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Environmental impact in building a new frontier

Influența mediului în definirea unei noi frontiere

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REZUMAT

Cercetarea frontierei transalutane, pe segmentul de câmpie, a relevat anomalii de proiectare, respectiv absenţa obstacolului de graniţă pe unele sectoare dintre Urlueni și Pitești. Explicaţia obișnuită – cea cu stadiul cercetărilor – este aici puţin plauzibilă, după un proiect de teren de trei ani, așa încât trebuie să căutăm faptului alte cauze. Câmpia Română de astăzi este unul dintre teritoriile cele mai desfigurate de „binefacerile" economiei socialiste, așa încât pe actualele realităţi din câmp sunt foarte greu de formulat judecăţi istorice. În această situaţie, am încercat să folosesc toate resursele disponibile, de la documente medievale la hărţi de diverse generaţii, toponimie și știința pedologiei, atât cât poate un arheolog discerne din domenii care sunt, toate, dincolo de formaţia sa profesională.

Răspunsul final la o întrebare complicată pare o soluţie simplă: nu toate sectoarele de graniţă au fost închise prin obstacole artificiale (fie ele „valuri" sau palisade), fiindcă erau protejate, de fapt, de o natură neîmblânzită, fie că vorbim despre păduri (relativ ușor demonstrabil) sau mlaștini (mai greu de demonstrat pe terenuri demult desecate). Chiar și pe asemenea zone apărate natural se presupune însă amenajarea unor palănci, care însă nu lasă urme arheologice.

În articol sunt discutate şi alte particularităţi regionale, descriind o frontieră romană puţin obişnuită, în care cele mai uzuale resurse şi materiale de construcţii ale civilizaţiei romane sunt în penurie. Bazându-mă în special pe săpăturile recente de la Băneasa, încerc să descriu extraordinara capacitate de adaptare a armatei romane la resursele locului. Rezultatul, însă, este cel puţin surprinzător.

ABSTRACT

A three years research project along the plain section of the Roman frontier known as *Limes Transalutanus* has reached some peculiar conclusions. Between them one can count the fact that some sectors, summing three quarters of length of the northern section, although crossing open fields, has no obvious frontier obstacle. The common explanation, about 'the state of art', does not work this time, therefore one will need a rationale for that 'anomaly'. The Romanian Plain of today is one of the most disfigured territories, due to the socialist exploitation of the land (mainly by draining and deforestations); consequently, it is impossible to make a historical assessment only on things today visible in the landscape. I tried to use all resources at hand, beginning with medieval documents and pursuing with cartographic depictions of several generations, place names and pedology, as much as an archaeologist can deal with them.

The final answer is far simpler than expected: not all the sectors of the frontier were closed by manmade obstacles, because they were already secured by natural items, either thick forests or unexplored marshes. The only needed proof for a Roman boundary is the road running along the frontier, but this is difficult to prove on a field completely devoid of stone. I am suggesting also wooded barriers made of cut trees left on the spot, but such an obstacle leaves no archaeological traces.

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In the paper are also discussed other regional peculiarities, this time for the southern section of the border, picturing an unusual Roman frontier, missing the most iconic building materials and means, as stone, wood and *tegulae*. This part is supported by the recent diggings from the Roman fort at Băneasa, describing the outstanding vocation for adaptability. The result is yet at least surprising.

Introduction

In the fall of 2017 has ended a research project dedicated to *Limes Transalutanus*, a frontier made by Romans in southern Romania at the threshold of the second and third century. The province protected by the new frontier was not new, being created in the aftermath of the Dacian Wars (101-106), named for a while *Dacia inferior* (the lower province of the Dacians),[2] then *Dacia Malvensis*, taking the southern and eastern parts of the former Decebalus' kingdom. It was structured along a major tributary of the Lower Danube, named Olt in our days, and *Alutus* in antiquity, the only to cross the Southern Carpathians (over 2500 m in altitude) through the Olt Gorges. Starting with the third decade of the second century the frontier has been organized along the middle and lower course of Olt River, crossing the river only in the south-eastern corner of Transylvania, in order to reach Oriental Carpathians and lock the Oituz pass. This frontier was painfully long (almost 500 km), giving headaches to logistics, as it's north-eastern end (Brețcu, *Angustia*) was pretty far from the main Roman roads, or at least those documented.[3]

The research project dealt only with the segment of the frontier between the Danube and the Argeș River, stretching about 160 km, due mainly to the short span of time dedicated (initially only two years) and the poor financial support[4], being thus stuck in the Romanian Plain. An extensive display of the means and aims of the project was published from the very beginning (Teodor, Ștefan, 2014).

As I am not an environmental expert, being just an archaeologist, the issues connected with the nature of the land on which the border has been built were included in the research project just 'between others'. As the funding amount was cut at half, from the very beginning, those objectives were kept on the list, but the only attempt (we could afford) to get palynological data – as it is an expensive line of activity – has failed in collecting enough pollen. With or without pollen results on a single point from the route, it was obvious to me that that the main results concerning the environment, in the given situation, could be acquired mainly in office tasks, largely described below.

As the project activities were developing, became increasingly obvious that the 'weird data portfolio' was not decreasing, but increasing, and the capacity of explaining them through 'regularly' archaeology is relatively low, and as we were already in the latest phase of execution (the third year of activity) we

[2] Note that for the first decade after the conquest there was only one *Dacia* province, and the southern part of now-a-days Romania was part of *Moesia Inferior*; after the Sarmatians' turmoil from 117 these parts became *Dacia Inferior*. For some details see Țentea, Matei Popescu, 2016, 4-9.

[3] A map containing both frontiers (of the second and third century) could be seen in Teodor, Ștefan, 2014, 33, Fig. 1. The map is a little outdated in some details, but fair enough for an introduction in the matter. Other relevant details about the project and the team are available on the project web-site, www.limes-transalutanus.ro.

[4] As planned, the project aimed to get around 340.000 Euros, but finally proved to be exactly half. Beyond the financial weakness, there was the problem of manpower, as long as truly specialists on landscape archaeology in Romania could be counted on fingers, across Romania.

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had to push harder in order to understand the 'anomalies'. This paper resumes those efforts. Many of them are already rendered in diverse publications – most of them online contributions, as they have occurred late within the project timetable – but most of them in Romanian, less accessible to our colleagues from abroad. This overview of the environmental issues also intends to asses the level of our knowledge in the matter and to suggest further needed investigations as soon as a founding solution will be available, by the same team, or any other team concerned about the connection between a large scale project, as one oriented to a Roman frontier is, and its ground of materialisation.

General facts about the climate in the Roman Age are available in large numbers on Internet, but the picture available is rather divers and confusing. The climate change is today a public debate in which it becomes difficult to assess which information is pure politics and which a scientific fact. A catastrophic perspective of the history, making from climate the cause of all causes in the mankind history, is turning some professionals into green agents, as the case of Karen Carr (2017), an associated professor of the History Department of the Portland State University, which has found that the fall of the (western) Roman Empire was a result of the cooling climate. Of course, one can find completely different approaches on studies grounded in climatology. This way we can find out that the first two centuries AD were warmer than the average, named 'the Roman warm period', but the next three centuries were just usual, comparable with our time-life, a really cold weather occurring only beginning with 530's.[5]

In what concerns data regarding this part of Europe and the Roman Age conditions, diagnostic is just in the beginning. We owe to a project dealing with the northern frontier of Dacia a study which shows, basically, that the climate was more or less the same as in our days.[6] Although missing a study concerning the southern Romania for the Roman Age, we have a study referring the Eastern Mediterranean basin and others referring the northern Transylvania, and all are saying that one should not expect unbalanced climate conditions (both for temperature and humidity) for the third century AD. In judging the natural conditions expected in southern Romania at the end of the second century AD, one has to consider the fact that almost 200 years before the area was more or less not inhabited, due to the so called 'sanitary belt' imposed by Romans on the northern shore of the Lower Danube.[7] In other words, the area was pretty much wild and deserted, at least until the mid second century.

A collection of weird data

Our research project was the first to tackle the plain segment of *Limes Transalutanus* as a whole[8]. Some details known from the very beginning, preparing the action in

[5] Finné et al. 2011, esp. p. 3164.

[6] Grindean et al. 2015 (esp. p. 122, 'warm and mild climatic conditions'); see also Tanţău et al. 2016, 159-161.

[7] Petolescu 2010, 71-75, 79-82; the 'sanitary belt' is a modern concept, of course, used only metaphoric, but expressions la 'safety buffer' has been previously used (D.M. Pippidi, cited by Petolescu). See also: Gruen 2008, 176-178, in English but less useful; a recent thesis PhD oriented on *Getae* settlements concludes also that the end of habitation in the Romanian Plain, dated mainly along the first century AD, would be caused by the Roman pressure and massive displacements of population, mostly south of the Danube (Bătrînoiu 2017, 8).

[8] The only notable effort to understand this frontier was previously made by Ioana Bogdan Cătăniciu, beginning with early 1970's up to the middle of 2000's. Her main contribution (1997) is also a Romanian language book, but one could find divers short publications about the subject, spread out mainly in the proceedings of Limes Congresses from the last decades (examples Bogdan Cătăniciu 1974, 1977; see also Bogdan Cătăniciu 1981).

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the field, were already noted in my book from 2013.[9] The most striking fact was the discontinuous *limes* obstacle in the northern area of the targeted segment. Reaching here, I have to briefly present the structure of the frontier between Danube and Argeş River, which is made from three different sectors, as follows (Figure 1):

- the southern sector, from Danube to the Vedea River (58 km long), which is fully delineated by an embankment (a ruined palisade, in fact);
- the middle sector, from the fort Gresia to the fort Urlueni (about 42 km), where the frontier is made behind a high and steep terrace, made by the Vedea River digging in the geological clayish support;
- the northern plain sector, between Urlueni and Piteşti City (60 km), crosses the opened fields and should be made similarly with the southern sector; but it is not.

It worth mention that such a frontier, crossing a plain without a built obstacle, does not exist, in the Roman Empire, or at least in its European part, which I know better. In general terms, it could be settled along a river, when it is named *ripa* (the 'slope'), or across an opened field, known generally as *limes* (pl. *limitis*, the 'edge', coming from an older sense of 'road separating properties').[10] If a frontier is surely crossing the land, but leaves no trace, one faces the next alternatives: the limit of the empire was never marked, from reasons to be established; either the limit has been drawn on the terrain, but left no archaeological traces. In which of the situations are we here, south of Piteşti City, was one of the main questions to be answered within the project.

What I knew, in the fall 2014, were the next: a sort of burned '*vallum*', at the southern end of the sector, near the fort Urlueni, just across the Cotmeana Valley, a bit longer than 2 km; something similar, but not burned at all, at the opposite end, near Piteşti, also about 2 km long; a similar length segment was rather supposed that known, at Pădurea Grozeasca, a toponym meaning a forest but actually with no trees, at about the mid way, close to the fort Săpata. Counting the sum, I knew a bit more than 6 km out of about 60 km. At the end, three years later, I was able to prove a supplementary line, 7.5 km long, prolonging the southern segment, heading north; a few kilometres north of Pădurea Grozeasca I found the traces for a very short landmark (about one km), meaning very likely another piece of evidence, and also a segment of a Roman road near the fort Albota. Overall, our knowledge about the northern frontier made a sort of progress, from 10% to 25% from the entire route between Urlueni and Piteşti; obviously, the problem is the same as at the very beginning, at least on theoretical grounds.

A second set of weird facts came up later, as I have started diggings at the large fort from Băneasa, 23 km away from Danube. This is the largest fort of *Limes Transalutanus*, but not greater than 139 m on one side (being square). A snapshot taken from the airplane, in the late July 2015,[11] has showed that its western wing is partially lost in the crumbling high terrace of the Călmăţui Valley. Although digging was not a priority in this project – being preferred typical means of the landscape archaeology – I made a test digging in the September 2016, in order to asses the conservation status at the south-

[9] Teodor 2013, 69-70, 75-76, 78-79 (with Fig. 31), etc., available also in an English version of the book (Teodor, 2015, heavily revised, see pages 72-73, 78, 80-81 with the Fig. 34, etc.).

[10] The subject is already presented in Teodor 2015 a, 104-109, with some connected literature.

[11] Teodor et al. 2015.

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western corner of the fort, apparently the most endangered. Because the first results were rather positive (the barrack behind the palisade was better preserved than expected), in the summer 2017 I made a regular archaeological campaign, at the north-eastern corner of the fort (apparently the best preserved). As the reports are published (Teodor 2016 a and Teodor et al. 2017), there is no need to go for details here; nevertheless, some of the conclusions are peculiar and worth being mentioned.

The enclosure of 'the large' fort from Băneasa[12] is not made of perennial materials, as expected for a Roman fortification made (and remade) in the first half of the third century, being a palisade. There is no *intervallum*, almost no *agger*, and there are no corner towers (there is no room left between the inner buildings and the palisade).[13] The barracks are not covered with roof tiles, but with reed (one case) or branches ('glued' with adobe, a second case). The barracks were built on log structures, with walls made of adobe (whitewashed and decorated with crude chalk), and the use of building iron nails was very limited.[14]

The fact that the stone is missing on the site was not a surprise, because it is missing everywhere in the Romanian Plain, on huge surfaces. In the western part of this plain it is still worse, because all the rivers which are crossing the Roman frontier are springing in the northern part of the plain, not from the mountains; consequently, they do not carry rolling stones.[15] Then why not using bricks for the circuit wall or the inner buildings? Why using wooden sticks instead of iron nails?

Obviously, clearing 'weird data' is not a simple task. True enough, I noticed from the beginning that *Limes Transalutanus* is one of its kind between the Roman frontiers, because it crosses the largest and the lowest plain in Europe, with poor resources and difficult transportation. But this is also the frontier crossing the mountains at the highest level: about 1200 m in Bran Pass. This is why no research project could tackle with both situations in just a few years, no matter the funding level. Nevertheless, sensing the unmatched situation is one, and proving some facts is another.

It is a common place to say that the Romanian Plain has changed a lot, mainly within the communist regime, which 'improved' it in order to make more room for agriculture. Our day traveller can see a huge flat earth, crossed here and there by valleys or ravines, endless crop fields and just spots of woods. It is really hard to imagine this place as it was 2000 years ago, theoretically taken by dark and wild woods. The county covering the southern part of the project area is named Teleorman; it is, in fact, the name of a river which springs somewhere west of Piteşti and crosses the old frontier near the fort Albota. The meaning of the name, in Turkish languages, is 'The Mad Forest', and very likely this is not an Ottoman

[12] Like that because at the site one could find a second fort, far smaller (63 x 46 m), which seems to be not contemporary with the larger one.

[13] The report (Teodor et al. 2017, 96) discusses the possibility to have a sort of tower made above to northern end of barrack from the north-eastern corner (although no analogy for it). If this hypothesis is right or wrong is difficult to prove now, but either way the fact illustrates the effort to make the inner area of the fort larger than it looks at the first glance.

[14] About one tenth of a 'normal' situation, as seen in my eight campaigns in the fort Răcari (Dolj County; see Teodor 2009). I suppose no iron nail was used on the new building, those four found fragments being probably later reparations.

[15] The rolling stones are not completely absent in the area, but they are due to completely different geography of the rivers in far resolute geologic ages; nevertheless, such a resource is missing on a range of 20 km around the fort.

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borrow, but a Cuman inheritance[16] from the eleventh century.

The means of reconstructing the old environment – others than pure 'science' costly arguments – are just a few: the cartography, the study of the place names, and, as we shall see, pedological freely available data. At this short list one can add some more or less 'speculative' items, as recent meteorological reports or the archaeological sites distribution for different ages (the last two being not referred in this paper).

Cartographical evidence

The first map detailed enough to show the woods is known as Specht Map (1:57,600), after the name of the officer in command with the topographical job, Friderich Specht. The opportunity was a Russian-Turkish war at the lower Danube (1787-92), when Austrians took advantage and occupied most of Walachia (southern Romania). The map was made in a great hurry (nine months), therefore it has great issues in geometry, but it is the one to present the most 'archaic' stage of the country, less transformed by modernisation[17], with a poor demography in the plain[18], close to its 'natural' condition. Studying this map[19] one can notice several 'floors' from Danube heading the mountains, as follows:

- a field completely devoid of woods, from Danube to the Urlui Valley (35 km);
- a thick belt of woods, about 35 km long (heading north), on the both sides of the Roșiori City;
- another 35 km northwards with empty spaces, mainly along Burdea Valley (between Vedea and Teleorman rivers);
- the area north of Săpata Fort, strongly covered by woods, again, in general terms, but not along the Roman frontier, devoid of forests.

The third belt from above is difficult to explain, because exactly that area is the less populated across Middle Ages, and 'deforestation' cannot be an argument[20]. As we shall see, the reason is to be found elsewhere.

As it is, with a bad geometry, Specht Map is the only to picture the difference between proper woods and areas covered with bushes, a detail unexpectedly relevant when comes to the quality of soils. I chose here a depiction of the areas around Roşiorii de Vede (Figure 2). What one can see there is that the woods usually are developed along the main rivers (Olt, Călmăţui, Vedea) and their terraces, but large 'bold' areas occur in between, although the region is almost unpopulated; the village Băseşti, the only one in the western part of the map, had only 10 households, therefore cannot be

[16] The name is attested from the 14th century, *before* the Ottoman presence north of Danube.

[17] In this part of the Europe, or at least here, at the Lower Danube, the 'Modern Age' cannot be considered before the 19th century, mainly looking at the transportation network, which was absolutely primitive (or lets say 'native'), conserving partly the old days routes, peaking the ridges, not the valleys, although being so lengthy. The transformation has begun in the late 18th century, as proved by Specht Map, but it was in an early stage.

[18] Probably worst than in the 16th century, due to the robbery raids of the Turks but also frequent wars in the area.

[19] On the project website one can find both a presentation of the Specht Map (http://www.limes-transalutanus.ro/files/Documentare/HARTA%20SPECHT.pdf) and a copy of the map itself (http://www.limes-transalutanus.ro/materiale.html#harti-istorice_1791).

[20] Because there is no available study for the Middle Age demography, for this particular area from Southern Romania, I had to make a database with data extracted from medieval documents, in order to asses the density of settlements along 14th to 17th century. Except the area nearby Pitești city, all the route of the Roman frontier has been very poorly inhabited. Doing this I had the help and assistance of my colleague Cristina Anton Manea, for which I am expressing here my gratitude. The results can be downloaded on the website of the research project (http://www.limes-transalutanus.ro/materiale.html).

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'guilty' of a deforestation of 10 km on the both sides of the Călmăţuiul Sec ('the dry one'). A somehow different picture one can get at the eastern end of the figure, where another isolated village (Leşeni) was standing in a sea of bushes, obviously not using the land for ploughing. From one reason or another, the forests remained there as dwarfs, very likely from natural causes.[21] This seems to me a sort of transition from the steppe-like plains from south to the woods located on the latitude of Roşiori City.

In order to understand if the current state of the studied area is the result of an anthropic action (if not a natural potential), I used also other cartographic sources. As Száthmari Map (1864) has a much better geometry, but also is containing the woods, it was the base for calculating the diminishing of the forested areas between the mid 19th century and the beginning of the 21st century, for which where used orthophotos from 2012. For comparison I have picked two areas: a northern one (Urlueni-Albota) and a southern one (Danube to Gresia fort). In the given span time, the northern area lost 63% of its forests, similar with the southern area, which lost 70%. The involution is similar, but still preserved a great gap between the two areas, the forest cover being still more than twice better in north, than south.[22] A simple conclusion of the comparison is that the evolution is symmetrical, with the twisted end that, very likely, the present day differences between 'north' and 'south' could be very well old enough, if not 'antique'.

Other analytical means prove the same, i.e. that the uneven situation in southern and northern parts of the Romanian Plain are not due to some recent cataclysm, but to the geographical constitution. The hydrographic network is very different in sections of the plain located on different latitudes, as proved by the Figure 3. The rationale behind the map is similar to the modern irrigation systems using thin pipes, for which not the amount of water is essential, but its distribution.

Evidence of the place names

Toponymy was considered as a back-up mean to crosscheck the cartographic evidence. It was also meant to compensate, in a certain degree, the late chronology of the historical maps at hand. We do not know the age of the place names, but we know for certain that the minor toponymy (rivulets, hills, woods) is less affected by political turmoil of the last centuries,[23] thus at least a part of it could be older that our oldest map.

In order to accomplish that were collected around 6000 place names from five different maps, referring to the entire length of the studied Roman frontier, as well as a buffer of about 20 km on each side of it, database accessible for the public in both a searchable application and Google Earth files, both located on our website[24]. This quite large evidence allowed me to try a 'toponymic restitution' of the forests across the plain.[25] I used not only explicit names of the woods ('pădurea' in Romanian),

[21] Take note that the 17th and 18th centuries were unusual cold and rainy, a fact which theoretically would favour the natural vegetation (although not the crops).

[22] See details in Teodor, Ştefan, 2014, 38-39, Table 1.

[23] For 'major' and 'minor' place names, see Jones 2015. The author said that the 'stock of minor-names has largely been lost' (p. 209), which is true, and I can add that they are subjected of frequently change (in general); nevertheless, in Romania the minor toponymy is sometimes more stable than the place names of the localities, being very rarely affected by political constrains, very strong in eastern Europe.

[24] For the place names data base see http://www.limes-transalutanus.ro/baze-de-date/toponimie.html; for Google Earth files see http://www.limes-transalutanus.ro/materiale.html#material-toponimic.

[25] A more detailed exposition of these arguments in Teodor 2016 b, 161-165.

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but also any hint about the existence of a forest, as would be any word related to a former forest (like 'glade'),[26] or names of the wild animals, or even trades related with woods (like Rom. 'cărbunari', 'charcoal makers'). Each location was considered to be a circle with a radius of 750 m (although many woods are far larger than that). The first result was a map suggesting obvious differences between the southern and northern areas. A similar thing was done in a table expressing statistical such differences, reporting the sum of the forest names to the surface of each hydrographic basin.[27] I will not retake here these, as they are meaningful beyond the language barrier. What I am doing here is to make a geographical depiction of the figures from the mentioned table (see Figure 4). What we can see there is that except two small hydrographic basins from the north, the forest coverage is low or poor. The famous Teleorman does not perform much, but it is anyway above the average. Except the south, where the dry and uncovered soil is the rule, in the middle of the map there is a 'yellow' basin, named Tecuci, but similar low figures are to be found anywhere between Vedea and Teleorman. This is almost a 'strategic' information, describing – in statistical terms – the territories located immediately east of the frontier. In general terms, the areas located further north are supposed to be more forested, thus defending naturally the line of the frontier.

This is good, but not good enough.

Filling the gap… or maybe not

In the next pages of the paper I will tell the short story about hide-and-seek between Urlueni and Pitești, looking after the line of the frontier.[28] I will stress here mainly the results between certain landmarks, and less the methods followed in field, in order to diminish the length of the paper. I will resume here the facts following the direction heading north, helping the reader with comprehensive maps.

Cotmeana River is crossed by the Roman road exactly in front of the two forts from Urlueni (Figure 5). On the opposite side, there is known (from the late 19th century) a 2.3 km long burned "*vallum*" (as all Romanian archaeologists said). That line is visible on any of the aerial images at hand, up to a place named Dealul Troian (Trajan's Hill).[29] Looking thoroughly at the pictures, the last thing one will see is a turn northward, then the trail vanishes. We knew from two different sources[30] that it should be found again some kilometres northward, but the early tries to identify it have failed, including two drone missions north at Dealul Troian. In 29th July 2015 we made a survey flight from Pitești to Danube and back, capturing interesting snapshots for the area north of Pădurea Hârsești.[31] Back on the field, a burned trail has been found, for about 200 m, although completely missing a profile.[32] The frontier obstacle has been also found in the forest southward, where also a small embankment has been measured, in two different places.[33] Although the trail from the Hârsești Forest, looking south, has

[26] Many woods lost long time ago could be thus driven back on the map, in areas where no map pointed them out.

[27] For map see Teodor 2016 b, 160, Fig. 4; for table see idem, 158 (Table 6).

[28] The long story was already reported in Teodor 2017.

[29] 'Troian' is archaic for Trajan, meaning yet not the historical character, but an earthwork (or even a snow-drift).

[30] Notes made by Polonic, telling that the 'troian' has been last spotted 8 km north of Urlueni (Teodor 2015 a, 73, 125), and Bogdan Cătăniciu, 1997, 84), noting the embankment somewhere north of Pădurea Hârsești.

[31] Teodor, Bem, Ștefan, 2015.

[32] See also Teodor 2016 c, 38-40, Figs. 10-12.

[33] See Teodor 2016 c, 40 with Fig. 12, where two profiles of the embankment found in the forest are published.

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the exact azimuth heading Dealul Troian, and the route of the frontier had to be just straight, there is absolutely nothing in between. Two fresh tries to find any trace, no matter how thin, where made in 2016, but came up nothing at all, although the field was in perfect conditions for observation. There is here an important outcome: it is possible that for certain lengths of the frontier to have no earthworks, no outposts, no stray finds and no roads. Because a road was yet necessary along the frontier, I suppose it should be finally found somewhere westward, cutting the turn from Dealul Troian.

North of the Hârseşti Forest traces of burned adobe are again vanishing in the flat field. The general direction of the route is still very clear, as long as it should run near the Izbăşeşti fort, located about six km further.[34] Taking advantage on that, I made a systematic hunt of traces north of this point, taking full three days, but at the end I was able to give a sort of 'restitution' for the boundary, up to the Ursoaia Valley (Figure 6). On all that route there is no sign of any kind of earthworks, big or small; for a change, I found some stray finds, just a few on the southern half, but relatively many on the northern half, from different sorts of artefacts (broken bricks, burned adobe, Roman age pottery, an iron construction nail).[35] Interesting to note, the restituted path do not follow the ridges, leaving most of them east of the path, which is the direction of *barbaricum*; this is weird, because it was possible an alternative route of the same length, but with a better visibility. Such a 'neglecting' design is not accustomed for Roman militaries and tells me a thing: the place was located in a thick forest, with no visibility whatsoever. The minor toponymy around the path is strengthening the hypothesis. The main valley to cross, at the northern edge of this sector, is named Ursoaia,[36] which means "The She-Bear",[37] name always associated with (former) woods. Looking on an older map I found this name second time, for a small (dry today) valley, located closely westward of the restituted path. In the same area one can find also 'Valea Fântânele' (Fountains' Valley), suggesting fresh water, i.e. a place one can stay and rest before hitting the road again, a fact possibly explaining the relatively many rest-places within this sector, as suggested by the stray finds.

The trajectory of the restituted path is almost straight, having yet a double turn and coming back on the initial track. It is not easy to understand why (the Romans were rational beings, using topographers for designing roads, isn't that so?), but finally I got a hint (Figure 7): it was avoiding the ponding areas. The terrain is, in fact, extremely flat and clayey, forming shallow hollows (named 'găvan' in Romanian), with no drainage, keeping the water and becoming true traps, especially in the dry season, when under a dry crust there is a muddy and sticky pit.

[34] The fort is connected by the main frontier road (the limes) by a secondary road, leaving the fort and heading east, a fact known for several hundreds meters (Teodor 2016 c, 42, fig. 14).

[35] I have to mention that the route is relatively far from the villages of our days and the field is relatively clean, without recent waste. The bricks are not a traditional building material, being used only in the last part of the communist regime; the 'quality' of the communist age bricks cannot be mismatched with Roman age artefacts, being friable.

[36] The second name of the valley (on different maps) is Vlăşcuţa, as well as the village located west, or the forest beyond the valley, is Vlăşcuţa, name having to meanings: first – the place were the Walachs live; secondly it is suggesting exactly the woods.

[37] See Teodor 2016 b, 157, Fig. 3, which is a map of the occurrences of animal names. Note that the bear is to be found only in the northern half of the map, and – interestingly enough – mostly on the western side of it, suggesting that large woods, suited as habitat for bears, were to be found mainly in the north-western side of the studied area.

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Concluding the results of the expedition between the forests Hârseşti and Vlăşcuţa, a path was restituted from stray finds, but there are no signs of earthworks. Very likely we are speaking about a road, made out of clay anywhere in this plain,[38] crossing the woods. I have to add some words about the forests in the area. They stand on a ground where the lack of water is chronic, mainly during the summer, developing under the tall trees dense bushes from spiky species (like acacia and eglantine), obvious everywhere the foresters are neglecting their job. In such woods I saw twice sheep caught in thicket and bleeding to death. Taking a 'surprise' direction of attack crossing such woods, the attacker would be trapped and slowed down, needing noisy tools – like axes – to make its way out. Obviously, such environments were the best obstacle against the raiders, providing to the Roman garrisons the time to react. Frankly, such attacks are unlikely.

In Romanian language there is a word, 'palanca', which has two (related) meanings: a forest smitten by the storm, and a (primitive) fortification made of cut down trunks, used mainly in a frontier area. Such fortifications can be doubled by regular palisades, but they can be very effective just leaving the cut trees with their top oriented to the enemy, in the exact position in which the trunks have fallen. 'Palanca' is attested for Middle Ages,[39] but I found nowhere a mention about its use in the Roman Age, or, to be exact, nothing in history text books. I am pretty much sure that this is the case with the 'missing' earthworks along this frontier; it is obvious, yet, that such defensive works do not leave any archaeological trace. In our case this can be just a rationale hypothesis, as long as the trunks cut for making room to the road had to be used somehow; from this perspective, the restituted path is, more or less, both the road and the very line of the frontier.

The rest of the route heading Piteşti will be discussed here even shorter, only in order to have a fair description of the types of frontier identified on the field. North of Ursoaia Valley there are two forests of our days: Vlăşcuţa and Izbăşeşti. The first is private and inaccessible, but the second was been thoroughly investigated and it provided no trace of an earthwork. Nevertheless, the ideal route of the frontier passes west of the Ursoaia Valley, and very likely the Romans picked the best solution. Of course, in a forest the chance to find artefacts is very low, thus a documented path of the Roman road cannot be drawn; what we can see at the Figure 8 is just an ideal route, following the higher parts of the terrain. One can expect, from a military point of view, advanced outposts, closer to the Ursoaia Valley, but the task of finding them is almost impossible (where not woods, one can see pastures).

The next sequence, north of Izbăşeşti fort (Figure 9), stands between fixed positions: the connection between the *semita* coming from the fort, and the passage over the Pârscov Valley, suggested by the

[38] There are so far no English papers about the mechanical diggings through the palisade and the Roman Road, but there is available the Interim Report for 2016 (Teodor 2016 d). See mainly Section 3, pages 2-3, Fig. 3 and 4 (mainly the section represented at the bottom).

[39] I do not know a study dedicated to this word or type of fortification. The Romanian dictionaries consider it related to 'palisade' (see https://dexonline.ro/definitie/palanca). The given etymologies hesitate between Turk, Hungarian and Polish origins. Interesting to note, an Italian dictionary online gives for that (identical) noun a (reconstructed) Latin etymology, but also a real Greek term (http://www.treccani.it/vocabolario/palanca1/). The second meaning for this Italian word would be the next: *'Negli antichi lavori di fortificazione campale, riparo costruito per difendere una posizione da improvvise scorrerie; era costituita da pali conficcati nel terreno a contatto uno con l'altro'.* In Romanian toponymy the name is frequently associated with log fortifications.

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orientation of the earthworks from the location known as Pădurea Grozeasca. The middle way is given by the terrain-model, keeping the ridge lines as much as possible. At the about half way there is a small forest of our days, named Ciolpani ('The Old, Ill forest'), in which there is no sign of earthworks (I crossed it three times, to be sure). Very likely, the area was also forested in antiquity and no special defensive works were necessary. No detailed field walking was performed south and north this place, except the last kilometre before the passage over the Pârscov Valley, were no traces have been spotted.

At the landmark know as Pădurea Grozeasca (today a ploughing field) there are obvious traces of earthworks, visible mainly from the air, and less from the ground, made of two segments with different orientation (changed when passing a valley, which is typical), measuring together 2.15 km. A thorough fieldwalk was performed on the site, with no results,[40] which is pretty odd, because the earthworks should be watched; the only conclusion I can draw here is that the place, although in the open field, was considered safe, due to some natural obstacles before it (other thick woods? marshes along the valley located eastward?). The direction of the earthworks, turned northwest, is heading the forts from Săpata, located another 2.4 km further, but how far the earthworks have reached we don't know, because they run under a village. The hypotheses for a continuation are many and I prefer standing here with some clear facts (as much as they can be…).

The next landmark providing a fixed element of the route is Pădurea Cătanei (Figure 10), which is today half in the open field, half in a (terrible) forest. A relatively clear cropmark is visible for more than 500 m, the rest to a total of 1.3 km is an – unusual – clear mark crossing the forest.[41] Strange enough, that line is obvious on the aerial images (no matter the 'edition'), but almost invisible into the woods, giving no profile; on one part and on the other of that (imaginary?) line, there are growing different species of trees, in perfect continuation with the cropmark from the open field. We made there geophysics (magnetometry and magnetic susceptibility) with no concluding results. No traces of living in that area were found. We have here again an earthwork apparently not watched my militaries, facing approximately the same area as the sector of earthwork from Pădurea Grozeasca: the plain driving Teleorman River.

The azimuth heading northeast – changed immediately east of the fort Săpata – is going straight to the meeting point with the next landmark. The distance until the next certain point of the frontier is 3.4 km, where a short – but convincing – segment of a Roman road was found, in the forest Pârvu Roșu[42] which is clearly heading a ford through the Albota Valley. Another 4 km further, we can see again an earthwork. Similar to the others in the area, it is not burned (except a small sector, at the southern end), it is visible from air, but it is very difficult to find on the ground. The only one sector with clear signs of military presence is at the southern end, after a strong turn southward, where a watchtower stands.[43] The earthwork is ending exactly at the tower, a 'trail' of lost artefacts being documented a few hundred meters southward.

[40] Except a very rusty coin, proved later to be emitted in... 1967.

[41] See, for instance, Teodor 2016 c, 48-50, Figs. 23-25.

[42] Teodor 2016 c, 51, Figs. 26-27.

[43] Or something else, larger; the magnetometry shows an 'object' with no analogy in our work. A possible analogy I found on the northern frontier of Dacia (Zăgrean et al. 2017, 28, Fig. 3), where an oblong structure, made of a square tower and an auxiliary building sharing one wall.

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North of Poiana Roșie ('The Red Glade') there is a continuous earthwork up to the Argeș Valley (almost 7 km, but visible only for the first 2.3 km), about which there is a recent paper published and there is no need to retake here the data (Teodor, Chivoci, 2017).

Pedology – the last redoubt

The picture one can get from the study of cartography and toponymy can be already helpful for understanding some particularities of *Limes Transalutanus*. If the situation south of Roșiorii de Vede, near the Danube, is somehow simpler and clearer (a steppe-like environment), the alternation of areas closed by earthworks and areas missing an obvious sign of the Empire, north of Urlueni, is more intricate and needs deepening before being sure we did understand the situation. Figure 11 is illustrating this, relaying in place names. Keeping in mind that a black line (embankment) suggests an open field in antiquity, the data (toponymy and archaeology) is relatively fit for the northern part of the map, but the resemblance is relative in the southern part. The map is suggesting that the imperial troops were hiding in the forest – when not at the very edge of it – and were looking at the barbarians coming on the clear field eastward.

It would be very nice if the sciences usually associated with archaeology could provide a confirmation of the hypothesis. One of them could be palynology, but I have doubts one could collect needed evidence in a province suffering of draught most of the time, mainly over the summer, and having all its natural marshes desiccated.[44] The last hope for our own project was pedology, for which one can find free available data, older and newer.[45] Figure 12 puts together two of them, an older pedological Romanian map, released in early 1970's, at the scale 1:500.000,[46] and a European one, much recent (2012), at the scale 1:1.000.000.[47] The third part is my own map from 2016, depicting forests and bushes in the same area.[48]

The two pedological maps are different, and not only because of the scale. The Romanian map was working with a more developed taxonomy, difficult not only because it is the result of a science relatively unknown to me, and not only because it is in Romanian language, but because in the meantime the national and international taxonomy changed several times.[49] I made some captions only for the main areas covering the plateaus between the main valleys, as they cover about 90% of the surface, suggesting the main resources in wood. This section of the plain, between Danube and Argeș Valley, is made of four classes of soils. From south heading north, they are the next:

[44] Of course one can try, but it is highly risky, because the costs are great and a funded research project needs 'results'.

[45] Unfortunately 'the last hope' came in the last minute, in September 2017, just before providing the 'final report'. I have mention here the great help given by my colleagues of project, Dan and Magdalena Ștefan, in finding those public resources for Pedology.

[46] Florea et al. 1971.

[47] Downloaded from https://esdac.jrc.ec.europa.eu/; see also Panagos et al. 2012. The map has serious problems with the geometry and I had to improvise in order to make my point. The cropped file was exported as a bitmap, subjected later to orthorectification. In order to accomplish that, the network of streams (extracted from an accurate DEM) was very helpful. The final result is far from being 'perfect', but at least it is not grotesque. The Romanian map is either not perfect (for instance: the fort from Albota is located, there, on the right bank of Teleorman River, which is wrong), but I left it as it is, because the areas where I had a concern are almost right. The small scale could be partially to blame for such errors.

[48] Teodor 2016 b, 160, Fig. 4.

[49] Ţarău et al. 2012.

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Chernozem soils (with variation Luvic Phaeozem),[50] formed in steppe-like areas (or, at most, forest-steppe transition), corresponding to a belt of opened fields, where the woods cover has been always thin, conforming to both cartography and toponymy studies;

Chromic Luvisol, east of Vedea River, labelled on the Romanian map as reddish-brown soils (podzols or not), considered in literature as a typical forest soil; let's say also that the area is corresponding to the forest belt from the Specht Map, extended there also west of the Vedea River (see again Figure 2);

Pellic Vertisol (same as in the Romanian map), characterised by a heavy share of clay (around 40%), improper both for forests or crops, which actually corresponds to areas with almost no woods, as documented in cartography and toponymy;

Gleyic Luvisol, similar with Chromic Luvisols and, similarly, an area were the forests are not only well attested, but still present today, although partially lost.

Figure 12 surely deserves some comments. First of all, pedology tells us that the genetic conditions of soil formation, in the southern belt, near Danube, were always steppe-like. This gives us confidence that, with a good probability, the woods were more or less absent in the area, including in the Roman Age. This is critical for understanding the conditions in which the frontier was made. They made almost 60 km of palisade, from big logs,[51] needing at least 60.000 of them, they built (at least) three forts, having as curtain also a palisade (not that impressive as the frontier obstacle); they also had to use wood for the structures of all their buildings, military or not; they needed also wood for heating (because the winter is long and harsh), and for at least some of the crafts, as (all day) pottery. We understand now that much of that wood was brought from somewhere else, and from relatively far, and that put to work a lot of people, Romans or not. The relative absence of bricks and tiles should not be intriguing anymore, and the barracks roofs made out of reeds and branches, although far from safe, were an understandable choice.

Yet the comparison of these three sets of data, contained into the Figure 12, is still more interesting in the northern part of the studied frontier. All of them are saying that the military boundary goes more or less parallel with the line separating the Gleyic Luvisol (supporting well the life of woods) and Pellic Vertisol (on which usually only some bushes are adapted). Of course, environmental data is far from being perfectly matched with archaeological data. For instance, the forest Hârsești (of our days) is cut by a palisade, thus it was an opened field in the third century, as well as Grozeasca Forest (of 19th century). Nevertheless, data strongly suggests that the Roman boundary was designed at the very edge of the forests, having in front of it open lands, a description fitting mainly the outskirts of Izbășești fort. As previously commented, the full forested areas of the frontier were not closed by a palisade, the natural obstacle being far more difficult than an artificial one. Inside the 'forested' areas (in an environmental perspective given by the Fig. 12) were also, in Roman time, some open fields, as the sector near Cătanei Forest, or the relatively long palisade near Pitești City. For the last case, the woods were possibly cut for the very

[50] The Romanian map worked for the same areas with three taxa: chernozems moderate levigated (extreme south), levigated (centre) and strong levigated (north). Levigation is turning the soil into dust, under the action of (steady) water, due to the flat relief.

[51] And not halves, as on the Raetic frontier, visited in 2015, taking the chance offered by the Limes Congress.

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interests of the Roman militaries, as they had to build at the river Argeș a relatively large bridge, as well as two fortifications.[52]

Conclusions

Limes Transalutanus has a great deal of peculiarities. For instance, the relative small garrisons, the average distance between two forts, which is rather high, the signalling towers, which are located at around 90 m behind the frontier palisade,[53] the forts located distant of the line of duty (200 to 2000 m), apparently hidden by the enemies' eyes, the obvious concern for naturally defended positions (mainly on the northern frontier, approaching Argeș River).[54] Some of these particularities could be probably explained by chronology, at the threshold of the second and third century. In fact, this is the only Roman frontier designed so late, and there is no direct comparison with other frontiers, at least in Europe.

The army which made it was not any more strong enough, nor confident as it was in its best days. As a consequence, the defenders were not showing up, but choosing to hide and strike back, just for hiding again, taking advantage of a better knowledge of the natural environment around the forts. Some of particularities could be then probably due to chronology; some of them, yet, seem a result of the environmental conditions in which this border came to life. I have had giving earlier some examples, about the data from two archaeological campaigns at the large fort from Băneasa. I will stress here the fact that they gave up *intervallum* and the corner towers, in order to make more room for the barracks. Conversely, housing the same number of militaries but following the known rules of construction, one will need a supplementary space of 8 m on each side. The comparison of the two models looks like in the next table:

model dimension	the large fort from Băneasa as it is	a 'normal' fort for the same unit strength
size of one side (m)	139	155
length of the circuit (m)	537	587
surface inside the palisade	1.93 ha	2.39 ha

In a 'normal' fort stretching less than 2 hectares it is not possible to house a full auxiliary unit;[55] but a fort taking 2.4 hectares inside the palisades can house a full unit, as one should expect for the largest fortification of the southern frontier. Due to the mentioned 'innovations', the same thing is yet possible for a less than 2 hectares fort.

I will not discuss here the military value of that shift (undoubtedly not good), but I shall ask instead: were they so desperate of the lack of wood that have decided to cut 50 m from the length of the curtain (about 100 mid sized logs)? What is the logic of that 'sparing' when they needed anyway logs to accomplish an almost 60 km frontier palisade? I do not thing this riddle can be broken now, but I really hope that future diggings will bring new facts and hints.

As for the bizarre northern frontier obstacle which just appear from here and there, but missing for more than half of the route, this first approach (as rendered

[52] None of them preserved or documented (Teodor, Chivoci, 2017).
[53] For details see Teodor 2018.
[54] Teodor, Chivoci, 2017.
[55] Teodor 2015 a, see the entire chapter 8 (173-210), with many references about the size of the forts and their correspondent military units.

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in the previous section of the paper) is more or less a hypothesis to be deepened further. On the one hand, there are still public (or at least declared as public) resources not used,[56] on the other hand probably we will need land samples taken from critical points of the frontier, in order to analyse them and prove the accuracy of the hypothesis. I cannot know if I will be able to gather the financial and human resources in order to accomplish that, but I am pretty sure that a solution will come from the field work and lab results.

The lesson learned on *Limes Transalutanus* could be a key in order to unlock the complicated issues connected with *Limes Dacicus* as a whole.[57] This is a frontier around 1100 km long (without *Limes Alutanus*), most of it going around Transylvania, inside the mountains, with no obvious artificial barriers, except some hundred meters long *valla* near Porolissum; what we know so far is that the manmade obstacles are located in strategic passageways, not everywhere along the frontier. Such a perspective could be suspected as being due to the lack of detailed research, but this is not the case for the plain sector of *Limes Transalutanus*, for which we know for sure that the frontier palisade was made only for areas considered as vulnerable. Such a pattern seems know a plausible approach everywhere along *Limes Dacicus*.

[56] I found an interesting information, on Internet, about a research institute from Bucharest having a pedological map at 1:200.000, but so far I was not able to get the data; I am still hoping (see http://geoportal.gov.ro/Geoportal_INIS/catalog/search/resource/details.page?uuid=%7BEF676695-DA13-4E3A-A71E-DB51DF908688%7D). Finally I got the data (mid March 2018), but it is still in evaluation at the dead-line established for this paper.

[57] Teodor 2015 b, esp. 375-383; that paper is rather a theoretical approach, considering technical means to tackle a very long and unusual Roman frontier. Today the research is far more developed, mainly on the northern frontier, where a network of watchtowers is revealed by the field research, but only a fraction of the data is published (Ferenczi 1973; Ferenczi 1976; Marcu, Cupcea, 2013, with older literature; see also Cociș, Zăgreanu, 2017, Gaiu, Zăgreanu, 2017, Zăgreanu et al. 2017, Marcu et al. 2017).

https://biblioteca-digitala.ro

Bibliografie / *Bibliography*

Bătrînoiu 2017

Raluca E. Bătrînoiu, *Așezările getice din Muntenia (sec. IV î.e.n. – I e.n.)*, PhD, abstract, Universitatea București.

Bogdan Cătăniciu 1974

Ioana Bogdan Cătăniciu, Nouvelles donnée sur le limes Transalutanus, *Actes du IXe Congrés International d'études sur les frontière romaines, Mamaia, 6-13 sept. 1972*, D.M. Pippidi (ed.) București-Köln-Wien, 259-265.

Bogdan Cătăniciu 1977

Ioana Bogdan Cătăniciu, Les limes du Sud-Est de la Dacie et les relations des Romaines avec la population de la Valachie (IIe-IIIe s.), *Studien zu den Militargrenzen Roms: Vortrage des 10. Internationalen Limeskongresses in der Germania Inferior*, D. Haupt, H.G. Horn (eds.), Köln: Rheinland-Verlag, 333-352.

Bogdan Cătăniciu 1981

Ioana Bogdan Cătăniciu, *Evolution of the System of Defence Works in Roman Dacia*, Oxford: B.A.R. Intl. s. 116.

Bogdan Cătăniciu 1997

Ioana Bogdan Cătăniciu, *Muntenia în sistemul defensiv al Imperiului roman, sec. I-III p.Chr.*, Alexandria: Muzeul Judeţean Teleorman

Carr 2017

Karen E. Carr, Ancient Rome – geography and climate, *Quatr.us Study Guides*, August 31, 2017, https://quatr.us/romans/roman-environment-ancient-rome.htm.

Cociș, Zăgreanu, 2017

H. Cociș, R.I. Zăgreanu, R.I, Ridicări topografice ș analize geostatistice aplicate pe frontiera nordică a Daciei Porolissensis, *Limes. Frontierele imperiului roman în România*, 2, 2017, 25-29.

Gaiu, Zăgreanu, 2017

C. Gaiu, R.I. Zăgreanu, Turnul roman de la Ciceu-Corabia-"Poniţă" (jud. Bistriţa-Năsăud), *Limes. Frontierele imperiului roman în România*, 2, 2017, 30-33.

Finné et al. 2011

M. Finné, K. Holmgren, H.S. Sundqvist, E. Weinberg, M. Lindblom, Climate in the Eastern Mediterranean, and adjacent regions, during the past 6000 years – A review, *Journal of Archaeological Science*, 38, 3153-3173.

Ferenczi 1973

Ștefan Ferenczi, Contribuții la cunoașterea limesului roman la nord de Someșul Mare. Studiu preliminar (Partea I), *Sargetia*, 10, 79-104.

Ferenczi 1976

Ștefan Ferenczi, Contribuții la cunoașterea limesului roman la nord de Someșul Mare. Studiu preliminar (Partea a II-a), *File de Istorie (Bistrița)*, 4, 107-133.

Florea et al. 1971

N. Florea, A. Conea, I. Munteanu, *Harta pedologică a RSR*, București: Institutul Geologic/Institutul de Studii și Cercetări Pedologice.

Grindean et al. 2015

R. Grindean, V.A. Lăzărescu, A.C. Diaconu, C.H. Opreanu, S. Fărcaș, I. Tanţău, The Usefulness of Interdisciplinary Studies: Paleoecological and Archaeological aspects from NW Romania, *Ephemeris Napocensis*, 25, 105-134.

Gruen 2008

Erich S. Gruen, The expansion of the empire under Augustus, *The Cambridge Ancient History*, vol. X: *The Augustan Empire, 43 BC – AD 69*, A.K. Bowman et al. (eds.), Cambridge University Press, 147-197.

Jones 2015

Richard Jones, Place-names in Landscape Archaeology, in *Detecting and Understanding Historic Landscapes,* A. Chavarría Arnau, A. Reynolds (eds.), Mantova: SAP Societa Archeologica S.R.L., 209-225.

Marcu, Cupcea, 2013

F. Marcu, G. Cupcea, Topografia limes-ului de nord-vest al Daciei în zona castrului de la Bologa, *Arheovest, I, Interdisciplinaritate în Arheologie și Istorie. In memoriam Liviu Măruia*, A. Stavilă et al. (eds.), Szeged: Arheo Vest Timișoara & JATE Kiadó, 2013, 569-568.

https://biblioteca-digitala.ro

Marcu et al. 2017

F. Marcu, G. Cupcea, M. Bajusz, I. Petiș, H. Cociș, R.I. Zăgreanu, R.I., Frontiera Daciei Porolissensis între castrele de la Tihău și Cășeiu, *Limes. Frontierele imperiului roman în România*, 2, 2017, 20-24.

Panagos et al. 2012

P. Panagos, M. Van Liedekerke, A. Jones, L. Montanarella, European Soil Data Centre: Response to European policy support and public data requirements, *Land Use Policy*, 29 (2), 329-338. doi:10.1016/j.landusepol.2011.07.003

Petolescu 2010

Constantin C. Petolescu, *Dacia, un mileniu de istorie*, București: Ed. Academiei.

Tanţău et al. 2016

Tanţău, I., Grindean, R., Panait, A.M., Diaconu, A.C., Fărcaș, S., 2016 - *Landscape Archaeology on the northern frontier of the Roman Empire at Porolissum*, C.H. Opreanu, V.A. Lăzărescu (eds.), Cluj-Napoca: Mega, 153-164.

Teodor 2009

Eugen S. Teodor, Roman Fort from Răcari (Dolj County, Romania) and its four stages. Plannimetry, Stratigraphy and Chronology, *Proceedings of the XXth Congress of the Roman Frontiers, 4-11 Sept. 2006, Léon, Spain*, A. Morillo Cerdán et al. (eds.), Madrid: Instituto Histórico Hoffmeyer, vol. 2, 1524-39.

Teodor 2013

Eugen S. Teodor, *Uriașul invizibil: Limes Transalutanus. O reevaluare la sud de râul Argeș*, Târgoviște: Cetatea de Scaun, 2013.

Teodor 2015 a

Eugen S. Teodor, *The Invisible Giant: Limes Transalutanus. An overview south of Argeș River*, Târgoviște: Cetatea de Scaun 2015.

Teodor 2015 b

Eugen S. Teodor, A Romanian World Heritage Linear Site? Unsolved issues, *AD FINEM IMPERII ROMANI. Studies in Honour of Coriolan H. Opreanu*, Sorin Cociș et al. (eds.), Cluj-Napoca: Mega, 373-390.

Teodor 2016 a

Eugen S. Teodor, New Archaeological researches at the Roman Fort from Băneasa, *Cercetări Arheologice*, 23, 107-125.

Teodor 2016 b

Eugen S. Teodor, Terminologie descriptivă în toponimia din vestul Munteniei, *Arheologia peisajului și frontiera romană*, E.S. Teodor (ed.), Târgoviște: Cetatea de Scaun, 147-192.

Teodor 2016 c

Eugen S. Teodor, Frontiera văzută de sus. Cercetări pe sectorul argeșean al Limes Transalutanus, *Arheologia peisajului și frontiera romană*, E.S. Teodor (ed.), Târgoviște: Cetatea de Scaun, 27-56.

Teodor 2016 d

Eugen S. Teodor, *Tehnologia de cercetare a obiectivelor liniare* (Interim Report 2016, section 3), http://www.limes-transalutanus.ro/rapoarte/raport_etapa3.html.

Teodor 2017

Eugen S. Teodor, Analize de traseu optim pe Limes Transalutanus. Analiza zonelor incomplete documentate, *Academia.edu*, Draft section.

Teodor et al. 2017

E.S. Teodor, E. Dumitrașcu, D. Ștefan, Archaeological excavations at the Roman fort Băneasa in the summer 2017, *Cercetări Arheologice*, 24, 83-98.

Teodor 2018

Eugen S. Teodor, Watch and Alert along Limes Transalutanus, *Proceedings of the 23rd International Limes Congress, Ingolstadt, Sept. 2015*, forthcoming.

Teodor et al. 2015

E.S. Teodor, C.C. Bem, D. Ștefan, D., A story about one shot from three thousand five hundred, *AARGnews. The newsletter of the Aerial Research Group*, 51, 25-31.

Teodor, Chivoci, 2017

E.S. Teodor, F. Chivoci, F., A Roman Frontier crossing the City, *Tracing Linear Archaeological Sites, Symposium held in Pitești, 1st of July 2017*, E.S. Teodor (ed.), 25-34.

Teodor, Ștefan, 2014

E.S. Teodor, M. Ștefan, Landscape archaeology along Limes Transalutanus, *Journal of Ancient History and Archaeology*, 1, 3, 31-43.

Ţarău et al. 2012

D. Ţarău, G. Rogobete, D. Dicu, L. Niţă, Romanian Soil Taxonomy System SRTS-2012,

https://biblioteca-digitala.ro

Research Journal of Agricultural Science, 44, 3, 140-145.

Țentea, Matei-Popescu, 2016

O. Țentea, F. Matei Popescu, *Between Dacia and Moesia Inferior. The Roman forts in Muntenia under Trajan*, Bucharest: Mega.

Ză̆greanu et al. 2017

Ză̆greanu, R.I., Cociș, H., Gaiu, C., Vaida, D.L., Bîcă, I., 2017 – The Roman Frontier in Bistrița-Năsăud County. Part I. The Repertory, *Journal of Ancient History and Archaeology*, 4, 1, 2017, 25-45.

https://biblioteca-digitala.ro

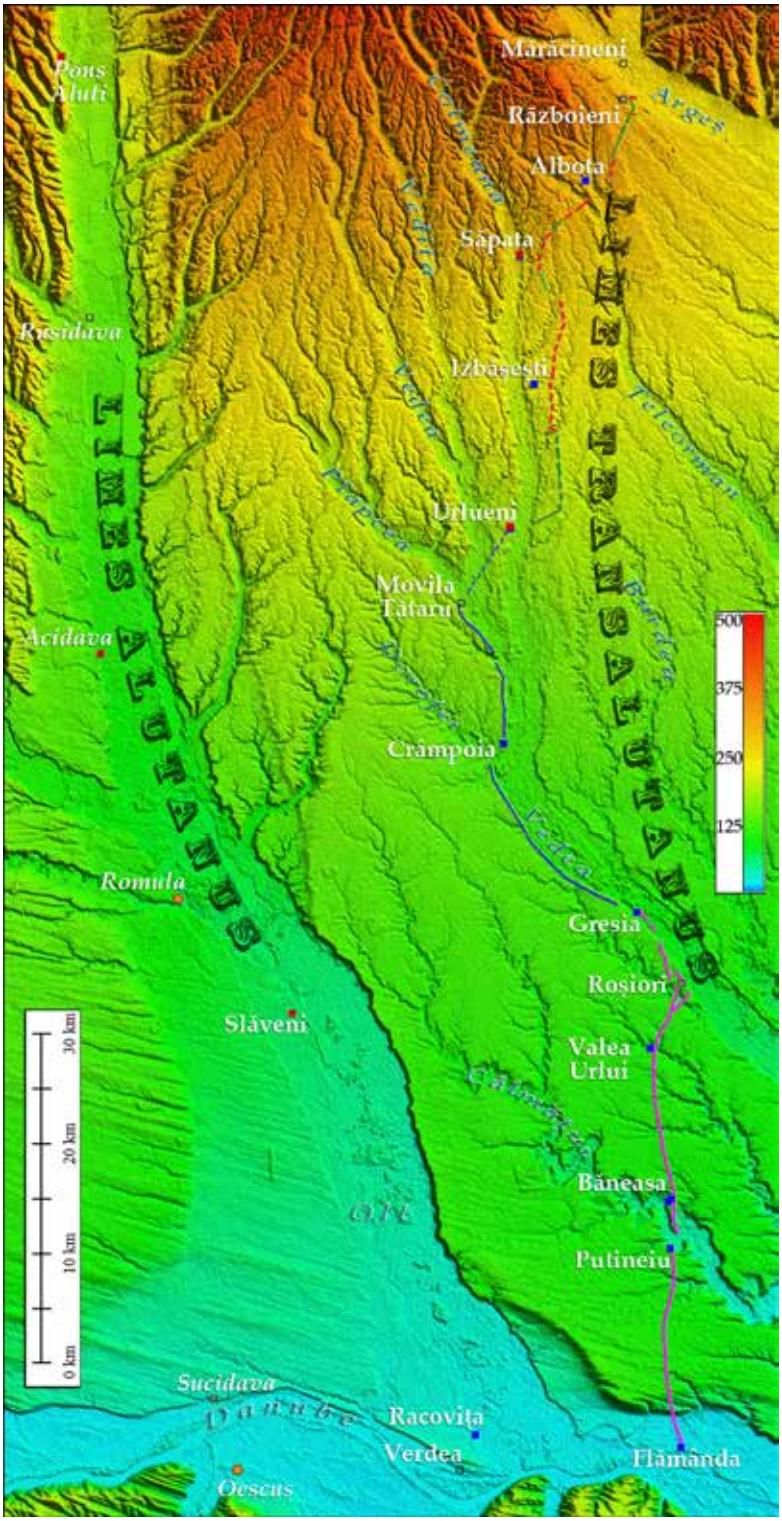

Figure 1. *Limes Transalutanus* between Danube and Argeș River.
Legend: pink lines: continuous embankment between Danube and Vedea River; dark blue lines: ripa sector, behind Vedea River (the route between Movila Tătaru and Urlueni is not known); dark green: known line of the border; red dashed lines: the most likely routes of the frontier (where the real line is not known).

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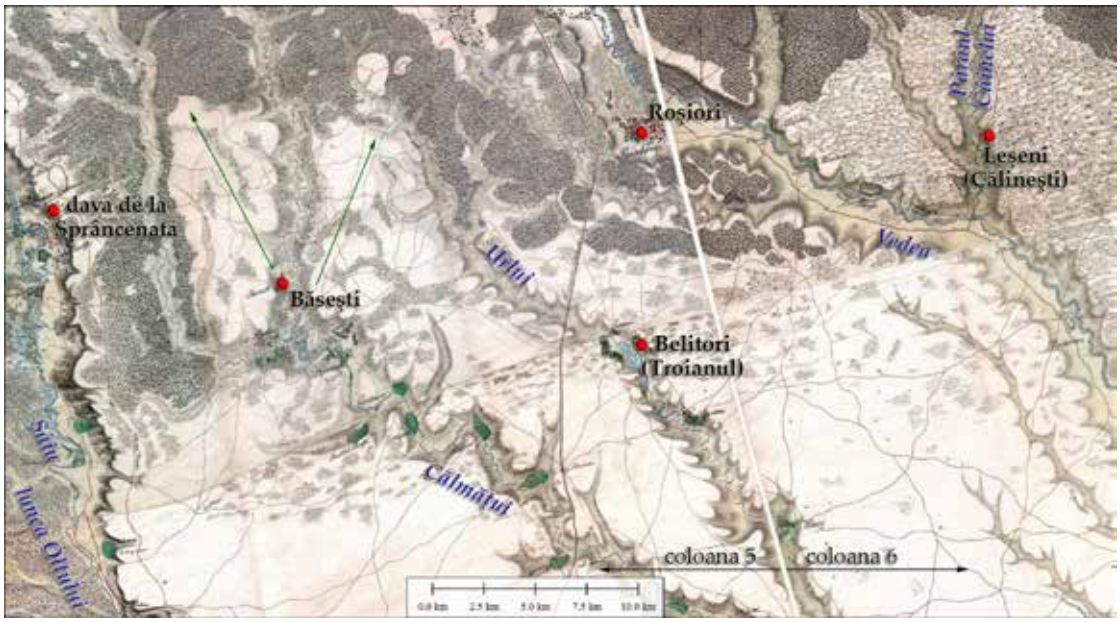

Figure 2. The area between Vedea and Olt on their lower courses, as represented on Specht Map (1791). With dense hatches – woods; with clear hatches – bushes.

Figure 3. The hydrographic network in western Muntenia. The rivers rendered in bold lines are those considered (in my study!) to collect the 'hydrographic basins'; the others are considered contributors of the main streams, most of them being temporary streams. The central black line is depicting the frontier line; the others two – the limits of the study.

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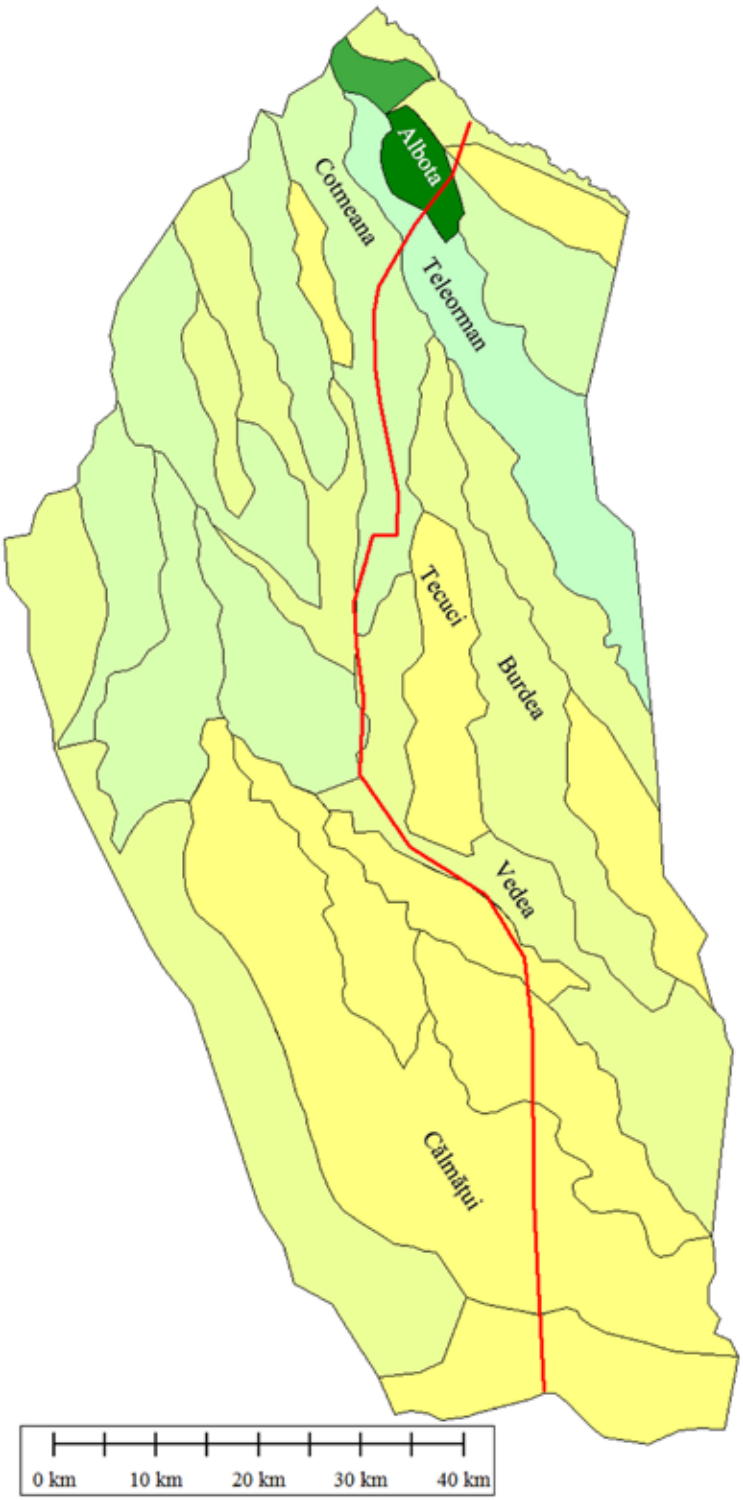

Figure 4. Distribution of the forestry place names reported on hydrographical basins.
Statistical ratio between the forest names and the surface of the entity:
dark green – many; pale green – average values; yellow – low figures.
There are mentioned some key basins.

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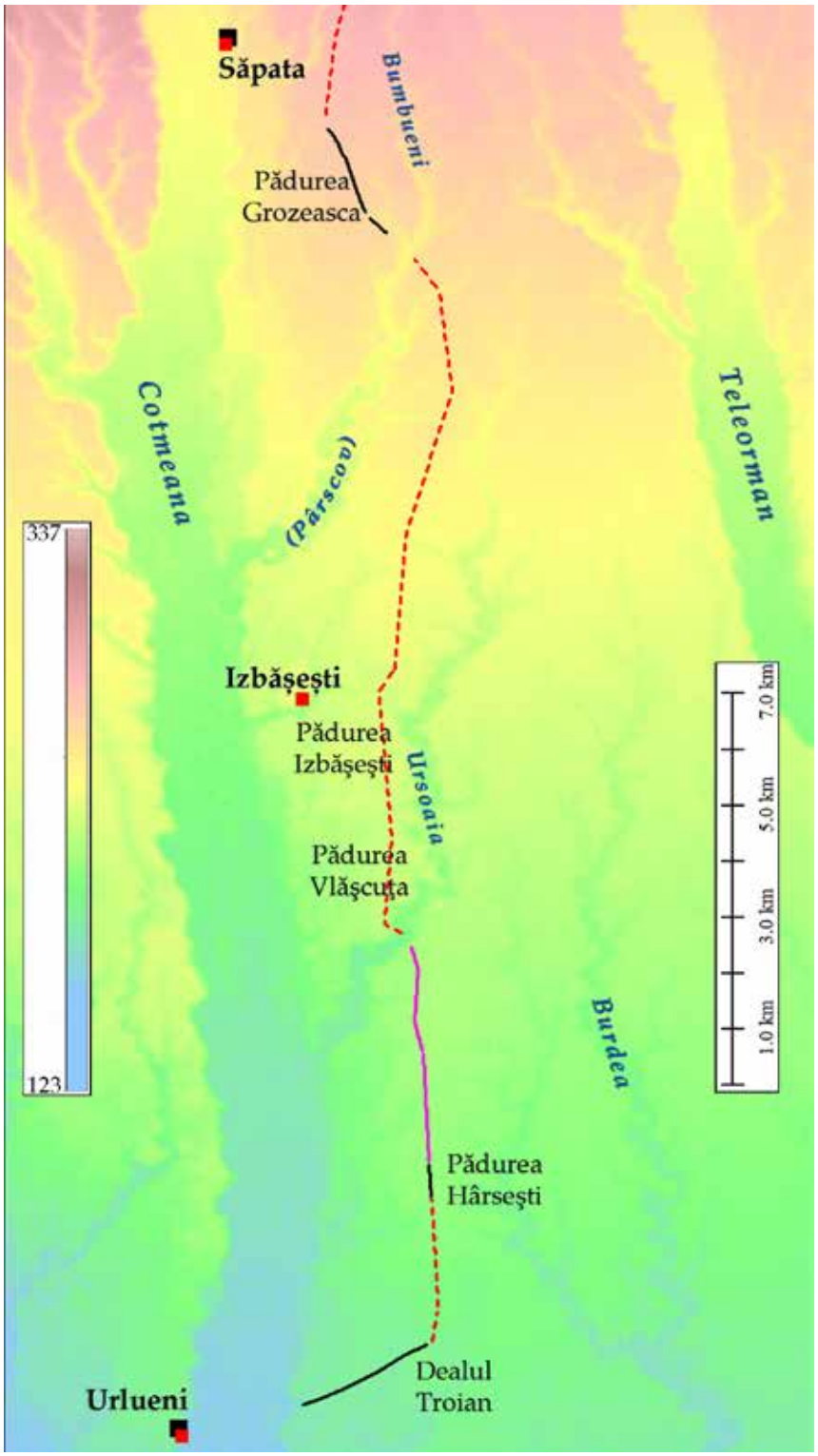

Figure 5. Map of the frontier area between forts from Urlueni and Săpata.
Legend: black line – certain route (earthworks); pink line – route with a good degree of certitude (probably just a rod); dashed lines – "logical" routes.

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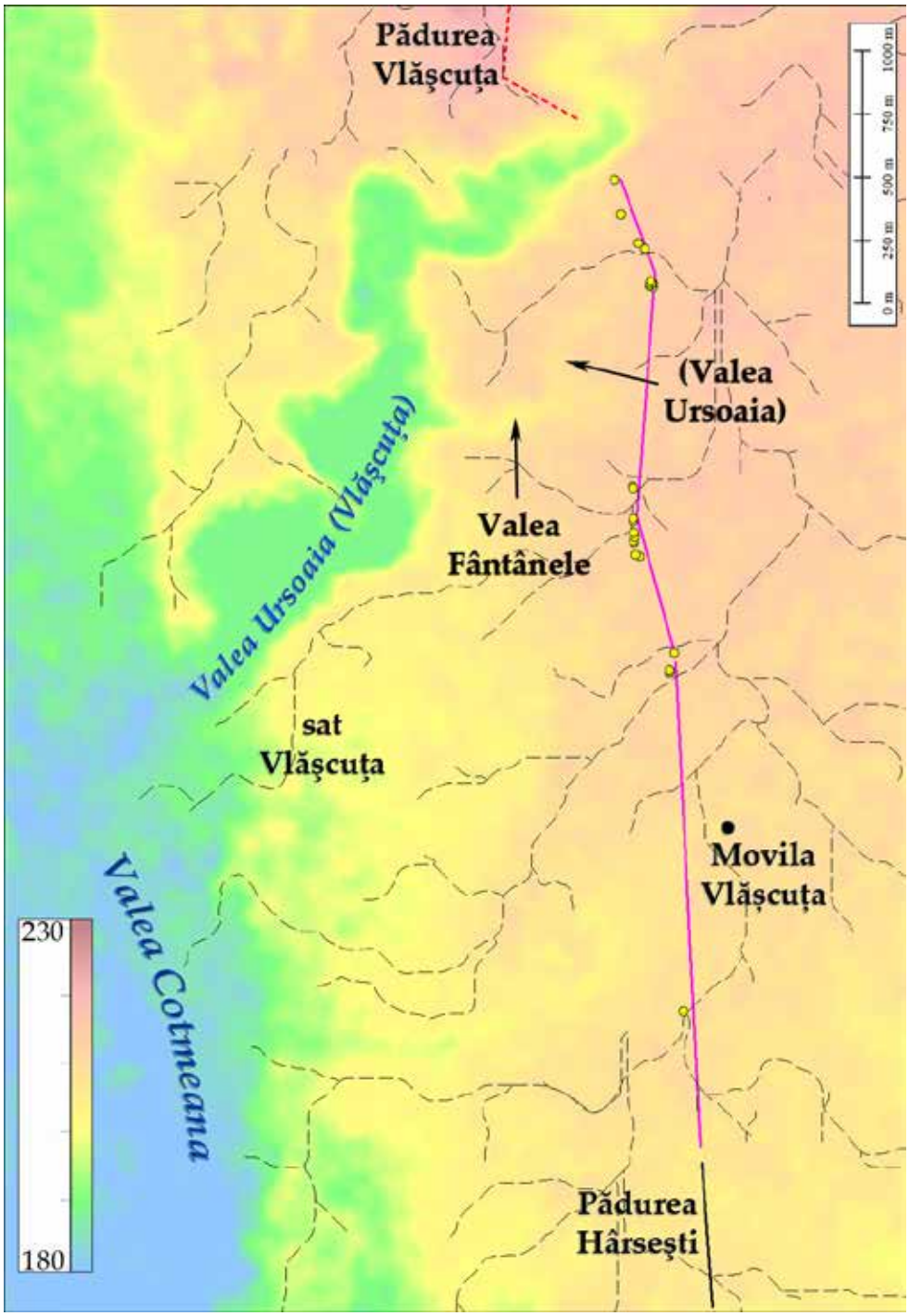

Figure 6. Quest for the Roman boundary between Hârsești Forest and Vlășcuța Forest. Legend: black solid line – known earthworks; yellow dots – traces of Roman time occupation; pink solid line – 'restitution' of the frontier corridor (road?); pink dashed line – the most likely continuation northward; black dashed lines – ridge lines.

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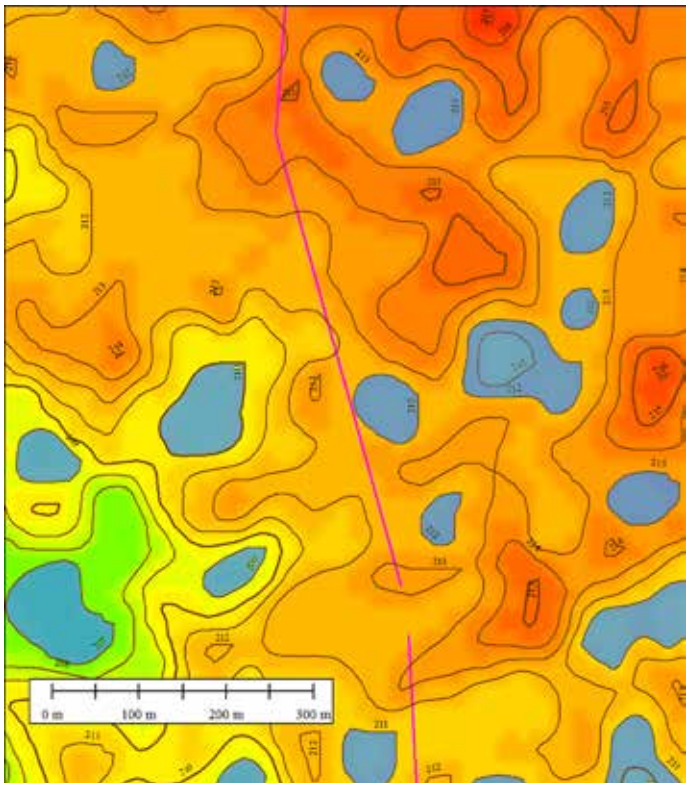

Figure 7. Detail from the figure 6, representing the double turn of the path. There are added contour lines at 1 m, marking the ponding areas (in blue). Averaged terrain-model (Alos Palsar and SRTM-30), resolution 12.5 m.

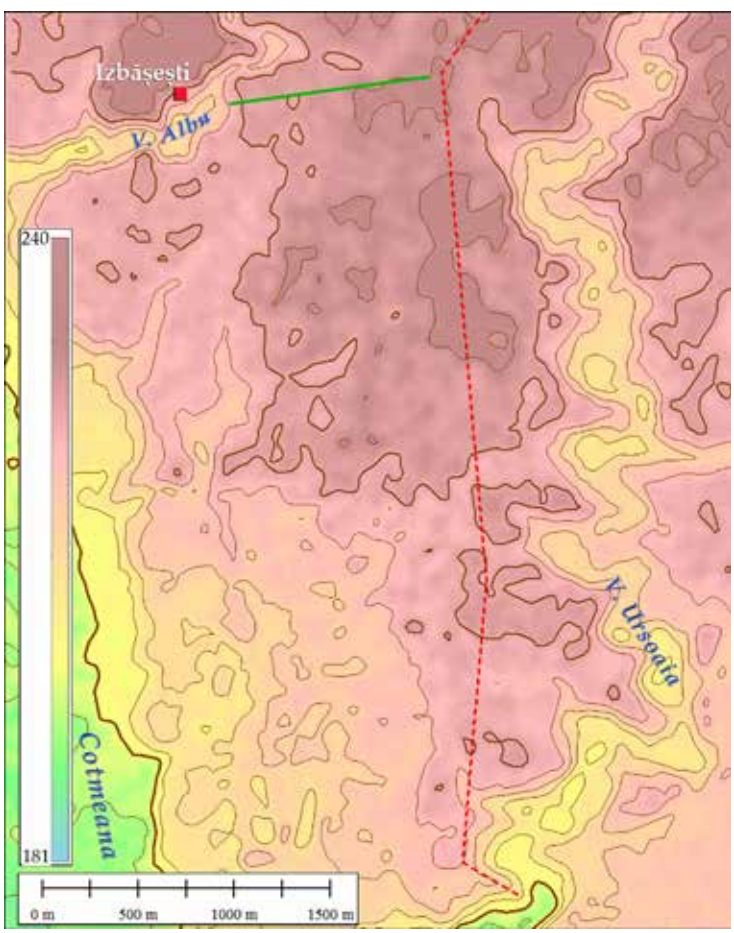

Figure 8. Hypothetical route between Ursoaia Valley and the fort Izbășești. Terrain-model Alos Palsar, resolution 12.5 m, contour lines at 5 m. Red dotted line – the reconstructed route; green line – secondary route connecting the fort to the main boundary road (limes).

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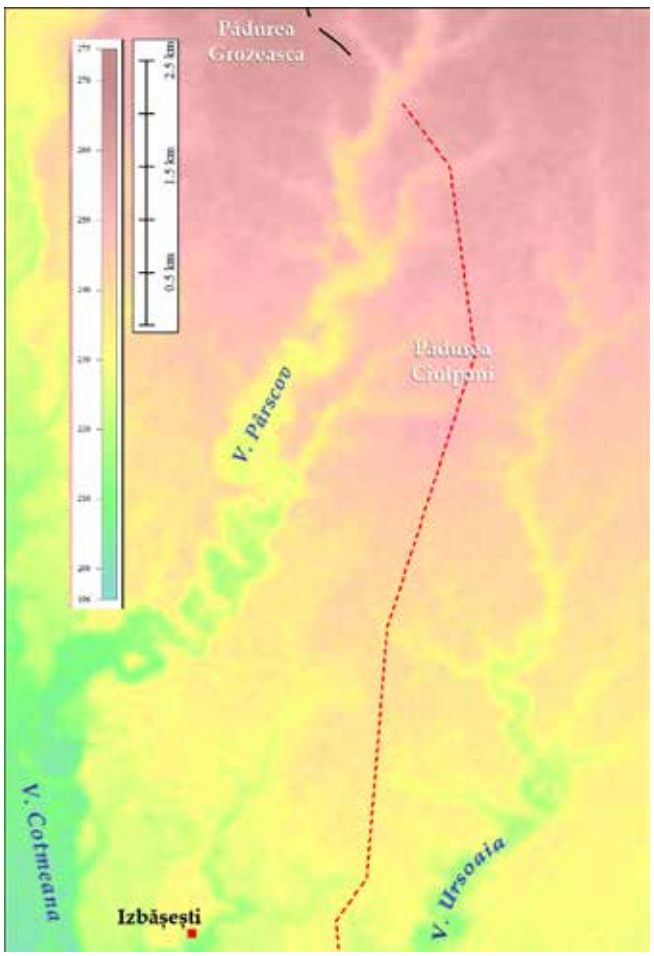

Figure 9. The hypothetical route between Izbășești and Grozeasca Forest. Terrain-model Alos Palsar. Red dotted line – the reconstructed route; black solid line – earthworks.

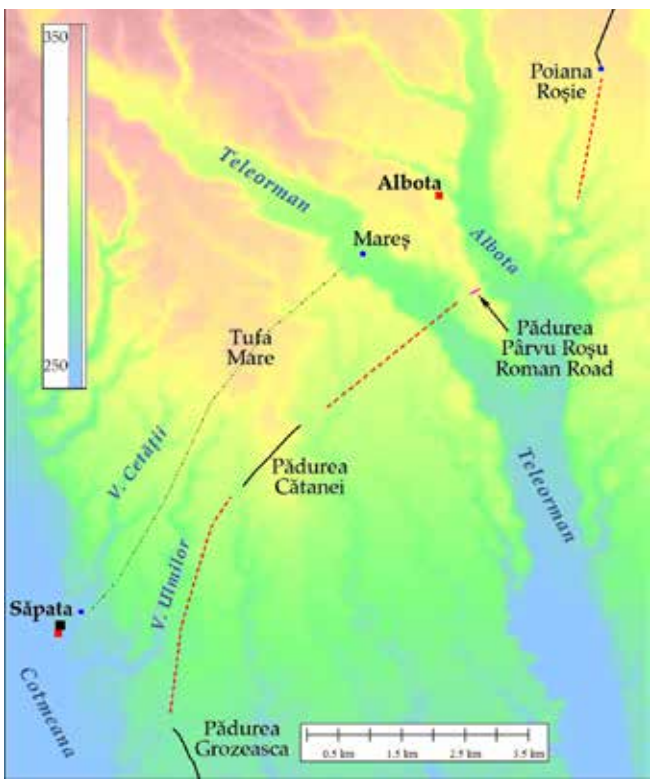

Figure 10. Alternative routes between the forts from Săpata and Albota. SRTM-30 terrain-model. Legend: blue dots: watching towers; black line – earthworks; pink, short line – Roman road; red dashed line – theoretical route; dash and dot green line – alternative route.

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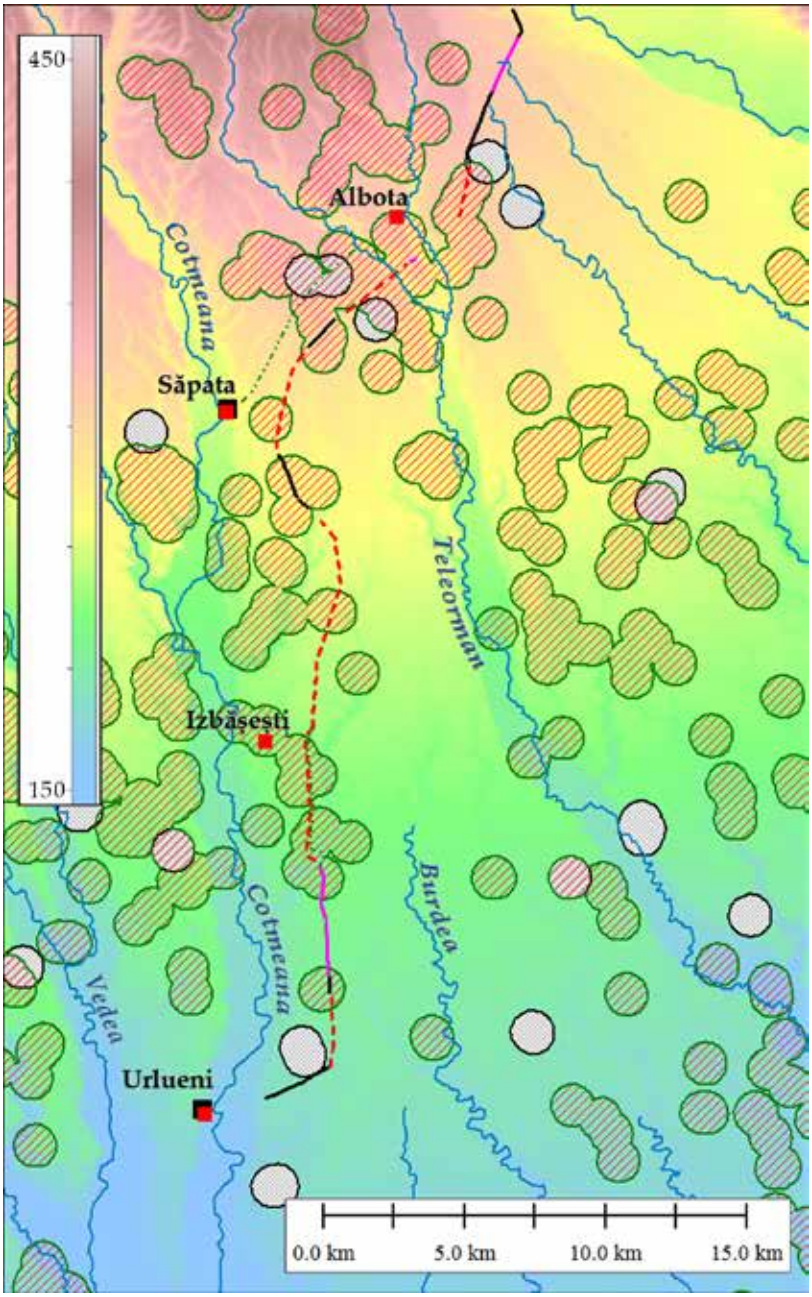

Figure 11. Map of the forestry name places on the northern part of the studied frontier. Legend: red hatches – forests and associated terms; white spots – areas with middle height vegetation (bushes like); lines like in the Fig. 10.

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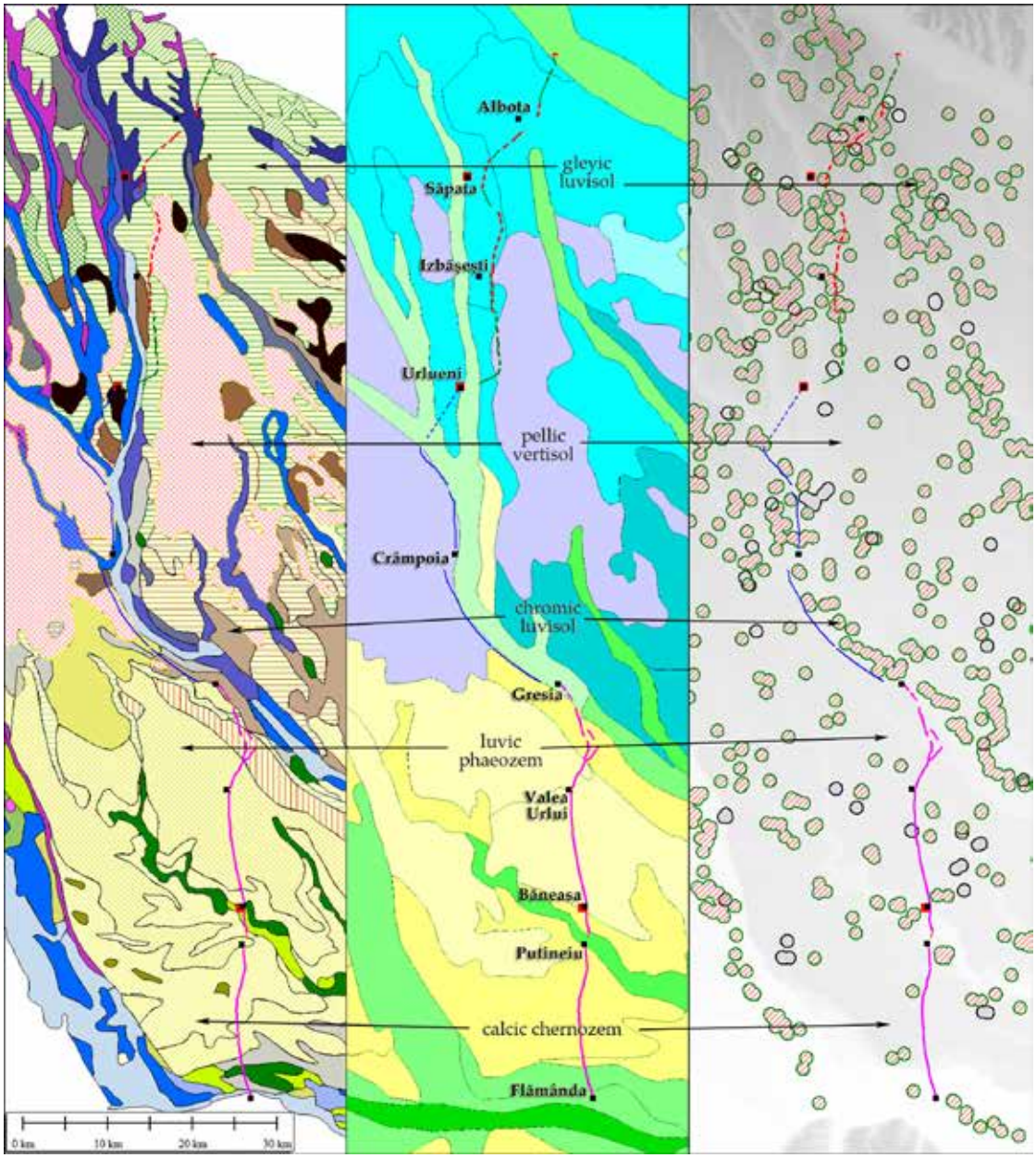

Figure 12. Former natural environment of western Muntenia, as suggested by three sets of data. Left: vectorised version of the Pedological Map of Romania (Florea et al. 1971, 1:500.000); centre: European Soil Database & Soil Properties (Panogos et. al. 2012, 1:1.000.000); right: map of the forestry cover as rendered by place names' distribution (Teodor 2016 b, 160, Fig. 4).

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