THE ALFÖLD: DENOMINATION AND ITS SOUTHERN BOUNDARY (GF 2019 THEMATIC ISSUE)

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Abstract: The Alföld with its central position in the Carpathian Basin and eastern position in the Pannonian Plain represents the first among equal landscape or physico-geographical region of Carpathian-Pannonian area.

Following the recommendation of the Hungarian Geographical Society's Alföld Commission (from 1910) the Alföld should used as a geographic name and the previous denomination "Great Hungarian Plain" should be abandoned. Some parts / segments of the Alföld if use in the context restricted to the national boundaries, the proposed recommendation should be the form of the Alföld with the prefix which according to the country belongs the pointed segment (i.e. in case of Serbia - it should mention: Serbian segment of the Alföld).

The southern boundary of the Alföld is well defined. It is same as SE part of the Pannonian Plain. The south parts of the Alföld encompass the Lower Sava Plain, the Tamnava-Kolubara plain, the lower Velika Morava Plain and the Mlava Plain.

Keywords: Alföld; Great Hungarian Plain; geomorphologic subdivision; landscape; Carpathian Basin.

Introduction

In the general context the term Alföld (in Serbian: *Alfeld*) used as landscape unit and physico-geographical region even as administrative unit of Hungary. Moreover, the organized geographical investigations of the Alföld started more than century ago, but the WWI and the later political and scientific community left the results and the objectives *ad acta*. The recent published atlases keep to be used the term Alföld (e.g. Kocsis & Schweizer, 2009; Kocsis, 2018), however in the monographs and textbooks still used for the same area and context the geographical name "Great Hungarian Plain" (e.g. Lóczy, 2015; Mezősi, 2017).

The aim of this paper is to elaborate ideas and investigations of Cholnoky (1910) with critical analysis, in purpose to find a logical recommendation which term should be the most appropriate for the denomination (the Alföld or the Great Hungarian Plain) and to define (as well as delineate) its area using geomorphological methods and geologic data.

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Figure 1. Morphological map of the Alföld complied by Cholnoky 1910. (cropped from Cholnoky 1910, p. 497) (WHOLE PAGE)

Material and Methods

The to anayzed the 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 total number of 78 DEM-s were merged in one DEM.

The study beside the geologic surveying data for the study, on the DEM the roughness tool of QGIS Software used for the delineation same as it was used for the Sava Plain (Gaudenyi & Mihajović, submitted).

Rougness QGIS should be described briefly as: "Tools to analyze and visualize DEMs outputs the single-band raster with values computed from the elevation. Roughness is the degree of irregularity of the surface. It is calculated by the largest inter-cell difference of a central pixel and it surrounding cell. The determination of the roughness plays role in the analysis of terrain elevation data. It is useful for calculation of river morphology and physical geography in general, is derived from the GDAL DEM utility" (QGIS 2.8 User Guide). The DEM resolution 100 x 100 m was chosen which results for the generalizing surficial image gives similar values as other analysis. With the tool "Roughness" of QGIS software we separate the surface roughness in five classes. The plain terrain of the Alföld was defined with roughness coefficients of 0-5 which was analyzed for the whole area of the middle part of the Carpathian Basin testing same criteria of relief elements. Later the generalization and the delineation was drawn manually.

The southern boundary of the Alföld of its definition take in account the major seminal works of Cholnoky, (1910, 1924a, 1924b, 1928), Bulla (e.g. Bulla, 1940; Bulla, 1947), Pécsi (1970), as well as the recently published review chapters i.e. Dövényi (2012), Lóczy et al. (2012) Lóczy (2015) Mezősi (2017) and new recently published investigations (e.g. Kocsis, 2018).

Results

The history of the denomination of the Alföld

The Hungarian became an official language in Hungarian part of the Austrian Empire in 1844. The term Alföld immediately became in the use, even in the scientific literature the term Alföld often used (e.g. Szabó, 1860; Hunfalvy, 1886; Hanusz, 1895, Czirbus, 1899).

"The first systematic research into the physical geography of a region in a true Humboldtian conception, was conducted by a populous group of scientists in the Lake Balaton Basin under the guidance of L. Lóczy Sen. (1849-1920), the most eminent figure in Hungarian geology and geography" (Lóczy et al.,, 2012 p. 206). The organized and systematic geographical research of the Alföld begun with the coordination of the Hungarian Geographical Society. The Lake Balaton Commission on Nov. 12th 1908 converted to the Alföld Commission of Hungarian Geographical Society (hereinafter: the Alföld Commission). The Alföld Commission headed by Lóczy's former student J. Cholnoky (1970-1950) and it was more-less active till the end of 20-ies of 20th century. The end of activities of the Alföld Commission is closely

related to its Head and the political situation (the move of university employees which after the WWI were outside of the Hungarian border and it affects personally Cholnoky also). However, Cholnoky's other activities became of higher priority, he also mentioned that it has not a such importance to continue the acietific activitiies of the Alföld Commission because the southern and eastern parts of the Alföld lost Hungary in the WWI (*sensu* Fodor, 2006). Last but not at least the lack of finances for sciences or changes the priorities of scientific investigations.

In one of the five most important papers of Cholnoky (sensu Fodor, 2006) was that in which the denomination of the Alföld, and its application of its geographical name in the international correspondence is clarified (*cf.* Cholnoky, 1910). The accepted proposal was that the Great Hungarian Plain / Great Plain / Hungarian Plain have to be abandoned and it use in the international literature is not justified. The one of the main conlcusion of Cholnoky's paper (Cholnoky, 1910) geographical name Alföld must exclusively used in the national and international correspondence.

The previously used Great Plain (in Hungarian: *Nagy-Alföld* / *Nagyalföld*) is not appropriate because it associates to the Great Plains of North America. The Great Hungarian Plain as Cholnoky (1910) justified the geographical name is confused because its edge is outside of the Hungary. Later with the changes of boundaries of Hungary after WWI it became more evident. The Alföld (in Hungarian it means lowland or plain) clearly pointed the geographic region / landscape in the central part of the Carpathian Basin (in between Little Alföld and the Transylvanian Basin). Cholnoky (1910) when in French used the Alföld Commission name proposed the form "*Commission de l'Alföld*". It justified that was created on similar way when other geographic names have roots from appellative names in such case as the Alps, Niagara, Balaton.

Figure 2. The delineation of the Alföld based on roughness classifcation classes with QGIS software. The Alföld boundary shown with black line. (WHOLE PAGE)

The southern boundary of the Alföld

This study's starting point in the case of delineation was paper of Cholnoky (1910) and his map (Fig. 1). The mentioned paper without map was published again in 1924 in two separated parts (Cholnoky, 1924a, 1924b). The morphological map of the Alföld from 1910 (Cholnoky, 1910) shows quite clear its main parts except the south-westen and the southern segments (Fig. 1). In the paper of Cholnoky (1910 p. 421) mentioned that the "*Nunc venio ad fortissimum.* The Alföld continues in the Drava and the Sava valley..." In case of the Sava Valley stated: "...It seems that the we can delinate its SW boundary of the Alföld at Slavonski- and Bosanski Brod where the Sava valley became narrower". Moreover, for the Drava written the following: "...The Drava plain continues as a wide openness to the Szigetvár area towards in the the direction of Pécs, and the Railway Station of Pécs is still in the Alföld." "It should be a matter of compromise to which area of the Drava plain encompass the Alföld. The opinion is that Osijek, Siklós, and Szigetvár should be parts of the Alföld nearly to Barcs".

The studies of Bulla (1940, 1947) pointed clearly that the Drava Plain from Barcs and eastwards belongs to the Alföld. In case of Sava Plain from Slavonski- and Bosanski Brod eastwards (Lower Sava Plain *sensu* Gaudenyi & Mihajlović, submitted) the plain area encompass the Alföld.

Pécsi (1970) only focuses and analyzed the Hungarian segment of the Alföld (in his study used the term "Great Hungarian Plain" and stated that the Drava floodplain belongs to the Alföld.

The recent regional/review studies Lóczy et al., (2012), Lóczy (2015), Mezősi (2017) following/adopted the “Great Hungarian Plain” concept and accoring to the conclusions of Pécsi (1970). In most cases only mentioned that more than a half of the area of Alföld is in Hungary, while in their articles only the area of Hungary evaulated.

The used the geographical name Alföld in the chapter of Schweizer (2009) were correctly mentioned that 100,000 km2 of the Alföld 52,000 km2 are in the territory of Hungary.

The results of the roughness analysis shown on the Fig. 2. The area with 0-5 roughness coefficients was considered that the almost flat lowland relief shown. The area of the Alföld also presented on the topographical environments.

The new studies and analysis of Telbisz in Gábris et al. (2018) based on digital terrain models represents a set of useful maps and promoted the relief visualization on excellent way: the slope category map of the Carpathian-Balkan Region (Map 5 in Gábris et al. 2018); the map for the relative relief of the Carpathian-Balkan Region (Map 6 in Gábris et al. 2018); and the map of terrain types of the Carpathian-Balkan Region (Map 7 in Gábris et al. 2018). The landscape subdivision the historical landscape types in the Carpathian Basin from 11th till the 16th century (Map 2 in Csorba et al. 2018) Taxonomy of the natural landscapes (Map 19 for the Carpathian Basin and Map 22 for Hungary in Csorba et al. 2018). The results of this study obtain with the surface roughness classes are very similar to those in Kocsis (2018) also it is compatible with the previous studies of in case of the Serbian segment of the Alföld as defined after Ćalic et al. (2012a, 2012b).

Discussion

Despite the German language influence and many primary Hungarian geographers preferred the term Great Hungarian Plain in English or the authors just translate from the German *Grosse Ungarische Tiefebene* (e.g. Trunkó, 2000) or in earlier references as *Grosse Ungarische Ebene* (e.g. von Raumer, 1848) *or niederungarische Ebene* (e.g. Wolf, 1867) to English, however the geographical term Alföld have more sense. In spite of the the geographical context in which we mentioned the Alföld if the area is restricted to the national boundaries (or only to the part of the Alföld) the most appropriate way should be to used with the countries context i.e. Serbian segment of the Alföld or Romanian and Hungarian segments of the Alföld.

The Drava Plain segment of the Drava Plain is slightly different than it defined by Cholnoky (1910) and Bulla (1940) it seems the delineation near Barcs was arbitrary and the quality or information from relief and slope angles cannot serve serve such as reliable field data. However, the differences are not significantly big also can interpret those changes as the last century changes. We simply cannot ignore the recent (last century) changes due to natural processes and anthropogenic impacts in the Drava Plain. The geology show that the Alföld in the Drava valley is westwards of the to the Mid-Hungarian line (for the description of the Mid-Hungarian line see *i.e.* Csontos & Nagymarossy, 1998 and references therein).

The Southern boundary was described by Bulla (1940). In the case of the Sava valley as the results confirmed by Gaudenyi & Mihajlović (submitted) and suggested and written by Bulla (1940). In the case of the Drava Plain the SW line was the Brod Gate in the Sava Plain. It confirms the Lower Sava Sava Plain is a part of the Alföld (e.g. Gaudenyi & Mihajlović, submitted; Ćalić et al, 2012a, 2012b).

The area of the Alföld southwards fromm the Sava and the Danube was previously defined by Ćalić et al. (2012a, 2012b) and this study also shows that I the studies of Bulla (1940), Kocsis (2018), Gaudenyi & Mihajlović (submitted) got nearly

the same results. Small changes were due to different resolution and scales used for the analysis as well as some (dis)advantages of methods/tools used for the land surface analysis.

The QGIS tool “Roughness” was second time tested for the Western Balkan countries (after Gaudenyi & Mihajlović, submitted). The DEM resolution 100 x 100 m shows similar results as used in the paper of Ćalić et al. (2012a, 2012b) which based on the subsequent calculations and analyses were by using the raster-based GIS software Idrisi Andes. In that case the SRTM was resampled from 90 x 90 m grid cells to 200 x 200 m grid cells. The 5 x 5 cells were gathered into a moving window for calculation of average elevation within a window. In our case when have to make a further generalization. The surface roughness coefficients in the also shown the surface roughness coefficient lower than 5 indicated the plain relief (same cofficients as in Ćalić et al, 2012). However nearly same results got with more simplified method by using QGIS “Roughness” tool. The control checking were done applying the results in the sets of map published by Gábris et al. (2018), Csorba et al. (2018) and Ćalić et al. (2012a, 2012b). Although that different methodology was used the results were similar (nearly the same) which confirms that combined several methods of relief analysis when the authors are familiar with the methodology got proper interpretation and the results are comparable. In our case seems that the delineation of the southern boundary is quite clearly defined (Fig. 3).

Figure 3. The position of the Alföld in the Carpathian Basin (the area of the Alföld is in color). (WHOLE PAGE)

Conclusions

The authors of this study justified to appliy the use of the geographical name Alföld as the proposal of the Alföld Commission of the Hungarian Geographical Society (Cholnoky, 1910) for one of the biggest physico-geographic macroregion / landscape unit of the Carpathian Basin. The frequently used name “Great Hungarian Plain” should be abandoned. If the segment of the Alföld is restricted to the national boundaries it can be used with the prefix which pointed to which country it belongs (i.e. in case of Hungary it should mention as: the Hungarian segment / part of the Alföld).

The southern boundary of the Alföld is well defined (Fig 3 and 4). The results of this study in case of the Drava Plain segment of the Alföld, well defined in this study and nearly the same as in Gábris et al. (2018). The Lower Sava Plain is a segment of the Alföld and confirmed the results of the studies of Cholnoky (1910), Bulla (1940), Gábris et al. (2018) as well as Gaudenyi & Mihajlović (submitted). The south boundary of the Alföld in case of the Serbian segment of the Alföld confirms the results of Ćalić et al. (2012a, 2012b).

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Figure captions:

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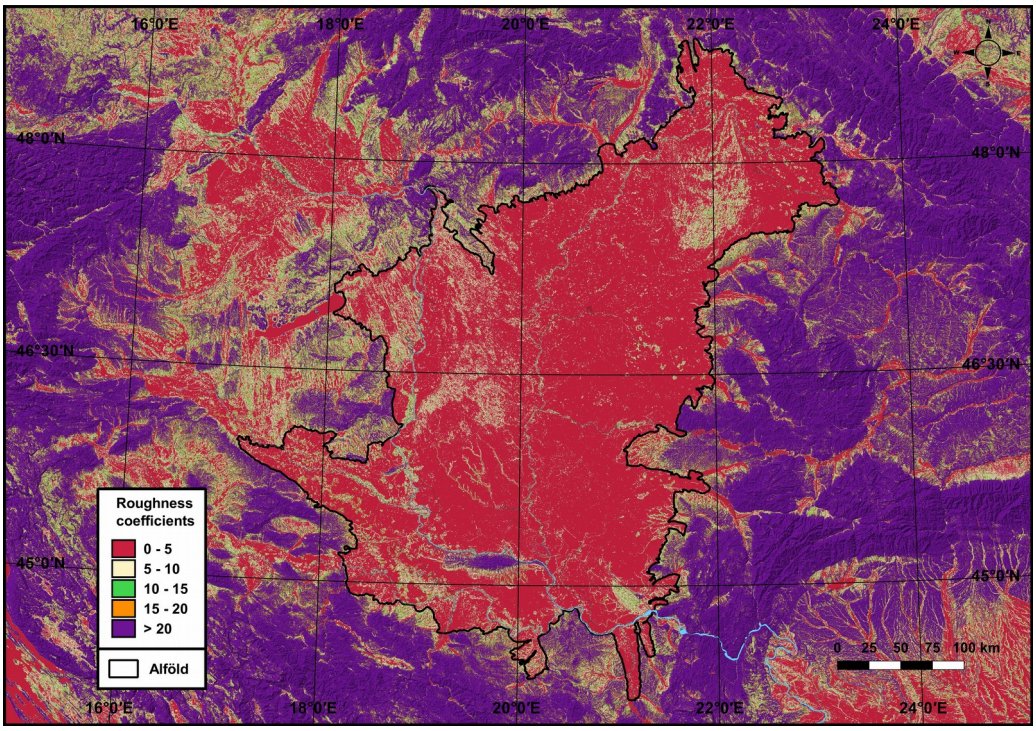
Figure 2. The delineation of the Alföld based on roughness classifcation classes with QGIS software. The Alföld boundary shown with black line.

Figure 3. The position of the Alföld in the Carpathian Basin.


AZ
ALFÖLD
MORFOLOGIAI TÉRKÉPE
MORPHOLOGISCHE KARTE
DES
ALFÖLD
TERV. és RAJZ. (ENTW. u. GEZ.): CHOLNOKY JENŐ dr.
JELMAGYARÁZAT.
Zeichenerklärung.
Az Alföldön kívül fekvő ter.
Nicht z. Alföld gehörige Gebiete.
Tó.
See
Törésvonal.
Bruchlinie.
Alluviális felszín.
Alluviale Oberfläche.
Felső-diluviális felszín.
Jungdiluviale Oberfläche.
Alsó-diluviális felszín.
Altdiluviale Oberfläche.
Pliocén felszín?
Pliocäne Oberfläche?
Törmelékkúp (all., dil., pl.).
Schuttkegel. (all., dil., pl.).
Mocsár, láp stb.
Sumpf, Morast, etc.
Futóhomok.
Flugsand.
Parti düne.
Uferdüne.
Régi folyók.
Alte Flussläufe.
Morotva.
Altwasser.
10 0 10 20 30 40 50 km
BUDAPEST
KECSKEMÉT
SZABADKA
CZEGLÉD
SZOLNOK
DEBRECZEN
Nyíregyháza
Ungvár
Munkács
Szatmár
BÉKÉSCSABA
Gyula
ARAD
MAKÓ
TEMESVÁR
LUGOS
NAGYBECSK
VERSECZ
ZOMBOR
OSIEK
Balaton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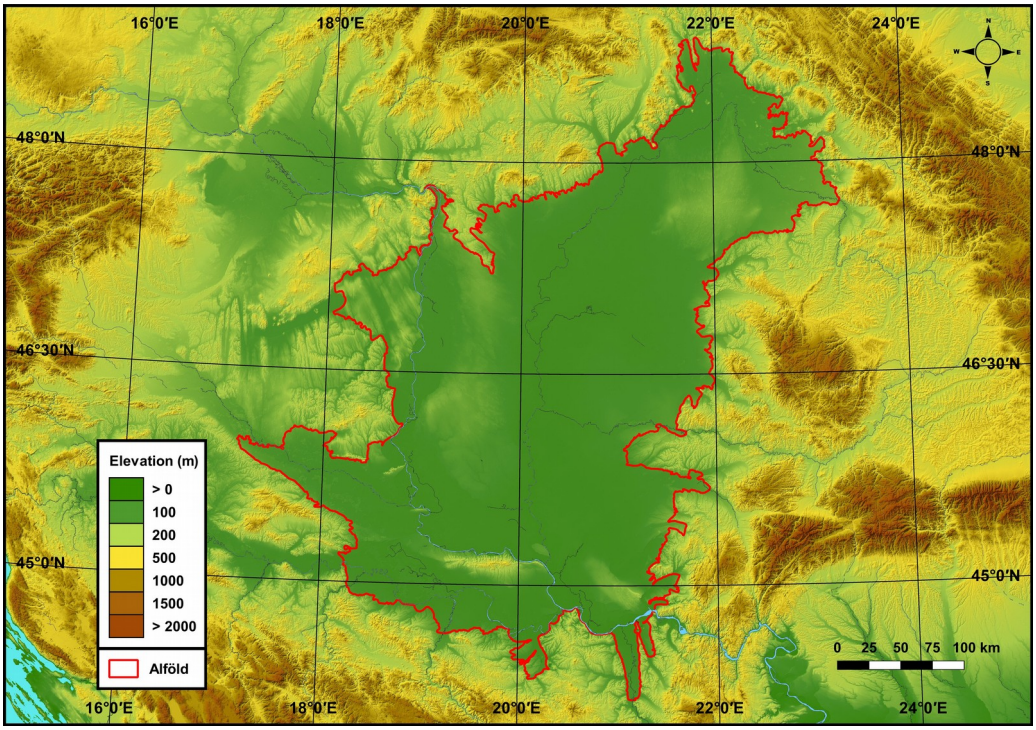
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Alföld
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