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SELECTED EXAMPLES OF POTENTIAL EARLY CARTOGRAPHIC DATA SOURCES FOR THE CARPATHIAN BASIN

*Exemplos Selecionados de Potenciais Fontes Antigas de Dados Cartográficos
para a Bacia dos Cárpatos*

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ABSTRACT

In our present study, we would like to draw attention to some early graphic data sources that could provide thematic information for GIS applications focusing on the Carpathian Basin. There is one map in particular that stands out from the works listed in this study. The map *Tabula Hungariae* by Script Lázár, listed in the UNESCO Memory of the World Registry, is considered to mark the beginning of Hungarian geography. Other early maps were also undeservedly neglected in recent thematic applications. It is our hope that future geo-graphic studies will start with Lázár's map and that historical maps will become a more significant part of GIS applications.

Keywords: History of Cartography, GIS, Thematic Data Source.

RESUMO

No presente estudo tem-se a intenção de se investigar fontes de dados gráficas antigas, as quais podem prover informações temáticas para bases de dados geográficas relacionadas à Bacia dos Cárpatos. Existe um mapa em particular que se destaca nas obras analisadas neste trabalho. O mapa "*Tabula Hungariae*" de Script Lázár, listado no programa "Memória do Mundo" desenvolvido pela UNESCO, o qual é considerado marco inicial da geografia húngara. Outros mapas antigos também foram negligenciados em aplicações temáticas recentes. Espera-se que estudos geográficos feitos no futuro façam uso de mapas históricos (neste caso particular, o mapa de Lázár), tornan-

do-os parte significante nos estudos geográficos desenvolvidos em plataformas computacionais.

Palavras Chave: História da Cartografia, SIG, Fonte de Dados Temáticos.

1. INTRODUCTION

Our experience shows that even in cases where historical maps were used in GIS applications, users only looked back until the military maps of the 18th century. However, in case of the Carpathian Basin, older maps stored in museums could provide important information for studies about nature or society, since the maps hiding in museums could provide hydrographical or settlement-geographical thematic data.

Monitoring prefers the use of the longest time series possible. Unfortunately, the further we go back in time, the positional and thematic accuracy of the data sources get weaker. It is obvious that maps without actual projections are difficult to include in precise GIS systems, but their thematic content still provides information that can be related to locations in a non-geometric way.

In the following we review nine historical maps of the Carpathian Basin. Through them, we follow the development of cartography, which is not always continuous, and we highlight the thematic information that can be extracted from them for long-term GIS analysis.

2. EARLIEST CARTOGRAPHICAL DATA SOURCES FOR THE CARPATHIAN BASIN

Available data sources for the study area date back to antiquity. The earliest presentations of the Carpathian Basin occur in the maps of the eight-volume geographic work of Claudius Ptolemy (AD 87-150).

The Tabula Peutingeriana (a 4th century map named after its first owner) presents the road network of the Roman Empire. The 12th century copy – almost seven meters long and a little over thirty centimeters wide – presents the main roads and settlements of Transylvania and the settlements along the Danube, the Drava and the Sava.

The Hungarians capturing the Carpathian Basin are considered to be Huns by the 10th century Cottonian Map (*hunorum gens*).

The map found in the 13th century monastery in Ebstorf provides the first example

of the area being named Hungary – *Ungaria* (*Pannonia inferior quae nunc Ungaria*). Among the 14th century Portolan charts there were two including Hungarian settlements: the map of Angelo Dalorto and Abraham Crasques' Catalan Atlas.

Henricus Martellus Germanus presented Central-Europe and the Balkan Peninsula on his charts (1480-1496). There are 140 place names and other geographic names in the map showing Hungarian territories (Plihál, 2007). An interesting inconsistency is that Lake Balaton is described as swamp (“*palus*”) in the Balkan-map, but is called lake (“*lacus*”) on the map of Central-Europe (ELTE, 2006).

Charts – existing on the borderline between art and science – have moved to the forefront of interest during the renaissance era, and became the tool for describing the world. However, it is most likely that Mathias Corvinus had no accurate map of Hungary in his court in the 15th century. Petrus Ransanus, the court historian of Mathias Corvinus was inaccurate in his work *Epithoma rerum Hungarorum* (SZEPESI, 2013).

3. THE MAP OF SCRIBE LÁZÁR: TABULA HUNGARIAE AD QUATOR LATERA

The 500 years old Tabula Hungariae (the map of Hungary with its borderland, approximate scale 1: 1 150 000, from 1528) marked a new era of cartography. Thanks to his smashing work, Scibe Lázár has become the greatest Hungarian cartographer. He was making his chart from 1514, but the map itself has only been published after his death in 1528, with an attention to detail far ahead of its time. His chart did not only mark the beginning of Hungarian cartography, but also that of the modern European one (TÖRÖK, 2007). Examining the Lázár-map, we can primarily study the changes in hydrography and the network of settlements. It is also a vital source of information for studying land surface change – a contemporary topic in geology (MOLNÁR; TIMÁR & SZÉKELY, 2008). We could also find important information for environmental history, land cover studies, changes to road networks or borders in historic

maps.

Lázár's chart (figures 1 and 2), due to the novel – stereotype – printing process used for its production, has been inscribed to the Memory of the World Register on the 19th of July, 2007. The map is hand-coloured, woodcut, including descriptions both in Latin and German.

This chart presents the first accurate presentation of settlements in Hungary, especially in the case of riverside settlements. The collection of settlement names is particularly rich, the original manuscript contains names for 1396 settlements, including ones long since swept away by the storms of history. The settlement names were written in gothic letters.

Although the map has an unusual orientation – it has been rotated counter clockwise by about 45 degrees – but the directions and relative distances of settlements are accurate, which suggests that they were based on astronomical site definitions and field studies. An inscription on the chart claims that – "If you place this map according to the points on the compass, you will be able to tell which town is located to East, West, South or North compared to the other." (PLIHÁL, 2009).

Clearly visible on the map are the larger towns with their city walls, multiple towers, bastions, churches and monasteries, as opposed to simpler marks for smaller settlements. 125 settlements were only marked with symbols, without presenting their names (SZEPESI, 2013).

The map can also be viewed as the most accurate map from the late middle-ages considering its hydrography, including the tributaries of both the river Danube and the river Tisza. Peter Apianus, working based on Lázár's map has drawn deciduous and coniferous trees, marking the impression of the landscape, also including fortifications.

The map shows three major lakes in Hungary. The Fertő lake is shown with the surrounding swampland, as well as with the towns Sopron (Oedenburg or Sopronium) and Magyaróvár (Owar or Altenburg).

The vertically positioned Lake Balaton is surrounded by the settlements of Kenese, Fok, Szántó, Köröshegy, Somogyvár, Bér, Leweld, Vázsony, Somló, and in the region of the Eocene volcanic cones Csobánc, Szigliget (Zegliget) and

Tátika (Tadika). Some settlements are listed on the side of the map, and marked with numbers inside of it. In this list, we can find Zalavár and Keszi among others.

The third lake – noted as "See" on the map – between Becskerek and Temesvár (Figure 2.) has been drained in the 18th century by the construction of the channel-network of the Béga. However, during the floods in Banat, most of the settlements were flooded up to Temesvár (Timisoara), which were settled on the dried-out lakebed. For example Módos, located just 81 m above sea-level. The lake could later once again come into existence when the channels could not drain the water from multiple days of rainfall (PÓSA, 2005).

Seeing this "See" in the map, one can also infer to the phenomenal marshland of the Béga and the Temes, giving refuge to hundreds of millions of wild birds. This land has also inspired Ottó Hermann, with its herons, falcons, spoonbills, glossy ibises and uncountable number of mallards (SZEPESI, 2013).

On later works based on Lázár's work – called Lazarus maps within the trade – this lake is noted as Lacus Becskerek.

Lake Velence cannot be found on the map, it is possible that it has dried out at the time, which is known to have happened in times of drought, there are at least three known periods when it happened during the history of Hungary, but the lake still exists in our days.

At the center of the map we can find the field of Cumanians (Cumano-rum Campus), a large, barren wilderness almost without settlements, and with only a few on its borders, such as Halas, Badány, Félegyháza, Körtvélyes, Szegedein (Szeged). Above the field of Cumanians there is another large empty area with the city of Debrecen. There are only a couple of villages marked here in the side notes (SZEPESI, 2013).

4. WOLFGANG LAZIUS: HUNGARIAE DESCRIPTIO

In his book published in 1556 Lazius has used the map of Lázár. However, he did not recognize its unique orientation and thus made an error when "adjusting" the location of the Danube. This resulted in the distorted presentation of all the rivers in the Carpathian Basin, and consequently of Hungary (Figure 3).



Fig. 1 - Map of scribe Lázár: Tabula Hungariae ad quatuor latera.



Fig 2 - "See" or Lake Beckserek, with Beckserek Island. Detail of Lázár's map.

For hundreds of years, copiers of the Lazius map have distributed an erroneous cartographical representation of Hungary and the Danube.

Lazius' colleague, János Sylvester created an exceptionally detailed collection of geographical names (Figure 4), therefore many considered Lazius Hungarian. This is the first map to present its legend in three languages.

5. JÁNOS ZSÁMBOKY'S MAP

The original title is *Ungariae Loca prae Cipurencens Emendata atq Edita per Ioan Sambucum* (1579) This was a corrected version of Lázár's map, including additional information and Hungarian names (figures 5 and 6).

6. MERCATOR: HUNGARIA 1585

Besides Ortelius, Mercator was the reformer of cartography in the 16th century. He presented Hungary and Transylvania in separate maps. His map of Hungary – HUNGARIA – is the 51th map of the *Germaniae Tabula Geographicae* series (figures 7 and 8), with French description on its back. An interesting fact about the map that it tries to "straighten" the flow of the Danube from North to South. The water of Lake Balaton is drained by the Dráva and the Tihany peninsula extends to the lake from the south, just like on the Lazius maps. The map contains scale, is in Latin and has been reproduced.

7. GÁBOR HEVENESI (1656-1717): PAR-VUS ATLAS HUNGARIAE

His main work, the *Hand Atlas of Hungary* was published in 1689. It showed the area of Hungary with the names of 110 rivers. This is also the first Hungarian atlas, albeit still in Latin, but including an index of Hungarian names. The size of map sheets is 14.5* 11. 9 cm, the scale is 1: 1 500 000. Hevenesi provided its introduction chapter (figures 9 and 10).

The titling strip of the Atlas provides us with a reference point: it was most likely created by Colloredo after the encouragement of Hevenesi. Chalcography was crafted by Johann Andreas Pfeffel in Augsburg. In its lower left corner we can see a fighting scene against ottoman forces.

8. MAPS BY LUIGI FERDINANDO MARSIGLI

Together with Müller, Marsigli created an approximately 1: 100 000 scale map of the Danube, and a 1: 400 000 scale hydrographical map of Hungary. Müller is known for the first map since Lázár that was developed using field surveys, published in 1709. Marsigli presented the astrological observations made in Hungary by Johann Cristoph Müller, this helped the map's author so that, in the first time in history, the positions of the rivers Danube and Tisza were



Fig. 3 - Map by Wolfgang Lazius. Source: Duna Museum Cartographic Archives, Esztergom.



Fig. 4 - Selection from the map by Wolfgang Lazius.



Fig. 5 - János Zsámboky's map.



Fig. 6 - Selection from János Zsámboky's map.

accurate, even in the first, 1699 version of his map. This resulted in a complete renewal of the view of the Carpathian Basin.

8.1 Marsigli's geographic map of the locations of roman ruins in Hungary (1726)

Theatrum Antiquitatum Romanarum in Hungaria sive Mappa Geographica Regionum Danubio circujacentium Pannoniarum, Daciarum, Mysiar: etc. in quibus antiquitates romanae

suis singulis figuris in hoc tomo descriptae reperiuntur – i.e.: Locations of roman ruins in Hunga-ry. Namely, it was the geographical map of the former roman territories along the Danube (Pannonia, Dacia, Serbia etc.). The roman ruins are also presented in drawings (Figure 11).

8.2 Marsigli: Duna Mappa Generalis 1726

An overview map of the Danube in scale 1:103061. The map sheet (70x91 cm) splits up the Danube to 18 sections from Kalhenberg to the Jantra river Figure 12.

It presents cities and towns protected by walls, boroughs and villages. It also marks roman archeological sites along the Danube river.

It links scale and geographic coordinates, namely 15 miles equals one degree. It shows the Fertő Lake, but not the Balaton.

At the center of the sheet there is an ornamented compass rose showing magnetic variation Figure 13. This is remarkable because based on the magnetic variation measurements carried out by J.C. Müller in 1696, it presents only one inland line according to the isogon-map published by Halley for seamen: the line crossing Eger, Szolnok, Szeged and Titel.

8.3 Mappa Potamographica 1741

Intellectual author: L. F. Marsigli, drawn by J. C. Müller.

The map presents the hydrological network of the Danube from Vienna to the Black Sea. It is rich in details and river names, this is the first thematic hydrographical map of Hungary Figure 14.

Marsigli presented an overview of almost every notable river, stream, lake and swamp flowing into the Danube in the area of the Hungarian Kingdom. In the top corner of the sheet he drew the reader's attention to the thin lines intersecting the rivers Danube, Tisza, Száva and Maros. These were the sites where he measured the width and depth of the rivers. It is interesting to note the four straight lines linking the mountains above the Carpathian Basin. The author wanted to present how the elevation of the riverbed of some notable rivers compares to the Danube. Related to this, on separate sheets he presents the cross-section of the Carpathian Basin, this way he was able to show the elevation difference between the rivers Danube, Olt,



Fig. 7 - Mercator: HUNGARIA 1585.



Fig. 8 - Selection from Mercator's map of Hungary.

Maros, Szamos, Tisza, Boszna, Drina, Száva, Temes, Verbas, Dráva, Ipoly, Garam and Vág. His elevation measurements were carried out by barometer.

After providing information on the catchments, he presents, one-by-one, the rivers flowing into the Danube, marking their origins, outflows, lengths, sizes and groups them into classes II., III. and IV. He also analyzed the structure, composition and banks of the Danube. He also tested the waters entering the Danube: rivers, still waters, water from wells, mineral waters, waters from hail, rain and hot springs. Summarizing the results he found that the water of the Tisza at Szeged was the worst quality. According to his notes when he sampled it had

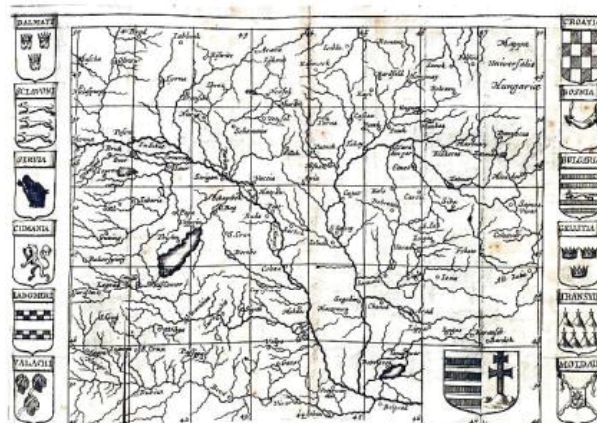


Fig. 9 - Exam work of Fabius Anton Colloredo at the University of Vienna.

an earthy smell, tasted like a swamp, had a dark color and contained a lot of sediment and insects. He found the water of the Maros to be the best. He sampled it on the 4th of October, it was clear, odorless and tasted fine. He similarly described the water of the Danube and its tributaries. This map therefore is an excellent resource for water quality studies.

He summarized the plants native along the Danube into a four-column table. The first column is based on a not specified German catalogue, *Historia Tabernamontana reformata*. The second is according to Gasparus Bauhin. The third is based on general habitat, while the third is about special habitats. This is presented



Fig. 10 - Table 13 of Gábor Hevenesi's *Parvus Atlas Hungariae*, published in 1689 (not including Transylvania).



Fig. 11 - Marsigli's geographic map of the locations of roman ruins in Hungary.

in detail by Antal András Deák. (PÓSA, 2005).

The markings on the map are so self-explaining that even an untrained eye can easily get an idea of how the landscape used to look like: how much of the area was forest, swamp, how the bigger-smaller human settlement could have looked like. It is clear that this map could be a basis for phytogeographical or land use studies.

9. DE L' ISLE: CARTE PARTICULIERE DE LA HONGRIE DE LA TRANSILVANIE DE LA CROATIE ET DE LA SCLAVONIE

Detailed map of Hungary, Transylvania, Croatia and Slovenia. Preparing the French-written map of Hungary and related countries (1717), De L' Isle used the maps of Ligi Ferdinando Marsigli and other authors. In

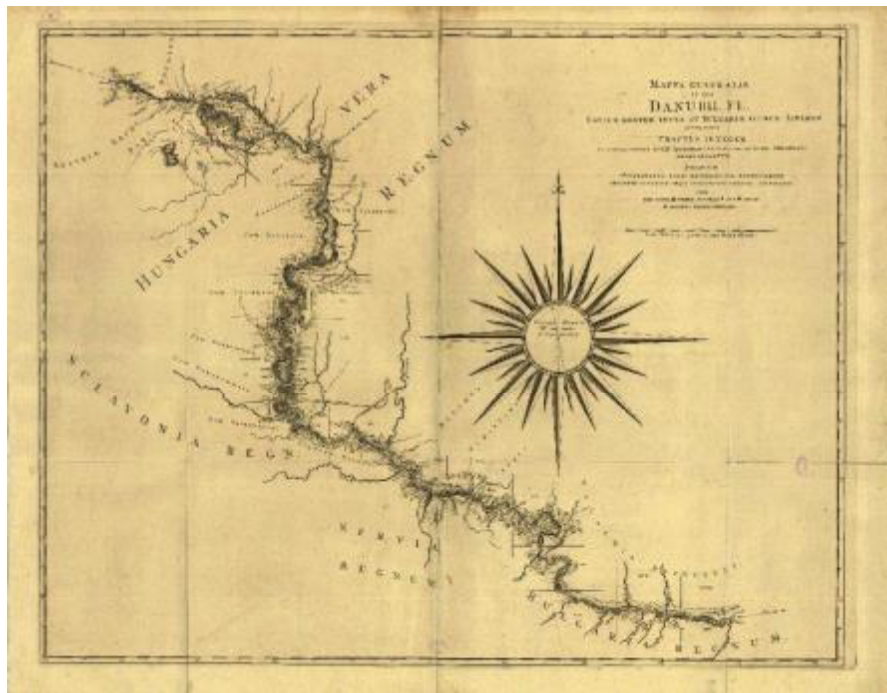


Fig. 12 - Marsigli: Duna Mappa Generalis.

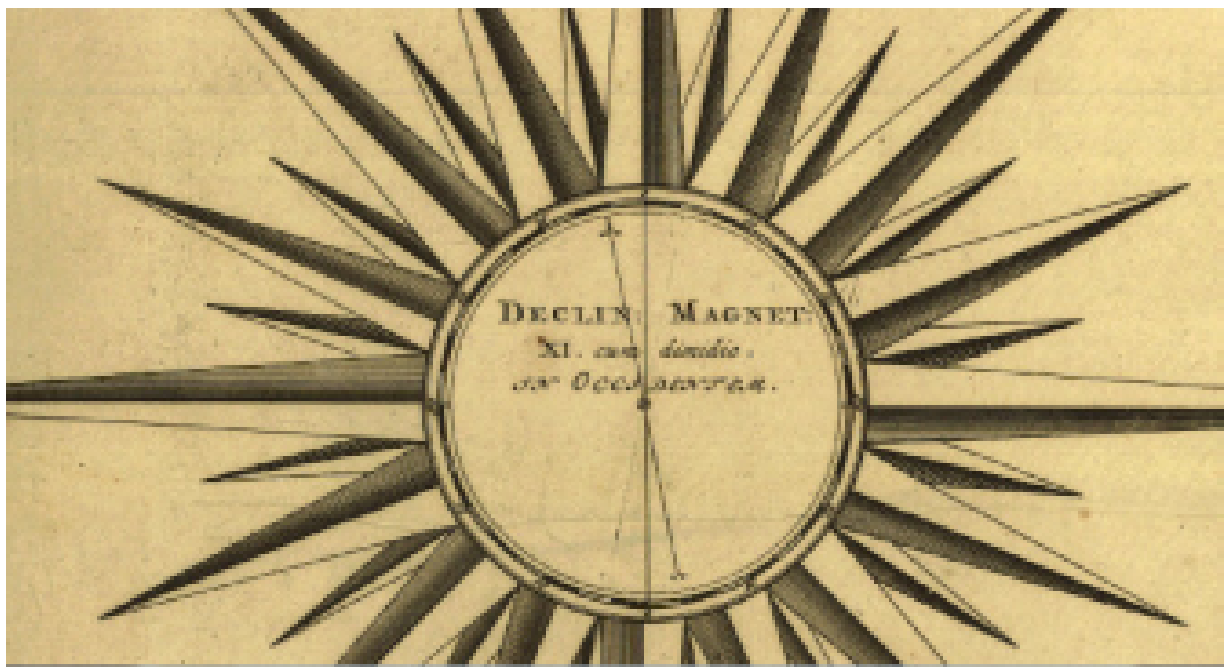


Fig. 13 - Magnetic variation on the compass rose.

the first version of his Danube-monograph (PRODRONUS, 1699), Marsigli presented the data from Johann Cristoph Müller's astrological measurements which De L' Isle used creating these new maps Figure 15.

By the date the map was published he may also have had the Danube-maps drawn by Müller after the Marsigli was disgraced (1704). This is suggested by the comparison of the Danube-maps: the errors of the Marsigli-Müller maps are repeated in De L' Isle's work as well. The picture

and location of Lake Balaton are remarkably good. The chalcography was crafted in Pierre Schenk's workshop in Amsterdam, where some of figures of Marsigli's Danubius were made.

Distances are noted in German, Hungarian and French miles. Marks the main roads within the Hungarian Kingdom Figure 16 and also presents geographic coordinates.

10. CONCLUSION

The conclusions are best presented in



Fig. 14 - L. F. Marsigli: Mappa Potamographica 1741.

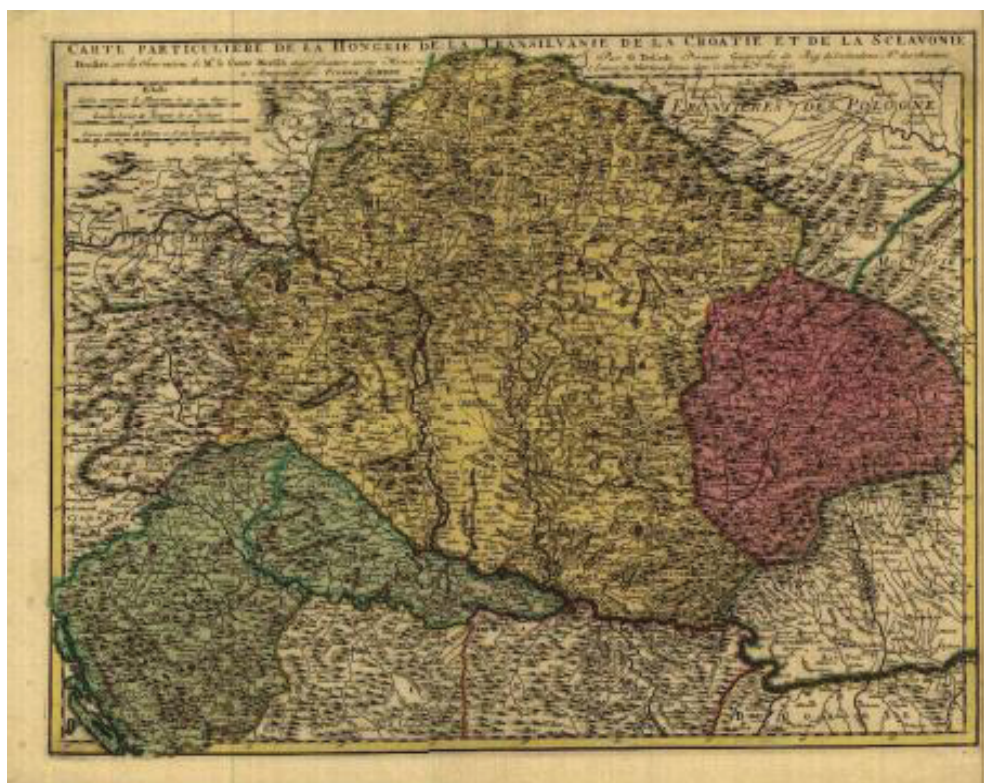


Fig. 15 - De L'Isle: Carte particuliere de la Hongrie de la Transilvanie de la Croatie et de la Slavonie.

a tabular form (Table 1.), summarizing the thematic information accessible in the old maps of the museums. Since historical maps of the Carpathian Basin are also historical maps of Eastern-Central Europe, they could provide basis

for international geoinformatic projects as well.

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Fig. 16 - Selection from De L' Isle: Carte particuliere de la Hongrie de la Transilvanie de la Croatie et de la Sclavonie.

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