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ABSTRACT

In this paper, we analyse the nineteenth-century Ottoman cartographic activities and map production in the European parts of their empire. Already weakened by centuries of wars, the Ottoman Empire, in its late phase of territorial regression, had to find a way to compensate the absence of its own mapping activities. That especially came to the fore when the interest of the Ottoman administration in the mapping of the European part of its empire was stimulated by the requirements of its military operations during the Russo-Turkish Wars, as well as by the consequent geopolitical changes that occurred with the independence of certain parts of the empire (Greece, Wallachia and Moldavia, Serbia, Montenegro, and Bulgaria). The solution was found in translating European, mostly Austrian and Russian, topographic maps into the Ottoman Turkish language. This practice resulted in the production of topographic maps that met the military needs of the Ottoman army, but also in a gradual transfer of the Western science and cartographic practice to the Ottoman culture.

KEYWORDS

Ottoman Empire; topographic mapping; military cartography; nineteenth century; the Balkans

Introduction

The European parts of the Ottoman Empire (Turk. Rumelia), which largely coincided with today's term 'the Balkans', constituted the most north-western periphery of their empire. After the Napoleonic Wars, which ended with the Congress of Vienna (1815), the Ottoman territory in Europe included Bosnia, Serbia, Kosovo, Montenegro, Romania, Moldavia, Bulgaria, Albania, Macedonia, and most of Greece. At that time, the Ottoman Empire had already undergone a deep political and economic crisis, which lasted throughout the eighteenth century. Under the Peace Treaty of Karlowitz, signed in 1699, the Ottomans lost a significant part of their holdings in Europe (the whole of Hungary, Slavonia, and most of Dalmatia). Yet it was just the beginning of their withdrawal from the European territory. A series of Austro-Turkish Wars (1716–1718, 1737–1739 and 1788–1791), concurrently with the Russo-Turkish Wars (1768–1774 and 1787–1792), marked a continuation of their territorial decline.

The nineteenth century did not bring any relief. The Ottoman Empire in Europe still had long borders with two mighty empires, the Austrian in the western Balkans, and the Russian in the eastern part of the Balkans. Turkish warfare with the Russians that was to continue throughout the nineteenth century was additionally hampered by a national awakening in the Balkans. National movements for liberation from the Ottomans soon resulted in the emergence of nation-states (Greece in 1829, Wallachia and Moldavia in 1829, Serbia in 1830, Montenegro in 1852, and Bulgaria in 1878), which were pushing the Ottoman territory towards the south-east edge of Europe (by 1913, as a result of the First Balkan War, the Ottomans were driven entirely out of Europe). Ottoman nineteenth-century cartography, which was developing in the conditions of long-lasting warfare with the Russians and the constant struggle against local national movements, should have served as a backbone for military operations and an instrument of maintaining control over territory under their authority.

Ottoman tradition in the translation of European maps

The Ottoman Empire, which was one of the largest administrative institutions in world history, had a pragmatic foundation that left much scope for practical applications of cartography. However, most of the areas of Ottoman administrative practice seem to have been innocent of the manifold uses of cartographic representation (Karamustafa, 1992: 209). Even stranger, the same applies to their military practice as well. While the seventeenth and eighteenth centuries in Europe were marked by the flourishing of cartography, especially the one used for military purposes, the Ottoman Empire, preoccupied by the expansion of the empire, did not perceive cartography as a necessary part of its military doctrine. For the purposes of their military campaigns, instead of maps, the Ottomans preferred to use local people as guides. Only a very limited number of military

maps appeared during their conquest of Europe (mostly pictorial sketches that illustrated their sieges of certain towns). With time, such attitude resulted in major stagnation in the geographic knowledge of the territories that the Ottomans controlled or intended to conquer. Ottoman geographers followed the above-mentioned developments very closely. They observed the political and territorial decline of their empire and decided to offer remedies (Emiralioğlu, 2007: 106). From the mid-seventeenth century onwards, Ottoman geographers and cartographers turned their attention to the West and started translating European geographic knowledge into the Ottoman Turkish language. The milestone in the Europeanization of Ottoman knowledge was Kātib Çelebi's translation of Gerhard Mercator's Atlas minor in 1653-1655. This was followed by Ebū Bekir ibn Behrām el-Dimāşki's translation of Joan Blaeu's Atlas Maior in 1675–1685. Such translations from European languages gradually became the norm (Karamustafa, 1992: 218). Ottoman maps that were prepared as translations of European maps were often used for military purposes as well, compensating for the lack of original topographic maps. The Ottoman map that was confiscated by Prince Eugene of Savoy, a general of the Austrian Imperial Army, during the battle of Petrovaradin (1716) confirms that. The large manuscript map that shows the European parts of the Ottoman Empire is actually a translation of Nicolas Sanson's map of Hungary and neighbouring countries from 1697.¹ Moreover, the Ottomans used European maps for the purposes of peace treaties, which defined new borders of their empire. The demarcation maps that were part of the Austro-Turkish peace treaties of Karlowitz (1699), Passarowitz (1718) and Sistova (1791) were all drawn by Austrian cartographers and then translated by Ottoman officers into the Turkish language to be enclosed to their copy of the peace treaty document².

While these maps were manuscripts, only to a small number of privileged individuals, the advent of print instigated the dissemination of geographic knowledge to the wider public, as well as its application in various areas of life. The development and implementation of printing in Ottoman cartography, beginning with the printing house of Ibrāhim Müteferriķa, established in the Istanbul district of Üsküdar in 1727, enabled to compensate the absence of their own significant mapping activities at a larger scale.³ Yet Müteferriķa's maps were mostly translations of European templates as well. The map of the Ottoman Empire from 1726 to 1727, titled *Memalik-i 'Osmantye haritasi* and attributed to Ibrāhim Müteferriķa, is actually a translation of Johann Baptist Homann's map *Imperii Persici* (Nuremberg, 1724) (Goodrich, 1993: 126). Something similar can be said of the map of the region north of the Black Sea, which was signed by Ressām Musţafā and dated 1768/1769. To the Ottoman Turks, these maps both afforded practical knowledge for further conquests and projected Ottoman imperial inspirations toward being a world power (Emiralioğlu, 2007: 107).

To summarize, we can conclude that the Ottoman tradition of adopting knowledge from the West was rather long. These seventeenth- and eighteenth-century translations mark the entry of European geographical knowledge into Ottoman culture. The eventual result of such practice was that the European style of cartography became firmly rooted in Ottoman scientific circles even before the nineteenth century. After the opening of technical colleges, such as the Imperial Ottoman School of Engineering, which was founded in 1769, courses on geography and cartography were taught along Western lines, officially incorporating European tradition into the Ottoman curriculum (Orhonlu, 1977: 275). This long and gradual process of substitution of own cartographic tradition with Western science and cartographic practice would reach an even higher level during the long nineteenth century.

Establishing the New Order reforms (Nizam-i-Cedid) and their reflection on cartography

As an additional effort to incorporate European military and economic achievements into the Ottoman system, Sultan Selim III carried out a series of reforms also known as the New Order (Nizam-i-Cedid), which were introduced between 1792 and 1807. The central objective of the reforms was the creation of a professional army along European lines and a private treasury to finance military spending, as well as other administrative reforms. As part of the reforms, in 1793, the second military engineering school, originally called the Mühendishane-i Cedide or New Engineering School, was established with the objective of providing modern education to artillery officers. Having seen his armies easily routed by European forces, Selim III brought foreign lecturers to serve as military advisers, with French as the language of instruction (Hanioğlu, 2008: 44). As cartography was recognized as a key issue in military education, a state printing press that would support the publishing needs of the military proved to be necessary. Thus, to support the reforms, Selim III also ordered the establishment of the first state press, which would be in charge of map printing as well.⁴ Since 1797, all translated maps and atlases were printed under the control of Müderris Abdurrahman in the Mühendishane Printing House in Selimiye (Üsküdar). The same printing house was assigned with the task of preparing an atlas that needed to be compiled to provide students and faculty at the new school with contemporary geographic and cartographic practice. The atlas titled Cedid Atlas Tercümesi [A Translation of a New Atlas] (Istanbul, 1803) was, in fact, prepared for use at the new Ottoman Military Engineering School.⁵ All

maps in this atlas were taken from an edition of William Faden's *General Atlas*, which had been acquired by Mahmud Ra'if Efendi (d. 1807), when he was private secretary to the Ottoman Ambassador in London. Translated into Ottoman Turkish by Jakovaki Efendi and with all the maps re-engraved under the direction of Abdurrahman Efendi, it was the first Muslim-published world atlas completely based on European geographic knowledge and cartographic methods. Besides Mahmud Ra'if's original geographic introduction (*Ucaletü'l-coğrafiyye*) [Handbook of Geography], the atlas contained 25 copperplate maps, including two small-scale maps showing the European parts of the Ottoman Empire and the wider Balkan area, which provided only a general overview of the Ottoman territory in Europe.

Ottoman production of topographic maps after the establishment of the General Staff (*Erkan-i Harb*)

The first surveying school in the Ottoman Empire was established in 1818, but there are no specific records on education and graduates of this school. The first significant milestone in the development of cartography happened with foundation of the Imperial Military Academy (*Mekteb-i Harbiye-i Şahane*) in 1848, which included courses in cartography and geodesy. Again, Western cartography was taken as a role model, therefore young Ottoman officers were sent to England and Prussia and especially to France, to the Ottoman School (*Mekteb-i Osmaniye*) founded in Paris in 1859. The education programme of the Military Academy included courses on modern cartography, such as topography, optical survey instruments, map drawing, shading, hachuring, geodesy, and determination of road routes (Önder, 2002: 73). Although the first cartography branch was formally established within the Armed Forces in 1853, an effective mapping organization could not yet be established. Finally, in 1860, the General Staff (*Erkan-1 Harb*), the first official cartographic organization of the Ottoman Empire, was established that with time became the major force in the development of field surveying and topographic mapping. Yet, even after its establishment, the publication of translated or copied topographic maps continued to be the major practice in Ottoman map production.

In the mid-nineteenth century, the interest of the Ottoman administration in the mapping of the European parts of its empire was further urged by the requirements of its military operations during the Russo-Turkish Wars, as well as by the consequent geopolitical changes that occurred with the independence of certain parts of the empire. The emergence of nation-states, such as Greece, Serbia, Wallachia and Moldavia, which occurred in the aftermath of the Treaty of Adrianople/Edirne that ended another Russo-Turkish War (1828–1829), once again pointed out the absence of proper maps that would support Ottoman military operations. The main source of topographic information to the Ottoman army continued to be foreign maps. The war, whose battlefields stretched between present-day Bulgaria and the Caucasus, urged a new survey conducted by Russian military topographers whose maps significantly improved the representation of the eastern part of European Turkey.⁶ Besides Russian topographic maps, a more accessible source to the Ottoman army represented the printed maps of European Turkey produced for the Austrian General Staff, especially those by Franz von Weiss.⁷ On the eve of a new Russo-Turkish war (the Crimean War of 1853-1856), a new source for the Ottoman army appeared when Heinrich Kiepert started to compile his maps of Bosnia and Herzegovina (Weimar, 1840),⁸ Serbia (Weimar, 1849 and 1853),⁹ Montenegro (Berlin, 1853 and 1862),¹⁰ Walachia (Weimar, 1849),¹¹ and, finally, of the whole of European Turkey (Berlin, 1853).¹² As syntheses based on original local sources (mostly Austrian, Serbian and Russian), Kiepert's cartographic representations had all the characteristics of military outline topographic maps, and were often used by the Ottoman administration. His maps that appeared at a time of growing instability in the western part of the Ottoman Empire (the unrest in Bosnia and Herzegovina did not subside, the Albanian revolt in Kosovo broke out in 1844, and the Montenegrin rebellion against Ottoman rule resulted in the declaration of Montenegrin independence in 1852) would largely serve the military and diplomatic purposes of the empire.

Evidence of use of Kiepert's maps by the Ottoman General Staff came to the fore when the border between Montenegro and the Ottoman Empire needed to be officially demarcated in 1860. For that purpose, in 1862, Kiepert's map of Montenegro, at a scale of 1:500 000, was translated into Ottoman Turkish and used for the purpose of compiling a report on a new boundary with Montenegro (Figure 1).¹³ In addition to the newly established borders, the representation includes the administrative division of the territory, the main settlements, traffic communications, and the relief depicted by hachures. In regard to the content and coverage, this Ottoman edition coincided with Kiepert's map (with the exception of Kiepert's coordinate grid referring to Ferro, which is excluded from the Ottoman copy). The only Ottoman addition to this map was an illustration at the top and an extensive text at the lower edge containing a report on the war between the Ottomans and the Montenegrins in 1858.¹⁴ Untypically, the map is also accompanied by European-style iconography (cartouche and illustration with symbols of the Ottoman armed forces).



Figure 1. Map of Montenegro prepared by the Ottoman General Staff in the scale of 1:500 000 for the purpose of demarcation after 1860 (Courtesy of the Staatsbibliothek zu Berlin – Preußischer Kulturbesitz).

The first more extensive endeavour in Ottoman map production appeared after the Crimean War (1853–1856), when the transliteration of Austrian and Russian topographic maps into the Ottoman script was made by the Office of the General Staff during the 1860s (Öktem, 2008: 14). In the map production process, they would usually keep the original content and scale (generally, 1:210 000 from Russian and 1:300 000 from Austrian maps), however, the local toponymy would be not only translated/transliterated, but more often renamed/replaced by Turkish names. In that way, a certain toponymical engineering began that would culminate in the early twentieth-century Ottoman maps, which openly strived to erase any evidence of ethnic and/or religious heterogeneity. The Ottoman topographic maps of that generation mostly remained in manuscript and were never published.

Further topographic activity at the time of the Balkan Crisis of 1875–1876

A rebellion in Herzegovina (1859) and a border demarcation treaty between the Ottoman Empire and Montenegro (1860) underlined the Ottoman need for more detailed topographic maps of the western Balkans. For this purpose, based on the 1869 map of Montenegro and neighbouring countries prepared by the Austrian General Staff at a scale of 1:144 000¹⁵, the Ottoman General Staff published its own topographic map of the same area in 1876 (Figure 2).¹⁶ Prepared at the same scale as the Austrian map, it is one of the earliest medium-scale topographic maps published and printed by the Ottoman General Staff. The result was quite good. Although the map is not accompanied by a coordinate grid (and neither was its template), the detailed representation of relief, abundant toponymy, and the precise depiction of the road system and the boundaries, established in 1860, give the map all the necessary qualities. Moreover, it is noticeable that Ottoman cartographers put additional efforts to improve the representation taken from the Austrian source. That especially refers to the representation of relief. While the Austrian original gave the relief of Montenegro by shading (that was not the case with Dalmatia on the same map), Ottoman cartographers managed to convert it into hachures. This intervention into the map confirms that they did not rely upon the Austrian map exclusively, but also strived to supplement the map with their own data. The most possible source for additional information they included into their map, including the upgraded representation of relief, is the Russian 1:168 000 topographic map of Montenegro prepared by the



Figure 2. Topographic map of Montenegro at a scale of 1:144 000 prepared by the Ottoman General Staff in 1874 based on an Austrian topographic map of the same area (Courtesy of the Military Archives in Vienna).

officer of the Russian General Staff, Pavel Bykov, in 1866 (Altić, 2015: 54).¹⁷ In the right upper corner, there is an ancillary map of the Nikšić region (part of Montenegro still under the Ottomans and an important Turks' stronghold until 1877) presented at a particularly large scale. The map is accompanied by a European-style cartouche, which makes a strong statement about Ottoman military power (unrecognized internationally, Montenegro was still considered an Ottoman province).

The outbreak of an anti-Ottoman revolt in Bosnia and Herzegovina in 1875, which was soon followed by that in central Bulgaria (1876), provoked extremely tense relations among the European Great Powers, known as the Eastern Question. The rebellion provided Serbia and Montenegro with an opportunity to shed Ottoman suzerainty entirely. Thus, they decided to declare war on the Ottomans.¹⁸ The Russians supported the Serbs and the Montenegrins, prompting Britain to intensify its efforts to preserve intact what remained of the Ottoman Empire in Europe. At the same time, the Austrians sought to validate their Great Power status by dominating the Serbs and Herzegovina, the Ottoman army had the above-mentioned 1:144 000 map by the Austrian General Staff at its disposal. However, when it comes to Serbia, the shortage of proper mapping required prompt action from the Ottoman General Staff. To fill the gap, the old solution was applied – in a short period of time they managed to prepare Ottoman editions of two European topographic maps of Serbia.

The first one was based on Heinrich Kiepert's map of Serbia (1853). Prepared by the Ottoman General Staff at a scale of 1:750 000, the map shows the territory of Serbia within its borders established in 1833 (Figure 3)¹⁹. Although the scale is slightly enlarged compared to Kiepert's template, the coverage and content of the map coincide almost exactly (even the layout of the title and the scale are kept the same on both maps). Kiepert's coordinate grid that refers to Ferro and Paris is removed in the Ottoman edition, but the representation of relief is significantly improved. The representation of relief by shading is now replaced with a much more exact method of hachuring, but the height points noted in Kiepert's original are excluded. The map was



Figure 3. Ottoman outline map of Serbia at a scale of 1:750 000 produced by their General Staff in 1876 by using Heinrich Kiepert's map of Serbia as a template (Courtesy of the Military Archives in Vienna).

supplemented with some more recent data, such as the Skopje-Mitrovica railway, which was put into service in 1874. In certain other aspects, the Ottoman version shows some shortcomings. That especially refers to the representation of rivers and roads, which are represented by the same type of lines, thus causing confusion and great difficulty in reading the map. Moreover, the toponymy is significantly reduced to the main settlements located along the roads. The map was obviously prepared in a great hurry with not much time for details.

For a more detailed insight into the Serbian territory, the Ottomans prepared another topographic map at a scale of 1:350 000 (Figure 4).²⁰ For that purpose, they chose a Serbian topographic map as a template. At that time, the Serbians had just started their own cartographic production that was mostly based on Russian and Austrian data. What distinguished Serbian maps from most of their Austrian and Russian counterparts was the fact that they were printed and publicly available. A map of the Principality of Serbia by Jovan Milenković, printed in Belgrade in 1850, was prepared at a scale of 1:300 000. Although it was not a military map, by its scale and content, it had many features of a topographic map. Milenković was presumably a civilian member of the Serbian-Ottoman-Russian border commission, which demarcated the Serbian border in 1833, and thus had an insight into military maps of both sides, Ottoman and Russian. With time, he managed to prepare his map for print, which enabled better dissemination of geographic information on Serbia (Škalamera, 1991: 146). The map was well received in Serbia and used for administrative purposes (the internal territorial division is noted, as well as many economic facilities, such as lead, copper and iron mines, quarries, thermal springs, and so on). When the Ottoman General Staff took Milenković's map to prepare its own edition in 1875, it did not implement any significant changes, but kept the complete toponymy and the same explanation key, including the symbolization for all the objects presented on the map and the markings of height points (Figure 5). As usual, the authors eliminated the coordinate grid and reduced the scale from 1:300 000 to 1:350 000. The map was published as a monochrome lithographic print with hand-colouring of rivers, borders and inner territorial division.



Figure 4. Ottoman topographic map of Serbia at a scale of 1:350 000 prepared by the Ottoman General Staff in 1875 (Courtesy of the Military Archives in Vienna)

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Figure 5. Explanation keys of Milenković's 1850 map of Serbia and of its edition prepared by the Ottoman General Staff in 1875.

Austrian triangulation of European Turkey (1871–1875) and production of Ottoman topographic maps of Bosnia, Serbia and Montenegro in 1877

In an atmosphere of preparations for the new Russo-Turkish War of 1877–1878, and aware of the fact that the existing Ottoman topographic maps could not address all technical issues regarding the Balkans, the Ottoman government authorized the Austrian military authorities to triangulate the European part of its empire during the Austrian topographic survey of the Austro-Hungarian Monarchy. In the 1871–1875 period, Bosnia-Herzegovina, Albania, Montenegro, southern Serbia (under Ottoman rule), Kosovo, Bulgaria, southern Romania, Macedonia, and northern Greece were thus covered by the Austrian triangulation network (Kovác and Timár, 2009: 917). Based on this triangulation, the Military Geographical Institute in Vienna published a provisional edition of the *General-Karte von Bosnien, der Hercegovina, von Serbien und Montenegro* in 1876 (Haardt v. Hartenthurn, 1902: 156).²¹ The map, which consisted of 12 colour lithographed sheets, was compiled at a scale of 1:300 000, referring to Paris as its prime meridian. Accompanied by a coordinate grid, astronomical, trigonometric and points of graphical triangulation, a detailed classification of roads and settlements according to their population, with wooded areas marked in green and relief shown by brown shading, this series represents the first modern geodetically based medium-scale topographic map of the north-western part of the Ottoman Empire (Figure 6).²²

The Ottoman edition of this map (Bosna ve Hersek ve Sırbiya ve Karadağ) was published by the Imperial Military Academy (Mekteb-i Fünūn-i Harbiye-i Şahane) in Istanbul in 1877.²³ Both series, Austrian and Ottoman, have the same sheet lines. Although Ottoman cartographers tried to make their map as close to the



Figure 6. Detail of the sheet Skodra, 1:300 000, by the Military Geographical Institute (Vienna, 1876) (Courtesy of the Military Archives in Vienna).

Austrian template as possible, the printing capabilities limited the Ottoman General Staff from achieving the same quality (Figure 7). They managed to produce all sheets of the map at the same scale (1:300 000), and use the same colours (black for roads, place names and rivers, green for wooded areas, and brown for relief), but not with the same result. Because of printing limitations, they had to significantly reduce the content and change the symbolization applied to the Austrian sheets. There is no classification of roads and settlements (all localities are marked with the same simple circle symbol), wooded areas are presented in green colour, but very imprecisely. The abundant toponymy present is notably reduced to main settlements. Due to the use of almost the same marking lines for both roads and rivers, the legibility is severely reduced, particularly in mountainous areas. The lower print quality especially affects the representation of relief. Well applied in the Austrian copy, brown shading becomes rather blurred and illegible in the Ottoman edition. However, despite the abovementioned shortcomings, that was the first Ottoman topographic map that was based on first-, second-, and third-order triangulation and accompanied by a full coordinate grid (according to the Paris prime meridian), enabling the Ottoman artillery to achieve greater efficiency on the battlefield. It was exactly the map that the Ottoman army used during the Russo-Turkish War of 1877-1878, as well as during the negotiations of the Congress of Berlin in 1878.²⁴ Strangely enough, the Ottomans omitted to prepare the edition of the Austrian 1:300 000 sheets of Central Europe that covered the north-eastern part of the Balkans, where most of the 1877-1878 battles took place.²⁵ A series for the eastern part of the Balkans (1:300 000) was prepared by the Ottoman General Staff as late as in 1883, five years after the war ended. Although they sought to keep the same style applied to the sheets of the western Balkans, some differences can be noticed, primarily in the marking of wooded areas whose representation is omitted in the sheets of the eastern Balkans.

Ottoman cartography in the aftermath of the Congress of Berlin

A significant step in the development of Ottoman cartography in the nineteenth century was taken in 1880, with the establishment of the Mapping Department, and, subsequently, in 1895, with the establishment of the Mapping Commission as a unit subordinate to the Fifth Department of the Turkish General Staff (Sarıcaoğlu, 2009: 124). For the purposes of their work, a theodolite and some instruments for astronomy and gravimetry were brought from



Figure 7. Detail of the sheet Skodra, 1:300 000, by the Ottoman General Staff (Istanbul, 1877) (Courtesy of the Bavarian State Library).

France, and the first mapping studies based on the essentials of the base and triangulation started in the Vardar basin in 1895 (Önder, 2002: 74). The new organizational structure enabled the intensification of cartographic production. The map of the Ottoman Empire at a scale of 1:300 000 was planned and estimated to comprise 74 sheets. Although preparation work started and the base line was being measured, until 1893, only 24 sheets of Asia Minor were finished in lead drawings while European Turkey was not even started (Haardt v. Hartenthurn, 1902: 334).

The new mapping endeavour was taken at the dawn of the twentieth century. Using the above-mentioned Austrian 1:300 000 topographic map of Central Europe, as well as the 1:210 000 and 1:126 000 maps of the eastern Balkans, which were compiled by the Russian General Staff in 1884,²⁶ by 1901–1902, the Ottoman General Staff created a 1:210 000 topographic map of the European part of the Ottoman Empire (*Rumeli-i şahane haritası*) consisting of 73 multi-coloured lithographed sheets (Figure 8).²⁷ The most distinguished cartographer involved in its production was Lieutenant General Hafiz Ali Şeref (d. 1907). After graduating at the Ottoman School in Paris, he was promoted as the Commander of the Cartographic Section of the Mapping Department. During his period of service at the General Staff he prepared the majority of the 73 sheets of the 1:210 000 topographic map of Rumelia (Önder, 2002: 73).

The map covers what was left of the empire after the Congress of Berlin: Albania, Kosovo, Macedonia, Northern Greece, Eastern Rumelia, and Thrace, referring to Paris as the prime meridian. The scale of 1:210 000 was chosen to conform to the Russian 1877/1878 sheets of the same scale (even the same sheet lines were kept). Comparing the coverage of the Austrian sheets, the four Turkish sheets (34 × 30 cm) correspond exactly to one Austrian. The map is accompanied by a detailed explanation key, which coincides with the key of the Russian 1:210 000 map. There is an extensive list of symbols for settlements (several categories in regard to their population), astronomical, trigonometric, and geodetic points, road network (classified into several categories), bridges, utilities, such as post offices, telegraph lines, windmills, lighthouses, anchorages, and then mosques, madrasas, synagogues, churches, monasteries, as well as land use (fields, orchards, vineyards, rocks, sand, and moors are represented by the usual black and white symbols, while pasture lands and woods are marked with different shades of green) (Figure 9). However, many of the symbols listed in the explanation key were actually not applied in the Ottoman sheets. The only land use categories marked in the Ottoman sheets are woods and pastures while all the rest are excluded. Also, the Ottoman representation of the road network is generalized, showing only the main directions without any small bends or branches.



Figure 8. Sheet of the Ottoman 1:210 000 topographic map of Rumelia produced by its General Staff in 1901/1902 (Courtesy of Harvard University).

The biggest step forward was achieved in the representation of terrain configuration. This was the first series of Ottoman topographic maps, on which relief was represented by contour lines (interval 50 m). As the Austrian 1:300 000 sheets still showed the relief by shading, contour lines were taken from the Russian 1:210 000 and 1:126 000 topographic maps. Contour lines drafted in brown colour and accompanied by numerous height points (in metres) enabled great progress in relief representation. Partially, the Ottoman sheets were supplemented with additional topographic data, especially for those areas where the Austrian 1:200 000 or 1:75 000 sheets that contained contour lines were already available. This is especially evident in the area around Scutari, where the basis measurements of the Austrian triangulation of Montenegro and Dalmatia were carried out.

While the Ottoman representation of physical geography showed significant progress, in many cases surpassing the Austrian sheets, the same elements of human geography proved to be more difficult. Abundant toponymy from the Austrian sheets is reduced to just the main settlements in the Ottoman map. One of the reasons for such decision were probably the difficulties in printing Ottoman Turkish lettering, which took more space on the map than Roman one. Moreover, Ottoman Turkish lettering of place names was not uniformly applied. In the western sheets, the Turkish cursive script (Ruq'ah) was used almost exclusively, while a more legible alphabet of Fuad Pasha was employed in the eastern sheets (Haardt v. Hartenthurn, 1902: 332). The Ottoman sheets used only official Ottoman names that were often unknown to the local population, but used only by the officials. In the regions with a Turkish majority, the nomenclature was extremely clear. However, the transcription of Slavic, Albanian and Greek letters was an arbitrary one with lots of inaccuracies. In the sheets that covered Bulgaria and Eastern Rumelia, Turkish nomenclature was retained despite the fact that, after Bulgarian independence, these place names were replaced with historical Bulgarian toponymy. In addition, the map showed the border of the Ottoman Empire after the Congress of Berlin of 1878 with no references to further



Figure 9. Title and explanation key of the 1:210 000 map of Rumelia from 1901 to 1902 (Courtesy of Harvard University).

territorial changes that occurred in Greece (Thessaly and part of southern Epirus were acquired by Greece in 1881) and Bulgaria (Eastern Rumelia united with Bulgaria in 1885). Despite some shortcomings, the publication of this 1:210 000 map of Rumelia is considered the beginning of modern Turkish cartography.

Concluding remarks

Notwithstanding the significant progress that Ottoman cartography experienced during the long nineteenth century, the lack of original surveys limited their topographic map production to the translation/transcription of European sheets into the Ottoman Turkish language. Their long tradition in adopting Western knowledge in the field of cartography enabled an easy transition into European-style topographic maps that were used in battlefields of the European part of the Ottoman Empire. However, the Ottoman map production that was based on the adaptation of foreign templates was not without difficulties. The biggest limitation arose from the limited technical capabilities of their press. The printing of the Ottoman Turkish letters was more demanding than the printing of the Roman or Cyrillic ones (they took more space on the map), thus the number of place names in Ottoman sheets had to be significantly reduced. The detailed classification of land use were also difficult to print, so the cartographers of the Ottoman General Staff had to adjust the symbolization to the capabilities of their press. Although at first they avoided to accompany their sheets by a grid, in the second half of the nineteen century, they fully adopted the coordinate grid according to Paris, as well as the metric system of measurement, which greatly helped the efficiency of their artillery.

The greatest development of Ottoman nineteenth-century cartography can be noticed in the representation of relief. Brown shading from the Austrian sheets was successfully replaced with hachuring. Highly developed Russian cartographic practice, which introduced the use of contour lines as early as in the 1870s, enabled Ottoman cartographers to apply the same technique of relief representation and produce sheets accompanied by contour lines even before the appearance of the Austrian General Staff's sheets (most of the Austrian 1:200 000 sheets with contour lines for the Balkans were produced several years after the Ottoman sheets).

However, in spite of some progress that was achieved, they continued the practice of using foreign sheets for their military needs even on the eve of World War I. Thus, when the Ottomans occupied parts of Bulgaria

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during the Second Balkan War, in 1913, the Ottoman General Staff used the original Bulgarian 1:40 000 sheets, but overprinted them with Ottoman Turkish place names to meet the needs of their own military operations. In this sense, Ottoman nineteenth-century cartography and the map production of their General Staff represent a unique example of a relatively efficient production of topographic maps with almost no original surveys conducted. By skilfully adapting Austrian and Russian sheets to their military and administrative needs, they succeeded in compensating for the lack of their own field activity, and managed to maintain a satisfying production of topographic maps.

Notes

- [Map of European parts of the Ottoman Empire]. Scale ca. 1:1 100 000. Manuscript in colour; 156 × 111 cm. Military Archives in Vienna, Map Collection, B.III.a.41. According to the note on the back of the map, it was confiscated by the Austrian army during the defeat of the Ottomans in the battle of Petrovaradin on 8 August 1716. Ironically, due to a lack of recent information on Ottoman territories, Sanson's map that they translated shows the borders as they were before the Ottoman incursion.
- 2. For the purpose of demarcations, a joined Austrian-Ottoman border commission was created each time when a treaty needed to be signed. Although the Ottomans always had their representatives in border commissions, the mapping of the border was normally assigned to Habsburg military cartographers. In 1699, it was Johann Christian Müller (1673–1721) who conducted a survey of the border and produced an official demarcation map (under the supervision of Luigi Fernando Marsigli). In 1718, the same job was assigned to Captain F. Heise and Lieutenant I. Berndt, while the demarcation of 1791 was conducted by two Habsburg military cartographers, Major Boxich and Captain Franz Rexler (Altić, 1999: 64, 68).
- 3. Müteferriķa's main work was *Cihânnümâ* (1732) with which he filled many gaps in Kātib Çelebi's work. *Cihânnümâ* included 27 maps and 13 diagrams with a total of 40 plates. These maps were the first Ottoman documents to be printed (Sarıcaoğlu, 2009: 122–123)
- 4. For more on the development of early printing in the Ottoman Empire, cf. Kemal Beydilli, *Türk Bilim ve Matbaacilik Tarihinde Mühendishâne ve Kütüphanesi (1776–1826)* [Mühendishane in Turkish Science and Printing History: Mühendishane Printing House and Library (1776–1826)]. Istanbul: Eren, 1995.
- 5. Cedid Atlas Tercümesi. [Istanbul]: Bu evan-i yumn-i ikbalde mahruse-yi Üsküdar'da müceddeden bina ve inşa buyurlan Tab'hane-yi Hümayun'da tab' ve tekmili müyesser olmuşdur ve bi-Allah'l-tevfik, sene 1218.– 1 atlas in 79 p., 50 leaves (some folded) : 25 hand col. maps; 54 × 72 cm. Library of Congress, Geography and Map Division Washington, DC, G1019 .T2 1803.
- 6. In 1828, under the leadership of the Russian colonel Ditmars, the officers Vronchenko, Ortenberg and Essen conducted systematic field measurements, particularly in the regions of Wallachia and Moldavia, the scenes of decisive battles. On this occasion, the Russian surveyors established forty astronomically determined points, and made a series of field sketches at scales of 1:42 000 and 1:84 000.
- 7. In the period from 1819 to 1823, Franz von Weiss produced an 18-sheet map for the Austrian General Staff that depicted the area of European Turkey at a relatively large scale of 1:576 000.
- 8. Bosnien und Dalmatien/ von Heinrich Kiepert.– 1:800 000.– Weimar: Geographisches Institut, 1840. Unhappy with the result, especially the representation of relief and hydrography, Kiepert prepared a new edition of the map, which was published in 1851. Military Archives in Vienna, Map Collection, B.IX.a.930.
- Serbien nach Österreichischen und Russischen Aufnahmen/ Heinrich Kiepert.– 1:800 000.– Weimar, 1849; 46.5 × 37.5 cm. Second edition of the map was prepared in 1876. Military Archives in Vienna, Map Collection, B.II.1.214.
- Das Fürstenthum Zrnagora oder Montenegro eingeteilt in die Nahia's (Distrikte): H. Kiepert's neue Karte von Montenegro / Heinrich Kiepert.– 1:500 000.– Berlin: 1862. Lithograph in colour; 29 × 30 cm. Military Archives in Vienna, Map Collection, B.II.1.241–1.
- 11. Die Walachei/ Heinrich Kiepert.– 1:800 000. Weimar: 1849.– Lithograph; 59×33 cm. Military Archives in Vienna, Map Collection, B III a 189.
- 12. General-Karte von der europäischen Türkei/ Heinrich Kiepert.– 1:1 000 000.– Berlin: In Commission bei Dietrich Reimer, 1853. It contains an ancillary 1:500 000 map of Montenegro. Military Archives in Vienna, Map Collection, B III a 62.
- 13. [Map of Montenegro]. Ottoman General Staff. -ca. 1:500 000.- [after 1860].- Staatsbibliothek zu Berlin Preußischer Kulturbesitz, Map Collection, CBB-IIIc-Kart. Q1247.
- 14. Montenegro was declared a principality in 1852. After the uprising in 1858, Montenegro achieved significant territorial gains in areas that previously were part of the Ottoman Empire. When the border between Montenegro and the Ottoman Empire was officially demarcated in 1860, this was, although unofficial, the first recognition of the Montenegrin statehood (Montenegro would not receive full international recognition until the Congress of Berlin in 1878).
- Special Karte des Fürstenthumes Montenegro (Crnagora) mit angrenzenden Gebieten von Dalmatien, Albanien, Bosnien und der Hercegovina. 1:144 000.– [Wien]: K. k. Militärisches Geographisches Institut, 1869.– Lithograph on 4 sheets; 57 × 53 cm. Military Archives in Vienna, Map Collection, B.II.a.252.
- 16. [Karte von Montenegro vom Department des türkisch Generalstabes].–1:144 000.–[S.l]: 1874.– Lithograph on 4 sheets. Military Archives in Vienna, Map Collection, B.III.a.253.
- 17. Kapt. Bykow Aufnahme von Montenegro 1. Juni 1860–3. Mai 1866. Reduziert auf den Maßstab 1:150 000. Military Archives in Vienna, Map Collection, B.III.a.250–101.

- 18. The war soon ended with a truce, the only result of which was the proclamation of the Constitution by which the Sultan guaranteed the freedom of religion and civil rights. Already in 1877, after Russia enters another war with the Ottoman Empire, a new Serb-Ottoman conflict arises.
- [Map of Serbia with neighbouring lands].- Ottoman General Staff.- 1:750 000.- [Istanbul]: 1876.- Lithograph on one sheet; 46 × 38 cm. Military Archives in Vienna, Map Collection, B.III.a.216.
- [Map of Serbia]/Ottoman General Staff.- 1:350 000.- [Istanbul]: 1289 (1875).- Lithograph on one sheet; 99 × 81 cm. Military Archives in Vienna, Map Collection, B.III.a.224.
- General-Karte von Bosnien, der Hercegovina, von Serbien und Montenegro nach den neuesten und besten Quellen entworfen und ausgeführt im K.K. Militärisch-Geografischen Institute.– 1:300 000.– Wien: K.-K. militärischgeographisches Institut, 1876. Map in 12 sheets: colour lithograph, 47 × 42 cm each. Military Archives in Vienna, Map Collection, B.III.a.23–1.
- 22. The whole Balkans, including its north-eastern part, was covered by the General-Karte von Central Europe at a scale of 1:300 000, prepared by the Military Geographical Institute in Vienna in 1873–1876. Military Archives in Vienna, Map Collection, B II a 38/1.
- Bosna ve Hersek ve Sırbiya ve Karadağ [Map of Bosnia, Herzegovina, Serbia and Montenegro].– 1:300 000.– Istanbul: Imperial Military Academy, 1877.– Colour lithograph in 12 sheets: 51 × 45 cm each. Bavarian State Library, Cartographic Collection, Mapp. XVII,40 h.
- 24. Under the Treaty of Berlin of 1878, Montenegro and Romania finally achieved the status of internationally recognized states, Bulgaria and Eastern Rumelia were given nominal autonomy under the control of the Ottoman Empire, Serbia, Romania and Montenegro extended their territories, while Bosnia and Herzegovina were occupied by the Austrian forces, thus reducing the extent of the Ottoman Empire in Europe to today's Kosovo, Macedonia, Albania, northern Greece, and Thrace.
- 25. For the battlefield in the north-east, besides the sheets they produced in the 1860s, the Ottomans used the Austrian topographic sheets prepared at a scale of 1:420 000 during the Crimean War (1853–1856), and titled *Bessarabien, Moldau, Wallachei und ein Theil von Bulgarien.* It was a provisional map produced by the Imperial Royal Military Geographical Institute in 1854 that was based on older Russian topographic sources (Haardt v. Hartenthurn, 1902: 198).
- 26. Karta csaszti Balkanszkago poluosztrova obnimajuscsej vesz' teatr' vojnü 1877–1878 g.g..– 1:210 000.– [St. Petersburg]: 1884.– Map in 55 coloured lithographed sheets. Military Archives in Vienna, Map Collection B III a 25; and Karta csaszti Balkanszkago poluosztrova obnimajuscsej vesz' teatr' vojnü 1877–1878 g.g..– 1:126 000.– [St. Petersburg: 1884].– Map in 61 coloured lithographed sheets. Military Archives in Vienna, Map Collection B III a 32.
- Rumeli-i şahane haritası/ saye-i füyuzât-i sermaye-i Cenab-i Zıllullahi'de Erkân-1 Harbiyye istikşaf postaları taraflarından tashih ve Erkân-1 Harbiye-i Umumiye da'iresi beşinci fen şubesi marifetiyle tersim olunarak bu kerre da'ire-i mezkûre matbaasında tab u temsil olunmuşdur.– 1:210 000.– [Dersaadet]: Erkân-1 Harbiyye-i Umumiyye da'iresi beşinci fen şubesi matbaası, 1317 [1901 or 1902].– Map in 73 lithographic sheets in colour; 34×30 cm each. Harvard University, Fine Arts Library, ID 009316995.

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