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Front cover photography: The image shows part of the cartouche of the map *Ducatus Carnioliae tabula chorographica* by Janez Dizma Florjančič from 1744. The personified Carniola is surrounded by the coats of arms of noble families and a mountainous landscape showing the entrance to a mine, a waterfall, a river gorge, and people on stilts (Geographical Museum GIAM ZRC SAZU).
Fotografija na naslovnici: Na sliki je predstavljen del kartuše zemljevida *Ducatus Carnioliae tabula chorographica* Janeza Dizme Florjančiča iz leta 1744. Personificirano Kranjsko obdajajo grbi plemiških rodbin in gorska pokrajina, kjer so upodobljeni vhod v rudnik, slap, rečna soteska in osebi na hoduljah (Zemljepisni muzej GIAM ZRC SAZU).

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SPECIAL ISSUE
Old maps in geography and cartography

POSEBNA IZDAJA
Stari zemljevidi v geografiji in kartografiji

EDITORS/UREDNIKI:
Primož Gašperič
Rok Ciglič
Blaž Komac

Acta geographica Slovenica, 63-2, 2023, 9–21

CARTOGRAPHIC TIME TRAVEL: REFLECTING THE PAST, DEFINING THE PRESENT, AND CHALLENGING THE FUTURE USING OLD MAPS

Blaž Komac, Primož Gašperič

CHERRY BLOSSOM, SHUTTERSTOCK

Old maps are an important basis for how we perceive the modern world.

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Blaž Komac[1], Primož Gašperič[1]

Cartographic time travel: Reflecting the past, defining the present, and challenging the future using old maps

ABSTRACT: This introductory article of the special issue of *Acta geographica Slovenica* on old maps examines the importance of old maps as the foundation and culmination of geographical research. Maps, one of the earliest languages of communication, have guided exploration and become reference documents. Old maps reveal history, values, and contexts of geographical regions and geographical science. They serve as a special form of text, making possible communication across centuries. Old maps have inspired fantasy maps that depict fictional landscapes and create a cultural phenomenon. This special issue contains articles that analyze the cartographic elements of old maps, the semiotics of old maps, their use in education, and their historical significance, as well as an article on the first Slovenian atlas. Old maps challenge geographic knowledge and representation, and they are shaping the digital future.

KEY WORDS: geography, cartography, old maps, semiotics, education, Slovenia

Kartografsko potovanje skozi čas: odsevanje preteklosti, opredeljevanje sedanjosti in izzivanje prihodnosti z uporabo starih zemljevidov

POVZETEK: Uvodni članek v posebni številki revije *Acta geographica Slovenica* obravnava pomen starih zemljevidov kot temelj in vrhunec geografskih raziskav. Zemljevidi, ki so eden najzgodnejših komunikacijskih jezikov, so usmerjali raziskovanje in postali referenčni dokumenti. Stari zemljevidi razkrivajo zgodovino, vrednote in kontekste geografskih regij in geografske znanosti. Služijo kot posebna oblika besedila, ki omogoča komunikacijo skozi stoletja. Stari zemljevidi so navdihnili domišljijske zemljevide, ki prikazujejo izmišljene pokrajine in ustvarjajo kulturni fenomen. Ta številka vsebuje članke, ki analizirajo kartografske elemente in semiotiko starih zemljevidov, njihovo uporabo v izobraževanju in zgodovinski pomen ter članek o prvem slovenskem atlasu. Stari zemljevidi izzivajo geografsko znanje in predstave ter oblikujejo digitalno prihodnost.

KLJUČNE BESEDE: geografija, kartografija, stari zemljevidi, semiotika, izobraževanje, Slovenija

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1 Introduction

This special edition of volume 63 of *Acta geographica Slovenica* explores the importance of old maps, which are both the basis for and the result of geographical research. Maps are one of the oldest languages of communication (Harley and Woodward 1987) and have long been a prominent – and the initially preferred–written language of geography (Harley 1992). The International Cartographic Association (https://icaci.org/mission) defines a map as »a symbolized representation of geographical reality, representing selected features or characteristics, resulting from the creative effort of its author's execution of choices, and is designed for use when spatial relationships are of primary relevance«. Visualizing spatial phenomena at an appropriate scale allowed or facilitated people's exploration of uncharted territories. Immediately after their creation, they became a guidepost and later a reference document for future travelers and explorers. The first known maps were created in prehistoric times using simple methods and natural materials. With the improvement of technical methods, especially the invention of paper and printing, they became increasingly precise and technically sophisticated documents, and from the sixteenth century onward they offered two answers to the problem of interpreting the space-time continuum. *Kairos* refers to eternity; maps of the *mappa mundi* type thus show the position of man in the universe as it exists eternally. The other aspect, *chronos*, reflects the encounter with the mundane and thus the mutable, and it is anchored to the Earth by geographic coordinates. Modern cartography is based on the *chronos* approach, which has also allowed it to evolve continuously due to the constant flow of time (Dickason 2011).

Old maps do more than bring the world of the time into the present. Because they include several technical, contextual, and other levels, they offer something more. They are a »geographical more« (Mlekuž 2008) because they explain the history and the present of a place and time (Urbanc et al. 2006). The authors of the maps did more than transfer their knowledge of the landscape of the time into the graphic and textual (i.e., linguistic) content of the maps. By choosing or not choosing cartographic elements, they also conveyed the thinking and values of themselves and the social group they belonged to. Even empty space has meaning because »there is no such thing as empty space on a map« (Harley 1988b, 71). Because maps have a rather clear and also certain technical (Gašperič 2010; 2023), hierarchical, and symbolic structure (Gašperič and Babič 2023), which allows even »textually illiterates« to communicate across centuries, we classify them as (bookless, graphic) texts. They have an additional communicative value because, as historical documents, they »reveal the political and cultural picture of the eras in which they were created, the state of technological development, and the knowledge and ideas of the author« (Fridl and Urbanc 2006, 55). Old maps offer unique insights into history and human perceptions of the world, but they are not infallible records of the real past landscape. As with any historical source, critical analysis and cross-referencing with other evidence are crucial to gain a deeper understanding of the past.

2 The odyssey of old maps: From cartographic treasures to geographic insights

2.1 Old maps are defined by the past

The cartographic definition that maps are simply a representation of space and time is flawed. Even modern topographic maps are sometimes imaginative works because cartographers arbitrarily decide what to depict on a map, revealing psychological, educational, historical, and cultural backgrounds (Akerman and Karrow 2007). Rather, old maps reflect the dynamic relationship between the geography of the real world at the time of their creation and an imaginative geography (Gašperič and Komac 2020) that, like a mental image (Smrekar 2006), reflects the perception of the real world by patrons, cartographers, and map users in different historical periods.

Old maps serve as a two-dimensional window, revealing a four-dimensional perspective on the evolution of historical space–time perception. They help us understand how the world was understood and imagined or, to put it literally, visualized, in the past (Urbanc, Gašperič and Kozina 2015), when boundaries were simultaneously discovered and overcome through maps (Dorling and Fairbairn 1997; Cosgrove 1999).

Western cartography is a complex knowledge system with a half-millennium history as »a form of knowledge and a form of power« (Harley 1988a) that both created and interpreted an emerging social, economic, and political spatial structure that was initially imperial (Eurocentric or Northcentric), later national, and eventually global (Sutton 2015; Corujo Hernández 2019). The maps that are now »old« have helped constitute and sustain relationships between different worldviews over the centuries, which conceived of the world first locally and superficially, then increasingly broadly, and finally as a planet. Through them, readers were told where the political and economic centers of the world lay, and which language was the *lingua franca* of a map in addition to the cartographic one. It is well known that colonial maps did not include indigenous place names, and even Google Maps maintained cartographic silence (Quinn 2020) when it avoided showing favelas in the city of Rio de Janeiro (Novaes 2014). The choice of projection, selection, and limitation of the area shown on the map contributed (un)willingly to this. The choice of geographic names and the language of their notation is also critical to understanding maps and creating meanings, culminating in exonyms with the Springtime of Nations (Kladnik, Geršič and Perko 2020) and decolonial cartography in the modern era (McGurk and Caquard 2020).

The time and place of the creation of old maps influenced other map elements. In this special issue, we present a study that was used to identify and classify cartographic elements on old maps. In addition to today's standardized elements such as title and scale (Gašperič 2023), they also contain written or visual information about journeys, such as that of the Argonauts (Figure 1), who are said to have traveled through Slovenian territory along the Sava and Ljubljanica rivers, or include information about unknown, unexplored areas, such as the phrase »Here be dragons« with some information inadvertently or intentionally omitted. Thus we know of a label and inscriptions indicating the existence of an unknown southern continent, *Terra Incognita Australis*, which became a fantastic locale invoked in fantasy maps and literature, such as Gulliver's Travels. Some old maps, such as those by Mercator and Ortelius, entered the world of »modern fantasy maps« when they sparked the Tartary theory. This revolves around the idea that there was once a vast, powerful, and highly advanced civilization called *Tartaria* that supposedly existed in the region of present-day Russia, Central Asia, and parts of Europe (River 2022).

One article of the special issue is thus devoted to the emergence and development of the »language of cartographic symbols,« which has become a true graphic Esperanto not only because of its standardization, but especially because of its semiotic symbolic structure (Gašperič and Babič 2023) and its universality.

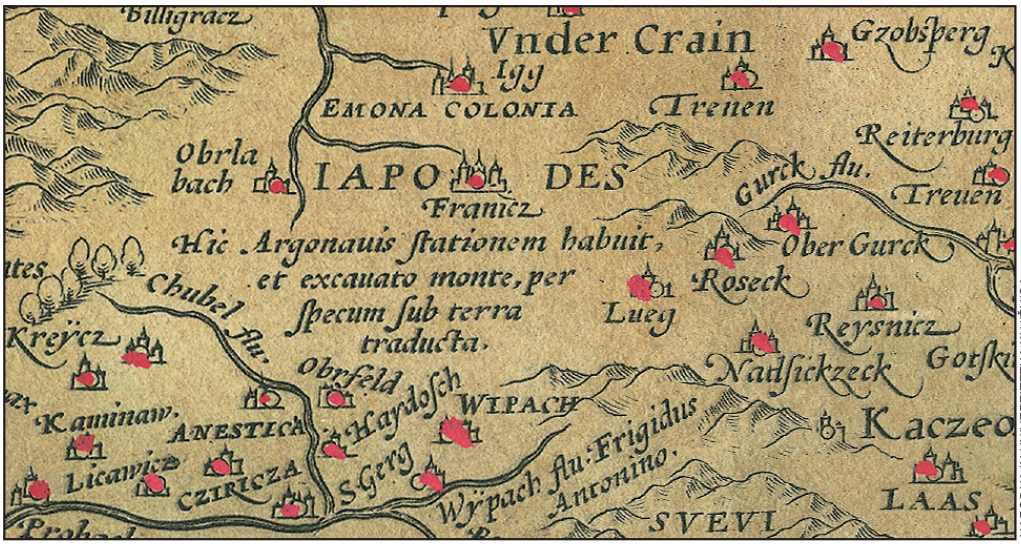

Figure 1: Part of Wolfgang Lazius's map from Ortelius's atlas of 1573 with a label about the Argonauts: *Hic Argonauis stationem habuit, et excauato monte, per specum sub terra traducta* (Here the ship *Argo* came to a halt, and, because the mountain had been hollowed out, was brought through a(n underground) cave; Shaw and Macqueen 1998, 381).

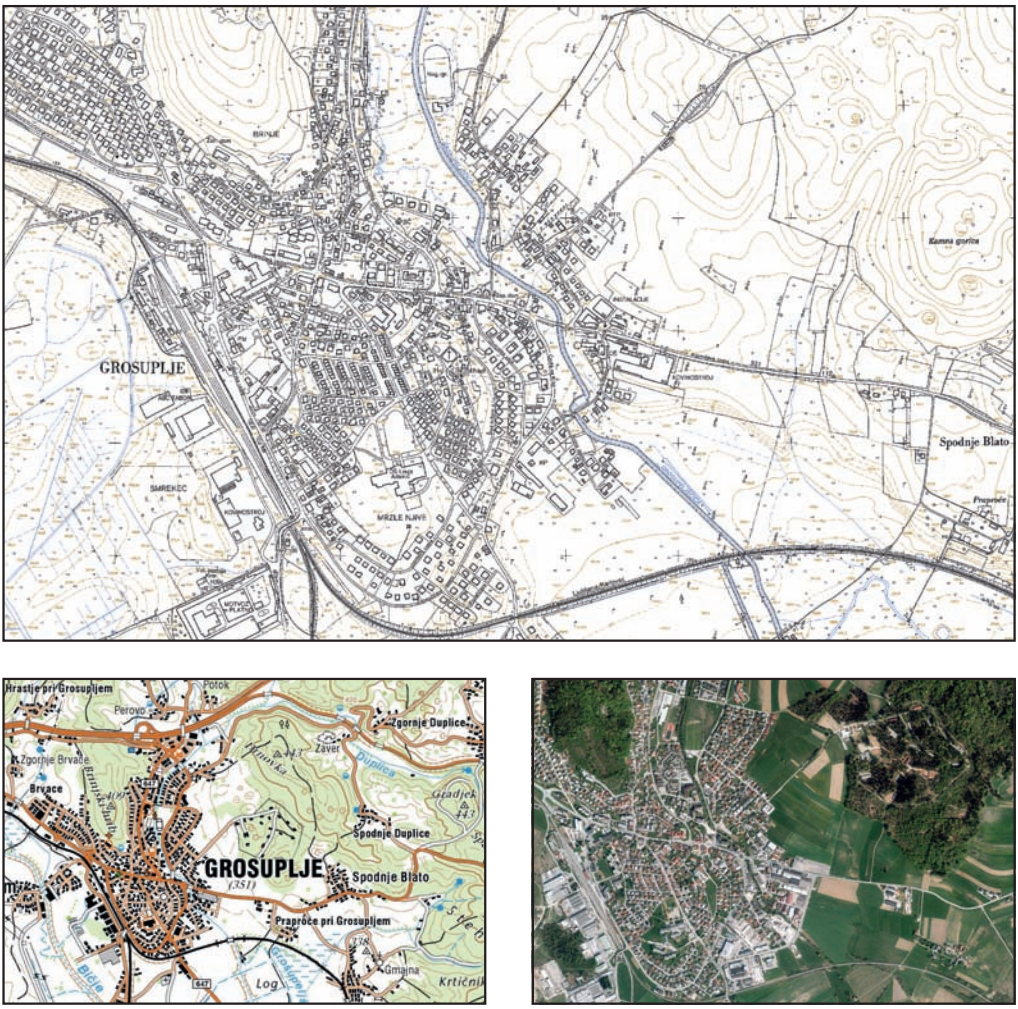

Figure 2: Biased cartographic representation, or cartographic silence, on the basic 1:5,000 topographic map of Slovenia (top) from the time of Yugoslavia without the military installations that can be seen on the newer map above the name of the settlement (*Grosuplje*) and on the digital orthophoto (source: Surveying and Mapping Authority of the Republic of Slovenia).

2.2 Old maps define modernity

Old maps (which were not »old« at the time they were created), along with advances in navigation and orientation technology, helped accelerate the spread of the Western *ecumene* and way of life. They contributed to the development of the economy, to the exchange of ideas and cultures, and, through the establishment of trade routes, to the marches of war. At the same time, they made possible and enhanced visual perception and interpretation of the world's landscapes, and they profoundly changed the understanding of the world.

Even today, histories tell us more about the world of the time, the relationships between natural and social elements, and political and economic systems, than their creators may have wanted or been able to know (Crampton and Krygier 2015). Censors were not as attentive to maps as they were to other texts, with the possible exception of information about military capabilities (Figure 2). The rule is confirmed by exceptions, such as Kosler's Map of the Slovenian Land and Regions in the Austrian Empire, which could

not be distributed for several years after its publication in 1852 (Gašperič 2007) because it had the characteristics of a national propaganda map (Fridl and Urbanc 2006).

We cannot be certain that old maps have improved our perception of the world. After all, it was the appearance of old maps in European culture at the time of the discoveries that contributed to the limited and one-sided view of the realities of the Earth at that time. The changing perception of their importance can be seen in the shift of focus of the prime meridian through centuries, as well as in the different ways in which maps were graphically focused. In antiquity Jerusalem was the focus, in medieval Islamic cartography Mecca, and even today we know of maps that focus on one part of the world (e.g., Australia; Harley and Woodward 1987). In every age and in every part of the world, the dominant perspective of maps has also reflected the dominance of certain countries or cultures, while neglecting or even distorting the images of others. Today's state of global culture is characterized by digital maps oriented in every direction and accessible to everyone through electronic devices connected to the global navigation satellite systems (such as GPS).

Old maps are not so much an accurate representation of the real world, but a representation of the reality that they co-create (Pickles 2004). Contemporary readings of old maps depend on knowledge, insight, experience, social and cultural background, personal opinions, and other circumstances (Fridl and Urbanc 2006). Old maps are a representation of the real world but also a representation of reality as perceived at a particular point in time, and they co-create that reality (Pickles 2004). Therefore, maps are a valuable source of information about historical political-geographical and spatial relationships and a source of information about the culture, society, and values of the past – and the present. Although old maps show the configuration of the Earth's surface in the past, they can help us understand how people understood the world at that time, which in turn helps us understand the present. Old maps thus provide a justification for the values and identities of contemporary societies and are important for the study of history, sociology, and geography (Wood 1992; Fridl and Urbanc 2006).

2.3 Old maps as the root of fantasy maps

Old maps shape the past or its image, but, on the other hand, they also obscure the past in which they were created. They are like a palimpsest (Komac 2009), on which only the upper layer of the map is always visible to the reader as a text or image. The choice of the territory represented, the division of territories into units, the cartographic symbols used, the language and geographical names used, and the absence of some cartographic elements, create a limited picture of the terrestrial reality of a historical period. The content is presented by the client and the cartographer in a unidirectional and limited manner. Therefore, old maps would be classified as »informing« on Arnstein's (1969) scale, which is only the third of eight levels of participation (Nared and Bole 2020).

On the other hand, it is the limitations of the image, the obscuring or non-appearance of certain elements, that open the view to new worlds. They have made it possible to move away from the map of the actual surface of the Earth in a historical era, which is itself a sort of a fantasy map, a map of imagined worlds that are not real, because of limited perception and knowledge. Old maps may have awakened the desire to explore distant places, and the imagination and curiosity to explore imaginary landscapes, already at the time they were created.

It is no coincidence that the image of formal old maps, some of which are true works of art with their artistic components, has become the characteristic image of fantasy maps (Gašperič and Komac 2020). From today's perspective, the old maps are flawed, often distorted and inaccurate. They contain generalized cartographic symbols (e.g., molehills for hills, deciduous trees for forest, and images of buildings for settlements) that are illustrative, easy to read, and visually pleasing (compared to more modern conventional cartographic symbols). Because they do not include all the details of the territory depicted, they awaken the reader's emotions and imagination (Gašperič and Babič 2023).

Fantasy maps show lands that exist only in the imagination. They seem to be an addition to imaginative stories, although they are also an important part of them; this can be seen, for example, in Tolkein's works (Padrón 2007). They show fictional, imagined landscapes (Cooper and Gregory 2010; Daniels 2011), but they have all the qualities of real maps: location, locale, and a sense of place (Bushell 2016). Old maps were originally associated with art rather than science (Rees 1980; Ferdinand 2019), and they then became technicized and reapproximated to art through imaginary maps as »map art« (Wood 2006).

Old maps have become »imaginary« – or, in other words, imaginary maps have become the pinnacle of historicism in mapmaking. The lands depicted do not exist in the real world but are imagined as »Neverland.« This makes it easier to understand why old maps have helped (re)construct imaginary landscapes in the totality of their space and time. Maps are of-the-moment, bursting into being through practices (embodied, social, technical), *always* re-made every time they are engaged with. Maps are transitory and fleeting, being contingent, relational and context-dependent (Kitchin, Gleeson and Dodge 2012).

Because of this, landscapes are marked with realistic cartographic symbols, which makes it easier for the reader to establish spatial contact and follow the story. Fantasy maps add an important dimension to stories by giving the appearance of reality (Ekman 2013). Old maps, which represent a distinct visual language, have evolved from an originally technical commodity to the basis for language-based word creations. In this way, they anchor fantasies in the real world (Sundmark 2014). This cultural phenomenon also transcends languages and has a universal meaning as it recreates and represents landscapes (Harmon 2004).

2.4 Old maps as a challenge for the future

In the modern, digital age, old maps offer unprecedented opportunities for discovering different levels of meaning in terms of content, technology, and symbolism. Geographic information systems (GIS) make it possible to bridge the gap between historical and traditional cartography and the cartography of the future, which is limited to a digital replica of planet Earth (Gao and Cao 2021; Novak and Ostash 2022). The evolution of cartographic representations can be traced from 1) maps and atlases that have a specific scale and projection to 2) globes, which allow one to view the hemisphere from different perspectives but not change the scale, and 3) GIS and geoportals, which allow one to choose the scale and the projection, to 4) a multi-resolution and three-dimensional digital Earth (Gore 1998), where we are not constrained by projection or scale (Eremchenko 2020), and 5) a historical digital Earth showing changes in the past to the as yet unknown 6) AI-driven digital Earth, digital Earth with near-live and live data presentation. Like the crystal ball from Bulgakov's novel The Master and Margarita, it has all the elements of a digital Earth: it shows live action in color, it shows the whole or part (zoom), it allows us to see the future (modeling), but it does not yet contain sound (Siepmann, Edler and Kühne 2021):

> Near Woland was a strange globe, lit from one side, which seemed **almost alive** . . . . My globe is much more convenient, especially as I need exact information. Do you see that **little speck of land**, for instance, **washed by the sea** on one side? Look, it's **just** bursting into flames. War has broken out there. **If you look closer, you'll see it in detail**. Margarita leaned towards the globe and saw that the little square of land was growing bigger, emerging in natural colours and turning into a kind of **relief map.** Then she saw a **river** and a **village** beside it. A **house** the size of a pea **grew until it was as large** as a matchbox . . . . »What are you looking at?« asked Berlioz. »**I'm looking at your future**,« said the man. (Bulgakov 1967)

Old maps provide insight into the past and allow interpretation of the social, political, and economic conditions of the time. Their digitization makes it possible to preserve their images and use them in GIS and digital environments (Li 2019). Despite the relatively low accuracy of some old maps, this allows for a dynamic visual representation of the evolution of a landscape over time (Lafreniere and Rivet 2010), down to deep time (Zahirovic et al. 2019). Digitized historical maps also make analytical research possible: by overlaying and integrating old maps with other data layers (Madry 2006), all kinds of analyses of relationships with natural and social landscape features can be conducted at different spatial scales. Together with the temporal dynamics, this allows the detection and analysis of landscape patterns that would otherwise be invisible and unknown. Old maps thus gain contextual depth, and their utility is extended through digitization (Capolupo et al. 2020). Virtual and augmented reality, and artificial intelligence will allow their use in real time – live *in situ* (Figure 3), as already suggested in fantasy films, such as Narnia: The Voyage of the Dawn Treader.

In the digital age, old maps become important for cartography, geography, and their auxiliary sciences, such as history and archeology. They make it possible to analyze changes in land use, the development of routes and settlements, and changes in coastlines and watercourses (Lelo 2014; Nobajas 2014; Polczynski and Polczynski 2021), all of which are landscape elements that are also depicted with specific symbols on

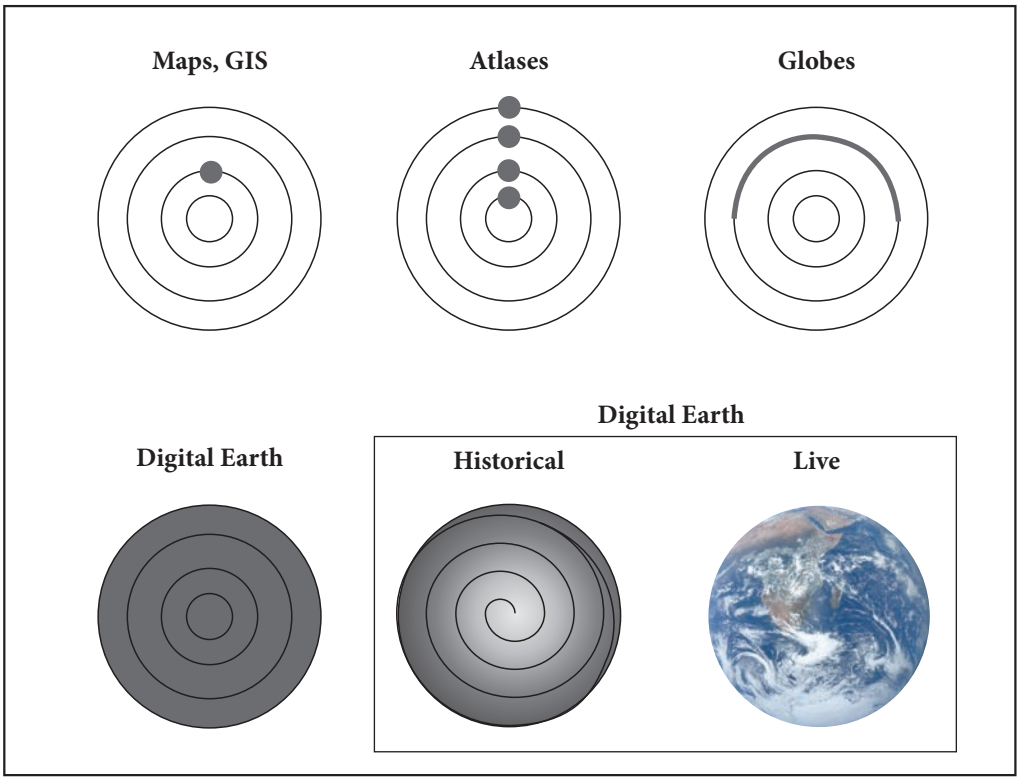

Figure 3: The transition from old maps to a digital Earth with spatial and temporal resolution (Eremchenko 2020, 5; NASA Johnson Space Center Gateway to Astronaut Photography of Earth, Visible Earth).

old maps. Thus, this special issue offers an analysis of cartographic elements (Gašperič 2023), which is an important first step toward further steps of digitization of old maps and their analysis. Digital historical maps will add a temporal dimension to the emerging multiresolution and three-dimensional »digital Earth« (Baturin, Eremchenko and Zakharova 2019), which is not a map but an unsigned (with non-signs) representation with dynamically integrated visual (images, video, 3D-models), auditory (music, audio), and abstract (text, numbers, symbols) information (Table 1).

The digital age also brings uncertainties: the maps produced today are available on the internet, which has the character of impermanence. In Slovenia, there is the case of a portal for territorial maps, whose updating was stopped due to a shift in the focus of the company. Prints are rare, but this is the form in which old maps have survived over the centuries. With digital maps, we do not even have the experience of decades of archiving, and the file format is constantly changing. Another challenge is that the digital Earth will reduce the need for cartographic symbols. We will have to rethink cartography because the digitization of maps and geographic environments may cause cartographic symbols to become obsolete or disappear. Paradoxically, this will unexpectedly dramatically increase the information content of the network-centered digital Earth compared to earlier print and digital maps. This new way of representing the global environment will provide previously unimaginable detail and can be called a geospatial revolution (Eremchenko 2022). Old maps in the era of T-O maps exhibited a remarkable degree of generalization, which was not due to a low level of understanding, but to the idea of separating the four essential elements (the circle of the Oikumene, surrounded by the sea-ocean, into Europe, Africa and Asia) from the multitude of others (Eremchenko 2016). The maps later became spatially and visually precise and formed the basis for modern cartography. In the new digital era, old maps become an important part of the scale-free, holistic geospatial environment in which geography can play a leading role.

Table 1: Characteristics of map types in typical cartographic eras.

	Old maps	Modern standard maps	Future maps (digital Earth)
Descriptive factors			
Historical period	Up to nineteenth century	Nineteenth century onward	Twenty-first century
Development period	Imperial era	Era of states	Global era
Use and participation	Navigation, military, non-participatory	Transportation, travel, tourism, urban planning, environmental protection, limited participation	Navigation, augmented reality, full participation
Time	Historical landscape	Contemporary landscape	Future landscape (predictive modeling)
Author, copyright	Individual/restricted use	National institution/use through digitization	Global enterprise, everyone/private property, permitted use
Resource	Observation, travel itineraries, navigation	Measured cartographic data, remote sensing	Remote sensing (UAVs, microsatellites) and grid data, Bigdata, enriched with AI
Types	Topographic	Topographic and thematic	Thematic: any
Technological factors			
Production technology	Drawing, woodcut, copper engraving	Copper engraving, lithography, metal type printing, digital printing	Non-map
Display technique	2D (plan)	2D (area) and 3D (space)	4D (space and time)
Use of colors	Black and white (sometimes colorized)	Color	Color
Interactivity	Manual use	Manual and digital use	Enriched reality: augmented reality and virtual reality applications in usage based on AI-powered actual space and time, personalized actual data integration, and 4D visualization, incorporating changes over time
Cartographic factors			
Type of cartography	Static (printed map)	Static (printed) and hierarchical (digital map)	Dynamic, network-centered
Cartographic symbols	Nonexistent, then limited, start of use	Standardized elements or symbols	Non-symbols
Scale	Regional and global	All scales separately	All scales at once/no scale
Projection	None, basic	Standardized and precise, but different scales	Arbitrary, valid in all criteria and dimensions
Geographical names	Imperial languages	National languages	Local languages, AI-generated speech/language, automatic translations
Voids	Filled with graphic elements	Blank	Zero-sign

3 Articles in the special issue

This special issue is dedicated to historical cartography. It sheds light on the meaning, use, and creation of old maps of Slovenian territory, which accompany us as individuals and as a nation in parallel with our history.

Cartographic elements define the characteristics of a map and are its basic building blocks. They are represented on the map in the form of cartographic symbols. Therefore, we have taken them as the basis for the study in the first two articles of this issue. The first article, »A new standardized methodology for analyzing cartographic information on old maps« by Gašperič (2023), presents a new methodology for analyzing old maps to identify and interpret their cartographic symbols. It analyzes fifty-eight maps, dating from the sixteenth to nineteenth centuries, showing the territory of Slovenia at scales ranging from 1:200,000 to 1:900,000. For each map, about eighty entries were made, and several thousand pieces of data were collected, which required a uniform and systematic study of all cartographic symbols on the selected maps. Before the nineteenth century, changes were most evident in the symbols for vegetation, relief, and transport networks. The article concludes with an indication of the reliability of the new method for studying maps and to determine the causal relationship between cartographic elements and map content. The overall design of the survey and the data obtained are unique in historical cartography.

The second article, »The semiotics of cartographic symbols on old maps« by Gašperič and Babič (2023), analyzes selected cartographic symbols on five old maps depicting the territory of Slovenia from the sixteenth to the nineteenth century. A semiotic approach was applied to establish connections between cartographic symbols on old maps and the characteristics of society at the time the maps were created. This semiotic approach was used to discuss the impact of the interpretation of four symbolic cartographic elements, their iconic basis, and the reading of the five maps analyzed. It was found that cartographic symbols changed in line with the development of cartography and the society at the time. Old maps were presented as the primary source for the study of history and environmental phenomena. Due to the development and demands of a changing society, cartographic symbols have gradually transformed into symbolic signs (in the semiotic sense), including the quality of map representation.

The third and fourth articles focus on important cartographic works and their authors that influenced Slovenian geography and cartography in the second half of the nineteenth century. The article »Traditional and modern cartographic materials for geography teaching: From Blaž Kocen to the present« by Gašperič and Bratec Mrvar (2023) presents cartographic teaching materials used in two different periods: the second half of the nineteenth century and the beginning of the 2020s. During the first period examined, the works of Blaž Kocen (also Blasius Kozenn) laid the foundations of school cartography in the Habsburg Monarchy. The most highly valued among them in central Europe were his atlases, which have the longest tradition of publishing in the world. In the second period, technological development and the COVID-19 pandemic laid the foundations for a faster transition to digital approaches to teaching. This article examines the use of maps, atlases, and textbooks by Slovenian geography teachers to determine whether modern (digital) teaching materials have replaced or will replace traditional (paper) ones. It was established that the use of printed cartographic materials continues to predominate in geography teaching, which indirectly preserves the importance of Kocen's pioneering and visionary work.

The last article, by Perko (2023) is about »The first world atlas in Slovenian in the history of world atlases and Slovenia's present territory in some of them«. It was published between 1869 and 1877, when the vast majority of Slovenians lived in Austria-Hungary. *Atlant* was edited by the lawyer and linguist Matej Cigale (1819–1889). The atlas was published between 1869 and 1877, and eighteen maps were published in six volumes. Because the atlas was never bound into a book, a facsimile was published in 2005 under the name *Atlant*, which also includes a companion book. Matej Cigale performed pioneering work in the Slovenianization of geographical names and the preservation of Slovenian exonyms. This cartographic achievement influenced later world atlases and is an important part of Slovenian cultural heritage.

4 Conclusion

This special issue of volume 63 of *Acta geographica Slovenica* emphasizes the role of old maps, which are both the basis and the result of geographical research. These maps are not only one of the first languages of communication (Casti 2000), but also an outstanding written and visual language of geography. They

are a valuable source of information about historical, political-geographical, and spatial relations in history, and they are also bearers of cultural values and the identity of contemporary societies, and thus an important element of cultural heritage (Gašperič and Zorn 2020). Cartography is the science and technique of producing maps and map-related products as digital or analog models of (virtual) reality. The discipline focuses on 1) map graphics (semiotics as the language of cartography), 2) epistemological aspects: modeling and object relations in space and time (ontology), and 3) spatiotemporal communication (Kainz 2020).

Old maps were a landmark and reference document in the discovery of the world, and they contributed to the spread of Western ecumenism and later to the exchange of cultures. They showed and communicated where the boundaries of the corresponding »civilized« world, the *ecumene*, lay. Just as they are defined on the one hand by the world at the time of their creation, they are also important for contemporary perceptions of the past. They help us better understand how people in the past understood the world, and thus better understand the present – and, with the help of digital (geographic) information systems and modeling, the future.

Old maps have become the inspiration for imaginary maps, depicting lands that exist only in the imagination but feature real cartographic symbols that complement the stories and create a cultural phenomenon that crosses linguistic and cultural boundaries.

The articles in this special issue present an original method for cartographic analysis of maps, the semiotics of cartographic symbols on old maps, the use of cartographic methods in education, and the first world atlas in Slovenian. This special issue of *Acta geographica Slovenica* highlights the importance and impact of old maps on social development, art, and geography, raises new questions, and lays the foundation for new research in this field. The definition of informatics, now identified with signs, must be redefined, increasing the role of scientific visualization. The transformation of maps to the digital Earth and of signs into non-signs or zero signs presents a rich research area and challenges us to rethink fundamental aspects of geographical knowledge and representation.

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A NEW STANDARDIZED METHODOLOGY FOR ANALYZING CARTOGRAPHIC INFORMATION ON OLD MAPS

Primož Gašperič

MARKO ZAPLATIL

The cartographic material at the Geographical Museum was of great importance for understanding old maps better.

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528.91(497.4)"15/18"

Primož Gašperič[1]

A new standardized methodology for analyzing cartographic information on old maps

ABSTRACT: This article presents a new methodology for analyzing old maps that was used to identify and interpret cartographic symbols on selected maps. It analyzes fifty-eight maps, originating from the sixteenth to nineteenth centuries and showing the territory of Slovenia. The basic criteria for selecting the maps were authorship, scale, and the territory depicted. The study included maps at a medium scale of 1:200,000 to 1:900,000. Approximately eighty entries were made for each map, and several thousand pieces of data were obtained, which then required a uniform and systematic examination of all cartographic symbols on the maps selected. Before the nineteenth century, changes in symbols for vegetation, relief, transport networks, and explanatory elements were the most evident. The article concludes by highlighting the reliability of cartographic content as a source for research. The new method for examining maps makes it easier to determine the cause-and-effect relationship of cartographic elements to map content.

KEY WORDS: cartographic methodology, old map, cartographic element, cartographic symbol

Nova standardizirana metoda za analizo kartografskih podatkov na starih zemljevidih

POVZETEK: Članek predstavlja novo metodologijo za analiziranje starih zemljevidov, ki je bila uporabljena za identifikacijo in interpretacijo kartografskih znakov na izbranih zemljevidih. Analizirali smo 58 zemljevidov, ki so nastali v obdobju od 16. do 19. stoletja in prikazujejo ozemlje Slovenije. Osnovni pogoji za izbor zemljevidov so bili avtorstvo, merilo in prikazano ozemlje. Študija je vključevala zemljevide srednjega merila od 1 : 200.000 do 1 : 900.000. Za vsak zemljevid smo naredili približno osemdeset vnosov in tako pridobili več tisoč podatkov, ki so zahtevali enoten in sistematičen pregled vseh kartografskih znakov na izbranih zemljevidih. Pred 19. stoletjem so bile najbolj očitne spremembe simbolov za rastlinstvo, relief, prometno omrežje in pojasnjevalne elemente. V zaključku je izpostavljena verodostojnost kartografske vsebine kot vira raziskav. Nova metoda za preučevanje zemljevidov olajša ugotavljanje vzročno-posledičnega vpliva kartografskih elementov na vsebino zemljevida.

KLJUČNE BESEDE: kartografska metodologija, star zemljevid, kartografski element, kartografski znak

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1 Introduction

Maps can have great communicative value (Fridl and Urbanc 2006) and are an important tool for understanding the current and past landscape. It is important to know a landscape's past because the present landscape largely reflects past developments (Komac 2009). Maps are a vital source of information (Urbanc et al. 2006). However, in the past, they were often neglected as a historical source of information, or their content and communicative value were underutilized (Harley and Woodward 1987). This has changed over the past decades (Chiang et al. 2020). Maps have become a valuable source for understanding spatial changes to landscapes, offering insight into the social, political, and natural situation of the time of their creation (Zorn, Breg Valjavec, and Ciglič 2018).

Maps can be studied in various ways: in terms of their time of origin (Höck and Leitner 1984; Marković 1993), the accuracy of the territory presented (Timár et al. 2006; Frajer and Geletič 2011), their authorship (Rojc 1990; Pedley 1992), the cartographic network and projections (Bönisch 1967; Molnár, Podobnikar, and Timár 2009), and so on. One way to standardize research is to analyze cartographic elements, which are the foundation of every map. As such, they are inextricably related to the development of cartography. They include natural and built elements, toponyms, and mathematical and explanatory elements.

In the past, the use and form of cartographic elements on maps were never formalized. Therefore, authors randomly selected the content of maps and the manner of representing the cartographic elements. The content of maps was in the domain of the client commissioning the map and the cartographer. On old maps, cartographic representation commonly deviated from geographic reality, which was often unknown. Due to unstandardized representation and production of maps, their analysis, comparison, and content-related evaluation have so far been very demanding and lacking methodological structure. For example,

Figure 1: Ioanes Sambucus's 1572 map of Illyria.

there have been substantial differences in representing settlements (point versus area symbols) and relief (side view: molehills, plan view: hachures and contour lines). Moreover, the density of information presented on maps has varied significantly, as well as the locations of this information (e.g., the type and location of the content in relation to the map frame). In the technical and cartographic sense, sixteenth-, seventeenth-, and eighteenth-century maps differ greatly from maps created in the nineteenth century or later. Therefore, a cursory or casual comparison may be inaccurate or misleading.

Slovenian and international literature predominantly uses chronological and descriptive approaches to examine maps in a specific period (e.g., Gašperič 2007). The most relevant and extensive contributions in analyzing cartographic elements are the volumes from the series The History of Cartography Project (2022). Interesting insights into the topic are also offered by a book that analyzes the cartographic elements of fantasy maps (Ekman 2013), and fictional maps (Gašperič and Komac 2019). However, a description of a specific map or a small group of maps from the same period can only satisfy readers looking for information on a specific cartographic representation or maps from a specific period. It does not reveal what these maps mean in cartographic terms, such as in relation to older or younger maps or in terms of the development of cartography.

To date, cartographic elements have been divided in various ways, such as from the historical, cartographic, geodesic, or art-research perspectives. Some authors have divided elements on large-scale topographic maps into two main groups: 1) geographical and 2) mathematical elements (Peterca et al. 1974) or 1) natural and 2) built elements (Lovrić 1988). Others have identified three groups: 1) natural elements, 2) anthropogenic (built) elements, and 3) toponyms (Petrovič 2010); or four groups: 1) mathematical, 2) natural-geographical, 3) socio-geographical, and 4) other elements (Vrišer 1998), or 1) mathematical basis, 2) geographical elements, 3) editorial information, and 4) additional elements (Peterca et al. 1974), or 1) mathematical basis, 2) cartographic image, 3) supporting elements, and 4) additional information (Markoski 2018). Some authors have interpreted the division of cartographic elements very randomly; for

BORUT ŽUNIČ

Figure 2: Henricus Hondius's 1636 map of Carniola.

example, in terms of their relevance on the map at the content level, or the desire to highlight a certain feature (Robinson et al. 1995; Monmonier 1996; Maps and Cartography … 2015).

Unlike the studies mentioned above, which mainly contain descriptive comparisons of individual maps or partial analyses of specific cartographic elements, the method presented in this article allows more comprehensive analysis of maps. It offers a framework for the analysis of selected characteristics of maps, such as scale, location, and content. Moreover, it proposes a more comprehensive division of cartographic elements, which allows for a uniform analysis and comparison of different types of maps from different periods. Each cartographic element (natural and built elements, toponyms, and mathematical and explanatory elements) is divided into three hierarchical levels down to cartographic symbols (Table 1).

This article proposes and utilizes a comprehensive method for examining cartographic elements on the selected set of maps, and it thus fills the research gap described above. The main contribution of this methodological approach is that it provides a uniform framework for comparing cartographic elements on maps designed in different time periods and differing in visual appearance, structure, and design. It formulates the process of studying cartographic elements by identifying, sorting, comparing, evaluating, and interpreting cartographic symbols on old maps. This covers the entire process chain of studying cartographic elements.

A data form was compiled based on a division of cartographic elements into the following five groups: natural elements, built elements, toponyms, mathematical elements, and explanatory elements. These make up the highest hierarchical level and are further divided into subgroups at a lower hierarchical level (Table 1). The data form built this way allows the uniform use of cartographic elements on all general geographical maps from the period observed.

In this article, general geographical maps created in the past (e.g., during the period examined: between the sixteenth and nineteenth centuries, figures 1–5) are referred to as »old maps.« The term *old maps* is conceptually distinguished from the term *historical maps*, which some authors (e.g., Chiang et al. 2020)

Figure 3: Alexis-Hubert Jaillot's 1709 map of Carniola.

use interchangeably. According to cartographic literature (e.g., Wallis and Robinson 1987), the term *historical map* denotes a cartographic representation of the situation in the area depicted and its development based on the interpretation of source material. The purpose of such representation is to chronologically present a selected topic, which is why this can often be referred to as a thematic map with historical content. It is suggested that a distinction be made between these two technical terms, and they are used in this sense in this article.

This article fills a gap in understanding the past, considering that old maps have been recognized as a primary source of information on a specific area and period. The proposed methodology is applicable in analyzing, comparing, and understanding relations and differences between territories and their cartographic representations on the one hand and the historical influences on cartographic representations on the other. The analysis was conducted at the temporal and spatial levels, using medium-scale maps.

The aim of the article is to present a new method for studying old medium-scale maps, which can be used to obtain information contained on maps with similar characteristics in terms of scale, location, and content, and to compare them on an equal basis.

2 Methods

2.1 Cartographic elements and their divisions

This article is about cartographic elements as fundamental components of cartographic content on maps. However, perceptions of what is fundamental vary. For cartographers, a cartographic element may be a line, dot, or molehill, for artists it can be a color or line, for landscape architects a specific structure or type of vegetation, for geographers a specific landform or type of road, and so on. This is why the term *cartographic element* is very broad and has several meanings. The Slovenian *Geografski terminološki slovar* (Kladnik, Lovrenčak, and Orožen Adamič 2005, 167) describes it as »an element on a map that represents a specific

Figure 4: Franz Xaver Baraga's untitled 1778 map, labeled *Krainska deschela* (Carniola).

structure, feature, or process more clearly or in greater detail, such as relief, a river system, a transportation network, or a settlement.« The term *element* in this perspective is understood in a broad sense as »a necessary or typical« (Oxford … 2022) and an »essential,« »relatively independent« (Slovar … 2014, 331) part of a whole, which, in the case at hand, is an old map. In reference to maps or in cartography in general, the term *cartographic element* is used.

Figure 5: Johann Walch's 1819 map of Styria, Carinthia, Carniola, and the County of Gorizia.

To examine the maps on an equal basis, a special digital data form (Figure 1) was created in Microsoft Access to analyze cartographic elements over the entire period studied. In terms of technical characteristics and design, maps differ considerably from the sixteenth to nineteenth centuries, which is why the depiction of individual cartographic elements differs significantly. Because the composition of maps was hence inconsistent, the aforementioned data form was used, which makes it possible to compare diverse maps. Microsoft Access made it possible to design the entry fields arbitrarily and link the data to pictorial material. Most importantly, the program collects and sorts all the data entered into the database so that they can be statistically processed and presented in the form of tables and graphs.

As shown in Table 1, the data form was built based on a breakdown of cartographic elements into the following five groups: 1) natural elements, 2) built elements, 3) toponyms, 4) mathematical elements, and 5) explanatory elements. These represent the highest hierarchical level and were further divided into subgroups at lower hierarchical levels (Table 1). Natural elements were divided into three subgroups (relief, vegetation, and water), built elements into four subgroups (settlements, built structures, roads, and borders), toponyms into five subgroups (choronyms, oronyms, hydronyms, settlement names, and names of built structures), mathematical elements into two subgroups (scale and graticule), and explanatory elements into five subgroups (title, colophon, explanatory text, decorative elements, and additional insets). Each of the subgroups was further divided into several subcategories, as presented in Table 1. The lowest (fourth) level represents the methods used to depict individual cartographic element on the map (e.g., forest depicted with a stylized tree symbol). The attempt to divide cartographic elements into groups is not new. However, a novel concept made it possible to standardize coverage of all elements on old maps.

2.2 The selection of old maps

The study included fifty-eight maps produced from the mid-sixteenth century to the end of the nineteenth century (Table 2). The main source of the maps was the map collection held by the Geographical Museum at the Anton Melik Geographical Institute of the Research Centre of the Slovenian Academy of Science and Arts, which holds several thousand maps, primarily of central Europe (Zorn and Gašperič 2016). In addition, collections from other museums and libraries, as well as private collections, were employed.

The basic criteria for the selection of maps were territorial (Slovenia), authorship, and scale. The maps analyzed represent the territory that today constitutes Slovenia or at least its majority (e.g., individual historical crownlands). The study did not take into account individual versions of maps. The term *version* refers to a map produced by the same author, at the same scale and showing the same area, but printed later. If a map was reprinted several times and the prints only differed in color or additions that did not affect the area mapped (e.g., an illustration or a cartouche), only one version was examined. This decision was made to eliminate numerous reprints that were very common for maps of Slovenian territory produced by Mercator, Homann, Mannert, and Kindermann.

Some maps were reprinted over an extended period of time, in various forms and with minor changes, but produced by different authors. The study included similar versions of maps produced by different authors. Regarding the scale, topographic maps at a medium scale (Vrišer 1998) or medium-large scale (Petrovič 2010) were analyzed, which means scales between 1 : 200,000 and 1:900,000. Medium-scale maps were selected because searching for and studying content on small-scale maps would have been too demanding (i.e., cartographic elements and symbols). On the other hand, the main challenge with large-scale maps would be their insufficient representation and uneven distribution over the period examined. Such maps were rare, especially in the sixteenth and seventeenth centuries.

2.3 Identifying information on old maps

The purpose of the digital data form was to establish a uniform database for the maps examined, which further allowed statistical comparison of cartographic elements. During the identification of basic information on the maps, several difficulties were encountered. Many maps did not contain any information about the year of publication, scale, authorship, and so on. In the case of missing date, information was sought in the literature and maps from equivalent editions. If it was impossible to determine the year, the following rules were applied:

- If it was possible to determine approximately, but not precisely, when a specific map was published, the oldest known year of publication was entered in the data form.
- If possible dates of the creation of the map spanned several decades or part of a century, the midpoint of this period was taken as the year of publication.
- If it was known from the sources when the maps started to be published, but it remained unknown until when they were published, the first year of publication was entered in the data form.

Because the majority of maps from the period studied lacked scale, this was calculated based on three to five selected distances on each map. The aim was to determine the distance between the same places. Distances between the following towns were selected as a starting point:

- Kranj (*Crainburg*)–Brežice (*Rann*);
- Trieste (Italy)–Ljubljana (*Laibach*);
- Piran (*Pirano*)–Novo Mesto (*Rudolfswert*);
- Udine (Italy)–Brežice (*Rann*);
- Dravograd (*Drauburg*)–Pula (*Polo*, Croatia).

On many maps, it was impossible to measure these distances accurately (or at all). The possible reasons for this are the following:

- The map was printed across two pages in a book or atlas, and the binding made it difficult to measure;
- Because of a distorted, inaccurate, and insufficiently detailed area mapped, not all the selected towns are displayed on the map; or
- The map does not depict the areas where these towns are located.

In the last case, distances were measured between towns close to those selected or other towns were selected for measuring the distances in various directions.

The entire area depicted within the map's inner frame was studied, even if it extended beyond the borders of today's Slovenia. The occurrence of individual cartographic elements is also affected by the map's form.

2.4 Data form structure

The digital data form created for the purpose of the study is divided into four data fields (Figure 1):

- Data field 1 (marked *1* in Figure 1) contains boxes for entering map data and selecting the basic commands (e.g., Save, Next, Back, Close, etc.);
- Data field 2 (marked *2*) contains buttons for selecting level-one and level-two cartographic elements, where it can be defined whether an individual group of elements is found on the map (options: Yes, No, Rarely); because of limited space, level-one buttons were placed under level-two buttons;
- Data field 3 (marked *3*) contains boxes for selecting and defining level-three cartographic elements and the methods of their representation; a specific box defines the presence of a cartographic element (e.g., built structures) or, more specifically, the user must select (e.g., a stylized symbol representing a built structure) and enter (e.g., which built structure is depicted: a castle, windmill, bridge, etc.) the characteristics of the elements examined, the methods of their representation, and the graphic variables used;
- Data field 4 (marked *4*) displays the map examined.

2.5 Map analysis

In the data form, maps were analyzed using the following protocol:

- Skimming the map to get a first impression of the cartographic representation and explanatory elements;
- Entering the basic information on the map in data field 1: year, title, author, and the ID number of the map image (Figure 2);
- Entering further data based on studying individual cartographic elements at all levels of the map selected (the »vertical« entry mode);

Table 1: A breakdown of cartographic elements, with methods of their representation. ► p. 32–33
Table 2: Basic information on the maps studied. ► p. 34–35

First level of cartographic elements	Second level of cartographic elements	Third level of cartographic elements	Depiction, method of representation
1 NATURAL ELEMENTS	1.1 Relief		Molehills (also set of molehills)
			Semicircles (also set of semicircles, caterpillars, plaited braids, fish scales, roof tiles, waves, pleated curtains)
			Triangles (also set of triangles, saw teeth, zigzag lines)
			Elevation contour (isohypse)
			Spot elevations
			Elevation layers (use of colors)
			Shading
			Hachures
			Dots
	1.2 Vegetation	1.2.1 Grassland	Grassland display (stylized image of grassland: surface with vertical lines, tufts of grass)
		1.2.2 Forest	Forest display (stylized image of trees: various density of the same or different trees)
		1.2.3 Other (e.g., vineyard, flood vegetation, olive grove)	Display of other vegetation (stylized image of vineyard, flood vegetation, olive grove)
	1.3 Water	1.3.1 River	Point symbols (geometric, pictorial, or alphanumeric)
			Line symbols (single line)
			Line symbols (two lines, often parallel)
			Area symbols (colored polygon)
			Other symbols for flowing water
		1.3.2 Body of water	Point symbols (geometric)
			Area symbols (colored shape)
			Other displays for bodies of water
		1.3.3 Point	Point symbols (e.g., waterfall)
2 BUILT ELEMENTS	2.1 Settlements		Point symbols (geometric symbols: square, circle, triangle, and others)
			Point symbols (stylized images of buildings)
			Area symbols (ground plan of a settlement/walls)
			Other symbols for settlements
	2.2 Built structures		Point symbols (geometric symbols: square, circle, triangle, and others)
			Point symbols (stylized images of buildings)
			Area symbols (ground plan of a settlement/walls)
			Other symbols for settlements

	2.3 Roads		Point symbols (geometric)
			Point symbols (stylized)
			Line symbols (single line, line of equal symbols)
			Line symbols (parallel lines)
			Other symbols for roads
	2.4 Borders		Line symbols (single line, line of equal symbols)
			Area symbols (colored area)
			Other symbols for borders
3 TOPONYMS	3.1 Choronyms		Letters of the name
	3.2 Oronyms		Letters of the name
	3.3 Hydronyms		Letters of the name
	3.4 Settlement names		Letters of the name
	3.5 Names of built structures		Letters of the name
4 MATHEMATICAL ELEMENTS	4.1 Scale		Numerical scale displays
			Graphic scale displays
			Verbal scale displays
	4.2 Graticule		Graticule displays
5 EXPLANATORY ELEMENTS	5.1 Title		Text
	5.2 Legend		Legend displays
	5.3 Colophon		Colophon displays
	5.4 Explanatory text		Text
	5.5 Decorative elements	5.5.1 Wind/compass rose	Wind/compass rose displays
		5.5.2 Cartouche	Cartouche displays
		5.5.3 Pictorial images (e.g., coats of arm, mythological symbol, ship, animal, human)	Displays of pictorial images
		5.5.4 Other (e.g., vignette)	Other image displays
	5.6 Additional inset	5.6.1 Panoramic image of landscape and city	Displays of panoramic images of landscapes and cities in an additional frame
		5.6.2 Other pictures	Displays of other pictures in an additional frame
		5.6.3 City plan	Displays of other city plans in an additional frame
		5.6.4 Map	Displays of maps in an additional frame
		5.6.5 Other (framed windows with various content)	Displays of other images in an additional frame

YEAR OF ISSUE	TITLE (original)	AUTHOR/PRODUCER	SCALE (measured distances)	PLACE OF ISSUE
1545–1552	*Descriptio Totius Illyridis XVI NO TAB*	Sebastian Münster (1488–1552)	1:702,878	/
1561	*Ducatus Carniolae et Histriae una cum Marcha Windorum*	Wolfgang Lazius (1514–1565)	1:513,979	Vienna
1569	*Ducatus Carniolae una cum Marcha Windorum*	Bolognino Zaltieri (Bolognius Zalterius)	1:486,766	Venice
1570	*Schlavoniae, Croatiae, Carniae, Istriae, Bosniae, finitimarumque regionum nova descriptio*	Abraham Ortelius (1527–1598), based on Augustin Hirschvogel	1:868,911	/
1572	*Illyricum*	Ioanes Sambucus (János Zsámboki) (1531–1584)	1:816,219	/
1573	*Goritiae, Karstii, Chaczeolae, Carniolae, Histriae, et Windorum marchae descrip[tio]*	Wolfgang Lazius (1514–1565)	1:692,240	Gorizia
1589	*Forum Iulium, Karstia, Carniola, Histria et Windorum Marchia*	Gerardus Mercator (1512–1594)	1:642,771	/
1593	*Carniolae Chaziolaeque Ducatus nec non et Goritiae Comitatus prouintiarum Norici ac Illirici uera propriaque delineatio*	Gerard (1509–1591) and Cornelis de Jode (1568–1600)	1:613,342	Antwerp
second half of the 16th century	*Sclauonia oder Windisch Marck, Bossen, Crabaten*	Sebastian Münster (1488–1552)	1:881,567	/
1635	*Karstia, Carniola, Histria et Windorum Marchia*	Willem Janszoon (1571–1638), Johan (1599–1673) and Cornelis (1610–1644) Blaeu	1:615,000*	/
1636	*Karstia, Carniola et Windorum Marchia*	Henricus Hondius (1597–1651), based on Gerardus Mercator	1:647,801	/
1649	*Karstia, Carniola, Histria et Windorum Marchia*	Matthäus Merian (1593–1650), based on Gerardus Mercator	1:747,443	/
1657	*Hertzogthüber Steyer, Karnten, Krain, & c./Duchés de Stirie, Carinthie, Carniole . . .*	Nicolas Sanson (1600–1667)	1:777,868	Paris
c. 1660	*Circuli Austriaci in quo Sunt Archiducatus Austriae Ducatus Stiriae Carintiae Carniolae Comitatus Tirolis et Episcopatus Tridentini*	Justus Danckerts (1635–1701)	1:750,583	Amsterdam
c. 1680	*Ducatus Carintiae et Carniolae Cilleiaeque Comitatus*	Frederick de Wit (1629/1630–1706)	1:515,632	Amsterdam
1681	*Partie du Cercle d'Austriche, ou sont Les Duches de Stirie, de Carinthie, de Carniole et autres Estats Hereditaries a la Maison d'Austriche*	Alexis–Hubert Jaillot (1632–1712), based on Nicolas Sanson	1:558,980	Paris
1681	*Carniolia, Karstia, Histria et Windorum Marchia*	Janez Vajkard Valvasor (1641–1693)	1:606,212	/
1689	*Carniolia Karstia Histria et Windorum Marchia*	Janez Vajkard Valvasor (1641–1693)	1:629,266	/
c. 1690	*Circuli Austriaci Orientalior Pars in qua Austria Propria et abea Dependentes, tum Ducatus, Stiriae, Carintiae, Carniola tum Comitatus, hisce inclusi, Cillensis et Goritiae, singuli subdivisi*	Gerard Valck (1652–1726)	1:747,765	Amsterdam
c. 1700	*Karstia, Carniola, Histria et Windorum Marchia*	Gerard Valck (1652–1726) and Petrus Schenk (1660–1718)	1:534,810	Amsterdam
1709	*Partie du Cercle d'Austriche, ou sont Les Duches de Stirie, de Carinthie, de Carniole et autres Estats Hereditaries a la Maison d'Austriche*	Alexis-Hubert Jaillot (1632–1712), based on Nicolas Sanson	1:681,511	Paris
1719	*Ducatus Carnioliae accuratissima delineatio*	Christoph Weigel the Elder (1654–1725), based on Janez Vajkard Valvasor	1:683,889	Nuremberg
after 1718	*Tabula Ducatus Carnioliae, Vindorum Marchiae et Histriae*	Johann Baptist Homann (1664–1724)	1:509,060	Nuremberg
1726–1750	*Ducatus Stiriae et Carintiae Carniolae Cilleiaeque Comitatus Nova Tabula*	Reinier (1698–1750) and Josua (1704–1765) Ottens	1:523,276	Amsterdam
first half of the 18th century	*Exactissima Ducatus Carniolae Vinidorum Marchiä et Histriae delineatio*	Matthäus Seutter (1678 – c. 1757)	1:522,218	Augsburg
1740	*Ducatus Carnioliae Tabula*	Johann van der Bruggen (1695–1740)	1:760,127	Vienna
1742	*Le Duche de Carniole*	Georges-Louis Le Rouge (c. 1712 – c. 1790)	1:640,885	Paris
1742	*Le Duché de Stirie*	Georges-Louis Le Rouge (c. 1712 – c. 1790)	1:447,356	Paris

1752	*Partie Méridionale du Cercle d'Autriche, qui comprend la Basse Partie du Duché de Stirie, le Duché de Carinthie, divisé en haute et basse, le Duché de Carniole, divisé en haute, basse, moyenne et interieure Carniole, et l'Istrie Impériale*	Didier Robert de Vaugondy (c. 1723 – 1786)	1:578,461	Paris
c. 1760	*Exactissima Ducatus Carnioliae, Vindorum Marchiae et Histriae delineatio*	Tobias Conrad Lotter (1717–1777)	1:526,909	/
1778	No title *(Krainska deschela)*	Franz Xaver Baraga	1:335,202	Ljubljana
1782	*Mappa Litho-Hydrographica Nationis Slavicae*	Baltazar Hacquet (1739/40–1815)	1:390,339	Ljubljana
1789–1806	*Inner Krain mit der windischen Mark und dem Triester Gebiethe. Nro.143.*	Franz Johann Joseph von Reilly (1766–1820)	1:499,328	Vienna
1791	*Kaartje van t Hertogdom Crain*	Guillaume Delisle (1675–1726)	1:319,998	Amsterdam
1796	*Unterkrain oder der Neustaedtler Kreis*	Joseph Karl Kindermann (1744–1801)	1:260,661	Graz
1798–1802	*Carte générale du Théâtre de la Guerre en Italie et dans les Alpes*	Bacler d'Albe (1761–1824)	1:257,509	/
1800	No title *(Herzogthum Krain)*	Franz Anton Schrämbl (1751–1803)	1:517,546	Vienna
1800	*Der Oesterreichische Kreis*	Conrad Mannert (1756–1834)	1:897,246	Nuremberg
1803	*Charte von Kaernthen und Krain, nebst den Grafschaften Görz und Gradiska und dem Gebiethe von Triest/Carte de la Carinthie et de la Carniole, avec les Comtés de Gorice et de Gradisca et le Gouvernement de Trieste*	Joseph Karl Kindermann (1744–1801)	1:498,119	Vienna
1807	*Charte vom Erzherzogthum Oesterreich, den Herzogthümern Steyermark, Salzburg, Kärnthen und Krain*	Conrad Mannert (1756–1834)	1:788,854	Nuremberg
1810	*Inner Oesterreich oder Die Herzogthümer Steyermark Kärnten und Krain. Die Grafschaften Goerz und Monfalcone. Die Bezirke Triest und Istrien. Nebst den angränzenden Theilenvon Italien Tyrol Salzburg Nieder Oesterreich Kroatien und Hungarn*	Zürner, probably Georg Adam (1756–1809)	1:336,735	Vienna
1812	*Carte des Provinces Illyriennes comprenant la Bosnie, l'Herzégovine, le Monténéro et quelques pays adjacens*	Gaetano Palma	1:650,000*	Trieste
1818	*Charte von dem Koenigreiche Illyrien*	Joseph Karl Kindermann (1744–1801)	1:533,835	Vienna
1818	*Charte von dem Königreiche Illyrien und dem Herzogthume Steyermark*	Carl Ferdinand Weiland (1782–1847)	1:608,669	Weimar
1819	*Königreich Illyrien und Herzogthum Steyermark in seine Kreise eingetheilt nebst den angrenzenden Theilen von Italien, Tyrol, Salzburg, Nieder–Oesterreich, Kroatien und Hungarn*	Zürner, probably Georg Adam (1756–1809)	1:336,787	Vienna
1819	*Charte von Steyermark Kaernthen und Krain, nebst der Grafschaft Görz*	Johann Walch (1757–1824)	1:498,558	Augsburg
1831	*Neueste Specialkarte von Krain nach der dermaligen Eintheilung in Bezirke*	Georg Ludwig von Ritter	1:277,842	Ljubljana
1832	*Karte vom Herzogthume Krain*	Gottfried Loschan (1796–1857)	1:295,094	Vienna
1836	*Königreich Illyrien, Gouvernement Laibach. Charte der Kreise: Laibach, Neustädtl, Adelsberg*	Renner (cartographer), O. C. Apelt (lithographer)	1:524,560	Leipzig
1841	*General-Post-&Strassenkarte des Königreichs Illyrien nebst dem k[öniglich] ungarischen Littorale*	R. A. Schulz	1:521,244	Vienna
1842	*General Post und Strassen Karte des Herzogthums Steyermark*	R. A. Schulz	1:401,368	Vienna
c. 1850	*Karte des Kronlandes Steiermark*	Josef Franz Kaiser (1786–1859)	1:382,487	Graz
1853	*Zemljovid Slovenske dežele in pokrajin*	Peter Kozler (1824–1879)	1:576,000*	Vienna
1853	*Königreich Illyrien*	Carl Christian Franz Radefeld (1788–1874)	1:880,000*	/
1859–1871	*Die Herzogthümer Steiermark, Kärnten, Krain, die gefürstete Grafschaft Görz und Gradiska, die Markcrafschaft Istrien, die Stadt Triest mit Gebiet und das ungarische Littorale*	Carl Gräf (1822 – c. 1897)	1:600,000*	Weimar
1863	*Die Herzogthümer Kärnthen und Krain, die Grafschaft Görz & Gradisca, die Markgrafschaft Istrien und die reichsunmittelbare Stadt Triest*	Hermann Berghaus (1828–1890)	1:770,985	Gotha
1878	*Die Kronländer Kärnthen, Krain, Görz - Gradisca - Istrien und Triest*	Friedrich H. Handtke (1815–1879)	1:872,626	Głogów
1885–1892	*Krain - Istrien*	Bibliographisches Institut	1:835,591	Leipzig

LEGEND: * Scale taken from literature or map

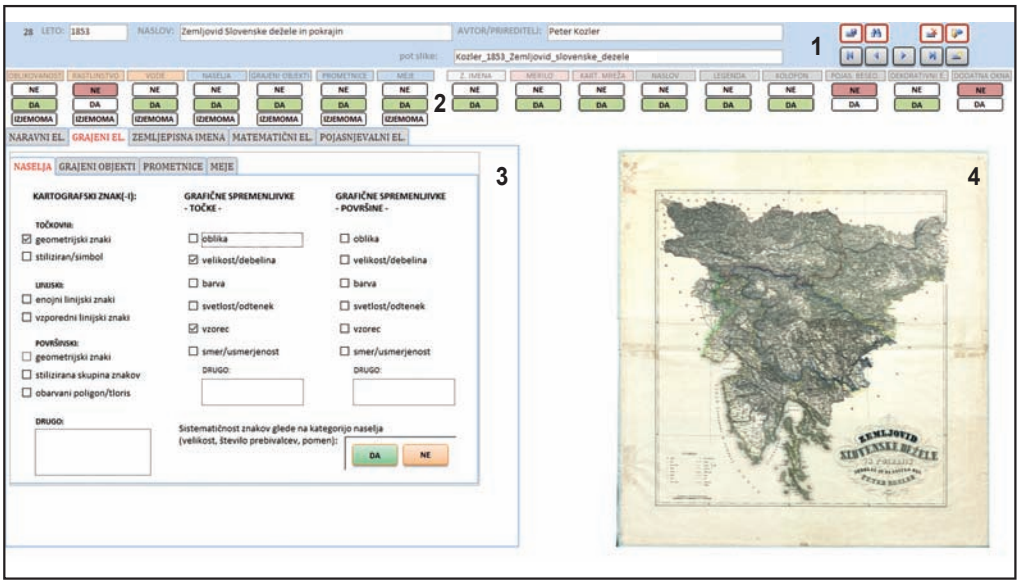


Figure 6: The data form was made in Slovene in digital format with the four basic data fields, explained in English in section 2.5.

- To get a clearer picture and avoid potential errors, data were not entered by level for all the maps simultaneously (the »horizontal« entry mode);
- Two pieces of data were provided in data field 2: the type of level-one cartographic element was selected, and for this element the presence of a level-two cartographic element was indicated by selecting »Yes« (evenly present across the map), »No« (absent), or »Rarely« (present only in some sections of the map; Figure 3);
- Data on the method used to represent the cartographic element at hand and its graphic variables (shape, size, color, brightness, pattern, and direction) were provided in data field 3, along with data on any special features (the »Other« box) if relevant and answers to questions related to a specific cartographic element (Figure 4);
- A low-resolution image of the map was entered in data field 4, which aided data entry and made it easier to move between the data form pages (right side of the data form; Figure 1);
- After entering all the data, they were double checked for accuracy and saved.

Each map was evaluated separately. First, an individual group of cartographic elements was selected in the data form, a group of representation methods was ascribed to it, and the types of representation included in the map were defined. For example, for natural elements, the method of representing relief with molehills was identified. This was followed by an assessment of the representation method using graphic

Figure 7: Data field 1.

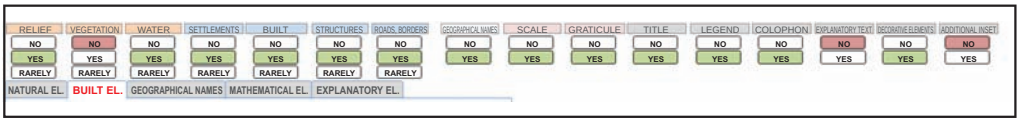


Figure 8: Data field 2.

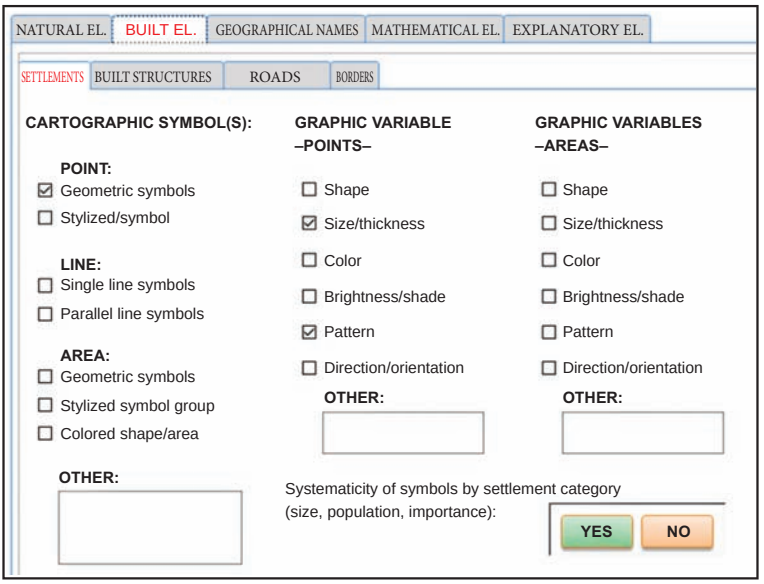


Figure 9: Data field 3.

variables. Their division and interpretation were adopted from Fridl (1999), who based her study on the systematic processing of cartographic means of expression (Bertin 1981). Graphic variables were assessed for the methods of representation of natural and built elements, and for geographical names. For mathematical and explanatory elements, assessing graphic variables does not make sense, and so their data characteristics were defined instead (e.g., location on the map, shape, type, and composition).

In terms of the dimension or type of the feature depicted (Fridl 1999), cartographic symbols can be divided into point, line, and area or surface symbols (i.e., shapes). The terms »point symbol,« »line symbol,« and »area symbol« are used below.

3 Results

For natural (cartographic) elements, the representation of relief was studied (Figure 5). The greatest change can be observed around 1800, when molehills and shading were replaced by hachures (Gašperič 2010). Of all the cartographic elements examined, relief had the largest number of representation methods. Chronologically, these methods are divided into the period from the sixteenth to the eighteenth centuries (molehills and shading), and the nineteenth century, when hachures, contour lines, and dots were used (Figure 6).

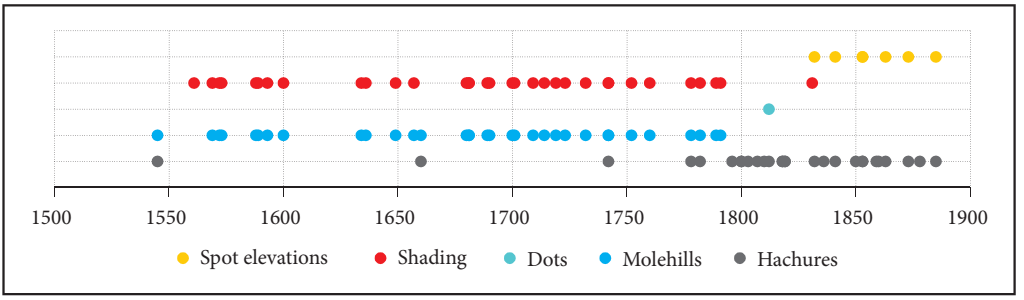


Figure 10: Occurrence of relief representations on maps from the mid-sixteenth century to the end of the nineteenth century.

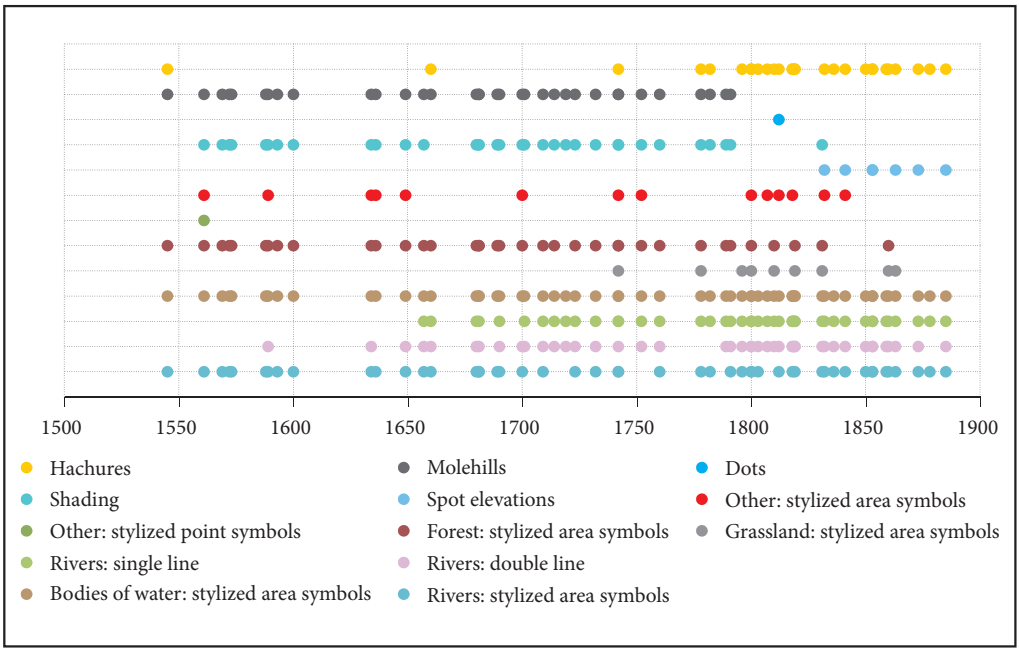


Figure 11: Occurrence of natural elements' representations in the period studied.

In terms of vegetation, forest representations predominate over those of grassland and other vegetation types. From the sixteenth to nineteenth centuries, the number of maps depicting vegetation declines, and vegetation is gone completely by the second half of the nineteenth century. Except for a 1561 map, vegetation is typically depicted with a stylized area symbol (Figure 7). Cartographers gradually realized that depicting vegetation on medium-scale maps was inappropriate because accurate representation demanded additional fieldwork and limited map clarity and usefulness.

Waters are represented on all maps, but until the mid-seventeenth century even rivers are depicted with area symbols (Figure 8); later, a more accurate line representation begins to be used. The share of names of rivers gradually declines. In the sixteenth century, the shares vary and can even be 100%, from the early seventeenth century onward up to 50% of waters are named, and after 1800 only up to 25% (Figure 9). The reason for this may be the production of increasingly detailed maps showing a denser river system. Naming all watercourses would definitely affect a map's clarity.

Figure 12: Occurrence of level-two and level-three natural elements in the period studied. ►

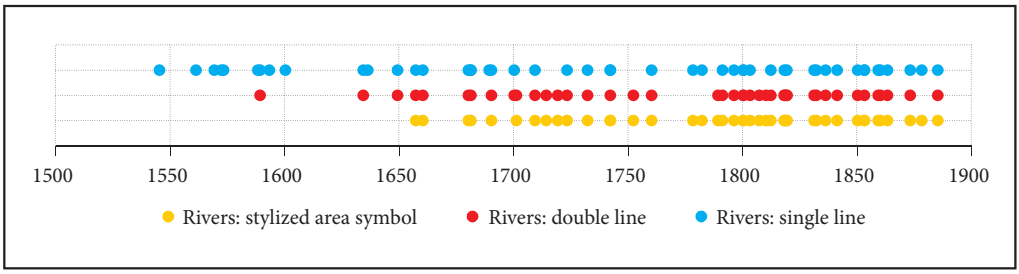
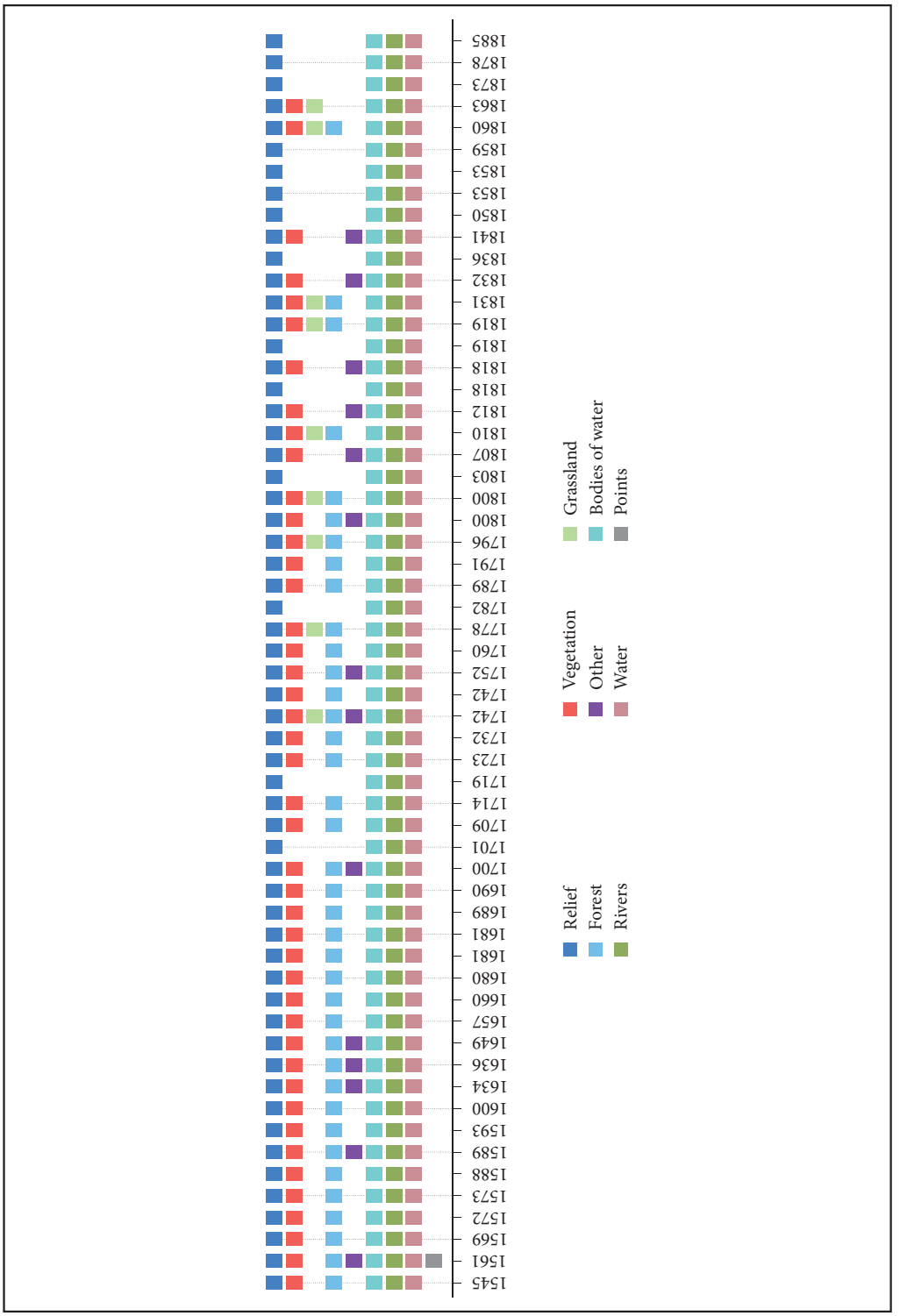


Figure 13: Occurrence of river representations on maps from the mid-sixteenth century to the end of the nineteenth century.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1593
1589
1588
1573
1572
1569
1561
1545
Relief
Forest
Rivers
Vegetation
Other
Water
Grassland
Bodies of water
Points

With built elements, the single- or double-line representations of roads stand out. None can be found in the sixteenth and seventeenth centuries, in the eighteenth century they begin to appear only exceptionally, and in the nineteenth century they are used on every map (Figure 10). There may be several reasons for this, but a change can be observed in the perception of the importance of roads and hence their representation on maps.

Settlement representations on maps are often not distinguished from those of built structures. Both are usually depicted with stylized point symbols. With regard to cartographic symbols and the names of selected castles – for example, Kamen (*Stein*), Bogenšperk (*Wagensberg*), Strmol (*Stermal*), and Borl (*Ankenstein*), it can be established that the authors were not familiar with all the settlements and castles or did not distinguish between them, and hence they also marked them accordingly. In the specific examples listed, they marked a named castle as a settlement.

Borders are marked on most maps. Single lines predominate over colored areas. The latter are common on eighteenth-century maps, whereas lines are used throughout the period studied (Figure 11).

Graticules and scales were examined among mathematical elements. They appear on most maps. The scale is most often provided in a verbal form; a graphic form is also very common, whereas a numerical scale is used only exceptionally (Figure 12).

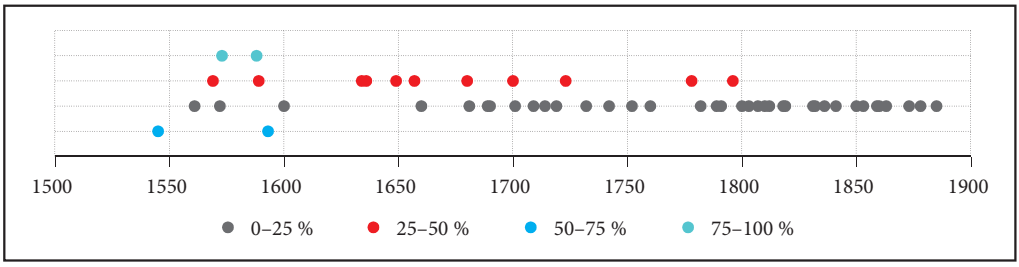


Figure 14: Occurrence of maps from the mid-sixteenth century to the end of the nineteenth century by share of hydronyms used on them.

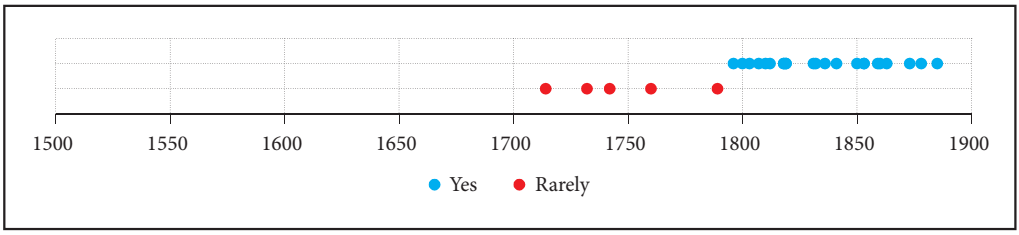


Figure 15: Occurrence of roads on maps from the mid-sixteenth century to the end of the nineteenth century.

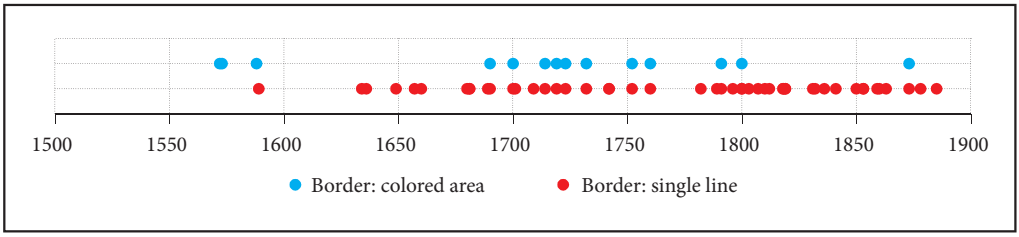


Figure 16: Occurrence of borders represented with line or area symbols on maps from the mid-sixteenth century to the end of the nineteenth century.

The graticule is not labeled on any map. Until the nineteenth century, only printing degrees between the two map frames was common; later a longitude and latitude grid was also drawn on most maps (Figure 13). Conic and pseudoconic projections predominate; from the mid-seventeenth century onward, cylindrical projection also appears in places (Figure 14).

Toponyms appear on all maps. Choronyms are largely written in all capital letters and other toponyms in small caps. On nearly all maps, the names of rivers are provided both in the direction of their flow and in its opposite direction. In evaluating the graphic variables, the most frequent changes with all toponyms occur in size, and changes in shape are also common (Figure 15).

The group of explanatory elements was newly designed for the purposes of this study. On most maps, the title is provided inside the inner map frame. Decorative elements are also common, especially a cartouche, which can be found on most maps between the sixteenth and eighteenth centuries, after which it gradually disappears. In turn, vignettes and oval frames are more common in the nineteenth century. Legends

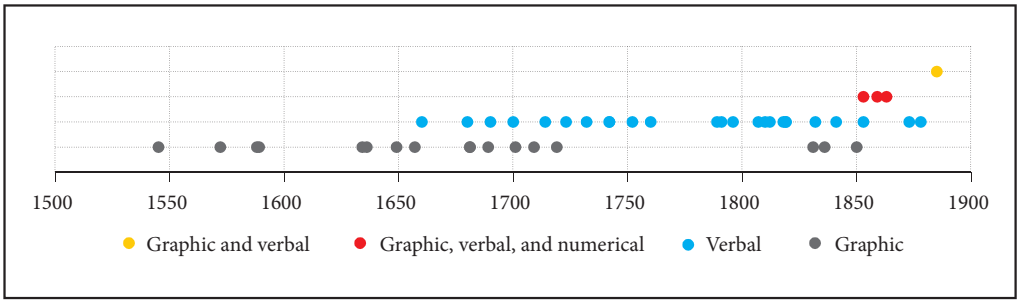


Figure 17: Occurrence of scale representations as provided on individual maps from the mid-sixteenth century to the end of the nineteenth century.

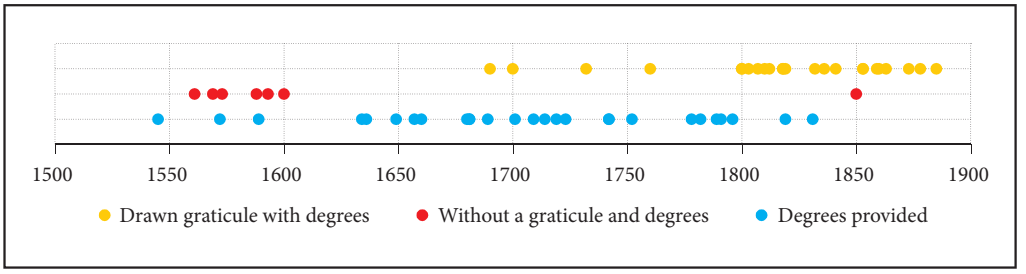


Figure 18: Occurrence of various types of graticules on maps from the mid-sixteenth century to the end of the nineteenth century.

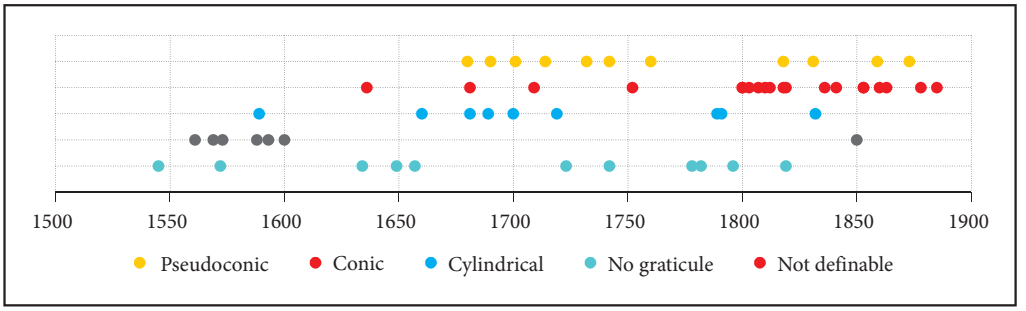


Figure 19: Occurrence of map projections between the mid-sixteenth century and the end of the nineteenth century.

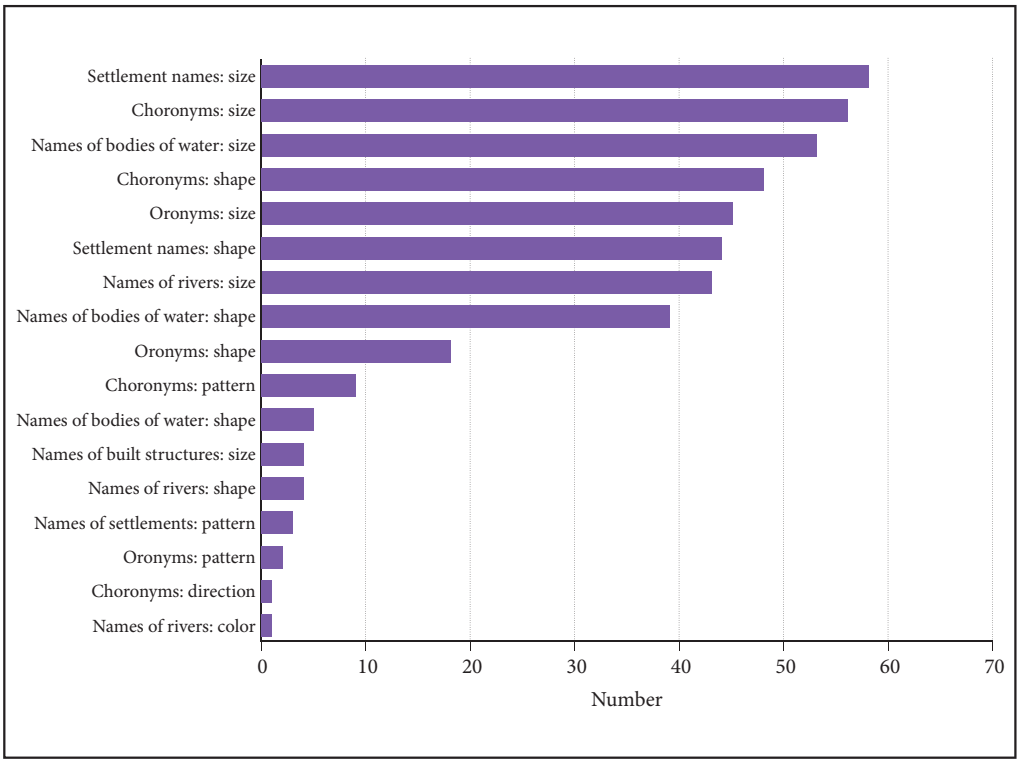


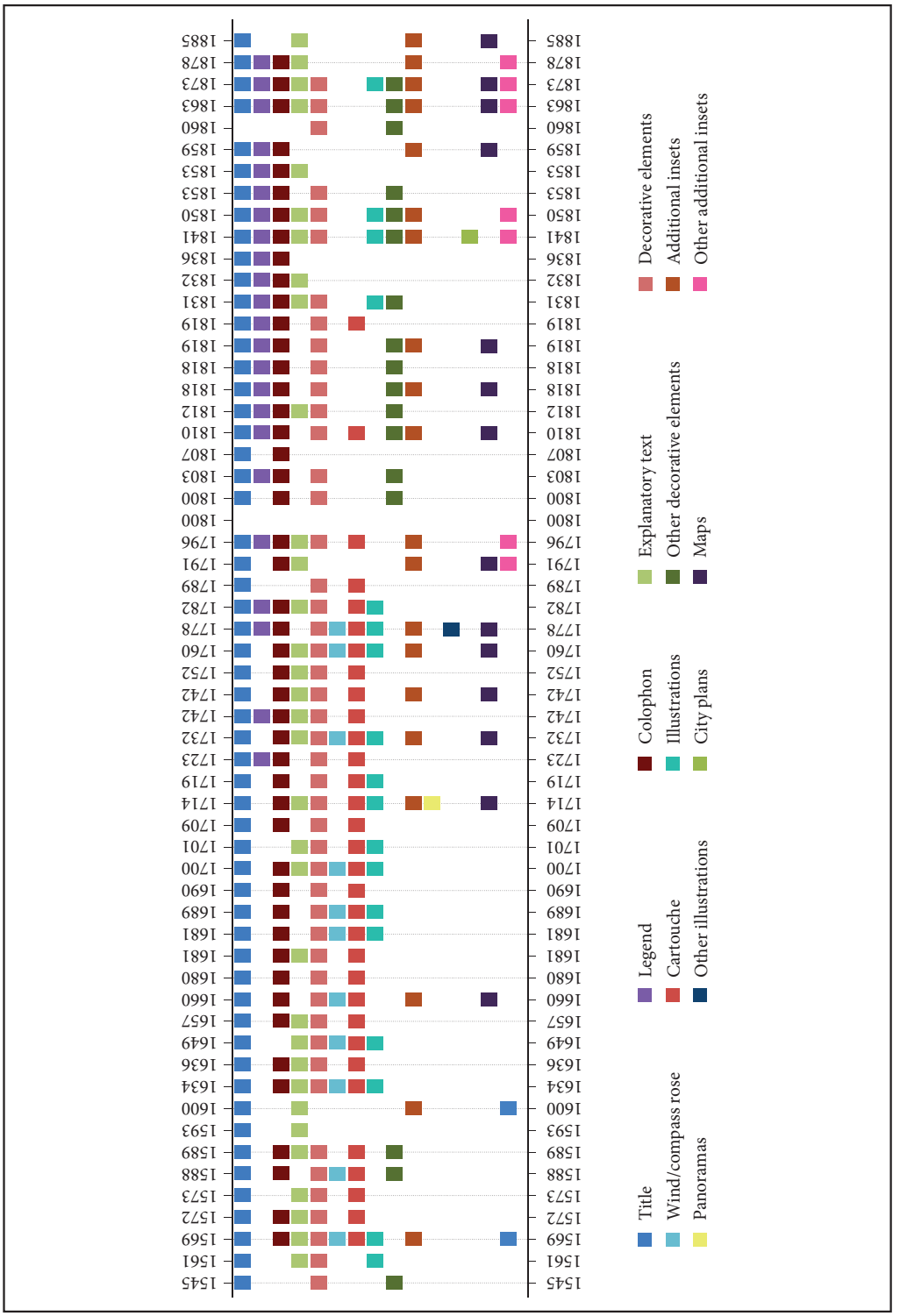
Figure 20: Applying graphic variables to all toponyms.

are more common on more recent maps; none can be found on maps before the early eighteenth century. Colophons appear throughout the period studied, as do explanatory texts and additional insets, albeit not as frequently (Figure 16).

European cartography had various centers during the period studied. Thus, the maps of Slovenian territory reflected Dutch, Belgian, French, Italian, and, first and foremost, German and Austrian cartography. This can already be seen from the names of their authors. Only three authors of the maps examined can be treated as »Slovenian.« These were authors that lived in what is now Slovenia (Johann Weikhard (Janez Vajkard) Valvasor and Peter Kozler) or worked there for an extended period of time (Balthasar Hacquet; Figure 17).

Different types of cartographic elements developed at different paces (Figure 18). In some places, a chain reaction occurred, whereby a change in the representation or frequency of one type of cartographic element affected another type. Hence, for instance, the shift from a stylized representation of relief (molehills) to a plastic representation (hachures) and the subsequent »freeing up« of space on the map led to the more frequent use of other elements (e.g., roads, rivers, and geographical names). The representations of vegetation (forest) were replaced by other cartographic elements (e.g., river systems, relief, roads, and geographical names). An increase in the number of representations of rivers led to a smaller number or share of hydronyms. The density of road symbols increased from the end of the eighteenth century onward, which facilitated better orientation, but also led to poorer map readability. In addition, roads were often depicted very similarly to rivers.

Figure 21: Occurrence of level-two and level-three explanatory elements in the period studied. ►


1885
1878
1873
1863
1860
1859
1853
1853
1850
1841
1836
1832
1831
1819
1819
1818
1818
1812
1810
1807
1803
1800
1800
1796
1791
1789
1782
1778
1760
1752
1742
1742
1732
1723
1719
1714
1709
1701
1700
1690
1689
1681
1681
1680
1660
1657
1649
1636
1634
1600
1593
1589
1588
1573
1572
1569
1561
1545
Decorative elements
Additional insets
Other additional insets
Explanatory text
Other decorative elements
Maps
Colophon
Illustrations
City plans
Legend
Cartouche
Other illustrations
Title
Wind/compass rose
Panoramas

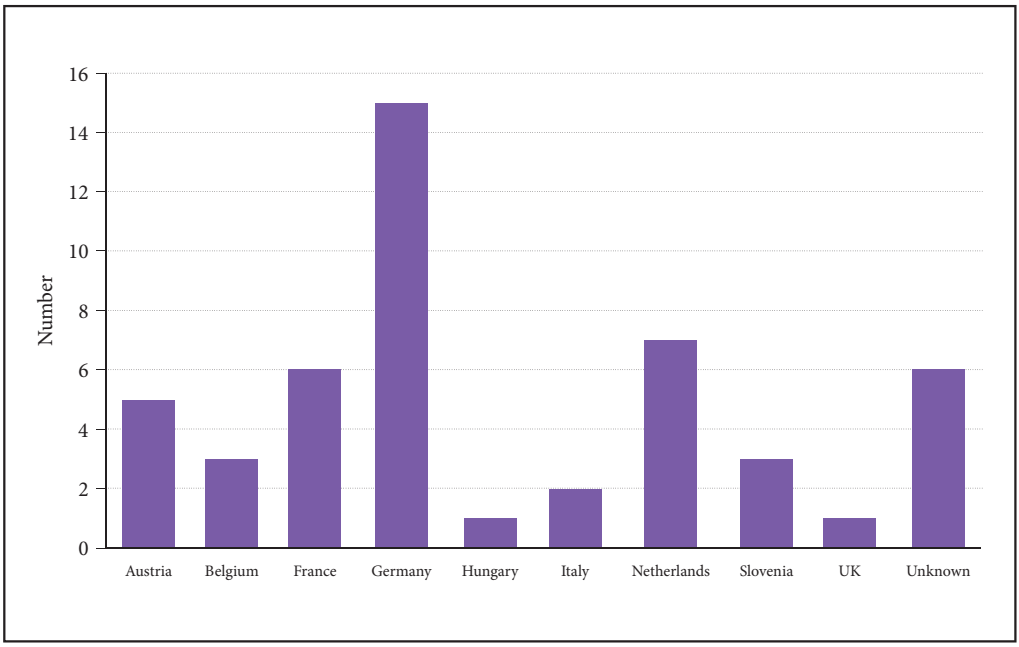


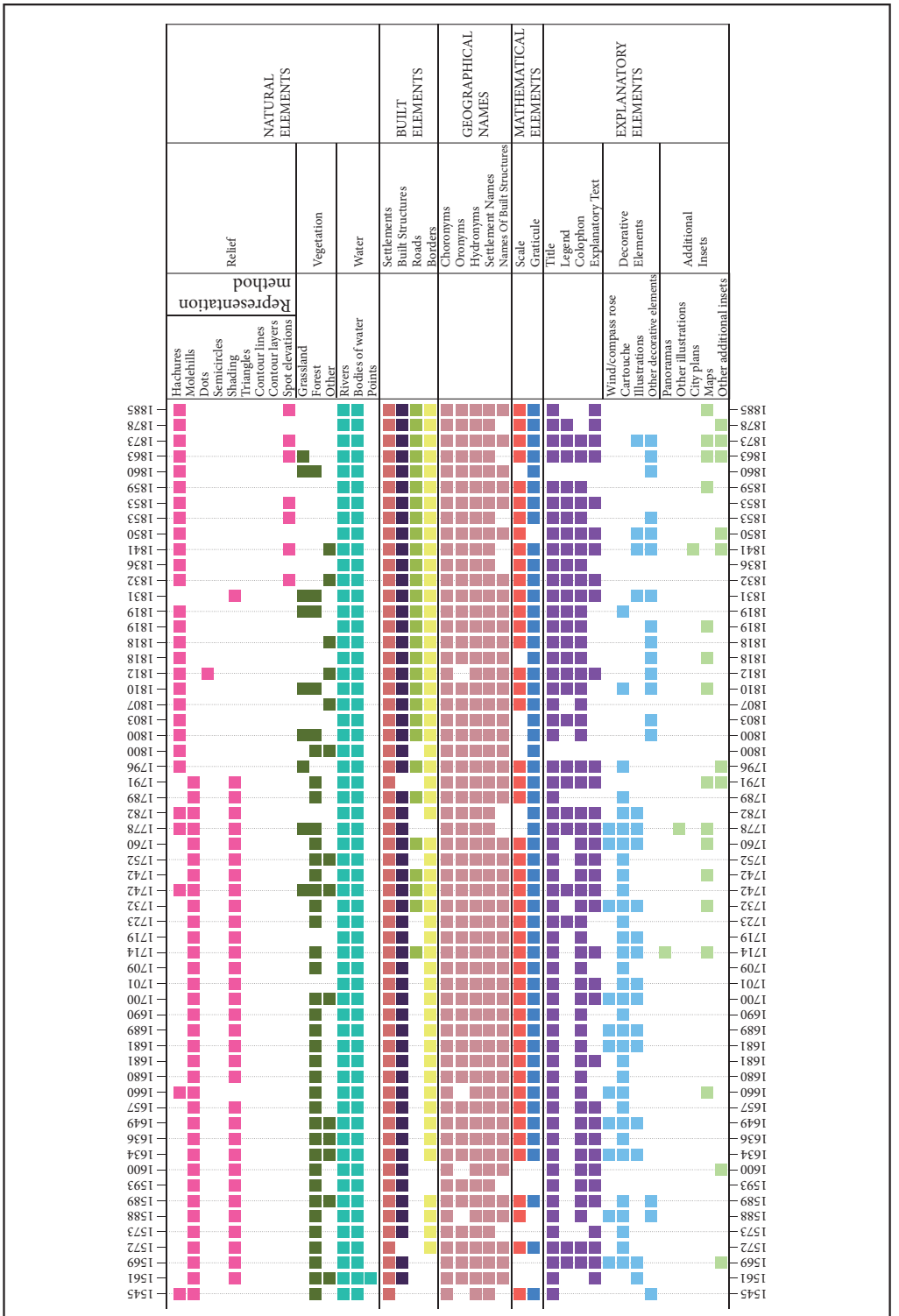
Figure 22: Map authors by origin (modern country).

4 Discussion

The new method of studying cartographic elements was used to compare cartographic elements across different periods and to identify, evaluate, and interpret cartographic content on an equal footing. The advantage of this standardized method is that, by using it, established or generalized interpretations can be confirmed or rejected because the findings are based on data analysis and not on the opinion of the map researcher or reader.

The unexpected result in this study is related to built elements, for which the (lack of) presence of roads represented with single or double lines stands out. There are none in the sixteenth and seventeenth centuries, they appear only exceptionally in the eighteenth century, and they are used on all maps in the nineteenth century (Figure 10). This reflects a change in the perception of the importance of roads and hence the representation of roads on maps. The question is why roads began to be depicted on the maps relatively late, despite an extensive road network and substantial quantities of goods passing through Slovenian territory. Based on information gathered from the literature and cartographic material, the answer is multifaceted. Poor road conditions began to improve through gradual renovation in the nineteenth century, when numerous measurements were made and precise drawings and maps were produced. The perception of the maps' communicative value also changed, which was demonstrated in the case of the road network. Medium- and small-scale maps were not used for wayfinding, but to spread knowledge and obtain a better understanding of a region (Delano-Smith 2007). Until the early modern period, people traveled on foot or by horse. The use of horse-drawn wagons began to increase in the sixteenth century, and by the eighteenth century higher-quality roads facilitated the use of wagons in most goods transport (Zwitter 2014). It was not only the quality of roads, but also the type and quantity of cargo that influenced their importance. Information shows that large quantities of diverse goods were transported on Slovenian roads. A cart load

Figure 23: Cartographic elements of all levels depicted on maps from the mid-sixteenth century to the end of the nineteenth century. ►


NATURAL ELEMENTS
Relief
Hachures
Molehills
Dots
Semicircles
Shading
Triangles
Contour lines
Contour layers
Spot elevations
Vegetation
Grassland
Forest
Other
Water
Rivers
Bodies of water
Points
Representation method
BUILT ELEMENTS
Settlements
Built Structures
Roads
Borders
GEOGRAPHICAL NAMES
Choronyms
Oronyms
Hydronyms
Settlement Names
Names Of Built Structures
MATHEMATICAL ELEMENTS
Scale
Graticule
EXPLANATORY ELEMENTS
Title
Legend
Colophon
Explanatory Text
Decorative Elements
Wind/compass rose
Cartouche
Illustrations
Other decorative elements
Additional Insets
Panoramas
Other illustrations
City plans
Maps
Other additional insets
1545
1561
1569
1572
1573
1588
1589
1593
1600
1634
1636
1649
1657
1660
1680
1681
1689
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1873
1878
1885

was measured in a unit known as a *tovor* 'seam', usually corresponding to approximately 150 kg (Kosi 1998). In the sixteenth century, the transport of goods between the Mediterranean region and the surrounding countryside (in both directions) could even amount to 200,000 seams during the peak season (Gestrin 1991). It can be concluded that it exceeded 30,000 tons per year. At the end of the sixteenth century, an average of around 20,000 oxen per year were driven through Slovenian territory to the Republic of Venice (Zwitter 2014). The 1787 data show that approximately 15,500 wagons of various sizes passed through the Vrhnika toll station in both directions (Šorn 1979). In 1806 and 1807, the transit transport between Ljubljana and Trieste alone included 80,000 wagons (Holz 1994).

Gradually the belief developed that even features that may have previously been taken for granted (e.g., roads for going from one place to another) must be depicted on maps. The main reason for this, though, may be cartographic development itself or the change in the representation of relief. As already mentioned (Figure 5), around 1800 a change occurred in the representation of the Earth's surface, when a stylized representation using molehills (a profile perspective) was replaced by hachuring (a plan perspective). In this way, technical limitations hindering a detailed representation of roads were eliminated.

The method presented is designed to examine all maps in the period studied. However, a limitation of the study is related to the problems in searching for cartographic material or with its public accessibility, and to identifying and interpreting specific cartographic symbols. In principle, more maps means better results but, when looking for cartographic material, one may not be aware of all the material available in archives, libraries, private collections, and online. In addition, identifying cartographic symbols may be subjective, not only in terms of the researcher or map reader, but also the cartographer, who is either familiar or unfamiliar with the territory mapped, or is overly casual in its representation. A good example is the representation of an olive grove on a 1561 map by Wolfgang Lazius, who also used the same or a similar symbol for areas more suitable for viticulture (Figure 19). Hence it follows that the new method presented in this article is primarily intended for studying old maps from the fifteenth to nineteenth centuries. Old maps are usually very simplified, whereas modern maps (especially from the end of the nineteenth century onward) are already made following a uniform standard and based on expert data. Due to differences in the cartographic content, an examination of even older maps (from before the fifteenth century) or more recent maps (from the twentieth century) would require changes in methodology.

This study has certain limitations. On the oldest maps in particular, certain representation methods are unclear or inconsistent (e.g., molehills, trees, and so on), which made it more difficult to identify individual characteristics (e.g., those of graphic variables). Because of poorer technical possibilities and knowledge, as well as non-standardized symbols and map structure, on old maps individual symbols are drawn without any special principles. This resulted in idiosyncratic depictions, which are often difficult to classify under a specific evaluation category. To avoid this, uniform rules for evaluating all maps equally were defined in the data form.

Figure 24: A similar green cartographic symbol was used to represent an olive grove near Koper and Trieste (left), and a vineyard in the Bizeljsko region (right) on a 1561 map by Wolfgang Lazius.

In addition, a review of the geographical, cartographic, and historical literature did not identify any study comparably analyzing cartographic elements on old maps. Unfortunately, it was therefore impossible to make a comparison with other studies.

5 Conclusion

This article presents a new method for simultaneously examining a random number of cartographic elements and symbols on maps with similar characteristics in terms of scale, location, and content. This study proved that old maps are an important primary source of information that cannot be found in written or pictorial archival material (Zorn 2007). They provide an important complement to historical written sources, but the depictions on them may be the result of the author's or producer's preferences or (incorrect) perceptions (Štular 2010). In 1733, the Anglo-Irish satirist Jonathan Swift nicely verbalized the problem of the cartographer's ignorance in his poem On Poetry: A Rhapsody:

»So geographers, in Afric maps,
»With savage pictures fill their gaps,
»And o'er unhabitable downs
»Place elephants for want of towns.«

Therefore, old maps require a critical and standardized research approach, like the one presented in this article. A special digital data form was created to examine the maps and analyze cartographic elements over the entire period studied in a uniform way. The data form was built based on a division of cartographic elements into the five main groups, which were further divided into four subgroups at lower hierarchical levels. The study included fifty-eight medium-scale topographic maps produced from the mid-sixteenth century to the end of the nineteenth century.

The results show that different types of cartographic elements developed at different paces at different times (Figure 18). The main findings regarding the cartographic elements on old maps are provided here.

In terms of vegetation, stylized representations of forest predominate. However, in the second half of the nineteenth century there is no longer any vegetation depicted on maps because cartographers realized the inappropriateness of such practice, which required additional fieldwork and limited the map's clarity and usefulness. Roads were only rarely depicted before the eighteenth century, whereas they appear on all maps since the nineteenth century. This had to do with a shift in the perception of the importance of roads for economic importance and their cartographic representation. Settlements are often depicted interchangeably with built structures (e.g., castles), which shows that the authors were unfamiliar with the area displayed. Borders are marked on most maps, most often as colored areas and single lines with various patterns.

The scale is usually provided in verbal and graphic form (the numeric form was rare), but the graticule is not labelled on any map.

The group of explanatory elements was newly designed for the purposes of this study. It was established that the title is provided on most maps, usually inside the inner map frame. Cartouches stand out among the decorative elements, especially between the sixteenth and eighteenth centuries, and later other decorative elements (e.g., vignettes) are common. Legends only begin to be used in the early eighteenth century.

In some places, a chain reaction occurred, where a change in the representation or frequency of one type of cartographic element affected another type. Hence, for instance, the shift from a stylized representation of relief (molehills) to a plastic representation (hachures) and the subsequent »freeing up« of space on the map led to more frequent use of other elements (e.g., roads, rivers, and geographical names). It is similar with representations of vegetation (forest was replaced by river systems, relief, roads, and geographical names) and rivers (this led to a smaller number of hydronyms). The density of road symbols increased from the end of the eighteenth century onward, which facilitated better orientation, but also led to poorer map readability because roads were often depicted very similarly to rivers.

This methodology can be further improved by changing the selection of data studied. If more modern maps were selected, this would primarily require an expansion of the representation methods selected.

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THE SEMIOTICS OF CARTOGRAPHIC SYMBOLS ON OLD MAPS

Primož Gašperič, Saša Babič

NACIONALNA I SVEUČILIŠNA KNJIŽNICA U ZAGREBU

Part of Wolfgang Lazius's 1561 map of Carniola.

DOI: https://doi.org/10.3986/AGS.10930
UDC: 912.43:528.91(497.4)"15/18"
81'22:528.91(497.4)"15/18"

Primož Gašperič[1], Saša Babič[2]

The semiotics of cartographic symbols on old maps

ABSTRACT: This study analyzed selected cartographic symbols on old maps depicting the territory of Slovenia from the sixteenth to nineteenth century. A semiotic approach was applied to establish connections between cartographic symbols on old maps and the characteristics of society at the time the maps were created. This semiotic approach was used to discuss the impact of the interpretation of four symbolic cartographic elements, their iconic basis, and the reading of the five maps analyzed. Cartographic symbols changed in line with the development of cartography at the time, as well as society. The depictions of settlements were first stylistic and then geometric. Relief depictions were first stylized and then shown through plastic or spatial methods. Cartographic symbols gradually changed into symbolic signs (in the semiotic sense), including the quality of the map display, as a result of developments and the demands of changing society.

KEY WORDS: geography, semiotics, cartographic element, map, history of cartography, Slovenia

Semiotična sporočilnost kartografskih znakov na starih zemljevidih

POVZETEK: Analizirali smo izbrane kartografske znake na starih zemljevidih ozemlja Slovenije od 16. do 19. stoletja. S semiotičnim pristopom smo ugotavljali povezave med kartografskimi znaki na starih zemljevidih in značilnostmi družbe v času nastanka zemljevidov. S semiotičnim pristopom smo obravnavali vpliv interpretacije štirih simbolnih kartografskih elementov, njihove ikonske podlage in družbenega koncepta na branje analiziranih petih zemljevidov. Kartografski znaki so se spreminjali glede na razvoj takratne kartografske stroke in družbe. Upodobitve naselij so bile najprej stilizirane, nato geometrijske. Reliefne upodobitve so bile najprej stilizirane in nato prikazane s plastičnim ali prostorskim načinom prikaza. Kartografski znaki so se postopoma spreminjali v simbolne znake, vključno s kakovostjo prikaza zemljevida, kot posledica razvoja in zahtev spreminjajoče družbe.

KLJUČNE BESEDE: geografija, semiotika, kartografski element, zemljevid, zgodovina kartografije, Slovenija

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1 Introduction

In many languages, the word for 'map' is cognate with *chart* (from Greek *khártēs* 'sheet of papyrus', Lat. *charta* 'paper, writing'), referring to »a generalized representation of the Earth's surface reduced to a specific scale« (Kladnik 2001, 630) and depicted using agreed-upon symbols (Krušič 1982). A map can also be defined as »[a] symbolised representation of a geographical reality, representing selected features and characteristics, resulting from the creative effort of its author's execution of choices, that is designed for use when spatial relationships are of primary relevance« (International … 2003, 17).

Every map is a synthesis of cartographic signs (in the semiotic sense), which as a whole make up a map, which, again in terms of semiotics, is a sign in itself. A map is thus a metonymic depiction of a certain geographical area, which is denoted by the map as a sign. A map is a tool for depicting geographical areas, natural features, and manmade changes. At the same time, the purpose of a map is to present as well as promote space and the map itself as a commodity or social capital (Logar 2019; Razpotnik Visković 2021). Like any technical product, a map is also created using a special code or language. Cartographic signs have specific relations, details, and highlights that make up the content and thus communicate a message. The elements and hence codes that make up a map differ to some degree; these differences also reflect the time when the maps were created and the development of cartography.

Like »symbol« in cartography, »sign« is an established term in semiotics, even though it is not conceived entirely the same way. However, what is key is that, in the part that semantically overlaps between the two terms, they both refer to a means of communication and hence the same phenomenon. Both cartography (geography) and semiotics conceive a printed sign or symbol as a socially agreed-upon graphic

Figure 1: Wolfgang Lazius's 1561 map of Carniola.

element. It has its own meaning, which it acquires within the context of the map's content as an »entity reflecting … a landscape the way it was perceived and experienced by cartographers and the way it was contextualized« (Štular 2010, 86), in which a geographical name marks a sign in itself, and the semiotics reveals the signifier and the signified. The symbols used on a map hence build a code or a culturally agreed-upon system of signs (Saussure 1974), which the map as a sign in itself uses to communicate its message.

Semiotics is the discipline that explores and interprets signs and sign systems. Semiotics defines signs as part of our everyday lives. They are phenomena that we try to connect, they are the language we use to convey a message, and they are the images and experiences that evoke various associations for us. Semiotics is generally defined as the science of signs – that is, all the signs we use to communicate or receive information. Its founder was the structural linguist Ferdinand de Saussure (1974), who highlighted the fact that signs are part of language and social life, and he called the discipline semiology.

The basic elements of semiology are: the signifier + the signified = the sign. With regard to the developments in research on the sign itself, a further major contribution was made by Charles S. Peirce (1931–1958), who expanded the dyadic model of the sign with an interpretant, turning it into a triadic model: the object (the signified) + the representament (the signifier) + the interpretant = the sign. The interpretant plays an important role in deciphering a sign because, based on his or her interpretation, he or she can understand the sign correctly or incorrectly, regardless of the established codes. The interpretant thus plays a key role in understanding a sign.

Signs and one's prior knowledge of them evoke associations that form the basis for their division into three types: a symbol, an icon, and an index (Peirce 1931–1958). Symbols are signs that do not resemble the signified; they are either entirely arbitrary or entirely conventional, and must be fully learned (e.g., the stop sign). Icons are signs that resemble or imitate the signified (e.g., portraits and onomatopoeia). Indices

Figure 2: Gerard Mercator's 1589 map of Carniola.

are signs that are not arbitrary, but directly connected with the signified, in which the connection can be observed or affected (e.g., smoke is an index of fire, footsteps are an index of someone walking in the snow, and pain is an index of injury).

Semiotics was primarily developed through the study of language in the broader sense. This article, too, proceeds from language – that is, a specialized language that the map reader must know to understand the map's message. This language can be defined as a type of pictography or language depicted in the form of pictures, or as elements on the map that show a specific structure, feature, or process more clearly and in greater detail using a cartographic symbol (e.g., relief, a river system, roads, settlements, etc.; Kladnik, Lovrenčak and Orožen Adamič 2005). Elements within this larger scale define in detail the phenomena planned and required for every map; at the same time, these elements must be clear to the addressee. In semiotic terms, the signs on maps include symbols and icons. Older maps contain more icons, whereas modern maps primarily reflect the global conventionality and abstraction of geographical features in the form of symbols.

On a map, the clarity or meaning of individual symbols can be provided in a legend, which does not necessarily contain all the symbols. Therefore, this article does not focus on what a specific cartographic element signifies (e.g., a line may signify a border), but rather on how cartographic symbols mean what they signify (e.g., a point symbol defines the importance of a settlement). In addition, as fundamental building blocks, individual cartographic symbols (Gašperič 2022) create a »text« or, in this specific case, a map. The semiotic approach provides access to the cultural code or the socially agreed-upon system of signs that convey specific information, and to the premises that the author of the cartographic symbol used in creating the map: what kind of a symbol he had to draw so that the local reader could understand it. In any case, in these contexts, too, a sign refers to »correspondence between a signifier and a signified … a sign

KARTOGRAFSKA ZBIRKA, NARODNA IN UNIVERZITETNA KNJIŽNICA

Figure 3: Nicolas Sanson's 1657 map of Carniola.

function when two functives (expression and content) enter into mutual correlation« (Eco 1976, 48–49); that is, whenever the signified and the content correlate, there is a sign. Signs on maps are divided into two types: pictures or images of objects, and combinational units (e.g., a legend of cartographic symbols; Schlichtmann 2009).

Comparisons of old and modern maps based on GIS have been very common in recent geographical research across the globe (Zorn 2007; Zorn, Breg Valjavec and Ciglič 2018). State-of-the-art information technology has turned old maps into an important source for determining landscape changes (Podobnikar and Kokalj 2007). Thus, cartographic sources can serve as a means of representing spatial features, as well as reliable documents of the specific time, place, and social conditions in which they were created (Slukan Altić 2003). All of this confirms that they can also be treated as primary sources and used to »determine the author's direct contact with events or conditions« (Grafenauer 1960, 252). They often contain information that is not provided in any other source. This includes various depictions of borders, rivers, roads, landforms, and place names (Rumsey and Williams 2002).

Maps are often neglected as a historical source, and in the past their content has not been adequately taken into account (Gašperič 2022), even though they can reveal spatial dynamics over an extended period. Because they depict how space was perceived at a given time, they provide access to the social conceptual structures of that time; for example, how cartographers depicted settlements so that this was clear to the readers. From the semiotic perspective, the focus is on cartographic symbols as »agreed-upon signs used to depict structures, features, and processes on a map« (Kladnik, Lovrenčak and Orožen Adamič 2005, 167). Due to their large number and thematic diversity, they can be divided into several groups called

KARTOGRAFSKA ZBIRKA, NARODNA IN UNIVERZITETNA KNJIŽNICA

Figure 4: Johann Baptist Homann's map of Carniola produced around 1718.

cartographic elements (Gašperič 2023). By using and depicting symbols, maps build their own sign system or code and message, which is the primary focus of this article.

In historical literature, the conceived primary function of maps was to present results (Grafenauer 1960). Now the importance of maps as sources of information on landscape changes is gradually growing, which is also confirmed by the latest research (Gašperič, Perko and Zorn 2018; Perko et al. 2019; Zorn, Ciglič and Gašperič 2020).

At the end of the twentieth century, maps began to be analyzed as part of a special branch of semiotics called cartosemiotics (Nöth 1998) or cartographic semiotics (Schlichtmann 2008). This branch specializes in the semiotic study of cartographic material (e.g., maps, globes, and relief models). The first analyses were already conducted by Wood and Fells (1986), but the first to tackle this topic systematically was Schlichtmann (2009), who highlighted the importance of semiotics for analyzing maps and hence providing broader insight into society. The subject of cartosemiotics is subsumed into five major themes: map symbolism (map language), the sign process, the context in which signs and sign processes are embedded, marginal notes (explaining the meaning of the entries and providing background information), and peripheral signification phenomena, which are style traits or reflect ideologies.

Cartosemiotics studies map symbolism as a complex semiotic system with spatial and non-spatial components; macrosigns (localized signs) are ultimately composed of minimal signs and in turn combined in texts (Schlichtman 1985). Along these lines, Wood and Fels (1986) highlight ten codes that need to be decoded on a map to understand what it depicts. Because these codes are inextricably related and dependent on one another, they divide them into codes of intrasignification, which operate within the map or at the level of language, and codes of extrasignification, which are composed of five categories: the thematic, the topic, the historical, the rhetorical, and the utilitarian. All five indicate the map's main focus or discourse (Wood and Fels 1986) and operate outside the map or at the level of myth (Eco 1976): the map »succeeds in persuading us that it is a natural consequence of perceiving the world« (Wood and Fels 1986, 63). This article focuses on the codes of intrasignification, among which at least five categories can be distinguished (Wood and Fels 1986): the iconic (roads, towns, rivers, mountains, and hypsometric layers; the inventory or fragmentary world), the linguistic (the codes of names of places, roads, and areas), the tectonic (relationships in space, normally expressed in the form of numeric ratios for measuring distances and sizes), the temporal (this code is closely connected with the spatial code because it refers to the time needed to get somewhere or the temporal aspect of distance between individual elements; in addition, maps can be old or new, and some may refer to the future; e.g., they show projected roads), and the presentational (information such as a title, a legend box, a map image, illustrations, the scale, and instructions). This article primarily concentrates on part of the iconic codes of intrasignification – that is, on selected basic cartographic symbols.

Most cartosemiotic analyses are conducted on modern maps (Nöth 1998; Schlichtmann 2009), whereas this article relies on historical sources, providing insight into the development of symbols over time and hence also the social conceptions reflected in the maps. The analysis of cartographic symbols draws directly from maps, which has been rare in studying past developments in what is now Slovenia. The main interest is in what is conveyed through the changes on maps between the sixteenth and nineteenth centuries.

This article identifies the potential influence of social conceptions by assessing cartographic symbols based on a review of selected maps of Slovenian territory (e.g., a triangle representing a mountain or a circle representing a settlement as a complete whole). Because maps can also reflect the social and political situation in which they were created (Zorn, Breg Valjavec and Ciglič 2018), attention was drawn to the meaning conveyed by their fundamental building blocks: cartographic symbols. Therefore, a semiotic method was used to analyze the most frequent cartographic symbols on all the maps studied (i.e., symbols for settlements, vegetation, relief, and water).

The terms used in this article are »cartographic element« and »cartographic symbol« as defined by geographers and cartographers (Gašperič 2023). They are both considered the fundamental building blocks of any map. A cartographic element refers to the group of methods used to represent a specific topic, and a cartographic symbol is the method of representing a cartographic element on a map. For example, the cartographic element of 'water' can be represented with (single or parallel) line cartographic symbols or area cartographic symbols for rivers, lakes, and seas; the cartographic element of 'settlement' can be depicted with point cartographic symbols (e.g., a circle, triangle, square, or dot) or area cartographic symbols

used for settlements of various sizes (i.e., a simplified plan view of a settlement). This article specifically analyzes the cartographic symbols mentioned, determines the meaning of their diversity and changes through time, and treats them as semiotic signs that build a map and its discourse.

2 Methods

The methods used were as follows: selecting old maps based on the area mapped, scale, and time of origin; selecting cartographic elements that are depicted on all the maps studied and that varied by the time of origin and the cartographer's knowledge; analyzing the cartographic symbols used for representing individual

ZEMLJEPISNI MUZEJ GIAM ZRC SAZU

Figure 5: Peter Kozler's 1853 map of the Slovenian land.

cartographic elements in terms of composition, type, and evaluation; and comparing results between various periods and determining the main characteristics of changes in the representation of cartographic elements.

The article examines natural cartographic elements (relief, vegetation, and water) and built cartographic elements (settlements; Gašperič 2023). Cartographic symbols for the following were selected:

- Settlements (stylized point and area symbols);
- Vegetation (stylized point symbols);
- Relief (stylized, plastic, geometric, and combined method of representation; Perko 2001);
- Water (line and area symbols).

Five representative general geographical maps at a medium scale (approximately 1:500,000–1:800,000) from the mid-sixteenth to the mid-nineteenth century (figures 1–5) were selected for analysis. They all map the territory of what is now Slovenia, as well as parts of what is now Italy, Austria, Hungary, and Croatia (Table 1). The 1561 map by Wolfgang Lazius is considered the first known map presenting Carniola per se, and it stands out in the cartographic sense because of its great interplay of imaginary, historical, and realistic depictions and geographical names. Despite being created only a few decades later, Mercator's map of 1589 is cartographically more accurate and geographically more complete. It also served as the basis for the next two maps. The 1657 map by Nicolas Sanson and the map by Johann Baptist Homann created around 1718 are representative cartographic products of the seventeenth and eighteenth centuries, in which the accuracy of the features mapped and their names (e.g., Lake Cerknica) improved. Compared to its predecessors, Kozler's 1853 map (also Kosler) exhibits a significant advance in quality and, in terms of its content (i.e., the territory mapped and geographical names), its primary aim is to promote national identity.

This article focuses on the importance of symbols as pictorial signifiers of spatial features and, as such, how they build the »text« or map. The semiotic approach provides access to the cultural code or socially agreed-upon system of signs that represent specific information that the cartographer had and interpreted through symbols. In these contexts, too, a sign or a symbol reflects a »correspondence between a signifier and a signified« (Eco 1976, 48–49). The semiotic analysis of the maps selected relied on the theory of cartosemiotics, which considers a map a product made of signs – that is, a combination of various cartographic elements depicted in the form of cartographic symbols. Cartosemiotics, too, is based on elements.

3 Analysis

The maps contain all five major groups of cartographic elements: natural and built elements, geographical names, and mathematical and explanatory elements (Gašperič 2023). Explanatory elements, such as various illustrations and text added to the map, are more common on older maps (created before the nineteenth century). Their purpose was to attract the buyer's and reader's attention, and to highlight a special feature or event that was geographically or historically connected with the area mapped. Even though they cannot be found in the map's legend, they have their own function, just like all the other cartographic symbols, and they may even more clearly reflect the social systems and the predominant mindset (of the author, society, and authorities). This can be clearly seen on Lazius' 1561 map, which has a shape of an oval embraced by the double-headed Habsburg eagle and is decorated with ten provincial coats of arms. Because an analysis of all cartographic symbols on the maps selected would exceed the scope of this article, the analysis here

Table 1: List of selected maps with basic information.

Year	Title	Author	Scale (roughly)	Cited (in text)
1561	*Ducatus Carniolae et Histriae una cum Marcha Windorum*	Wolfgang Lazius (1514–1565)	1:500,000	Lazius 1561
1589	*Forum Iulium, Karstia, Carniola, Histria et Windorum Marchia*	Gerard Mercator (1512–1594)	1:700,000	Mercator 1589
1657	*Hertzogthüber Steyer, Karnten, Krain, & c./Duchés de Stirie, Carinthie, Carniole . . .*	Nicolas Sanson (1600–1667)	1:800,000	Sanson 1657
c. 1718	*Tabula Ducatus Carnioliae, Vindorum Marchiae et Histriae*	Johann Baptist Homann (1664–1724)	1:500,000	Homann 1718
1853	*Zemljovid Slovenske dežele in pokrajin*	Peter Kozler (1824–1897)	1:576,000	Kozler 1853

is limited to the cartographic symbols representing settlements, vegetation, relief, and water. These symbols are the (most) common ones on maps and the ones the reader (most) easily recognizes. Because they changed and developed over time, this study assumes that they are good indicators of various directions of cartographic and social development.

3.1 Settlements

General geographical maps show all settlements in the area mapped that meet the agreed-upon principles for representation (e.g., detail of representation, and the population, size, and importance of the settlement). Especially on maps produced before the nineteenth century, the selection of settlements depicted was based on the author's judgment. Depending on the size and importance of a settlement, a cartographic symbol was selected for its depiction on the map. On older maps, settlements were predominantly depicted with geometric symbols (e.g., circles and rectangles), stylized symbols (e.g., a panoramic image of one or several structures), and area symbols (e.g., a simplified plan view of a settlement; Table 2).

Between the fifteenth and seventeenth centuries, stylized symbols for settlements were depicted in four predominant ways: a side view (up to three built structures drawn in a line), a stylized view (a line of unevenly distributed buildings, creating a sense of depth), a bird's eye view (a limited view of the entire settlement from various height), and a vertical view (a perpendicular view of the settlement). The side view is used on most maps from this period. However, it remains unclear whether settlements were represented systematically during that period, or the authors determined the number and importance of settlements subjectively (Delano-Smith 2007). It is presumed that the author's subjective judgment had considerable influence because it is difficult to believe that cartographers of that time had the expertise and geographical breadth necessary to objectively depict all places on a map. In any case, they at least tried to highlight the prominent function of the more important places.

3.2 Vegetation

Vegetation is already shown on the oldest maps, which indicates its great importance, especially in terms of the economy, defense, and travel. The term »vegetation« refers to all the vegetation depicted on a map (Peterca et al. 1974). On old general geographical maps, its depiction depends on the detail of representation

Table 2: Types of cartographic symbols representing settlements on the maps analyzed.

Element	Symbol	Lazius 1561	Mercator 1589	Sanson 1657	Homann c. 1718	Kozler 1853
Settlement	Point (geometric shapes: square, triangle, etc.)	No	Yes	No	Yes	Yes
	Point (stylized images of buildings)	Yes	Yes	Yes	Yes	No
	Area (plan view of settlements / town walls)	No	No	No	Yes	No
	Other	No	No	No	No	No

Table 3: Types of cartographic symbols representing vegetation on the maps analyzed.

Element		Symbol	Lazius 1561	Mercator 1589	Sanson 1657	Homann c. 1718	Kozler 1853
Vegetation	Grassland	Stylized images of grassland (areas with small vertical lines, clumps of grass)	No	No	No	No	No
	Forest	Stylized images of trees (various density of the same or different trees)	Yes	Yes	Yes	Yes	No
	Other	Stylized images of grapevines, wetland vegetation, olive trees	Yes (olive trees, wetland vegetation)	Yes (wetland vegetation)	No	No	No

envisaged by the cartographer, with representations of forest and distinctive vegetation (e.g., wetland plants, olive groves, or vineyards) predominating.

Stylized representations of trees in the form of groups of various sizes, tree lines of various lengths, and various individual trees predominate until the nineteenth century. Trees are a metonymic symbol or an icon for forest and, on the two oldest maps, for olive groves and vineyards. The image of trees is often the same throughout the map, but it may also differ, especially by the size of the symbol rather than type of vegetation. Forests are depicted with stylized images of trees drawn from the side and, if they are depicted in the form of a group of trees, they may cover a substantial part of the map. Wetland vegetation is depicted on Lazius's and Mercator's maps; the iconic representation of wetland vegetation is probably important to show impassable areas. Table 3 shows the representation of vegetation on the maps discussed.

3.3 Relief

In depicting relief, cartographers deal with the challenge of how to depict three-dimensional terrain in two-dimensional form on the map. Representations of relief can be divided into four main categories (Perko 2001): stylized representations (simplified symbols resembling molehills and half-circles), plastic or spatial representations (using colors, color shades, hachures, and dots), geometric representation (contour lines and spot elevations), and combined representations (a combination of various methods). Stylized representations predominated until the eighteenth century, hachures were widely used in the nineteenth century, and combined representations have predominated since the twentieth century (Table 4).

The four older maps use brown or gray molehills and shading; a molehill is the iconic representation of a mountain. It is primarily higher and more visible mountains that are marked on the map; the ones that can be conceived as a barrier preventing access to a neighboring area, which was a key piece of information at that time. Nonetheless, mountains are not drawn consistently, and mountain ranges are used as an icon or metonymy representing an impassable area or an area that is difficult to pass. In this regard, Kozler's map shows a significant advance in quality because it uses spot elevations and hachures to represent relief. This is a more accurate and realistic method of depicting relief, and a shift to a completely symbolic representation.

3.4 Water

Water can be divided into still and moving, surface and underground, and freshwater and saltwater. Lakes and seas are depicted using an area symbol, which usually illustrates the envisaged size and shape of the body of water. Rivers and creeks are most often depicted with single or double (parallel) line symbols and area symbols. Area symbols are typical of older maps, on which a river is not depicted with two parallel lines, but as an undefinable elongated form that in the upper reaches may resemble a short tail, which grows thicker toward the mouth. The space between the two lines may be empty or filled with various patterns, most often several parallel, solid or broken, or curvy or straight lines. Waterfalls and springs are rarely depicted, usually with a stylized point symbol. Linear representation indicates that water was conceived as a line that cuts through the land or as a transport route. Water symbols on these maps do not show individual depths or major gradients, rapids, and so on.

Table 4: Types of cartographic symbols representing relief on the maps analyzed.

Element	Symbol	Lazius 1561	Mercator 1589	Sanson 1657	Homann c. 1718	Kozler 1853
Relief	Molehills	Yes	Yes	Yes	Yes	No
	Contour lines	No	No	No	No	No
	Spot elevations	No	No	No	No	Yes
	Shading	Yes	Yes	Yes	Yes	No
	Hachures	No	No	No	No	Yes

Table 5: Types of cartographic symbols representing water on the maps analyzed.

Element		Symbol	Lazius 1561	Mercator 1589	Sanson 1657	Homann c. 1718	Kozler 1853
Water	General	Point symbols	Yes (waterfall)	No	No	No	No
	River	Line symbols (single line)	No	No	Yes	Yes	Yes
		Line symbols (double line, often parallel)	No	Yes	Yes	Yes	Yes
		Area symbols (colored areas)	Yes	Yes	Yes	No	Yes
		Others	No	No	No	No	No
	Sea, lake	Area symbols (colored areas)	Yes	Yes	Yes	Yes	Yes

Especially on maps created before the sixteenth century, problems with depicting water were connected with cartographic projection; these problems persisted on many maps up until the nineteenth century. On these maps, the territory is overly stretched or expanded in the east–west direction, which is why the courses of rivers are depicted disproportionately in the east–west direction and many also in the north–south direction; other directions of the main watercourses are less common (Slukan Altić 2003). The question is whether this can be understood within the context of the social conception of space and time: space seems to be expanded based on the more frequent and, first and foremost, longer and more long-term travel from central Europe toward the east or west (also because of sea travel or the route in stages to the final destination) than toward the north or south. Therefore, this map expansion could also be related to the general spatial connection with time. Table 5 shows how water features were depicted on the maps selected.

4 Discussion

This article identifies the reflection of social conceptions in cartographic symbols on selected maps of Slovenian territory. It analyzes the most common cartographic symbols on five maps published between the sixteenth and nineteenth centuries: symbols for settlements, relief, vegetation, and water. These symbols have a metaphoric character, which is why a semiotic approach is also used to analyze them.

Semiotically, signs on maps can be divided into symbols and icons. Older maps contain more icons, whereas on more recent maps (especially those produced from the nineteenth century onward) the signs already reflect global conventionality and abstraction in the form of agreed-upon symbols. Cartographic signs are stereotypical metonymic images of a feature, which is clearly evident with the following: forests, which are represented with a typical forest element (i.e., a tree or a group of trees): settlements, which are represented with a building or a group of buildings; moving water, which is represented in the form of curvy lines: and relief, which is represented through a group of (shaded) molehills on maps produced before the nineteenth century.

Signs on older maps before the nineteenth century are partly arbitrary and motivated by the expected understanding of the map reader. At the point of making the maps that were studied, no rules had been established yet, and signs were chosen by predicted understandability. At this point, it is exactly understandability that creates the (social) convention: what kind of sign would be understandable to the recipient. That is, in drawing the map, the cartographer had to take into account the stereotypical social images of these features to make the map understandable. The stereotypical image of a feature depicted with a sign or a symbol is often metonymic: a part of the feature representing a whole bears the entire meaning. Hence, for example, it can be observed that with settlements the image of a whole is represented by a tower and a few buildings. Based on his judgment or knowledge, the cartographer indicated the size of a settlement by using different numbers of buildings. The image is stylized and, in terms of semiotics, symbolic, even though it initially seems to be iconic (i.e., it imitates the image of a settlement). However, more or less the same generalized image is applied to all settlements, regardless of their image in the real world. Due to this uniformity, it can be semiotically referred to as fully symbolic, even though Wood and Fells defined these signs as iconic. By taking into account that these are stereotypical metonymic signs, one can already talk about conventionality within the representation: maps do not resemble that which they depict; these

images can only be connected by taking into account a series of complex principles or conventions – that is, an agreed-upon code. An example of such a code is the color blue to represent rivers on colored maps (Wood and Fels 1986), or (blue) lines used in graphs and diagrams, where they represent something entirely different (e.g., changes in water level). Just as it is completely clear that blue lines represent rivers on maps, it is also clear that a blue line in a medical diagram can refer to the human circulatory system. Hence, iconicity is always based on a systemic structure – that is, it is always analogue, rather than (merely) based on the image and subsequently metaphorical; for example, a blue line (Wood and Fels 1986). Thus, it is about the code used and not the signifier, which would mean that the code, rather than the signified itself (e.g., the river), determines the sign. To some degree, a sign can also be predictable due to its strong resemblance to real features. However, map users must know the code to successfully and fully decode (i.e., read and understand) the map. Nonetheless, it should be highlighted that (in cartography) the code is primarily founded on resemblance to features. For example, a river is represented with a line, a lake with an area symbol, and stereotypical colors are used for specific features (blue for water, green for vegetation, etc.). Hence, the iconicity of cartographic symbols is based on both their stereotypical symbolism and social convention. By combining both perspectives, a stereotypical social conception of an individual feature can be inferred. This article focuses on the interpretation of »intersignifications« or, specifically, the symbols representing settlements, water, vegetation, and relief.

4.1 Settlements

Except for Kozler's map, all the maps analyzed show a clear connection with a stylized conception of a settlement expressed in the form of buildings of various numbers, which may also contain a dominating tower or an iconic symbol resembling a fortress. At the time these maps were created, no uniform symbols had yet been established for towns, boroughs, and villages, and so, as expected, the symbols used reflect the cartographer's conceptions and subjective views. The predominating principle used on the first four maps is that a larger settlement is depicted with a more imposing iconic symbol, usually a fortress. An interesting detail on Homann's map is the plan-view depiction of Palmanova (now part of Italy), whose distinctive star-shaped defense walls have been preserved until today. On Mercator's map and all later maps, smaller settlements are marked with a circle (i.e., a geometric symbol), which is the second most frequent method used for representing settlements. Mercator and Homann used them to represent smaller settlements, but it was only Kozler that finally began using a circle as a point symbol with various sizes and centers for marking settlements.

Settlements are various forms of permanent human habitation (Kladnik 2001), with more or less compact buildings and various functions. Conceptually, this compactness is often understood as completeness, which is most likely based on the image of earlier settlements, which, due to their defense role, had a more clustered character and defense walls. The stylized depictions of settlements on maps also resemble fortresses with defense walls, and it can be presumed that every larger settlement was conceived as a larger cluster of protected buildings. A settlement usually had at least a church, and there was often also a castle within, above, or near it, which made it rank among major or more important settlements. Proceeding from the completeness mentioned above, parallels can be drawn with the complete point symbol, most often round or square in shape, which indicates that the settlement was conceived as a complete residential product of society – society as an independent whole or a bubble separated from the neighboring settlement or bubble. This hypothesis is supported by the use of such point symbols for smaller settlements on various old maps, even though in many cases the settlements were neither clustered nor walled (e.g., settlements in the Pannonian region, which have a distinctive oblong shape). The completeness of a settlement and the metaphorical completeness of society as a relatively closed cell (or an inner circle of identity) is thus transferred into the cartographic symbol.

It should also be mentioned that castles in the immediate vicinity of which there was no settlement at all were also marked as settlements on maps; usually the settlement was at some distance from the castle – for example, Stein Castle (*Stain*) and Zaprice (*Stainpuhl*) on Mercator's map – or there was none at all; for example, Bogenšperk Castle (*Wagensberg*) near Litija on Homann's map. The maps studied show a clear trend of practical adaptation of signs in the direction of greater symbolism. Lazius's map still tried to distinguish between settlements and castles by using different icons; nonetheless, the signs largely do not reflect the (metonymic) real image of the castle or fortress and are predominantly imaginary instead. Mercator's map already introduced symbolic signs – that is, circles, which are of the same size for all

settlements. Sanson's map predominantly depicts settlements using iconic images of a castle with a town, which differ by settlement size. Smaller settlements are only marked with a small circle. On Homann's map, settlements are marked with circles and fully symbolic, tiny images of towers. In turn, Kozler's map only uses fully symbolic signs (i.e., circles of various sizes) to depict settlements.

4.2 Vegetation

As expected, the maps originating from before the nineteenth century most often depict forests, with larger wooded areas standing out (e.g., the extensive Kočevje forests). Forests are represented with clusters of

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Figure 6: Typical representations of settlements on maps by Lazius, Mercator, Sanson, and Kozler.

iconic stylized (green) trees of various sizes, with no distinction between deciduous and coniferous trees because all trees are represented in a generic deciduous form. The maps analyzed do not depict grasslands, and other types of vegetation are only included on the two earliest maps: Lazius's map contains olive groves and vineyards (depicted with a symbolic stylized sign representing an olive tree and grapevine), and Mercator's map also features wetland vegetation (Figure 2).

In representing vegetation, there was a gradual shift from icons to symbolic images or, later on, complete absence (e.g., on Kozler's map). On Lazius's map, forests are represented with green stereotypical tree icons (a large group of trees), and olive groves and vineyards are marked metonymically, using a single green icon representing a plant. Green is the stereotypical color of vegetation, related to the immediate experience of observing extensive green areas, such as forests and grasslands. This color is metaphorically

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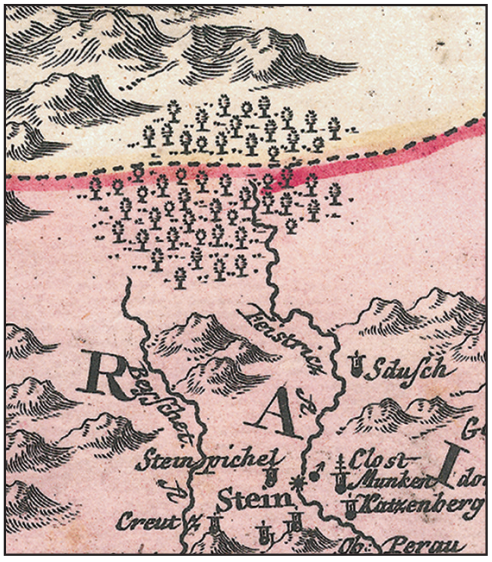

ZEMLJEPISNI MUZEJ GIAM ZRC SAZU

Figure 7: Typical representations of vegetation on maps by Lazius, Mercator, Sanson, and Homann.

transferred to vegetation, signifying natural elements or nature. All representations of forests on the first four maps contain an iconic image of a group of trees with trunks and crowns. Highlighting the size of a wooded area had a similar motive as with mountain ranges: these were regions that were considered alien or bordering another region, or even perceived as inaccessible or unpassable. Because people were unfamiliar with areas of extensive forests and mountain ranges (as well as seas) and considered them unattractive to live in and inaccessible, they conceived of them as mythological places. Therefore, they were merely vaguely drawn on maps, or presented fairly metonymically. Only part of a mountain range or forest was drawn, in a form indicating its presumed dimensions. Forests were often depicted linearly, in the form of green or tree belts. It was only Homann that also used clusters of vegetation to depict forests. As already mentioned, like mountain ranges, forests can be identified as a spatial barrier or dividing line between two areas; rivers and roads stop at forests or go around them. However, most importantly, this element is depicted metonymically on maps: merely as a part of a whole that is wider and larger than the one presented on the map. In general, the maps depict only a small portion of the forests that at that time existed in the area mapped.

4.3 Relief

On the maps from before the nineteenth century, hills and mountains are drawn as shaded molehills of various shapes and sizes, but with no relation to the actual elevation (Figure 3). Higher-elevation mountainous regions represent the approximate location and area of elevated landscapes, which primarily communicate the size of the geographic feature to the map reader. In the nineteenth century, relief was primarily depicted using the plastic method with hachures, whereby the thickness and length of hachures expressed the inclination and length of terrain, and their position and distribution indicated specific landforms. This method proved to be very accurate, which was greatly contributed to by its scientific justification in 1799 (Gašperič 2010). On Kozler's map, relief is thus depicted with spot elevations and hachures. Despite its monotonous black-and-white depiction of relief, this plan-view representation shows the characteristics of elevated areas across the entire map very realistically and evenly.

Before the nineteenth century, relief was represented using symbolic stylized signs for elevations, which had the shape of mountains and were stereotyped, because they were always shaded on the right side, with a typically narrower peak. Through this, the cartographic symbol reflected the understanding of a steep rise and descent of a slope and of mountains forming a mountain range, which can represent an unpassable barrier. This is also how elevations are depicted on the four older maps: as spatial barriers at which roads and rivers stop or must go around them. The conception of mountains as barriers is also reflected in the Slovenian collocation *gorska pregrada* 'mountain range' (literally: 'mountain barrier'), which can have an impact on weather or road construction. In addition, Slovenian also uses the term *gorska veriga* 'mountain chain', in which the linking of mountains together is metaphorically associated with a chain and conceptually with forming a contiguous series. The latter confirms the thesis that the cartographic symbols on older maps were based on the conception of mountains as chain-like spatial barriers.

The development of cartography around 1800 led to a change in the cartographic representation of relief, which is why Kozler's map differs greatly from the other maps. With the hachure method, elevated areas can be represented in plan view (i.e., more realistically). The representation moves from the iconic sign to greater abstraction and hence the symbolic sign: pointy peaks are iconically turned into triangular symbols on the map. This provides a higher-quality representation of terrain, and mountains no longer evoke an explicit association with spatial barriers.

4.4 Water

The maps analyzed show rivers, lakes, and seas. On Lazius's map, rivers are depicted with area symbols of various oblong shapes. Rivers are represented disproportionately to other features, but the map nonetheless makes a distinction between rivers in terms of their size and length. The course of larger rivers is accentuated with intermittent lines (most likely indicating waves and currents). The other maps studied use a combination of line and area symbols, which have a more convincing cartographic effect. As expected, the representation of streams is of the highest quality on Kozler's map, on which area symbols are rare. However, it is difficult to distinguish between rivers and roads.

The sea is only marked in color on Lazius's map. On all the other maps, the coast is marked with thin parallel lines. The sea is depicted in various ways (parallel hachures, lines, or sea currents), but this is primarily merely a decorative addition.

The maps analyzed also contain certain special features (Figure 4). On Lazius's map, certain settlements on or along rivers are depicted like islands in the middle of the river (in what is now Croatia), and Savica Falls (*Fons Saus*) is the only water feature depicted with a point symbol. Imaginary creatures (Lazius) and ships (Lazius, Homann) are also depicted on the sea. All the maps show Lake Cerknica, in which swallow holes are also depicted. As a typical karst feature and a natural wonder of Carniola (part of the year it is its largest lake and part of the year it is its smallest lake), it is a prominent element on the map, which cartographers before Homann depicted in the form of an excessively large ellipse.

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Figure 8: Typical representations of relief on maps by Lazius, Mercator, Homann, and Kozler.

On the maps analyzed, water features are represented with line or area symbols, which, as expected, have a metaphorical reference to a natural feature. On color maps, water features are exclusively marked in blue, which is stereotypically associated with water, regardless of its true color (e.g., brown or green). Rivers represented with line symbols reflect the cartographer's perception of the (linear) river course, rather than the width of the riverbed or the river network. A river is perceived as water that flows through a riverbed in a specific direction. The depictions of river basins on the map are reminiscent of a tree with a stem (i.e., the main river) and branches (i.e., tributaries). This is also reflected in the Slovenian expression *razvejano porečje* 'branched basin', which shows a conceptual connection between a river basin and a tree. This conceptual connection can be most clearly seen on Lazius's map, on which the Sava and its tributaries clearly resemble a tree. On the other maps analyzed, water is marked with black lines; rivers are represented with

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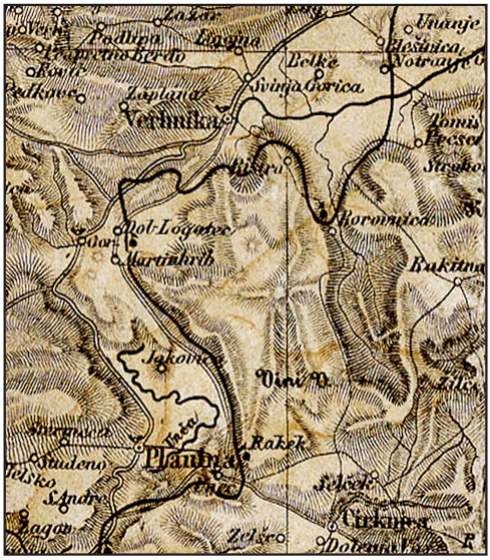

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Figure 9: Typical representations of water features on maps by Lazius, Mercator, Homann, and Kozler.

one line or two parallel lines with a light uncolored surface in between. The branched structure of river basins is depicted more accurately and clearly on these maps, which is why the basins on them are not so reminiscent of trees anymore. In general, rivers are oriented correctly, although in some places the tiny meanders are clearly made up and only have a symbolic meaning. This reflects the stereotypical necessity for meandering riverbeds and branched basins, which also arises from the cartographer's lack of familiarity with the area mapped.

On Kozler's map, it is difficult to identify the rivers and their basins because the linear river representations resemble the representations of roads so much that it is difficult to distinguish between the two. In addition, it is also necessary to take into account the association between rivers and roads because both are understood and depicted as lines connecting places. Thus, they represent a (communication) link between two points or places. Even though rivers vary more in terms of width, from a cartographic perspective they are stereotypically associated with a stable, one-way linear flow in the riverbed. Here, a connection arises between the two symbols: both the river and road run or lead somewhere.

Lakes are depicted using area symbols, which mostly take a generalized form. Even though there are only two major permanent lakes in Slovenia (i.e., Lake Bohinj and Lake Bled), they are not included on Lazius's map. Mercator's map only shows Lake Bohinj, whereas the last two maps show both lakes. However, all maps include intermittent Lake Cerknica with a detailed depiction of swallow holes, which testifies to the uniqueness of this karst feature. On Homann's map, a depiction of Lake Cerknica with marked and named swallow holes and a description of this karst feature is added in the bottom right corner, following Valvasor's model.

The shores of lakes and the sea are marked with short parallel lines, which represent the border between land and water. This has to do with the stereotypical conception of a shallow water area, possibly cliffs, illustrating the change in relief at the contact of land and water.

5 Conclusion

Based on the analysis of five representative maps of Slovenian territory, certain trends related to social concepts (settlements as complete units, vegetation stereotypically depicted as deciduous trees, mountains perceived as spatial barriers, river basins depicted as branched trees, and rivers as lines cut into terrain) were identified in the development of cartographic elements from the sixteenth to the nineteenth century.

In cartography, a map is an aggregate of cartographic elements depicted with cartographic symbols. In the semiotic sense, a map is a range of codes expressed in visual interpretations oriented in time and space and combined into a final form: the map. These codes are fairly independent and can also differ (Wood and Fels 1986). An old map is a cultural artifact, a culmination of choices expressing the conception and value of a specific area or part of the world. This aspect is expressed in code, through which all meaning is conveyed to the map reader in an intelligible way. Hence, maps are a good source for cultural analyses because they often highlight various social views and values (e.g., forest areas, Lake Cerknica, or specific settlements). At the same time, old maps cannot escape the grasp of myth within the context of semiotic analysis. Namely, the purpose of a map is to persuade the reader that it is a realistic reflection of an area and social system (Wood and Fels 1986). Because they always draw their content from a concrete area, they seek to be reliable, even though they often deviate significantly from reality. However, this already has to do with the development of cartography, rather than the cartographer's perception, which has remained the same until today.

Especially with regard to the representation of relief, the analyses presented in this article reveal the development from a concrete and symbolic representation (e.g., a molehill representing a hill or mountain) that imitates a stereotypical image from the environment into a more abstract representation and use of iconic cartographic symbols (e.g., hachures). Other cartographic elements were also found to primarily depict space in an iconic manner on maps created before the nineteenth century. Symbols are stereotypical metonymic images of a specific feature depicted on the map. This can be clearly seen with forests, which are depicted with a typical forest element (i.e., a tree or a group of trees); settlements, which are represented with a building or a group of buildings; and rivers, which are depicted as curvy lines. It can be established that the metonymic cartographic elements that the cartographers used were sufficiently illustrative and clear for the maps to still be intelligible and readable today. However, with more recent symbolic cartographic

signs, resulting from the nineteenth-century development of cartography, the readers must know the meaning of an individual sign, regardless of their direct experience with the feature depicted on the map (e.g., vegetation, relief, etc.). This is also confirmed by the legend printed on Kozler's map and the absence of a legend on all the other maps.

The development from iconic to symbolic cartographic signs is generally apparent, and their conceptual background can also be traced (e.g., of complete shapes, such as circles or squares). This development is the most evident with the depictions of settlements, which moved from the symbolic depiction of a cluster of buildings to a symbolic circle or square – that is, a complete form, which could also be interpreted based on the conception of a settlement as a complete residential product of society. Rivers and roads are marked very similarly on all maps (i.e., with lines) and on some (e.g., on Kozler's map) they are difficult to distinguish. These are conceptually similar representations (lines), which connect places (river routes) and facilitate transport between them (with boats and rafts).

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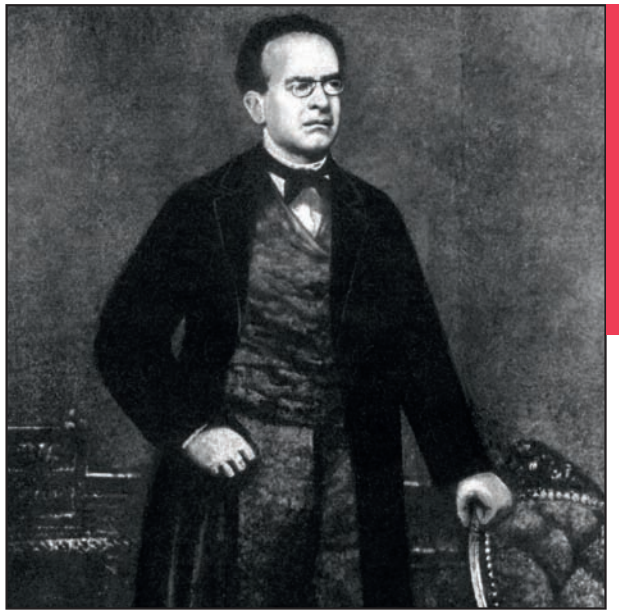
TRADITIONAL AND MODERN CARTOGRAPHIC MATERIALS FOR GEOGRAPHY TEACHING: FROM BLAŽ KOCEN TO THE PRESENT

Rožle Bratec Mrvar, Primož Gašperič



MAKSO PIRNAT

Portrait of Blaž Kocen (Dom in svet 11-24, 1898).

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UDC: 912:37.091.64(497.4)

Rožle Bratec Mrvar[1], Primož Gašperič[2]

Traditional and modern cartographic materials for geography teaching: From Blaž Kocen to the present

ABSTRACT: This article presents cartographic teaching materials used in two different periods: the second half of the nineteenth century and the beginning of the 2020s. During the first period examined, the works of Blaž Kocen (also Blasius Kozenn) laid the foundations of school cartography in the Habsburg Monarchy. The most highly valued among them in central Europe were his atlases, which have the longest tradition of publishing in the world. In the second period, technological development and the COVID-19 pandemic laid the foundations for a faster transition to digital approaches to teaching. This article examines the use of maps, atlases, and textbooks by Slovenian geography teachers to determine whether modern (digital) teaching materials have replaced or will replace the traditional (paper) ones. It was established that the use of printed cartographic materials continues to predominate in geography teaching, which indirectly preserves the importance of Kocen's pioneering and visionary work.

KEY WORDS: cultural geography, cartography, geography instruction, geography didactics, school atlas, map, history of cartography, Slovenia

Uporaba klasičnih in sodobnih kartografskih učil za poučevanje geografije: Od Blaža Kocena do danes

POVZETEK: Namen članka je predstaviti kartografska učila dveh obdobij: v drugi polovici 19. stoletja in na začetku 21. stoletja. V prvem obdobju je Blaž Kocen s svojimi deli postavil didaktične temelje šolske kartografije na območju habsburške monarhije. V Srednji Evropi so bili strokovno najbolj cenjeni njegovi geografski atlasi, ki imajo najdaljšo tradicijo izhajanja na svetu. V drugem obdobju pa sta tehnični razvoj in pandemija postavila temelje za hitrejši prehod na digitalne didaktične pristope. V raziskavi smo preučili uporabo zemljevidov, atlasov in učbenikov pri slovenskih učiteljih geografije ter ugotavljali ali so oziroma bodo sodobna (digitalna) učila zamenjala klasične (papirne). Ugotovili smo, da pri pouku geografije še vedno prevladuje uporaba tiskanih kartografskih učil, s čimer se posledično ohranja pionirski in vizionarski pomen Kocenovega dela.

KLJUČNE BESEDE: kulturna geografija, kartografija, didaktika geografije, šolski atlas, zemljevid, zgodovina kartografije, Slovenija

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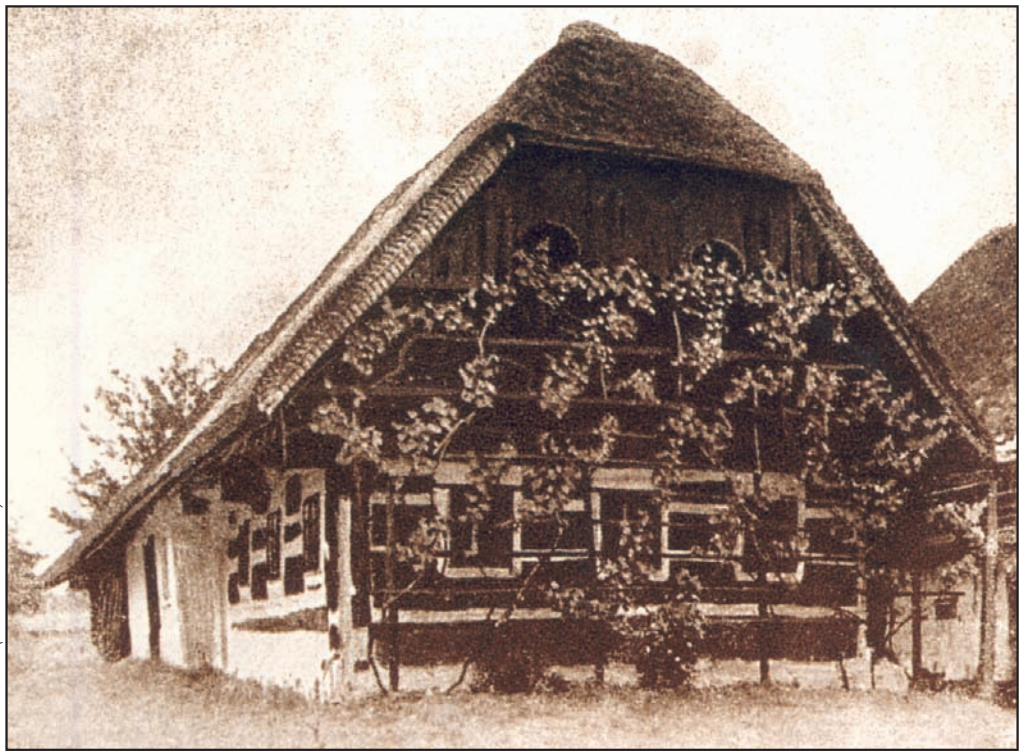
1 Introduction

This article highlights two periods reflecting the development and application of teaching materials in what is now Slovenia. Based on the large quantity of his works and their wide use in school geography, Blaž Kocen is considered one of the founders of modern geography teaching (or didactics). To better understand the importance of his work for geography in Slovenia, central Europe, and the rest of the world, the most important points in his professional career are presented, followed by an evaluation of his work in cartography and geography teaching.

Kocen is considered one of the most important geographers and cartographers, and the founder of geography teaching in the Habsburg Monarchy. In just over a decade (between 1860 and 1871), he produced an enormous quantity of cartographic works, especially school atlases. In the form of various adaptations and reprints, his atlases for primary schools and secondary schools, which have been printed in millions of copies and achieved great recognition in professional circles, have been published in at least 209 German editions to date; in addition, several dozen editions have also been published in Czech, Polish, Hungarian, Croatian, and Italian. A total of at least 297 different atlases have been published under his name, of which 210 or over two-thirds are secondary-school atlases (Bratec Mrvar et al. 2011). It is striking that over a century and a half later these works still bear the name of their original author, even though they have been reworked and updated in terms of both content and design. In 2011, *Grosser Kozenn-Atlas mit Atlas-CD* (Kocen's Great Atlas with CD) published by Hölzel even received the best school atlas award from the International Cartographic Association.

In Slovenia, several articles on Kocen's life and work have been published in newspapers (e.g., Dom in svet 11-24, 1898; Ljubljanski zvon 19-7, 1899; Jutro 21, 1921) and later in journals (e.g., Žagar 1973; Frelih, Bratec Mrvar and Gašperič 2020) and books (e.g., Kunaver 2009; Bratec Mrvar et al. 2011).



SLAVA KOVAČIČ (PHOTO: ANTON IHAN)

Figure 1: Kocen's birthplace at Hotunje. The house collapsed at the end of the 1960s.

Blaž Kocen was born in 1821 in the Styrian village of Hotunje near Ponikva (Figure 1). After elementary school, he attended the upper secondary school in Celje and then a lyceum in Graz. In 1845, he graduated in theology in Klagenfurt and was ordained the same year. He initially served as a curate in Šentrupert above Laško, Šoštanj, and Rogatec. In 1850, he became a substitute teacher at the upper secondary school in Celje, where he taught mathematics, physics, and natural history for two years. Then he studied at the Institute of Physics in Vienna for just under a year. In 1853, he obtained a full-time position as a teacher at the upper secondary school in Ljubljana. At that time, the school began purchasing modern geography teaching materials, and some of Kocen's students mention that he constantly carried one geography textbook or another with him (Marburger Zeitung, 25. 1. 1944).

In September 1855, he relocated to Gorizia, where he taught mathematics and physics at the upper secondary school and began to engage in geography research and write school textbooks. In 1859, he took up a position at the German-language upper secondary school in Olomouc (now in the Czech Republic), where he taught Latin, Greek, natural history, mathematics, physics, and, later, geography. Illness compelled him to retire early, in 1870. He died in Vienna a year later (Bratec Mrvar et al. 2011).

This article presents cartographic teaching materials used in two different periods: the second half of the nineteenth century and the beginning of the 2020s. During the first period examined, basic geography teaching materials were introduced, and, during the second period, technological development and the COVID-19 pandemic laid the foundations for transitioning to digital teaching approaches. Therefore, this study examines whether modern (digital) teaching materials have replaced or will replace traditional (paper) ones.

The nineteenth century saw the rise of modern cartography (Gašperič 2010). With the national revival in the second half of the nineteenth century, cartography in Europe became increasingly nationally oriented (Gašperič 2007). The content on maps became more detailed, with very accurate data. The second half of the nineteenth century was also when the first cartographic works for geography teaching were published, and so this period is directly related to Kocen as the author of school textbooks, atlases, and maps. The second period examined refers to 2022, when things began to normalize after the COVID-19 pandemic. This pandemic caused radical changes to society and the environment, which also had a strong impact on teaching and learning geography (Chang 2020). Work and education were carried out remotely. In 2021, the impacts of the pandemic were still strongly present in everyday life, but in 2022 they gradually eased off because by that point a sufficient number of people had recovered from it and had been vaccinated, and general awareness among people was also high. Therefore, the use of geography teaching materials among Slovenian geography teachers was examined along with their preferences in this regard.

2 Methods

The situation in the first period was examined by reviewing the life and work of the founder of geography teaching, Blaž Kocen. The discussion presents many of his seminal works in the form of maps, atlases, and textbooks, outlining his pioneering work, which has been preserved until today in the form of atlases. The situation in the second period studied was examined using an online survey among Slovenian geography teachers, which focused on the following:

- The use of wall maps, folded maps, and printed atlases in teaching geography and in geography exams;
- The use of digital maps in teaching geography;
- Views on using digital maps and atlases in the future;
- Familiarity with established Slovenian nineteenth-and twentieth-century cartographers, with an emphasis on Kocen.

An e-request to complete the questionnaire used in the survey was sent via the mailing list on the Geolista website, which is part of the Association of Slovenian Geographers and makes up an online database of emails of geographers, geography students, and anyone else interested in geography in Slovenia. The questionnaire was created in the application 1KA and sent to 883 recipients. Nineteen short questions were accessible online for five days (from November 6th to 11th, 2022), and a total of 132 respondents completed the questionnaire in full.

Primary school geography teachers predominated among the respondents that completed the questionnaire (54%), followed by secondary school teachers (technical and general high schools, and high schools with a specialization; 28%), university professors (geography departments in Ljubljana, Maribor, and Koper; 15%), and others (university of the third age, 3%).

3 Results

Printed cartographic materials still tend to predominate in geography teaching. Folded maps are used by 67% of respondents, printed school atlases by 79%, and wall maps by 81%.

Over half of the respondents (56%) require students to use folded maps in class, and 64% require them to use a school atlas. There are certain deviations between oral and written exams in terms of using cartographic materials. During oral exams, 46% of respondents report that their students use folded maps and 59% report that they use school atlases. During written exams, the corresponding percentages are 36% and 30%, respectively (Figure 2).

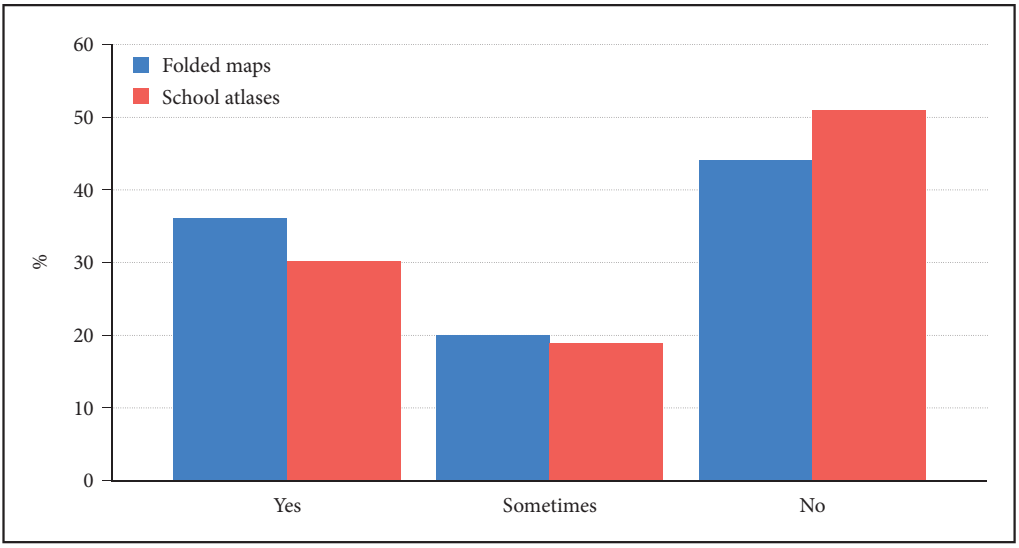


Figure 2: Use of folded maps and school atlases during written exams.

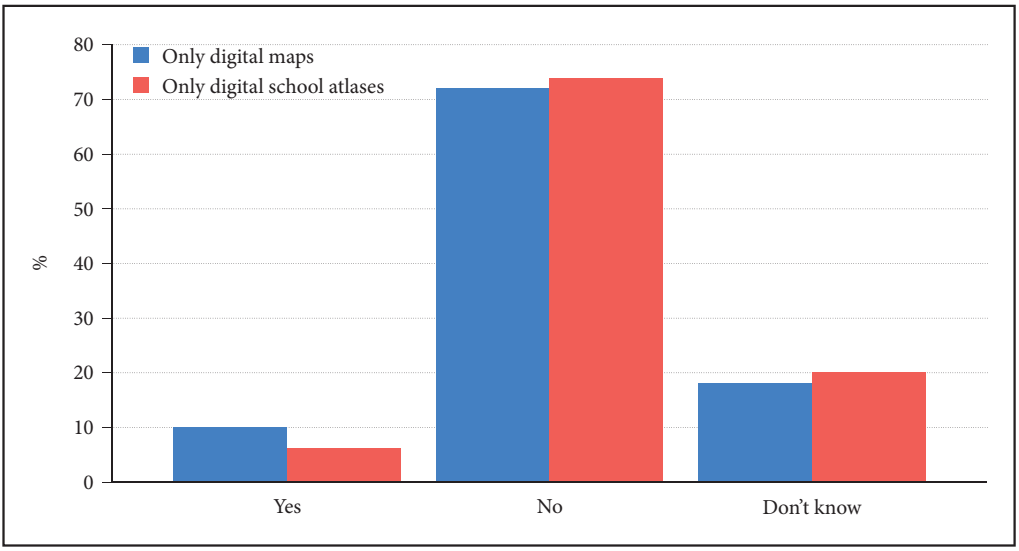


Figure 3: Teachers' views on the use of digital maps and atlases in five years.

With regard to using digital or printed cartographic teaching materials, 48% of respondents reported that they use both types of materials equally, 36% prefer printed materials, and 16% prefer digital ones. In addition, most teachers agree that only digital maps (72%) or digital atlases (74%) will not be used in five years (Figure 3).

This article describes Kocen's life and work in detail, and so the goal was also to determine whether the teachers are familiar with him as a person whose work influenced the production and importance of cartographic materials (i.e., maps, atlases, and textbooks). In addition to Kocen, the respondents were also asked about Peter Kozler (1824–1879) and Valter Bohinec (1898–1984). The businessman, lawyer, geographer, cartographer, and politician Peter Kozler was the author of *Zemljovid slovenske dežele in pokrajin* (Map of the Slovenian Land and Regions) printed in 1852. The map was a cartographic depiction of the United Slovenia political program, which strove for a single Slovenian province within the Habsburg Monarchy. The librarian, speleologist, geographer, and cartographer Valter Bohinec coauthored many general geographical and thematic maps used in schools and elsewhere. Most respondents were good at identifying Kozler and Kocen as geographers and cartographers (95%), but they were somewhat less familiar with Bohinec (85%). The results were similar for their works. Kozler was identified as the author of atlases and/or maps by 95% of the respondents, Kocen by 93%, and Bohinec by 73% (Figure 4).

4 Discussion

The survey examined the ratios between the current use of traditional materials and digital sources, which are also increasingly applied in geography teaching. Even though at the end of the twentieth century increasingly more atlases were available in electronic form on CDs, traditional printed atlases continued to predominate in geography teaching (Dent 1996). The survey among Slovenian geography teachers thus investigated whether that still applied to Slovenian schools a quarter of a century later. The results showed that school atlases continue to predominate in geography teaching in Slovenian schools (they are required

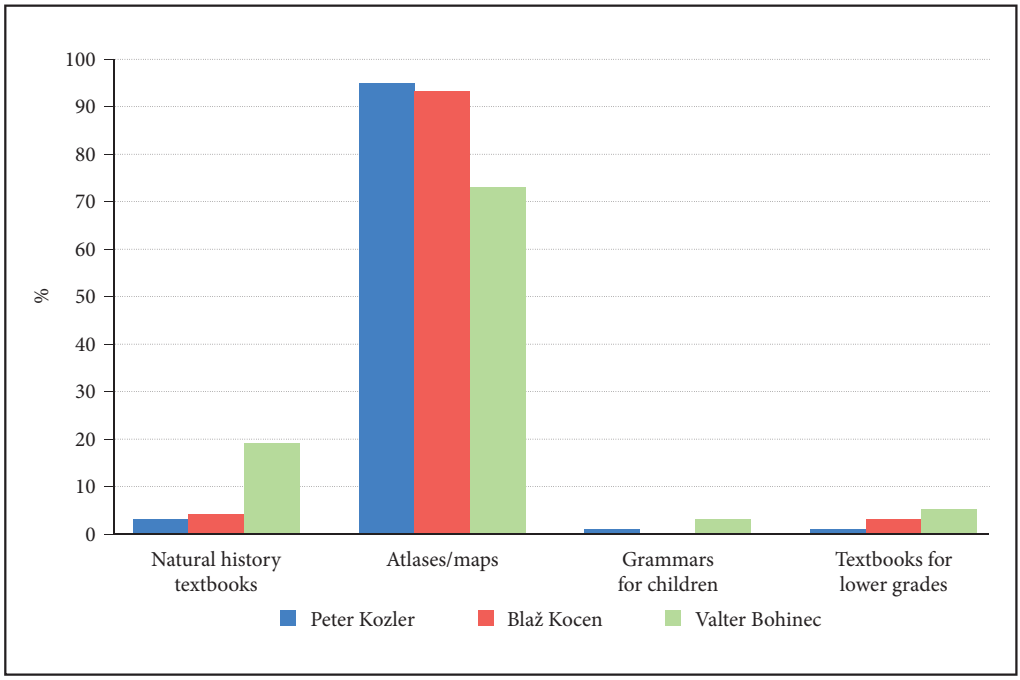


Figure 4: Teachers' views on the work of Peter Kozler, Blaž Kocen, and Valter Bohinec.

by approximately two-thirds of the teachers surveyed), followed by wall maps and folded maps. Today's perception of geographical space has been radically changed by cell phones because »the need for one's own orientation in space is decreasing« (Fridl 2016, 175). The digital media are truly taking control, and so »the syllabuses and learning methods in Slovenian schools will have to be adapted to these changes« (Fridl 2016, 184). Due to the lack of literature and expertise, cartographic literacy development in Slovenia was only included in the initial stages of primary school education around 2000 (Umek 2001; Hergan and Umek 2011). In terms of the ability to use their functional knowledge, Slovenian children lag behind their Asian counterparts, in which the use of maps or cartographic symbols is reported to have a similar stimulating effect on the development of the brain as the use of Chinese or Japanese characters (Hergan and Umek 2013). The results of an extensive survey conducted in 1999 as part of the research project »Spoznavni zemljevid Slovenije« (Cognitive Map of Slovenia), in which respondents were asked to draw the mental images they had of familiar and unfamiliar places in Slovenia, are also very revealing (Natek 2002). The level of cartographic literacy among Slovenian primary-school students was already low in the first decade of the twenty-first century (Hojnik and Hus 2012), and it did not significantly improve over the following years (Fridl 2016). It can be confirmed that the transition from traditional to digital teaching materials is continuing to grow stronger. In the mid-2010s, approximately 90% of teachers predominantly used traditional textbooks, maps, and atlases (Fridl 2016), whereas this study reveals that today a large portion of teachers (48%) are using digital and printed materials equally. Distance learning has definitely also played a role in this. A major advantage of mobile cartography is »presenting spatial data to a mobile user based on his context and his profile« (Reichenbacher 2001, 44). Clearly, the use of interactive multimedia teaching aids and hypermedia content, such as e-textbooks, mobile apps, and GIS, is also on the rise (Cartwright, Peterson and Gartner 2007). Their importance in teaching is growing: they have become »an active digital database of geospatial information« (Kolnik 2020, 10). Also growing in importance are information and communication technologies, which »make it possible to virtually simulate the transition from observation /…/ to its cartographic representation« (Kolnik 2020, 8). However, the view presented by the Slovenian educator and geography teacher Slavko Brinovec (1936–2022) that an atlas and a map are indispensable because they »encourage students to walk outdoors with their eyes open and observe« (Lipovšek 2018, 58) continues to predominate. The aspect that Brinovec highlighted is also one of the main advantages of printed cartographic materials.

Kocen's cartographic work was the most productive during the time he spent in Olomouc, where he met the publisher, printer, bookseller, and merchant Eduard Hölzel (1817–1885), together with whom he established the largest and most important cartographic institute in the Austrian Empire (Slanar 1984). In a period spanning just twelve years, Kocen published three textbooks in ten editions, seven atlases in over fifty editions, over twenty pocket maps, and at least eleven wall maps (Bratec Mrvar 2000). His following statement nicely illustrates the importance of cartographic material: »Ultimately, it should also be noted that a map is still the most excellent geographical teaching aid because a book merely explains a map and indicates the most important points it contains« (Kocen 1877, 1).

His works can be divided into four main categories: textbooks, maps, school atlases, and research works.

4.1 Kocen's textbooks

Textbooks were Kocen's earliest educational works. He wrote four textbooks, which were published in a total of forty-one editions between 1858 and 1898 (Table 1). The first among them was the only one that he wrote while still teaching at the upper secondary school in Gorizia, and it was initially not published by Hölzel. In its introduction, Kocen explains that »a special value of geography lies in its explicitness and deeply entrenched conceptions of the subjects of its study« (Kozenn 1858, 3). In this textbook, he conceived learning as proceeding from »familiar, easy, and simple to unfamiliar, difficult, and synthetic consolidation of knowledge« (Kozenn 1858, 3). He supported the idea that students should copy drawings, sketches, and images (Figure 5), he stressed the importance of properly writing and pronouncing foreign geographical names, and he was the first to add information on their pronunciation in atlases. A need soon arose for separate textbooks for primary schools on the one hand and secondary schools on the other, which is why he started writing new textbooks. The last, significantly modified and abridged, edition of his first textbook for primary schools and the first grades of secondary schools, titled *Grundzüge der Geographie* (Basics of Geography), was published in 1871. His textbooks were also translated from German into Czech and Slovenian.

Table 1: Overview of Kocen's geography textbooks published between 1858 and 1898 (Kunaver 2009).

Title	Published 1858–1871	Published 1872–1898
Grundzüge der Geographie (Basics of Geography)	5	0
Leitfaden der Geographie für die Schulen im Kaiserthume Oesterreich (Guide to Geography for Schools in the Austrian Empire)	2	19
Erdbeschreibung für Volksschulen (Geography for Primary Schools)	4	10
Die österreichisch-ungarische Monarchie: für den geographischen Schulunterricht (The Austro-Hungarian Monarchy: Geography Teaching)	0	1
Total	11	30

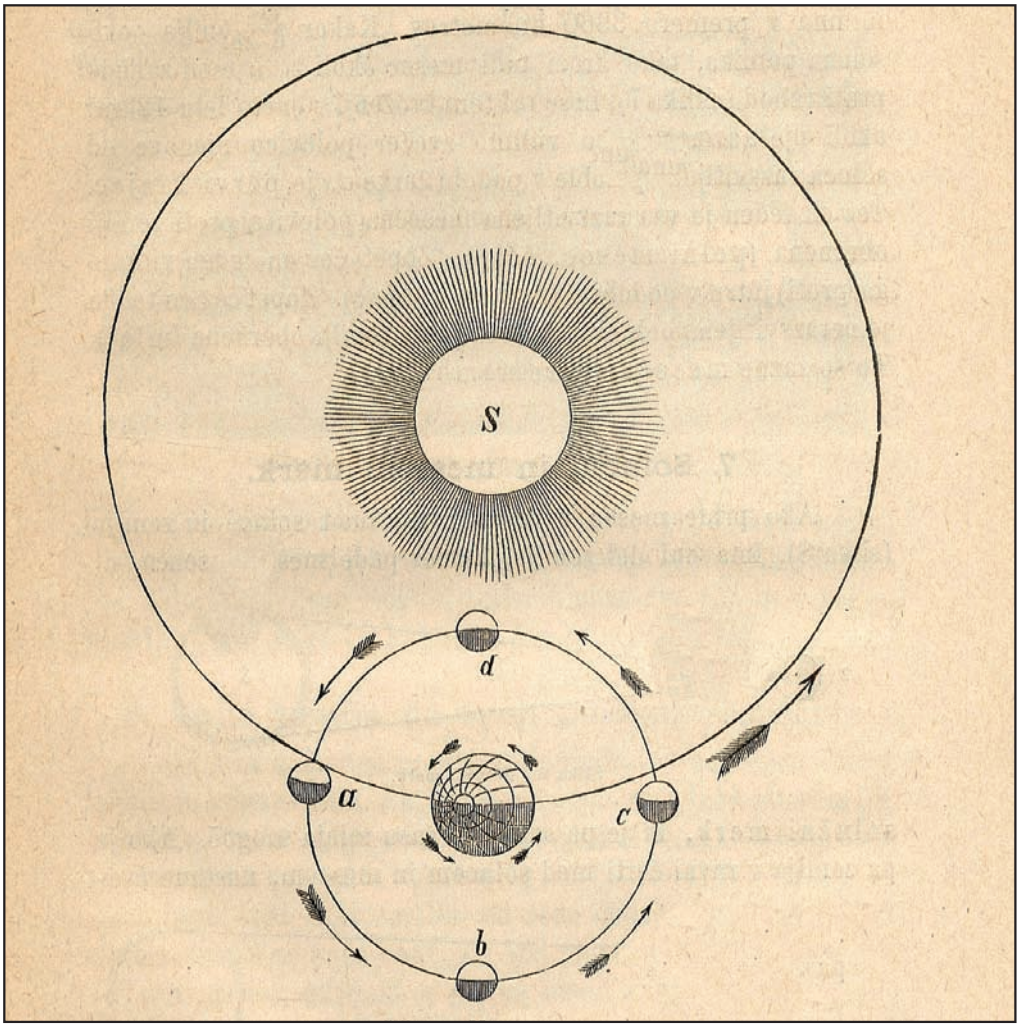


Figure 5: Illustration from the Slovenian edition of Kocen's *Erdbeschreibung für Volksschulen* (Kocen 1879) showing the orbits of the Moon and Earth around the Sun.

4.2 Kocen's wall maps and folded maps

After the mid-nineteenth century school reform, every primary and secondary school was required to have at least three wall maps: of the two hemispheres, Europe, and central Europe (Fuchs 1952). To this end, Hölzel started publishing Kocen's wall maps and folded maps before his atlases (Haardt 1898). Kocen's general geographical and historical maps were used in schools until the end of the nineteenth century. His wall maps and folded school maps (Table 2) were published in German, Czech, Hungarian, Croatian, and Polish.

Table 2: List of known maps published by Hölzel during the initial period of Kocen's cartographic activity.

Title	Type
Planigloben or *Halbkugeln der Erde* (The Earth's Hemispheres)	/
Europa (Europe)	Wall
Schulwandkarte der Österreichisch-ungarischen Monarchie (School Wall Map of the Austro-Hungarian Monarchy)	/
Palästina (Palestine)	/
Königreich Böhmen (The Kingdom of Bohemia)	Wall
Mähren und Schlesien (Moravia and Silesia)	Wall
Niederösterreich (Lower Austria)	Wall
Oberösterreich (Upper Austria)	Wall
Kärnten (Carinthia)	Wall
Steiermark (Styria)	Wall
Oberösterreich und Salzburg (Upper Austria and Salzburg)	Wall

Table 3: List of known regional maps published by Hölzel (most likely) after 1869.

Title
• *Höhenschichtenkarte von Ober-Österreich und Salzburg* (Map of Upper Austria and Salzburg with Contour Lines)
• *Handkarte von Böhmen* (Pocket Map of Bohemia)
• *Handkarte von Mähren und Schlesien* (Pocket Map of Moravia and Silesia)
• *Handkarte der Österreichisch-ungarischen Monarchie zur Übersicht der topographischen und politischen Einteilung* (Pocket Topographic and Political Map of the Austro-Hungarian Monarchy)
• *Berg- und Flußkarte der Österreichisch-ungarischen Monarchie* (Map of Mountains and Rivers in the Austro-Hungarian Monarchy)
• *Alpenländer* (Alpine Lands)
• *Österreichische Alpenländer* (Austrian Alpine Provinces)
• *Ungarn und Nebenländer* (Map of Hungary and Neighboring Lands)
• *Karte von Böhmen* (Map of Bohemia)
• *Karte von Galizien mit der Bukowina* (Map of Galicia and Bukovina)
• *Karte von Länder der ungarischen Krone* (Map of Hungarian Crownlands)
• *Karte von Mähren und Schlesien* (Map of Moravia and Silesia)
• *Karte von Karpathenländer* (Map of Carpathian Lands)
• *Karte von Nieder-Österreich* (Map of Lower Austria)
• *Karte von Ober-Österreich und Salzburg* (Map of Upper Austria and Salzburg)
• *Karte von Steiermark* (Map of Styria)
• *Karte von Kärnten* (Map of Carinthia)
• *Karte von Steiermark und Kärnten* (Map of Styria and Carinthia)
• *Karte von Krain mit Istrien* (Map of Carniola and Istria)
• *Karte von Krain, Istrien, Görz, unt. Kärnten und unt. Steiermark* (Map of Carniola, Istria, the County of Gorizia, Lower Carinthia, and Lower Styria)
• *Karte von Tirol mit Vorarlberg* (Map of Tyrol and Vorarlberg)
• *Schulkarte von Bayern* (School Map of Bavaria)
• *Schulkarte von Württemberg* (School Map of Württemberg)
• *Schulkarte von Baden* (School Map of Baden)
• *Schulkarte der Schweiz* (School Map of Switzerland)

Hölzel also published these maps in a reduced pocket format (Figure 6), along with maps of Alpine lands and the supplementary regional maps of all Austrian crownlands, Switzerland, Bavaria, Württemberg, and Baden. His pocket maps are rare and poorly preserved. An overview of his maps' titles and the territories depicted on them shows that Hölzel also planned to expand to the Swiss and German markets (Table 3). Because the maps have no dates, it can be concluded that the regional maps (*Vaterlandskarte*) were primarily published after 1869.

What is now Slovenia is depicted on the *Map of Styria and Carinthia*, and the *Map of Carniola, Istria, the County of Gorizia, Lower Carinthia, and Lower Styria*; the latter could also be dubbed a »map of the Slovenian lands« because on it the Slovenian linguistic border is marked in blue by hand. It must have been inspired by the well-known *Map of the Slovenian Land* published by Peter Kozler in 1853, which used a similar scale and depicted a similar area. On Kocen's map, nearly all the names are provided exclusively in German.

ZBIRKA PRIMOŽA PREMZLA

Figure 6: Kocen's Map of Styria from around 1869.

4.3 Kocen's school atlases

What are known in German as the *Kozenn-Atlanten* 'Kocen's atlases' remain the most highly recognized school atlases in Austria today (Table 4). Their German, Czech, Polish, and Hungarian editions were followed by many other licensed editions across Europe and beyond (Kretschmer and Dörflinger 1995; Bratec Mrvar 2012). Best known in central Europe is Kocen's secondary-school atlas (Figure 7), which was published without interruption from 1861 to 1978, and then again from 1996 onward. It was published in nearly three hundred different editions and reprints under various titles, and its »descendants«, *Kozenn Schulatlas* (Kocen's School Atlas) for primary schools and *Großer Kozenn-Atlas* (Kocen's Great Atlas) for secondary schools, continue to be published today. These atlases became a watershed teaching aid that allowed Austrian teaching to become autonomous and free from the predominant German influence. Kocen thoroughly modified and updated his atlases, improving them constantly in terms of their technical features and content.

Table 4: Overview of Kocen's atlases published between 1861 and 2022 (Dörflinger and Hühnel 1995; Kretschmer 1995; Kunaver 2009; Birsak 2021).

Title and type of atlas	German	Czech	Polish	Hungarian	Croatian	Italian	Total
Geographischer Schul-Atlas für Gymnasien, Real-und Handels-Schulen der österreichischen Monarchie (secondary school atlas, 1861–1978)	113	27	20	2	20	4	186
B. Kozenn's oro-hydrographischer Atlas (orohydrographic atlas, 1864–1873)	3	1	0	0	0	0	4
Geographischer Atlas für die Schulen der österreichisch-ungarischen Monarchie. Ausgabe in 6 Karten (school atlas with six maps, 1869)	1	2	1	1	0	0	5
Geographischer Atlas für die Schulen der österreichisch-ungarischen Monarchie. Ausgabe in 12 Karten (school atlas with twelve maps, 1868–1876)	6	1	1	1	0	0	9
Geographischer Atlas für die Schulen der österreichisch-ungarischen Monarchie. Ausgabe in 18 Karten (school atlas with eighteen maps, 1868–1874)	3	1	2	1	0	0	7
B. Kozenn's kleiner geographischer Schul-Atlas (small school atlas, 1862)	1	2	0	0	0	0	3
Schul-Atlas der österreichisch-ungarischen Monarchie (school atlas, 1870–1882)	6	1	0	0	0	0	7
B. Kozenn's oro-hydrographischer Atlas der *österreichisch-ungarischen Monarchie* (orohydrographic atlas, 1873)	1	0	0	0	0	0	1
B. Kozen"s geographischer Schul-Atlas für Bürgerschulen (secondary school atlas, 1876–1896)	5	0	0	0	0	0	5
B. Kozenn's geographischer Schul-Atlas für die k.k. Militär-Bildungsanstalten (edited by Letoschek; atlas for imperial and royal military schools, 1889–1896)	5	0	0	0	0	0	5
B. Kozenn's geographischer Schul-Atlas für den Gebrauch an österreichischen Lehrerbildungs-Anstalten (edited by Seibert; atlas for teacher training schools, 1885–1910)	4	0	0	0	0	0	4
B. Kozenn's geographischer Schul-Atlas für die k.k. Militär-Bildungs-Anstalten (edited by Sonklar; atlas for imperial and royal military schools, 1876–1881)	7	0	0	0	0	0	7
Kozenn-Atlas. Ausgabe für Hauptschulen (edited by Güttenberger; secondary school atlas, 1930–1935)	15	0	0	0	0	0	15
Neuer Kozenn Atlas (The New Kozenn Atlas, 1996–2010)	13	0	0	0	0	0	13
Kozenn-Schulatlas (Kozenn's School Atlas, 2007–)	15	0	0	0	0	0	15
Großer Kozenn-Atlas (Kozenn's Great Atlas, 2011–)	11	0	0	0	0	0	11
Total	209	35	24	5	20	4	297

4.4 Kocen's research

In addition to textbooks, maps, and atlases, Kocen also produced several research works. While teaching at the upper secondary school in Gorizia, he conducted various meteorological measurements from July 1856 to June 1857, based on which he published the study *Das Klima von Görz* (The Climate of Gorizia) in the school's yearbook. In it, he described not only the climate, but also the rock, terrain, hydrology, vegetation, and soil of the Gorizia region, based on which he then examined the suitability of the landscape and climate for cultivating various crops. Among other things, he strongly supported the afforestation of the Karst Plateau (Kozenn 1857).

Kocen published the study *Geographische Lehrmittel* (Geography Teaching Materials) in the 1861 yearbook of the Olomouc upper secondary school, which, in addition to other influential cartographic works he produced, earned him a place on the Imperial School Council, where he served as the only geographer. In this capacity, he helped shape the thorough school policy reform of that time. In the study mentioned, he explains his own perspective on geography teaching and defines the criteria for producing high-quality school atlases (Kozenn 1861b).

4.5 Importance of Kocen's works for teaching

For several years, Kocen engaged in thorough research on the geographical literature of his time, especially textbooks and atlases. He drew attention to the weaknesses in presenting material, outlining guidelines for improving geography teaching. Despite adopting cartographic elements from atlases by other authors, he also introduced many improvements. Because of this, he is also acknowledged among geographers for having broken new ground in geography teaching (Kretschmer 1990). He emphasized the communicative value of geography, which can be achieved through maps and atlases, as well as various drawings, illustrations, and data. Gradualness using an appropriate selection, scope, and distribution of learning material was also very important to him (from what is familiar, known, and easy to understand to what is unfamiliar

Figure 7: Detail from the map of the Mediterranean in Kocen's 1861 secondary school atlas (Kozenn 1861a).

and more difficult). For example, in the chapter *Terrainlehre* (Terrain) from the first edition of his 1861 atlas, he highlighted the representation of terrain using the Lehmann hachure method (Kozenn 1861a) standardized in 1799 (Gašperič 2010). Contrary to the expectations of faster digitization of geography teaching expressed by some researchers (Fridl 2016), this survey showed that wall maps and traditional atlases continue to predominate in geography teaching (reported by 81% and 79% of teachers, respectively), along with folded maps (67% of teachers). Similar principles were highlighted by Brinovec (2004), according to whom maps are the most important teaching materials in geography teaching and teaching without a map is pointless. In addition, they point out that »geography contributes three further elements to general literacy: specific cartographic literacy and broader spatial literacy, which are part of people's general education, and geographical terminology« (Lipovšek Lenasi 2012, 1). In his *Geographische Lehrmittel*, Kocen examined the geographical materials at that time, adding that such »recommendations applied to teachers rather than students« (Kozenn 1861b, 1). He continues by explaining »the motives and ideas that guided him« (Kozenn 1861b, 1), which are also briefly presented in the introductions to his other works. Kocen highlights the importance of using many clear and detailed illustrations, which were, however, only included in more expensive teaching materials. He believed that the purpose of geography teaching was to explain and represent the Earth's landforms as clearly as possible. He ascribed great importance to sketches, drawings, and similar representations that made teaching and learning easier (Figures 8 and 9). This required the use of geographical teaching materials, such as books with pictures and sketches, wall maps and folded maps, and atlases. He drew attention to the key importance of wall maps and folded maps, which not even a good school atlas can replace, and which prove to be an indispensable teaching aid in geography teaching. Even now, many years later, teachers and students still use them for content, scholarly, and educational

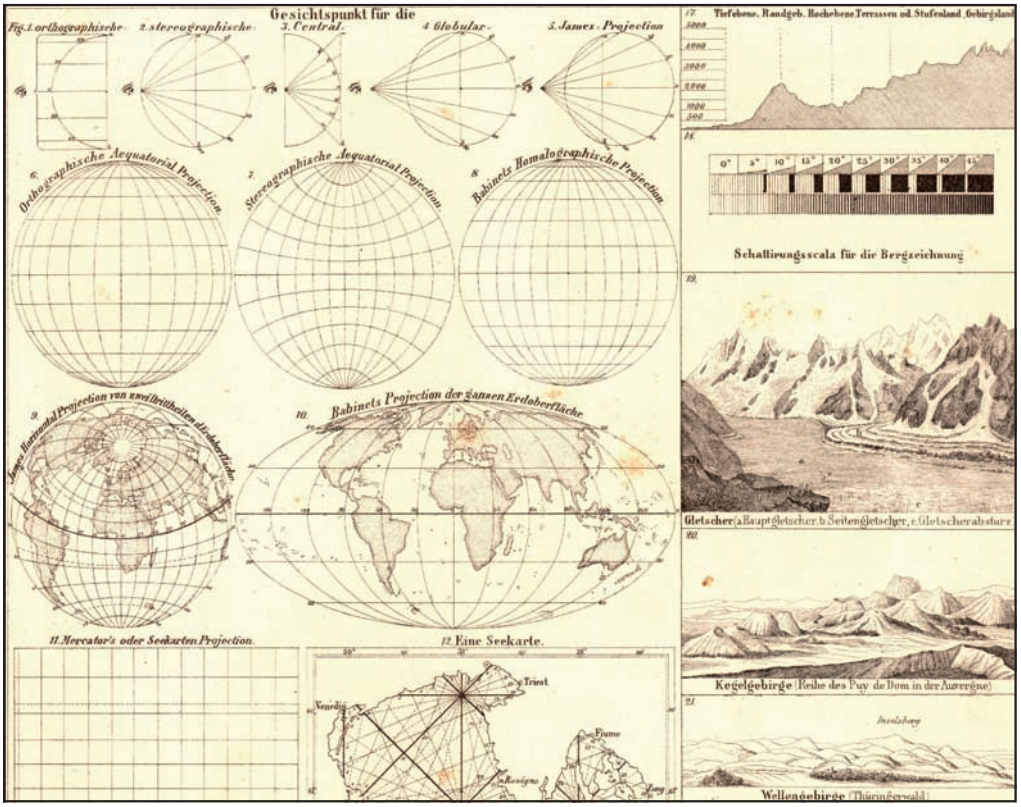


Figure 8: Detail from Kocen's 1861 secondary school atlas, with a clear representation of terrain (Kozenn 1861a).

Figure 9: Illustration from the Slovenian edition of Kocen's textbook *Erdbeschreibung für Volksschulen* (Kocen 1879), using various locations of a ship on the horizon to demonstrate that the Earth is round.

purposes, dealing with entirely practical problems in the process: »they are usually used by two students at a time, /…/ they are relatively expensive« (Brinovec 2004, 216).

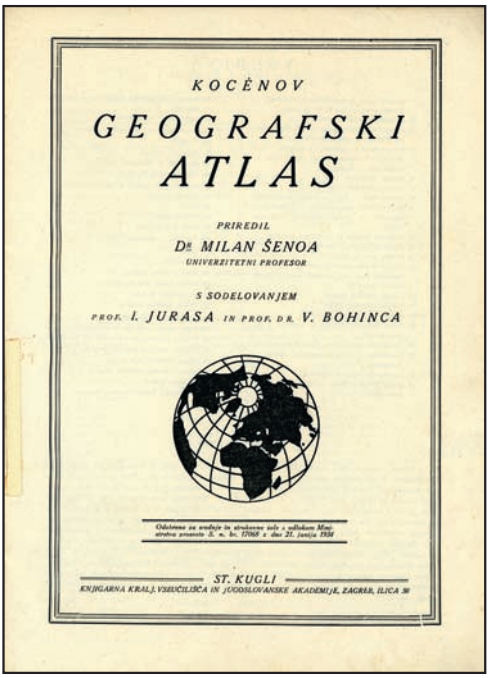
Based on his work and achievements related to geography teaching (Žagar 1971), Kocen was appointed a member of the Imperial School Council in 1863 (Laibacher Tagblatt 126, 1871). Among other things, this council achieved that in 1871 geography began to be taught separately from history and statistics (Umlauft 1898). Until his early retirement in 1870, Kocen was also member of the Primary and Secondary School Examination Committee (Sitte 1996), but his most important legacy has been the obligatory use of school atlases in geography teaching since 1874 (Fuchs 1952), which, based on the research results, has barely changed. Kocen drew attention to the importance of folded maps, which not even a good school atlas can fully replace and are an indispensable teaching material. The reasons for this are not only related to research and teaching, but are also artistic and financial.

5 Conclusion

The results of the survey conducted among Slovenian geography teachers at all levels of education confirm that Kocen is known as an important cartographer. Despite the many online options available today, the use of printed cartographic teaching materials continues to predominate, which consequently maintains the visionary and pioneering importance of Blaž Kocen as the author of clear and detailed materials for teaching geography.

Based on these findings, it can be rightfully concluded that Kocen was a visionary that recognized the importance of cartographic teaching materials very early on; even a century and a half later, these materials remain the main tools used in geography teaching. To date, his textbooks, wall maps and folded maps – and, first and foremost, school atlases and their various adaptations – have been studied in detail, especially by Austrian geographers (e.g., Haardt 1898; Sitte 1996; Kretschmer and Birsak 2007). Over the past two decades, interest in his work has also grown significantly in Slovenia, which has mainly been due to various events and publications by experts (Rožle Bratec Mrvar and Jurij Kunaver), teachers (the Association of Slovenian Geography Teachers), and local communities (the Ponikva Tourism and Beautification Society and Blaž Kocen Primary School in Ponikva). Hence, it is not surprising that Kocen is well known among geographers and that the respondents considered him one of the best-known Slovenian cartographers.

Kocen's most important works include school atlases, which constituted a watershed in the development of school cartography. They have acquired epochal significance through numerous reprints, adaptations, and translations (Figure 10). His atlases continue to be published today, and his name has become a recognized brand, with which Hölzel successfully entered the international market. Therefore, Kocen's life and his other works, with his atlases ranking him among the immortal giants of European cartography, are also presented in detail. His perspectives on geography teaching presented in the article *Geographische Lehrmittel* (Geography Teaching Materials) also proved highly influential; in addition to other high-profile cartographic works, this study earned him a place as the only geographer and cartographer on the Imperial



SLOVENSKI ŠOLSKI MUZEJ

Figure 10: *Kocenov geografski atlas* (Kocen's Geographical Atlas), published in 1934 (Kocen 1934), which was reprinted several times until 1939. This was the only atlas with an introduction in Slovenian (translated by Valter Bohinec), whereas the maps were the same as in the Croatian edition.

School Council, where he helped shape the school policy reform. His atlases, which were known especially for their clarity, affordability, adaptability, and constant improvements, acquired an indispensable place in geography teaching. They have retained this place up until today, which is also proven by the survey results presented in this article. Slovenian geography teachers (75%) think that school atlases will not disappear from geography teaching in the next five years; similar applies to printed maps (according to 72% of teachers). Kocen's name is well known; 94% of respondents know him as a cartographer and author of geography teaching materials.

With a tradition spanning over 160 years, Kocen's atlas most likely holds a world record among atlases. It has a longer legacy than Diercke's Atlas, which has been published by the Braunschweig-based publisher Westermann since 1883 (Kretschmer, Dörflinger and Wawrik 1986) and, based on licensed editions by Mladinska knjiga, it is the best-known atlas in Slovenia, with a total of over 350,000 Slovenian copies sold so far. Unfortunately, partial Slovenian translations of Kocen's atlases were only published during the interwar period – *Kocenov geografski atlas* (Kocen's Geographical Atlas) published between 1934 and 1939, with an introduction translated by Valter Bohinec (Figure 10) – whereas before that and especially recently the Slovenian market has proven to be insufficiently lucrative for a Slovenian publisher to dare publish one of his works in Slovenian.

In the future, the share of digital geography teaching materials both at school and in the home will most likely increase. The growing online availability of various content, increasing internet speed, and greater, higher-performance, and cheaper technical equipment (smartphones, computers, interactive displays, etc.) facilitate greater adaptability, innovativeness, and currency in teaching. Children and teens are growing up in a digital world, where programs and devices are constantly developed or improved. However, when it comes to learning and, perhaps even more evidently, studying and leisure use, traditional learning materials continue to have an advantage, especially in terms of their method of use and their independence from the internet, networks, and location.

ACKNOWLEDGEMENT: The authors acknowledge partial financial support from the Slovenian Research and Innovation Agency, research core funding Geography of Slovenia (P6-0101).

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THE FIRST WORLD ATLAS IN SLOVENIAN, AND SLOVENIAN TERRITORY IN SOME EARLY WORLD ATLASES

Drago Perko

DRAGO PERKO

The 2005 reissue of Matej Cigale's *Atlant* consists of a facsimile of all the maps, a seven-chapter supplemental volume, and a handmade cardboard case that protects the inserted maps and book.

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UDC: 912.44(100):811.163.6'21(091)
528.9:912.44(100)(091)

Drago Perko[1]

The first world atlas in Slovenian, and Slovenian territory in some early world atlases

ABSTRACT: *Atlant* was the first world atlas in Slovenian. It was published between 1869 and 1877, when most Slovenians lived in Austria-Hungary. The first-ever world atlas was authored by Abraham Ortelius and published in 1570, and the first Austrian world atlas was published in 1796 by Franz Johann Joseph von Reilly. In both of them, the territory of what is now Slovenia is depicted on several maps. *Atlant* was edited by Matej Cigale, who carried out pioneering work in Slovenianizing geographical names and preserving Slovenian exonyms. The Slovenian geographical names used in the atlas reflect the relationships at the time between Slovenian and other languages. *Atlas* is important because it uses Slovenian geographical names on the maps. It also influenced later world atlases, especially the first school atlases in Slovenian. A facsimile of *Atlant* with accompanying studies was published in 2005.

KEYWORDS: cultural geography, cartography, map, geographical name, Matej Cigale, Slovenia, Austria-Hungary

Prvi atlas sveta v slovenščini in slovensko ozemlje v nekaterih zgodnjih atlasih sveta

POVZETEK: Atlant je prvi atlasa sveta v slovenskem jeziku. Izhajal je med letoma 1869 in 1877, ko je večina Slovencev živela v Avstro-Ogrski. Prvi atlas sveta Abrahama Orteliusa je izšel leta 1570 in prvi avstrijski atlas sveta Franza Johanna Josepha von Reillyja leta 1796. V obeh je ozemlje današnje Slovenije prikazano na več zemljevidih. Atlant je uredil Matej Cigale, ki je opravil pionirsko delo pri slovenjenju zemljepisnih imen in ohranjanju slovenskih eksonimov. V slovenskih zemljepisnih imenih se kažejo takratna razmerja med slovenščino in drugimi jeziki. Atlas je pomemben zaradi uporabe slovenskih zemljepisnih imen na zemljevidih. Vplival je tudi na poznejše atlase sveta, še posebej prve šolske atlase v slovenskem jeziku. Leta 2005 je izšel faksimile Atlanta s spremnimi študijami.

KLJUČNE BESEDE: kulturna geografija, kartografija, zemljevid, zemljepisno ime, Matej Cigale, Slovenija, Avstro-Ogrska

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1 Introduction

This article presents the significance of the first world atlas published in Slovenian as a vital element of Slovenian cultural heritage and promoter of Slovenian national identity. It is connected with the first world atlases published in the sixteenth century, when the foundations for the development of Slovenian language and culture were laid through the first books printed in Slovenian. In addition, the article describes the first two Austrian world atlases because Austria was where nearly all ethnic Slovenians lived in the eighteenth century, when the first world atlas was published in Slovenian, and, also through this atlas, they began to place themselves on a more equal footing with other European nations. Using examples from various maps, the article illustrates how the territory of what is now Slovenia was depicted in these atlases.

Most of the article focuses on presenting the author of the first Slovenian world atlas, Matej Cigale (1819–1889), his work in geography, and, first and foremost, an evaluation of his atlas and the atlas's importance for Slovenian world and school atlases. Special attention is dedicated to Slovenian geographical names.

This review article thus contextualizes the first Slovenian world atlas within the history of world atlases, as well as the history of Slovenian geography, cartography, linguistics, and culture in general.

1.1 Material and methods

A variety of atlases and other old materials were examined for this study. Non-Slovenian world atlases were available in digital form, and Slovenian atlases and books were largely available in both digital and print versions. Most digital world atlases in languages other than Slovenian were obtained from the David Rumsey Map Collection website (www.davidrumsey.com), which provides access to over 150,000 maps, and most Slovenian materials were obtained from the National and University Library and especially its website Digital Library of Slovenia (www.dlib.si), and from the Geographical Museum and Geographical Library at the Slovenian Academy of Sciences and Arts Geographical Institute. The title pages of the most relevant publications reviewed are provided in the figures.

In all atlases, the maps on which Slovenian territory was depicted in greatest detail were identified. Special attention was dedicated to the first two world atlases, the first two Austrian world atlases, and the first two Slovenian world atlases (Table 1).

In reviewing non-Slovenian atlases, special focus was placed on finding similarities with the maps in Cigale's atlas to determine which world atlases he based his *Atlant* on.

The review of other materials followed the development of school atlases and world atlases in Slovenian, and it examined the influence of Cigale's atlas on Slovenian geographical names. The gazetteer of geographical names produced while preparing the facsimile of Cigale's atlas in 2005 (the original had no gazetteer; Fridl et al. 2005) was also used in the process.

In evaluating Cigale's atlas and his work, it was vital to take into account the historical, political, and cultural contexts in which atlases and other materials were created. To better understand Cigale's atlas, a brief review of the development of the Slovenian nation and language, or some important points on this path, are presented below.

Table 1: List of world atlases reviewed in detail.

Works examined	Title	Year
First two world atlases	*Theatrum orbis terrarum* (A Representation of the World)	1570
	Atlas sive Cosmographicae meditationes de fabrica mundi et fabricati figura (Atlas or Cosmographical Meditations upon the Creation of the Universe, and the Universe as Created)	1595
First two Austrian world atlases	*Grosser deutscher Atlas* (Great German Atlas)	1796
	Allgemeiner Grosser Atlass (Great General Atlas)	1800
First two Slovenian world atlases	*Atlant* (Atlas)	1877
	Velika atlas sveta (Great World Atlas)	1972

1.2 Cultural-geographical introductory overview: Young Slovenia, old Slovenians

Atlant, the first Slovenian world atlas produced by Matej Cigale in the second half of the nineteenth century, holds a special place in the history of the Slovenians and their language, and especially Slovenian geography and cartography.

Slovenians thus obtained the first world atlas in Slovenian three centuries after the publication of the first world atlas, and they obtained the second one another century later. The heyday of Slovenian world atlases was the 1990s (Perko 2005b), when several atlases were published to place independent Slovenia on world maps.

Slovenia is among the youngest countries in the world. It declared independence on June 25th, 1991, and it became a member of the United Nations on May 22nd, 1992, and of the European Union on May 1st, 2004.

Before it became independent, Slovenia was a Yugoslav republic with a constitutionally guaranteed right to secede. Most Slovenians lived in Yugoslavia's Drava Province before the Second World War and in the Austrian crown lands of Carniola, Carinthia, Styria, and the Littoral before the First World War.

The principality of Carantania was established in the seventh century. This was the first state of the ancestors of today's Slovenians, who settled the area between the sources of the Enns, Mura, and Drava rivers to the west, the Danube to the north, Lake Balaton to the east, and the Adriatic to the south in the sixth century (Perko et al. 2020).

Slovenians and their language are hence significantly older than the Slovenian state. The Freising manuscripts (Figure 1) are the oldest document in Slovenian and, at the same time, the oldest Slavic text written in Latin script. They were created at the end of the tenth century and are composed of three separate documents on nine parchment pages featuring religious content (Bernik et al. 2004). They are now held by the Bavarian State Library (*Bayerische Staatsbibliothek*) in Munich.

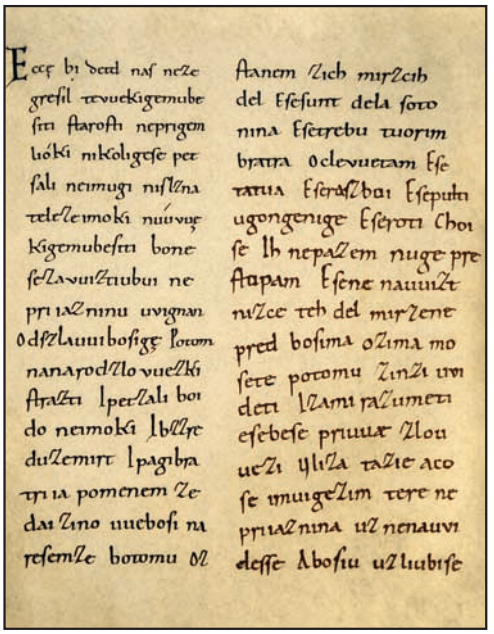
The Slovenian used in the Klagenfurt (or Rateče) manuscript (Figure 2) is of similar age. This is a copy of an older original from the period of early Christianization of the Slovenians, but it was only created in the second half of the fourteenth century. It comprises one parchment leaf with three prayers. It was used in Rateče, a Slovenian village right next to today's Austrian and Italian borders, and it is now held by the Carinthian Provincial Archives (*Kärntner Landesarchiv*) in Klagenfurt (Orel 1996).

An atlas is like a cartographic bible, but Slovenians obtained a printed Slovenian translation of the Bible much earlier than the first Slovenian atlas. Slovenian belongs to languages that was among the first into which the Bible was translated in full. As early as 1578, the Protestant writer and theologian Jurij Dalmatin (1547–1589) translated the Old and New Testaments into Slovenian (Figures 3 and 4). It was printed five years later in Wittenberg with the title *Biblia, tu ie, vse Svetu pismu, Stariga inu Noviga Teſtamenta* (The Bible, i.e. the Entire Old and New Testaments). The Bible was first printed in German in full in 1534 in Wittenberg, and it was translated by the Augustinian friar Martin Luther (1483–1546). The first English translation was printed in 1535, most likely in Antwerp, and it was translated by Myles Coverdale (1488–1569), also an Augustinian friar (Cain et al. 2023).

Slovenians thus obtained a printed copy of the entire Bible in Slovenian less than half a century later than the English or Germans, and only three decades after the first book in Slovenian, *Catechiſmus* (Catechism), printed in 1550. It was written by the Protestant priest and writer Primož Trubar (1508–1586), who dubbed himself *Philopatridus Illiricus* (an Illyrian patriot) in the book. With this work, Trubar established Slovenian as a standard language, and five years later, in his foreword to the Gospel of Matthew, he was the first in history to refer to his compatriots as Slovenians (Figures 5 and 6).

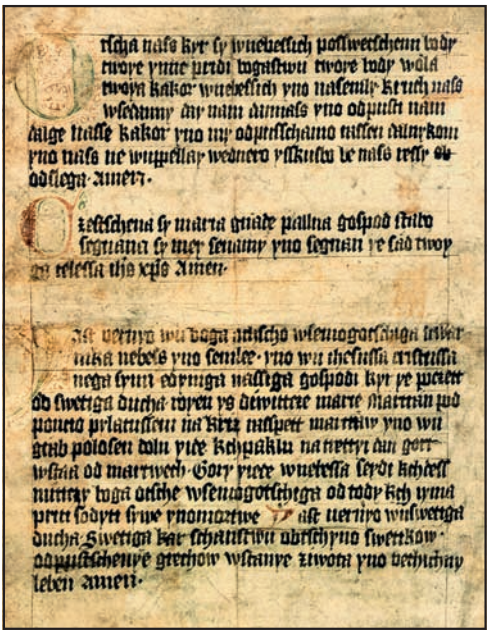
This was also the period of Jacobus Gallus (a.k.a. Jacobus Handl or Händl in German and Slovenianized as *Jakop Petelin Kranjski*), a late-Renaissance Slovenian composer (1550–1591), who authored numerous motets and madrigals (Figures 7 and 8).

Hence, the sixteenth century, which was of great significance for the development of atlases, was also of exceptional importance for the development of Slovenian and the consolidation of Slovenian culture and identity. That, however, was also one of the key roles of Cigale's *Atlant* three centuries later.



BAYERISCHE STAATSBIBLIOTHEK

Figure 1: The Freising manuscripts from the end of the tenth century are the earliest known Latin-script document in Slovenian and any Slavic language. The first page of the second Freising manuscript, which calls on churchgoers to confess and repent, starts with *Eccę bi detd naſ nezegreſil* 'If our forefather had not sinned'.



KÄRNTNER LANDESARCHIV

Figure 2: The Klagenfurt manuscript from the second half of the fourteenth century comprises one parchment leaf with three prayers. The first is the Our Father, and it begins with *Otſcha naſs kyr ſy wnebeſſich poſſwetſchenu body twoye yime* 'Our Father, who art in heaven, hallowed be thy name'.

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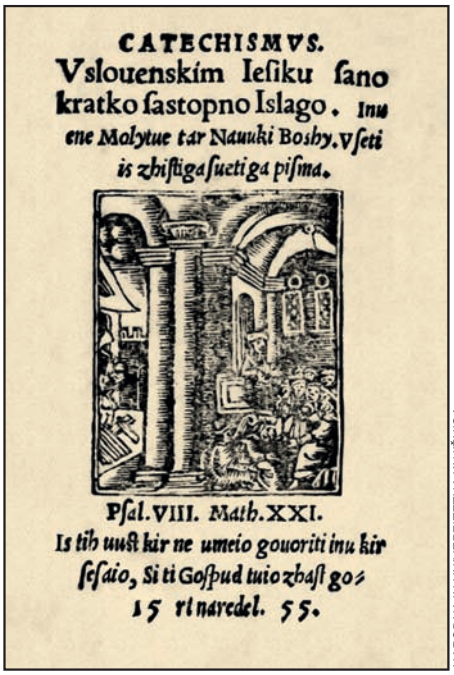
Figure 3: Jurij Dalmatin (1547–1589) translated the entire Bible into Slovenian in 1578.

NARODNA IN UNIVERZITETNA KNJIŽNICA

Figure 4: Title page of Dalmatin's *Biblia* (Bible) printed in 1583 in Wittenberg, Germany.

Figure 5: Primož Trubar (1508–1586) authored the first two books printed in Slovenian.


CATECHISMVS.
Vslouenskim Ieſiku ſano
kratko ſastopno Islago. Inu
ene Molytue tar Nauuki Boshy. Vſeti
is zhiſtiga ſuetiga piſma.

Pſal. VIII. Math. XXI.
Is tih uuſt kir ne umeio gouoriti inu kir
ſeſaio, Si ti Goſpud tuio zhaſt go:
15 ti naredel. 55.

Figure 6: Title page of Trubar's *Catechiſmus* (1555). Its first edition was printed in 1550 in Germany.

Figure 7: Jacobus Gallus (1550–1591), probably the best-known Slovenian late-Renaissance composer.


SECVNDVS TOMVS.
MVSICI OPERIS, HARMO-
NIARVM QVATVOR, QVINQVE, SEX, OCTO
ET PLVRIVM VOCVM, QVAE EX SANCTO CATHOLICAE
ECCLESIAE VSV ITA SVNT DISPOSITAE, VT
omni tempore inſeruire queant.
Ad Dei Opt: Max: laudem, & Eccleſiæ ſanctæ decus.
AVTHORE
Iacobo Händl.
CANTVS.
PRAGAE, TYPIS NIGRINIANIS. Anno M. D. LXXXVII.

De Paſsione Domini noſtri
IESV CHRISTI.
Octo Vocum. I. Chori I. Cantus.

Figure 8: The three-volume collection *Harmoniae morales* features fifty-three madrigals by Gallus. It was published in 1589 and 1590 in Prague.

2 The first two world atlases

The credit for the modern meaning of the term *atlas* 'systematic collection of maps' goes to the famous Flemish cartographer, geographer, and mathematician Gerhard Kremer (1512–1594), better known as Gerardus Mercator (Figure 9), who in 1569 began preparing maps of individual parts of the world for his *Atlas sive Cosmographicæ meditationes de fabrica mundi et fabricati figura* (Atlas or Cosmographical Meditations upon the Creation of the Universe, and the Universe as Created). The work was finished after his death by his son Rumold (1545–1599), who published it in 1595 (Figure 10). After Rumold's death, the atlas was first reissued in 1602, and then several times by 1641, including in extended editions and various languages. The atlas was 50 × 33 cm in size. The title page features the mythological Titan Atlas, which is why these types of books have been referred to as *atlases* ever since (Krogt and Koeman 2003; Perko 2005b).

The territory of what is now Slovenia is depicted in greatest detail on the maps *Forum Iulium, Karstia, Carniola, Histria Et Windorum Marchia* (Friuli, Karst, Carniola, Istria, and the Windic March; Figure 11) at an approximate scale of 1:750,000 (47 × 35 cm) and *Stiria* (Styria) at an approximate scale of 1:1,500,000 (41 × 31 cm).

However, Mercator was not the author of the first world atlas. This was Abraham Ortelius (1527–1598), a Flemish geographer of German descent (Figure 12), who published the book *Theatrum orbis terrarum* (A Representation of the World) a quarter of a century earlier, in 1570, in Antwerp. The atlas (Figure 13) was 42 × 30 cm in size, and it contained 288 pages. Copperplate maps, approximately 45 × 32 cm in size, predominate. He created them based on earlier maps produced by eighty-seven cartographers. The first

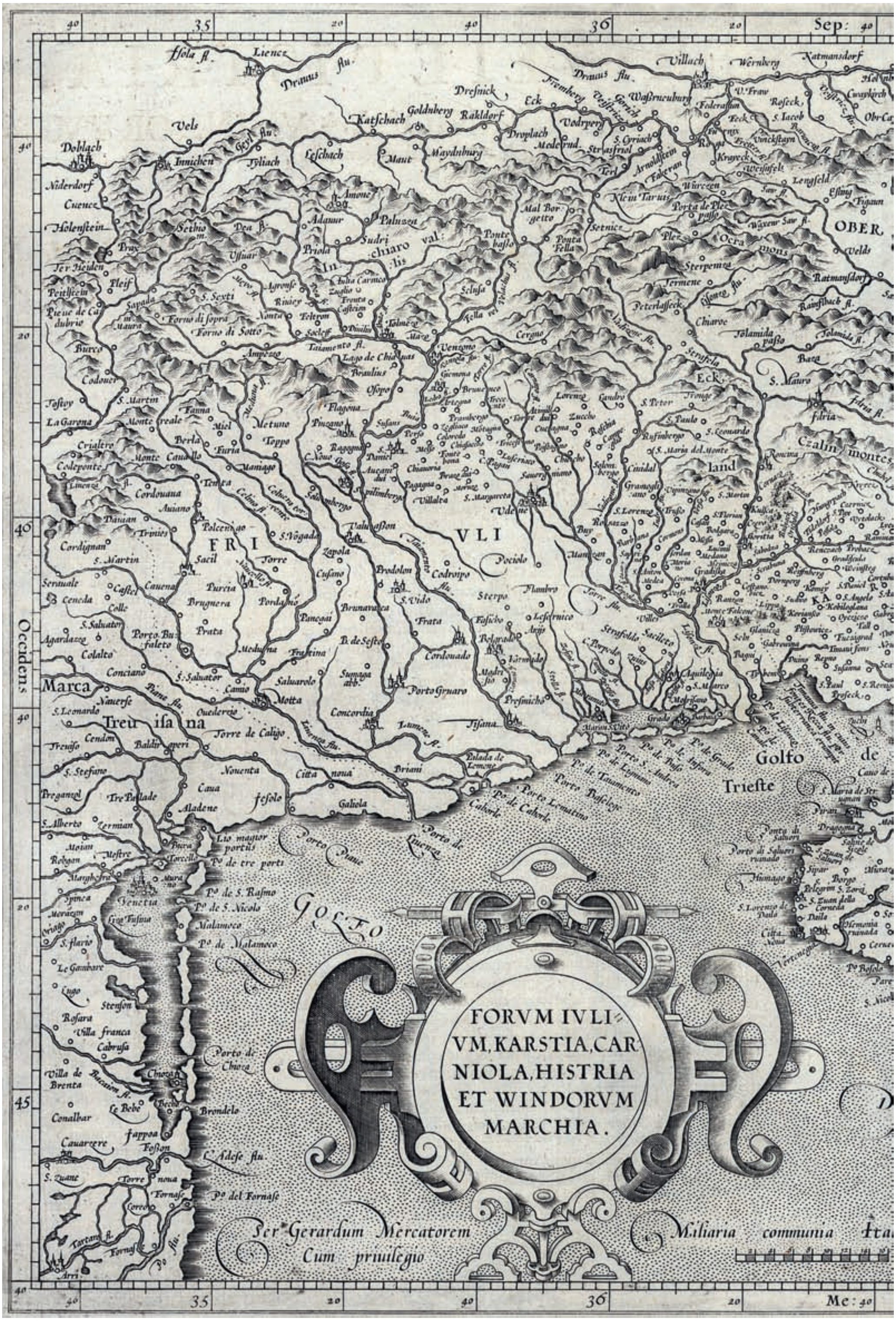
PORTRAITIST FRANS HOGENBERG (1535–1590)

Figure 9: Gerardus Mercator (1512–1594) was the first to call a systematic collection of maps an *atlas*.

DAVID RUMSEY MAP CENTER, STANFORD LIBRARIES

Figure 10: Title page of Mercator's atlas, published in 1595 by his son Rumold.

Figure 11: Reduced-scale map of Friuli, Karst, Carniola, Istria, and the Windic March, depicting the majority of what is now Slovenia except its easternmost part. ► p. 98–99

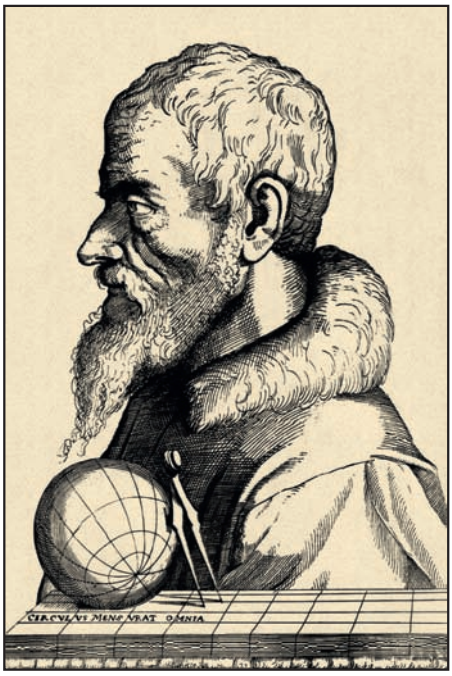

FORVM IVLI
VM, KARSTIA, CAR
NIOLA, HISTRIA
ET WINDORVM
MARCHIA.
Per Gerardum Mercatorem
Cum priuilegio
Golfo
Trieste
Occidens

PORTRAITIST PETER PAUL RUBENS (1577–1640)

Figure 12: Abraham Ortelius (1527–1598) did not yet refer to his map collection as an *atlas*.

DAVID RUMSEY MAP CENTER, STANFORD LIBRARIES

Figure 13: Title page of Ortelius's 1570 atlas, featuring the title *Theatrum orbis terrarum*.



SELF PORTRAIT

Figure 14: Augustin Hirschvogel (1503–1553) worked in Ljubljana from 1536 to 1543.

ENGRAVER PHILIP GALLE (1537–1612)

Figure 15: János Zsámboki (1531–1584) was a Hungarian physician, linguist, and historian.

Figure 16: The reduced-scale map *Schlavoniae, Croatiae, Carniae, Istriae, Bosniae Finitimarumque regionum nova descriptio* from the 1570 edition of Ortelius's atlas. It was created based on Augustin Hirschvogel's map and shows the entire territory of present-day Slovenia, except its northeastern-most part. ► p. 102–103

Figure 17: The reduced-scale map *Ilirija* (Illyria) from the 1608 edition of Ortelius's atlas. It was created based on János Zsámboki's map and shows the territory of what is now Slovenia and all its neighboring regions where ethnic Slovenians still live today. ► p. 104–105

edition featured fifty-three maps, the 1587 edition contained a further fifty, the 1593 edition already featured 137, and the 1612 edition contained a full 167. At least thirty-seven editions were published altogether, including in other languages, the last one in 1641 (Broecke 1986; Krogt and Koeman 2003; Perko 2005b).

Ortelius depicted the territory of what is now Slovenia in detail on four maps: its northern part on the map *Austriae* (Austria) at an approximate scale of 1:1,000,000 (47 × 34 cm), its northeastern part on the map *Hungariae* (Hungary) at a scale of 1:3,000,000 (51 × 36 cm), its western part on the small map *Fori Iulii* (Friuli) at a scale of 1:1,500,000 (16 × 12 cm), and nearly its entire territory on the map *Schlavoniae, Croatiae, Carniae, Istriae, Bosniae Finitimarumque regionum nova descriptio* (A New Description of Slavonia, Croatia, Carniola, Istria, Bosnia, and Neighboring Regions; Figure 16) at a scale of 1:600,000 (46 × 34 cm). This last map was created by the German artist Augustin Hirschvogel or Augustino Hirsvogelio (1503–1553), who worked as a cartographer in Ljubljana between 1536 and 1543 (Figure 14). Based on it, the Hungarian humanist János Zsámboki or Johannes Sambucus (1531–1584; Figure 15) created the map *Illyricum* (Illyria), which Ortelius first published in the 1573 edition of his atlas (Figure 17) at a scale of 1:660,000 (48 × 37 cm). The map covers all of what is now Slovenia and all its neighboring areas where ethnic Slovenians still live today (Perko 2005b; Fridl and Šolar 2011).

3 The first two Austrian world atlases

In the eighteenth and nineteenth centuries, the territory of what is now Slovenia was part of Austria: until 1804 it was part of the Habsburg Monarchy, until 1867 it belonged to the Austrian Empire, and until 1918 to Austria-Hungary.

The first Austrian world atlases are over two hundred years younger than Ortelius's first world atlas and just under one hundred years older than the first Slovenian world atlas. An important factor in their creation was the establishment of an engraving school in Vienna in 1766, thanks to which in just a few years Vienna became the cartographic capital of central Europe in terms of the number and quality of maps published. Twenty years later, Franz Anton Schrämbl (1751–1803) began preparing the first Austrian world atlas, but it was Franz Johann Joseph von Reilly (1766–1820) that completed one first in 1796 (Dörflinger 1981).

In 1786, Schrämbl announced the publication of a world atlas in German. He entitled it *Allgemeiner Grosser Atlass* (Great General Atlas; Figure 18). In 1787, he established a bookstore together with Reilly and got to work. He planned to publish thirty-six large sheets with full-page copper engravings per year and complete the atlas in three years (Dörflinger 1981).

To promote sales, he set the pre-order price for an individual leaf at only twenty kreuzers, or a third of a gulden, even though maps printed abroad cost between one and three guldens or even more. By sacrificing his entire fortune, he published over a hundred sheets by 1790, after which he had to sell the project to another publisher, Philipp Joseph Schalbacher. The atlas was ultimately completed in 1800 (Dörflinger 1981).

It was 65 × 51 cm in size, and it contained 133 sheets with 31–61 × 53–81 cm maps. Because of the various sources used, the maps vary greatly in terms of size, scale, design, and quality.


KERNTEN.
STEY
OBER KRAYN.
KARST
CRAI
CILLEI.
WIndisch Landt
Tergestinus sinus
MARIS ADRIATICI TABVLA
Scala Miliarium
Fla naticus sinus, uulgo el Quer ner
SCHLAVONIAE, CROATIAE, CARNIAE, IS
REGIONVM NOVA DESCRIPTIO, AVCT

TRIAE, BOSNIAE, FINITIMARVMQVE
ORE AVGVSTINO HIRSVOGELIO.

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CARNITIA
CARNIOLA
Cum Imperatoriæ & Regiæ Maiestatis Privilegio.
M. Caranus.
Aquileia
Gradisca
Trieste
Tergestinus sinus
OCCIDENS.
HISTRIA
Parenzo
Sinus Hadriaticus.
VELGER
SCHERO
LE ZIN.
PAGO.
Quarnicro, olim Flanaticus sinus.
Millaria communia, & magna.
MERIDI

Present-day Slovenia is depicted in greatest detail on three maps: its western part on the map *Deutschland XXIV* (Germany XXIV; Figure 19) at a scale of 1:530,000 (41 × 55 cm), its northeastern part on the map *Ungarn Siebenbürgen, Sclavonien N.72.D* (Hungary, Transylvania, and Slavonia N.72.D) at a scale of 1:1,140,000 (44 × 56 cm), and its southeastern part on the map *Ungarn Siebenbürgen, Sclavonien N.72.F* (Hungary, Transylvania, and Slavonia N.72.F) at a scale of 1:1,140,000 (44 × 56 cm).

Hearing about the success of Schrämbl's atlas, Reilly embarked on a similarly extensive project. He inherited a substantial fortune from his father, which allowed him to focus on printing and cartography. Between 1789 and 1806, he published a map almost every week for his world atlas *Schauplatz der fünf Theile der Welt* (A Representation of Five Parts of the World). In seventeen years, this added up to 830 maps, which, however, only depict Europe. In contrast to Schrämbl's atlas, the maps are only 22–28 × 31–43 cm in size (Dörflinger 1981).

In 1791, when Schrämbl was facing bankruptcy and further publication of his world atlas was under threat, Reilly decided that his world atlas would contain fewer maps. He entitled it *Grosser deutscher Atlas* (Great German Atlas; Figure 20). He prepared all the maps between 1794 and 1796, modeling them on the relevant maps from Schrämbl's atlas. Even though the price of an individual sheet was thirty-six kreuzers, compared to twenty kreuzers for a sheet in Schrämbl's atlas, because of fewer sheets the total price of his atlas was lower than that of Schrämbl's atlas, and the number of copies printed was larger than that of Schrämbl's atlas, and the number of copies printed was larger (Dörflinger 1981).

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Figure 18: Title page of *Allgemeiner Grosser Atlass* by Franz Anton Schrämbl (1751–1803) published in 1800.

Figure 19: Reduced-scale map of Germany, sheet XXIV from Schrämbl's world atlas. The map was created in 1797 and printed in 1800. It shows roughly two-thirds of what is now Slovenia west of Celje. ► p. 108–109

The atlas was 69 × 50 cm in size, and it contained twenty-seven double-page maps 40–48 × 50–80 cm in size. They were all hand colored. The first map showed the western and eastern hemispheres, followed by five maps of the continents (Europe, Asia, Africa, North and South America, and Australia) and twenty-one maps of Europe.

The atlas comprises a total of thirty double-page sheets: in addition to twenty-seven sheets of maps, the title page, a page with explanations and an index, and a sheet with data on the population and area in square miles for European countries.

Present-day Slovenia is depicted in detail and in full on the map *Deutschland* (Germany, Figure 21) at a scale of 1:1,900,000 (56 × 78 cm) and its eastern part also on the map *Ungarn* (Hungary) at a scale of 1:1,470,000 (56 × 74 cm).

Because it took Schrämbl thirteen years to complete his atlas in 1800, and it only took Reilly two years to finish his in 1796, Reilly's atlas is considered the first Austrian world atlas.

Even though the two world atlases by both Viennese authors from the end of the eighteenth century did not introduce any important new features in terms of cartography, they contributed to the spread of maps to a wider circle of people, improvements in creating maps in Austria, and subsequently also the creation of the first world atlas in Slovenian.

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Figure 20: Title page of *Grosser deutscher Atlas* (1796), which Franz Johann Joseph von Reilly (1766–1820) allegorically dedicated to the development of cartography.

Figure 21: Reduced-scale map of Germany from Reilly's 1797 world atlas. It shows the territory of what is now Slovenia and all its neighboring regions where ethnic Slovenians still live today, except the northeasternmost corner between the Rába and Mura rivers, which belonged to Hungary. ► p. 110–111


MEERBUSEN VON VENEDIG
VENEDIG
Pieve di Cadore
Belluno
Feltre
Asolo
Castelfranco
Treviso
Conegliano
Sacille
Porto Bufale
Tolmezo
Chiusa Veneta
Adria
Fossone
Cittanova
Parenzo
Pierre di Sacco
Concordia
Gruaro
Stra
Dolo
Brenta Fl.
Lago Morto
Palmo

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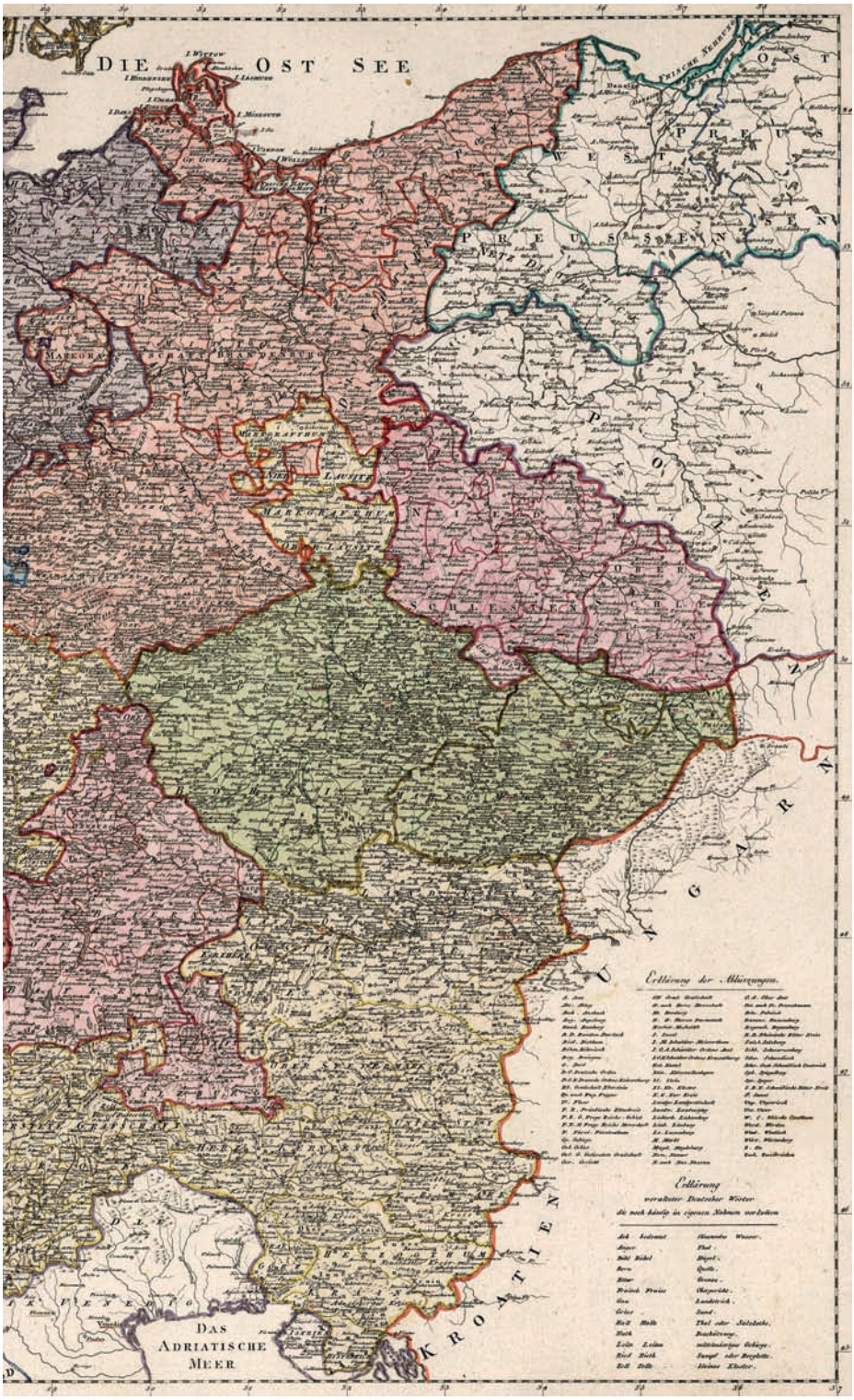
Zeichen Erklärung.
DAS DEUTSCHE MEER ODER DIE NORD SEE
FRANKREICH
KARTE
von
DEUTSCHLAND
NACH SOTZMANN
Neu verzeichnet herausgegeben
von
FRANZ JOH. JOS. VON REILLY.



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4 The first world atlas in Slovenian

4.1 Matej Cigale and his works

The author of the first world atlas in Slovenian, Matej Cigale (Figures 22 and 23), was born on September 2nd, 1819, to a rural family in the mountain village of Lome near Idrija. He attended high school in Gorizia from 1834 and 1839, and the lyceum there from 1840 to 1841. In 1841, he entered the seminary in Ljubljana, but he decided to drop out the next year and study law instead. He first studied in Graz until 1843, and then in Vienna until 1846 (Atelšek 2022).

In 1847, Cigale started working as an apprentice judge at the city and provincial court in Gorizia. The following year he passed the judicial exam in Klagenfurt. In 1849, he returned to Vienna, where he worked in the editorial office for the official gazette until his death on April 20th, 1889. He was buried in Vienna (Atelšek 2022).

In 1894, a monument commemorating Cigale was unveiled in the center of Črni Vrh above Idrija (Figure 24) along with a plaque on his birthplace in nearby Lome (Urbanc 2005), which describes him as a writer (Figure 25).

Cigale spent over four decades translating legislation and hence developing Slovenian legal terminology, in which his knowledge of classical, Romance, Germanic, and Slavic languages acquired during his schooling and later professional career proved very useful (Urbanc 2005).

In 1853, *Juridisch-politische Terminologie für die slavischen Sprachen Österreich* (Legal and Political Terminology for the Slavic Languages of Austria), a German–Croatian–Serbian–Slovenian dictionary, was published in Vienna as the basis for translating the Austrian official gazette (Germ. *Reichsgesetzblatt*, Sln. *Državni zakonik*). Cigale wrote the Slovenian foreword for this dictionary and edited most of its Slovenian

Figure 22: The only known photo of Matej Cigale.

Figure 23: A drawing of Matej Cigale in the newspaper *Slovan* (1887).

material. He sought to use terms that would be readily understood in all the Austrian crown lands where ethnic Slovenians lived. That same year, he also translated the Austrian penal code (Germ. *Strafgesetz*) into Slovenian (*Kazenska postava*) in addition to the civil code (*Allgemeines bürgerliches Gesetzbuch für die gesammten Deutschen Erbländer der Oesterreichischen Monarchie* / *Občni deržavljanski zakonik za vse nemške dedne dežele avstrijskega cesarstva*), which was published in three parts comprising 668 pages. In 1887, he produced a new translation of the civil code based on the terminology used in *Državni zakonik*. His translations laid the foundations for modern Slovenian legal terminology and influenced the development of terminology in other disciplines.

Cigale's most important lexicographical work was his two-volume German–Slovenian dictionary (*Deutsch-slovenisches Wörterbuch*) published in Ljubljana in 1860. It comprised 2,025 pages with 103,000 German headwords. It also included an appendix with German–Slovenian lists of male and female names, historical figures, and Slovenian and foreign geographical names. In 1880, he produced the dictionary titled *Znanstvena terminologija s posebnim ozirom na srednja učilišča / Deutsch-slovenische wissenschaftliche Terminologie* (Technical Terminology with Special Reference to Secondary Schools / German-Slovenian Technical Terminology), which was also published in Ljubljana and featured the terminology of twenty-four disciplines.

Cigale also helped produce school textbooks. In 1859, he simply added Slovenian terms in parentheses to the German text in *Lehrbuch der Physik für Unterrealschulen* (Physics Textbook for Secondary Schools) by Franz Josef Pisko (1827–1888). In 1861, he translated the geographical textbook on Austria and its crown lands into Slovenian. He also served as advisor for the second edition of Anton Janežič's (1828–1869) *Slovenska slovnica za domačo in šolsko rabo* (Slovenian Grammar for School and Home Use), which was published in 1863 and became the most important Slovenian grammar in the second half of the nineteenth century. In 1885, he wrote a German grammar for the first grade of primary school, followed by one for the second and third grades in 1886 (Atelšek 2022).

MILAN OROŽEN ADAMIČ

Figure 24: In 1894, the residents of Črni Vrh erected a monument to Matej Cigale, who came from the area.

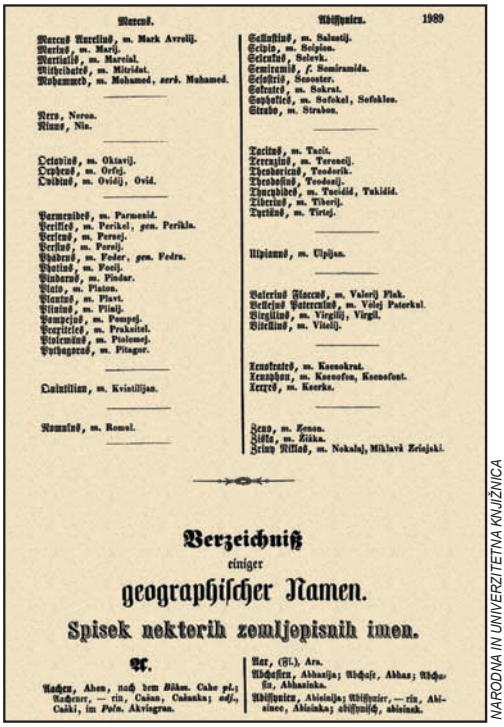
MILAN OROŽEN ADAMIČ

Figure 25: In 1894, a plaque commemorating Matej Cigale was installed on the house where he was born.

Outstanding was also Cigale's work in geography, especially in relation to textbooks, maps, and geographical names. In 1860, he published the aforementioned appendix with geographical names in his German–Slovenian dictionary (Figure 26). It includes twenty-four pages from pages 1989 to 2012 (Cigale 1860) and 2,175 German headwords, for which he provided the corresponding Slovenian endonyms (e.g., *Laibach/Ljubljana*) and exonyms (e.g., *Deutschland/Nemčija*). To some names, he also added demonyms in the singular male and female forms and the corresponding adjectives (e.g., *Deutscher/Nemec*, *Deutsche/Nemka*, *Deutsch/nemšk*).

In 1861, Cigale translated the geographical textbook *Österreich und seine Kronländer: ein geographischer Versuch* / *Kratek popis cesarstva avstrijanskega sploh in njegovih dežel posebej* (Austria and its Crown Lands: A Geographical Overview / A Brief Inventory of the Austrian Empire in General and its Crown Lands in Particular, Figure 27), written by Ludwig Heufler (1817–1885), comprising four hundred pages (Heufler 1861), followed by the textbook *Grundzüge der allgemeinen Erdkunde* / *Početni nauk o zemljepisu* (Basics of General Geography) in 1863, which was, however, never published (Žigon et al. 2017).

In 1865, Cigale arranged the geographical names and terminology for the textbook *Vévodství Korutany a Krajina v geograficko-statistickém i historickém přehledu* (The Duchy of Carinthia and Carniola in a Geographical-Statistical and Historical Overview), written by the Czech geographer and statistician Josef Erben (1830–1908) and translated by France Rebec (1841 – after 1887). It was published in two parts a year later: the first part was entitled *Vojvodstvo Koroško v zemljepisnem, statističnem in zgodovinskem spregledu* (The Duchy of Carinthia from a Geographical, Statistical, and Historical Perspective; Figure 28) and it contained sixty-nine pages (Erben 1866a), and the second part was entitled *Vojvodstvo Kranjsko v zemljepisnem, statističnem in zgodovinskem spregledu* (The Duchy of Carniola from a Geographical, Statistical, and Historical Perspective) and it contained eighty-six pages (Erben 1866b).



Verzeichniß
einiger
geographischer Namen.
Spisek nekterih zemljepisnih imen.

Figure 26: First page of the appendix featuring geographical names in the 1860 German–Slovenian dictionary.

Kratek popis
Cesarstva Avstrijanskega
sploh
in njegovih dežel
posebej.

Za niže gimnazije in niže realne šole.

Sostavil
Ludovik vitez Heufler.

Poslovenil
M. Cigale.

(Z medorezom na čelu).

Ta knjiga velja vezana s platnenim herbtom 85 novih krajcarjev.

Na Dunaju.
V c. kr. zalogi šolskih bukev.
1861.

Figure 27: Title page of Cigale's translation of the geographical textbook on Austrian crown lands published in 1861.

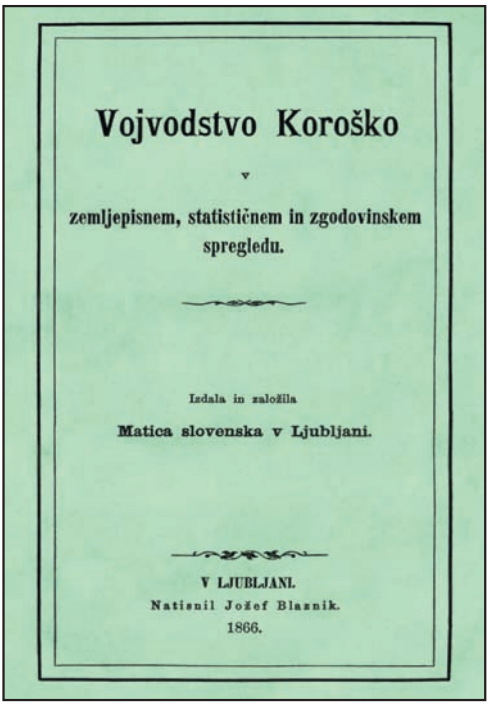


Figure 28: Title page of the 1866 textbook on Carinthia.

4.2 *Atlant*

Cigale's most important geographical work was *Atlant* (Atlas), which was published in individual sheets from 1869 to 1877. Relevant for its creation were primarily the conditions under which Slovenians lived in the second half of the nineteenth century, and the status of their native language. Ever since the early Middle Ages, Slovenians had not been politically united in a nation state. Until the revolutionary year of 1848, the Slovenian national movement largely had a cultural character. In 1848, Slovenians formulated the United Slovenia political program in Vienna, in which, first and foremost, they requested that all ethnic Slovenian territories be united within a kingdom of Slovenia through an administrative reorganization of the Austrian Empire, that Slovenian become equal to German in all areas, and that a Slovenian university be established.

Their program was cartographically supported by *Zemljovid slovenske dežele in pokrajin* (Map of the Slovenian Land and Its Regions) published by the lawyer, geographer, and politician Peter Kosler (1824–1879), a Gottschee German by birth. He drew the ethnic Slovenian border on the map, explaining the grounds for it in an accompanying booklet. Even though the map was already printed in 1853, it was only released in 1861 because censorship prevented it from being published based on the fact that it depicted a non-existing political entity (Orožen Adamič and Urbanc 2005b).

In 1861, when Franz Joseph I reorganized the Austrian half of the monarchy through the February Patent, reading rooms began to be established, where ethnically conscious Slovenians from all classes gathered and held plays, concerts, talks, parties, and balls. The reading rooms became the center of Slovenian cultural and political activities (Orožen Adamič and Urbanc 2005b). The first ones were founded in 1861 in Trieste, Maribor, Ljubljana, and Celje, totaling fifty-seven by 1869, when the first three maps of Cigale's *Atlant* were published. Slovenian ethnic identity was promoted by new newspapers and newly founded societies. In addition, connections between Slovenian provinces and the center of the monarchy were boosted by the newly constructed railroad between Vienna and Trieste, which reached Ljubljana in 1849 and Trieste in 1857.

The main association in charge of printing demanding works from a variety of areas, developing Slovenian terminology, and raising Slovenian cultural awareness was the Slovenian Association (*Slovenska matica* or simply *Matica*; initially *Matica slovenska*). It was established in 1864 through voluntary contributions from intellectuals and businessmen, including a generous donation of five hundred guldens (or 50,000 kreuzers) from Emperor Franz Joseph. For comparison, a mug of beer at that time cost twelve kreuzers and an egg cost two (Orožen Adamič and Urbanc 2005b). The Slovenian Association tried to connect the ethnic Slovenian territories as much as possible, and to transcend the division of Slovenians into provinces.

As early as 1867 – that is, only three years after its inception – the Slovenian Association decided to publish *Atlant*, which indicates how important it thought it was to also deliver the first world atlas in Slovenian to Slovenians. It planned to publish one fascicle with a few maps per year. The following year it held unsuccessful negotiations with printing houses in Olomouc, Bohemia, and in Hildburghausen and Gotha, Germany. At Cigale's proposal, it ultimately selected the printing house of the Köke Lithography Institute (*Lithographische Anstalt Köke*) in Vienna, whose owner, Friedrich Köke (1823–1882), demanded 565 guldens for the first fascicle, 270 of which (i.e., nearly half) he requested for the map of Austria alone. Between 1866 and 1872 (i.e., when the first three fascicles of *Atlant* were printed), his nephew Gustav Freytag (1852–1938) worked for him as a lithography apprentice. Freitag later became a well-known German-Austrian cartographer and publisher, and the cofounder of the Freytag & Berndt Cartographic Institute (*Kartografische Anstalt Freytag & Berndt*), which by the early twentieth century grew into one of the most important cartographic publishers in Europe and still operates in Vienna today (Orožen Adamič and Urbanc 2005b).

The atlas was published for nine years in fascicles of three maps each. The fascicles were numbered with Roman numerals from I to VI. The first three were printed in 2,000 copies each, and the fourth, fifth, and sixth in 3,000 copies each, which was only slightly more than the number of members of the Slovenian Association. For example, when the first fascicle was published in 1869, the association had 1,633 members. The cost of producing an individual fascicle ranged from 1,000 to 1,200 guldens, and Cigale was paid between 170 and 200 guldens per fascicle for his work, which covered everything from translation to printing supervision (Orožen Adamič and Urbanc 2005b).

The atlas was 38 × 24 cm in size, with individual sheets measuring 38 × 48 cm. The first fascicle, published in December 1869, included the following maps:

- Face of the Entire Earth in Hemispheres (*Obraz cele Zemlje v polutah*) at a scale of 1:120,000,000 (the scale is not provided on the map; 26 × 36 cm),
- A 1:18,000,000 map of Europe (30 × 38 cm) and
- A 1:3,300,000 map of Austria (33 × 42 cm).

The second fascicle, published in January 1871, comprised the following:

- A 1:30,000,000 map of Asia (34 × 42 cm);
- A 1:30,000,000 map of North America (34 × 42 cm); and
- A 1:30,000,000 map of South America (34 × 42 cm).

The third fascicle was published in February 1872, and it included the following:

- A 1:25,000,000 map of Africa (the scale is not provided on the map; 34 × 43 cm);
- A 1:30,000,000 map of Australia (the scale is not provided on the map; 34 × 44 cm); and
- A 1:9,600,000 map of Russia (34 × 41 cm).

The fourth fascicle, published in August 1874, included:

- A 1:3,800,000 map of the German Empire (33 × 43 cm);
- A 1:3,300,000 map of Italy (34 × 42 cm); and
- A 1:4,000,000 map of Turkey and other eastern lands (the scale is not provided on the map; 34 × 41 cm).

The fifth fascicle was published in December 1875, and it included:

- A 1:3,800,000 map of Great Britain and Ireland (33 × 41 cm);
- A 1:3,200,000 map of France (the scale is not provided on the map; 33 × 43 cm); and
- A 1:5,300,000 map of Scandinavia (33 × 41 cm).

The last fascicle was published in December 1877, and it included the following maps:

- A 1:800,000 map of Switzerland (29 × 44 cm);
- A 1:3,000,000 map of Spain and Portugal (33 × 42 cm); and
- A 1:1,200,000 map of the Netherlands and Belgium (31 × 40 cm).

The map of Austria (Figure 29) is a typical example of how the maps in the atlas were cartographically outfitted. The legend (Figure 30) contains the map's title, along with a numerical scale and two graphic

scales (in German geographical miles to the left and in Austrian miles to the right) below it. Provided below the scales are the symbols and labels for towns based on the size of their population, and the symbols for roads, railways, and various types of borders.

Hachures – a method perfected in 1799 by the Saxon cartographer Johann Georg Lehmann (1765–1811) – are used to represent relief. The thickness and length of the strokes indicate the slope, and their orientation and distribution communicate specific shapes of terrain (Perko 2001). Seas and lakes are blue, and rivers are black.

Land outside Austria, which had been renamed Austria-Hungary two years before the map was published, is depicted in black and white, and land inside the empire is represented in color (e.g., Carinthia in brown, Styria in light green, Carniola in dark green, and the Littoral in yellow; Figure 31). All geographical names in Carniola and the Littoral are Slovenian. They are also all Slovenian in Carinthia, except one that is provided in German, and in Styria half of the names are Slovenian and half are German. Outside the provinces populated by ethnic Slovenians, both within and outside the empire, the names of major towns are provided in Slovenian (e.g., *Mnihov* for Munich, *Karlovec* for Karlovac, *Osek* for Osijek, *Zader* for Zadar, and *Belgrad* for Belgrade), as are the names of major lakes (e.g., *Blatno jezero* for Lake Balaton, *Nežidersko jezero* for Lake Neusiedl (Germ. *Neusiedler See*, Hung. *Fertő*), and *Skadersko jezero* for Lake Skadar (SCr. *Skadarsko jezero*, Alb. *Liqeni i Shkodrës*)) and rivers (e.g., *Ina* for the Inn, *Naba* for the Naab, and *Adiža* for the Adige). Some of these exonyms are practically no longer used today (e.g., *Mnihov*, *Zader*, *Belgrad*, *Ina*, and *Naba*).

The map features a degree grid with marked latitudes and longitudes, measured from the Ferro meridian. *Ferro* is the French name for El Hierro, the westernmost of the Canary Islands, also referred to as the Meridian Island.

An interesting feature is the addition in the upper right corner of the map (Figure 32), where Cigale provided instructions on how Slovenian readers should read specific letters or their combinations in Hungarian names (e.g., *zs* as *ž*, *ly* as *lj*, and *gy* as *dž* or *gj*). Cigale provided similar instructions on other maps, such as instructions on how to pronounce the Italian, French, Spanish, Portuguese, Dutch, English, Scandinavian, and Russian geographical names.

The label *Založila in izdala Matica Slovenska* (Published and issued by the Slovenian Association) appears in the left corner below the map, along with the label *Vrezal na kamen in tiskal F. Köke na Dunaji* (Etched on stone and printed by F. Köke in Vienna) in the right corner. The label on the right thus reveals that *Atlant*'s maps were printed using lithography, a technique invented in 1796 by the Bavarian Alois Senefelder (1771–1834), who used limestone plates for printing. Lithography is a printing procedure in which an image is drawn with a greasy substance onto the surface of a smooth stone plate. The ink from the roller sticks only to the oil-based drawing and so, when the plate and paper are run through a press, only the drawing is printed onto the paper. Various chemical substances are used to improve the quality of the printed image. Great progress was achieved through this technique because, compared to copper engraving, which Orteli's and Mercator's world atlases were based on, and woodcut, it made printing cheaper and faster, while also making color printing easier. Specifically, it made it possible to apply various colored areas in a drawing onto separate stone plates and print them on the same sheet of paper. Stone plates were used to print maps until the mid-twentieth century, which means that Cigale's atlas was printed in what was the most state-of-the-art technique at the time, but it was also comparable to other atlases of that time in terms of cartographic quality (Fridl 2005).

The Slovenian Association distributed the maps to its members together with other books, but they were also available for general sale. Each fascicle of three maps cost one gulden and five kreuzers. In 1871, the association considered reprinting the atlas in five hundred copies. Even though, according to the stock inventory, only 2,132 individual maps of the total of 27,000 printed as part of the first four fascicles were still available in 1876, and even though by 1880 the first fascicle had already run out, the atlas was never reprinted (Orožen Adamič and Urbanc 2005a).

After all the fascicles had been published, the Slovenian Association never printed the title page or bound the maps into a single volume. Therefore, individual sheets were often lost, and so the complete sets of all eighteen maps have rarely been preserved and the atlas has nearly fallen into oblivion. Two complete sets

Figure 29: The reduced-scale map of Austria in Cigale's atlas was published in 1869 (at a scale of 1:3,300,000). ► p. 118–119


JADRANSKO MORJE
Tirensko morje
Založila in izdala Matica Slovenska.

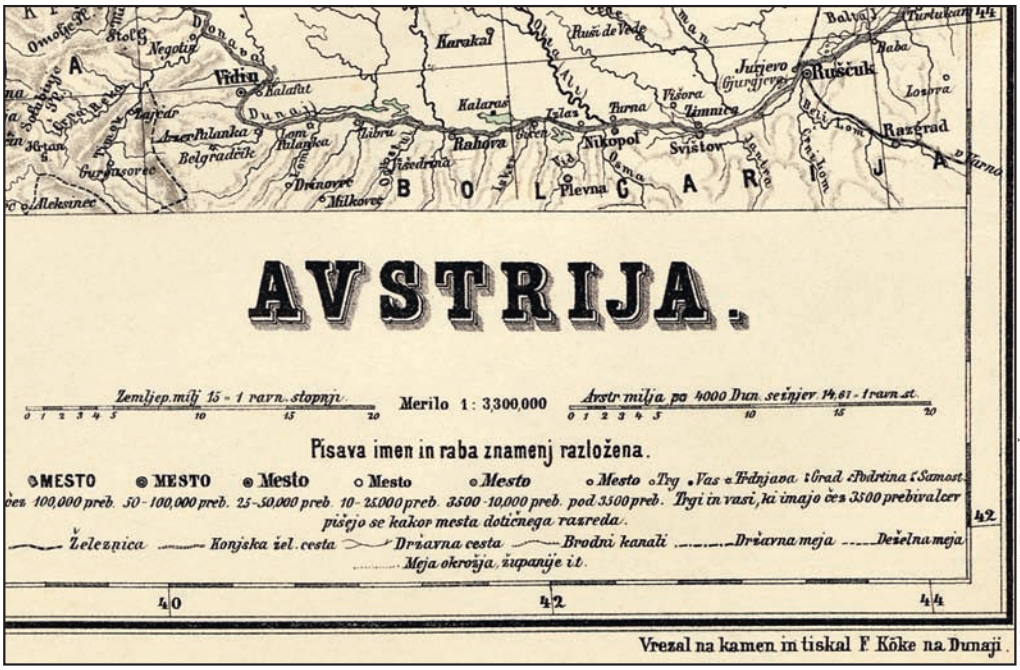


Figure 30: Lower right corner of the map of Austria featuring the legend and information conveying that the map was printed by F. Köke.

Figure 31: Detail from the map of Austria, showing the Slovenian-inhabited provinces of Carniola, Carinthia, Carniola, and the Littoral. ➤ p. 121

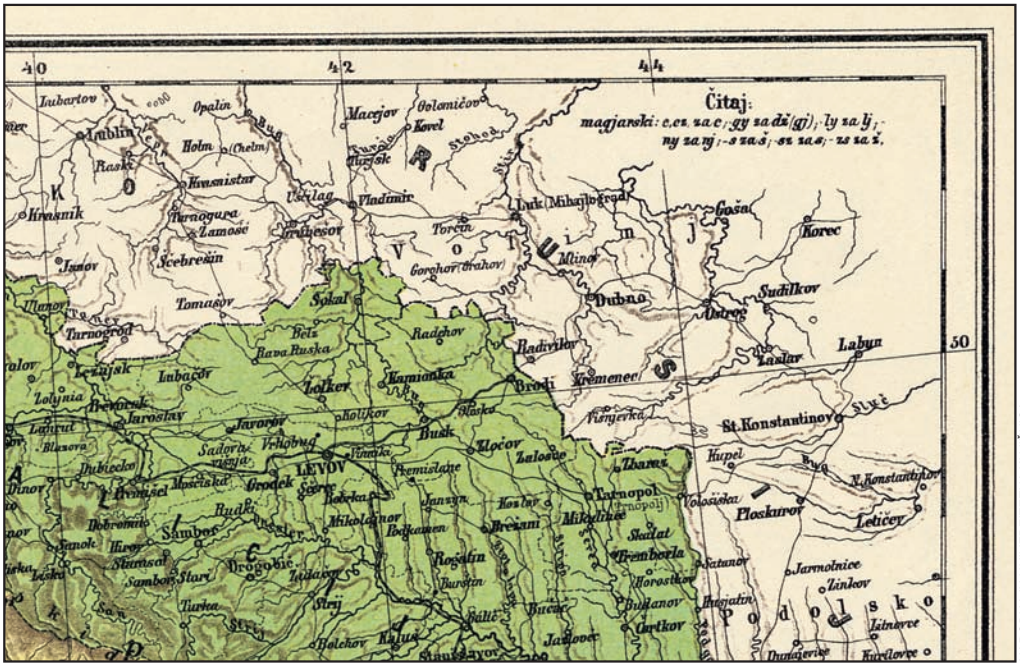


Figure 32: Upper right corner of the map of Austria with added instructions on how to properly pronounce Hungarian letters.

are held by the National and University Library in Ljubljana, and one is held by the Geographical Museum at the ZRC SAZU Geographical Institute. The full set discovered by Milan Orožen Adamič (1946–2018) among his great-aunt's estate (Orožen Adamič 2005) provided the impetus for publishing a facsimile. One of the sets held by the National and University Library was used as the basis for preparing the 2005 facsimile edition of the atlas because it is the best preserved of all the remaining known copies.

4.3 *Atlant*'s facsimile

A facsimile edition of *Atlant* was published in 2005 by the Anton Melik Geographical Institute of the Slovenian Academy of Sciences and Arts' Research Center to mark its sixtieth anniversary (Fridl et al. 2005). The institute presented it to the professional community and the press on September 28th, 2005, at its Geographical Museum in Ljubljana, where it also launched an exhibition dedicated to the atlas and Matej Cigale.

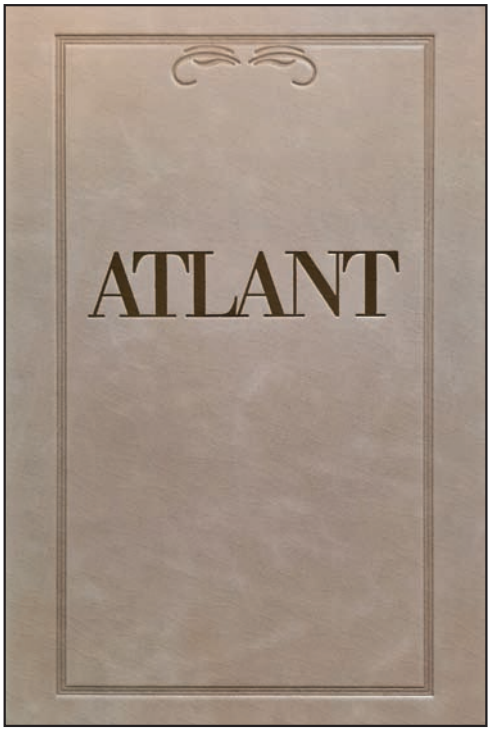
The facsimile is composed of three parts:

- A color facsimile of all eighteen maps (379 × 482 mm) folded in half (379 × 241 mm);
- An accompanying ninety-six-page volume (381 × 245 mm); and
- A cardboard case (402 × 260 mm) for the folded maps and the accompanying volume; ten cases were leather-bound (Figure 33).

The accompanying volume is also composed of three parts.

The three introductory pages are followed by seven two-page chapters:

- *Zemljevid in atlas, kartografija in geografija: od okostja do vezja* (A Map and an Atlas, Cartography and Geography: From a Framework to Connections; Perko 2005b);
- *Politična in družbena podoba druge polovice 19. stoletja: dom in svet Cigaletovega Atlanta* (Politics and Society of the Second Half of the Nineteenth Century: The Home and World of Cigale's *Atlant*; Šumrada 2005);



DRAGO PERKO

Figure 33: Cover of the 2005 leather-bound facsimile of Cigale's *Atlant*.

- *Okoliščine nastanka Atlanta: od zamisli zanesenjakov do knjižnih polic narodno zavednih Slovencev* (The Circumstances Surrounding *Atlant*'s creation: From Enthusiasts' Ideas to the Bookshelves of Ethnically Conscious Slovenians; Orožen Adamič and Urbanc 2005b);
- *Matej Cigale 1819–1889: Petričev dohtar* (Matej Cigale, 1819–1889: Doc Petrič; Urbanc 2005);
- *Kartografska podoba zemljevidov 19. stoletja: vrezal na kamen in tiskal* (The Cartographic Character of Nineteenth-Century Maps: Etched on Stone and Printed; Fridl 2005);
- *Zemljepisna imena v Atlantu in njihov pomen za sodobno imenoslovje: gora Balkan se imenuje bolgarski Stara planina* (Geographical Names in *Atlant* and Their Significance for Modern Onomastics: In Bulgarian the Balkans Are the Old Mountains; Kladnik 2005);
- *Odzivi na Atlant in njegovo mesto v slovenski geografski literaturi: od ene strani hudo grajane, od druge pa toplo hvaljene* (*Atlant*'s Reception and Its Place in Slovenian Geographical Literature: Strongly Criticized on the One Hand and Highly Praised on the Other; Orožen Adamič and Urbanc 2005a).

This is followed by a set of black-and-white reproductions of the maps (thirty-six pages). The maps are numbered, with the number printed above the upper left corner of each map. The coordinates A, B, C, and so on and 1, 2, 3, and so on are added along the edges; they formed the basis for compiling the gazetteer of geographical names appearing on the maps. The accompanying volume concludes with a forty-three-page index of all geographical names in the atlas. They are listed in alphabetical order, in full forms, and they are printed in bold. Each geographical name is followed by a label in italics, indicating its type. There are seventeen types altogether (e.g., continent, country, settlement, natural landscape, and landform). To find a geographical name on the map more easily, the map number (and a lower-case letter for smaller maps included on larger maps) is provided with each name, followed by a quadrant label after a slash, consisting of a letter and number. The quadrant grid is made up of the meridians and parallels drawn on the map. If a geographical name appears on several maps, it comes with the corresponding number of quadrant labels.

For example, this is how the Soča River is listed in the index: **Soča**, *kopenski hidronim*, 3/C3; 10/N11. This means that the Soča River is defined as a land hydronym (*kopenski hidronim*) and that its name appears twice: on map no. 3 (i.e., the map of Austria), in quadrant C3, and on map no. 10 (i.e., the map of the German Empire), in quadrant N11.

In producing the facsimile, the compilation of this index took the longest. The atlas contains a total of 28,075 instances of names (or tokens), but, because many names appear more than once, the actual number of different names (or types) listed in the index is 22,233, of which 4,651 or 20.9% are Slovenianized.

The largest number of names (2,298) appear on the map of Austria, followed by four other maps that include over 2,000 names: the Netherlands and Belgium, France, Turkey and other eastern lands, and the German Empire. The maps of South America and North America contain the fewest names (636 and 791, respectively; Kladnik 2005).

The largest share of Slovenianized geographical names in general appear on the maps of the continents. This share is the highest on the maps of North America (45.3%) and Europe (44.7%), and the smallest on the map of South America (19.8%). The largest share of Slovenianized names overall (56.5%) appears on the map Face of the Entire Earth in Hemispheres and the smallest share overall (2.0%) appears on the map of Spain and Portugal (Kladnik 2005).

It remains unclear which atlases Cigale used as the basis for his atlas. A comparison of the maps of the hemispheres, Europe, and Austria in *Atlant* against the same three maps in the world atlases that were published up to one hundred years before *Atlant* (i.e., from 1770 to 1869) and are available online did not reveal an evident source.

Based on the geographical names used, it can be concluded that Cigale modeled his work on Czech and German (Austrian) atlases because he Slovenianized several names following the Czech example – for instance, *Mnihov* (Cz. *Mnichov*, Germ. *München* 'Munich'), *Moguč* (Cz. *Mohuč*, Germ. *Mainz*), and *Bazileja* (Cz. *Bazslej*, Germ. *Basel*) – or the German model – for example, *Lutih* (Germ. *Lüttich*, Fr. *Liège*, Du. *Luik*) – or he simply used the Czech and German names – for example, *Jakin* (Cz. *Jakin*, Ital. *Ancona*), *Tiflis* (Germ. *Tiflis*, Georg. *Tbilisi*), or *Oporto* (Germ. *Oporto*, Port. *Porto*). Cigale also Slovenianized several names outside the Slavic-speaking world, such as *Kraljevec* (Germ. *Königsberg*, now *Kaliningrad*), *Branibor* (Germ. *Brandenburg*), *Devin* (Germ. *Magdeburg*), and *Kraljevo* (Rom. *Craiova*), which demonstrates the strong influence of the pan-Slavic movement (Kladnik 2005).

5 The importance and evaluation of *Atlant*

Even though *Atlant*, as the first Slovenian world atlas, was a pioneering work and an exceptional promoter of Slovenian identity and the development of Slovenian as a native language, its received very little coverage. The newspaper *Novice* reported in 1872 that the Slovenian Association had published three »attractive« maps, and in 1878 that the Slovenian Association commended Cigale for his »beautiful« maps and thanked him for nine years of effort and high-quality work (Orožen Adamič and Urbanc 2005a).

The first proper review was only published in 1925, when Slovenian was no longer under such a threat. In the opening article on the development of geography published in the first issue of *Geografski vestnik*, Valter Bohinec (1898–1984) wrote that *Atlant* had contributed to the development of Slovenian geographical names, but that it had not introduced any new features in the cartographic and methodological sense (Bohinec 1925).

In 1964, Silvo Kranjec (1892–1976) described the history of *Atlant's* creation in detail in the chapter *Geografija* (Geography) in the volume *Slovenska matica 1864–1964* (Kranjec 1964). He concluded that the maps' content focused excessively on political elements, while neglecting physical and human elements. He believed that Cigale went too far in Slovenianizing geographical names, but he nonetheless confirmed that *Atlant* was a great achievement, especially compared to similar cartographic works produced by other Slavs in Austria-Hungary at that time.

Atlant was also overlooked by the extensive volume *Atlantes Austriaci* published in 1995, which provides the most comprehensive overview of all cartographic publications in the former and present territory of Austria and depictions of this territory (Dörflinger and Hühnel 1995). The volume, does, however, mention all the editions and language versions of the school atlas by the Slovenian geographer and cartographer Blasius Kozenn (1821–1871), as well as some Czech and Hungarian world atlases from that period (Orožen Adamič and Urbanc 2005a).

Atlant was also mentioned by Branko Korošec (1927–1999) in his book on cartography (Korošec 1978), as well as in volume 1 of *Enciklopedija Slovenije* (1987) under the entry *Atlas*, but with only one sentence.

In turn, the publication of *Atlant*'s facsimile was covered twice by *Geografski vestnik*. In the first issue of volume 77, published in 2005, this journal presented *Atlant* and its facsimile edition (Rojc 2005), and in the second issue of the same volume it reported on the opening of the exhibition on *Atlant* and Matej Cigale (Perko 2005a). Both articles were distinctly positive, highlighting the versatile importance of the atlas.

It was only with the publication of *Atlant*'s facsimile that Slovenians again became aware of the importance of this atlas and Cigale's work. Moreover, because *Atlant* is not only a collection of maps, but also a reflection of the second half of the nineteenth century and the people from that period, it is important not only for cartography (Fridl and Šolar 2011), but also for disciplines like geography, linguistics, and history, to name just a few.

Maps reflect social, cultural, and political development, political power, and appropriation of land, and they also serve as propaganda material because, due to their visual power, they are generally a very useful medium for communicating information (Fridl and Urbanc 2006).

In evaluating *Atlant*, it is first and foremost vital to highlight the following:

- As the first world atlas published in Slovenian, it became an important part of Slovenian cultural heritage;
- It strengthened Slovenian national identity;
- It was the first to introduce Slovenian maps to schools and influenced the first Slovenian school atlases;
- It also influenced other Slovenian world atlases; and
- It laid the foundations for Slovenian geographical names.

Cigale's *Atlant* has already been presented as an important publication for Slovenian identity, ethnic consciousness, and cultural heritage by several research articles (Kladnik et al. 2006; Fridl and Urbanc 2006; Urbanc et al. 2006). Therefore, more attention is given below to a detailed presentation of its geographical significance, especially its role in school atlases, world atlases, and geographical names.

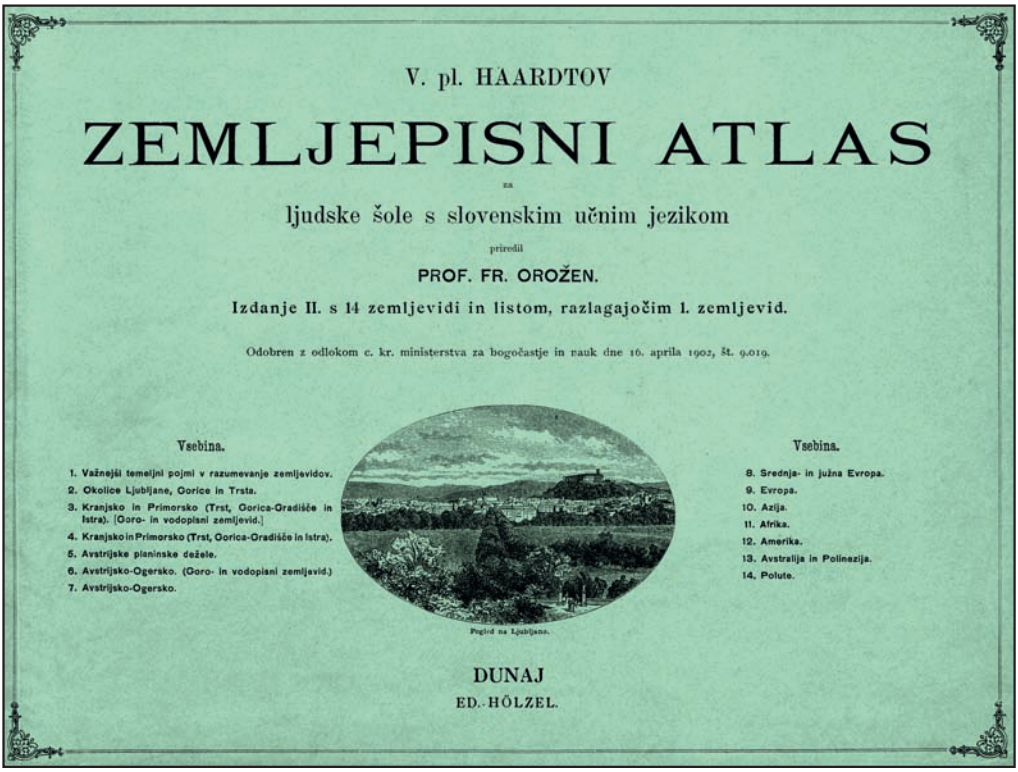
5.1 *Atlant* and Slovenian school atlases

As the first Slovenian world atlas, *Atlant* also partly played the pioneering role of a school atlas (Orožen Adamič and Urbanc 2005a) because, for a quarter of a century, it was the only source that provided Slovenian

maps to Slovenian students and teachers. The first proper Slovenian school atlas, *Zemljepisni atlas za ljudske šole s slovenskim učnim jezikom* (Geographical Atlas for Primary Schools with Slovenian-Language Instruction, Figure 34), was not published until 1899. The maps for this atlas were prepared and printed by the Eduard Hölzel Geographical Institute (*Eduard Hölzel Geographisches Institut*) in Vienna (or, as written on the maps, *Ed. Hölzlov zemljep. zavod na Dunaju*), which from 1877 to 1896 was headed by the Viennese military cartographer Vinzenz Haardt von Hartenthurn (1843–1914). The atlas cites Haardt as the author, and the geographers and historians Simon Rutar (1851–1903) and Fran Orožen (1853–1912) as coeditors. The first edition contained seven maps (Haardt 1899), and the second edition published in 1902, which was edited only by Orožen, featured fourteen maps (Haardt 1902). Orožen kept approximately three-quarters of the exonyms that Cigale had used in *Atlant*.

During the interwar period, Slovenian schools used Croatian adaptations of Kozenn's school atlas. Kozenn produced his first school atlas in 1861. Nearly three hundred editions of his atlases were published in six languages (i.e., German (Figure 35), Czech, Polish, Hungarian, Croatian (Figure 36), and Italian), but never in Slovenian. However, four Croatian editions of the atlas were published between 1934 and 1940, with the introductory pages translated into Slovenian (Bratec Mrvar et al. 2011; Bratec Mrvar and Gašperič 2023).

At the beginning of the Second World War in Yugoslavia (i.e., in 1941), the first extensive Slovenian school atlas, *Zemljepisni atlas za srednje in njim sorodne šole* (Geographical Atlas for Secondary and Similar Schools; Figure 37), was published. It contained fifty-six color maps and 350 black-and-white photographs (Visintin 1941b). It was produced and printed by the De Agostini Geographical Institute (*Istituto Geografico De Agostini*) in Novara, which was headed by the Italian geographer Luigi Visintin (1892–1958) from 1920 to 1958. The atlas lists Visintin as the author, and the Slovenian geographers Valter Bohinec, Ciril Bernot (1900–1961), France Planina (1901–1992), and Roman Savnik (1902–1987) as coeditors. The atlas was reprinted in 1942 and 1948.


V. pl. HAARDTOV

ZEMLJEPISNI ATLAS

za

ljudske šole s slovenskim učnim jezikom

priredil

PROF. FR. OROŽEN.

Izdanje II. s 14 zemljevidi in listom, razlagajočim I. zemljevid.

Odobren z odlokom c. kr. ministerstva za bogočastje in nauk dne 16. aprila 1902, št. 9.019.

Vsebina.

1. Važnejši temeljni pojmi v razumevanje zemljevidov.
2. Okolice Ljubljane, Gorice in Trsta.
3. Kranjsko in Primorsko (Trst, Gorica-Gradišče in Istra). [Goro- in vodopisni zemljevid.]
4. Kranjsko in Primorsko (Trst, Gorica-Gradišče in Istra).
5. Avstrijske planinske dežele.
6. Avstrijsko-Ogersko. (Goro- in vodopisni zemljevid.)
7. Avstrijsko-Ogersko.

Pogled na Ljubljano.

Vsebina.

8. Srednja- in južna Evropa.
9. Evropa.
10. Azija.
11. Afrika.
12. Amerika.
13. Avstralija in Polinezija.
14. Polute.

DUNAJ

ED. HÖLZEL.

ZEMLJEPISNI MUZEJ GIAM ZRC SAZU

Figure 34: Title page of the 1902 edition of the school atlas, translated and edited by Fran Orožen.


B. KOZENN'S
GEOGRAPHISCHER
SCHUL-ATLAS
für
Gymnasien, Real- und Handelsschulen.
Fünfundzwanzigste Auflage.
Gänzlich neu bearbeitet von
VINZENZ VON HAARDT
revidiert von
PROFESSOR Dr. FRIEDRICH UMLAUFT.
Ausgabe in 50 Karten.
WIEN.
EDUARD HÖLZEL'S VERLAG
1880.

Figure 35: Title page of the German edition of Blasius Kozenn's atlas (Kozenn 1880).

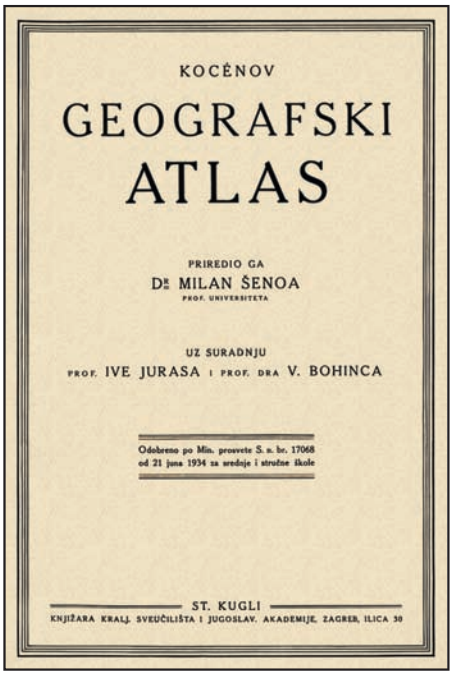

KOCĚNOV
GEOGRAFSKI
ATLAS
PRIREDIO GA
Dr MILAN ŠENOA
PROF. UNIVERSITETA
UZ SURADNJU
PROF. IVE JURASA I PROF. DRA V. BOHINCA
Odobreno po Min. prosvete S. n. br. 17068
od 21 juna 1934 za srednje i stručne škole
ST. KUGLI
KNJIŽARA KRALJ. SVEUČILIŠTA I JUGOSLAV. AKADEMIJE, ZAGREB, ILICA 30

Figure 36: Title page of the Croatian edition of Blasius Kozenn's atlas (Kocen 1934).

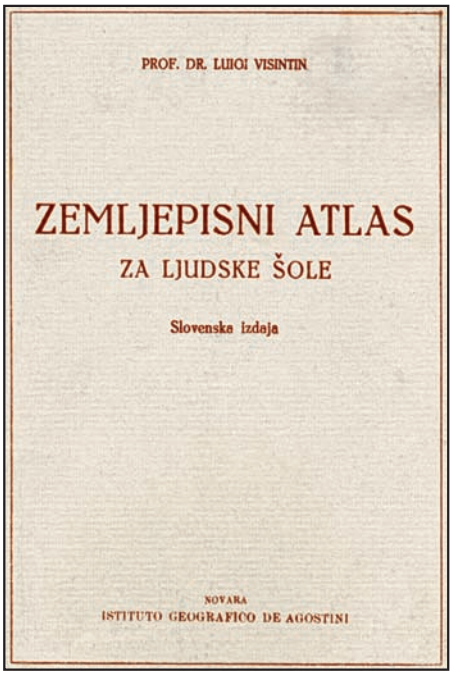

PROF. DR. LUIGI VISINTIN
ZEMLJEPISNI ATLAS
ZA LJUDSKE ŠOLE
Slovenska izdaja
NOVARA
ISTITUTO GEOGRAFICO DE AGOSTINI

Figure 37: Cover of De Agostini's 1941 school atlas, which was adapted by Valter Bohinec et al.

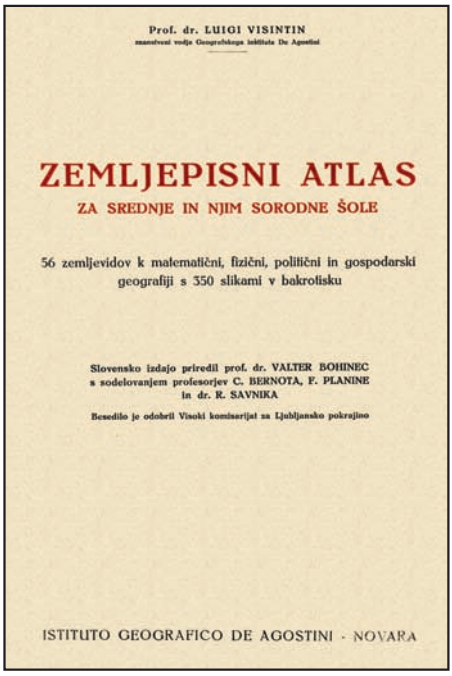

Prof. dr. LUIGI VISINTIN
ZEMLJEPISNI ATLAS
ZA SREDNJE IN NJIM SORODNE ŠOLE
56 zemljevidov k matematični, fizični, politični in gospodarski geografiji s 350 slikami v bakrotisku
Slovensko izdajo priredil prof. dr. VALTER BOHINEC
s sodelovanjem profesorjev C. BERNOTA, F. PLANINE
in dr. R. SAVNIKA
Besedilo je odobril Visoki komisarijat za Ljubljansko pokrajino
ISTITUTO GEOGRAFICO DE AGOSTINI - NOVARA

Figure 38: Cover of De Agostini's 1941 school atlas, which does not provide the names of its translators.

An abridged version of this atlas was published in 1941 and 1942. It was titled *Zemljepisni atlas za ljudske šole* (Geographical Atlas for Primary Schools; Figure 38) and it contained twenty maps and ninety-one photos (Visintin 1941a).

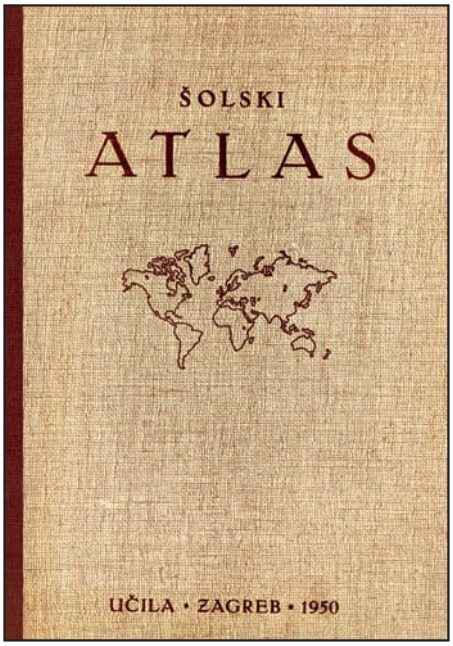
The number of Cigale's exonyms used in this atlas decreased significantly, especially on the maps depicting Italy, which was connected with the Italian annexation of a major part of Slovenia, including Ljubljana, during that time. Thus, only two exonyms, *Benetke* 'Venice' and *Rim* 'Rome', were still used in Italy, and even these two were provided together with the endonyms *Venezia* and *Roma*; the well-established Slovenian endonyms *Trst*, *Gorica*, and *Videm* were absent, and only the Italian names appeared (i.e., *Trieste*, *Gorizia*, and *Udine*). However, it is interesting that Slovenian names on maps depicting Austria did not bother the Italian publisher: on all maps of various scales, the towns of Klagenfurt, Graz, Villach, and Vienna were only provided in Slovenian (i.e., *Celovec*, *Gradec*, *Beljak*, and *Dunaj*).

After the Second World War, when the modern period of Slovenian school atlases began, Valter Bohinec was involved in most of them. The first one was published in 1950, with the simple title *Šolski atlas* (School Atlas; Figure 39). Bohinec translated it and coedited it with the Croatian geographer Josip Roglić (1906–1987). Like Cigale's *Atlant*, it contains folded two-page maps. All ten maps in it are bound into a book with a cover.

Bohinec was among the harshest critics of *Atlant* (Orožen Adamič and Urbanc 2005b). In general, he criticized the geographical names the least, but in the many atlases that he produced he nonetheless refused to use many exonyms introduced by Cigale. He even provided the name for the Croatian town of Rijeka in Croatian only, and the name of the Italian town of Udine in Italian only. Bohinec's atlases practically put an end to the influence of Cigale's *Atlant*.

5.2 *Atlant* and Slovenian world atlases

Despite the deficiencies it was criticized for, *Atlant* was only surpassed in Slovenian by *Veliki atlas sveta* (Great World Atlas) published by Mladinska Knjiga in 1972 (Medved and Ingolič 1972) – that is, over a century



ZEMLJEPISNI MUZEJ GIAM ZRC SAZU

Figure 39: Cover of the school atlas translated and coedited by Valter Bohinec in 1950.

Figure 40: Map of Slovenia in the 1972 *Veliki atlas sveta*. Small-scale maps are provided in color, and most large-scale maps are provided in black-and-white or brown. ► p. 128–129


A V S T R I
ITALIJA
JADRANSKO
MORJE
TRŽAŠKI ZALIV
KARNIŠKE ALPE
KARAVANKE
JULIJSKE ALPE
SAVINJSKE ALPE
KRAS
ISTRA
ČIČARIJA
TRNOVSKI GOZD
KVARNER
KVARNERIĆ
VELEBIT
KAPELA
FRIULI
VENEZIA GIULIA
Villach (Beljak)
Klagenfurt (Celovec)
Wörther See (Vrbsko j.)
Ossiacher See (Osojsko j.)
Millstätter See
Hermagor (Šmohor)
Bleiburg (Pliberk)
Dravograd
Wolfsberg
Völkermarkt (Velikovec)
Eberndorf (Dobrla vas)
Ferlach (Borovlje)
Eisenkappel (Železna Kapla)
Tarvisio (Trbiž)
Kranjska gora
Jesenice
Bled
TRIGLAV 2863
Bohinjsko jez.
Radovljica
Kranj
Tržič
Škofja Loka
Kamnik
Domžale
LJUBLJANA
Vrhnika
Logatec
Idrija
Žiri
Celje
Žalec
Laško
Trbovlje
Hrastnik
Litija
Grosuplje
Trebnje
Novo mesto
Kočevje
Ribnica
Cerknica
Postojna
Pivka
Ilirska Bistrica
Tolmin
Kobarid
Bovec
Kanal
Solkan
Gorizia (Gorica)
Nova Gorica
Ajdovščina
Vipava
Sežana
Divača
Trieste (Trst)
Muggia (Milje)
Koper
Izola
Piran
Portorož
Sečovlje
Umag
Buje
Buzet
Novigrad
Poreč
Rovinj
Pazin
Pula
Medulin
Labin
Opatija
Rijeka
Kastav
Bakar
Kraljevica
Crikvenica
Senj
Delnice
Gorski kotar
Cres
Lošinj
Krk
Rab
Udine (Videm)
Cividale del Friuli (Čedad)
Monfalcone (Tržič)
Aquiléia (Oglej)
Grado (Gradež)
Palmanova
Gradiscia (Gradišče)
Črnomelj
Metlika
Bela krajina
Kolpa
Sava
Drava
Soča
46°
45°
14°
15°

KNJIŽNICA GIAM ZRC SAZU

after *Atlant*. The geographer Jakob Medved (1926–1978) and linguist Janko Moder (1914–2006) were involved as expert advisors in the creation of this first Slovenian general world atlas in the twentieth century. Moder made a significant contribution to geographical onomastics with a valuable article on the orthography and pronunciation of geographical names in the appendix to the atlas (Moder 1972). This atlas is of course much more extensive than *Atlant*, and it is an atlas in the true sense of the word because, in addition to maps of various parts of the world, it also contains a variety of thematic maps, a comprehensive gazetteer, and other content typical of modern atlases. However, this atlas, too, received criticism, especially for its predominant use of black-and-white or brownish large-scale maps, including the 1:1,452,400 map of Slovenia (Figure 40).

Hence, from 1570, when the first world atlas was published, to 1972, Slovenians only obtained two Slovenian world atlases. After Slovenia's independence in 1991, a decade-and-a-half »heyday« of Slovenian atlases started. A translation of De Agostini's world atlas was published in 1992, followed by five more world atlases until 2005, when the last one was published (Hrvatin, Kladnik and Perko 2005). In addition, the extensive *Geografski atlas Slovenije* (Geographical Atlas of Slovenia) was published in 1998 (Figure 41), followed by *Nacionalni atlas Slovenije* (National Atlas of Slovenia) in Slovenian and English in 2001 (Figure 42), and the first Slovenian census atlas in 2007 (*Popisni atlas*; Figure 43). The work *Slovenia in Focus* (Figure 44) was published at the start of Slovenia's EU presidency in 2008. In terms of geographical names, all these atlases, even though they are not world atlases, follow the orientation of Cigale's *Atlant* much more than the school atlases published after the Second World War or the 1972 world atlas.

These high-quality works (Fridl et al. 1998, 2001, 2007; Dolenc et al. 2007) placed Slovenians on an equal footing not only with the »Austrian Slavs,« as Cigale termed them (Cigale 1880), but also much larger nations with a longer literary tradition in their native languages.

However, it is interesting that, for example, the 1:800,000 map of Switzerland in *Atlant* has remained the most accurate and detailed Slovenian map of this central European country to date, even though a variety of Slovenian world atlases have been published since then (Kladnik 2005).

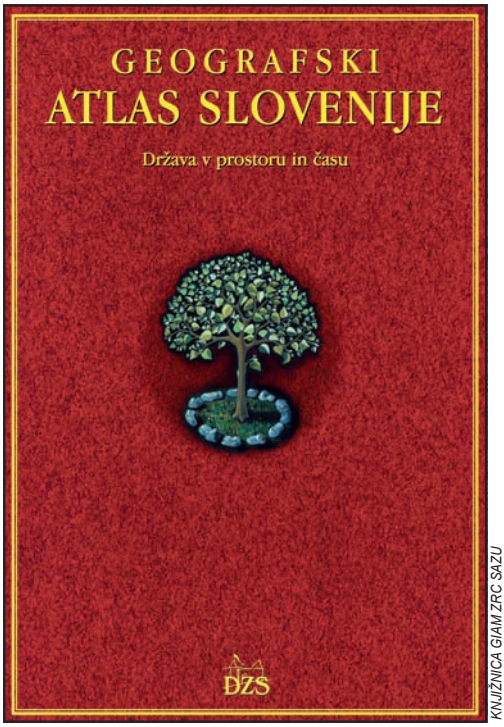


Figure 41: Cover of *Geografski atlas Slovenije* published in 1998.

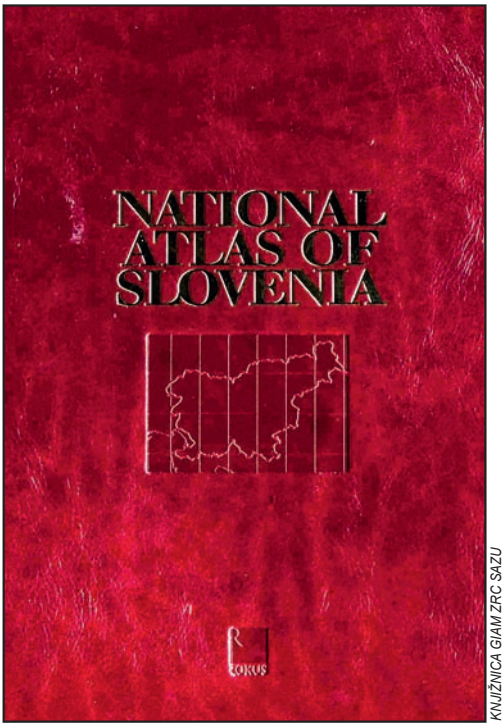


Figure 42: Detail from the cover of the 2001 English edition of *Nacionalni atlas Slovenije*.

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Figure 43: Cover of the first Slovenian census atlas, published in 2007.

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Figure 44: A special atlas was published at the start of Slovenia's EU presidency in 2008.

5.3 *Atlant* and Slovenian geographical names

Atlant's most significant achievement is the use of Slovenian geographical names on its maps. Through this work, Cigale laid the foundations for Slovenian exonyms. He provided many Slovenian and Slovenianized names of foreign geographical features for the first time, and he Slovenianized the names of these features in a planned and critical manner. As a linguist, he took into account linguistic rules when forming the names, and he also made good use of his knowledge of foreign languages.

Prior to Cigale, Slovenian geographical names had only been systematically dealt with by the geographer Janez Jesenko (1838–1908), who recorded the Slovenian names of most major geographical features in his textbook *Zemljepisna začetnica za gimnazije in realke* (An Introduction to Geography for High Schools and Secondary Schools; Figure 45), such as the continents, regions, mountain ranges, mountains, islands, seas, straits, gulfs, lakes, and rivers. He added three tables at the end of the textbook in which he provided the names of the largest towns in Austria, Europe, and beyond (Jesenko 1865).

He provided predominantly Slovenian names for the Austrian towns of that time (e.g., *Benetke* for Venice, Italy, *Dunaj* for Vienna, Austria, *Krakov* for Kraków, Poland, and *Segedin* for Szeged, Hungary), or bilingual names separated with an equals sign (e.g., *Gorica = Görz* (Slovenian–German) for Gorizia, Italy, *Reka = Fiume* (Slovenian–Italian) for Rijeka, Croatia, *Pečuh = Fünfkirchen* (Slovenian–German) for Pécs, Hungary, or *Braševo = Kronstadt* (Slovenian–German) for Braşov, Romania). He also provided bilingual pairs for certain towns in what is now Slovenia; for example, *Maribor = Marburg* (Slovenian–German) or *Koper = Capo d' Istria* (Slovenian–Italian). In contrast, Cigale used only the Slovenian names for all ten of these towns, and they were the same as the ones provided by Jesenko.

In the table with the names of European towns, the names in the languages of the respective country predominate, but a few Slovenian names are also provided (e.g., *Belgrad* for Belgrade, Serbia, *Draždane*


ZEMLJEPISNA ZAČETNICA

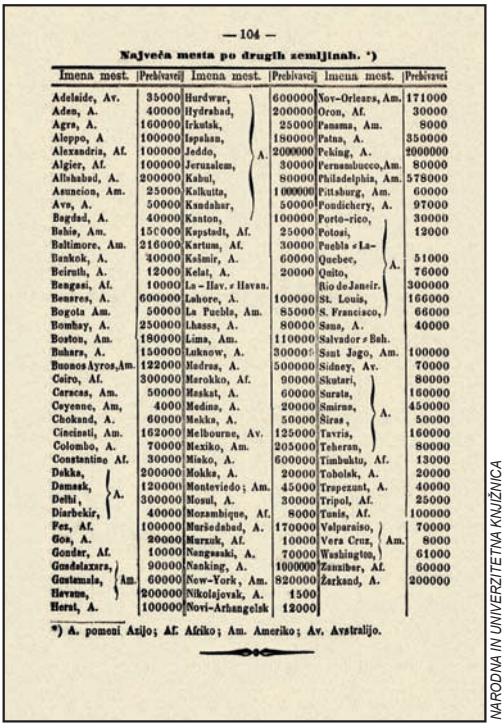
za

gimnazije in realke.

Izdal in založil
JANEZ JESENKO.

V GORICI 1865.
Natisnil Paternolli.

Figure 45: Cover of Janez Jesenko's 1865 textbook *Zemljepisna začetnica za gimnazije in realke*.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Največa mesta po drugih zemljinah. *)

Imena mest.	Prebivavci	Imena mest.	Prebivavci	Imena mest.	Prebivavci
Adelaide, Av.	35000	Hurdwar,	600000	Nov-Orleans, Am.	171000
Aden, A.	40000	Hydrabad,	200000	Oron, Af.	30000
Agra, A.	160000	Irkutsk,	25000	Panama, Am.	8000
Aleppo, A	100000	Ispahan,	180000	Patna, A.	350000
Alexandria, Af.	100000	Jeddo, A.	2000000	Peking, A.	1000000
Algier, Af.	100000	Jeruzalem,	30000	Pernambucco, Am.	80000
Allahabad, A.	200000	Kabul,	80000	Philadelphia, Am.	578000
Asuncion, Am.	25000	Kalkuta,	1000000	Pittsburg, Am.	60000
Ava, A.	50000	Kandahar,	50000	Pondichery, A.	97000
Bagdad, A.	40000	Kanton,	100000	Porto-rico,	30000
Bahia, Am.	150000	Kapstadt, Af.	25000	Potosi,	12000
Baltimore, Am.	216000	Kartum, Af.	30000	Puebla v La-	
Bankok, A.	40000	Kašmir, A.	60000	Quebec, A.	51000
Beiruth, A.	12000	Kelat, A.	20000	Quito,	76000
Bengasi, Af.	10000	La-Hav. v Havan.		Rio de Janeir.	300000
Benares, A.	600000	Lahore, A.	100000	St. Louis,	166000
Bogota Am.	50000	La Puebla, Am.	85000	S. Francisco,	66000
Bombay, A.	250000	Lhasse, A.	80000	Sana, A.	40000
Boston, Am.	180000	Lima, Am.	110000	Salvador v Bah.	
Buhara, A.	150000	Luknow, A.	30000	Sant Jago, Am.	100000
Buonos Ayros, Am.	122000	Madras, A.	500000	Sidney, Av.	70000
Cairo, Af.	300000	Marokko, Af.	90000	Skutari,	80000
Caracas, Am.	50000	Maskat, A.	60000	Surata,	160000
Cayenne, Am,	4000	Medina, A.	20000	Smirna, A.	450000
Chokand, A.	60000	Mekka, A.	50000	Sirac, A.	50000
Cincinati, Am.	162000	Melbourne, Av.	125000	Tavris,	160000
Colombo, A.	70000	Mexiko, Am.	205000	Teheran,	80000
Constantino Af.	30000	Misko, A.	600000	Timbuktu, Af.	13000
Dekka,	200000	Mokka, A.	20000	Tobolsk, A.	20000
Damask, A.	120000	Montevideo; Am.	45000	Trapezunt, A.	40000
Delhi, A.	300000	Mosul, A.	30000	Tripol, Af.	25000
Diarbekir, A.	40000	Mozambique, Af.	8000	Tunis, Af.	100000
Fez, Af.	100000	Muršedabad, A.	170000	Valparaiso,	70000
Goa, A.	20000	Murzuk, Af.	10000	Vera Cruz, Am.	8000
Gondar, Af.	10000	Nangasaki, A.	70000	Washington,	61000
Guadalaxara,	90000	Nanking, A.	1000000	Zanziber, Af.	60000
Gustemala, Am.	60000	New-York, Am.	820000	Žarkand, A.	200000
Havana,	200000	Nikolajevsk, A.	1500		
Herat, A.	100000	Novi-Arhangelsk	12000		

*) A. pomeni Azijo; Af. Afriko; Am. Ameriko; Av. Avstralijo.

Figure 46: Page 104 from Jesenko's geography textbook, containing a table of the names of the largest towns outside Europe.

for Dresden and *Mnihov* for Munich, Germany, *Rim* for Rome, Italy, and *Varšava* for Warsaw, Poland). The first three exonyms are no longer used in Slovenian today, whereas the last two are now standard. Something similar applies to the table with the names of towns outside Europe (Figure 46). It contains only few Slovenian names (e.g., *Nov-Orleans* for New Orleans in the US, which is also no longer used today). There are no bilingual names in these two tables. Cigale used the same names on his maps for the five towns mentioned above, and he used the form *Novi Orleans* instead of *Nov-Orlenas*.

Based on the analysis of geographical names used by Jesenko, it can be concluded that his selection of several hundred geographical names must have been an important source and model for Cigale in creating *Atlant*.

Atlant is an important source for studying Slovenian geographical names, including their foundations. Certain Slovenianized forms of foreign names now sound awkward in Slovenian (Kladnik 2005); for example, the names of certain countries: Cigale referred to Switzerland as *Švajca* (now Sln. *Švica*), China as *Kitaj* (now *Kitajska*), and Japan as *Japonija* (now *Japonska*). In addition, he Slovenianized certain major towns for which only endonyms are used in modern Slovenian (e.g., *Novi Jork* for New York, *Kodanj* for Copenhagen, *Kolin* for Cologne, Germany, *Antverpa* for Antwerp, *Marsilja* for Marseille, *Curih* for Zurich, or *Jakin* for Ancona, Italy).

However, some of his solutions are absolutely remarkable from today's perspective. One of them is the use of the Slovenian common noun *dežela* 'land, country' for a cohesive piece of territory, such as a country, part of it, or a region; for example, *Viktorijina dežela* for Victoria Land or *Wilkezova dežela* for Wilkes Land in Antarctica, *Bafinova dežela* for Baffin Land (now Baffin Island) in Canada, *Washingtonova dežela* for Washington Land in Greenland, *Aleksandrina dežela* for Alexandra Land in Russia, and *Van Diemenova dežela* for Van Diemen's Land (now Tasmania) in Australia. During the period of the pan-Slavic movement and the influence of Russian, and especially later, during the period of Yugoslavia and the influence of Serbo-Croatian, the word *zemlja* predominated over *dežela* until the last decade of the twentieth century, even though the primary meaning of this word in Slovenian is 'soil' or 'upper layer of earth'. The Slovenian term for a foreign country or geographical unit is *tuja dežela* 'foreign land' or *tuja država* 'foreign country', and the Croatian expression is *strana zemlja*.

Cigale used the word *dežela* twenty-eight times, and he only used the word *zemlja* outside Russia in the geographical name *Ognjena zemlja* (Sp. *Tierra del Fuego*). In Russia, he used the word three times (e.g., *Nova Zemlja* for Novaya Zemlya).

Examination of geographical names used in *Atlant* and later atlases makes it possible to follow the changes in Slovenian and in the political situation, which are also associated with chronological changes in the ratio between exonyms and endonyms.

By examining the names of thirty-six major towns in Slovenia's vicinity (Table 2), for which Slovenian exonyms and endonyms are more commonly used in various atlases, it can be established that Cigale used the Slovenian name for as many as thirty-four, or 94% of them. He only kept the original forms of the names for Sarajevo and Kotor, which already sounded »Slovenian« enough. The share of Slovenian names decreased over the years, reaching the lowest value (33%) in the 1972 world atlas, after which it began to increase again. In the latest world atlas, published in 2005, this share was 44%.

Only seven Slovenian names appear in all seven atlases examined. These are *Benetke* 'Venice' and *Rim* 'Rome' in Italy, *Celovec* 'Klagenfurt', *Beljak* 'Villach', and *Dunaj* 'Vienna' in Austria, *Budimpešta* 'Budapest' in Hungary, and *Solun* 'Thessaloniki' in Greece. The names *Trst* 'Trieste' and *Gorica* 'Gorizia' in Italy, *Gradec* 'Graz' in Austria, and *Lvov* 'Lviv' in Ukraine appear six times, and the names *Videm* 'Udine' in Italy and *Monošter* 'Szentgotthárd' in Hungary appear five times. Sarajevo, Bosnia and Herzegovina, and Kotor, Montenegro, are always referred to with their original names.

Figure 47: Reduced-scale map of the southern part of central Europe (at a scale of 1:2,500,000) from the latest Slovenian world atlas (*Veliki atlas sveta*), published in 2005. The geographical names on it are written in full compliance with the recommendations by the United Nations Group of Experts on Geographical Names (UNGEGN), which is why multilingual endonyms are separated with a slash (e.g., the Italian–German endonyms *Bolzano/Bozen* or the Italian–French endonyms *Aosta/Aoste*), and Slovenian exonyms are added to the original names in parentheses: e.g., *Wien (Dunaj)* 'Vienna' or *Roma (Rim)* 'Rome'. The name of Brussels, which is bilingual (French–Flemish) and for which Slovenian uses an exonym, is written as *Bruxelles/Brussel (Bruselj)*. This atlas again contains a substantial number of exonyms (i.e., Slovenian names of foreign geographical features) in the form used by Matej Cigale, which were neglected in the world atlases published after the Second World War (e.g., *Rijeka (Reka)* in Croatia). ► p. 134–135


Srednja Evropa (južni del)
64
62
66
STUTTGART
Strasbourg
Augsburg
MÜNCHEN
Nancy
Mulhouse
Basel
Zürich
Konstanz
Bern
Luzern
Genève (Genève)
Grenoble
TORINO
MILANO
Bergamo
Verona
Padova
Venezia (Benetke)
GENOVA
Bologna
Ravenna
Firenze (Firence)
Livorno
Nice (Nica)
Toulon
Golfo di Genova (Genovski zaliv)
LIGURSKO MORJE
SREDOZEMSKO MORJE
TIRENSKO MORJE
FRANCIJA
ROMA (RIM)
Merilo 1 : 2.500.000
Lambertova konformna stožčna projekcija
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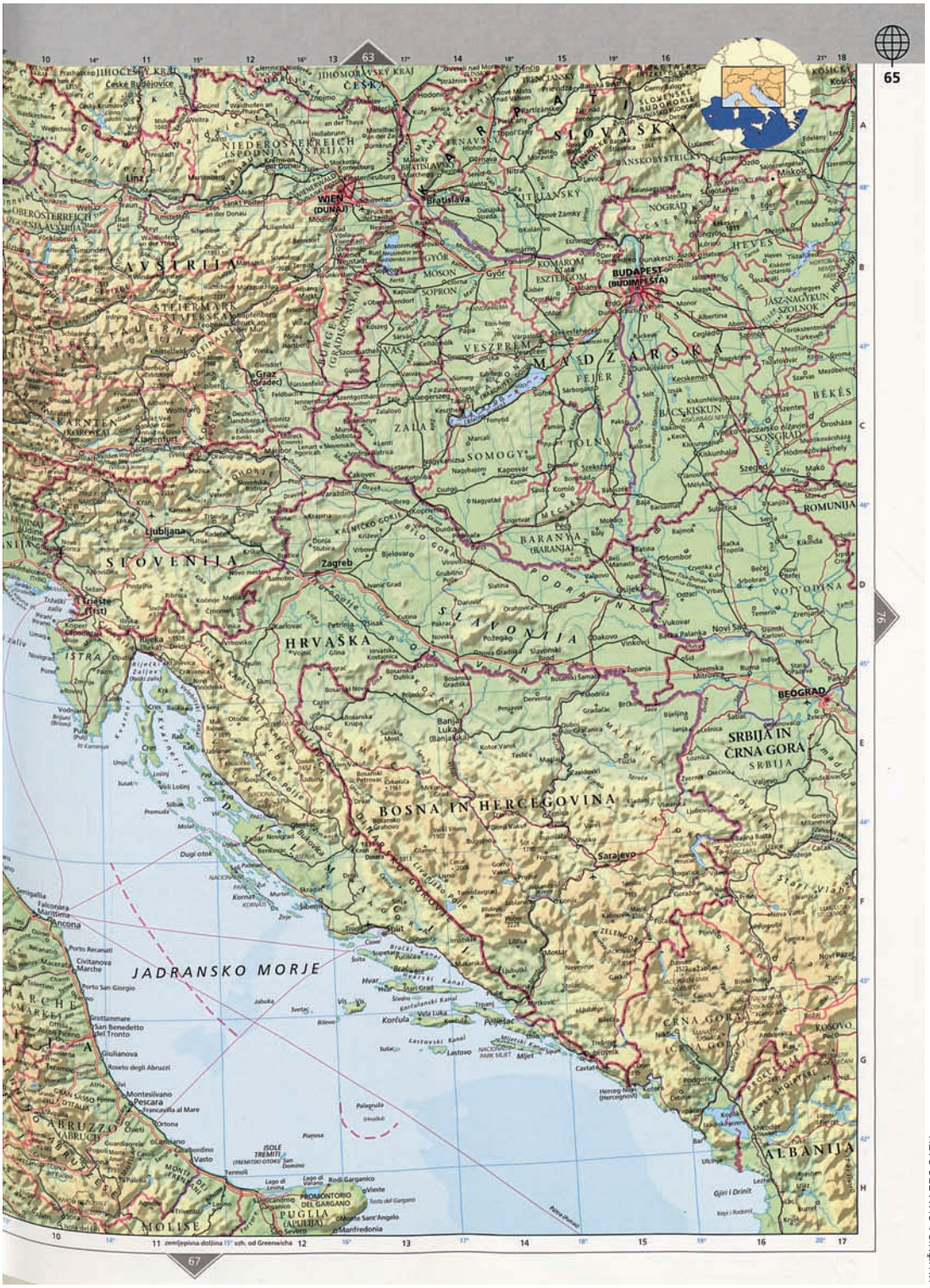

Table 2: Overview of changes in the names of certain major towns in countries close to Slovenia in individual atlases (the name adaptors are provided in parentheses in the first row).

Foreign-language endonym	Country	Endonym language	Cigale 1869–1977 (Cigale)	Haardt 1902 (Orožen)	Visintin 1941 (Bohinec et al.)	Bohinec and Roglić 1950 (Bohinec)	Medved and Ingolič 1972 (Medved, Moder)	De Agostini 1992 (Kladnik et al.)	De Agostini 2005 (Hrvatin, Kladnik, Perko)
Trieste	Italy	Italian	*Trst*	*Trst*	*Trieste*	*Trst*	*Trst*	*Trst*	*Trst*
Gorizia	Italy	Italian	*Gorica*	*Gorica*	*Gorizia*	*Gorica*	*Gorica*	*Gorica*	*Gorica*
Udine	Italy	Italian	*Videm*	*Videm*	*Udine*	*Udine*	*Videm*	*Videm*	*Videm*
Venezia 'Venice'	Italy	Italian	*Benetke*	*Benetke*	*Benetke*	*Benetke*	*Benetke*	*Benetke*	*Benetke*
Roma 'Rome'	Italy	Italian	*Rim*	*Rim*	*Rim*	*Rim*	*Rim*	*Rim*	*Rim*
München 'Munich'	Germany	German	*Mnihov*	*München*	*München*	*München*	*München*	*München*	*München*
Nürnberg 'Nuremberg'	Germany	German	*Norimberk*	*Nürnberg*	*Nürnberg*	–	*Nürnberg*	*Nürnberg*	*Nürnberg*
Chemnitz	Germany	German	*Kamenice*	*Chemnitz*	*Chemnitz*	*Chemnitz*	*Karl-Marx-Stadt*	*Chemnitz*	*Chemnitz*
Dresden	Germany	German	*Draždane*	*Dresden*	*Dresden*	*Dresden*	*Dresden*	*Dresden*	*Dresden*
Leipzig	Germany	German	*Lipsko*	*Leipzig*	*Leipzig*	*Leipzig*	*Leipzig*	*Leipzig*	*Leipzig*
Klagenfurt	Austria	German	*Celovec*	*Celovec*	*Celovec*	*Celovec*	*Celovec*	*Celovec*	*Celovec*
Villach	Austria	German	*Beljak*	*Beljak*	*Beljak*	*Beljak*	*Beljak*	*Beljak*	*Beljak*
Graz	Austria	German	*Gradec*	*Gradec*	*Gradec*	*Gradec*	*Graz*	*Gradec*	*Gradec*
Innsbruck	Austria	German	*Inspruk*	*Innsbruck*	*Innsbruck*	–	*Innsbruck*	*Innsbruck*	*Innsbruck*
Wien 'Vienna'	Austria	German	*Dunaj*	*Dunaj*	*Dunaj*	*Dunaj*	*Dunaj*	*Dunaj*	*Dunaj*
Bern	Switzerland	German	*Berna*	*Bern*	*Bern*	*Bern*	*Bern*	*Bern*	*Bern*
Plzeň 'Pilsen'	Bohemia, Czechia	Czech	*Pelzenj*	*Plzenj*	*Pilsen*	*Plzeň*	*Plzeň*	*Plzeň*	*Plzeň*
Bratislava	Slovakia	Slovak	*Požun*	*Požun*	*Bratislava*	*Bratislava*	*Bratislava*	*Bratislava*	*Bratislava*
Kraków	Poland	Polish	*Krakov*	*Krakov*	*Kraków*	*Kraków*	*Kraków*	*Krakov*	*Krakov*
Pécs	Hungary	Hungarian	*Pečuh*	*Pečuh*	*Pečuh*	*Pécs*	*Pécs*	*Pécs*	*Pécs*
Szeged	Hungary	Hungarian	*Segedin*	*Szegedin*	*Szeged*	*Szeged*	*Szeged*	*Szeged*	*Szeged*
Budapest	Hungary	Hungarian	*Budim, Pešta*	*Buda Pešta*	*Budimpešta*	*Budimpešta*	*Budimpešta*	*Budimpešta*	*Budimpešta*
Győr	Hungary	Hungarian	*Gjur*	*Gjur*	*Györ*	*Györ*	*Győr*	*Győr*	*Győr*
Szentgotthárd	Hungary	Hungarian	*Monostur*	*S. Gotthard*	*Monošter*	–	*Monošter*	*Monošter*	*Monošter*
Osijek	Croatia	Croatian	*Osek*	*Osek*	*Osijek*	*Osijek*	*Osijek*	*Osijek*	*Osijek*
Rijeka	Croatia	Croatian	*Reka*	*Reka*	*Fiume*	*Rijeka*	*Rijeka*	*Reka*	*Reka*
Karlovac	Croatia	Croatian	*Karlovec*	*Karlovec*	*Karlovac*	*Karlovac*	*Karlovac*	*Karlovac*	*Karlovac*
Zadar	Croatia	Croatian	*Zader*	*Zader*	*Zara*	*Zadar*	*Zadar*	*Zadar*	*Zadar*
Dubrovnik	Croatia	Croatian	*Dobrovnik*	*Dubrovnik*	*Dubrovnik*	*Dubrovnik*	*Dubrovnik*	*Dubrovnik*	*Dubrovnik*
Sarajevo	Bosnia and Herzegovina	Bosnian	*Sarajevo*	*Serajevo*	*Sarajevo*	*Sarajevo*	*Sarajevo*	*Sarajevo*	*Sarajevo*
Kotor	Montenegro	Montenegrin	*Kotor*	*Kotor*	*Cattaro*	*Kotor*	*Kotor*	*Kotor*	*Kotor*
Shkodër	Albania	Albanian	*Skader*	*Skader*	*Skader*	*Skadar*	*Skadar*	*Skadar*	*Skader*
Thessaloníkī	Greece	Greek	*Solun*	*Solun*	*Solun*	*Solun*	*Solun*	*Solun*	*Solun*
Beograd 'Belgrade'	Serbia	Serbian	*Belgrad*	*Beligrad*	*Beograd*	*Beograd*	*Beograd*	*Beograd*	*Beograd*
Braşov	Romania	Romanian	*Braševo*	*Braševo*	*Braşov*	*Braşov*	*Braşov*	*Braşov*	*Braşov*
L'viv 'Lviv'	Ukraine	Ukrainian	*Levov*	*Levov*	*Lwów*	*Lvov*	*Lvov*	*Lvov*	*Lvov*

The first world atlas after the Second World War, published in 1950, only retained nine Slovenian forms introduced by Cigale, and the last one from 2005 (Figure 47) retained fifteen, which is two-thirds more (including the forms *Levov* 'Lviv' and *Monostur* 'Szentgotthárd' that Cigale used and their modern Slovenian variants *Lvov* and *Monošter*). This most likely cannot be attributed to *Atlant*'s resurgent influence, but to the fact that, after Slovenia became independent, the producers of new world atlases thought along the same lines as Cigale, who also prepared his atlas during a period of Slovenian emancipation.

6 Conclusion

Atlant received some well-founded, primarily linguistic, criticism when it was published. In addition, it did not represent any technological progress in cartography and the publication of maps, and it initially received very little coverage from geographers, despite promoting Slovenian ethnic identity and developing Slovenian as a native language, which is why it gradually sank into oblivion. Nonetheless, it is a priceless source for studying Slovenian geographical names, including their foundations. Namely, it reflects the geographical, linguistic, and political situation that determined the degree of Slovenianizing geographical names and the language the Slovenianized forms were based on. Thus, already a century and a half ago, *Atlant* enriched Slovenian with many exonyms that have been retained in Slovenian until today, which is an important value during a time of globalization and the great predominance of English (Urbanc et al. 2006).

In metaphorical sense, the importance of the first Slovenian world atlas can also be inferred from its title. In Slovenian, *Atlant* means 'Atlas' (Gr. Ἄτλας), a Titan in Greek mythology. Because he helped other Titans fight the Olympians, he was condemned by Zeus to hold up the heavens for eternity (Figure 48). Mercator depicted him on the cover of his atlas holding the globe (Figure 10). In architecture, an atlas (plural: *atlantes*) is a large male sculpture that gives the impression that it is supporting the entire building (Figure 49).

OLEKSII SERGIEIEV, ADOBE STOCK

Figure 48: Statue of Atlas (Sln. *Atlant*) on the roof of the main railway station in Frankfurt, Germany.

MARKO ZAPLATIL

Figure 49: Four atlantes on the facade of the Bank of Slovenia main building, symbolizing the strength of this financial institution.

At the time it was published, Matej Cigale's *Atlant* promoted the development of Slovenian as well as Slovenian ethnic consciousness and identity through Slovenian geographical names, and, well over a century later, its facsimile continues to do the same. From the Slovenian perspective, this is especially important considering that Slovenians were without their own nation state for over 1,200 years.

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Guidelines for contributing authors in Acta geographica Slovenica

EDITORIAL POLICIES

1 Focus and scope

The *Acta geographica Slovenica* journal is issued by the ZRC SAZU Anton Melik Geographical Institute, published by the ZRC SAZU Založba ZRC, and co-published by the Slovenian Academy of Sciences and Arts.

Acta geographica Slovenica publishes original research articles from all fields of geography and related disciplines, and provides a forum for discussing new aspects of theory, methods, issues, and research findings, especially in Central, Eastern and Southeastern Europe.

The journal accepts original research articles and review articles. Articles presenting new developments and innovative methods in geography are welcome. Submissions should address current research gaps and explore state-of-the-art issues. Research-based on case studies should have the added value of transnational comparison and should be integrated into established or new theoretical and conceptual frameworks.

The target readership is researchers, policymakers, students, and others who are studying or applying geography at various levels.

The journal is indexed in the following bibliographic databases: Clarivate Web of Science (SCIE – Science Citation Index Expanded; JCR – Journal Citation Report/Science Edition), Scopus, ERIH PLUS, GEOBASE Journals, Current Geographical Publications, EBSCOhost, Georef, FRANCIS, SJR (SCImago Journal & Country Rank), OCLC WorldCat, Google Scholar, and CrossRef.

2 Types of articles

Unsolicited or invited original research articles and review articles are accepted. Articles and materials or sections of them should not have been previously published or under consideration for publication elsewhere. The articles should cover subjects of current interest within the journal's scope.

3 Special issues

The journal also publishes special issues (thematic supplements). Special issues usually consist of invited articles and present a special topic, with an introduction by the (guest) editors. The introduction briefly presents the topic, summarizes the articles, and provides important implications.

4 Peer-review process

All articles are examined by the editor-in-chief. This includes fact-checking the content, spelling and grammar, writing style, and figures. Articles that appear to be plagiarized, are badly or ghost-written, have been published elsewhere, are outside the scope of the journal, or are of little interest to readers of *Acta geographica Slovenica* may be rejected. If the article exceeds the maximum length, the author(s) must shorten it before the article is reviewed. The article is then sent to responsible editors, who check the relevance, significance, originality, clarity, and quality of the article. If accepted for consideration, the articles are then sent to peer reviewer(s) for double-blind review. Articles are rejected or accepted based on the peer reviews and editorial board's decision.

5 Publication frequency

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6 Open-access policy

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Digital copies of the journal are stored by the repository of ZRC SAZU and the digital department of Slovenian national library NUK, dLib.

The journal's publication ethics and publication malpractice statement is available online, as well as information on subscriptions and prices for print copies.

AUTHOR GUIDELINES

Before submitting an article, please read the details on the journal's focus and scope, publication frequency, privacy statement, history, peer-review process, open-access policy, duties of participants, and publication ethics. See also the latest version of the author guidelines online. All the materials are available at https://ags.zrc-sazu.si

1 Types of articles

Unsolicited or invited original research articles and review articles are accepted. Articles and materials or sections of them should not have been previously published or under consideration for publication elsewhere. The articles should cover subjects of current interest within the journal's scope.

2 Special issues

The journal also publishes special issues (thematic supplements). Special issues usually consist of invited articles and present a special topic, with an introduction by the (guest) editors. The introduction briefly presents the topic, summarizes the articles, and provides important implications.

3 The articles

Research articles must be prepared using the journal's template (available at https://ags.zrc-sazu.si) and contain the following elements:

- **Title:** this should be clear, short, and simple.
- **Information about author(s):** submit names (without academic titles), affiliations, ORCiDs, and e-mail addresses through the online submission system (available at https://ags.zrc-sazu.si).
- **Highlights**: authors must provide 3–5 highlights. This section must not exceed 400 characters, including spaces.
- **Abstract:** introduce the topic clearly so that readers can relate it to other work by presenting the background, why the topic was selected, how it was studied, and what was discovered. It should contain one or two sentences about each section (introduction, methods, results, discussion, and conclusions). The maximum length is 800 characters including spaces.
- **Keywords:** include up to seven informative keywords. Start with the research field and end with the place and country.
- **Main text:** The main text must not exceed 30,000 characters, including spaces (without the title, affiliation, abstract, keywords, highlights, reference list, and tables). Do not use footnotes or endnotes. Divide the article into sections with short, clear titles marked with numbers without final dots: **1 Section title**. Use only one level of subsections: **1.1 Subsection title**.

Research articles should have the following structure:

- **Introduction:** present the background of the research problem (trends and new perspectives), state of the art (current international discussion in the field), research gap, motivation, aim, and research questions.
- **Methods:** describe the study area, equipment, tools, models, programs, data collection, and analysis, define the variables, and justify the methods.
- **Results:** follow the research questions as presented in the introduction and briefly present the results.

- **Discussion:** interpret the results, generalize from them, and present related broader principles and relationships between the study and previous research. Critically assess the methods and their limitations, and discuss important implications of the results. Clarify unexpected results or lacking correlations.
- **Conclusion:** present the main implications of the findings, your interpretations, and unresolved questions, offering a short take-home message.

Review articles (narratives, best-practice examples, systematic approaches, etc.) should have the following structure:

- **Introduction:** include 1) the background; 2) the problem: trends, new perspectives, gaps, and conflicts; and 3) the motivation/justification.
- **Material and methods:** provide information such as data sources (e.g., bibliographic databases), search terms and search strategies, selection criteria (inclusion/exclusion of studies), the number of studies screened and included, and statistical methods of meta-analysis.
- **Literature review:** use subheadings to indicate the content of the various subsections. Possible structure: methodological approaches, models or theories, the extent of support for a given thesis, studies that agree with one another versus studies that disagree, chronological order, and geographical location.
- **Conclusions:** provide implications of the findings and your interpretations (separate from facts), identify unresolved questions, summarize, and draw conclusions.

– **Acknowledgments:** use when relevant. In this section, authors can specify the contribution of each author.
– **Reference list:** see the guidelines below.

4 Article submission

4.1 Open journal system

Author(s) must submit their contributions through the *Acta geographica Slovenica* Open Journal System (OJS; available at https://ags.zrc.sazu.si) using the Word document template (available at https://ags.zrc.sazu.si).

Enter all necessary information into the OJS. Any addition, deletion, or rearrangement of names of the author(s) in the authorship list should be made and confirmed by all coauthors before the manuscript has been accepted, and is only possible if approved by the journal editor.

To make anonymous peer review possible, the article text and figures should not include names of author(s).

Do not use contractions or excessive abbreviations. Use plain text, with sparing use of **bold** and *italics* (e.g. for non-English words). Do not use auto-formatting, such as section or list numbering and bullets.

If a text is unsatisfactory, the editorial board may return it to the author(s) for professional copyediting or reject the article. See the section on the peer-review process (available at https//ags.zrc-sazu.si) for details. Author(s) may suggest reviewers when submitting an article.

4.2 Language

Articles are published in English.

Articles can be submitted in English or Slovenian.

Authors must take care of high-quality English text. In the case of poor language, the article is copy-edited/translated after acceptance by a professional chosen by the editorial board. In such a case, the translation or copyediting costs are borne by the author(s) and must be paid before layout editing.

All articles should have English and Slovenian abstracts.

4.3 Graphic file submission

Graphic files (figures) can be submitted to the OJS packed in one zip file not exceeding 50 MB.

4.4 Submission date

The journal publishes the submission date of articles. Please contact the editorial board (ags@zrc-sazu.si) with any questions.

5 Citations

Examples for citing publications are given below. Citing »grey literature« is strongly discouraged. In case there are more than seven authors, list the first seven followed by et al.

5.1 Citing articles

- Bole, D. 2004: Daily mobility of workers in Slovenia. Acta geographica Slovenica 44-1. DOI: https://doi.org/10.3986/AGS44102
- Fridl, J., Urbanc, M., Pipan, P. 2009: The importance of teachers' perception of space in education. Acta geographica Slovenica 49-2. DOI: https://doi.org/10.3986/AGS49205
- Gams, I. 1994a: Types of contact karst. Geografia Fisica e Dinamica Quaternaria 17.
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- Van Hall, R. L., Cammeraat, L. H., Keesstra, S. D., Zorn, M. 2016: Impact of secondary vegetation succession on soil quality in a humid Mediterranean landscape. Catena, In press. DOI: https://doi.org/10.1016/j.catena.2016.05.021 (25. 11. 2016).
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5.2 Citing books

- Cohen, J. 1988: Statistical power analysis for the behavioral sciences. New York.
- Fridl, J., Kladnik, D., Perko, D., Orožen Adamič, M. (eds.) 1998: Geografski atlas Slovenije. Ljubljana.
- Hall, T., Barrett, H. 2018: Urban geography. London. DOI: https://doi.org/10.4324/9781315652597
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- Nared, J., Razpotnik Visković, N. (eds.) 2014: Managing cultural heritage sites in southeastern Europe. Ljubljana. DOI: https://doi.org/10.3986/9789610503675

5.3 Citing chapters of books or proceedings

- Gams, I. 1987: A contribution to the knowledge of the pattern of walls in the Mediterranean karst: A case study on the N. island Hvar, Yugoslavia. Karst and Man, Proceedings of the International Symposium on Human Influence in Karst. Ljubljana.
- Hrvatin, M., Perko, D., Komac, B., Zorn, M. 2006: Slovenia. Soil Erosion in Europe. Chichester. DOI: https://doi.org/10.1002/0470859202.ch25
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- Zorn, M., Komac, B. 2013: Land degradation. Encyclopedia of Natural Hazards. Dordrecht. DOI: https://doi.org/10.1007/978-1-4020-4399-4_207

5.4 Citing expert reports, theses, dissertations and institutional reports

- Breg Valjavec, M. 2012: Geoinformatic methods for the detection of former waste disposal sites in karstic and nonkarstic regions (case study of dolines and gravel pits). Ph.D. thesis, University of Nova Gorica. Nova Gorica.

- Holmes, R. L., Adams, R. K., Fritts, H. C. 1986: Tree-ring chronologies of North America: California, Eastern Oregon and Northern Great Basin with procedures used in the chronology development work including user manual for computer program COFECHA and ARSTAN. Chronology Series 6. University of Arizona, Laboratory of tree-ring research. Tucson.
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- Šifrer, M. 1997: Površje v Sloveniji. Elaborat, Geografski inštitut Antona Melika ZRC SAZU. Ljubljana.
- World commission on environment and development 1987: Our common future: Brundtland report. Oxford.

5.5 Citing online materials with authors

- Tiran, J. 2021: Slovenija se je v celoti odela v modro. Metina lista. Internet: https://metinalista.si/slovenija-se-je-v-celoti-odela-v-modro/ (3. 11. 2021).
- Davies, G. 2017: The place of data papers: Producing data for geography and the geography of data production. Geo: Geography and Environment. Internet: https://blog.geographyandenvironment.com/2017/09/27/the-place-of-data-papers-producing-data-for-geography-and-the-geography-of-data-production/ (8. 11. 2021).

5.6 Citing websites without authors (e.g. websites of projects and institutions)

Use in-text citations only. It is not necessary to include a citation in the reference list. The in-text citation should include the URL.

5.7 Citing publicly archived data (e.g. statistical data)

Use in-text citations only. It is not necessary to include publicly archived datasets in the reference list. The in-text citation should include the name of the dataset, the institution providing the data and the time frame of the data used.

When the data you cited were published as a report, add it to the reference list and use the following format:

- Popis prebivalstva, gospodinjstev, stanovanj in kmečkih gospodarstev v Republiki Sloveniji, 1991 – končni podatki. Zavod Republike Slovenije za statistiko. Ljubljana, 1993.
- Agriculture, forestry and fishery statistics. 2020 edition. Publications Office of the European Union. Luxembourg, 2020.

5.8 Citing geospatial data and cartographic materials

Geospatial data used in maps should be cited in the colophon on the map (see the Table and Figures section of the Authors' Guidelines). It is not necessary to include geospatial data in the reference list.

When cartographic materials are published as an independent monograph, add it to the reference list and use the following format:

- Buser, S. 1986: Osnovna geološka karta SFRJ 1 : 100.000, list Tolmin in Videm (Udine). Savezni geološki zavod. Beograd.
- Državna topografska karta Republike Slovenije 1 : 25.000, list Brežice. Geodetska uprava Republike Slovenije. Ljubljana, 1998.
- Franciscejski kataster za Kranjsko, k. o. Sv. Agata, list A02. Arhiv Republike Slovenije. Ljubljana, 1823–1869.
- The vegetation map of forest communities of Slovenia 1:400,000. Biološki inštitut Jovana Hadžija ZRC SAZU. Ljubljana, 2002.

5.9 Citing legal sources

Use in-text citation. It is not necessary to include a citation in the reference list. The in-text citation should include the title of legal document and the year.

5.10 In-text citation examples

All references in the reference list are cited in the text. In-text citations should include the last name of the author(s) or the name of the institution, and the year of publication. Separate individual citations by semicolons, arrange citations by year of publication, and separate the page information from author(s)' names and years by a comma; for example: (Melik 1955), (Melik, Ilešič and Vrišer 1963; Gams 1982a; Gams 1982b; World Commission on Environment and Development 1987). For references with more than three authors, cite only the first, followed by et al.: (Melik et al. 1956). Give page numbers only for direct quotations. Narrative citations: Perko (2016, 25) states: »Hotspots are …« or parenthetical citation (Kokole 1974, 7–8).

When citing online materials without authors, such as project or institutional websites, the URL should be included, for example: »The aim of the LABELSCAPE project is to develop mechanisms for integrating sustainability labels into tourism policy (https://labelscape.interreg-med.eu).«

When citing publicly archived data, such as statistical data, inform the reader in the text with the name of dataset, the time frame, and the institution that provides the data: »The 2000–2020 population data used in the analysis were provided by the Eurostat«. If the statistical data were published as a report, cite the document, e.g. (Popis prebivalstva … 1993).

When citing legal sources such as legislative acts, white papers, etc., you should provide (short formal) title and the year, for example: »… The European Commission's White paper on transport (2011) sets out ten strategic goals for a competitive and resource-efficient transport system: …«

5.11 Reference list

Arrange references alphabetically and then chronologically if necessary. Identify more than one reference by the same author(s) in the same year with the letters *a*, *b*, *c*, etc., after the year of publication: (1999a; 1999b). Use this format for indirect citations: (Gunn 2002, cited in Matei et al. 2014).

Include the Digital Object Identifier (DOI) in the reference if available. Format the DOI as follows: https://doi.org/… (for example: https://doi.org/10.3986/AGS.1812).

6 Tables and figures

Number all tables in the article uniformly with their own titles. The number and the text are separated by a colon, and the caption ends with a period. Example:

Table 1: Number of inhabitants of Ljubljana.

Table 2: Changes in average air temperature in Ljubljana (Velkavrh 2009).

Tables and figures must be indicated in the main text in parentheses, for example »(Table 1)«, or as a part of the sentence, for example »… as can be seen in the Table 1«.

Tables should contain no formatting and should not be too large; it is recommended that tables not exceed one page.

Upload figures to the OJS as separate files in digital form. If the files prepared cannot be uploaded using these programs, consult the editorial board (ags@zrc-sazu.si) in advance.

Number all figures (maps, graphs, photographs) in the article uniformly with their own titles. Example:

Figure 1: Location of measurement points along the glacier.

All graphic materials must be adapted to the journal's format. Illustrations should be exactly 134 mm wide (one page) or 64 mm wide (half page, one column), and the height limit is 200 mm.

To make anonymous peer review possible, include the name of the author(s) with the title of the illustration in the file metadata, but not in the article text.

Maps should be made in digital vector form with Corel Draw, Adobe Illustrator, or a similar program, especially if they contain text. They can exceptionally be produced in digital raster form with at least 300 dpi resolution, preferably in TIFF or JPG format. For maps made with *CorelDraw* or *Adobe Illustrator*, two separate files should be prepared; the original file (.cdr or .ai format) and an image file (.jpg format).

For maps made with ArcGIS with raster layers used next to vector layers (e.g., .tif of relief, airborne or satellite image), three files should be submitted: the first with a vector image without transparency together with a legend and colophon (export in .ai format), the second with a raster background (export in .tif format), and the third with all of the content (vector and raster elements) together showing the final version of the map (export in .jpg format).

Do not print titles on maps; they should appear in a caption.

Save colors in CMYK, not in RGB or other formats.

Use Times New Roman for the legend (size 8) and colophon (size 6). List the author(s), scale, source, and copyright in the colophon. Write the colophon in English (and Slovenian, if applicable). Example:

Scale: 1:1,000,000
Content by: Drago Perko
Map by: Jerneja Fridl
Source: Statistical Office of the Republic of Slovenia 2002
© 2005, ZRC SAZU Anton Melik Geographical Institute

Graphs should be made in digital form using *Excel* on separate sheets and accompanied by data.
Photos must be in raster format with a resolution of 600 dpi, preferably in .tif or .jpg formats.

Figures containing a screenshot should be prepared at the highest possible screen resolution (Control Panel\All Control Panel Items\Display\Screen Resolution). The figure is made using Print Screen, and the captured screen is pasted to the selected graphic program (e.g., *Paint*) and saved as .tif. The size of the image or its resolution must not be changed.

Examples of appropriate graphic data formats: see the templates of maps in cdr and mxd files (available at https://ags.zrc.sazu.si) for a full-page map in landscape layout and an example of the correct file structure (available at https://ags.zrc.sazu.si) for submitting a map created with *ESRI ArcGIS*.

SUBMISSION PREPARATION CHECKLIST

As part of the submission process, authors are required to check off their submission's compliance with all of the following items, and submissions may be returned to authors that do not adhere to these guidelines.

- I, the corresponding author, declare that this manuscript is original, and is therefore based on original research, done exclusively by the authors. All information and data used in the manuscript were prepared by the authors or the authors have properly acknowledged other sources of ideas, materials, methods, and results.
- Authors confirm that they are the authors of the submitting article, which is under consideration to be published (print and online) in the journal *Acta geographica Slovenica* by Založba ZRC, ZRC SAZU.
- All authors have seen and approved the article being submitted.
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- The list of authors is complete. Failure to do so may result in co-authors not being listed on the article at publication.
- The submission is in Microsoft Word format and the document template was used (single-spaced text, 12-point font, no formatting except italics and bold).
- The article has been checked for spelling and grammar.
- Figures are not embedded in the Word file and are provided as a graphic file: editable vector format (e.g., cdr, ai) for maps and illustrations; tif for photographs; xlsx for graphs. The Word file includes only figure captions.
- Tables are placed in the Word file with text at the appropriate place.
- The reference list was prepared following the guidelines.
- All references in the reference list are cited in the text.
- Where available, URLs and DOI numbers for references are provided.
- Graphic files are in one .zip file.
- Authors agree that any costs of English proofreading are borne by the author(s). No additional costs are associated with the submission.
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ACTA GEOGRAPHICA SLOVENICA EDITORIAL REVIEW FORM

This is a review form for editorial review (version 14) of an article submitted to the AGS journal.

This is an original scientific article.
(The article is original and the first presentation of research results with the focus on methods, theoretical aspects or a case study.)

- Yes
- No

The article follows the standard IMRAD/ILRAD scheme.

- Yes
- No

The article's content is suitable for reviewing in the AGS journal.
(The article is from the field of geography or related fields of interest, the presented topic is interesting for the readers of *Acta geographica Slovenica* and well presented. In case of negative answer add comments below.)

- Yes
- No

Editorial notes regarding the article's content.

The reference list is suitable (the author cites previously published articles with similar topics from other relevant geographic scientific journals).

- Yes, the author cited previously published articles on a similar topic.
- No, the author did not cite previously published articles on a similar topic.

Notes to editor-in-chief regarding previously published scientific work.

Is the language of the article appropriate and understandable?

RECOMMENDATION OF THE EDITOR

- The article is accepted and can be sent to the review process.
- Reconsider after a major revision (see notes).
- The article is rejected.

ACTA GEOGRAPHICA SLOVENICA REVIEW FORM

This is *Acta geographica Slovenica* review form (version 7).

1 RELEVANCE

Are the findings original and the article is therefore a significant one?

- yes
- no
- partly

Is the article suitable for the subject focus of the AGS journal?

- yes
- no

2 SIGNIFICANCE

Does the article discuss an important problem in geography or related fields?

- yes
- no
- partly

Does it bring relevant results for contemporary geography?

- yes
- no
- partly

What is the level of the novelty of research presented in the article?

- high
- middle
- low

3 ORIGINALITY

Has the article been already published or is too similar to work already published?

- yes
- no

Does the article discuss a new issue?

- yes
- no

Are the methods presented sound and adequate?

- yes
- no
- partly

Do the presented data support the conclusions?

- yes
- no
- partly

4 CLARITY

Is the article clear, logical and understandable?

- yes
- no

If necessary, add comments and recommendations to improve the clarity of the title, abstract, keywords, introduction, methods or conclusion:

5 QUALITY

Is the article technically sound? (If not, the author should discuss with the Editorial Board [ags@zrc-sazu.si] for assistance.)

- yes
- no

Does the article take into account relevant current and past research on the topic?

- yes
- no

Propose amendments, if no is selected:

Is the references list at the end of the article adequate?

- yes
- no

Propose amendments, if no is selected:

Is the quoting in the text appropriate?

- yes
- no
- partly

Propose amendments, if no is selected:
Which tables are not necessary?
Which figures are not necessary?

COMMENTS OF THE REVIEWER

Comments of the reviewer on the contents of the article:
Comments of the reviewer on the methods used in the article:

RECOMMENDATION OF THE REVIEWER TO THE EDITOR-IN-CHIEF

Please rate the article from 1 [low] to 100 [high] (this will NOT be presented to the author):
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JOURNAL HISTORY

Acta geographica Slovenica (print version: ISSN: 1581-6613, digital version: ISSN: 1581-8314) was founded in 1952. It was originally named *Geografski zbornik / Acta geographica* (print ISSN 0373-4498, digital ISSN: 1408-8711). Altogether 42 volumes were published. In 2002 *Geographica Slovenica* (ISSN 0351-1731, founded in 1971, 35 volumes) was merged with the journal.

Since 2003 (from volume 43 onward) the name of the joint journal has been *Acta geographica Slovenica*. The journal continues the numbering system of the journal *Geografski zbornik / Acta geographica*.

Until 1976, the journal was published periodically, then once a year, from 2003 twice a year and from 2019 three times a year.

The online version of the journal has been available since 1995. In 2013, all volumes of the magazine were digitized from the beginning of its publication to 1994 inclusive.

All articles of the journal are available free of charge in digital form on the journal website http://ags.zrc-sazu.si.

Those interested in the history of the journal are invited to read the article »The History of *Acta geographica Slovenica*« in volume 50-1.

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