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Recreating the landscape of the former Roman Dacia using modern 19th century cartography, digital data and GIS

Keywords: Roman Dacia; landscape; fortresses; roads; limes.

Summary: In the last 22 years, the attempts of the central institutions to create, use and update a national database with all the archaeological sites of Roman Dacia have failed. In this paper, we will use digital data, former maps from the 19th century, archaeological information, and aerial vertical photographs, to reconstruct several elements of the landscape of the Roman Dacia. In lack of a national archaeological repertory and topographic researches using aerial photography, the reconstruction of the Dacian landscape is still today a difficult task to achieve. Our purpose is to discover, explain and map the spatial patterns using archaeological data, digital cartography and GIS.

Premises

In the last 22 years, the attempts of the central institutions to create, use and update a national database with all the archaeological sites of Roman Dacia have failed. All these data are available online[1]. The reasons of the failure mentioned above are: 1. most of the archaeological data used were actually copied for older sources (the archaeological repertories of several counties); 2. the databases contain only extremely general information about each site. This leads to another problem: the location of a large number of these sites is a hard task, because of the inexact topographic data provided; 3. the lack of new methods to discover, evaluate and map new archaeological sites (the study of older maps, the use of aerial archaeology). Compared to other programs developed in Europe (we would like to mention the National Mapping Program developed in Great Britain, with excellent results[2]), the attempts made in Romania are, until now, useless, in lack of the use of new methods. One of these methods is the analysis of each archaeological region, the creation of a real GIS database, the mapping of the sites using digital methods.

In this paper, we will use digital data, former maps from the 19th century, archaeological information, and aerial vertical photographs, to reconstruct several elements of the landscape of the former province Roman Dacia, including fortresses, roads and watch-towers.

The topography and the landscape of Roman Dacia

In the 19th century there were major improvements in mapping within Europe. They took three forms. First, the publication of cadastral maps, made for taxation of administrative purposes, was a big step. The second major development was the growing importance of large-scale military surveys. The third form is the representation, within these maps, of elements which formed the Roman landscape. Anyone who studied the modern cartography noticed an 'appetite' to map all

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[1] See at http://www.cimec.ro/Arheologie.html (e-Patrimoniu. Institutul de memorie culturală, cIMeC.ro).
[2] http://www.english-heritage.org.uk/professional/research/landscapes-and-areas/national-mapping-programme.

the terrain details, including elements of the topography of the former Roman provinces: roads, settlements, bridges, milestones, legionary or auxiliary fortresses, *stationes*, *mansiones*, *thermae*, *villae rusticae*, aqueducts etc. This 'appetite' or this abundance of such details in the 19th century maps has a logical explanation. Mapping former Roman landscape elements was easier in the 19th century, because the landscape was 'untouched' and these elements were more visible comparing to nowadays. The geographical space was free of highways, or big cities. In fact, the density of modern roads, settlements and other infrastructure elements was smaller. The economic development of the last 50 years dramatically changed this landscape. Sometimes, this economic 'interests' leaded to the destruction of the archaeological patrimony.

The Romanian archaeologists and historians made efforts to know the topography of Roman Dacia. They use classical methods, i.e. fieldwalkings and excavations, in a period of 'romantic archeology', when there were no economic pressures, no 'deadlines', no preventive archaeology. During the 1950's, a project started in Romania, focusing on the creation of the National Archaeological Repertory. A big problem occurred during this period. Because of the communist regime, the topographical maps published by the Military Topographical Direction (Direcţia Topografică Militară) were strictly considered secret. The aerial photographs had the same status. Or, to produce topographic studies and landscape analysis, one needs maps first of all, otherwise it is impossible to realize this task. After the 1990's, this situation changed, but slowly. The first archaeological repertory published was the one for the Cluj County (1992)[3]. This work established a pattern for the future publications of this kind. The modern settlements were alphabetically described, starting with the earliest discoveries (prehistory) and continuing chronologically, to Roman times and post roman discoveries. Almost every description was completed with 'maps', which, in fact, were hand copies of portions from topographical maps, including only the surfaces close to every settlement described. After 1992, other repertories were published: Alba[4], Mureş[5], Covasna[6], Arad[7], Harghita[8], Sibiu[9], Braşov[10], Caraş-Severin[11], Hunedoara[12], Sălaj[13], but, unfortunately, methodologically nothing changed. So, when preventive archaeology started to be practiced in Romania (from 2000's until now), the archaeologists realized that they don't have many instruments of work, no maps presenting uniformly the discoveries from a certain area, from a certain period, no micro-regional topographic studies.

Modern cartography. Maps used for the identification of the archaeological sites

After the end of the Seven Years' War against Prussia (1756–1763), a cartographical registration of the Habsburgic Monarchy's crown lands was commissioned by the empress Maria Theresa.

[3] Crişan, Bărbulescu, Chirilă, Vasiliev, Winkler 1992.
[4] Moga, Ciugudean 1995.
[5] Lazăr 1995.
[6] Cavruc 1998.
[7] Hügel 1999.
[8] Cavruc 2000.
[9] Luca, Pinter, Georgescu 2003. Also available online at
http://arheologie.ulbsibiu.ro/publicatii/bibliotheca/repsibiu/cuprins.htm.
[10] Costea 1996.
[11] Luca 2004; Luca 2004a; Luca 2005; Luca 2006.
[12] Luca 2005a (available online at:
http://arheologie.ulbsibiu.ro/publicatii/bibliotheca/xvi/repertoriu%20arheologic%20hunedoara%20mic.pdf);
Luca 2005b (available online at: http://arheologie.ulbsibiu.ro/publicatii/bibliotheca/chunedoara/cuprins.htm).
[13] Luca, Gudea 2010. Available at:
http://www.brukenthalmuseum.ro/pdf/Biblioteca_Brukenthal/XLV/BBXLV.pdf.

The surveying lasted for twenty-three years (1763–1787) and resulted in 3589 hand-drawn coloured map sheets. After the foundation of the Austrian Empire (Kaiserstaat Österreich) in 1804, the 2nd survey of 1806–1869 was based on the first network of horizontal control points (triangulation). The entire area of the Austro-Hungarian Monarchy was mapped during the 3rd survey, in only eighteen years (1869–1887). Especially the second and the third military survey are masterpieces. They are outstanding in quality regarding its data content, drawing features and aesthetic appearance. The archaeologists understood their importance and after the publication of these maps they started to use them to reconstruct the landscape of some former Roman provinces. So far, the following DVDs were published[14]: 1. The First Military Surveying – Transilvania and Temes (April 2005); 2. The First Military Survey: Königreich Ungarn - Georeferenced version. It contains 3400 colorful, handmade, 1:28.800 scale map sheets, and 23000 names of 9974 settlements with sophisticated search engine (October 2004); 3. Second Military Survey of Hungarian Kingdom and Temes (December 2005); 4. The Second Military Surveying: Kingdom of Hungary and Temes - Georeferenced version (December 2005); 5. First & second military survey of Transilvania. This DVD contains the Transylvanian sheets of the first and second military surveys of the Habsburg Empire (November 2007); 6. The Third Military Survey 1869-1887: Ungarn, Siebenbürgen, Kroatien-Slawonien, 1:25.000 (March 2007); 7. The Third Military Survey 1869-1887: Österreichisch-Ungarischen Monarchie, 1:75.000 (March 2007).

A very valuable cartographic source for the identification of former elements of the Roman landscape is the group of military maps realized at the beginning of the last century. These are officially named 'directory plans' ('Planuri directoare de tragere'). These maps contain old toponyms, points, places of former Roman fortresses, or traces of former Roman roads.[15]

Cartography and archaeological researches in Romania. Unsolved issues

Starting in the 1960's, the Romanian researchers, archaeologists and historians contributed to the publication of the so-called *Archaeological Repertories*. Today, a part of the counties which cover the former territory of Roman Dacia benefit of these repertories. All of them are structured using a common model. The settlements are alphabetically ordered and a large number of archaeological findings are briefly described, but a big problem is still unsolved in that the topographic indications and the maps from these repertoires are, in many cases, almost useless. The indications in text, in many cases, are formulated like this: '…in that part of the village…', '…within the territory of the settlement X…' or '…. South, North, East or West of this point/road/terrace/river' etc. The maps published in these repertories are extremely general, sometimes with no scale, difficult to read, to understand.

Nowadays, intensive preventive archaeological research takes place every year, and the first step is to present a prognosis of the archaeological potential of a territory. In lack of accurate information, mapped and catalogued, one can not estimate the archaeological potential of an area.

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[14] See additional data at: http://www.arcanum.hu/english/kiadvanyaink/terkep/.

[15] Vasile Crăciunescu, Ioan Rus, Ștefan Constantinescu, Ionuț Ovejanu initiated in 2010 and finished in 2011 a project regarding these maps. So far, within their project entitled 'eHarta' (http://earth.unibuc.ro/articole/eHarta), they scanned and digitized 1425 map sheets, from a total of 1700 (covering the whole territory of Romania). These maps can be downloaded for free at: http://earth.unibuc.ro/harti/download-planuri-tragere.php. In this section, the authors offer a total number of 2341 map sheets.

Conquering Dacia, measuring the land, organizing the landscape

Between 102-103 A.D. and 105-105 A.D. Trajan organized two huge military campaigns to conquer Dacia. He succeeded in achieving his goal, but with great efforts and a lot of help coming from his military staff. During this first campaign the Roman troops penetrated the territory of Banat using two routes, which became rapidly parts of the Roman imperial road.[16] The first is the road between Lederata (Today Ram, in Serbia) and Tibiscum (today, Jupa, Caraş-Severin county). The second one is the road between Dierna (today Orşova, Mehedin□i County) and the same Tibiscum.

Today we do not have too many sources for the reconstruction of the Dacian wars. Almost all of them are lost. Trajan wrote, as his predecessor Caesar did, a 'book' concerning the military campaigns in Dacia: *De bello Dacico.* Only one sentence survived: *'inde Berzobim, deinde Aizi processimus'* (*'from there we advanced to Berzobis, and then to Aizis'*). This sentence describes the advancement of the Roman army leaded by Trajan himself on a road constructed during the first military campaign in the Western part of Banat. The most important aspect here is the sentence in itself. It matters that Trajan presented *ad modum simpliciter et militariter* all the settlements, and maybe the distances between them, in the form of a written *itinerarium.*[17] This knowledge could be easily transformed in an *itinerarium pictum.*

The Roman surveyor Balbus wrote a book on topography and geometry. His text, entitled *Expositio et ratio omnium formarum*, was dedicated to Celsus, the famous mathematician from Alexandria, Egypt. Unfortunately only a part of his text survived. But the information is essential for one to understand the role played by surveyors in *clara expeditionis* against the Dacians[18]:

> "But as soon as we stepped into the enemy's land, Celsus, the operations of our emperor started to request the help of measurement sciences. It happened that along a certain sector of the road we needed to draw two straight regular lines, with the help of which we built the huge defense constructions necessary for the defense of routes. Thanks to your invention (the measurement instrument), this allowed the drawing of these (lines) in a big part of Dacia. For example, regarding the design of the bridges, even if the enemy wanted to attack us, we could calculate from our bank, which are the widths of the rivers. All this venerable science, gifted by gods, has showed me how to find out the heights of the mountains which needed to be conquered".

Balbus established, using geometric methods, the width of the rivers, even if one bank was controlled by enemies. He also mentioned that he managed to establish the position of the future military fortresses in Dacia. And the most important thing is his presence in Dacia for a year, together with the emperor. This signifies an important aspect. Trajan was really very concerned about the rapid administrative and military organization of his newly conquered territory. Two things were always realized by the Romans when they penetrated a foreign territory: they built roads necessary for the advance of the troops and fortresses to accommodate the soldiers from legions and auxiliary troops. So, Balbus and other surveyors (*mensores* from legions) participated at this huge effort. The soldiers from legions worked hard to accomplish that, as the relief of Trajan's column show. They cut the forests, built bridges and roads. They penetrated constantly the enemy's territory, showing the two qualities of the Roman soldiers: *labor et disciplina.*

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[16] Fodorean 2004, 331-446; Fodorean 2005; Fodorean 2005-2006, 165-344; Fodorean 2006.

[17] Bărbulescu 1999, 34.

[18] Text and translation after Crişan, Timoc 2004-2005, 157-170.

It is logical to assume that Balbus was not the only *mensor* in Dacia. He was, obviously, the 'chief-engineer', and from this position he supervised all the works related to the establishment of the routes of the roads and the location of the military fortresses. In their advancement in Dacia, the Romans used, for the recognition of the terrain, cavalry units, the so-called *exploratores*. The most famous in this context was *Tiberius Claudius Maximus* (ca. 65 A.D. – 117 A.D.), the decurion who followed Decebalus sometime after 2 September 106 A.D., after his withdrawal from the Dacian capital. We know his entire career because by chance his tombstone was found at Grammeni, in Macedonia.

Exploratores were usually cavalrymen forming troops which had as main tasks the recognition of the terrain, the position of the enemy, the establishment of the future routes. They acted almost always as troops, together, unlike the *speculatores*. The literary sources attest various kinds of auxiliaries in the Roman Empire: *exploratores Batavi*, *Divitienses*, *Germanici*, *Nemaningenses*, *Sciopenses* (in Germania), *Bremenienses* (in Britannia), *Pomarienses* (in Africa). They are also attested in the armies of the Danubian provinces.

An important branch was that formed by military surveyors. They are usually named *mensores*, though this category includes all kind of specialists in measurement. In Dacia three *mensores* are attested in inscriptions. Basically, *mensores* served in many branches of the Roman army, holding preeminent posts in them. So, they were used in geographical expeditions and in military campaigns. Balbus, a civilian *mensor*, was invited by Trajan to take part at the organization of Dacia doubtlessly because he had been the best in his field at that time.

Case studies. Organizing the landscape in Roman Dacia

Because of its terrain and its particular position, Dacia is packed with examples of what we call the adaptation of the constructions to the general conditions of the terrain (Fig. 1). Our examples will provide data to show how Roman fortresses, watch-towers, or Roman roads, were projected and positioned in the most suitable areas.
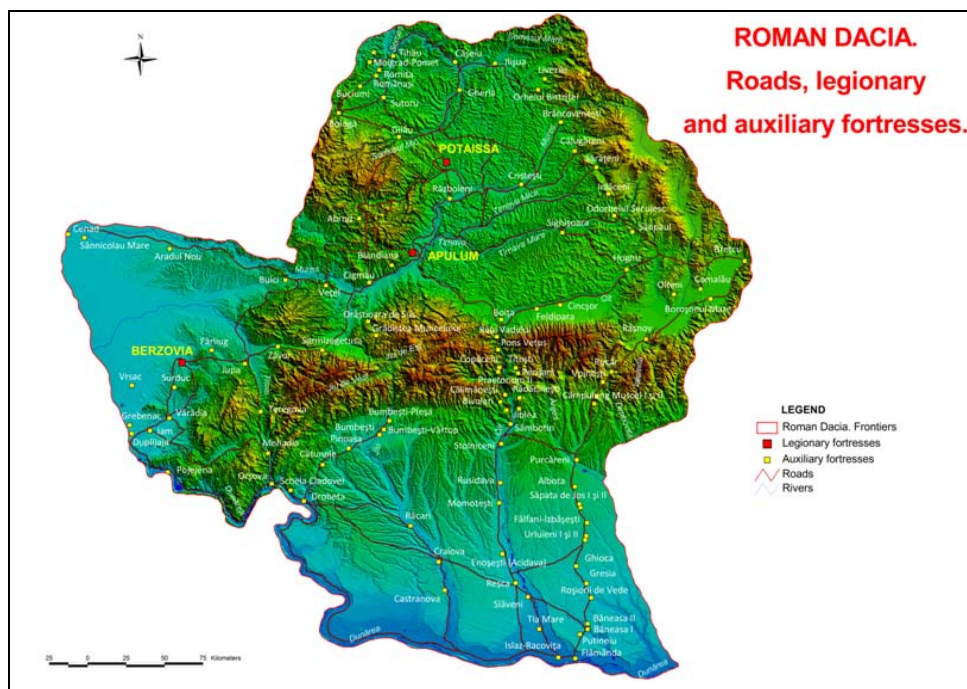

Figure 1. Roman Dacia. SRTM. Roads, legionary and auxiliary fortresses.

The defensive system around the Roman fortress from Bologa (Cluj County)

The fortress from Bologa is positioned in the eastern part of the village, 200 m south of the current road Bologa-Huedin, and 300 m east of the valley called Henţu (Fig. 2).
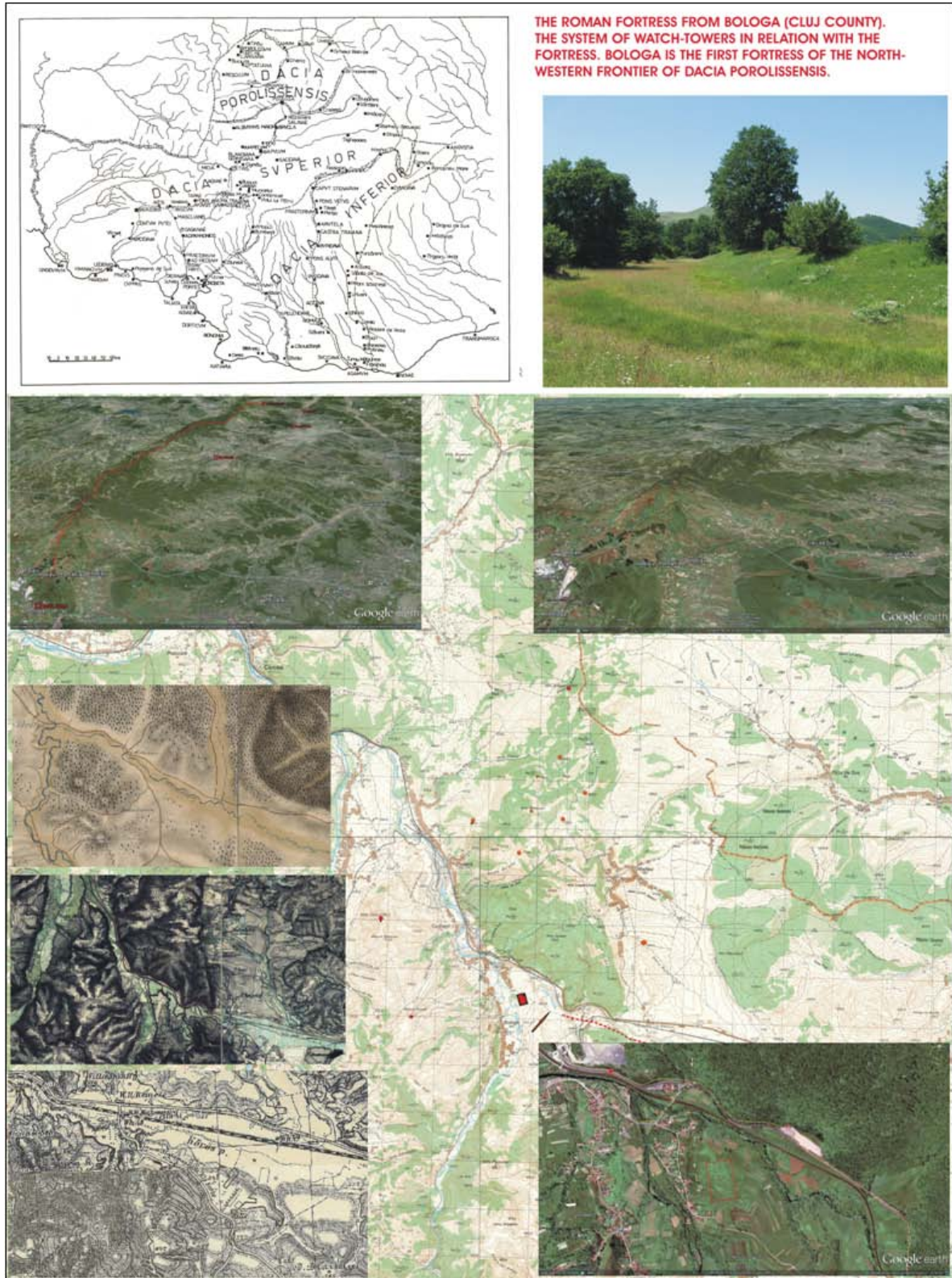

Figure 2. The Roman fortress from Bologa.

The fortress[21] is located in the triangle formed by the valley of the river Henţu with the valley of Crişul Repede. The camp is a rectangle with dimensions 205 x 121 m. The Roman engineers chose strategic positions for a series of watch towers positioned along a 66 kilometer line, above the Meseş Mountains. These towers were able to visually communicate with the fortresses positioned in the valleys of the river Agrij and Almaş: Bologa, Buciumi, Românaşi, Romita, and Porolissum. In this particular case, the fortress from Bologa communicates with several towers, positioned in the highest points around it (Fig. 2, 3). The fortress is positioned in the visual range of the tower from Măgura Bologa. This tower also communicates with another one, discovered on the hill called 'Vârfu Ţiclu' (altitude 760,2 m). The tower from the last mentioned point visually communicates with eight other towers, all of them raised on the highest hills. Our analysis using Global Mapper ('Shed Analysis') started from archaeological data, which confirm the existence of a tower on the hill 'Vârfu Ţiclu'[22].

We can see that from this point one could have visual contact with all the other towers (Fig. 3). The northernmost one is positioned on the hill 'Dealu Grebenului' ('Vărfu Grebeni', altitude 970,0 m). The distance between this tower and the one from 'Vârfu Ţiclu' is, in straight line, of 6732,5 meters. All this visual camp is covered from south to north, from 'Vârfu Ţiclu'. From this point one could also communicate with the tower positioned 1547 meters south, on the hill 'Măgura Bologa'. And, to sum up, the fortress is visible from 'Vârfu Ţiclu' and 'Măgura Bologa'. So, using all these data, we reached an important conclusion. The fortress from Bologa communicated with the towers from 'Vârfu Ţiclu' and 'Măgura Bologa'. The last mentioned tower had visual contact with nine other towers, all positioned north of these two, all on high hills.
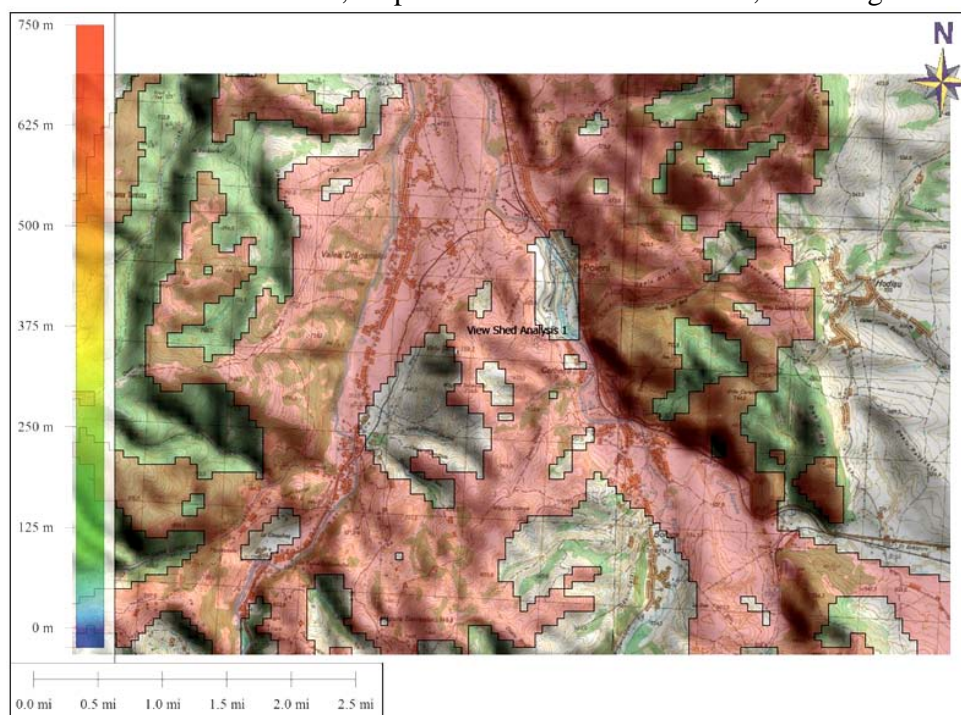

Figure 3. 'View shed' analysis. Target point: 'Vârfu Ţiclu', west of Bologa.

[21] See Gudea 1997, Gudea 1997a and Gudea 1997b, 39-42.
[22] We used for all our case studies: 1. Software - Global Mapper 12; 2. Digital elevation data (SRTM – Shuttle Radar Topography Mission), Romania, resolution - 45 m. We overlapped the topographic maps, 1:25 000 scale, covering the whole territory of Romania. Further, to provide information for our goal, we use the commands ‚map texture' and ‚shed analysis'. We digitized, for each case, the position of former Roman fortresses, or roads. We also use, to work with accuracy, all information available from older maps, especially those realized by the Austrian cartographers, to identify and to maps these former elements of the Roman landscape.

The Roman imperial road between Potaissa and Napoca

In 106 A.D. Dacia became a Roman province. Before the conquest, during the two military campaigns in 101-102 A.D. and 105-106 A.D., the Roman engineers, led by Balbus, succeeded to project and to start the construction of the first Dacian 'highway': the road starting from the Danube, towards the Banat region, including two branches – the Western road, from Lederata to Tibiscum, and the Eastern road, from Dierna to Tibiscum (Fig. 4).

In fact, these two branches were the two lines used by the Roman army to penetrate the Dacian territory. Connecting together at Tibiscum, the road continued along the valley of the river Bistra, in the narrow corridor also known with the name 'the Iron Gates of Transylvania', until it reached the future capital of Dacia, Ulpia Traiana Sarmizegetusa. From here, the road continued to the north, towards Apulum, Potaissa, Napoca, ending at Porolissum, the northernmost point of the Dacian province. From south to north, the road has a total length of circa 450 kilometers. The construction started in 101-102 A.D. and probably ended around 110 A.D. We know this from an interesting discovery of the 18th century. In 1758, at Aiton (Cluj Clunty) a Roman milestone was discovered, with an inscription informing that this road was constructed during Trajan's rule (Fig. 5). According to the inscription, the road was built in 108 A.D. Probably soon, in the next two years, the Romans succeeded in finalizing the construction of the most important road in Dacia.
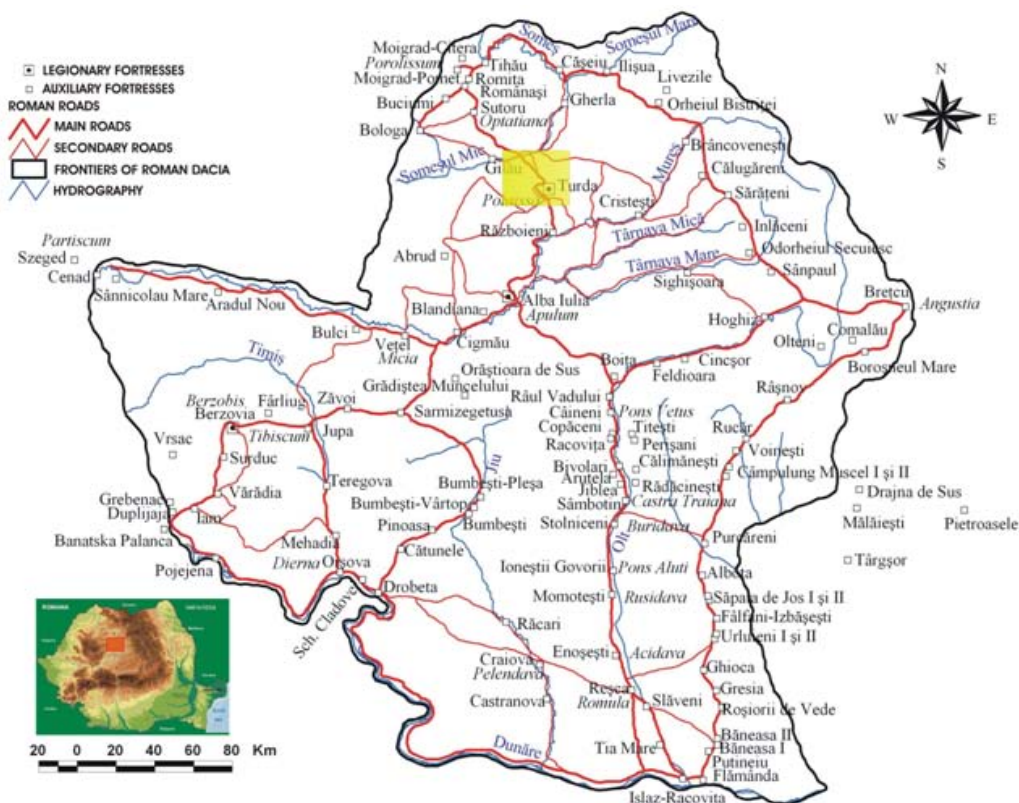

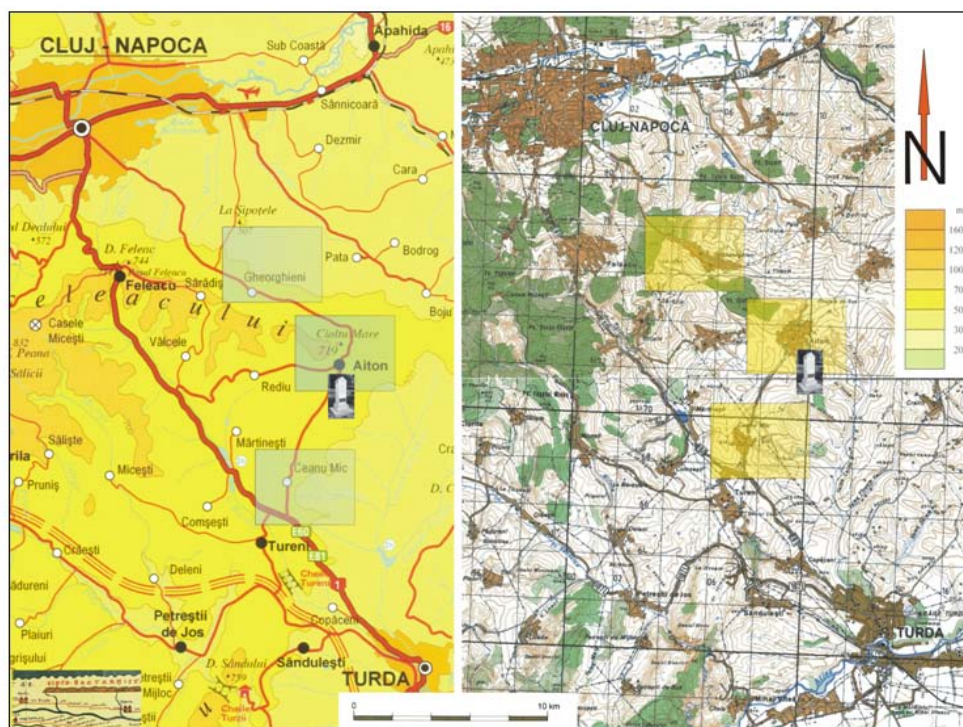Figure 4. Map of Roman Dacia. With yellow, the sector Potaissa-Napoca.

Figure 5. Potaissa-Napoca: the route of the Roman road.

Between Potaissa and Napoca this road was extensively identified in the terrain and mapped with accuracy. The total length in this sector is 36 kilometers, i.e. 24 Roman miles (Fig. 6, 7). The slope is small; the general direction is from south-east to north-west (Fig. 8). In several points, close to the area of the current village Ceanu Mic, the road was recently the object of some preventive archaeological researches. What is more important, as our shed analysis demonstrate, is the position of the legionary fortress from Potaissa[23] (Turda, Cluj County), in relation to this road and the other one from south, heading towards Războieni-Cetate. Choosing the location for one big legionary fortress as the one from Potaissa (23,37 ha) was not an easy task. The only one big plateau in this area was/is the hill called 'Cetate' (altitude 375 m), positioned west of the current city. This place was also close to a stone quarry (from here up to north, to the quarry from Sănduleşti, the distance, in straigth line, is circa 5,5 kilometers). Another important aspect was related to the water source for the camp and the ancient city. This source was identified and used by the Romans close to the stone quarry. The plateau provides a slight slope: towards north-west, where *porta decumana* was built, the terrain is a little higher comparing to the east. From the north-eastern corner of the fortress one could easily visually observe the Roman road up to the top of the hill called 'Dealul Dăbăgăului'. Our shed analysis demonstrates that towards north, there was visibility up to Aiton, and in south, all the valley of Arieş was visible, almost to the point when this river flows into the Mureş River (fig. 9). Once again, using digital data, combined, obviously, with archaeological information, we can demonstrate the powerful preoccupation of the Roman engineers to carefully occupy the geographical space, and to create strategic and economic advantages using this space.

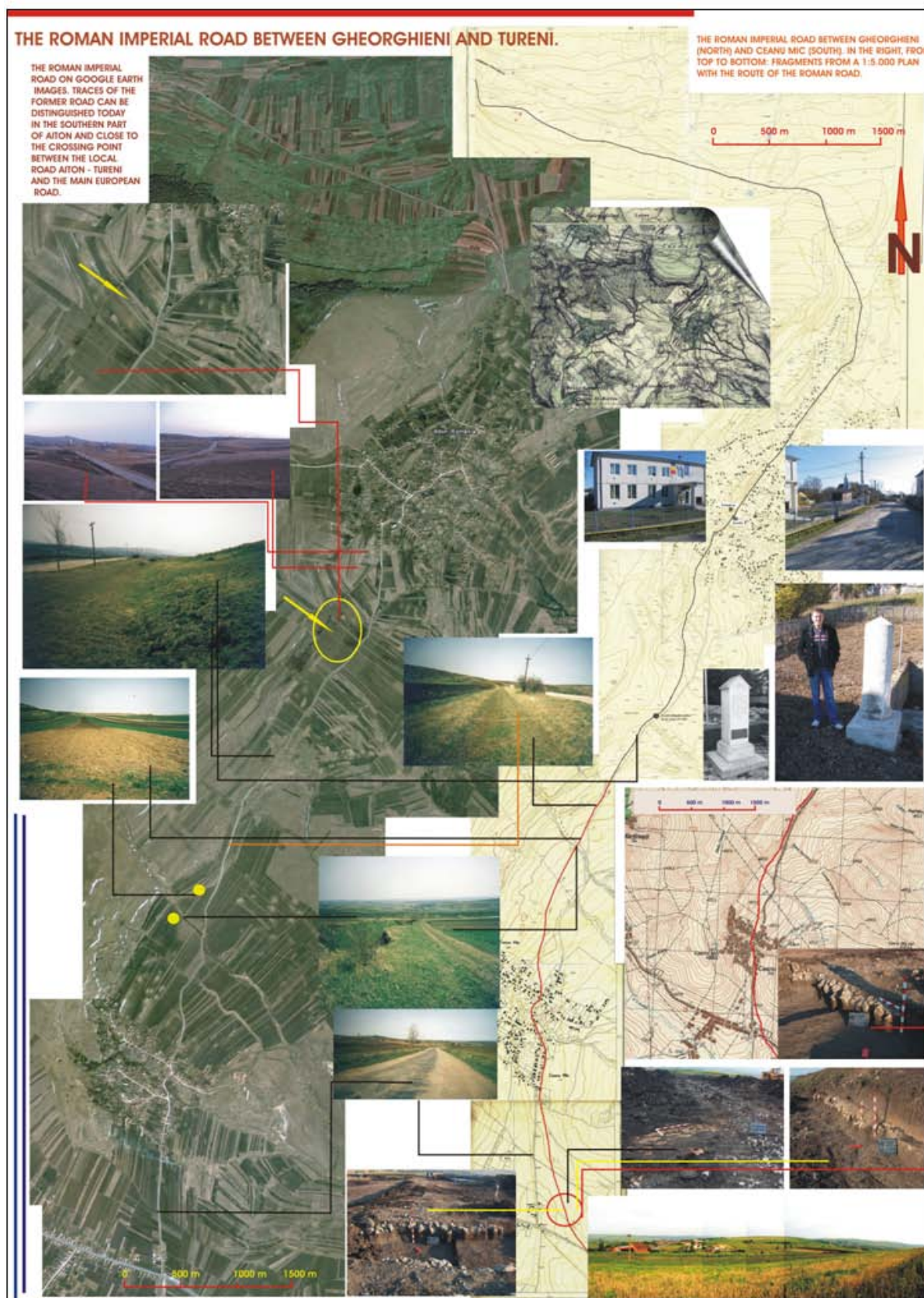[23] For this: Bărbulescu 1987; Bărbulescu 1994; Bărbulescu 1997.

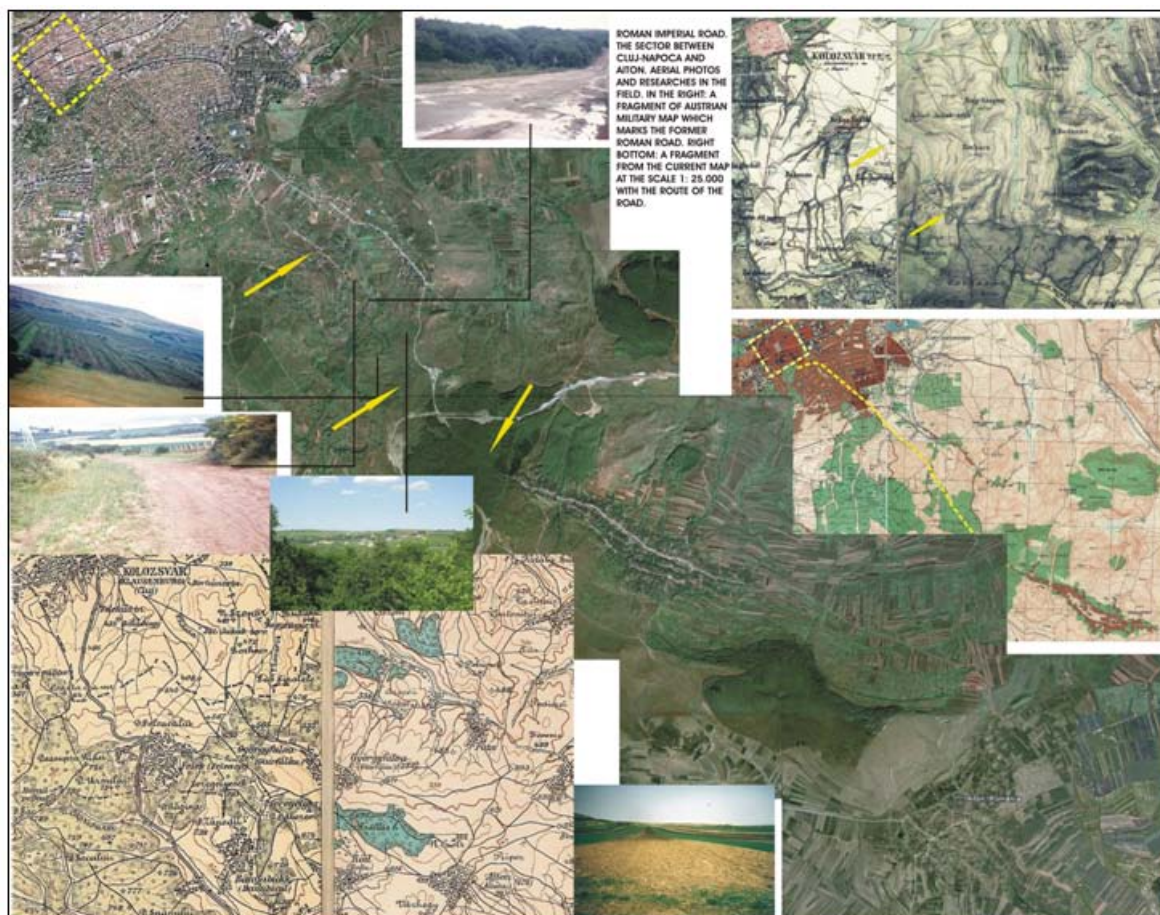Figure 6. Potaissa-Napoca: the route of the Roman road in the sector Tureni-Aiton.

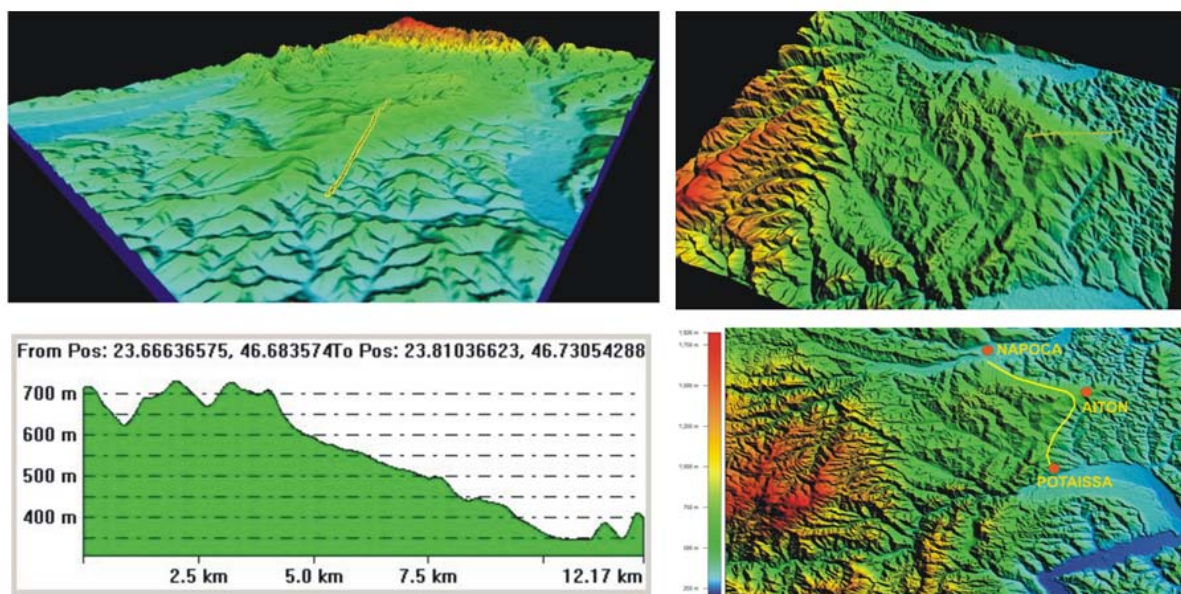Figure 7. Potaissa-Napoca: the route of the Roman road in the sector Aiton – Cluj-Napoca.

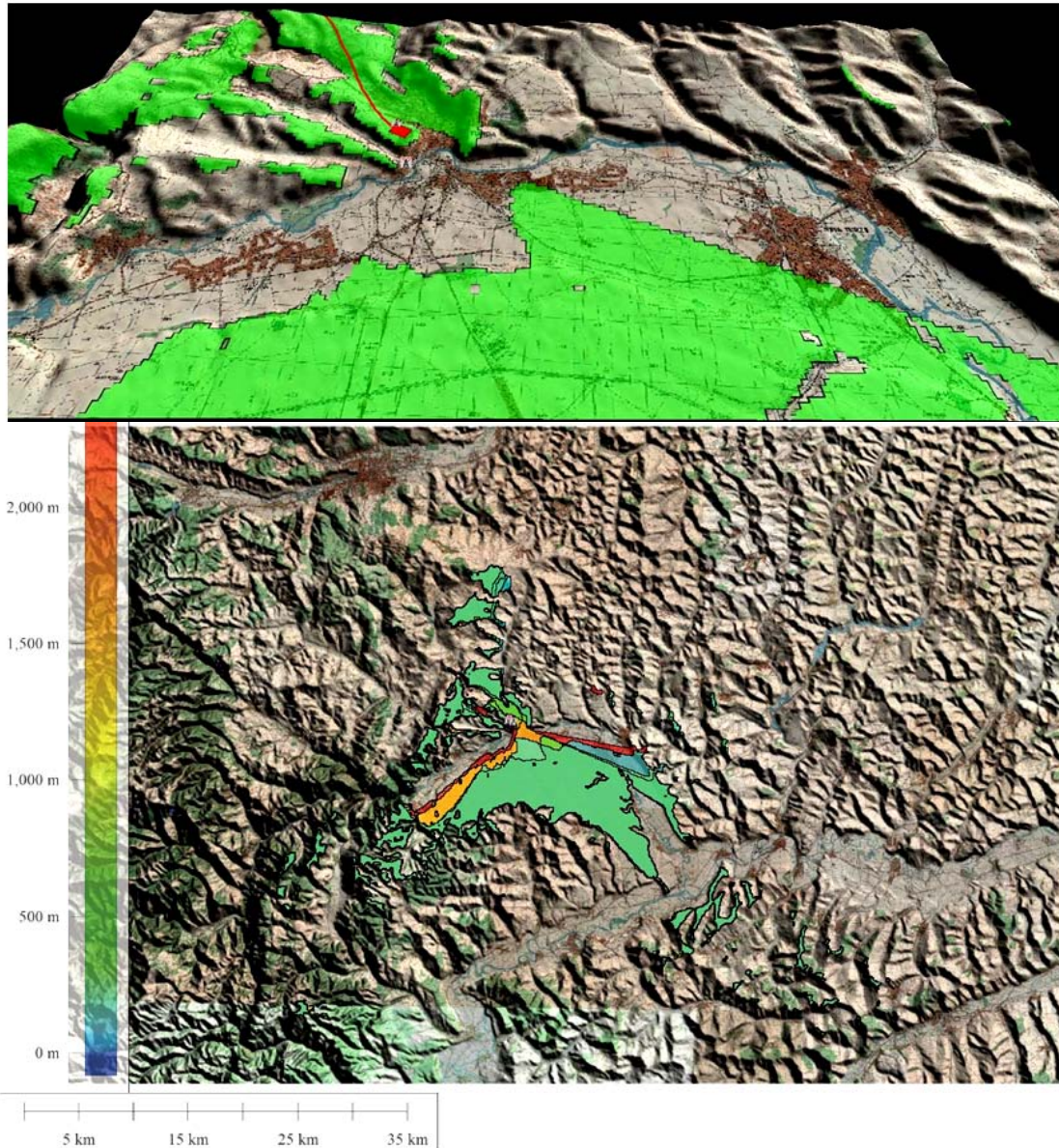Figure 8. Potaissa-Napoca: SRTM and topographic profile.

Figure 9. 'View shed' analysis and 3D model. Point: the Roman legionary fortress from Potaissa.

Roman fortresses and modern maps

Locating Roman fortresses on modern maps is a topic which has caught our attention since many years. The method we use is simple. The landscape changed dramatically in the last 100 years or more. The Austrian surveyors, and the cartographers, in order to accomplish their task, i.e. mapping the territory of the Habsburgic and later the Austro-Hungarian Empire, recorded almost every detail in the terrain. The results? Several former Roman fortresses were marked and described in these maps.

We will start our examples with the Roman military fortress from Gherla (Cluj County). The fortress is positioned on the right bank of the river Someşul Mic[24], in a triangle formed by the river, the so-called Canalul Morii (the Mill-Chanel) and the national road E 15 Cluj-Napoca – Dej (Fig.

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[24] Protase, Gudea, Ardevan 2008.

10). In the maps from the third military survey, as well as in the military maps created at the beginning of the 20th century, the place of the fortress is clearly marked as a rectangle.

Figure 10. The Roman fortress from Gherla.

Beside the fortress, the maps also show the route of the modern secondary road coming from south via Iclozel – Silivaş - Hăşdate. This is, in fact, the former Roman road, maintained and used until nowadays as a secondary road. After reaching the fortress, the road crossed the river (the traces of a bridge were not found) and continued via Băiţa and Buneşti to the north, to Dej. The position of this fortress is strategic. As the fortress from Bologa, or Sutor (Sălaj County), or Căşeiu, or Cincşor, the fortress was erected close to the valley of the river, to block possible attacks coming from north along this line.

Another interesting example is offered by the fortress from Hoghiz[25] (Fig. 11). The camp was discovered in 1949. Since then, no systematic archaeological excavations were made there, only several small surveys. The directory plans published in 1953 do not specifically mentions the toponym 'Roman fortress', but another important word: 'la Cetate'. Always, this toponym indicates a fortress. The Roman fortress is positioned on the left, southern bank of the river Olt, circa 1055 m south-east of the center of the village Ungra, 1796 m west of the southern entrance in the village of Hoghiz, and 3652 m north from the church from the village Cuciulata. The plateau where the fortress was built is delimited by the level curve of 460 meters, and the maximum altitude here is 470 m. On the military Austrian maps from the third survey, the fortress is marked as a rectangle in the same spot, and with a supplementary, essential remark, in German: 'Standort der Römer Lagers Pons Vetus' (the third military survey). The same drawing and toponym is present in the maps from the second military survey. In the maps from the first military survey (1763-1785), a rectangle symbolizing the fortress is drawn, and within this rectangle it is specified: 'Altes Schloss. Rudera'.

The same Austrian military maps mark clearly the position of the Roman fortress from Râşnov[26], ancient Cumidava (Fig. 12). On the maps from the first military survey (1763-1785) the fortress is marked as a rectangle, with the toponym 'Schantz'. On the maps from the second military survey the same point is marked as a rectangle, in an area named 'Ober der Erdenburg'. On the maps from the third military survey the fortress is also marked as a rectangle, and a toponym is present: 'Erdenburg', close to the value of the altitude - 610 m. The fortress from Râşnov is positioned between three settlements, along the valley of the river Bârsa, on the eastern, right bank of the river. The fortress is erected at 2001 meters in straigth line north west from the farm from Râşnov, 2643 meters west of the southern exit from the city of Cristian and exactly at 2273 meters south-east of the church from Vulcan (1512 meters south-east of the 90º curve made by the road which enters in the settlement of Vulcan from South).

Another fortress marked on the Austrian military maps is the easternmost fortress in Roman Dacia: Bre□cu[27] (Covasna County), ancient *Angustia* (Fig. 13). The fortress is positioned exactly 692 meters north-east of the catholic church from the village, 3464 meters north of the geodesic point marked on the current maps at Chirilău (east of the village of Mărtănuş, on the hill called 'Dealul Măgurii') and 6349 meters west-south west of the entrance in the village of Oituz. On the maps from the first military survey the fortress is marked as a rectangle, with the toponym 'Alte Schantz'. On the maps from the second military survey the same place is marked also as a rectangle, without any other indications. The same situation can be found on the maps from the third military survey. On the plans from the beginning of the 20th century (1917), the same Roman fortress is also marked, as a rectangle. The current maps do not provide anymore this type of indications. The fortress (positioned at 46º02' 59.06'' N and 26º18' 30.26'' E, altitude 607 meters)

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[25] Protase 2003, 125-134.
[26] Gudea, Pop 1971.
[27] Gudea 1980, 255-365; Vlădescu 1986, 83-85.

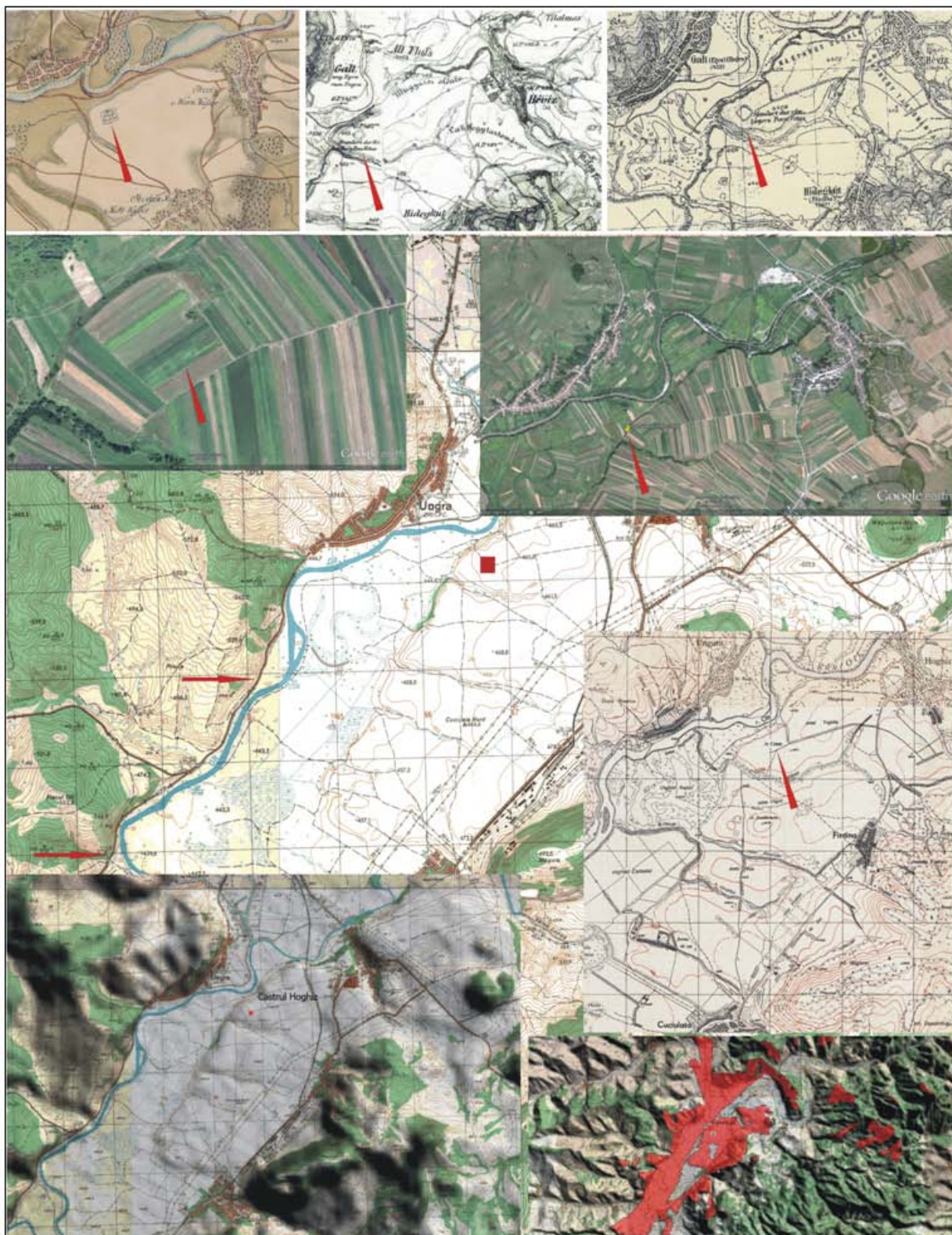had a perfect strategic position, blocking the entrance into the province from East, from the Oituz Pass.

Figure 11. The Roman fortress from Hoghiz.
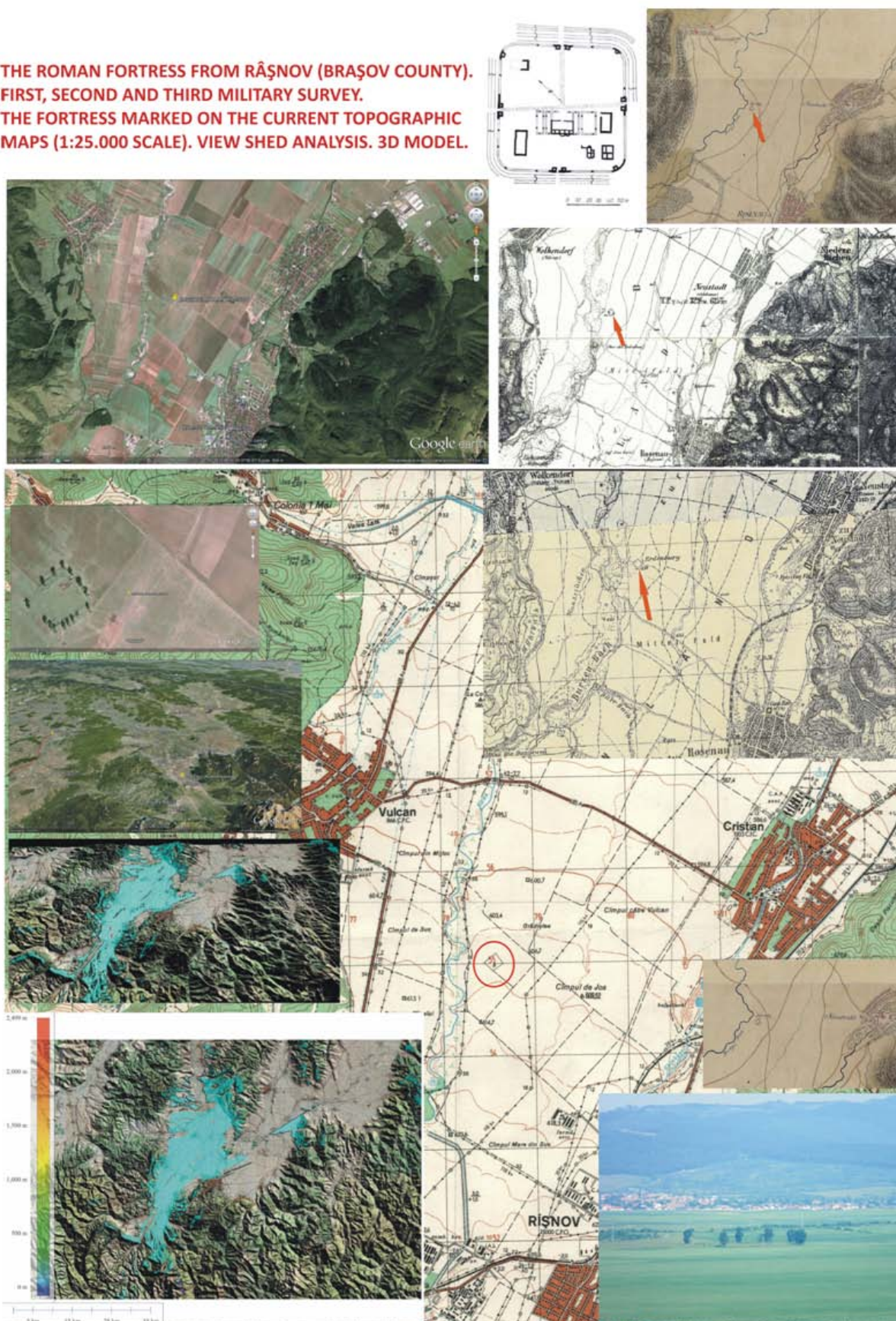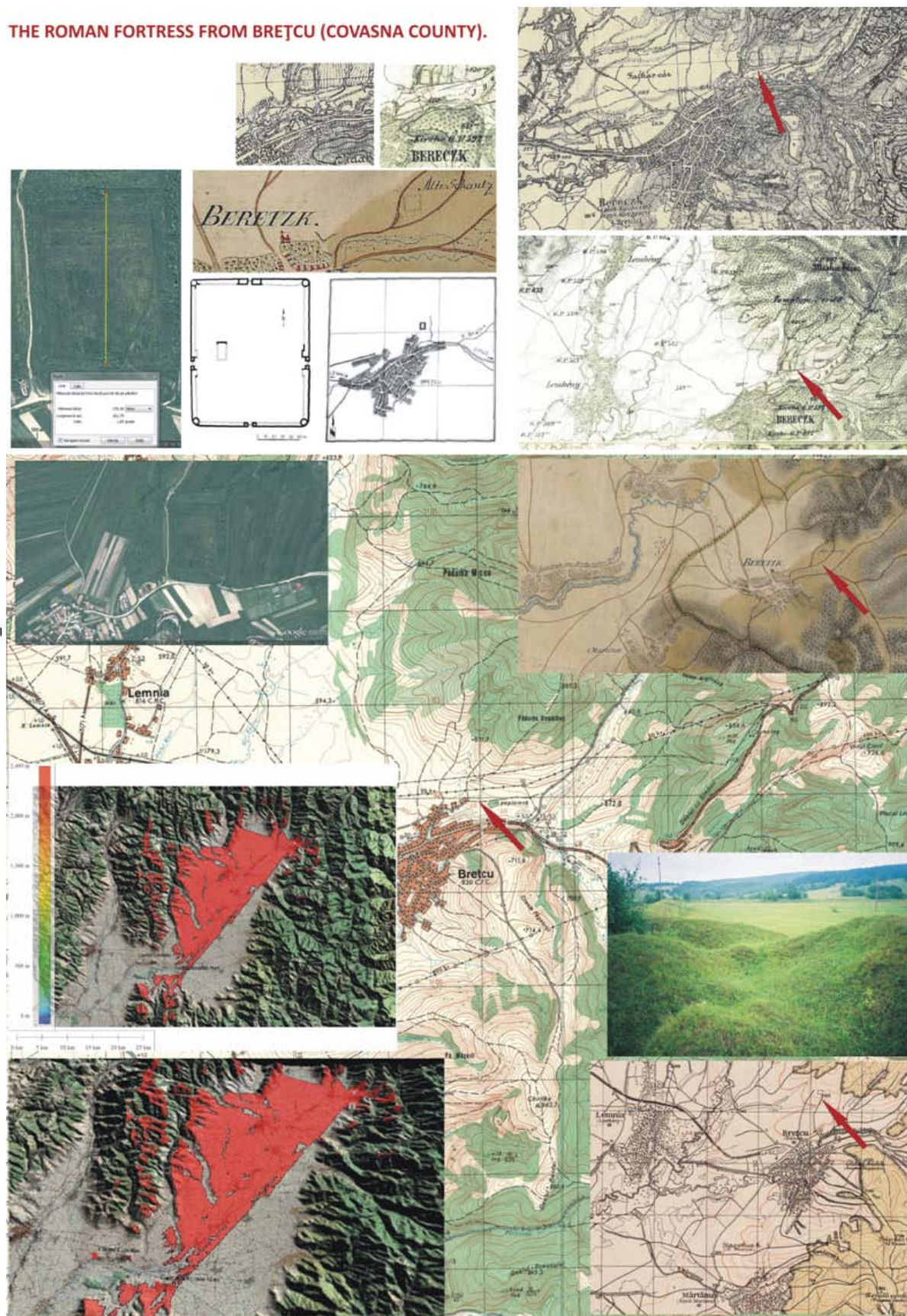
Figure 12. The Roman fortress from Râşnov.

Figure 13. The Roman fortress from Brețcu.

Conclusions

Recreating the landscape of Dacia is a very difficult task. Today, in Romania, around 13.000 archaeological sites are recorded. Of these, a big category is formed by the Roman archaeological sites. 105 Roman fortresses were built in Dacia, together with circa 5000 miles of roads, 11 cities with status of *municipia* and *colonia*, and around 500 rural settlements. Unfortunately, apart from the figure regarding the roads, and cities, all the other data are only approximated, i.e. we do not know today the location of numerous rural settlements. Modern maps, combined with archaeological data, and methods used in digital cartography, can provide a good solution, in the future, to discover new fortresses, sectors of Roman roads, or settlements. In lack of systematic research using aerial photographs, we will continue this type of investigation, providing new data for future analysis.

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