
THE CARPATHIAN BASIN: DENOMINATION AND DELINEATION (GF 2019 THEMATIC ISSUE)

Tivadar Gaudenyi^{1}, Milan Mihajlović².*

¹ Geographical Institute "Jovan Cvijić" of the Serbian Academy of Sciences and Arts, Department of Physical Geography, Djure Jakšica 9, 11000 Belgrade, Serbia; e-mail: t.gaudenyi@gi.sanu.ac.rs

² Rumska 15, Kraljevci, Serbia; e-mail: mihajlovicmilan13@gmail.com

Abstract: The Carpathian Basin introduced in the geographical literature of the year 1921. However, after few clarifications it became in official use in 1947. It has been used in the context of landscape unit or physico-geographical entity mainly by the Central European geoscientists.

The Carpathian Basin bordered by the Alps, the Carpathians, the Dinaric Mountains and Šumadija Mountains. It represents the lowlands (and mountains which they encircled) as well as the slopes of mountains which faced to the lowlands.

After multidisciplinary analysis (surface geology and roughness, orography, slope angles) the area of the Carpathian Basin delineated and presented. The analysis shown that the Carpathian Basin excludes the intramontane basins in the Carpathians and the Dinaric Mountains.

Keywords: Carpathian Basin; landscape; physico-geographical unit, Central Europe; geomorphologic subdivision.

Introduction

The geographical name Carpathian Basin for the landscape unit or physico-geographical unit often used by Central European geoscientists. It exist also some uncertainties of its context when we use this geographical name and its delineation.

"The problem how to call the area bordered by the Alps, the Carpathians, the Dinaric Mountains in cartography and geography was not merely an issue of terminology. Different names were in use for this territorial unit both in different periods and simultaneously. (Hungarian Basin, Pannonian Basin, Central Danubian Basin, Danubian Basin, Carpath Basin, Carpathian Basin etc.). The names were reflecting some kind of spatial community sense, a general responsibility and attitude as well. This is the reason why both in international and Hungarian geographic science the notion and synthesis category of 'Carpathian Basin' was introduced with great difficulty only. The Hungarian naming process was also influenced by German, Italian, Russian, English and French spatial orientations and naming practices" (Hajdú, 2004, p.5).

The aim of this paper is to give an overview of the denomination history of the Carpathian Basin and to make a clear delineation of its boundaries to used in the

*Corresponding author, e-mail: t.gaudenyi@gi.sanu.ac.rs

proper context and without difficulties. As it is a regional - Central European agenda the authors motivation was to done this study.

Material and Methods

Regarding the denomination of the Carpathian Basin the references used which dealing the history of research in geosciences, mainly physical- and regional geography because the the Carpathian Basin represents a landscape or physico-geographic units or sedimentary basin. The main references were published from Hungarian authors, the studies of Fodor (2006), Hajdú (2004, 2005), Hevesi (2003), Mendöl & Bulla (1947), Dövényi, (2012) and Kocsis (2018) were the guiding thread including the papers dealing with the Carpathian Basin issue.

According to the published the authors only in the Bátky & Kogutowicz (1921) found the eastern delineation of the Carpathian Basin (Fig. 1).

The delineation in this study based on several surficial analysis. The relief of the Carpathian Basin encompass the lowlands (and mountains which they encircle) and the mountain slopes faced to the lowlands. The location of the Carpathian Basin can be defined as the wider area of the Danube valley from the Devín Gate (or Hainburger Gate) till the Iron Gate. The regional geologic maps were used to identify lower parts of the Carpathian Basin (e.g. Beck-Mannagetta & Medwenitsch, 1978) which shows the surficial geology. According to the lithostratigraphy of the Neogene and Quaternary sediments in the lowlands. The mentioned area of lowlands were encircled with the Eastern Alps (in the west) Carpathians (in north and east) and Dinaric Mts. and Šumadija Mts. (in the south). The mountain ridges which encircled the lowlands of the Carpathian Basin represents the bordering line for the Carpathian Basin. The analyzed area DEM-s of 30 m resolution were used from the Earth Explorer DEM collection of the United States Geological Survey (<https://earthexplorer.usgs.gov>) which were merged using QGIS software. The pixel resolution used in our case was 100 x 100 m. The number of the merged DEM-s was 148. "The relative relief (or relief energy) which quantifies the vertical differences of terrain. Relative relief is defined as the elevation difference between the highest and the lowest points within an arbitrary circular environment identified" (Gábris et al., 2018 p. 48). For the purpose of this investigations the study of Gábris et al., (2018) consulted and the results shown for the Carpathian-Pannonian Region in the map of Telbisz (green coloured area of the Map 6 in Gábris et al, 2018). The lowland faced slopes were identified on DEM-s in some cases the orographic layers were used to distinguish and easier identify some ridges. In some cases the map slope categories of Telbisz (Map 5 in Gábris et al., 2018) consulted which using slightly different parameters. The mountain ridges and the line which connected was drawing manually and when it was finished we got the encircled area of the Carpathian Basin.

Figure 1. Orographical structure of the Carpathian Basin (cropped from Bátky & Kogutowicz, 1921) (THIRD PAGE)

Results

Denomination history of the Carpathian Basin

The Z. Hajdú wrote an article chapter entitled "The Carpathian Basin issue in the Hungarian geographical science" (cf. Hajdú, 2004) which more-less covers the denomination history of the Carpathian Basin.

“The notion of ‘Carpathian Basin’ is a result of a long evolution process both in the history of international and Hungarian geographic science. The ‘sensing’ of the Carpathians and river Danube appeared in a natural way at an early time in the European geographical mind (Hungary’s territory was almost always covered by comprehensive European geographic analyses, and since the 18th century several cartographers were carrying out country assessments) and at the same time in Hungarian name catasters the rather the country’s ‘valley’ than basin features were emphasized for a long time. This ‘valley approach’ mostly resulted from the Danube’s natural geographical role and predominance in Hungarian geographical mind. This general ‘valley-oriented approach’ may be the explanation for the fact that both international and Hungarian maps showed the territory of Hungary stretched in Northwest-Southeast bound direction” (Hajdú, 2004 p.6).

“The language of Hungarian geographical literature was dominated by Latin (*till 1844*) at first and by German at a later period (*officially till 1869, but unformally till 1918*). The ‘adaptation’ of spatial categories into different languages made continuously a big headache for geographers. (György Szaller wrote his book first in German in 1796 and later on he translated it into Hungarian. The two variations of the book significantly differ from each other in the use of names, spatial approach, spatial categories etc. It is an eye-catching phenomenon that in natural geographical studies the author used the German, while during the overview of political structures he used the Hungarian spatial approach.)” (Hajdú, 2004 p.6).

“The fact that Hungary belongs to the Danube water catchment area (Danube Valley) was recognised by the Hungarian geographical science at a relatively early period (Figure 1). In the German Danube and spatial approach the territory of Hungary was represented as a part of the Central Danubian Basin” (Hajdú, 2004 p.6).

“The Austrian historical and political approach often referred to the Habsburg Empire and later to the Austro-Hungarian Monarchy from 1867 as „Danube Monarchy” (Hajdú, 2004 p.6).

“During the 19th and 20th centuries after the “inside members of the Carpathian Basin” (Germans, Hungarians, Slovaks, Romanians, Serbs etc.) the “external nations” (English, French, Russians, Italians etc.) also formed their opinion on the naming of the geographic space during the marking and naming of geographic territories in the natural geographical division of Europe. We can see here a special ‘naming competition’ which cannot be considered as a unique or peculiar phenomenon through the area in wider sense” (Hajdú, 2004 p.8).

“In the second half of the 19th century the notion ‘Central Danube Basin’ was acknowledged in hydrological research only, the country’s geographical macro region was rather referred to as ‘Hungarian Basin’. In archaeology and history the notion ‘Pannon Basin’ (*or ‘Pannonian Basin’*) was also in use. The name of ‘Carpathian Basin’ was used by foreigners only (*non-Hungarian literature e.g. German*) (Hajdú, 2004 p.8).

“After the turn of the 19th and 20th centuries the majority of Hungarian geographical papers, textbooks and maps labelled the area as ‘Hungarian Basin’.

Between World War I and II both scientific literature and education textbooks used mostly the notion of ‘Hungarian Basin’, but the terms ‘Carpat or Carpathian Basin’ were also present in the wider public” (Hajdú, 2004 p. 8).

One of the first the Carpathian Basin as a geographical term by the prominent cartographer Kogutowicz (Bátky & Kogutowicz, 1921) for the title of the map of the “Relief and hydrography of the Carpathian Basin” (*Domborzat és vizek a Kárpátok medencéjében*). However, he used the slightly different term in Hungarian (*Kárpátok medencéje* not *Kárpát-medence*) (Fig. 2). Later in the monograph text it was

implemented Bendefy-Benda (1932, 1934), when published the results of the geologic investigations.

Figure 2. Relief and hydrography of the Carpathian Basin (cropped from Bátky & Kogutowicz, 1921) (THIRD PAGE)

“Béla Bulla in 1940 clearly pointed out that geographical names were not merely names but they represented ideas as well: ‘Foreign literature tends to hide the original right of Magyars for this area by naming it Danube Basin instead of Hungarian Basin – though its geographic unity should be regarded as evidence.’ (Bulla, 1940, p. 3.)” (Hajdú, 2004 p.8).

“In 1941 a scientific journal was founded under the title “Kárpát-medence” (Carpathian Basin) regarding the popularization of the notion and the area’s scientific analysis its prime mission. The names (Carpathian Basin, Hungarian Basin) started to be synonyms in fact” (Hajdú, 2004 p. 8).

The Carpathian Basin was represented as an orographical, hydrological area on the majority of maps. The orographical and hydrological elements were the very parts of natural geography through which were the most suitable elements for the demonstration and verification of the theory of Carpathian Basin as a whole natural unit (Figure 2).

“The notion of Carpathian Basin was ‘introduced’ by the monograph of Bulla & Mendöl (1947) as a geographical name in Hungary with almost an exclusive character. The “Carpathian Basin is the smallest physical geographic unit that fully covers the territory of Hungary with its neighbor states” (Bulla & Mendöl, 1947, p. VI) – this was the authors’ explanation why it have to be replaced the ‘Hungarian Basin’ term with the ‘Carpathian Basin’ (*sensu* Hajdú, 2004).

The Carpathian Basin was in wider use as a landscape unit, regional unit in physical geography and as a sedimentary basin in Central Europe. In all mentioned contexts it encompass the same area.

Figure 3. The area of the Carpathian Basin (WHOLE PAGE)

Delineation

The after applying the methods described in the Methodology part of the paper we create the delineation line on hillshape DEM (Fig. 3) which in some cases better shown the mountain ridges. The final delineation of the Carpathian Basin shown on Fig. 4. with applied colors for topographic layering. The north boundary of the Carpathians are the ridges of slopes faced to the Little Alföld (in the Inner Northwestern Carpathians), Alföld (in the Inner Northwestern Carpathians and Inner Northeastern Carpathians) and the Transylvanian Lowland (in the Inner Northeastern Carpathians and Inner Eastern Carpathians). The eastern boundary are the ridges of the slopes faced the Transylvanian lowland (in the Inner Eastern Carpathians). The southern boundary were the ridges of slopes faced to the Sava Upper- and Sava Plain (*sensu* Gaudenyi & Mihajlović submitted) (in the Dinaric Mountains and Šumadija Mountains), while south from Stig, Braničevo, Banat Plain and Transylvanian Lowland are the ridges of north faced slopes to the lowlands of the South Carpathians (South Carpathians *sensu* Cvijić, 1924, 1926).

Discussion

The use of geographical name Carpathian Basin mainly favored by geoscientists who investigate the area of Hungary. It is the smallest natural unit (landscape / physico-geographic entity) which encompass the whole area of Hungary. The investigation of Hungary's neighboring countries used this term rare and with confusion they prefer some other term however they have different meanings (e.g. Pannonian Basin). The term Carpathian Basin is useful among archaeologists, geoscientists, ecologists and biologists because it is strongly connected with a landscape / geographical unit.

According to the delineation the investigations has several challenges:

i) The intermontane basins. The intermontane basins are encircled by higher orography on all sides and drained by streams or rivers which leave the basin floor through relative narrow valley. The position of the intermontane basins is often influenced by the lithology and structural lines in the bedrock. The basin outlines tend to follow the mountain ridges faced to the lowland area between the Alps, Carpathians, Dinaric Mts. and Šumadija Mts. The first problematic case was the Zagorje Basin which has a restricted connections via river valleys to be open northwards and eastwards, so it was classified that cannot be a part of the Carpathian Basin. In the case of Krško- and Samobor basins (defined after Nikolić, 1985) and Kupa valley south of Vukomeričke Gorice as well as other small basins south of the Upper- and Lower Sava Plain (described in Gaudenyi & Mihajlović, submitted) of the Dinaric Mountains qualified as intermontane basins outside the Carpathian Basin. Similar case we have in the the Gheogheni-, Chiuc- and Braşov basins which is densely dissected by fluvial valleys in the Eastern Carpathians.

ii) The North Hungarian (Matra-Slanec) Range. Due the landscape subdivision the North Hungarian (Matra-Slanec) Range belongs to the Northwestern Carpathians (Csorba et al, 2018). However, the Nógrád (Novohrad) - Abaúj (Abov) Depression which positioned northwards has several connections to the Little Alföld and the Alföld and due its quite wide area it was classified as a part of the Carpathian Basin with the North Hungarian (Matra-Slanec) Range. We have the same case for the Apuseni Mts. and Poiana Ruscă Mts. which also belongs to the Carpathians.

iii) Respecting the earlier delineation. The earlier delineation concepts mainly based on the line which connects the highest ridges / watersheds of the mountain systems (e.g. Fig. 1). This methodology will include the intermontane basins and lower peak than the highest ridges, but Carpathian Basin used also in the context of sedimentary basin. In this study only the basin slopes faced to the lowlands included in the Carpathian Basin but the main ridges of mountains systems generally not.

The term Carpathian Basin and its synonyms. The term Carpathian Basin used in the context of synonymy of the Pannonian Basin, Pannonian Basin System, Pannonian Plain. Due its definition and area which encompass, the Carpathian Basin has no synonyms. The Pannonian Basin is a paleogeographic term defined by Róth von Telegd (Róth, 1879; Róth von Telegd, 1879) its area in the geographical context described as the Pannonian Realm. The Pannonian Plain represents the plain segments of the Pannonian Realm. The Pannonian Basin System is a tectono-genetic entity of Central European geology (e.g. Royden & Horváth, 1983a, 1983b). In the wider geographical context terms such as Carpathian-Dinaric Region, Carpathian-Balkan Region, Carpathian-Balkan-Dinaric Region etc. are coined.

The recently published 2nd volume of the National Atlas of Hungary (Kocsis, 2018) have different delineation of the Carpathian Basin. It is similar (or same) as it was in the initial version or the first description of Bátky & Kogutowicz (1921). However, in the atlas of Kocsis (2018) (Fig. 4) cannot find any methodological explanation. Both results and delineation of the Carpathian Basin can be a matter of debate to find a solution and compromise. According to the recent status we also can simply used the results of this study could as *s.s.* (Carpathian Basin *sensu stricto*) or while those

in Kocsis (2018) in *s.l.* versions (Carpathian Basin *sensu lato*) with citing the appropriate publication sources.

Figure 4. The area of Hungary, the Carpathian Basin (*s.l.*) and Pannonian Basin (cropped from Kocsis, 2018) (1/3 PAGE)

Conclusions

The geographical name Carpathian Basin for the landscape unit or physico-geographical entity often used by Central European geoscientists. The Carpathian Basin introduced and in use in the geographical literature of the year 1921. However, after few clarifications it became in official used from 1947.

The Carpathian Basin bordered by the Alps (in the west), the Carpathians (in the north, east and party on the south), the Dinaric Mountains and Šumadija Mountains (in the south). It represents the lowlands (and mountains which they encircled) as well as the slopes of neighboring mountains which faced to the lowlands. Based on the its geology, slope categories and relative relief on DEM-s defined its position and delineation, which is given in the Fig. 3.

Due to the earlier delineation it includes some intramontane basins (Carpathian Basin *s.l.*) or this study (Carpathian Basin *s.s.*) further investigations and finding the solutions for this landscape unit(s) can be an objective of future investigations.

The Carpathian Basin has no synonyms and its an unique geographical name.

Acknowledgements

The investigations of Tivadar Gaudenyi was supported by the Bolyai János Research Grant of the Hungarian Academy of Sciences.

References

- Bátky, Zs., & Kogutowicz, K. (Eds.) (1921). *Kogutowicz zebatlasza az 1922. évre* [Pocket atlas of Kogutowicz for the year 1922]. Magyar Népföldrajzi Társaság Emberföldrajzi Szakosztálya, Budapest.
- Beck-Mannagetta, P. & Medwenitsch, W. (1978). Geology with Tectonics. In: *Atlas of the Danubian Countries*. Österreichisches Ost- und Südeuropa-Institut, Wien. Plate 131.
- Bendefy-Benda, L. (1932). *A magyar föld szerkezete* [The structure of the Hungarian land]. Magyar királyi Erzsébet Tudományegyetem Földrajzi Intézete, Pécs.
- Bendefy-Benda, L. (1934). *A magyar föld: A magyar föld szerkezete - belsőkontinentális kéregmozgások a Kárpátmedencében. Második bővített kiadás* [The Hungarian land: The structure of the Hungarian land - inner continental crust movements in the Carpathian Basin. 2nd expanded edition]. A Magyar Etiópiai Expedíció Országos Bizottságának Kiadása, Budapest.
- Csorba, P., Bartos-Elekes, Zs., Bata, T., Bede-Fazekas, Á., Czúcz, B., Csimá, P., Csüllög, G., Fodor., N., Frisnyák, S., Horváth, G., Illés, G., Kiss, G., Kocsis, K., Kollányi, L., Konkoly-Gyúró, É., Lepesi, N., Lóczy, D., Malatinszki, Á., Mezősi, G., Mikesy, G., Molnár, Zs., Pásztor, L., Somodi, I., Szegedi, S., Szilassi, P., Tamas, L., Tirászi, Á., vasvári, M. (2018). X. Landscapes. In: Kocsis, K. (Ed.) *National Atlas of Hungary: Vol. 2. Natural Environment*. Hungarian Academy of Sciences, Research Centre for Astronomy and Earth Sciences, Geographical Institute Budapest. pp. 112-129.
- Nikolić, B. (1985). Geomorphological characteristics of the River Sava valley between Krško and Podsused. *Geographical Papers*, 6, 61-77.
- Bulla, B. (1940) *Az Alföld The [The Alföld]*. Kincsestár: A Magyar Szemle Társaság Kis Könyvtára vol. 116. Budapest.

-
- Bulla, B., Mendöl., T. (1947). *A Kárpát-medence földrajza* [The Geography of the Carpathian Basin]. Nevelők Könyvtára 2. Országos Köznevelési Tanács, Budapest.
- Cvijić, J. (1924). *Morphologie Terrestre*. Vol. 1, Državna štamparija Kraljevine Srba, Hrvata i Slovenaca, Beograd.
- Cvijić, J. (1926). *Morphologie Terrestre*. Vol. 2, Državna štamparija Kraljevine Srba, Hrvata i Slovenaca, Beograd.
- Fodor, F. (2006). *A magyar földrajztudomány története* [The History of the Hungarian Geography]. Magyar Tudományos Akadémia - Földrajztudományi Kutatóintézet. Budapest.
- Gábris, Gy., Pécsi., M., Telbisz, T. (2018). IV. Relief. In: Kocsis, K. (Ed.): *National Atlas of Hungary: Vol. 1. Natural Environment*. Hungarian Academy of Sciences, Research Centre for Astronomy and Earth Sciences, Geographical Institute Budapest. pp. 42-57.
- Gaudenyi, T. & Mihajović, M (submitted) The Sava Plain
- Dövényi, Z. (Ed.) (2012). *A Kárpát-medence földrajza* [The Geography of the Carpathian Basin]. Akadémiai Kiadó, Budapest. 1321 pp.
- Hajdú, Z. (2004). Carpathian Basin and the development of the Hungarian Landscape Theory Until 1948. *Discussion papers*, 44. 1-44. Centre for Regional Studies of Hungarian Academy of Sciences. Pécs.
- Hajdú, Z. (2005). *Magyarország közigazgatási földrajza* [The administrative geography of Hungary]. Studia Regionum - Dialóg Campus Tankönyvek: Területi és települési kutatások 17. Dialóg Campus Budapest-Pécs.
- Hevesi, A. (2001). A Kárpát-medence és a Kárpatok természetföldrajzi tájtagoltságáról. [About the Landscape subdivision of the Carpathian Basin and the Carpathians] Dormány, G., Kovács, F., Péti, M., Rakonczai, J. (Eds.) *A földrajz eredményei az új évezred küszöbén: A Magyar Földrajzi Konferencia tudományos közleményei*. [The results of geographical investigations in the beginning of the second millennium: Proceedings of the Hungarian Geographical Conference] CD-R pp. 1-17. University of Szeged, Faculty of Sciences, Department of Physical Geography.
- Hevesi, A. (2003). A Kárpát-medence és a Kárpatok természetföldrajzi tájtagoltságáról [About the Landscape subdivision of the Carpathian Basin and the Carpathians]. *Földrajzi Értesítő*, 52 (3-4), 253-267.
- Kocsis, K. (Ed.) (2018). *National Atlas of Hungary: Vol. 2. Natural Environment*. Hungarian Academy of Sciences, Research Centre for Astronomy and Earth Sciences, Geographical Institute Budapest.
- Róth-Telegdi, L., 1879. A rákos-rushti hegyvonulat és a Lajta hegység déli részének geológiai vázlata [Geological outline of the Kroisbach-Ruster range and the south parts of the Leitha mountain]. *Földtani Közlöny*, 9 (3-4), 99-110.
- Roth von Telegd, L., 1879. Geologische Skizze des Kroisbach-Ruster Bergzuges und südlichen Teiles des Leita-Gebirge. *Földtani Közlöny* (German Edition), 9 (3-4), 129-140.
- Royden, L.H., Horváth, F. & Rumpel, J., (1983a). Evolution of the Pannonian Basin System 1. Tectonics. *Tectonics*, 2, 63-90.
- Royden, L.H., Horváth, F. Nagymarosy, A. & Stegena, L., (1983b). Evolution of the Pannonian Basin System 1. Subsidence and thermal history. *Tectonics*, 2, 91-137.

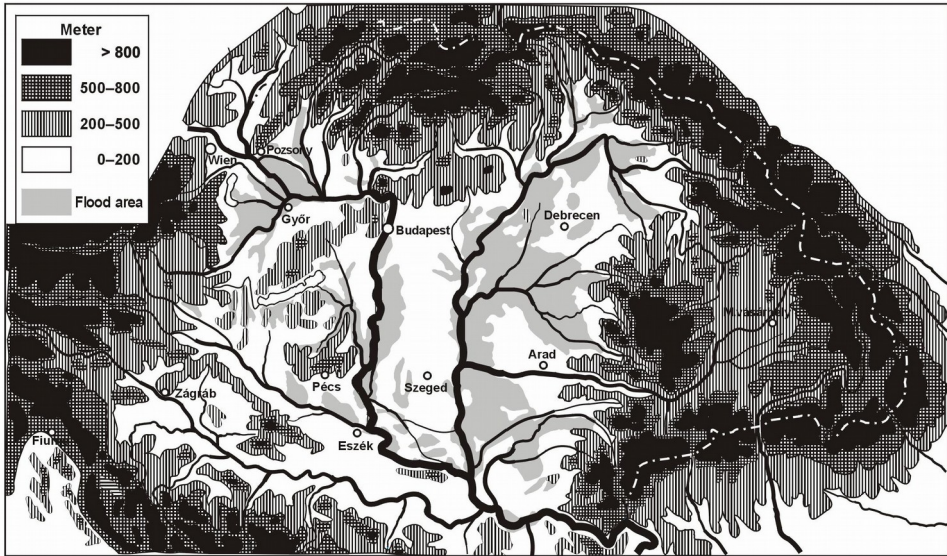
Figure captions:

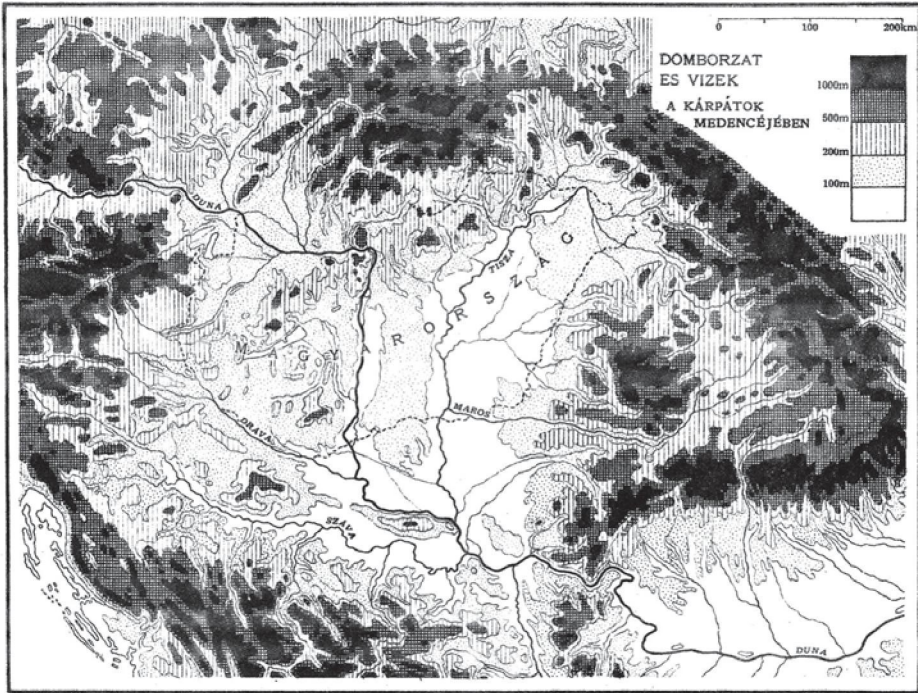
Figure 1. Orographical structure of the Carpathian Basin (cropped from Bátky & Kogutowicz, 1921)

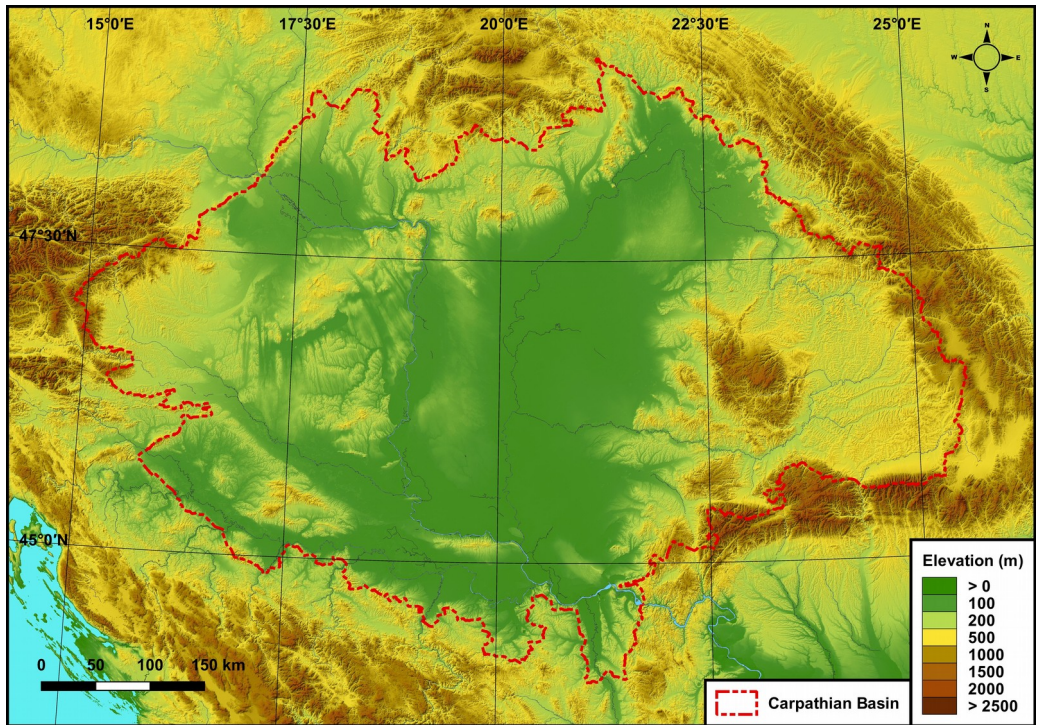
Figure 2. Relief and hydrography of the Carpathian Basin (cropped from Bátky & Kogutowicz, 1921)

Figure 3. The area of the Carpathian Basin

Figure 4. The area of Hungary, the Carpathian Basin (s.l.) and Pannonian Basin (cropped from Kocsis, 2018)







1 HUNGARY, THE CARPATHIAN AND PANNONIAN BASINS

