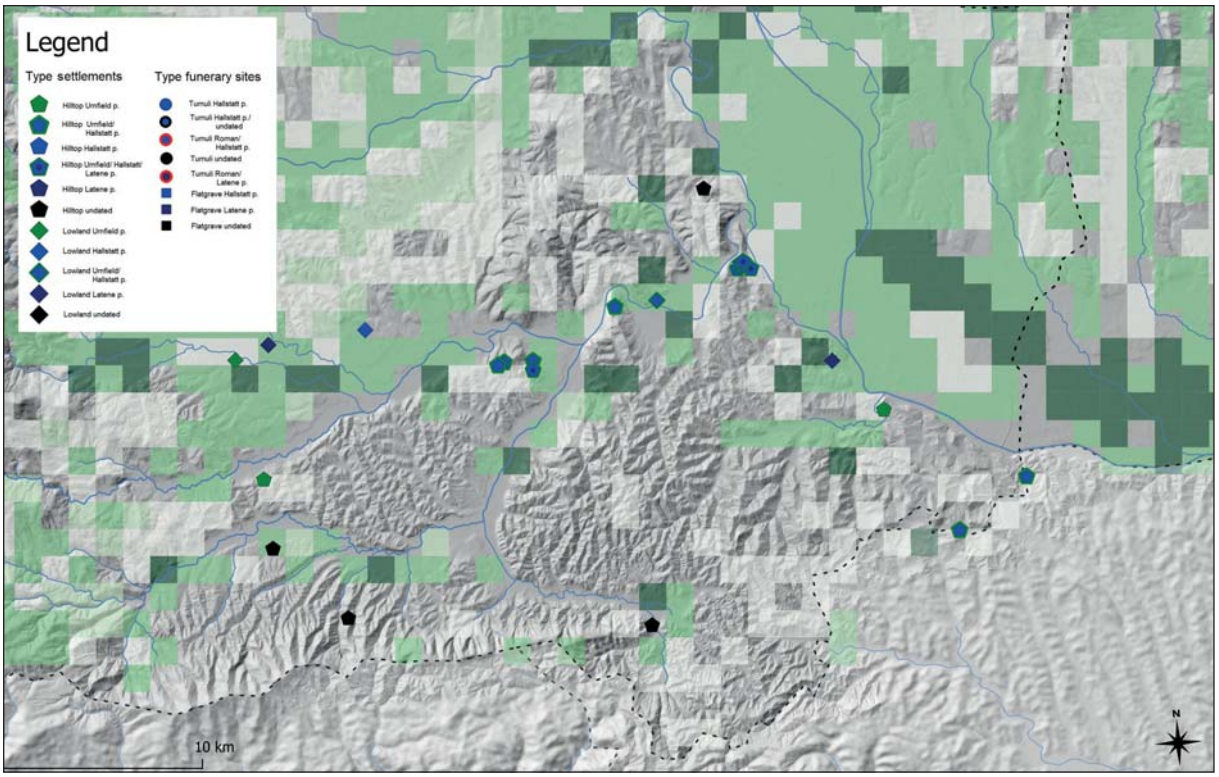

Fig. 20: Suitability of the soils for agriculture in the micro-region Großklein with the locations of the settlements (map: M. Fera)

trial basis.[118] The respective soil form determines with its specific soil properties, such as feedstock, slope or the humus and carbonate content, the usability or significance as a cultivation area.[119] In particular, parameters such as feedstock and slope were also valid in prehistory, which means that the map for the usability of soils can certainly also be regarded as an indicator for the choice of the location of the Late Bronze Age and Iron Age settlements. Considering the suitability of the soils for agriculture in the micro-region Großklein with the positions of the settlements (*fig. 20*), it is noticeable that the plains of the Sulm valley are well suited for agriculture, but are not among the best zones (dark green), which can be found in the wide Mur valley between Wagna and Mureck. Furthermore, it is noticeable that all three hilltop settlements in the Lower Sulm valley (Burgstallkogel, Königsberg, Frauenberg / Seggauberg) are partly in areas that are classified as poorly suited for farmland (white), whereby it must be taken into account that the grid is relatively rough and not all areas are covered by a mapping (grey). On the other hand, however, it is precisely the transition zones to the plains of the rivers Sulm and Saggau in the vicinity of Burgstallkogel that are classified as particularly favourable (dark green) for grassland or pastures (*fig. 21*). This is particularly noticeable in comparison to the adjacent Laßnitz valley in the north, where no comparable situation exists.

[118] Basis is eBod, Digital Soil Map (https://bodenkarte.at). The extent of forested areas or marshes in the Bronze and Iron Age cannot be estimated, so the transferability of the data to past conditions is very limited.

[119] https://bodenkarte.at/#/center/15.5969,46.73/zoom/13.

In general, it can be said that the Late Bronze Age and Iron Age hilltop settlements in the Lower Sulm valley lie in geologically and ecologically strongly articulated zones. For the Near East, it has been stressed that the earliest permanent settlements were preferably located in such strongly articulated zones found at the foothills or in mountainous areas, since these have a greater variability in species of plants and animals, thus provide the widest possible range of food sources and usability.[120]

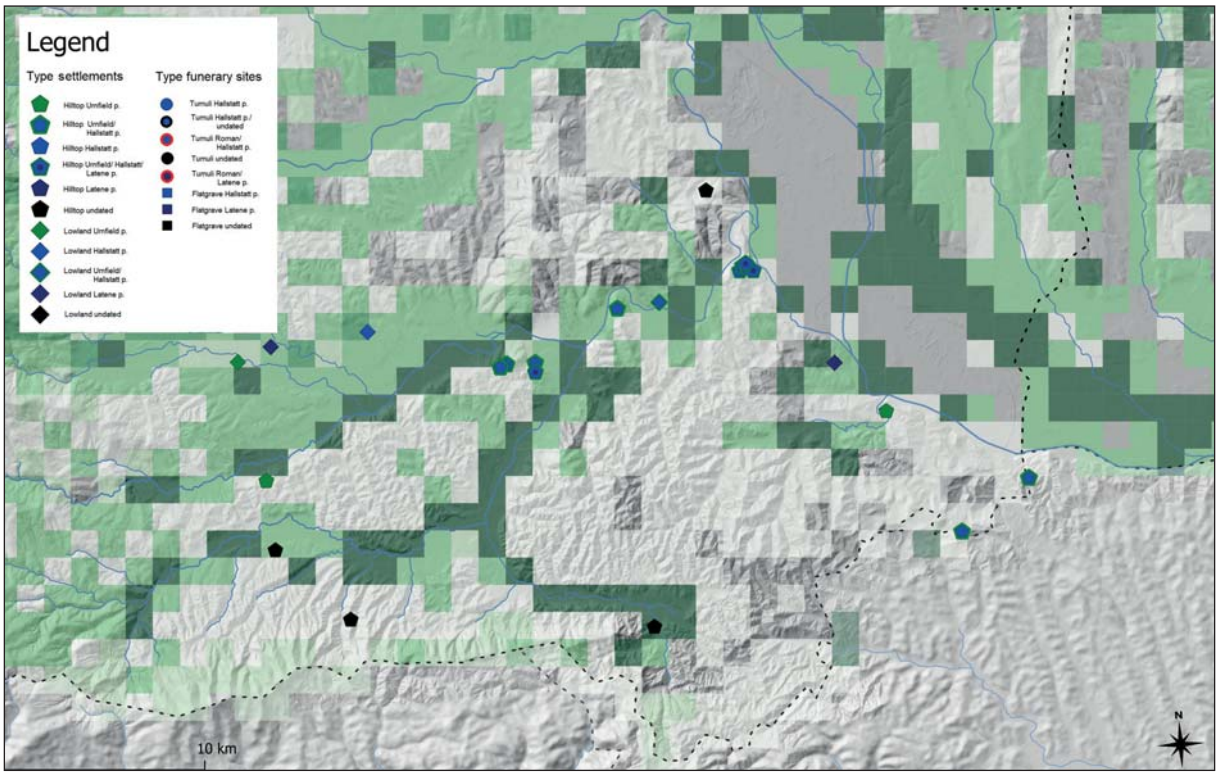

Fig. 21: Suitability of the soils for grassland and pastures in the micro-region Großklein with the locations of the settlements (map: M. Fera)

3.5 Communication

Our working area is determined by the course of the rivers Sulm and Saggau (with their tributaries), which unite east of the Burgstallkogel near the modern-day village of Wippelsach. Today, the Sulm flows between Unterlupitscheni and Obervogau into the Mur, which in turn flows at Legrad on the Croatian-Hungarian border into the Drava, one of the most important of the right tributaries of the Danube. Rivers were considered in the past as the most relevant of communication routes, which seems to also apply to our micro-region.

For the Urnfield and Hallstatt period, it is likely that settlements also existed closer together along the river valleys, even though little information on lowland settlements from that time is currently available. According to the Joanneum's archives from 1981, presumed settlement remains in the form of a black burned layer and ceramic

[120] Nissen 1983, 19ff.

fragments were found north of Heimschuh in the course of the construction of a moat. Ceramic remains dating to the Urnfield, Hallstatt and to the Latène period were identified.[121] Traces of Hallstatt period lowland settlements were discovered in the western part of the micro-region in the municipality of Sankt Martin im Sulmtal (Graschach[122] and Bergla / Sulb[123]). In particular, the Hallstatt settlement in Hartwald near Graschach represents the first known and extensively researched lowland settlement in Styria. The settlement with its position at the edge of the valley is located about 3 km northwest of Burgstallkogel in relative proximity of several undated burial mounds on a tertiary loam terrace.[124] In addition to numerous Ha C / D1-period ceramics,[125] settlement traces in form of pits, ditches from walls, clay daub, charcoal and stone paving were discovered.[126] Indication for a presumed lowland settlement dating to the (early) Urnfield period are also available for the municipality of Sankt Peter im Sulmtal.[127] The previously mentioned lowland settlements are within a radius of 3–12 km distance from the Burgstallkogel.

Another important factor might be the visual contact, which depends on geomorphology and distances between settlements. The line of visual communication to the east from the Burgstallkogel is especially notable. A direct visual contact exists between Burgstallkogel and Königsberg and even Burgstallkogel and Frauenberg, which lies almost 10 km to the east (*fig. 22*). In a western direction, one might have had visual contact from the Burgstallkogel to the settlements in the Sulm valley around Sankt Martin im Sulmtal, although the presumed lowland settlement near Heimschuh would not have been visible from there, but from the plateau of the Königsberg.

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[121] Leibnitz aktuell VI/81, Leibnitz-Graz 1981, 2–3; UMJ OA. E. Staudinger, "Fundbericht begonnen am 29.5.1981, 9.6.1981".

[122] Kramer 1981, 128f.; Hebert 1987, 224; id. 1988, 286–287; Bernhard/Hebert 2000, 91–99; Raab 2006, 257–286; Tiefengraber 2015c, 556–560.

[123] These are presumed settlement finds (post holes, discolorations and other settlement remains such as burned clay daub), which came to light in the course of the investigation of a small tumulus-group ("Kreuzbergl") with intervening flat-graves from the Hallstatt-period (Artner 2004; id. 2007, footnote 4; Tiefengraber 2015b, 511). Settlement material was obviously used to pile up the burial mounds (see Artner 2004, 867). The site is located about 12 km west of the Burgstallkogel.

[124] Tiefengraber 2015c, 556ff.

[125] Hebert/Lehner 1996.

[126] In total, there are 23 settlement objects that were documented during several rescue excavation campaigns. Post holes were barely detected, suggesting that mainly log buildings had been erected (Tiefengraber 2015c, 558). The building discovered on the southern slope of the Burgstallkogel (see Mele 2019, 359ff.) was a log cabin as well.

[127] Joanneum's register of sites; B. Hebert. – The available information on the site is very imprecise. In detail it concerns the report of an increased ceramic concentration discovered on April 6, 1999 by A. Steffan. The site was visited by B. Hebert on April 7, 1999, a small-scale excavation was carried out by Archaeo Norico in 2006 and are said to have yielded early Unrfield-period ceramics, bones and charcoal in a pit (which could also speak for a grave).

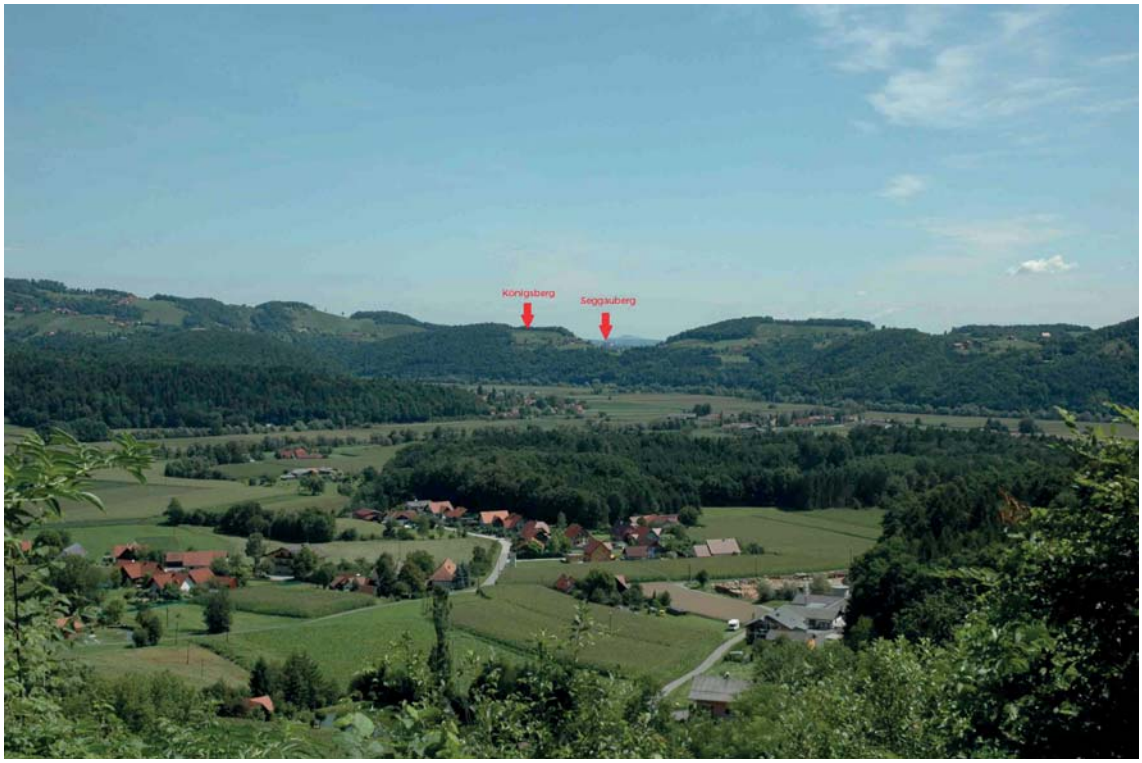

Fig. 22: View from Burgstallkogel towards Königsberg and Seggauberg

4. The Early Iron Age landscape of Großklein in transnational context

As noted above, the Burgstallkogel and the Sulm valley necropolis have attracted the interest of researchers since the beginning of the 19th century, in particular due to the remarkable grave goods which were found in the "princely graves". The finds ignited discussions on transnational contacts and relations with the neighbouring regions in recent decades.[128] These cultural relationships are an important factor in the discussion on central Iron Age settlements and princely seats, as the exchange of goods and trade are considered to be important criteria for Hallstatt period centres of power.[129] In the following only some of the most important points concerning the interaction network of the Burgstallkogel and the Sulm valley necropolis with its closer and wider contact sphere will be summarized.

The addition of bronze helmets as grave goods, as documented in the princely graves, is seen as a custom going back to the Etruscans in Central Italy. This is further illustrated by the fact that in the Hartnermichelkogel 1 tumulus – the founder´s grave of the separate tumulus group in Kleinklein[130] – a conical bronze helmet decorated

[128] Schmid 1933; Frey 1962, 68ff.; Dobiat 1980, 171ff.; Reichenberger/Dobiat 1985; Teržan 1990, 123–142; Smolnik 1994; Egg 1996a; Egg/Kramer 2005; Egg/Kramer2013; Egg/Kramer 2016; Egg 2018.

[129] E.g. Kimmig 1969; Gringmuth-Dallmer 1996; Nakoinz 2009, 364; Egg/Kramer 2013, 415 fig. 190, 416ff. 429ff.

[130] Compare Egg/Kramer 2013, 391 table.

with incised zigzags was found,[131] which belongs to the Novilara type and is certainly an import.[132] The antenna sword of the type Tarquinia variant Steyr, which was found at the Hartnermichelkogel 1, also points to the same contact zone in Central Italy; however, it is not considered an import from Italy due to its specific design details, but as a local product of the East-Alpine region.[133] The connections to Central Italy and the Venetian Este culture in eastern Upper Italy were described as diverse and are reflected in particular in the bronze vessels and lids as well as in the ornamentation on vessels from the tumuli Kröllkogel[134] and Pommerkogel.[135] The custom of adding large sets of vessels as grave goods, including bronze situlae and cists, probably came from eastern Central Italy, the Picenum.[136] A connection to northern Italy and the area of the Este culture is reflected in various types of bronze boat-fibulae[137] and serpentine-fibulae[138] from the Sulm valley necropolis. Although the famous bronze mask and the bronze hands from the Kröllkogel are unique pieces, they refer to similar manifestations in Italy, more precisely Etruria.[139] On the other hand, gold masks are known in the Balkan-Greek area, but they certainly represent death masks, which were placed on the face of the deceased.[140] In contrast to those bronzes, which indicate contacts to Central Italy, the bronze bell armours as part of the protective armament and an important attribute of the warrior's equipment – which

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131 Egg/Kramer 2016, 216, fig. 5,1–2, fig. 8, pl. 2,1–2. – Compare e.g. with Born/Nebelsick 1991, fig. 27.

132 ibid. 14, 15 fig. 7, 18 fig. 9, 431; Egg 1988, 218ff.

133 Egg/Kramer 2016, 24, 11 fig. 6,1. – See also: Müller-Karpe 1955; Müller-Karpe 1961, 63ff.; Mayer 1977, 176; Krämer 1985, 38f.

134 Schmid 1933, 272ff., 278; Frey 1969, 62ff.; Reichenberger/Dobiat 1985, 15ff.; Egg/Kramer 2005, 21ff.; Egg/Kramer 2013, 175ff., 183f., 235, 241, 243, 430, 447ff.

135 Egg/Kramer 2016, 87ff., 100ff., 135, 229ff.

136 Egg/Kramer 2005, 28, 27 fig. 21; Egg/Kramer 2013, 402, 401 fig. 188.

137 As for example boat-fibulae of the type Este XIb, with rhomboid widened straps or a bulge on the strap ("Kahnfibel mit rhomboid verbreitertem Bügel oder mit Bügelwulst"): Dobiat 1980, 146f., pl. 2,1.9, pl. 31,1, pl. 95,11; Teržan 1990, 217 map 13, 219, 218 map 14; Tomedi 2002, 180ff.; Egg/Kramer 2015, 78ff., pl. 9,1 – Among the boat-fibulae of the Sulm valley necropolis, types can also be found that are characteristic for the Southeast-Alpine region, such as boat-fibulae with grid-shaped transverse ribs ("Kahnfibel mit gitterförmigen Querrippen") (compare Teržan 1990, 219 map 15; Tecco Hvala 2012, 209 fig. 81,11, 210, 216f.; Egg/Kramer 2016, 78 fig. 33,2, 81, pl. 9,2). A boat-fibula with transverse ribs also comes from trench II of the Burgstallkogel (Dobiat 1990, 34, pl. 16B).

138 Compare e.g. the large and small serpentine-fibulae from the burial mound Wiesenkaisertumulus 4 (Hack 2002, 118f., 119 fig. 24, pl. 3,1–4).

139 On the occurrence of bronze masks ("Deathmasks from Chiusi") and bronze hands (votive-pendants in form of bronze hands) in graves as well as anthropomorphic urns, compare: Schmid 1933, 281; Siegfried-Weiss 1980, 114ff., 115 map 8; Reichenberger/Dobiat 1985, 33; Born/Nebelsick 1991, 55f., 56 fig. 17; Egg/Kramer 2005, 21; Egg/Kramer 2013, 169ff., 169 fig. 65, 171ff. – A notable parallel is the decoration on a splendour helmet, which is likely to be a find from a Picenic tomb, found "north of Ancona" (Born/Nebelsick 1991, especially 11 fig. 2). Again, we encounter the combination of a mask, which has quite similar stylistic features such as the merging eyebrows and nose and the round, laterally protruding ears, together with hands.

140 Siegfried-Weiss 1980, 116; Dobiat 1980, 171; Egg/Kramer 2013, 169 fig. 65, 170.

are additionally known from the Slovenian Lower Carniola / Dolenjska-group[141] – are regarded as objects that go back to Greek models.[142]

The bronze horse bridle from the Hartnermichelkogel 1[143] points to another direction or contact zone. Although it was described as unique,[144] it shows stylistic elements which we find both in the Dolenjska group of Slovenia and in eastern and Balkan-Greek bridles and bronzes.[145] The tips of the pipe-shaped fittings of the cheek pieces (which were originally placed on cheek pieces made of antlers) show fine ribs, as also found on horn-shaped bronze cheek pieces from the Tumulus 125 of Stična.[146] In contrast to the cheek pieces from Stična, the specimens from the Hartnermichelkogel 1 are decorated with an openwork decoration consisting of two rows of oppositely arranged triangles, in addition to the rib ornament. Openwork decorations with oppositely arranged triangles are known for example on bronze belt ornaments, occurring in Southern Transdanubia,[147] in the Balkan region[148] and south of the Carpathians in early Scythian contexts[149] as well as in form of lance sheaths. A bronze lance sheath, decorated with as openwork decoration in the form

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141 Gabrovec 1960; Gabrovec 1966, 26f.; Gabrovec 2006, pl. 135, 207, 212; Born 2008/2010, 137–158.; Križ/Stipančić/Škedelj Petrič 2009, 86, 299 no. 13.

142 Schmid 1933, 276ff.; von Mehrhart 1969, 151ff., fig. 3; Egg/Kramer 2005, 11ff., 13 fig. 8; Egg/Kramer 2013, 103f.; Egg/Kramer 2016, 19ff. – On the relations between the Sulm valley necropolis and the princely graves of Kleinklein to the Etruscan region on the one hand, and to Greece on the other hand see also: Teržan 1990, 141–144. On a Hungarian find, see: Born/Hansen 2001, 257.

143 Egg/Kramer 2016, 30–33, 11 fig. 6,3–8, 32 fig. 16,1–2. – About the assignment of the object to the grave goods from the burial mound Hartnermichelkogel 1 see also: Teržan 1995, 94, footnote 93; Pare 1998, 349, fig. 27, 12, footnote 83; Kemenczei 2003/2004; Egg 2004.

144 Kemenczei 2003/2004, 56f.; Egg/Kramer 2016, 33.

145 A dating back to eastern models has been evaluated in the past quite differently, compare e.g. Gallus/Horváth 1939; Kossack 1954, 57, pl. 14, 1; Kemenczei 2003/2004, 55ff.

146 Kemenczei 2003/2004, 56; Gabrovec 2006, pl. 200, 22.4; Egg/Kramer 2016, 33, fig. 17.

147 E.g. in Beremend, Kom. Baranya (Jerem 1973, 70f., fig. 6–7; compare Metzner-Nebelsick 2002, 418, 417 fig. 187).

148 As e.g. in Northern Bosnia in the cemetery of Donja Dolina, grave 3 – Greda des Stipe Čagrlje, see: Truhelka 1904; Čović 1961; Gavranović 2011, 126ff., 133 fig. 166,10.

149 E.g. in the necropolis of Ferigile in Oltenia, Romania (Vulpe 1967, pl. 24). – A link between the horse nomadic groups of the Carpathian Basin and the Balkan region is represented by bronze disc-fibulae with openwork decoration ("Scheibenfibeln mit Durchbruchverzierung"), as they are found e.g. in the cemetery of Szentes-Vekerzug on the one hand (Kemenczei 2004, 87ff., 88 fig. 5.7.16), and in Donja Dolina (Gavranović 2011, 133 fig. 166,4) on the other. Bronze disc-fibulae without openwork decoration are known in Donja Dolina (Gavranović2011, 81 fig. 103,12, 130 fig. 160,11, 131 fig. 163,6, 138 fig. 174,6-6a) as well as with one specimen in the Sulm valley necropolis, namely in Höchschusterwald grave 32 (Dobiat 1980, 147, t. 7,6; Teržan 1990, 212 map 6). Openwork decorated bronzes, so-called "bird-cage" bronzes (Bouzek 1971a; id. 1971b; id. 1974), are furthermore known on the one hand in Greece and on the other hand in Iran in form of the so-called Luristan bronzes as well as in form of specific "sceptres" among the early Scythian finds from Southern Russia (Kilian-Dirlmeier 1979; Galanina 1997, pl. 6, 218.46; Ivantchik 2001, 218ff., fig. 108–110; Metzner-Nebelsick 2002, 446ff.; Kemenczei 2005, 196).

of rows of smaller and larger triangles, is known from Transylvania,[150] another one from the hilltop settlement Smolnice-Molpír in Southwest Slovakia.[151]

A fascinating object is also the two-part bronze horse bit of the bridle, which has rounded bit-rings and imitated torsion.[152] Remarkably, horse bits with rounded or oval bit-rings and imitated torsion, in particular in combination with cheek pieces of the types XII, XIIIa and IX after Metzer-Nebelsick, are found mainly (if not exclusively) in Cis- and Transcaucasia.[153] The bridle from the Hartnermichelkogel 1 is not the only part of horse-harness for which an "eastern connection" is given. A connection to the cultural circle of mounted nomads is likewise obvious[154] for the fragment of an iron cheek piece with forged bit-rings from the Kröllkogel princely tumulus.

The occurrence of incised and stamped ornaments on some ceramic vessels can also be seen as a "south-eastern" or Balkan element, which find their parallels in the distribution area of cultural groups with the so-called Basarabi pottery/ceramics.[155]

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[150] Found in grave 6 of the early Scythian flat-grave necropolis Budeşti-Fînaţe (Marinescu 1984, 56 fig. 5,8–9; Hellmuth 2006, 62, 63 fig. 40a, plf. 30,4).

[151] Dušek/Dušek 1995, 74 pl. 1,14; Hellmuth 2006, 62, 63 fig. 40b, 143.

[152] Kemenczei (2003/2004, 51) named the bit "diagonally ribbed".

[153] Metzner-Nebelsick 2002, 238 fig. 115,13.16.18, 240 fig. 116, 241; Reinhold 2007, 63ff. – Especially in the necropolis of Fars/Klady in the Adygej appear two-part bronze horse bits with imitated torsion (Leskov/Ėrlich 1999; compare Metzner-Nebelsick 2002, 248, 244 fig. 117,3, 245 fig. 118,9, 248 fig. 120,7). As C. Metzner-Nebelsick has stressed, the dating of the necropolis suggested by Leskov and Ėrlich (1999, 154 fig. 62) in the first half of the 8th until the middle of the 7th century BC is estimated too late (Metzner-Nebelsick 2002, 247ff.). The horse harnesses found in the graves represent types which start chronologically as early as the second half of the 9th century BC up to the end of the 8th century BC (ibid. 288–289 fig. 135–135; Reinhold 2007, 258ff.). The bronze horse bit therefore supports the chronological position of tumulus Hartnermichelkogels 1 at the beginning of the occupation of the Sulm valley princely necropolis (compare Egg/Kramer 2013, 389ff., 391; Egg/Kramer 2016, 204, 205 tab. 3), while the bridle of Pontic-Caucasian type even allows a chronological position before the last quarter of the 8th century BC.

[154] M. Egg and D. Kramer expressed very carefully the suspicion that the piece represents a cheek piece after a "Scythian model" (Egg/Kramer 2013, 128, 126 fig. 45,4, pl. 16,1–4 (right). Irrespective of the question whether the strongly corroded and fragmented piece actually has a torsion (which seems unlikely on the basis of the poor state of preservation and according to the photo), it is still most likely a cheek piece of the so-called Vekerzug type (e.g. Chochorowski 1985; Kemenczei 1985; Kozubová 2011), although the cheek-pieces of identical shape are also known from the early Scythian kurgans of Kelermes in the northern Caucasus foothills (Galanina 1997; Metzner-Nebelsick 2002, 257 fig. 122,4; Hellmuth 2007). Last but not least, the occurrence of other objects in the Kröllkogel, which could belong to a horse harness, as for example an iron bit, bronze rings, phalerae and a "miniature horse bit" also speaks against an interpretation of the object as a "modern" horse bit (Egg/Kramer 2013, 124f., 126 fig. 45, 131–134). Several examples of "miniature horse bits" were also found in the Tschoneggerfranzl-Tumulus 2 (Dobiat 1980, 145, pl. 58,29a-c).

[155] The core area of the occurrence of Basarabi ceramics is the Vojvodina, southern Moldova and Transylvania, with the Danube forming the southern border (see Metzner-Nebelsick 1992, 349). For the Sulm valley necropolis, the characteristic representatives of such vessels with "basaraboid" ornamentation are a vessel with conical neck and a pedestal bowl from tumulus 55 Ofenmacherwald (Dobiat 1980, 136, pl. 24,1–2). The presence of "basaraboid" ceramics outside of the actual distribution area of such ceramics was

The fragmentary sword from the Kröllkogel[156] also represents a type that indicates the remote contacts of its former owner, in this case the Westhallstatt circle northwest of the Alps, which is the main distribution area of the Gündlingen-sword type.[157] The occurrence of bronze broad-rimed bowls also dominates the wider area north of the Alps, as they were discovered in the Pommerkogel tumulus[158] and in the Wiesenkaiser tumulus 4;[159] models for this type of vessel can be found in Etruscan Central Italy.[160]

Other objects from the graves, especially from the princely graves, do not point to relations to specific regions, but instead place the Burgstallkogel and the Sulm valley necropolis in the wider early Iron Age communication network. In this connection, it is worth mentioning, for example, the so-called "Kreuzattaschenkessel"[161] (cauldron with cross-shaped handles), bronze Situlas of the Kurd type[162] or a special form of bronze cup, called "Beckentassen".[163] Another form that reflects the extensive network in which Burgstallkogel and Sulm valley necropolis were integrated are the rhombic belt hooks, which were not only widespread north of the Alps between Poland and Baden-Württemberg, but show a significant concentration of finds in the Slovenian Dolenjska group[164] as well. The connection to the Slovenian Dolenjska, which can be noticed in many ways, is probably also proven by the presence of zoomorphic amber beads (and glass beads).[165] The occurrence of amber generally implies the

intensively researched (see e.g. Siegfried-Weiss 1980, 121; Teržan 1990, 71–76; Metzner-Nebelsick 1992; Metzner-Nebelsick 2002, 102f.; Tomedi 2002, 241ff.) due to the more frequent occurrence in contexts of the Easthallstatt circle, as for example in the necropolis of Frög in Carinthia (Modrijan 1957, 3ff. 13 fig. 5,2; 15 fig. 6,la-b; 15 fig. 6,2–3; 18 fig. 8; 17 fig. 7,7-8; Tomedi 2002, pl. 28,11; 41,1; 49,1–2; 52; 73,A1).

156 Egg/Kramer 2013, 109ff., 108 fig. 39,1; pl. 15,1.

157 Egg/Kramer 2013, 112f., 113 fig. 42, 429f. – The sword from the Kröllkogel joins in the discussion about the "traditional swords", so the phenomenon of the occurrence of archaic sword types in sometimes much younger burials (compare Dobiat 1985, 48).

158 Egg/Kramer 2016, 139ff., 137 fig. 58, 138 fig. 59, 140 fig. 60, 141 fig. 61, pl. 27–29.

159 Hack 2003, pl. 2,1a-b; Egg/Kramer 2016, 142.

160 Egg/Kramer 2016, 141.

161 E.g. Von Merhart 1969b, 298f., map 1; Hack 2002, 115ff.; Egg/Kramer 2013, 252, 253 fig. 104; Egg/Kramer 2016, 193ff.

162 Dehn/Egg/Lehnert 2005, 147ff., fig. 64; Egg/Kramer 2005, Egg/Kramer 2013, 178ff., 179 fig. 69; Egg/Kramer 2016, 97f., 98 fig. 40.

163 Von Merhart 1969b, 284ff.; Egg/Kramer 2016, 149f., fig. 63.

164 Kossack 1959, 32, 82, 112 pl. 154C; Stöllner 2002, 456 List 13,32a; Egg/Kramer 2005, 16, 17 fig. 11; Egg/Kramer 2013, 136ff., 138 fig. 1, 139 fig. 51, 140 fig. 52, pl. 17.

165 Egg/Kramer 2005, 18 fig. 13; Egg/Kramer 2013, 163, 156 fig. 56,11, pl. 18,13. – A comparison is possible albeit in the form of other animals, about zoomorphic amber beads from grave 35 in Tumulus V of the necropolis of Novo Mesto, Kapiteljska njiva (bird heads) (Križ/Turk 2003, 80, fig. on page 81) or grave 4 in Tumulus VI (ram heads) (ibid. 80, fig. on page. 82; Križ/Stipančić/Škedelj Petrič 2009, 139). At the same time, in the Dolenjska-group, the little ram's heads are also found in glass (compare e.g. Križ/Turk 2003, 74f.; Križ/Stipančić/Škedelj Petrič 2009, 101f., 103, 257, no. 39). Noteworthy for the Slovenian Dolenjska-group are also small glass beads with laterally outstanding animal head protoms, such as a blue glass bead with two small horse heads from the tomb 121 in Tumulus 48 of Stična (Gabrovec 2006, pl. 71, 121.12; compare Egg/Kramer 2013, 164, 159 fig. 60,2), which resemble the two small amber beads with laterally protruding horse heads from the Kröllkogel. Other glass beads were found in grave 33 Ofenmacherwald, the tumulus

integration of both regions into the network of the postulated "Amber Road" from the Baltic Sea via the area of the Lusatian culture and the Easthallstatt circle towards the Caput Adriae.[166]

5. Understanding the Early Iron Age landscape of Großklein

As the brief remarks on the contacts between our working area and the neighbouring and more distant regions show, the settlement on Burgstallkogel or its community was integrated into a far-reaching communication network. Finally, it is important to come back to the question as to which role the hilltop settlement on Burgstallkogel with its imposing tumulus cemeteries has played during the time frame between the turn of 9th/8th century BC till the end of the 6th century BC. Can the hypothesis of the central settlement within a hierarchical settlement system between the Sulm and Saggau rivers be confirmed?

With reference to Walter Christaller's Central Place Theory, the Burgstallkogel should have a surplus of meaning in form of economic, political or religious supremacy compared to contemporary settlements in the surrounding areas. As M. Egg and D. Kramer have already pointed out, our knowledge of the three known hilltop settlements in Sulmtal – Burgstallkogel, Königsberg and Frauenberg / Seggauberg – is still very limited.[167]

With regard to the question of a settlement system, the current research results from Königsberg are particularly relevant. They have shown[168] that the peak of the settlement activities on Königsberg was in the Late Urnfield period, followed by only negligible or sporadic settlement activities in the Hallstatt period, which can be interpreted as an outpost for the control of the eastern access through the narrow part of the Sulm valley.[169] Clearly a functional and hierarchical relation between the two settlements can be seen here.

A similar situation also seems to be indicated for Frauenberg. As N. Geigenberger notes, there are massive settlement strata on Frauenberg, especially from the late Urnfield period, while a weaker settlement appears in the following Iron Age,[170] although the existence of a princely residence in the Hallstatt period was postulated, because of the possible connection to the tumulus cemetery in Leibnitz-Altenmarkt.[171] The

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Tschoneggerfranzl 2, Kürbischhansl-tumulus, grave 48 Ofenmacherwald (Dobiat 1980, 150, pl. 17,4; 22,14), on the Burgstallkogel (Dobiat 1986, 33, pl. 7,14; Dobiat 1990, 41, pl. 17,33) or in the burial mound Wiesenkaisertumulus 4 (Hack 2002, pl. 5,2.1–4). Of particular interest among these finds is the so-called "Schichtaugenperle" (eye bead) from Section IV of the Burgstallkogel, as it once again emphasizes the relationship to the Dolenjska region with a presumed centre of glass bead production (Dobiat 1986, 33, pl. 7,14; Dobiat 1990, 41, pl. 17,33).

166 Egg/Kramer 2013, 430.
167 Egg/Kramer 2013, 414ff., 421.
168 See also Mele 2019, 367ff.
169 See also Egg/Kramer 2013, 413.
170 Geigenbauer 2008a, 3.
171 Artner 1999, 225; Hampel 2005/2006; Egg/Kramer 2013, 414.

ceramics from the summit and the northern slope area[172] from the numerous rescue excavations in the 1980s conducted by the Landesmuseum Joanneum was, with reference to the studies of Dobiat[173] and Smolnik[174] on Burgstallkogel, dated to the 10th / early 9th century BC.[175] At that time there was already a large "unfortified" / naturally fortified[176] settlement on Burgstallkogel and urn graves[177] had been created, but the place had not yet reached its zenith and the erecting of the founder's tumulus of the princely necropolis, the Hartnermichelkogel 1, was still several decades away.

It seems that the two fortified settlements on Königsberg and Frauenberg, whose relationship to each other remains unclear, had greater significance during the late Urnfield period than during the late 8th and 7th–6th century BC. The settlement focus changed to Burgstallkogel, so a "change of power" might have occurred or at least changes in settlement dynamics.

It is a fascinating fact that on Burgstallkogel[178] and Königsberg we have burned layers dated to the late Urnfield period, so we are tempted to link the change either to tribal quarrels or major changes at the end of the Bronze Age.[179] Whether these destructions occurred in all settlements within a short period of time[180] cannot be decided with the help of currently available data, but in any case, they must have had a more or less serious impact on the life and development in the respective settlement. In the case of Königsberg and Frauenberg / Seggauberg the late Urnfield period destruction did have a greater impact on the settlement development than on Burgstallkogel, although C. Dobiat also postulated a reduction of the settlement area in the early Hallstatt period.[181] Besides settlement changes, the evaluation of LiDAR-scans and ortho-photos (GIS-Styria) in combination with literature research has shown that there are no major Hallstatt tumulus cemeteries at the foot of the two settlements on Königsberg and Frauenberg, but merely a few smaller groups.

As already noted above, Königsberg indicates an only sparse use during the Hallstatt period, which generally explains the absence of larger tumulus cemeteries. If the settlement on Königsberg was used more intensively during the Hallstatt period as supposed at the moment, the inhabitants could have buried their dead either in unknown flat cemeteries, under completely eroded burial mounds or also in the nearby Sulm valley necropolis. The distance (straight-line) between Burgstallkogel and Königsberg is just over 4.5 km. Within this radius of 4 to 5 km around the

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172 Urnfield and Hallstatt period pottery, which has been found at Perl- / Stadläcker, belongs to the settlement positioned on the eastern edge terrace on Frauenberg (Bartl 2008).
173 Dobiat 1990.
174 Smolnik 1994.
175 Geigenbauer 2008a, 53ff., 56.
176 For the topography and the "Spitzgraben" system on the northern slope (Dobiat 1990, 66f., fig. 24) and its continuous use, see above.
177 See Dobiat 1990, 61f.; Hebert 1986; Hebert 1988b; Egg/Kramer 2013, 389f., 391 Tab.; Dobiat 1980, 166–168; Lippert 2007, 37, 40; Bernhard 2003, 83f., 109f., t. 13,1–2; 14,3–9; 20,1; 21,2; 22,3-6.
178 Dobiat 1990, 61.
179 For the late Urnfield period destructions cf. Dobiat 1990, 66f., 69.
180 In the sense of a single battle or armed conflict (war has a duration…).
181 Dobiat 1990, 69.

Burgstallkogel there are hardly any other Hallstatt period[182] cemeteries. Despite the lack of cemeteries we should not expect an "empty space", but maybe agriculturally used areas with pastures, farmsteads and / or smaller lowland settlements. Assuming that the inhabitants of this area buried all their deceased in groups[183] of the Sulm valley necropolis, we could interpret Burgstallkogel as a "central cemetery" and presumably a religious centre. If that is true, an additional meaning, in the sense Christaller used it, could be assigned to the area, and so one criterium for a central place would be met. From an economic point of view, the Burgstallkogel could also have been significant with regard to iron ore mining and metallurgy, even if there are only indications up to date.[184] In any case, there must have been an economic component that made the richness and the far-reaching influence reflected in the grave burials possible, and which cannot be explained merely by a favourable trade-strategic situation alone.

Regarding the considerations on the settlement size, it has been shown, despite some unclear variables, that gradations can be observed between the three most important hilltop settlements of the Sulm valley. Although it is not possible to define the exact extent of the settlement area in the various periods, there are arguments that the central settlement area of the Burgstallkogel (plateau and north-western terraces) was significantly larger than the central plateau of the settlement on Königsberg. The same applies to a comparison between Burgstallkogel and another Urnfield and Hallstatt period hilltop settlement in the southeast corner of our micro-region, the Platsch.[185] According to the current state of research, it is highly likely that the settlement at Burgstallkogel represents the largest settlement of the micro-region in the Urnfield and Hallstatt periods.

Finally, it can be stated that archaeological research conducted by the Universalmuseum Joanneum in recent years at Burgstallkogel and in the micro-region Großklein have yielded a great deal of new data.[186] However, in order to better understand the genesis and structure of the Late Bronze and Iron Age cultural landscape, "the spade in the lower Sulm valley must again be used on target".[187]

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[182] The same applies to Roman period tumulus cemeteries.

[183] The slightly outlying Precklwald group (see Mele 2015, ill. P. 502) could probably already be addressed as an independent small necropolis connected to the burial community of a suspected (and as yet undiscovered) lowland settlement in the plains near the Sulm.

[184] Modl 2012b, 107; Egg/Kramer 2013, 414.

[185] In its total extent including the central and outer settlements, the settlement on Burgstallkogel would, as noted above, also be larger than the hilltop settlement on nearby Bubenberg (Hoarachkogel) – Novine.

[186] Mele 2012; id. 2019.

[187] Egg/Kramer 2013, 416.

Legend: F – Funeral site, S – Settlement, O – Other

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F1	Bischofegg	undatable	15,31069	46,69987	Radimsky 1883; Kramer 1981; BDA-register of sites, register of sites UMJ; InterArch/BorderArch: Deutschlandsberg.61107.1
F2	Eibiswald, Staudinger Wald	Roman/ undatable	15,23137	46,6818	Radimsky 1883; Kramer 1981; InterArch/BorderArch: Deutschlandsberg.61112.1
F3	Feisternitz	undatable	15,26132	46,68729	MÜLLER 2005; analysis LiDAR GIS Steiermark, UMJ 2014; InterArch/BorderArch: Deutschlandsberg.61114.1
F4	Haselbach, Hügelgräbergruppe „Striegl“	Roman/ undatable	15,2809	46,69727	Radimsky 1883; Kramer 1981; InterArch/BorderArch: Deutschlandsberg.61118.1
F5	Haselbach, Hügelgräbergruppe „Kögelhansel“	undatable	15,2884	46,69198	BDA-register of sites; survey by B. Hebert and A. Steffan; survey by UMJ in the frame of the project BorderArch-Steiermark; InterArch/BorderArch: Deutschlandsberg.61118.2
S1	Haselbach	undatable	15,2884	46,69198	BDA-register of sites; survey by B. Hebert and A. Steffan; survey by UMJ in the frame of the project BorderArch-Steiermark; InterArch/BorderArch: Deutschlandsberg.61118.2
F6	Hörmsdorf, Hügelgräbergruppe „Fuxwald“	Roman/ Hallstatt period	15,261181	46,689317	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 23); InterArch/BorderArch: Deutschlandsberg.61119.1
F7	Vordersdorf, Altenmarkt	Roman/ La-Tène period	15,239433	46,711786	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 21); InterArch/BorderArch: Deutschlandsberg.61146.1
F9	Altenmarkt und Altenmarkt, vulgo „Peissermichel“	undatable	15,24655639	46,70962871	Radimsky 1883; Kramer 1981; InterArch/BorderArch: Deutschlandsberg.61103.2
S2	Aug, Kigerlschneiderkogel	Urnfield period	15,28642	46,71508	Tscherne 1983; Hebert 1991; survey in the frame of the Iron-Age-Danube project
F10; F11; O1	Aug	Roman/ La-Tène period/ Hallstatt period	15,288503	46,719559	Artner 2000; BDA-register of sites, UMJ register of sites; analysis LiDAR GIS Steiermark, UMJ 2014; InterArch/BorderArch: Deutschlandsberg.61104.1
F12	Etzendorf, Hügelgräbergruppe „Kohlwald“	undatable	15,24769	46,72412	Kramer 1981; BDA-register of sites, UMJ register of sites; analysis LiDAR GIS Steiermark, UMJ 2014; InterArch/BorderArch: Deutschlandsberg.61113.1

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F13	Etzendorf	undatable	15,24592	46,72408	analysis LiDAR GIS Steiermark, UMJ 2014; InterArch/BorderArch: Deutschlandsberg.61113.2
F14	Vordersdorf	Roman/ undatable	15,237594	46,709772	Radimsky/Szombathy 1888; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 22)
F15	Vordersdorf, vulgo Harrer	undatable	15,242272	46,705983	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F16	Vordersdorf, vulgo Heidensiegel	undatable	15,239167	46,704754	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F17	Vordersdorf	undatable	15,238192	46,712846	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F18	Kresbach	undatable	15,224675	46,791818	Müller 2005; BDA-register of sites, register of sites UMJ
F19	Rettenbach-Hollenegg	Roman/ undatable	15,222329	46,768061	Radimsky 1883; Müller 2005; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 17)
F20	Trag	Roman/ undatable	15,240252	46,771612	Radimsky 1883; Hebert 1999; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 14)
O2	Warnblick	La-Tène period	15,19485	46,807751	Hebert 1988c; BDA-register of sites, register of sites UMJ
S3	Sankt Peter im Sulmtal	Urnfield period	15,276812	46,755014	Hebert 1999
F21	Kerschbaum, Hügelgräbergruppe Niederhölzer	Roman/ undatable	15,228865	46,755139	Radimsky 1883; Urban 1984; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 18); InterArch: 61026.1882.1; InterArch/BorderArch: Deutschlandsberg.61026.1
F22	Kerschbaum, Winklerwald	Roman/ undatable	15,228865	46,755139	Radimsky 1883; Urban 1984; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 18); InterArch: 61026.1882.1; InterArch/BorderArch: Deutschlandsberg.61026.1
F23	Kerschbaum, vulgo Holzhieselkeusche	undatable	15,232074	46,753976	Radimsky 1883; Urban 1984; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F24	Kerschbaum	Roman/ undatable	15,231493	46,763135	Radimsky 1883; Urban 1984; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 16); InterArch: 61026.1882.1; InterArch/BorderArch: Deutschlandsberg.61026.1
F25	Kerschbaum	Roman/ undatable	15,22393	46,755136	Radimsky 1883; Urban 1984; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F26	Kerschbaum	Roman/ undatable	15,224832	46,759095	Radimsky 1883; Urban 1984; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F27	Moos, Korbin	Roman/ undatable	15,267477	46,769381	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 15)
F28	Sankt Peter im Sulmtal	Roman/ undatable	15,253799	46,757223	Radimsky 1883; Urban 1984; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F29	Sankt Peter im Sulmtal, vulgo Kellnerschneider	undatable	15,247634	46,760122	Urban 1984; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F30	Sankt Peter im Sulmtal	Roman/ undatable	15,254427	46,753812	Radimsky 1883; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 19)
F31	Wieden, Hügelgräbergruppe Dechantwald	Roman/ undatable	15,250849	46,775197	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 13)
F32	Wieden, Hügelgräbergruppe Tafelwiese	undatable	15,250011	46,76563	Radimsky 1883; Urban 1984; register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F33	Wieden, Hügelgräbergruppe Golliwiese	Roman/ undatable	15,255976	46,773119	Radimsky 1883; Urban 1984; register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F34	Bergla	Roman/ undatable	15,26601	46,75001	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 73)
F36	Bergla, Gräbergruppe Sillihanselweide	Roman/ undatable	15,276153	46,746659	Radimsky 1883; InterArch/BorderArch: Deutschlandsberg.61077.1
F37; O4	Bergla	Roman/ La-Tène period	15,279432	46,753799	Artner 1994
F38; F39; S4	Bergla	Hallstatt period/ La-Tène period	15,259769	46,745811	Artner 2004; Artner 2007
F40	Bergla	undatable	15,261441	46,746625	analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F41	Dietmannsdorf im Sulmtal	Roman/ undatable	15,319314	46,758186	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 39 und 74); InterArch/BorderArch: Deutschlandsberg.61152.1
F42	Dietmannsdorf im Sulmtal	Roman/ undatable	15,321784	46,753196	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 74 und 39); InterArch/BorderArch: Deutschlandsberg.61152.1
S5; F51	Graschach, Hartwald	Hallstatt period	15,340247	46,761915	Hebert 1987; Hebert 1988; Bernhard/Hebert 2000; InterArch/BorderArch: Deutschlandsberg.61153.1

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F43	Graschach	undatable	15,341035	46,762035	analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F44 = F51?	Graschach, „Gleinstättner Hartwalde“	undatable	15,352889	46,751545	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project); InterArch/BorderArch: Deutschlandsberg.61153.1
F45	Graschach, vulgo Fuchs	undatable	15,332388	46,758525	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F46	Graschach	undatable	15,337736	46,763974	Urban 1984; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F47	Graschach	undatable	15,328186	46,758976	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 38)
F48	Graschach	undatable	15,330013	46,759827	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 37)
F49	Graschach	undatable	15,332438	46,761657	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 36)
F50	Graschach	undatable	15,334308	46,768051	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 30)
F53	Graschach	undatable	15,336241	46,747971	Radimsky 1883; register of sites UMJ, survey by W. Artner and G. Fuchs 1982; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 50)
F54	Otternitz, Hügelgräbergruppe Marbauer	undatable	15,326429	46,777761	Radimsky 1883; InterArch/BorderArch: Deutschlandsberg.61047.1
F55	Otternitz, Hügelgräbergruppe Puff	undatable	15,31651	46,778179	Radimsky 1883; register of sites UMJ; InterArch/BorderArch: Deutschlandsberg.61047.2
F56	Otternitz	undatable	15,328478	46,779411	Urban 1984; register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F57	Otternitz	undatable	15,312774	46,774314	register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F58	Otternitz	undatable	15,317196	46,773246	register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F59	Otternitz, vulgo Kogelweingarten	Roman/ undatable	15,310993	46,77711	Radimsky 1883; register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 10)
F60	Otternitz	undatable	15,307818	46,773678	register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F70	Otternitz, „Gmoakogels“/ “Gmoariegls“	Roman/ undatable	15,315485	46,776048	Kramer 1981; Artner 2004b; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 11)

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F71	Otternitz	undatable	15,30874	46,776627	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 9)
F72	Otternitz	undatable	15,307546	46,777681	register of sites UMJ, survey by W. Artner on the 28.5.1983, survey in the frame of the Iron-Age-Danube project; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 8)
F73	Sulb	Roman/ undatable	15,296366	46,762762	Radimsky 1883; register of sites UMJ; InterArch/BorderArch: Deutschlandsberg.61058.1
S7	Sulb, Bergla	La-Tène period	15,293174	46,759311	Artner 2004
F74	Sulb	undatable	15,305677	46,762862	register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F75	Sulb, „Am Eichkogel“	undatable	15,298063	46,76437	Radimsky 1883; register of sites UMJ
F76; S8	Sulb	Roman/ Hallstatt period	15,302057	46,761775	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 20); InterArch/BorderArch: Deutschlandsberg.61058.2
F77	Dornach	undatable	15,340691	46,768253	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 31)
F78	Gleinstätten, „Bäckenhartl“	undatable	15,354881	46,749312	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F79	Gleinstätten / Goldes, Forstwaldgruppe	Hallstatt period	15,39521	46,74671	Dobiat 1980; InterArch/BorderArch: Leibnitz.66009.1
F80	Gleinstätten / Goldes, Tschonegger Wald	Hallstatt period	15,39758	46,74656	Dobiat 1980; InterArch/ BorderArch: Leibnitz.66010.10 (Goldes), Leibnitz.66010.12 (Gleinstätten) together with Forstwaldgroup Leibnitz.66009.1 (Gleinstätten)
O6	Gleinstätten	Hallstatt period	15,36582	46,756388	BDA-register of sites, B. Hebert, find report from the 3.3.1988
F81	Maierhof	undatable	15,3996	46,760018	Radimsky 1883; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F82	Pistorf, vulgo Fuchs	undatable	15,377256	46,767478	Radimsky 1883; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F83	Pistorf, vulgo Schelch	undatable	15,365955	46,764103	Radimsky 1883; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F84	Distelhof	undatable	15,388463	46,762093	Radimsky 1883; BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F85	Pistorf, vulgo Gady	Roman/ undatable	15,361008	46,765071	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 33)
F86	Pistorf, vulgo Puff	Roman/ undatable	15,36431	46,763082	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 34)
F87	Prarath	Roman/ undatable	15,336913	46,746337	Reiterer 1990
F88	Altenbach	undatable	15,330736	46,658893	analysis LiDAR GIS Steiermark, UMJ (Kiszter unknown 22)
F89	Hardegg	undatable	15,39181	46,67166	survey by UMJ 2014 (project BorderArch); InterArch/BorderArch: Leibnitz.66014.1
F90	Schloßberg, vulgo Hainz	undatable	15,37986	46,67891	Radimsky 1883; FUCHS 1988, ALFS, 74; InterArch/BorderArch: Leibnitz.66018.1
F91	Lieschen, Flur: Jirglbauerwald	Roman/ undatable	15,330713	46,682837	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 45); InterArch/BorderArch: Leibnitz.66021.2
F92	Lieschen, Flur: Unterer Hofer-Wald	Roman/ undatable	15,332257	46,681898	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 46); InterArch/BorderArch: Leibnitz.66021.2
F93	Lieschen, Flur: Haring-Wald	Roman/ undatable	15,330562	46,68003	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 47); InterArch/BorderArch: Leibnitz.66021.2
S30	Lieschen	undatable	15,32215	46,66726	register of sites UMJ; FUCHS 1988, ALFS; InterArch/BorderArch: Leibnitz.66021.1
F94	Oberhaag	undatable	15,334514	46,690367	BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F95	Eichberg-Arnfels, „Fakitsch-Wald“	Roman/ undatable	15,43133	46,728716	Radimsky/Szombathy 1888; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 57); InterArch/BorderArch: Leibnitz.66005.2
F96	Saggau	undatable	15,369186	46,703050	analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F97	Untergreith, Flur: Röselgraben	undatable	15,36621	46,7125	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 41); InterArch/BorderArch: Leibnitz.66040.4
F98	Untergreith	undatable	15,38619	46,7106	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 42); InterArch/BorderArch: Leibnitz.66040.3

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F99	Untergreith, Flur: Ehrenbichl	undatable	15,38812	46,71169	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 43); InterArch/BorderArch: Leibnitz.66040.2
F100	Untergreith, Flur: Ortsschusterwald/ Ujzingerwald	Roman/ undatable	15,393672	46,711287	Radimsky 1883; Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 44); InterArch/BorderArch: Leibnitz.66040.1
F101; F102	Arnfels	Roman/ undatable	15,401229	46,675253	Kramer 1981; InterArch/BorderArch: Leibnitz.66002.1
F103	Fötschach	undatable	15,48372	46,66576	Kramer 1981; InterArch/BorderArch: Leibnitz.66007.1
F104	Langegg, „Czamillenberg“	undatable	15,54787	46,65036	BDA-register of sites, register of sites UMJ. Survey by D. Kramer (unknown date). Survey G. Fuchs on the 11.04.1988; InterArch/BorderArch: Leibnitz.66019.1
F105	Remschnigg	undatable	15,46346	46,66108	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 59); InterArch/BorderArch: Leibnitz.66035.1
S9	Remschnigg, Schloßberg, Montikogel	undatable	15,46756	46,65762	BDA-register of sites, register of sites UMJ; FUCHS 1988, ALFS, 74; InterArch/BorderArch: Leibnitz.66035.2 / Leibnitz.66039.1
F106	Eckberg/Preg	Roman/ undatable	15,551788	46,692037	BDA-register of sites, register of sites UMJ; FUCHS 1988, ALFS, 64, 67–68, 70, 73; InterArch/BorderArch: Leibnitz.66106.1
F107	Gamlitz	Roman/ undatable	15,53885	46,7166	Kramer 1981; InterArch/BorderArch: Leibnitz.66114.2
F108	Sernau, Flur: Koglwirt	undatable	15,5193	46,71434	Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 72); InterArch/BorderArch: Leibnitz.66173.2
F110	Burgstall	Hallstatt period/ undatable	15,40234	46,7484	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 54); InterArch/BorderArch: Leibnitz.66003.8
F111	Burgstall, Wockwaldgruppe	Hallstatt period	15,42075	46,74701	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 55); InterArch/BorderArch: Leibnitz.66003.7
F112	Burgstall, Großklein, Kröllwaldgruppe	Hallstatt period	15,42131	46,74461	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66003.4 (Burgstall), Leibnitz.66011.5 (Großklein)
F113	Burgstall, Muskervastl waldgruppe	Hallstatt period	15,42048	46,74434	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66003.5
F114	Burgstall, Ofenmacher waldgruppe	Hallstatt period	15,40182	46,74617	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66003.9, Leibnitz.66003.1

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F115	Burgstall, Hochschuster waldgruppe	Urnfield period/ Hallstatt period	15,40277	46,74698	Dobiat 1980; Smolnik 1994; Lippert 2007; Mele 2012; InterArch/ BorderArch: Leibnitz.66003.2
S10	Burgstallkogel, Südhang	Hallstatt period	15,40277	46,74698	Mele 2019
F116	Burgstall, Andrä-Bäckwald-Gruppe	Hallstatt period	15,40161	46,74735	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66003.10
F117	Burgstall, Kaiserschneiderkogel	Hallstatt period	15,4022	46,7507	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66003.12
F118	Burgstall, Karnerwaldgruppe	Hallstatt period	15,41639	46,74653	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66003.6
F119	Burgstall, Kaiserschneider-waldgruppe	Urnfield period/ Hallstatt period	15,40047	46,7472	Dobiat 1980; Bernhard 2003; Mele 2012; InterArch/BorderArch: Leibnitz.66003.11
S11	Burgstallkogel, Ostfuß oberhalb Hochterrasse der Sulm „Burgstallhölzer“	Urnfield period	15,419699	46,747639	Hebert 1988b
S12	Burgstallkogel	Urnfield period	15,405875	46,747854	Hebert 1986
F120	Burgstall, „Masser-Kreuzbauer“	Urnfield period/ Hallstatt period	15,405704	46,744268	Bernhard 2003
S13	Burgstall, Sporn westl. der Muskervastl-waldgruppe	Hallstatt period	15,419463	46,744565	BDA-register of sites; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F122	Goldes	Hallstatt period/ undatable	15,41088	46,73948	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 63); InterArch/BorderArch: Leibnitz.66010.3
F123	Goldes, Tschoneggerfranzl	Hallstatt period	15,40221	46,74480	Dobiat 1980; InterArch/BorderArch: Leibnitz.66010.7
F124	Goldes, Tschoneggerfranzl waldgruppe	Hallstatt period	15,40052	46,74611	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66010.11
F125	Goldes, Forstwaldgruppe, Tschoneggerwiese	Urnfield period/ Hallstatt period	15,3996	46,74562	Dobiat 1980; SMOLNIK 1994; Mele 2012; InterArch/BorderArch: Leibnitz.66010.9, Leibnitz.66009.1/ Leibnitz.66010.10
F126	Goldes, Forstwaldgruppe, Tschonegger Kogel	Hallstatt period	15,39569	46,74590	Dobiat 1980; InterArch/BorderArch: Leibnitz.66010.12
F127	Goldes, Goldesvastlwald	Hallstatt period	15,409566	46,730305	Radimsky 1883; Radimsky/ Szombathy 1888; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 56); InterArch/BorderArch: Leibnitz.66010.2
F128	Goldes, Kürbischbauer	Hallstatt period	15,40556	46,74086	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66010.5

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F129	Goldes, Silberschneider(kogel)	Hallstatt period/ undatable	15,40635	46,73973	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66010.4
F130	Goldes, Kürbischhanslkogel	Hallstatt period	15,40358	46,74389	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66010.1
F131	Goldes, Grellwaldgruppe	Hallstatt period	15,40315	46,74265	Dobiat 1980; Weihs 2003; Mele 2012; InterArch/BorderArch: Leibnitz.66010.6
F132	Goldes, Pasatfranzl	Hallstatt period	15,40659	46,73786	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66010.8
F133	Goldes, Wiesenkaisergruppe	Hallstatt period	15,39028	46,7439	Dobiat 1980; Hack 2003; Mele 2012; InterArch/BorderArch: Leibnitz.66010.13
F134	Kleinklein, Kröllkogel	Hallstatt period	15,43199	46,7408	Dobiat 1980; Mele 2012; Egg/Kramer 2005; Egg/Kramer 2013; InterArch/ BorderArch: Leibnitz.66011.2
F135	Kleinklein, Hartnermichlkogel 1-2	Hallstatt period	15,43272	46,74315	Dobiat 1980; Mele 2012; Egg/ Kramer 2016; InterArch/BorderArch: Leibnitz.66011.4
F136	Großklein, Pommerkogel	Hallstatt period	15,42839	46,7432	Dobiat 1980; Mele 2012; Egg/ Kramer 2016; InterArch/BorderArch: Leibnitz.66011.3 = next to Leibnitz.66011.1
F137	Großklein	La-Tène period	15,42839	46,7432	Hebert 1997; Bernhard 2014; excavation M. Mele 2016 (Maßnahmen 66011.16.01)
F138	Burgstall, Kröll-Muskervastlwaldgruppe	Hallstatt period	15,42131	46,74461	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66003.4 (Burgstall), Leibnitz.66011.5 (Großklein)
S14 (S10–12)	Burgstall/Mantrach, Burgstallkogel	Urnfield period/ Hallstatt period	15,40277	46,74698	Dobiat 1986; Dobiat 1990; Mele 2019; InterArch/BorderArch: Leibnitz.66003.3 (Burgstall), Leibnitz.66023.6 (Mantrach)
F139	Mantrach, Haiblwaldgruppe	Hallstatt period	15,4068	46,75050	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66023.5
F140	Mantrach, Leitengritsch waldgruppe	Hallstatt period	15,40899	46,75236	Dobiat 1980; Mele 2012; InterArch/ BorderArch: Leibnitz.66023.4
F141	Mantrach, Preckl waldgruppe	Urnfield period/ Hallstatt period	15,4267	46,75059	Dobiat 1980; Smolnik 1994; Mele 2012; InterArch/BorderArch: Leibnitz.66023.2
F142	Nestelberg bei Großklein	Roman/ undatable	15,43455	46,729059	Radimsky 1883; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 58)
F143	Altenberg-Hügelgräberfeld Manneg	undatable	15,48959	46,7979	register of sites UMJ, August 31, 1987, survey by G. Fuchs; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 61); InterArch: 66102.1987.3; InterArch/BorderArch: Leibnitz.66102.4
F144; S15	Altenberg	undatable	15,507848	46,800411	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 60)

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F145	Steingrub	undatable	15,490367	46,791265	Fuchs 1988; InterArch: 66177.1987.1; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 64)
F146	Heimschuh, Teichwaldgruppe	undatable	15,48514	46,767481	BDA-register of sites, report about illegal excavations 1996/97, survey by BDA; analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 66)
F147	Heimschuh	undatable	15,480154	46,768028	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 65)
F148	Heimschuh	undatable	15,489371	46,751445	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 68)
F149	Heimschuh, „Theißl-Holz“	undatable	15,496235	46,77324	Protocol E. Staudinger Nr. 411; ALA Fuchs 1987; BDA-register of sites
S16	Heimschuh	Urnfield period/ Hallstatt period/ La-Tène period	15,481376	46,764692	register of sites UMJ, finding report 1981; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F150	Nestelberg bei Heimschuh	undatable	15,47213	46,752371	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 67)
S17	Nestelberg bei Heimschuh, Königsberg	Urnfield period/ Hallstatt period	15,461068	46,763542	Felgenhauer 1977/78; Mele 2019.
F151	Unterfahrenbach	undatable	15,49645	46,747182	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 69)
F153	Schönegg	undatable	15,514473	46,742166	analysis LiDAR GIS Steiermark, UMJ (Kiszter Tumulus group 71)
F154; S18; O3	Seggauberg, Frauenberg	Urnfield period/ Hallstatt period/ La-Tène period	15,527723	46,772778	Tiefengraber/Grill 1997; Bartl 2008; InterArch/BorderArch: Leibnitz.66172.2
S19	Seggauberg, Frauenberg	Roman/ La-Tène period/ Urnfield period	15,522737	46,774642	Geigenbauer 2008a; Tiefengraber 2015b.
S20	Seggauberg, Frauenberg	Roman/ La-Tène period/ Urnfield period	15,524783	46,773709	register of sites UMJ, excavations on parcel 10/2 and 11/2 27.6.1983-19.8.1983 by G. Fuchs. Survey of parcel 10/1-2, 11/2 on the 12.12.1984 by D. Kramer, H. Ecker, G. Fuchs, DI Irgang, Hr. Gschiel. Excavations on parcel 10/1 between 1.4. and 29.5.1985 by D. Kramer - G. Fuchs); Hebert 1987b
F155	Seggauberg, Forstwald	undatable	15,513205	46,771161	Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
F156	Seggauberg	Hallstatt period/ undatable	15,517605	46,769255	register of sites UMJ, G. Fuchs, survey report, 30.3.1981. E. Staudinger, writing no. 405, 1965, 8-10. E. Staudinger, protocol no. 8, spring 1951.
F157	Seggauberg, Hügelgräberfeld Hasenwirt	undatable	15,519608	46,767719	Kramer 1981; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
S21	Seggauberg	Roman/ La-Tène period/ Urnfield period	15,524304	46,775343	BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
S22	Seggauberg	Roman/ La-Tène period	15,524988	46,774631	Hebert 1987b.
S23	Seggauberg	Roman/ La-Tène period	15,52119	46,773066	register of sites UMJ, G. Fuchs, survey report 27.9.1984; excavation 2004 by H. Heymans in the frame of the construction of a swimming pool
F158	Hasendorf an der Mur, „Kogelried“	Roman/ undatable	15,577155	46,801697	BDA-register of sites, register of sites UMJ. G. Fuchs, survey report, 24.4.1981
F159	Altenmarkt	Roman/ Hallstatt period	15,549695	46,772404	Fuchs 1996; Hampel 2005/2006; InterArch: 66103.1912.1; InterArch/ BorderArch: Leibnitz.66103.1
F160	Wagna, „Marburgerstraße“	Roman/ Hallstatt period	15,56107	46,772495	BDA-register of sites, register of sites UMJ; analysis LiDAR GIS Steiermark, UMJ (Iron-Age-Danube project)
F161	Ehrenhausen, „Bücheläcker“	undatable	15,55246537	46,75499717	register of sites UMJ, 15.06.1982 survey by G. Fuchs and W. Artner; InterArch/BorderArch: Leibnitz.66188.6
F162; O5	Ehrenhausen	undatable	15,5780746	46,72765868	Fauster 1890; Kramer 1981; InterArch/BorderArch: Leibnitz.66107.3
F163	Ehrenhausen	undatable	15,5745909	46,7273754	Stauder 1990; InterArch/BorderArch: Leibnitz.66107.4
S24	Ehrenhausen, Schloßberg	Urnfield period	15,5864779	46,7231052	Hebert 1993
F164	Ottenberg, „Sattelgraben, Fuchswald“	undatable	15,58196269	46,71480517	BDA-register of sites, register of sites UMJ, G. Fuchs - I. Kainz 1988, 74, 95, G. Fuchs, survey report of the 7.3.1988; InterArch/BorderArch: Leibnitz.66158.1
S25	Retznei, „Kreuzacker“	Roman/ La-Tène period/ Urnfield period (?)	15,563463	46,740408	Pichler 1874; Schrettle 2004
F165	Zieregg	undatable	15,609367	46,6860156	BDA-register of sites, register of sites UMJ; find report by ARGIS, G. Fuchs, on the 22.02.2006; InterArch/ BorderArch: Leibnitz.66190.1

Number	Name	Dating	Coordinates WGS 84	Coordinates WGS 84	References (in selection)
S26	Platsch	Urnfield period/ Hallstatt period	15,61847718	46,68141915	Kramer 1981; Music/Medaric/Mori/ Nas 2015; Vinazza/Nanut/Mihelic/ Cresnar 2015b; Gaberz/Kiszter/ Mele 2015b; InterArch/BorderArch: Leibnitz.66118.2
F66	Bubenberg, Hoarachkogel	Hallstatt period	15,65248023	46,69747719	Gaberz/Kiszter/Mele 2015a; InterArch/BorderArch: Leibnitz.66174.2
S27	Bubenberg, Hoarachkogel	Urnfield period/ Hallstatt period	15,65248023	46,69747719	Schmid 1937; Vinazza/Nanut/Mihelic/ Cresnar 2015a; InterArch/BorderArch: Leibnitz.66174.1

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Landscape studies of the micro-region Strettweg (Aichfeld/Murboden) in Austrian Styria in the framework of the Iron-Age-Danube project

Man and his landscape in the Iron Age – natural environment, resources (agriculture, woods, ore...)

by Susanne Tiefengraber and Georg Tiefengraber

Abstract
Since the co-incidence discovery of the famous "cult cart" in Strettweg near Judenburg 1851, the site situated in the large inner alpine basin of Aichfeld in upper Styria became well-known. As part of an opulently equipped grave with numerous prestigious artefacts, it was quickly established as a prime example of a "princely" burial of a member of the elite of the Eastern Hallstatt circle. Apart from this grave, the state of research (not only) in the Early Iron Age stagnated for nearly 150 years in this region. Even the exact position of the former burial mound fell into oblivion. It was only in the last 15 years that important new discoveries in an intensified, multidisciplinary research program within the application of new surveying methods were made. The "cult cart grave" is part of a number of huge former burial mound necropolises that surrounded the large-scale hilltop "central settlement" on the Falkenberg. Together with a handful of further hilltop settlements surrounding the Aichfeld plain, they are part of a large supra-regional network of contemporary settlement systems. Due to the favourable position at the crossroad of important routes of trade, communication and cultural exchange as well as to the richness in natural resources, the Strettweg "micro-region" became one of the most important centres of the Eastern Hallstatt circle.

Geography

The micro-region Strettweg is situated in the northern parts of the federal state of Styria in Austria. The landscape is shaped by the 22 kilometers long and up to five kilometers wide inner-alpine basin, the so-called Aichfeld-Murboden, and the surrounding mountains of heights up to 2,000 meters and more.

It is located on the upper Mur river, which enters the wide flood plain in the West at Judenburg. The Mur has dug a deep riverbed at the narrow point between the city of Judenburg and the ridge of Falkenberg over time. Northwest of the city of Knittelfeld the Seckauer basin is connected to the Aichfeld plain, then the valley narrows again at the village of Preg and the ridge of Schlosskogel. From the north the river Pöls and the Ingering creek and from the south the Granitzen creek enter the basin.

The eastern end of the Mur Mountains and the Gaaler ridge border the basin in the North, both belonging to the Lower Tauern. The foothills of the Zirbitzkogel, the Ameringkogel and the western Gleinalpe border the basin in the South.

Geology

The shape of the landscape of Aichfeld-Murboden developed during the last Glacial Period, when the whole basin got filled with the debris mass of the Würm Glacial

Fig. 1: Strettweg micro-region, view from Falkenberg (photo: ISBE/Tiefengraber)

Period. The Mur Glacier extended close to Judenburg and formed an end moraine ridge at Grünhübl.

Three major units dominate the geological structure of the micro-region Strettweg:[1] crystalline basement rock, tertiary and quaternary sediments. North of the river Mur are mostly mica slate, in the southwestern part mainly slate gneisses and in the southeastern part gneissgranites, amphibolite and gneisses occur. East of the river Pöls occur predominantly granitoid rocks of the crystalline of the Seckauer Tauern as well as Rannachquarzite. The marbles of Bretstein, Ober- and Unterzeiring, Lichtensteinberg and Eppenstein are a striking element of both the northern and the southern part. Mighty weathering covers overlay almost the entire crystalline area except of the marbles.

Inner-alpine basin subsidence developed within the crystalline rocks during the Tertiary. These were subsequently flooded and filled with thick layers of sediment. Above ground they are usually only recognizable at the edges of the basins in the form of a narrow hill zone. Glacial or postglacial quaternary sediments superimpose them for the most part.

These tertiary sediments occur on the northern edge of the Aichfeld basin, in the area of Grottenhof-Mariabuch, in the basin of Reifling, in the area of the Obdach basin and in the Pöls valley near St. Oswald.

Deposits of different shapes emerged during the quaternary. Moraines and morainic remains form a striking morphological element. Especially in the area west of Judenburg (Grünhübl), near Unzmarkt, in the area of the pass landscape around

[1] Flügel/Neubauer 1984.

Hohentauern, at Pölshals, near Scheiben, south of Unterzeiring and in the area of the Obdach basin these formations are visible.

Large-scale terrace formations represent the second type of quaternary deposits. They are located at Aichfeld, at Murboden and in the Mur-, Pöls- and Granitzen-valley. These formations consist of a narrow floodplain area and a main terrace, which are mostly separated by sharp edges.

The third type of quaternary deposits are fan-shaped crushed stones and alluvial cones. They emerged along the border of the valley and at the areas of the supply valleys to the main valleys.

Natural resources

The region is rich in mineral resources such as copper and iron ore.[2] Near Flatschach there are copper deposits proven to have been mined from the beginning of the 15th to the beginning of the 20th century. In the course of surveys, numerous traces of ore mining, such as fall shafts and mine galleries, were found on the mountain slopes north of the Mur valley. It is possible that these deposits were already used in prehistoric times. However, clear evidence of this has not yet been determined. On the Tremmelberg near Flatschach even gold was mined until the middle of the 17th century.[3] The situation is almost the same for iron ore deposits. The iron ore occurring on Falkenberg as well was mined in modern times until the 19th century.[4] At the hillslopes on the east side of Falkenberg above Waltersdorf numerous deeply cut hollow paths and broken galleries are visible. Mighty spoil piles are stringed together along the Mur at the southern foot of the Falkenberg. In the course of excavations some evidence that might be associated with ore smelting or other melting processes was discovered. Anyway, there is no clear evidence of this.

In connection with the iron ore deposits on the Falkenberg, a hypothesis was developed to explain the important finds and the supra-regional cultural connections: If the iron ore had already been mined and smelted in the Hallstatt period, it could have contributed significantly to the wealth and importance of the settlement as a valuable commodity.

Botany

Today most of the land in the plain of the Aichfeld is used as farmland. The mountains around the fertile plain are mostly wooded. It may be assumed that these areas were more heavily wooded at present than in the Iron Age.

Palynological, palaeobotanical and macroclimatic studies testify that the plant covering in the micro-region Strettweg was composed primarily of common spruces and fir trees supplemented with some pines and larches in the forested areas during

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2 Weber 1997, 336ff.
3 Seebacher-Mesaritsch 1974.
4 Brunner 1981, 148ff.

the Iron Age.[5] Furthermore, a stock of oaks and alders might have grown in the lowlands. Wood is an important basis for many aspects of human life, especially in the inner-alpine region. It served not only as a readily available construction material for several types of buildings, but also was used to erect fortifications, paths, wells or fences. A large amount of wood also was applied for heating, cooking and various handicraft purposes, such as ceramic production or metalwork. In addition, many articles of daily use such as furniture, utensils and tools were made of wood. Last but not least: This universal material also was used in connection with burial processes (cremations) or other ritual acts.[6] It is not possible to prove, if this important resource already was supported by forestry during the Iron Age or if people trusted in its natural regeneration. In this context, however, the considerable time for trees to regrow has to be taken into account.

In the investigation of the Late Bronze Age and Urnfield Period wood demand in Lower Bavaria and the southern Oberpfalz, Bernhard Zirngibel for example assumes an estimated wood consumption of approximately 32,79 m^3 per household for one year. This amount corresponds to a forest area of 9,6 ha.[7] Due to the size and the number of settlements within the micro-region Strettweg, one can assume that large parts of the forests were cleared. A large amount of wood was necessary to support the inhabitants with firewood and construction timber.

Regarding the crops from the settlement excavations at Falkenberg, more accurate results could be obtained in the course of the investigations conducted within the frame of the *PaleoDiversiStyriae* project.[8] The soil samples mostly derive from the northern part of the settlement where occupation layers from Hallstatt and Early La Téne period are testified. Charred plant remains from this samples have been analyzed and identified. From cereal types, especially barley (*Hordeum vulgare*) could be determined, furthermore spelt wheat (*Triticum spelta*), proso millet (*Panicum miliaceum*), foxtail millet (*Setaria italica*) and emmer wheat (*Triticum dicoccum*) occured. Additionally the evidence of lentils (*Lens culinaris*) and ervil (*Vicia ervilia*) could be proved. Apart from that, some typical taxa for meadows and pastures and for the edge of the forests could be identified. Unfortunately, data is only available from the settlement on *Falkenberg* about agricultural crops and the plant covering within the micro-region. Based on this fact it is possible to draw only general conclusions for the whole area. However, it can be assumed that the plant covering in the other places was not so different.

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5 The classification of the plant covering was conducted by Ruth Drescher-Schneider in the framework of the project: Kultur-, Landschafts- und Klimawandel in der Steiermark (Land Steiermark, Abt. 15, Energie, Wohnbau, Technik)

6 Zirngibl 2017, 182.

7 Zirngibl 2017, 184ff.

8 The analysis of the macrobotanic remains was conducted in the framework of the INTERREG-project PalaeoDiversiStyriae (lead partner: Universalmuseum Joanneum, Graz) by Andreas Heiss, Austrian Archaeological Institute, Vienna.

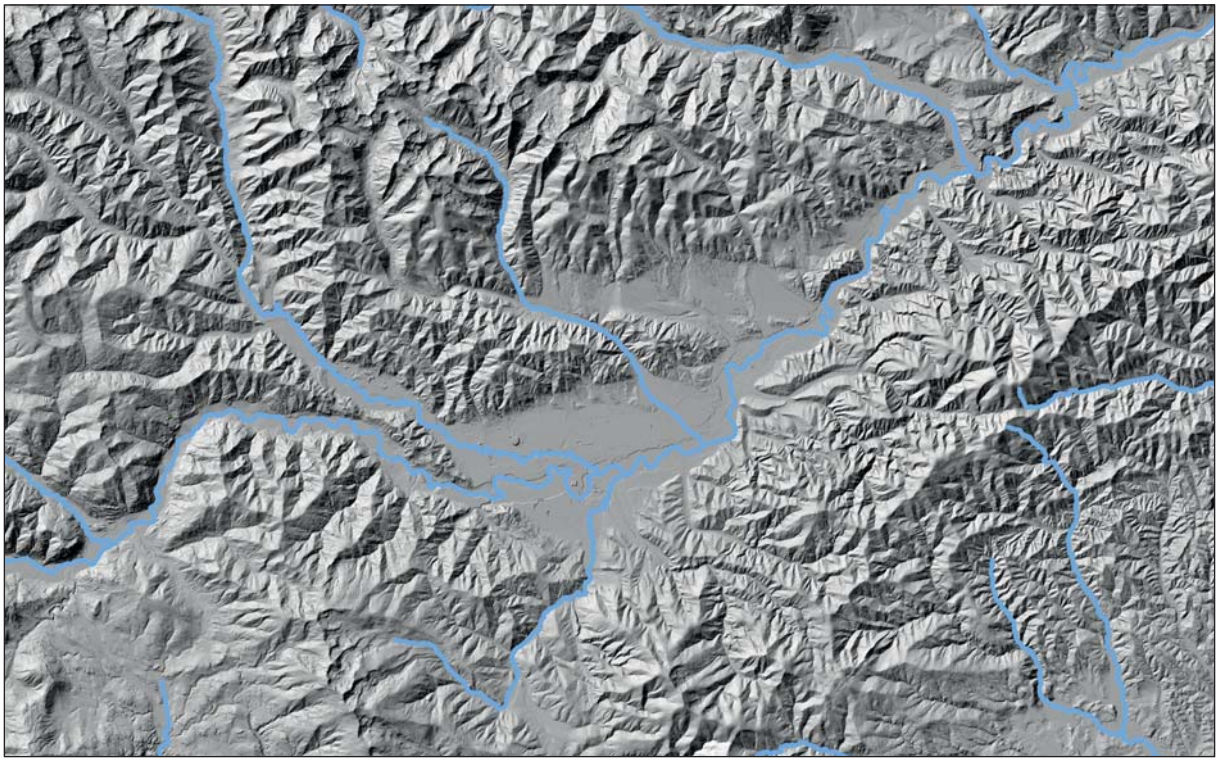

Fig. 2: LiDAR View of the Strettweg micro-region, the inner-alpine basin of Aichfeld/Murboden (ALS: GIS Styria)

Natural communications

Among other factors especially the natural riverbeds of the Mur, the Pöls and the Granitzen creek contribute to the development of the human communication routes. The Iron-Age central settlement Falkenberg is situated on an important intersection point of these natural connecting paths.[9] Crossing the Aichfeld basin lengthwise, the river Mur forms an East-West connection. Moreover, if one crosses the Pöls valley and the Triebener Tauern pass, it is easily possible to reach the Palten-Liesing and the Enns valley in the North, which offers the opportunity to get to the important salt mines in Hallstatt. In addition, one can get to the south by crossing the Granitzen creek valley and the Obdacher saddle, reaching the Lavant valley heading further to South towards todays Carinthia. By the means of the favorable terms of the landscape, the micro-region gained an outstanding importance during the Iron Age.

By the localization of the so far known sites and single finds, the use of these communication routes could be proven since the Neolithic. Presumably, these traffic ways to the salt trade center in Hallstatt are related at least since the late Bronze Age. By means of single artefacts from the Strettweg burial mounds and the settlement at *Falkenberg* it is possible to provide evidence of supra-regional trade and far-reaching cultural contacts.

[9] See Tiefengraber/Tiefengraber 2015, 215ff. – See also Lippert 2004, 203ff.

Fig. 3: Falkenberg, view from Judenburg (photo: ISBE/Tiefengraber)

Landscape research – new results

Strategy and approach in the research of the micro-region of Strettweg

At the beginning of the systematic research in the Strettweg micro-region the focal point was on the localization of the former place of discovery of the famous "cult cart grave". Furthermore, the place of a fabulous, so-called "druid circle", which was mentioned by Franz Ferk in 1877 should be relocated.[10] In the course of the first undetermined field-walking survey at Falkenberg the research focus shifted very soon, as the Early Iron Age settlement presumably associated to the "cult cart grave" was detected. Due to the promising results of the ensuing excavations and the analyses of the Airborne Laser Scanning (ALS) data since the year 2009 it was necessary to set a more comprehensive research strategy for the whole region around the central settlement at Falkenberg. Therefore, various research priorities were defined.

The first point was to determine the location of the graveyards belonging to the settlement at Falkenberg. Because the approximate position of the "cult cart grave" was known, ZAMG Archeo Prospections® were assigned to conduct large-scale geophysical measurements at the plot in 2011. Since this showed promising results, it was intended to record the total extent of the meanwhile completely flattened former tumuli groups with geophysical methods over the following years. In parallel selective excavations in some of the newly discovered burial mounds were started. The aerial photographs and Airborne Laser Scannings available up to that time (2011) did not provide any useful information about the existence or position of former tumuli. Connected with this field research various topics and questions were treated: the state of preservation, chronology, construction type, cultural connections and impacts, social rank of the buried persons, varieties in the custom of furnishing the dead with material goods.

[10] Ferk 1877.

The second strategic focus relates to the acquisition and exact localization of all archaeological sites in the nearer and further surroundings within the micro-region Strettweg. For this purpose, on the one hand, analysis of Airborne Laser Scanning data and aerial photographs of the federal state department of GIS-Styria were conducted. On the other hand, all available information from publications, the files of the Department for protecting monuments (*Bundesdenkmalamt*) and the former *Landesmuseum Joanneum*, were recorded and mapped in a GIS-System. Besides, at field-walking surveys, find collections and conversations with the local residents additional knowledge was compiled. In part, the data obtained by excavation campaigns at places of outstanding interest were supplemented. Questions about the diachronic interaction of the inhabitants of the settlements, the organization of the whole region forming a natural habitat throughout the time, the nature and use of the existing resources, the possible specialization on particular crafts, the production of special goods and the course of the communication routes should be answered by these measures.

The third strategic focus applies to the research on the supra-regional contacts and the communication routes used therefor. By means of artefact research and various material analyses trade and cultural connections, the distribution of innovative technology and a possible migration of nonlocal persons should be analyzed.

The preservation, conservation and protection of the archaeological sites and ground monuments is a complementary and not less important strategic point. In cooperation with the Department for Protection of Monuments, a special strategy due to the requirements of the region, the topography and today's use of the sites was created. On the one hand, this leads to a protection of monuments on many plots of land concerning the hilltop settlement at Falkenberg and various burial mound groups around Strettweg and Waltersdorf. On the other hand, the information and sensitization of the local residents about the importance and the singularity of the archaeological remains is considered to be important. To prevent any devastation by construction works, forestry, agriculture and pot hunters it was of particular importance to arouse the interest, to distribute information and to make people proud of the archaeological heritage in their immediate vicinity. In order to reach this goal several informative and educative programs for all ages and drafts for cultural exchange were developed. In addition, archaeological topics should be involved in local tourism concepts.

History of research – archaeologists and their landscape

Due to a spectacular discovery, the micro-region Strettweg is well known in scientific research since the end of the 19th century. The former landowner Ferdinand Pfeffer discovered at the field work in the year 1851 the famous so-called „cult cart of Strettweg". A re-excavation under the direction of Matthias Robitsch, then professor of the Institute for Church History at the University of Graz, took place in the following year.[11] In the course of this investigation, which was from today´s point of view more a kind of treasure-hunt than an excavation, bronze vessels, weapons, costume attires, horse harnesses, iron skewers and much more came to light. Especially the cult cart

[11] Robitsch 1852, 67ff.

Fig. 4: Falkenberg, artificial terraces (photo: ISBE/Tiefengraber)

is among the most important archaeological artifacts of the federal state of Styria and Austria.

But already short time after the discovery of this wealthy "princely grave" from the Hallstatt period, the site and its exact location were forgotten.

In 1934 all known finds of the grave were again published in a small monography by Walter Schmid, who also gave an interpretation of the sense and meaning of the cult cart.[12]

Although a monograph by Markus Egg was provided in 1996, it was not possible to tell more about the embedment of the tomb in an associated Iron Age landscape.[13] In addition, the thesis persisted for a long time (especially in local institutions and residents) that an important sovereign of the Hallstatt period passed away during the "journey through" in Strettweg. Because of his high social rank, to get buried with all honor he was entitled. Although reflections related to the location of an associated settlement were made, the position at Falkenberg was excluded because of the steepness of this mountain ridge, regardless of the fact, that two Iron Age finds, known for several years, are reported to originate from Falkenberg.[14]

Besides, all the other areas of the micro-region Strettweg have been nearly a white spot on the archaeological map up to the 21st century. Excluding single finds, which

[12] Schmid 1934. – See also Modrijan 1962.
[13] Egg 1996.
[14] Tiefengraber 2018, 605.

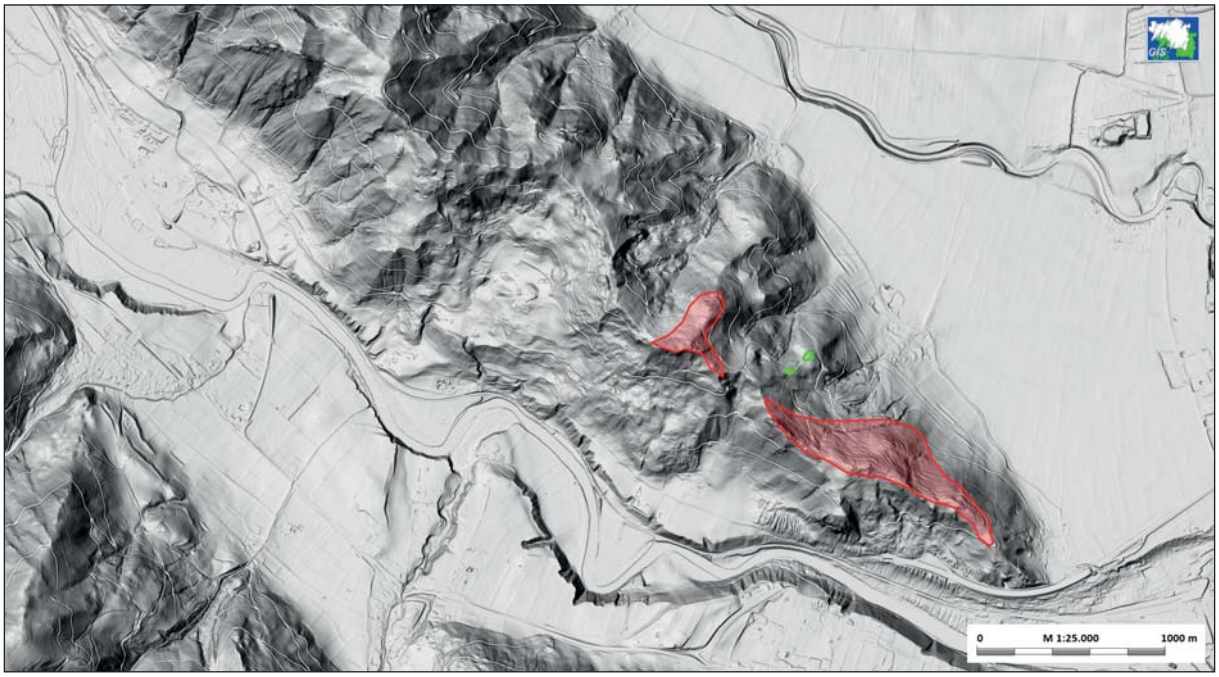

Fig. 5: Falkenberg, extent of the settlement (multidirectional hillshade: GIS Styria)

could not be definitely localized and interpreted there were no detailed records about documented and investigated find spots.

Based on descriptions and sketches the rough position of the cult cart site was still known. Therefore, extensive field surveys at the ploughed plots near Strettweg took place in the year 2005. In course of these investigations by order of the Department for Protection of Monuments a few Hallstatt period finds could be made. Additionally, no clear indications of the existence of further burial mounds could be determined.

However, in the course of a further survey executed by Georg and Susanne Tiefengraber in 2003 the artificial terraces at Falkenberg could be determined. A few ceramic shards picked up at this occasion could be assigned to the Hallstatt period. Because of these results, the Falkenberg as the possible associated settlement of the "cult cart grave" returned into the focus of scientific interest. Therefore, excavations within this area under direction of G. Tiefengraber started in 2006. Several campaigns at different areas in the southern parts of the settlement took place during the following years up to 2011.[15] In the context of these investigations, the connection to the "cult cart grave" and the dating in the Early Iron Age period could be proved. In parallel, ALS analyses and extensive field surveys on Falkenberg and around have been carried out. However, it was only after the ALS measures mentioned before that the real extend of the settlement could be assessed. Additional excavation campaigns within the northern parts of the settlement area under the direction of G. Tiefengraber were carried out in 2014 and 2015.

The promising results of the settlement investigations provided the impulse for the search for the associated graveyard. Due to the fact, that the approximate

[15] See Tiefengraber/Tiefengraber 2009, 97ff.; Tiefengraber/Tiefengraber 2015, 215ff.

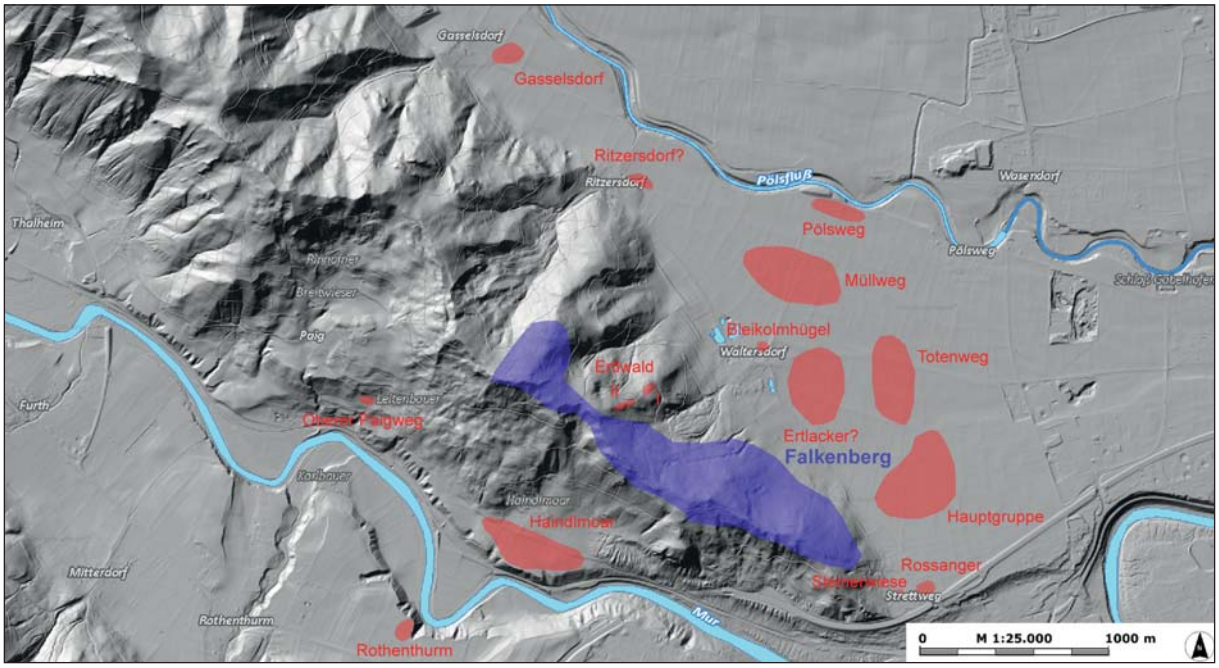

Fig 6: Falkenberg, settlement area and tumuli groups (ALS: GIS Styria, graphic: ISBE/Tiefengraber)

position of the "cult cart grave" was still known, ZAMG Archeo Prospections® was assigned to conduct large-scale geophysical measurements at the plots in the years 2011, 2012 and 2014.[16] Additionally, small-scale georadar- and geoelectrical-measurements were also conducted by Nicole Kamp (ISBE and University of Graz) in 2013 and 2014.[17] Because of the just as much promising results of the geophysical measurements, systematic excavations under the direction of G. Tiefengraber in selected burial mounds were carried out in 2012 (tumulus II "helmet grave" and tumulus I, the rediscovered "cult cart grave"), 2013 (tumulus III and the so-called *Bleikolm* tumulus) and 2017 (tumulus IV-IX). One further excavation in the area of the tumuli groups, based on data which were gained from aerial photographs, was conducted in 2016 (tumuli group *Pölsweg*). In the frame of the Iron-Age-Danube project, the partners from ELTE-FHIAS University in Budapest conducted further supplementary geophysical measurements in 2017.[18]

Apart from the mentioned research-activities near *Falkenberg* and *Strettweg* further investigations in the wider environment of the micro-region Strettweg were conducted.[19] Initially, extensive source studies in literature and files kept by the Federal Monuments Authority for Styria and the *Universalmuseum Joanneum* were carried out. Based on information from local residents several surveys at the hilltops surrounding the Aichfeld-Murboden basin were accomplished. In addition,

[16] E.g. Tiefengraber 2012a, 310ff.; Tiefengraber 2012b, 313ff. – Also see Tiefengraber/Tiefengraber/Moser 2013.
[17] Georadar prospection was also conducted in the Early Iron Age settlement area on Falkenberg in 2014 by Nicole Kamp. See Kamp et al. 2015, 9ff.
[18] Czajlik et al. 2017, 353ff.
[19] Synoptical also see Hebert 2008, 88ff.

some picked up ceramic shards enabled a dating, as for example on the *Zuckenhut* at Fentsch or at the commonly *Rotheder* at Flatschach. Due to the Airborne Laser Scanning data provided by GIS-Styria several artificial structures of possible prehistoric settlements could be located. Further field surveys with the intention to check the ALS results were conducted. By this means, a significant number of so far unknown find spots of settlements and burial mounds was recognized. A short excavation campaign was conducted at the small hilltop settlement *Guggamoar* in 2014.[20] Three further excavations at the strongly fortified hilltop settlement *Gerschkogel* took place from 2017 to 2019.

ALS-analysis

The first Airborne Laser Scanning (ALS) data from GIS-Styria could be analyzed and evaluated in 2009. Over the following years the whole federal country of Styria was scanned by Airborne Laser Scannings assigned by GIS-Styria. Only in course of the evaluation of the relevant scans could the whole extent of the settlement-area at *Falkenberg* be recorded. In addition, numerous further artificial structures especially located at the surrounding hilltops of the *Aichfeld* basin were recognized on the basis of these scans. Most of them show similar characteristic terraces as determined at *Falkenberg*. It turned out that this is obviously an essential feature of many prehistoric hilltop settlements in this inner alpine region (in Styria and also in Carinthia). Particularly with regards to the discovery of field monuments in forested areas, the Airborne Laser Scanning DGM data are a meaningful source. As

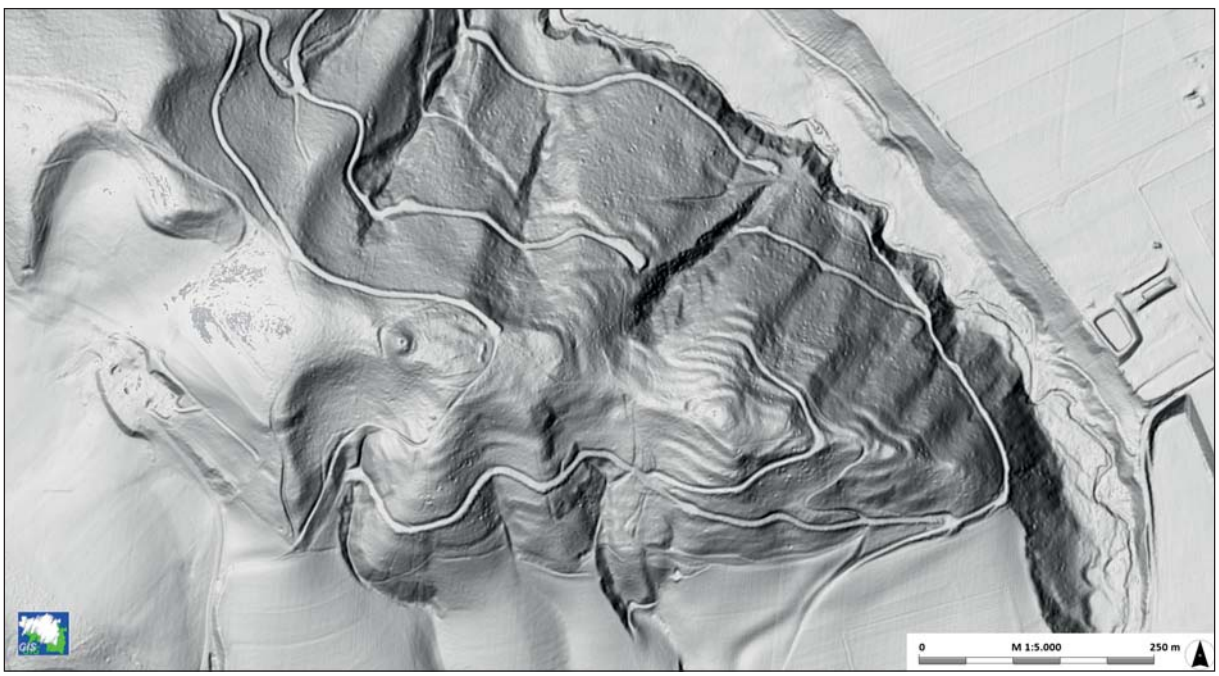

Fig. 7: LiDAR Scan of the Zuckenhut *settlement (multidirectional hillshade: GIS Styria)*

[20] Tiefengraber/Tiefengraber 2015, 237f.

well, these data are a useful tool for the prevention and protection of archaeological sites. However, to check the accuracy of the ALS images field surveys took place. In addition to a verification of the LiDAR data several finds in the course of the inspection in the nature were discovered. Some of these fragments were significant enough to assign them to the Hallstatt period. In this way, most settlements could be assigned chronologically quite reliable. Though the artificial terraces were not the only structures that could be interpreted as man-made: On the densely forested slopes of the *Falkenberg* even some barrow mounds are visible on the surface. Apart from this, traces of mining from different periods and numerous paths cut into the surface could be determined. The soil formations relevant for archaeological research naturally have been preserved especially on the forested hill- and mountain slopes and tops. On the flat fields and meadows in the *Aichfeld* basin there are hardly interpretable structures of this kind. As a result of intensive arable farming, the soil structures became flatter and flatter over time and finally disappeared completely. In order to discover find spots in this area one needs correspondingly meaningful aerial photographs.

Aerial photography

However, in order to make crop marks visible, the aerial images must be recorded under specific conditions, which succeeded in the particularly dry summer in 2013. These photographs of the micro-region Strettweg, commissioned by GIS-Styria,

Fig. 8: Circular ditches of burial mounds, grave group "Totenweg" (aerial photo: GIS Styria)

made – among other archaeological relevant structures – many remains of burial mounds, that had previously not been suspected, suddenly visible.[21] That year's dryness made the circular ditches of the former burial mounds on today´s extensive arable and meadow areas perfectly observable. In these moats, more humidity could be preserved by the higher humus quantity, which caused a lusher and greener vegetation in these places. Up to this moment, there had been (nearly) no reliable knowledge of any burial mounds in these parts of the federal state of Styria! In this way, the connection between the hilltop settlements, previously identified by the LIDAR scan analysis, and the burial sites mostly located in the flatter areas below became clearly visible. Meanwhile almost each of the prehistoric settlements could be assigned to burial sites.

Geophysics

Only after the evaluation of the LIDAR scans and subsequent intensive surface surveys was it possible to estimate realistically the total extent of the settlement area on the Falkenberg. With a projected settlement area of about 60 hectares, there had to be correspondingly large necropolises in the immediate vicinity of the settlement. The search for these started in the areas where the cult cart was found in 1851. Since the location of this grave was reasonably – more or less – easy to define (at

Fig. 9: Geophysical measurements (ZAMG Archaeo Prospections®) at the "Hauptgruppe" at Strettweg (photo: ISBE/Tiefengraber)

[21] First overview in Tiefengraber/Tiefengraber 2015, 217ff.

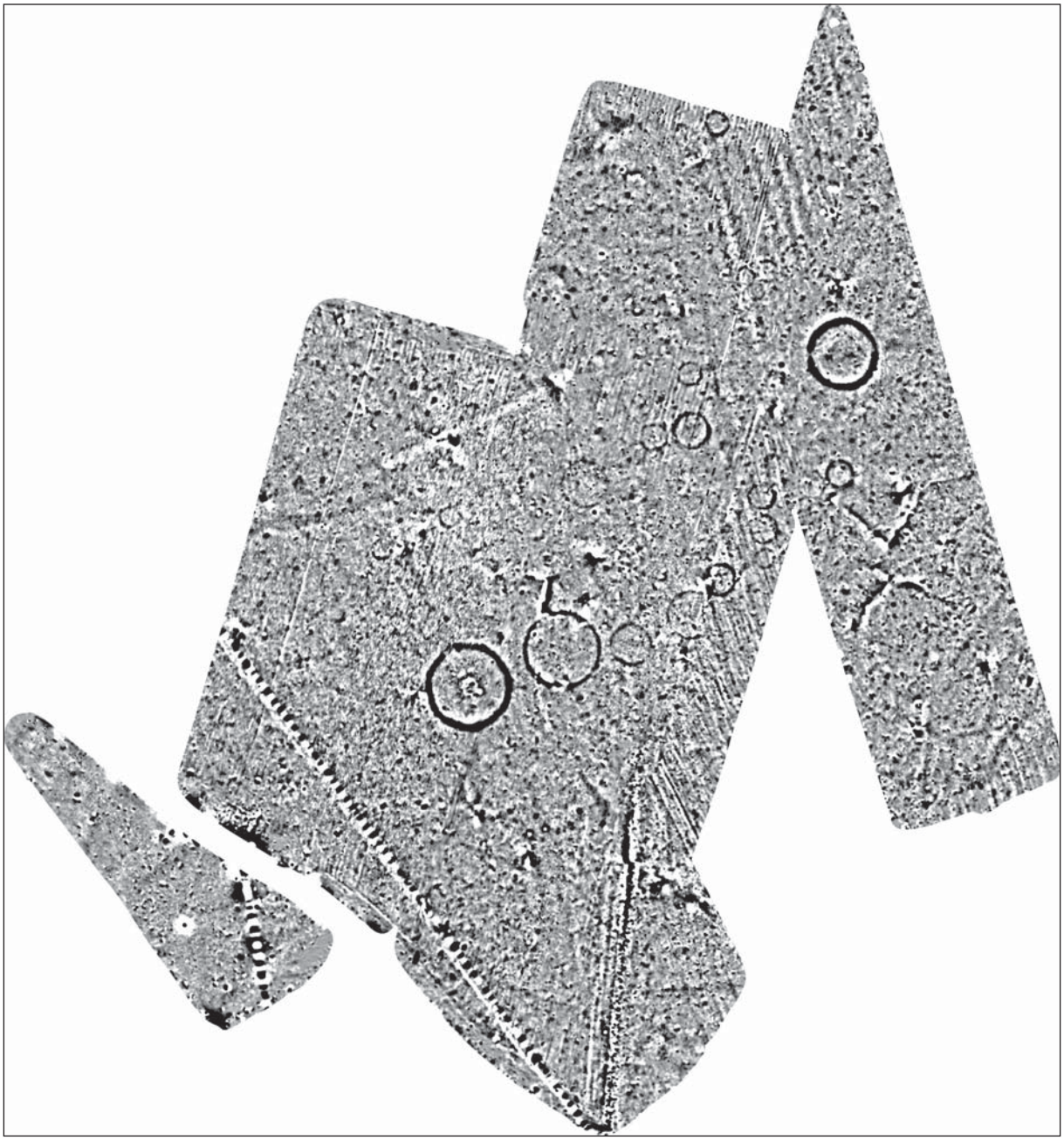

Fig. 10: Section of the geomagnetic measurements in the area of the "Hauptgruppe" at Strettweg (graphic: ZAMG Archaeo Prospections®)

least for some hundred meters), the first geophysical measurements were carried out there in October 2011 and January 2012 by ZAMG Archaeo Prospections®. Based on the large size of the comparatively flat areas mobile measurement units were used. Almost on all parts of the measured plots structures of the former mounds were visible, which appeared as circle-shaped anomalies. Even the remains of the stone-surrounded burial chambers including the dromoi became recognizable in a few graves. ZAMG Archaeo Prospections® investigated also some adjacent plots in the area of the so-called "main group"-necropolis of Strettweg (*Gräberfeld*

"Hauptgruppe") and around the so-called *Bleikolm* burial mound near the hamlet of Waltersdorf. ZAMG Archaeo Prospections® performed in all cases geomagnetic as well as targeted georadar measurements in smaller areas. A part connected north of the "main group" of Strettweg was measured in 2014.

A team of the Iron-Age-Danube project partner of the ELTE-FHIAS University Budapest, led by Zoltán Czajlik, investigated some additional parts of the necropolis near Waltersdorf in 2017 (grave-groups *"Pölsweg"*, *"Müllweg"* and *"Totenweg"*).[22] The results obtained from the geophysical measurements supplement perfectly the outcome of the aerial photographs taken by GIS-Styria in 2013. So far, the data available suggest that the landscape in the plain east of Falkenberg once was characterized by numerous large-scale necropolises of burial mounds. According to the current state of the research, apparently, they were arranged in several grave-groups. The occupation of the necropolises took place over several generations, whereby the occupation period corresponds generally to that observed in the settlement on the Falkenberg. On the basis of the data obtained during the archaeological excavations of the years 2015 in the *"Pölsweg"* grave group[23] and 2017 in the "main group" *("Hauptgruppe"*),[24] it can be established that the younger graves were not only erected in the immediate vicinity of the older ones, but – in some cases – that they even disrupted them. Partly the older burial places even had to give way to the younger ones and were levelled in order to create space.

Excavations

Several excavations in the southern part of the Falkenberg settlement under the direction of Georg Tiefengraber took place between 2006 and 2011. Only Hallstatt period structures and finds came to light in these areas. In the course of the excavation campaigns, a settlement activity lasting for several generations could be proven. In all excavation trenches, remains of wooden buildings in the form of soil discoloration and some pieces of wattle and daub were discovered. Depending on the time of their construction, the houses were formed and positioned in different ways. Some of them were built as a post construction with wooden poles and others as a beam construction. In the southern part of Falkenberg the bedrock is covered with only a few centimeters of humus. In these areas, the pits for anchoring the posts and beams partially were cut directly into the rock. On these plots a settlement activity from Ha C to Ha D is to be proven. Numerous ceramic finds, some of them of impressive quality, but also bronze fibulae and bracelets, loom weights, firedogs and much more tell of the life of the former inhabitants.

The youngest cultural layers in the areas investigated in 2014 and 2015 start – like in the former campaigns in the southern area of Falkenberg – in Ha C and date back to the early La Tène period (Lt A). There, in the up to 1.5 meter thick sequence of layers also several superimposed settlement layers could be detected. In this area numerous animal bones were found in addition to numerous pottery fragments.

[22] Czajlik et al. 2017, 353ff.
[23] Tiefengraber 2016, 470ff.
[24] Tiefengraber 2017a, 442f.

Fig. 11: Falkenberg, structures of the Hallstatt period buildings (photo: ISBE/Tiefengraber)

Fig. 12: View from Guggamoar *settlement to* Zuckenhut *settlement (photo: ISBE/Tiefengraber)*

Fig. 13: Strettweg, Tumulus II/helmet grave, burial chamber with finds (photo: ISBE/Tiefengraber)

Glowed ceramic shards and clay nozzles may indicate a melting process or a craft for which great heat was needed.

In addition to the Falkenberg research program, a settlement site at the so-called *Guggamoar* near St. Lorenzen near Knittelfeld was investigated archaeologically as an example for a smaller settlement in the Aichfeld area.[25] It is located on a very small hilltop with steep slopes on the southern edge of the Aichfeld and was inhabited repeatedly from the Early Bronze Age through the Early and Late Iron Age to the Middle Ages. This limited area was also terraced in order to be able to erect buildings on it. However, the structures by the medieval wooden rampart fortifications in some parts were overprinted and disturbed.

In addition, excavations were carried out on the *Gerschkogel* near St. Georgen near Judenburg from 2017 to 2019.[26] This very exposed hilltop settlement has a strong fortification that is still clearly visible today and dates from the Hallstatt period to the La Tène period. A rampart and ditch with an inturned gateway ("Zangentor") with two

[25] Tiefengraber/Tiefengraber 2015, 237f. – See also Tiefengraber/Tiefengraber 2014, 128ff.
[26] Tiefengraber 2017b, 434f.

Fig. 14: Strettweg, cult cart grave, amber beads (photo: ISBE/Tiefengraber)

further smaller ramparts positioned in front secures the settlement to the west and southwest. The former residential terraces on which wooden buildings once stood are still visible within the fortification today.

Furthermore, several excavations in different grave groups around the "central settlement" on Falkenberg took place in Strettweg and Waltersdorf.[27]

The first began in 2012 at a place where the geophysical measurements showed a strong circular anomaly (ditch), the stone framed chamber and the *dromos* of a former burial mound. The choice of this area turned out to be a stroke of luck, as the grave was undisturbed. The most outstanding grave goods were a bronze helmet, a bronze sword, various axes, bronze and ceramic vessels and horse harnesses. Based on these finds it can be concluded, that the grave owner was an important male person of the rank of a "prince". Presumably, however, two other persons – another man and a woman – were buried in this grave. Only the analysis of the cremated bones will make possible a final assessment. The lowest stone layers of the burial chamber and the *dromos* were still preserved. The grave goods were positioned in groups at different points of the chamber. They had been compressed in the course of the time by the pressure of the burial mound originally heaped up over them. Besides the stone substructure of the floor had been preserved underneath. However, no remains of the once existing wooden floor or the walls could be found. In the *dromos*, just before the threshold into the burial chamber, the remains of the grave goods burnt at the pyre had been deposited. The grave is dated to Ha D1.

Towards the end of this excavation campaign, the location of the "cult cart grave" (also Ha D1) was clearly identified. Therefore, an excavation took place here in autumn 2012. Unfortunately, due to the excavations of the 19th century, almost no undis-

[27] Synoptical to the following excavations: Tiefengraber/Tiefengraber 2015; Tiefengraber 2018, 553ff., esp. 555–565.

turbed areas could be found. Nevertheless, significant new insights were gained into the construction of the tomb and the individuals buried there. Only the lowest layer of the stone enclosure of the burial chamber and of the *dromos* was preserved. The low stone wall surrounding the burial mound (*Krepis*) may indicate Italic-Etruscan traditions in burial architecture. Nevertheless, many hundreds of small fragments of the grave goods could still be recovered. The largest part of it only came to light in the course of the flotation of the soil material from the inside of the burial chamber. Despite the poor condition of the tomb, more than 2,500 amber beads, glass and gold beads, pendants, fibulae, bronze ornaments, bracelets and earrings were discovered. The rich and magnificent grave goods indicated the burial of a high-ranking lady. The finds, which can be attributed to her traditional costume, provide information about her. Even some bronze fragments belonging to the cult cart were found.

Another burial mound discovered by geophysical measurements was investigated archaeologically in the following year 2013. The enclosure of this grave was clearly visible as a circular anomaly. On the northern side, an apparently arc-shaped stone structure was detected. In the course of the excavation, this structure as a path leading by the burial mound could be identified. Apparently, the burial mound was still visible at the beginning of the 20th century and served as a kind of landmark, which was surrounded by a pathway. The area where the wooden burial chamber was originally located was recognizable as a dark discoloration of the ground. In contrast to those previously investigated, this burial chamber was not surrounded by a stone packing and had no access corridor. This grave dated in Ha C2. Unfortunately, the tomb turned out to be robbed almost completely and only a few significant finds could be recovered. On one side of the burial mound the surrounding ditch was interrupted and allowed a close approach by an earthen bridge. Possibly this is connected to the grave customs practiced in the Hallstatt period. At this position, at the lowest point of the trench charred pieces of wood and remains of ceramic bowls were discovered.

The largest burial mound known to date east of Falkenberg was investigated in autumn 2013. The so-called "*Bleikolm burial mound*" was a clearly visible elevation until about the middle of the 20th century. During this time, however, an attempt to level it out with a bulldozer in order to be able to use the area for agricultural purposes was made. Before the start of the excavations, it was perceived only as a very slight elevation. The geophysical measurements suggested spectacular findings. The stone packing of the burial chamber, the access corridor and the huge enclosure ditch were clearly visible. After the removal of the uppermost layers of the earth, early medieval graves came to light, which were remarkably not recognizable in geophysical measurements. The burial mound must have been still visible at this time as a mighty elevation. People were probably aware of its former function. Following the old tradition, they created their tombs in the Iron Age tumulus. The stone enclosure of the large burial chamber had external dimensions of 13 x 13 meters and was preserved more than one meter high. However, probably relatively soon after its construction it had been robbed. Only a few fragments of the magnificent grave goods could be discovered. These finds allow a dating in Ha D1.

Fig. 15: Bleikolm *burial mound, chamber, dromos and early medieval graves (photo: ISBE/Tiefengraber)*

On aerial pictures, another group of graves situated near the river Pöls could be discovered *("Pölsweg")*. The circular structures of the former burial mounds were characterized by dark green discolorations. Apart from these, an approximately quadratic structure was visible. The assumption was obvious that this could be a La Tène period burial site, especially, since corresponding settlement strata had been determined on Falkenberg in the years of 2014 and 2015. In the course of the excavation, it was determined that the younger findings (Lt A) were located directly next to the older ones (Ha C2/D1), or even overlapped them.[28]

The same phenomenon could be observed in the area of the "main group" *("Hauptgruppe")* of Strettweg, during the excavation carried out within the framework of the Iron-Age-Danube project.[29] The structures also overlapped at this point. Some of the prior burial mounds seem to have been leveled for the construction of the younger ones. Whether this approach can be linked to a kind of *"damnatio memoriae"*, or whether it was a generally accepted approach, cannot be conclusively assessed yet. In any case, the cemeteries were occupied for several generations. Possibly, after the extinction of a family dynasty, their burial places were abandoned in order to create space for new ones. The investigated graves date from Ha C to Ha D.

Settlement patterns

Only through a close connection of different research methods, can a reasonably complete picture of the Iron Age landscape be obtained. Source studies, analysis

[28] Tiefengraber 2016, 470ff.
[29] Tiefengraber 2017a, 442ff.

of aerial photographs and LiDAR Scans, geophysical measurements, surveys and excavations, in addition to various natural scientific analyses, formed the basis for the results acquired so far. Despite the extensive data, many questions remain unanswered and can be interpreted only provisionally. On the one hand, this is due to the intensive agricultural use of the land in the Aichfeld area. On the other hand, in the course of time many construction activities took place, which were not accompanied by archaeological research. Sometimes landowners discovered a find during their fieldwork or other earth moving. In most cases, however, this was not reported to the competent authorities for fear of possible consequences and ignorance of the legal situation. In this way, much information is irretrievably lost. Find spots have been preserved reasonably well and undisturbed only in the areas that have been forested for a long time.

Pattern analysis in relation to settlement sizes

Only the terraces visible on the LiDAR scans allow a reasonably conclusive statement about the extent of the settlements in this region. Using this method, however, settlement sites located exclusively on forested hilltops could be identified.[30] So far, research excavations could be carried out only on the Falkenberg, the *Gerschkogel* and at the *Schlosskogel* near *Guggamoar*. However, with the help of the LiDAR scan analysis it was possible to discover some more settlement sites. In the plain,

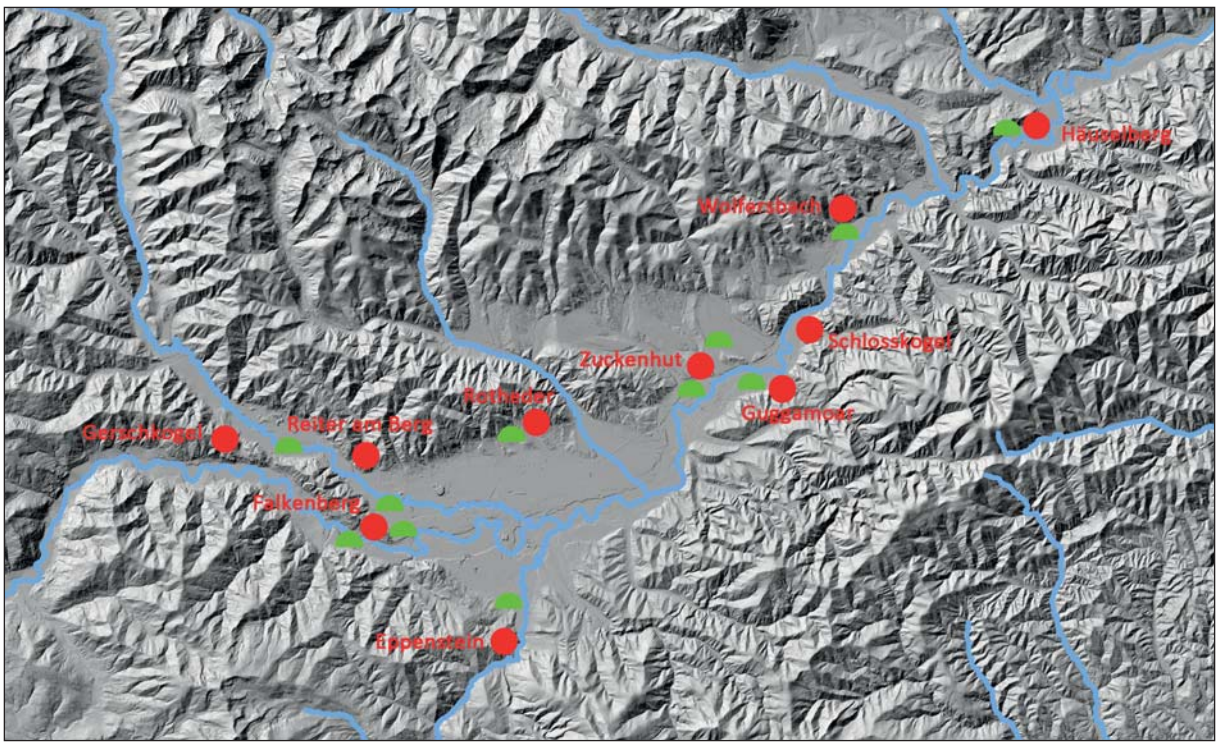

Fig. 16: LiDAR View (GIS Styria) of the Strettweg micro-region, settlements (red) and tumuli (green), (graphic: ISBE/Tiefengraber)

[30] Synoptical Tiefengraber/Tiefengraber 2015, 217ff.

unwooded areas of the Aichfeld it has not been possible to find settlement sites by the analysis of aerial photographs or LiDAR scans. The study of the sources did not provide any information of this either. Although information about individual finds, such as fibulae, exists, in most cases it cannot be assigned to a certain find category due to the lack of background information. These individual finds allow only a rather general statement about the use of the entire region during the Hallstatt period. However, it can be assumed that people have also settled on the plain. Possibly these were groups of farmsteads of different sizes. In the course of the construction of the district heating pipeline between Pöls and Judenburg some structures and finds were detected which were first interpreted as settlement remains, meanwhile it is obvious that some of them were in fact remains of former burial mounds. However, the possibility of observation in the line ditches was relatively limited. Moreover, these observations did not allow any conclusions about the extent of a possible settlement site. Around the Aichfeld there are currently at least eight known settlement sites that can be identified by artificial terraces. They are situated on wooded hilltops at altitudes of about 700 to 1000 meters above the sea level at their highest point.

The following data on the size of the settlements are based on measurements carried out using the LiDAR data. Since they include the steep parts between the settlement terraces, a correspondingly reduced value must be calculated. However, this value as a comparative size was used. Due to the fact, that all settlements were built in a similar way, the value can be reduced by approximately the same percentage.

The largest settlement is located on Falkenberg and has a total extent of about 60 hectares. Both, the size and especially the significant finds from the burial mounds suggest that the "central settlement" of the Aichfeld/Strettweg micro-region was located here. Apart from that, it is located at the intersection of important traffic routes.

The next largest settlement with about 25 hectares is situated on the *Zuckenhut*. It is located in the eastern part of the Aichfeld, north of the river Mur. During several field surveys, numerous ceramic fragments from the Hallstatt period could be collected here. Among them are pieces that indicate a melting process and even iron slags were collected. The settlement terraces extend around the southeastern part of the hill with a height of 727 meter. On the highest spot, a medieval moated site with rampart and ditch is situated.

The two next largest settlements cover an area of about 20 hectares. One of them is located about 3.5 kilometers north of Falkenberg at the so-called *Reiter am Berg*. On the eastern, wooded part of the hilltop, terraces are visible in the terrain. These cover an area of about two hectares. The remaining areas are used today as meadows and pastures. There are no more terraces preserved. The entire settlement area is surrounded by a rampart. Due to the lack of significant finds, currently an exact temporal classification is not possible. On the one hand, two Neolithic stone axes are known from this site, on the other hand the terrain structures indicate a development in the Iron Age.

The second settlement of a size of about 20 hectares is situated at *Gerschkogel* near St. Georgen ob Judenburg. As it was already mentioned, it is also fortified with

ramparts and ditches. In the course of excavations one of the settlement terraces and the rampart with a gate were investigated from 2017 to 2019. Settlement structures and remains of the Early and Late Iron Age could be found. Nevertheless, the strong fortifications can be dated to the late La Tène period,

With a size of about six hectares, the settlement at the so-called *Rotheder* near Flatschach clearly stands out from the previous ones. Also at this site, terraces are clearly visible in the forest. Besides, the hilltop is surrounded by a rampart. However, this rampart can either be probably connected to a small medieval timber castle, which is situated at the north-eastern side of the Iron Age settlement or can be dated to the Early Iron Age. In the course of field surveys, Hallstatt period ceramic fragments were discovered, which suggested a dating of the settlement to this time span. Numerous traces of copper mining can be seen on the mountain slopes near the settlement. Maybe some small heaps and pits, surrounding the settlement area in the south are related to prehistoric mining activities. However, this can be clarified only within the framework of an excavation.

The settlement on the *Schlosskogel* of Preg at the eastern end of the Aichfeld plain covers an area of about five hectares. The settlement terraces extend over both hilltop areas. Due to field surveys, Urnfield period finds have been known for several years. So far, no excavations took place that could prove a Hallstatt period settlement at this place.

The smallest settlements are located above the so-called *Guggamoar* on the south side of the Mur valley. Both hilltops show terraces, which related them directly to the ones mentioned before. The settlement investigated in 2014 covers an area of about 0.3 hectares. In the course of the excavation settlement activities in the early Bronze Age, the Early and the Late Iron Age, the Middle Ages and the Modern Age were proven.

The terraces at the second settlement, located immediately at the east, covered an area of about 0.7 hectares. So far, no dated finds have been collected there. The artificial terrain formations are of the same type as the previously described ones.

Pattern analysis in relation to communication

The hilltop settlements in the Strettweg micro-region are located about three to ten kilometres apart from each other. Looking at possible route connections between the several known settlement sites, two almost parallel routes along the Mur valley borders can be expected. The section north of the Mur was probably of major importance. The routes of supra-regional importance also ran here, which in addition to the east-west connection mentioned above enabled also connections to the north and south. The main connection of this region to the north was probably the Pöls valley. Passing the Triebener Tauern, one quickly reached the Enns valley without having to overcome too steep inclines. Whereby one of the two possible connections probably existed west of the Falkenberg at the so-called Pölshals. A second led along the eastern foot of the Falkenberg, as well in this direction. The most important route to the south with supra-regional significance ran through the Granitzen valley across

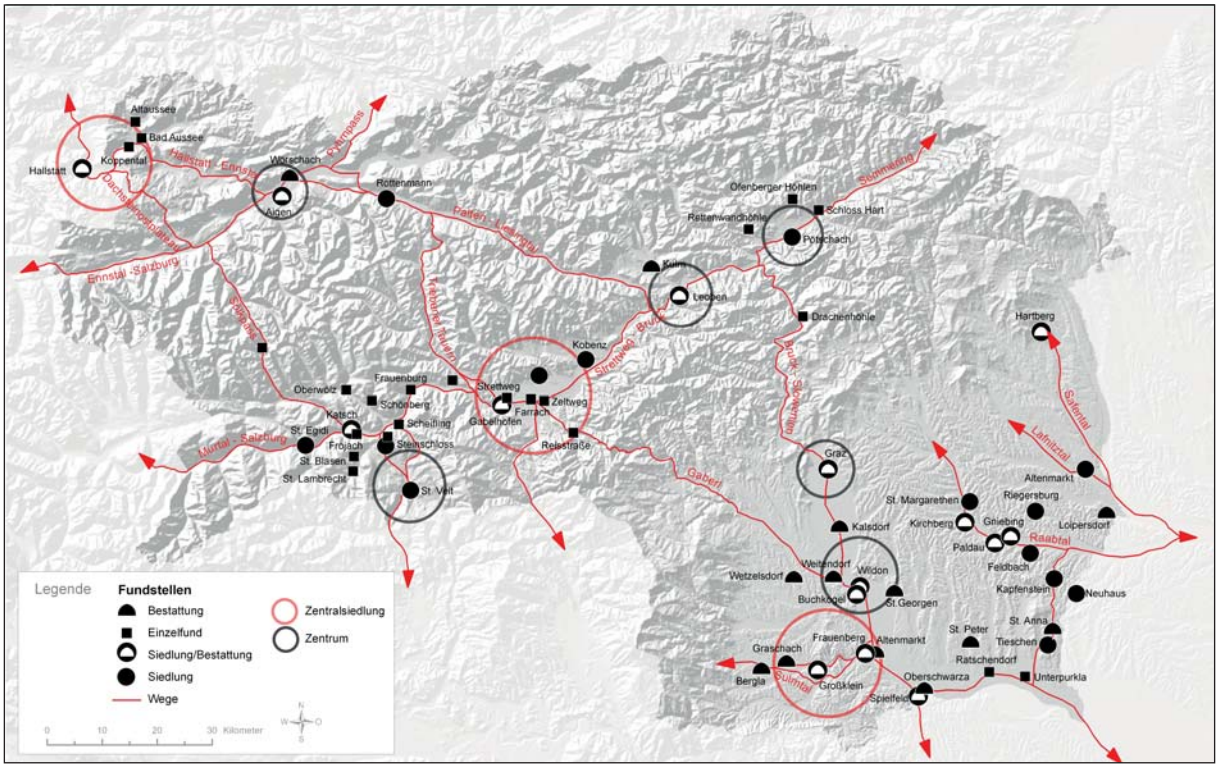

Fig. 17: Communication routes and settlement centers in Styria (graphic: S. Tiefengraber)

the Obdacher saddle. A crossing of the Mur was probably possible only at a few places because its bed is cut very deeply into the basin landscape of the Aichfeld. Therefore, it was difficult to overcome this obstacle. Possibly, there was a passable ford near the confluence of the Mur, the Pöls and the Granitzen creek in the area of Zeltweg. Communication between the particular settlements probably worked as well for the most part via paths running through the plain of the Aichfeld. All known settlements are situated on steep hilltops, which do not have any traffic-relevant connections at higher altitudes. It can be assumed, that routes used since Neolithic probably continued to exist in the Iron Age and followed more or less the same course. Presumably, these routes were used again in Roman times and in the end got lost under modern road constructions. Therefore, as a basis for assessing the communication routes in the Hallstatt period, only models derived from the existing topography can be developed. The evaluation of LiDAR scans provides further possible indications. However, this method is useful only to long time forested areas. In the case of the micro-region Strettweg it is applicable solely to the mountain slopes. In these areas, the traces of ancient road connections are clearly visible to some extent while they trail away in the wide arable spaces.

Pattern analysis in relation to resources

The micro-region around Strettweg and the Aichfeld is comparatively rich in natural resources. Beside an abundance of wood especially in the lower parts of the surrounding hills and a natural richness of fresh water, deposits of different kind of

ores are well known. Initially, rich copper ore and gold deposits along the northern range of hills have to be mentioned, like the deposits around Flatschach, near Rattenberg or on Tremmelberg. Each of this deposit was mined (even) in historic times, some of them until the 19th century. Nevertheless, from today´s point of view these deposits are impoverished. Traces of mining in these deposits can be followed back in some cases even until the Middle Ages, one can also expect mining on copper ore in Roman times and maybe also before in prehistoric times, although evidence is lacking. Beside copper ore and gold different kind of iron ore (e.g. pyrit, haematit or magnetit) are well known from most of the hills surrounding the Aichfeld plain and even Falkenberg owned more or less rich iron ore deposits, which were mined until the 19th century. Intensive traces of mining are still visible today on the southern and eastern side of Falkenberg, where heaps of stones and different mining pits can be detected. The situation is quite similar on most of the surrounding hills, where intensive traces of iron ore mining can be found. This is also the case further to the west, south and east to adjacent areas. Though until now not even one structure of mining activity can be connected to a time before the Middle Ages! The only evidences of pyrometallurgical processes connected with iron from prehistoric times in the micro-region are known from Falkenberg and from *Zuckenhut* (unstratified). During excavations in 2014 and 2015 clay nozzles and iron slags were found on Falkenberg in settlement layers of the Early Iron Age. Very poorly preserved remains of a furnace with some iron slags in this excavation area also show connections to iron production or – more likely – further iron processing (e.g. forging). It has to be mentioned that not only the Falkenberg contains more or less rich deposits of iron ore, but in fact all of the already mentioned hills covered by Early Iron Age hilltop settlements. Beside these mineral resources, wood is one of the most important and abundant resources in this inner alpine landscape. The high density of more or less contemporary large-scale hilltop – and for sure also flatland – settlements demands a huge amount of wood for different purposes, e.g. as a building material, for heating, cooking, for pottery production, for tools, weapons, maybe for pyrometallurgical processes and also for mining. It is unclear how the use of wood was managed but concerning the enormous requirement for the large settlements one might expect quite a distinctive forestry to provide a sufficient subsistence. Furthermore, – like it is proved from historical times – it must not be forgotten that the Mur and the Pöls streams were used as a natural waterway for transporting logs. Other natural resources, which had quite an importance in historical times, like e.g. the real *Speik* (*Valeriana celtica*), might also have been used in prehistoric times, but – as can be expected – the evidence is lacking. Finally, it has to be mentioned that all of the prehistoric hilltop settlements in the micro-region have an abundance of water, springs are testified on each of them.

Pattern analysis in relation to necropolises

The combination of LIDAR-scans, aerial photographs, geophysical prospections and field surveys can provide a sharp picture of the relationship between the Early Iron Age hilltop settlements and the associated graveyards. As it was already mentioned in this paper, the settlements were surrounded by burial mounds, which were

combined to more or less large grave groups or necropolises, depending on the size of the settlement. In fact, the structure of Early Iron Age settlements in the Strettweg micro-region corresponds perfectly to the situation in better researched areas, where even today burial mounds are still existing above the ground, e.g. around the Burgstallkogel near Kleinklein in Sulm valley or around the Poštela near Maribor. In the last two years even the poorly researched area of today´s middle and eastern Carinthia provided some more or less unknown hilltop settlements surrounded by large-scale burial mound graveyards, which show exactly the same pattern. In all of these cases the (former) burial mounds were erected around the settlements, mostly in a vicinity of less than one kilometer distance. In some cases the burial mounds form irregular clusters of graves, sometimes they show a more straight structure, which could be an indication for the construction along or beside roads or paths. Due to the poor state of research of these graveyards, flat graves have not yet been testified, but one can expect them with a high possibility. As the examples of Falkenberg and *Zuckenhut* can prove, grave mounds are directly connected beside the edge of the settlements, in some cases (Falkenberg, grave group *"Ertlwald"*) it seems, that the tumuli are even integrated into the settlement. Restrictively it must be mentioned that these tumuli are not yet excavated, so their exact dating and a chronological coincidence with the settlement stays unclear. Until now an appraisal of the former number of grave mounds surrounding the settlements is not really possible, because most of them were positioned in the heavily remodelled plain. Flattened tumuli can be traced on aerial photographs and by geoprospections only by their enclosure ditches, mostly in circular shape. If burial mounds did not possess dug-in enclosures, usually they cannot be recognized any more. Furthermore, it must not be forgotten that ploughing over centuries destroyed small and shallow enclosures, so today´s available picture is already heavily distorted. Compared to better preserved settlements and graveyards one should expect the former existence of not only a few hundred (as it can be proven by research today), but maybe some thousands of tumuli of different size surrounding the settlements. This fact implicates that the space for agricultural utilization in some cases showed a remarkable distance from the settlement. Finally, it must be emphasized that some single necropolises, like the grave group *"Rothenthurm"* lying approximately 1.2 km south of the Falkenberg on the other bank of the Mur river, must not inevitably belong to this settlement. It could have been also a small graveyard for a separated hamlet or a small settlement on the right side of the Mur.

Pattern analysis in relation to the chronological framework

Due to the lack of excavations in all of the mentioned settlements in the Strettweg micro-region, questions about their chronological framework are difficult to answer. As it was already shown above, excavations were conducted on Falkenberg and in the small *Guggamoar* hilltop settlement, from all other settlements pottery finds were collected throughout surveys as surface finds. Although, regarding these survey finds, it is not possible to give an exact dating of the beginning and the end of all of these settlements some tendencies are nevertheless obvious: If one ignores older finds from the Neolithic, Copper Age and Early and Middle Bronze Age, each of

these settlements had its beginning in Ha C, that means at least at the end of the 9th or the beginning of the 8th century BC. At this time, it seems that the settlements got their typical structure by the construction of artificial terraces. Not even one of these large-scale hilltop settlements from the Early Iron Age had yielded pottery finds before that were from the late Bronze Age (Urnfield period). All of these hilltop settlements in the Strettweg micro-region – except *Guggamoar*! – might have their most intense occupation in Ha C until the beginning of Ha D (D1) in the 6th century BC. After this time span, the situation becomes unclear in the mirror of the surface finds. On Falkenberg most parts inside the settlement seem to be abandoned, only in a smaller area does the occupation continue without interruption until the 5th century, the end of Lt A. A similar situation could be expected also for the other large-scale settlements. Nevertheless, it can be clarified only by future excavations. The situation in the small hilltop settlement on *Guggamoar* is significantly different, as the excavations indicate an occupation in Ha D until the end of Lt A or maybe even the beginning of Lt B (6th to 4th century BC). Maybe the *Guggamoar* settlement could be an example for a reduction of settlement size due to a reduction of the population in the late Hallstatt and early La Tène period. A similar situation is indicated in the small exposed settlement on the so-called *Kaiserköpperl* in the Palten valley,[31] which connects – together with the Liesing valley – over the Schoberpass the Enns and Mur valley.

Understanding the Iron Age landscape of Strettweg

The micro-region of Strettweg and its connections to the neighbour regions of the East-Hallstatt circle

The micro-region of Strettweg is clearly embedded in a large-scale network of an Early Iron Age central-settlement system. As was shown above, the Falkenberg with its surrounding necropolises was the central settlement of the large Aichfeld basin with its incoming smaller valleys. Following down the Mur river, the next larger central settlement can be found on *Häuselberg* near Leoben (ca. 25 ha size) on another intersection of crossroads in west-east and north-west direction. Exposed graves – especially princely graves – are nevertheless not (yet) known from this site. The next neighbouring central settlement to the north is located on the *Kulm* near Aigen in the Enns valley, which is one of the first and largest settlements on the road from Hallstatt to the south. Only some finds from destroyed tumuli graves have been published so far, so the state of research of this most important Early Iron Age settlement in the Enns valley is still quite poor. What became obvious is, that the pottery finds from these graves have much more similarities to the pottery from Strettweg and even from Kleinklein than to the pottery from the famous graveyard in Hallstatt. Even though smaller Hallstatt settlements and traces of former burial mounds can be detected following the Mur river upstream, the next Early Iron Age central settlement can be found in the basin of Neumarkt in the federal border region of Styria and Carinthia. Research has started here only some years ago, the results are still modest. Aerial photographs at least can prove large-scale

[31] Eibner 1996, 87ff.

Fig. 18: Bleikolm *burial mound, glass vessel (photo: ISBE/Tiefengraber)*

flattened tumuli graveyards surrounding the hilltop settlement on *Burgstall* near Tauchendorf. Following the way down to the south via the Görtschitz valley, which is famous for its richness of iron ore, the next central settlement can be found near Völkermarkt on the *Lamprechtskogel*. Even if there were no specific excavations on this hilltop settlement itself, its importance in the Early Iron Age can impressively be testified by the surrounding burials.[32] A large tumuli necropolis, for which a former number of 300–500 burial mounds is estimated, is situated on the southern fringes of *Lamprechtskogel* in Führholz. In the plain west to *Lamprechtskogel* at least four separate monumental burial mounds can be detected, two of them were excavated between 1993 and 2000 by Paul Gleirscher. Although both were robbed already in ancient times the construction of the burial mound, the grave chamber and even the inventory of the graves showed striking parallels to the Strettweg/Waltersdorf tumuli, especially to the *Bleikolm* tumulus. Until now, the closest analogies to the princely burial mounds from Strettweg can be recognised in the *Waisenberg* tumuli. Due to the vicinity of these central settlements, which are positioned on vital communication and trade routes between the North, especially between Hallstatt and the *Caput Adriae* respectively Northern Italy, this supra-regional connections are clearly testified by import artefacts in the graves of the leading elites in Waisenberg and Strettweg. Unfortunately, the state of research as well in upper Styria as in most

[32] Synoptical Wedenig 2005, 19ff. and Gleirscher 2005, 59ff.

Fig. 19: Tumulus II/helmet grave Strettweg, dagger (photo: ISBE/Tiefengraber)

parts of Carinthia is not sufficient to draw a more accurate picture of this situation in the Early Iron Age currently.

As latest LIDAR-scans of the county of Carinthia clearly demonstrated, our knowledge about Iron Age hilltop settlements is still on quite a low level. Even large-scale hilltop settlements of some dozens of hectares, which had not been known before – at least in their dimension – could now be identified by LIDAR. Initially, the *Rainberg/Weinberg* central settlement in the lower Lavant valley and the so-called *Ottitschkogel/Wallerberg* near Ruden with sizes between 40–60 hectares have to be mentioned. Both were (formerly) surrounded by extended tumuli-graveyards, which even survived especially in the forests of the ridge of *Rainberg/Weinberg*. Other Iron Age hilltop settlements can be added in this enumeration, like e.g. the castle-hills of *Hochosterwitz* near St. Veit an der Glan, Wolfsberg or *Landskron* near Villach. Finally, it has to be mentioned that all of them seem to have been unfortified – like the contemporary settlements in Styria. The next neighbours of the Strettweg central settlement can be found to the southeast in the area of today´s middle Styria and southwestern Styria, that means in the so-called Sulmtal group of the Eastern Hallstatt circle. Central settlements like the Grazer *Schlossberg* and the Wildoner *Schlossberg* with their (former) surrounding, extended tumuli graveyards, which are not yet researched sufficiently, can demonstrate impressively that our knowledge about these large-scale settlements and their graveyards is still quite

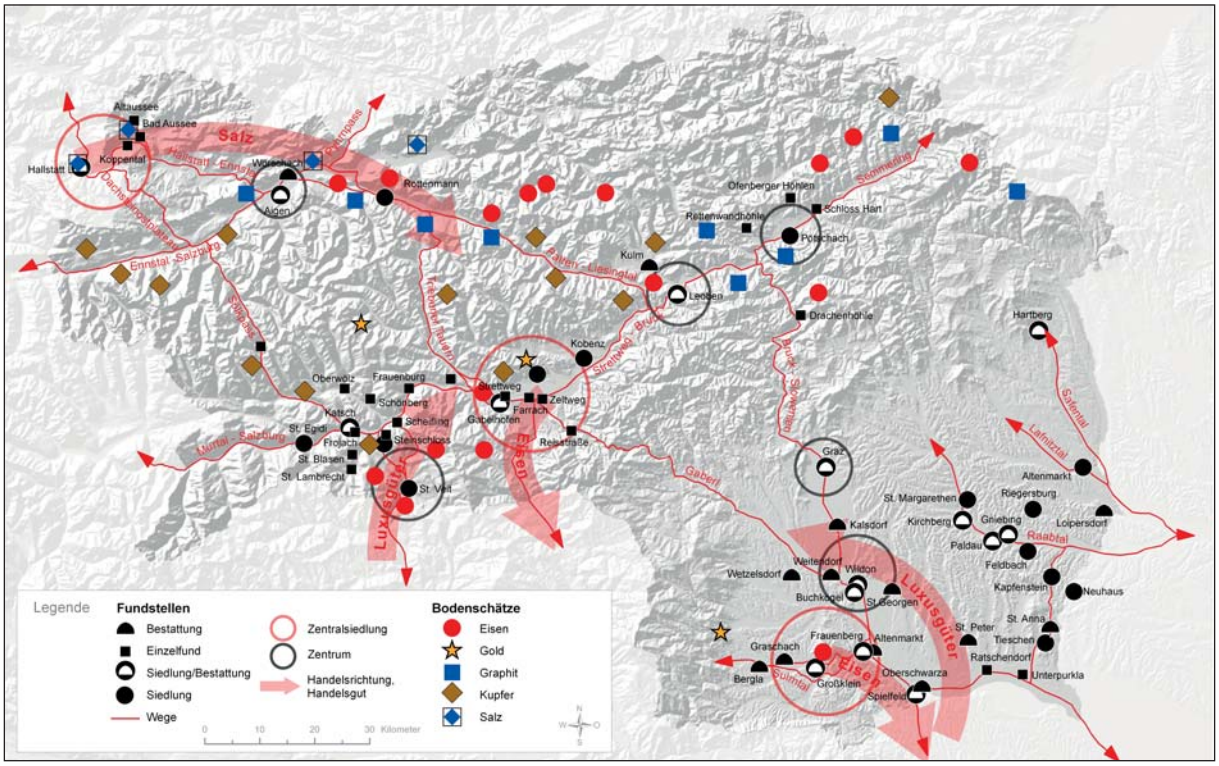

Fig. 20: Strettweg micro-region, resources, connections and communication routes (graphic: S. Tiefengraber)

poor. Nevertheless, the state of research in the Wildon micro-region improves quite fast thanks to the excavation and research work of Christoph Gutjahr.

Meanwhile it is obvious that one has to expect quite rich princely graves from the Early Iron Ages even around Wildon, as the rescue excavations in the so-called *Grafenkogel* clearly demonstrated. From this new point of view, the rich and famous graveyards and princely graves in the Sulm valley around the *Burgstallkogel* near Kleinklein have to be seen from another perspective. Obviously rich princely graves of the Kleinklein type are not as unique as one expected, but quite more common as thought before. The difference seems to be mostly the state of preservation. While the graves survived in the Sulm-valley until the 21th century, most of the tumuli in the area around Wildon, Graz or Strettweg were erased by intensive agricultural use of the valuable fertile plains. Nevertheless, a comparison of the princely graves from Kleinklein and Strettweg indicates clearly more or less common coincidences in the construction of the burial mounds, the chambers and the inventories, which both contain a number of imported artefacts and cultural connections from/to Italy. From the point of view of details, there are more analogies between the *Waisenberg* graves and Strettweg than to Kleinklein. Besides, this tendency can be followed up at the neighbouring Early Iron Age groups. In particular in the micro-regions to the East and South, like to the *Kalenderberg group*, the *Western-Pannonian group* or the *Kaptol group*, not to mention the *Dolenjska group*, where mostly parallels in general cultural aspects can be recognized, which connect all of this groups in the large-scale Eastern Hallstatt circle.

Joint interpretation and conclusive discussion

Even though the diachronic studies of the Strettweg micro-region started only 15 years ago, outstanding results are visible already now, especially for the research of the Early Iron Age. A combination of "classical" field methods, like surveys and excavations, and the evaluation of aerial photographs, LIDAR-scans as well as old cadasters etc. produced a completely new picture of these large-scale inner-alpine basins and adjacent valleys. However, it can be concluded that during the Early Iron Age the picture and structure of population and settlements together with their connected graveyards correspond perfectly to the well-known models of Iron Age structures from much better – and especially much longer – researched areas and micro-regions, for example the Sulm valley around the *Burgstallkogel* near Kleinklein or the area around the *Poštela* near Maribor in the Drava valley. The Strettweg micro-region is characterized by a number of unfortified Early Iron Age hilltop settlements of different sizes. The most important of them is the Falkenberg near Strettweg near Judenburg with a size of approximately 60 hectares, which also marks the western end of the Aichfeld plain. The combination of size and the outstanding number and quality of (former) surrounding tumuli graveyards testifies that Falkenberg can be addressed as the most important settlement not only in the relevant micro-region, but in a large part of today´s inner-alpine Upper Styria. The surprisingly quick development of this central settlement can be connected with its position on the crossroads of supra-regional important trade and communication routes, the fertile plain of Aichfeld and the richness of different resources, like wood, iron ore or copper ore. Although the exploitation of these ores and the production of iron and copper as well as bronze artefacts in the Early Iron Age has not yet been proven, it can be hypothesized. These natural advantages are the foundation for these large-scale settlements with a strongly hierarchically structured population and society, which can be traced in their graves. Imported goods from all directions and neighboring areas, but especially from Northern and Middle Italy testify long-range connections. The huge number of these imported Italian artefacts in the graves of the elite can be interpreted in different ways and can also be assigned to personal contacts. Imported goods, as for example Attic and Venetian ceramic fragments from inside the settlement demonstrate a higher availability as implicated by the grave goods. Beside this central settlement on Falkenberg some more large-scale hilltop settlements are known from this micro-region, as for example *Zuckenhut* near Kobenz or the so-called *Reiter am Berg* near Fohnsdorf with approximately 20–25 hectares of size. All of them were also surrounded by former tumuli graveyards. A number of smaller hilltop settlements supplement the picture, but one must not forget that the huge plain is still unexplored in terms of Early Iron Age settlements. Stray finds clearly indicate their former existence, nevertheless they have not yet been researched until now. Most of the settlements were erected at the end of the 9th century BC, the majority lasted until the (late?) 6th century, when a part of them were abandoned. On the other hand, life continued on a much smaller scale even in the huge central settlements. Beside this, new and smaller hilltop settlements, like *Guggamoar* near St. Lorenzen bei Knittelfeld were established. These small settlements as the heirs of former centers of trade, culture, religion and power existed until the early La Tène

period, respectively, Lt B. A rupture in the settlement patterns can be assumed with the decline of the salt production in Hallstatt at this time. Graphite pottery, specific fibula types and other artefacts, like the bronze knob of a Berru type helmet, indicate a clear influence in the Early La Tène circle and a different development, as it is known for example in the Late Hallstatt and Early La Tène periods in the well researched Dolenjska region.

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Architecture of power or demise: Gigantic burial mounds of Podravina as parts of the Early Iron Age landscape. The Iron-Age-Danube project in the Plitvica-Bednja Rivers Basin (NW Croatia)

by Saša Kovačević

Abstract

Jalžabet, Martijanec and Zbelava are considered to be well known sites of the Early Iron Age in Podravina (NW Croatia). Although the sites helped us immensely to understand the development of the Early Iron Age in north Croatia, many important aspects concerning the sites, but also concerning the Early Iron Age landscape were still missing. This was the primary thought behind the decision on participation of the Institute of Archaeology in Zagreb in the *"Monumentalized Early Iron Age Landscapes in the Danube River Basin"* ("Iron-Age-Danube") Interreg DTP project.[1] The idea was to use modern instruments like LiDAR or geophysics together with the classic archaeological methods to research, protect and present the important archaeological landscape in Jalžabet.

Regretfully, in September 2017, during the implementation of the Iron-Age-Danube project, the archeological team of the Institute of Archeology verified that Gomila in Jalžabet – one of the most famous prehistoric monuments of the Republic of Croatia and one of the rare gigantic unexplored prehistoric burial mounds in Central Europe – was looted and severely damaged during the robbery.

Due to the possible further damage to this valuable archaeological monument and thanks to the intervention funds of the Ministry of Culture of the Republic of Croatia, the Institute of Archeology started an immediate rescue excavation at the beginning of winter 2017, which continued during 2018 and 2019.

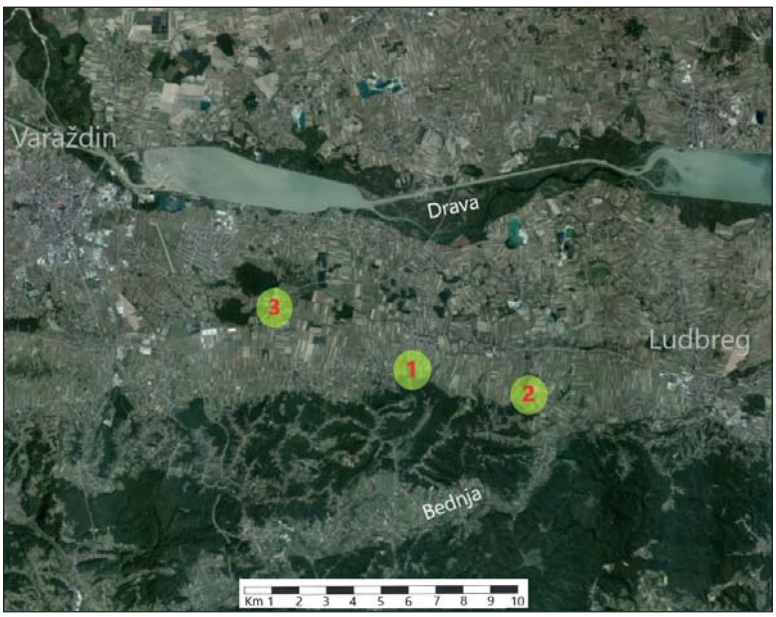
1. Introduction

The northern part of central Croatia is in many aspects marked by the Drava River. The Drava is not only the hydro-geographic backbone of the region. The people along the river, by following its cycles, navigating and moving along and across the Drava, live with and from the river. The river supplies fish and drinking water, and feeds entire ecosystems with fertile river mud. River valleys have clearly been paths of vital communication from the earliest times to this day.

The name Podravina, in the narrower sense of the word, is between ten and twenty kilometers wide plain along the Drava River, between the river in the north and the northern slopes of the mountains in the south: Macelj, Topličká Gora, Kalnik, Bilogora and Papuk mountains. The undulating tertiary hills in the south of Podravina abound with segmented valleys of watercourses – like Plitvica, Bednja and numerous smaller creeks – that flow into the Drava. Precisely the contact zone between the hills in the

[1] Institute of Archeology as project partner 6 (PP6) participated in the project "*Monumentalized Early Iron Age Landscapes in the Danube River Basin*", acronyms "Iron-Age-Danube", (project code DTP1-1 -248-2.2) implemented under the European Union Program, Interreg Danube Transnational Cooperation Program 2014-2020. Project implementation time was from 01.01.2017. do 30.09.2019.

Map 1: Geographic position of Jalžabet



Map 2: 1 – Jalžabet, 2 – Martijanec, 3 – Zbelava in Podravina between the Drava and Bednja Rivers (source: www.arkod.hr)

Map 3: A – archaeological landscape between Jalžabet and Martijanec on the 2nd military survey of the Habsburg Empire (source: www.mapire.eu), B – segment of LiDAR with the Early Iron Age settlement and cemetery in Jalžabet (recorded at the end of 2018, organized by PP9, ELTE-FHIAS team of the Iron-Age-Danube project; visualization and interpretation M. Fera, PP2, University of Vienna)

south and the plain along the Drava in the north would often throughout the past be the scene where settlements were founded and through which ran important communication routes. The longitudinal Roman road along the Drava River, starting in Ptuj (*Poetovio*), can be traced over an agriculturally most attractive terraced area on the southern edge of the Drava valley, over Petrijanec (*Aqua Viva*) and Ludbreg (*Iovia Botivo*) towards the east and Osijek (*Mursa*). The route was followed by both medieval roads and contemporary ones.[2] This is also the place where Jalžabet lies (*map 1* and *2*). The village of Jalžabet is situated around 18 km south-east of Varaždin, along the southern periphery of the Upper Podravina. At this place the Podravina plain gradually rises to a terrace suitable for habitation, and further south to the first slopes of Topličká Gora hills. Five or so kilometers to the north, the Drava River marks the natural border of the area. In the past, the river was quick, fast and sometimes volatile. A good illustration of the volatility and capriciousness of the Drava River is the fact that Legrad, a settlement at the mouth of the Mura River in the Drava River, was part of Međimurje until 1710, and after the movement of the riverbed to this day is located in Podravina. There are more similar examples illustrating the power of the Drava River.[3] In particular, during the last glacial period (Würm), the Drava applied a lot of gravel and sand, which was deposited up to the base of the mountains and hills in the south. After warming, due to the great erosive energy, the river cut its riverbed into the deposits. In these processes, it also influenced the appearance of the northern edge of the mountains in the south.[4] The gravel-sand alluvium spreads along the Drava and its tributaries – Plitvica, Bednja and other – in the lowlands. In slightly elevated positions, towards the hills, the Pleistocene sediments prevail, most commonly clay and loess.[5]

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2 Feletar 1988, 28.
3 Slukan-Antić 2002, 132.
4 Crikvenčić et al. 1974, 129.
5 Kurtek 1966, 10.

About 2 km east of the center of Jalžabet, on the right side of the road towards Ludbreg, parts of the ancient cultural landscape are still visible. The lowland, slightly undulating terrain is dominated by a large tumulus Gomila within the Early Iron Age cemetery, west of which runs the Bistričak creek. On the west shore of the creek lies Carev jarek, a settlement of the Hallstatt culture (*map 3*).

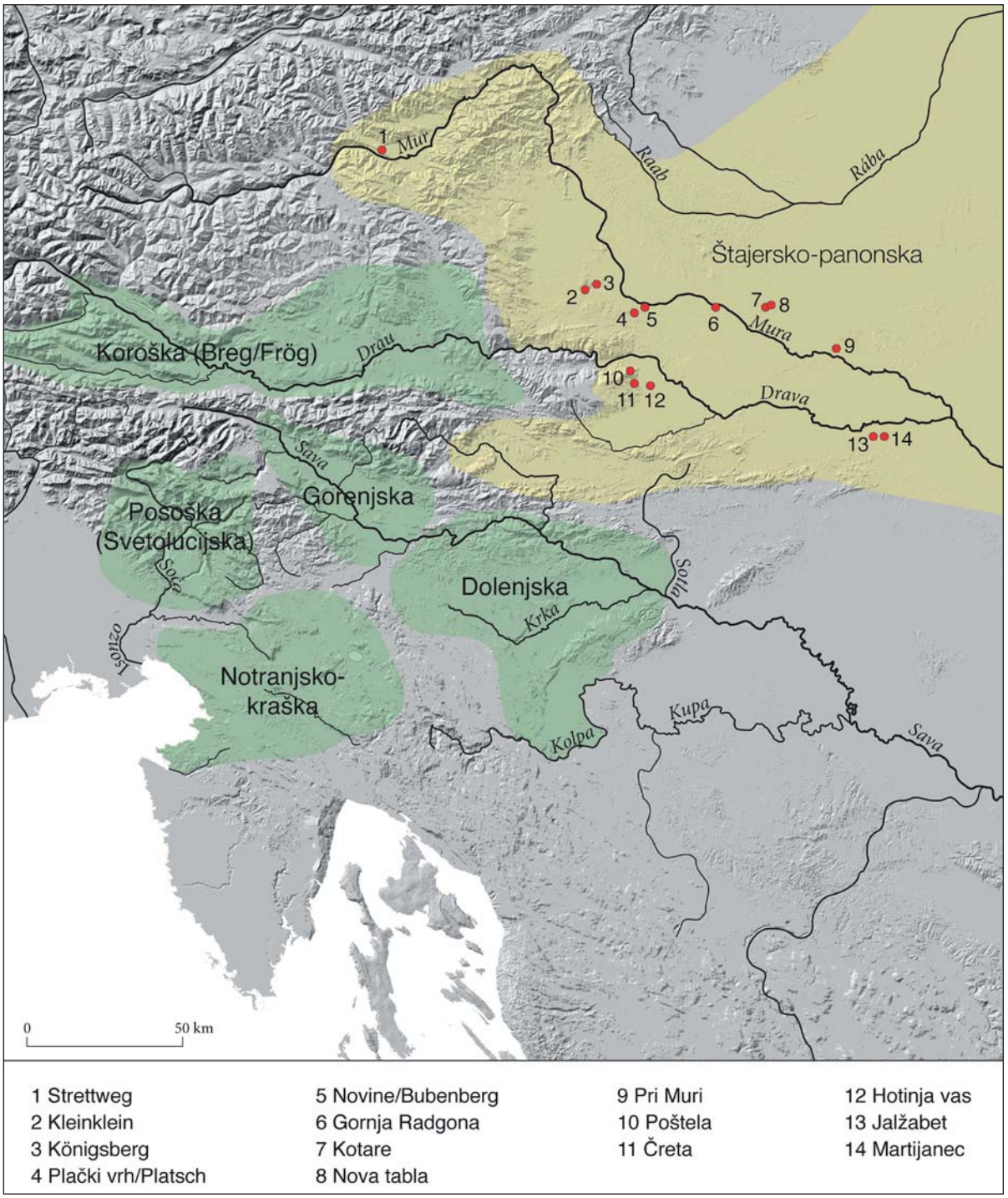
The Bistričak creek springs in the hilly hinterland of Jalžabet, southwest of Gomila, and flows towards the north, where it flows into the Plitvica River. In Mali Bukovac, northeast of Ludbreg, the Plitvica flows into the Drava River, which in the east, in Slavonia near Aljmaš, transfers its power to the Danube. Upstream, along the Drava and Mura, we can easily reach the slopes of the southeastern Alps and famous Hallstatt culture sites such as Poštela, Kleinklein or Strettweg. Likewise, crossing the Drava and Mura Rivers towards the north, in Transdanubia we can find well known Early Iron Age sites such as Sopron, Regöly or Sé-Doberdó, to which we will often return as the closest analogies for the Early Iron Age sites in the Plitvica-Bednja Rivers basin.[6] Just following the watercourses, we follow the ancient lines of communication, certainly also the footsteps of members of the Hallstatt communities in the Plitvica and Bednja basin.

2. History of the research

During the Early Iron Age, the north part of Central Croatia was part of the Eastern Hallstatt Circle. In the literature, we can find different cultural groups proposed by different authors for the area: Martijanec-Kaptol group,[7] Kaptol group[8] or the Styrian-Pannonian Hallstatt group[9] are only some of them (*map 4*). The beginning of the Early Iron Age was a time of change in the Drava River Basin. For the most part it was marked by intensive communication, exchange of ideas, customs and goods between the southeastern Alpine regions and Pannonia on the one, and the Mediterranean and the European east on the other hand. In this communication network of the Eastern Hallstatt Circle, the Drava river, as noted by scientists like Nives Majnarić-Pandžić or B. Teržan, had an important role – it was one of the links between the Alps and the east parts of the Carpathian Basin.[10] This development can already be seen in the inventory of the metallurgic workshop from Sv. Petar near Ludbreg, a settlement dating to the end of the Late Bronze Age and the beginning of the Early Iron Age, positioned in the Drava River's valley, only 12 km towards the east from Jalžabet (*map 5*).[11]

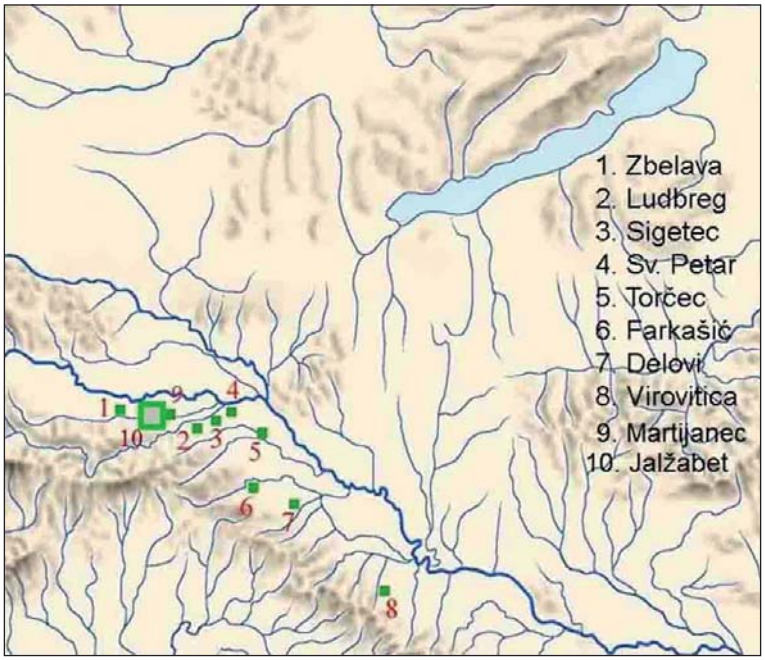
During the Early Iron Age tumuli were being built also in Podravina, not only to mark graves, but also as a symbol of the whole community. This is especially true in the case of gigantic burial mounds, like the ones in Jalžabet and Martijanec.[12] We should not forget the fact that erecting such monuments, like any other serious project,

6 Kovačević 2005; 2007; 2008; 2018; 2018a.
7 Vinski-Gasparini 1987.
8 Egg/Kramer 2005.
9 Teržan 1990; 2019, 320.
10 Teržan 1990; Dimitrijević et al. 1998.
11 Vinski-Gasparini 1987; Šimek 1989.
12 Vinski-Gasparini 1961; Vinski/Vinski-Gasparini 1962; Vinski-Gasparini 1987; *Registar* 1997.



Map 4: The Hallstatt cultural groups in Slovenia and neighboring regions (source: Teržan 2019, 321)

required a lot of knowledge and skills, available resources and certain organizational preconditions. This speaks in favor of a stratified and organized society with access to different kinds of resources.



Map 5: The Early Iron Age sites in Podravina between Varaždin and Virovitica (source: Kovačević 2007)

We can presume that in the Early Iron Age the Podravina region was very densely settled. Lowland settlements like Sv. Petar Ludbreški, Sigetec or Šemovec-Šarnjak have been well known for some time now.[13] Further towards the south, the west and the east, usually fortified and positioned on prominent hilltops, we find famous hillforts of the Early Iron Age, like Lobor, Špičak, Sv. Križ Brdovečki, Zagreb-Gornji grad and Kaptol in Požega valley. 1997 on the route of the future highway Goričan-Zagreb at a place called Pod lipom in Zbelava, 5 km NW from Jalžabet, one of the first lowland settlements of the late phase of the Early Iron Age in continental Croatia was excavated. More recent finds gradually change the image of settlement in this area during the Early Iron Age. Lowland settlements here are becoming increasingly visible and important.

The first systematic field surveys in north-eastern Croatia aimed at locating and mapping the Early Iron Age tumuli was carried out in 1956 by a team from the Archaeological Museum in Zagreb.[14] The list of surveyed mounds mentions, among other sites, a tumulus in Jalžabet, which certainly refers to Gomila, as the only visible tumulus by that time. A test excavation of the Jalžabet tumulus was carried out afterwards by the Archaeological Museum in Zagreb in 1963.[15] Two trenches were excavated on the slopes of big tumuli. One of the trenches was excavated to the level of the structure made of pebbles, upon which the trench was filled up. The site was repeatedly surveyed on various occasions during the 1970s, 1980s and later.[16]

[13] Vinski-Gasparini 1987; *Registar* 1998.
[14] Vinski-Gasparini 1961, 39, Fig. 3; Vinski/Vinski-Gasparini 1962, 268 seq, Map 1.
[15] Vinski-Gasparini 1978, note 49a, Fig. 7.
[16] Šimek/Kovačević 2014, 233.

In the 1989 survey of the wider area of Bistričak pieces of sandstone, ploughed to the surface, were discovered next to a field east of Gomila. The initial test excavation by the Varaždin City Museum was soon supplemented by a salvage excavation of the burial mound – tumulus 2. The constant ploughing has dramatically reduced the height of the mound. The excavation of its original surface of around 1 000 m^2, showed that it contained an exceptional Early Iron Age burial with quadratic burial chamber and dromos.[17] Important movable finds, like famous decorated bone arrows or fragments of scale armor, the remains of the complex grave architecture and the traces of an elaborate burial rite marked tumulus 2 as a particularly valuable monument of the Early Iron Age (Ha C2/D1) in continental Croatia and central Europe.[18] At the time of the excavation, a collaboration with the Faculty of Geotechnical Engineering in Varaždin resulted in a shallow geoelectrical survey at Bistričak, with the aim to verify the possibility of locating prehistoric grave mounds by geophysical methods. At that time, this was one of the first geophysical measurements used for archaeological purposes.[19] It took 30 years for archaeologists to return to Jalžabet and to perform new geophysical and archaeological research.

Although burial mounds of Martijanec and Jalžabet were among the oldest known prehistoric archaeological monuments in Croatia, only a few of them in Podravina were excavated during the 20th century (eponymous Gamulica in Martijanec in 1957, burial mound 2 in Jalžabet in 1989). About contemporary Hallstatt culture settlements in Martijanec and Jalžabet we did not know anything.

2.1 Research of the Early Iron Age landscape between Jalžabet and Martijanec within the framework of the Iron-Age-Danube project

In September 2017, within the framework of the Camp Croatia of the Iron-Age-Danube Project, trial archaeological excavations were carried out around burial mound 1 – Gomila in Jalžabet. In doing so, valuable archaeological remains have been discovered in three archeological trenches, supplementing with brand new information the archeological profile of the Bistričak site (*map 6*).[20] Thus, it was established that before the gigantic burial mound was erected on Bistričak, before the Early Iron Age horizon, there was an older settlement in the same place, we assume from the Early Bronze Age. Objects belonging to that settlement – pits and kilns – were found both below Gomila itself and southeast of Gomila towards the forest (in trench 3/2017). Likewise, within the trench 2/2017, located just off the southern edge of Gomila, a few inches thick Roman settlement layer was found. Additionally, archaeological research within the Iron-Age-Danube project in 2017 confirmed earlier assumptions based on the geophysical survey regarding the existence of a ditch around Gomila. The circular ditch was detected in two trenches, trench 1/2017 and trench 2/2017 (*fig. 1*). Estimated dimensions of the ditch is about 100 m in diameter, about 15 m wide and a maximum depth of 2 m in the deepest, central part of the ditch. Along

[17] Šimek 1995, 11;1998; 2001.

[18] Only selected finds from the burial mound 2 in Jalžabet were published so far. We have just finished restoration and we are making drawings of all unpublished finds from tumulus 2 in Jalžabet. Marina Šimek and I hope to publish finds from the tumulus soon.

[19] Šimek/Kovačević 2014, 233.

[20] Kovačević 2018a.

Map 6: Archaeological trenches in Jalžabet during archaeological excavation in 2017 (visualization: M. Mađerić)

Fig. 1: Trenches 1 and 2/2017 and presumed position of the big circular ditch around Gomila (digital documentation M. Mađerić)

the edges of the ditch and at its bottom, post holes were found both in trench 1/2017 and 2/2017. They point out the existence of some kind of fence made of freestanding posts or other above-ground construction, around Gomila. Perhaps we should think about Gomila as a focal point and a part of more elaborate, still hidden ceremonial landscape similar to Glauberg.[21] Because of some organizational issues, the LiDAR measurement was not made before the end of 2018. It took us additional 4 months to read and analyze the data.[22] The huge quantity of collected data will certainly be a valuable base for future archaeological research in the whole micro-region.

Barely five kilometers away from Gomila in Jalžabet, there is another giant burial mound with a similar name, Gamula or Gomila in Martijanec. Although this damaged monument has not been investigated, the Gamulica – smaller flattened tumuli some

[21] Hansen/Pare 2008.

[22] I would like to thank our Hungarian partners (PP9), ELTE-FHIAS team led by dr. Z. Czajlik for organizing and making geophysical and LiDAR measurements and to dr. M. Doneus and Martin Fera from University of Vienna for an immense help in filtering and interpreting the data.

800 m from the great Gamula in Martijanec – was. Gamulica's research helped to define the Hallstatt culture between the Drava and Sava Rivers.[23]

Can we boldly speculate for a moment that Gamula in Martijanec belongs to the same (or similar) phase of the Early Iron Age as Gamulica; has in that case older Gamula in Martijanec served as a model or at least a stimulus for erecting the younger giant burial mound 1 – Gomila in Jalžabet? If we allow ourselves to ponder in this direction for a moment, should we speak of Martijanec and Jalžabet as points that are an integral part of the same archeological landscape, perhaps with the founder or forefather of a local ruling dynasty buried beneath a large mound in Martijanec, and the last and the greatest ruler of the same dynasty, buried in Jalžabet, similarly to Kleinklein?[24] Do tumuli from Jalžabet and Martijanec and their content speak of a different, perhaps for Podravina specific burial ritual and will we need to adjust our views on the use of these monuments? At this point, before analyzing and evaluating the latest findings from the Gomila in Jalžabet (especially huge amounts of burned bones from the burial chamber), and continuing with intensive archaeological and interdisciplinary research of the area based on data obtained from LiDAR and geophysics, these types of assumptions are still deep in the sphere of courageous speculation. It may be indicative of the fact that, despite the efforts made, the presumed settlement of the Early Iron Age in Martijanec is still not located either by prospecting methods or archaeological investigations.[25] It is also known that at least two burial mounds, possibly from the Early Iron Age, were detected long time ago between Jalžabet and the Martijanec. Are there any more? Are Martijanec and Jalžabet indeed the two sides of the same coin? Given the chronological differences between so far known finds of the Early Iron Age from Martijanec, Jalžabet and Zbelava, can we speak of a horizontal shift in population during the Early Iron Age in the Plitvica and Bednja Rivers Basin? In that case, can inhabitants of Zbelava be recognized as survivors of the turmoil that happened to their ostentatious ancestors (among others, from Jalžabet) only around 100 years earlier?

As recent research has shown on the northern edge of the Požega Basin, it is quite possible that in close proximity two separate settlements and two separate necropolises – Kagovac and Kaptol – functioned, practically in the same period of the Early Iron Age.[26] The question of the economic base for this social development, as well as the relations between the two communities in such a close proximity is worth to be explored.

It is hard to shake the thought that with or in spite of all this new data – the research of the archaeological landscape and the Early Iron Age in this region is only at the beginning. But, before confirming or completely refuting previously set research questions concerning the Early Iron Age development in the Plitvica-Bednja basin, we

[23] Vinski-Gasparini 1961; Gabrovec 1964-1965; Gabrovec 1980; Kramer 1986; Teržan 1990.
[24] Egg 2019, 346.
[25] I would like to thank Martina Matijaško and Marina Šimek, who excavated position of the presumed Early Iron Age settlement at Rivalno in Martijanec during 2016, for the information. Also, I would like to thank my colleague Marijana Krmpotić from the Croatian Restoration Institute for kind help and information from her research on Gamula in Martijanec.
[26] Potrebica 2019, 500.

Fig. 2: The beginning of the research of the burial chamber of the burial mound 1 – Gomila in Jalžabet during the rescue excavation in 2018 (digital documentation M. Mađerić/J. Boras, 1 – stone slabs cornice, 2 – crepidoma, 3 – layers of charcoal, 4 – robber's trenches, 5 – the top of the dromos)

still need to continue with intensive archeological and multidisciplinary investigations of the entire micro-region in the years to come. The first steps in this direction have already been taken. Intensive geophysical survey during 2019 has shown position of additional possible flattened burial mounds around Gomila in Jalžabet, but also in Martijanec. Thanks to the Iron-Age-Danube project, a complete aerial laser survey – LiDAR was made at the end of 2018, which, together with the results of geophysical and archeological research, will be an excellent base for further investigation of the Early Iron Age.

3. Gigantic burial mounds of Podravina as parts of the Early Iron Age landscape

Gomila in Jalžabet is a monument whose significance is measured in European and world terms, as one of the largest prehistoric burial mounds in Central Europe, with a diameter of approximately 65 m and preserved height of more than 8 m. In 2017, during the implementation of the Iron-Age-Danube project, the Institute of Archeology conducted targeted archaeological excavation in the vicinity of Gomila.

During this research it was discovered that Gomila was severely damaged during the unauthorized excavations, and Institute of archaeology with financial support of the Ministry of culture began urgent rescue excavation soon after vandalism was discovered.

Rescue archaeological excavations in 2017-2019 included a trench approximately 30 m wide and 40 m long, with archeological profiles up to 8 m high (*fig. 2*). The northeast-southwest positioned archaeological trench encompassed a bigger, hypothetical area of the burial chamber with a dromos; it did not penetrate the tumulus all the way in a north-south direction. There are two good reasons for this approach; as the northern slope is the highest and the best preserved part of the tumulus, we were going to save its shape as much as possible and left enough as an archaeological reserve. In addition, because the SW part of the burial mound was lowered and transformed into the ramp long time ago, we would reduce the amount of soil to be removed in these rescue excavations by at least one third, and thus accelerate the excavation.

We gradually lowered the archaeological trench in order to document the archaeological vertical profiles and the horizontal layers of the tumulus. The steps or levels were 2 m high and 2 m wide. The first level begins at 180.6 m and ends at 178.6 m above sea level. The second level lies between 178.6 m to 176.6 m, etc. I have taken over this methodology of the archeological excavation from mining, and applied the method of stone quarrying. Because of cavities of unknown scale in the center of the burial mound left after robbers and the overall shape and condition of the monument, this seemed to be the only reasonable thing to do.

The burial chamber of burial mound 1 in Jalžabet discovered during the rescue excavation from 2017–2019 was built of a combination of wood, clay, sandstone, limestone and pebbles. During the excavation in 2019 we have discovered several dozens of deep postholes, which were one of the several constructive elements of the walls of the burial chamber (*fig. 3*).[27] At the top of the chamber probably stood a simple horizontal roof which rested on a complex support – on thick composite outside walls of the burial chamber but also on additional wooden construction/ rectangular wooden frame in the center of the chamber. The monumental burial chamber had a quadratic layout with a dimension of approx. 12 by 12 m and a monumental ceremonial corridor through which the chamber could be approached; a dromos connected to the east wall of the burial chamber. Dromos was 3 m wide. It was not researched in full length, because this would have destabilized the entire eastern part of the tumuli and would have increased the already high risk of collapsing of the 8 m high archaeological profile. It would also have meant removing an additional, huge quantity of the burial mound's soil in the east.

The burial chamber was located in the center of a crepidoma, a plateau of approximately 30 m diameter paved with stone, with a cornice made of a large

[27] It seems, there are strong similarities between the construction of burial mound 1 in Jalžabet and the one in Regöly. As far as we can see from the published material, we can single out here the dense layout of postholes in the composite construction of the walls of the burial chambers, but also the presence of the thick layers of charcoal outside the walls (Szabó/Fekete 2012, 72; 2017, 97).

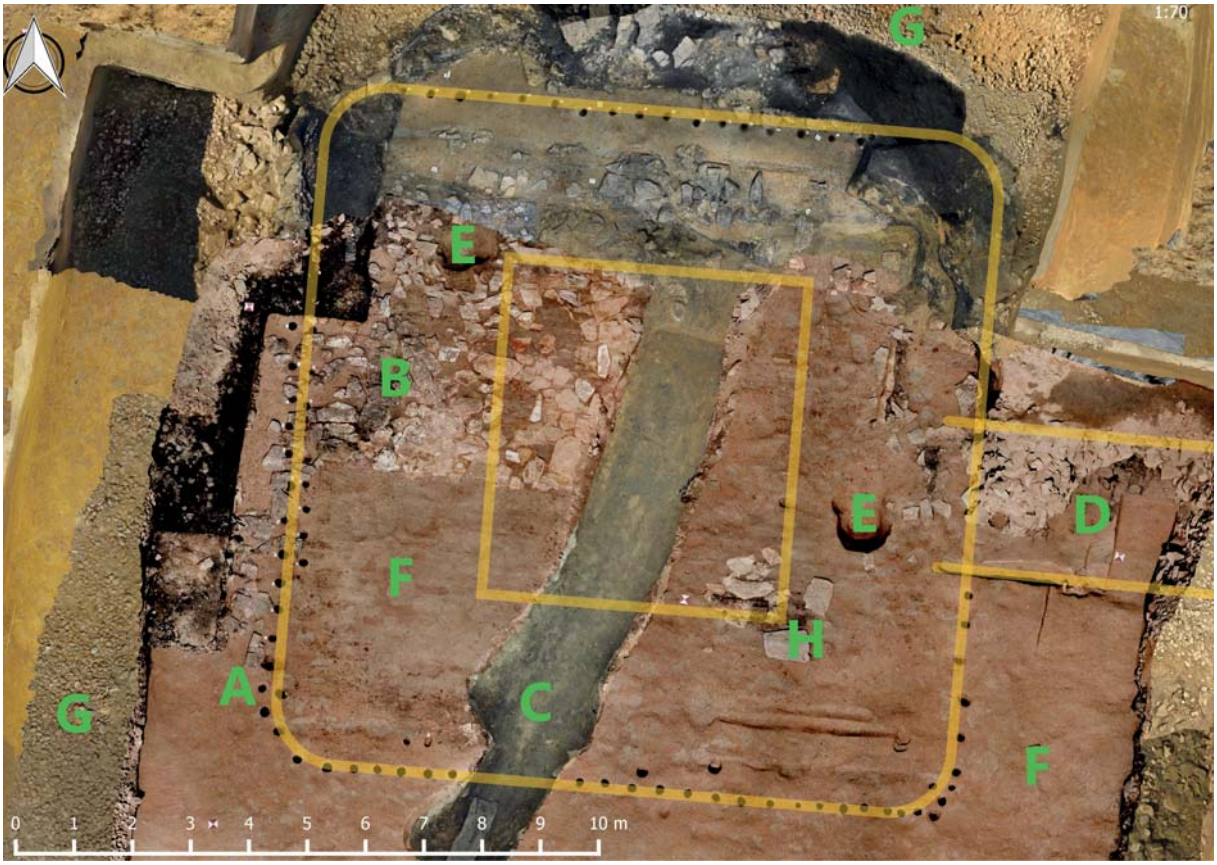


Fig. 3: Temporary photo-digital scheme of burial chamber after the rescue excavation of burial mound 1 - Gomila in Jalžabet in 2019 : A – row of post holes as a part of the construction of the burial chamber walls, B – remains of the pavement of the burial chamber's floor left during the research in 2019, in the NW corner, C – robber's trenches, D – dromos, E – pits/settlement structures from the Early Bronze Age , F – leveled plateau beneath the floor of the burial chamber and the whole burial mound, G – pebbles of crepidoma, H – internal wooden frame in the center of the burial chamber (digital documentation and interpretation by M. Mađerić/S. Kovačević)

stone slabs (*fig. 2* and *3*). The monument, including the dromos, was very precisely oriented towards the East. Pebbles, stone, gray clay and large quantities of burned wood and soil covered the composite walls of the chamber from the outside. With tons of soil taken from the huge circular ditch around Gomila, the huge mound was finally shaped and finished.

The preliminary analysis of charcoal that covered the walls of the burial chamber from the outside already proved to be interesting.[28] During the preliminary analysis, the remains of large, adult oak trees were repeatedly recognized. According to the results of the preliminary analysis, these trees have spent a lifetime in a habitat with marginal living conditions; meaning that an adult oak forest is cut down somewhere in a flooded or very arid area. Given that Jalžabet is on the edge of the Podravina Plain, can we

[28] Dr. E. Goršić from the Faculty of Forestry, University of Zagreb, performed preliminary analysis on the charcoal samples collected at several places along the walls of the burial chamber. I would like to thank dr. Goršić for his preliminary analysis and report.

assume that the builders had to go deep and far into the plain in search of solid oak trunks, as the resources – in proportion to the duration of the settlement – became less and less easy to obtain? Or did they have to bring trunks from outside of the region, perhaps even downstream the Drava River? Such ideas seem plausible considering the fact that among the remains of coal, the remnants of an oak tree infested with a bug were found (Lat. *Scolytus intricatus*). This means that the builders used also dead or sick trees attacked by a pest. Additionally, during the rescue excavation we have also discovered the remains of oak logs that did not burn out completely – as analysis has shown – because they were moist and probably rotten.

The floor of the chamber was entirely paved with finely splitted sandstone tiles, and additionally, with wood. The outer walls of the burial chamber were thick and built of a combination of clay, stone, pebbles, charcoal, wooden posts, and with wooden paneling on the inside. The burial chamber of Gomila in Jalžabet, with its very complex and carefully planned architectural sequence, is probably the most valuable find of the rescue excavation. It is without doubt one of the most complex and best preserved examples of prehistoric architecture of this kind in Europe.

During the excavation we noticed certain rules regarding the deposition and distribution of finds inside the burial chamber. For example, along the southern wall of the burial chamber, we found a thick layer of compressed burned bones, which are probably human and animal remains, and, according to current working interpretation, represent in fact the central grave of a deceased person, or the reason why the entire monumental construction was built. In the dromos we noticed a wooden structure, probably some kind of floor. Vertical wooden stakes or planks were used for the lining of the walls of the dromos. The bottom part of the dromos was completely filled with densely arranged large sandstones.

This selected preliminary information on some of the elements related to the excavation of Gomila in Jalžabet testifies to the organizational skills and craftsmanship of the past population, but also their intense search for materials and their overwhelming need for resources. On the other hand, it should not be overlooked that Gomila is not only a mere well-planned and executed architectural project. It is first and foremost a complex assemblage of a thoughtfully planned and performed, very specific sequence of ritual activities.

Prior to the extensive restoration and evaluation of the finds, it can be hypothesized that this grandiose monument is associated with a person of the highest status of the Hallstatt society in the region. Preliminarily, the monument can be dated to roughly the same period as burial mound 2 in Jalžabet: approximately to the first half of the 6th century BC. Large quantity of burned bones were found during the rescue excavation, which probably can be attributed to more than one human and certainly to a large number of different animals (horses, sheep/goats or cattle).[29] We did not

[29] I would like to thank Siniša Radović from the Croatian Academy of Sciences and Arts and dr. Mario Novak from the Institute of Anthropology for the quick preliminary analysis of the bones from Gomila. Huge quantities of soil from the burial chamber and other archaeological contexts in Gomila are put through flotation and dry sifting. We plan to continue with a thorough analysis of all collected archaeobotanical and zooarchaeological samples.

Fig. 4: Decorated bone arrow from burial mound 2 in Jalžabet (1989), decorated bone triangle from burial mound 1 – Gomila (photos: HRZ/S. Kovačević), decorated bone arrow from Regöly (source: Szabó/Fekete 2014)

find intact large bronze or ceramic vessels squashed *in situ* on the burial chamber floor. However, a large amount of prestige goods (including defensive and offensive weapons, horse equipment, jewelry, parts of bronze and ceramic vessels etc.) made from different materials have been found in the grandiose burial chamber, frequently touched by fire, damaged and usually fragmented. This hampers the restoration and precise identification of the finds. Although the detailed analysis of the finds from Jalžabet has not yet started, there are obvious analogies for finds from burial mound 1 in Jalžabet, such as the famous finds from Kröllkogel Kleinklein,[30] Strettweg,[31] Süttő,[32] burial mounds in Kaptol[33] or in Dolenjska.[34] It is almost astonishing to look at the similarities of architectural sequence and movable finds between burial mounds in Jalžabet and the ones from the badly damaged burial mound in Regöly in Transdanubia.[35]

Among the finds, parts of decorated objects made of bone or antler have a special place. These carved and painted, highly decorative objects could represent different types of everyday items; such as nicely decorated handles or smaller containers of cylindrical shape for keeping something special, like cosmetic utensils. Perhaps

[30] Egg/Kramer 2013.
[31] Egg 1996.
[32] Kmeťová 2011, 264; Vadász 1986.
[33] Vejvoda/Mirnik 1973; Potrebica 2019.
[34] Dular/Tecco-Hvala 2007; Dular/Križ 2004.
[35] Szabó/Fekete 2014; Kurthy et al. 2015.

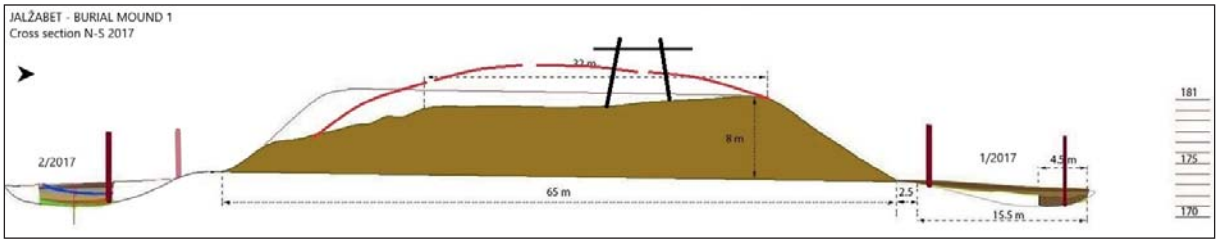


Fig. 5: The phases of burial mound 1 in Jalžabet (digital documentation M. Mađerić/S. Kovačević)

they were used like inlays on luxurious furniture or on wagons,[36] on vessels made from organic material (wood, horn or tree bark), or even like appliques on textile or leather garments. From burial mound 2 in Jalžabet we have decorated bone arrows, and from burial mound 1 – Gomila, in similar fashion decorated bone triangles. The decoration is made by repeating similar but not exactly the same patterns, both on the arrows and triangles (*fig. 4*). Objects are repeating themselves; we have at least 12 bone arrows from the burial mound 2, and so far we have several dozens of triangles from burial mound 1. Although on both types of objects we detected same or similar production technique and very similar motifs, it is interesting that the two types are not overlapping in two different archaeological contexts; bone arrows can only be found in tumulus 2, and triangles only in Gomila. If these objects do not have a merely decorative function, maybe like parts of a more intricate abstract design/ pattern on especially nice and luxurious everyday objects, could they be something more? Perhaps they are symbols of the prominent individual or family, like emblems or simplified crests? If so, how can we interpret the decorated bone arrow found in Regöly, in Tolna County of Transdanubia? In the huge spectrum of incredible decorated bones from the site which lies around 150 km NE from Jalžabet, only one such arrow was found. Still, only a small part that was left from this important burial mound was researched and we cannot be absolutely sure this was the only one.[37]

During research of the burial mound 1 in Jalžabet and with the help of preliminary results from the processing of the archeological finds, we were able to isolate several phases during the life of Gomila in Jalžabet (*fig. 5*).

Phase 1: time immediately after construction, roughly in Ha D1 (first half of the 6th century BC); Gomila has the shape of a cone with rounded top and it is surrounded by a large ditch and probably rows of stand-alone wooden columns,

[36] Like in Rovná, South Bohemia (Chytráček et al. 2018, 302, Abb. 16, 20). Burial mound 1 from Rovná is little younger than burial mound 1 – Gomila in Jalžabet. Besides nicely decorated bone objects and similar metal finds, we can find further similarities between these two monuments. Here we only mention the quite prominent round crepidoma or densely paved plateau with a square burial chamber made of wood and stone (Chytráček et al. 2015, 73).

[37] Szabó/Fekete 2014, 98.

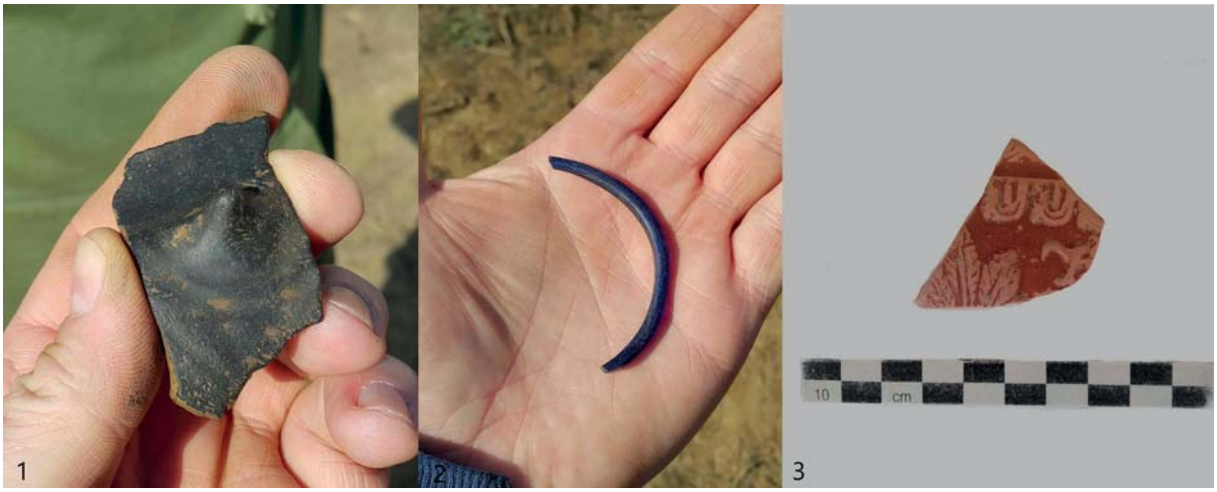


Fig. 6: 1 – fragment of the Ha C2/D1 ceramic vessel from the bottom of the circular ditch in trench 1/2017, 2 – Lt D smooth cobalt blue glass bracelet of D-profile from the fill of the ditch in trench 1/2017, 3 – fragment of a terra sigilata *vessel from the 2nd – 3rd century AD found in the crater in the upper part of burial mound 1 in Jalžabet, during the rescue excavation in 2018 (photo: S. Kovačević)*

Phase 2: in the post-construction period, possibly during the Late Iron Age (*figs 2–6*),[38] the burial chamber collapses and the ditch around Gomila is partially filled with sediment; as a result of the collapse, a crater forms on top of the burial mound,

Phase 3: the crater at the top of Gomila is filled with soil and leveled; wooden structure (watchtower?) with deeply buried posts rises at the northern part of the top of the tumulus; this phase belongs to the second half of 2nd or first half of the 3rd century AD,

Phase 4: encompasses the time from the remodeling of the upper part in phase 3 to the present day; agricultural work at the top of the tumulus lasted until the end of the 20th century.

In Phase 3, Gomila appears to be significantly remodeled. We assume that there was a massive intervention in the upper part of Gomila and the largest transformation since the time of construction took place in this period.[39] During the rescue excavation, gray ceramics thrown on a potter's wheel occasionally appeared in the upper two levels. Household Roman pottery was located within the dark gray and brown layers in the central part of the tumulus. We assume that these layers represent the soil taken from the vicinity of Gomila (from the position of the Roman settlement?) and used to fill the crater created by the collapse of the burial chamber. It is clear that the intervention, which consisted of the filling and leveling of the crater and then construction of a wooden structure with deeply buried posts (perhaps tower or observation deck) on a now flat plateau at the top of Gomila, did not take place before the 2nd–3rd century AD which is clearly evidenced by movable finds from the central part of the tumulus.

[38] Dizdar 2006, 77.
[39] Kovačević 2019.

Among the most significant finds so far, for dating the Roman intervention on Gomila is the fragment of the relief *terra sigilata* Drag 37 made in the Rheinzabern workshop, probably from master workshops by B.F. Attoni, Belsus II, Respectus or Pupus (*fig. 6*). The Rheinzabern workshop, between Wörms and Strassburg, is one of the most productive centers for *terra sigilata* production, with markets ranging from Britain to the Black Sea. The workshop began production sometime in the middle of the 2nd century and ends with the destruction of the workshop during the invasion of Aleman in 233 AD.[40] This gives us the best possible chronological framework for the Roman Period intervention on Gomila in Jalžabet: the second half of the 2nd or the first half of the 3rd century AD, during times of danger and uncertainty in Pannonia.[41] Having an observation post at the top of Gomila in Jalžabet would make sense, both during the Marcoman wars in the 2nd and during the turbulent 3rd century AD, especially because the vital Roman road *Poetovio-Mursa* was running close to Gomila, along the Drava River.

4. Early Iron Age settlements as parts of the archaeological landscape

During the Iron-Age-Danube project we have gathered numerous new information regarding the archaeological landscape in which Jalžabet, Martijanec and Zbelava are located. Thanks to intensive geophysical research, LiDAR scanning and archaeological excavation we have a better understanding of what was really going on in this micro-region, not only during the Early Iron Age, but also in other periods of time. Although some complex analysis, like communication routes, more detailed layouts of the settlements, or the relationship between settlements and the natural landscape are only beginning to emerge like a distant outline, we can see far more clearly some segments of the Early Iron Age life, and understand the complexity of the archaeological landscapes better. So far, the most clearly visible parts of the whole archaeological landscape – 2600 years ago and today – were and are gigantic burial mounds in Jalžabet and Martijanec. Little or nothing was known about contemporary settlements in the region. So it seems worthy to present some data collected about two Early Iron Age settlements in this micro-region.

4.1 The Early Iron Age settlement Jalžabet-Carev Jarek

The Early Iron Age settlement in Jalžabet lies on the left, west bank of Bistričak creek, at a place called Carev jarek. This is the prominent and the last elevation which extends from the hilly southern edge of Podravina plain towards the Drava River (*fig. 7*). The position looks interesting even at the first glance because of the clear signs of anthropogenic activity. The central plateau of the settlement is quite sharply separated from environment, especially towards the north, but also towards the Bistričak creek and the east. The eastern slopes of the plateau are articulated in

[40] Leleković 2007, 50; Brukner 1981, 21.

[41] I thank my colleagues dr. Ivana Ožanić Roguljić, dr. Tino Leleković and dr. Domagoj Tončinić for literature and help with the identification and dating of findings from the Roman period horizon in Jalžabet. Also, I would like to extend my sincere thanks to dr. Georg Tiefengraber and dr. Louis Nebelsick for support and many fruitful conversations during my excavation in Jalžabet.

Fig. 7: Aerial photo of burial mound 1 and the central plateau of the settlement in Jalžabet in 2018 (photo: K. Šobat)

several prominent elongated terraces stretching in the north-south direction. These are clearly traces of human activity, but at present it is not possible to identify them precisely. The elevated area towards the south, currently under the forest, could also be a part of an Early Iron Age settlement. Perhaps we have to think about Jalžabet as a more complex Hallstatt settlement, somewhat similar to Poštela or Heuneburg.[42] A lot of effort, time and money have been so far invested in researching both of these sites. Can we, even in this initial stage of research, presume the outlines of a large Hallstatt culture settlement in Jalžabet with a central plateau, "suburbia" on the north side and "acropolis" or elevated part of the settlement in the south? The last geophysical campaign in 2019 provided us with very interesting new data regarding the settlement Carev jarek; very densely positioned settlement structures can be observed especially in the northern part of the central plateau, but also towards the southern part of the settlement, close to the forest.

The position of the settlement in Jalžabet was visited by the experts from the Varaždin City Museum over the years. Small finds were collected from arable land suggesting the existence of prehistoric settlement structures on the plateau and at the base of

[42] Črešnar/Vinazza 2019; Fernandez-Götz 2018; Mlekuž/Črešnar 2014.

the plateau in the north, where the nursing home is situated today. Thanks to the financial support of the Ministry of Culture of the Republic of Croatia, one trench was opened in 2017 in the middle of the settlement. Archaeological research included a trench about 20 m in length and 7 m wide. The archaeological trench was oriented north-south and we placed it in the central part of the plateau, were during the previous year geophysical measurements provided us with promising results. Initially, the plan was to open a much larger surface, but this was abandoned when we realized that the buried objects in the settlement of Hallstatt were deep and relatively well preserved. This meant their excavation would be more demanding and time consuming than we first thought. On that occasion two square-shaped, deeply buried cellars were researched. Many finds belonging to the Hallstatt culture were identified and the position of the Early Iron Age settlement on Carev jarek was thereby confirmed.[43]

SJ 08, 09 from Carev jarek has an irregular quadratic layout, measuring 3.2 x 2.6 m, and along the north wall has a single recess similar to a shallow step. The walls steeply, almost vertically, fall towards the bottom which is relatively even. At the bottom, along the west wall, there is a larger post hole, probably from the vertical wooden support of the floor above. In the fill of SJ 08, 09 we found large quantities of fragments of ceramic vessels, as well as daub and some coal. According to preliminary analyses, the ceramic vessels belong to the Ha C-D phase of the Early Iron Age. During the research, it was noticed that a high percentage of the ceramic vessels were of a higher production quality, well fired, with relatively thin polished walls, in numerous cases decorated with horizontal and vertical channeling and faceting. This segment of material culture probably speaks volumes about everyday life, and will be further analyzed in the future.

The second square-shaped feature, SJ 012, 013, is located immediately south of the previously described feature SJ 08, 09. Somewhat smaller, with dimensions of 3.2 x 2.4 m, it also has an irregular square-shaped layout. Its walls fell steeply to a leveled bottom on which two post holes were found, which are probably the remains of the wooden construction of the floor of the building. This facility, like the one described above, probably served as an auxiliary building in the Hallstatt settlement, perhaps as a sort of covered and buried storage space/basement (*fig. 8*). As we did not find any remains of post holes immediately outside the cellar, we can assume that the walls of both buildings consisted of thick wooden planks and that it was built in the manner of a wooden framed log cabin with a simple gable thatched roof. The walls of the building could have been additionally protected by daub on the inside and outside, but there is no direct archaeological evidence for this.

Both features were used as refuse pits after the termination of their original function, so in addition to a variety of types of ceramic vessels, we also find here objects used in textile manufacturing: spindle whorls and pyramidal weights. The fill of the buried part of the building SJ 012, 013 consisted of several layers that could be clearly separated due to the different color. This indicates that both rectangular features

[43] Kovačević 2018.

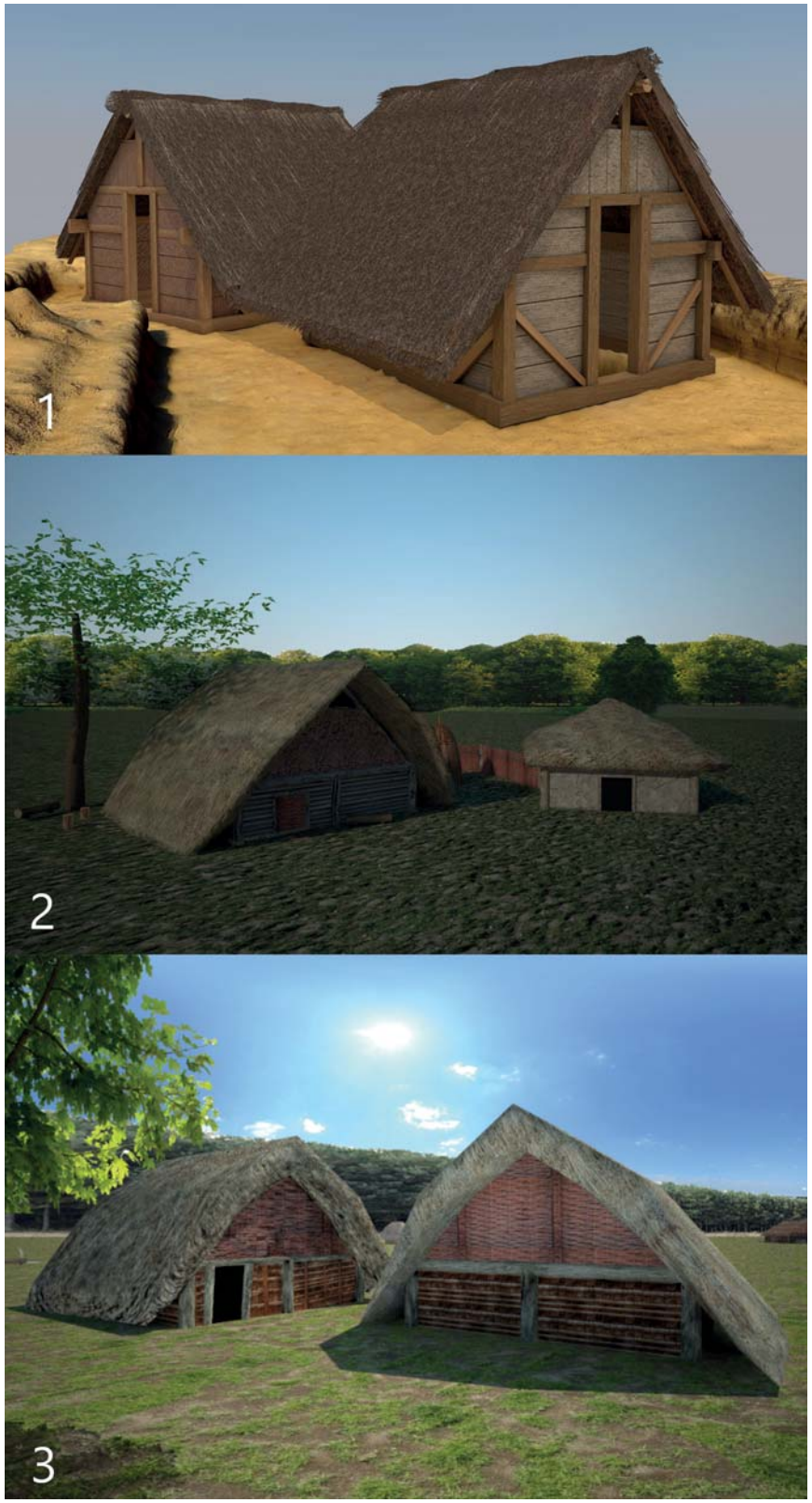


Fig. 8: Ideal digital reconstruction of settlement structures from the Early Iron Age settlements: 1 – Jalžabet-Carev jarek, 2 – Virovitica-Đurađ istok, 3 – Zbelava-Pod lipom (digital reconstruction and interpretation: M. Mađerić)

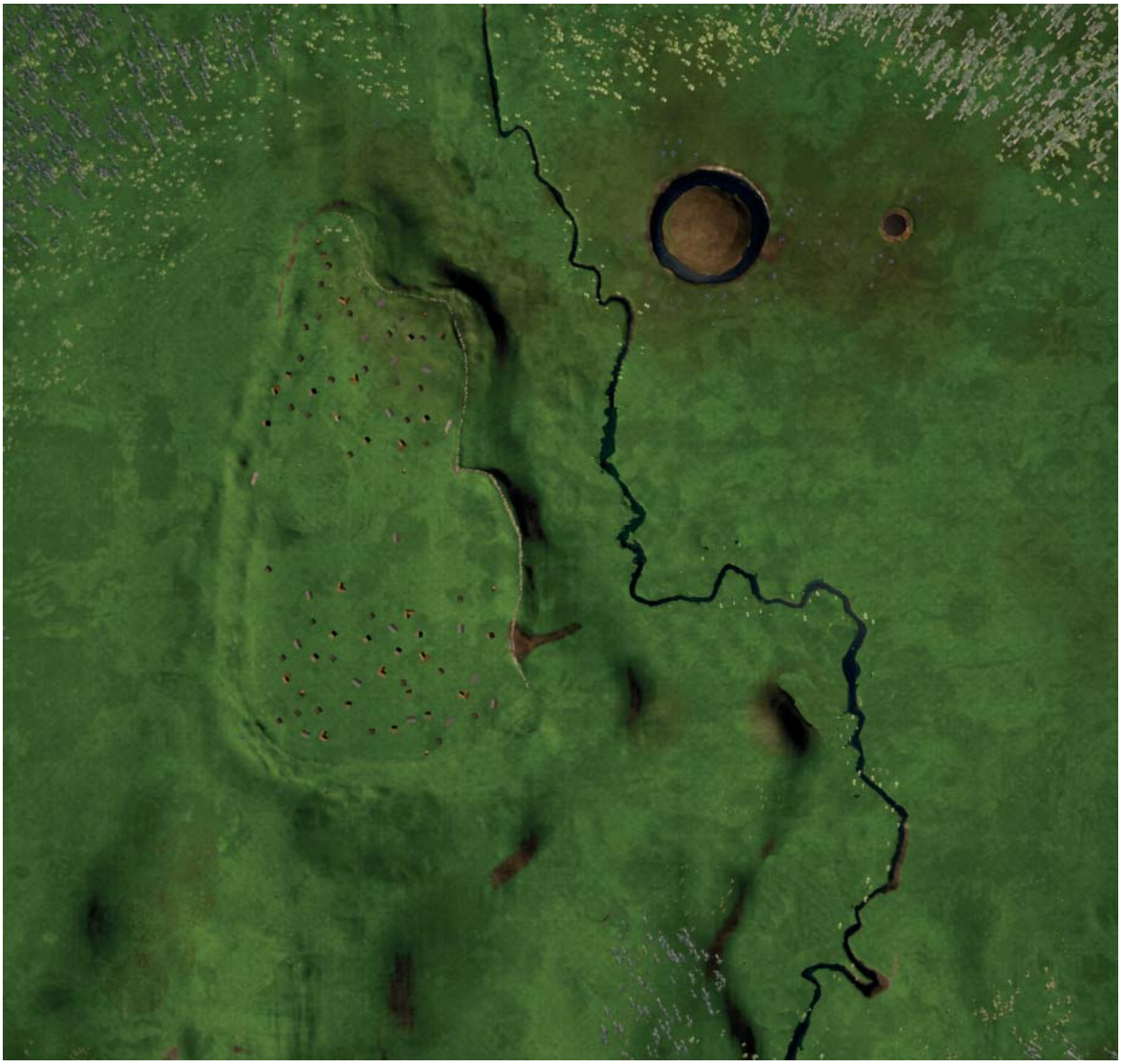


Fig. 9: An ideal digital reconstruction of the archaeological landscape in Jalžabet (M. Mađerić)

were filled up with the waste from the settlement, which continued to live after the excavated features stopped being used.

At the end of the 2017 research season, several post holes were documented. Unfortunately, they cannot be connected to a particular above-ground object so far, although we can see some regularities in their arrangement. Geophysical prospection during the Iron-Age-Danube project in 2019 performed on the settlement plateau showed various kinds of anomalies, probably remains of above ground houses, fireplaces and similar settlement structures. In more than one way, the research of the settlement of the Early Iron Age in Jalžabet is just at the beginning. We will have to continue with intense geophysical prospection and archaeological research to understand the dynamic of this specific settlement (*fig. 9*).

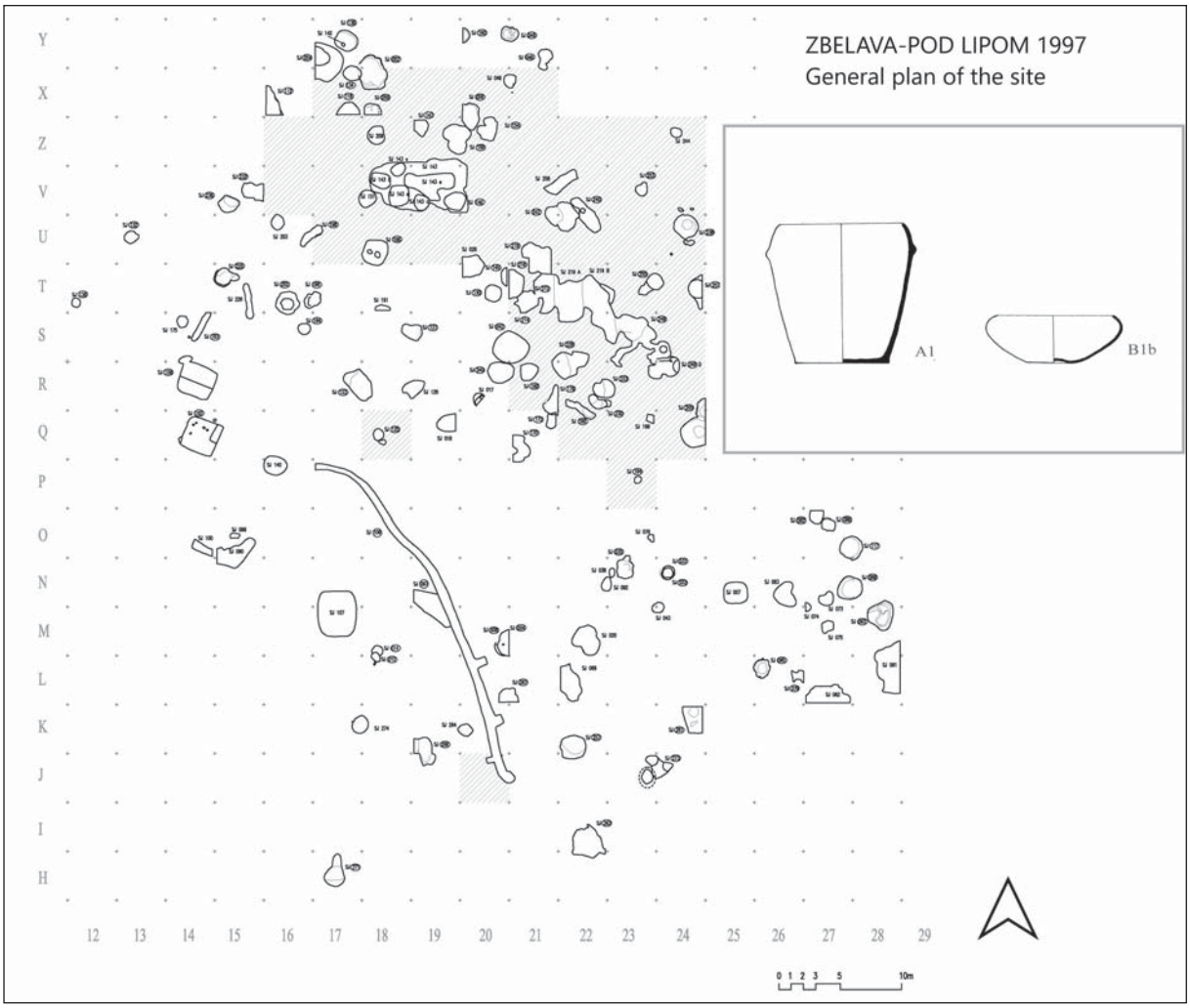


Fig. 10: Layout of the Zbelava-Pod lipom site and dominant types of ceramic vessels (drawings: M. Galić-K. Turkalj)

4.2 The Late Hallstatt settlement Zbelava-Pod lipom

A late Hallstatt settlement on the route of the highway Zagreb-Goričan in Zbelava, near Varaždin, was excavated by Amelio Vekić in 1997. Zbelava is located approximately 10 kilometers E of Varaždin and 5 kilometers NW of Jalžabet. The village is situated in a lowland area which is naturally bordered to the north by the Drava River, while the foothills of the Varaždinske Toplice highlands rise to its south, in Zbelava's hinterland.

The archaeological site at Pod lipom is approximately 2.5 km south-east of the village's center, at an elevation with a round layout and a diameter of approximately one hundred meters, which is 2–2.5 m above the surrounding lowlands. The Plitvica River flows in the immediate vicinity of the site, toward the south, while the stream Zbel passes on its northern side.[44] The settlement from the late phase of the Early

[44] Šimek 1987, 42; *Registar* 1997,141.

Iron Age lies in the same micro-region as the known important Hallstatt culture sites mentioned before: Jalžabet, Martijanec, Sveti Petar Ludbreški, Sigetec (*map 5*).[45]

The Zbelava-Pod lipom site was inhabited during the Copper Age, Early Bronze and Early Iron Age and in the Early Middle Ages.[46] As we can see, the Early Iron Age settlement was located in the middle of a lowland, on a gentle elevation surrounded by several watercourses. Chronologically, the Zbelava settlement belongs to the end of the EIA in northern Croatia, to the Ha D3 phase, or simultaneous to the Negova horizon in the Dolenjska group, or phase Styria V, according to B. Teržan.[47] In the structure of the Zbelava settlement we can single out above ground houses, probably built like log cabins, and various structures like dug-in huts, storage pits, fireplaces outside the houses, refuse pits. Post holes were found in small quantities at the site. The partially preserved late Hallstatt cultural layer SU 150 yielded numerous valuable finds. The results of archaeobotanical and zooarchaeological analysis performed on the samples from the Zbelava late Hallstatt settlement show that the most numerous animal species was red deer, but also cattle, pigs, as well as barley and oak acorn, were confirmed in the EIA settlement (*fig. 10*).

We have found a well preserved clay floor with pebble stone substruction, measuring approximately 10 x 4,5 m in house 1 (SU 143) in Zbelava. Several dozens of pyramidal weights of various sizes have been found on floor SU 143 as well as within layer SU 150 around the structure, which suggests that textiles were produced inside (and outside?) of the house. Another floor SU 061 in □ L+M/28, only partially excavated, lies in the other part of the settlement, southeast of all the so far mentioned structures (dimensions of the excavated part are around 2,5 x 3,5 m).

Important part of the Zbelava settlement are several semi-dug-in structures with a rectangular ground-plan (SU 161, 162 in □ 14+15, SU 155, 156 in □ R+S/14, SU 107, 108 in □ M+N/17).[48] Rather than pit-houses, they could have been used as a workshop or storage huts. Similar constructions have been found in Jalžabet and Virovitica, but also in other regions during the Early and Late Iron Age (*fig. 8*).[49] It is interesting that two dug-in structures of a quadratic ground-plan in Zbelava – SU 155, 156 and SU 161, 162 – are of identical size (2,6 x 2,8 m). In one we found carbonized barley. At Zbelava, we have also found a third, larger quadratic dug-in hut. SU 107, 108 has a slightly different, more rectangular ground-plan (4,6 x 3,1 m) and it could have been used as a house. In the whole region and beyond, this type of semi-dug-in structures seems to be very popular and without doubt we can prove their existence during the early and the late phase of the Early Iron Age.[50] The persistent use of the same type of settlement structure could be a simple and strong proof of its practicality, but it should not be dismissed either as an indicator of continuity of life.

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[45] *Registar* 1997, map for the prehistoric period.
[46] Kovačević 2007, 94.
[47] Teržan 1990.
[48] Kovačević 2007.
[49] Selected literature: Gerbec 2019; Hršak/Kovačević 2010 with quoted literature, especially Griebl 2004 and Lauermann 1994.
[50] Hršak/Kovačević 2010; Kovačević 2009.

The next important structure type is a circular dug-in roofed structure. SU 237 from Zbelava is a circular pit with a diameter of around 2 m, with the greatest depth at 0,75 m. Buried parts of the structure had two levels. Four post-holes and a layer of debris from a large quantity of daub were found along the rim of the pit, pointing to a certain construction serving as walls and a roof. Similar round structures can be found elsewhere, like in the East Hungary[51]. Not a single animal species was determined among the bone material from this structure, but we mention here a find of animal ribs with clear cut marks made most probably with a saw-like instrument. The analysis confirmed the marks to be surely ancient.[52]

Among the ceramic finds from Zbelava, the most frequent types are household items: simple bowl with inverted rim (type B1b), pot A1 type with simple elongated body and gently inverted rim, pyramidal weights (type I1) and s-profiled pot (type A4). Both A1 and B1b types can be found during the earlier phase of the Early Iron Age, but the popularity and numerous repetition of the simple, usually undecorated vessels begun to be characteristic for the late Hallstatt cultural period (*fig. 10*).[53] Chronologically, the most important finds from the EIA settlement in Zbelava include two bronze fibulae: a southeastern Alpine animal crossbow fibula and a Velem-type fibula. The southeastern Alpine animal crossbow fibula is dated predominantly to the Ha D3 phase, although it lasted until the Lt B phase.[54] The Velem-type fibulae point towards close connections between Pannonia and the southeastern Alps, where models for the design of this type should be looked for.[55] They are the products of workshop centers in western Hungary and appear towards the end of the sixth and the beginning of the fifth century BC, and last until the emergence of early La Tène fibulae.[56]

Important cultural and chronological analogies positioned the site in Zbelava between Dolenjska group and late Hallstatt centers in Transdanubia, and showed how the northern part of Croatia was impregnated with influences from the west, but also from the northern regions, lying across the River Drava. Following the collapse or transformation of the previous Early Iron Age phenomena, new settlements appear and a new phase of life begins.[57] This is the time when Sigetec and Sv. Petar in Podravina are probably repopulated again (or life may have continued in a limited scope during all that time).[58] Among the settlements that appeared after Jalžabet, Martijanec and Goričan, we have to include also the one in Zbelava, east of Varaždin. The analysis of archaeological evidence has shown that Zbelava had not lived in the earlier phases of the Early Iron Age. While we perceive elements from the previous period in the material remains of the Hallstatt settlement in Zbelava, in the same corpus we distinguish remains of the material culture that we connect with the neighboring similar and at least partly contemporary settlements in Sigetec

[51] Czifra 2015.
[52] Babić/Trbojević-Vukičević 2004.
[53] Kovačević 2005.
[54] Teržan 1977.
[55] Jerem 1981, 204.
[56] Jerem 1996, 97; Jerem 1986, Pl. 3.
[57] Teržan 1998, 521.
[58] Vinski-Gasparini 1987; Šimek 1982; Šimek 1979.

(embossed ware) and Sv. Petar (stylized protomes of a square or floral base, applied "ears" and meanders), as well as with the younger phase of the Lower Carniola group of the Early Iron Age, particularly with the settlements in Kučar near Podzemelj and Cvinger in Dolenjske Toplice.[59] The graves in Szentlőrinc, Beremend, Vinkovci and Sanski Most[60] contain southeastern Alpine animal fibulae or other late variants of crossbow fibulae, eye-beads, embossed decoration on pottery, but also certain ceramic forms of vessels, which underline the cultural and chronological relationship of Zbelava with other south Pannonian sites of late Hallstatt period, and to a degree certainly also with other settlements and necropolises of Transdanubia.[61] The basic importance of Zbelava lies in its position in southwestern Pannonia, exactly between the powerful late Hallstatt cultural centers in the southeastern Alpine area on the one side, and the cultural phenomena in the north, across the Drava River, on the other side. Pottery types, embossed ware, stylized small heads of animals, which we can connect with one or the other area, the use of graphite in the making and decoration of vessels, the southeastern Alpine animal fibula and the Velem-type fibula, the axe with single flanges, eye-beads are all elements that not only shed light on the chronological position of Zbelava, placing it chronologically after Sv. Petar, Martijanec or Jalžabet, but also reveal a transformed material culture and the strong influence that the neighboring late Hallstatt cultural centers must have exerted on the territory of northwestern Croatia.

We can be fairly confident that our settlement at Zbelava lives during the 5th century BC, in the latest phase of the Hallstatt culture, the Ha D3 phase, and perhaps also during the time when the latènization of the northern areas of Transdanubia and of eastern Austria had already started. In favor of this speaks also the pronounced closeness of the Zbelava finds with the material from house 6 of the Sé-Doberdó settlement, attributed by the excavators to the Lt A2 period,[62] but also with the other early La Tène sites of Transdanubia and the neighboring territories.[63]

5. Conclusion

In the more than two and a half year of the Iron-Age-Danube project, we have collected huge quantities of data on the Early Iron Age landscape, but also on other archaeological sites and structures in the Plitvica-Bednja basin. Only a fraction of this big dataset could be interpreted and checked on the field. The archaeological rescue excavation of the gigantic burial mound 1 in Jalžabet has not yet been finished and the finds have not been restored and interpreted. Therefore, one has to be cautious with the interpretation of the preliminary results presented here. Judging by the size and complexity of the Gomila burial mound, as well as by the hypothesized size and importance of the contemporary settlement, one can assume that the Early Iron Age community in Jalžabet and the Plitvica-Bednja rivers basin had an enormous need for resources. Wood, especially oak for buildings, but also other species used for heating

[59] Dular/Tecco Hvala 2007.
[60] Majnarić-Pandžić 2003; Jerem 1968; 1973; Fiala 1899.
[61] Kovačević 2007; 2008.
[62] Gál/Molnár 2004, Pl. 25–33.
[63] Čambal 2012; Stegmann-Rajtár 1996; Bujna/Romsauer 1983.

and lighting the houses, probably became harder to obtain with time. The impact on the natural landscape in the region must have been noticeable, especially in terms of deforestation. Excavations at Gomila and burial mound 2 showed that people moved an incredible quantity of different types of material to construct the burial mounds. Huge quantities of pebbles were transported to the building sites probably from the Drava River. Other kinds of stones, also abundantly used during the construction of burial mounds 1 and 2, such as sandstone and limestone, were probably queried in the hills in the south. Finding the exact location of the stone deposits or quarries is a task for future research. Building houses and other structures in the settlement, or projects like the Gomila mound, were demanding activities that certainly required lots of working hours, specific skills, and organization; e.g. builders had to be fed and housed during such projects. The remains of a large number of different kinds of animals, horses, cattle or sheep/goats, probably used as sacrifices and/or food during the funerary rituals, were found. This reveals a lot about the economy and structure of the Early Iron Age society settled in the landscape around the Bistričak creek and beyond. We can presume that this outstanding structure, the gigantic burial mound Gomila in Jalžabet, is a funerary monument built for only one, very prominent person. But at same time it is an oversized tridimensional marker of wealth and power, a focal point with strong and complex religious background imprinted in the landscape by an Early Iron community. The preliminary analysis, the character and distribution of the finds in the grandiose burial chamber of burial mound 1 in Jalžabet made us re-think our standpoint regarding important questions of identity and burial customs in the Early Iron Age in Jalžabet and the Drava River valley.

The relationship between the Early Iron Age community in nearby Martijanec and the one in Jalžabet is still uncertain. Astonishing, complex similarities between burial mounds 1 and 2 in Jalžabet and the one in Regöly in Transdanubia open broader perspectives about the dynamic of the Early Iron Age development, both south and north of the Drava River. These are only a few major questions that arose after our work in the past three years. However, it can be confirmed without doubt that the results of the Iron-Age-Danube project and the preliminary outcomes of the rescue excavation of burial mound 1 of Gomila in Jalžabet provided vital information that has the potential to transform our present knowledge of the Early Iron Age in Podravina and NW Croatia. As usual, each new dataset and explanation raises at least two new research questions. It is our plan to invest even more time and effort into continuing the research on Jalžabet and the Plitvica-Bednja basin in the Early Iron Age.

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Study of the Kaptol micro-region

by Hrvoje Potrebica and Marta Rakvin

Abstract
The discovery of a burial mound cemetery with richly furnished burial mounds and princely graves near the village of Kaptol gave the Požega Valley a prominent place on the map of the Hallstatt cultural complex. Prestigious items originating from Central Europe and the Alpine region as well as from the Balkan Peninsula suggested the existence of a unique community living on the south-eastern fringes of the Eastern Hallstatt Circle. Seventeen years of continuous Iron Age research in the valley has generated a vast amount of data regarding the material culture as well as the spatial distribution of archaeological features. Kaptol was recognised as a complex site with two burial mound cemeteries and a hillfort. Based on these results, a hypothesis was constructed that Kaptol functioned as a sort of a central place in the area and that it was part of a hierarchical network together with the other Early Iron Age sites identified in the valley. Modern research methods involving LiDAR scanning and extensive geophysical surveys completely changed our perspective and interpretation paradigm, both in the spatial and diachronical sense. We now know that the contemporary site of Kagovac in Kaptol's immediate vicinity is also a complex site with two burial mound cemeteries and a large fortified settlement, and that its status was comparable to Kaptol. We also became aware of more Iron Age sites in the valley and gained information indicating the existence of additional sites beyond its natural borders. This shows that in order to understand the Iron Age, we have to shift our interpretative focus from individual sites and direct it to the landscape and its specific features.

1. Kaptol micro-region and its surroundings

The complex Early Iron Age site of Kaptol is located in the Požega Valley in Eastern Croatia, on the southern slopes of the Papuk mountain. In recent literature Kaptol has become the eponymous site for the Early Iron Age Hallstatt cultural complex present in the greater part of northern Croatia. This site, as well as the other Early Iron Age sites found in Kaptol's micro-region, owes much of its cultural identity and economic prosperity to the unparalleled and unique position of the Požega Valley. The liminal position of the valley, located at the south-eastern border of the Carpathian Basin and the Eastern Hallstatt cultural complex, linked the Hallstatt world with the communities of the Balkans.[1]

The Požega Valley is a 977-km^2 plain of loess soil at an average altitude of 170 m^2, surrounded by a ring of mountains. Psunj (▲ 985 m), Papuk (▲ 954 m), Krndija (▲ 792 m), Požeška Gora (▲ 618 m) and Dilj (▲ 471 m) encircle the valley from west to east, leaving only the narrow Orljava river valley between the mountains of Požeška Gora and Dilj. This natural gateway into the valley connected it with the Sava river valley / Posavina region to the south, a major communication route during the Iron Age. To the north, although seemingly enclosed, access to the other major Iron Age communication route, along the Drava river valley, could be achieved by crossing the Papuk and Psunj mountains, following the ridges. Recent archaeological research

[1] Potrebica/Mavrović Mokos 2016, 46.
[2] Geological map of Croatia: http://webgis.hgi-cgs.hr/gk300/default.aspx (accessed 03.04.2018).

suggests active use of routes over the Papuk mountain and into the Drava river valley. The position of Bangradac fortified hillfort settlement, located below Tromeđa peak (the point at which three ridges of the Papuk mountain meet) would suggest that its location was chosen with the main purpose of controlling this communication route.

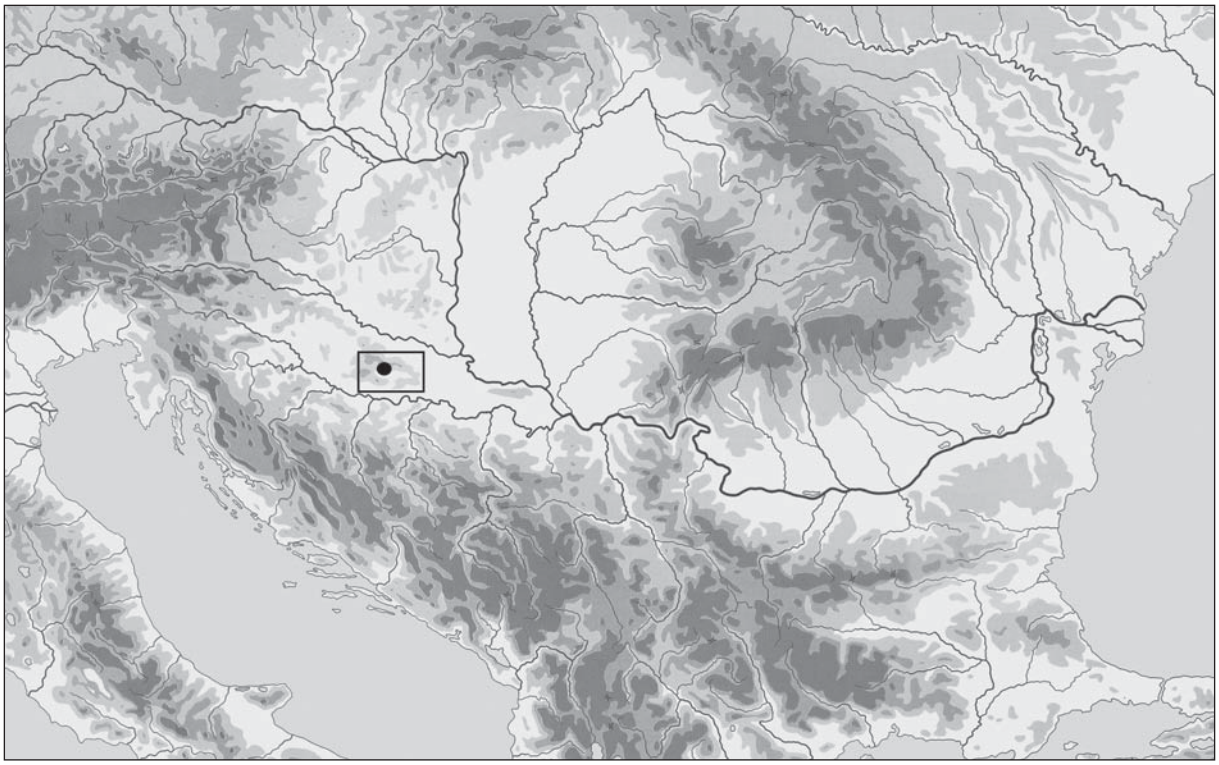

Fig. 1: Location of the Požega Valley and the site of Kaptol (black dot) (image: M. Rakvin)

On the other hand, communities inhabiting the valley benefited from its geological features. According to its geomorphological characteristics, the Papuk mountain is one of the most geologically diverse regions in Croatia.[3] On the Psunj and Krndija mountain areas, slates and igneous rocks are commonly found. In the lowland valley area, sedimentary rocks are usually found.[4] One of the major resources found in the mountain area of the valley was high-quality stone, found in the Psunj, Papuk and Krndija mountains. The use of local stone has been confirmed at burial-mound cemeteries on Kaptol and Kagovac. The Papuk and Psunj mountains are also known as a source of graphite, a scarce commodity extensively used on Iron Age pottery throughout the Hallstatt world. It has been suggested that the graphite trade presents one of the cornerstones of Kaptol's economy. The combination of fertile, arable land in the valley with forested mountain areas, suitable for both agriculture and animal husbandry, make this region a very agreeable place to live. Furthermore, the mountains are a source of freshwater springs that stream down into the valley,

[3] For more information about Geo Park Papuk see: https://www.papukgeopark.com/index.php?option=com_content&view=article&id=78&Itemid=76&lang=hr (accessed 12.05.2019).

[4] Potrebica 2003 b, 160–161.

forming numerous waterways and rivers. Hydrological conditions in the valley are largely determined by the Rivers Orljava and Londža. The Orljava's source is on the Psunj mountain, at over 800 metres above sea level, while the Londža's is on the Krndija mountain, at about 300 metres above sea level. The network of their tributaries covers an area of around 1500 km^2. One of the characteristics of the area is large oscillations in water levels, depending on precipitation. They have largely contributed to the shaping of the relief in the lowland parts of the valley by rinsing material from the mountains and settling it in the valley, sometimes forming thick alluvial layers in the plains.[5]

Results of the archaeobotanical analyses conducted on samples from tumuli 1, 6, 7, 13 and 14 of the Kaptol–Gradca burial-mound cemetery showed a variety of species domiciled to the Požega Valley during the Early Iron Age.[6] They gave new insights, not only into the complex burial ritual at the cemetery, but also into the Early Iron Age palaeo-environment of the region, representing the start of the systematic palaeo-environmental study of the Požega Valley.

Cereal grains were predominant in all tumuli, except in tumulus 13, where they were not found at all. In burial mounds 6 and 7, most frequent was emmer (*Triticum dicoccum*). In addition to other identifiable cereal grains (*Triticum monococcum*, *Triticum aestivum*, *Hordeum vulgare* and *Triticum spelta*), associated weeds have also been identified, as accidental additions with no crucial significance to the burial ritual. The remains of cereal grains could not be associated with specific vessels. They were scattered over the burial chambers, together with pottery sherds. On the other hand, the so-called fruit deposits were found in vessels. They comprised the carbonized remains of hazelnut (*Corylus avellana*), wild apples (*Malus sylvestris*) and Cornelian cherry (*Cornus mas*).[7] The predominant plant remains in tumulus 13 were diverse wild fruits, primarily remains of common hazel (*Corylus avellana*), while other fruits, such as Cornelian cherry (*Cornus mas*), elderberry (*Sambucus nigra*) and probably service tree (cf. *Sorbus domestica*), appear in very small quantities. In tumulus 14, cereals are the dominant plant remains. Among them, the most numerous were the remains of spelt (*Triticum spelta*). Other cereals, such as common wheat (*Triticum aestivum*), emmer (*Triticum dicoccon*), barley (*Hordeum vulgare*) and millet (*Panicum miliaceum*) appear in smaller quantities. The cereals probably reflect local production and cultivation of plant food, while the fruit present in the graves was collected in the settlement's surroundings.[8]

2. History of research

The first mention of the archaeological site of Kaptol was received by Šime Ljubić, the director of the National Museum in 1881. Mate Bišćan, commissioner of the Croatian Archaeological Society, wrote to him about prehistoric graves located in the vineyard of the parish priest in the village of Kaptol. In response,

5 Potrebica 2003 b, 160–161.
6 Šoštarić et al. 2007; Šoštarić et al. 2017.
7 Šoštarić et al. 2017, 189.
8 Šoštarić et al. 2016, 313–314.

Ljubić asked the priest, Tomo Novaković, to buy the items for the Museum and to continue with his research in the vineyard. Today, it is unknown what happened to the items or whether any excavations were undertaken. In 1924 or 1925 Milan Turković, also a museum commissioner, conducted excavations on reportedly the largest visible burial mound at the Kaptol–Čemernica burial-mound cemetery. Unfortunately, Turković's archaeological collection was destroyed in the fire when his castle burned down, and all the data on those excavations and finds were lost.[9] In 1965 Anđela Horvat, a member of the Croatian Academy of Sciences and Arts, acting on a report from Kaptol's parish priest, Mijo Bestić, notified the Archaeological Museum in Zagreb about the burial mounds near Kaptol.[10] The area in question is today known as Kaptol–Čemernica burial-mound cemetery, located north of the village of Kaptol.

The first modern archaeological excavation campaigns in Kaptol were conducted from 1965 to 1971. They were led by Vera Vejvoda and Ivan Mirnik of the Archaeological Museum in Zagreb.[11] The results of these campaigns identified Kaptol as one of the most important Early Iron Age centres in the southern Carpathian Basin. Finds, especially from two princely burial mounds, gave an insight into Kaptol's economic power and the role it had in the communication network between the communities of the Eastern Hallstatt Circle and the Balkans.

When Vejvoda and Mirnik arrived on the site, they documented fourteen burial mounds. During excavations, they noticed that some mounds had been destroyed by ploughing and that they appeared to be lowered or "dragged" to one side and, in some cases, barely visible.[12] The state of the mounds shows the devastating effect of the intensive multi-centennial agricultural activities on the fields of Čemernica. Further evidence of the mounds' devastation can be seen in the First Military Survey maps from the second half the 17th century, where the mounds north of Kaptol are clearly labelled as *Türk Hügel*,[13] indicating that at that time they were not only seen as prominent features in the landscape, but also recognized as an archaeological site by the surveyors almost a century earlier than the museum's archival records showed.[14]

In 1975 Vejvoda and Mirnik launched an excavation campaign on Kaptol's other burial-mound cemetery, Kaptol–Gradca.[15] As the excavation funds were limited, and since the results did not match the results of the Kaptol–Čemernica campaigns (especially in regard to the opulence of items found), it was decided to call off further research on the site.

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9 Vejvoda/Mirnik 1991.
10 Vejvoda/Mirnik 1971a, 183–184.
11 Vejvoda/Mirnik 1971 a; id. 1971b; id. 1971c; id. 1972; id. 1973; id. 1991; Vejvoda/Šmic 1977; Vinski-Gasparini 1987.
12 Vejvoda/Mirnik 1971a, 190, 196, 199, 201, 203.
13 More on Mapire - The historical Map Portal: https://mapire.eu/en/map/europe18centuryfirstsurvey/?layers=163%2C165&bbox=1931770.9982096679%2C5650568.41434052%22077230.663036358%2C5696430.631311625 (accessed: 17.05.2019).
14 Potrebica 2019, 507.
15 Vejvoda/Mirnik 1991, 16–17.

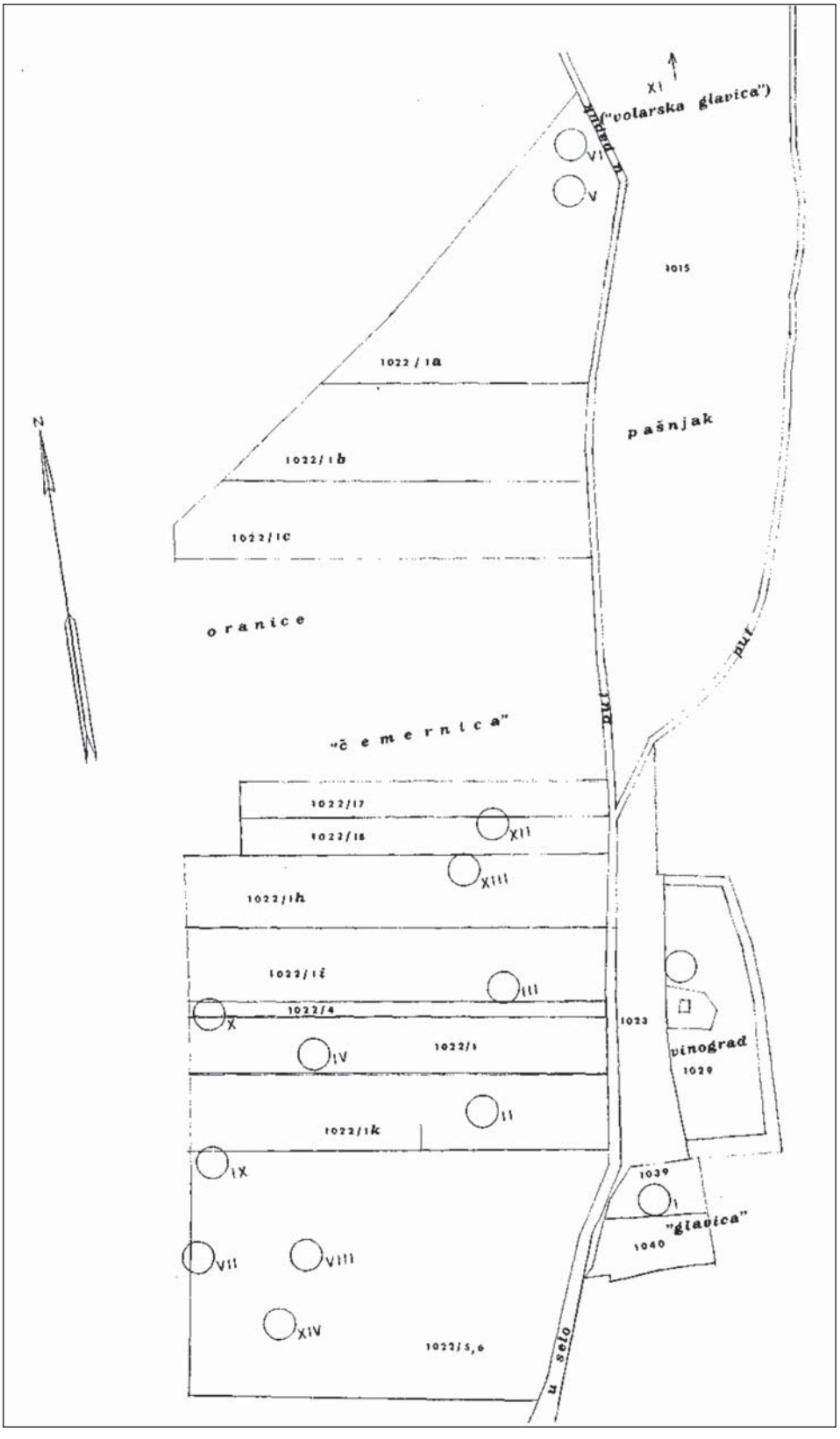

Fig. 2: Plan of the Kaptol–Čemernica burial-mound cemetery from 1965 (after: Vejvoda/Mirnik, I 1971a. Fig. 1)

During their campaigns, Vejvoda and Mirnik also gave the first description of the hillfort settlement on the slopes of the Papuk mountain, to which both of Kaptol's cemeteries (Kaptol–Čemernica and Kaptol–Gradca) are attributed. They gave an account of a settlement on a hilltop surrounded by steep slopes on its northern, western and southern sides. On the eastern side of the settlement, researchers described a rampart, a ditch and terraces on its western slope. The first estimate of the size of the settlement was made (5 ha). In addition, the vicinity of a graphite mine to the hillfort was noticed, and the idea of graphite's being the basis of Kaptol's economic strength was proposed.[16]

Their research results pinpointed Kaptol on the map as an important centre on the south-eastern periphery of the Eastern Hallstatt cultural complex. The discovery of remains of weaponry, horse equipment, pieces of attire and grave goods painted a picture of a community with extensive communications that linked the core Hallstatt area with communities in the Balkans and the Mediterranean world. The specific tastes of the elites buried in the mounds made R. Vasić single them out as a special Kaptol or Požega group.[17] In a similar manner, K. Vinski-Gasparini defined the Martijanec-Kaptol group, connecting the area of Central Slavonia with Podravina, Međimurje, Prekmurje and Styria, but clearly distinguishing it from the Sulmtal group, as a separate subgroup existing within a wider cultural phenomenon.[18] The research of the site continued in 2001, when a series of systematic research campaigns were launched by the author and a team from the University of Zagreb and the Centre for Prehistoric Research. Research focused mainly on the other burial-mound cemetery in Kaptol: Kaptol–Gradca. From 2001 to 2014, seventeen excavated burial mounds gave insight, not only into the material remains found, but also into the monumental and complex burial architecture and burial practices at the cemetery. The deceased were buried predominantly in wooden chambers with drywall stone constructions built around them. After they were burnt on the pyre, their remains, along with pieces of attire, were collected and placed in the chamber. Grave goods were then attributed to the deceased. As the burial structures at the Kaptol–Čemernica cemetery could not be researched sufficiently during the previous, largely under-funded campaigns, in 2007, 2009 and 2016 revision campaigns were undertaken on three burial mounds at the Kaptol–Čemernica cemetery.

Results revealed that monumental burial structures existed under the mounds, with massive burial chambers with, in some cases, ceremonial corridors (dromoi). The revision campaigns also changed previously established notions about multiple burials under the mounds, showing that the mounds were predominantly erected for a single burial, or – in the rare cases of double burials found (tumulus IV at Kaptol–Čemernica and tumulus 6 at Kaptol–Gradca) – they were both buried in a single event in the same chamber. The only exception is the later peripheral burial found in tumulus 6.[19]

[16] Vejvoda/Mirnik 1971, 203–204; Vejvoda/Mirnik 1991, 10.
[17] Vasić 1973, 38.
[18] Vinski-Gasparini 1987, 183, 227; Potrebica 2019, 504.
[19] Pavličić/Potrebica 2013; Potrebica 2001a; id. 2001b; id. 2002; id. 2003a; id. 2004; id. 2005; id. 2006; id. 2007; id. 2008; id. 2010; id. 2011; id. 2013a; id. 2013b; Potrebica/Bezić 2002; Potrebica/Rakvin 2019.

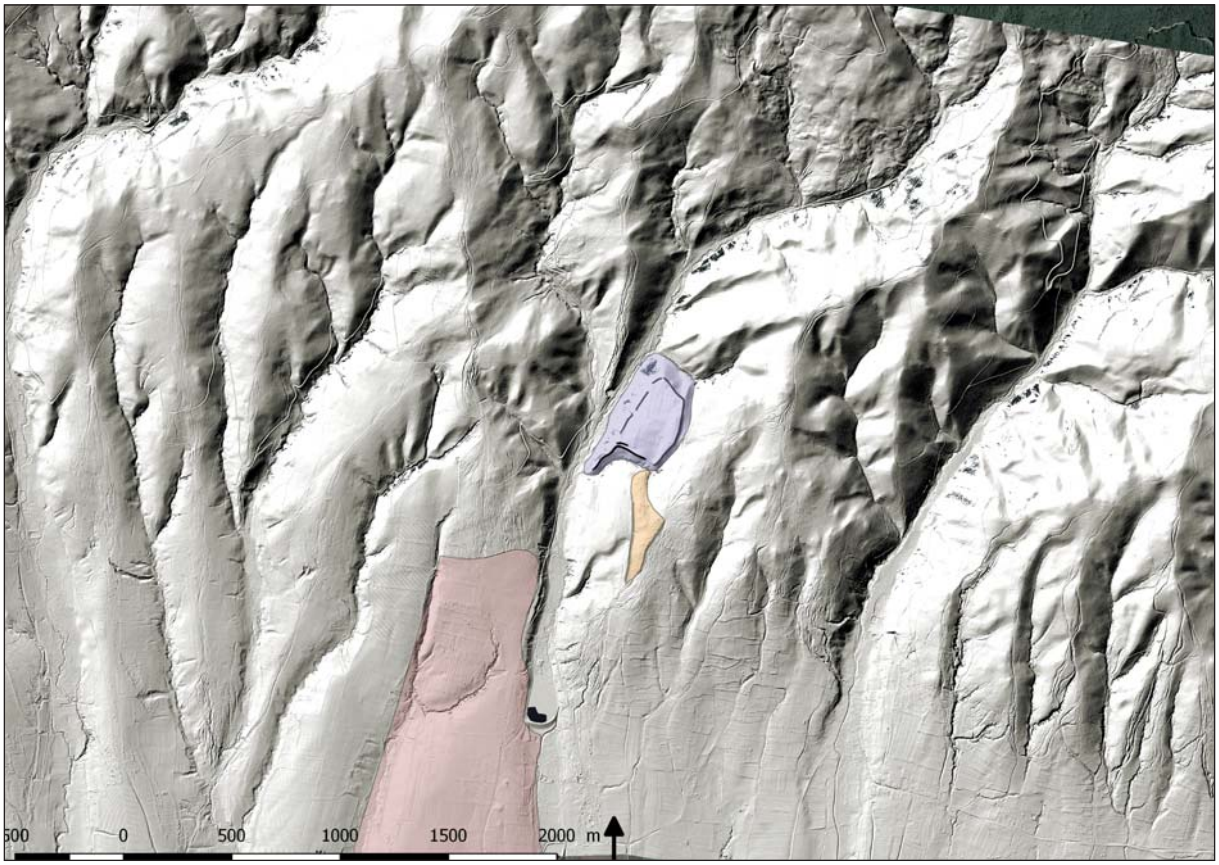

Fig. 3: Archaeological site of Kaptol with the two burial-mound cemeteries of Kaptol–Čemernica and Kaptol–Gradca and the hillfort settlement of Kaptol–Gradci (image: D. Mlekuž, M. Rakvin)

Simultaneously with the excavations at the cemetery, stratigraphic test pits were opened at the Kaptol–Gradca hillfort settlement in 2001. Located north of the cemetery, the Kaptol–Gradca hillfort settlement covers an area of about 7 hectares. The hillfort's slanting plateau is enclosed by sloping terraces and a rampart. On three sides, the settlement is surrounded with steep stream gorges, while on its eastern side it is guarded by a wide natural prominence of the Papuk mountain. In the Iron Age, the entrance would probably have been situated at its south-western corner.

Material found in the test pits indicated great settlement activity on the hillfort that could be attributed to the Late Iron Age.[20] The accidental find, in 2004 on the hillfort plateau,[21] of a double-looped bow fibula with foot formed as a Boeotian shield pointed to the expected chronological frame of a hillfort occupation contemporaneous with the burial mounds.[22]

In order to establish the relationship between the buried members of the Kaptol community and those that left traces on the hillfort, as well as to define its stratigraphic and chronological frame, three trenches were researched in 2011. A vast amount

[20] Potrebica 2005, 45; id. 2019, 511.
[21] Potrebica 2005, 44.
[22] Heilman 2016, 10, Fig. 1.

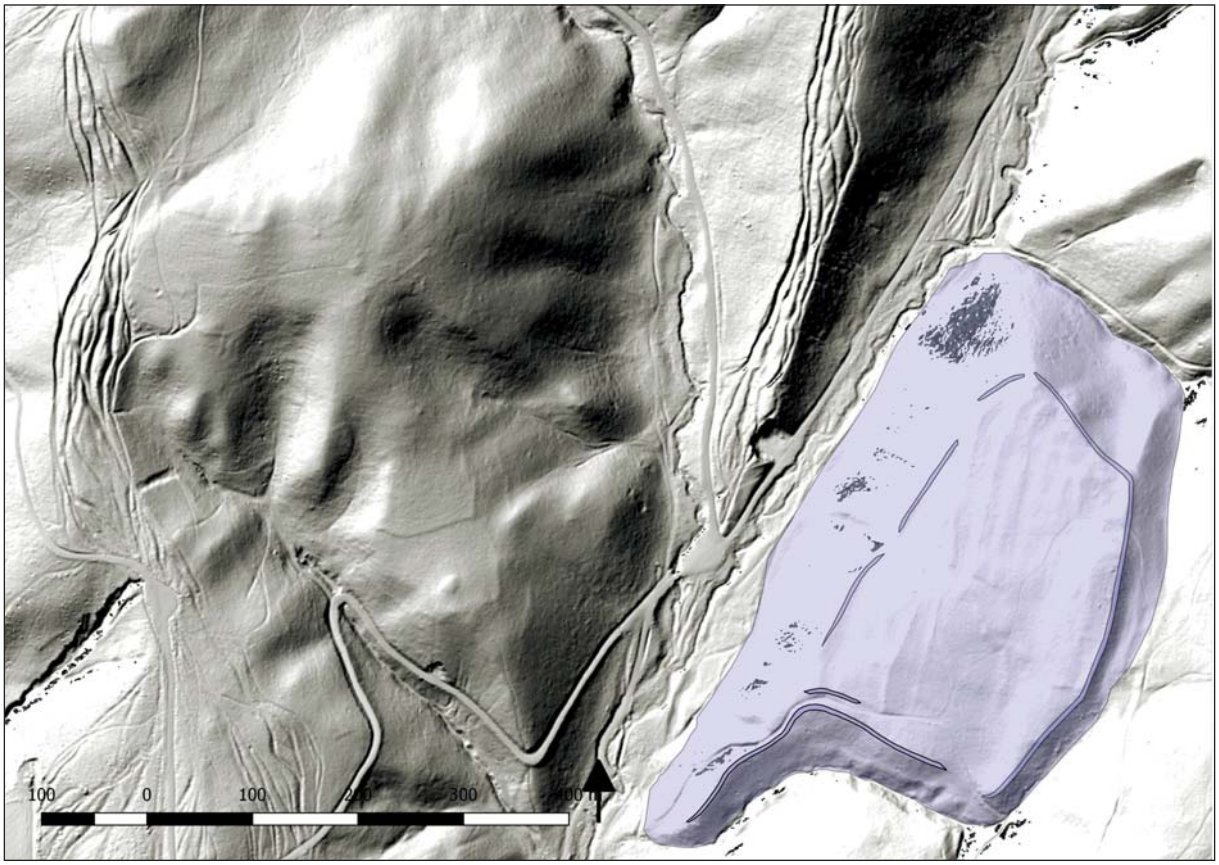

Fig. 4: Fortified hillfort settlement with terraces, Kaptol–Gradci (image: D. Mlekuž, M. Rakvin)

of typical settlement finds that were made in the trenches (pottery sherds, loom weights, spindle whorls and pieces of wattle-and-daub house constructions) could not be attributed to any kind of settlement structures. Years of erosion and very intensive forestry activities had resulted in the perseverance of only a very shallow cultural layer positioned directly on the gneiss bedrock. By 2013, trenches 4 and 5 were excavated. The same situation was revealed in trench 5, excavated at the position of the presumed rampart. Excavation of trench 3, which was supposed to reveal the cross-section of the rampart, showed that what was expected to be a man-made rampart was a natural rocky ridge, artificially cut on the outside in order to obtain a steep surface with a small elevation in front of it. This modification of a natural feature assumed the function of a rampart on the eastern side of the hillfort. Like the finds from the first trenches, finds from trenches 3 and 5 could be dated provisionally to a period from the later phases of the Early Iron Age to the beginning of the Late Iron Age (from Ha D2 to Lt B1).[23]

On the other hand, as burials under both of Kaptol's cemeteries can be attributed to the timespan from Ha C1 to Ha D1, an obvious chronological disparity between burials and hillfort occupancy appeared. The fact that no settlement layers were found which would correspond with material in the mounds raised questions about

[23] Potrebica 2005, 45; id. 2019, 511.

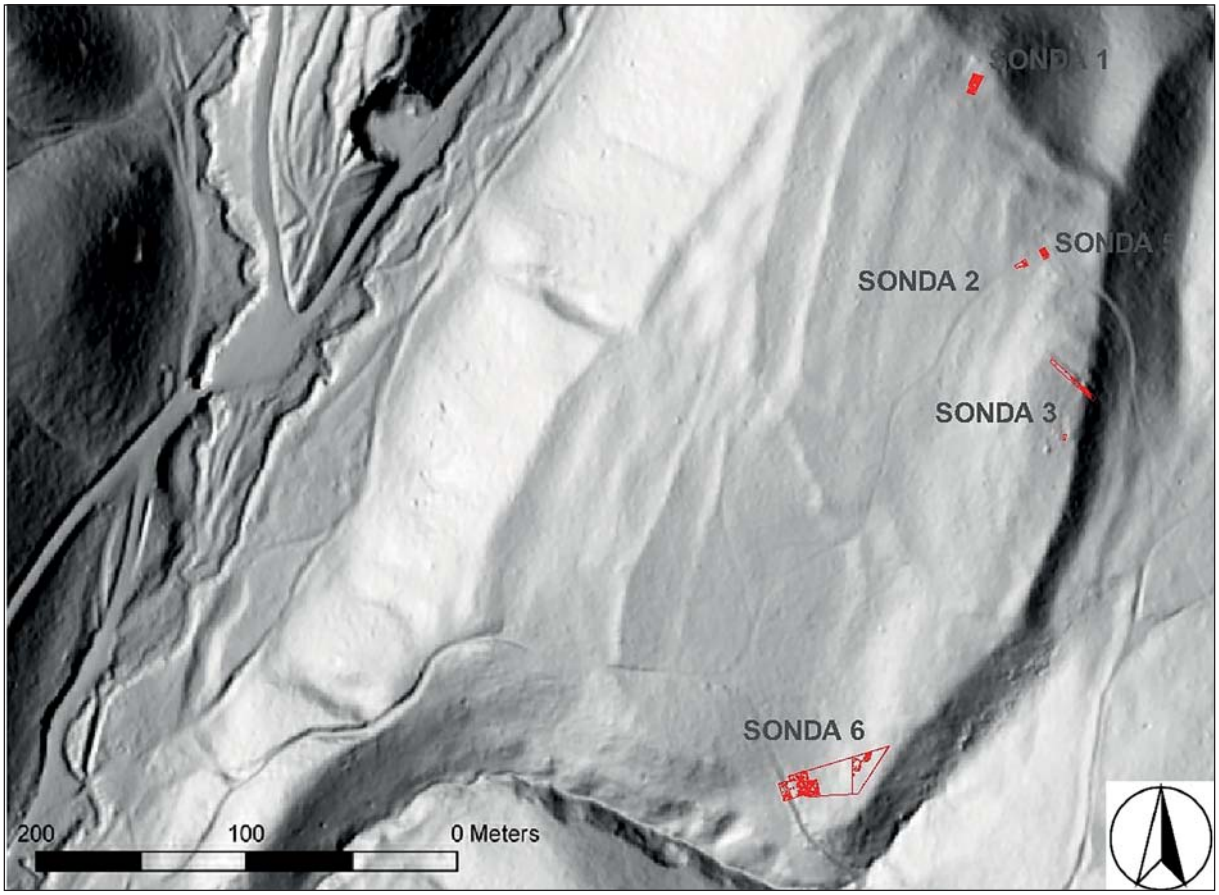

Fig. 5: Trench distribution at Kaptol–Gradci hillfort (image: D. Mlekuž, M. Ceković)

the relationship between them. Furthermore, the settlement occupation phase found at the hillfort, which could be attributed to the Early-to-Late Iron Age transition period, changes the cultural picture of the southern Carpathian Basin. In addition, the overall inferior state of Iron Age settlement research compared to the levels of cemetery research in northern Croatia gave additional impetus for the development of a new research strategy at Kaptol.

In 2014, trench 6 was opened on the south-western slope of the hillfort, after identifying traces of settlement structures and textile production on that spot. In the course of the next three excavation campaigns, from 2015 to 2017, the data gathered from trench 6 gave new insights into the settlement's occupational horizons. Two settlement (construction) horizons could be clearly distinguished. They were separated by a thick layer of gravel that was used for levelling the terrain. Underneath, traces of a burnt house, heavily damaged by erosion, were found with material that could be dated to the Ha C2 / Ha D1, contemporaneous with the burials. Above the levelling layer, the material could be dated to between the Ha D2 and Lt B1 phases.[24]

[24] Potrebica 2019, 511–512.

3. Landscape research: new results

The research of trench 6 coincided with the start of the ENTRANS project (Encounters and Transformations in Iron Age Europe), in the course of which new methodology for working in forested areas was developed. The methodology consisted of three components: airborne laser scanning (LiDAR) of the site and site-adjacent area with the objective of locating Iron Age settlements and spatial relationships between them, conducting a geophysical survey on the site in order to determine their internal structure, and conducting a limited and targeted excavation aimed at ascertaining the results of the previous methods and giving an archaeological interpretation of the sites.[25]

When it was introduced in 2014, this methodological framework presented a novelty in the research of Croatian Iron Age sites. The results that followed yielded new data, which was not only important for new insights into Kaptol, but was also essential for our comprehension of the Iron Age features found in the wider micro-region area around it.

Branko Mušič and his team from the Faculty of Arts of Ljubljana University conducted a geophysical survey of the hillfort settlement. The results of georadar and magnetometry surveying show that a dense grid of rectangular enclosures 20 x 20 m covers the surface of the settlement. All are oriented in the same direction, with discernible communication paths between them following the configuration of the terrain. The picture leaves an impression of a very organized settlement with

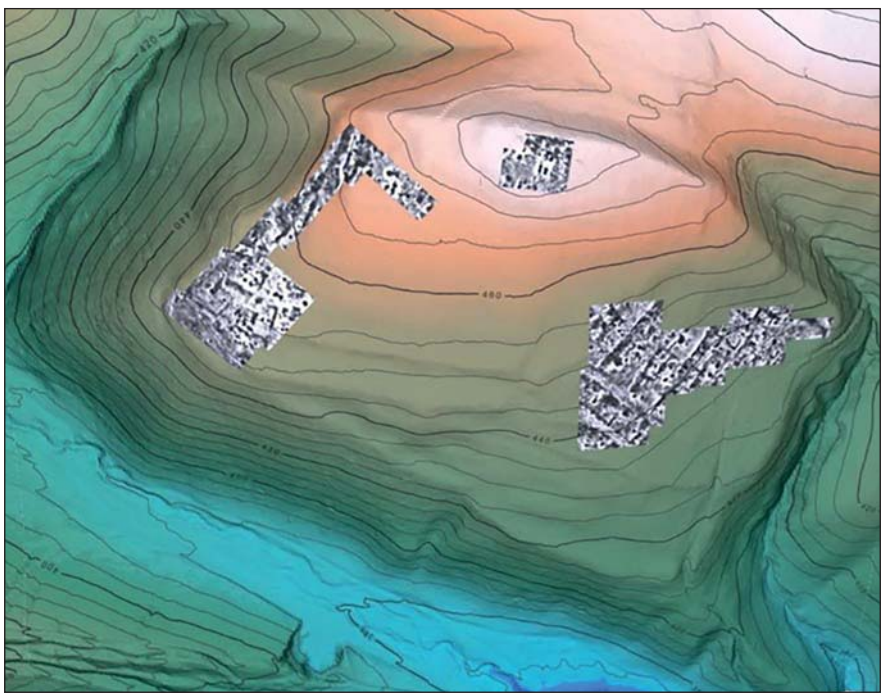

Fig. 6a: Geophysical survey results at Kaptol–Gradci hillfort settlement, situation in 2015 (image: B. Mušič)

[25] Potrebica/Mavrović Mokos 2016, 57–59.

Fig. 6b: Geophysical survey results at Kaptol–Gradci hillfort settlement, situation in 2017 (image: B. Mušič)

advanced infrastructure which was built over a short period. The current state of research in trench 6 corresponds with the survey results. These rectangular spatial units probably should not be interpreted as single houses, but rather as yards that could have been used by households, which could then potentially represent the basic social unit that formed the Iron Age community of Kaptol.[26]

[26] Potrebica/Mavrović Mokos 2016, 512.

Fig. 7: Enclosure feature around Kaptol–Gradci burial-mound cemetery (image: D. Mlekuž, M. Rakvin)

LiDAR scanning done on the site gave us a more precise view of those features already known, such as terraces, the rampart and the entrance to the hillfort. In addition, it allowed us to obtain new spatial information about previously undistinguishable landscape features, such as holloways leading to and from the settlement. The rampart-like feature at the Kaptol–Gradca cemetery, so far only partially discernible, could now be identified as an enclosure around the cemetery. This adds a new dimension to the perception and use of space by the community in Kaptol, probably implying that the "sacred" burial ground had to be physically separated from the common ground.[27]

New seemingly man-made features were also observed north of the Kaptol–Čemernica cemetery, potentially changing our notions of the cemetery's range. Moreover, at the Kaptol–Čemernica cemetery, LiDAR scanning has shown the current state of site preservation (and devastation), with the mounds almost completely flattened by intensive agricultural activities, in greater part, and past excavations, in lesser. Traces of some mounds could still be visible (e.g. tumuli IV and I), while satellite images might help in detecting others. This is particularly troublesome for any future revision

[27] At the Kaptol–Čemernica cemetery this was done by positioning the cemetery west of the Bistra stream. For more on the relationship between waterways and burial customs, see Potrebica 2003c, 103–117.

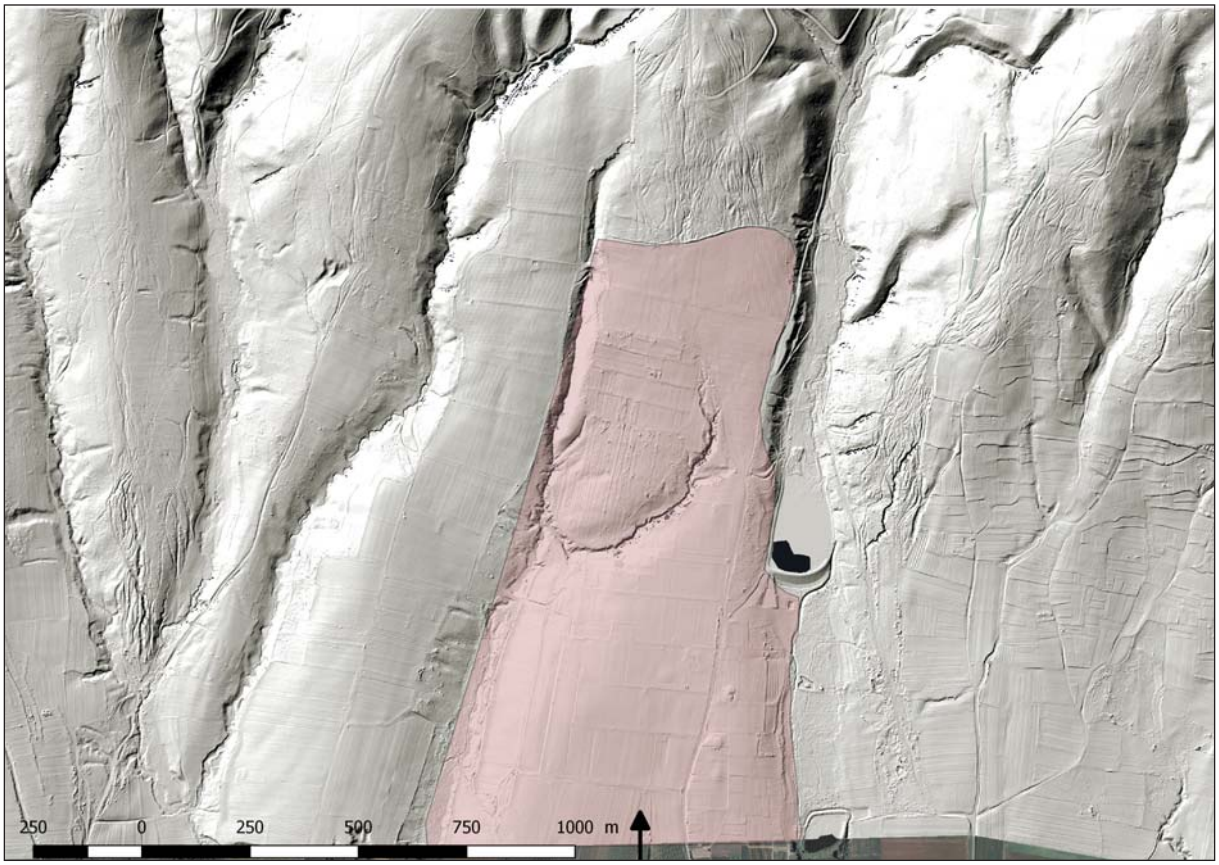

Fig. 8: Current burial-mound visibility at Kaptol–Čemernica cemetery (image: D. Mlekuž, M. Rakvin)

campaign, since the determination of the correct position of each excavated tumulus is of vital importance.

LiDAR scanning, which was conducted in 2014, covered 34 km² of Kaptol's surrounding area, encompassing the heavily forested area north of the villages of Vetovo and Lukač. Although a hillfort settlement at this position was known prior to analysis of the LiDAR scans,[28] the extent and the complexity of this site remained hidden. Located only 6 km east of Kaptol (in a straight line), the archaeological site of Kagovac comprises a hillfort settlement located on the Gradac hill with terraces and an elaborate fortification system.

The two burial-mound cemeteries located to the west and south that belonged to the hillfort settlement differ in size and spatial organization of their mounds. At the western cemetery, fourteen burial mounds, ranging from 10 to 20 metres in diameter, are longitudinally positioned along the elevated plateau above the Vrboska stream, possibly marking the path leading to the settlement's entrance. The southern burial-mound cemetery comprises a group of much smaller and hardly visible mounds of approximately 4 m in diameter. Located south of the hillfort on a slope, the mounds in this group have been greatly affected by erosion, resulting in the poor preservation

[28] Potrebica 2003b, 170.

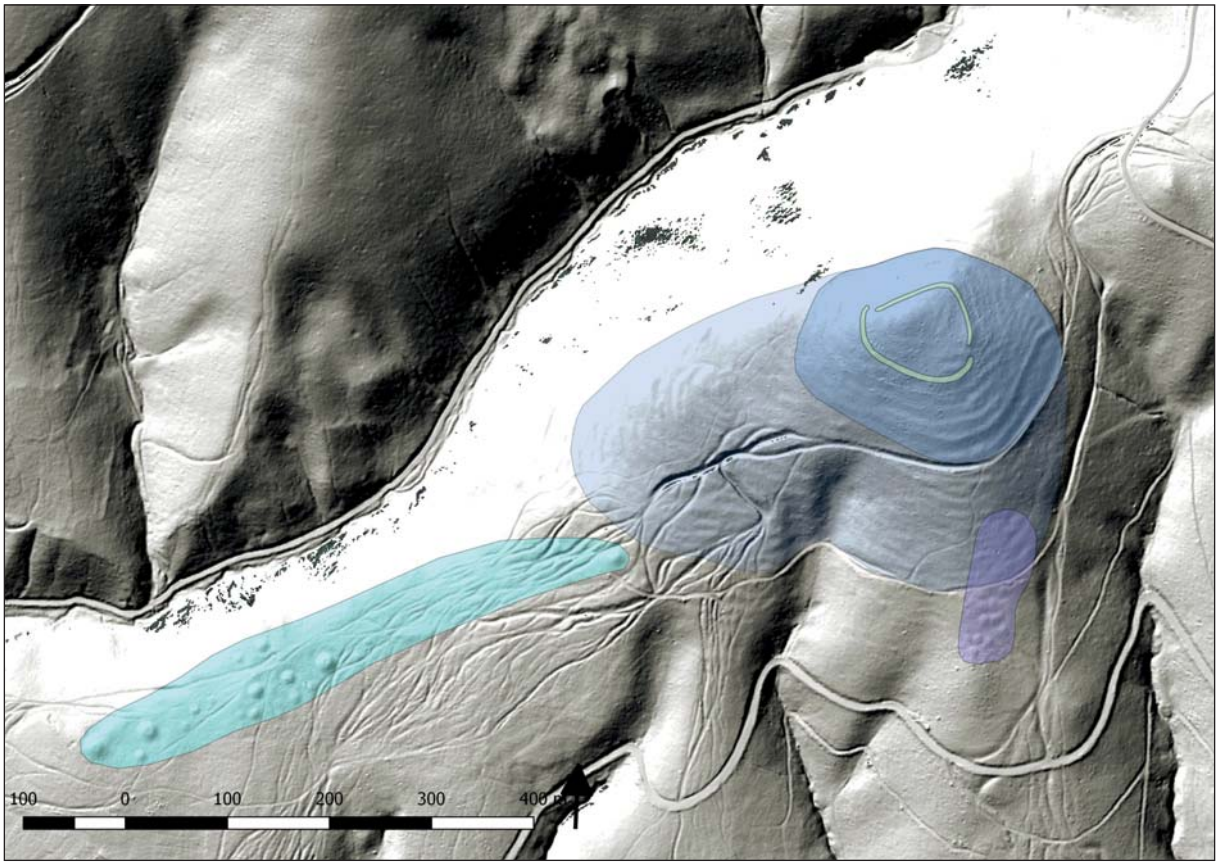

Fig. 9: Archaeological site of Kagovac with fortified hillfort settlement of Gradac and two burial-mound cemeteries located west and south of it (image: D. Mlekuž, M. Rakvin)

of their original heights. Initial geophysical research and excavation on this site was performed by the project Burial Customs of the Early Iron Age in Southern Pannonia – Crossroads of Identity (BCCrossId) financed by Croatian Science Foundation. So far, three tumuli that were excavated at the western cemetery have yielded very rich graves, with complex burial architecture that could be dated to the Ha C1 period. Between tumuli 2 and 3, a flat late-Hallstatt grave was found, implying that the site was occupied well into the later phases of the Early Iron Age. At the southern cemetery, one excavated tumulus was found, containing rich warrior equipment, but with less elaborated burial architecture, which could also be dated to Ha C1.[29] Approximately half-way between Kaptol and Kagovac, north of the village of Podgorje, the settlement of Bangradac is located. Hidden in a densely forested area, it was discovered after analysing LiDAR images in 2014. The settlement, surrounded with ramparts, has a surface area of about four hectares, with the entrance on its south-eastern side.

Targeted excavations on the site have shown that the rampart consists of a wooden structure and packed earth, enclosed by drystone walls and covered again with packed earth. No chronological building phases could be observed at this stage. In addition, the construction of structures found inside the enclosure was based

[29] Potrebica/Mavrović Mokos 2016, 39–65, Fig. 13; Potrebica 2019, 513.

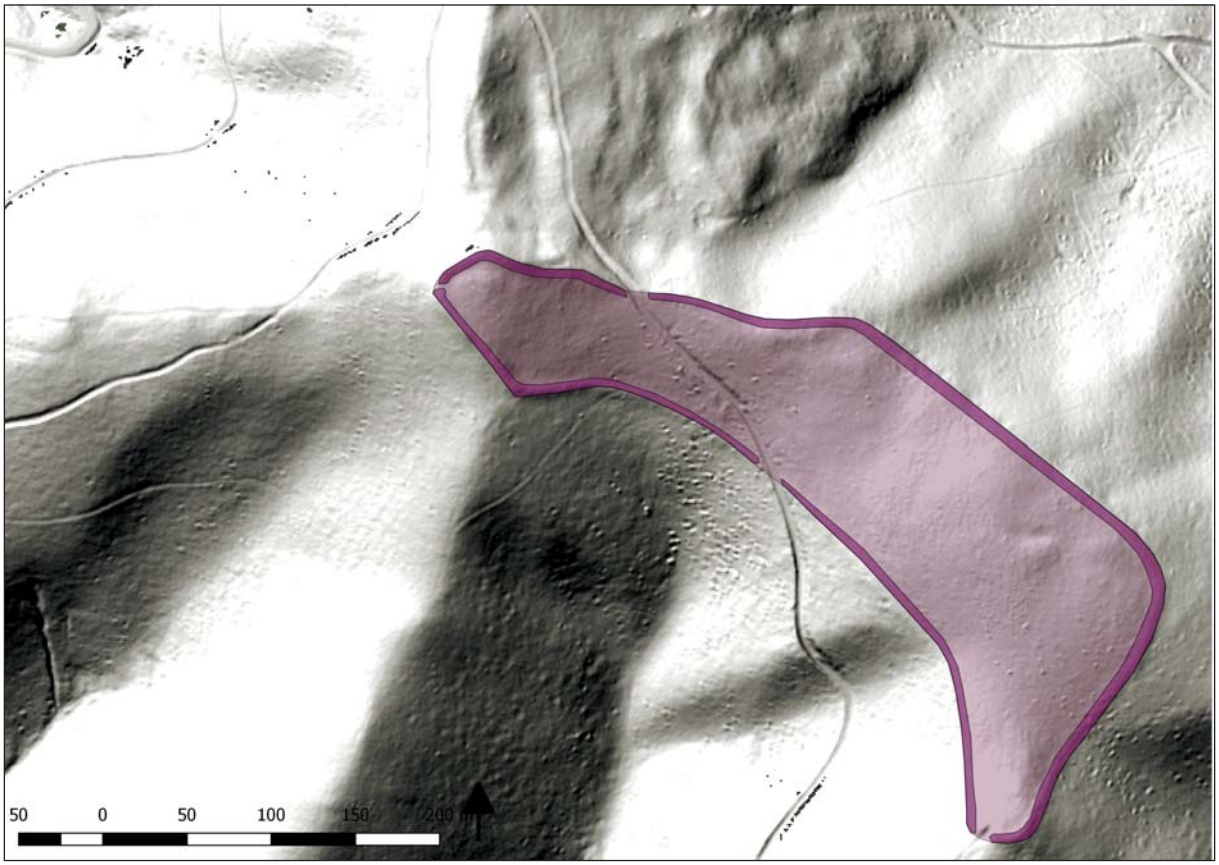

Fig. 10: Archaeological site of Bangradac with fortified hillfort settlement (image: D. Mlekuž, M. Rakvin)

on wooden posts. Material finds, as well as the radiocarbon date obtained from a charcoal sample, date these settlement structures to the final stages of the LBA (1090–917 cal BC – Beta – 487863). So far, no traces of a cemetery belonging to this settlement have been found.[30]

4. Strategy and approach in the research of the Kaptol micro-region: understanding the landscape of Kaptol

The research that has been done in Kaptol since 2001 shows gradual evolution of the research concepts and the interpretations of the finds and features found. The focus was primarily centred around burial customs of the elites, their place and connections in the Eastern Hallstatt Circle, and subsidiarily around the settlement area of the community. Monumental burial structures with rich grave goods and prestigious pieces of weaponry and attire from elite burials and a large settlement with a complex fortification system, which was occupied over a long period of time, pointed to the fact that Kaptol was important and (most) dominant in the Early Iron Age, not only in the Požega Valley, but in a much broader area of the southern Carpathian Basin. Material finds have shown that its prominent status emerged from its position

[30] Potrebica 2019, 513.

at the cross-roads of three cultural spheres: Pannonia, the Alps and the Balkans.[31] New technologies, introduced to the research of Kaptol in recent years, have greatly shifted the focus of research and changed the way in which the community in Kaptol is perceived on two opposing levels. At the level of the site, geophysical surveys and targeted excavations, combined with LiDAR images, revealed a complex settlement structure revealing a highly organized community capable of large infrastructural ventures above and below ground. In addition, systematic archaeobotanical sampling is allowing us to obtain new notions about the burial ritual, but moreover to take the first steps towards the reconstruction of the Early Iron Age environment. On the other hand, at a wider regional level, LiDAR scanning allowed us to observe new features in the landscape surrounding Kaptol. Although only a small area around Kaptol was scanned, the results not only added to our notions about the settlement density in the area, but completely changed the way the dynamics of this cultural landscape is perceived.

The existence of another complex Early Iron Age site – that of Kagovac – with two burial-mound cemeteries and a terraced fortified settlement in Kaptol's vicinity raises questions about their interrelation. Preliminary results of the burial research at Kagovac show that some graves (tumuli 1 and 3) chronologically precede those in Kaptol, and that the occupation of the two sites overlapped during the Ha C and Ha D periods. This opposes the long-standing hypothesis that Kaptol was the dominant centre in the region, flanked by smaller satellite settlements gravitating towards it. The research of a third prominent Late Bronze Age fortified settlement in the region, that of Bangradac, introduces a chronological dimension into the picture, possibly revealing the mechanism of transformation from Late Bronze Age to Early Iron Age in the liminal part of the Eastern Hallstatt cultural complex. As no traces of Late Bronze Age have been found in the immediate vicinity of Kaptol or Kagovac, and taking into account the significantly more elevated position of Bangradac (approx. 750 m above sea level, as opposed to 350–450 m at Kaptol and Kagovac), a hypothesis could be made that the Early Iron Age centres in the Požega Valley emerged after the Late Bronze Age settlements had been abandoned, with their population establishing new settlements on the lower slopes, closer to the valley floor.[32]

Important paradigmatic shift was brought about by INTERREG project Monumentalized Early Iron Age Landscapes in the Danube River Valley (Iron-Age-Danube). In scope of this project sites were not interpreted as individual points in landscape, but landscape was rather taken as a whole – an integrated and complex archaeological feature consisting of multiple layers and interconnected elements. This different approach brought new value to already existing results some of which are presented here.

In order to propose a more coherent model of settlement dynamics in the region, a much wider area than the Kaptol micro-region has to be taken into account. The current state of research[33] of the Late Bronze and Early Iron Age settlement

[31] Potrebica/Mavrović Mokos 2016, 39–65, 60.

[32] Potrebica 2019, 514.

[33] As a systematic reconnaissance survey has yet to be done, data on the Late Bronze Age and Early Iron Age settlements in the Požega Valley comes from several rescue excavations,

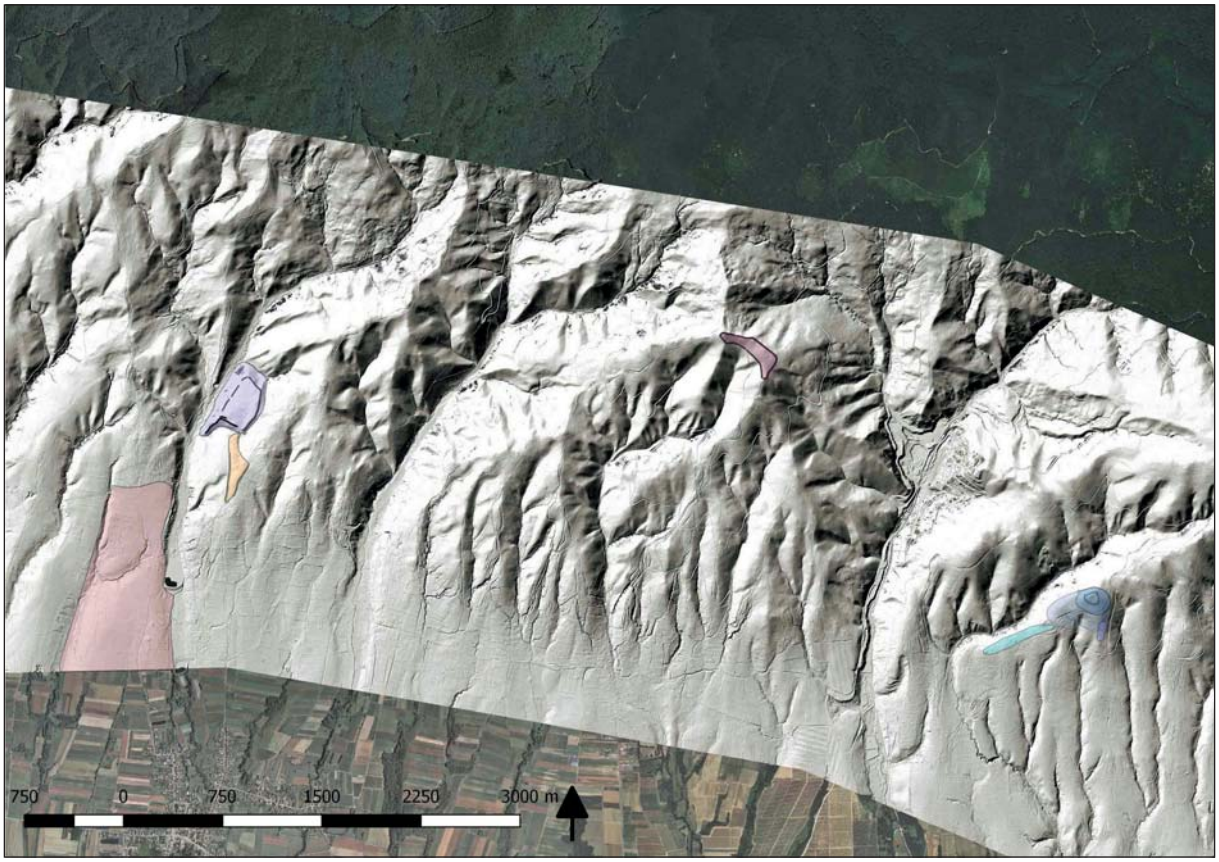

Fig. 11: Positions of Kaptol, Kagovac and Bangradac in the Kaptol micro-region (image: D. Mlekuž, M. Rakvin)

distribution in the Požega Valley shows two major clusters: a northern one, with settlements positioned on the Papuk and Krndija mountains, and a southern one, along the River Orljava and the natural gateway into the valley. The apparent lack of Late Bronze and Early Iron Age sites in the central part of the valley could be explained by the intensive agricultural activities and the consequential damaging of the sites, alluvial layers covering the sites, and the Late Bronze and Early Iron Age communities' proven affinity for settling on elevated positions (hillforts).

It could also be suggested that the clusters are oriented towards the two major communication routes connecting the valley with the Sava and Drava river valleys. This is particularly noticeable in the case of the position of the Kravljak burial-mound cemetery, located on the northern slopes of the Psunj mountain, marking the route that connected the valley with the Drava river valley. However, as most of the sites are located under a densely forested area and are lacking coherent data, further inferences cannot be made without a thorough systematic reconnaissance of the Požega Valley with new LiDAR-scan analyses, as well as geophysical surveys and targeted excavations combined with interdisciplinary scientific analyses of organic

unsystematic surveys or from the material brought to the Archaeological Museum in Zagreb by museum commissioners over the years. See Balen/Potrebica 1999; Potrebica 2003b; Ložnjak Dizdar/Potrebica 2004; Dizdar/Potrebica 2012.

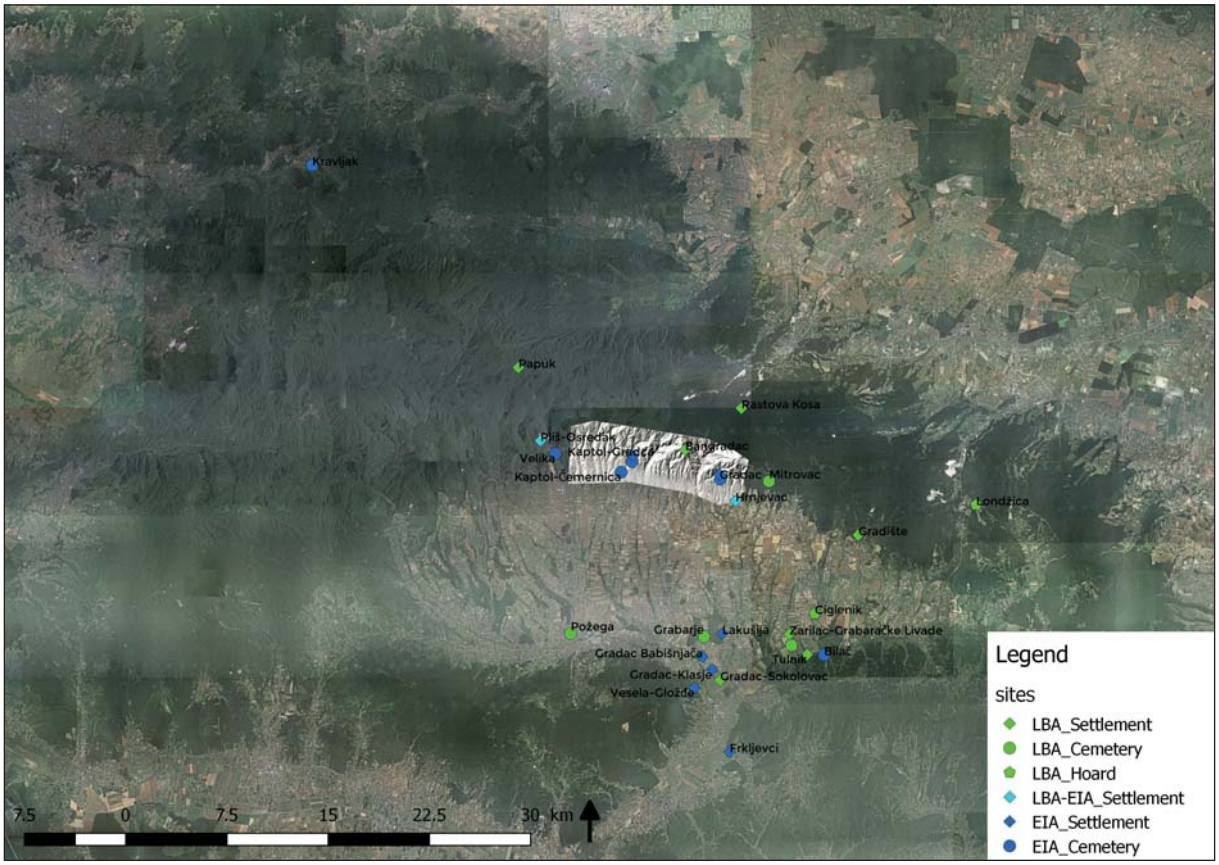

Fig. 12: Distribution map of Late Bronze and Early Iron Age sites in the Požega Valley (image: M. Rakvin)

and inorganic matter, ranging through soil, plant, pottery, metal and bone remains. For the time being, the working model of the settlement dynamics in the Požega Valley refutes the single-centre (with several satellites) hypothesis and goes in the direction of a polycentric model. The model proposes that the entire area of the Požega Valley should be regarded as an important and dynamic hub within the superregional communication network of Iron Age communities, where Kaptol, although important and distinguished, is just one of many centres in the region.

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Before and after: investigations of prehistoric land use in relation to the Early Iron Age settlement and tumulus necropolis on the Érd/Százhalombatta-plateau

by Zoltán Czajlik, Eszter Fejér, Katalin Novinszki-Groma, László Rupnik, András Bödőcs, Rebeka Gergácz, Balázs Holl, András Jáky, Géza Király, Gabriella T. Németh, Sándor Puszta and Bence Soós

Abstract
Located on the fringes of the Eastern Hallstatt culture, the tumulus cemetery at Érd/Százhalombatta is one of the earliest identified archaeological sites in Hungary. The first map of the site was drawn in 1847; the number of mounds registered at the time (122) did not change substantially until the end of the 20th century. The aerial archaeological investigations from 2001 and the magnetometer geophysical survey from 2012 led to the identification of another 103 ring ditches. In the framework of the Iron-Age-Danube project aerial archaeological and geophysical research were continued and complemented with systematical field walkings. Not only the Early Iron Age tumulus field but also the Iron Age settlement area was investigated. The results presented in this paper aim at giving an overview on the land use in the periods of the Bronze, Iron and Roman Ages.

1. Introduction

The area around Százhalombatta has been known to archaeological research for a long time: the fortified Bronze Age tell-settlement, the Early Iron Age tumulus cemetery, the Celtic fortification, the Roman road and *castellum* are emblematic archaeological features/peculiarities of the region. Over the past decades several macro- and micro-scale investigations have contributed to our knowledge on the occupation of the area.[1]

The expression *százhalom* ("hundred mounds") in the name of the town of Százhalombatta is attested in the form *Zazholm* at a fairly early date, around 1283, in Simon Kézai's chronicle, one of the most important medieval historical sources of Hungary.[2] Its Latin counterpart, *centum montes*, appears even earlier, in another early medieval chronicle, the *Gesta Hungarorum* of the Anonymous Notary.[3]

The Érd/Százhalombatta tumulus cemetery (*fig. 1*) lies south of Budapest, in a loessy area with a relative altitude of 100 m flanking the western Danube bank, north of the Benta stream, the largest watercourse of the area flowing into the Danube. Due to the bend of the river the Danube slightly cuts into the plateau, thus the area between the water and the plateau is not suitable for regular land traffic. In the

[1] Hungarian Archaeological Topographic Survey (MRT) (Dinnyés et al. 1986), the Százhalombatta Archaeological eXcavation Project (SAX) and the Benta Valley Project (Poroszlai 2000; Poroszlai/Vicze 2000; Poroszlai/Vicze 2005; Earle et al. 2010) investigated the archaeological remains of the region. The latter project focused primarily on understanding the Bronze Age network system in the Benta valley.
[2] Szentpétery 1937, 149.
[3] Szentpétery 1937, 95.

Fig. 1: Érd/Százhalombatta Early Iron Age tumulus field. Aerial view from north (Zoltán Czajlik, April 27, 2018)

past 230 years, the road along the Danube surely did not lead up to the plateau, avoiding this difficult section. The tumuli are located roughly parallelly to the river in a north/south and northwest/southeast direction; earlier surveys indicated that the site extended across a circa 50 ha large area measuring 1200 m × 400 m, which was declared as a protected archaeological monument.

2. Previous research

Topographic research on the imposing burial mounds known to the medieval chroniclers, who used them as a setting for various events of the Hungarian Conquest period, began some 170 years ago, when János Varsányi prepared the topographic map of the tumulus cemetery in 1847 (*fig. 2*).[4] His map depicts 122 tumuli, the location of which correlates surprisingly well with the mounds recorded during the survey conducted by Dénes Virágh and István Torma around 140 years later, who identified 123 barrows. Their map, the tumulus numbers of which has been used ever since, was based on an aerial photograph made in 1953.[5] Although the aerial archaeological investigation of the well-known site lying fairly close to Budapest

[4] Luczenbacher 1847, pl. 5.
[5] Dinnyés et al. 1986, 228–231.

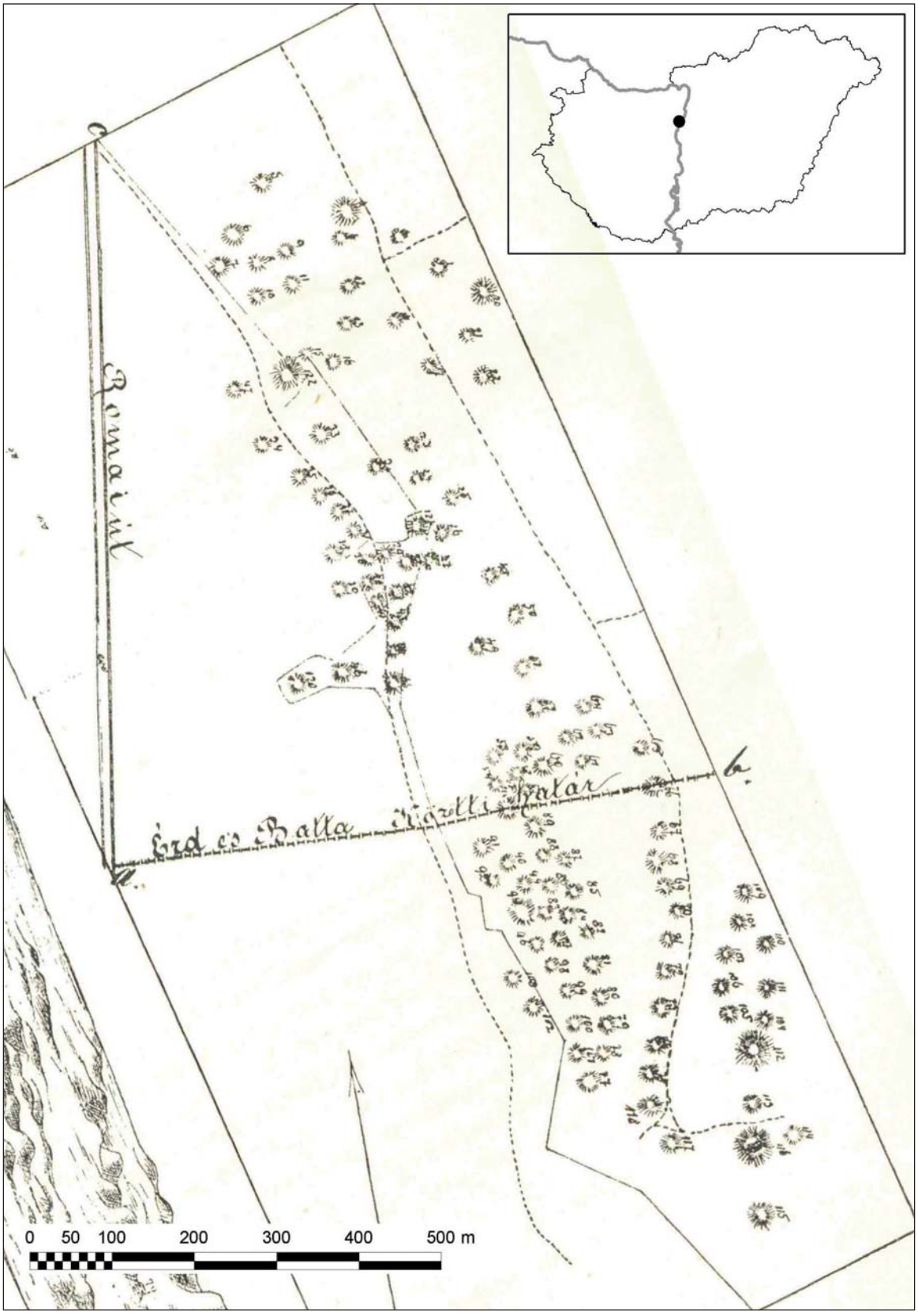

Fig. 2: The tumulus field on the 1847 map of János Varsányi (Balázs Holl)

Fig. 3: Tumulus 120 and its environs. Aerial photo of René Goguey (June 6, 1993)

has begun quite early, before World War II, the photos made by István Gersi in May 1934 were soon forgotten. D. Virágh and I. Torma were unaware of their existence at the time of their survey; the pictures have only been recently identified among the records kept in the Hungarian National Museum.[6] The area south of the tumulus cemetery was not built in at the time these photographs were made. Thus it was expected that the remains of possible additional tumuli would be visible – however, there were no soil marks or other features to indicate their presence.

Although several photos were made of the tumulus cemetery as a part of the Hungarian-French aerial archaeological project (*fig. 3*),[7] a systematic investigation only began in 2001, as part of a research collaboration between the Institute of Archaeological Sciences of the Eötvös Loránd University in Budapest and the Matrica Museum of Százhalombatta. The possibility that there were other archaeological features in the cemetery in addition to the already known burial mounds and their remnants were first conjectured during this project.[8] A few burial mounds of the tumulus cemetery were opened under the direction of the historian István Horváth before 1843; later, in 1847, János Luczenbacher (Érdy) excavated four tumuli.[9] In May 1866 Flóris Rómer investigated Tumulus 120; in 1872 Gyula Kereskényi opened two

6 Holl/Czajlik 2013, 27., fig. 2.
7 Goguey/Szabó 1995, 20., fig. 65.
8 Czajlik 2008.
9 Luczenbacher 1847.

mounds, and four years later, in 1876, another two mounds were explored by Elek Csetneki Jelenik.[10]

Between 1978 and 1996 Ágnes Holport conducted the salvage excavation and systematic research investigation of eight tumuli: in the case of Tumulus 118, she identified the traces of the 19th century excavation. It proved impossible to conclusively determine whether the other seven tumuli unearthed in the southern part of the cemetery had been studied previously;[11] it would appear that roughly 18 burial mounds had been opened during the 19th–20th centuries. However the investigation of the tumuli did not mean their complete excavation: in the 19th century, a trench cutting across the entire mound was only opened in the case of Tumulus 120, while the field documentation from the 20th century[12] indicates that with the exception of Tumulus 115, the investigations focused on the central part of the mounds. In summary, this means that we have information on the structure of not more than 15% of the known mounds and that this information is essentially restricted to the central burial zone.

Not all of the mounds have been raised over a wooden burial chamber; if there was one, it was usually constructed on a 4-5 m × 4-5 m large clay floor. Stone rings were often observed around the burial chamber, although these could equally well be interpreted as the remains of the stone packing once covering the burial chamber.[13] The remnants of a low bank preserved to a height of 0.7 m which once encircled Tumulus 115 were documented during the modern excavation;[14] however, no ring ditches enclosing the tumuli were observed in the case of the vanished tumuli and neither do the excavation reports mention other possible features between the mounds.[15]

3. Methodology

The area of the Érd/Százhalombatta tumulus cemetery is owned by several persons, who typically possess small fields, utilised variously: as ploughland, orchards and gardens. This means that the investigation of the area can only be conducted in several successive phases across smaller fields only, which are explored at a time when conditions are more suitable for that particular area (*fig. 4*).

In the framework of the Hungarian-French aerial archaeological cooperation, and later in connection with our own research programs, aerial photographs were regularly taken of the mosaic-like cultivated area. The first geophysical surveys were conducted between 2012 and 2014 thanks to them and to aerial photography, the number of tumuli known from the necropolis area increased by 103 mound-traces.[16] The aggregation of the new data on the one hand increased the area of the cemetery, but on the other hand it rebutted the earlier idea of dividing the cemetery

[10] Dinnyés et al. 1986, 230.
[11] Holport 1996.
[12] Holport 1985.
[13] Holport 1996, 40–41.
[14] Holport 1996, 40–41.
[15] Holport 1986; Holport 1996.
[16] Czajlik et al. 2016, 65.

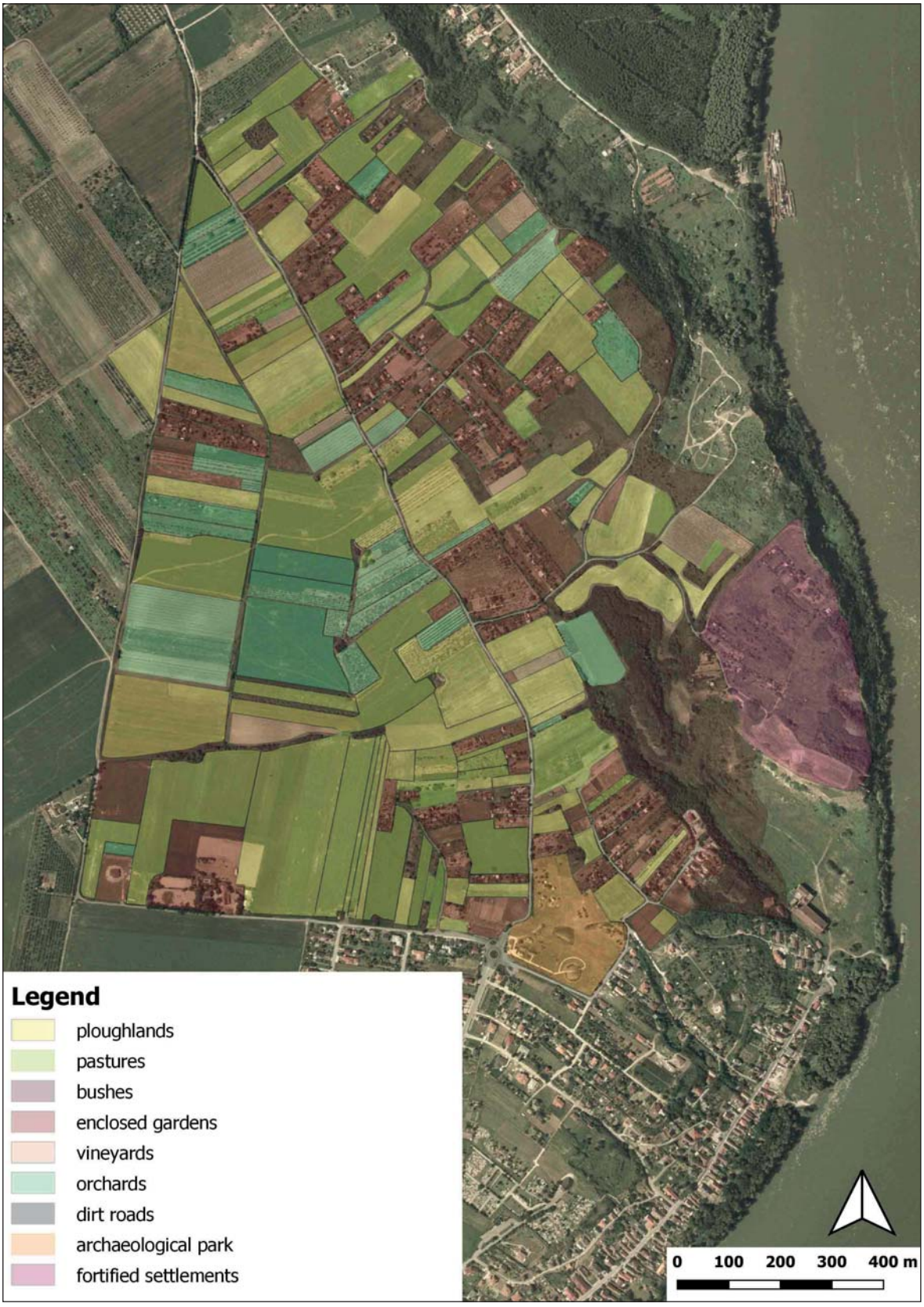

Fig. 4: Types of surface covers on the Érd/Százhalombatta plateau (László Rupnik)

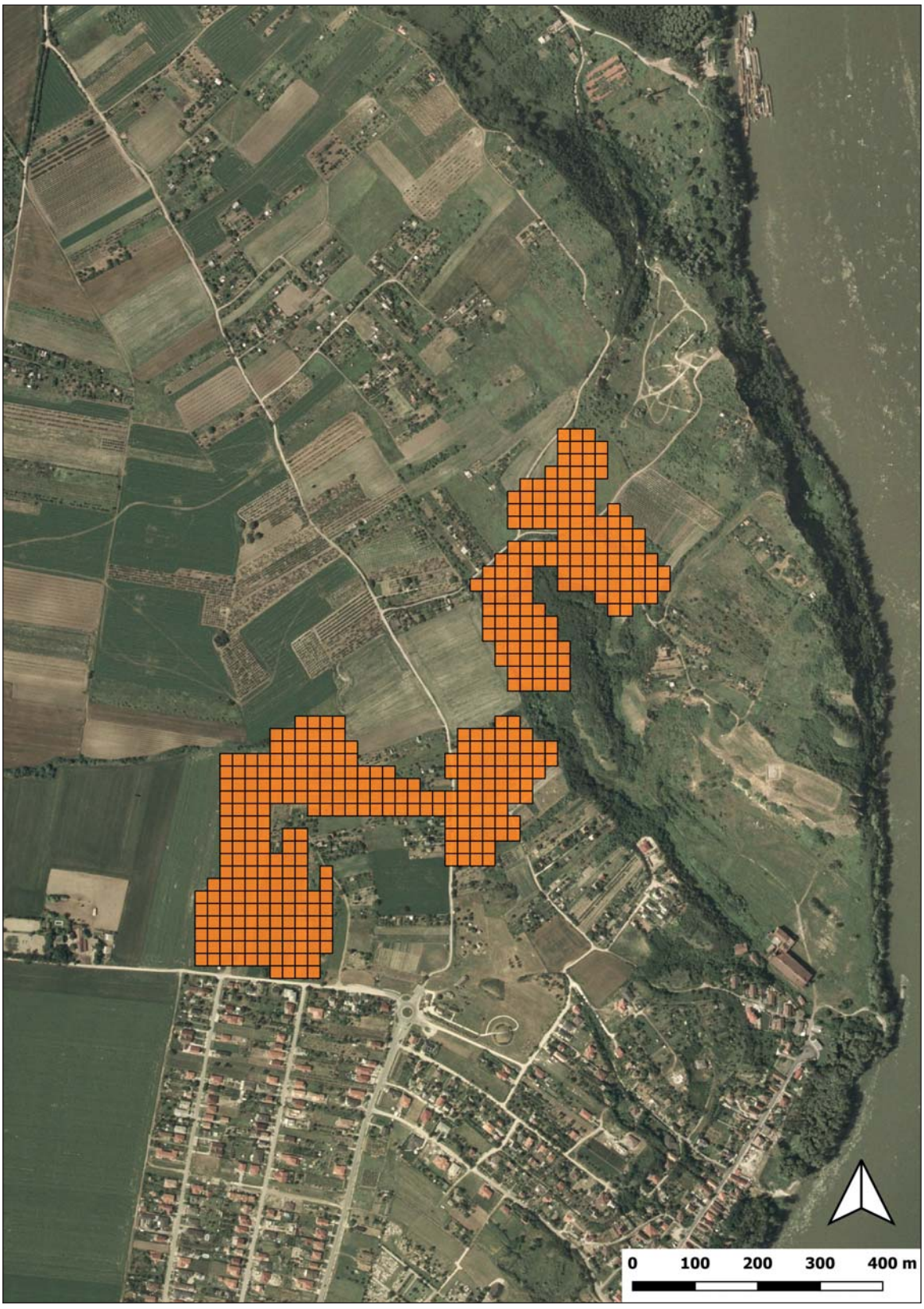

Fig. 5: Systematic grid walkings on the southern part of the Érd/Százhalombatta plateau (László Rupnik – Rebeka Gergácz, 2017–2018)

into two parts. In parallel with the topographic research, the Tumulus 64 and 49 were investigated with test excavations in 2013–2016.[17]

In the framework of the IAD programme, the aerial photographical activity was continued, based on which the magnetometer surveys were extended to new zones. Until February 2019 aerial archaeological photography took place 12 times, and magnetic mapping reached 50 ha in 30 working days between 2017–2018. In 2017–2018 systematic grid walking survey was carried out 6 times, on a total of 17.54 ha (*fig. 5*). Their main purpose was to gain more information about the southern edge and the eastern side of the tumulus field, furthermore about the settlement area connected to it, which are more difficult to survey with the above mentioned methods.

For the timing of our research, we had to constantly adapt to the current state of the diverse cultivation areas, looking for ideal time windows not only for aerial photography (clean air, good lighting and vegetation conditions), but also for magnetometer surveys (low noise, preferably non-ploughed areas, orchards in leafless periods) and field walking surveys (outside the vegetation period, under good prospection conditions).

In connection with field work, we reviewed the First (1763–1787), Second (1806–1869) and Third (1869–1887) Military (or Land) Surveys of the Habsburg Empire, and a 330 ha terrain model based on the ALS in 2017 of the Érd/Százhalombatta loess plateau. We conducted additional/experimental drone flights and gathered data about the Bronze, Late Iron and Roman Age topography of the area.

In order to understand the formation of the Early Iron Age monumental landscape and land use after the abandonment of the tumulus cemetery, a diachronic (that is, to analyze not only the topographical relations of the Hallstatt necropolis, but also the settlement and burial conditions of the periods before and after the Hallstatt period) approach is necessary.

4. Bronze Age antecendents

The earliest prehistoric remains in the area belong to the Early Bronze Age. EBA Nagyrév type material has been attested in the first layers of the Földvár tell settlement situated on top of the loess plateau.[18] In this period only a small settlement was established on the hilltop, and as the results of the Benta Valley Project suggest, the area adjacent to the tell also had a low population density.[19] The material collected during our systematic topographic survey does not allow us to safely outline the scope of the EBA site, since the heavily fragmented pottery of Nagyrév and Vatya style are very similar and difficult to distinguish from each other.[20] Based on our investigations carried out outside the Iron Age fortification we can agree on a restricted distribution area of the EBA settlement. It has been assumed that the EBA people had not only

[17] T. Németh et al. 2016.
[18] Kovács 1969; Poroszlai 2000.
[19] Earle/Kolb 2010, 72; Artursson 2010, 104. The estimated territory of the EBA site is around 2 ha.
[20] Cf. the method of the Benta Valley Project: Earle et al. 2011.

used the natural protection of the hillside but they had already built an enclosure around their occupation area.[21]

The tell site had been continuously settled until the end of the Middle Bronze Age. The transition between the layers characterized by Nagyrév and Vatya type archaeological material was uninterrupted. The largest part of the multi-layer site was accumulated during the MBA. In this period the settlement was fortified with a ditch and a rampart. A part of the Bronze Age fortification ditches could be identified during the exploration drilling by András Varga.[22] Based on this research and on the part of the fortification that can be observed on the surface today it is an approximately W-E oriented ditch running towards the loess wall sloping into the Danube on the east. Its W/NW section cannot be traced due to a brickwork quarry. According to Varga's examination on the topography of the subsoil, not only the above mentioned ditch, but also a palisade wall can be reconstructed. Furthermore, he was the first, who also draw attention to the earlier inner ditch, presumably used by the first inhabitants of the site. Using the results of the morphological survey Magdolna Vicze and György Füleky tried to clarify the extent and the geomorphological structure of the Bronze Age settlement.[23] It became clear that the brick factory established at the end of the 19th century in the vicinity of the tell destroyed at least two-thirds of the prehistoric site. Therefore our aerial archaeological research conducted since 2001 was limited to the present southern edge of the plateau, which was originally the northern part of the Bronze Age settlement. For this reason to study the former extension of the site we have to rely on old surveys and maps. Based on the Second Military Survey (1869) it can be stated that the possible southernmost boundary of the prehistoric settlement(s) was aligned with a network of gullies, in which the modern brick factory started to extract clay and subsequently the whole area became one large quarry and field (*fig. 6*). The fortified section was around 2.5 ha, but based on the distribution of the collected ceramic material the occupation spread north across another 3 ha – within the area which was enclosed later in the Iron Age.[24] The fact, that MBA settlement finds scatter in the area between the Iron Age rampart and the MBA fortification, and also in the territory north of the Celtic rampart was already known, but high density of MBA finds west from the long gully network could be identified only as the result of new systematical topographic research. In this recently discovered area mostly MBA and some LBA material was collected (*fig. 7*). Our investigations which focused on the area outside the Late Iron Age fortification were also able to define a further accumulation of MBA finds west of the tumulus cemetery. During our survey we discovered here a destroyed grave, parts of a vessel and small amount (ca. 30 pieces) of white cremated bones. Most of the bones belonged to the lower and upper limbs, but some remains of the skull were also described. The anthropological research proved that they are the cremains of a child (infans II, 8–14 years).[25] Contemporary

[21] Vicze 2005, 66–68.
[22] Varga 2000, 78., fig. 2, 5.
[23] Vicze 2001; Füleky/Vicze 2003; Vicze 2005, 67–68., fig. 3–4.
[24] Poroszlai 2000; Vicze 2005, 66–68; Artursson 2010, 107, cf. also Vicze et al. 2005.
[25] Anthropological analyses conducted by Mónika Merczi.

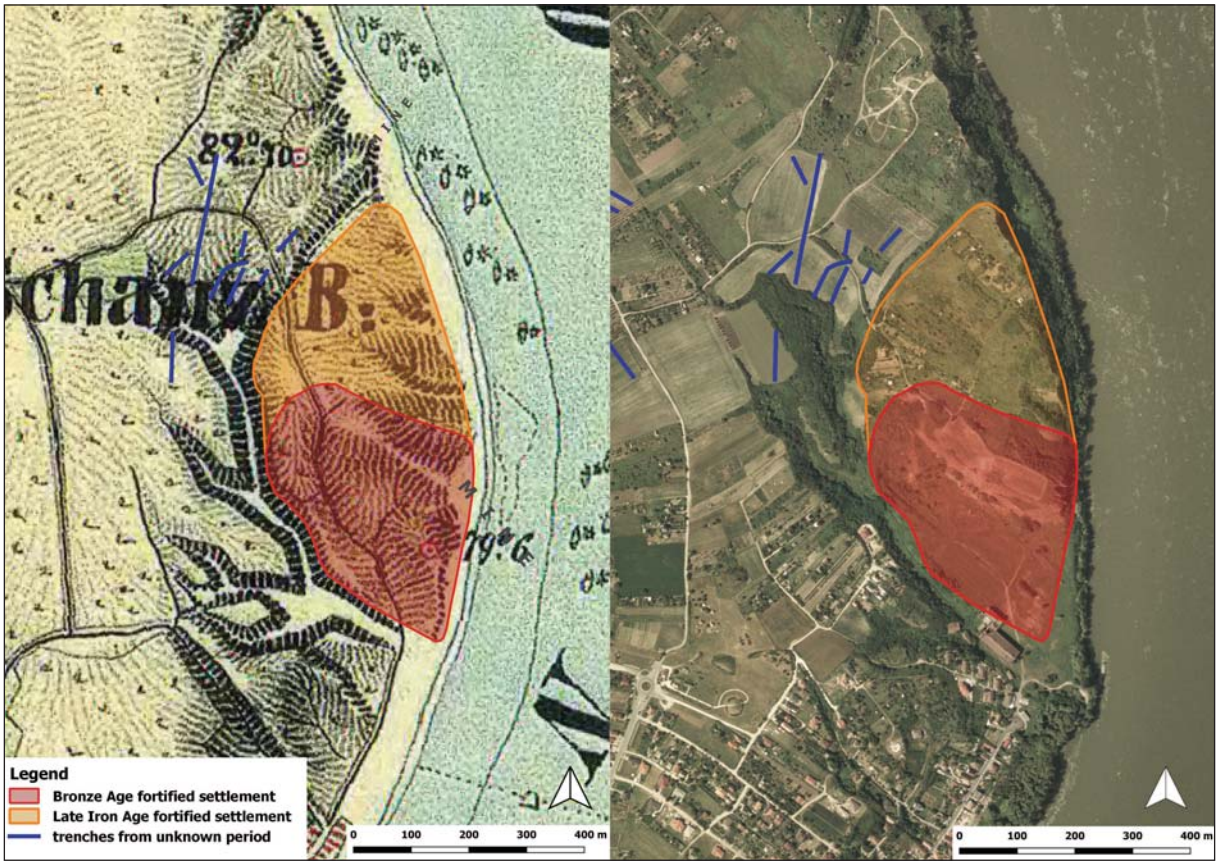

Fig. 6: Reconstructed extension of prehistoric settlements at Százhalombatta based on the Second Military Survey (Zoltán Czajlik – László Rupnik)

burials are barely known in the micro-region, but other elements (settlements) of a MBA network in the Benta valley are well known.[26]

After a 300–400 year long hiatus, the territory of the tell site was reinhabited during the Late Bronze Age in the Urnfield Period. Since the remains of this period were later destroyed by a Celtic settlement, only scatter finds and some excavated pits relate to this phase. The occupied territory reached over 7.7 ha, but seemingly it was less densely populated. Our survey has also proved the large extension of the LBA occupation: a huge amount of LBA ceramic was collected mostly northwest of the main Celtic rampart. In the territory of the tumulus cemetery some further finds dated to the LBA or EIA were detected. The northern zone of the distribution area of the LBA material approaches the nearest contemporaneous settlement and

[26] During the excavation of the Early Iron Age tumulus 74, a cremation burial of the EBA was unearthed in Százhalombatta (Holport 1980, 21). The grave we discovered is located just a few hundred meters away from the published burial, close to the EBA-MBA site of Százhalombatta-Tóth tanya (Dinnyés et al. 1986, 27/7; Vicze et al. 2005). Érd-Külső újföldek (Dinnyés et al. 1986, 9/3), Érd-Belső újföldek (Dinnyés et al. 1986, 9/4) are the nearest settlements (Dinnyés et al. 1986; Vicze et al. 2005; Earle/Kolb 2010, 71–76).

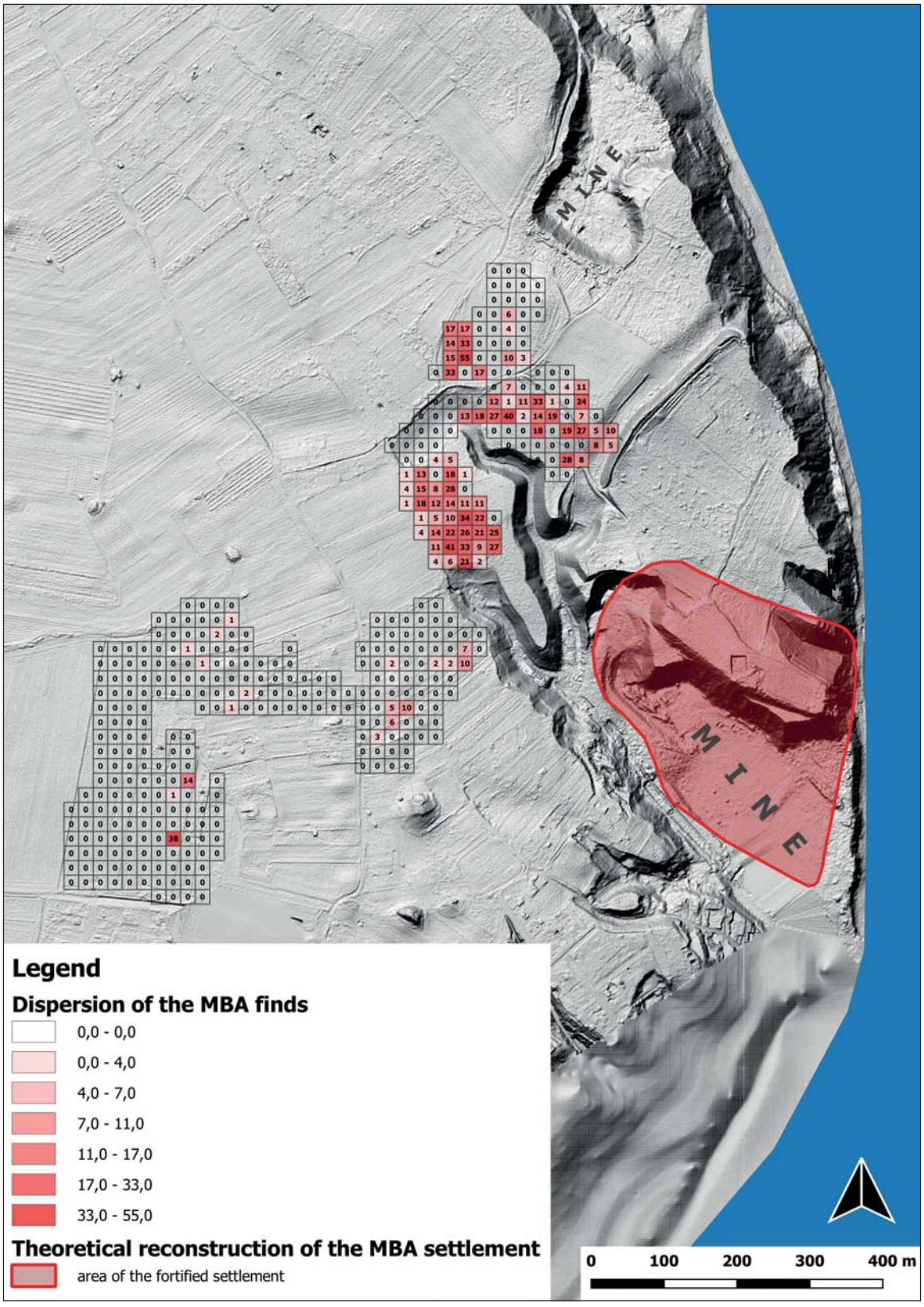

Fig. 7: Location of the MBA-settlement based on the grid collection (Rebeka Gergácz – Katalin Novinszki-Groma – László Rupnik)

cemetery of Érd-Téglagyár.[27] Other remains of the Urnfield Period are reported from several sites alongside the Benta valley.[28]

In summary, we can say that the inhabited zone on the top of the Érd/Százhalombatta plateau increased spectacularly during the periods of the Bronze Age and assumably it also affected the landscape use of the later periods as well. An important 'by-product' of our research was, that proving the previous presumptions we could identify the location of an EBA-MBA cemetery, which is situated at the edge of (and partially under) the later tumulus field.

5. Data for the reconstruction of the Early Iron Age landscape

Based on previous research, the Early Iron Age settlement was on the higher part of the plateau closed by ramparts. In the area of the clay extraction conducted by the brick factory, five Early Iron Age pits were discovered during the rescue excavations of Tibor Kovács and some further pits are known from the presently ongoing tell excavation.[29] The intensity and extent of the settlement are uncertain. The southern extension may be indicated by the bronze statuette found next to the former brick factory,[30] and Gabriella T. Németh collected ceramic sherds indicating an Early Iron Age settlement in the north, outside of the fortification as well. Early Iron Age finds are also present in the material collected in this zone during systematic field walkings (*fig. 8*). These settlement traces can also be followed in the west as far as the Middle Bronze Age antecedents. On January 25 in 2018, a trace of a trench situated north of, and running parallel to the Iron Age earthworks was recorded by aerial photography. Therefore, the magnetometer surveys have been extended to this zone. As a result, more traces of two or three (?) further ditches and/or ramparts in the same direction could be observed. The newly identified linear phenomena mostly connect to the long gully that borders the plateau in the west. Some of them have an uneven outline and irregular course of natural origin, while the regularity of others refers to artificial design. West of the trench systems, due to the enclosed gardens, neither geophysical measurements nor field walkings can be carried out. However, it cannot be ruled out that the western boundary of the prehistoric settlement zone was roughly the same since the Bronze Age, and that this area (which can be defined with approximately 50-100 m precision) is also the eastern boundary of the Early Iron Age tumulus field. Here again, the enclosed gardens make impossible the further research on this question. But, in addition, based on some aerial images, it is considerable, that there were lone burial constructs in this zone.[31] The southern edge of the cemetery can be drawn on the basis of the concordant data of aerial photography, magnetometer

[27] Dinnyés et al. 1986, 9/21 site. The extension of Érd-Téglagyár site and its relation to the LBA Százhalombatta-Földvár is less known, it could be the topic of further investigations.

[28] Based on the results of the Hungarian Archaeological Topographic Survey (MRT, Dinnyés et al. 1986) the closest sites are Érd-Külső újföldek (9/3), Érd-Belső újföldek (9/4), Érd-Országúti dűlő (9/7), Érd-Akácos-dűlő (9/10), Érd-Hosszú-földek alja (9/13), Érd-Simonpusztai-dűlő (9/16) (Dinnyés et al. 1986; Vicze et al. 2005; Earle/Kolb 2010, 76–77).

[29] Kovács 1963, 11; Poroszlai 2000; Poroszlai/Vicze 2004.

[30] Mozsolics 1954.

[31] Czajlik et al. 2017, fig. 3.

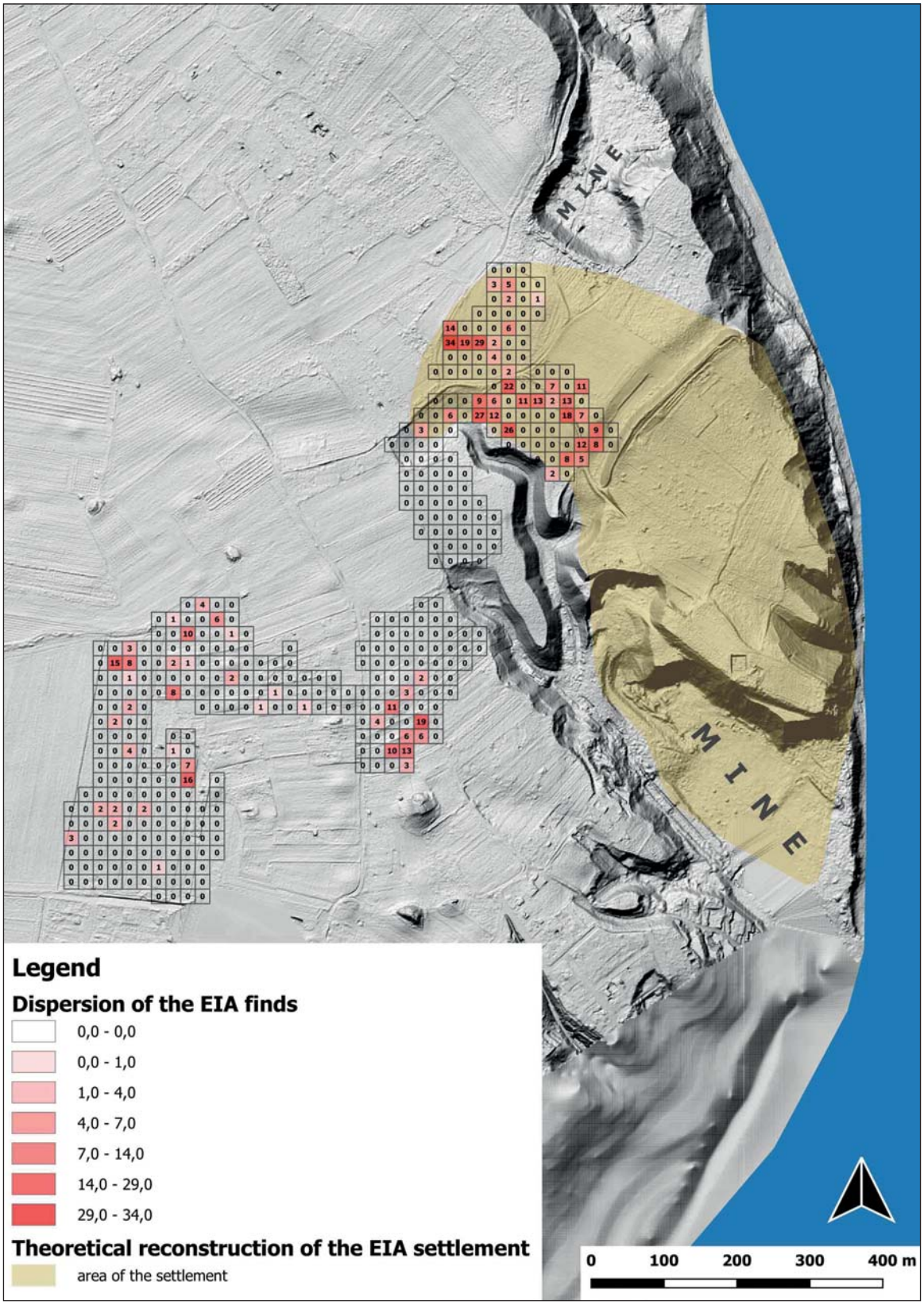

Fig. 8: Location of the Early Iron Age settlement based on the grid collection (Rebeka Gergácz – Katalin Novinszki-Groma)

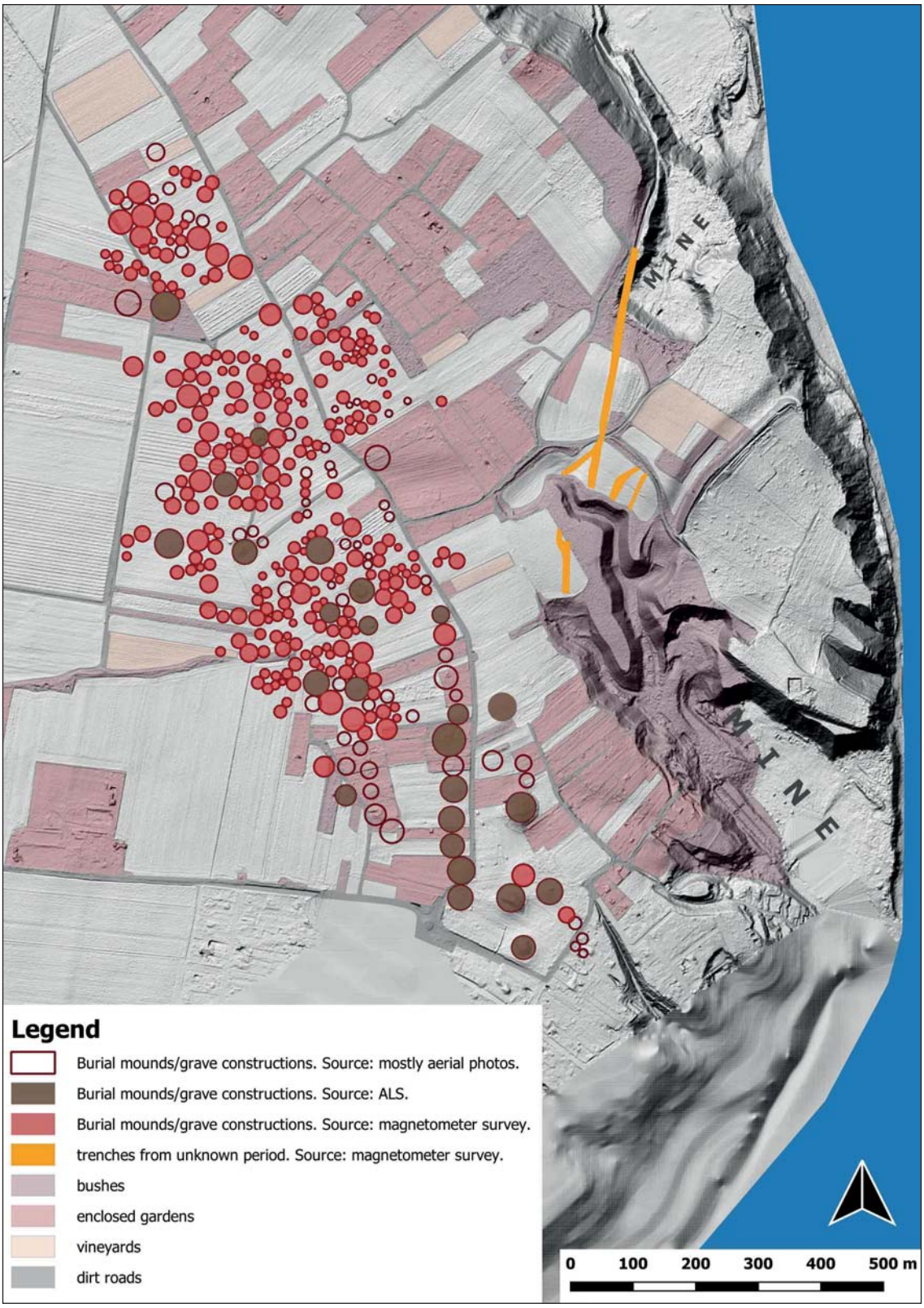

Fig. 9: Reconstructed map of the Érd/Százhalombatta tumulus field based on aerial archaeology, ALS and magnetometer geophysical surveys (Zoltán Czajlik – Géza Király – Sándor Puszta – László Rupnik)

surveys and systematic field walkings; essentially it coincides the northern line of today's urban boundary of Százhalombatta. The situation is even clearer in the west: with geophysical surveys, we have documented the lack of circular ditches indicating tumuli at several distant zones. This edge of the cemetery was noticeably adapted to the natural conditions, namely to an escarpment that can be easily tracked especially on the ALS model. The northern end of the necropolis can also be well determined by the results of aerial photography and magnetometer survey (*fig. 9*).

As a result of the mosaic surface cover, several smaller but important areas have been left out, whose magnetometer survey had to be postponed until the autumn of 2019. The systematic grid collection of surface finds should also be continued, extending it as far as possible, to all areas where the magnetic anomaly map is available or can be made in the future. It should be noted, that due to the mosaic surface cover, modern roads and electric lines, a complete measurement of the necropolis will not be possible in the future. Inevitably, there will be areas on which we can only get information from archive materials – mostly aerial photographs. In the quick evaluation of the raw anomaly map, compared to previous data and aerial photography, we have determined the number of circles referring to mounds in 365.[32] Although the anomaly map containing data processed from both geometric and geophysical points of view has been completed in the meantime, we also need to re-evaluate all aerial photographs in the next processing phase to produce a modern map of the site. Therefore, for this publication, we have created a map with only clearly visible circular structures in the magnetometer survey, supplemented by the mounds visible on the ALS survey, but not accessible by geophysical methods. On the map, these two data sources were marked with different colors, and the tumuli with a built burial chamber on the basis of magnetometer measurements (*fig. 9*).

It has been mentioned earlier that prior to the application of modern site detection methods, the tumulus field was divided into a southern, denser and a northern, more sparsely occupied zone based on visually observable and on the archive aerial photography of 1953 detected and assumed mounds. If we redraw the map of the necropolis based on the circular ditches visible on the aerial photographs and magnetometer anomaly maps, the above described grouping does not seem to be tenable. As indicated in our previous study,[33] the burial constructs were built not intersecting but relatively close to each other, and there are no spatial groups in the sense earlier studies suggested. At the same time, however, it is still acceptable – shown above all by the ALS survey – that most of the larger mounds are in the southern part of the tumulus field, and no trace of a mound with burial chamber north of Tumulus 120 can be observed. Comparing the ALS survey and the magnetic mapping, the observation of previous researchers, that the Iron Age visitors of the cemetery have been welcomed in the south by larger mounds, similarly as it is proved in other EIA tumulus fields (e.g. Sopron-Burgstall). Moreover, based on our data, it is also possible that the former road ran between two parallel rows of tumuli. For traffic within the densely-built necropolis a route along the same line as today's northwest-southeast road may have been required, which does not mean that other

[32] Czajlik et al. 2017, 350.
[33] Czajlik et al. 2016 .

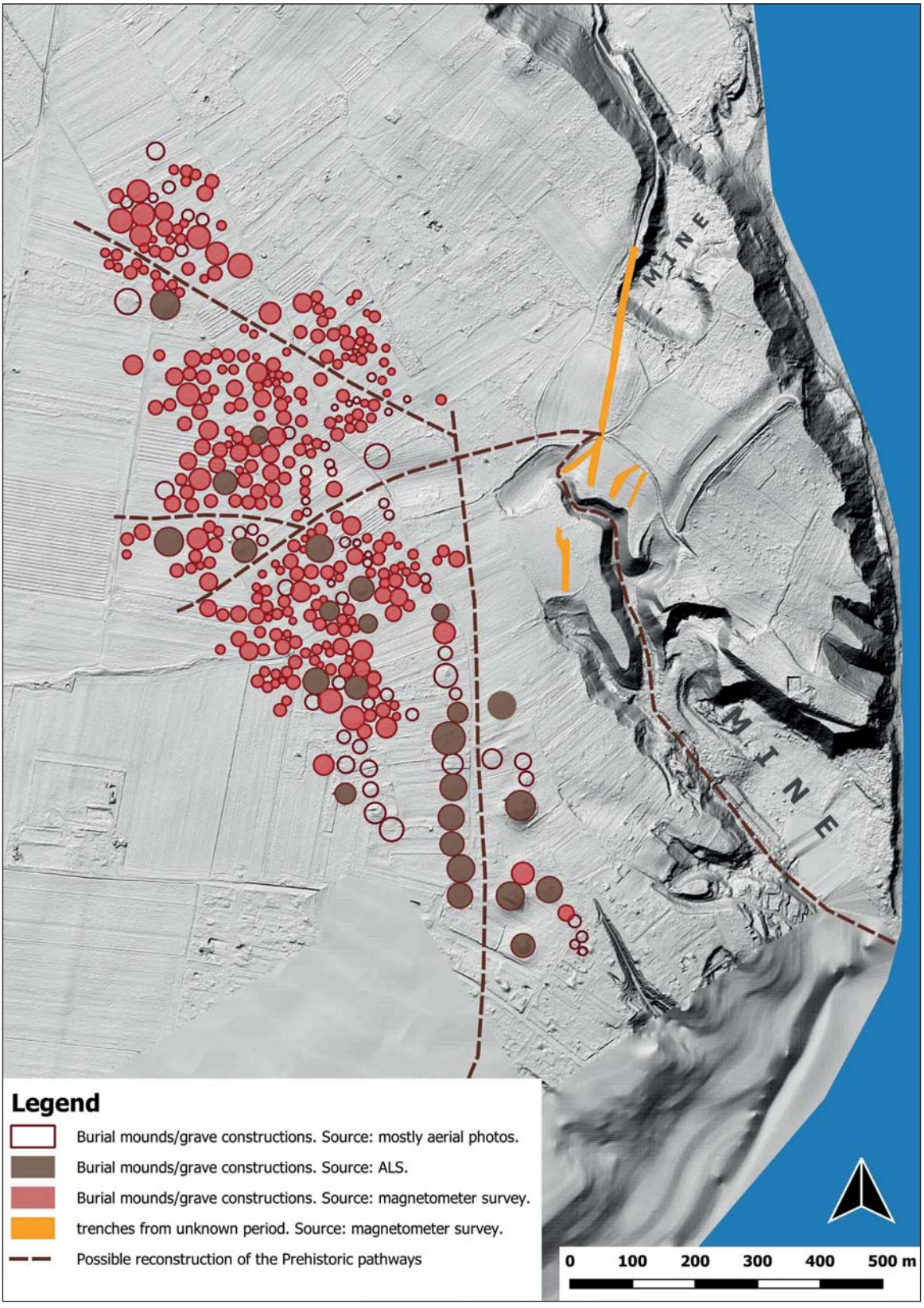

Fig. 10: Probable prehistoric paths of the Érd/Százhalombatta plateau (Zoltán Czajlik – László Rupnik)

(presumably smaller) paths could not have passed through among the tumuli. Due to the location of the gullies, which have largely delimited the settlement zone, it is likely that the tumulus field could have been connected to the settlement by a route similar to the current one. Finally, given that on the basis of previous maps the main gully system has reached the Danube, we cannot exclude that this natural route was used to provide the connection between the settlement, the cemetery and the river (*fig. 10*).

6. The presence of Late Iron Age landmarks

The northern part of Százhalombatta – Sánc is one of the most prominent and most undamaged Hungarian examples of the so-called *Fécamp*-type ramparts, which could be assigned to the Late Iron Age (*fig. 11*).[34] The fortification on the edge of the loess plateau is difficult to climb even in its present state; the gate is presumed to be from the direction of the ramp-way. Unfortunately, the results of both the old and more recent excavations are unpublished, so the classification of the hillfort as an *oppidum* is supported mostly by stray coins, an important stone statue head and painted pottery finds besides the spectacular rampart.[35] In 2017, we reconstructed the possible extent of the former Iron Age settlement based on the Second Military Survey

Fig. 11: The northen rampart of the Iron Age fortified settlement (aerial photograph by Zoltán Czajlik, November 27, 2017)

[34] Czajlik 2018, 95–96.
[35] Szabó 2005, 169.

or Franciscan Land Survey of the Habsburg Empire (1806–1869).[36] In the framework of the IAD project possible fortification ditches north of the *Fécamp*-type rampart have also been detected as a result of magnetometer geophysical surveys.[37] Although the age of the latter is still unclear, both data suggest that the former Late Celtic settlement could have been much larger than previously assumed, which reinforces the hypothesis of defining the fortified settlement as an *oppidum*.

7. Transition in the use of the landscape during the Roman Age

Due to their different interest and political structure the topographical setting of the area had significantly changed after the Roman occupation. The focus has moved from the higher loess plateau to the lower area south of the Early Iron Age site. The auxiliary fortress was built in the alluvial plain of the Danube south from the estuary of the Benta creek controlling the natural path towards the inner territory of the province (*fig. 12*). Owing to the excavations of Árpád Dormuth, András Mócsy and more recently Péter Kovács, the structure and phases of the camp can easily be reconstructed, despite the fact that in 1809 during the Napoleonic Wars the construction of ditches damaged the Roman ruins to a large extent (*fig. 13*).[38] The civilian settlement surrounded the camp on its western and southwestern and mainly on its northern side. The excavations concentrated chiefly on the northern part, and revealed several stone buildings, a bath and a *mansio* with a bath.[39] One of the cemeteries of the settlement is located along the limes road running to the south. During and prior to construction works 213 burials of the biritual graveyard possibly consisting of more than a thousand graves have been unearthed.[40] After its brightest period during the 2nd–3rd centuries, the civilian settlement was gradually abandoned, and those who remained moved within the fortifications. It is very likely that both the settlement and the camp were exposed to floods of the Danube, since during the excavations possible traces of inundations were documented. Furthermore, A. Mócsy even assumed based on his observations during the excavation of the *vicus* that the Romans endeavoured to defend themselves by building dams and ramparts.[41]

Beside the *castellum* and the surrounding *vicus*, the limes road was the other remarkable component of the Roman landscape. From our point of view the section connecting the fort of Campona (Nagytétény) and Matrica (Százhalombatta) claims particular attention. Recently, several authors touched upon the questions regarding the track line and possible traces of the *limes* road, also summarizing the results of the

[36] Czajlik et al. 2017, fig. 4.
[37] Czajlik et al. 2017, fig. 6.
[38] Mócsy 1955; Kovács 2000. About the investigations of the auxiliary fort including the assessment of old maps and aerial photos: Kovács 2000, 8–12; Kovács 2003, 109–111; Visy 2000, 62–65; Visy 2011, 74–75.
[39] Mócsy 1955; Topál 1972, 48; Topál 1973, 38; Topál 1975, 36–37; Dinnyés et al. 1986, 235–237, 27/7; Kovács 2003, 111.
[40] Topál 1981.
[41] Mócsy 1955, 59–60.

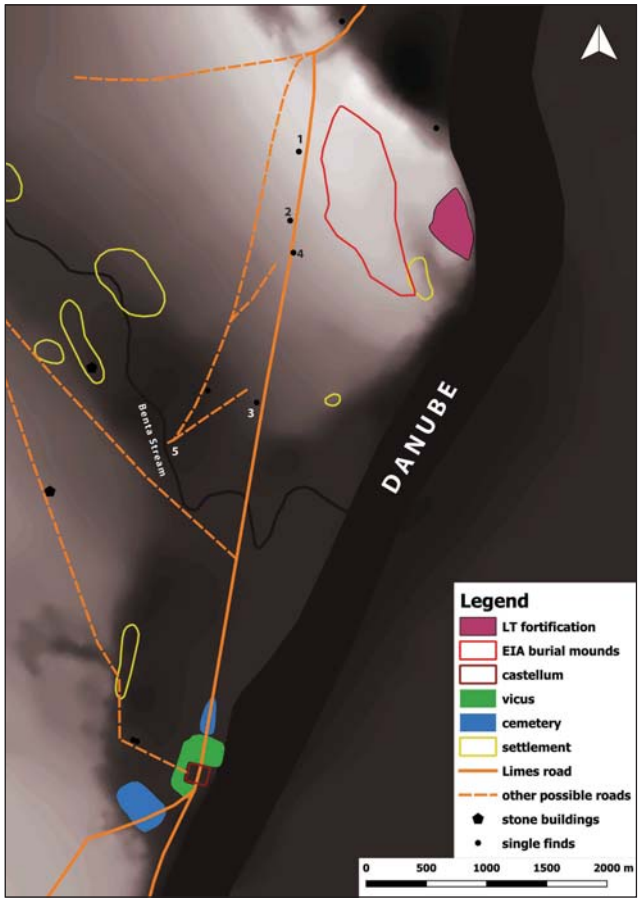

Fig. 12: The elements of the Roman landscape (László Rupnik)

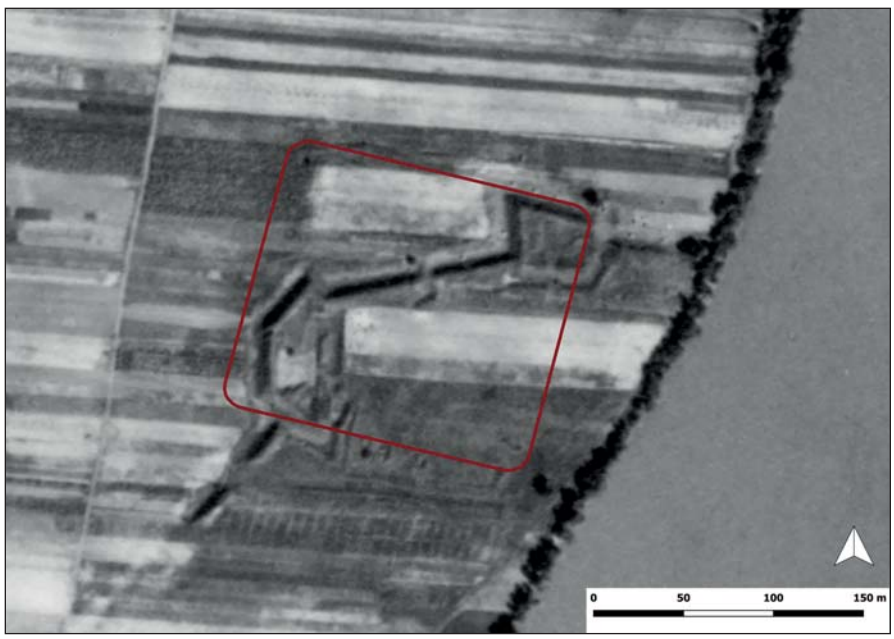

Fig. 13: The area of the Roman castellum with the traces of the Napoleonic Wars fortifications in 1955 (source: Military History Museum 35672; László Rupnik)

investigations in the last 150 years.[42] The road reached the area in question presumably through Érd-Ófalu, where it climbed upon the loess plateau in a gully presently called Római út ('Roman road'). It was a general belief that the stone pavement still clearly visible might originate from Roman times, however, in light of recent investigations, this assumption can be firmly rejected.[43] Based on old aerial photographs, the Roman road runs through the side of the actual gully, as due to the erosions of the last two millennia, it reaches the plateau farther to the west.[44] Farther away a track branches off the main road and runs to the south along a still used pathway, along which, based also on old aerial photographs Zsolt Visy would identify three watchtowers (*fig. 12, 1–3*).[45] Further evidence that would prove their existence, however, has not yet been found, even despite the fact that our geophysical prospections have reached the area of the northern tower. Furthermore, the existence of the assumed watchtowers on the edge of the plateau near Érd-Ófalu and within the prehistoric fortification of Százhalombatta,[46] respectively, is also still questionable. The road itself, however, is either detectable by our prospections or perhaps still visible at some points. Near the so-called Stich-tanya Máté Szabó succeeded in finding it with a small excavation and managed to date it beyond doubt to the Roman Period.[47] Earlier three pieces of a milestone had come to light in the close vicinity (*fig. 12, 4*).[48] This section of the road bypasses the tumulus cemetery along its western border in order to avoid the uncomfortable and uneven surface. Similarly, old georeferenced aerial photos help us identify further parts of the road. Based on these, it runs straight to the northern gate of the camp of Matrica. The structure of the road was archaeologically investigated at several points within the area of the *vicus* situated north of the camp.[49] There is another track visible on aerial photographs and old maps running west of the road which reaches the plateau at Érd. This one can be clearly traced as far as the bridge over the Benta creek within the territory of today's Százhalombatta. According to common belief, this bridge originates from Roman times, but neither this nor the post road leading to it could not have existed before the 18th century. Nevertheless, it cannot be ruled out that this tradition has some real foundation and there might have existed here a track branching off the *limes* road (*fig. 12, 5*).

Conclusion

Looking at the first two thousand years of nearly 4000 years of land use on the Érd/Százhalombatta plateau, we can come to interesting conclusions. Although not a novelty, but it is important to emphasize that extreme stability can be detected in the use of the settlement zone. From the Early Bronze Age, sometimes with larger

[42] Dinnyés et al. 1986, 102–103, 9/25; Dinnyés et al. 1986, 240–241, 27/10; Visy 1978; Visy 1981; Visy 2000, 60–65; Visy 2003, 64–65, fig. 82–85; Bödőcs 2008, 152–154, 167–168; Kovács 2007; Varga 2016.
[43] Mráv 2003, 134.
[44] Visy 2000, 61, fig. 84; Visy 2003, 65, fig. 84.
[45] Visy 2000, 61–62, fig. 85; Visy 2003, 65–66, fig. 85.
[46] Vicze/Nagy 2003, 14.
[47] Szabó 2014.
[48] Dinnyés et al. 1986, 103, 9/25.
[49] Mócsy 1955, 60.

breaks, but for nearly two thousand years people are settled on the same plateau along the Danube due to its favourable (a closed area in suitable dimensions) and despite its possibly unfavourable (access to the water is still in question) givens. The largest expansion of the settlement was reached in the Middle Bronze Age and the Late Iron Age, while the Early Iron Age settlement does not seem to be extremely intensive on the basis of the research at hand. Compared to this relative continuity and the special situation in all eras, it is a major change that after almost two thousand years, the Roman settlement was established 4.5 km away from the antecedents, in a not naturally protected area, but also much lower, closer to the bank of the Danube.

Although the significance of the Early Iron Age settlement may be smaller than in the earlier and subsequent periods, the landscape transformations related to the necropolis – which seems to belong to a rather short (maybe three or four generation) period, but covers the largest area (at least 60 ha) – are rather notheworthy. This landscape transformation is not only extensive but long-lasting as well: after an approximately 400-year break, the Celts, who settled on the eastern edge of the plateau, inevitably used the existing features. Not only the location of the settlement, but also its approach was similar to that of the Bronze Age and the Early Iron Age. In the Roman era, with the creation of the limes road, this relationship system has also changed; the new route bypassed the nearly 80 hectares of the prehistoric landscape of visible mounds and earthworks, running west of it at the edge of the tumulus field.

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Traces of prehistoric land use on the Süttő plateau

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Abstract

According to recent research, the Early Iron Age settlement and cemetery complex situated on a loess plateau above the Danube river in the western vicinity of Süttő, in northeastern Transdanubia, can be interpreted as a complex landscape used in various ways during several prehistoric eras. Excavations on the first half of the 20th century concentrated more on the research of the tumulus field. In the 1970s and 1980s, thanks to the efforts of Éva Vadász and Gábor Vékony a further tumulus, the fortified settlement of the Nagysánctető as well as most part of the Early Iron Age flat cemetery came to light. This study summarizes the results of the research conducted in the framework of the Iron-Age-Danube programme, which started in 2017. Beside aerial archeology, geophysical surveys, field walkings and sediment drillings, trial excavation also added precious new data on the diverse uses of the landscape by the communities inhabiting different parts of the plateau in several prehistoric eras (Early, Middle and Late Bronze Age, Early and Late Iron Age). On-site procedures were complemented by laboratory research (examination of ceramics, metal objects, bone and stone material, botanical remains), which contributed to our knowledge on the prehistoric use of natural resources in the area.

1. Introduction

Our first field walkings took place on the Süttő plateau nearly 10 years ago. These activities – more like field trips – served the purpose of familiarizing a new generation of students and researchers with this large-scale site complex, formerly explored by Éva Vadász and Gábor Vékony, who, unfortunately, can no longer be consulted on the matter.[1] The archive photographic material, which can be considered as a forerunner of the regular archaeological aerial photography started in 2013, was only used in the study of the Roman border and the *limes* road; the geophysical research that began in 2014 had no precedent. Thanks to this preliminary work and our joint field training with researchers from the Institute of Archaeology at the Hungarian Academy of Sciences, Gábor Serlegi and Bence Vágvölgyi, we gained more and more complex information on the basis of which we proposed the area to the Iron-Age-Danube programme. Since 2015, our results are continuously presented at

[1] One of these students was Katalin Novinszki-Groma, who currently processes the results of their excavations in the framework of her doctoral thesis.

conferences, [2] published in preliminary reports,[3] in thematic volumes,[4] as well as in our methodological[5] and promotional[6] publications.

The aim of our study is to present the geographical background, the history of research, the applied methodology, the Early Iron Age landscape use and its antecedents and descendants, as well as the exploitation of landscape resources.

2. Geographical background (*fig. 1*)

The Early Iron Age settlement complex (Süttő – Nagysánctető, Nagysánc), with associated cemeteries (Sánci-dűlő, Sáncföldek) were established on the top of the loess plateau next to the Danube. Discussed in detail in our previous publications, there were two settlements on the loess plateau cut up by gullies, sloping into the Danube (the fall is approximately 40 m), and the necropolises were further south.

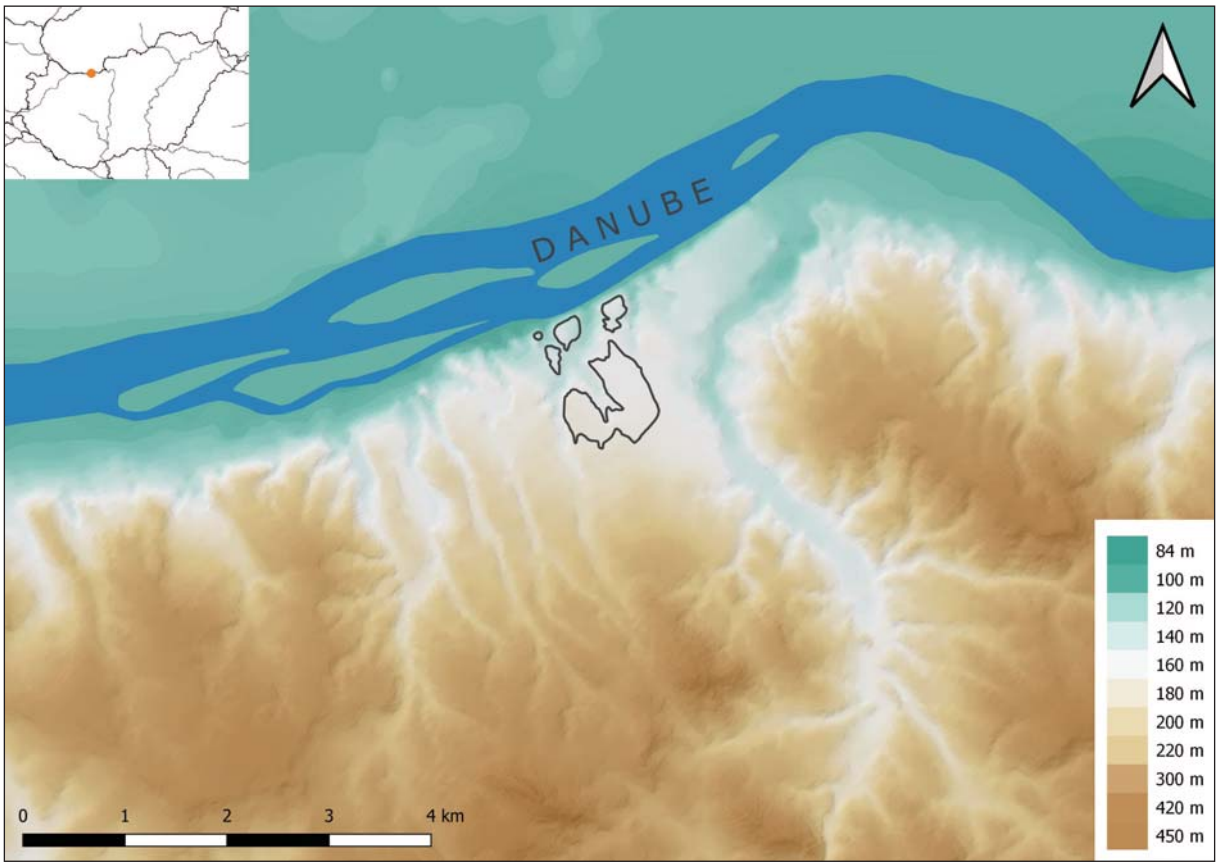

Fig. 1: Geographical location of the Süttő micro-region (László Rupnik)

[2] Novinszki-Groma 2017a; Czajlik et al. 2019.
[3] Czajlik et al. 2017; Czajlik et al. 2018.
[4] Czajlik et al. 2015; Novinszki-Groma 2017b; Novinszki-Groma 2018.
[5] Bödőcs/Rupnik 2019; Bödőcs et al. 2019; Czajlik/Doneus 2019.
[6] Bödőcs/Rupnik 2018a; Bödőcs/Rupnik 2018b; Czajlik 2018; Czajlik/Puszta 2019; Czajlik/Király 2019.

The part of the plateau near the Danube was split into blocks separated by deep gullies due to the suffosion of the loess, making them a naturally protected place for settlement. The series of loess plateaus, which can be followed from Dunaalmás to Tát, are bordered by hills from the south, and the Neszmély – Süttő section by the Gerecse mountain range, which reaches here 450 m high.[7] While the right bank of the Danube is characterized by a bluff and hills, the left bank, belonging to Slovakia, is an almost flat, alluvial plane with traces of former river beds in the section between Virt (Vért) and Kravany nad Dunajom (Karva). Several major islands (for example the Mocsi Island) are located in this part of the Danube. These topographical conditions made the formation of a unique micro-region possible.

The current vegetation cover of the cut-off part of the plateau next to the Danube is varied with deep gullies as well as the westernmost loess block covered with dense bushy forest. The sides of Nagysánctető and Nagysánc are also overgrown with vegetation, but their top is used as a meadow. In the southern part of the plateau, partially split by a prolonged gully (Sánci-dűlő, Sáncföldek), grain monoculture is cultivated, which is crucial for the organization of research.

3. Research history

While part of Transdanubia's significant Early Iron Age tumulus fields (such as Érd/Százhalombatta and Nagyberki – Szalacska) became internationally known from the 19th century topographical summary of Flóris Rómer,[8] the tumuli of Süttő were first introduced to the European research only by the comprehensive paper of Ferenc Tompa[9] in the mid-1930s. Although Süttő is often mentioned in international literature due to the burial mound excavated by Éva Vadász in 1978–1982,[10] the research history and topographical conditions of the site complex are lesser-known to researchers.

The first systematical topographical study of the Süttő site was carried out in 1968–1971 by István Horváth and István Torma in the framework of the Archaeological Topography of Hungary. In addition to the identification of some of the tumuli, on the basis of the two previously known hillforts, an Early Iron Age site complex similar to Százhalombatta was documented.[11] The research programmes of Éva Vadász and Gábor Vékony between 1978 and 1990 included both the Nagysánctető settlement and the burial mounds, as well as the flat cemetery found in the meantime,[12] however, their results could not be processed and evaluated before their passing.

In addition to the Early Iron Age site complex, archaeological remains of several other periods are also known from the Süttő plateau and from the narrow Danube

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7 Czajlik et al. 2015, 62–66, fig. 4.
8 Rómer 1878, 127–128, 115–121.
9 Tompa 1934–35, 104; cf. also Mérey-Kádár 1958.
10 Teržan 1990, 166; Stegmann-Rajtár 1992, 103–104, fig. 38; Egg 1996a, 7–8, fig. 4; Egg 1996b, 65; Brosseder 2004, 126, fig. 88; Golec 2004, 541–542; Hansen 2011, 304, fig. 17; Kmeťová 2011, 264, fig. 1.
11 Horváth et al. 1979, 311–313.
12 Vadász 1983; Vadász 1986.

bank below. Based on the aforementioned topographic work and excavations, we can count with the settlements of the Neolithic Age, Early Bronze Age(?), Middle Bronze Age and Late Bronze Age on Nagysánctető prior to the Early Iron Age fortified settlement. Horváth and Torma observed the settlement remains of the Early Bronze Age Hatvan culture on a loess block called Kissánc, located east of the hilltop settlement; in the west, on the Nagysánc, traces of Late Bronze Age, Early Iron Age and Celtic settlements were identified.

In the Hosszú-valley between Kissánc and Nagysánctető, on the bank of the Danube, Erzsébet Nebehay and Amália Mozsolics excavated a part of a Middle Bronze Age (Magyarád culture, Transdanubian Encrusted Pottery Culture) settlement. Roman ceramic fragments were also reported from the same place.[13] Moreover, under the bridge of the highroad along the Danube, two Roman milestones were found in the section between Nagysánctető and Nagysánc,[14] suggesting that the *limes* road could follow the same trail as the modern road today.

Unfortunately, during the archaeological topographical works of 1968–1971 – except for the cultivated tumulus groups and Nagysánctető – no detailed land-survey of the tumulus field and the fortified settlements was carried out. Partly this shortage was overcome by the preliminary announcement of Éva Vadász, who enlarged the map of the 1979 publication,[15] and gave a detailed description of the tumulus groups.[16] A total of 16 mounds were recorded in four groups, and according to her, the area of the entire tumulus field was approximately 1 km^2. In her opinion, the mounds were lined up in NW-SE direction within the tumulus groups and indicated the location of former roads leading to Nagysánctető. According to the author, besides the well-known tumuli, a number of additional mound traces were observed in the area marked by stony zones. The burial mound excavated by Éva Vadász from 1978 to 1982 was the easternmost tumulus of the southern tumulus group 'F', and at the same time, it was the first modern excavation at the site. The most cited result was the discovery of the NW-SE-oriented *dromos* structure; but from a topographic point of view, it was at least as significant that – unlike other tumulus excavations at that time – their excavation trench was extended to the edge of the tumulus base and thus the remains of the stone cover (or a stone circle?) were also documented.[17]

In addition to the preliminary reports, only the remaining parts of the excavation documentation can be used to find out the topographic conditions of the flat(?) cemetery with 82 graves revealed at Sáncföld in 1983–1990. The necropolis oriented roughly in N-S direction was in the southern approach zone of Nagysánctető, the closest graves were at a distance of maximum 50 m from the edge of the outer ditch and at least 200 m from the nearest standing burial mound. An interesting detail of the cemetery map is that it also captures a semi-circular feature, which – according to its size and shape – could have been a detail of a circular ditch around a tumulus. Here we note that in her thesis, Anikó Horváth consistently cited the site as the 'Kis

[13] Horváth et al. 1979, site 20/15, 315–317.
[14] Rómer 1866, 161, 182.
[15] Horváth et al. 1979, 312.
[16] Vadász 1983, 19–20.
[17] Vadász 1983, 22.

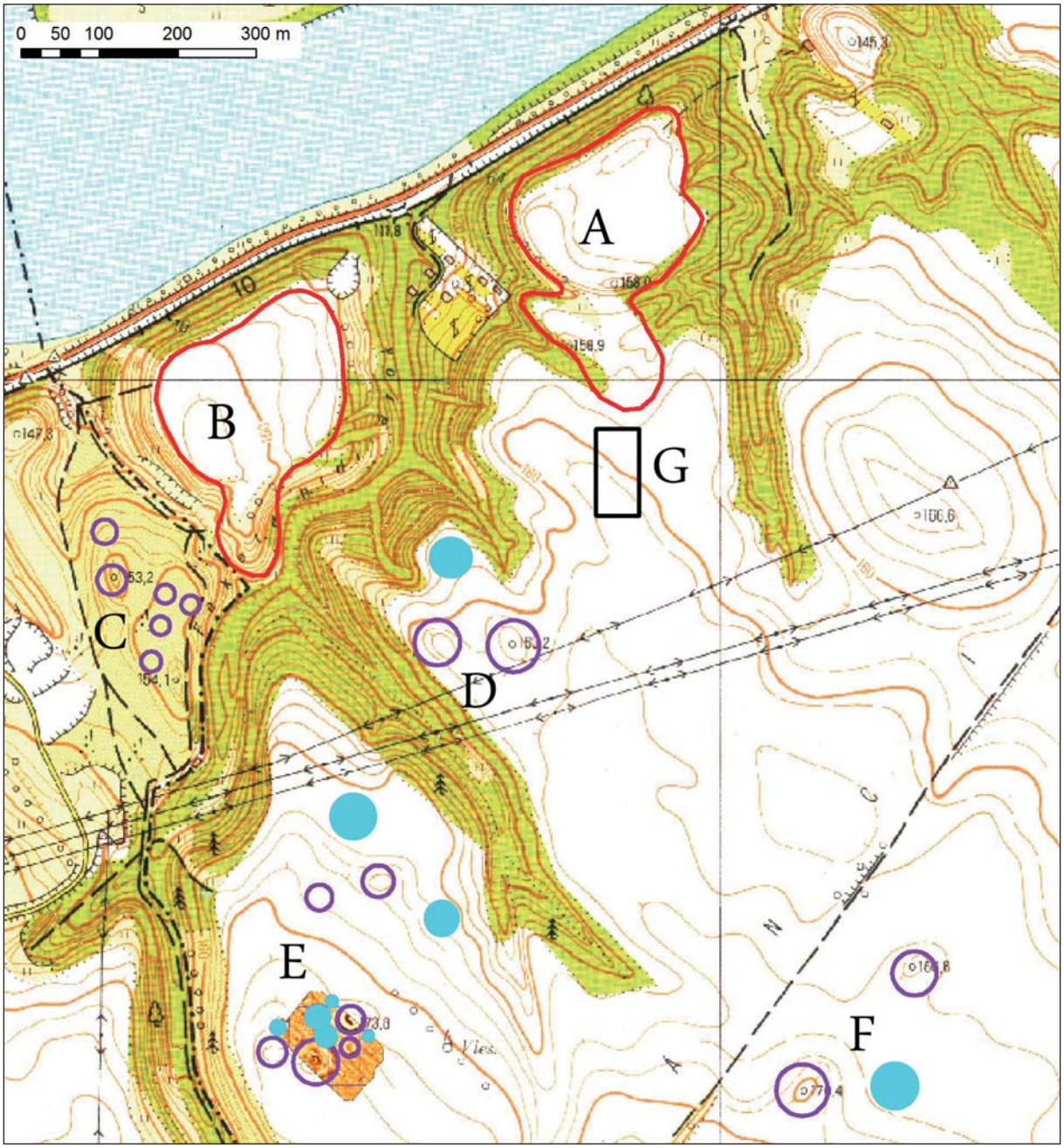

Fig. 2: The topographic view of the site complex based on previous research (see Czajlik et al. 2015, 66–70, fig. 7, Balázs Holl/Zoltán Czajlik, 2015). Source: unified national cartography system of Hungary, M=1:10000

halmos' (small tumuli) cemetery,[18] referring to one of the excavation reports of Gábor Vékony, from which one can infer small heaps covering these tombs (or some of them). Another important feature of the site is that among the cremation burials, without a special order, inhumations were also discovered.

[18] Horváth 2001, 30.

The topographic knowledge of the mid-1980s was recorded by Gyula Nováki on a map in 1985, on which the Sáncföldek excavation site can also be identified, in addition to the survey of the tumulus field and hilltop settlements.[19]

Parallel to the research of Éva Vadász, from 1979 Gábor Vékony conducted the excavations of the larger, fortified settlement of Nagysánctető. The most important goal was to acquire information on the stone and clay rampart, reinforced by a wooden structure on the upper part,[20] which was mainly built on the southwestern side of the settlement not protected by gullies, and reinforced by a double – perhaps partially natural – trench. Another result of the settlement excavations was the documentation of the long wall and semisubterranean buildings. In the latter, besides the ceramic sherds, there were objects related to craft activities (iron slag, clay blocks, spindle whorls, loom weights), which were processed by Móni Szincsák (*fig. 2*).[21]

4. Methods used in landscape research

Traces of neither the hilltop settlements nor the tumuli (that must have been taller then) were depicted on the map of the First Military Survey or Josephinian Land Survey of the Habsburg Empire (1763–1787). This situation has changed in the case of the Second Military Survey or Franciscan Land Survey of the Habsburg Empire (1806–1869) and Third Military Survey of the Habsburg Empire (1869–1887). On these two map sources, essentially the same phenomena were delineated from Süttő (*fig. 3*): those tumuli that can still be well identified on the surface today, except for the tumulus group 'C',[22] which is located in a bushy, wooded area and which is not included in any survey. On this basis, two conclusions can be drawn. On the one hand, in the area that is cultivated continuously, we probably cannot count on the destruction of many large mounds in the last 250 years. On the other hand, observations were not made during the mapping work for understandable reasons in forested areas.

As far as we know, the earliest archive aerial photographs are from 1940, when the entire course of the river Danube was recorded throughout the country. Due to the conditions of the vegetation during the photography, only traces of already known tumuli can be observed at Süttő.[23] In connection with his research of the Ripa Pannonica, Zsolt Visy also examined the archive footage of this *limes* section.[24] He identified the double trenches of the Azaum/Odiavum 5 Roman Age watchtower and traces of Iron Age tumuli thanks to an aerial photograph from 1954.[25] Recently, the number of available recordings has increased significantly through the webpage *fentrol.hu*. These images can be used for archaeological research in many cases, also

[19] Horváth 2001, Pl. VII.
[20] Vékony/Vadász 1982.
[21] Szincsák 1997.
[22] Czajlik et al. 2015, fig. 7.
[23] The images can be found in the collection of the Military History Institute and Museum, Budapest (Inv. Nr: HI 69398-69399).
[24] Visy 2003, 41–42, Fig. 62–64.
[25] Visy 1990, 24; Visy 2003, 41, Fig. 62. (HI 23119). For the watchtower belonging to Neszmély by administration, see also: Visy 2011, 65, Fig. 51.

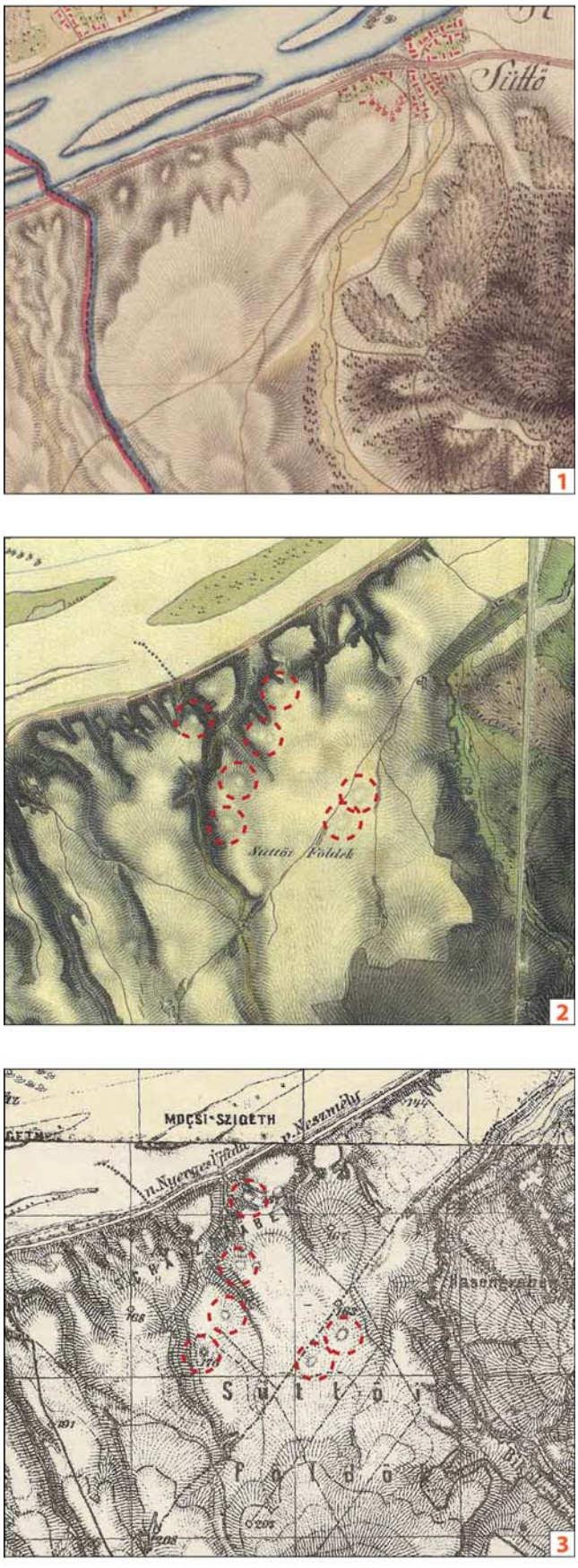

Fig. 3: The Süttő site complex on the First, Second and Third Military Surveys of the Habsburg Empire. (Arcanum/László Rupnik)

Fig. 4: Excavations of Éva Vadász and Gábor Vékony in the 1987 archive aerial photograph. 1 (cf. Fig. 2, area 'G') flat cemetery excavation; 2 (cf. Fig. 2, area 'A') rampart/gate(?) excavation (fentrol.hu/László Rupnik)

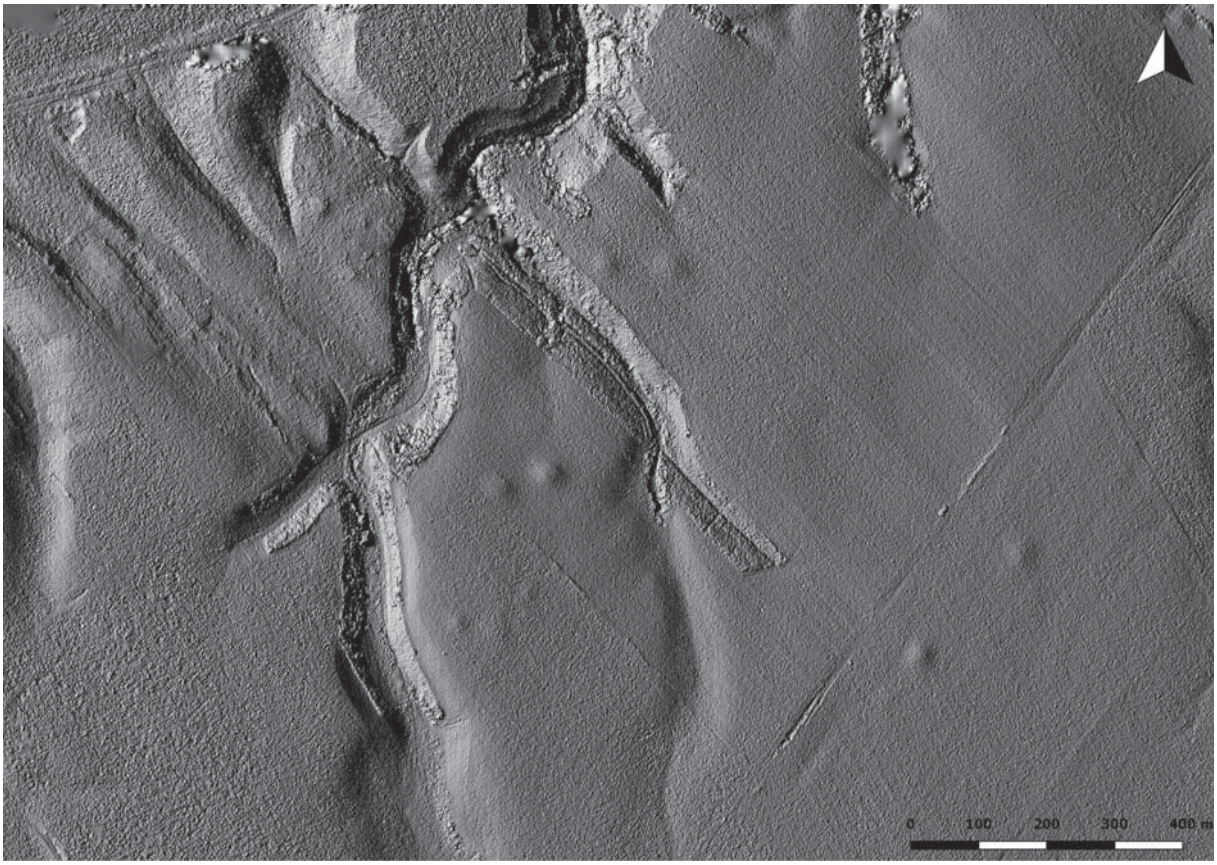

Fig. 5: The tumulus groups of the Süttő site complex on the DSM, generated on the basis of archive aerial photographs (László Rupnik)

in the case of Süttő. Thanks to the fortunate timing, positive crop signs of the ditch of a previously unknown watchtower can be observed east of the Iron Age site on a photograph from 1975. Besides that, we could identify additional linear phenomena (ditches, former roads?) as well, however, their exact age is questionable. A series of images from 1987 shows the open excavation trenches of Gábor Vékony and Éva Vadász (*fig. 4*). The importance of this information is enhanced by the fact that a complete map of that excavation has not been retained – now its location can be reconstructed based on the aerial photographs. Using a photogrammetric process, with a sufficient number of photographs from these flights, a digital surface model (DSM) can also be made (*fig. 5*).

The regular aerial archaeological investigation of the Iron Age site complex began in 2008,[26] and by the end of 2018 we carried out archaeological prospections on 12 occasions with Cessna aircrafts and Robinson helicopters.[27] Of the winter aerial surveys, the one on February 28, 2018 is worth mentioning, when the tumulus group 'C', located in a separate loess block, was first documented. At the edge of the plateau north of the tumuli, overlooking the Danube, the remains of the Azaum/Odiavum 5 Roman Age watchtower – in the bushes – were also photographed (*fig. 6*). Thanks to

[26] Czajlik et al. 2015, 64.
[27] For a summary of the previous flights, see: Czajlik et al. 2018.

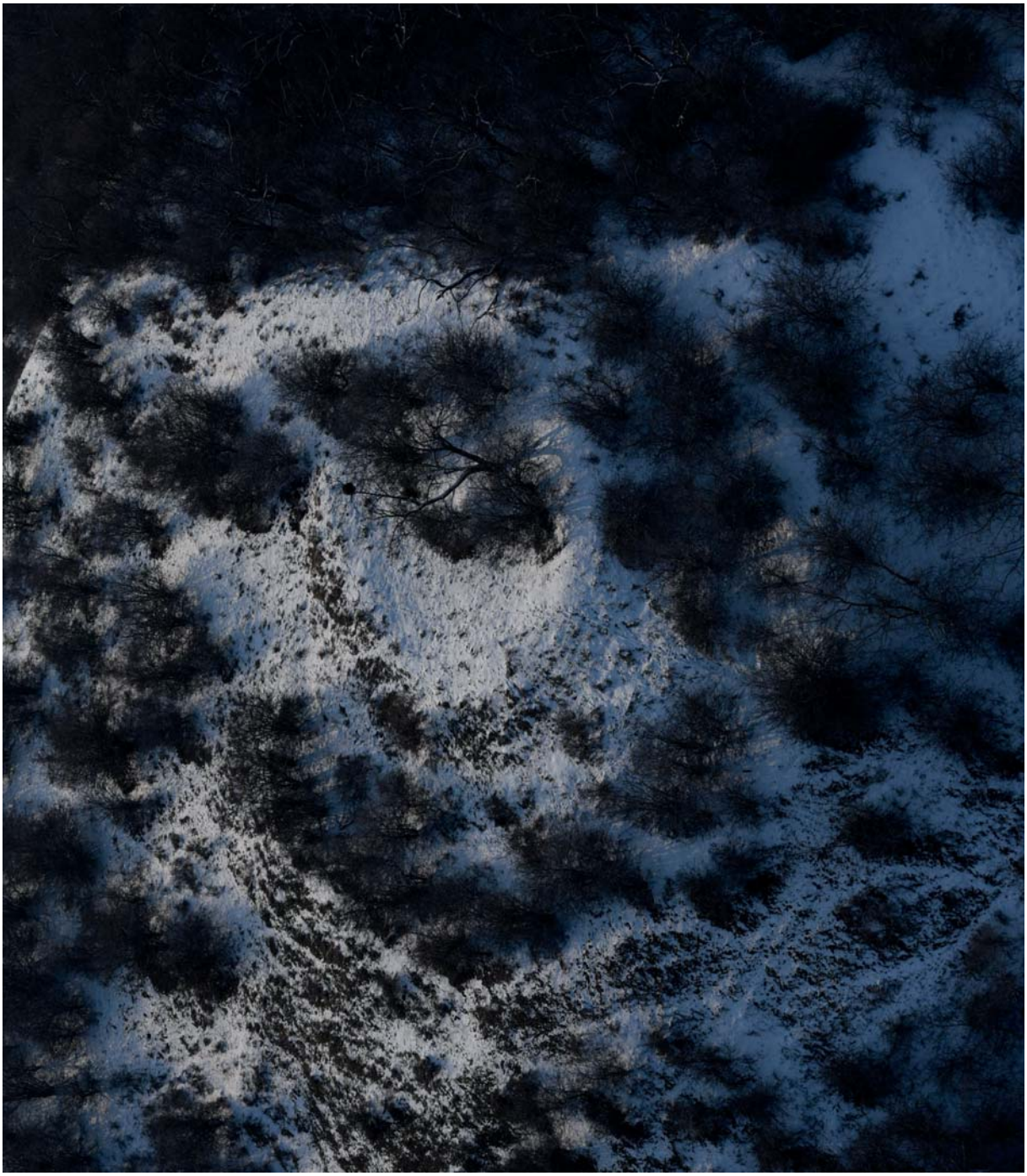

Fig. 6: Azaum/Odiavum 5 Roman watchtower on an oblique aerial photograph (Zoltán Czajlik, February 28, 2018)

helicopter flights, we were able to see the site complex from a low altitude (30–50 m), which is not possible with aerial photography at an altitude above 300 m. This helped to better understand the terrain conditions of the area.

The data from the ALS survey along the Danube in 2013 was processed by Géza Király. Since data was only collected from a narrow area next to the Danube during

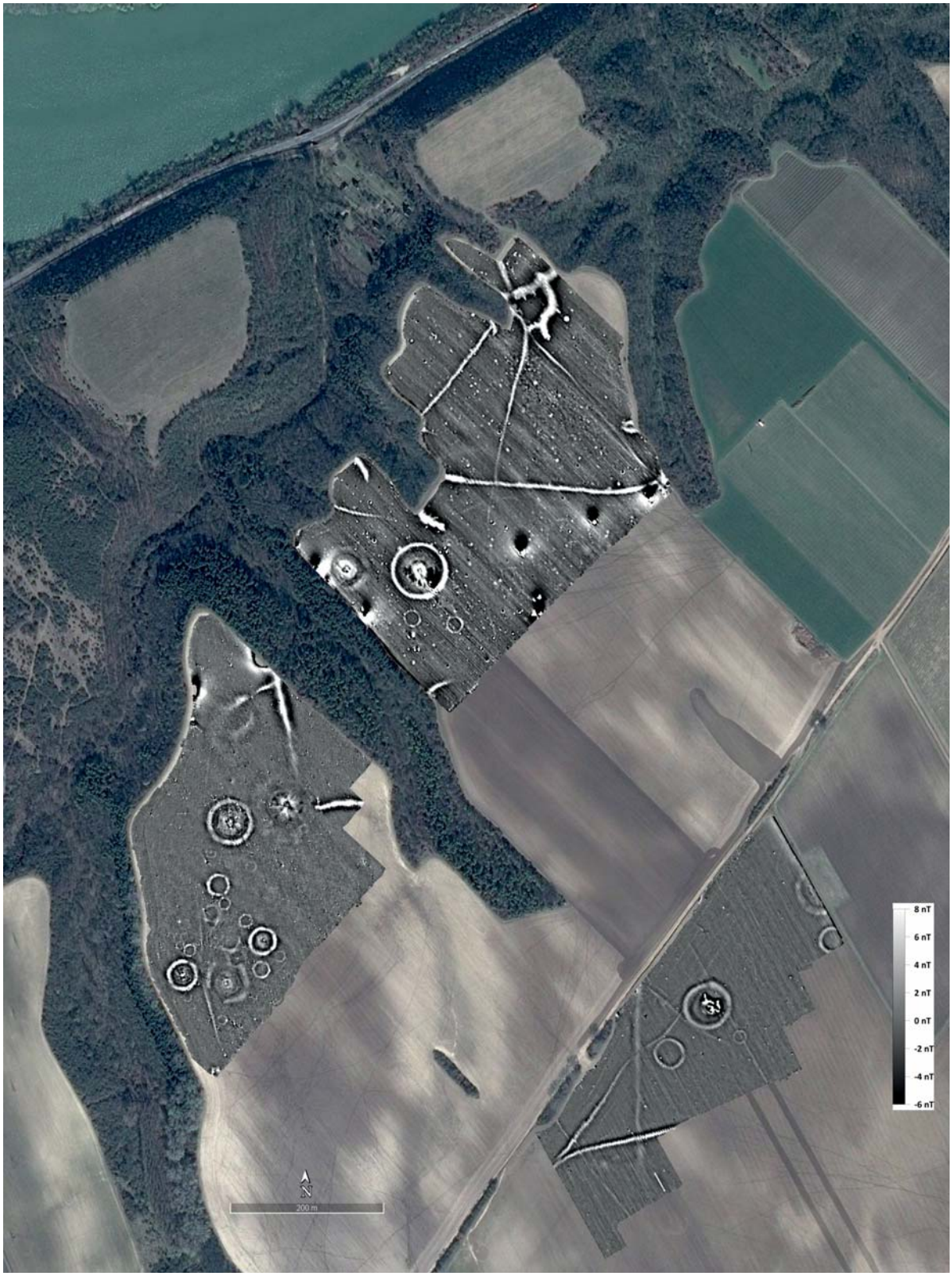

Fig. 7: Magnetometer survey of Süttő – Sáncföldek and Sánci-dűlő (autumn 2017 – winter 2019, processed by Sándor Puszta; source of the background: GE-imagery, 29 March 2017)

the flight in question, it was not possible to produce a model from the zone of the tumulus group 'F' in the south, or the southern part of the tumulus group 'E'. The data covers a total of about 5.4 km^2 with a dot density of ~7.8 points/m^2, namely a total of about 41.9 million points. The most important result is that we got a clear picture of the split parts of the loess plateau, especially the gully system. The tumulus group of the northwest plateau block is also clearly visible on the model.

The first magnetometer measurements at the Süttő plateau were conducted on October 28, 2014. The method we used was developed by Balázs Holl and Sándor Puszta in several steps from 2007 onwards, the most important devices used to date were two GSM19W Overhauser magnetometers and a Trimble Geo 7 GPS. They were arranged and used identically during all the surveys. The problem of the temporal change of the magnetic field was solved by local base measurements, and the rover unit proceeded in variometer layout. The GPS data were corrected on the basis of base stations.[28]

In the framework of the Iron-Age-Danube project, the first geophysical surveys were carried out in 2017 (two days both in the spring and the autumn) on the southernmost part of the site complex, south of the dirt road connecting Süttő and Dunaszentmiklós. The resulting magnetic anomaly map shows a remarkably clear geological background. The encircling ditches of the larger, well-known tumuli, as well as two additional, smaller (each one is approximately 20 m in diameter) circular ditches were observed, similarly to the situation of tumulus group 'E' in 2014 and tumulus group 'D' in 2016 (*fig. 2*).[29]

Adapting to the monoculture cultivation, the next time window opened in late summer of 2018, when the area 'G' was surveyed, including the remeasurement of the zone 'D' (*fig. 2*). In the case of the latter tumulus group, around one of the hypothetical stone burial chambers, a Mala GPR equipment was also used besides the magnetometer measurement, without any particular results. The geological background of the magnetometer measurements in this zone was also remarkably uniform and clear. We could only start the magnetic survey of the entire NW part (tumulus group 'E', omitting the parts already measured in 2014) at the end of 2018 (*fig. 2*), after the corn harvest, which we could only finish in February 2019 due to the winter weather. As a result of the measurements, we were able to get to know the remnants of a very complex tumulus group with large mounds not necessarily encircled with a ditch, and several small (about 20 m in diameter) circular ditches (*fig. 7*).

Since 2017, magnetometer geophysical measurements were accompanied by drone photography several times after the first adaptation of this method during the 2016 joint survey with the Institute of Archaeology at the Hungarian Academy of Sciences. The RPAS (Remotely Piloted Aircraft System) technology has helped our work in many ways. The simplest use was the documentation of field work with photographs and video footages. In addition, we have regularly monitored the individual burial mounds

[28] For a summary of the geophysical surveys at Süttő between 2014 and 2016, see: Czajlik et al. 2019.

[29] For the results of the geophysical surveys in 2017, see: Czajlik et al. 2017.

Fig. 8: Tumulus group 'F' (cf. fig. 2*) on the DSM, generated on the basis of drone photographs (László Rupnik, March 2019; source of the background: ortophoto, 2005 – Department of Geodesy, Remote Sensing and Land Offices, Government Office of the Capital City Budapest)*

and their environment to supplement the data from conventional aerial photography. The most significant part was the 3D-modeling based on photogrammetry. For this, we took photographs of the area of the systematic field walkings and archaeological excavation and the parts of the site-complex that were missing from the ALS-based digital terrain model. During these flights, we used DJI Phantom 4 and Phantom 4 Pro Plus platforms, which were carried out partly freely, partly automatically on the basis of previously programmed parameters. The programmed flights were designed with the DJI Ground Station Pro software, and we also installed ground control points (GCP) measured by GPS for later use in a GIS software. We used the Agisoft Metashape to process the photographs and create surface models (DSM) (*fig. 8*).

In 2016, during the simultaneously conducted large-scale field surveys and drone aerial photography, traces of a previously unknown Early Iron Age settlement west of the southern tumulus group ('F') were observed (*fig. 2*).[30] Also in combination with the above-listed methods, intensive systematic field walkings were conducted under the leadership of László Rupnik in 2018 at the area of Sáncföld, where 256 times 20x20 m squares were surveyed in a total of 10.24 hectares using a virtual grid. A square was

[30] Czajlik et al. 2019.

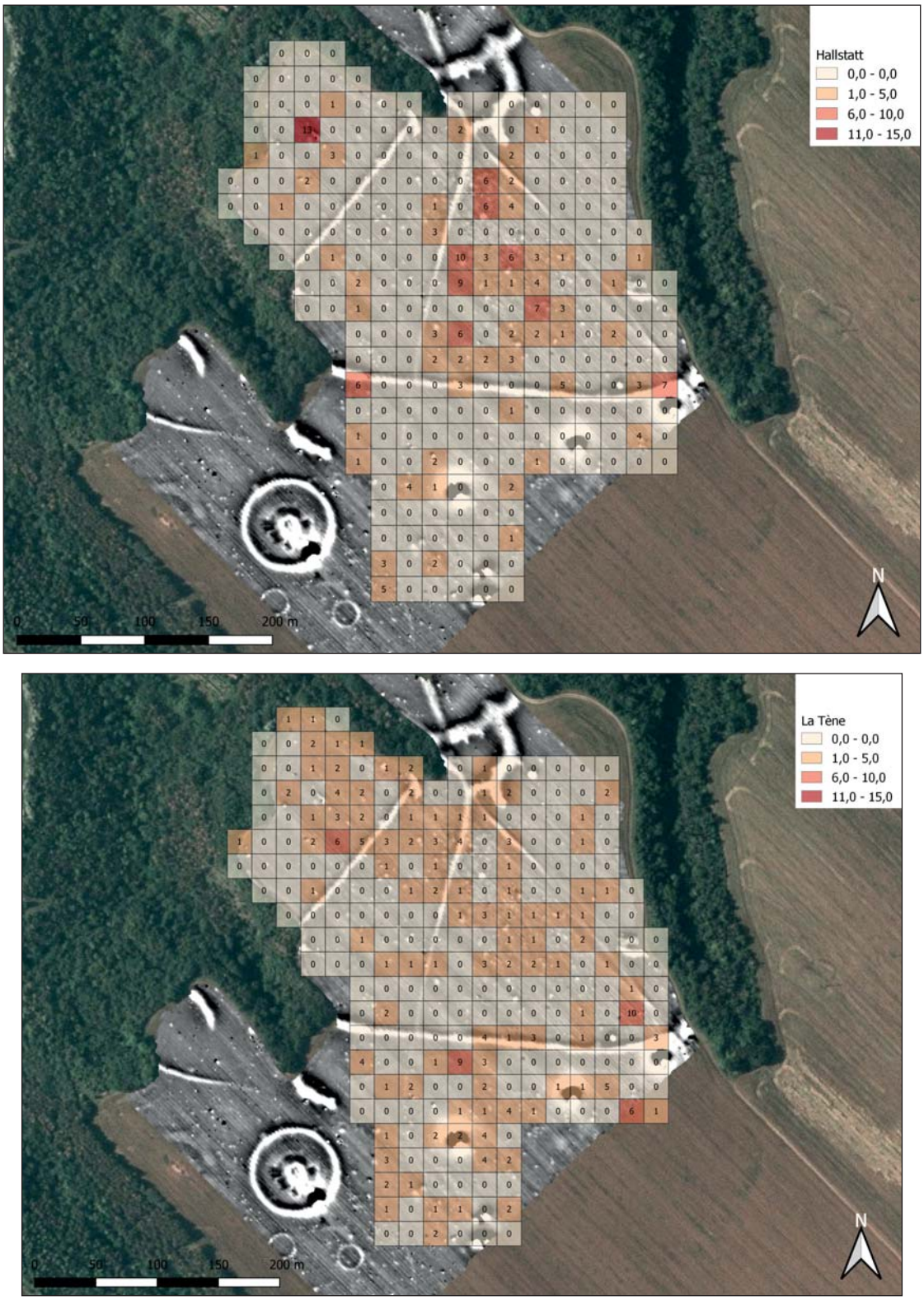

Fig. 9: Systematic field walking surveys in Süttő – Sáncföld (area 'G', cf. fig. 2*) August-September 2018 (above: Hallstatt, below: La Tène findings with geophysical survey; Rebeka Gergácz – Sándor Puszta – László Rupnik; source of the background: GE-imagery, 29 March 2017)*

walked through by one person about 15 minutes in two orthogonal directions, the position of the finds was recorded with handheld GPS devices, and the finds were packed by squares.[31] The survey was carried out by 4–6 people in total for 5 days, mostly in sunny, good weather. The surface was a scarified wheat stubble, sometimes with growing weeds. Only 28 of the surveyed squares were found to be devoid of finds; in the others, Middle and Late Bronze Age, Early and Late Iron Age, Roman Age and modern sherds were collected. Late Bronze Age/Early Iron Age, definitely Early Iron Age and Late Iron Age material was represented in the highest proportion (*fig. 9*). Modern sherds and other objects pointing to the disturbance of the site were scattered throughout the area, but their number rarely exceeded 3–4 pieces per square. In addition to the ceramic sherds, several metal objects and processed stones were also collected during the survey. In parallel with the geophysical measurements, systematic field walkings were complemented with a metal detector survey by Lajos Sándor. Finds from metal detecting were cleaned and then sorted by age together with the finds from the surface collection. The location of the excavation Trench 1 was designated based on the geospatial processing of these results compared to the map of the geophysical measurements, northwest of the previous excavations at a distance of 100–120 m.

In the sub-chapter 2 presenting the geographical background of the area, we have already described in detail the parts and the surface cover of the suffosed loess plateau next to the Danube. In the previous topographical sub-chapters, we also presented the scenes of former human activity. All examinations were based on measurements and analyses related to the current surface; we could only gain information about the deeper layers indirectly (aerial photographs, magnetic mapping). Since detailed geomorphological mapping plays a major role in determining the current and present state of the natural landscape and in the exploration of human influences, we have tried to explore at least part of the area with sediment drilling.

Drillings were carried out by geographer students of the Eötvös Loránd University and András Bödőcs under the leadership of Balázs Nagy in September 2018 (50 drillings in 2 days), and by Balázs Nagy, András Jáky and László Rupnik (45 drillings in 1 day) during the next time window in March 2019 with Ejkelkamp sampling equipment. In the course of the research, a preliminary study of Nagysánctető (Area 'A'), the Early Iron Age flat cemetery (Area 'G'), the northeast tumulus group ('D') and the northwest tumulus group ('E') was conducted (*fig. 2*).

We already had information about the layer sequence of Nagysánctető based on the excavations of Gábor Vékony[32] as well as the work of Anikó Horváth.[33] They reported on a significant layer sequence going back to the Neolithic Age, reaching 2 m depth in the south-western part of the plateau. However, based on the 2018 research, it

[31] The long-established method of grid walking was used in many of our previous researches (Czajlik et al. 2010; Czajlik et al. 2015). An improved version for a whole micro-region (100x100 m virtual grid, using manual GPS devices) was developed by Gábor Mesterházy and Máté Stibrányi (Mesterházy/Stibrányi 2012), which was adapted by László Rupnik for the IAD programme.

[32] Vékony 1986.

[33] Horváth 2001.

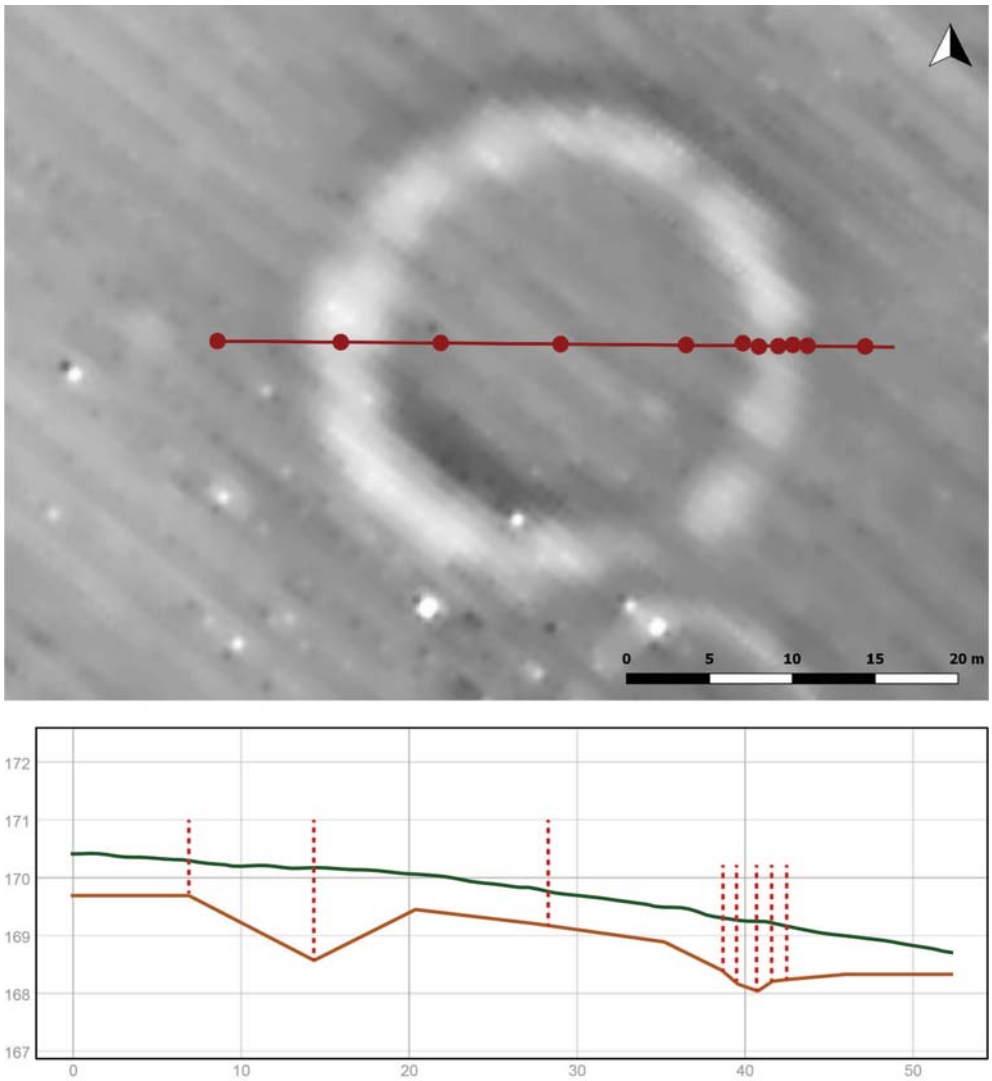

Fig. 10: Archaeological geomorphological drilling results of tumulus 2 (in tumulus group 'E', cf. fig. 2*) (Balázs Nagy – Sándor Puszta – László Rupnik, 2018–2019)*

is clear that this thick culture layer cannot be characteristic for the whole area, as our drillings generally reached the non-humus loess zone in a 40–70 cm, less often 90–110 cm in depth. At the same time, the presence of more significant culture layers in the zone some 80–190 cm deep from the surface can be reinforced in the western part near the former excavation.

The overwhelming majority of the drilling series was carried out in the northern part of the tumulus field. The main purpose was to determine the depth and shape of the circular ditches identified by magnetometer geophysical survey, but we also tried to obtain information about other linear structures. The ditch depth of the western, smaller member of tumulus group 'D' is 340 cm. At the larger, eastern mound opposing sections of the circular ditch were also examined and differences in shape and depth were documented, the latter being between 110 and 230 cm. There was an even greater difference between the individual members of the tumulus group

'E': the largest mound here – as it is also apparent on the geophysical anomaly map – does not have a circular ditch at all. As far as linear structures are concerned, it was possible to distinguish between the structures which can be considered as natural continuations of the gullies and the traces of former paths in both area 'G' and around tumulus group 'E' (*figs 2, 10*).

Prior to the excavations topographic information collected on the basis of previous excavations as well as all surface research (magnetometer, systematic field walking, and metal detector surveys) were evaluated. Our goal in selecting the specific location was to better understand the topographical conditions of the Early Iron Age flat cemetery and its surroundings.[34]

5. Landscape use in the Bronze Age

Previous topographic research (see above) proved that the Süttő plateau had been intensively used in the Bronze Age: several assemblages of various periods were revealed from Kissánc, Hosszú-valley, Nagysánctető, Sáncföldek and Nagysánc.[35] Our recent fieldwork could provide some further archaeological data on the Early and the Late Bronze Age landscape of the area.

In Trench 1 a heavily disturbed Early Bronze Age cremation grave was excavated (STR 5). This feature was selected for systematical archaeobotanical sampling, which was led methodologically by Mária Hajnalová, an expert of the Constantine the Philosopher University in Nitra (UKF). A 50x50 cm grid system was laid over the grave, but in case of ceramic concentrations or other interesting archaeological observations, these units were divided into separate sub-units. Soil samples were collected from every 5 cm of each unit. Because of the intensive modern agricultural use of the territory, the finds of the shallow grave had been scattered, thus neither the outlines of the burial pit nor the complete inventory and the original position of the grave goods could be identified. Beside cremated human remains the grave contained a set of very fragmented vessels and animal bones. The inventory of the burial dates the feature to the Makó-Kosihy-Čaka period and the ^{14}C dating correlates with this result (2620–2460 calBC). The presence of Early Bronze Age material on the Süttő plateau is not completely surprising, previous archaeological research (topographic surveys and an excavation) have already indicated its distribution in the area.[36] In the

[34] Czajlik et al. 2018.

[35] Assemblages from Makó-Kosihy-Čaka, Hatvan, Transdanubian Encrusted, Magyarád/Mad'arovce, Tumulus and Urnfield type archaeological material are known from these sites: MRT 20/3, 20/4, 20/6, 20/15 (Horváth et al. 1979); Kovács 1988; Vékony/Vadász 1982).

[36] Early Bronze Age material was reported from the excavation of Nagysánctető (Vékony/Vadász 1982) and from the neighbouring sites of Horváth et al. 1979, 20/4 (Kissánc) and 20/13 (Tatai úti dűlő II). Furthermore, some stray finds are also known from Süttő (Horváth et al. 1979, 320.)

Measured area:		rivet (upper)			rivet (lower)			blade		
Element	**Detection limit (D.L.) (wt%)**	**wt%**	**Rel. unc %**	**±**	**wt%**	**Rel. unc %**	**±**	**wt%**	**Rel. unc %**	**±**
Cu	-	**86**	0.6%	0.5	**86**	0.5%	0.5	**89**	0.4%	0.4
Sn	***2***	**11.0**	4%	0.5	**11.8**	3.8%	0.5	**9.8**	3.7%	0.4
Ni	***0.012***	**0.65**	3.7%	0.02	**0.61**	3.6%	0.02	**0.72**	1.9%	0.01
As	***0.09***	**0.28**	13%	0.04	**0.32**	11%	0.03	**0.32**	12%	0.04
Sb	***0.2***	<D.L.			<D.L.			<D.L.		
Ag	***0.025***	<D.L.			<D.L.			<D.L.		
Co	***0.01***	**0.024**	11%	0.003	**0.025**	10%	0.00	**0.023**	9%	0.002
H	***0.008***	**0.124**	2.2%	0.003	**0.095**	2.3%	0.002	**0.074**	2.8%	0.002
Si	***0.8***	**1.7**	7%	0.1	<D.L.			<D.L.		
Cl	***0.02***	**0.227**	2.0%	0.005	**0.353**	1.8%	0.006	**0.126**	2.2%	0.003

Fig. 11. Late Bronze Age bronze dagger from Feature 18 (photo: József Bicskei) and the results of the prompt gamma activation analysis (PGAA) (Boglárka Maróti, for the method see: Révay/Belgya 2004)

wider region of Süttő several excavated sites (settlements and graves) have yielded Makó-Kosihy-Čaka assemblages.[37]

In Trench 2 two Late Bronze Age features were documented (STR 18 and STR 16). Both had an irregular shape and large dimensions (4x2,5–4 m, 0,5–1 m deep) – their function is unknown. The smaller feature (STR 16) contained a considerable amount of archaeological material: pottery, animal bones, stones, daub fragments, and a small bronze object. Although on the bottom of the feature a debris-layer of burnt daub was excavated, no postholes were detected which would indicate the existence of a permanent built structure. The other feature (STR 18), located 2–3 m to the north from feature STR 16, was larger, deeper and contained much more archaeological material: a huge amount of ceramic fragments, bones, stones, and a couple of bronze objects were unearthed. No layers could be distinguished in its filling and there was no sign of any built structure connected to it. The typological characteristics of the

[37] A burial of the culture was discovered in Lábatlan – Rózsa Ferenc street, settlements were detected in Lábatlan – Hosszú földek (formerly Süttő – Vasúti őrház), Nyergesújfalu – Józsefpuszta, Mužla (Muzsla) – Čenkov-Vilmakert and Orechovy sad, Mužla (Muzsla) – Svätojurský vnútorny hon (Kulcsár 2009, Cat.Nr. 165, 166, 194, 230, 231, 346, 347).

pottery found in both pits, as far as its fragmented condition allows a reconstruction, are closely related to the ceramic tradition of the Late Tumulus and Early Urnfield periods. A completely preserved bronze dagger[38] from the larger pit suggests a similar dating (RB D, *fig. 11*). Based on these results, a Late Tumulus/Early Urnfield settlement can be assumed at Süttő – Sáncföldek, which was probably used contemporarily with the neighbouring settlement of Nagysánctető.[39] The ^{14}C data from these two features (1430–1220 calBC) correlate with the typological observations.

6. Data for reconstructing the Early Iron Age landscape (*figs 2, 7, 14*)

The discovery of the site in the 1930s is probably not due to the hilltop settlements on loess blocks near the Danube, but rather to the spectacular groups of tumuli. Three of the four tumulus groups are relatively close to each other (200–300 m as the crow flies), but are located on different sections separated by steep gullies. The south-eastern tumulus group 'F' is located at least 600 m from all of these, and markedly far (at least 1 km) away from the hilltop settlements. Three of the four tumulus groups have been under intensive agricultural cultivation for decades, still they are well recognizable in the landscape. Two members of tumulus group 'D', four to five members of tumulus group 'E' (*fig. 12*), and also two members of tumulus group 'F' can still be identified from the surface, on aerial photographs taken from low altitude partly from helicopter, partly by drone, and on photogrammetry and ALS-based terrain models. According to the geophysical mapping, the large mounds have impressive circular ditches both in the case of tumulus group 'F' and 'D'. Interestingly, one of the most impressive mounds of the entire site complex, burial mound 4 in tumulus group 'E', does not possess an encircling ditch based on the geophysical survey, and no such construction can be inferred from the sediment drilling either (*fig. 13*). Slightly south in the same zone, a large circle can also be observed on the magnetic anomaly map, which was perhaps only partially completed. Besides tumuli of exceptional size, wide and deep circular ditches of large diameter usually referring to such tumuli, as well as medium or even small-sized circular ditches can also be observed based on magnetometer surveys. The latter occur in all tumulus groups, (cf. *fig. 2*). Tumulus group 'C', not affected by modern agricultural cultivation, could not be investigated by magnetometer due to the bushy vegetation cover, however, on the basis of the ALS terrain map, one larger and several small/medium-sized examples can also be detected among the tumuli. It should be noted that we

[38] The characteristic dagger belongs to the type "Ringknaufdolch" and it has not been known before from closed archaeological context in the territory of Hungary. The type is dated to the Late Tumulus – Early Urnfield Period (Kemenczei 1988, 23–27).

[39] On the basis of the published report of the Nagysánctető excavation, we can assume a Tumulus and Urnfield period occupation on the fortified settlement, although it is not clear in which phases the fortification was used. (Vékony/Vadász 1982) During topographic research in the area Urnfield type ceramic fragments were observed on several sites close to the investigated territory (Horváth et al. 1979, 20/6 Fekete hídi árok mellett, 20/21 Süttő – Rákóczi street, 20/25 Papi földek, see: Horváth et al. 1979), but their more accurate dating is rarely possible. For the distribution of the Urnfield Culture in NE Transdanubia see: Patek 1968 and Kőszegi 1988.

Fig. 12. Tumulus group 'E' (cf. fig. 2*) from the air (Zoltán Czajlik, February 28, 2018)*

also know the remains of a circular ditch from area 'G' (the zone of the flat cemetery), thanks to the excavations of Éva Vadász.[40]

The topographic analysis of the four tumulus groups that can still be identified on the spot (*figs 2*, *14*) seems to confirm the concept of previous researchers in the case of several other sites, namely, that these separate tumulus groups of 1–2 larger and several smaller mounds represent different social units and/or period and a hierarchy within the groups by the size of the burial constructs. Insisting on topographical data, tumulus group 'E' stands at the top of the Süttő hierarchy with the highest number of tumuli and including Tumulus 4 without a circular ditch. It should be noted that this is not only the largest and the most numerous group, but also located in the highest position compared to other areas. It should be highlighted that all other tumulus groups and settlement units of the site complex were also visible from this area. The adoption of the above chain of reasoning would be particularly exciting in the case of Süttő, because according to the findings, there were individuals of very different social status in the flat cemetery.[41] At the same time, it would not be surprising if fine chronology or its combination with the above-mentioned concept would settle this matter between the tumulus groups.

[40] Czajlik et al. 2015, fig. 3.
[41] Novinszki-Groma 2018.

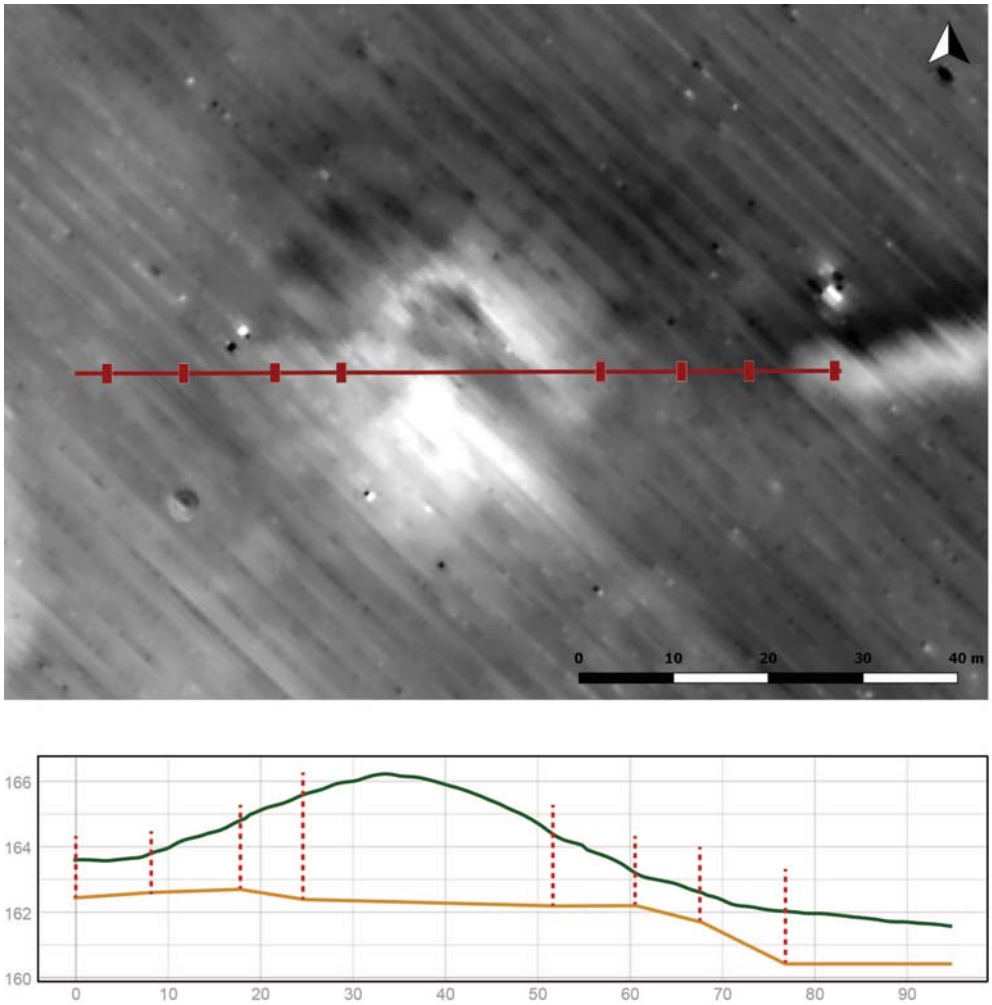

Fig. 13: Archaeological geomorphological drilling results of tumulus 4 (in tumulus group 'E', cf. fig. 2*) (Balázs Nagy – Sándor Puszta – László Rupnik, 2018–2019)*

We were unable to identify new graves of the flat cemetery during modern research, but the large-scale metal detector survey in area 'G' resulted in a number of fibulae in good condition, which could be linked to the previously discovered artefacts of the Early Iron Age flat cemetery. Their dating and network of connections is similar to the previously known pieces and their presence confirms the image of the prominent richness of some burials of the necropolis in question (*fig. 15*).[42]

Thanks to archive and modern aerial photography, and especially the ALS relief model, we can now imagine the former appearance of Early Iron Age hilltop settlements better than before. Especially the ALS model, which is free of the vegetation cover, shows how distinct both hilltop settlements were from their surroundings. It is also clear on the basis of the model why it was not necessary to fortify area 'B' (Süttő – Nagysánc), and why and where it was justified to artificially strengthen the protection of area 'A' (Süttő – Nagysánctető) (*fig. 14*). In the latter case, the results of archaeological geomorphological drillings refine the image created by the excavations of Gábor

[42] Novinszki-Groma 2017b.

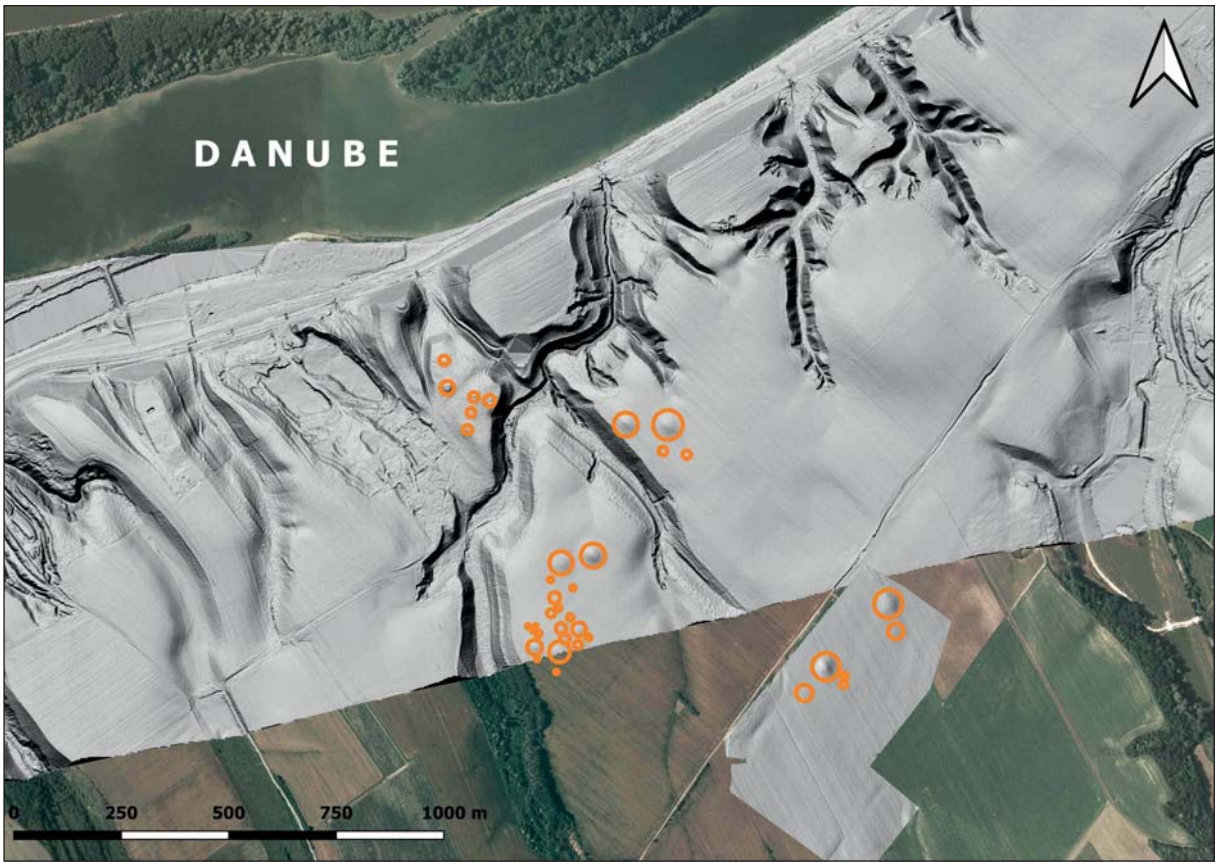

Fig. 14: The actual topographic map of the tumulus groups – analysis based on magnetometer, drone and ALS surveys (Géza Király – László Rupnik; source of the background: ortophoto, 2005 – Department of Geodesy, Remote Sensing and Land Offices, Government Office of the Capital City Budapest)

Vékony and the research of Anikó Horváth. Comparing the data of the drillings and the microrelief of the plateau, the center of Neolithic, Early Bronze Age, Late Bronze Age and Early Iron Age settlements were clearly in the south of the Nagysánc-tető.

7. Survival of elements of Early Iron Age landscape in the Late Iron Age

The intensive use of the landscape, largely and permanently transformed in the Early Iron Age has started again at the end of the Early Celtic period. Previous research already documented traces of Celtic settlements and cemeteries from certain parts of the plateau. The area called Nagysánc (Horváth et al. 1979, site 20/6), west of Nagysánctető, is also known as a Celtic settlement based on surface finds.[43] This is confirmed by the publication of Márta H. Kelemen, who dated a characteristic ceramic sherd found here to the LTB – C1 period.[44] Additionally, she assumed a contemporaneous cemetery near the Nagysánc settlement on the basis of the typical

[43] Horváth et al. 1979, 311–312.
[44] Kelemen 1987, 193–194, Pl. XI. 6.

Fig. 15: Variations of Early Iron Age bronze Navicella (1–3) and Bow (4) fibulae from the metal detector survey of the Süttő plateau (September, October, 2018) (Katalin Novinszki-Groma – Eszter Fejér)

finds in Ilona Hunyady's monograph.[45] At the site Süttő – Sáncföldek, during the excavation of the Early Iron Age cemetery, Celtic features (pits?) were also identified by Éva Vadász and Gábor Vékony.

During the 2018 excavation we documented four Celtic features: building STR 24 as well as pits STR 11, 20, and ditch STR 33. The building belongs to the simplest type as it included no postholes.[46] From its southwest corner, from the demolition layer of the building (STR 41) remains of a child's cranium (parietal area) came to light, the age of which is 400–210 calBC according to radiocarbon dating. At the bottom of the wide, flat-bottomed pit STR 11 remains of charred wood were recovered, while on the top of the filling layer accumulated fragments of grinding stones, as well as pieces of deliberately (?) crushed ceramics, were found. Ditch (?) STR 8 also yielded Celtic archaeological material.

The find material of the above-mentioned archaeological features consist of a low number of ceramics and significant amount of grinding stones, both heavily fragmented. Based on these, only an approximate dating within the Celtic period is possible. In general, the absolute lack of LT C1 (2nd half of the 3rd century BC – beginning of the 2nd century BC) ceramic forms (for example ring-rimmed bowls, elongated biconical forms, an upward shift in the placement of the shoulder) can

[45] Kelemen 1987, 193, Pl. XI. 3.
[46] Horváth 1987, 65, fig. 5.p/1.

be documented.[47] The only hint to this time period is a fragment of a glass bracelet, found on the surface during field survey. Although the Dux type fibula was also a stray find, chronologically it corresponds to the dating of the ceramic material from the settlement.

The above-mentioned Dux type fibula is not the only one of its kind known from Süttő: I. Hunyady mentions another piece found in the area which is practically identical in form to the one found in 2018.[48] The few fragments of graphite situlae, the lightly curved S-profile bowl as well as the wheel-thrown small pot with low-lying shoulder all point to the LT B1–B2a period. A survival of local traditions can be observed in the form of the pot decorated with an incised rib as well as a sherd with graphite slip. Perhaps the horizontally flatted knob, known from subsequent periods, is also a manifestation of these traditions.

The archaeological material of the neighbouring territories along the rivers Nitra and Žitava inhabited during the LT B period (Veľka Maňa, Kamenín, Hurbanovo-Bacherov majer) yield several parallels to the Süttő material.[49] For example, the form of the Dux type fibula found on the surface is identical to that of a fibula found in the inhumation Grave 13 of Maňa,[50] and another piece recovered in Grave 21 of the Dubník cemetery.[51] Beside the Slovakian sites, the fibula found in Süttő is also related to the fibulae excavated at the LT period settlement[52] and related cemetery[53] of Győr-Ménfőcsanak. This site complex, located at the confluence of the rivers Danube and Rába, came to being at the beginning of the 4th century BC.

In summary, based on the ceramic material, the life of the settlement can be roughly dated to sometime between the 2nd half of the 4th century BC and the 3rd century BC. Thus the presently available data suggests that the researched part of the settlement was established at the end of the LT B1 period (2nd half of the 4th century BC) and was still in use during the LT B2a period. From the perspective of its wider surroundings, the Late Iron Age settlement of Süttő fits well with the Transdanubian settlements established at the end of the 4th century BC. [54]

8. Transformation of land use in Roman times: watchtowers at the edge of the plateau

The remains of a Roman watchtower are located on a peaky height with a steeper side west of the Sánci-dűlő, including the tumuli and the settlement.[55] The oval building bordered by a double trench can be observed on many archive aerial photographs and also on the spot. Its northern part has been partially washed away

[47] Almássy 2014, 178.
[48] Hunyady 1942–1944, XIX. t. 6.
[49] Benadík 1963.
[50] Benadík 1983, 17. Taf. VI/7.
[51] Bujna 1989, Taf. XXIV/2.
[52] Tankó/Egry 2009, 404. Fig. 2/1; Tankó 2004, 109. Fig. 4.
[53] Uzsoki 1987, 36. Pl. V/2–4, X/1.
[54] Bujna 2003, 96. Obr. 64.
[55] Azaum 5 or Odiavum 5 *burgus*: Visy 2000, 39–40, Figs 62–64.

Fig. 16: Ditch of a Roman watchtower(?) from Süttő – Kissánc on an archive aerial photograph (fentrol.hu/László Rupnik)

by the Danube. In the early 1930s Albin Balogh found some Roman ceramic sherds here on the surface, but neither was our nor Zsolt Visy's field walking survey at the same location successful in this regard.[56] Both the modern aerial photography carried out in connection with the nomination of the Ripa Pannonica to the UNESCO list of World Heritage Sites,[57] and the photographs taken by Zoltán Czajlik – especially the ones shot during snow cover – show the current state of the *burgus* (*fig. 6*). The next watchtower to the east, known from the literature, is located further away in the area of Lábatlan.[58] There must have been more watch-posts between these two, however locating these will be a task for future research. In any case, an archive aerial photograph made in 1975 shows a trace of a feature with rounded corners and a double trench at Süttő – Kissánc (*fig. 16*).[59] The area confined by the internal trench is approximately 15x15 m, the trench is 21x21 m, but the northern part was destroyed by erosion. It has an external dimension of 36x36 m.

[56] Balogh 1934, 44.
[57] Photo of Máté Szabó (PTL 38677): Visy 2011, 65, Fig. 51.
[58] Horváth et al. 1979, 245, 10/7; Visy 2000, 40.
[59] *fentrol.hu*

This hilltop has been surveyed several times and is known as a Bronze Age fortified settlement.[60] At the same time, we do not know any Roman finds from this location, only a few solitary stray finds from the valley west of it,[61] which is probably due to erosion. Additional geophysical or field research is required to identify the phenomenon.

9. Resource exploitation of the Süttő plateau

As described above, the Süttő site complex is located in a special geographical position. In that, the approximately 40 m high loess plateau above the Danube is such a dominant element as the micro-region closed by the Gerecse's northern stretches in the south, which had a huge buffer zone north of the Danube. Only Anikó Horváth was concerned with this question previously. On the one hand, she suggested that besides the Danube, smaller sources – assumed on the basis of travertine patches – could also play a role in the water supply, while on the other hand she considered the southern part of the plateau (Sáncföldek, Sánci-dűlő) to be the agricultural hinterland of the Early Iron Age settlement.[62]

Based on our intensive field research, this model of landscape use cannot be maintained. As far as the predecessors are concerned, there are serious Late Bronze Age settlement traces on the northern edge of Sáncföldek, where a significant amount of animal bones have been revealed. With regards to meat-eating, the main domestic species – mainly cattle and caprine – are dominant in the assemblage, but a few bones belonging to wild animals also came to light. It is still a question whether the inhabitants used the Danube as a source of water through the steep gullies or they utilized possible other, more distant sources. Water for people and their animals living on Nagysánc and Nagysánc-tető could also be provided by the Danube in the Early Iron Age. Land use has limited the resources, as a significant part of the well-cultivable, easily accessible lands from the hilltop settlements were covered by burials.

An interesting addition to the Early Iron Age use of vegetal raw materials is the reedmace from earlier excavations (definition of Mária Hajnalová). The reedmace did not grow on the Süttő plateau, its closest habitat can only be suspected north of the Danube, in its extensive anabranch system. It is obvious that Early Iron Age monumental land use has limited the size of areas suitable for cultivation in the Late Iron Age as well. Identifying of millet, also observed elsewhere in the Celtic era, among plant debris obtained from the ditch at the edge of the plateau could be a good answer to the problem (*fig. 17*).

To identify the connection between the used raw materials and the geology of the region, characteristic stones and ceramics were examinde from the site. The supposed provenances most of the types of *limestones* from the 2018 excavation occur within a 10 km range of Süttő: Mesozoic (Triassic) micritic limestone; porous Pleistocene

[60] Horváth et al. 1979, 311, 20/4; Hungarian National Museum Archaeology Database, https://archeodatabase.hnm.hu/en/node/27294, December 19, 2019.
[61] Site Süttő – Hosszúvölgy: Horváth et al. 1979, 315–316, 20/14.
[62] Horváth 2001.

Fig. 17: Possible Celtic landscape of the Süttő plateau with millet (Frigyes Kőnig, 2019)

travertine and Eocene bioclastic limestone. Among them, the Triassic limestone has to be highlighted, since this type has also been identified from the burial chamber remains of the tumuli coming to light due to agricultural cultivation. This building material was easily accessible in the Gerecse Mountains to the south. From those listed above, two types of carbonatic rock fragments can be distinguished in ceramics as well: mainly micritic limestone (that is, the same raw material from which the burial chambers were built), and sparsely Eocene bioclastic limestone. Based on the petrographic characteristics, ceramics dated between the Early Bronze Age and the end of the Early Iron Age were produced by using the same tradition. They used the technology of (local) clay mixing (fat and silty clays in different proportion) and (local) fine to coarse sand-sized grains as temper (*fig. 18*). The temper mostly changed with the Celtic period, and the thin section examination even raise the question whether the Late Iron Age ceramics were partly imported products, due to the fact that the graphite and marble fragments used for tempering are not of a local origin.

In this era, the inhabitants of the site were able to obtain further rocks along the Danube. The probable provenance of all types of volcanic rocks (grinding stones) might be suspected in the area of the Börzsöny – Visegrád Mountains (50 km downstream!). It is interesting to note that green coloured pebbles were collected since the Late Bronze Age which are in fact retrograde eclogites (main components: garnet, tremolite, actinolite). The closest occurrence of this rock type is known to be from the area of the Bohemian Massif; these rocks could also be transported here by the Danube river.

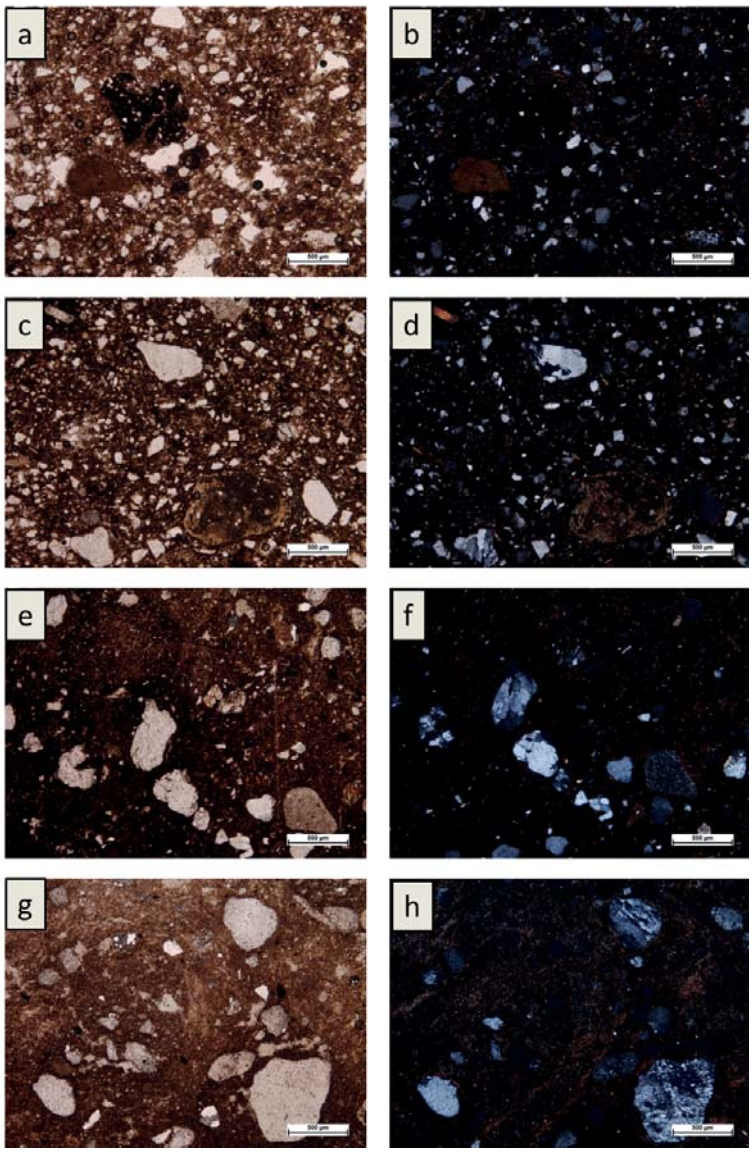

Fig. 18: Süttő – Sáncföldek. Petrographic characteristics of ceramics dated between the Early Bronze Age and the end of the Early Iron Age. The typical non-plastic inclusions; mono- and polycrystalline quartz, K-feldspar (microcline as well), plagioclase, micas (muscovite and biotite), opaque minerals, sparsely clinopyroxene, hornblende (a–b) and tourmaline (c–d), granitoid, quartzite, chert (e–h) and two types of carbonatic rock fragments: mainly micritic limestone (c–d), sparsely Eocene bioclastic limestone (Dorottya Györkös – István Simon)

The good condition of the bronze objects which came to light from the agricultural zone, mostly from metal detector surveys, has been affirmed by the analyses. Their composition shows significant differences from age to age. Late Bronze Age pieces, in addition to the significant trace element content, also contain side elements; the Early Iron Age fibulae are tin bronze with minimal trace elements (possibly containing 2% lead), and one Roman Age fibula is definitely a copper-tin-lead ternary alloy.

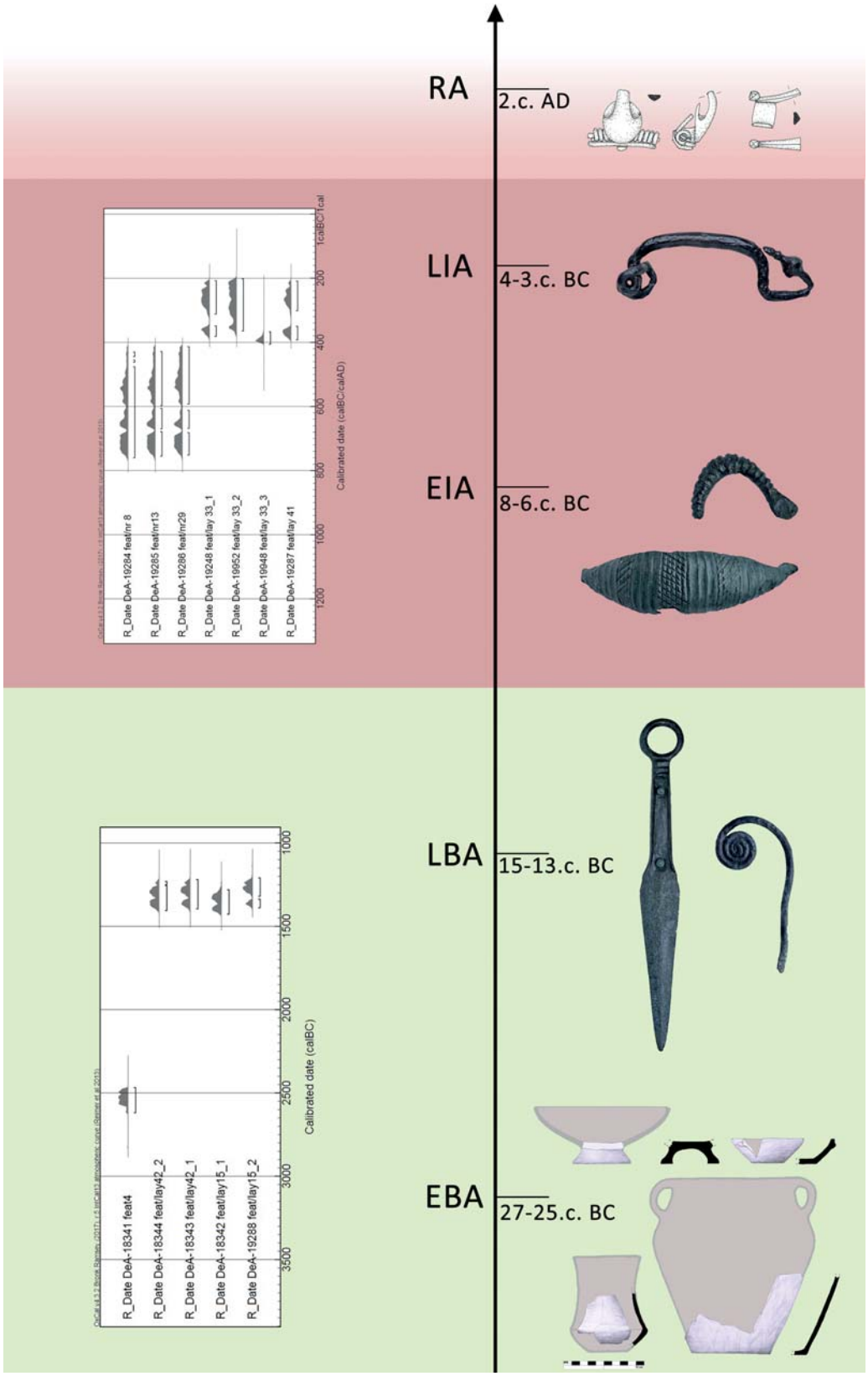

Fig. 19: The chronological table of the use of the Süttő plateau for settlement and/or funeral purposes (József Bicskei – Eszter Fejér – Mónika Merczi – Katalin Novinszki-Groma)

Although it is more difficult to infer the origin of the artefacts on the basis of non-serial analysis, it can be stated that the raw material base of the Late Bronze Age and Early Iron Age bronze objects is not the same, the latter being made of much cleaner material.

10. Results (*figs 2, 7, 14* and *19*)

The first section of the series of loess plateaus which characterize most of the Hungarian section of the Danube river is situated in the area of Dunaalmás, Neszmély and Süttő. The Gerecse Mountains comprise a firm border to this micro-region from the south, while to the north, on the southern bank of the Danube alluvial plains open towards north-northeast are to be found. The enclosed character of the Süttő plateau has already been mentioned before, Anikó Horváth discussed the question of arable land in the vicinity of Early Iron Age settlements as well as the problematics of water supply.[63]

The oldest settlement remains are known from the southern zone of the Nagysánctető, where Gábor Vékony excavated finds of the Middle Neolithic Zseliz(?) culture. This excavation brought to light the traces of an Early Bronze Age settlement, in relation to which stray finds collected in Süttő – Hosszú-völgy (that is the area between the Kissánc and the Nagysánctető) can also be mentioned. A Late Bronze Age settlement also existed on the Nagysánctető, in the immediate vicinity of the Early Bronze Age grave. The Early Iron Age hilltop settlements were located on the Nagysánctető and, according to previous research, on the Nagysánc.

In area 'G', used as a burial ground in the Early Bronze Age and later for settlement in the Late Bronze Age, a flat cemetery was established in the Early Iron Age. It is possible that smaller tumuli were also built above the graves, or at least some of them. Traces of a circular ditch were also documented in the area. Without doubt, the most imposing proof of Early Iron Age landscape use was the establishment of tumuli groups expanding over an area of some 80 ha. With the help of magnetometer mapping the number of still identifiable burials in tumuli groups 'D', 'E' and 'F' can be determined, as well as the fact that there were no similar monumental constructions in the area between the groups.

The excavation of 2018 has verified as well as refined the results of earlier topographic surveys and also the data gained through the excavation of the Celtic remains which came to light together with the Early Iron Age flat cemetery. Based on the 2018 campaign, there have been significant Late Iron Age archaeological features, respectively in area 'G'. It is important to note that the Celtic occupation of the area, not older than the end of the 4th century BC, has been established some 200–300 metres from the tumulus group 'D' and the building and pits were located quite close (about 20–30 m) to the Early Iron Age flat cemetery, which may have been still marked by smaller mounds at the time.

A surprising result of the metal detector surveys has been the identification of Roman Age fibulae. This suggests that even in the 2nd century AD area 'G' has been visited

[63] Horváth 2001.

Fig. 20: The actual land use of the Süttő-plateau; pasture, plough-land (corn/wheat), orchards and vineyards (Zoltán Czajlik, June 25, 2019)

from time to time. Perhaps the reason for this was that the edge of the loess plateau became part of the Roman border defenses to which the access had to be sustained. One of the identified Roman watchtowers was located in the northern part of the loess plateau section including the Early Iron Age grave group 'C', while another tower could have stood on the relatively small loess outcrop known as Kissánc.

In summary, Early Iron Age has been the most enduring period in the millennial human use of the Süttő loess plateau. Perhaps there was a prelude as well as a reason for tumuli being built at particular plateau-sections, and these mounds have perceptibly influenced landscape use in later periods as well. There are no signs of human land use from the Late Roman Age onwards, which of course does not mean that the area was not used as a pasture/hayfield the way it is used today (see for example military surveys) or either as an orchard (*fig. 20*).

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Early Iron Age cultural landscapes: case studies from the Poštela and Cvinger (Eastern Slovenia)

by Dimitrij Mlekuž and Matija Črešnar

1. Introduction

The Early Iron Age studies in Slovenia have shifted from traditional studies of finds and sites to the study of their wider context, landscapes. Although the importance of the first is not under question; new technical developments in the fields of remote sensing, geophysics and spatial technologies, as well as new theoretical approaches have provided the impetus for this change.

Within the frame of the Iron-Age-Danube project hundreds of Early Iron Age sites in Austria, Croatia, Hungary, Slovakia and Slovenia have been studied. Information on the age, data quality, research activities, heritage protection status etc. were gathered. In Slovenia, we have focused on its eastern part, due to the rich research history and a large amount of available high-quality data.[1]

The basic data was acquired from public national and institutional databases.[2] As the whole Slovenia was recently covered by airborne laser scanning (ALS) and the data is freely available (Lidar data of the Environmental agency of Slovenia), this offered opportunity to study the known sites and their surroundings, but also to discover new potential sites. Dozens of sites were mapped (*fig. 1*) and a large number of new sites and features were recorded.

The large quantity of acquired data calls for new theoretical approaches. This paper presents a study of two Early Iron Age landscapes, centred around the hillforts of Poštela near Maribor above the Drava river valley and Cvinger near Dolenjske Toplice in the Krka river valley. We aim to emphasise common features and themes in both landscapes as well as differences and contrasts. It aims at displaying the richness and variability of ways Early Iron Age landscapes were used, imagined, researched and presented.

2. Landscape as an archaeological object

Landscape, as an object of investigation, could be defined as the materialization of the social practices in spatial terms. Landscape archaeology is concerned with the material, studying the processes of construction, function, signification, and valorisation of that material medium through time. Without material expressions,

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[1] Teržan 1990; Dular/Tecco Hvala 2007; Dular 2013; Teržan/Črešnar 2014; Črešnar et al. 2015.

[2] The register of all registered archaeological sites is freely available (Register of cultural heritage of Slovenia), but there are also institutional databases, some freely accessible (ARKAS), some closed, and project databases (e.g. InterArch Steiermark and BorderArch Steiermark: Database of the InterArch-Steiermark and BorderArch-Steiermark projects), which were very important when establishing the database of EIA archaeological sites.

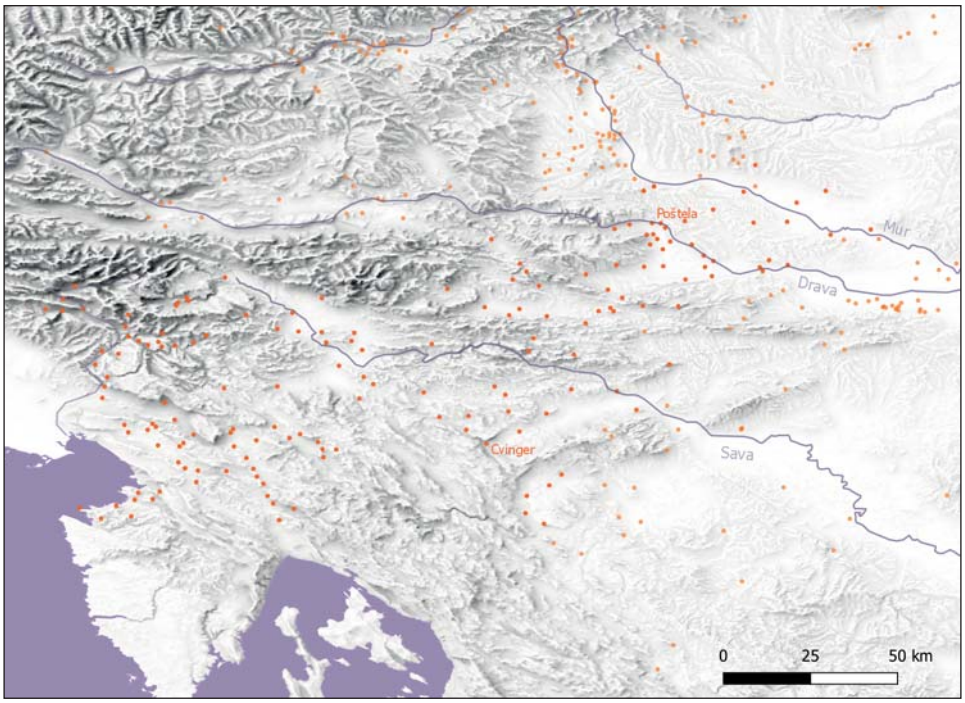

Fig. 1: Early Iron Age sites studied in Slovenia and adjacent areas within the framework of the Iron Age Danube project

social relations have little substantive reality, as there is nothing through which these relations can be mediated and presented to others. Materiality conveys meaning and social relations can be fixed and stabilised by the use of durable material resources.[3]

Processual approaches that equated landscape simply as a space (of sites, artefacts, resources ..., or as a region, a sampling universe) have failed to fully comprehensively address all aspects of human experience. The concept of space, as an empirically neutral series of relationships between objects and the environment, was replaced (or complemented) with the concept of "place", which is the meaningfully constituted and culturally constructed space that people dwell in and interact with.[4]

Thus landscapes become a set of culturally constructed and experienced "places" because of the culturally and socially determined understandings that people have of them.[5] Space exists merely as an abstraction according to this perspective, because cultural and social experiences in space reconstitute spaces as places through experience. This approach focused on lived experience, symbolic aspects, meaning, power, and the emphasis given on symbolic and sacred landscapes.

Landscape archaeology thus refers to a varied and heterogeneous field of archaeological research that shares a common interest: the spatial dimension of the past human activity as it is revealed through material traces and remains. It explores spatial dimensions of human existence, or how human communities have related

[3] David/Thomas 2008.
[4] Casey 2008.
[5] Tilley 1994.

to space through time in terms of how they structured their activities in space, transformed its appearance, significance and meaning through cultural practices.

All approaches developed or adopted by landscape archaeology, such as settlement pattern analyses, locational analyses, distributional, historical, social formation, and symbolic analyses, all can contribute toward the building of a landscape approach. Each may offer partial answers to the larger questions the landscape paradigm enables us to ask. Such an integrative methodological approach might facilitate examination of different facets of the key issue of landscape archaeology: the human experience of the world around them.

Many of these aspects of landscape archaeology were embraced into the Iron-Age-Danube project. Our common goal at the beginning of the project was to improve the research approaches as well as protection and promotion strategies of the Iron Age landscapes. This can only be done based on knowledge.

3. Studying Early Iron Age landscapes

Early Iron Age landscapes were formed by a fundamental change in the settlement of people in the landscape. It contrasts sharply with the preceding Late Bronze Age, i.e. Urnfield period, which mostly settled the fertile fluvial lowlands. In the transitional period and in the beginning of the Early Iron Age communities started to settle prominent locations in the landscape, mostly hilltops. These locations were monumentalised by erecting fortifications. There is also a marked change in burial practices. Flat cremation graves that gave the name to the Urnfield period have been mostly substituted by burial mounds, which however differ strongly in both regions; Štajerska region remained faithful to the traditional cremation rite and mostly single individuals were buried per one burial mound, whereas in Dolenjska region inhumation became the norm and multiple individuals, several tens or even hundreds, were buried in one burial mound. The letter in both regions often cluster in large groups and can reach monumental dimensions of over 30m in diameter and 6m in height.[6]

Landscapes are combinations of natural and anthropogenic features, produced, altered, used, or conceptualized by people. They are embedded ideologies, ideas and schemes. They are not only places and sites with their own function, but also material anchors of ideas, assumptions, and priorities of those who made and used them.[7] Early Iron Age landscapes can be studied in a range of different scales.[8]

The local-scale (micro-regional) analysis focuses on a landscape around a single settlement. This scale permits a focus on the structure and changes in the organization of cultural landscapes. Analysis of the cultural landscape is a viable method of examining how prehistoric societies, especially those that do not conform to more familiar or obvious political configurations, structured their daily activities in space, transformed its appearance and its meaning through cultural practices.

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6 Teržan 1990, 21–120, 204–208; Dular/Tecco Hvala 2007, 66–154; Dular 2013, 84–110.
7 Reed 1984, 7.
8 Thruston 2002, 17–20.

At the intermediate (regional) scale, one can observe political entities and hierarchies in settlement systems. We can ask what were the relationships between communities, the organisation of regional centres and hierarchy of settlement systems in a region. These relations might have influenced the autonomous polities to voluntarily surrender their authority to a centralized leadership. This scale of study meshes well with the material culture studies, focusing often on the exchange of prestige goods.[9]

The large scale analysis examines the supra-regional and/or trans-regional systems, for instance, the so-called 'Eastern Hallstatt circle' and other wider European Iron Age "world system".

In the paper, we approach Early Iron Age landscapes of two regions through prehistoric cultural geography, particularly with the analysis of processes of construction, function, signification of the landscape features.

Cultural landscapes take into account many aspects of the human past and are a useful framework for organising archaeological data. Landscape, in this perspective, is not a background or a stage on which human actions occur, limiting or suggesting certain patterns or ways of life. On the contrary, the landscape is a dialectic between people and their environment, relations encoded in the spatial relationships between constructed, imagined and used elements of the landscapes. Several aspects of cultural landscapes may be considered: political, ideological, economic, as well as sacred. These aspects are not isolated, but they intermingle and intertwine.[10]

Political landscapes are the patterns and locations of elite centres and outposts, sites of power and control, either military or political or ideological. Nodes that crystalize the formation of landscapes around them. Besides their location in a landscape, what defines them are their relations to other sites of power and other landscape elements. Thus this aspects of a landscape provide a direct link to the next, regional, scale of observation. Political-administrative hierarchy is directly embedded within the central place hierarchy; that is, the elites who govern on each level of hierarchy reside in the corresponding sites – from local to supra-regional centres. This hierarchy can be observed on a regional scale. Settlement pattern studies are often used in studying political landscapes. However, the position in the hierarchy would be visible also in differences between cultural landscapes.

The economic landscape comprises the locations of raw materials, agricultural and crafts production sites. Again, contents of such sites are important, but even more important is how these elements are spatially related. This can suggest the level of control and existence of core and backwater areas. Changes in the nonelite landscape, such as shifts from nucleated villages to dispersed farmsteads or small villages, and wide-scale introduction of intensification strategies, may indicate changes in elite demands upon rural subjects.

The sacred landscape consists of places of sacred importance, whether these are barrows, the most evident Early Iron Age sacred features, or offering places, the

[9] Dular/Tecco Hvala 2007, 155–195, 237–252.
[10] Strang 2008.

sacred groves, caves, mountains or other natural features perceived as places with cosmological importance.

Furthermore, where these different landscapes intersect and articulate reveals the relationships between them. In this connection also ideology is an important aspect. The landscape was shaped in the form that suggested rule and position of elites would be natural and self-evident. The changes associated with the rise of Early Iron Age elites were also expressed in a landscape setting. This consisted of direct control over resources, land, the movement of people but also more subtle manipulation of the location of monuments, visual landscapes and spatial narratives. The landscape was a playground for expressing particular political and ideological narratives. Ideological landscape thus lies at the intersection of political and sacred landscape, as it uses sacred to justify and enforce political position. In a system with tight central control, there may be a frequent intersection of the economic and political landscape.

4. The cultural landscape of the Poštela hillfort

The Poštela complex, comprising the hillfort with its cemeteries, is one of the most important Early Iron Age centres in Eastern Slovenia and holds its place also amongst the most significant sites in the area between the Eastern Alps and the Pannonian plain.[11]

It was erected on a sloping plateau on the south-eastern fringes of Pohorje hill-range on a dominant position overlooking the whole north-eastern part of the Drava river plain between Maribor and Ptuj. The site was settled in multiple periods, although it is the Early Iron Age (late 9th – middle of the 6th cent. BC) when Poštela seems to have reached its highest importance and has left the most intensive fingerprint in the surrounding landscape.[12]

Due to its monumental appearance it has been broadly studied since the 19th century,[13] however the last years, have due to the use of remote sensing methods, such as airborne laser scanning (ALS), and geophysics shed new light onto the whole site and its surrounding landscape.[14] In recent years Poštela has been the nodal point of the Iron Age Danube project. Therewith Poštela and its broader landscape became an object of integrated interdisciplinary research important not only in the terms of Early Iron Age studies, but also for development of research methodology, heritage protection as well as its promotion.

Airborne laser scanning survey of the complex provided the base document for the planning and integration of different surveys. Using ALS allows very precise three-dimensional mapping of the surface of the earth, even where the surface is obscured by forest and vegetation. The high level of detail on digital surface and terrain models produced from high-resolution lidar topographic data helped us enormously in the identification of past events which reworked and modified the surface of the earth.[15]

[11] Teržan 1990, 26-36, 59–77, 204–208; Črešnar/Vinazza 2019, 438–448.
[12] Teržan 1990, 26–36; Črešnar/Vinazza 2019, 439–443.
[13] Teržan 1990, 256–338, with literature.
[14] Teržan/Črešnar/Mušič 2015; Črešnar/Mlekuž 2014.
[15] Mlekuž 2012.

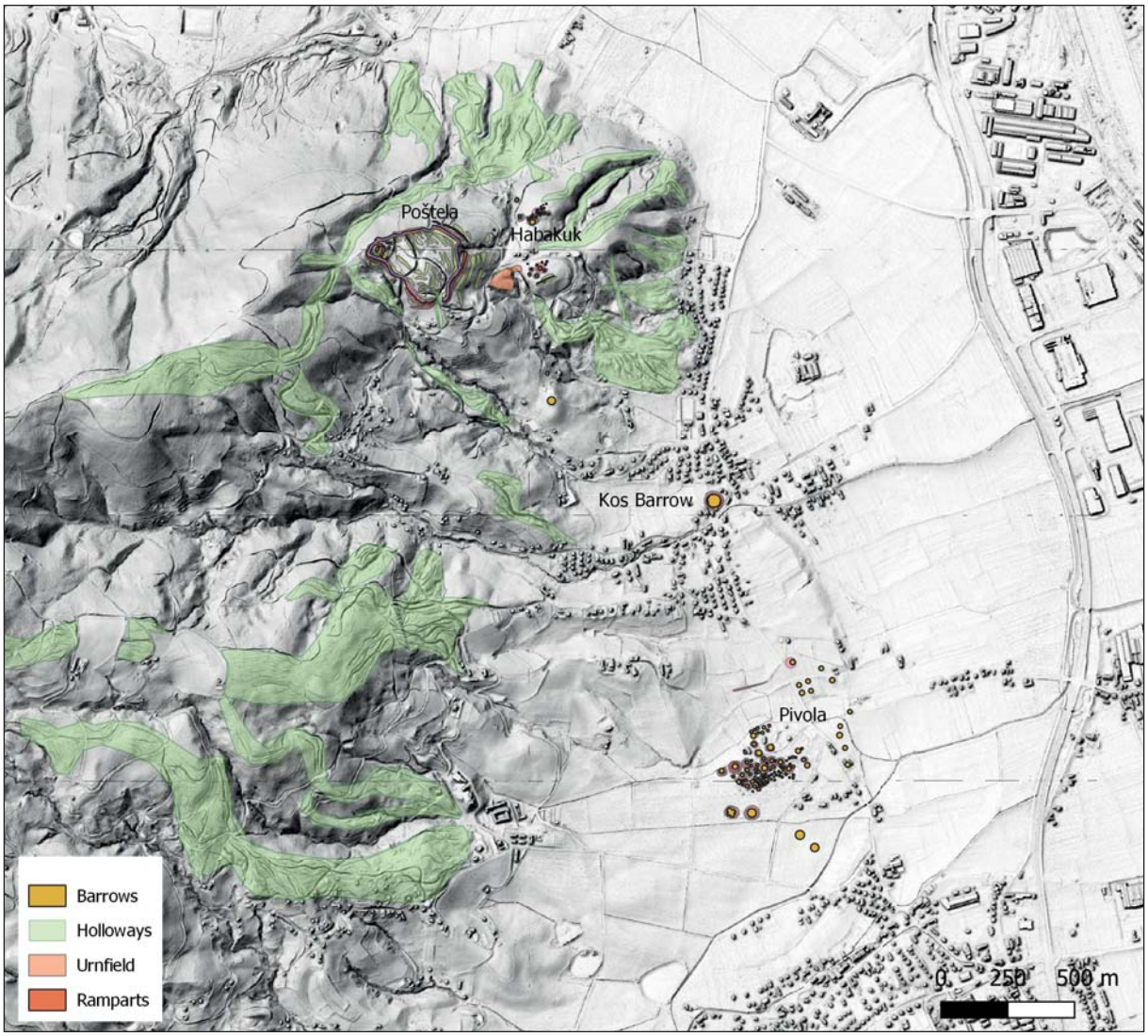

Fig. 2: Elements of the cultural landscape of the Poštela hillfort, recognized on the ALS derived DTM

The survey clearly revealed a series of new detailed information about the hillfort itself, with its monumental ramparts, groups of barrows and the flat cemetery below the settlement on the Habakuk plateau, as well as networks of holloways on the slopes, mainly on ridges, that emerge from the plain and converge on the hillfort, combining in a connected and meaningful landscape, centred on and around the hillfort (*fig. 2*). The next step of our research included intensive multi-method geophysical prospections in various parts of the complex. It was followed by low intensive subsurface methods, including core-drilling, shovel pits and only at a crucial location more extensive trial tranches.[16]

The geological map of the area clearly shows that barrows are located above on the narrow strip of colluvial sediments, stretching between the slopes of Pohorje and the

[16] E.g. Mušič/Medarič/Črešnar 2014; Mušič et al. 2015.

strip of marshy sandy-clays that were deposited in front of the gravel-rich Pleistocene Drava river terraces. This narrow strip of colluvium can also be perceived as a natural corridor of movement along with the Pohorje hill range.[17]

The hillfort itself was erected to dominate the natural corridors of movement along the Pohorje towards the southwest and along Drava valley towards southeast and northwest. There is also the nearest connection towards the other major river in the region, the Mura, with its broad plain, where sites like Gornja Radgona, Novine/Hoarachkogel, Wildon and last but not least Strettweg are located. Worth mentioning is also the visual connection to the settlement on Plački vrh/Platsch, a near neighbour of Novine, an important hillfort above the Mura river, which seem to have had a very close trade/exchange relationship.[18]

The political landscape was undoubtedly centred on the Poštela hillfort with its dominant position, reinforced by monumental ramparts and a possible wooden palisade. Viewshed analysis of Poštela hillfort demonstrates that it is a prominent landmark. Its position was chosen to be visible and to be in the visual control of the approaches along and to Drava river, especially from south and south-east. It rose prominently on the skyline for anyone moving in the northern part of the plain or approaching from along the south-eastern slopes of Pohorje or the Drava river from the south or southeast (*fig. 3*).

Its role and influence were possibly determined by the central position in a regional network of movement corridors. However, its cultural landscape was also structured by the movement itself. We have evidence of numerous corridors/networks of holloways that connect the hillfort to the cemeteries and further with the wider landscape. A fundamental implication, which comes with the acceptance of visibility as an embodied perceptual act, is the issue of mobility. The relations between movement and visual configuration of the landscape create an intensive spatial narrative for people moving along the natural corridors in the landscape as well as man-made standing structures purposefully located at chosen locations.

There is not much evidence about the economic landscape. The substantial basis was in any case agriculture, as other studies of the period show[19] and we found remains of domesticated animals and charred cultivated plants. The amount is in any case to too modest and as we lack environmental analysis, the study of any potential grazing areas or fields would be only based on recent historic sources, nevertheless, suchlike resources are ample. Besides that, we haven't been able to identify any areas of resource extraction, although there might be traces to follow. For instance, magnetite, as well as iron slag, were found in the settlement. Furthermore, broader areas of clay deposits where clay used for pottery production was extracted have been located.[20] Recently also a contemporary unfortified lowland settlement has been excavated, Hotinja vas, which comprised different handcraft activities, however,

[17] Mlekuž/Črešnar 2014, 205, fig. 3.
[18] Žibrat Gašparič/Dolenec 2015.
[19] Dular/Tecco Hvala 2007, 206–213; Toškan/Dirjec 2010.
[20] Žibrat Gašparič/Vinazza/Črešnar 2018.

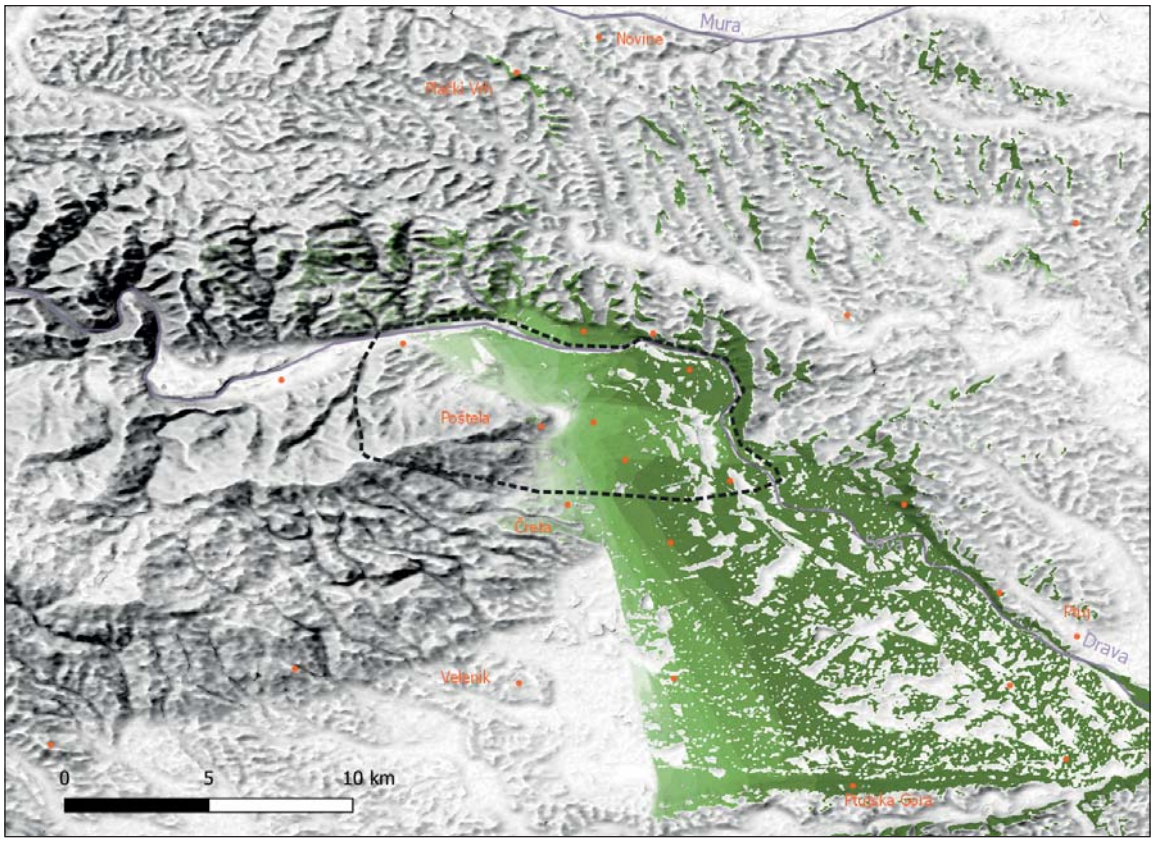

Fig. 3: Viewshed analysis of Poštela hillfort with its tentative territory

the level of production looks limited[21] and therefore cannot be perceived as an outpost production centre.

This sacred landscape around Poštela seems complex and was evidently in the ideological use, a polygon for expressing new political ideas and messages. Respecting, relating to and manipulating the existing spatial order was a powerful political message, which reproduced or subverted the existing political configurations.[22]

Bellow the hillfort there are several spatially isolated individual barrows and groups of barrows. They are all visually connected to the Poštela hillfort as their positions and visual contacts convey the idea of belonging to the hillfort community.

Groups of barrows locate on the Habakuk plateau, although spatially close can be separated into two groups, the northern (1) and the southern group (2). The separation in two groups can also be justified by considering archaeological finds.[23] From the southern entrance of the hillfort to the SE individual barrows are following the slopes into the plain at Razvanje, were also the biggest and most monumental "Kos barrow", with a diameter of 57m, a height of 6m and a ring-ditch with a width of 15m is located. The individual barrows continue to Pivola with the biggest group of barrows,

[21] Gerbec 2015.
[22] Mlekuž/Črešnar 2014.
[23] Teržan 1990, 60–61.

again showing interior division by clustering and the biggest three, although one erased in the past, standing at the south-western edge of the group.

The barrows are positioned in the landscape so they change its visual structure, to rearrange existing visual structure inherent in the landscape and the relations of barrows and hillfort to this landscape. We can assume that the choices where to locate individual barrows, whether in the landscape, or in relation to other barrows and the Poštela hillfort, were not coincidental and that the location of the barrows conveys a clear message.

The differences in the locations, funeral constructions and the heterogeneity of grave goods as well as their combinations have to root in distinct social groups within Poštela community, with different identities.[24] This is further supported by GIS analysis, as cumulative viewsheds from different barrow groups are spatially mutually exclusive, and while they partially overlap, each of them seems to be visually connected to a different area around the hillfort. However, all of them are visible from the hillfort itself, especially from the rampart at the southern entrance.[25]

Barrows in the Habakuk groups, located on the plateau below the hillfort, are spatially most isolated and compact. They are located closest to the hillfort but can be seen only from a short section of its rampart. They are not so prominent in close range or foreground view, however, a line of barrows of the southern Habakuk group, located right on the edge of the plateau is clearly visible from the lowlands in the skyline, while the rest is hidden. They are more than merely visible as they change the skyline of the ridge and are above that framed by the prominent ramparts of the hillfort above. Even more, faint linear features on the edge of the ridge are visible in the digital terrain model, which seem to predate at least one of the barrows positioned on top of one of them, could be deliberately made to enhance the skyline together with the barrows.[26]

The Pivola group is situated in a compact visual envelope in the valley, as it is situated in a shallow depression, bounded by natural features such as low ridges to the north and south. The barrows are positioned deliberately to change the visual structure of the landscape, to dominate the foreground or short-distance view, being immediate, close and engaging to all senses. When inside this group, a viewer would find himself in a well-bounded visual envelope and dominated by the immediate presence of barrows. They are less striking in the middle distance range, but still, manage to become an important compositional element of the landscape.[27]

The position of barrows in the landscape was not random and locations for barrows are carefully selected. Monuments are purposefully positioned in specific parts of the landscape, to afford views to the hillfort and other barrow groups. Even more, barrows seem to deliberately change the visual configuration of landscape, to enhance their interrelations. This visual configuration seems to imply a certain ideological message.

[24] Teržan 1990, 59–78; Mlekuž/Črešnar 2014.
[25] Mlekuž/Črešnar 2014, 201, fig. 1.
[26] Mlekuž/Črešnar 2014, 201–205, figs. 4, 6.
[27] Mlekuž/Črešnar 2014, 201–205, fig. 5.

The Poštela cultural landscape was deliberately constructed and maintained to exist as an ideological landscape.

Although expressing the basic idea of belonging to the Poštela community, the interrelation of barrow groups suggests a more nuanced story. The fact that the groups coexist, each with its individual spatial organisation[28] and have very different visual envelopes, suggests that they convey different identities within the Poštela community.

Each group communicates a distinct identity within the community, based either on lineage, rank or other criteria. Barrows were therefore powerful visual reminders, places of memory that reiterated ideas about the identity of the community and distinct kinship or rank group identities within the community. Spatial and visual relations between barrow groups and relations to the hillfort not only reflect, but actively establish the community of Poštela and different identities of its inhabitants. And because they bring identities into being, barrows and their relations are powerful media for social action and shared public understandings. Their pattern is thus a result of the internal identity politics and the ideas of belonging and identity of groups within the Poštela community. This process was never finished and completed.

5. The cultural landscape of the Cvinger hillfort

The Cvinger hillfort holds a position at a crossroads in the Krka valley in the Dolenjska region (SE Slovenia). It occupies the peak of a limestone hill above Dolenjske Toplice, dominating the lowlands around it. It is located where the Krka river, coming from its narrow valley in the north, turns to the east and opens into a plain leading to Novo Mesto, one of the most important centres of the Early Iron Age in the broader "Eastern Hallstatt world". Besides that, is the hillfort overlooking the natural corridor that branches along the Sušica and Redešica streams and leading to the south towards the Bela Krajina region, also an integral part of the Dolenjska EIA group.

Similarly to Poštela, Cvinger witnessed a long history of research. It all began with Jernej Pečnik between 1898 and 1899 when he excavated several barrows below the settlement. His work was occasionally overseen by Josef Szombathy from Vienna, who besides that explored, described and measured the hillfort. He also excavated a series of altogether 16 trenches, which was one of the first major investigations of a prehistoric hillfort in the Dolenjska region.[29] W. Schmid later excavated on the hillfort in 1935, however much more important were the investigations under the leadership of B. Križ, who excavated six additional trenches inside the settlement between 1986 and 1991. He has also determined the location of the iron-smelting area and excavated one trial trench.[30] The area was later surveyed also by Branko Mušič, using the geomagnetic method. Thereby the site has become the first geophysically prospected smelting area from the EIA in the region.[31]

[28] Črešnar 2017, 269, fig. 3.
[29] Dular/Križ 2004, 212–214.
[30] Križ 1988 [1999]; Dular/Križ 2004, 214–230.
[31] Mušič/Orengo 1998.

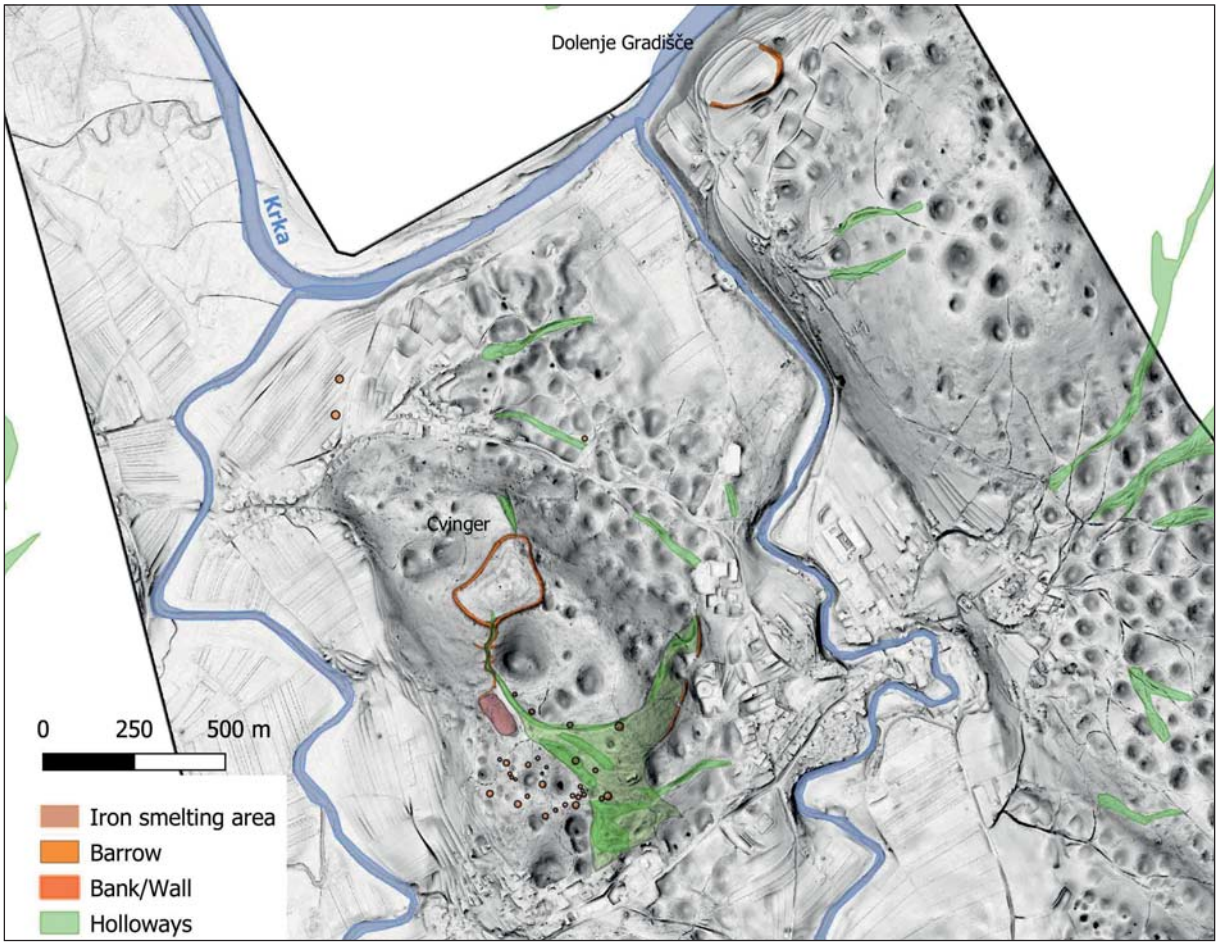

Fig. 4: The cultural landscape of the Cvinger hillfort, recognised on a ALS derived DTM

Since 2015 research into the settlement and its surrounding landscape were reawaken in the framework of the ENTRANS project, followed by the Iron-Age-Danube project. In the first step of our research, we have used the ALS survey for the creation of the base document of the area. The accurate analysis revealed the details of the monumental rampart and the internal structure of the settlement, as well as the newly discovered embanked approach, leading from the smelting area on the southern side of the hill into the hillfort (*fig. 4*). Furthermore, large scale multi-method geophysical measurements (magnetic method, magnetic susceptibility of surface layers, low-frequency electromagnetic method and electrical resistivity tomography), as well as the intra-site surface collection, were conducted.[32] Besides that, small trial trenches were excavated on selected locations to provide the best possible information for interpretations of certain geophysical anomalies and answer to other important archaeological questions.

The hillfort has an irregular trapezoid form and is one of the best-preserved fortified prehistoric sites in the region, as it was never reoccupied after the end of the Early

[32] Mušič et al. 2015; Črešnar/ Vinazza/Burja 2017.

Iron Age. Its form is influenced by the karstic landscape with several dolines, which are partly incorporated in the fortification logic.

The interior of the settlement consists of several settlement terraces.[33] Preliminary results of geophysics and surface collection show also distinct areas that were probably used for craft activities connected with fire and metallurgy; however, the research in these aspects is still ongoing.

In the first occupation phase, i.e. in the Late Bronze Age, the settlement was surrounded by an earthen dyke embankment, which was constructed in such a way that an earthen fill was inserted between wooden panelling. The first embankment was destroyed in a fire connected event dated to the 10th and 9th centuries BC. It seems that Cvinger was then abandoned for a considerable period, and occupied again only in the late 6th century BC when a dry stone wall was constructed on the remains of the former earthen construction. Traces of stone quarrying are encircling the hillfort. The limestone was extracted for the building of the wall, built above the remains of the previous fortification. These traces are visible on ALS derived DTM (*fig. 5*) and represent a feature never noticed before on other EIA sites in the region.

Particularly surprising is the approx. 180m long embanked southern approach path, strengthened also by transverse walls, discovered on the DTM and confirmed by test trenching (*fig. 5*). It is a structure with no suitable parallels as the only similar structure in the region is the much shorter (20m) simple linear embanked approach path at the entrance to the Vinkov vrh hillfort, located not far away to the north above the Krka valley.[34]

The iron smelting area lies on the saddle called Branževec south of the settlement and besides the path coming to the hillfort from the nearby barrow cemetery (*fig. 4*). This area has been detected by the surface collection of slag and burned clay already in the 1980's and the also studied by geophysics.[35] Since 2015 this study was followed by intensive multi-method geophysical prospections and test trenching. The preliminary results show that the remains of furnaces and smelting waste can be detected on an approx. 0.6 ha large area with remains of at least a few hundred furnaces.

In the Early Iron Age, the Cvinger community buried their dead in at least three barrow cemeteries, two on the north side of the hill at Gomivnica and Dolgi deli and the biggest one, with at least 26 family/lineage barrows at Branževac.[36] The finds from the barrows testify of a community with access to prestige items.[37] The wealth can be probably attributed to the successful and efficient resource management and handicraft, undoubtedly connected with trade and/or exchange.

The political landscape of Cvinger reminds us partly of Poštela, as it occupies a nodal point in the landscape, exercising not only the visual control over the Krka river valley but also over the valley, leading from Dolenjska region to Bela Krajina (*fig. 6*). The area

[33] Dular/Križ 2004, 211–212, 231.
[34] Dular/Tecco Hvala 2007, 183–184, 341, fig. 104, 263.
[35] Dular/Križ 2004, 228–230; Mušič/Orengo 1998.
[36] Dular/Križ 2004, 209–212.
[37] E.g. Teržan 1976, T. 12, 24, 25: 1, 29: 4.

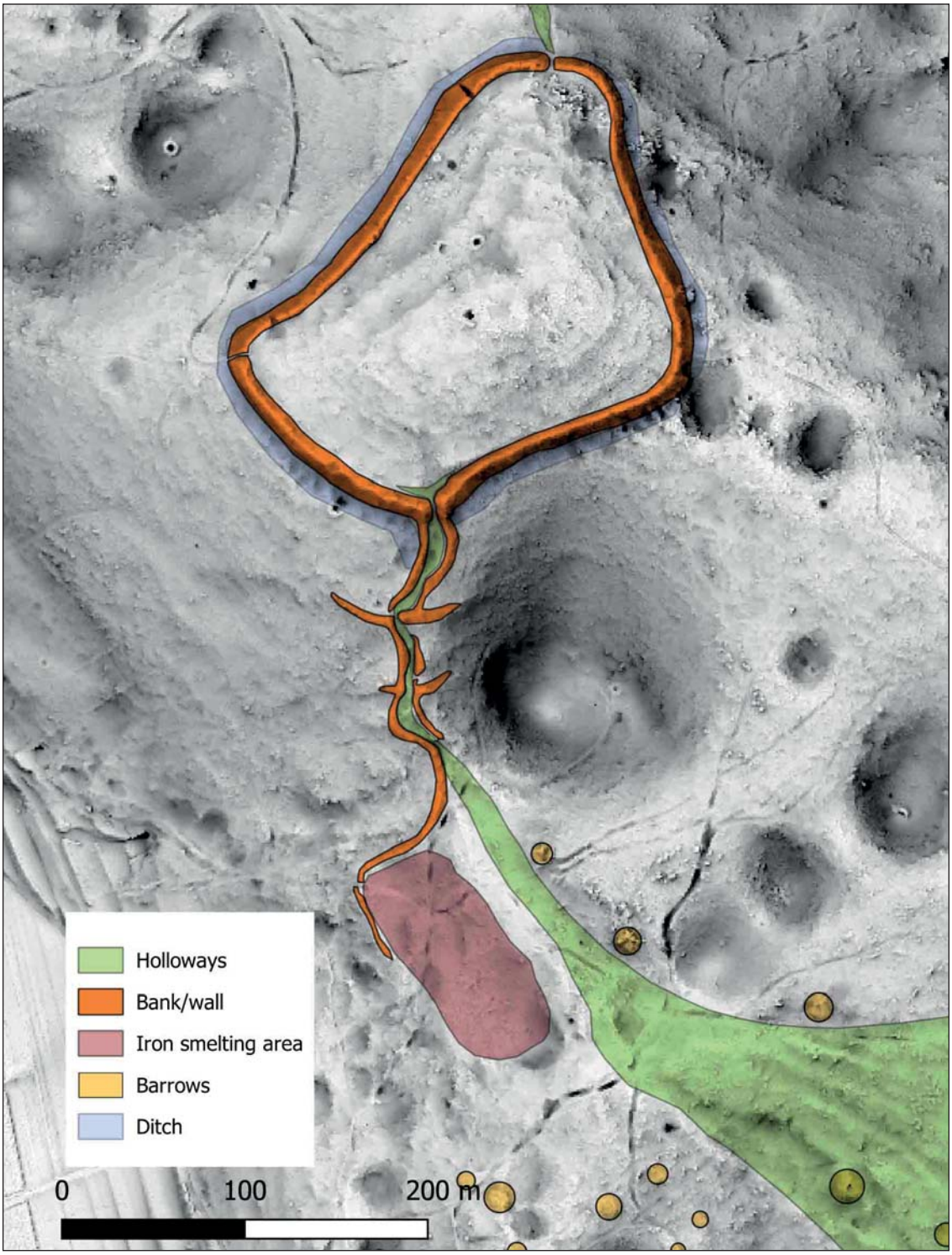

Fig. 5: Cvinger hillfort with the monumental southern approach from the iron-smelting area

around the Cvinger hillfort is a very compact, well-delimited lowland area, bordered by hills and highlands; especially to the north and west ridges are rising more than 300m above the valley.

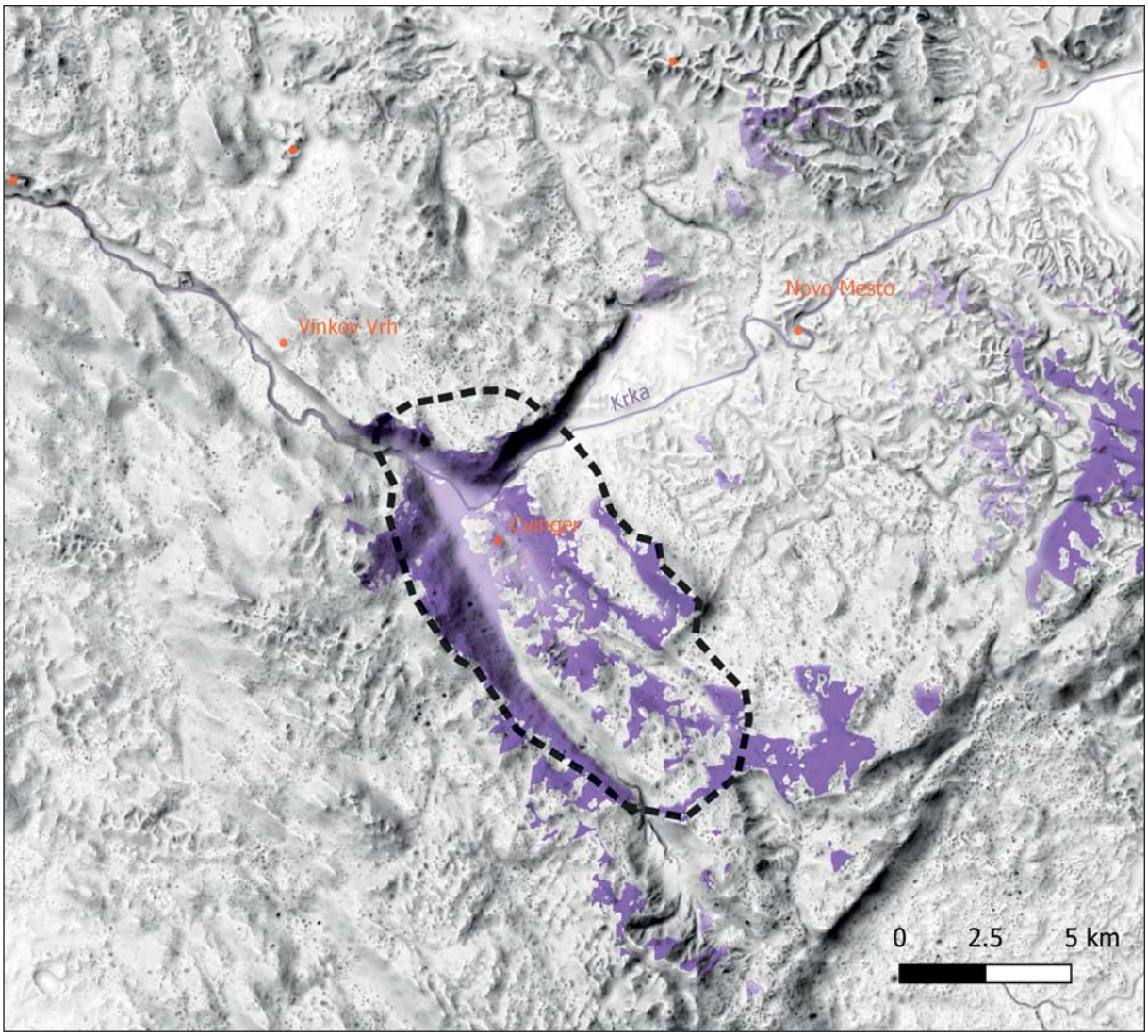

Fig. 6: Tentative territory of the Cvinger hillfort, based on a viewshed analysis

In the immediate surrounding of Cvinger, right above the Krka river in the narrow part of the river valley another fortified settlement is located, Dolenje Gradišče. It can be dated to late prehistory, more precise attribution to LBA or EIA is at the moment not possible. Its strategic position is nevertheless extremely interesting as it directly controls the access from the east along the Krka river valley. If it is contemporaneous with Cvinger, it could have had a function of control over the border with the territory of the EIA centre at Novo mesto.

The compactness of the Cvinger hillfort landscape can be observed again if we take a look at its sacred landscape. There are three barrow cemeteries located below the settlement, with none of the barrow further away than 600 m. However, it is only the one at Branževec (*fig. 5*), which can be still studied, although even there most of the 26 barrows have been excavated or reworked,[38] making them difficult to detect.

[38] Dular/Križ 2004, 210–221.

Besides the close visual connection to the hillfort, the most obvious feature of the barrows is their relation to the corridors of movement, which can be seen in the intertwined holloways, winding around the southern side of the hill from the east. This is a common phenomenon, seen already at Poštela, but also at other EIA sites in the Dolenjska region, with the best example probably at Veliki Vinji vrh and its main barrow group located around its western approach corridor.[39]

This makes a powerful association between the settlement and ancestors, which is enacted through bodily movement. Everyone moving from or to Cvinger enacts a relation place of the living and place of the ancestors. It sends a message of belonging, which situates a hillfort within the sacred landscape of the burial mounds and thus legitimizes the position of the community and their elites as they are the heirs of "the glory of their ancestors". Here an existing spatial order conveyed a powerful political message, which reproduced and confirmed also the existing political order.

This message of power was emphasized with the reference to the economic landscape. Here, the key role was played by the iron smelting area, occupying a central node in the movement network. From here a corridor of holloways branches off toward the east. Besides that, also the eastern edge of the smelting area was flanked by barrows.

The smelting area was at least on the northern side embanked with a stone rampart, which continues into the embanked approach path, leading to the main entrance of the hillfort.

It was, in any case, the most important part of the economic landscape, as the wealth of the community was produced here, but as it was located right beside the approach path, the obvious intention to convey this information to any guest cannot be overseen. Similar ideas have been reported for sites like Veliki Vinji vrh, Marof in Novo mesto and others, however, it is only Cvinger, where we can so clearly see these spatial relations in the Early Iron Age cultural landscape, articulated into a clear political message of wealth, power and control.

The economic landscape has extended far beyond the smelting areas, as basic resource for iron smelting (iron ore, wood/charcoal, clay) were most probably gathered not only in the immediate surroundings, however data on this is not available.

There is no question, that the cultural landscape of the Cvinger hillfort, which for instance secured their basic resources did not end at the foot of the hill. Although we lack the important "off-site" data from the lowlands and even more the environmental data, it is interesting to note, that the lowlands around Cvinger are full of little known prehistoric sites, which have great potential for further investigation of this very compact settlement cell.

Conclusions

Comparing the Early Iron Age cultural landscapes of Poštela and Cvinger near Dolenjske Toplice we can discern some common themes.

[39] Dular/Tecco Hvala 2007, 177–181, 323–329; Mason/Mlekuž 2016, 99–101, fig. 3.

Early Iron Age cultural landscapes are organised around central settlements or hillforts. The hillforts, with their ramparts, are monumental structures, made not only to fortify the settlement but also to display the message of control and power. In both case studies hillforts seem to control the lowlands below or around them. Most probably the area that was directly controlled, was used for agriculture or even settled by dispersed farmsteads or small villages, e.g. Hotinja vas in the vicinity of Poštela in the developed early Hallstatt period.[40]

This area was probably the economic foundation of the hillfort, the main part of its economic landscape. It consisted of fields, meadows, pastures. This was brought under social control maybe in the form of tenure; it was an area where most of the daily practices were performed.[41] However, in the case of Poštela and Cvinger near Dolenjske Toplice, those aspects are not visible, mainly due to the later reuse of the land. There is some evidence that points to the Iron Age land division and land use traces from the surroundings of the Veliki Vinji vrh hillfort.[42] Some clues for understanding this topic might be also extracted from first results of recent studies of the better preserved prehistoric land divisions in Slovenian Karst, with very well preserved traces of land division and land use.[43]

An important aspect of the economic landscape are production sites, such as iron smelting area at Cvinger. Its position is in direct connection to the hillfort, communication network and barrows. That points to its core importance for the community.

Besides the hillforts are barrow cemeteries the most visible elements of the Early Iron Age landscape. The sacred landscapes were monumentalised in the form of large barrows and barrow groups. And although the burial customs differed strongly in both areas, it seems very likely that they communicated similar messages, discussed above. As the cemeteries were not located in hidden places, but purposefully positioned besides the main communications. They were obviously also meant to be experienced while moving to or from the hillfort, establishing connections and spatial narratives. Ideological narratives were enacted through daily practices of moving around the landscape, performing daily tasks.

Furthermore, they were associated with sacrificial places or offering sites, as the one on the Habakuk plateau bellow Poštela,[44] or the one at Turska kosa in Croatia.[45]

In both study cases, but also at other sites in the regions, the barrows appear in discrete groups. The study of the Poštela micro-region suggests that different barrow groups are associated with different identities within the hillfort population and points to dynamic internal politics within the hillfort community. The same could be

[40] Gerbec 2015.
[41] Mlekuž 2015.
[42] Mason/Mlekuž 2016.
[43] Mlekuž 2014.
[44] Črešnar/Vinazza 2019, 446, fig. 7.
[45] Čučković 2009.

probably applied also to Cvinger barrows or others in the region.[46] As one barrow in the Dolenjska group comprises a large number of graves (family/lineage) they should be better compared or equated with a barrow group of the Štajerska group,[47] where the close relations of individual buried in each of the barrows are indicated by close proximity and interconnection of the build monuments.

In both landscapes, explored above, landscape elements seem to combine in a powerful ideological message. Early Iron Age landscapes were organised in a way to suggest power and legitimacy of a ruling elite, controlling the hillfort and landscape around it. Landscape became a network of culturally constructed and experienced 'places' created through cultural and social practices based on the common but also contested understandings that people have of them. Places had meaning; cultural and social experiences in space reconstituted spaces as places through experience.

Landscapes are, on one hand, a record of long-term interaction between humans and the environment, population dynamics, land use as well as cognitive and symbolic aspects of the past existence, as this study demonstrated. The landscape is also the framework that enables integration of research into a comprehensive interpretation of the past. Focus on the spatial aspect of archaeological record enables integration of different methodologies (from remote sensing, geophysics to the functional and technological study of artefact assemblages …) with theoretical approaches focusing on a living experience, symbolic aspects of cultural landscapes, meaning, power, and the emphasis given on symbolic and sacred landscapes.

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[46] Important information considering internal politics within the individual social groups can also be deduced from grave goods, where shifts of power between families were repeatedly suggested (e.g. Teržan 1976, 285–291; Dular/Tecco Hvala 2007, 237–245).

[47] E.g. Črešnar/Vinazza 2019, 445–446, fig. 6.

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EARLY IRON AGE
LANDSCAPES
OF THE DANUBE REGION



Connecting European archaeological heritage to wider transnational networks has gained significant attention in the past decades, and has become a vital tool for heritage research, protection, promotion and touristic use. One such network was initiated in 2017 by 20 partners from five countries across the Danube region. They have jointly prepared the Iron-Age-Danube project which received funding in the framework of the Interreg Danube Transnational Programme. Its full title, Monumental Landscapes of the Early Iron Age in the Danube Basin, indicates the main focus of the project.

The present book summarizes the results of activities undertaken to fulfil the basic aim of the Iron-Age-Danube project, to create new datasets and translate them into knowledge to be used in future heritage protection and promotion. The project explored the rich archaeological heritage of the Early Iron Age in the Danube region, i.e. the monumental archaeological landscapes, hilltop settlements and tumulus cemeteries from the Hallstatt Period, using modern archaeological methods, combined in an interdisciplinary approach. The project's major innovation is the methodological shift of dealing with complex prehistoric landscapes rather than individual sites. The studies in this book explore prehistoric land use, settlement dynamics, and tumulus cemeteries on a micro-regional scale, contributing to a better understanding of past landscapes as well as the potentials and limitations of cutting-edge technologies in archaeological research.