

Cultural Heritage in Times of World War I: The Case of the Austro-Hungarian Relief Map of Montenegro (1916-1918) (ME 07/2019)

Kulturno nasleđe u vreme Prvog Svetskog Rata: Slučaj austro-ugarske reljefne karte Crne Gore (1916-1918)

Duration: 1 January 2019-31 December 2021

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<https://tib.oeaw.ac.at/index.php?seite=sub&submenu=montenegro>

Montenegrin Team: Andrej Bracanović, Milena Mijušković, Ines Pajović

1. Introduction

The Austro-Hungarian relief map of Montenegro is located in a pavilion in the Southern courtyard of the “Njegoš Museum – Biljarda” (“Njegošev muzej Biljarda”) in the historic Montenegrin capital of Cetinje. It is a testimony for a shared Austro-Montenegrin heritage in South-Eastern Europe and is of threefold importance, i.e. from the viewpoint of History, Material Culture as well as Digital Humanities (*fig. 1*). The relief’s outstanding character had already been emphasised by geographers and cartographers of the Yugoslav People’s Army in the 1980s with the following statement:

“In our country several relief models from different periods are kept. One of them is the large relief model of Montenegro, which is to be found in Cetinje and which was made in 1916. Its dimensions are 19×20m, with a horizontal scale of 1:10,000 and a vertical of 1:5,000.”¹

2. The Historical Context

Most interesting is the story behind the creation of the relief map. The outbreak of the First World War in July 1914 led to antagonism between Austria-Hungary as part of the Central Powers and the Kingdom of Montenegro as part of the Allied Powers. After the breakthrough of the Austro-Hungarian army at the Lovćen mountain massif in January 1916, the occupation of the Montenegrin capital of Cetinje on 13 January 1916 and the signing of the armistice on 25 January 1916², an Austro-Hungarian “Militärgeneralgouvernement Montenegro” was established with its headquarters in the residence of the Montenegrin rulers called *Biljarda* in Cetinje. Its two governors were the officer Viktor Weber

¹ English translation by M. St. Popović. Cf. A. Leskovar, Ručna izrada modela reljefa zemljišta od lakih materijala. In: *Zbornik Radova. Vojnogeografski Institut*. Belgrade 1984, pp. 111-117, here p. 111: “U našoj zemlji sačuvano je više reljefnih modela iz raznih perioda. Jedan od njih je veliki reljefni model Crne Gore koji se nalazi na Cetinju, izrađen 1916. godine. Njegove dimenzije iznose 19×20m, horizontalni razmer 1:10.000, a vertikalni 1:5.000.”

² The conditions of the capitulation were for example published in the newspaper: Reichspost, Morgenblatt, 23. Jahrgang, Nr. 45, Wien, Freitag den 28. Jänner 1916, 1-2.

Edler von Webenau (from 26 February 1916 until 10 July 1917) and the politician Heinrich Karl Maria Graf Clam-Martinic (from 10 July 1917 until 3 November 1918). According to the local Austro-Hungarian newspaper “Cetinjer Zeitung”, the work on a relief map of Montenegro at the scale 1:10,000 started in the summer of 1916.³ The circumstances of its creation are also very well described in the “Cetinjer Zeitung”.⁴ Two black and white photographs were published together with the article (**fig. 2**). They present an invaluable pictorial source for the original state of the relief map and its pavilion. Very soon the relief map had become an object of representation and sightseeing: On Tuesday, 27 March 1917, it was shown to the Deputy Chief of the German Admiral Staff Vice-Admiral Richard Koch (1863-1927).⁵ Half a year later, on 28 November 1917, Prince Sigismund of Prussia (1896-1978) visited Cetinje, and the relief map was presented to him as well.⁶ From 9 May until 16 May 1918 – during the so-called “Emperor Charles Week” (“Karl-Woche”) – the relief map of Montenegro was opened to the general public on a daily basis from 9am to 11am and from 2pm to 7pm. After that, the relief map remained open to the general public on Sundays and holidays from 2pm to 7pm. The entrance fees were used for humanitarian purposes, in the “Karl-Woche” for the “Kaiser und König Karl-Kriegsfürsorgefond” and after that for the soup kitchen in Cetinje.⁷

Up until now the relief map of Montenegro has not been researched based on archival data in Austrian archives. We have addressed this research question in order to be able to contextualise this exceptional monument. Adding to the complexity of the research is the changing terminology in the media coverage of the map itself. It is denoted as “plastische Karte von Montenegro”, “großes Relief von Montenegro”, “Reliefbild von Montenegro”, “topographisches Relief Montenegros”, “ethnographisches Relief von Montenegro” and “Reliefkarte von Montenegro”.

In autumn 2019 and spring 2020 our research in the Austrian State Archives in Vienna focused on the biographies of the military personnel, which was involved in the creation of the relief map. In order to

³ The “Cetinjer Zeitung” was published in Cetinje two times a week – on Sundays and Thursdays – by the Austrian military administration. It was printed separately in German and in Serbo-Croat. Cf. on its stock in the Austrian National Library in Vienna: Cetinjer Zeitung 1916-1918. In: ANNO. Historische österreichische Zeitungen und Zeitschriften (ÖNB), http://anno.onb.ac.at/info/cet_info.htm (17/02/2022). See on the first mentioning of the relief map: Cetinjer Zeitung, Cetinje, am 17. August 1916, I. Jahrgang, Nummer 1, 5. The Serbo-Croat version of the same issue of the newspaper is: Cetinjske Novine, Cetinje, 17. avgusta 1916., God. I., Broj 1., 5. We are very grateful to Mr. Vukota Vukotić, MA (State Archives of Montenegro, Cetinje), who supported us in our research of archival material and the stock of the “Cetinjer Zeitung” in March 2020 in Cetinje.

⁴ Illustrierte Cetinjer Zeitung, Sonntagsbeilage der Cetinjer Zeitung, Cetinje, 20. Mai 1917, II. Jahrgang, Nummer 24, 3. The Serbo-Croat version of the same issue of the newspaper is: Ilustrovane Cetinjske Novine, Nedjeljni Prilog „Cetinjskih Novina“, Cetinje, dne 24. maja [sic!] 1917., God. II., Broj 24., 3.

⁵ During his visit the relief map was still under construction (“in Ausführung stehende Reliefbild von Montenegro”). Cf. Cetinjer Zeitung, Cetinje, Donnerstag den 29. März 1917, II. Jahrgang, Nummer 65, 3. The Serbo-Croat version of the same issue of the newspaper is: Cetinjske Novine, Cetinje, četvrtak dne 29. marta 1917., God. II., Broj 65., 2.

⁶ Cetinjer Zeitung, Cetinje, Donnerstag, den 29. November 1917, II. Jahrgang, Nummer 135, 3. The Serbo-Croat version of the same issue of the newspaper is: Cetinjske Novine, Cetinje, četvrtak 29. novembra 1917., God. II., Broj 135., 3.

⁷ Cetinjer Zeitung, Cetinje, Sonntag den 28. April 1918, III. Jahrgang, Nummer 178, 3. The Serbo-Croat version of the same issue of the newspaper is: Cetinjske Novine, Cetinje, nedjelja 28. aprila 1918., God. III., Broj 178., 3.

coordinate our research, the Austrian team was visited by the Montenegrin team member Andrej Bracanović and Milena Mijušković in January 2020.

We were able to trace the presence of the painter Peter Grabwinkler (1885-1943) in Montenegro based on a very limited piece of information. In April 1917 the Austro-Hungarian Supreme Command sent a telegram to the military administration in Cetinje ordering that Grabwinkler must return to Vienna as quickly as possible (“cetinje beauftragt zugsfuehrer peter grabwinkler ehestens nach wien einrueckent [sic!] zu machen stop”).⁸ Unfortunately, our research in the Austrian State Archives was interrupted by the outbreak of the COVID-19 pandemic in March 2020, but we were able to continue our archival research in the summer of 2021.

On 13 October 1918 governor Graf Clam-Martinic officially announced the dissolution of the Austro-Hungarian “Militärgeneralgouvernement Montenegro” and his personal retirement.⁹ The Austro-Hungarian troops left the Kingdom of Montenegro, but the relief map remained *in situ* as a lasting monument of a short-lived joint historical episode.

The technical attributes of the relief map are as follows: According to our 3D capture of its geometry in March 2020 (see below), it covers a total of \pm 282 square metres. The \pm may be explained by the fact that the concrete gallery surrounding the relief map covers small parts of it and prevents complete documentation on its very margins.

The relief map displays territories, which are today part of Montenegro, Croatia, Bosnia and Herzegovina, Serbia and Albania. It was designed with a concrete mass on a base also made of concrete. In order to determine the elevation points on the map, thin metal sticks were used, around which the space was filled by hand to match the appearance of the actual landscape. Then, the surface was painted in great detail.

Very impressive is the quality of modelling of the mountain massifs. The relief map shows the road network, hydrography, cover of vegetation and settlement areas of the time. Moreover, monasteries, churches, fortifications, houses, bridges etc. were modelled as 3D objects and placed on the relief. In some cases, houses or entire settlement areas were painted onto the relief and not represented by 3D objects.

According to the colleagues in the “Njegoš Museum – Biljarda” (“Njegošev muzej Biljarda”) in Cetinje, small flags and a map legend were originally attached to the relief map, which described some

⁸ To be found in: Österreichisches Staatsarchiv (OeStA), Kriegsarchiv (KA), Feldakten (FA), Armeeoberkommando (AOK), Kriegspressequartier (KPQ), Akten 30 Kunstgruppe, KPQ-Mitglieder (Ansuchen um Aufnahme, diverse Personalunterlagen), Namen G, 1914-1918.

⁹ Verlautbarungen des k. u. k. Militär-Generalgouvernements in Montenegro, Cetinje, am 13. Oktober 1918, Nr. 84.

of the topographic features to be seen. Remnants of small flags without descriptions can still be found *in situ*.

Unresolved is the question, what kind of cartographic data was used as a basis for the modelling of the relief. Here, further research will be needed in the Austrian State Archives in Vienna in the future. It may be assumed that the Austro-Hungarian “Generalkarte von Mitteleuropa” at the scale 1:200,000 formed one group of the data sets.¹⁰ Moreover, the role of the Montenegrin and Yugoslav artist and sculptor Marko Brežanin (1885-1956) in the creation of the relief map will also require future in-depth research.

In September 1948 the relief map of Montenegro was proclaimed a monument of culture. The original Austro-Hungarian pavilion, which was protecting the relief map, had a basilica shaped wooden roof, which was supported by concrete beams and pillars. At a later, unknown date walls made of concrete and glass were added on all four sides.

This construction was severely damaged in an earthquake on 15 April 1979. Therefore, plans for a new pavilion were made in June/July 1980. It was decided that no contemporary topographic information (like new roads, urban areas, dam lakes, etc.) should be added on the map. The old pavilion was removed and replaced by a metal construction with tinted glass of the same dimension regarding length and width (18m×19,8m) (*fig. 3*).

While the Austro-Hungarian small pedestrian bridge over the relief was stripped – its five pillars have left marks on the relief, the entrance to the object remained in the South.¹¹ Over 100 years after the end of the First World War our project team set out to 3D capture this exceptional monument in order to create a digital model, which meets the needs of museums in Montenegro and their future local exhibitions as well as enables the Austrian academia and public to become aware of this immobile object of a joint episode in history by digital means and as a digital model. From 1 March until 10 March 2020 Mihailo St. Popović, Moisés Hernández Cordero, Jelena Nikić and Bernhard Koschiček-Krombholz went on a survey to Montenegro with the aim to document and to 3D capture the geometry of the Austro-Hungarian relief map of Montenegro. With the crucial support of our Montenegrin project partners – namely Ines Pajović, Andrej Bracanović and Milena Mijušković – and by permission of the museum’s directorate, the Austrian team gained access to this most remarkable object.

3. The 3D Capture of the Austro-Hungarian Relief Map of Montenegro

Our survey in March 2020 aimed to 3D capture the geometry of the historical relief and to archive the historical feature, for geographical purposes (referenced orthophotos, meshes and DEMs) and for its

¹⁰Cf. on this map with a bibliography: Popović 2014, pp. 130-131.

¹¹We are very grateful to Mr. Dr. Petar Glendža (National Museum of Montenegro, Cetinje) for speaking with us and sharing this information, based on archival material, in March 2020 in Cetinje.

integration in georeferenced datasets. Furthermore, the data created shall go beyond the capture of the spatial layout and contribute to prospective initiatives of dissemination, preservation and visualisation, for example archiving, articles, conferences, presentations and reconstructions.

The method selected by Moisés Hernández Cordero for the capture of the data were Structure from Motion (SfM) Multi-View Stereo (MVS) techniques. It employs a batch of overlapping images captured from different spatial positions to produce a 3D point cloud. The accuracy is comparable to existing laser scanning and stereophotogrammetry techniques in close-range scenarios. They have provided excellent results for archaeological and cultural surveys compared to the terrestrial laser scanner technique.

The first step before the capture of the images consisted of the creation of a network of ground control points. A total station 3D survey was undertaken using a close traverse of five station positions around the relief, surveying 51 reference points. These reference points for the geolocation and adjustment of the model were substituted by chalk marks with an “X” shape, in order to remove them easily without damaging the surface of the protected monument. They are of the utmost importance to improve the accuracy of the model. As there are neither records of any cadastral points nor a national grid reference on the surface of the relief, future uses of the georeferenced data will be facilitated by the location of survey points in key geographical features such as bays, crossroads or bridges. The integration of the model in geographical coordinates and its geolocation with modern cartography methods can help to identify how accurate the historical relief is, compared to the geography of Montenegro.

A Canon EOS 80D and a Canon 35mm EF were used by Moisés Hernández Cordero to capture the images and reduce the noise of the computed surface. 1,789 images were taken of the relief, that were later filtered using a semi-automatic Python script in order to process only the ones with better quality (lighting, sharpness and overlapping). Agisoft Photoscan 1.4.4 was the software selected to process the selected 1,067 TIFF images. This software is well-known for producing smooth surfaces and an accurate colour pattern for orthophoto and texturized mesh. At the end of the computing process, an .obj texturized mesh, a DEM of 28,887×31,761 pixel resolution and an orthophoto of 58,546×55,573 pixel resolution were exported (*fig. 4*).

At the end of September/beginning of October 2021 the Austrian team (here Moisés Hernández Cordero, Bernhard Koschiček-Krombholz, Mihailo St. Popović) managed to conduct a second journey to Montenegro, to meet the Montenegrin team and hand over a copy of the 3D model to the National Museum of Montenegro in Cetinje for their future exhibition purposes. Unfortunately, the Delta- and Omikron-waves of the pandemic in autumn and winter 2021 impeded a second journey of the Montenegrin team to Austria.

Neither the story behind the creation of the relief map, nor the 3D capture, nor the digital preservation stand isolated for themselves, but they do form a holistic approach with the aim to contextualise the artefact and to use it in order to address future research questions. As a first step in this very direction, the georeferenced orthophoto of the Austro-Hungarian Relief Map of Montenegro was embedded as a map layer into the frontend “Maps of Power: Historical Atlas of Places, Borderzones and Migration Dynamics in Byzantium (TIB Balkans)” (<https://data1.geo.univie.ac.at/projects/tibapp>; fig. 5) and, thus, made accessible to the general public.



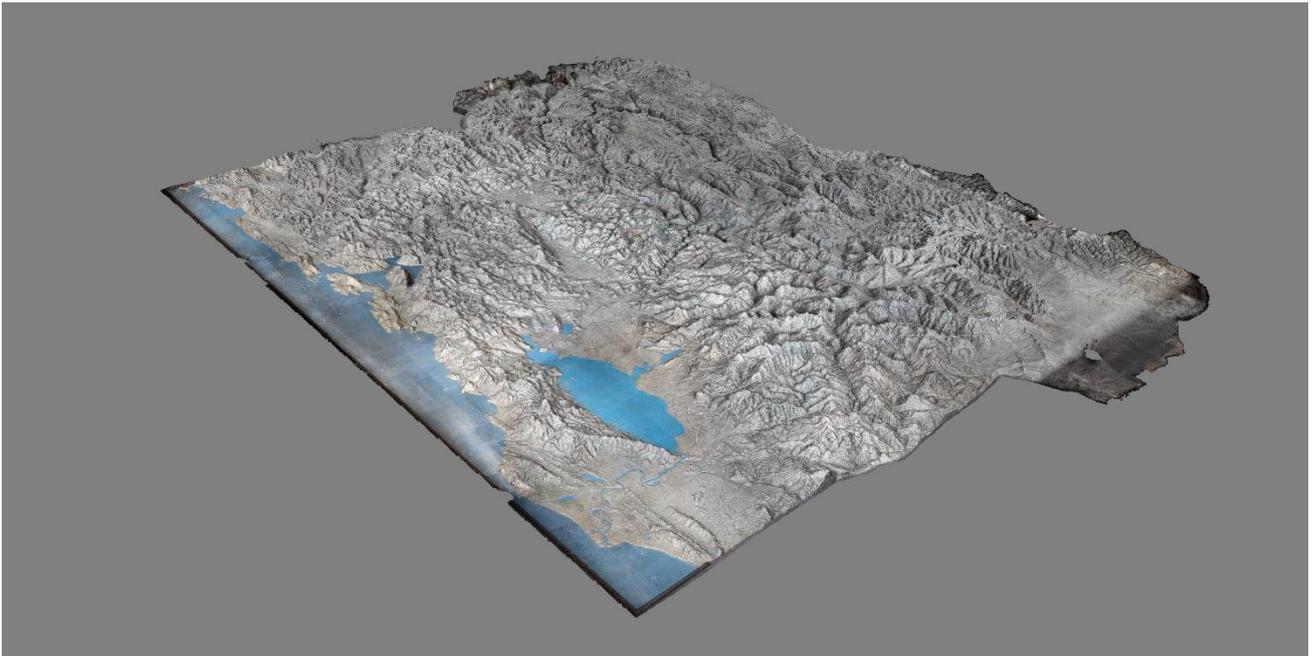
Fig. 1: The Austro-Hungarian Relief Map of Montenegro in Cetinje (Mihailo St. Popović, 2020)



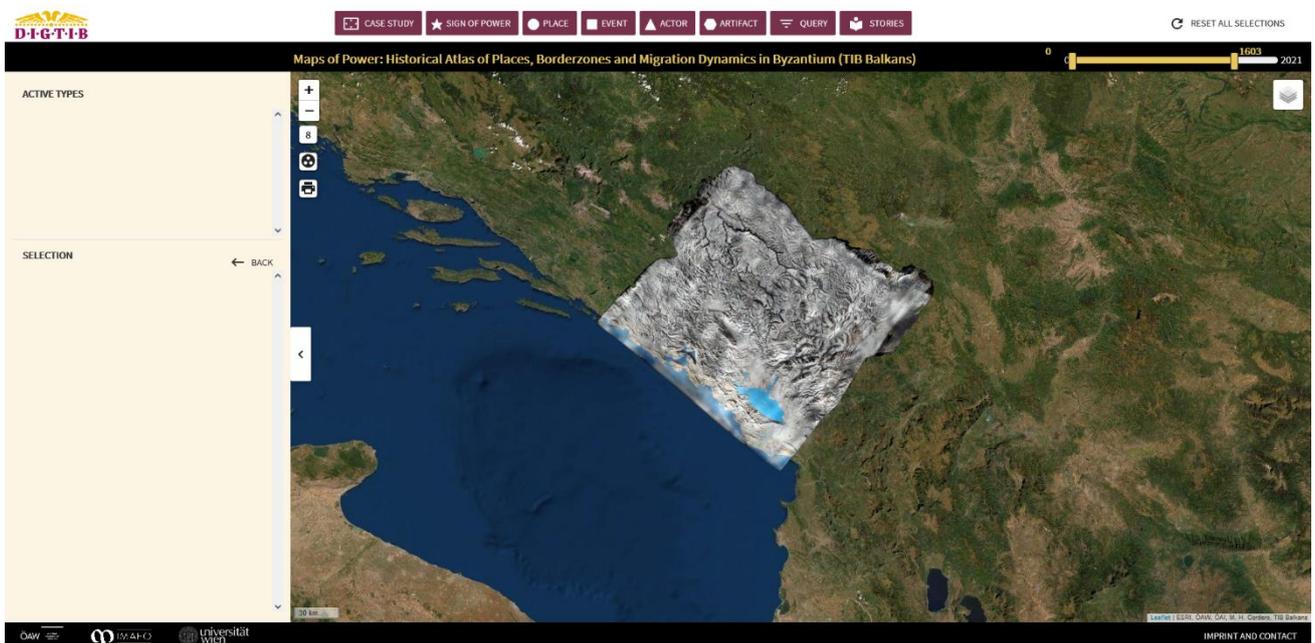
*Fig. 2: The Austro-Hungarian Relief Map of Montenegro in Cetinje in 1917
(Illustrierte Cetinjer Zeitung, May 1917, page 2)*



Fig. 3: The New, Current Pavilion of the Relief Map from the South (Mihailo St. Popović, 2020)



*Fig. 4: The Result of the 3D Capture of the Relief Map of Montenegro
(Moisés Hernández Cordero, 2020)*



*Fig. 5: The Map Layer “Historical Relief of Montenegro in Cetinje” in
the Frontend “Maps of Power” (Screenshot by Mihailo St. Popović, 2021)*