COUNT DRACULA'S IMPERIAL PATHWAY

GEO-REFERENCING THE VIA-MARIA-THERESIA ON THE JOSEPHINIAN MILITARY SURVEY

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About 400 enthusiast athletes participated in the marathon, biking and hiking event along the historical Via Maria Theresesia in the Bârgău and Călimani Mountains on 16 August 2014, organised by *Asociația Tăşuleasa Social*. Yet, just a few of them may have been aware that the road they were running, driving or walking on must have – in whole or at least in parts – been identical with the road Count Dracula and Jonathan Harker drove from the Borgo Pass to Castle Dracula. This essay results from my exchange of information with Ana Szekely, Executive Director of *Tăşuleasa Social*, and my personal participation in their event, as well as from my previous research of old military maps covering this region and my discovery of the site Bram Stoker had in mind for his fictitious Castle Dracula.

I. CONTEXT FOR THIS RESEARCH PROJECT

1. Historical context: the Austrian Military Surveys

The Borgo Pass, today known as Tihuța Pass, connects Bistrița-Năsăud County in Transylvania with the historical region of Bukovina. After a defeat in the Prusso-Austrian War (Seven Years' War, 1756-1763), due to a lack of orientation in the terrain, the Austrian Empress Via Maria Theresia decided to have detailed military maps made of her empire and the surrounding territories.[1] The project, using a scale of 1: 28,800, lasted from 1763 until 1787 and was finished by Emperor Joseph II, the son of Maria Theresia; hence the name "Josephinische Landaufnahme" or "Josephinian Survey," also named First Military Survey. This first effort was followed by the Second Military Survey, initiated by Emperor Franz II after the establishment of Austria as a "Kaiserstaat" in 1804. This second survey lasted from 1806-1869 and was based on the method of triangulation (using triangle patches with a basis of known length and two measured angles). From 1869 until 1887, during the Dual Monarchy, a Third Survey took place, with a scale of 1: 25,000, resulting in a "Generalkarte" in scale 1:75:000. A Fourth Survey was started in 1896, but was stopped by Word War I. The maps were only available for military use and kept secret to the public.

Especially after Austria annexed Bukovina in 1775,[2] the Borgo route became of eminent military importance and Joseph II had the pass road improved. A secondary path was established to provide the frontier posts at the border with Moldavia with food and ammunition. This pathway, more than 40 km, long crossed the Borgo (Bârgău) and Kelemen (Călimani) Mountains and was about four meters broad, so that horse carriages could pass. This road became known as the Via Maria Theresia, although the empress herself probably was not involved in its creation.

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[1] For this and the following information, I refer to the article "Georeferencing and Quality Assessment of Josephine Survey Maps for the Mountainous Region in the Triglav National Park" by T. Podobnikar, in *Acta Geod. Geoph. Hung*., Vol. 44(1), pp. 49–66 (2009) / DOI: 10.1556/AGeod.44.2009.1.6. This article not only deals with the history of the Austrian Military Surveys, but also describes the problem of geo-referencing the Josephinian maps, and provides scientific sources.

[2] The Ottoman Empire "presented" it to Austria, hoping to thwart Russian expansion – personal conversation with Professor Constantin Rezachevici in Bucharest, 21 August 2014.

2. Literary context: the route of Count Dracula and Jonathan Harker to Mount Izvorul

In the *Dracula* novel, the young lawyer Jonathan Harker travels by post carriage from Bistrița (Bistritz) in the direction of Bukovina. From *Baedekers* 1896 travel guide for Austria, we know that this trip over 126 km took 17 hours; average travel speed thus was 7½ km/h. We know that the post carriage started at 2 p.m. (Stoker's handwritten notes for the novel) or 3 p.m. (printed version of *Dracula*, 1897) and arrived at the meeting point, where Harker was to be picked up by the Count's *calèche*, at 9 p.m. From this we can deduct that the agreed meeting point was either somewhere between Tihuța and Piatra Fântânele, or shortly after Piatra Fântânele. After circling around in the Pass until midnight, the howling of wolves is heard and the *calèche*, driving toward the far end of the Pass (that is, the north-east end), takes a sharp turn to the right (to the south-east) and with high speed follows a rough road through the mountains, towards Castle Dracula. From the description of Harker's arrival and first meal, we can conclude that the trip took approximately 3½-4¼ hours, meaning that the Count and his guest must have left the Bârgău Mountains and have arrived at the volcanic caldera of the Călimani Mountains. This ridge of a collapsed volcano, formed 3-5 million years ago, has a diameter of 10 km and thus is Europe's largest extinct volcano.

The final chapters of *Dracula* describe how Professor van Helsing and Mina follow the same primitive road and make their night camp shortly before the Castle. After van Helsing has eliminated the three Vampire Sisters, he and Mina walk about one mile to the east; from there, Mina can look over to the Bistrița River, winding its way through the Moldavian plains. In order to have an unobstructed view, she must be standing on the eastern part of the ridge, marked by the peaks of the Cserbükk, the Izvorul Călimanului and the Rețiția (Rățiția, Retitio).

I studied this mountain region by help of maps from the Austrian military surveys in Autum 2011 and was able to identify several possible pathways between the Borgo Pass and the Călimani caldera; the described primitive road must start with the route from Piatra Fântânele, near today's *Hotel Castel Dracula* in the direction of Dornișoara, a little village straddling the Dorna River.

In January 2012, I discovered a cryptic remark in Bram Stoker's notes for *Dracula*, which proves that the Irish novelist had picked Mount Izvorul as the exact location of his fictitious Castle Dracula and the destination of the Gypsies, transporting the Count in his box from the Bistrița River to his home, crossing the Moldavian-Transylvanian border through the Tulghe Pass. For a detailed description, see my book *The Ultimate Dracula* (Munich: Moonlake Editions, 2012).

3. Ecological context: *Tăşuleasa Social*'s fight against illegal deforestation

In Spring 2014, the track of the Via Maria Theresia was restored by a local initiative, *Asociația Tăşuleasa Social* (www.tasuleasasocial.ro), having its premises in the Borgo Pass, just 4 km removed from *Hotel Castel Dracula*. This interest in the former road is not merely historical; by attracting more athletes and eco-tourists to the area, these volunteers hope to stop the illegal deforestation of their county. Every year, 5,000 Million Euro worth of timber is stolen from the Romanian forests and because of their isolated situation, the Bârgău and Călimani Mountains are especially vulnerable. Since the year 2000, *Tăşuleasa Social* has planted new trees with the help of young volunteers. The regular staff of six social workers is aided by students, mostly from Germany, who leave their universities for a couple of months to live in *Tăşuleasa*'s simple campus; around 25 of such helpers stay there over summer. Since spring 2014, *Tăşuleasa Social*, with the help of 150 volunteers, has cleaned up the track

of the Via Maria Theresia and put up new signs. The completion of this task was successfully celebrated by the mentioned marathon, mountain biking and hiking event on 16 August 2014.

4. Dracula by Bram Stoker: The Travel Guide

After discovering the true location of Castle Dracula from military maps and Stoker's own notes, I was curious to travel there and take photos. My first trip was directly after the Bram Stoker Centenary Conference, London, in April 2012. Together with Lakshmi Sinclair, a Florida-based journalist from India, I travelled to the Neagra Valley, which leads from the north into the horse-shoe shaped Călimani caldera ridge. We were faced with heavy rain, but the next day after our arrival in Gura Haitii, I was able to follow the Neagra to its origin and come within a few hundred meters of the snow-blocked top of the Izvorul Călimanului. Six more trips to Romania followed, during which I explored and photographed all locations linked to the *Dracula* novel, planning to write a specialised Travel Guide on the issue. In Autumn 2013, I was joined by Dacre Stoker, the novelist's great-grandnephew, whom I had met at the 2012 conference. Together, we traveled to the Borgo Pass, Sighişoara, Bran Castle, Târgovişte and Bucharest, and met with Daniela Diaconescu, co-founder and Vice President of *The Transylvanian Society of Dracula*. It was Daniela who saw a TV feature about *Tăşuleasa*'s "Via Maria Theresia Marathon" and informed me about it. Together with Daniela, I participated in the event and walked a part of the restored route.

II. THE VIA MARIA THERESIA ON THE JOSEPHINIAN MAPS

Prior to our trip, I contacted Ana Szekely, spokeswoman of the local initiators, and exchanged information with her. According to Ana, the Habsburg trail must have been marked on the Josephinian maps already, but because these maps were kept in a state archive in Vienna, she had no access to them. As I had already obtained high-resolution scans of the map drawings and in 2011 had made an attempt to geo-reference them with modern maps,[3] I took up these efforts again after returning to Munich, by the end of August 2014.

The Josephinian maps were produced in two versions: an original and a copy, showing the map drawing within a black ink border. For the Bistrița-Năsăud region, the scans of the copies have an average size of 8,500 x 5,500 pixels, translating to 72 x 48 cm @ 300 dpi. After cropping the extra margin, the drawings are approximately 63 x 42 cm large.[4]

As a geographical reference, I used the following map sets:

1. A digital relief map of the area between Bistritz and Poiana Stampi, created from high-resolution screenshots from www.wandermap.net (Search for keyword "Retitis").
2. Digital Google satellite maps of the Bârgău and Călimani Mountains created from screenshots from www.wandermap.net, with extra mark-ups I created during my research.
3. A hiking map of the Bârgău and Călimani Mountains, created by Professor Traian Naum (digital scan).

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[3] See *The Ultimate Dracula*, 2012, pp. 28-29. To geo-reference means to compare an unknown set op maps with a standardized set op maps by trying to produce a geometrical match, so that points, lines and areas of the tested maps correspond to their counterparts on the standardized maps. It is used to make ancient maps "readable" and evaluate or verify the information contained in them.

[4] Because I did not make these scans myself, I could not check the precise size of the paper drawings, but these measures correspond to those given by Podobnikar; for the geo-referencing project, the actual size of the drawings are irrelevant, as long as their proportions (1½ : 1) are identical with those of the digital scans.

4. Black & white maps of the Bistrița-Năsăud region (high-resolution scans of zones 16 and 17, columns XXXII and XXXII, stitched, of the K & K *Spezialkarte* of 1876).
5. Black & white map, year 1907, Section Maros-Borgo, Zone 17, column XXII, scale 1:75,000, scan @ 400 dpi, and Zone 18 Column XXXII, scan @ 600 dpi.
6. Colored maps of the Bistrița-Năsăud region, year 1907 (300 dpi scans of zones 42-47 ("Besterce") and 43-47 ("Pojana Stampi"), the first number indicating Longitude east of the Ferro-Meridian, the second number latitude north of the Equator).

All these maps could be easily georeferenced to each other, by creating transparent layers in a PhotoShop file (canvas size: 38,000 x 30,000 pixels, representing an area between 24°20' and 25°20' East Longitude[5] (Also Balásfalva in Transylvania and Vatra Dornei in Bukovina) and between 47°30' and 46°55' North Latitude (Someş River and Mureş River), with a size of approximately 76 km wide and 67 km high.

From the Josephinian Survey, sheets number 45-56, 55-58, 66-68 and 77-79 and 89-90 were used. A double sheet (sheet 68), was split, in order to reduce the amount of transformation for each part.

Already in 2011, I had noticed that the Josephinian maps cannot simply be matched to modern maps; at that time, I developed a pattern of stitched trapezoids and simply added the names of the most important villages, mountain tops and routes. This rough model, though visually elegant, still contained many matching errors.[6]

For comparing the Via Maria Theresia route, as restored by the *Tăşuleasa* workers, to the mountain trails indicated in dark red on the Josephinian maps, a more sophisticated method was needed.

It is not known which projection method was used for the Josephinian maps, and it is doubted if any uniform geometrical procedure was applied as all; rather, the relative distances and landshape forms were estimated *à vue* (by sight), their reliability and graphic representation depending on the skills of the individual surveyors. Like in the case of the Triglav National Park in Slovenia, described by Podobnikar, the only practical method of geo-referencing therefore is to try and match the maps "point by point," using markers which can be identified with certainty: village centers, mountain tops, major valley and rivers.

Transforming map sheets for the sake of stitching is called "rubbersheeting," as it is similar to gluing rubber sheets together while deforming them. The main challenge was not to fit the Josephinian map sheets side to side, because they match very well at the edges; the problem was to match them to modern maps at the same time. Instead of using a specialised software,[7] I decided to do this "by hand," using PhotoShop's transformation, warping and liquifying tools.[8]

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[5] In modern maps, the Longitude east of Greenwich is indicated, instead of Ferro (Hierro). Ferro coordinates can be converted to Greenwich coordinates by deducting 17°40' from the Ferro coordinate's Longitude. In Google Maps, decimal coordinates are given; e.g. 47.33° Latitude coresponds to 47° 20' Latitude.

[6] See again *The Ultimate Dracula*, 2012, essay *The Dracula Maps*, pp. 28-29 (Map Nr. 5).

[7] Such as ESRI's ArcMap 9.2+, Autodesk's Raster Design or Blue Marble Geographics' Global Mapper, which can all work with rasterized data – although I am not sure whether these software applications can deal with a 1 Gigapixel map with multiple layers.

[8] This choice is based on my professional experience with using and teaching such digital transformation techniques in my photo studio in order to create ultra-high resolution seamless composings (up to 1 Gigapixel and more) from partial photo captures.

For my geo-referencing, I choose three priorities, in the following order:

1. Create seamless stitches, so that each map sheet has uninterrupted, matching transitions to all surrounding maps.
2. Preserving "logical," geometrical forms and curves for each map, using mostly the Ctrl+T transformation (scaling, rotation, distorting and warping) tools. By using the liquifying and puppet-warp tools, it would be possible to improve the matching, but this way, the significance of my analysis with regard to the accuracy of the Josephinian maps would be reduced.
3. Matching all reference points which can be identified with certainty to the corresponding points indicated on modern maps.

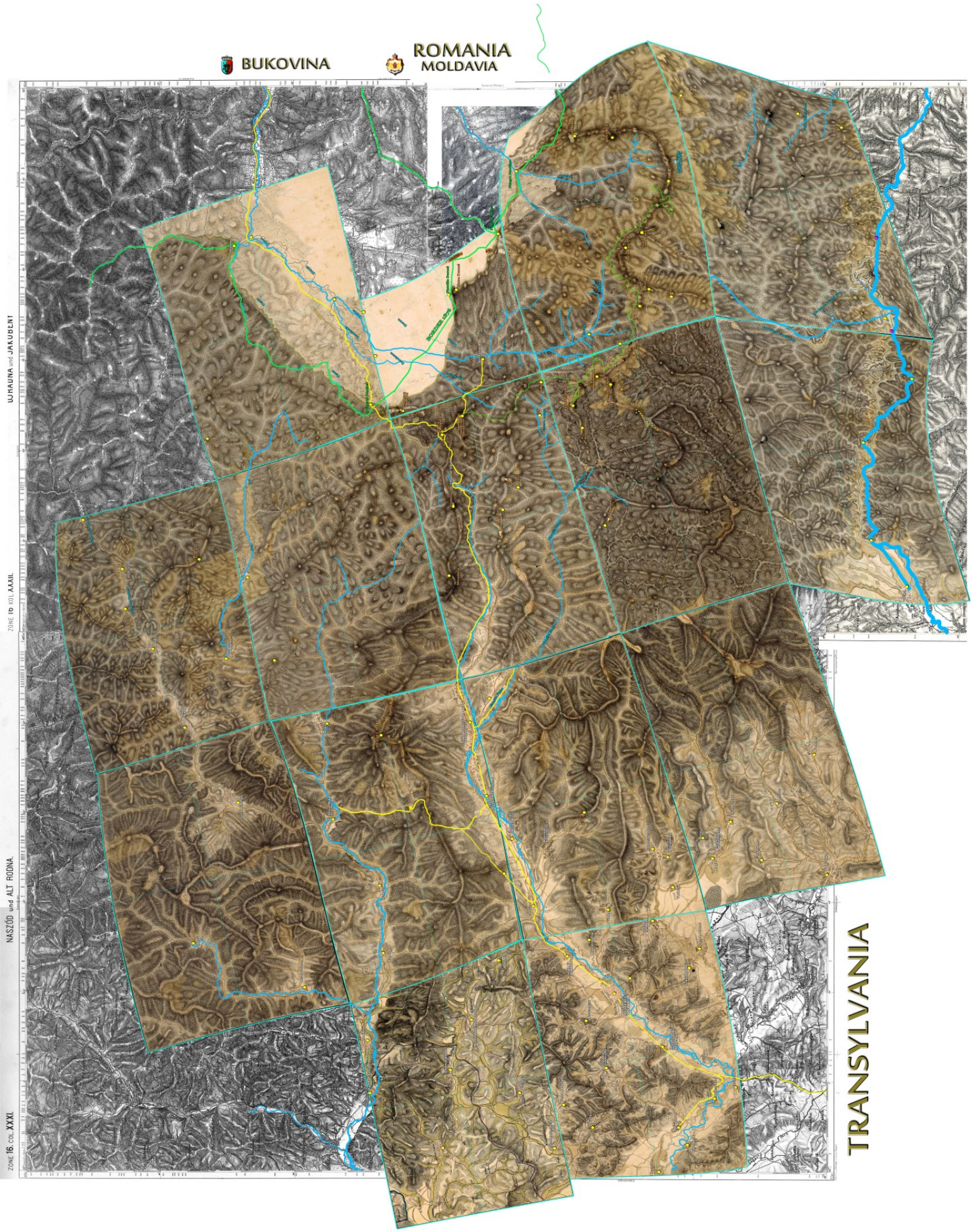
Major problems in identifying such points were:

1. In the discussed area, names of towns, villages, mountains and rivers are sometimes given in Hungarian, sometimes in High German, sometimes in Saxon dialect, and sometimes in Romanian; Latin expressions are also used (like "vel" for "or"). For each location, synonymous names had to be checked on lists and in individual web documents.
2. Many of the locations on the Josephinian maps are not indicated by names at all, and most other names are not used on later maps any more, rendering them useless as reference points, unless they can be identified by other characteristics.
3. Villages and major mountains and valleys have not moved, but villages have expanded into towns, river beds have been canalized, roads have been straightened, forests have been cut down over the past 250 years, so that the modern landscapes are not identical to the Josephinian ones.
4. Due to the "intuitive," non-scientific methods of Josephinian surveying, sometimes mountain tops have been mislocated or the representation of whole mountain ranges has been deformed, resulting in grave problems in geo-referencing. Map parts had to be transformated disproportionally; in some instances, I decided *not* to match two points of the same name, such as the peaks of the Maieris and Arilor, which seem dislocated on the Josephinian map; instead, I used arrows to indicate the link.

This process of geo-referencing therefore was as intuitive as the method of creating the Josephinian maps; for each sheet, multiple steps of warping were necessary in order to reach an acceptable match – which means that the used transformations cannot be expressed in a simple mathematical formula.

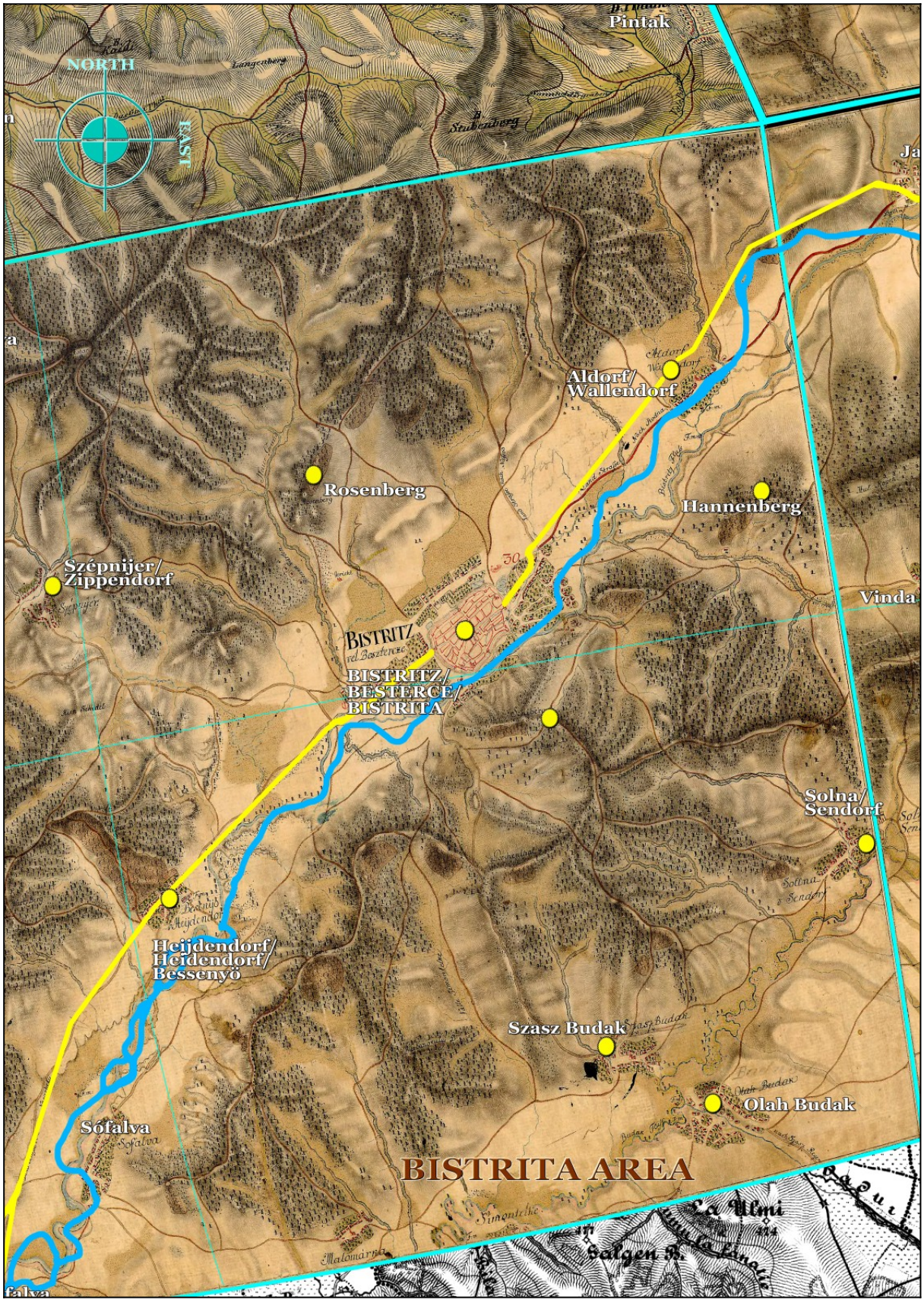
It took three days of warping – identifying and testing reference points during the process – to arrive at a plausible result. By then, most Josephinian map sheets had lost their crisp detail in my image file, due to multiple warping and the subsequent blurring. All such blurred map sheets were replaced by fresh layers, while I tried to reach an identical result with just one transformation step. A few corrections were needed all the same, as some new reference points were discovered, as well as matching errors in the first design.

By adding more sheets to my core area, the total amount of work increased, but errors could be reduced, as the extra sheets provided additional information. To all sheets, I added a horizontal and vertical hairline, dividing each sheet in four quadrants, thus visualizing the amount of disproportional transformation for each quadrant. Since sheet 56 (with the village of Földra/Feldru in its upper-left quadrant) has a quadratic pencil grid, the transformation of each part of this sheet can be reconstructed in more detail.

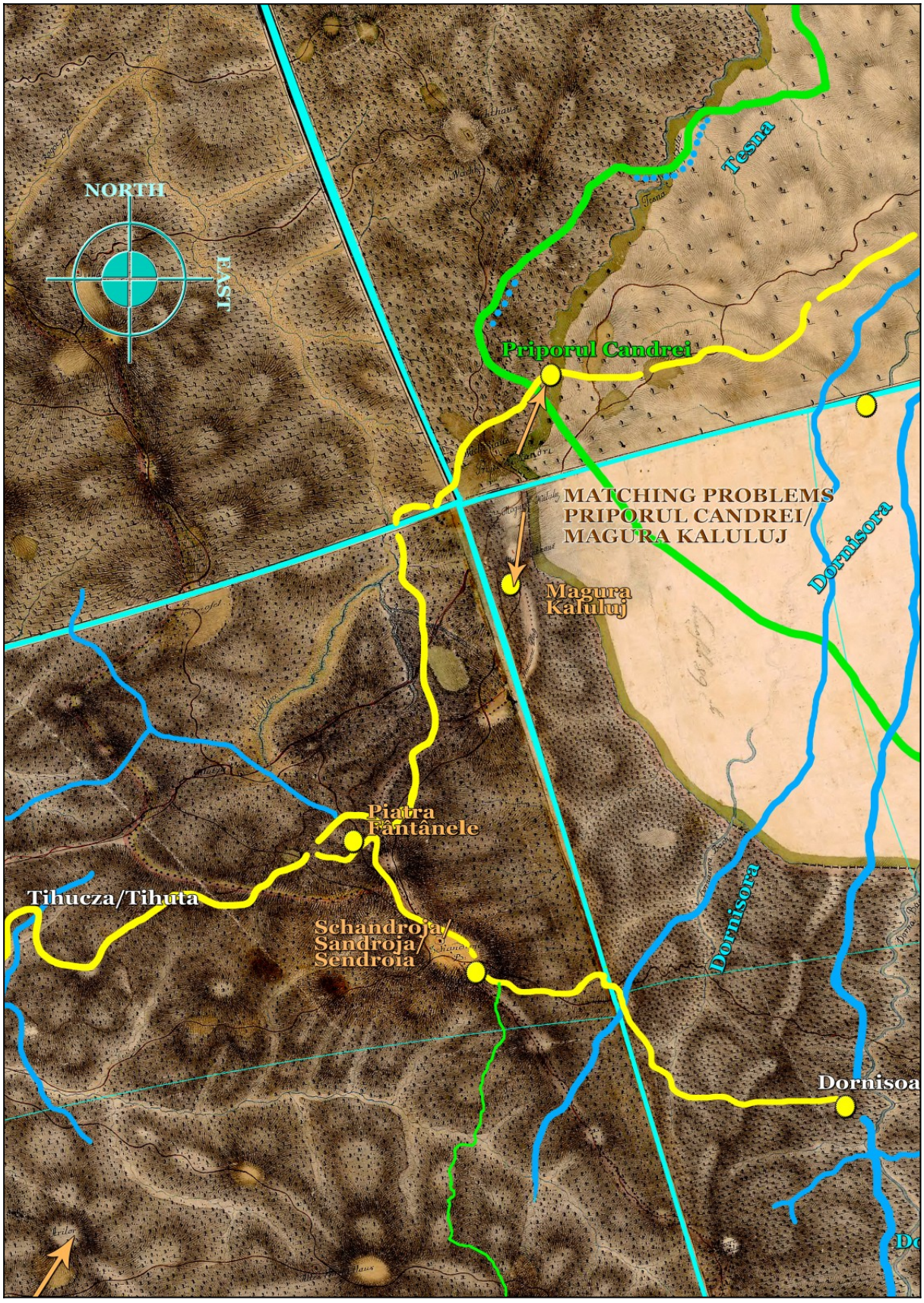


Geo-referencing the Josephinian Survey Maps of the Borgo Pass/Tihuta Pass Region -- H. de Roos -- Sept. 2014

The sheets in the south-west of my working field, with Bistritz and many villages as clear reference points, were the most easy to handle.



Sheets 58 and 68 show Magura Kaluluj/Măgura Calului and Priporul Candrei next to each other; in fact, they are more than 3 km apart, which led to serious matching problems.



For sheet 78, it was hard to find any clear points at all, except for the peaks of the Delbidan, Struniorul and the Bistriciorul in the upper-right corner; the relief patterns on this sheet did not seem to match the patterns of the modern maps.

The Mureş River in the south, of which I hoped it would offer a clear reference, proved to be a major problem, and it was only by help of the villages (Deda, Palota, Meszterhazy) that I found a way to roughly match the course of the river itself; these sheets are strongly deformed.

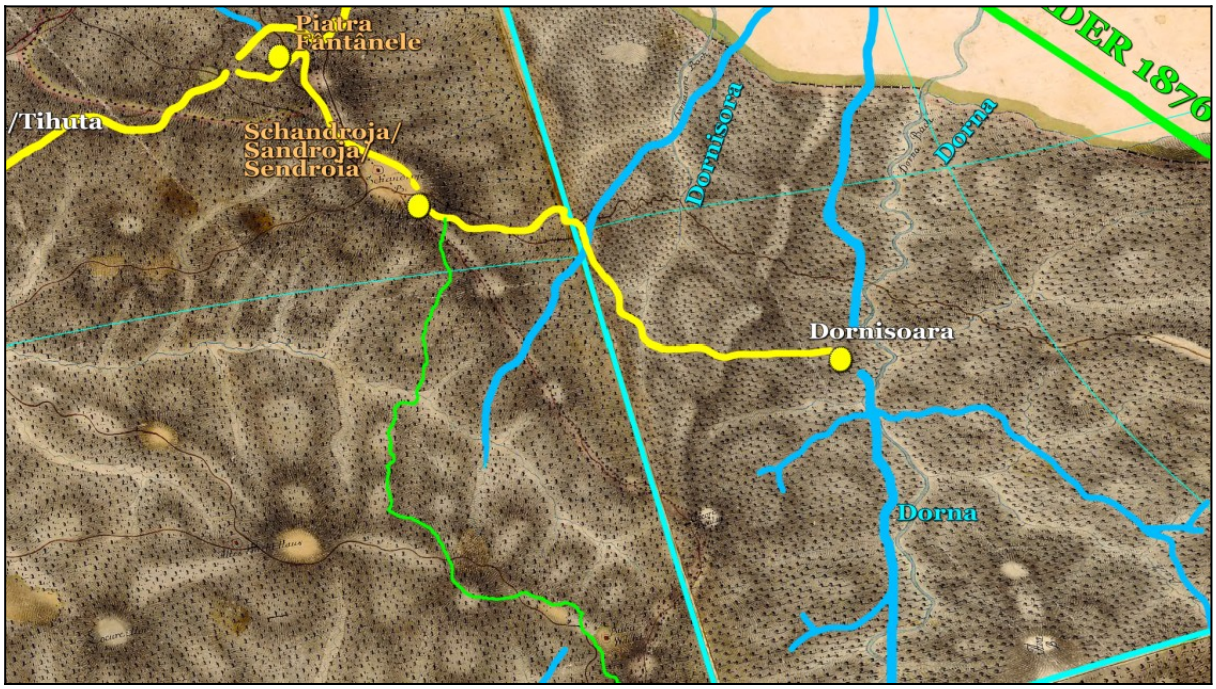
The main track of the Borgo Pass also was of limited use. As I discovered in 2011 already, in the 18th century, the main trails seem to lead *north* of the Zimbroaia, while the DN 17 (this modern route is already shown in the 1876 and 1907 maps) leads *south* of that mountain.

The eastern border did not match; it has to be checked which border changes were made.

Only after geo-referencing the obvious reference points of the Josephinian Maps can we say more about the representation of the Via Maria Theresia. It is clear that a route fromTihuța/Piatra Fântânele to the Călimani volcanic ridge already existed, indicated by dark red lines, but it is also evident that is does not precisely match the track recently restored by *Tăşuleasa Social,* which is already accurately depicted on the black-and-white map from the year 1907, Section Maros-Borgo, Zone 17, column XXII. No matter how much we warp the ancient map sheets, the trails will not exactly match.[9] There are two possibilities: either the Josephinian surveyors intended to represent the very same route, but made errors in surveying and drawing it, or they – more or less accurately – visualised an alternative or older version of this route.

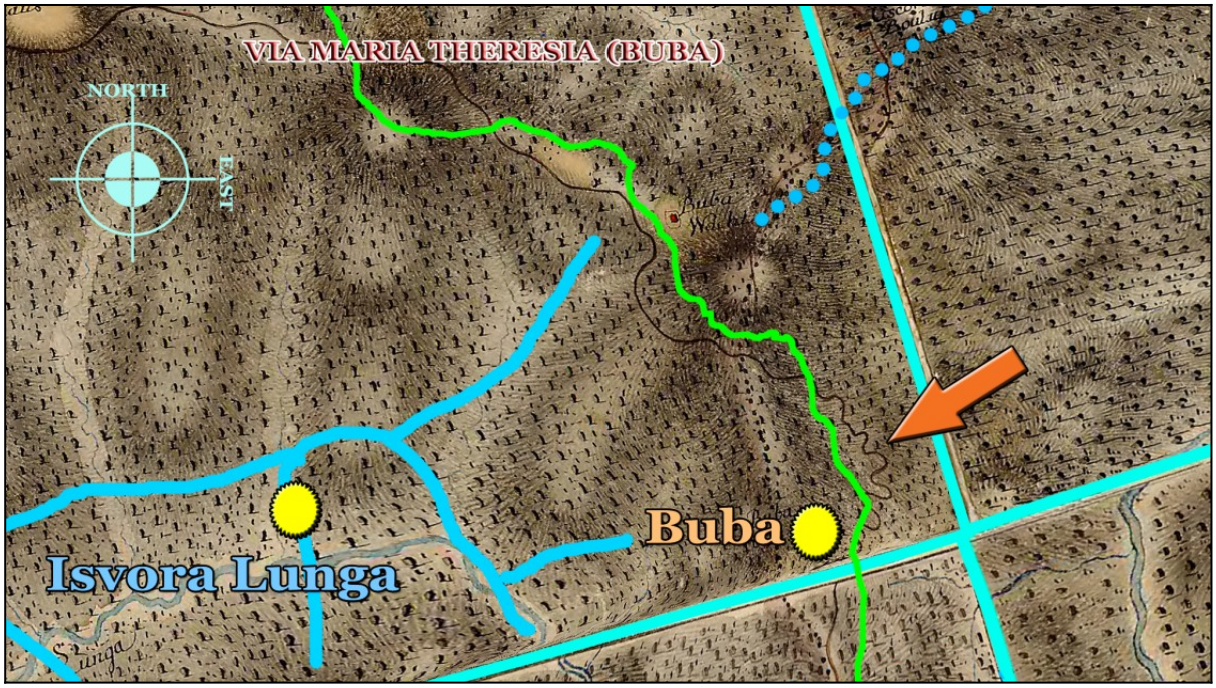
After comparing the indicated trails in detail, I must conclude that there are differences which, in my view, cannot be explained from surveying errors:

- The route from the Schandroja/Sandroja/Sendroaia (now the start of the restored Via Maria Theresia, marked bright green, at the Forester's Office, Ocolul Silvic) direction south-south-west is not indicated on the Josephinian maps yet.

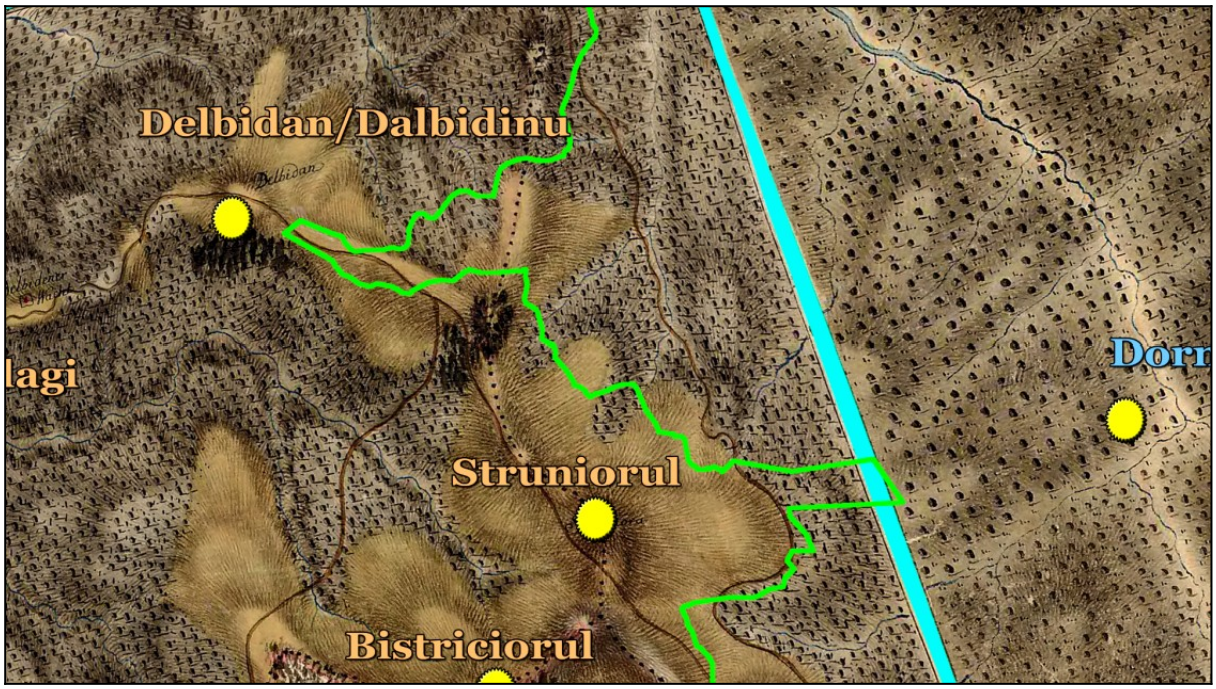


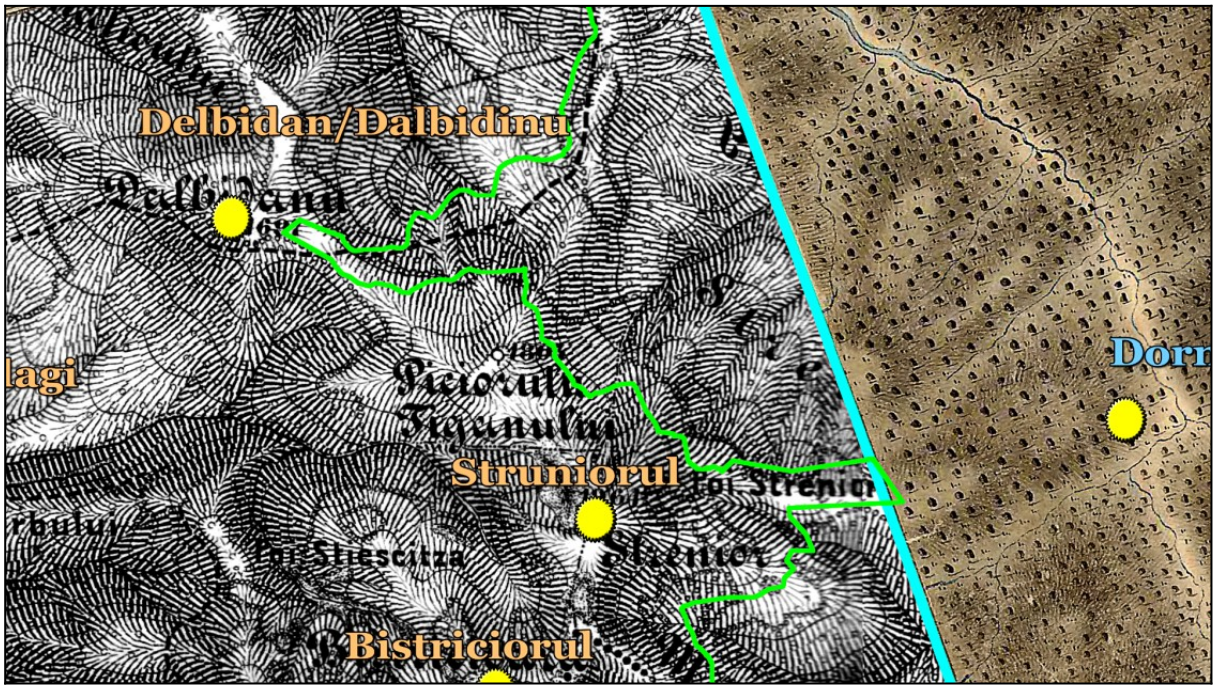
[9] Of course, we could "force" them to match by liquifying or using the puppet-warp tool, but as already stated, this would also distort our evaluation of the quality of the Josephinian maps.

- On the Josephinian maps, the route north-east of the Buba shows many narrow curves, while on the modern maps, it is more or less straight. This must have had a basis in real curves being present in the 18th century; a trained surveyor would not invent such curves from scratch. To a lesser degree, the same is valid for the many curves east of the Pietrosul and Negoiul Unguresc indicated on the Josephinian maps, but not on the modern maps.



- On modern maps, the route connecting the Delbidan and the Struniorul passes east of the Struniorul and avoids the peaks; on the Josephinian maps, a route from mountain top to mountain top is indicated, passing just west of the Struniorul peak.

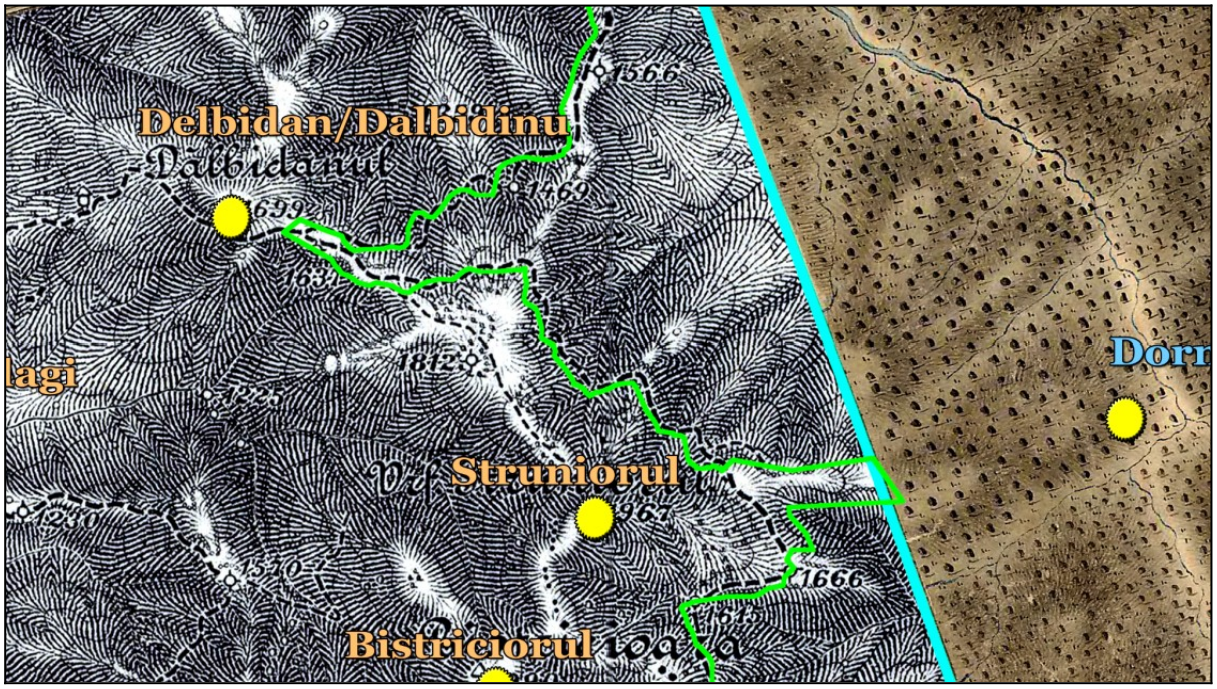




K & K *Spezialkarte*, 1876: The indicated pathway avoids the Picioruli Tiganului and the peak of the Strenior/Struniorul.

CONCLUSION: Since the Via Maria Theresia as we know it today most resembles the trail shown on the 1907 map, the 1876 *Spezialkarte* displaying an intermediary result, it seems logical that the road was gradually improved and straightened over the course of more than a century, until it started to be forgotten after World War I, when Transylvania and Moldavia were united and the eastern border of Transylvania did not have to be guarded any more. After World War II, Romania became a member of the Warsaw Pact, so that there was no reason to build or restore defence lines in the east.

Hans Corneel de Roos
Munich, 5 September 2014



Military Survey map, year 1907: the intermittent black line is almost identical with the now restored Via Maria Theresia (green), but the old pathway connecting the mountain peaks is still indicated as a thinner intermittent line and as black dots respectively.


VIA MARIA THERESIA (WEST)
Piatra Fântânele
Schandroja/ Sandroja/ Sendroia
Dornisora
Dorna
Dornisoara
NORTH
EAST
Dorna
Izvora Lunga
Buba
Delbidan/Dalbidinu
Pojana Blagi
Dorna
Struniorul
Bistriciorul
Tihu


VIA MARIA THERESIA (EAST)
Pietrille Dornei
Piatra Dornei
NORTH
EAST
Pietrille Rossa
Neagra Junction
Haita
Neagra
Cserbükk
Dorna
IZVORUL
PIETROSUL
Negoiul Unguresc
Ruscii
Tihu
Retitis
Iesera Teich/
Lacul Iesera