

OCCUPATION, TRANSFORMATION, COMMUNICATION.

Interaction between the geographic environment, regional administration, and traffic in Northern Transdanubia during the Roman Period. The ALP project

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When the expanding Roman Empire reached today's Transdanubia and incorporated the area as Pannonia province, this part of the Carpathian Basin got under a strong central rule for the first time. The economic and social framework that developed determined not only the history but also the structure of the territory in the centuries to come. Our understanding of how the economy, society, or simply life was organised in the territory of the former empire is constantly improving. The presented research project focuses on settling in Pannonia, that is, in North-western Transdanubia throughout the Roman Period, by investigating the topic using non-destructive methods instead of excavations. It aims to reveal how the new power situation and economic structure affected the environment and how the new economic units emerged as a result of the mixing of a new immigrant population, the slow but constant inflow of which was related to the military occupation of the region, and the local population. The focus, in this case, has shifted from the limes, a zone that required constant military presence, to the hinterland, where steady food production secured a reliable supply for the army.

Keywords: Pannonia, occupation of land, veteran settling, Roman land survey, landscaping, landscape archaeology, geospatial modelling, multispectral UAV

FOREWORD

The large-scale archaeological investigations carried out in the past 25–30 years have proven the relevance of the survey of large continuous areas in topographic research. The idea behind the project presented in this paper was to learn about the processes taking place in well-delineated settlement zones (equal to Roman land use units) by investigating large continuous areas. Eventually, the volume of the areas to be researched during the implementation period and the novel approach will hopefully yield results that represent a significant step forward in reconstructing the settlement history and inhabitation pattern of Pannonia province while also promoting the potential of non-destructive research methods (*Fig. 1*).

RESEARCH AIMS

The aims of the project cluster around three distinct but not unrelated foci. Its theoretical background is based on previous hypotheses (BÖDÖCS 2011; 2013; 2014), which included a conceptual model of the land distribution (*centuriatio*) around Savaria, the first town in Pannonia established by Romans, and some related observations made in the landscape recently. The questions include ones that have been giving researchers a lot of thought in the last century and a half, like: How relevant are antique sources regarding the number of *veterani* who were granted a piece of land when the region was parcelled into regular units (*centuriae*) and distributed? Actually, the approach and aims to make this project a macro-level household archaeological research, as it strives to reach its goals via identifying farmsteads, buildings, potential *villas* and estate boundaries within the already identified *centuriae* – square plots of 708 x 708 m, about 50 ha each (*Fig. 2*) – and carrying out a spatial analysis of their relationship, while also investigating how the extent and boundaries of these economic units changed with time. Currently, such investigations, using the methods of household archaeology of topics like settling down, the occupation of land, and the social layer

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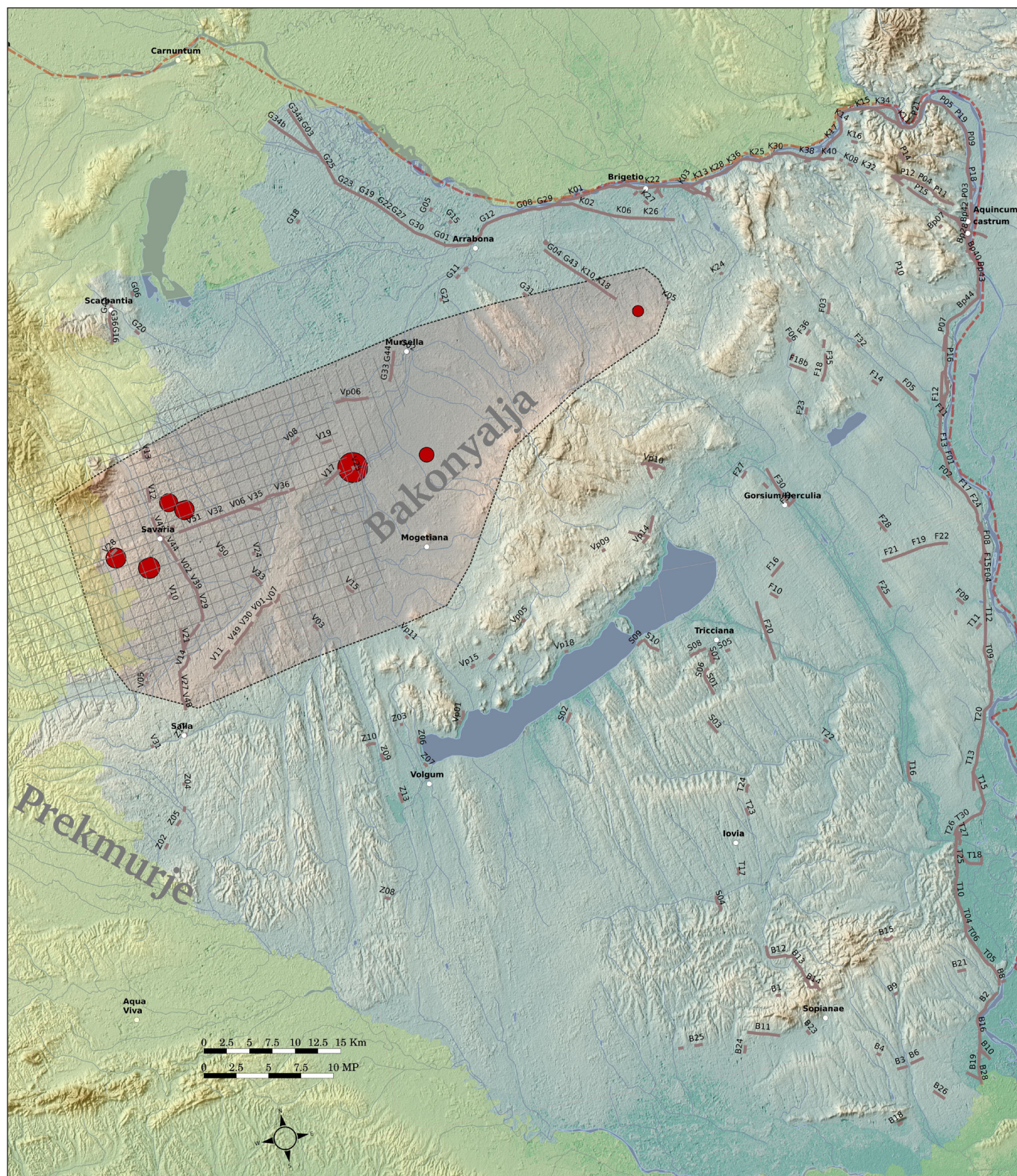


Fig. 1. Reserch area on the research plan of the project. Red dots mark the sites selected for a more detailed investigation with respect to the reconstructed area of the Roman land distribution (coloured patch) and the supposed road network (grid).

1: Felsőcsatár, 2: Ják/Nárai, 3–4: Vasasszonyfa/Salköveskút, 5: Sárvár, 6: Pápa, 7: Ete

primarily engaged in agricultural production, have an upswing in research internationally. However, projects aimed at learning about non-urban Roman life have only started recently; these also involve complex investigations of specific regions (e.g., De Haas *et al.* 2015; De Haas 2017). Still, our project counts as novelty as – albeit the traces of *centuriatio* have been identified at multiple places in the territory of the former

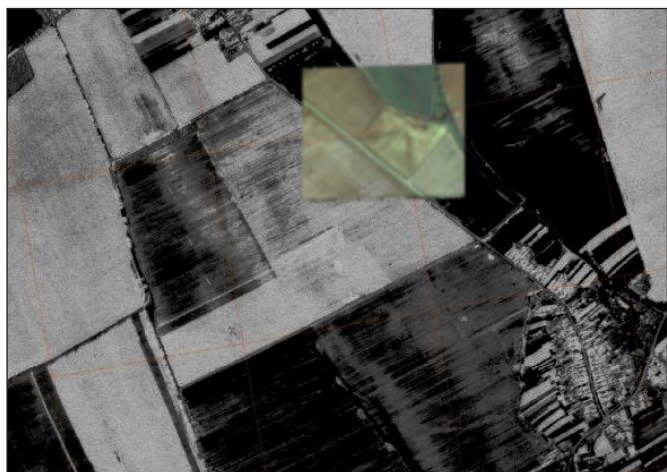


Fig. 2. Roman land distribution unit (*centuria*) in the surroundings of Kőszegpaty and Vasasszonyfa, as appearing on a compound of photos taken at different times. Archive of the Military History Institute and Museum and Google Earth (26.06.2003)

Roman Empire – previously, there was no attempt to survey and learn about a whole region that was once subject to Roman land distribution and check the results against antique sources.

The complex non-destructive investigation of the fifty-hectare *centuria* units – including fieldwalking, multispectral UAV image-based mapping, and magnetometry – can provide information about the internal arrangement of these holdings. Having their borders identified topographically, we may have data suitable for testing economic-historical hypotheses like the transformation of the initial smallholdings into large estates. This hypothesis was based on epigraphic research and the data of the occasionally identified *villas*; our complex approach represents the first real opportunity to test it.

The second focus of our research is the landscaping activity of Romans. If the antique writers on land

surveying are to be believed, the Roman occupation automatically brought about the mapping and precise division of the new lands and their transformation to suit the requirements of the Roman production structure. At the same time, historical sources contain plenty of *topoi* concerning Pannonia, most of which are based on antique sources and seem to have been refuted by research recently. For example, historical sources often men-

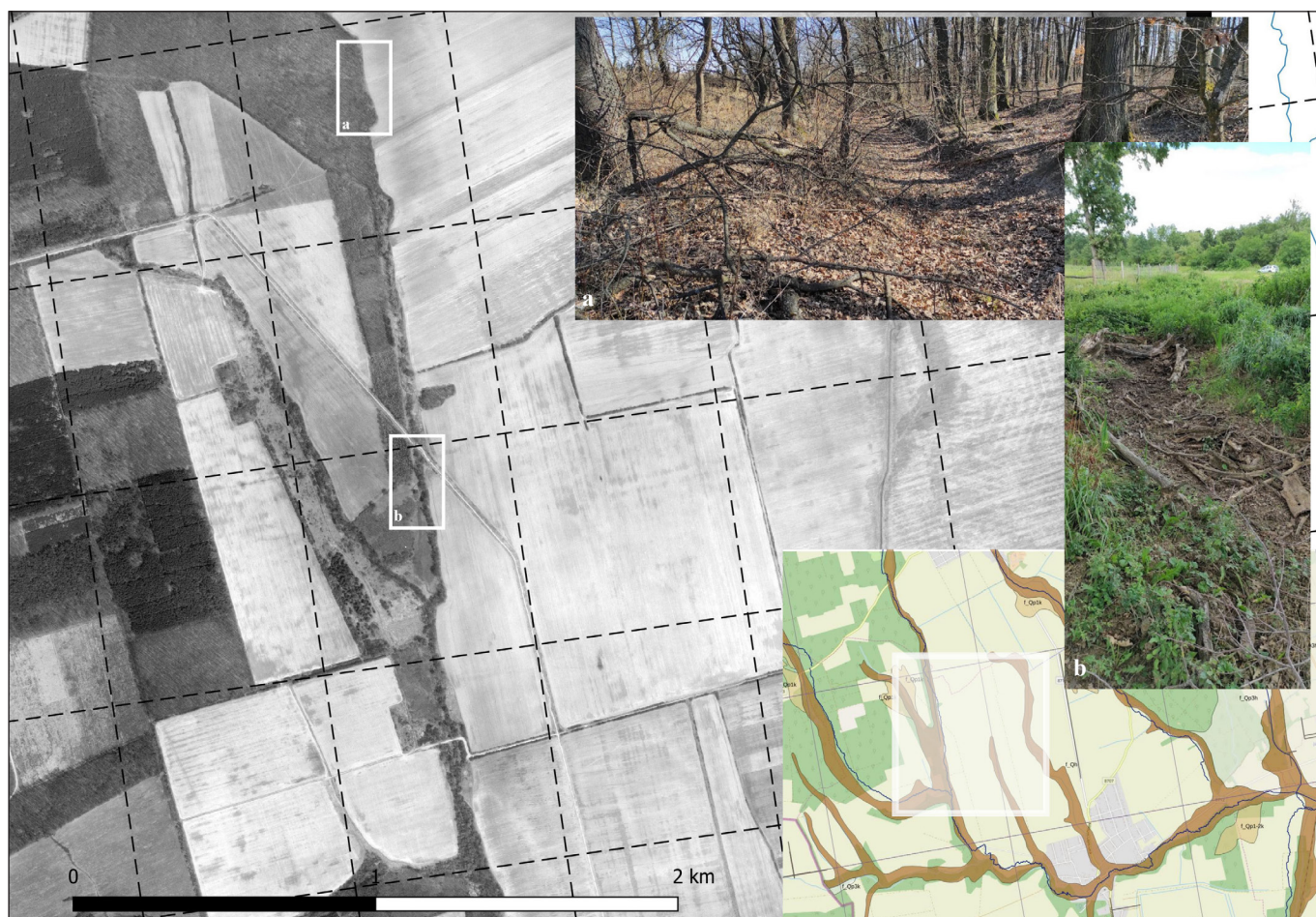


Fig. 3. The direction of the straight bed of the Sorok stream, a temporary watercourse in the area of Ják and Nárái, matches the *centuriatio*, as visible on a map of the Mining and Geological Survey of Hungary and aerial photos (source: Fentrol.hu)

tion the vast forests of Pannonia, quoting antique authors, who themselves often recorded only ear knowledge. Accordingly, the image of the first incoming *veterani* who got lands there, starting the transformation of the landscape with massive and gruelling deforestation, is still vivid in academia. Were this the case, that is, the area selected to give it away to discharged *legionari* for settling was really covered with forests, the land distribution should have been preceded by large-scale land surveying, which the Roman surveyors must have completed before the giving off of plots. If a considerable part of the area was covered with forests, they could not divide it into perfectly square sections – a task they carried out with remarkable precision – in a relatively short time. Anyone who has ever tried to set out a straight line in a forest knows how difficult it can be. Therefore, it seems much more probable that the plots of land intended for discharged soldiers were marked out on lands that were already in cultivation – especially if we add that, according to Tacit (*Annales* I.17), one of the (main) causes of the insurgency that had broken out only a couple of decades before the land distribution around Savaria was that the holdings granted to the veterans were swamplands in unfavourable locations. In conclusion, it is reasonable to suppose that the environment that greeted the new settlers was very similar to today.

We have several indirect clues suggesting the transformation of the hydrological conditions, i.e., the changing of the beds of streams, but conclusive evidence is yet to be found. Therefore, the research areas were chosen to include territories where the direction of the current beds of watercourses shows an unusually close match with that of the *centuriatio* (Fig. 3) and, besides, they have suspiciously many straight sections. We investigated the topographic conditions around these watercourses and used the results to point out areas for magnetometry survey and soil sampling to find the original beds of potentially diverted watercourses. The research for the possible traces of the landscaping activity of Romans also brings along hydrographical, hydrological, sedimentological, and anthropogenic geomorphological questions. Artificial alteration of the hydrological conditions of an area has caused disasters in many cases or at least has often had a negative impact on the quality of the lands. The landscape elements in the focus of the project may serve as examples for research into anthropogenic geomorphology and provide a point of reference for the analysis of the effects of human interference on the environment and their compensation. By identifying the traces of large-scale landscape alterations and understanding the reasons behind and the technical details of execution, we may also provide new opportunities for the research of, for example, climate change.

The third focus of the project has been to create a reconstruction model of the administrative units and road network of the study area. The *centuriatio* around Savaria seems to have affected, besides Prekmurje (Slovenia; Muravidék in Hungarian) (RUTAR 2018), the northern and western areas of today's County Fejér (BÖDÖCS 2011). In our hopes, the accumulation of topographic and aerial archaeological data on traces of Roman road stops and buildings related to these smallholdings, together with geospatial analyses and the research of the Roman road network in the study area, will allow for a gradual improvement of our current understanding of the administrative boundaries of Savaria *colonia* and the native *civitates*. As it was mentioned above, the previous model describing the process of *centuriatio* highlighted the importance of the artificial alteration of the hydrological conditions, turning the attention of researchers to this topic; however, some hypotheses suggest that the boundaries of this grid network have also been taken into account later when the road network was designed (PETERSON 2014). If that were indeed the case, that would bring us closer to creating road network reconstructions that can be tested using available methods and techniques.

We know from antique sources (Hyginus Gromaticus: *Constitutio limitum*, 28) that the *centuriatio* in Pannonia also included lands that did not belong to the *colonia*. Therefore, it is worth surveying the lands adjacent to Savaria when mapping the traces of Roman land distribution in the region. We attempt to show how the gradual, relatively slow inhabitation of the region, driven by economic reasons, took place (in contrast to military occupation) because the location of the administrative boundaries within Pannonia – and especially in the Hungarian parts of the former province – is still subject to debate. Recording the physical traces of the occupation of land (land distribution, road network) could immensely improve the chance of creating a faithful reconstruction, and clarifying these boundaries might specify – at points, perhaps alter – the current hypotheses about the Roman settlement network. Besides, the research of the persisting traces of the Roman land distribution and the related artificial landscape formation is worth investigating, as these

boundaries remained in use for a long in Roman times. Thanks to the meticulous Roman administration, the *formae*, the lot and boundary maps, a copy of which were always archived in Rome, could be used as evidence in case of land dispute and, as a case from North Africa shows (CIL VIII, 22787), also as a point of reference based on which the borders could be changed back anytime.

While the population and the borders changed multiple times during the centuries of Roman rule, the physical boundaries have remained in respect.

APPLIED METHODS

From a methodological point of view, the project relies hugely on multispectral drone-based sensing. While this technology has already proved its worth in agriculture, it is still not widely used in archaeological research projects like ours, even internationally, albeit unmanned vehicles equipped with sensors for the visible light spectrum have been a useful addition to archaeological field research for long. Near and far infrared spectrums, when combined with the red, blue, and green spectrums of visible light, enable the calculation of vegetation indexes that provide more reliable information on the actual state of vegetation than visual data. The comparison of the results of these surveys with the geophysical maps of large areas yields a pattern, a data set where the changes in vegetation may be linked with subsurface archaeological features. Thus, the data collection phase of any research can be extended and freed from the constraints represented by the relatively short window of the current aerial archaeological practice.

We aim to improve the current digital model of Roman land distribution, the initial data set of the project, by introducing more specific topographic data on the *centuria* borders and reconstructing the process of inhabitation, including chronological sequencing. We also wish to learn about irregular plots: do they represent different land survey phases, or are they simply the results of errors? Moreover, based on the relation between the land distribution scheme and the road network, investigated via a geospatial analysis of the collected data, we will create a possible reconstruction model of the paths of the former roads and test the results on the field.

THE RESULTS OF THE FIRST YEAR

The four-year-long project started with the initiation of multispectral data collecting in December 2021 (the analysis of the available archive photo record had started before, and we only continued with it). As this

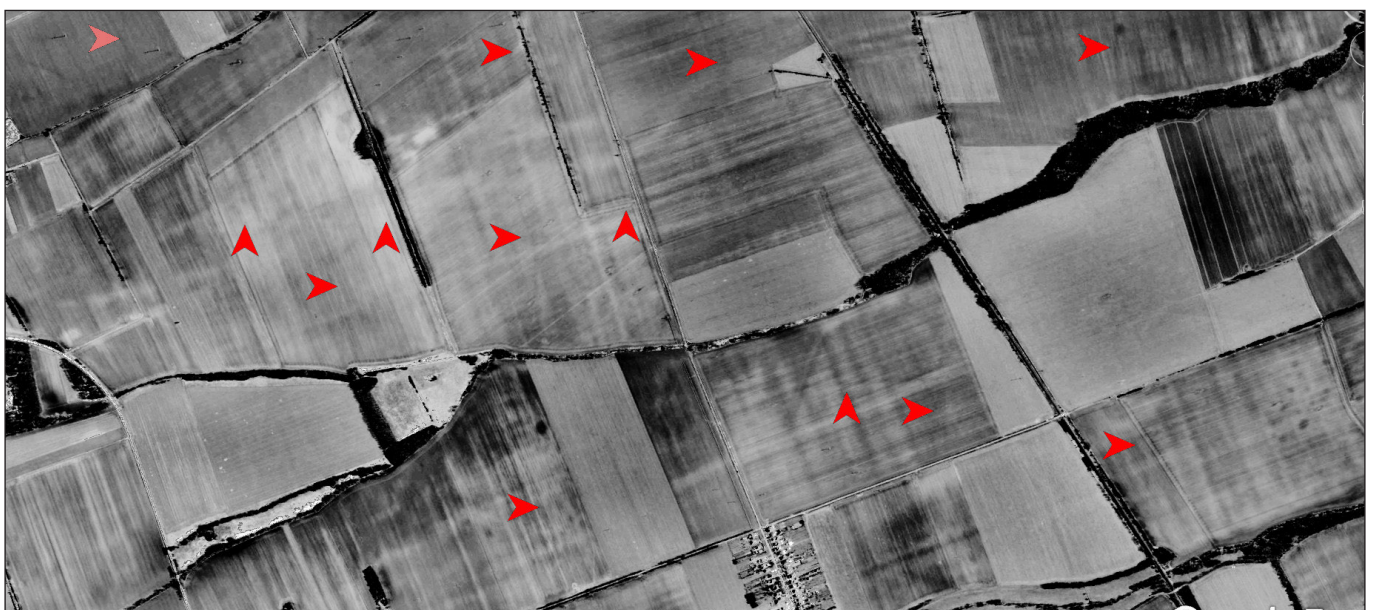


Fig. 4. Traces of the Roman land distribution in the surroundings of Salköveskút and Söpte on a satellite image from 2021 (source: Google Earth)

technology was new to us, the time spent evaluating data in the first phase was disproportionately much. Thus, the first surveys, the data of which proved to be useful indeed, were made in a less active phase of the vegetation; nonetheless, the comparison of the data sets from the areas below yielded interesting results.

Salköveskút–Nyugati mező, Salköveskút–Közép-dűlő, Salköveskút–Kopraló, Söpte–Napkeleti-dűlő (Fig. 4.)

We detected about twenty *centuria* units, the roads between them, and their crossroads in an area of about a thousand hectares on satellite images by Mayar Tech/Google Earth taken in February 2021. This is the largest continuous area to be investigated by analysing remote sensing data so far. Recently, a military diploma from the Traian era was found near Salköveskút; the find can be linked with the land distribution for veterans (AGÓCS & ANDERKÓ 2021).

Ják–Csillagmajori mezők-dűlő (Fig. 5)

The orthogonal intersections observed on previously digitised contact prints of photos made in 1953 and '54, currently stored in the archive of the Military History Institute and Museum (MHIM), outlined a continuous series of *centuria* units in the surroundings of Ják, south-west of the village (photo IDs: 13142-13145 (1953); 13157-11359 (1954)). The area in question is marked as a forest on the maps of the First and Second Military Survey, indicating that perhaps vegetation cover helped to preserve so much of the former Roman roads.

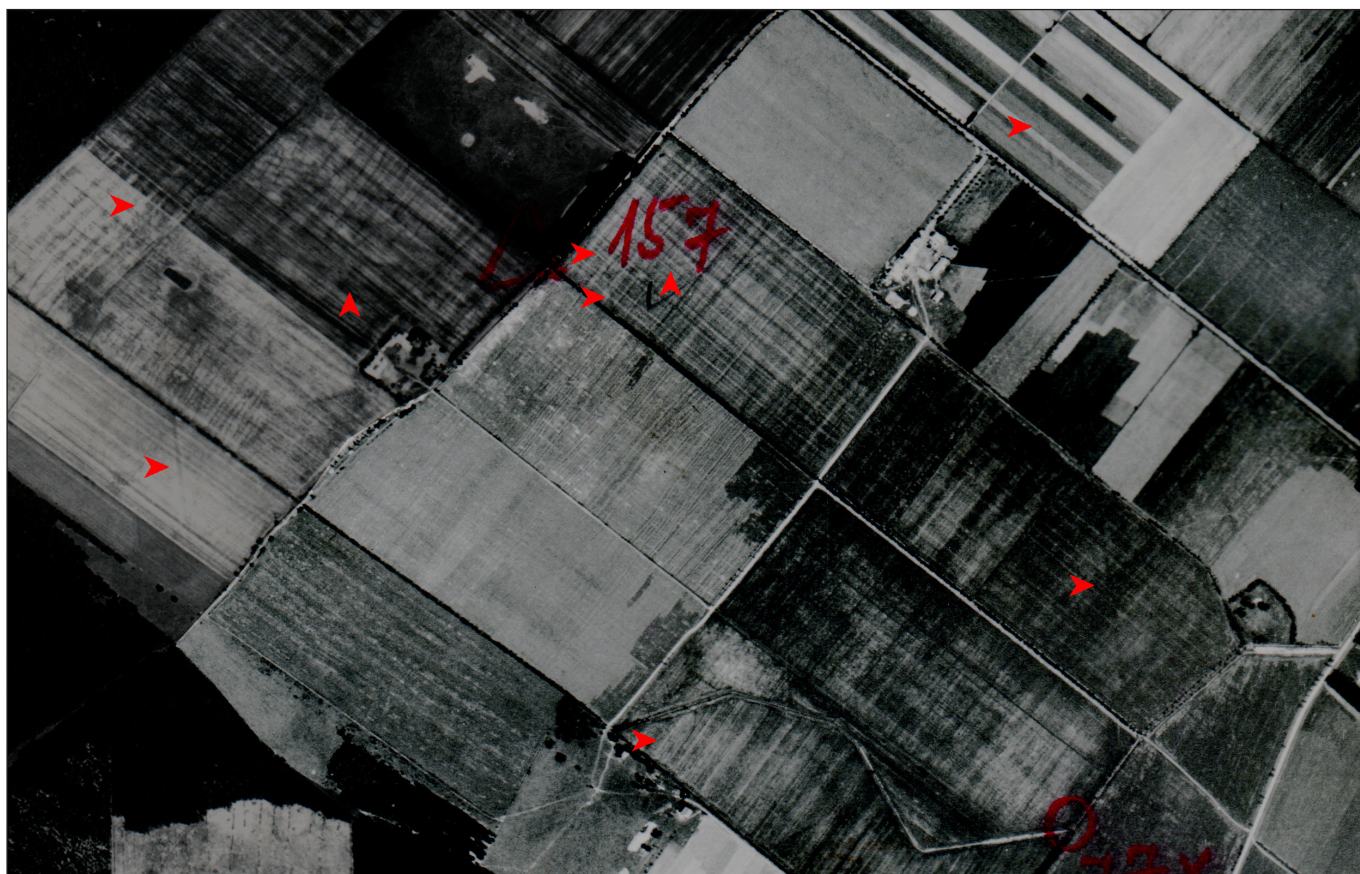


Fig. 5. The traces of the Roman land distribution in Ják–Csillagmajori-mezők-dűlő were still discernible on photos taken in the 1950s. The cultivated lands in this area had been covered by forests until the 19th century

Ják–Gyergy (Fig. 6)

The area was chosen for investigation because of the 3.5-kilometre-long straight sections of the Sorok-víz-folyás, a stream near Ják. The long, straight waterbed sections that match the direction of the *centuriatio* and the surroundings of the outfall of another NW-SE-directed stream seemed ideal for analysis. While no trace of the *centuriatio* had been detected in the area before, we supposed their presence. The one-time boundaries were outlined clearly – in the form of an orthogonal intersection – on a satellite image by CNES/

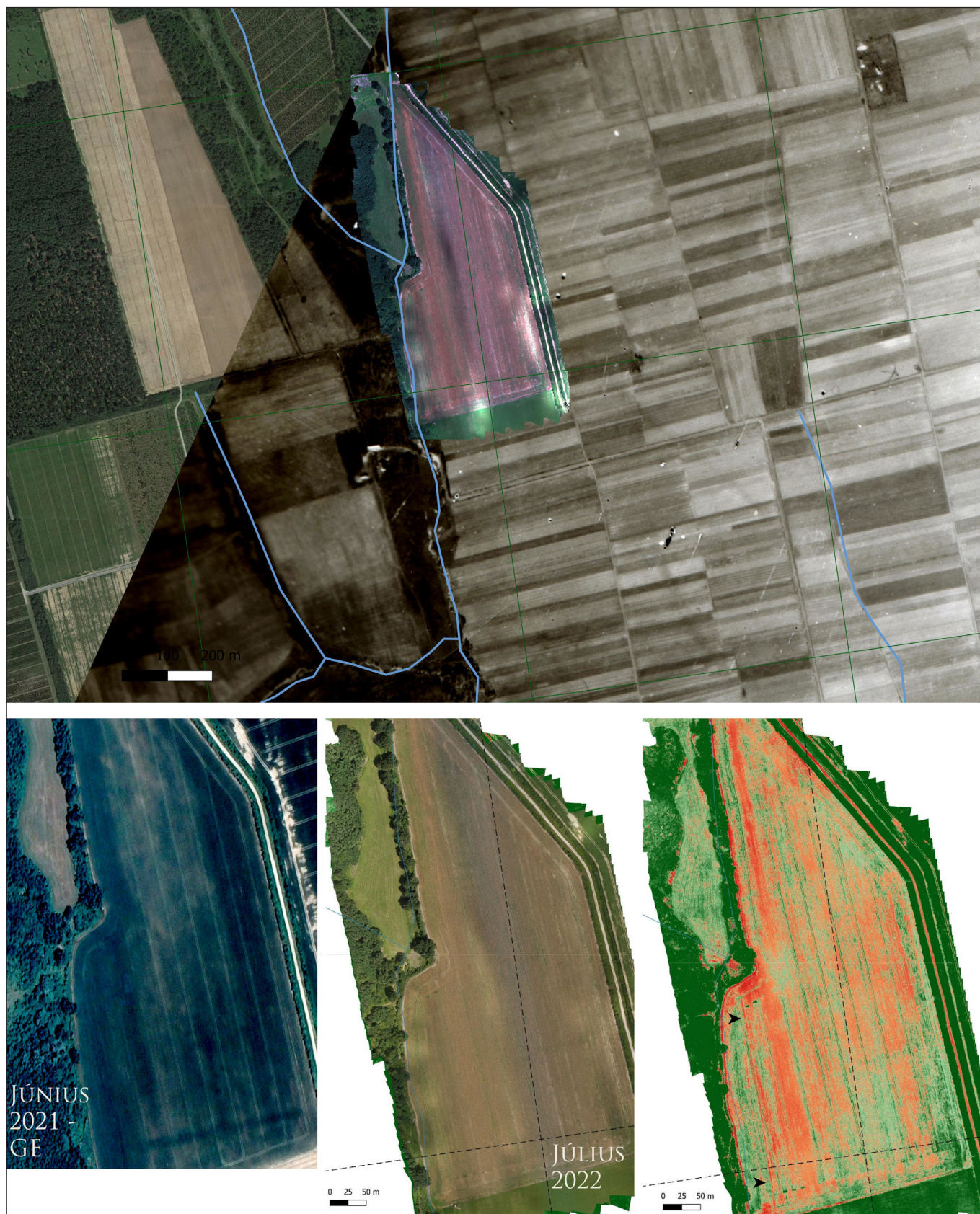


Fig. 6. Results of the topographic investigations in Ják-Gyergye-dűlő. Below left: the crossroads where the roads bordering the centurias met is clearly discernible on a satellite image by Google Earth, taken in July 2021, approximately where it is expected based on the model (centre below). Above: a former ditch or road in the NW-SE continuation of the bed of the watercourse on an aerial photo from 1951 (source: Institute of Military History). Right below: a ditch with its orientation matching the centuriatio's on a composite image of multispectral UAV data (compiled by the author)

Airbus/Google Earth, taken in June 2021. We found another 800-metre-long section of the west-east road (*decumanus*) about 3 km west of the crossroads on the digitised 1950s contact prints from MHIM's collection, while a darker SE-NW strip on another contact print from 1951 (ID: 13131) marked perhaps the silted-up bed of another watercourse or a former road (see Second Military Survey).

At the time of the multispectral survey, the lands were covered with fully ripe winter barley. At the end of a long, dry, warm period, the vegetation showed little differences; nonetheless, we could detect a straight feature in the infrared spectrum, the direction of which matched that of the *centuriatio* instead of the recent cultivation.

Ete–Kecskés (Fig. 7.2)

This site, at the easternmost fringes of the focus area of the research project, was included amongst the ones to be surveyed based on an aerial photo taken by Zoltán Czajlik, which showed the ground plan of a building of a type named 'road stop' by research. While such buildings have been identified mainly along the Amber and Limes Roads (see BÍRÓ & MOLNÁR 2009; CSERMÉNYI & TÓTH 1979–80; GROH, SEDLMAYER & ZALKA 2013), the presence of one near the supposed road in the Móri-árok, connecting the foothill regions of the Bakony and Vértes Mountains via the village of Bársonyos, made the area absolutely worth investigating.

We managed to locate the Roman building from the aerial photo during a fieldwalk trip, although, for the time being, the strong magnetic signal of some features (debris of *imbrex*es or a burnt layer) covers that of the ground plan.

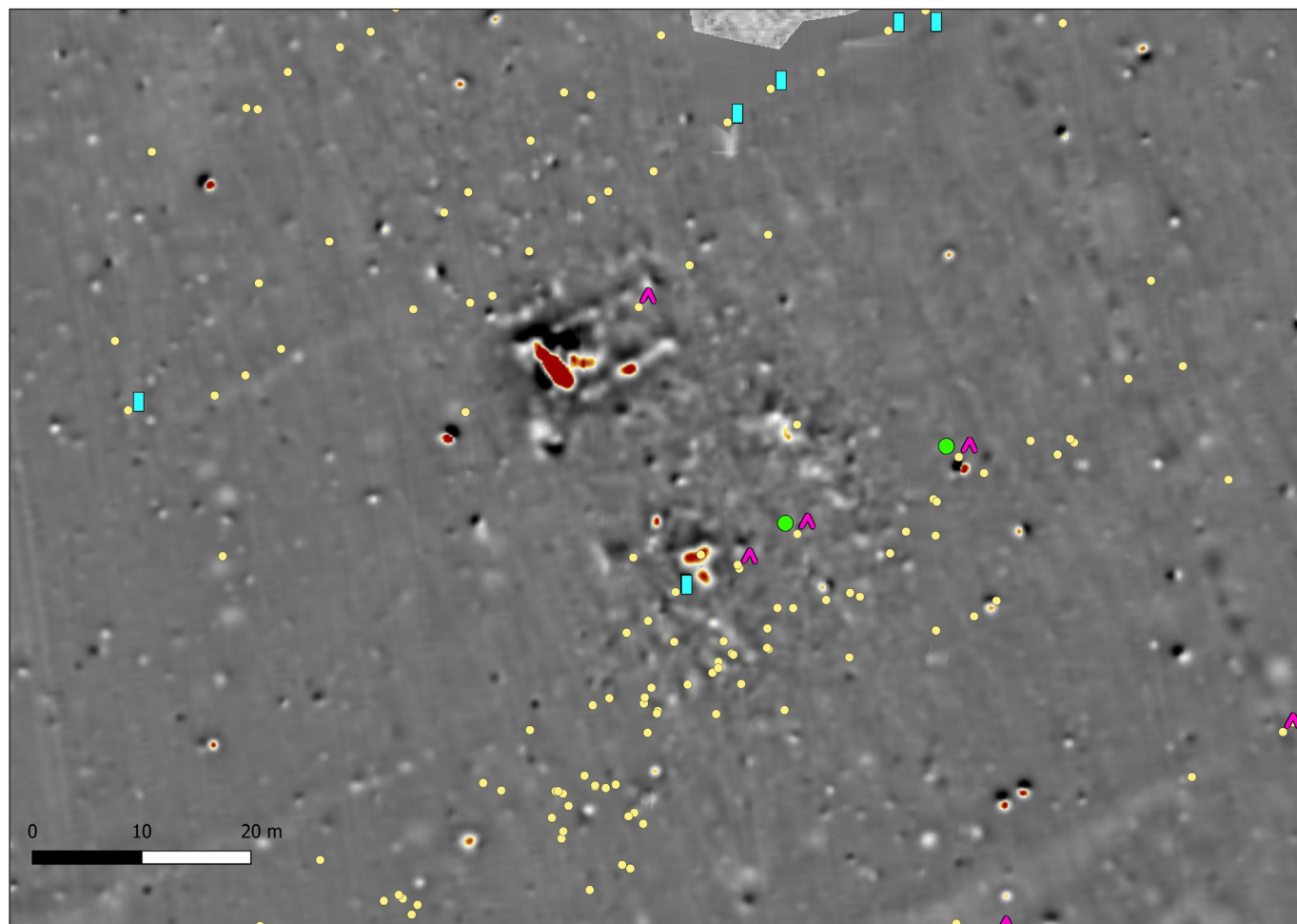


Fig. 7. Ete–Kecskés-dűlő, geophysical survey map and the scatter of surface finds (^ – imbrex/tegula, o – stone, [] – brick). The investigations proved the presence of the Roman building supposed based on aerial images but could not verify that it was a Roman road stop (compiled by the author)

SOCIAL RETURN

As for the possibilities of utilisation, the expected results of the project point far beyond archaeology and history. The *centuriatio* model can be used for risk assessment in archaeology, thus, it can be a useful tool – even in its current state – when preparing preliminary archaeological documentation. The research plan of the project includes the development of further models to improve the precision of risk assessment; these include a ‘villa estate’ model based on the spatial analysis of data related to farmsteads, which may also be used in other fields, and a Roman road and settlement network model. We plan to make all models available in an online database.

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