

ABSTRACT

During the past five years, we had the opportunity to build up a research method series in order to prove and verify the Roman land allocation system in the broader area of Szombathely (County Vas, western Hungary), the oldest continuously populated town of Hungary. These methods are derived from the "classical" landscape archaeology package: the combination of GIS modelling, aerial archaeological reconnaissance, field survey and geophysical prospection. The focus of our investigations more recently was the extent of the Roman cadastral system (called *limitatio* or *centuriatio* in Latin) and its impact on the landscape.

INTRODUCTION AND RESEARCH HISTORY

The roman colony of Savaria (Szombathely, West-Hungary) had been established in the mid-1st century AD, during the reign of the Emperor Claudius. There is epigraphic evidence that the veterans of the *legio XV Apollinaris* had been settled in this region (*deductio*) and that the surrounding area was divided and allotted among them.



The *deductio* amounted of a huge land surveyor work: the layout of the *centuriatio*, the formation of the field boundary system. The exact instructions of the layout-methods are delineated in the written sources of the roman land surveyors (e.g. Hyginus Gromaticus); we become aware, however, also from this texts of their overdraw adaptation in Pannonia.

The first reconstruction of the *centuriatio* occurred by András Mócsy (1965), who tried to draw it with the assistance of mid-scale topographical maps. Mócsy assumed a 16x25 actus (ca. 566x885m) sized *centuria* unit in the orientation of 22-23° geographical north to west. This was adapted also by Endre Tóth who extended Mócsy's grid to the whole assumed territory of Savaria: from the river Lafnitz (west) and river Ikva (north) to the River Rába (south and east).



[Reconstructions of the orientation and size of the *centuriae*: grey - Mócsy's suggestion for size and orientation for *centuria*, blue - Bődöcs' reconstruction, fits better to the early street system Savaria's]

Since Mócsy's publication there were no archaeological attempt in the last 40 years to prove his theory. In the last recent years we tried to continue the survey of the existence of the Savarian *centuriatio* with support of GIS methods. The latest results in the reconstruction have been based on archaeological excavations and aerial archaeological phenomena. The recently proposed "cell"-size (*centuria*) corresponds to the values mentioned in the text of the ancient land surveyors: an 20x20 actus sized rectangular *centuria* units, in the orientation of 10° west to geographic north.

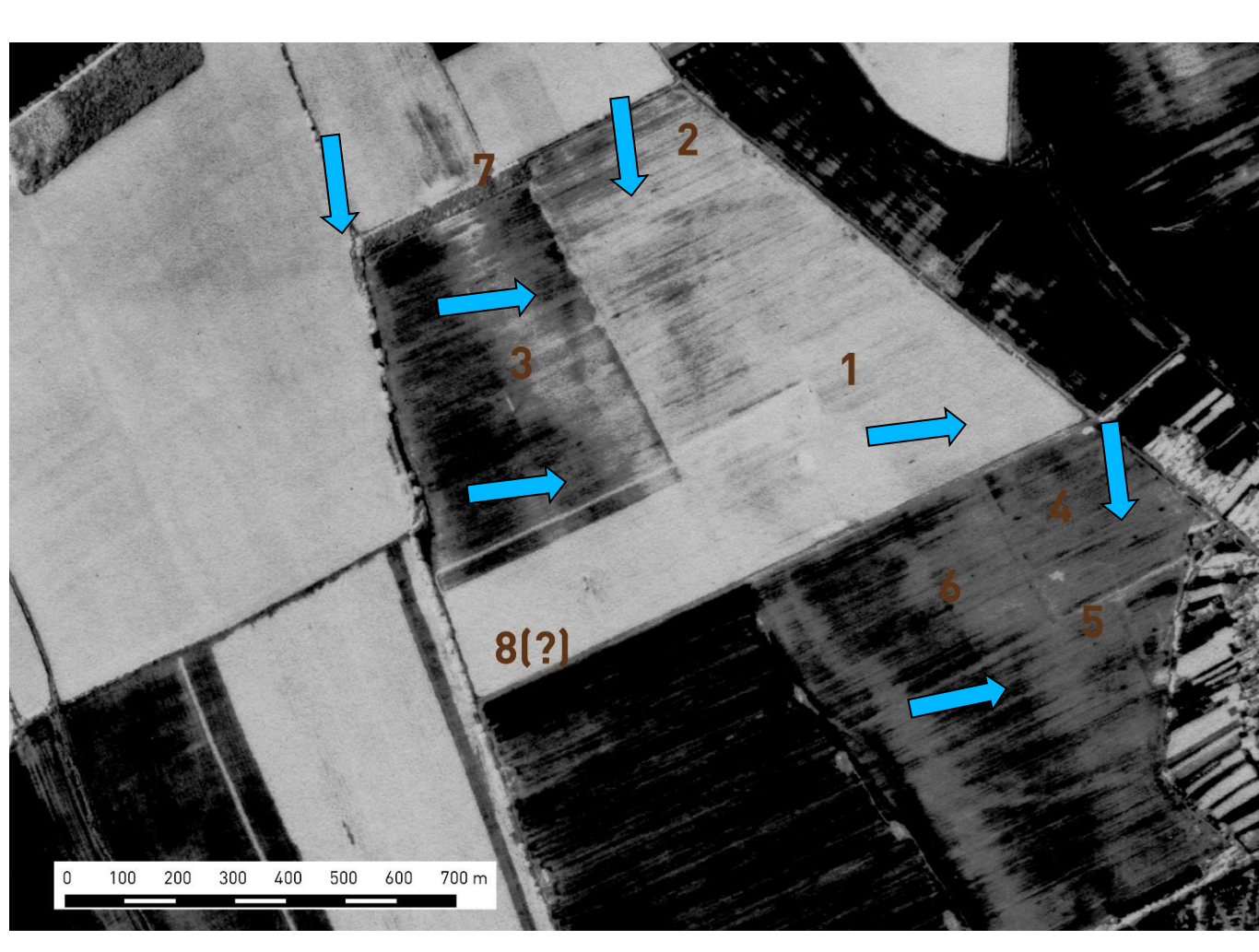
In order to prove and verify the Roman land allocation system in the broader area of Szombathely, a research method series were built up. These methods are derived from a "classical" landscape archaeology package:

- the combination of GIS modelling,
- aerial archaeological reconnaissance,
- field survey and
- geophysical prospection

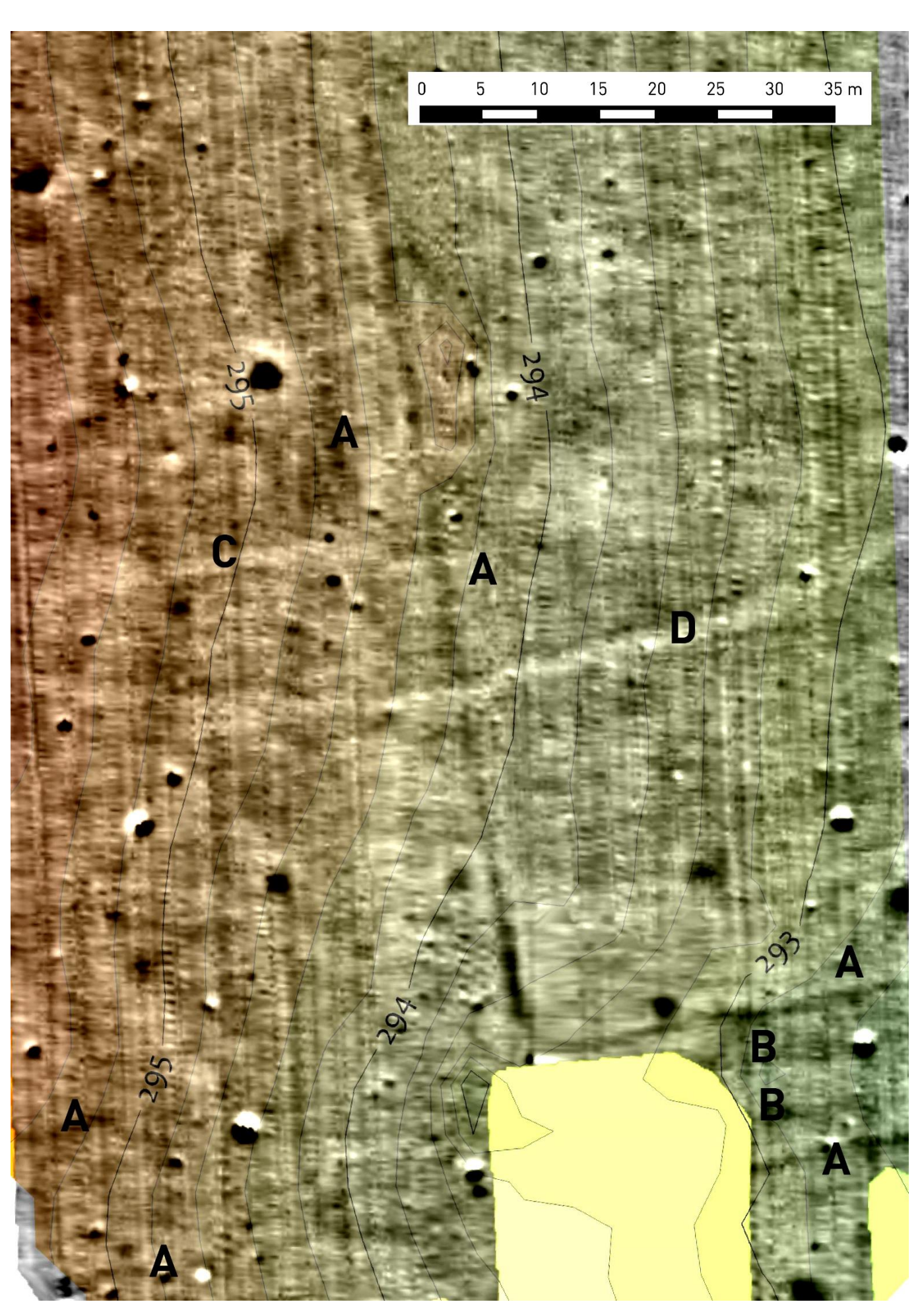
RESEARCH APPROACH – ARCHAEOLOGICAL SUBSTANTIATION OF THE PREDICTIVE MODEL



[above] In the summer of 2010, the rainy weather was not too favourable for aerial survey, but this year, we had the opportunity to test the correctness of the model in the field. We were able to identify the double ditches of a Roman road from cropmarks in the south-eastern part of the colony's assumed territory. The size, the location and the orientation conformed to the expectations, the documented Roman road was of the same type as the excavated parallels. The distance between the two road ditches was ca. 5.4-6 m, conforming to the width of the known Roman gravel roads unearthed near the colony.



[above] The archive in the Museum of the Military History contains vertical aerial photos from the years 1951-60, and 1970-90. The digitizing (resolution 600-900dpi) and rectifying process of thousands –almost– 24x24cm sized contact prints resulted a large historical photomap from the territory. This pictures indicated soil marks that refer to the roman cadastre. The picture shows 7 identifiable centuriae that fully corresponds to the size, orientation and location to the theoretical model.



[above] After the successful aerial photo research test geophysical survey was carried out to obtain more details from the supposed roman parcels. The magnetometer (SENSYS) survey above shows the details of the roman road and its ditches (B) that led to west from the colony. This constitutes the main E-W axis of the *centuriatio* (*decumanus maximus*). The other rec-tangular ditches (A) are the part of the roman cadastral system. The ditch (C) could be a separator line between the roman plots. The phenomena (D) is unknown.

[left] The development-led excavations (led by G. Ilon) on the former territory of the colony during the past decade that have brought to light Roman road sections. The theoretical model of the *centuriatio* supported the identification and dating of the excavated objects, like in this case: no road ditches but postholes mark the border of the former property. The crossing lines of the centuria border roads (*limites*) diverge from the predictive model less than 10m.

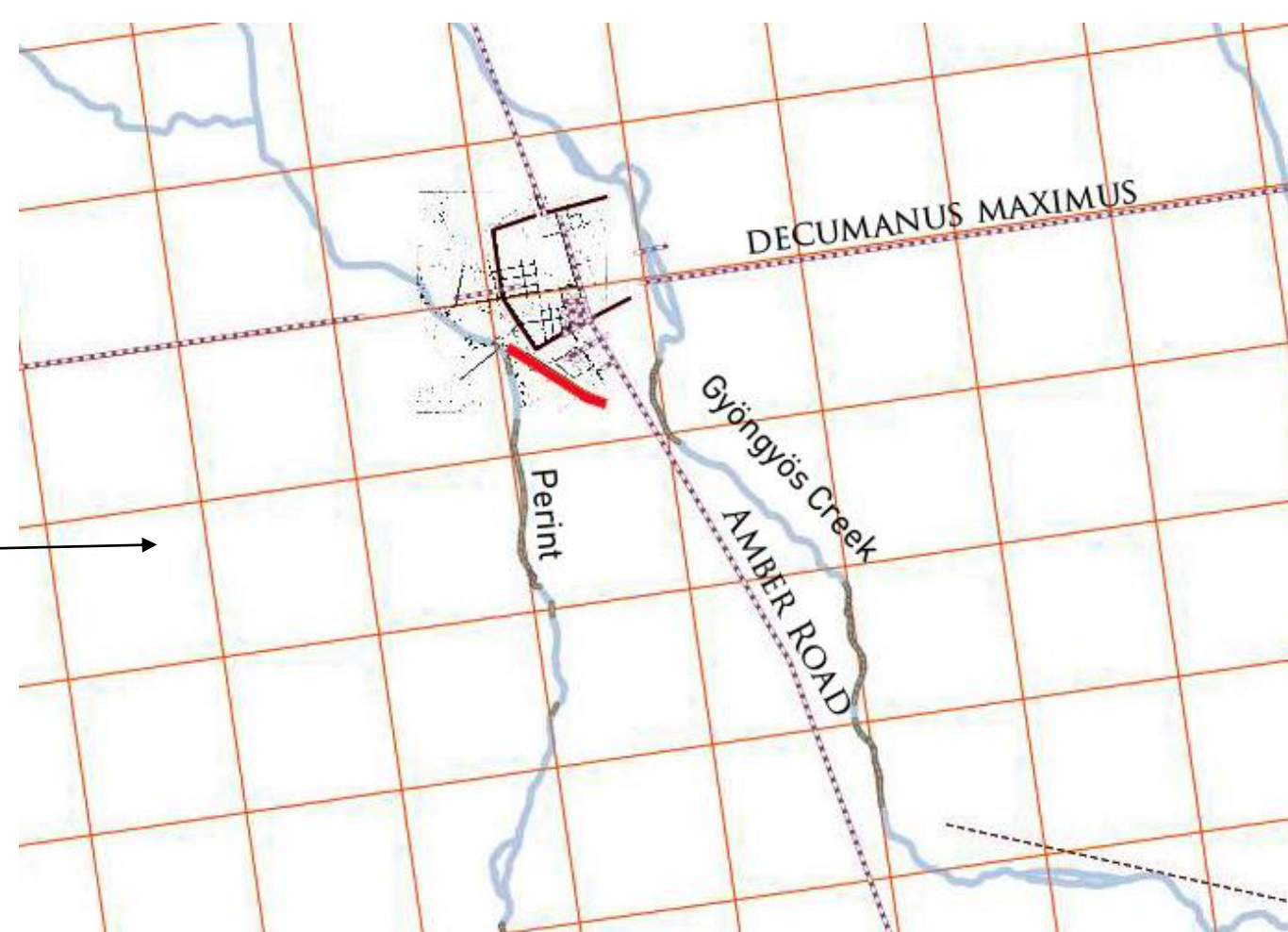
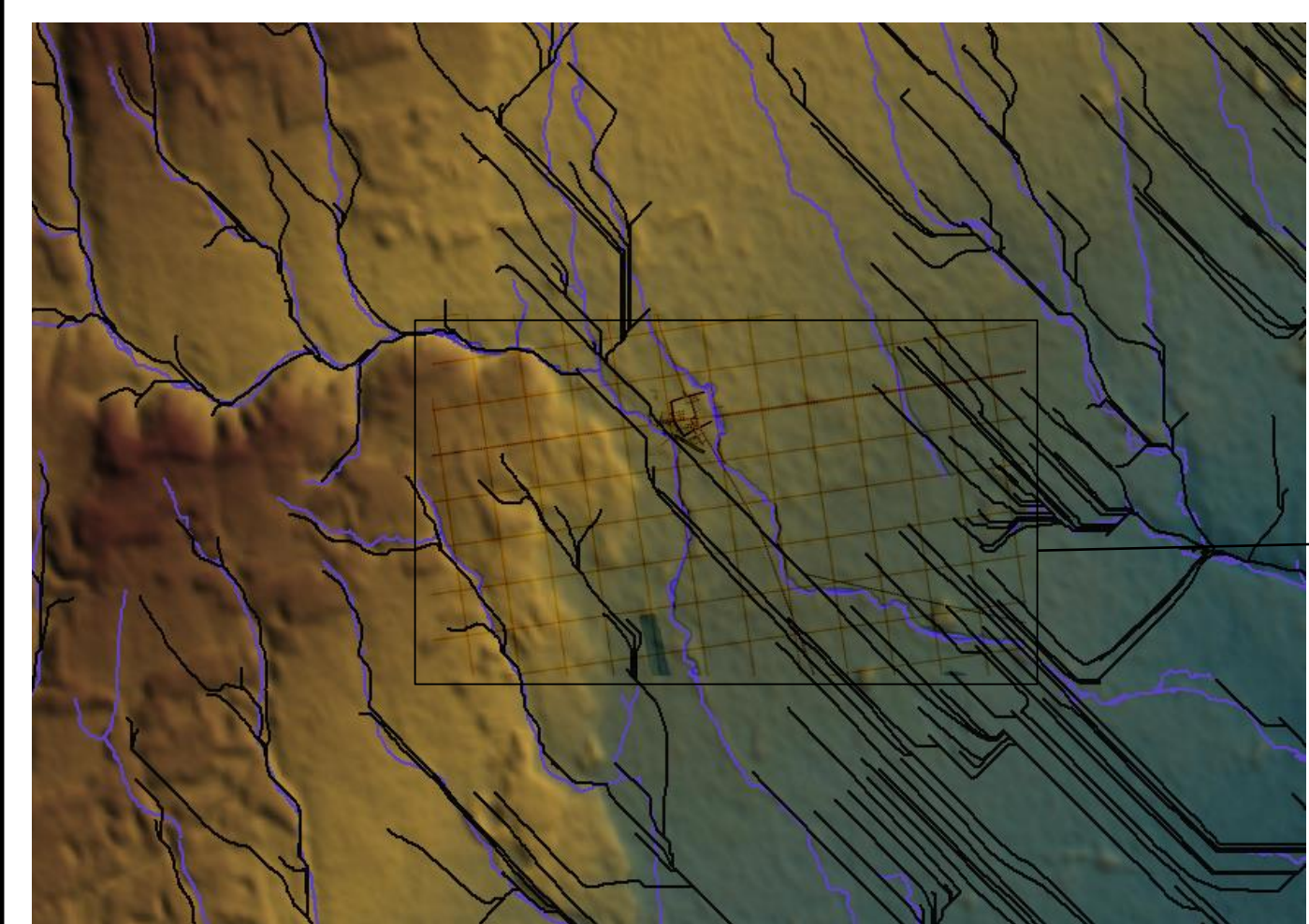


EXPERIMENTAL STUDY – LANDSCAPE TRANSFORMATION IMPACT OF THE CENTURIATIO

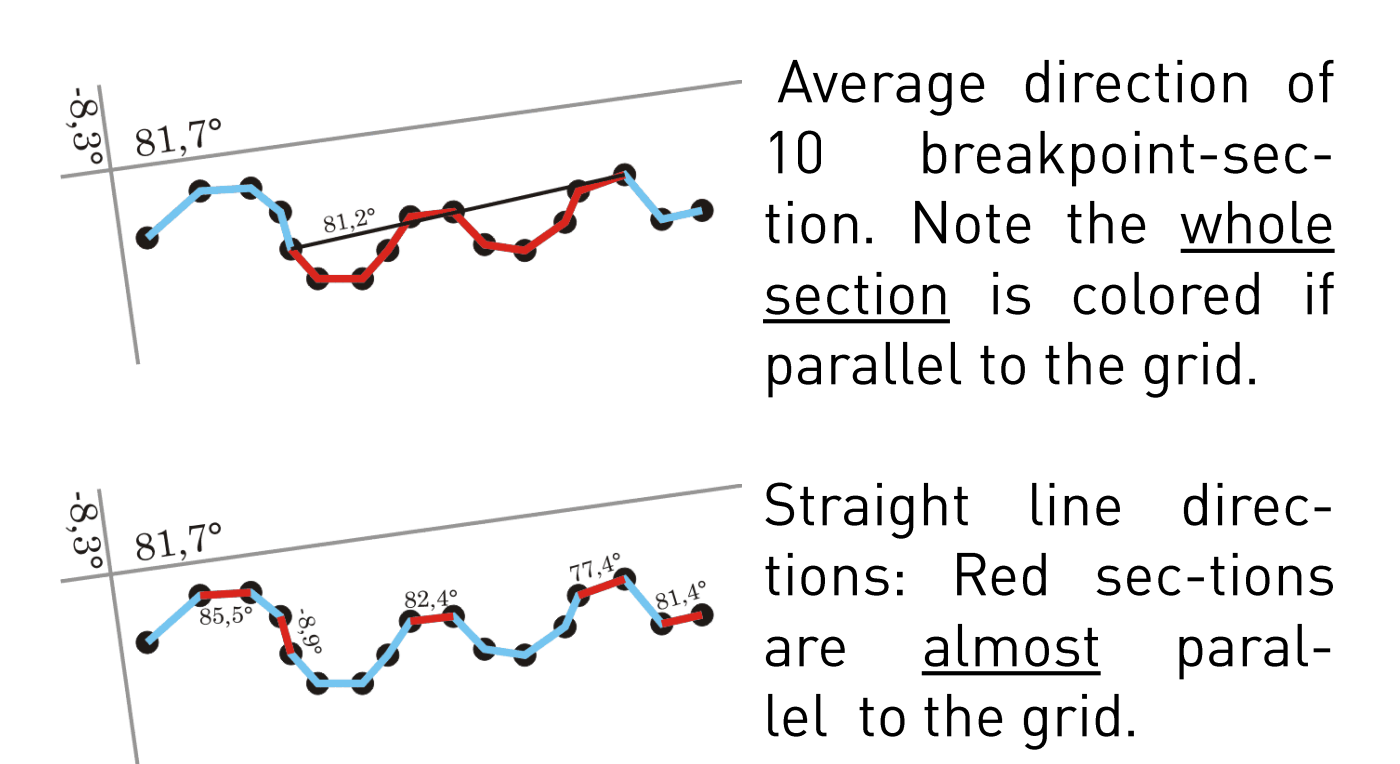
The similarity in orientation between the former roman cadastral system of Savaria and some section of the hydrological environment led us to test, whether could it be generated indeed by the roman veterans/farmers or the reason has to be searched in geology? Various GIS methods were adapted during the experiment presented below.

[below] The flow accumulation directions in the region (black lines) corresponds almost to the recent hydrological environment (blue lines). There are but minor differences e.g. in the selected zone, where the present-day riverbed' direction diverge from the expected. In these sections the orientation fits the *centuriatio*.

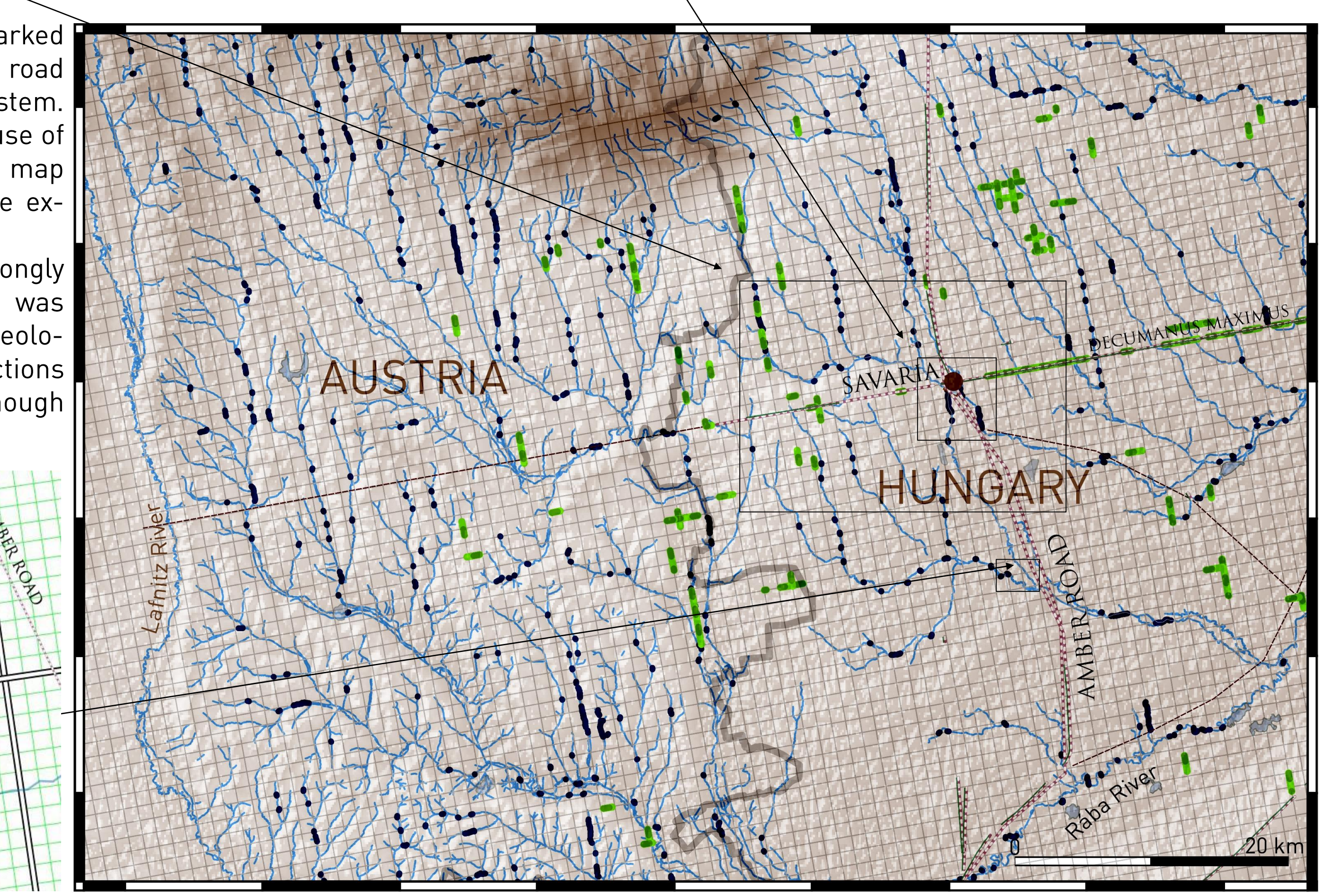
[below] The detailed view of the left selected area. The recent creeks (blue) south from the roman Savaria fit to the *centuriatio*. The NE-SW direction turns into N-S direction according to the grid. The marked section south from the city (red) is an excavated ancient riverbed, that was filled up irrevocably in the 17-18th c.



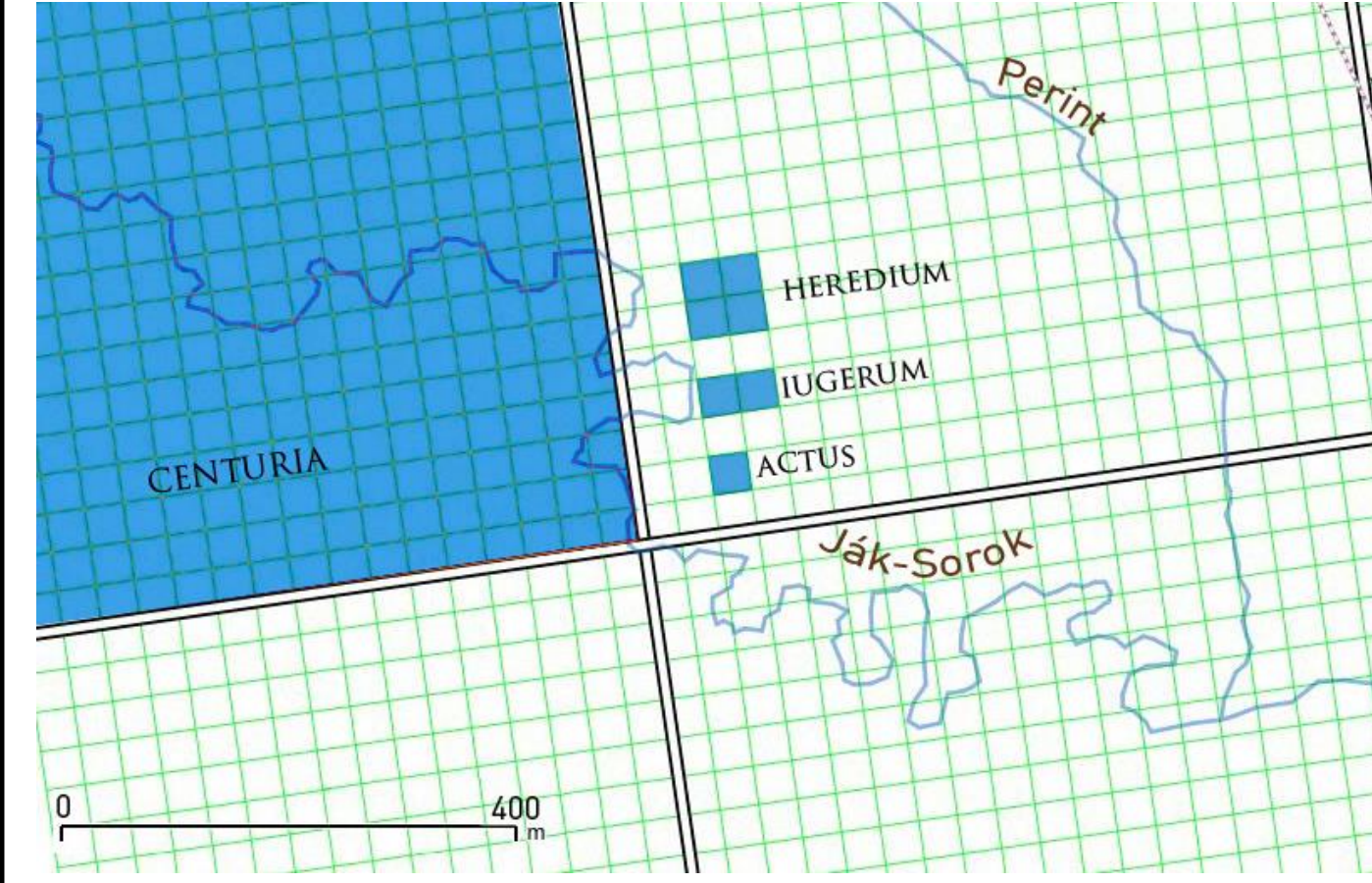
[below] A stream section query/highlight was initiated on hydrological layers digitized from historical (e.g the Habsburg II. Military Survey) and recent topographic maps. The digitized rivers are handled as continuous straight line sections between the chain of breakpoints. Directions of the straight sections is easy to calculate using their endpoint coordinates, then sections can be presented according to their direction-similarity to the *centuria* axes. The two standard for query are the following:



[right] The results of the stream section query (marked with bold blue line) and the soil marks and recent road sections (green) that fit into the *centuriatio* grid system. The stream section query allows 0-5° variances because of the possible meandering of the feral channels. This map contains those queried section that fit exactly to the expected *centuria* borders.



[below] Close to the Sorok-Perint convergence, strongly meandering section can be seen. The *centuria* grid was tiled to smaller units called *actus* (ca.35x35m). Geologically, tectonically that feature is hard to explain. Sections of the stream seems parallel to the *centuria* axes, although during the centuries became wild.



[left] Theoretical phases of the stream network modifications: 1 - natural state of streams with their original flow direction; 2 - result of roman ditching, streams are regulated and flow parallel with the grid axes; 3 - after abandonment streams are approximately parallel with the grid axes but became wild, sinuous. Note the flow direction changes between 1-3 phases.

SUMMARY
Assuming the romans regulated the streams: ditches were dig in order to border their own properties and obtain non-split cultivatable area. Thus straight stream sections were created, parallel to the direction of *centuria*. After Savaria area was abandoned, regulated streams initiated to erode and alter their trace freely again.

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Bödöcs, András, MA, MSc, PhD
University Eötvös Loránd, Institute of Archaeological
Sciences
Computing Laboratory
T: +36-1-4855200/2910
F: +36-1-41186653
E-mail: bodocs.andras@btk.elte.hu

