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Review article

HISTORICAL CARTOGRAPHY OF SERBIA AND MONTENEGRO FROM THE 2ND TO THE 20TH CENTURY: EVOLUTION OF CARTOGRAPHIC REPRESENTATIONS AND TECHNIQUES

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ABSTRACT

Historical maps represent an important source for understanding the geographical, political, and cultural development of Serbia and Montenegro. This study analyzes the evolution of cartographic representations of these territories from the 2nd to the 20th centuries, focusing on changes in cartographic techniques, spatial representation, and the influence of historical and political circumstances. This research is based on a qualitative approach and employs cartographic, descriptive, comparative and content analysis and semiotic methods to examine selected maps produced by domestic and foreign cartographers. The results indicate a gradual transition from symbolic and itinerary-based depictions in antiquity and the Middle Ages to increasingly accurate topographic and thematic maps supported by standardized cartographic methods. Foreign cartographers played a significant role in documenting and interpreting the region, particularly during periods when local cartographic production was limited. This study also reveals differences in the development of these two cartographic traditions. Serbia established institutional cartographic activities earlier through military and geographical organizations, which enabled systematic surveys and map production. In contrast, Montenegro relied on foreign authors and individual initiatives before achieving more intensive modernization in the 19th and 20th centuries. The findings further demonstrate that cartographic representations were strongly influenced by political, military, and administrative needs. By offering a comparative perspective on the historical cartography of Serbia and Montenegro, this study contributes to a better understanding of the development of cartographic knowledge in the Balkans. It highlights the enduring value of historical maps in interpreting past spatial relationships and supporting contemporary cartographic research.

Keywords: *Serbia, Montenegro, historical cartography, old maps, cartographic techniques*

THEORETICAL AND METHODOLOGICAL INTRODUCTION

Serbia and Montenegro is characterized by a rich history expressed through territorial and political changes visible on historical maps. These maps represent geographical depictions from the earliest periods, when names and borders were first recorded, to modern cartographic representations. Over time, the territory of Serbia and Montenegro has been the subject of various cartographic interpretations, conditioned by political, social, and technological circumstances.

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Old and new maps provide a unique insight into the cultural and historical value of a region. Although they originate from different time periods, their significance does not diminish but rather remains permanently present as an "antidote to forgetfulness," indicating ways of resolving historical, political, and geographical problems. The role of old maps is reflected in their ability to provide insight into historical spatial relationships and the context of their creation. The literature emphasizes that they reflect the specific characteristics of the time and place in which they were created (Grčić M., Grčić Lj., 2019, p. 600). Within historical cartography, old maps serve as primary or secondary sources for analyzing earlier spatial distributions (Grčić M., Grčić Lj., 2022). The aim of this paper is to analyze the development of cartographic representations of the territory of Serbia and Montenegro from the 2nd to the 20th century, created by domestic and foreign cartographers, with a focus on changes in cartographic methods, spatial representation and interpretation of politico-territorial and socio-geographical relations throughout history. The aim of the paper is not to encompass all the maps on which the territories of Serbia and Montenegro are shown, which is almost impossible, especially in a work of this scope.

In accordance with the objective of this study, the following tasks were defined:

- identify the main phases of the development of the cartography of Serbia and Montenegro through historical periods, - to analyze the changes in cartographic techniques and representation methods,

- compare cartographic representations in order to observe continuities and discontinuities,
- interpret the socio-political context of the maps (borders, power),
- determine the contribution of domestic and foreign cartographers to the development of the region's cartography.

In accordance with the objectives of this study, the following research questions have been formulated and addressed in the subsequent sections:

- How did cartographic techniques and methods of spatial representation develop in Serbia and Montenegro over different historical periods?
- How did foreign cartographers shape the development of cartography in Serbia and Montenegro?

Although numerous studies have focused on individual maps and the developmental phases of Balkan cartography, Serbia, and to a lesser extent, Montenegro, a lack of comparative analysis of the development of cartography between Serbia and Montenegro over a long period of time is evident, which can be characterized as an insufficiently researched aspect, with a noticeable imbalance in the scope and detail of the research in favor of Serbia over Montenegro. The research topic, which deals with old maps of Serbia and Montenegro, is important because it provides insight into the development of cartography in this part of the Balkans and contributes to a better understanding of the historical and geographical context of these countries. This topic is significant in historical cartography, geography and history.

From a methodological perspective, the development of geography and cartography has been largely shaped by the positivist approach, which emphasizes the measurement and analytical presentation of space (Grčić M., Grčić Lj., 2019). A "good" map is defined as one that corresponds as precisely as possible to real spatial relationships, with precision and accuracy being considered the basic criteria of cartographic value (Andrews, 2001). This approach is relevant when analyzing more modern cartographic representations of Serbia and Montenegro, in which a tendency towards standardization and geometric accuracy is observed. The difference between accuracy and precision is evident in the analysis of old maps of Serbia and Montenegro, where cartographic representations do not fully meet modern standards of geometric precision but rather reflect the knowledge available at the time they were created. The historian of cartography J. B. Harley in his works (1988, 2001) emphasized that maps are representations of reality but also a tool of power and ideology, especially during the era of colonial history, as they shape the way people see the world and act in it. This approach is applicable to the analysis of historical maps of Serbia and Montenegro, as they reveal diverse ways of interpreting territory and borders depending on the historical and geopolitical context. Similarly, geopolitician Gearóid Ó Tuathail (1996) pointed out that geopolitics cannot be viewed as an objective given but rather as a discursively constructed phenomenon through texts, maps, and policies, with maps

participating in the shaping of spatial and political narratives. Cartographic representations influence the perception of space, but their "power" depends on the context in which they are created and used, which remains relevant in modern digital cartography and GIS.

This research is based on a qualitative approach. This study applied the cartographic method as a basic framework for the identification, systematization and analysis of historical maps of Serbia and Montenegro, using scientific literature (monographs, scientific papers) to provide theoretical ground and contextualize the material under research. The descriptive method was used for the systematic description of the content and physical characteristics of old cartographic sources, including their graphic representation and spatial organization in the context of the time in which they were created. The comparative method was applied to analyze maps from different periods to observe changes in the representation of space and the development of cartographic techniques. Content analysis was used to examine the elements of individual maps, such as toponyms, symbols and spatial relationships, while semiotic analysis enabled the interpretation of the meaning and function of cartographic signs.

The territorial scope of the research includes the territory of Serbia and Montenegro, whose borders, as with many other countries, have changed throughout history. The time period spans from late antiquity (from the 2nd century), when rudimentary ancient cartographic representations appeared, to the 20th century. The analysis has a longitudinal temporal framework, as data are collected at several time points, through "multiple pictures" over time, across different epochs. Experts (Grčić M., Grčić Lj., 2019) define the time frame of old maps from the 2nd century to the 20th century. Considering this expert definition and the relevant literature, this study adopts the aforementioned time frame. Some authors (Radulović, 2020) narrow this framework to the period from the 4th to the 20th century. Slight differences in periodization stem from different approaches to defining the initial cartographic sources.

This study consists of several parts. The first part is a general overview divided into the main periods of development. The second part provides a chronological overview of Serbia on the old maps. The third part offers a concise overview of Montenegro on old maps. The conclusion summarizes the importance of old maps and their characteristics.

Overview of previous research

Previous research on the cartography of Serbia and Montenegro includes different approaches, from books to scientific papers in cartography. The literature can be divided into works that provide a general overview of the development of cartographic science and those that focus on the national specificities of cartographic representation. The books *Kartografija* (Peterca et al., 1974), which provides an overview of the history and basics of cartographic science in the Yugoslav region, and *Kartografija* (Borisov, 2020), which provides a more detailed analysis of the development of cartographic science and methodological approaches to the creation and interpretation of cartographic content, were used.

Studies focused on the development of cartographic depictions of Serbia, Montenegro, and the Balkans include the book *Serbia and the Balkans on Old Geographical maps of European Cartographers from the 2nd to the 20th century* by Mirko and Ljiljana Grčić (2019), which provides a broad chronological overview of the development of the cartographic representation of the region, as well as the work *Development of Serbian Cartography from the end of the 18th to the beginning of the 20th century* (Grčić, 2019), which focuses on the main stages of development and the most significant cartographers of that period. A similar approach is also present in the paper *Geographical maps of Serbia and Montenegro by Russian cartographers in the 19th century* (Grčić, 2021), which analyzes how the area was represented after the wars with the Ottoman Empire. The paper *Outstanding results of Serbian military topographic and cartographic activity* (Bakrač et al., 2024) extends this analysis to the development of military cartography and its modern technological development. In addition, the literature includes cartographic sources. Thus, *the Map of Serbia and Montenegro* (Cvijić, 1911) and *the General Map of the Kingdom of Serbia* (1893) are important sources for analyzing political, territorial, and topographic representations of the late 19th and early 20th centuries.

The development of Montenegrin cartography is specifically covered in the paper *Cartography of Montenegro with the emphasis on its earliest domestic maps* (Radulović, 2020), which analyzes the formation of Montenegro's domestic cartographic tradition from the 4th to the 20th century. Petrović and Živković (1985), Goffart (2003), Vemić (2005, 2007), Rosenberg and Grafton (2012), Živković (2012), Glišović and Gardašević (2015), as well as publications of the National Museum of Montenegro (Radović, 2022), also contribute to the study of the cartography of the region.

GENERAL OVERVIEW OF THE CARTOGRAPHY OF SERBIA AND MONTENEGRO

The historical cartography of Serbia and Montenegro can be divided into several development phases, with periodizations in the literature varying depending on the criteria applied - historical, political or technological division criteria (Peterca et al., 1974; Grčić M., Grčić Lj., 2019).

- Primitive society and antiquity - the first forms of cartography in the era of prehistory and ancient civilizations;
- Feudalism and the Middle Ages - cartography was primarily functional in a religious context, with an emphasis on theological and ideological representations of the world;
- The era of the Ottomans, the Venetians and the Habsburgs, the Renaissance - the influence of the great empires led to the development of more accurate maps, with the influence of Renaissance ideas and the exploration of new territories;
- 19th and early 20th century (modern cartography) - geographic maps were created with an emphasis on infrastructure planning and administrative needs;
- Between the two world wars (civil cartography) - cartography became important for the state organization of the Kingdom of Yugoslavia;
- After the Second World War - cartography was used to plan the development of the SR of Montenegro, the SR of Serbia and the SFRY itself;
- The end of the 20th century refers to digital and GIS cartography.

Although classic printed maps are still used, modern web cartography represents a more dynamic and technologically advanced approach (Govedarica, Borisov, 2011; Župan, Frangeš, 2007).

REPRESENTATION OF SERBIA ON OLD MAPS

Maps of Serbian territories of the ancient and medieval period

Old maps of Serbia and the Balkans represent a valuable source of data on geography, borders, roads and settlements, with significance for social development and military needs. The oldest surviving maps of the Balkan Peninsula come from Ptolemy's *Geography* (100–178) and its Renaissance reproduction (Mihailović, Vračarić, 1989; Grčić M., Grčić Lj., 2019). The first maps of the territory of today's Serbia were created in antiquity, when the Greeks and Romans mapped parts of the Balkans (Fig. 1), providing basic information about the location of important cities and mountains.

Peutinger's map from the 4th century, one of the rare ancient depictions of Serbia, covers the areas of the Balkan Peninsula from the Gulf of Trieste to the mouth of the Danube with the Black Sea, Constantinople, the Adriatic part of Italy and the Mediterranean coast of Africa, to the confluence of the Nile with the Mediterranean Sea, with numerous anthropogeographical data. The board is composed of 12 parchment sheets for practical reasons, different from most ancient earth maps (Grčić, 2017).

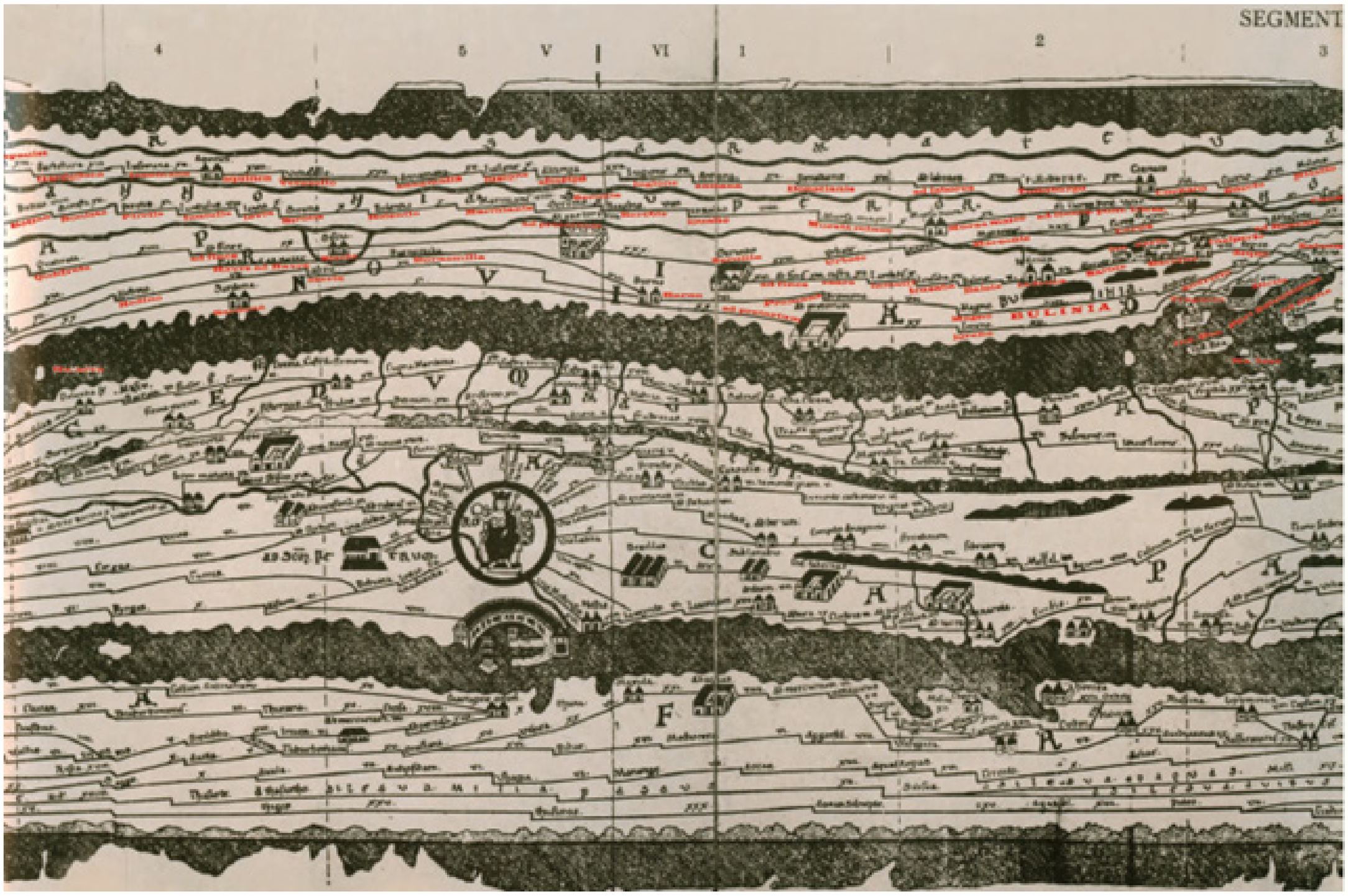


Figure 1. Peutinger's map (segment VI), from Aquileia to Constantinople (according to K. Müller), with an amended (red) transcription

Source: Grčić M. & Grčić Lj., 2019, p. 58

The map has a schematic itinerary representation of space, characteristic of ancient cartography as a travel guide, with visible east–west distortions that indicate a limited degree of geodetic knowledge of the region at the time of its creation. Physical-geographic elements are shown symbolically: relief as a series of hills and mountain ranges, and watercourses with linear symbols along communication routes. Socio-geographic content takes a dominant position, especially the network of Roman roads with marked stations and cities in the study area. This early phase of cartographic development indicates that space was not understood as a precisely defined territory but as a network of movement.

At the beginning of the Middle Ages, when the Slavs settled the Balkan Peninsula and gradually became the bearers of the local culture, there was a stagnation in the development of geographical knowledge during that period, and during the early medieval period (7th to 12th centuries), its regression was also observed. Nevertheless, the world map of the Arab geographer and cartographer Idrisi from 1154 is significant for that period. The relief and rivers are drawn imprecisely, with the Danube and the Morava being highlighted. In western Serbia, there is an unnamed river that is the Drina with the Lim according to its source, and the Sava at its mouth (Grčić M., Grčić Lj., 2019), which indicates the hydrographic inaccuracy of the map, and the mountain ranges are also shown in a scattered and colorful manner. Cities and towns are represented by circular symbols (dots), with an internal mark in the form of a six-pointed star, which is a decorative cartographic sign or an ornament of oriental art, because the six-pointed star (hexagram) is not a standard cartographic symbol (in modern cartography), while mosques are most often marked with a symbol of a green circle with a short vertical line above it, which ends with a rounded element at the top.

In the late Middle Ages (13th –15th centuries), not a single cartographic monument was preserved in Serbian lands; the centers of cartography were in Italy (Genoa, Venice) and Catalonia. The most significant ex-

ample is Fra Mauro's world map from 1459, with more details about Serbian territories. Servia (Serbia) and Rassia (Raška) are marked, and information on the presence of gold and silver is also given, which points to the rich mineral resources of medieval Serbia. In addition, the cities of Belgrado (Belgrade), Nisau (Niš), Formosa (numerous fortresses), as well as rivers and numerous other elements are shown. For its time, the map is an extremely valuable and informative cartographic representation. Such a presentation was in accordance with the possibilities and needs of the time in which it was created, which is why it should be interpreted in the context of the level of knowledge and technique of that era, and not according to today's criteria. This pattern should also apply when studying all historical maps. On that map, the mountains are depicted schematically, the size of the inscriptions indicates the importance of the place (Peterca et al., 1974; Grčić M., Grčić Lj., 2019), and the rivers are shown as double lines, with a highly meandering flow. Based on this map, another map was created, whose author has not been identified with certainty, but it is assumed that it comes from the workshop of Fra Mauro. It shows the courses of the Danube, the Sava and the Morava rivers, as well as the cities of Belgrade, Smederevo and Golubac. In addition, other cities in the interior are also included, which are recorded on Fra Mauro's map (Vasin, Krunić, 2019). Thus, during the period of Byzantine and Serbian rule, cartography was not developed as a scientific discipline, but mainly theological "spherical" *mappa mundi* pictures of the world existed. Medieval maps also contain illustrations and pictorial (pictographic) representations of saints and emperors that we would recognize today as supplementary elements of the map.

REPRESENTATION OF SERBIA ON MAPS FROM THE 16TH TO THE 19TH CENTURY

In the 16th century, in addition to the editions of Ptolemy's maps, individual maps of Europe appeared, showing the territory of Serbia. On Münster's map of Poland and Hungary from 1550. Kosovo polje appears for the first time in cartographic material (Peterca et al., 1974; Grčić M., Grčić Lj., 2019). From the 16th to the 18th century, Serbian cartography developed under the influence of the Ottoman Empire, the Habsburg Monarchy and the Republic of Venice. The Renaissance maps of Gerhard Mercator reflect the development of geographical knowledge and represent the basis for the era of large atlases. Among them are maps such as "Walachia, Servia, Bulgaria, Romania", then "Sclavonia, Croatia, Bosnia cum Dalmatiae parte " and the map of "Wallachia, Serbia, Bulgaria and Romania" from 1589. In this context, a shift towards more standardized cartographic signs is observed, where geographic data is increasingly transmitted through a system of topographical symbols that would remain in use in the following centuries (Grčić, 2022). The borders between the Habsburg Monarchy and the Ottoman Empire, as well as settlements, already appear on maps in the 17th century. These are broader changes in the political cartography of that period.

Under Turkish rule, the people had no conditions for cultural work, as they were preoccupied with the struggle for survival; therefore, in the 18th century, there were no conditions for making their own maps. In the 18th century, Habsburg institutions played a more significant role in cartographic activities, beginning with more systematic surveys of the region. At the same time, the interest of European centers such as Venice, Vienna, Rome, Antwerp and Paris in the Balkan region grew, partly due to geopolitical and military circumstances. Most of the old maps of Serbia were published in Western European centers at the time of Ottoman rule, where the Ottoman presence was shown only symbolically (Grčić, 2020; Grčić M., Grčić Lj., 2019). Such representations indicate that maps are not always neutral but rather reflect certain interpretations of space and power, which is in line with the theoretical approaches of Harley (2001). In this sense, cartographic representations of the Ottoman presence are often understated. This was an attempt to shape a narrative of power that did not correspond to the actual political relations on the ground. Along with the development of Serbian civil society in the regions under Habsburg rule in the 18th century, cartographic activity also began (Peterca et al., 1974).

The development of Serbian cartography in the 18th century is linked to the strengthening of civil society in the Habsburg regions. Zaharije Orfelin (1726–1785), one of the most versatile Serbian creators and edu-

cators in the 18th century (Bajin et al., 2012), created one of the earliest examples of domestic cartographic production: the plan "Grunt of Krušedol Monastery".

The map "Zemljoobraženie Srbske, Bosna, Dalmacija, Dubrovnik, Crne Gore" from 1805, created by Sava Popović Tekelija (1761–1842) from Arad, is significant for Serbian cartography because it was written using Cyrillic script. This map also comprises several (different) maps. Although Austrian cartography was still the most active, Russian cartographers began intensively collecting data and creating maps of the Balkans from the beginning of the 19th century. French cartographers had wide opportunities owing to the presence of the French and political-diplomatic relations with Turkey. German cartographers did not want to be left behind, and in the middle of the 19th century, especially in Serbia, a domestic cartographic industry began to develop (Fig. 2) (Peterca et al., 1974). After Serbia's autonomy was recognized in 1830, the first large-scale maps were made based on Russian surveys, including a 1:168 000 scale map made in Petrograd. This map is large-scale and relatively uncommon compared to standard school and overview maps.



Figure 2. Map of Serbia, author Stevan Milošević
Source: Peterca et al., 1974

Stevan Milošević's "Map of Serbia" from 1822 represents an early example of national cartographic production. The relief is depicted with prominent mountain ranges and their directions of extension, without a quantitative display of heights, while the hydrographic network is clearly highlighted, especially in the valleys and along communication routes. The socio-geographical content includes numerous settlements and a hierarchical system of cities, towns and villages, with administrative and political centers such as Belgrade and Smederevo being highlighted. The inscriptions and graphic style indicate a connection to the European cartographic tradition of that period, and the intended use of the map for a domestic and wider (foreign) audience. There is a clear improvement in the cartographic presentation in relation to the Middle Ages, especially compared to Roman and Greek maps, especially since the cartographic network is also visible.

As early as the 1840's, cartography in Serbia developed greatly and a series of various maps was created by Bugarski (Fig. 3) - "Map of Serbia" from 1845, Jovan Milenković - "Map of the Principality of Serbia" from 1850 and other authors (Burić, Barović, 2005).

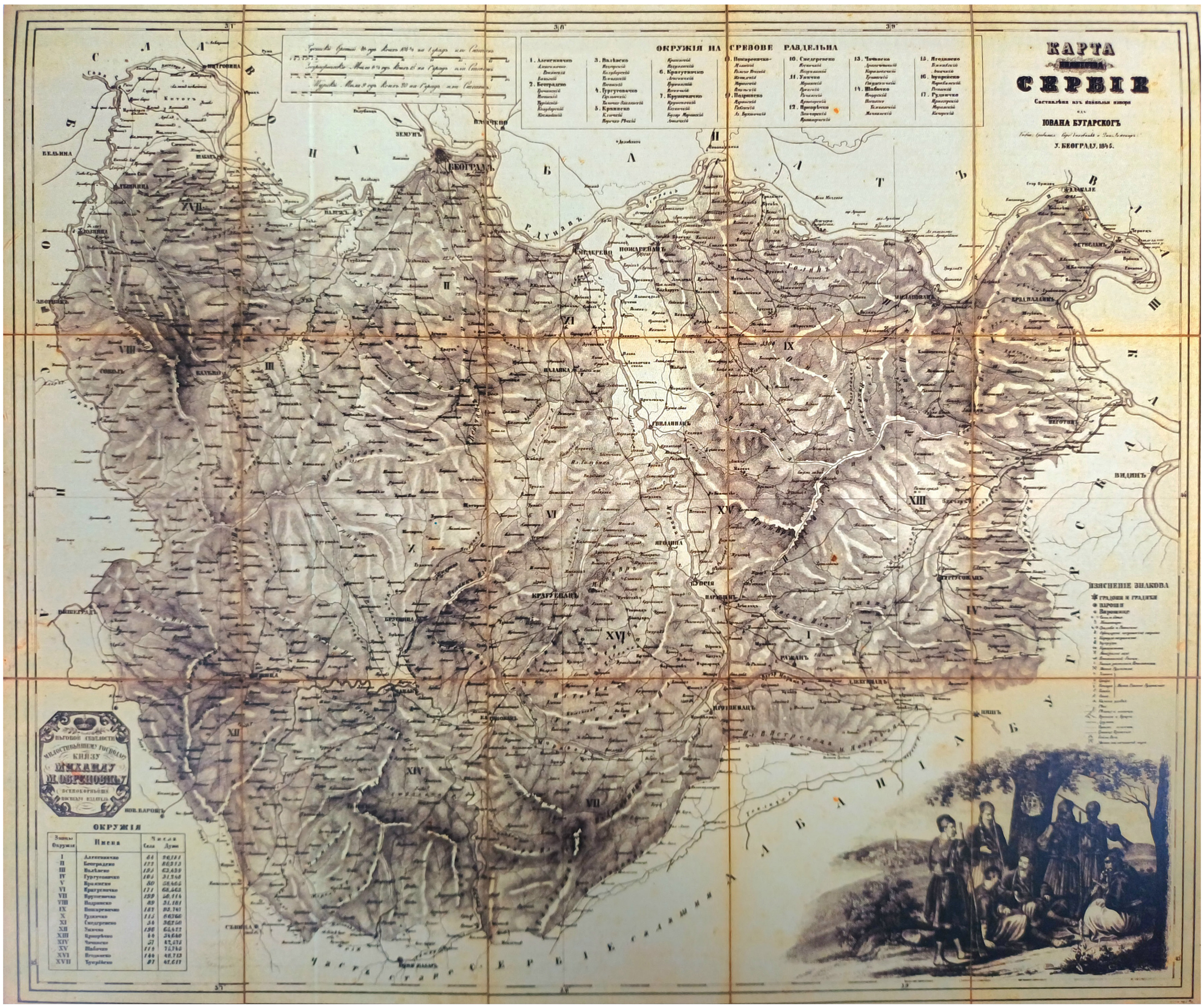


Figure 3. Jovan Bugarski: Map of Serbia, 1845.
Source: Grčić M., Grčić Lj., 2019, p. 547

Until the Congress of Berlin in 1878, maps of Serbia were based on maps from the 17th and 18th centuries (Coroneli's and Mercator's maps). A map by the Vienna Military Geographical Institute (VGI) at a scale of 1:300 000 (*Generalkarte von Bosnia und Herzegovina, von Serbien und Montenegro*) from 1876, which included the

territory of Serbia, was acquired for military purposes. A new method in Serbian cartography began in 1878 when the Geographical Department, the first institution for topographic survey and cartography intended for military purposes, was established within the Main General Staff of the Serbian Army (Vemić, 2007). The main and most important work of the Department was the "General Staff Map of Serbia" at a scale of 1:75 000, composed of 94 sheets, which was created based on a topographical survey at a scale of 1:50 000 (1881–1892). The basis of the map was formed by geometric points determined by graphic triangulation, starting from the points of Russian trigonometric triangulation along the Serbian-Turkish border (Peterca et al., 1974).

As part of the activities of this department, a map of the South Morava Basin (1881) was created. This is interesting because it is the first map created as a result of the work of the Geographical Department in Belgrade, Serbia. The map shows the hydrological system of the South Morava, including its mainstream and tributaries, up to its confluence with the West Morava near Stalać. Unlike earlier cartographic representations from the first half of the 19th century (Fig. 2), these maps are based on much more precise geodetic data obtained from a systematic survey in the 1880s. Relief is shown using the hatching method (by shading). This achieved a pronounced spatial and visual effect. The contemporary understanding of the Morava Basin indicates a perception of the spatial directions of movement for people and military forces, where knowledge of the terrain represents a significant strategic advantage, as control and knowledge of geographic space is a form of power, in accordance with the theoretical approaches of Harley and Tuathail, who treat geography as a factor in the construction of power.

Despite the Ottoman period, before the end of the 19th century, due to its high-quality maps, Serbia was among the few cartographically covered countries in Europe (Bakrač et al., 2016). In that period, Serbia was relatively early included in European-type cartographic processes. At the end of the 19th century, the geological cartography of Serbia also emerged as a special form of thematic cartography. In 1891, Jovan Žujović published the "Geological Map of the Kingdom of Serbia" on a scale of 1:750 000, while at the beginning of the 20th century, the "Mining Map of the Kingdom of Serbia" appeared (1900). Along with Cvijić's "Geological map of Old Serbia and Macedonia" (1903), these maps are singled out in the literature as an important basis for the development of geological cartography in Serbia (Vemić, 2007). In this period, Jovan Cvijić's contribution to the development of thematic cartography is significantly noteworthy, because his works and methodology contributed to the development of diverse types of thematic maps (Petrović, Živković, 1985), i.e., geological, hydrographic, ethnographic and others. Until 1899, the Geographical Department was focused on cartographic work and the production of maps at scales of 1:25 000 and 1:50 000 (Bakrač et al., 2024). A standardized approach to spatial mapping was gradually established.



Figure 4. Part of the General Map of the Kingdom of Serbia from 1893 (R 1:250 000)
Source: National Library of Serbia

The general map of the Kingdom of Serbia (Fig. 4) represents an example of a state topographical school from the end of the 19th century. The relief of Kragujevac is shown by hatching, while the mountainous and lowland forms of the space are differentiated through different display intensities. The meanders of Kragujevac's most important river, the Lepenica, with its tributaries (blue), are also recognizable. Forests are marked in green, and agricultural areas in lighter tones. The map shows borders, settlements and the transportation network, along with the cartographic network, despite the density of information, it clearly reflects the territorial organization of space. The map shows that the area has been measured, systematized and put into service for management, therefore knowledge of relief, settlements and traffic is the basis for state control and modernization. The enlarged segment of the map shows the application of geometric methods (elevation) and plastic methods - screws. The explanation of the topographic signs in the legend is given quite exhaustively, and the scale and protractor as supplementary elements of the map are given both textually and graphically. Topographic signs are depicted with symbols, lines and colors for settlements, waters, transportation and terrain; the legend is detailed, but not exhaustive by today's standards, since

internationally standardized symbolic systems have been developed in the modern cartographic context, while in earlier periods states and institutions used their own, often inconsistent, cartographic markings.

In contrast, the General Staff Map of the Kingdom of Serbia on a large scale (1:75 000) represents a detailed topographical depiction intended for military and administrative purposes, with an emphasized hilly relief of Šumadija shown by hatching and elevations, and a clearly developed network of roads and settlements.

MAP OF SERBIA IN THE 20TH CENTURY

The cartographic activity of Serbia in the 20th century progressed but did not fully compensate for the fall behind in relation to developed European countries. In 1920, the Geography Department was transformed into the Geographical Institute (in 1923 into the Military Geographical Institute - VGI) and the basis for precise recording and development of topographic, cadastral, engineering and geological maps was established (Vemić, 2007; Radošević, 1974).

The VGI, Serbia and the region were strongly influenced by the Balkan Wars and the First World War, along with significant territorial changes in Serbia (expansion into parts of Macedonia and Kosovo). After the Balkan Wars, the Geographical Department continued its work even in wartime conditions. Multicolored maps (R 1:1 000 000), such as the Map of the Kingdom of Serbia and the New Map of the Serbian Regions, with the relief shown on a hypsometric scale, were created (Bakrač et al., 2016). Throughout this period, the borders of Serbia changed, and this is reflected on the maps that show the Kingdom of Serbia.

The Geographical Department continued its activities during World War I as the Topographical Department of the Supreme Command. It also created a new "Map of Yugoslav countries" at a scale of 1:200 000. Work on the map began in Serbia in 1915 but was completed in Greece in 1917. The maps of the Geographical Department were used as the primary source for the creation of all maps of Serbia (Peterca et al., 1974), meaning that they were the basic (reference) maps for creating other specific maps, whether thematic or military. Thematic maps based on the 1921 census also began to appear, such as the Population Density Map and the Population Map by Religion, published in 1923 in the Bulletin of the Serbian Geographical Society (Grčić, 2019). Many individuals, such as Jovan Cvijić, also engaged in making maps during this period. He rejected maps whose depictions were based on speculation rather than field research (Vemić, 2005), which is consistent with Cvijić's scientific research method, as he advocated for scientifically grounded descriptions and maps, field work and detailed field analysis. Cvijić and other authors produced a large number of school wall maps and atlases, overview maps and the like (Peterca et al., 1974). In "Cvijić's Book" (1927), published on the occasion of his death, Borivoje Milojević lists 22 of Cvijić's works (books, atlases and maps) in the Serbian language. Vemić (2005) highlights several of his maps from that review:

- Map of Serbia and Montenegro (R 1:750 000), first edition in 1897, second in 1898 and third in 1911, Vienna.
- Map of the Kingdom of Serbs, Croats and Slovenes (R 1:500 000), 1922, Vienna.
- Map of the Kingdom of Serbs, Croats and Slovenes (R 1:1 200 000), 1922, Vienna.



Figure 5. Old Serbia and Macedonia

Source: Cvijić, 1910

On the political map of Old Serbia and Macedonia (Fig. 5), physical-geographical elements are not mapped, but the socio-geographical content is dominant. State borders are shown (Kingdom of Serbia, Austria-Hungary, Bulgaria, Romania), as well as historical-geographical regions such as Old Serbia, Macedonia and Albania, along with major urban centers. The names of the areas and the way they are demarcated also have an ethno-political interpretation, reflecting the significance of those areas for Serbia on the eve of the Balkan wars. Borders are represented by lines, and names are provided in the text.



Figure 6. Map of Serbia and Montenegro, author Cvijić, 1911

Source: Internet 1.

The map of Serbia and Montenegro (Fig. 6) has a predominantly physical-geographical character. Unlike the map of "Old Serbia and Macedonia " (Fig. 5), the relief is in the foreground here, with the Dinaric and Balkan orographic systems highlighted. The physical-geographical elements are depicted using modern techniques, primarily by hypsometric coloring (hypso-scale in the upper left corner; different shades of brown and green for altitude zones). The coast of the Adriatic Sea is precisely represented, as well as settlements, roads and administrative boundaries, which are more subtly depicted than on the political map of Old Serbia and Macedonia. The map is characterized by high cartometric accuracy, with an indicated scale, scale and legend bar, as well as combined display methods.

The last map of the Kingdom of Serbia, created before the First World War, showed the new borders of Serbia and Montenegro. The author was the prominent military cartographer Stevan Bošković. Although

on a smaller scale (R 1:1 000 000), the map was created as a general overview of a larger territorial scope, which enabled a clear spatial readability of basic geographical elements, especially borders and toponyms. The cartographic representation included symbols for monasteries, mosques, roads of various categories (the first, second, and third-class roads), railways, rivers, ponds, mines and spas. Experts (Jovan Cvijić, Rista Nikolić, and Jevto Dedijer, among others) consider this map to be one of the best works of Serbian cartography. In terms of mathematical elements, the map contains a coordinate grid, which indicates a satisfactory degree of accuracy and usability of the map for field navigation and planning. In the literature (Ilić, 2023), the prominent level of professional craftsmanship and importance for the development of Serbian cartography of that period is highlighted, and Bošković is the most famous Serbian surveyor and cartographer.

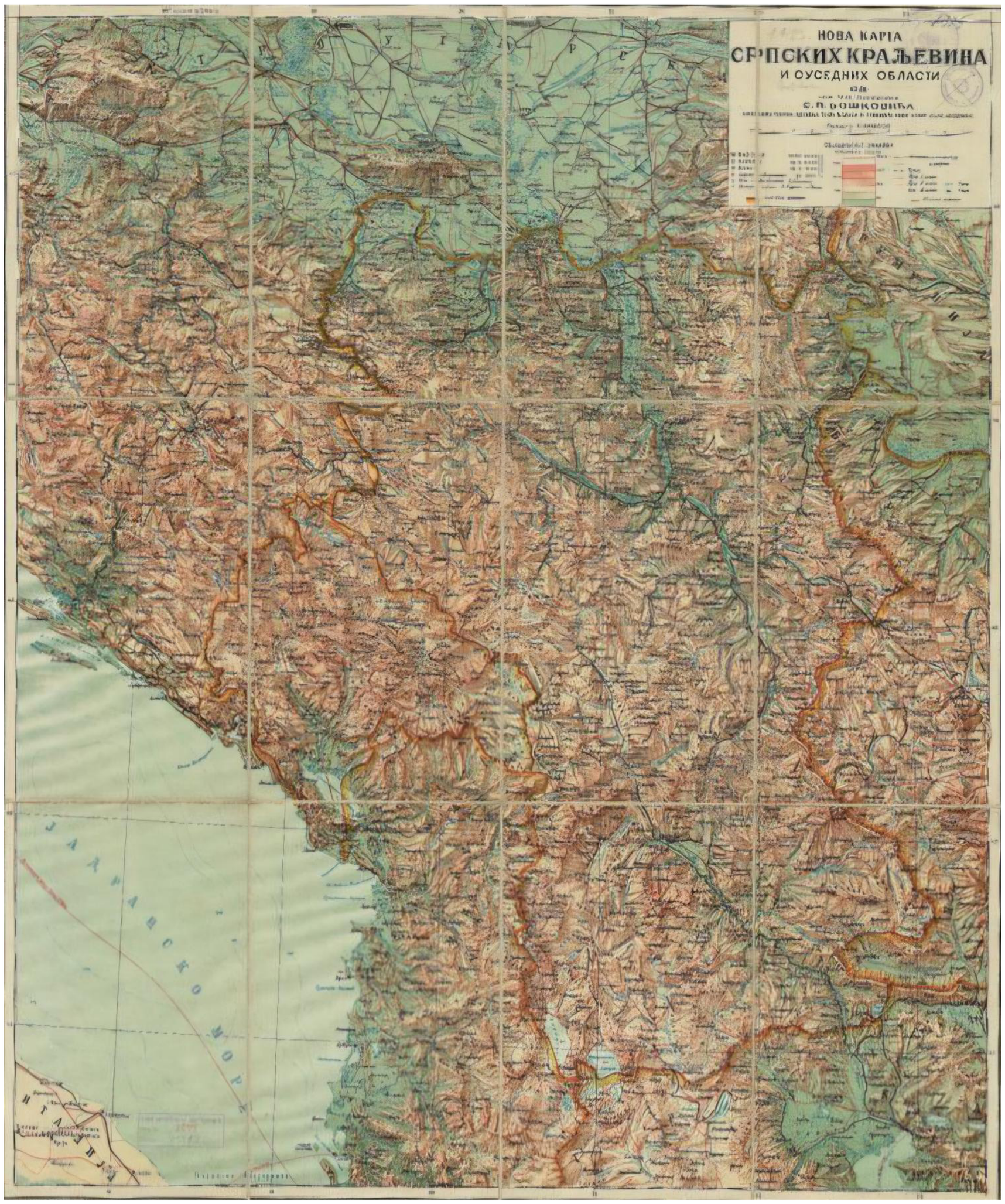


Figure 7. New map of the Serbian Kingdoms and neighboring areas (1914), author Stevan Bošković

Source: Ilić, 2023

If you compare the 1914 map (Fig. 7) and the 1893 map prepared by the Main General Staff of the Serbian Army (Fig. 4), it can be seen how cartography developed from the 19th to the 20th century. The general map of the Kingdom of Serbia, created by the Geographical Department of the Main General Staff, has a predominantly military-topographical character. It is detailed, but visually complex and intended for experts, with an emphasis on terrain, communications and strategic directions. The new map of the Serbian Kingdoms and neighboring territories (1914) was created in a different historical context - after the Balkan Wars, when Serbia achieved significant territorial expansion and the map reflects the idea of the Serbian state and national space. The inclusion of "neighboring areas" suggests that the area is perceived as part of the broader political environment and Serbia's interest in the region. However, this can also be interpreted simply as encompassing the surrounding territorial units for a more comprehensive presentation of geographical relations at a given historical moment. In this way, the map reflects the political-territorial organization of space during that period. It more clearly depicts borders and natural entities, and its content is adapted to a wider range of users.

Table 1. Comparative analysis of old maps

Aspect of comparison	**General map of the Kingdom of Serbia (1893)**	**New map of Serbian Kingdoms and neighboring countries (1914)**
Historical context	End of the 19th century	Beginning of the 20th century (after territorial expansion)
Primary purpose	Military-topographic	General geographical map
Relief view	Medium scale, relief shown with elevations and hatches	Small scale, relief shown with elevations and hypsometric scale
Developmental significance	Representative of 19th century cartography	Representative of 20th century cartography

Source: author's processing

After the First World War, the cartographic situation in Serbia was difficult due to the destruction of a large part of the cartographic material (Radošević, 1974). However, during the interwar period, the surveying of the wider area of Belgrade, Zemun and Pančevo continued at a scale of 1:25 000. With the creation of the Kingdom of SHS in 1918, new organizational and methodological issues were opened in the field of cartography; thus, in the period 1920–1934, a new topographical survey was carried out at a scale of 1:50 000, based on which maps were made at a scale of 1:100 000 and 1:50 000 (Vemić, 2007; Bakrač et al., 2016).

During the Second World War, cartographic activities were interrupted, and the VGI suffered destruction. After 1944, reorganizations followed, and by 1946, conditions for the renewal of geodetic and cartographic activities were created. (Bakrač et al., 2016). Between 1946 and 1963, VGI published pre-war maps and produced new editions, including the "Map of the Democratic Federative Yugoslavia " (1:750 000), which was later reprinted several times (Peterca et al., 1974). In the second half of the 20th century, the intensive production of topographic maps at various scales (1:25 000, 1:50 000, 1:100 000) continued, as well as the production of overview maps of a wider area, including the FPRY map (1:500 000) from 1952.

After the Second World War, the work of VGI focused on topographic maps, with the parallel development of geographic, thematic and geotopographical materials. At the same time, the process of geological mapping and mineral resources exploration intensified, while the first sheet of TK25 was printed in 1951 (Vemić, 2007; Bakrač et al., 2016). In the last decades of the 20th century, thanks to the development of digital technologies and an interdisciplinary approach, there was a significant improvement in the processing and presentation of spatial data (Živković, 2012). Serbian cartography at the end of the 20th century recorded further development through the modernization of production methods and the application of modern technologies.

REPRESENTATION OF MONTENEGRO ON OLD MAPS

Old maps of the territory of today's Montenegro in the ancient and medieval period

In antiquity and the Middle Ages, cartographic depictions of the territory of today's Montenegro were rudimentary. Similar to the case of Serbia, a large number of cartographic sources show the territory of today's Montenegro within the wider Balkan and Mediterranean context. Duklja (an ancient and early medieval region) stretched from Durres and Lješ to Ulcinj, Bar and Kotor, and in the mountainous regions it bordered Serbia. The oldest mention of Duklja appears in Ptolemy under the name *Doklea* and in Pliny as *Docleates*, and in the time of Constantine Porphyrogenitus, it was described as a deserted city.

The map of the French royal cartographer Guillaume Delisle recorded *Rhisena* (Risan), *Duklja* (near Podgorica), *Butova* (Budva) and *Antibaris* (Bar), while settlements in Duklja, such as Gradac, Novigrad and Lontodokla, were not represented (Novaković, 2006; Grčić M., Grčić Lj., 2019). Duklja was located in the territory of today's Montenegro, part of the Adriatic coast from Boka Kotorska to Lake Skadar, with the hinterland towards Zahumlje and Travunia, and in the 11th century, it expanded towards Raška and Bosnia (Jovanović, 2016). Ptolemy's maps from the 2nd century AD, which reached Europe through the Byzantine tradition and were later reproduced in Renaissance editions, represent one of the early cartographic representations of this area. In the 1513 edition, the regions of today's Montenegro were shown as part of a broader regional overview. The territories of Montenegro are also found on a 4th-century Roman road map. The territory of Montenegro was shown on the maps of Ptolemy (Fig. 8) and Konrad Poitinger during the Roman period as part of the provinces of Dalmatia and, later, Prevalitana.



Figure 8. Ptolemy's Tabula V showing the inscribed toponym Duklja

Source: Grčić M. & Grčić Lj., 2019, p. 42, modified by the author

In the Middle Ages, cartographic representations of the space of present-day Montenegro were predominantly created within the European tradition of manuscripts and *mappae mundi* and were limited by the geographical knowledge available at the time. Interior areas were represented with less precision, while depictions had a predominantly descriptive and symbolic character, lacking a developed mathematical basis in terms of projection and scale, which only developed in cartography during the late medieval period. Located on the eastern coast of the Adriatic, Montenegro has had great navigational importance throughout all historical periods for maritime empires such as Venice, which is why it often appears in the rich production of Venetian portolans, isolaries (maps of islands and coastal areas) and atlases of the 14th century (Pejović, 2009; Grčić M., Grčić Lj., 2019).

REPRESENTATION OF MONTENEGRO ON MAPS FROM THE 16TH TO THE 19TH CENTURY

The name "Montenegro" appears on maps for the first time only in the 16th century, as a mountain (Radulović, 2020; Grčić, 2020): "The name of the mountain *Monte Negro* was drawn by Camocho on the map *Golfo de Lodrin con parte di Albania* (1571), probably referring to today's Lovćen." (Grčić M., Grčić Lj., 2019, p. 23). Kamočo is also the author of the "Boka Kotorska Map" with engravings of the cities of Kotor, Herceg Novi and Dubrovnik (Fig. 9).



Figure 9. Kamočo: Map of the Bay of Kotor, 1574.

Source: Grčić M. & Grčić Lj., 2019, p. 174

On maps from the 16th to the 18th century, the territory of Montenegro was most often shown within the wider Balkan area, where the borders were approximate, that is, based on the cartographic knowledge of

that period. In particular, the mountainous interior regions were less well known and less precisely represented, which indicates the limitations of the geographical and topographical data of that time.

Geographical and cartographic information about Serbian lands at the end of the 18th century could only be found in fragments in the works of Serbian church dignitaries (Živković, 2012) and educated authors. In the State Archives of the President of the Republic of Turkey and in the collection of David Ramsey, 26 historical maps from the 16th century onwards have been preserved, which show the Montenegrin coast, as well as the demarcation between the Principality of Montenegro and the Ottoman Empire in later periods. These maps provide insights into the development of the cartographic display of borders and coastal areas over a longer time frame (Radović, 2022). These maps are characterized by their detail, which is explained by their predominantly military-administrative purpose and continuity, that is, by their "compilational" character.



Figure 10. Map of the Kotor Canal with Herceg Novi and other places, author Coronelli, 1688

Source: Internet 2.

On the map of the Bay of Kotor (Fig. 10), the relief is shown using stylized elevation forms (mounds), emphasizing the basic morphological characteristics of the terrain, especially the steeper slopes. This map is associated with medieval maps because on them, elements such as mountains and cities were represented as seen from the side–in a draft or side view (Grčić M., Grčić Lj., 2019), which is reminiscent of what we call today the perspective method. The main physical-geographical elements include the coastline, a bay with basins, the mountainous hinterland and the sea, while the social-geographical contents are limited to important settlements and basic toponyms (Kotor, Risan, Perast, Bokokotorska vrata, Adriatic Sea).

Relief is shown using the molehill method. The map has mainly a descriptive, not a cartometric, function. The map indicates the maritime importance of the Boka Kotor Bay, which can be inferred from the representation of the coastline, the configuration of the bay with basins, and prominent settlements and coastal toponyms. The symbol in the middle of the map in the shape of a circle with an arrow represents a stylized Venetian-type compass, where the arrow indicates the direction of north; it is a simplified display without a full wind rose. A comparative analysis of the map of Boka from 1688 (Fig. 10) and Camocho's map of Boka from the 16th century (Fig. 9) indicates that the elevations are shown similarly on these maps: individually and with molehills, even though there is a 114-year difference between them. In contrast, Vicenza Coronelli's map shows a clearer coastline that more closely matches the realistic sprawl of Boka. Although the toponyms in Coronelli's map are few or absent, in contrast to Camocho's map, the peninsula of Miholjska prevlaka, the islands of Sveti Marko and Gospa od milosrđa (Tivat), Mamula, etc., are drawn.

Compared to Coronelli's map from 1688, cartographic depictions of Serbia and Montenegro from a later period, including the works of Jovan Cvijić, show changes in the methodological approach to spatial mapping. While Coronelli's map is predominantly descriptive and artistic, Cvijić's maps rely on systematic field research and a geodetic basis. Later maps of Montenegro (e.g., Kipert's map of the "Principality of Montenegro" (1862), "Map of the Principality of Montenegro" (1889) by Pavel Rovinski, and Cvijić's maps) have a defined scale and legend, which enables reliable measurements and comparative cartometric analyses, and the relief is also shown using more advanced methods, such as the isohypses method.

Although Montenegro was formally politically independent in the 19th century, it did not develop its own cartographic production during that period. In historical cartography for this region, there is generally less data compared to Serbia, which can be related to the specific features of the relief and the difficult accessibility of mountainous areas, which were less well explored and cartographically documented. This argument is supported by Tekelia's map "Map of Serbia, Bosnia, Dalmatia, Dubrovnik, Montenegro" from 1805, where Montenegro is shown in detail, but in the broader context of neighboring countries and surrounding areas. Likewise, Pavle Solarić (1804), in his 720-page capital work "Novograđanski žempis" (Zamleopisanie), devotes only half a page to Montenegro, which he describes as a "piece of land" divided into several counties, with about 30,000 – 40,000 "armed men", while noting that "there are no cities" (emphasis on the absence of urban centers). The term "vooruženi muževi" ("armed husbands") comes from the Old Slavic language, where "vooruženi" means armed, that is, armed men, or soldiers.

From the beginning of the 19th century, independent maps of Montenegro appeared, such as those of Tekelia (1806), Palmina (1812), Paganijeva (1813), Friđova (1829), and Šestakova and Šerbova (1862). Colonel Vialla (*Vialla de Sommieres*) in 1820, with his work "Historical and Political Travel in Montenegro," attached the *Carte du Montenegro map* (R 1:260 000), which was printed in black and white with hand-drawn inscriptions. This map is significant because it shows Montenegro as an independent state. For example, Vuk Karadžić, in his 1852 edition of "Rječnik," placed the present-day Montenegrin town of Rožaje, along with Vranje and Novi Pazar, in Serbia. The result of the work of the Russian captain Bikov is the map of Montenegro (*Map of the Principality of Chernogorskago*), which was published in Petrograd in 1868. (Peterca et al., 1974; Šešum, 2015).

In comparison, the Map of Serbia by Stevan Milošević (1822) and the Map of Montenegro *by Vialle de Sommieres* (1820) belong to the same development phase but show differences in their approach to the representation of space and the degree of detail. Both maps use hatching as the basic method of displaying the relief, where the relief is more pronounced and emphasized on the map of Montenegro, which is in line with the mountain-karst character of the terrain, while the relief is shown more moderately on the map of Serbia, with a greater emphasis on the valley systems of the Sava, Danube and Morava. The socio-geographical content is more developed on the map of Serbia, which is reflected in a denser network of settlements, roads and toponyms, while on the map of Montenegro, this layer of display is more concise and selective, which indicates differences in the availability of spatial data and cartographic objectives, but also more advanced cartographic practice in Serbia.

During the Napoleonic Wars, when the French occupied most of the Balkans, more precise cartograph-

ic representations emerged. Nevertheless, Montenegro was presented on these maps as a predominantly mountainous and difficult-to-access territory, which can be seen on the basis of the dominant representation of the mountainous relief and the limited network of communication routes, which indicates difficult spatial accessibility. From the period 1806–1838, a smaller number of maps of Montenegro are known, including a map with a scale of 1:260 000 from 1820.

Cartography developed more intensively after the Battle of Grahovo (1858) and the Congress of Berlin, when the need for a more precise depiction of territory and borders increased. The map of Jan Vaclík (1859) is particularly notable, as it was the first domestic map created in the context of diplomatic needs and border demarcation (Burić, Barović, 2005; Pejović, 2009). Montenegro is also shown on maps by foreign authors, such as Desjardins (1853) and Kružić (1861), indicating its presence in the broader corpus of European cartography, where domestic cartographic works were less represented. Among the early domestic depictions, the map by Petar I Petrović stands out, containing toponyms and ethnonyms written in Cyrillic (Miladinović, 2005; Radulović, 2020). Later, maps by Nićifor Dučić (1874) appeared, as well as topographical maps of the Russian General Staff (1882), which were made based on field surveying. By the end of the 19th century, Montenegro also appeared in the works of Karić (1883) and Cvijić (1897), as well as on earlier maps, indicating the continuity of cartographic interest in this area (Peterca et al., 1974). The first map of Montenegro based on a geodetic basis was Pavle Rovinski's map from 1889 (Fig. 11), which marked the transition to more modern cartographic methods.



Figure 11. Map of the Principality of Montenegro

Source: Grčić M., Grčić Lj., 2019, p. 511

REPRESENTATION OF MONTENEGRO ON MAPS IN THE 20TH CENTURY

The continuous cartographic representation of the territory of present-day Montenegro can be linked to its geographical position, which has had strategic importance throughout history and thus represented a subject of interest for cartographers (Pejović, 2009). In addition to the geographical factor, the frequency and manner of cartographic representation were also influenced by political, military and naval significance in the context of control of the Adriatic coastline and communications between the interior of the Balkans and the Mediterranean. In the historical cartography of the 20th century, especially in its first half, individual examples of foreign and domestic maps of Montenegro stand out. The 1901 Austrian map (1:200 000) is an example of a military geographical representation of the area, while the map of Radoje Dedinac "Map of Houses in Montenegro" (1904, 1:200 000) indicates an interest in the ethnographic structure of the area and the organization of tribal units. On this map, the tribal territories are differentiated by colored zones, whereby the territory of Kuči is highlighted in a special color, and the display of borders with neighboring areas (including Albania/Arbania) serves to identify the ethnographic units.

Montenegrin cartography during the Balkan Wars (1912–1913) was limited in scope but functional for military purposes, considering the modest institutional and technical capacities of the then Kingdom of Montenegro. For military purposes, it was mostly adequate because the content was focused on the display of relief and topographical elements, communications and important directions of movement. The glass pavilion of the Njegoš Museum houses a 3D relief map of Montenegro from 1917, made of concrete on a scale of 1:10 000 by Austro-Hungarian experts, as an example of specific military-cartographic representations from that period.

After the First World War, the cartographic basis for the territory of Montenegro within the Kingdom of Serbia and Montenegro was limited, with scarce contemporary topographical materials (Vemić, 2007). In the first half of the 20th century, Montenegro was most often shown on broader Yugoslav maps, such as Dedier's "Map of Yugoslav Countries" (1:1 000 000), Cvijić's map "Serbs, Croats and Slovenes" (1921) and Antoni Lazić's "Map of Herzegovina" from 1928, which depicts the territory of Montenegro in the eastern part.

After the Second World War, Montenegro became part of the SFRY, which brought progress in cartography through the development of topographic and thematic maps and systematic and standardized mapping of the territory. Cartography was centralized through the VGI, which enabled the standardization of methods. Therefore, during the 20th century, cartographic techniques were improved, which is reflected in the greater precision and detail of maps, including the display of borders, settlements, roads and relief, first in the Kingdom of Yugoslavia, and then in the SFRY. These improvements were based on the development of geodetic measurement methods: triangulation, leveling and later photogrammetry (from the mid-20th century). Precision is evident in the establishment of unique coordinate networks, greater accuracy of the positioning of objects, as well as through a more detailed representation of the relief compared to earlier periods. Modern cartography has made it possible to produce topographic and tourist maps with georeferenced data and geographic coordinates, while in modern practice, georeferencing is mostly performed within GIS tools.

CONCLUSION

Old maps are an important source for studying the geographical history of Serbia and Montenegro, as they provide insight into changes in spatial representations, borders and political-historical circumstances from antiquity to the 20th century. Their analysis shows the gradual transformation of cartography from symbolic and itinerant representations to precise topographic and thematic maps, with space increasingly being viewed as a system of measurable spatial relations.

In this sense, this study presents a retrospective review of the cartography of Serbia and Montenegro, with

the aim of analyzing and systematizing selected historical cartographic representations, with the primary result being a comparative insight into the different development trends of these two cartographic traditions. The research findings indicate a multi-phase development of cartography. In earlier periods, a significant dependence on foreign cartographic sources was observed, which played a significant role in collecting and presenting spatial data. This enabled the inclusion of the territory of Serbia and Montenegro in wider European cartographic flows.

The contribution of this work lies in the comparative analysis of the development of the historical cartography of Serbia and Montenegro, where it is noted that the existing literature mainly treats these areas within separate national frameworks. Therefore, the comparative approach represents the specificity of the work, and the results indicate an uneven degree of research, whereby the cartographic development of Serbia is documented in much greater detail than that of Montenegro.

In the 19th century, Serbia experienced significant institutional development through the establishment of the Geographical Department within the Main General Staff. This enabled systematic topographical surveys and the creation of national reference maps. In contrast, in Montenegro, fragmentary representations were maintained for a longer period, and the modernization of cartography relied to a greater extent on individual maps and foreign authors, with more intensive development during the 19th and, especially, the 20th centuries.

In the 20th century, both countries entered a phase of accelerated cartographic modernization, but with different dynamics: in Serbia, a continuous institutional and methodological framework was established earlier, while Montenegro made a more significant leap through integration into the Yugoslav cartographic systems after the Second World War. In both cases, there was standardization of methods and later, digital technologies.

Additionally, the results indicate that cartographic representations are largely conditioned by political, military and administrative needs; therefore, maps often reflect the functional organization of space. From a historical perspective, the development of cartography from ancient itineraries to modern thematic maps confirms a long-term process of gradual complexity in cartographic methods and content. In the contemporary context, the digitization of old maps is becoming increasingly prominent. In this process, maps do not lose their importance; rather, they are revitalized as witnesses to past geospatial arrangements and as a foundation upon which modern (digital) cartographic representations are developed.

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CONFLICTS OF INTEREST

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