Angeliki Tsorlini[*], Chrysoula Boutoura[**], Asterios-Panagiotis Pagkalidis[***], Menelaos Psarogiorgos[****]

Visualizing historical facts on maps designed combining information from different sources

Keywords: historical maps, historical facts, textual data, data homogenization and visualisation, digital humanities

Summary: A map depicting historical data or historical facts can provide information about our history, giving a clear image of events that happened in the past. Such information is usually found in textual form in books and most of the times is not depicted on maps. Combining and visualizing historical data in different forms from different sources is a demanding and challenging procedure. In this paper, in an attempt to visualize historical facts or events on maps, we use data from different sources to design and produce maps in order to depict historical facts of two campaigns in Greece: Asia Minor campaign in 1919-1922 and Italian campaign in Greece in 1940-1941. The study is based on historical maps depicting each area at that time, and on textual data and descriptions, which provide information about the time period, the two respective wars, the battles, the position of troops and their movements during the military operations, as well as other descriptive and statistical information about the opponent armies. All this information is combined to each other and it is visualised on thematic maps in a way that allows the map readers to better understand these particular historical facts and to get important information about them in a more comprehensive way.

Introduction

A map depicting historical data can provide information about our history and the evolution of an area over time. The use of historical maps in studies is now a tool for researchers of many disciplines, particularly the humanities (Michev 2016), as it expands the scope of research and gives the opportunity to derive new data from the old maps (Tsorlini et al. 2017). Important role in the extraction of this information from historical maps plays the development of digital technologies that broadens the cartographic research and at the same time, it provides new computational methods and practices to be applied on the research in the field of digital humanities (Livieratos 2006b, 2008).

The study of historical maps referring to specific time periods in combination with historical texts found in books or articles and related pictorial material gives the opportunity to researchers to study an area in depth, to examine the changes taken place over centuries and draw conclusions about the way it has been developed (Tsorlini et al. 2017, Tsorlini et al 2010; Livieratos 2012); to study important historical events such as battles or physical disasters taken place in its territory influencing its history and development (Livieratos et al. 2003); or even to enrich the depiction of an area with historical information designing and producing new maps (Voulgarakis et al. 2019, Mentesidis et al. 2018).

[*]Assistant Professor of Cartography, CartoGeoLab, Faculty of Engineering, Aristotle University of Thessaloniki, Greece, [atsorlin@topo.auth.gr]

[**]Professor of Thematic and Digital Cartography, CartoGeoLab, Faculty of Engineering, Aristotle University of Thessaloniki, Greece, [boutoura@auth.gr]

[***] Rural and Surveying Engineer, Aristotle University of Thessaloniki, Greece, [a.pagkalidis@gmail.com]

[****] Rural and Surveying Engineer, Aristotle University of Thessaloniki, Greece, [psarogiorgos@hotmail.com]

Combining historical data in different forms from different sources to visualize historical events on maps in an objective way is a demanding and challenging procedure for many reasons. The data itself should come from different sources in order the derived information to be cross-checked for its reliability and the way it is visualized on the map allowing the map readers to get important information from it and to understand its significance. An important role in this process play also the topographical and morphological characteristics of the geographical space which influenced sometimes the evolution of a historical event such as a war or a battle or even a natural catastrophe.

In this paper, in an attempt to visualize historical facts on maps, we combine data from different sources to design and produce maps depicting historical facts of two important wars for Greece: Asia Minor campaign, also called Greco-Turkish War of 1919–1922, in Asia Minor (Turkey) from May 1919 to October 1922 and the Italian Campaign in Greece, called also Greco-Italian War, in northwest part of Greek mainland from October 1940 to April 1941.

The Greco-Turkish War of 1919–1922 occurred between Greece and the Turkish National Movement during the partitioning of the Ottoman Empire in the aftermath of World War I, between May 1919 and October 1922. The Greek campaign was launched primarily because the western Allies had promised Greece territorial gains at the expense of the Ottoman Empire, recently defeated in World War I. The armed conflict started when the Greek forces landed in Smyrna (Izmir) on May 1919. They advanced inland and took control of the western and north-western part of Anatolia. On August 1920, the Treaty of Sevres was signed, which clearly defined the limits of Greek army's advance. In summer of 1920, Greek troops began to advance into the area of Anatolia, which had suffered by the civil strife between the Sultan and the Kemalists. The campaign was victorious for the Greek side at the beginning, however in 1922 the Turkish troops began their counterattack. After achieving the disintegration of the Greek forces and the crushing of part of them, the Kemalist Turkish army forced the remaining Greek army to retreat constantly. The Greek front collapsed after the Turkish counterattack in August 1922, and the war effectively ended with the recapture of Smyrna by Turkish forces and the great fire of the city (HAGS/AHD[1] 1967; Kontogiannis 1921).

The Greco-Italian War was a conflict between Italy and Greece, which lasted from 28 October 1940 to 23 April 1941. This local war began the Balkans Campaign of World War II between the Axis powers and the Allies and eventually turned into the Battle of Greece with British and German involvement. By the middle of 1940, Italian dictator Benito Mussolini, concerned about Adolf Hitler's conquests, wanted to prove to his Axis partner that he could lead Italy to similar military successes. On 28 October 1940, Mussolini issued an ultimatum to Greece demanding the cession of the Greek territory. The Prime Minister of Greece, Ioannis Metaxas, rejected it and as a result, Italian forces invaded Greece. By mid-November, the Greeks had stopped the Italian invasion inside the Greek territory. As the British bombers and the military aircrafts struck Italy's forces and bases, the Greeks counterattacked with the bulk of their army to push the Italians back into Albania – an advance which culminated in the Capture of Klisoura Pass (Këlcyrë, Albania) in January 1941. In March 1941, a major Italian counterattack (the Italian Spring Offensive) failed, humiliating Italian military pretensions. On 6 April 1941, coming to the aid of Italy, Nazi Germany invaded Greece through Bulgaria and Yugoslavia. The Greek army began retreating from Albania to avoid being cut off by the rapid German advance. On 20 April, the Greek army of Epirus surrendered to the Germans and on 23 April 1941, the armistice was

[1] The Army History Directorate (AHD) constitutes an organic Directorate of the Hellenic Army General Staff (HAGS) coming under the D' Branch of the HAGS. It is the official advisory Directorate of HAGS for all matters related to the history of the Hellenic Army (https://dis.army.gr/en/content/about#)

repeated, including the Italians, effectively ending the Greco-Italian war (HAGS/AHD 1985; Allamani et al 2008).

In this study, we tried to depict on maps known historical events happened during these two wars giving emphasis to the way this information will be visualized on the maps, since our goal is the map reader to learn only by looking at the map, what happened to each event and get as much information as possible for it. For this reason, different sources of information are used in both cases and different kind of data were collected for each of the two wars. The procedure followed in both cases is the same and the visualization techniques, used to depict the historical facts on a map, depend on the collected data in each case. These techniques are selected with the aim to communicate to the map readers all the information gathered for each historical event and its importance in a comprehensive way.

Methodology

The three main steps of the procedure followed for the visualization of historical events on maps are:

a. data collection from different sources such as historical maps, historical texts or records, pictorial data, as well as vector data collection for the visualization of the geometric background of the map

b. development of a geographic information system, where all this information is organized, managed, cross-checked for its reliability and combined to each other and finally,

c. data visualization and map design and production with the goal to prepare maps which can describe historical events in a more comprehensive and communicative way.

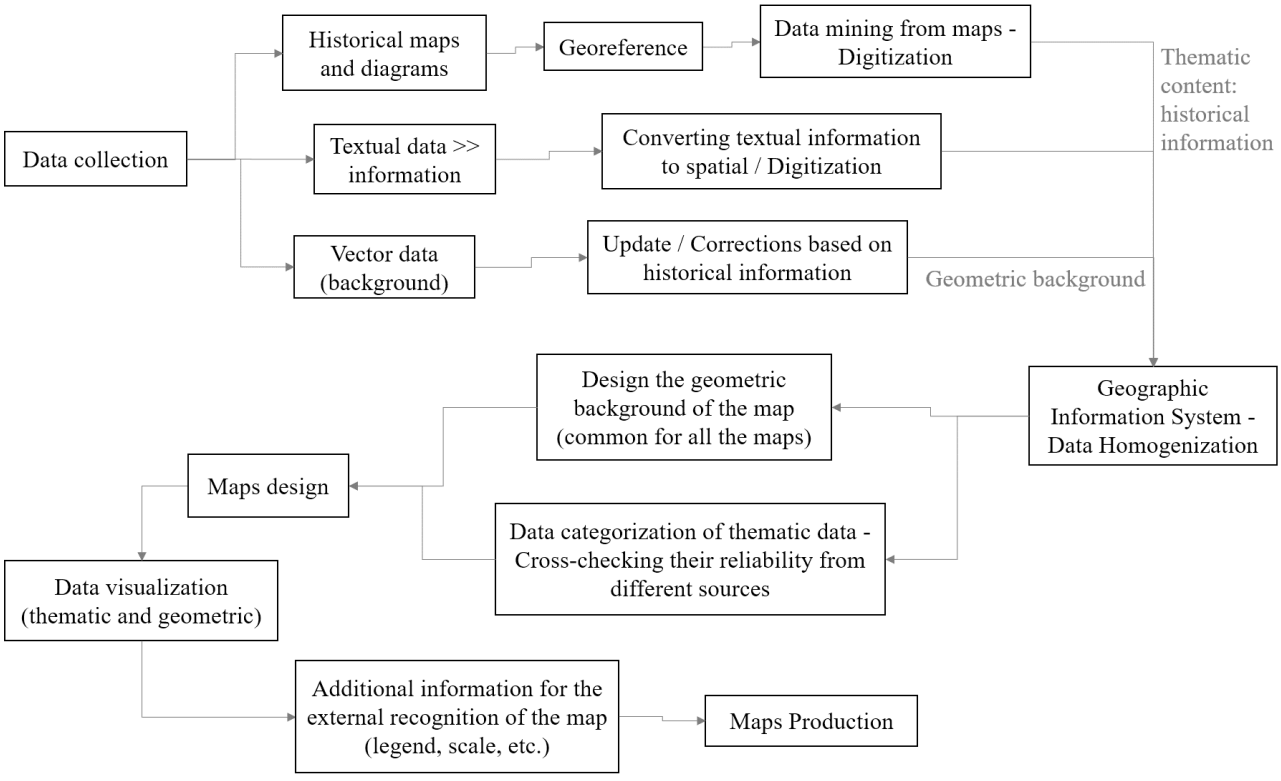

Figure 1: The methodology of the project.

Data collection: historical maps, textual data, vector data

Collecting data from different sources for historical events or facts occurred during a war is a very important and demanding process which requires special attention to the collected data, since sometimes they appear contradictory information, which should be crossed-checked from other sources in order to collect reliable information unaffected by other interests.

The basic source of data for the implementation of this work were the diagrams produced by the Hellenic Army General Staff which depicts the detailed movements of the Greek and the Turkish army in the Greco-Turkish War (HAGS/AHD 1967) and the Greek and Axis forces in the Greco-Italian War (HAGS/AHD 1985).

These diagrams have been an inexhaustible source of data on movements and battle position of troops during the military operations and the positions of the headquarters of the conflicting sides, providing also additional information about the army corps involved in each war (Fig. 2). Other historical maps such as the historical map of Hellenic Military Geographical Service (1997) in scale 1:1500000 depicting the Greek State and its expansions from 1832 until today (Fig. 3) and used for the depiction of events referred to the Greco-Turkish War and the map sheets of Generalkarte in scale 1:200000 (1887-1960) by the Military Geographic Institute (K.u.K. M.G.I.) in Vienna, depicting the northern part of Greece (Boutoura et al. 2007; Koussoulakou et al 2011; Livieratos 2003, Tsorlini et al. 2010) (Fig. 4) and referred to the Greco-Italian War are used to check and update the vector data representing the background of the maps, as well as to identify toponyms that have changed over time.

Figure 2: Diagrams produced by the Hellenic Army General Staff depicting the detailed movements of the Greek army towards the Turkish army in the Greco-Turkish War and the Axis forces in the Greco-Italian War (Source: HAGS/AHD 1967, 1985).

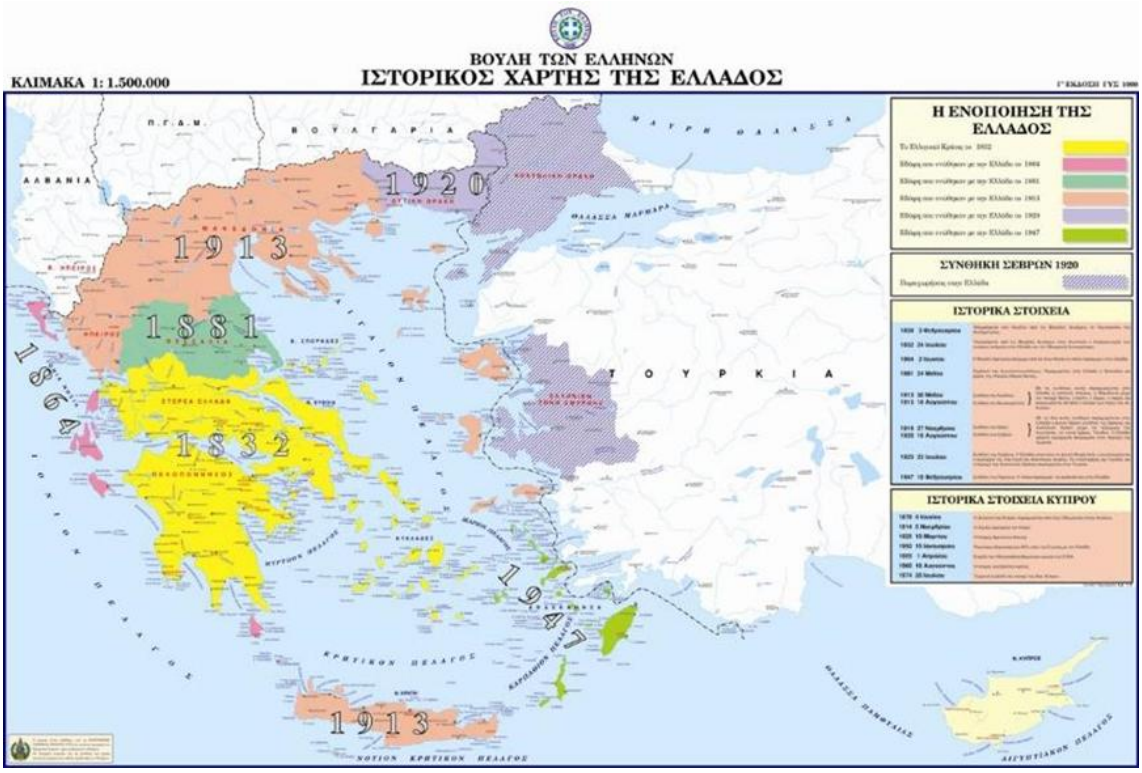

Figure 3. Historical map of Greece, Hellenic Military Geographical Service, 1997

Figure 4: The maps sheets Korfu (38°, 40°) and Elbasan (38°, 41°) of Generalkarte in scale 1:200000 (Source: Livieratos, 2003)

An important part of the historical data used for this project were collected from books and articles mainly in textual but also in pictorial form. A part of the collected textual information is the same for

both wars, but there are differences due to the difficulty in finding evidence from different sources to confirm events or statistical data found for these wars.

The data collected for the Asia Minor Campaign (Boubougiatzi 2009; HAGS/AHD 1967; Kontogiannis 1921; Kordatos 1958; Solotas 1995) refer to information about:

1. The main battles between Greek and Turkish forces until the collapse of the front. Specifically, 8 major battles are confirmed, of which the Greek forces prevailed in 6 and the Turkish in 2.
2. Occupations of cities by the Greek army with their exact date. Specifically, 19 cities of Asia Minor were captured, with or without a battle, until 1920.
3. Movements, positions and lines of the front on specific dates.

The data collected for the Greco-Italian War (Allamani et al. 2008; HAGS/AHD 1985; Kapaniaris 2009; National Geographic 2017; Tzouvalas 2007; Veremis et al. 2008) refer to information about:

1. The large units of each army, their commander and their divisions to smaller units depending on the available confirmed information.
2. Occupation of Albanian cities by Greek forces, accompanied with their dates and with addition information which explains better each historical event.
3. The most important battles during the Greco-Italian war, mainly the defensive battles of the Greek army during the war.
4. Movements, positions and front lines of both armies throughout the military operations of this war.

The collected information was cross-checked for its reliability at the next step of the procedure and information which cannot be confirmed and presents contradictory indications, was extracted from the database.

Finally, to represent the background of each area, vector data were collected from different online sources such as OpenStreetMaps, Natural Earth, the Greek Open data on geodata.gov.gr, the United States Geological Service (USGS) depicting:

- the basic road and railway network,
- the hydrographic network (rivers, lakes)
- administrative borders and boundaries
- the coastline
- cities, villages, settlements or toponyms in the two areas of interest
- mountains and peaks with their name and height
- digital elevation models (dem) to be used for the representation of each area's relief

Data Processing, Organization and Management through a GIS

At the next step of the procedure, all these data are included in a geographic information system and they are organized and managed through it.

The historical maps and the diagrams were georeferenced based on their geometric properties (Boutoura et al. 1986, 2006; Livieratos 2006a; Tsorlini et al. 2010, 2015) and the appropriate information is digitized. These maps are used also to adjust the modern road and railway networks, the hydrographic network, the administrative borders and boundaries, the toponyms and other characteristics of the area to those existed at that particular time, reconstructing the topography and geomorphology of the area.

The textual data are digitized in order to be connected with their geographic space and included in the geographic information system, in which they are combined to each other and crossed checked for their reliability to be later depicted on the maps (Tsorlini et al. 2017; Mentesidis et al. 2018; Voulgarakis et al. 2019; Boutoura et al. 2019). Due to the fact that this checking is not easy, a part of important and interesting information about historical events happened during the two wars could not be confirmed and finally could not be included in the maps. This is also the reason why the two set of maps designed and produced to depict historical events of the two wars, are not exactly the same, concerning the thematic information represented on them.

The vector data coming from different sources have different reference systems, which makes necessary their transformation to a common reference system which is the reference system of the developed geographic information system and it will be the reference system of the final maps. This reference system has been decided at the beginning taking into consideration the two areas of interest. With the inclusion of all the data into the geographic information system, all the features of the map are finally harmonized and projected on the same reference system and can be visualized appropriately in the next step of the procedure.

Data visualization – Map design and production

The final step of the procedure is the data visualization and the synthesis of the final maps (Livieratos 1989; Boutoura 2015; Tsorlini 2017) starting from the geometric background, which follows the same standards for both maps and depicts on each area of interest the relief, the hydrological network, the basic road network existed at that time, the railway in Turkey, the boundaries and the toponyms, which in case of Turkey are shown in two languages, the Turkish and the Greek name. The name of the mountains and their peaks with their height were important to be mentioned in the area where the Greco-Italian war was occurred, so we gave more emphasis on their correct depiction on these set of maps (Fig. 5).

Difficulties on creating the geometric background of the map appeared mainly on the processing of the road network and the identification of the toponyms especially in Albania and Turkey as well as their categorization to towns and villages which was not so obvious for these two countries, since information about their population was not found. This problem was solved with the help of the historical maps, which show the topography and the different toponyms referred to specific time period. Through these maps and the collected information from the textual data, it was also possible to select the important toponyms and those which are mentioned on the description of the historical events, and visualize them on maps.

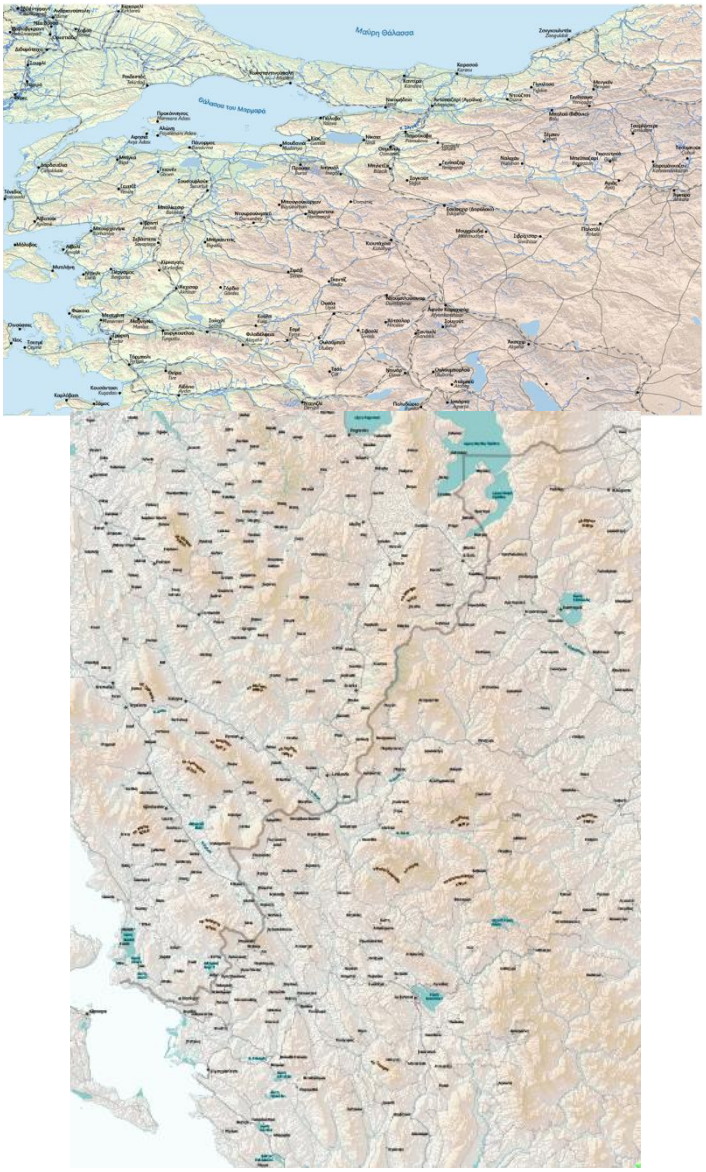

Figure: The basic geometric background for each set of maps (left: the area in which the Asia Minor Campaign (1919-1922) was occurred, right: the northwest part of Greece and the south part of Albania in which the Greco-Italian war (1940-1941) was occurred.

The visualization of the selected historical events was more challenging. The thematic information depicted in these maps refers to battles, troop movements and operation plans, both defensive and offensive. Different types of maps have been created based on the data collected for each war. For the Asia Minor Campaign, there are seven maps, showing troop movements and battles during specific operations and two general maps; battles and their outcome; and the opposition of cities by the Greek army. For the Greco-Italian war, there are two types of maps: those that show troop movements and battles between the Greek army forces and the Axis forces, and those which are static, depicting the positions of the opposing forces.

The visualization of thematic information on each set of maps was done with a common symbol, which was enriched in each case with additional information, in order the map reader to follow and understand better the evolution of the events depicted on maps in specific order to get the whole picture of the war. In particular, the Greek positions and movements were coloured in blue, while dark red was used for the positions and movements of the axis forces, and light red for the positions and

movements of Turkish forces. The symbols of the military units of the warring parties follow the corresponding colour and the symbolisation used in the diagrams produced by the Hellenic Army General Staff and Hellenic Military Geographical Service. A continuous line was used for the initial and final defensive positions, while dashed lines were used for the temporarily occupied positions. The movements of the units are displayed with arrows, which have the respective colour of each side, in combination with dates for the arrival or the troops at specific locations. Additionally, explanatory texts were added on the maps, where it was possible, so that, through them, the map readers understand better the depicted events as well as their outcome. These specific texts, which also follow the colour symbolization mentioned before, offer a wealth of information concerning the order and size of the units, the units' generals as well as other historical information referring to them (Fig. 6, Fig. 7).

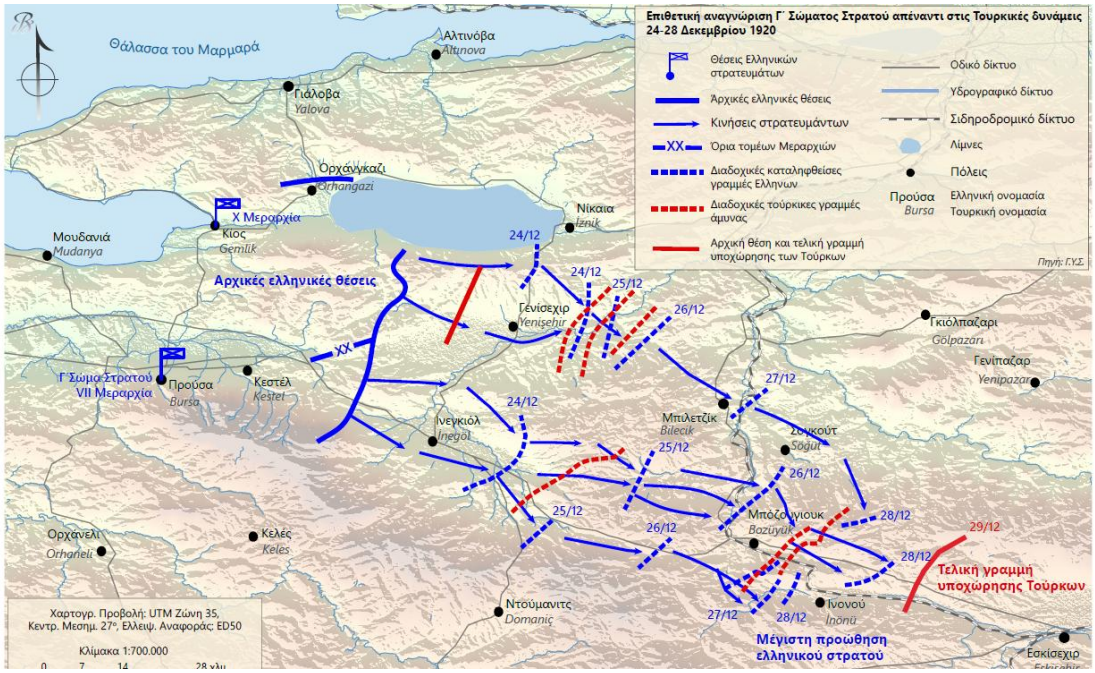

Figure 6: Part of the map showing the troop movements of the Greek forces (blue) and the final line of Turkish troops retreatment (light red) during the aggressive reconnaissance of the Greek forces (III Army Corps) against the Turkish forces 24-28 December 1920.

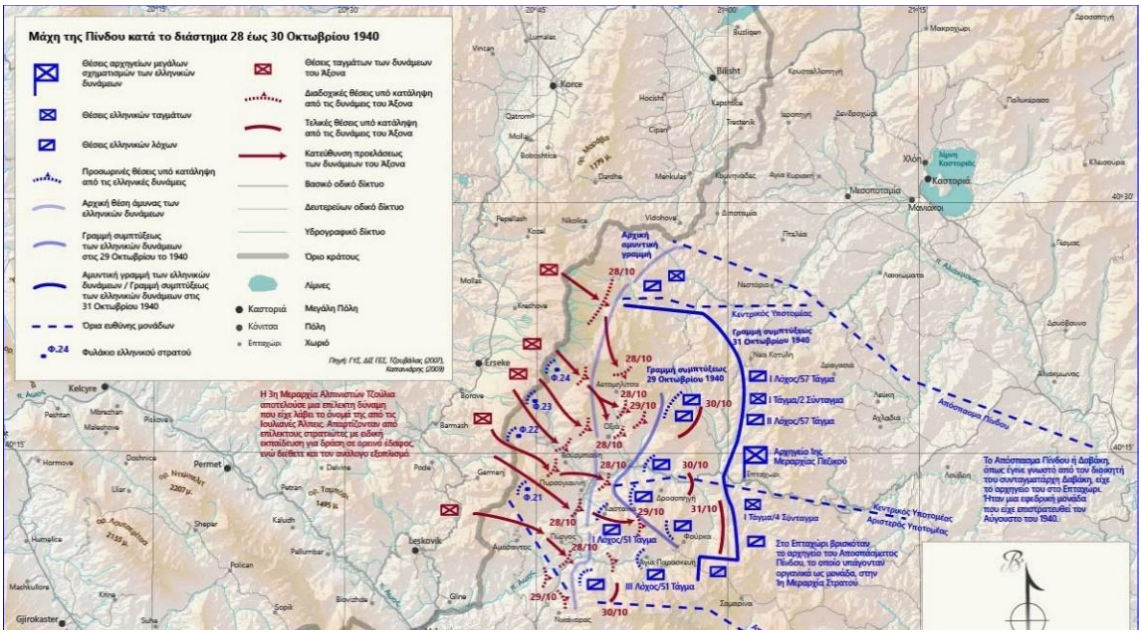

Figure 7: Part of the map showing the position of the units and troop movements of Greek (blue) and Axis forces (dark red) during the battle of Pindus from 28-30 October 1940, with explanatory texts providing more information about the opponent forces.

The outcome: the produced maps for the historical events of the two wars

Asia Minor campaign (Greco-Turkish War) 1919-1922

In the first case, the Asia Minor region, as it was formed after the Treaty of Sèvres, consist the geometric background of the maps, in which the most important events during the Greco-Turkish war, the subsequent movements of Greek and Turkish troops, the most important battles that took place during this period and the occupation of the cities by the Greek army are presented. This part of the project analysed historical data and maps combined to each other, producing a series of 9 maps in 4 scales due to the large area of interest, 1:2.000.000. 1:1.700.000, 1:1.000.000 and 1:700.000. These maps depict historical events happened in Asia Minor up to Ankara, during the Greco-Turkish war until the retreat of the Greek army from Asia Minor (Pagkalidis 2019).

The historical events visualized in chronological order in this set of maps are:

A' period

1. Attack of the Greek army for the consolidation of the defense line Uşak-Gediz (Fig.8)

B' Period

2. Offensive Reconnaissance of the Greek forces (III Army Corps) against the Turkish forces, 24-28 December 1920 (Fig. 9)
3. Advance of the Greek forces (III Army Corps) to İnönü, 10-14 March 1921 (Fig. 10)
4. Advance of the Greek forces (I Army Corps) from Uşak to Çivril and Çay, 10-20 March 1921 (Fig. 11)
5. Order of troops and movements of the Greek army in September 1921 (Fig. 12)
6. Order of the III Army Corps before the Turkish counterattack (Fig. 13)
7. Withdrawal of the southern band of the Greek army from the area of Smyrna (Fig. 14)

General maps

8. Battles during the Asia Minor campaign (Fig. 15)

9. Occupations of cities by the Greek army (Fig. 16)

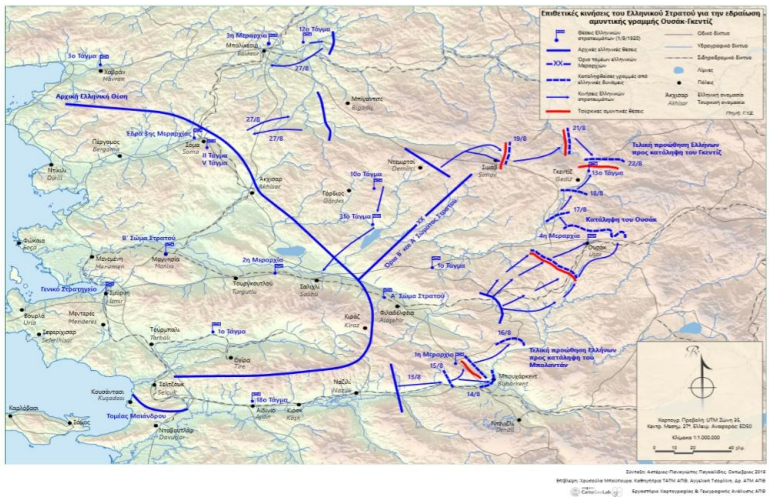

Figure 8: **A' period:** Attack of the Greek army for the consolidation of the defense line Uşak-Gediz in scale 1:1000000

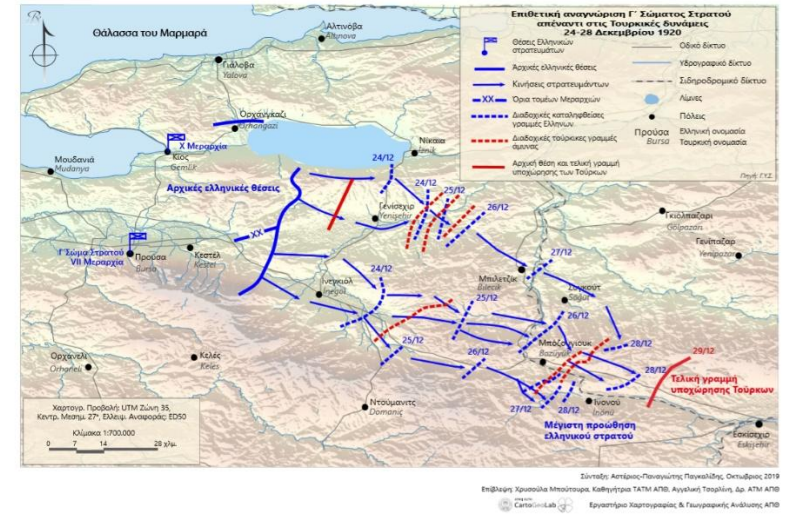

Figure 9: **B' period:** Offensive Reconnaissance of the Greek forces (III Army Corps) against the Turkish forces, 24-28 December 1920, in scale 1:700000.

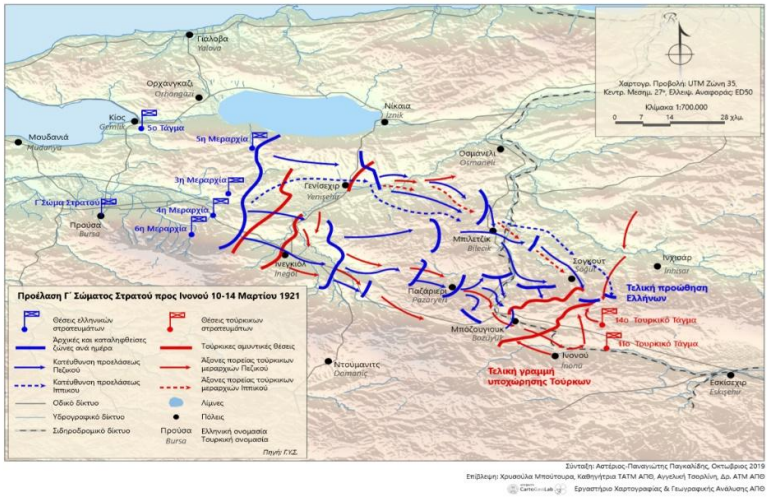

Figure 10: Advance of the Greek forces (III Army Corps) to İnönü, 10-14 March 1921, in scale 1:700000.

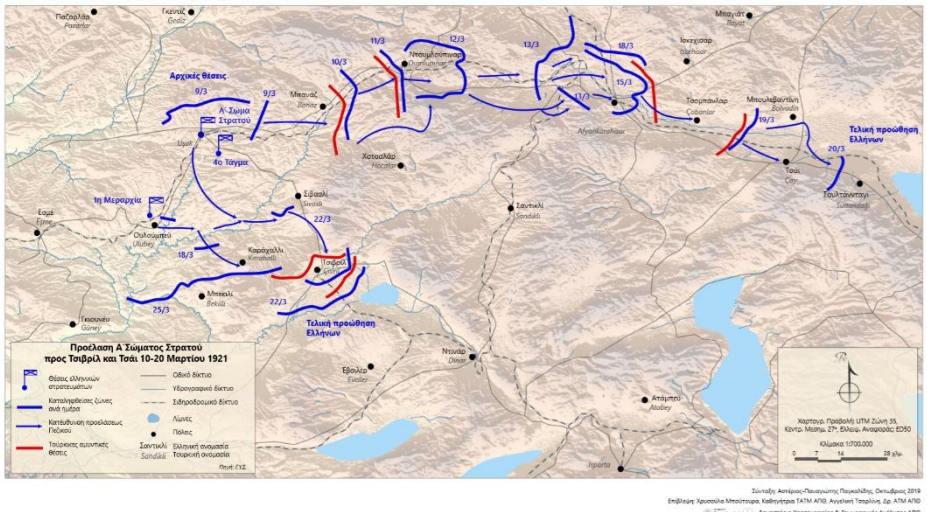

Figure 11: Advance of the Greek forces (I Army Corps) from Uşak to Çivril and Çay, 10-20 March 1921, in scale 1:700000.

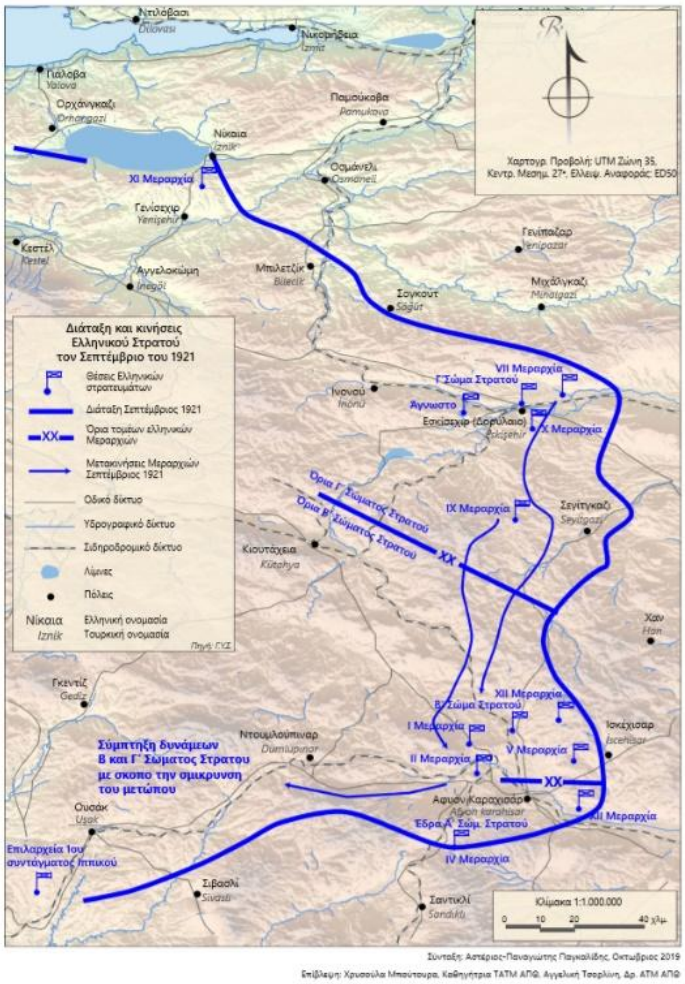

Figure 12: Order of troops and movements of Greek army, in September 1921, in scale 1:1000000.

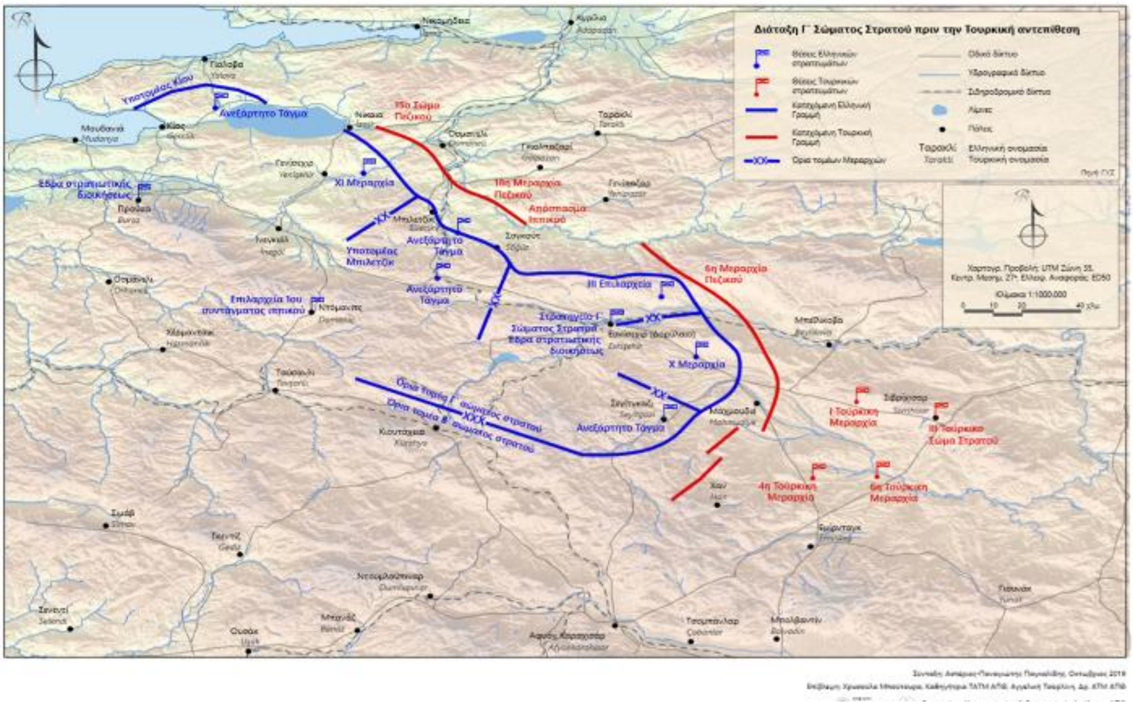

Figure 13: Order of the III Army Corps before the Turkish counterattack, in scale 1:1000000.

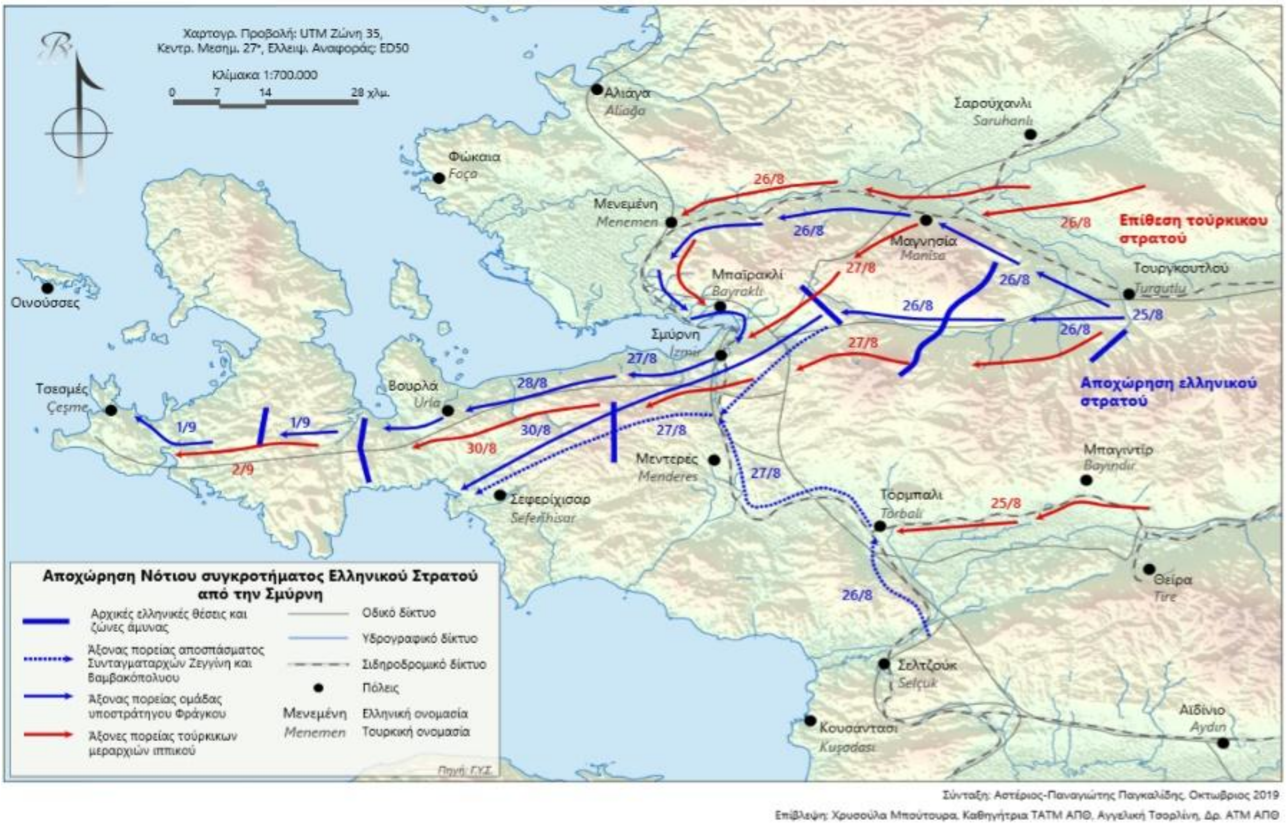

Figure 14: Withdrawal of the southern part of the Greek army from the area of Smyrna, in scale 1:700000.

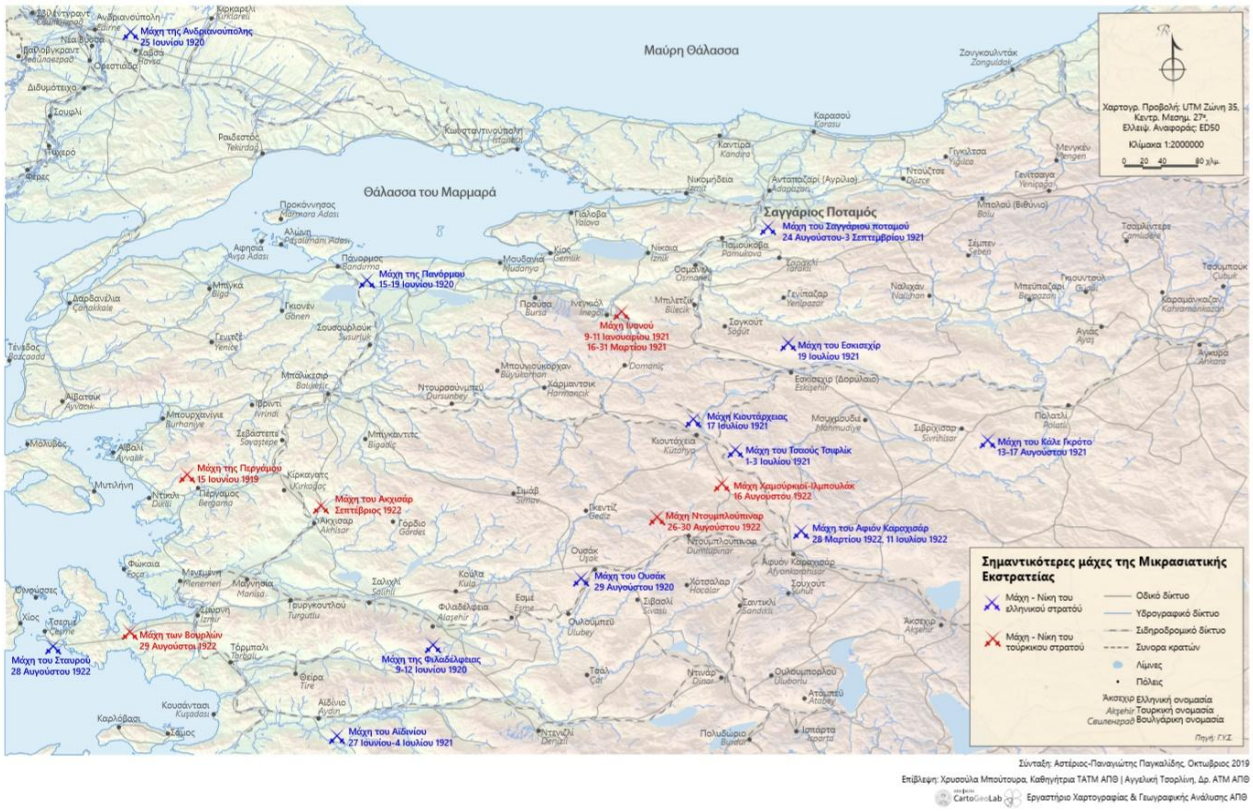

Figure 15: Battles during the Asia Minor campaign, in scale 1:200000.

Figure 16: Occupations of cities by the Greek army, in scale 1:1700000.

Italian campaign in Greece (Greco-Italian War) 1940-1941

In the second case, the area where the Greco-Italian War (28 October 1940 – 27 April 1941) took place was represented consisting the background of the produced maps on which the position of the units, troops movements and other military operations that occurred during this conflict, were visualized on maps together with additional descriptive information referring to the two armies on each historical event. The collected data, after their cross-checking and proper combination and visualization, led to the design and synthesis of a series of 8 maps mainly in scale 1:300000, depicting events happened in the two phases of the war in the area it was occurred, starting at the eve of the conflict's beginning, on 27 October 1940, until its end, in April 1941 (Psarogiorgos 2020).
The main historical events of the two phases depicted on the maps are:

Phase 1 (October 28, 1940 - November 12, 1940)

1. Order of Greek and Axis forces on 27 October 1940 (Fig. 17)
2. Offensive actions of the Axis forces on the front of Epirus (Fig. 18)
3. Battle of Pindus during the period 28 to 30 October 1940 (Fig. 19)
4. General Order of Opposing Forces on 12 November 1940 (Fig. 20)

Phase 2 (November 13, 1940 - April 1941)

1. Offensive actions of Greek forces from 13 November to 19 December 1940 (Fig. 21)
2. Maximum advance of the Greek forces (Capture of Klisoura Pass) in January 1941 (Fig. 22)
3. Plan of the Italian Spring Offensive, the attack of the Axis forces in March 1941 (Fig. 23)
4. Withdrawal of the Greek forces of the Epirus army during April 1941 (Fig. 24)

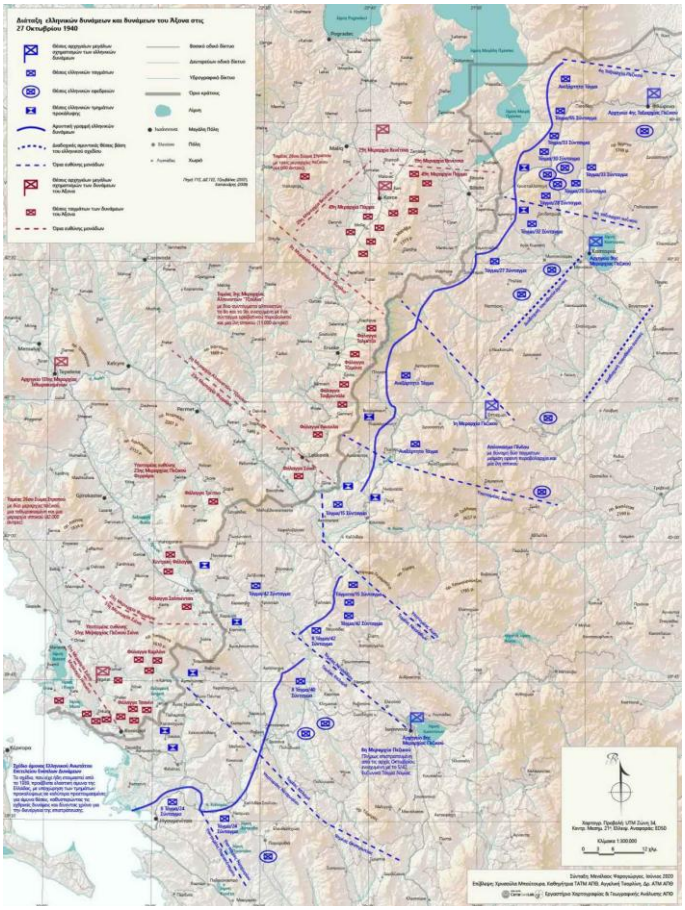

Figure 17. **Phase A**: Order of Greek and Axis forces on 27 October 1940, in scale 1:300000.

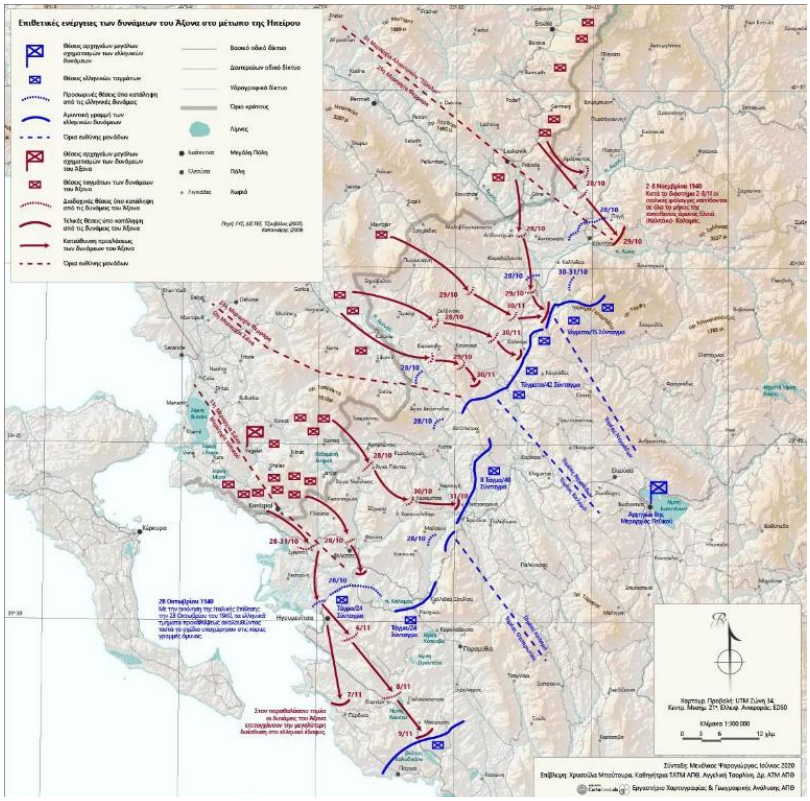

Figure 18. Offensive actions of the Axis forces on the front of Epirus, in scale 1:300000.

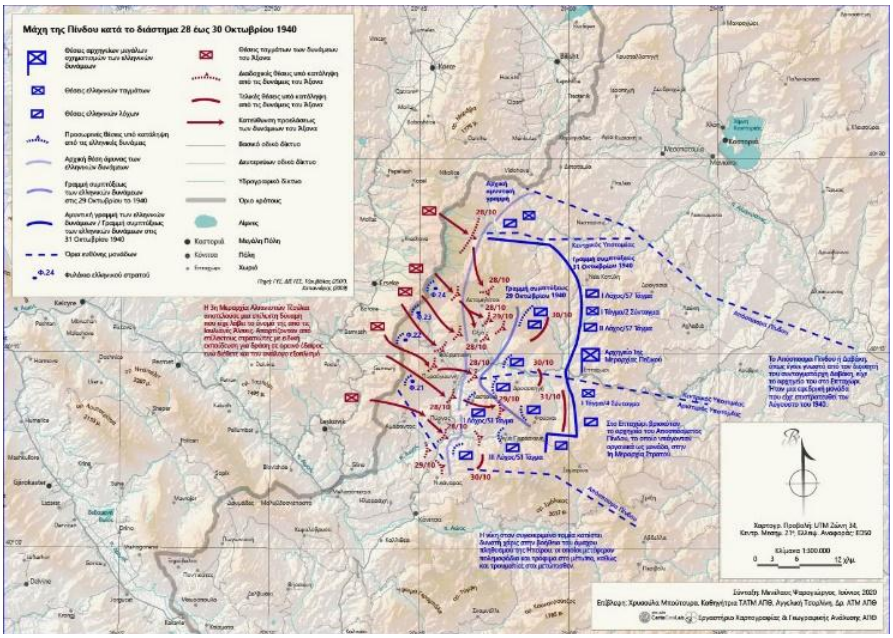

Figure 19. Battle of Pindus during the period 28 to 30 October 1940, in scale 1:300000.

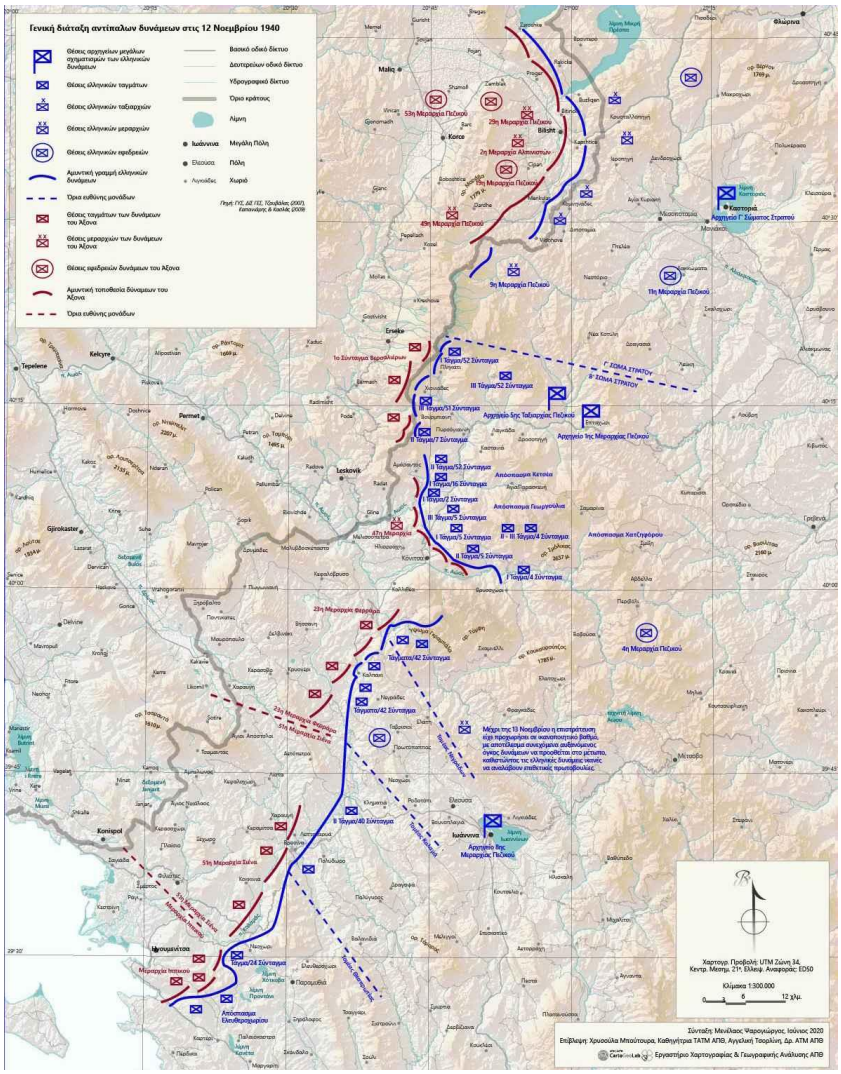

Figure 20. General Order of Opposing Forces on 12 November 1940, in scale 1:300000.

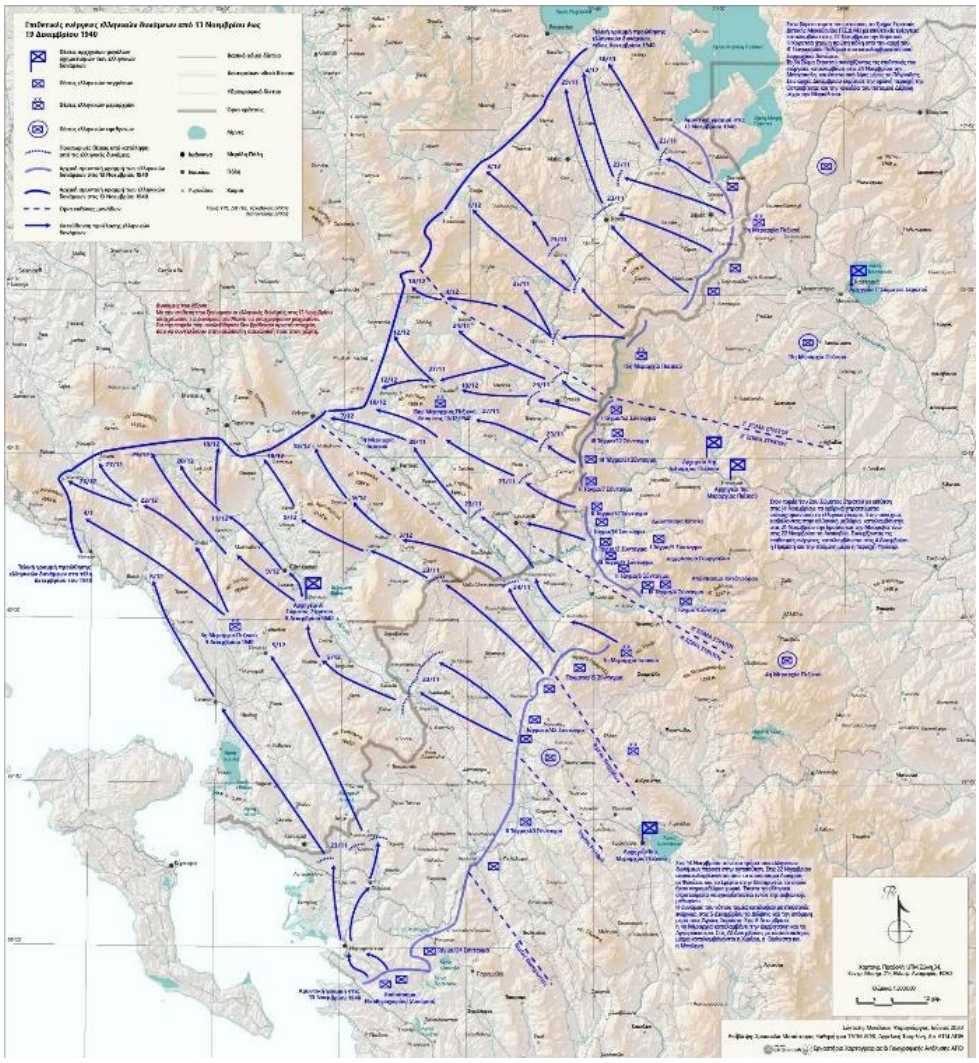

Figure 21. **Phase B:** Offensive actions of Greek forces from 13 November to 19 December 1940, in scale 1:300000.

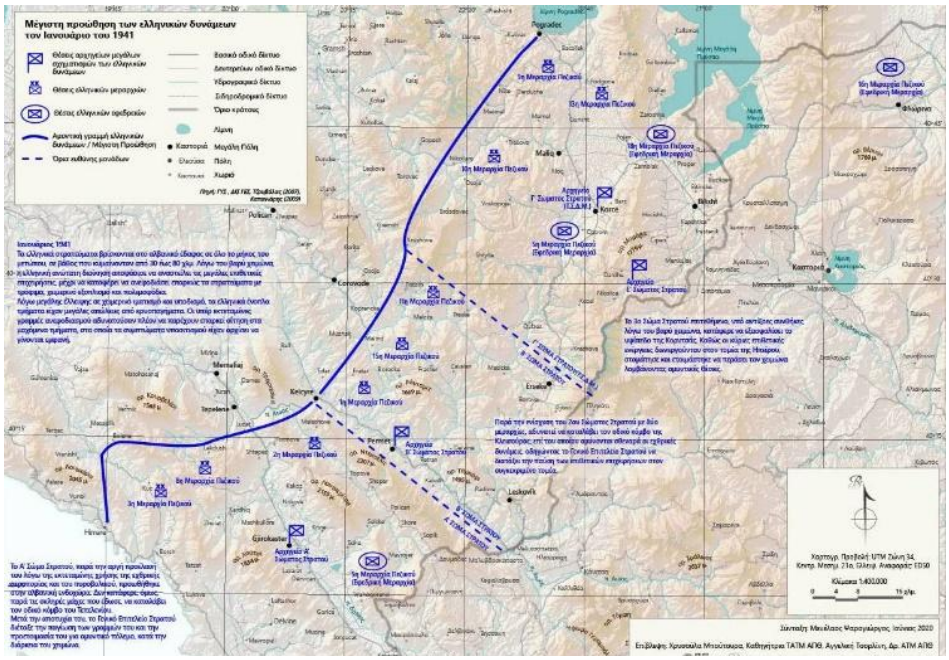

Figure 22. Maximum advance of the Greek forces (Capture of Klisoura Pass) in January 1941, in scale 1:400000.

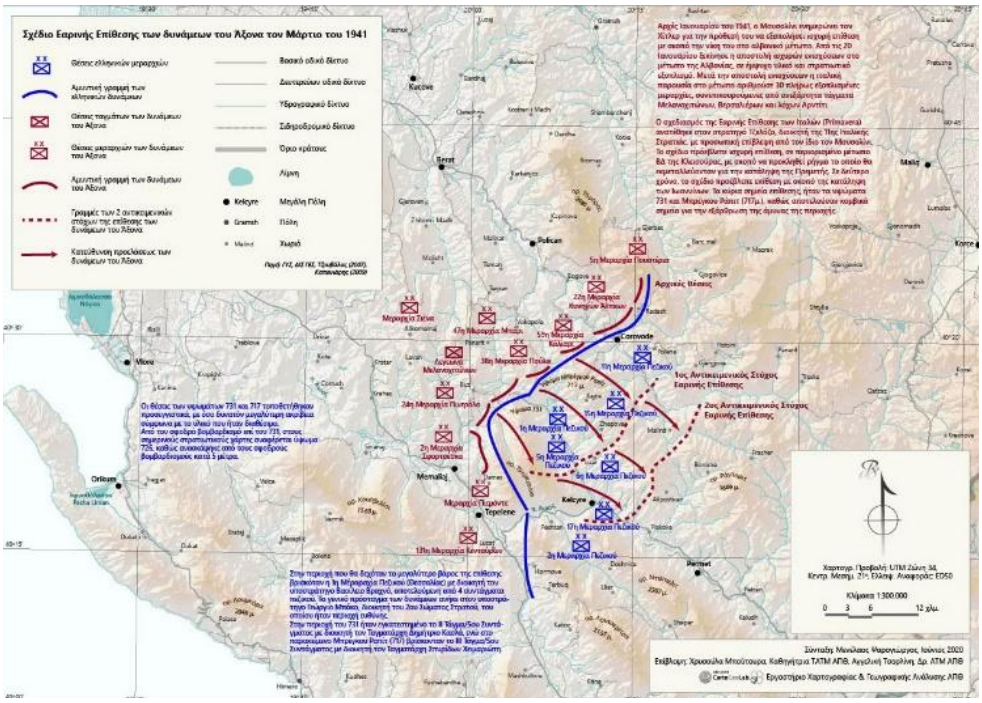

Figure 23. Plan of the Italian Spring Offensive, the attack of the Axis forces in March 1941, in scale 1:300000.

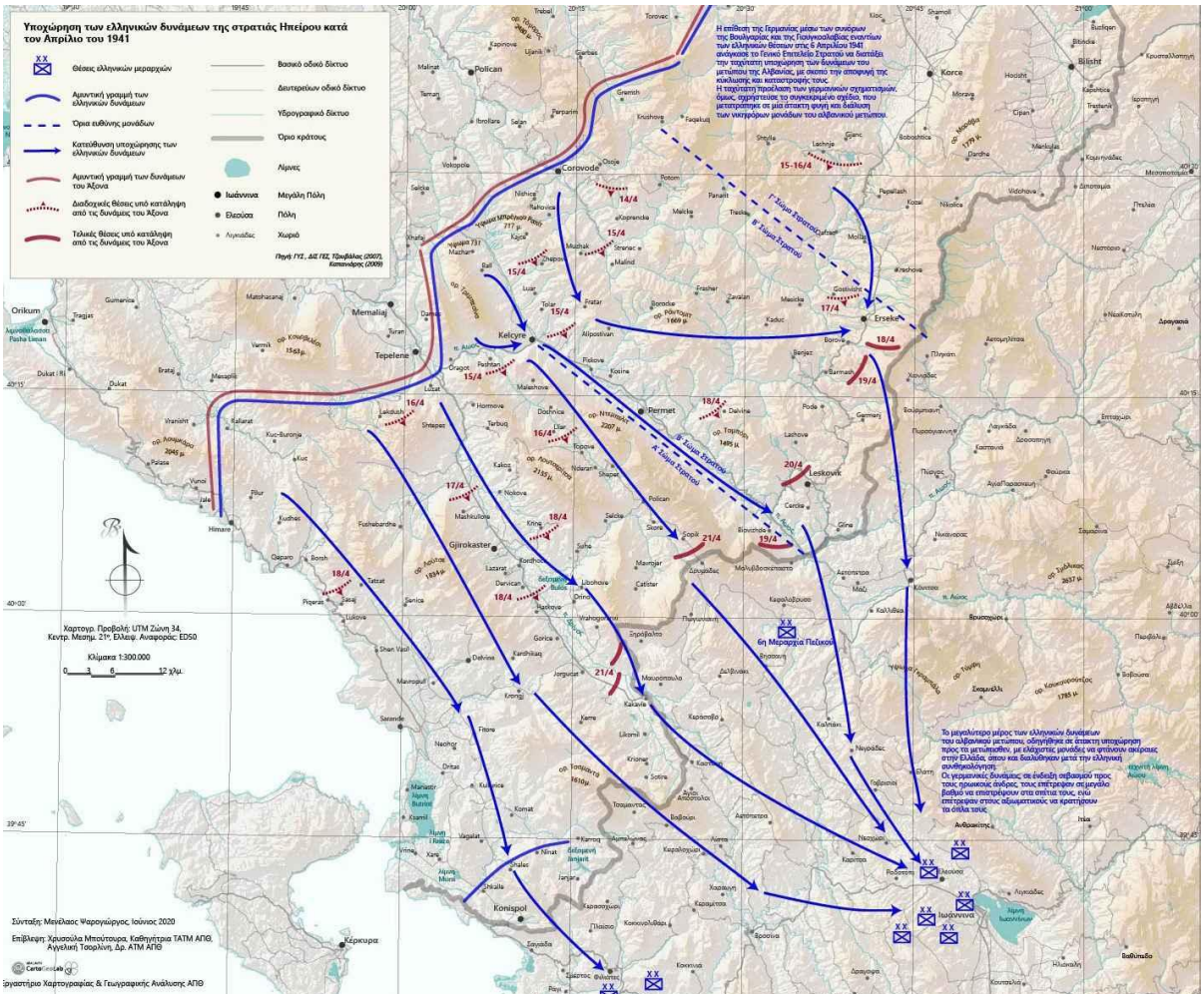

Figure 24. Withdrawal of the Greek forces of the Epirus army during April 1941, in scale 1:300000.

Conclusion

The visualization of historical facts on thematic maps is a very powerful tool, since it provides the opportunity to understand historical events, happened in the past, mining more information about them. The geographic space, the topography and the relief of an area, which most of the times influence the evolution of an event such as a battle, result in arising precious conclusions about the event's outcome, which were probably not possible to come up, if this event was only described in textual sources. Sometimes, aspects of the history which were widely unknown can be revealed through these maps, showing their extent or the influence they had to the evolution of an event. Therefore, a thematic map depicting historical events can be a useful tool for learning history, connecting the events with the geographic space and the physical environment they happened. It is obvious that the combined use of different thematic depictions, for further research, is now possible due to the precise geometric frame of the maps.

Important processes for the visualization of historical events on thematic maps are the collection, analysis, evaluation and digitization of the collected textual data, their combination as well as the selection of the appropriate visualization techniques to be used on the maps. The main goal here is that the map reader or researcher, regardless of its scientific background, gets a clear image of what happened in the past in a more intelligible and interesting way.

References

Allamani E., K. Vergopoulos, A. Veremis, I. Giannopoulos, A. Despotopoulos, A. Dimaras, K. Dimaras, P. Kitromilidis, I. Koliopoulos, G. Leontaridis, S. Loukatos, K. Mamoni, P. Moulas, N. Economou, K. Panagiotopoulou, N. Petsalis-Diomidis, K. Svolopoulos, T. Spiteris, 2008. *History of the Greek Nation*. (In Greek) Vol. 35, Athens: Ekdotiki Athinon.

Boubougiatzi E., 2009. *The persecutions of the Greeks of Ionia 1914-1922*. University of Western Macedonia.

Boutoura C., 2015. *Map design, synthesis and production (how to design a map?)*. Lecture Notes, School of Rural and Surveying Engineering, Aristotle University of Thessaloniki.

Boutoura C., G. Dalas, 2007. "A digital study on the 'Generalkarte' relief representation", *e-Perimetron*, 2, (1): 9-30, http://www.e-perimetron.org/Vol_2_1/Boutoura_Dalas.pdf.

Boutoura, C., E. Livieratos, 1986. "Strain analysis for geometric comparisons of maps". *The Cartographic Journal*, 23:27-34, http://www.ingentaconnect.com/content/maney/caj/1986/00000023/00000001/art00002.

Boutoura C., E. Livieratos, 2006. "Some fundamentals for the study of the geometry of early maps by comparative methods". *e-Perimetron*, 1, (1): 60-70, ISSN 1790-3769, http://www.e-perimetron.org/Vol_1_1/Boutoura_Livieratos/1_1_Boutoura_Livieratos.pdf.

Boutoura C., A. Koussoulakou, C. Mentesidis, A. Tsorlini, 2019. "Digital cartographic documentation and visualization of monasteries and churches in the area of Pontus". 2nd International Conference on "Monastic Centers and Monasticism in Pontus", in the context of the "Evgeneion" of the Holy Metropolis of Nea Krini and Kalamaria, 18-20 January.

HAGS/AHD, 1967. *A Concise History of the Campaign in Asia Minor, 1919–1922*, Athens: Hellenic Army General Staff.

HAGS/AHD, 1985. *An Abridged History of the Greek–Italian and Greek–German War (Land Operations), 1940–1941*, Athens: Hellenic Army General Staff.

Hellenic Military Geographical Service, 1997. Historical Map of Greece. Athens: Hellenic Military Geographical Service, http://web.gys.gr/GeoSearch/GYS/assets/images/gravoures/istorikos_xartis_ellados_2.jpg.

Kapaniaris A., 2009. *Dimitrios G. Kaslas*. (In Greek) Volos: Production-Publication of Prefecture of Magnesia, Prefecture of Trikala, Municipality of Zagora, Municipality of Karditsa.

Kontogiannis P., 1921. *Geography of Asia Minor*. (In Greek) Athens: Community for the dissemination of beneficial books.

Kordatos G., 1958. *History of Modern Greece (1900-1924)*, Vol. 13, Athens: 20th century Publications

Koussoulakou A., A. Tsorlini, C. Boutoura, 2011. "On the Generalkarte coverage of the northern part of Greece and its interactions with the relevant subsequent Greek map series", *e-Perimetron*, 6, (1): 46-56, http://www.e-perimetron.org/Vol_6_1/Koussoulakou_Tsorlini_Boutoura.pdf.

Livieratos E., 2012. *European Cartography and Politics: The Case of Macedonia*. Thessaloniki: Ziti Publications, p. 144, ISBN 978-960-456-372-2.

Livieratos E., 2008. 'The challenges of Cartographic Heritage in the digital world'. *Introduction speech in the 3rd International Workshop on Digital Approaches to Cartographic Heritage*, Barcelona, Spain.

Livieratos E., 2006a. "On the study of the geometric properties of historical cartographic representations". *Cartographica*, 41 (2): 165-175, http://utpjournals.metapress.com/content/rm863872894261p4/.

Livieratos E., 2006b. "A new ICA Working Group on merging cartographic heritage with digital technologies". *Welcome address at 1st International Workshop on Digital Approaches to Cartographic Heritage*, Thessaloniki, Greece, http://xeee.web.auth.gr/ICA-Heritage/Commission/Introduction.pdf.

Livieratos E. (Editor) 2003. *Map-sheets of North Greece*. *The first representation, late 19th - early 20th century*. (In Greek) Thessaloniki: National Centre for Maps and Cartographic Heritage; Athens: ELIA.

Livieratos E., 1989. General Cartography and Introduction to Thematic Cartography. (in Greek) Thessaloniki: Ziti Editions.

Livieratos E., C. Boutoura, K. Papadopoulos, M. Pazarli, N. Ploutoglou, E. Daniil, 2003. *The World of Alexander: Historical map of the panhellenic campaign of Alexander the Great*. On behalf of and with the support of the Bank of Cyprus Cultural Foundation. 100x70 cm. Scale 1:5.500.000. Thessaloniki: National Centre for Maps and Cartographic Heritage.

Mentesidis C., C Boutoura, A. Koussoulakou, 2018. "Historical, digital, geographic and cartographic documentation of toponyms in the area of Ano Matsouka, Trabzon, Pontos". *In Proceedings of 15th National Cartographic Conference of Hellenic Cartographic Society "Cartography of Crisis"*, Thessaloniki: Hellenic Cartographic Society, ISBN 978-960-88380-8-6, pg. 50-64.

Michev B., 2016. "Map exhibits as an important tool for connecting Cartography and the Digital Humanities". In *Proceedings of the 11th International Workshop on Digital Approaches to Cartographic Heritage*, ICA-Commission on Cartographic Heritage into the Digital, Riga, Latvia. ISSN 2459-3893.

National Geographic 2017. *Greece in World War II*. (In Greek) Vol. 1 and 2, Athens: National Geographic Greece.

Pagkalidis A.-P., 2019. *Digital documentation and cartographic representation of historical events occurred during the Asia Minor Campaign (1919-1922)*. Diploma thesis (In Greek). Thessaloniki: School of Rural and Surveying Engineering AUTH.

Psarogiorgos M. 2020. *Digital documentation and cartographic representation of historical events occurred during the Greco-Italian war (1940-1941)*. Diploma thesis (In Greek). Thessaloniki: School of Rural and Surveying Engineering AUTH.

Solotas A.-P., 1995. *The National Tragedy.* Athens: University of Athens (EKPA), Department of Political Science and Public Administration.

Tsorlini A., 2017. *Map design and production.* Lecture notes, School of Rural and Surveying Engineering, Aristotle University of Thessaloniki, http://cartography.web.auth.gr/Carto_design_production/.

Tsorlini A., R. Sieber, L. Hurni, 2017. "Combining current vector data with historical textual data and data extracted from old maps to study the development of the city of Zurich, Switzerland". In: *Proceedings of 12th ICA-Commission Conference on Digital Approaches to Cartographic Heritage*, ICA-Commission on Cartographic Heritage into the Digital, Venice, Italy. ISSN 2459-3893, pp. 29-39.

Tsorlini A., L. Hurni, 2015. "On the georeference and reprojection of old maps in different application software: comparing methodology and results". In *Proceedings of the 10th Jubilee Commission Conference on Digital Approaches to Cartographic Heritage*, Corfu, Greece, ISSN 1790-3769.

Tsorlini A., M. Daniil, M. Myridis, C. Boutoura, 2010. "An example of studying the evolution of a local geographic milieu in early 20th century Greece: Generalkarte (1900-1904) vs National mapping (1917) representations". In: *Proceedings of the 5th International Workshop Digital Approaches to Cartographic Heritage*, ICA-Commission on Cartographic Heritage into the Digital, Vienna, Austria.

Tzouvalas G. 2007. *The Hill 731*. (In Greek) Athens: Pelasgos Publications.

Veremis A., E. Gardika-Katsiadaki, V. Gounaris,. S. Dordanas, A. Kallaniotis, S. Kalyvas, D. Livanios, N. Marantzidis, I. Michailidis, I. Mourelos., I. Nikolokopoulos., N. Papanastasiou, I. Stefanidis, S. Sfetas, E. Chatzivasileiou, 2008. *We the Greeks*. (In Greek) Vol. 2, Athens: SKAI Publications.

Voulgarakis E., A. Tsorlini, C. Boutoura, 2019. "Depicting the Greek communities in "Smyrna Zone", Asia Minor at the beginning of 20th century (1919 – 1922), combining historical maps with textual data". In Boutoura C., A. Tsorlini, E. Livieratos (eds.) *Proceedings of 14th Commission Conference on Digital Approaches to Cartographic Heritage*, ISSN 2459-3893, pp. 34-48, Thessaloniki, Greece.

Web sources:

Aristotle University of Thessaloniki Digital Library, Thessaloniki, Greece, https://digital.lib.auth.gr/

Encyclopedia of the Hellenic World, Foundation of the Hellenic World, Athens, Greece, http://asiaminor.ehw.gr/Forms/fmain.aspx

Open geospatial data and services from Greece, http://geodata.gov.gr/

Geofabrik, an open tool to download free vector data, Germany, https://www.geofabrik.de/

Hellenic Cadastre, https://www.ktimatologio.gr/

Hellenic Military Geographical Service, Athens, Greece, http://web.gys.gr/GeoSearch/GYS/hmgs-historic.html

Natural Earth - Free vector and raster map data at 1:10m, 1:50m, and 1:110m, https://www.naturalearthdata.com/

Openstreetmap, https://www.openstreetmap.org/

United States Geological Survey, U.S.A, https://www.usgs.gov