The Roman limes road between Călugăreni and Sărăţeni

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Abstract:

The present paper focuses on the Roman *limes* road between the auxiliary forts of Călugăreni / Mikháza and Sărățeni / Sóvárad. Even though, since the early 18th century there has been scarce data concerning a Roman road through the Becheci / Bekecs Hill, the issue needed to be reanalysed. Based on a least cost path analysis and earlier survey data, we managed in February 2021 to identify through field survey the course of the former Roman road.

Zusammenfassung:

Der vorliegende Beitrag handelt von der römischen Limesstraße die zwischen den Auxiliarlagern von Călugăreni / Mikháza und Sărățeni / Sóvárad verläuft. Schon seit dem 18. Jh. existierten Hinweise, dass eine römische Straße über den Becheci / Bekecs Berg führte. Basierend auf eine Kostenfunktionsanalyse und Daten vorangegangener topographischer Messungen war es uns im Februar 2021, durch eine weitere archäologische Felduntersuchung möglich, den Verlauf der damaligen römischen Straße nachzuvollziehen.

Keywords: *limes* road, least cost path, survey, *dupondius*, Dacia

The Roman auxiliary forts of Călugăreni / Mikháza[1] and Sărățeni / Sóvárad[2] in Mureș / Maros County are located on the eastern *limes* of Roman Dacia in the valleys of the Niraj / Nyárád River and the Târnava Mică / Kis-Küküllő River. The Becheci / Bekecs Hill is part of the southern Gurghiu / Görgényi Mountains and is located between the two valleys. Its highest point is the Becheci / Bekecs Peak with an altitude of 1080 m.

This *limes* sector relied on the natural defence offered by the Eastern Carpathians and the hills of the Subcarpații Târnavei Mici / Sóvidéki dombság. Along with a chain of watchtowers, fortlets and other defensive structures, the forts had the task to control the Roman border section around the upper Niraj valley and the upper Târnava Mică valley, both being important commercial routes towards the *Barbaricum* (Fig. 1).

Research history

In 1817 the polyhistor J. Ercsei made a field survey on the Becheci starting from Călugăreni and managed to identify on the top of the hill a presumably Roman fortification and different road sectors leading towards it[3]. This information is listed by J. F. Neigebaur[4], M. J. Ackner[5] and J. Vass[6]. However, Ackner mentions serious doubts about the Roman origin of the fortification.[7] In his monographic work K. Benkő[8] mentions the partially filled up ditch of the "Șanțul Uriașilor / Óriások árka" which ran from Sărățeni towards the area of Călugăreni on the

1 For the research history and the recent results see mainly: Pánczél 2015; Pánczél et al. 2018; Dobos et al. 2017; Höpken et al. 2020.

2 For the research history see mainly: Orbán 1870, 20-21; Paulovics 1944, 38-43; Székely 1960, 185-186; Székely 1962, 331-336; Tudor 1968, 272; Lazăr 1995, 233-243, Pl. XXXVII; Gudea 1997, 58-59; Marcu 2009, 121-122.

3 Ercsei 1830, 411.

4 Neigebaur 1851, 248 refers to a late 18th century publication (Bartalis 1787) without citing it correctly, so the information cannot be verified.

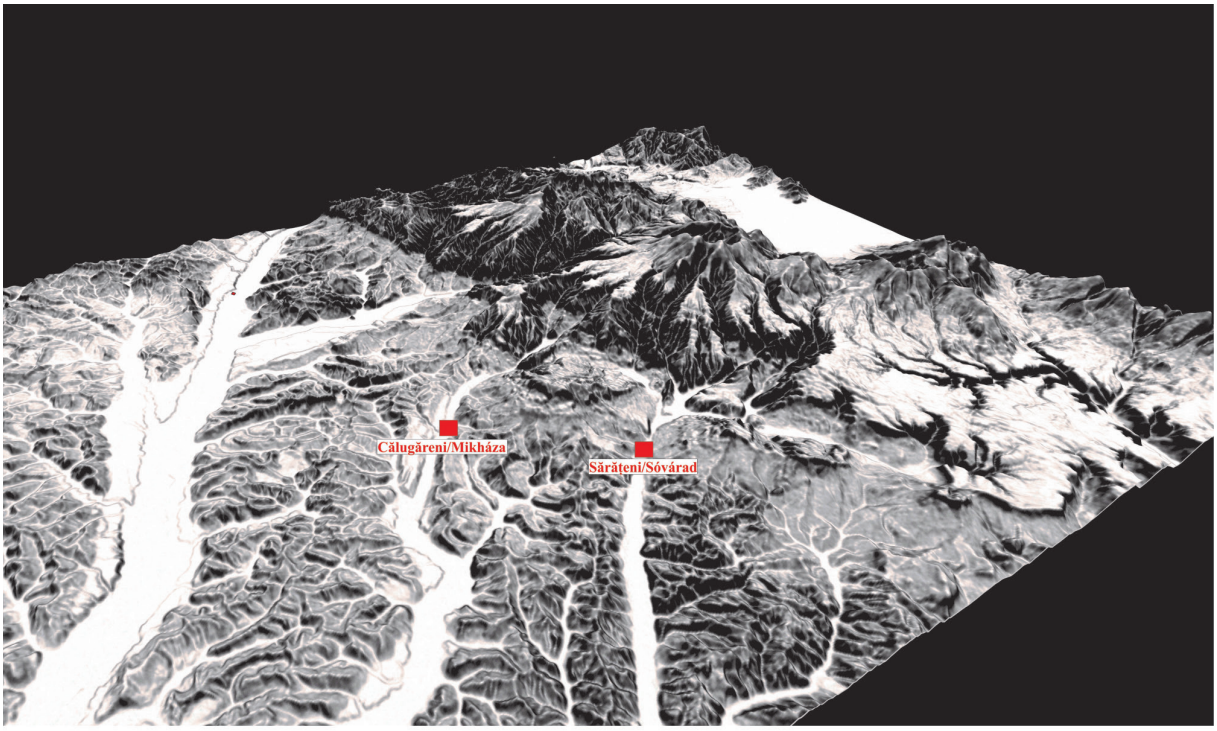
5 Ackner 1856, 24; Ackner 1857, 80.

6 Vass 1863, 118-119.

7 Ackner 1857, 80.

8 Benkő 1868-1869, 207.

a



b

Fig. 1. a. Map of Roman Dacia (after Țentea, Matei-Popescu și Călina 2021: 83 Pl. I.); b. Hillshade DEM of the research area.

western slopes of the Becheci Hill, next to the village of Șilea Nirajului / Nyárádselye. During his vast survey, B. Orbán visited the Becheci and argued that this rampart should be a Roman road connecting Sovata / Szováta (the neighbouring settlement of Sărățeni) with Călugăreni. He described it as a 2-3 fathom[9] wide rampart which had a

[9] B. Orbán probably refers to the Hungarian fathom which was 1.91 m, but we cannot exclude the possibility that he refers

2 fathom wide and 2 fathom deep ditch on the western side. He underlined that the lack of a ditch on the eastern side did not support his theory, but he was convinced that such a ditch had to have existed as well, but was filled up due to erosion. He described the track of the ditch and commented on the fact that it was running on the quite gentle western slopes of the hill[10].

S. Lattyák shortly mentions the rampart and publishes its first map and photo, considering it part of the Roman *limes* defensive system[11]. I. Paulovics is the first to clearly state that the fortification on the Becheci cannot be a Roman fort[12] and the rampart has to be considered the Roman road connecting the two forts[13].

The maps of V. Christescu[14] and M. Macrea[15] lists the eastern *limes* road, but do not discuss it in detail[16]. Most of the later publications accept the existence of a road connecting the Roman forts of Călugăreni and Sărățeni, without adding new data to the issue.

Even though the Călugăreni-Ungheni[17] and the Sărățeni-Apulum road[18] are discussed in detail in recent papers focusing on the road network of Roman Dacia, the *limes* road between Călugăreni and Sărățeni is mentioned only briefly among the main roads of Dacia. When it comes to the route, it is usually listed as running east of the Becheci through Eremitu / Nyárádremete and Sovata / Szováta without a thorough argumentation[19].

A detailed map covering the possible track of the *limes* road between Călugăreni and Sărățeni was published by Zs. Visy and it was based on the 1st Austrian military survey from the 18th century[20]. Visy underlines that the *limes* road connected the auxiliary forts on the shortest trajectory, and he lists two versions for our sector: one track running through Măgherani / Nyárádmagyarós and another through Șilea Nirajului[21].

Creating the model

The least-cost analysis (LCA) is a useful tool that allows archaeologists to 'predict' potential routes which may have been used at some point in the past, even when their physical remains are not necessarily preserved[22]. The identification of new Roman road segments has increased considerably in the past two decades using this method[23], even though in the research concerning the Roman *limes* road networks of Dacia, these methodological innovations have not been applied so far. The least-cost analysis is a geospatial quantitative method that allows us to understand the movement of people through the landscape, based on the premises that people, as rational actors, choose routes through the landscape in a way that tries to minimize the 'cost', what expresses the difficulty of horizontal movement, where cost indicates the accumulation of motion, and where the main parameters of the cost are the elevation change and distance.[24] Other cost components, such as environmental factors (eg. land use), visibility, soil type, wind direction etc. can also be taken into consideration[25].

The procedure in a geographic information system (GIS) is to find the lowest cumulative cost path for each grid in a raster-based source cell. To each cell, a value is assigned based on predefined criteria. The criteria may come from actual fieldwork or by assigning costs to an existing data. The result is a surface that expresses the difficulty of horizontal movement in space with different 'frictions' of the ground surface. Cells occupied by such obstructions could make it difficult to cross, slowed the process down, required more effort and, therefore, more investment to build the road. The analysis looks for cost effective routes from the source cell to the destination. The minimum

to the Viennese fathom which was 1.89 m.

10 Orbán 1870, 80.

11 Lattyák 1918, 230; Fig. 1; Fig. 17.

12 Paulovics 1944, 33.

13 Paulovics 1944, 37-38.

14 Christescu 1937, Harta Daciei romane și a ținuturilor vecine.

15 Macrea 1969, Harta provinciei Dacia.

16 Macrea 1969, 154.

17 Fodorean 2006, 263-266; Fodorean 2020.

18 Fodorean 2006, 266-269.

19 Gudea 1996, 103-105, 139, Fig. 1; Bărbulescu 2005, 24, Harta VI, 115-116/D7-D8; Fodorean 2006, 115-116, 279-285, Harta 1; Ursuț 2008, 48, Fig. 17.

20 Visy 2008, Kép 9; Visy 2009a, 595, Abb. 9; Visy 2009b, 115.

21 Visy 2008, 168; Visy 2009a, 593; Visy 2009b, 109.

22 Conolly and Lake 2006, 252-256.

23 See: Wiedemann et al. 2001, 83-96; Antrop and Wiedemann 2001; Verhagen and Jeneson 2012; Abou Diwan and Doumit 2017; Herzog and Schröer 2019; Ludwig 2020; Hodza and Butler 2022.

24 White 2015, 407.

25 For cost components taken into consideration in various archaeological LCA studies until 2009 see: Herzog 2014a, 224. Tab. 1; since 2010 see: Herzog 2020, 535. Tab. 18.1; for methodological issues see: Herzog 2014b.

cost resulted from such an analysis will not necessarily be the shortest physical path, instead, the analysis predicts the path that minimizes the sum of all cell values between two points[26].

Taking into consideration the available geomorphological dataset, the main component of our LCA focused on the topographical data (Fig. 2-3). The analysis was obtained using a digital terrain model with a resolution of 30 m, recorded by the Shuttle Radar Topography Mission (SRTM), which uses pixels as unit areas for integrating spatial data, along with hydrological data extracted from topographical maps at a 1:25000 scale[27].

The digital elevation model (DEM) had to be projected onto the Romanian Stereo70 coordinate system. Point type shape files were created with the coordinates of the Roman military forts, starting at destination (target) and ending at origin (source), in order to represent the measured points of the *limes* road segment identified before our analysis. To minimize the calculation effort, a smaller study area was clipped from the original raster. The DEM was used to generate a slope angle parameter, expressed in percentage, as this is a necessary parameter in the model[28]. Running the cost distance, cost backlink and cost path[29] parameters in the spatial analyst tools will result in a polyline of the least-cost analysis[30].

The data was exported to Google Earth in order to create a base map for the fieldwalking, to verify the truthfulness of the model.

Testing the model

Despite of the limited components we used in the calculation of the LCA model, an important indicator for the relevancy of our assessment was the juncture of the model with the previously identified *limes* road in the outskirts of Sărățeni (Fig. 2.). This seems even more important, if we underline the fact, that the predictive model had its starting point at the Roman auxiliary fort, instead of the first known point of the Roman *limes* road.

From the military fort of Sărățeni, the *limes* road (Fig. 4-8) heads towards southwest, most probably under the DN13A road, for approximately 1 km, where it turns into a dirt road running towards northwest in the direction of the buildings of the former Collective Agricultural Institution. From there, it continues as a dirt road (Fig. 6) in the valley of the Cărbunăriei / Szénégető Creek[31] towards north, until intersecting the road DJ135. For a 1 km segment it probably overlaps with the DJ135 road and roughly halfway it crosses the route suggested by the model. After this, the *limes* road reappears as a dirt road and bypasses the Sărățeni radio tower from the north in the area called Gaura Seacă / Gyér Likat. From this point the LCA model heads towards the valley, just like the modern road, but the *limes* road followed the 650 m contour line. Approximately 800 m from the point where it left the DJ135, the *limes* road intersected with the *Via Mariae* (Fig. 7.) pilgrimage path[32], which uses the same dirt road for 2.9 km.

Furthermore, after 1.1 km the road crosses the Sugăului / Sugó Creek, then continues along a contour line between 650-700 m height until the outskirts of Șilea Nirajului, while the modelled path runs parallel to the Roman road for approximately 500 meters. Our assumption is relatively unsure for the following 1.9 km sector in the vicinity of Șilea Nirajului (Fig. 4 and Fig. 8 - marked in yellow). Based on the topographical phenomenon, we prefer a slightly descending road crossing the Pietros / Köves Creek and then moving up to the dirt road on the ridge which leads to the Becheci Peak. The possibility of building the road further southwest, similarly to the modelled path, is unlikely due to the steep slopes of the valley. If we compare the topographic profile of the LCA (Fig. 3) and the *limes* road (Fig. 5), it is clearly visible that the slopes in the model are sharper then on the Roman road, and the lowest curve in both models is in the area of Șilea Nirajului. From this ridge, the *limes* road is identical with the modern dirt road descending to the valley of the Pereș / Peres Creek and continuing until Călugăreni almost parallel to the modelled path for 5.3 km.

On the *limes* road profile (Fig. 5) the average slope is 6% for the 8.9 km sector from Sărățeni to Șilea Nirajului, while the 5.3 km sector from Șilea Nirajului to Călugăreni has an average slope of 1.6%. In case of the presumed road sector of 1.9 km around the village of Șilea Nirajului the average slope is 9.2%, except this uncertain sector, where the values are lower than 8% which is rarely exceeded in the Roman roadbuilding practice after the 2nd century AD[33].

[26] St. Steinberg and Sh. Steinberg 2006, 175-176.

[27] The visualization and digital mapping of the analysed parameters was done with ArcGIS 10.1. software.

[28] For the importance and correct settings for slope calculations see: Esri. ArcGis blog.

[29] For a detailed description see: Gislounge.

[30] For step-by-step description in an ArcGIS case study see: Abou Diwan and Doumit 2017, 229-231.

[31] For toponymical data we used the: Planurile directoare de tragere; 1st, 2nd and 3rd Military Survey of the Habsburg Empire and Austria-Hungary.

[32] For the map see: Via Mariae.

[33] Herzog and Schröer 2019, 5.

In the sector between Sărățeni and Șilea Nirajului on the track of the Roman road (Fig. 8), a very worn Roman copper alloy *dupondius* was discovered (Fig 9)[34]. The coin was minted between 162–163 AD during the joint reign of Marcus Aurelius and Lucius Verus. Based on this, we can confirm the fact, that the road was already in use in the second part of the 2nd century AD, but based on the dating of the two forts we have no reason to doubt that it had been built and used earlier, in the first half of the 2nd century AD. In many cases tracks of wheels (Fig. 10) could be observed on certain stones on the road, attesting an intensive Roman (?) and possible later use. Traces of cobbles and pebbles were quite often the indicators that the current dirt roads had a stone supra and infrastructure in previous, probably Roman, periods.

Some sections of the former *limes* road are still in use today as dirt roads, pilgrimage roads, national or county roads, attesting that certain optimized paths/tracks in mountainous areas had only variations but no real alternatives throughout the centuries.

Bibliography

1st, 2nd and 3rd Military Survey of the Habsburg Empire and Austria-Hungary. Accessed on 1st of February 2022. https://maps.arcanum.com/en/browse/country/

Ackner, M. J. 1856. Die römischen Alterthümer und deutschen Burgen in Siebenbürgen. *Jahrbuch der K.K. Central-Commission zur Erforschung und Erhaltung der Baudenkmale* 1: 3-50.

Ackner, M. J. 1857. Die Colonien und militärischen Standlager der Römer in Dacien im heutigen Siebenbürgen. Jahrbuch der K.K. Central-Commission zur Erforschung und Erhaltung der Baudenkmale 2: 63-100.

Abou Diwan, G. and Doumit, J. 2017. The Berytus-Heliopolis Baalbak road in the Roman period: A least cost path analysis. *Mediterranean Archaeology & Archaeometry* 17(3): 225-241.

Antrop, M. and Wiedemann, T. 2001. Using GIS to Study Ancient Linear Marks, in: Vermeulen, F. and Antrop, M. (eds.) *Ancient Lines in the Landscape: a geo-Archaeological Study of Protohistoric and Roman Roads and Fields Systems in Northwestern Gaul*: 43-66. Leuven: Peeters Publishers.

Bartalis, A. 1787. *Ortus et occasus imperii Romanorum in Dacia mediterranea cui accedunt nonnullae de monumento quodam e ruderibus coloniae Apulensis eruto opiniones*. Posonii: Simonis Petri Weber.

Bărbulescu, M. 2005. *Atlas-dicționar al Daciei Romane*, Publicațiile Institutului de studii clasice 6. Cluj-Napoca: Editura Tribuna.

Benkő, K. 1868-1869. *Marosszék ismertetése*. Kolozsvár: Római Katholikus Lyceum.

Conolly, J. and Lake, M. 2006. *Geographical Information Systems in Archaeology,* Cambridge Manuals in Archaeology. Cambridge: Cambridge University Press.

Christescu, V. 1937, *Istoria militară a Daciei romane*. București: Fundația Regele Carol I.

Dobos, A., Fiedler, M., Höpken, C., Mustață, S. and Pánczél, Sz. P. 2017. Militärlager und vicus in Călugăreni/ Mikháza (Kreis Mureș, Rumänien) am Dakischen Ostlimes. *Kölner und Bonner Archaeologica* 7: 145-154.

Ercsei, J. 1830. Római út-nyomozás, a' Bekecs körűl. Nemzeti Társalkodó 52: 409-412.

Esri. ArcGIS blog: Setting the Z Factor parameter correctly. Accessed on 1st of February 2022. https://www.esri.com/arcgis-blog/products/product/imagery/setting-the-z-factor-parameter-correctly/.

Fodorean, F. 2006. *Drumurile din Dacia romană*, Publicațiile Institutului de studii clasice 7. Cluj-Napoca: Editura Napoca Star.

Fodorean, F. 2020. Mapping Roman Dacia: The road connecting the valley of the River Mureș with the fort at Călugăreni. *Journal of Ancient History and Archaeology* 7(2): 178-184. Accessed on 1st of February 2022. DOI: 10.14795/j.v7i2.519.

Gislounge: Overview of Least Cost Path Analysis. Accessed on 1st of February 2022. https://www.gislounge.com/overview-least-cost-path-analysis/.

[34] The coin (RIC III Marcus Aurelius 846) is part of the Archaeological collections of the Mureș County Museum, inventory number 16251, diameter 28.13 mm, weight: 13.74 g. We would like to express our gratitude towards Katalin Sidó for identifying the coin.

Gudea, N. 1996. *Porolissum. Vama romană*, Bibliotheca Mvsei Napocensis 12. Cluj-Napoca: Muzeul Național de Istorie a Transilvaniei.

Gudea, N. 1997. Der dakische Limes. Materialien zur seiner Geschichte. *Jahrbuch des Römisch-Germanischen Zentralmuseum Mainz* 44: 1-113.

Herzog, I. 2014a. A review of case studies in archaeological least-cost analysis. *Archeologia e Calcolatori* 25: 223-239.

Herzog, I. 2014b. Least-cost Paths - Some Methodological Issues, *Internet Archaeology* 36: 48-67. Accessed on 1st of February 2022. DOI: 10.11141/ia.36.5.

Herzog, I. 2020. Spatial analysis based on cost functions, in: Gillings, M., Hacigüzeller P. and Lock, G. (eds.) *Archaeological Spatial Analysis: A Methodological Guide to GIS*: 333-358. London and New York: Routledge, Taylor & Francis Group.

Herzog, I. and Schröer, S. 2019. Reconstruction of Roman Roads and Boundaries in Southern Germany, in: Börner, W. and Uhlirz, S. (eds.) *Proceedings of the 22nd International Conference on Cultural Heritage and New Technologies 2017,* CHNT 22, 2017: 1-19. Vienna: Museen der Stadt Wien.

Hodza, P. and Butler, K. A. 2022. Juxtaposing GIS and Archaeologically Mapped Ancient Road Routes. *Geographies* 2, 48-67. Accessed on 1st of February 2022. https://doi.org/10.3390/geographies2010005.

Höpken, C., Fiedler, M. and Oberhofer, K. 2020. Ausgrabungen im vicus von Călugăreni / Mikháza, Kreis Mureș (Rumänien), *Marisia. Archaeologia, Historia, Patrimonium* 2: 101–118.

Lattyák, S. 1918. Limes nyomok a „Görgényi hegyekben". Dolgozatok az Erdélyi Nemzeti Múzeum Érem- és régiségtárából 8/1-2: 218-232.

Lazăr, G. 1995. *Repertoriul arheologic al judeţului Mureş*. Târgu Mureș: Casa de Editură "Mureș".

Ludwig, B. 2020. Reconstructing the Ancient Route Network in Pergamon's Surroundings. *Land* 9(8), 241: 1-39. Accessed on 1st of February 2022. DOI: 10.3390/land9080241.

Macrea, M. 1969. *Viaţa în Dacia romană*. Bucureşti: Editura Științifică.

Marcu, F. 2009. *Organizarea internă a castrelor din Dacia*, Bibliotheca Mvsei Napocensis 30. Cluj-Napoca: Editura Mega.

Neigebaur, J. F. 1851. *Dacien. Aus den Ueberresten des klassischen Alterthums, mit besonderer Rücksicht auf Siebenbürgen.* Kronstadt: Johann Gött.

Orbán, B. 1870. A Székelyföld leírása történelmi, régészeti, természetrajzi s népismei szempontból IV. Pest: Ráth Mór Kiadása.

Paulovics, I. 1944. Dacia keleti határvonala és az úgynevezett "dák"-ezüstkincsek kérdése. Kolozsvár: Minerva Irodalmi és Nyomdai Műintézet.

Pánczél, Sz. P. 2015. The Roman Fort from Călugăreni (Mureș County, Romania), in: Vagalinski, L. and Sharankov N. (eds.) *LIMES XXII. Proceedings of the 22nd International Congress of Roman Frontier Studies Ruse, Bulgaria, September 2012*: 909–916, Sofia: National Archaeological Institute with Museum.

Pánczél, Sz. P., Mustață, S. and Dobos, A. 2018. A Mikházi római segédcsapattábor kutatása / The research at the Roman auxiliary fort of Mikháza/Călugăreni, *Magyar Régészet Online Magazin/ Hungarian Archaeology E-Journal* 2018 Spring: 13–20. Accessed on 1st of February 2022. http://files.archaeolingua.hu/2018TA/Pa%b4ncze%b4l_E18TA.pdf

Planurile directoare de tragere. Accessed on 1st of February 2022. http://geo-spatial.org/harti/#/viewer/openlayers/10.

Steinberg, St. and Steinberg, Sh. 2005. *Geographic information systems for social sciences. Investigating time and place*. Thousand Oaks, London and New Delhi: Sage Publications.

Székely, Z. 1960. Săpăturile executate de Muzeul regional din Sf. Gheorghe, Materiale și Cercetări Arheologice 7: 179–340.

Székely, Z. 1962. Sondajele executate de Muzeul regional din Sf. Gheorghe, Materiale și Cercetări Arheologice 8: 325–340.

Tudor, D. 1968. *Oraşe, tîrguri şi sate în Dacia romană*. Bucureşti: Editura Științifică.

Țentea, O., Matei-Popescu, Fl. și Călina, V. 2021, Frontiera romană din Dacia Inferior. O trecere în revistă și o actualizare. 1, *Cercetari Arheologice* 28.1: 9-90.

Ursuț, D. 2008. *Drumurile romane din județul Cluj*. Cluj-Napoca: Editura Napoca Star.

Vass, J. 1863. Erdély a rómaiak alatt. Kútfők nyomán. Kolozsvár: Stein János Bizománya.

Verhagen, P. and Jeneson, K. 2012. A Roman Puzzle. Trying to Find the via Belgica with GIS, in: Chrysanthi, A., Murrieta Flores, P. and Papadopoulos, C. (eds.) *Thinking Beyond the Tool. Archaeological Computing and the Interpretive Process*, British Archaeological Reports International Series 2344: 123-130. Oxford: Archaeopress.

Via Mariae. Accessed on 1st of February 2022. https://mariaut.ro/terkep/; https://www.ekemvh.ro/maria-ut/a-maros-megyei-szakasz.

Visy, Zs. 2008. Dacia limese mint lehetséges világörökségi helyszín, in: Visy, Zs. (szerk.) *Tanulmányok Énlaka történetéről és kultúrájáról*: 159-173. Énlaka-Pécs: Pro Énlaka Alapítvány.

Visy, Zs. 2009a. Archäologische Forschungen an der östlichen Grenze von Dacia Superior, in: Biró, Sz. (Hrg.) *Ex officina... Studia in honorem Dénes Gabler*: 587-598. Győr: Mursella Régészeti Egyesület.

Visy, Zs. 2009b. Régészeti kutatások Dacia superior keleti határán, in: Körösfői, Zs. (szerk.) *Kutatások a Nagy-Küküllő felső folyása mentén*, Molnár István Múzeum Kiadványai 1: 107-115. Székelykeresztúr: Molnár István Múzeum.

White, D. A. 2015. The Basics of Least Cost Analysis for Archaeological Applications. *Advances in Archaeological Practice* 3(4), 407-414. Accessed on 1st of February 2022. DOI: 10.7183/2326-3768.3.4.407.

Wiedemann, T., Antrop, M. and Vermeulen, F. 2001. Analysis of the Roman Road System around Cassel and Application of a GIS-Model in Sandy Flanders. in: Vermeulen, F. and Antrop, M (eds.) *Ancient Lines in the Landscape: a geo-Archaeological Study of Protohistoric and Roman Roads and Fields Systems in Northwestern Gaul*: 83-96. Leuven: Peeters Publishers.

Liste der Abbildungen

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Hungarian National Museum
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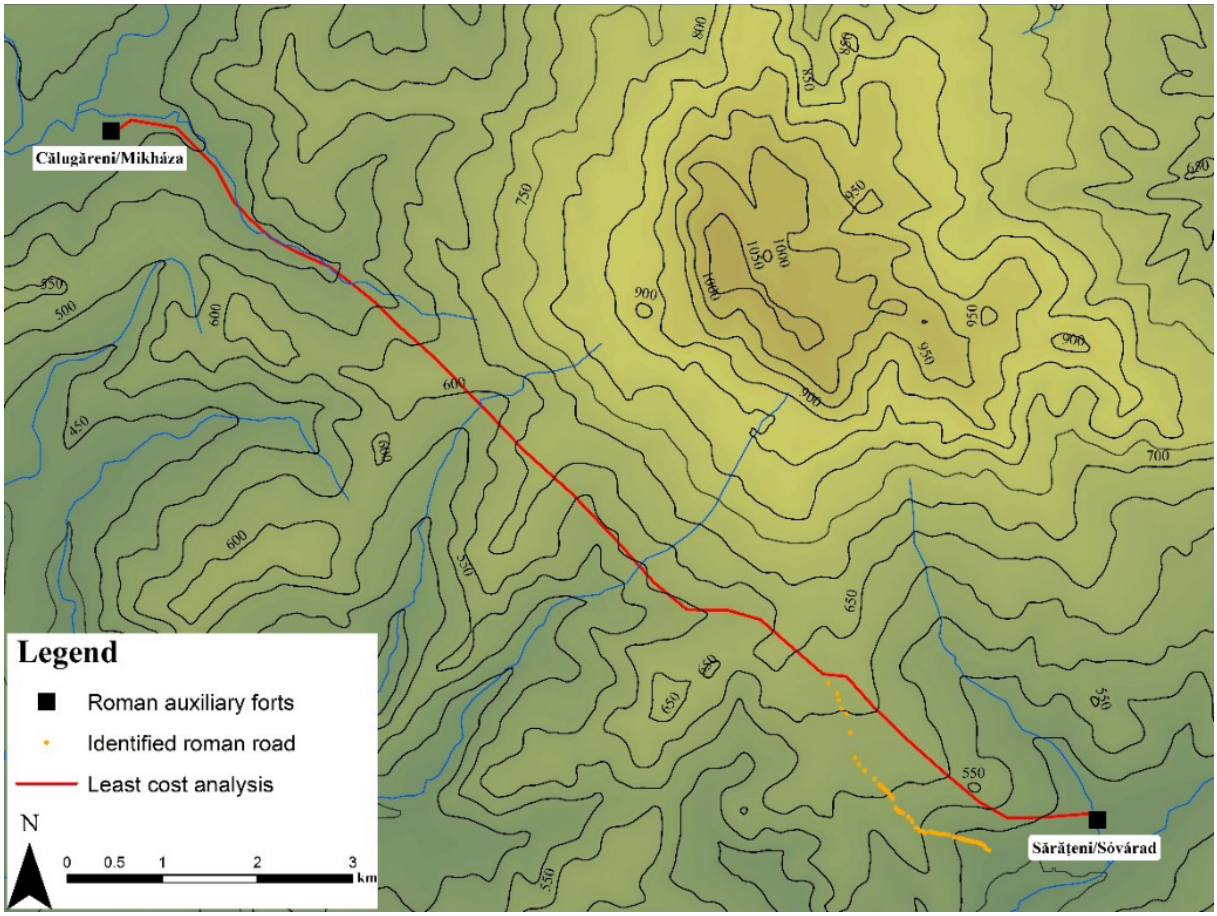

Fig. 2. Results of the LCA connecting the two forts and the road sector identified during field survey.

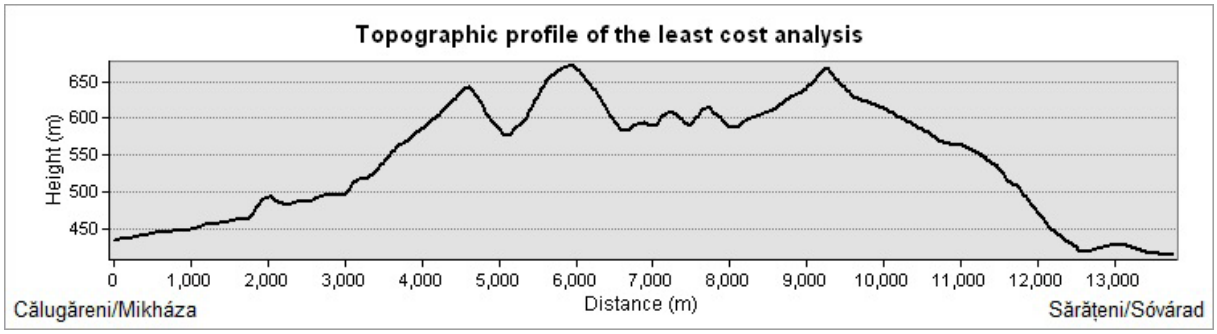

Fig. 3. Topographic profile of the LCA connecting the two forts.

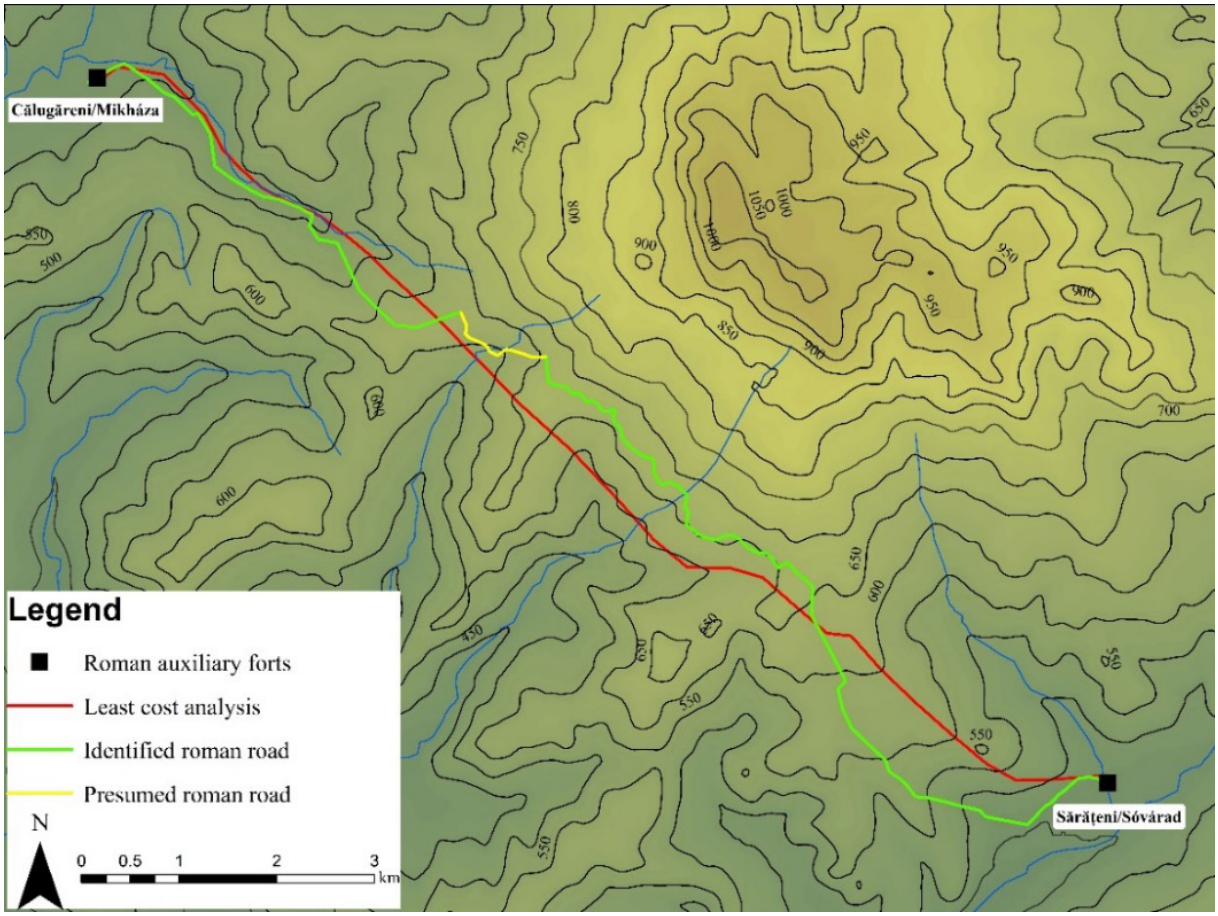

Fig. 4. Results of the LCA connecting the two forts and the road sector verified during field survey.

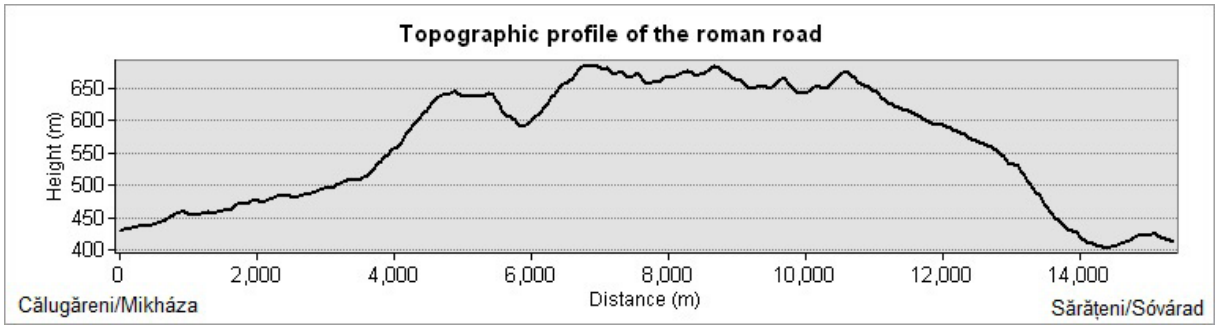

Fig. 5. Topographic profile of the limes road connecting the two forts.

Fig. 6. The limes road in the valley of the Cărbunăriei Creek next to the former Collective Agricultural Institution

Fig. 7. The limes road on the sector shared with the Via Mariae

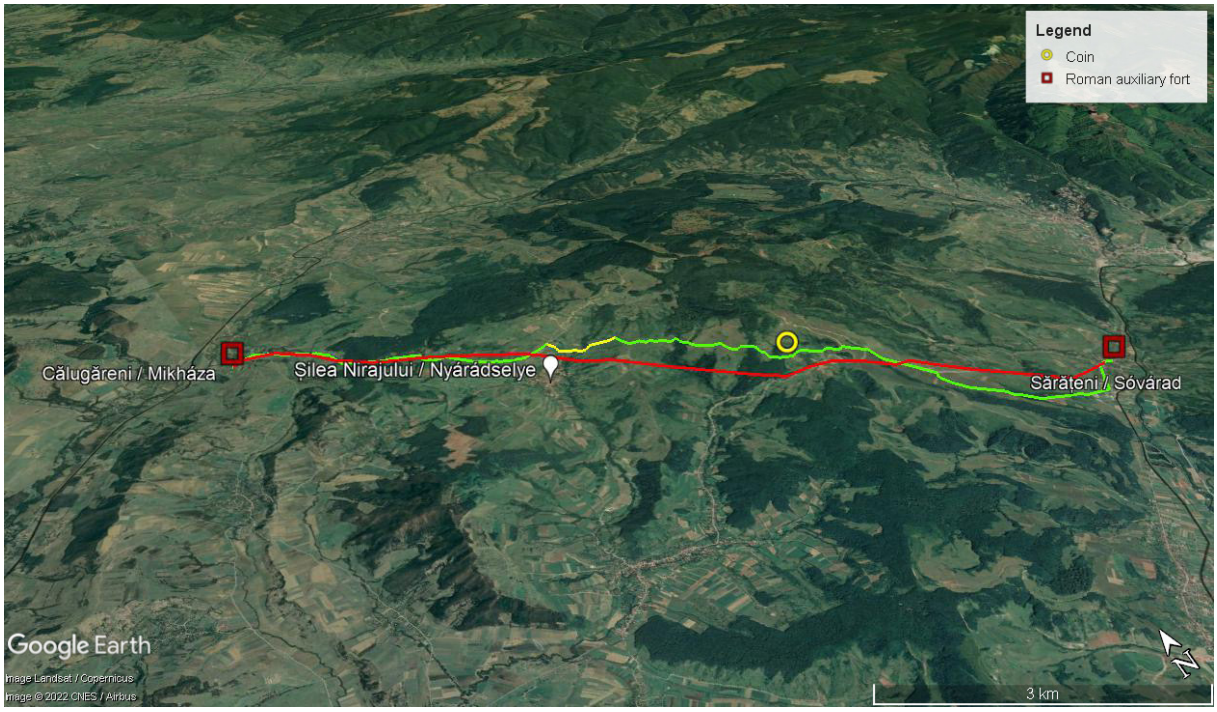

Fig. 8. Results of the LCA connecting the two forts (marked in red), the limes road sector verified during field survey (marked in green) and the presumed road sector (marked in yellow).

Fig. 9. The dupondius discovered on the road.

Fig. 10. Possible wheel tracks on a stone from the road.