

# LANDSCAPE ARCHAEOLOGY ALONG *LIMES TRANSALUTANUS*

**Abstract:** The project addresses the historical monuments comprised in the longest Roman 'linear defence' structure present on the Romanian territory. Despite it being the longest, this historic structure is the least protected and the least known in its technical details. Was indeed *Limes Transalutanus* an incomplete *limes* (lacking civilian settlements, for example), an odd construction (a *vallum* without *fossa*), an early-alarm line rather than a proper defensive line? Taking on these historical and archaeological challenges, the team attempts to develop an investigation technology applicable to large scale archaeological landscapes - a full evaluation chain, involving aerial survey, surface survey, geophysical investigation, multispectral images analysis, statistic evaluation and archaeological diggings. This technological chain will be systematically applied on the whole length of the objective, that is, on a 155 km distance. The attempt to find answers to issues related to the earth works' functionality, layout, structure, chronology and relation with adjacent sites will be grounded on exploring the relations of the monument with the surrounding environment, by focussing on finding methods to reconstruct the features of the ancient landscapes, like systematic drilling, palynological tests and toponymical studies.

**Keywords:** Roman frontier, UAV, geophysics, viewsheds, toponymy

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## THE OPPORTUNITY

**B**eginning with July 2014 a new research project will unfold, for the next two years, under the UEFSCDI Partnerships Programme for Joint Applied Research 2013: 'Interdisciplinary technology for archaeological field survey. Case Study – *Limes Transalutanus* south of Argeș River'. Being a complex project, mainly due to its technological aims, it was designed as a partnership between three competent entities: Romanian National History Museum, Romanian Academy Institute of Archaeology 'V. Pârvan', and Vector Studio Bucharest – a private enterprise active in the field of interdisciplinary services for archaeological research.

The project, initially proposed for competition in the area of *Novel practices for heritage investigation*, was developed on a double axis – a methodological experiment and a historical issue, the state of art for the Roman frontier known as *Limes Transalutanus* being seen as suitable example to test the limits of various methods and establish meaningful investigation sequences. The quest for relevancy of investigations, beyond their rather common (and disappointing) implementation as merely fashionable scientific embellishments or prestige testimonials, and the acknowledgement of the overall financial difficulties in the national research departments, has determined the involved interdisciplinary team to look for

realistic, alternative and non-costly solutions, like assessing toponymy dynamics in GIS analyses, extensive use of highly-customized UAVs, airborne geophysics and systematic surface surveys, permanently accompanied by geodetic and geophysical control. Focusing on data integration, efficiency and methodological complementarity, the activities were generally designed to respond to the need of finding efficient ways to document large scale archaeological landscapes, especially in relation with lane-like projects (motorways, for example), as the *limes* was, essentially, a linear set of sites.

As an opportunity to calibrate technologies, *Limes Transalutanus* represents a truly provoking case study, by both its historical complexity and nature of its preservation state, if considering that the targeted sector stretches along altered agricultural lands. Pertinent formulation of historical and archaeological questions and honest challenging of traditional interpretations will support methodologies to gain relevancy and become objective instruments for testing and exploring historical scenarios.

*Limes Transalutanus* is a modern age concept, showing exactly the way it has been scientifically perceived - an advanced frontier beyond the River Olt (*Alutus* in Antiquity), aimed to defend the main border of the Empire, and apparently mandatory to relate to its counterpart, the *Limes Alutanus* - itself a modern day construct. From the association of names to the emergence of the 'double *limes*'<sup>1</sup> concept it was just a small step. Unfortunately, analogies for a 'double frontier' (which is just another expression for 'double *limes*') remain difficult to establish, either as facts<sup>2</sup> or theory<sup>3</sup>, reason for which we acknowledge the necessity to reconsider it.

In a very recent occasion<sup>4</sup>, we advocated that the main reason for making *Limes Transalutanus* was not to attain an improved defence of the lower parts of *Dacia Malvensis* (southern Oltenia of our days)<sup>5</sup>, but to shorten the

lines of communications. The fort from Brețcu (*Angustia*) was, for eastern Dacia, as vital as *Porolissum* was for western Dacia, despite its remote location - significantly far away from the main communication line of the Imperial Road<sup>6</sup>, stretching from *Drobeta* to *Porolissum*, via *Apulum*. During the second century, the Romans tried to solve this problem by bringing the logistic caravans either from south (via *Pietroasele-Drajna-Tabla Buții-Boroșneu*), either from east (from *Barboși*, via *Piroboridava-Trotuș Valley-Oituz Pass*). The first route was abandoned as a consequence of the peace made by Hadrianus in 118, with *Roxolani*, when all Roman troops between Lower Olt and Lower Siret were withdrawn. The second route, although theoretically located outside the Roman borders, survived miraculously for about seven decades, until around 180-190 AD, as shown by the ceasing of monetary circulation in that major hub of communication which was *Piroboridava*<sup>7</sup>. In these conditions, the single route left for communication followed the Olt Valley, its major drawback being its length: from the Olt mouth to the fort from Comalău<sup>8</sup> there are no less than 426 km<sup>9</sup>; for comparison, the route along *Limes Transalutanus* has 312 km<sup>10</sup>, which is still much, but still only 73% of the previous one, or about 5 days of travel less for heavy caravans. Travelling by it, not once or twice, but all the time, for about another half a century, could have made this difference to matter.

A good reason to speak about lengths is to explain why our project did not encompass *all* the border known as *Limes Transalutanus*: in a two years project, at the level of the usual financial support for this kind of projects, would be not only impossible, but ridiculous, as well, to try to understand (map it, describe it, etc.) such a huge linear target. There is also a second reason: the type of border at the stake. North of the Argeș River the Roman frontier is mainly a strategic road and not much else, being protected by forested mountains and with almost no side corridors to drive the barbarians into the Empire. South of Argeș River the situation is strikingly different: that is a frontier crossing a plain, much of the time without the minimum protection of a high terrace (*ripa*). Earthworks were those marking here the Frontier.

<sup>1</sup> VULPE 1961, 385; TUDOR 1968, 212; TUDOR 1974, 245; BOGDAN-CĂTĂNCIU 1974, 262-263. For a complete list of references and criticism see NAPOLI 1997, 333. D. Tudor had a 'nuanced' opinion: '*Limes Transalutanus* was not a regular *limes*, but a forwarded frontier, in order to protect the (main) one, located along Olt River' (TUDOR 1978, 256). This would sound rational, but only if one forgot that a *limes* was a frontier. There were no such things, like a raw of forts in *Barbaricum*. On the other hand, there is impossible, in juridical terms, to imagine a double frontier. As about the strategic meaning of each line of defence, everyone can make its own judgement. The archaeological fact which really counts is that, except Slăveni, there is no proof that the line of forts along Olt coexisted with the forts belonging to *Limes Transalutanus*, in the first half of the third century, although at least some would necessary have had (for instance *Pons Aluti*) to supply and to back-up the advanced line.

<sup>2</sup> Hadrianus Wall was abandoned when Antoninus Wall was erected, and vice-versa, the last was deserted when the former was repaired in order to be repopulated (BREEZE 2004, 7-8). As concern the Rhaetic and German frontier, some of the forts of the old frontier remained in service also later, no doubt as back-up troops (SCHÖNBERGER 1969, 168-169). The feeling Tudor had, that the advanced *limes* was not quite a *limes* can be anyway understood as a consequence that the advanced territories from Germania and Dacia did not make the object of colonisation, the civilian settlements missing (NAPOLI 1997, 102), which would not be exactly a 'province', at least for a classicist.

<sup>3</sup> Especially the first half of the Benjamin Isaac's study (1988). See larger comments about this issue in TEODOR 2013, 102-103. On the other part, taking the meaning of *limes* in its restrictive sense, as a 'frontier across the land' (BĂRBULESCU 2005, 65), *Limes Transalutanus* is exactly a *limes*, as the frontier from the Olt Valley is not.

<sup>4</sup> TEODOR 2014.

<sup>5</sup> For a full map of the *limitis* of Roman Dacia, see GUDEA 1997, 20;

BĂRBULESCU 2005, 19-20; OLTEAN 2007, 2; TEODOR/ȘTEFAN 2014, fig. 1.

<sup>6</sup> FODOREAN 2006, 120-163, 243-250; FODOREAN 2013 (not seen).

<sup>7</sup> CROITORU 2013, 129-136

<sup>8</sup> The 'traditional' northern limit of *Limes Transalutanus* is considered the fort from Râșnov (TUDOR 1978, 253), but it makes no sense. The road coming from the southern Carpathians, through Bran Pass, is joining the road coming from the Eastern frontier in Comalău.

<sup>9</sup> Calculation was made using mainly military maps and keeping in mind the main rules of a Roman road (DAVIES 1998). The estimation figures should be taken as the minimum, our expectation being to be increased with at least 5%, mainly in rough terrain. A good 'restitution' of a *plausible* Roman road is not possible on maps at such scale (1:20,000 or 1:25,000), but those figures are certainly better than the usual 'approximation' (or compilation). Another increase of the figure should be considered due to some earlier variants of the military roads, as the detour Jibelea-Rădăciștești-Titești-Praetorium (+ 8 km) and the first road from Baraolt to Olteni, following the line of Olt River (it was the frontier!), for which one could add at least 35 km.

<sup>10</sup> The unchallenged number, in more than one century, is 235 km (TOCILESCU 1900, 123; TUDOR 1978, 253; CROITORU 2004, 68; FODOREAN 2006, 309; of course, the list is far from being complete...), but it is referring only to the length from Danube to Râșnov; according to our calculations, the real figure is greater than 268 (to add about 5-7%).

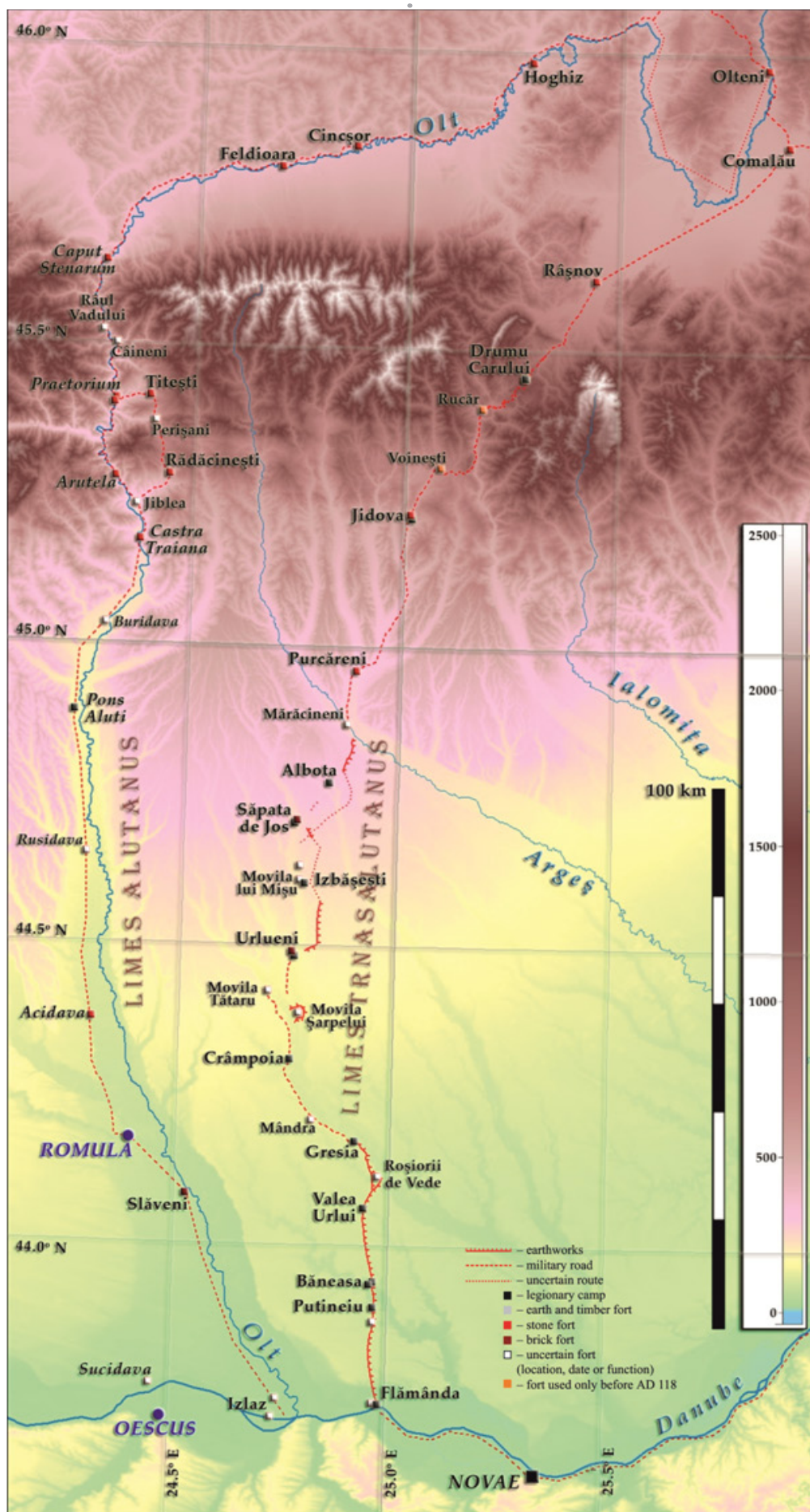


Fig. 1. Map of Limes Alutanus and Limes Transalutanus.

## BRIEFING OLDER RESEARCH

The first scientific approach of *Limes Transalutanus* was made by the German archaeologist Carl Schuchardt (1885, 228-229)<sup>11</sup>; in short, he considered the southern part of *Limes Transalutanus* as being a Roman road, not a military dyke. Let's say only that in the same volume Schuchardt dealt with all the *valla* from the Lower Danube, not only with this one, but only this was considered 'just a road'<sup>12</sup>.

A completely different resolution gave, a decade later, Grigore Tocilescu<sup>13</sup> and Pamfil Polonic<sup>14</sup> (Tocilescu's topographer), which described a dyke made of burned clay, but also without ditches. They made the crucial observation that all the forts they saw – 9 at that time – were located west of the monument, qualifying it as a dyke, and not a road. If the Tocilescu's book has some notoriety, even in our days, the work of Polonic is rather unknown, being not published. His notebooks, preserved in the archives of the Romanian Academy, contained also sketches for the location of the forts, which even if not very accurate, are vital for understanding the monument's state of preservation at the late 19<sup>th</sup> century<sup>15</sup>.

The archaeological contributions made between the world wars were rather poor, although some diggings were done, in Băneasa<sup>16</sup>, Urlueni<sup>17</sup> and Săpata de Jos<sup>18</sup> – resting here south of Argeş! Although they tried, the authors failed to understand the stratigraphy and some relevant phases of the forts' construction (for instance, the two halves of the

<sup>11</sup> That was a common opinion in the late 19<sup>th</sup> century; for instance, Marele Dicționar Geografic al României (The Great Geographical Dictionary of Romania), vol. 5, 1902, s.v. Teleorman, subtitle 'drumuri vechi' (old roads, 586-587), was writing that the so-called 'troiane' (a popular word for ancient *valla*) 'they still keep their old names and are still used as roads; here and there they also count as landmarks for property boundaries' (authors' translation).

<sup>12</sup> The reasons are multiple. First of all, the local tradition considers it a road ('Calea lui Traian', meaning the Road of Trajan), and used it like one (a common fact on all European former *limitis*). This tradition is inclusively reflected in some maps of the time, like the Third Austrian Survey (published entirely in 1910, with older data after 1868); such military productions were available for top archaeologists of the time, even if not 'public' yet – and with a better scale than we know them today, 1:20,000, ten times more detailed – as witnessed by R. Netzhammer (NETZHAMMER 2010, 104-165, esp. 118) in a text dated January 1907. A second reason is the apparent profile of the monument, relatively symmetrical on the both sides of the ridge, as a Roman road. What he did not understand is that the mass of a road is not in the same class with a dyke, and cannot have, after 16 centuries, 15 cubic metres for each linear metre (or more) above the ground. We are looking, then, after a dyke with a structure similar with a road, having two ditches...

<sup>13</sup> TOCILESCU 1900, 121-133.

<sup>14</sup> Pamfil Polonic was a topographer (of Austrian military school), being the right hand of the Professor Tocilescu, the Head of the National Museum of Antiquities – the former name of the Institute of Archaeology from our times. Although his main opus – granted by a prize by the Romanian Academy in 1917 – has remained unpublished, is available for study in the Library of the Romanian Academy. Some of these manuscripts, being just his working notebooks, are hold in copy at the Institute of Archaeology from Bucharest. The notebook pages regarding *Limes Transalutanus* were recently published, TEODOR 2013, 205-212, along some of his sketches. For the life and work of Pamfil Polonic, see IUGA 1942.

<sup>15</sup> And crucial, sometimes, for the location of the monuments. It is the case, for instance, of the fort from Albota, it was retrieved – with difficulties – in 2012, only after an attentive study of the positioning sketch.

<sup>16</sup> CANTACUZINO 1945.

<sup>17</sup> V. Christescu, but his diggings were published much later, merged with the research conducted by I. Bogdan-Cătăniciu, BOGDAN-CĂTĂNICIU 1997, 96-104.

<sup>18</sup> CHRISTESCU 1938.

'double fort' from Băneasa are still not explained). Among achievements one could count the recovery of a monetary hoard in Săpata<sup>19</sup> – still critical for establishing the *limes* chronology – and the Roman baths, on the same site – the first sign of a 'normal *limes*'.

The post-war period, although generally defined as a 'golden age' of the Romanian archaeology, brought no news on *Limes Transalutanus*. The only relevant diggings in the first three decades were rescue ones, on the occasion of building irrigation channels by cutting the dyke in many places<sup>20</sup>; however, the only published drawing<sup>21</sup> was recently considered at least debateable<sup>22</sup>. 'New' was only the historical synthesis made by D. Tudor (1978)<sup>23</sup>, containing also data for *Limes Transalutanus*, first account passing the state of an 'introduction'; this is, probably, one of the most read and most cited work in Romanian archaeology. Nevertheless, the personal contributions brought by D. Tudor for this segment of *limes*, south of Argeş River, were very limited.

The only archaeologist working along *Limes Transalutanus* longer than three campaigns was I. Bogdan Cătăniciu. She published relatively numerous works on the subject, including in foreign languages<sup>24</sup>, concluded by a book in 1997. She dug a tower, three sections on the wall (in different locations, near Danube, between Valea Urlui and Roşiori, and east of Urlueni), and made diggings in several forts, Flămânda (the large fort), Putineiu and Urlueni (both forts). She understood the key position at the confluence of the rivers Cotmeana and Vedea, searched after a new fort, but did not find it (yes, it is there...). Her contribution is important, but undermined by a too determined conviction that the *limes* was founded in the time of Hadrianus<sup>25</sup>. In addition, the inability to work with maps and aerial snapshots concluded in a rather difficult to use illustration.

There is also worth mentioning the excavation campaign initiated by Romeo Avram, concluded in short dig tests – less than one month for each – in the forts from Gresia<sup>26</sup>, Crâmpoia<sup>27</sup> and Izbăşeşti<sup>28</sup>. As a result, we have today only two forts with known location, but without any diggings, Valea Urlui and Albota, and a third fort, Roşiori, drawn by Polonic but never seen since.

Instead of an overall diagnostic of the state of art, we would stress one single fact: none of the forts south of the River Argeş, along *Limes Transalutanus*, has a proper topographic survey; as about their exact geographical coordinates, they were established just recently<sup>29</sup>.

<sup>19</sup> MITREA 1968; for an upgrade about numismatic evidence on the *Limes Transalutanus*, see DIMA 2012.

<sup>20</sup> No less than 12, TUDOR 1978, 254; BOGDAN-CĂTĂNICIU 1997, 87.

<sup>21</sup> BOGDAN-CĂTĂNICIU 1997, fig. 59a.

<sup>22</sup> TEODOR 2013, 107.

<sup>23</sup> This is the year of the fourth edition (revised); the first edition was published in 1942.

<sup>24</sup> BOGDAN-CĂTĂNICIU 1974; BOGDAN-CĂTĂNICIU 1981; BOGDAN-CĂTĂNICIU 1993; BOGDAN-CĂTĂNICIU 1995. BOGDAN-CĂTĂNICIU 1997 has also a large English summary.

<sup>25</sup> BOGDAN-CĂTĂNICIU 1997, esp. p. 100.

<sup>26</sup> AVRAM 2000.

<sup>27</sup> AVRAM 1999. For this campaign there are no notes, but a few artefacts in the repository of the National Military Museum, along with some drawings (a general plan with the location of the trenches and profiles of *valla* and *fossae*).

<sup>28</sup> AVRAM 1996, PETOLESCU et al. 1995.

<sup>29</sup> TEODOR 2013, 213-216.

## AIMS AND MEANS

The already cited book from the past year is nothing more than an inventory of facts collected from the literature and filtered/integrated through a typical set of landscape archaeology analyses: a GIS file, various historical maps<sup>30</sup>, orthophotographs coming from several sources and with different time spans (three complete covers of the national territory made by ANCP<sup>31</sup> and the well-known international sources), for elevation data<sup>32</sup>, vector files (for routes, administrative boundaries of several ages, others)<sup>33</sup>. The book made clear lot of facts, but left open many questions.

Although we already rejected the thesis of a dyke without a ditch, this should be tested on the field, by all means – geophysics and geological drilling, or even by an archaeological digging, if necessary. The layout of the Roman earthworks presents obvious outgrowths in several places, as west of Roşiorii de Vede, around Movila Şarpelui (see Fig. 1) and east of Săpata de Jos; some of them – but not all of them – could be explained as a consequence of the route being firstly used during the Dacian wars and in the first years of the Province, with slight location variations in some places. An intersection of roads near Valea Mocanului (between the forts from Valea Urlui and Roşiori<sup>34</sup>) might be, very well, a result of that history. There is no doubt that the defensive positions had been redrawn in certain points, although the *limes* was used only for about half a century. First of all, still, we need detailed plans of its design, before proposing more grounded interpretations.

The research project should reveal the spatial and strategic relationships between the main elements of the military facilities: the forts, fortlets, signalling towers, the dyke, the watching towers and the roads between them.

30 The military map of Romania issued in late 1970s and early 1980, usually referred to under the acronym DTM (from Direcția Topografică Militară, the publisher of the set), at the scale 1:25,000; the military maps known as Planurile Director de Tragere (acronym PDT), made (and remade) between 1916 and 1966, at the scale 1:20,000 (<http://earth.unibuc.ro/download/planurile-directoare-de-tragere>); the Third Austrian Survey, made after 1868, but printed in 1910, at the scale 1:200,000 (re-projected in Stereo70, see Geospatial <http://earth.unibuc.ro/download/harile-austriece-1910-reproiectate-in-stereo70>); after closing the Romanian version of the book, it became available the so-called Szathmári Map (<http://www.charta1864.ro/charta.html>), at the scale 1:28,000. The first set in the list is used by many GIS practitioners, from several years, but a formal agreement of DTM for the civilian use is no older than 27 May 2011 (the document is yet not public). From April 2014 it has become available the Second Austrian Survey (made between 1806-1869, see <http://mapire.eu/en/earth/collection/secondsurvey/>), but without notable news for Walachia, being made in the same period (1855-59) and from the same military team, the only differences being in the graphic design. All web-links from above were checked in 16 Sept. 2014.

31 ANCP (Autoritatea Națională pentru Cadastru și Publicitate Imobiliară) – the national authority in cadastre and cartography (<http://www.ancpi.ro>). See also <http://geoportal.ancpi.ro/geoportal/catalog/main/home.page> and the application for the public - <http://geoportal.ancpi.ro/geoportal/viewer/index.html>.

32 Mainly SRTM (Shuttle Radar Topography Mission), from several web sites (as [srtm.csi.cgiar.org/](http://srtm.csi.cgiar.org/) or [srtm.usgs.gov/](http://srtm.usgs.gov/)) with 90 m resolution. From October 2013 there is also available an European DEM (<http://www.eea.europa.eu/data-and-maps/data/eu-dem>), apparently much better (at a resolution of 30 m, see also <http://www.eea.europa.eu/data-and-maps/data/eu-dem#tab-metadatas>), very large and difficult to use, and still far from the expected accuracy.

33 Many of them are resources shared by the Geospatial community from Bucharest (<http://earth.unibuc.ro/>).

34 TEODOR/ȘTEFAN 2014, fig. 4.

This seems to be easier to do on the southern segments, apparently less affected by agriculture. On the route between Flămânda and Putineiu (18.5 km) there have been already identified 13 mounds<sup>35</sup> aligned immediately in the rear of the dyke, at distances of 15-40 m, which are very good candidates for former watch towers, but we expect to find more.

The technologic chain of the project was conceived in order to improve, in a progressive manner, the resolution of digital data, with the purpose of documenting, investigation and site detection, along the entire targeted route. The departure point is the newest set of orthophotographs, made by the army<sup>36</sup>, available to us from April 2014; its resolution is the usual for such products, 0.5 m, but being available as uncompressed tiff files (the national coverage has 5 TB), the aerial images appear clean and clear. The next step will be to acquire our own set of high resolution images, taken from a plain, by using a custom-made assemble of various digital cameras, positioned in a rack, directly on the aircraft. This system, prepared with an automatic recording procedure, will allow a complete footage, from various angles and with different filters and lenses, of the entire route in only about two hours (back and forth 150 km), with an expected resolution of about 0.2 m. The third step, which will increase resolution and flexibility, by getting closer to the ground, is the UAV (in our case multirotor flying platforms and, later, fixed wings), designed to be used especially in hot areas – as identified by taking in consideration previous larger scale aerial surveys and other landscape analyses. At this moment, robust, but efficiently designed (as well custom made) multicopters (hexacopters), capable to perform longer flights, may cover, by planned aerial mission, about 40 hectares for each take off, resulting orthophoto mosaics with a resolution between 5 and 10 cm (depending on height) and also oblique photos. At the same cost and flight time, the resulted imagery represents also the raw data for obtaining digital elevation models of the terrain surfaces – with the same resolution! –, ideal for topographic documentation and also site detection.

The progress in aerial image quality – or the possibility to acquire such images anytime needed, benefiting from different lighting conditions or seasonal features of the landscape/vegetation – are critical for guiding the soil level survey, reduce costs and update investigation strategy. For instance, the dyke segment located south of Pitești is known – as a general description and not as a plan – from the Polonic's notes. The dyke is poorly preserved, being extremely difficult to be observed on ground missions. The part of the dyke included in the city of Pitești – one of the most rapidly growing urban community from Romania – is not visible any more, the only remaining identifiable segment being its line south of the city, respectively west of the village Geamăna and east of the village Albota. The dyke is visible on the high altitude images like an almost straight line, stretching on a direction northeast to southwest. The military orthophotos, due to their better quality, brought

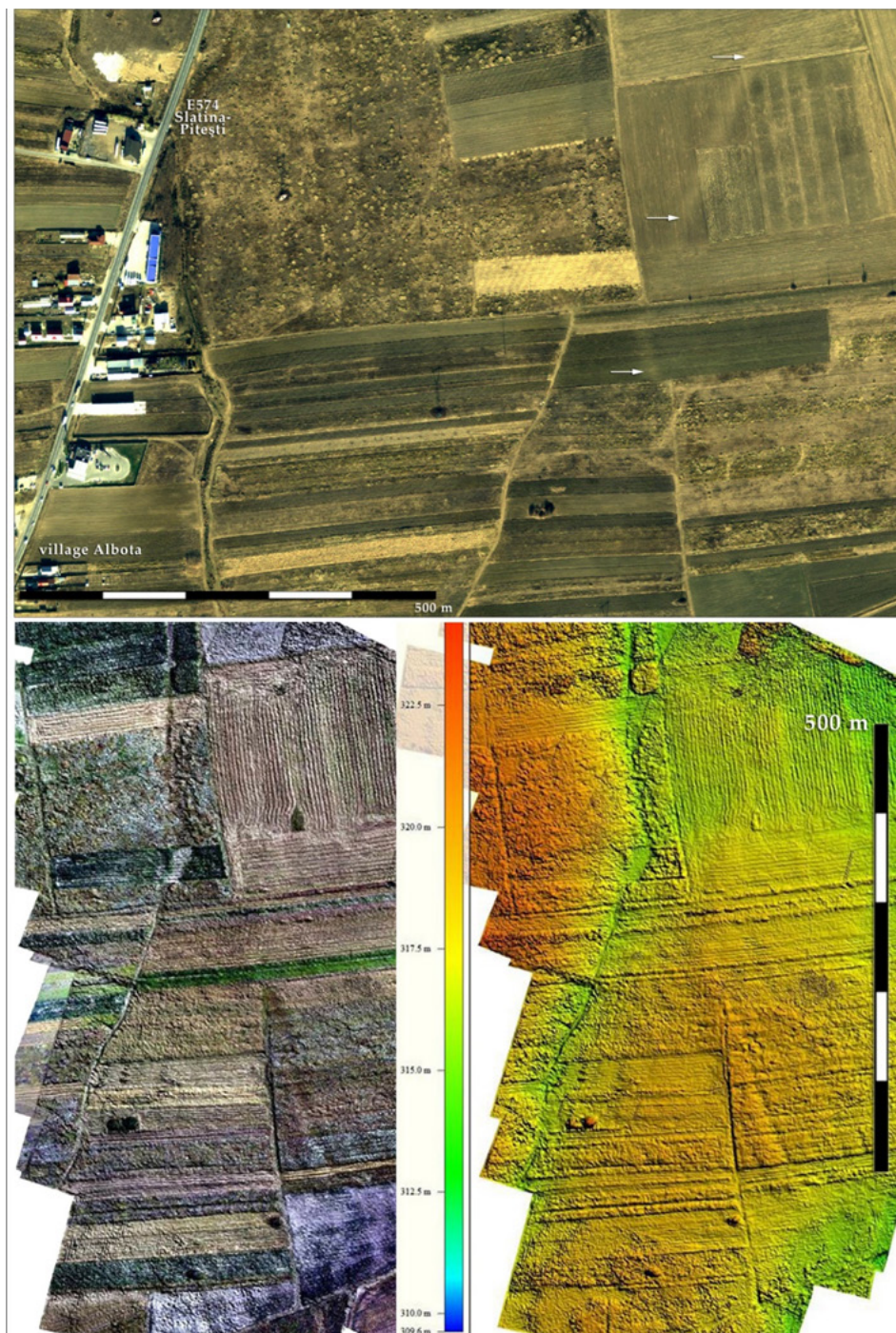
35 TEODOR 2013, 23-24.

36 This was possible thanks to a protocol between the Defence Ministry and the Culture Ministry (no. 4096/ 13 Sept. 2013).

an important emendation to our knowledge, showing a strong turn to south-southeast, leaving thus the 'classical' route Pitești-Albota supposed earlier (the fort from Albota is located southwest of the village), and proposing a new route, heading the town of Costești, but the continuation is still to be found.

We made the first UAV's tests in 11 August 2014, as part of an experiment of 'lucrativeveness' (aiming to answer the question 'when we should fly?'), projected to take place in four distinctive moments of the year (early November, early April, June and August) and above locations of special interest; one of them is the great turn of the dyke, east of the village Albota, near the toponym Poiana Roșie (The Red Glade...; of course, no forest around...). The results

– unexpected good<sup>37</sup> for the worst period of time elected within the experiment – are resumed in the Figure 2. August is not the best option to fly, of course; we had to deal with sunflower crops, two metres high, and vigorous cultures of corn (it has been an unusual rainy year in this part of the country, habitually with dry summers). Worse than the growing cultures were the former cultures, as a plot of land covering the northern route of the dyke (as represented in the Fig.2), a harvested barley area, with a thick layer of straw abandoned on the field, obviously 'blurring' the image. The topographical render of data acquired from UAV and processed by photogrammetric algorithms made yet the miracle, revealing back the searched dyke (Fig. 2, right-down).



**Fig. 2.** The big turn of the dyke near the spot Poiana Roșie – Albota. Above – the military orthophotos (2012) with elements of localization (white arrows for the dyke); left – orthophotography acquired from UAV (XX August 2014); right – the digital surface model of the UAV picture.

<sup>37</sup> Providing a quick answer to the main question (when?): 'anytime, if you can'.

An interesting and very expected test will be the geophysical prospection from UAV, namely magnetometry – the first implement of this technology at international scale, as we know it. The great challenges of balancing the equipment in relation to the carried exterior magnetic sensor and ensuring a constant and low flying altitude (ceiling) will require considerable amount of testing and manufacturing. However, the linear aspect of the investigated monument and the existence of burnt sectors along the dyke – with an expected highly magnetic response, make *Limes Transalutanus* the perfect archaeological target for this type of technological and instrumental experiment.

The greatest hopes, however, in terms of efficient geophysical prospection with archaeological significance are those for magnetic susceptibility – by far the cheapest, easiest to apply and process, and rapid, even if almost unknown at international scale<sup>38</sup>. It has a great productivity (about 5 square kilometres a day), its main applicability being the identification, by contrast, of human occupation sites in relation to non-site areas and to establish, inside sites, areas of increased human activity. Magnetic susceptibility measurements will accompany in real time the surface surveys, being enough relevant even if georeferenced by GPS.

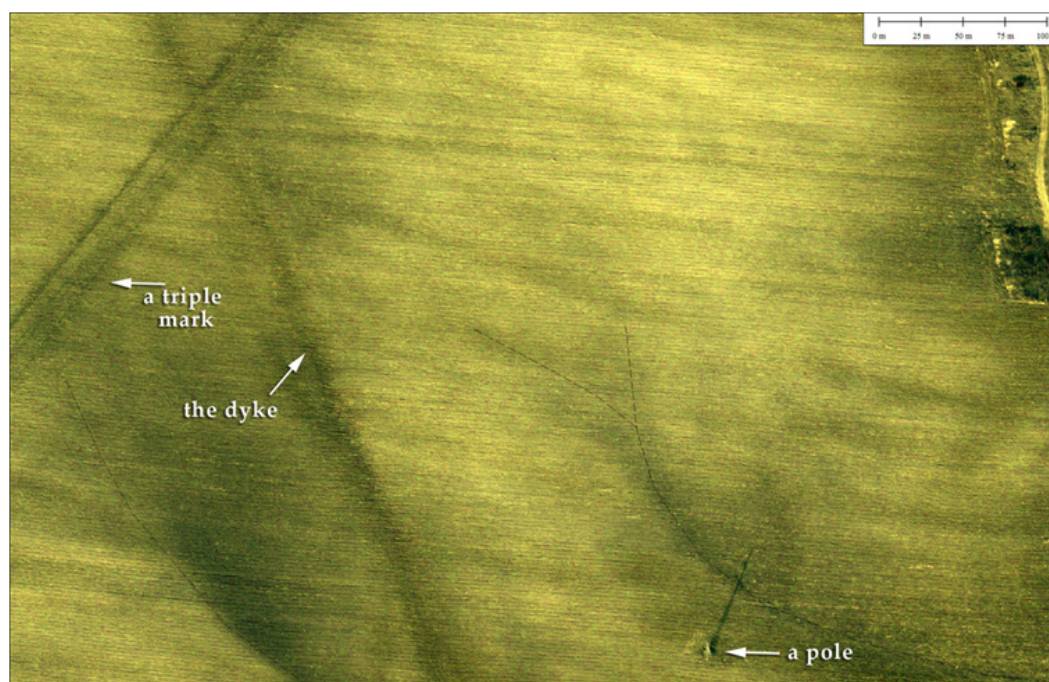
As much as possible, the aerial reconnaissance will anticipate and prepare the missions on soil. The last are of several types. First of all – what we called ‘linear survey’,

of the area (topographical and geophysical survey).

Previous surveys on the *limes* warn about the eclectic kind of pottery sherds possibly to be found, especially on the spot of the former watch towers. In order to be able to correctly identify the artefacts, we planned a preceding pottery study on inventories collected in regular diggings, on both Roman sites from the area (Gresia, Crâmpoia, Izbășești)<sup>39</sup> and sites classified within the cultural group Chilia-Militari (as Alexandria, Dulceana, Mătăsaru, Chilia, Scornicești)<sup>40</sup>. The area of this cultural group is laying on the both sides of the Roman border, being considered a product of a Getic population on the way of Romanisation – a fact clearly visible on pottery.

Separate missions will be dedicated to geologic drills and collecting soil samples for reconstruction of the stratigraphy and for palynological and pedological analyses. If the first is aimed to collect stratigraphic data without having to make a slow and expensive excavation, the next are part of an effort to reconstruct the environment of the former ages. Understanding the old environment is a key of the research project, because the Romanian Plain has changed dramatically, especially in the last two centuries. Once covered with dark and fearful forests – as proved by the name of a river in the area, Teleorman, meaning ‘The Mad Forest’ – today it is a huge agricultural field, almost completely devoid of the trees’ shadow.

The Roman border south of Argeș River can be



**Fig. 3.** Newly discovered segment of dyke, near the toponymic Pădurea Grozeasca (coordinates for the middle arrow: 44.68402462° N, 24.79593692° E). Black dashed lines are suggesting the direction of the main natural draining grooves in the area. Military orthophotography, 2012.

along the *limes*, for a terrestrial reconnaissance, searching for any signs of landscape alteration. All these will prepare a decision about the areas where systematic surveys will be done. The collection of artefacts and the observations about the soil surface will be doubled by a complete investigation

<sup>38</sup> TITE/MULLINS 1971.

<sup>39</sup> A selection of the digging inventories is preserved in the National Military Museum; happily, the management of the museum allowed us to study this collection resulted from Romeo Avram's diggings, because he has retired from both army and archaeology.

<sup>40</sup> These are some of the most relevant excavated sites of the Chilia-Militari Culture (we are mainly interested in the western – Chilia – area of the culture); see DOLINESCU-FERCHE 1974 for Dulceana; BICHI 1986 for Scornicești; BICHI/POPESCU 1970 for Mătăsaru; MORINTZ 1962 for Chilia; BICHI 1980 for the concept of Chilia-Militari culture; the diggings from Alexandria (the ring route of the city, preventive works, 2012) are recent and not published, but we have the agreement of the field archaeologists (Christian Schuster, Mihaela Simion, Constantin Băjenaru) to study the pottery of what already seems to be the main reference as a settlement of the Chilia-Militari Culture.

divided in at least three separate parts: the southern one, 55 km long, made by a continuous dyke, because the frontier was crossing several valleys, in the flat plain; the central one, 40 km long, in which the border was made by a 20 m high terrace, almost vertical, of the rivers Vedeia and Cotmeana (from south to north); a last segment – near the Argeş Valley – 55 km long, being again a route across plains and valleys. This time the dyke is not complete: we know a southern dyke of 8 km, documented by Polonic<sup>41</sup>, and a northern one, described also by Pamfil Polonic, for about 5.4 km, from a position east of the village Albota up to the railway station from Piteşti<sup>42</sup>, and a middle segment, of only 2.5 km, near the toponymic Pădurea Grozeasca<sup>43</sup> ('pădure' means a forest, but the forest was cut), in a point which looks like an interesting crossroad. In the Figure 3 one can see the unmistakable mark of a dyke, between two draining grooves. The route is marked on all detailed maps (Szathmári, PDT and DTM) as a mud road (today out of use), but it cannot be just a road, from two very good reasons: it has an extruded profile (see Fig. 3), which is not a feature of a mud road, at least not in this corner of the world; and it is far too wide. Our measurements on orthophotos, as relative as they are, show that the width of the elevated part measures around 13 m, three times larger than a casual country road. An intriguing fact is that the image suggests, as well, the presence of a ditch on the western part<sup>44</sup>, but this isn't quite a surprise anymore, similar features being already observed in other parts of the monument. We can thus expect a bilateral ditch, which would explain the symmetric profile of the ruined embankment, as rightly observed by Schuchardt or Polonic.

One of the biggest questions the project has to provide answers to is if the dyke was completely made by Romans, from Urlueni to Piteşti (which is unlikely), or, if not – why not?

## TOWARDS A TOPONYMICAL LANDSCAPE ARCHAEOLOGY

As everybody knows, arguments coming from toponymy are rather common in the archaeological discourse; nevertheless, the recourse to toponymy has never benefited from a systematic approach. The reason is plain: there are no available toponymic datasets, at least not in Romania. A second reason is that in the cases of the developed countries (and archaeologies!) the historical archives are good enough and old enough to allow a 'reconstruction' of the landscape, of course, with the blessed assistance of the biological laboratories... This is not our case, most of the time. As already mentioned, the oldest reliable, detailed and accessible map was made at the middle of the 19<sup>th</sup> century<sup>45</sup>. The alteration

<sup>41</sup> But in the 1970's Ioana Bogdan-Cătăniciu (BOGDAN-CĂTĂNICIU 1997, 84) was able to find only about 5 km, from Urlueni to the Hârseşti Forest (where she made a test digging). Today, on the best orthophotos, one can see only 2.5 km.

<sup>42</sup> Today, on orthophotos, one can see only about 2 km, and other small segments with great difficulty; at the soil level the dyke is completely gone.

<sup>43</sup> In this orthography in PDT, 'Grozasca' in DTM, a form more archaic, although the source is more recent.

<sup>44</sup> Although the light of the sun is coming from south-southwest (see the shadow of the pole, in the Fig. 3), the darker side of the dyke is the western one.

<sup>45</sup> We already mentioned that the Second Austrian survey has become available since several months ago, for public use (it has a Google Earth

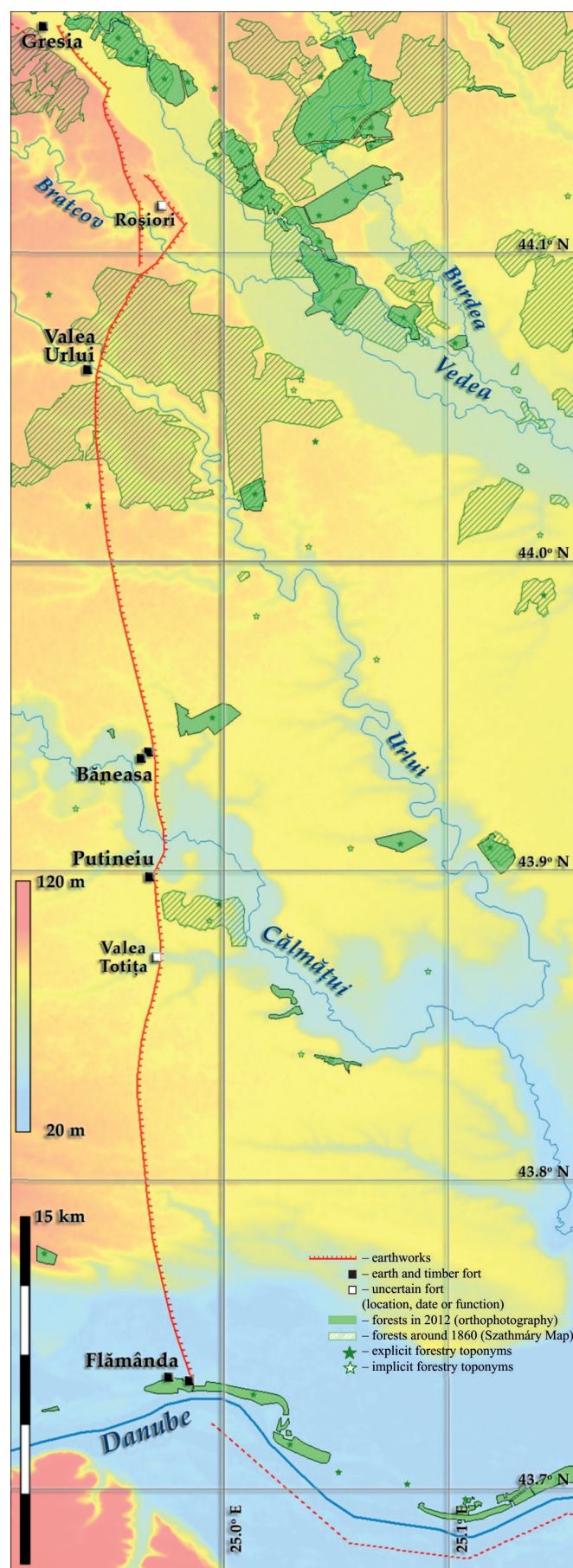


Fig. 4. Forests on the southern segment of Limes Transalutanus, from Danube to Gresia. Projection Stereo70, geographical coordinates. Note: Toponymic data from DTM map (1980s)

Table 1. Deforestation between 1860 and 2012 in the Romanian Plain, along Limes Transalutanus.

| Area                              | Northern area<br>(Urlueni-Albota) | Southern area<br>(Danube-Gresia) |
|-----------------------------------|-----------------------------------|----------------------------------|
| Surface                           | 469 km <sup>2</sup>               | 1044.5 km <sup>2</sup>           |
| forest extent in Szathmári Map    | 19.80%                            | 10.92%                           |
| forest extent in orthophotos 2012 | 7.37%                             | 3.27%                            |
| ratio 2012 versus 1860            | 37.22%                            | 29.94%                           |

of the landscape, in the meantime, was consistent. In a short paper sent for publication almost in the same time with this one<sup>46</sup> we have illustrated the deforestation exactly on the segment discussed above, between Urlueni and Albota. For this occasion we prepared a complementary illustration, highlighting the same facts for the comparative segment between Danube and the fort from Gresia, where one can see a continuous dyke (Fig. 4). What we did not do for Antiquity (missing the necessary space) was to give the statistics; we can do this now, for both segments.

Looking at both figures<sup>47</sup> and the subsequent statistics, we can draw some provisional conclusions: the deforestation in the mentioned interval evolved in a similar way in both areas, although the figures are suggesting a worst situation in the south; in fact, the almost complete lack of forests is characteristic only for a segment beginning with the half way between the forts Băneasa and Valea Urlui, where the village and the railway station Troian can be found, which is also the place where *Limes Transalutanus* is intersected by the southern Brazda lui Novac<sup>48</sup>. This situation could hardly be due to a more intense agricultural exploitation, mainly looking at the mediaeval history of Walachia, born around the towns at the mountains' foot, like Câmpulung, Curtea de Argeş and Târgovişte, the Middle Age villages spreading slowly from north to south, thus from the mountains' depressions and hills to the plains<sup>49</sup> (a process crossing mainly the 15<sup>th</sup> and 16<sup>th</sup> centuries) and not vice-versa. This could be a solid hint that the lack of forests along the Danube's terrace could be a natural fact of some age.

The problem is that the modern maps we have at hand cannot do more; we can presume that two or three centuries earlier the forests were spread on about half of the territory (interface), but also the fact that it is very similar with Szathmári Map and probably did not change much. The single 'surprise' we can – hopefully – expect is a similar event about the so-called Specht Map from 1791, considered a part of the First Austrian Survey (although not available for Walachia at the web-link dedicated for the First survey - <http://mapire.eu/en/map/collection/firstsurvey/?zoom=6&lat=47.89035&lon=14.76556>), according to BARTOS-ELEKES et alii, 2013, (1). An enthusiastic paper of V. Mihăilescu was stressing out the major importance of the Specht Map, being the earlier detailed map ever known for Walachia, making large comments about the informative value of it about the extent of the forests in the late 18<sup>th</sup> century, compared with later maps. A particular detail is of interest for our paper: a barrier of forests separating, in Specht's map, the Burnas Plain, from south, which is an old steppe, by the demi-steppe from the Găvanu-Burdea Plain, on the middle course of Teleorman Valley, MIHĂILESCU 1928, 368-369.

<sup>46</sup> TEODOR/ŞTEFAN 2014, esp. fig. 3.

<sup>47</sup> TEODOR/ŞTEFAN 2014, fig. 3; and the Fig. 4 from the present paper

<sup>48</sup> A dyke stretching west-east, of disputed age and function (SCHUCHHARDT 1865, 219-220, fig. 11, advocating a ditch oriented southward; VULPE 1974, 271 and TUDOR 1978, 249, advocating a ditch facing north).

<sup>49</sup> GIURESCU 1973, 30. The most obvious difference between the demography of the hills and of the plains was in eastern Walachia, where the most extended plain – also relatively arid – was almost completely devoid of villages until the 16th century (GIURESCU 1973, 32).

of interest here, at least north of the village Troianul. To get more that an intuition is a bit complicated, but we did it. Our presumption was that at least some toponyms are older than the available maps; thus – we started to collect toponyms<sup>50</sup>, and the first public result is here, in the Fig. 4. The toponyms show clearly that the forested area was much larger than the situation caught in 1857 by the Austrian topographers. They are clustering, as well as the cartographic forests, along the rivers from the area, and less on the interfluvies. The reasons are, clearly, at least two: first – the modern settlements are agglomerated along the rivers, as expected, and the density of known toponyms is decreasing from the village centre to the border of its lands; second – the forests, of course, need water. Beyond these, the situation of our days, with clustering forests along the main rivers, could be, very well, a structural landscape very similar with the antique one, but at a completely different scale. The consequence of this sketchy reconstruction of the landscape would be an unexpected explanation: the apparently very odd decision<sup>51</sup> made by Romans to cross the river Cotmeana and to build a dyke 3.5 km east of the river, and almost parallel with it, tends now to make sense: the Romans took the good place, in the shadow of the forest, but at its eastern limits, leaving the flat and uncovered plain to the visitors...

The toponymic enquiry – now at the very beginning – has many folds to search in, beyond the forestry terminology. Also interesting for the landscape restitution is the hydronymy – in its widest sense, as all the words referring the water (wells, lakes, etc.). A word caught our attention, due to a certain frequency: 'găvan', having probably the closest translation in 'a dimple'. On the DTM map one can find that the plain east of Vedeia and Cotmeana rivers is named 'Găvanu-Burdea'<sup>52</sup>, containing the key-word 'găvan' (of obscure origin). This is a dish-like shape of the terrain, occurring on the flat plains, where the rain water is gathered, having no drainage. But the folk choices to name those natural dishes are different, as 'lac' (lake, from lat. *lacus*), 'baltă' (puddle, of uncertain origin, arguably an old Slavic 'blato', or \*balto)<sup>53</sup>, or even 'heleşteu' (from the Hungarian word 'halastó'), meaning more specific a fishing pool. 'Găvan' occurs frequently, yet not where expected, on the middle course of Teleorman River, where Găvan Plains

<sup>50</sup> We are still in the very beginning of the project, and we collected, so far, only the toponyms from the latest map – DTM (1980s), which are more than 2100, for an area about 20 km west and east of the former *limes*.

<sup>51</sup> More comments on this in TEODOR 2013, 65-66.

<sup>52</sup> In a more detailed classification (as that made by Bogdan Candrea, as a downloadable vector files of the relief units, see <http://earth.unibuc.ro/download/harta-unitati-relief-romania>), Găvan Plain is east of Teleorman River, and Burdea Plain is west of Teleorman. The relief on the both sides of the middle Teleorman Valley is the same.

<sup>53</sup> Dicţionarul etimologic român, 1958-1966.

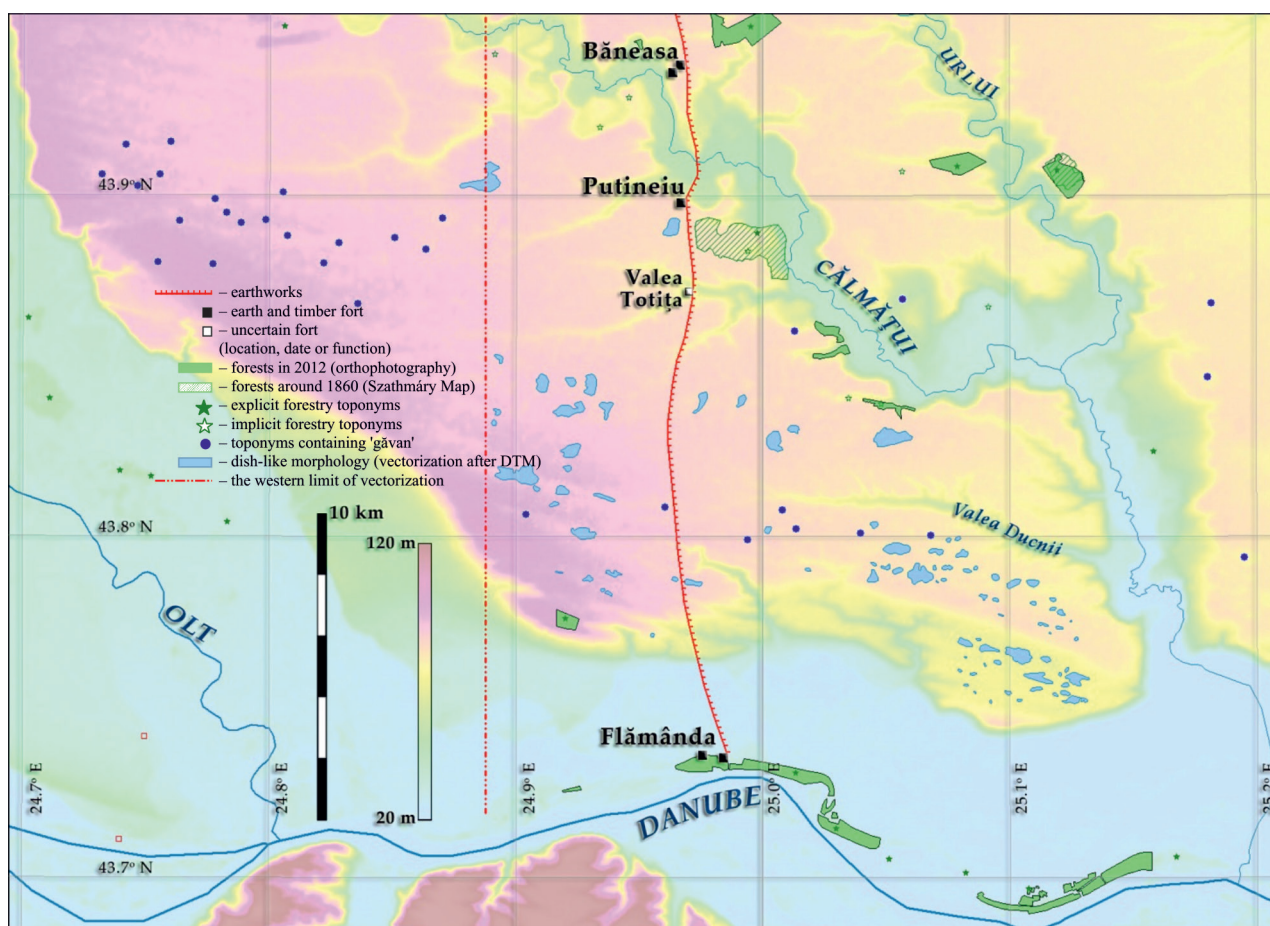


Fig. 5 Forests and dimples between Danube and Lower Călmățui River.

lays, but in the lower Basin of Călmățui River. The high rate of occurrence made us curious to see if there are, in the field, other 'dishes' than the named one; of course, there are plenty of them. The Figure 5 makes clear a fact: the flat plains between the valleys and ravines are full of depressions able to turn a half-desert in a huge marsh. This is a specific of the area well known for locals, turning the dust in dirt, as the authors of the Great Geographical Dictionary of Romania were writing in the late 19<sup>th</sup> century, about Burdea Plain<sup>54</sup>: 'when rains too much, the waters stand (on the field), but on dry weather the land is cracked'.

The altogether picture resulted from this short analysis is a plain cut by relatively deep valleys, with forests developed along the main rivers, and flat ridge areas, between the rivers, where vegetation is lower (bush-like, very likely), with many poodles turned sometimes in more or less permanent swamps (for which there is toponymic evidence, too<sup>55</sup>). This does not sound very friendly. Although we do not have an antique description of the area, we know some circumstances at the end of the Antiquity that might be quite descriptive. One of them is Novella XIII emitted by Justinian I (535) against officers guilty of insubordination, threatened to being sent north of the Danube, to defend the Empire's borders<sup>56</sup>, as an alternative to death. Nice comparison! The issue of troops sent beyond Danube, to

gain their food on barbarians' expenses, especially on winter, remained recurrent for the rest of the sixth century, a never ending nightmare of the Roman troops (and barbarians also). The military handbook written at the end of the century, *Strategicon*<sup>57</sup> was recommending winter camping north of the Danube, as a solution for shortage of victuals and for avoiding the looting of their own citizens. That this wasn't just theory was proved by several instances accounted by Theophylact Simocatta. One of them (Histories, VI, 8-10)<sup>58</sup> – referring probably to the winter 593-94 – is after the first Roman victory north of the Danube, after more than half a century, against the 'kings' Ardagastus and Musocius, in the lower basins of Ialomița, Buzău and Siret, more than 200 km east of the former *Limes Transalutanus*, but in the same tricky Romanian Plain<sup>59</sup>. The army received an imperial order to stay beyond Danube over the winter; although victorious and – theoretically at least – self trusting, the soldiers were very close to a revolt, fearing the freezing cold and the number of enemies, but they were settled down by the ability of the general Priscus. A similar order, eight years later, brought the end of the emperor Mauricius and of the Roman rule in northern Balkans; an uprising led the centurion Phocas, initiated by the troops sent north of the Danube, swept the loyal troops from their way to the capital, ending a glorious chapter of the history. The place where the revolt started is not very clear, but probably it is a sector of

<sup>54</sup> Marele Dicționar Geografic al României, vol. 2, 1899, 77. Burdea is a river immediately east of the Middle Vedeia Valley, or, simpler, east of the Roman frontier.

<sup>55</sup> TEODOR 2013, 82.

<sup>56</sup> CURTA 2001, 77.

<sup>57</sup> *Strategicon*, XI.4.19.

<sup>58</sup> Theophylact of Simocatta, *Historiae*, VI, 8-10.

<sup>59</sup> Larger comments about the landscape description, following the historical account, in the final section of TEODOR 2014, before conclusions.

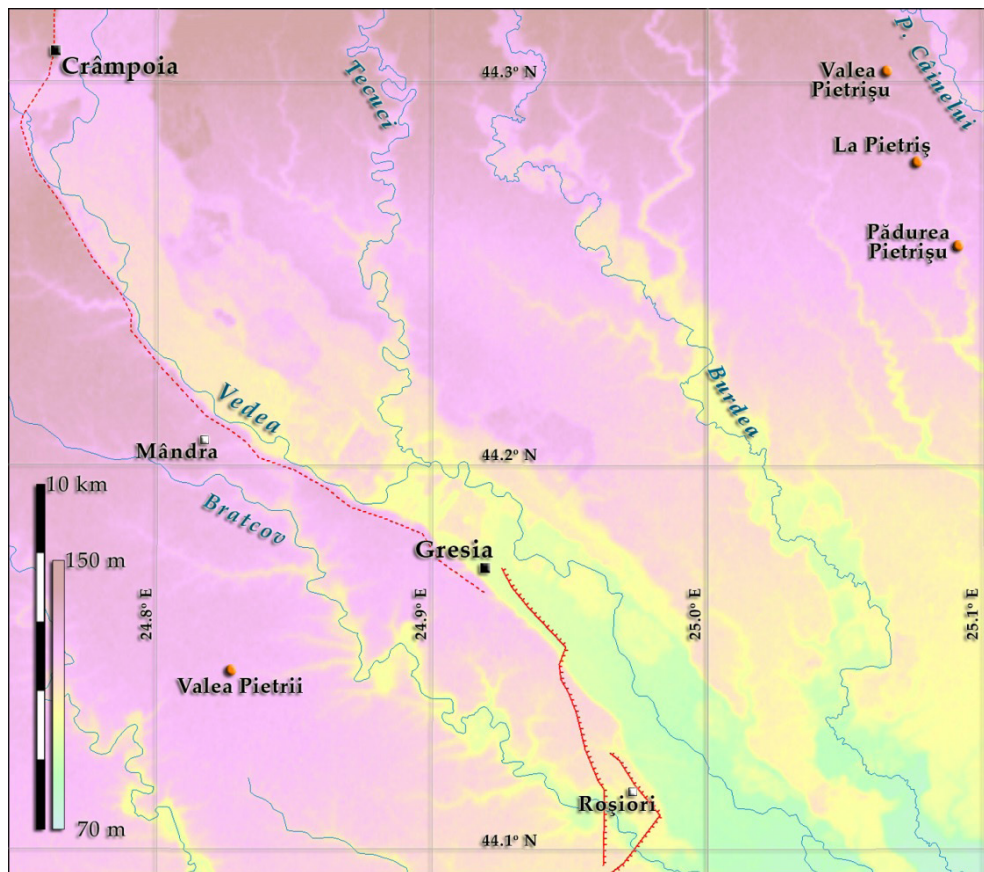


Fig. 6. Occurrence of toponyms based on 'piatra' (stone) and derivatives. Fragment from the middle basin of Vedeia.

the frontier in front of *Palatiolum*, near *Oescus*, where the mouth of Olt River is located<sup>60</sup>; if so – in the very location of the former *Limes Transalutanus*, the 'friendly frontier'.

There are also other hints for the changing landscape in the area of interest for our project. Small details, as you will see. One of them is the occurrence of the word 'piatră' (stone), in an area completely devoid of stone. Figure 6 shows the most southern toponyms related to 'piatră' (stone) and its derivatives. The fact is intriguing because, looking at the geological map of the area<sup>61</sup>, all there is to see, for one hundred kilometres around, are deposits of clay (50 m thick or more!) on the plain, and alluvionary sands on the valleys. A stone in this plain is exceptional, and this is exactly why it had been recorded in the toponymy. The toponyms showed in the Fig. 6 fall in two different cases: the first is Valea Pietrei (Stone's Valley), on a tributary of Bratcov Valley, which is a singular form and might suggest a single – amazing, like Kaaba... – stone. It could have any origin, including meteoritic; it is unlikely that it is revealing a reliable source of stone, at less than 10 km behind the fort from Gresia, not known and not used by the Romans. The situation should stay anyway in the attention of our geologists.

A different situation is presented in the north-eastern corner of Fig. 6, where three toponyms stands along the same – also secondary and small – valley, all containing the same word, 'pietriș', meaning gravel. Such a material is equally abnormal, or at least odd, in the middle of that plain; being on a small and relatively short valley, it is odder. The

<sup>60</sup> TEODOR 2003, 29.

<sup>61</sup> Harta Geologică 1:200,000, Institutul Geologic, București 1968, sheets 34, 35, 42, 43, 48, 49.

gravel could be a remanence of geological ages and a proof of a former strong stream – as Argeș, coming from the mountains – because rivers from the area changed a lot their courses<sup>62</sup>.

The occurrence of toponyms related to stones is also present northward, in a perfectly identical geological environment: 'Valea de la Piatră' (The Valley from the Stone), located only 5 km west of the fort from Izbășești (another timber and earth fort), being again a singular form and in the close rear of the *limes*. But the most frequent occurrences of stone-related names are located near the valley of Pârâul Câinelui (Dog's Creek) and along the Teleorman Valley: La Piatra Oancea (18 km east of the forts from Urlueni); a pair of names, Valea Pietroasa (Rocky Valley) and Valea Pietroasa Mică (The Small Rocky Valley), located 7 km east-northeast of the forts from Săpata, near Teleorman River, but on the route of a suspected

variant of road between Săpata Argeș River, bypassing Albota fort.

Of course, the toponymic inquiry cannot grant anything by itself; it can yet give clues and themes of research, and can suggest hot-areas for the landscaper investigator. The isolated stone could be natural accidents, meteoritic activity, but also – especially in areas located in the rear of the *limes* – possible sites of archaeological interest. On the other part, looking at the 'meridian' made by the Valea Pietroasa (Mică), La Piatra Oancea and three times Pietrișul, it could suggest a completely different kind of rivers that those we know today, several times larger and faster. If so, the vegetation associated with this new picture would be several times stronger, isn't that so<sup>63</sup>? 'The Mad Forest' (Teleorman) would deserve its name.

## FINAL REMARKS

We tried to advertise here a new research project and its profile, as we see it at its beginnings. What will exactly come up – we shall see together after a moderate length of time. We acknowledged that the way to the hell is paved with good intentions and great plans. Of course, more or less, the success of the project stands in our hands; not entirely, because the financial fluxes in Romanian research are not as predictable as one could wish.

The results of the project will became public through our web-site (expected in early 2015, search for [www.limes-](http://www.limes-)

<sup>62</sup> POSEA 2005, 292-298.

<sup>63</sup> About the relationship between the rains and the forests POVARĂ 2002, 120-122.

transalutatus.ro), but maybe in a more convincing manner in November 2015, when we intend to organize a national symposium dedicated to limes research in Romania<sup>64</sup>, in which a full day will be reserved for the results of this project. That will be followed, in May 2016, by an international symposium with a shifted theme, from *limes* in general to the technological challenges in the archaeological diagnostic of linear objectives – being frontiers, motorways, gas-pipes or other elongated targets<sup>65</sup>. Having in mind that the available places at the table will be limited by the financial support, an early notice of intention will be welcomed in both cases, following the rule ‘first come – first served’.

## ACKNOWLEDGEMENTS

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<sup>64</sup> Thus trying to develop the interest for the subject in southern Romania, where a systematic research of the Roman *limitis* is newer, compared to Transylvania. The first symposium in the line was held in Brăila, in 2013, the second was held September 2014 in Cumpăna (organised by the County Museum Argeș from Pitești).

<sup>65</sup> This one has already a name: ‘Old Frontiers, New Technologies. An evaluation of costs and opportunities in field archaeology’.

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