memo_quer 4/2022

On the Crossroads between East and West: Geocommunicating Medieval Sacred Landscapes in Today's Montenegro

First Project Results

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Recommended citation: Popović, Mihailo St. et al.: On the Crossroads between East and West: Geocommunicating Medieval Sacred Landscapes in Today's Montenegro. First Project Results. MEMO_quer 4 (2022). Pdf-Format, doi: 10.25536/2022q004

The aim of this paper is twofold. The first is to present the research questions of the multidisciplinary International Project Beyond East and West: Geocommunicating the Sacred Landscapes of 'Duklja' and 'Raška' through Space and Time (11th-14th centuries) (HOLDURA), which is conducted at the Austrian Academy of Sciences (Institute for Medieval Research, Division of Byzantine Research) with two partners (the University of Vienna, Department of Geography and Regional Research and the Leipzig University of Applied Sciences, Faculty of Computer Science and Media) from 1 March 2020 until 31 August 2023. The second aim is to introduce to the readers the resultsof the project's first year (2020). These achievements consist of the research on the Austro-Hungarian relief map of Montenegro (1916-1918) in Cetinje (Republic of Montenegro), its 3D capture during a survey in March 2020, its analysis and contextualisation – all of these in close cooperation with the project Cultural Heritage in Times of World War I: The Case of the Austro-Hungarian Relief Map of Montenegro (1916-1918)/Kulturno nasleđe u vreme Prvog Svetskog Rata: Slučaj austro-ugarske reljefne karte Crne Gore (1916-1918) –, the input of data on medieval settlements, toponyms and monuments in the area of research in the project's database (i.e. the TIB OpenAtlas Database), the research on the monuments themselves (i.e. churches and monasteries) from the viewpoint of Art History, and the development of a framework in the WWW, which will serve as a hub to promote the project's results to academia as well as the general public. All of these aspects form the integral basis for addressing the project's research questions in the second and third year. Moreover, the project team of HOLDURA has started with the dissemination of the aforesaid first results. While an article was published in the blog of the daily Austrian newspaper "Der Standard", relevant papers were presented at the virtual International Medieval Congress (IMC) in Leeds in July 2021. In this way, HOLDURA aims at addressing and answering the hypothesis of whether the historic regions of "Duklja" and "Raška" in South-Eastern Europe constituted a "Sacred Landscape" from the 11th to the 14th centuries and, if this is the case, to define analogue and digital means to geocommunicate it to academia as well as to the general public.

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Der Beitrag fußt auf ersten wissenschaftlichen Resultaten des FWF Drittmittelprojektes Jenseits von Ost und West: die Geokommunikation der „Heiligen Landschaften" (Sacred Landscapes) von „Duklja" und „Raška" durch Raum und Zeit (11.-14. Jahrhundert). Es konzentriert sich auf die zwei historischen Regionen von „Duklja" und „Raška", die Teil des *Illyricum* waren. Die Forschungshypothese geht davon aus, dass beide historischen Regionen eine „Heilige Landschaft" (*Sacred Landscape*) bildeten, die mit den vereinten Mitteln der Historischen Geographie, Kunstgeschichte und Geokommunikation sowohl der Wissenschaft als auch der interessierten Öffentlichkeit entschlüsselt und kommuniziert werden sollen. Hierbei spielen Applikationen der digitalen Geisteswissenschaften eine zentrale Rolle. Mittelalterliche Kirchen und Klöster werden bei Bereisungen vor Ort in Montenegro erfasst und als Datensätze in die *OpenAtlas* Projektdatenbank eingegeben. Historische Karten des 19. Jahrhunderts spielen ebenfalls eine bedeutende Rolle in der Kontextualisierung der Verortung bestimmter Heiligtümer. Aus

diesem Grund hat das Projektteam die österreichisch-ungarische Reliefkarte von Montenegro, die von der österreichisch-ungarischen Armee im besetzten Cetinje in den Jahren 1916/17 gestaltet wurde, erforscht und gescannt, um ein 3D Modell des Reliefs erstellen zu können. Das Modell wird als Layer in der Datenbank und im Frontend des Projektes verwendet. Auf diese Weise wird die Reliefkarte sowohl in ihrer Bedeutung als europäisches kulturelles Erbe hervorgehoben als auch als Datensatz für das Relief und die Verkehrswege in Montenegro vor der Industrialisierung und dem infrastrukturellen Ausbau des Landes im Rahmen der historischen Geographie des Balkans verwendet.

Keywords: Medieval Studies; Byzantine Studies; Historical Geography; Art History; Archaeology; Toponymy; Geography; Cartography; Geocommunication; Digital Humanities

Das Mittelalter war die Jugend der heutigen Welt,
und eine lange Jugend.
Was uns lebenswert ist, wurzelt dort.
(Jacob Burckhardt, 1818-1897)

1. Introduction and Aims of the Project

In January 2020 the FWF (Austrian Science Fund) and the DFG (German Research Foundation) approved a project proposal entitled "Beyond East and West: Geocommunicating the Sacred Landscapes of 'Duklja' and 'Raška' through Space and Time (11th-14th Cent.)" (in the following: HOLDURA[1]). It is a multidisciplinary international Project (I 4330-G) and at the same time a sub-project of the Long-Term Project Tabula Imperii Byzantini (in the following: TIB) Balkans at the Austrian Academy of Sciences in Vienna.[2] HOLDURA is conducted by three project partners: two are from Austria, namely the PI Doz. Mag. Dr. Mihailo St. Popović (Austrian Academy of Sciences, Institute for Medieval Research, Division of Byzantine Research) and Prof. Dr. Karel Kriz (University of Vienna, Department of Geography and Regional Research), and one is from Germany, namely Prof. Dr. Johannes Tripps (Leipzig University of Applied Sciences, Faculty of Computer Science and Media). HOLDURA started on 1 March 2020 and will last until 31 August 2023.[3]

The aforesaid multidisciplinarity is mirrored in the scholarly cooperation among the academic fields of Byzantine Studies, Medieval History, Historical Geography, Art History, Geography and Geocommunication (GIScience and Cartography). The areas of research are the historic regions of "Duklja" and "Raška", being part of the *Illyricum*.[4] "Duklja" is mainly located on the territory of the present-day Republic of Montenegro, while "Raška" lies partially in the North-East of Montenegro and is divided today between Montenegro, Serbia and Northern Albania (**Fig. 1**).

Both historic regions were and are spaces of religious encounter as well as interaction and were shaped by the following three important aspects:

1) Geographically as a junction of the Dinaric mountain range and the coastal zone of the Adriatic Sea

2) Politically and militarily as an area of the struggle for power between Byzantium and the First Bulgarian Empire as well as the Serbian realm

3) Ecclesiastically as a zone of interaction as well as encounter between Rome and Constantinople, i.e. the Latin and the Orthodox Church.

HOLDURA's research hypothesis is that both historic regions constituted a "Sacred Landscape". Regarding the concept of "Sacred Landscapes", Orlando Woods stated: "Attention therefore needs to be paid to where, and not just

1 Acronym for: **Ho**ly **L**andscapes **Du**klja **Ra**ška.

2 Digital Tabula Imperii Byzantini DIGTIB, online: https://tib.oeaw.ac.at. Cf. also: Current Team of the TIB, online: https://tib.oeaw.ac.at/team. See on the history, current research and future plans of the TIB: Külzer et al. 2020.

3 More information on the project I 4330-G may be found via: Beyond East and West: Geocommunicating the Sacred Landscapes of "Duklja" and "Raška" through Space and Time (11th-14th Cent.) – HOLDURA, online: https://tib.oeaw.ac.at/sub_projects/holdura.

4 Koder 2017; Villes et peuplement dans l'Illyricum protobyzantin 1984.

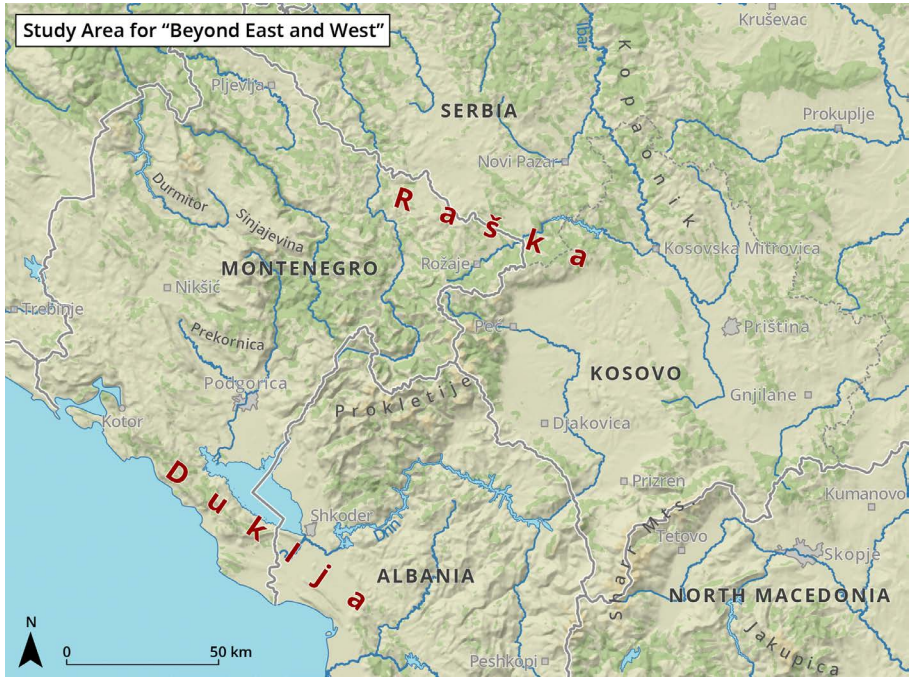

Fig. 1 The Area of Research ("Duklja" and "Raška") (Markus Breier, 2021)

why and how, conversion happens. […] [C]ompeting groups delineate boundaries, and use space for specific, religiously oriented purposes."[5] We intend to decipher and to communicate this "Sacred Landscape" to academia as well as to the interested public with the joint means of Historical Geography, Art History and Geocommunication.

Therefore, HOLDURA aims at approaching systematically the following three major research questions:

1) In which way did the local rulers and the Churches of Rome and Constantinople interact in the regions of "Duklja" and "Raška" from the 11th to the 14th centuries, and how is this very interaction mirrored in the distribution pattern of monuments (i.e. the churches and monasteries)?

2) Did the volatile religious affiliation of the local rulers have an impact on the "Sacred Landscape", and where were Latin or Orthodox places of worship transformed or superimposed in the course of time?

3) Can the religious and cultural influence of the Latin and Orthodox faith be traced through small Latin (i.e. "Western") as well as Byzantine and Slavic (i.e. "Eastern") objects of art, not only in the coastal area, but also in its hinterland and in Italy?

Out of this reason, we have chosen the expression "Beyond East and West" in our project title, which is taken from a remarkable essay written by the Saint Serbian-Orthodox Bishop Nikolaj Velimirović (1881-1956) and summarises the aforesaid research questions in four succinct words in the best possible way.[6]

2. Existing Digital Infrastructure and Geospatial Data

As a starting point, HOLDURA is building upon an already existing technical and digital infrastructure of the TIB Balkans. Since 2019 the Project Leader of the TIB Balkans, Mihailo St. Popović, has established a fully functional TIB OpenAtlas Database system in cooperation with the OpenAtlas initiative and a fully operational map-centered online frontend in synergy with the Department of Geography and Regional Research (University of Vienna). This frontend is entitled "Maps of Power: Historical Atlas of Places, Borderzones and Migration Dynamics in Byzantium (TIB Balkans)".[7]

5 Woods 2012, pp. 446-448. Cf. on the term "Sacred Landscapes" and its interpretation in general: Brace et al. 2006; Dewsbury/Cloke 2009; Eliade 1987, pp. 20-66; Knott 2005, pp. 245-285; Sack 1986, pp. 92-119; Stoddard 2009.

6 "Iznad Istoka i Zapada" – cf. Sabrana dela Nikolaja Velimirovića 2014.

7 The first version of the frontend is to be accessed online via the TIB Map Application, https://tib.oeaw.ac.at/atlas. The aims and results of the "Maps of Power" initiative are outlined online via "Maps of Power. Historical Atlas of Places, Borderzones and Migration Dynamics in Byzantium (TIB Balkans)" on Academia.edu: https://oeaw.academia.edu/MapsofPower.

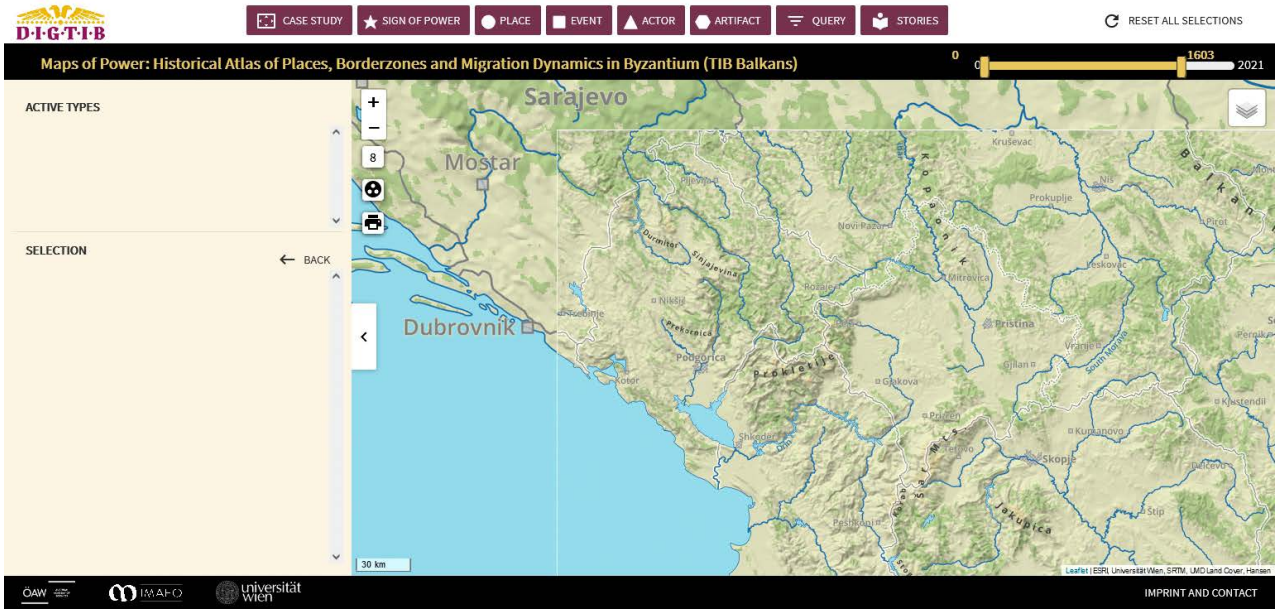

Fig. 2 The Map of Montenegro, South-Western Serbia and Albania in the Frontend "Maps of Power" (Screenshot by Mihailo St. Popović, 2021)

Fig. 3 The Map of Montenegro, here the Town of Cetinje, in the Frontend "Maps of Power", Zoom Factor 13 (Screenshot by Mihailo St. Popović, 2021)

In preparation of HOLDURA the cartographer Daniel Nell from the Department of Geography and Regional Research (University of Vienna) designed a base map of Montenegro, South-Western Serbia and Albania for the frontend "Maps of Power" during the year 2019 (**Fig. 2**).

This base map covers a wide range of scales, from an overview scale representing Europe, to large scale representations of the study area (**Fig. 3**). This range of scales has been established based on the experiences gained during the Digital Cluster Project "Digitising Patterns of Power (DPP): Peripherical Mountains in the Medieval World"[8] and is deemed more than adequate to illustrate the research results as well as the digital data of HOLDURA in the respective frontend.

Daniel Nell designed the map by expanding the customised DPP map and the DPP map modern, which are embedded as map layers in

8 Cf. in detail: Digitising Patterns of Power (DPP), https://dpp.oeaw.ac.at/.

Fig. 4 The DPP Map Modern in the Frontend "Maps of Power" (Screenshot by Mihailo St. Popović, 2021)

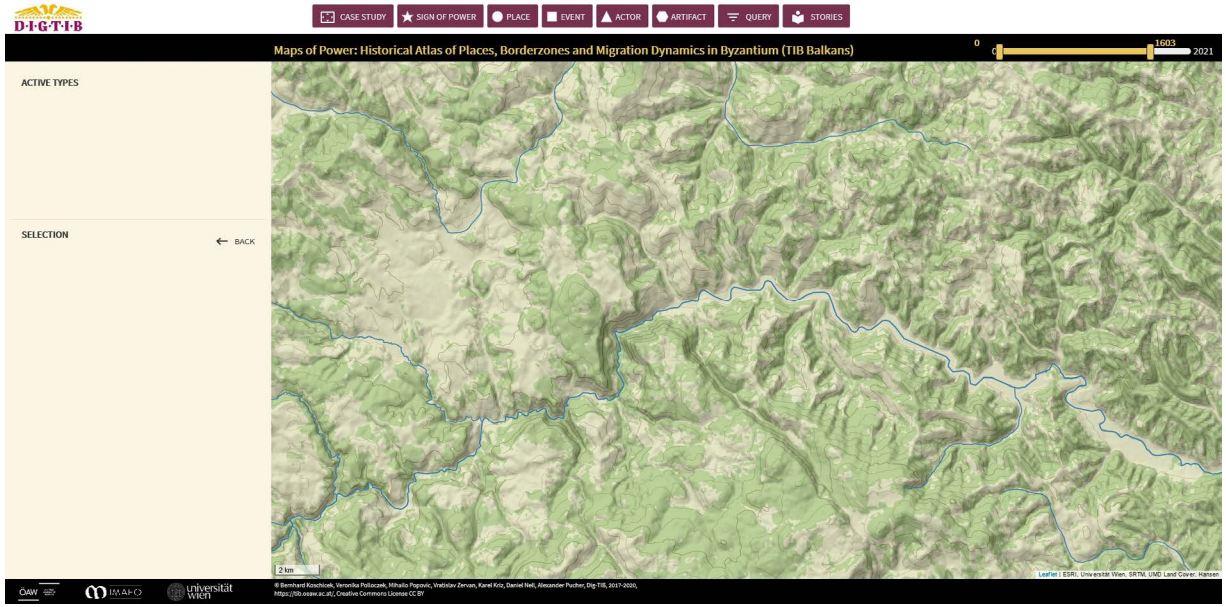

Fig. 5 The DPP Map of the Same Area in the Frontend "Maps of Power" (Screenshot by Mihailo St. Popović, 2021)

the frontend "Maps of Power" and can be selected from a top down list on the frontend's right-hand side.

The difference between the two layers lies in the fact that the DPP map modern shows features of modern infrastructure like national borders, urban areas, dam lakes, etc., while the DPP map has been adjusted by clearing these data sets in order to present and visualise our project's data deriving from medieval sources in the best way possible (**Fig. 4; Fig. 5**).

In addition, the analogue maps of the TIB at the scale 1:800,000 have been scanned, georeferenced and integrated as additional layers into the frontend (**Fig. 6**).[9]

9 The results of the project DPP are summarised in the following edited volume: Popović 2019a.

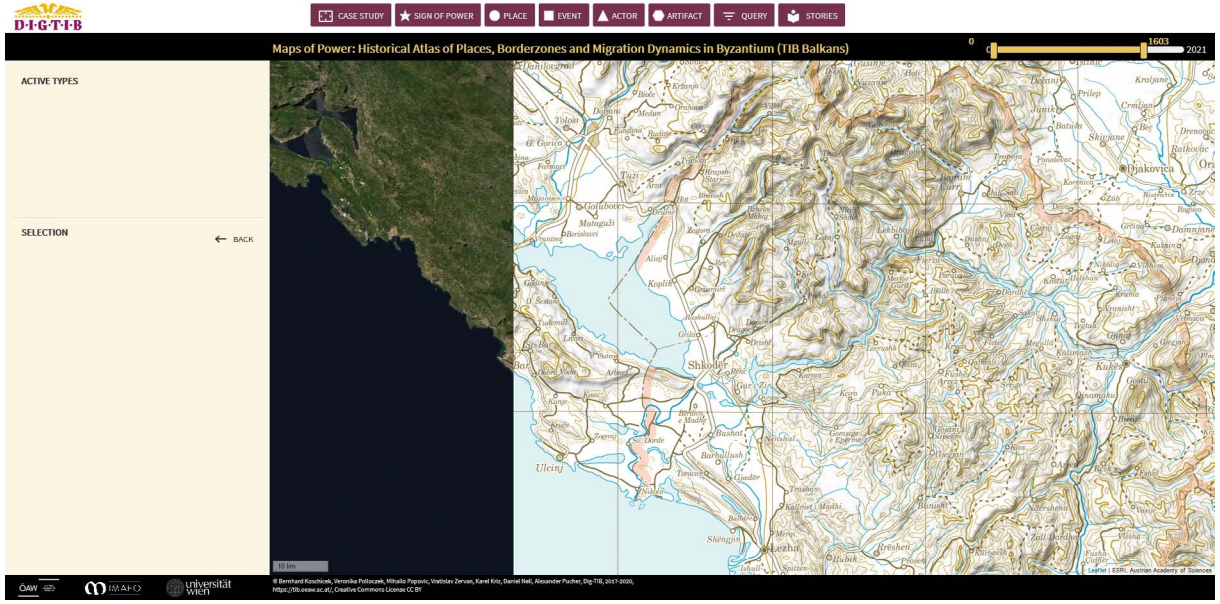

Fig. 6 The Map TIB 11 and 16 as Layer in the Frontend "Maps of Power" (Screenshot by Mihailo St. Popović, 2021)

3. Creating the Basis: The Acquisition of New Geospatial Data

3. 1. The Austro-Hungarian Relief Map of Montenegro

In the first year of HOLDURA (1 March 2020-28 February 2021) a synergy of its team took place with the team of the project "Cultural Heritage in Times of World War I: The Case of the Austro-Hungarian Relief Map of Montenegro (1916-1918)".[10] From 1 March until 10 March 2020 Mihailo St. Popović, Moisés Hernández Cordero, Jelena Nikić and Bernhard Koschicek 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. It is located in a pavilion in the Southern courtyard of the "Njegoš Museum – Biljarda" ("Njegošev muzej Biljarda")[11] in the historic Montenegrin capital of Cetinje. 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. The relief map of Montenegro 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. 7**). It covers the entire area of research of HOLDURA, which, as a consequence, stresses the necessity of the 3D capture of its geometry for further usage in our frontend "Maps of Power" and for the purpose of Geocommunication.

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:

10 Cultural Heritage in Times of World War I. The Case of the Austro-Hungarian Relief Map of Montenegro (1916-1918), online: https://tib.oeaw.ac.at/sub_projects/montenegro.

11 Njegošev muzej Biljarda, online: https://narodnimuzej.me/posjeta-njegosev-muzej-biljarda/.

Fig. 7 The Austro-Hungarian Relief Map of Montenegro in Cetinje (Mihailo St. Popović, 2020)

> "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 × 20 m, with a horizontal scale of 1:10,000 and a vertical of 1:5,000."[12]

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 1916[13], 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 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).[14] 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.[15] Eugen Oberhummer, an Austrian visitor to Cetinje in July 1917, reports on the relief map and its importance as an object for sightseeing:

> „Der alte Palast, die sogenannte Bigliarda, dient als Kaserne. Eine wirklich neue Sehenswürdigkeit ist jedoch das von Feldwebel J. Schugar unter Mitwirkung des Malers Grabwinkler 1916/17 hergestellte große Relief von Montenegro in 1:10.000, ein überaus anschauliches Bild der wechselvollen Bodengestaltung des Landes bis zum Becken des Skutarisees und den nordalbanischen Alpen. Es ist in einem besonderen Holzbau hinter dem Palast untergebracht und wird in Zukunft für alle Besucher Cetinjes einen Hauptanziehungspunkt bilden."[16]

12 English translation by M. St. Popović. Cf. Leskovar 1984, 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 × 20 m, horizontalni razmer 1:10.000, a vertikalni 1:5.000."

13 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.

14 Brendel 2019, pp. 77-95. Cf. also: Borisavljević 1941; Borozan 2005; Drašković 1996; Enne 2008; Fried 2014; Kerchnawe 1928; Pisarev 1967; Rakočević 1997.

15 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), online: http://anno.onb.ac.at/info/cet_info.htm. Also cf. Glendža 2013/2014. 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.

16 Oberhummer 1918, p. 320. Cf. on Austrian ethnographic studies in the Balkans during the First World War: Popović 2013; Popović 2019b.

The circumstances of its creation are very well described in the "Cetinjer Zeitung":

> „Ein Beispiel dieses, unsere Armee erfüllenden Geistes bietet die plastische Karte von Montenegro, die vor einem Jahre über Anregung des Generalstabschefs des Militär-Generalgouvernements Oberstleutnants Hubka angelegt wurde und nunmehr ihrer baldigen Vollendung entgegensieht. […] Die auf einer betonierten Unterlage im Maßstabe 1:10.000 ausgeführte Bildhauerarbeit ist hallenartig von einer Eisenbeton-Konstruktion überdacht, in deren Längenmitte eine Galerie führt, die so angelegt wurde, daß sie auch die unmittelbare Besichtigung der mittleren Teile ermöglicht. Der plastische Teil ist überaus sorgfältig gearbeitet, sodaß der Beschauer den Eindruck gewinnt, das Land aus der Vogelschau oder aus einem Flugzeug zu übersehen. Durch die Bemalung des Reliefs in natürlichen Farben wird dieser Eindruck noch gesteigert. Die Anregung des Generalstabschefs ist von den Ingenieroffizieren (sic!), Oberstleutnant des Geniestabes Mayer, Oberstleutnant Albert, Major Stickel und Ingenieur Müller erfolgreich gefördert, von den Bildhauern Wachtmeister Brežanin und Feldwebel Schugar sowie vom Kunstmaler Zugsführer Grabwinkler in die Tat umgesetzt worden."[17]

17 Illustrierte Cetinjer Zeitung, Sonntagsbeilage der Cetinjer Zeitung, Cetinje, 20. Mai 1917, II. Jahrgang, Nummer 24, 3. English translation by D. Schmid: "An example of this spirit of our army can be seen in the three-dimensional map of Montenegro. This map was made at the instigation of the Chief of the General Staff of the Military-General Government *Oberstleutnant* Hubka and now looks forward to its imminent completion. […] The sculpting was made on a concrete basis, at the scale of 1:10,000, and is roofed by a ferro concrete construction; a gallery in the mid of the hall allows a direct inspection of the middle parts of the map. The three-dimensional part is made with great detail and craftmanship, thus, the viewer could receive the impression of seeing the land from a bird's eye view or from a plane. The suggestion of the Chief of the General Staff was supported by the engineering officers *Oberstleutnant des Geniestabes* Mayer, *Oberstleutnant* Albert, *Major* Stickel and *Ingenieur* Müller and implemented by the sculptors *Wachtmeister* Brežanin and *Feldwebel* Schugar and the painter *Zugsführer* Grabwinkler." 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.

Two black and white photographs were published together with the article (**Fig. 8a; Fig. 8b**). They present an invaluable pictorial source for the original state of the relief map and its pavilion. At this point, the small pedestrian bridge over the relief should be noted, especially in **Fig. 8b**, which is mentioned in the aforesaid quotation ("in deren Längenmitte eine Galerie führt, die so angelegt wurde, daß sie auch die unmittelbare Besichtigung der mittleren Teile ermöglicht") and which shall be highlighted in our analysis below. The newspaper article clarifies that the creation of the relief map had started in May 1916.

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).[18] Half a

18 During his visit the relief map was still under construction ("in Ausführung stehende[s] 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.

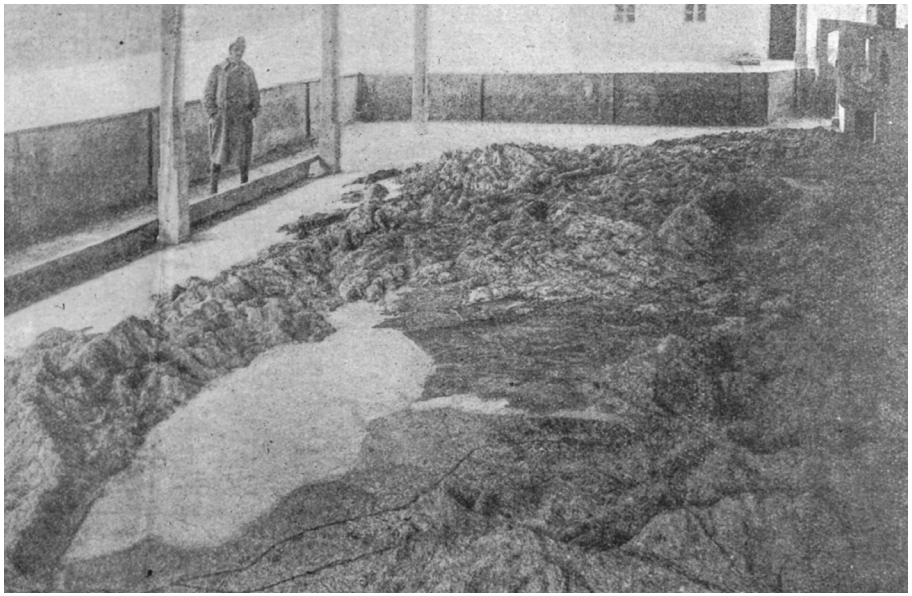

Fig. 8a The Austro-Hungarian Relief Map of Montenegro in Cetinje in 1917 (Illustrierte Cetinjer Zeitung, May 1917, page 2)

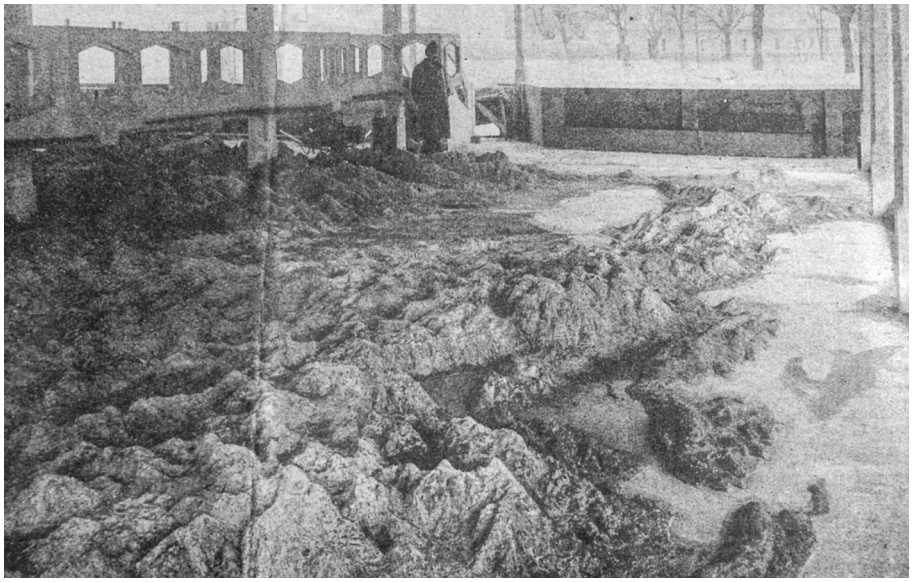

Fig. 8b The Austro-Hungarian Relief Map of Montenegro with the Small Pedestrian Bridge in Cetinje in 1917 (Illustrierte Cetinjer Zeitung, May 1917, page 3)

year later, on 28 November 1917, Prince Sigismund of Prussia (1896-1978) visited Cetinje, and the relief map was presented to him as well.[19] 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 9 am to 11 am and from 2 pm to 7 pm. After that, the relief map remained open to the general public on Sundays and holidays from 2 pm to 7 pm. 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.[20]

19 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.

20 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.

News on the relief map of Montenegro even reached Viennese newspapers:

> „Reliefkarte von Montenegro. Eine Sehenswürdigkeit Cetinjes. Nach einjähriger Arbeit wird demnächst eine plastische Karte von Montenegro fertiggestellt sein, die auf dem Platze zwischen der ehemaligen Kadettenschule und dem Klostergarten in Cetinje zur Ausstellung gelangt. Die auf einer betonierten Unterlage im Maßstabe 1:10.000 ausgeführte Bildhauerarbeit ist von einer Eisenbetonkonstruktion hallenartig überdacht, von deren Galerie aus das Relief wie aus der Vogelschau übersehen werden kann. Durch Bemalung des Reliefs in natürlichen Farben ist der Eindruck noch gesteigert. Das Werk ist über Anregung des Generalstabschefs Oberstleutnant Hubka von den Ingenieuroffizieren Oberstleutnants Mayer und Albert, Major Stickel und Ingenieur Müller erfolgreich gefördert und von den Bildhauern Feldwebel Schugar, Wachtmeister Brezanin und dem Maler Zugsführer Grabwinkler ausgeführt worden."[21]

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".

21 Die Neue Zeitung, Illustriertes unabhängiges Tagblatt, Wien, Donnerstag, den 31. Mai 1917, 10. Jahrgang, Nr. 147, 4. English translation by D. Schmid: "Contour map of Montenegro. An object of sightseeing in Cetinje. After one year of work the three-dimensional map of Montenegro between the *Kadettenschule* and the garden of the Monastery in Cetinje will be finished soon. The sculpture was made on a concrete basis, at the scale of 1:10,000, roofed by a ferro concrete construction and bridged by a gallery, which allows an inspection of the relief from a bird's perspective. The painting of the contour map increased the impression of flying even more. The map was initiated by the Chief of the General Staff *Oberstleutnant* Hubka, successfully supported by the Engineering Officers the *Oberstleutnants* Mayer and Albert, *Major* Stickel and *Ingenieur* Müller and made by the sculptors *Feldwebel* Schugar, *Wachtmeister* Brezanin and the painter *Zugsführer* Grabwinkler."

In autumn 2019 and spring 2020 our research in the Austrian State Archives in Vienna focused on the biographies of the military personnel involved in the creation of the relief map. 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").[22] Unfortunately, our research in the Austrian State Archives was interrupted by the outbreak of the COVID-19 pandemic in Austria in March 2020.

On 13 October 1918 Governor Graf Clam-Martinic officially announced the dissolution of the Austro-Hungarian "Militärgeneralgouvernement Montenegro" and his personal retirement.[23] 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, it covers a total of ± 282 square metres. The ± 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 (**Fig. 9**).

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 (**Fig. 10**). Then, the surface was painted in great detail.

Fig. 9 Part of the Concrete Gallery surrounding the Relief Map (Mihailo St. Popović, 2020)

Fig. 10 Example of a Thin Metal Stick for the Determination of Elevation Points, marked with a Red Circle (Mihailo St. Popović, 2020)

22 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.

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

Fig. 11 The Canyon of the River Tara (Mihailo St. Popović, 2020)

Fig. 12 The Serbian-Orthodox Patriarchal Monastery of Peć as 3D Object on the Relief Map (Mihailo St. Popović, 2020)

The quality of modelling of the mountain massifs is very impressive (**Fig. 11**). 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 (**Fig. 12**). In some cases, houses or entire settlement areas were painted onto the relief and not represented by 3D objects (**Fig. 13**).

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 of the topographic features to be seen. Remnants of small flags without descriptions can still be found *in situ* (**Fig. 14**).

Fig. 13 The Town of Nikšić painted onto the Relief (Mihailo St. Popović, 2020)

Fig. 14 Remnants of Small Flags without Descriptions on the Relief Map, marked with a Red Circle (Mihailo St. Popović, 2020)

The question of what kind of cartographic data was used as a basis for the modelling of the relief is still unanswered. Here, further research will be needed in the Austrian State Archives in Vienna. It may be assumed that the Austro-Hungarian "Generalkarte von Mitteleuropa" at the scale 1:200,000 formed one group of the data sets.[24] The publications by the Austro-Hungarian officer Hubert Ginzel (1874-1950) could prove to be instructive as well in the ongoing research.[25] 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 supported by concrete beams and pillars. At a later, unknown date walls made of concrete and glass were added on all four sides (**Fig. 15**).

24 Cf. on this map with a bibliography: Popović 2014, pp. 130-131.
25 Ginzel, 1918; Ginzel 1921; cf. also: Hassert 1894.

Fig. 15 The Original Austro-Hungarian Pavilion of the Relief Map before 1979 ("Njegošev muzej Biljarda" in Cetinje, 1970s)

Fig. 16 The New, Current Pavilion of the Relief Map from the South (Mihailo St. Popović, 2020)

Fig. 17 Mark of One of the Pillars of the Austro-Hungarian small pedestrian bridge (Mihailo St. Popović, 2020)

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 (18 m × 19,8 m) (**Fig. 16**).

While the Austro-Hungarian small pedestrian bridge over the relief was stripped – its five pillars have left marks on the relief (**Fig. 17**), the entrance to the object remained in the South.[26]

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.

3. 2. 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 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.

26 We 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.

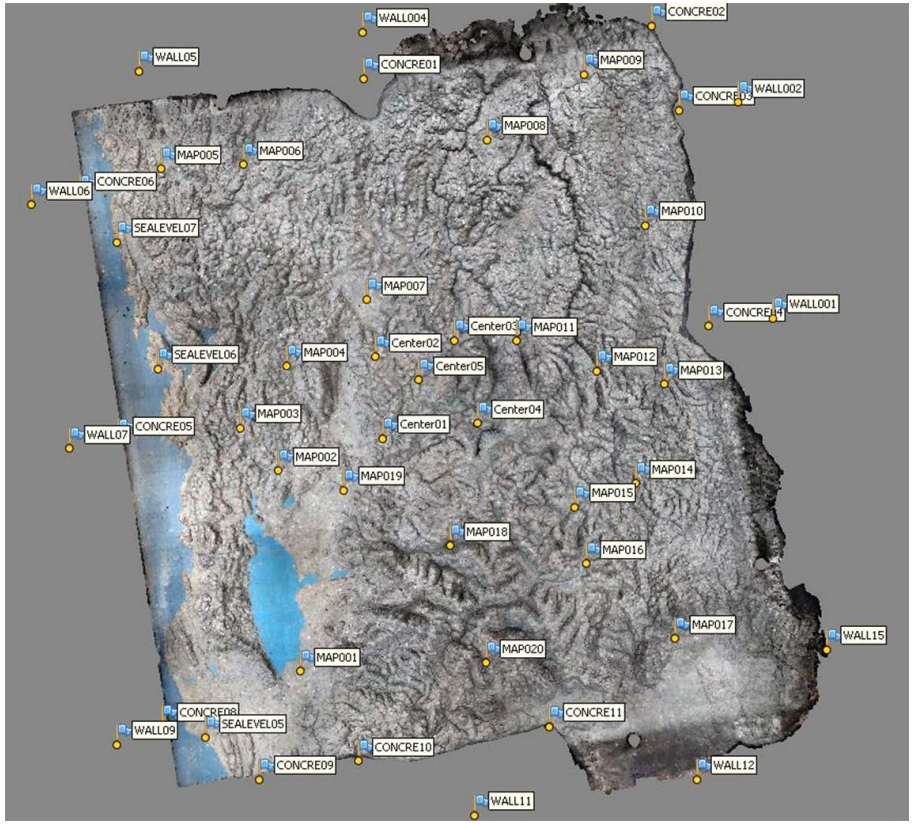

Fig. 18 The 51 Reference Points of the 3D Capture in March 2020 (Moisés Hernández Cordero, 2020)

It employs a batch of overlapping images captured from different spatial positions to produce a 3D point cloud.[27] The accuracy is comparable to existing laser scanning and stereophotogrammetry techniques in close-range scenarios.[28] They have provided excellent results for archaeological and cultural surveys compared to the terrestrial laser scanner technique.[29]

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 (**Fig. 18**).

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.[30] 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 (**Fig. 19**). 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.[31] For a better orthogonal view of the surface and to have the necessary overlap for each image, the photo equipment was mounted in an 8m Monopod. The effect of this was an improvement of the overall accuracy, better alignment of the images, the reducing of processing time and more detail on the surface of the digital relief.[32] The fieldwork did not require any special lighting, as the weather over Cetinje granted a constant non-sunned surface, the key to creating the later uniform texture map.[33] 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

27 Verma/Bourke 2019, p. 46.
28 Smith et al. 2016; Wilkinson et al. 2016.
29 Doneus et al. 2011, p. 87; Verhoeven et al. 2012.
30 Remondino et al. 2004.
31 Burns et al. 2015, p. 5.
32 Schön et al. 2016, p. 4; Zhang 2013, p. 68.
33 Hernández Cordero/Pülz 2019, p. 403. Cf. also: Hernández Cordero 2017.

Fig. 19 Survey Point in Key Geographical Features such as Bays, Crossroads or Bridges (Moisés Hernández Cordero, 2020)

and texturized mesh.[34] 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.

3. 3. The Relief Map of Montenegro as Outstanding Specimen in Europe's Material Culture

The research and scanning of the relief map of Montenegro should not be regarded as an isolated attempt to acquire data for HOLDURA and its digital tools alone, but foremost as a contribution to the contextualisation of such an object as paradigm in Europe's material culture. The first step in the contextualisation is the question whether this relief map is unique or whether other examples of relief maps of South-East Europe were made in the late modern period.

Our research has revealed two other relevant examples so far. The first is a relief map of Greece, which was made by the Philhellene Carl Jakob Iken (1789-1841), who was one of the leading German scholars of Modern Greek language and culture in the 19th century.[35] Iken published a description of his relief map in the journal "Isis oder Encyclopädische Zeitung von Oken" in 1818, which we quote in its entirety in the following, because the map has not been preserved. Thus, only the extensive description can shed light on this map's features:

> „Relief von Griechenland. Schon seit lange [sic!] beschäftigten wir uns in Nebenbenstunden [sic!] mit einer plastischen Nachbildung des griech. [ischen] Terrains in einer gewöhnlichen Masse von Gyps und Oel, obgleich nur nach einem sehr verkleinerten Maaßstabe. Durch nachstehende kurze Andeutung hofft man nicht bloß dem Freunde und Kenner des Alterthums einen Dienst zu leisten, sondern man wollte auch den Künstler zu einem gleichen Unternehmen auffordern, besonders wo es gelingen sollte, ein solches Relief von Griechenland nach einem recht großen Maaßstabe auszuführen. Dies Unternehmen möchten wir vorzugsweise dem Geographischen Institut zu Weimar empfehlen und anheimstellen, da es nicht allein die nöthigen Landkarten besitzt, sondern weil auch in Weimar für die Formkunst so viel geschieht und die Materialien dort vorräthig und die Handgriffe geläufig sind. Nächstdem vielleicht in Dresden, München,

34 Remondino et al. 2017.

35 Cf. on his biography in detail: Diamantopoulou 2020. See also: Diamantopoulou 2015.

oder in einer Bildungsanstalt wie Schnepfenthal[36], besonders aber in Wien, wo anwesende Griechen vielleicht manches berichtigen könnten. Es muß auffallend seyn, daß, während man vom Elsaß usw. längst Reliefs gearbeitet hat, doch von Griechenland noch keins unternommen ist. Allerdings fehlen dazu die genauen Angaben der Höhen und Umrisse der Gebirge; die Physiognomien der Felsenketten, die Bergprofile der Vorgebirge sind noch sehr wenig gezeichnet oder stehen nur in seltnen engl.[ischen] Werken; allein hierauf käme es auch nicht genau an, wenn der Zweck der Belehrung und der Erleichterung der Alterthums-Studien nur vorerst erreicht wäre. Und dies würde doch der Hauptnutzen seyn. Wie mancher Anfänger würde dadurch angezogen u.[nd] für dieses Studium gewonnen werden, wie sehr würde der Kenner sich manches aufklären, sich leichter zurechtfinden, die Wissenschaft würde angefrischt [sic!], das Studium des Alten würde erneut werden. Strabo, Plutarch, Thukydides würden lebendiger verstanden und angeschaut werden, wenn man über dem heiligen Boden wie in der Vogelperspective mit den Blicken schwebte. Eins der bekanntesten Hülfsmittel zu dieser Arbeit würden die Kupfer u [sic!] Karten zu Barthelemys Reisen seyn. (In einem besondern Bande mit Text von Biester 1793 in Berlin herausgegeben).[37] In dem Handbuch von Miltenberg über die Berghöhen fände man wol die meisten Höhen verzeichnet.[38] Zu der Composition pflegt man Lehm mit Holzkohlen zu nehmen, wie bey dem Relief des Generals Pfyffer in Lucern[39], ohne daß die Genauigkeit desselben zum Muster zu dienen brauchte. Auf dem Berliner Schloß ist ein ähnliches von der Schweiz und eins vom Harz, worauf die Landseen mit Spiegelglas angedeutet sind: Wasserfälle stellte man durch Zindel und gesponnenes Glas dar, das Meer mit grünen Glasplatten usw. Bloß von Athen hat man ein Relief des Herrn von Breitenbauch (s. Meusels Museum).[40] Ein neueres von Paris. Schweizer Reliefs kann man bekanntlich zu verschiedenen Preisen kaufen, von 20 bis etwa 100 Thlrn. Die Ruinen von Griechenland hat man schon längst in Gyps- und Korkmodellen. Die große Triester Charte von Griechenchenland [sic!] in 2 Bl. von Palma[41], so wie die 12 Charten von Ruga[42] und Franz Müller würden zu benutzen seyn. Besonders wären aber künftige Reisende im voraus aufzufordern, für diesen Zweck durch genaue Profilrisse der Gebirge, durch Messungen und Prospecte Sorge zu tragen."[43]

The second example is a relief map of the city of Skopje, which was made in 1925 and is today preserved in the Museum of the City of Skopje in Suli An in the Old Town (*Čaršija*) of Skopje. Its dimensions are 60 × 85 cm (**Fig. 20; Fig. 21**).

According to a Serbian inscription on a brass plate in the relief's lower right corner, the relief was made by Russian military topographers on 10 May 1925 in the Serbian town of Zemun and shows the city of Skopje in 1912, based on a Serbian topographic map from 1913.[44]

Subsequently, the question about the function of the aforesaid relief maps comes up. The "Cetinjer Zeitung" and the Philhellene Carl Jakob Iken provide important insights in their descriptions, which are quoted above: "… sodaß der Beschauer den Eindruck gewinnt, das Land aus der Vogelschau oder aus einem Flugzeug zu übersehen"[45] and "… wenn man über dem heiligen Boden wie in der Vogelperspective mit den Blicken schwebte …"[46]. Thus, it is the fascination of the bird's eye view combined with a better understanding of space and place.

36 Schnepfenthal became known through an educational institution of the educationists Christian Gotthilf Salzmann (1744-1811) and Johann Christoph Friedrich Guts Muths (1759-1839), who set up a new type of school with a special emphasis on sports and practical work in 1784. Cf. Rödl/Bause 2005.
37 Barthélemy 1793.
38 Miltenberg 1815.
39 Franz Ludwig Pfyffer (1716-1802) created a relief map of the central alpine regions in Switzerland between 1762 and 1786. Cf. Ottiger 1973; Bürgi 1998.
40 Cf. the description of this relief of Athens in: Meusel 1794, pp. 374-375.
41 Cf. on this map by Gaetan Palma from 1811: Pazarli 2010.
42 "Ruga" is a misprint for "Riga". The mentioned map is the famous specimen by the Greek writer and revolutionary Rigas Velestinlis (1757-1798). Cf. amongst others: Boutoura 2008.
43 Isis 1818, pp. 562-563.
44 Mihailo St. Popović is currently preparing an extensive article on the history of this relief. He published first findings in: Popović 2015; Popović 2016.
45 Cf. above, footnote 17.
46 Isis 1818, pp. 562-563.

Fig. 20 The Relief Map of Skopje from 1925 (Mihailo St. Popović, 2016)

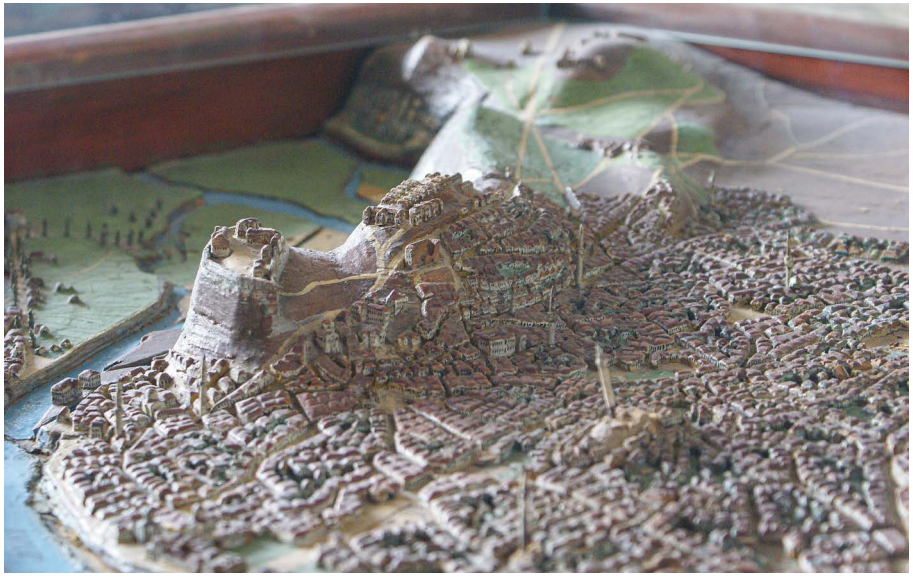

Fig. 21 The Medieval Upper Town (Kale) on the Relief Map of Skopje from 1925 (Mihailo St. Popović, 2016)

In this respect the relief map of Montenegro represents an outstanding specimen in Europe's material culture, both in terms of size (± 282 square metres) and of workmanship. Another aspect, which should be briefly addressed at this point, is the function of this artefact. Our respective research so far – *in situ* as well as based on the scarce bibliography, related maps and GIS analysis – seems to indicate that the relief map of Montenegro was not used for military planning itself, but it could have served for the presentation of military plans to an audience. Another function could have been political, i.e. to depict a region which had been subjugated by Austria-Hungary in the First World War.[47]

4. The Contextualisation of the Acquired Data

The aforesaid contextualisation of the relief map of Montenegro is of the utmost importance for HOLDURA. The Team Department of Geography and Regional Research (University of Vienna; K. Kriz, A. Pucher, M. Breier, L. Neugebauer, D. Nell, L. Brunauer) is continuing to conduct GIS analyses of the relief's 3D capture. First results were presented by Markus Breier with a paper entitled "Montenegro in Miniature: An Analysis of the Historical Relief of Montenegro in Cetinje" at the virtual International Medieval Congress (IMC) in Leeds in July 2021. Secondly, the Teams Austrian Academy of Sciences (M. St. Popović, D. Schmid) and Leipzig University of Applied Sciences (here Prof. Dr. Johannes Tripps and Dr. Branka Vranešević) will conduct analyses based on Historical Geography and Art History respectively. From the viewpoint of Historical Geography, the landscape, road network and hydrography as presented on the relief is very instructive, since it shows features and an infrastructure, which are preindustrial and, thus, reflect medieval patterns and the related environment. From the viewpoint of Art History, the relief will facilitate the interpretation of the location of churches and monasteries in the

47 Markus Breier, Moisés Hernández Cordero and Mihailo St. Popović are preparing a joint article on the making of the relief map, its function, its 3D capture and its accuracy.

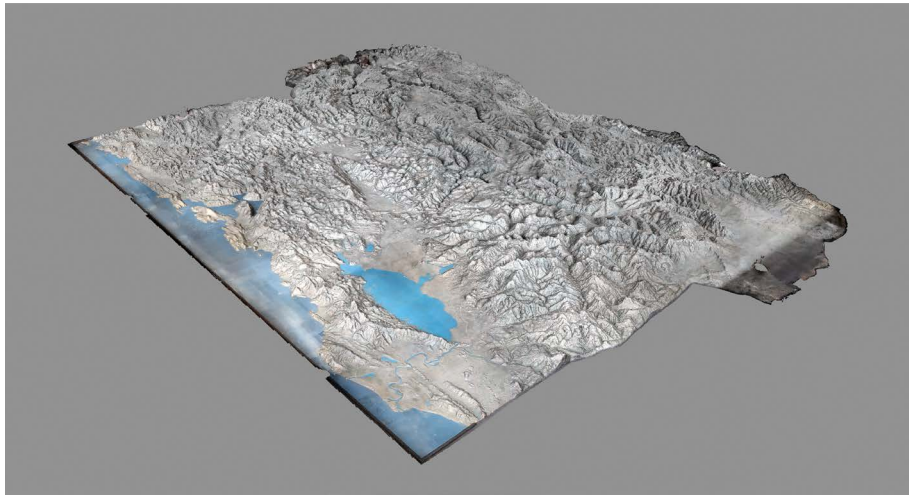

Fig. 22 The Result of the 3D Capture of the Relief Map of Montenegro (Moisés Hernández Cordero, 2020)

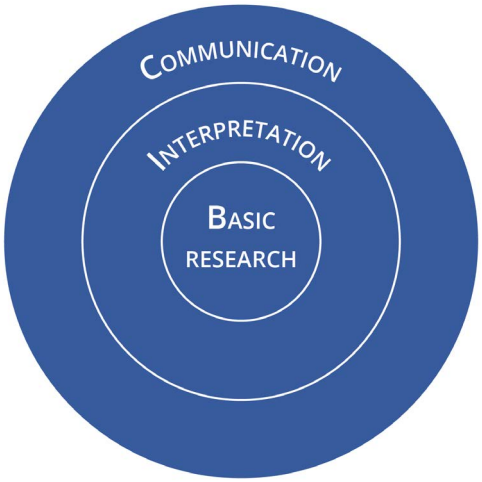

Fig. 23 The Three Fields of Interaction within HOLDURA (Team Department of Geography and Regional Research, University of Vienna, 2020)

area of research and enrich our studies on the distribution of Saints' cults as well as Latin and Orthodox sanctuaries. Therefore, the relief map of Montenegro will be a cornerstone in the interpretation and Geocommunication of the "Sacred Landscape" of "Duklja" and "Raška" through space and time (**Fig. 22**).

All scholars involved in HOLDURA engage in three interlocked fields of the project (i.e. "Basic Research", "Interpretation", "Communication"), interpret the acquired data from a historical geographical point of view and facilitate its exchange/interplay between the project partners in order to achieve the most effective outward communication and sustainability (**Fig. 23**).

In the project's first year the historical context of the relief map of Montenegro and its 3D capture were achieved in the field of "Basic Research". The GIS analysis of the relief contributes to "Interpretation", while the paper at the IMC Leeds in July 2021 is part of the field of "Communication". A step in the dissemination of first results, to be attributed to the field of "Communication", has been achieved by Mihailo St. Popović in 2020, who published an article in the blog of the daily Austrian newspaper "Der Standard" entitled Montenegro im Relief: Terra incognita auf dem Balkan.

Prof. Dr. Karel Kriz and his Team Department of Geography and Regional Research (University of Vienna) are strongly engaged in the field of "Communication" of HOLDURA. They will build upon the "Basic Research" provided by the Historians and Art Historians and will use the specialised know-how in GIScience in order to offer additional insight into the spatial structure of the "Sacred Landscape". These analyses will be valuable information for the interpretation of the "Basic Research". Methods of Geocommunication and spatial visualisation will provide a platform of dissemination to communicate the scope of the project to academia and the interested public. Therefore, the Team Department of Geography and Regional Research (University of Vienna) has developed the first version of a framework in the WWW during the project's first year, which will serve as a hub for all three aforesaid fields and promote the project's results to academia as well as the general public (**Fig. 24**).

It will feature Aerial Images, 3D Models of churches and monasteries, the Historical Relief of Montenegro in Cetinje, different aspects of Cartography, a linkage to the frontend "Maps of Power: Historical Atlas of Places, Borderzones and Migration Dynamics in Byzantium (TIB Balkans)" and GIS analyses.

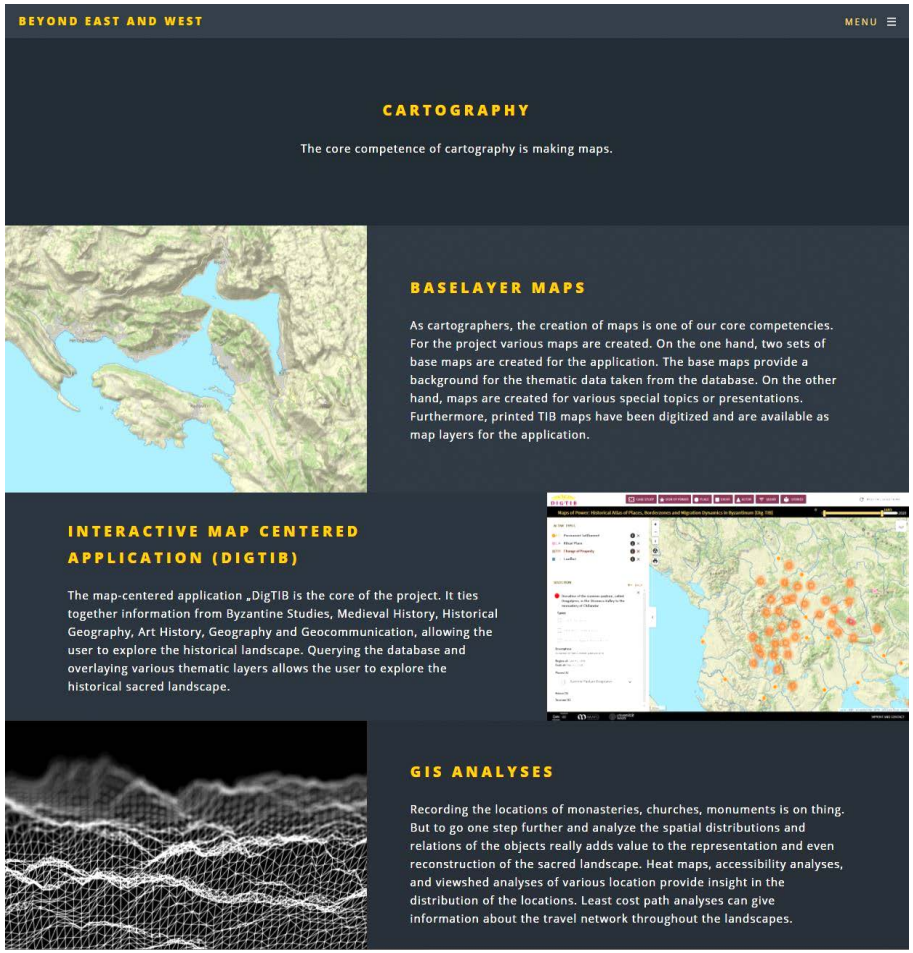

Fig. 24 The First Version of a Framework for HOLDURA in the WWW (Team Department of Geography and Regional Research, University of Vienna, 2020)

5. Embedding and Expanding our Data in the TIB OpenAtlas Database

In the field of "Basic Research" HOLDURA is closely connected to the ongoing scholarly work of Mihailo St. Popović on TIB volume 17 "Nea Epeiros and Praevalis", which is an integral part of the Long-Term Project Tabula Imperii Byzantini at the Austrian Academy of Sciences in Vienna and which he has begun in 2020.[48]

Also in 2020 David Schmid (Team Austrian Academy of Sciences) and Branka Vranešević (Team Leipzig University of Applied Sciences) have started to embed data from written sources and the bibliography regarding the Historical Geography and Art History of "Duklja" and "Raška" into the TIB OpenAtlas Database, which is used to store and query data sets of HOLDURA. Our aim in the first year of HOLDURA was to create a solid basis of evidence on settlement patterns and ritual places. Thus, 1,408 different entities had been input until December 2020. Those entities consist of Acquisitions, Activities, Documents, Legal Bodies, Linguistic Objects, Man-Made Objects, Persons, Places and Physical Things. Our focus lay and still lies on places and here specifically on churches, monasteries, fortresses, towns, fortified settlements and villages.

In order to build the fundament for the upcoming analysis, David Schmid started to identify and read relevant written sources and secondary literature on the area of research as well as to extract data from both according to the research questions (see above, Introduction and Aims of the Project). He localised the extracted sites using different maps, like Austro-Hungarian and Yugoslav military maps and contemporary road maps, as well as Open Street Map and Google Earth. Unfortunately, only a few publications provide GPS-coordinates. In order to minimise the uncertainty of some localisations, David Schmid has compared different accounts on the specific sites to pinpoint the location as precisely as possible. When he was not able to mark an

48 TIB 17. Nea Epeiros and Praevalis. In: DIGTIB, https://tib.oeaw.ac.at/balkan/b%C3%A4nde/TIB_17.

exact location, he drew a polygon in the database as an approximate localisation, in which the boundaries of the specific sites most probably lay.[49]

David Schmid started to enrich the database with the monograph "Early Croatian Architecture" by Vladimir P. Goss.[50] This book was published in 1987 and provided the basis for the "Sacred Landscape" of coastal Croatia (Dalmatia). David Schmid was able to extract data on 108 churches on the Croatian coast and the islands from Goss' publication.

After that, he consulted Miodrag Purković's monograph entitled "Popis crkava u staroj srpskoj državi" ("Gazetteer of Churches in the Old Serbian State") and published in 1938.[51] Purković provided the data for a huge amount of medieval Orthodox churches, monasteries and other religious buildings in the modern states of Serbia (including Kosovo), Montenegro and North Macedonia with references to the written sources and secondary literature. This dataset formed the basis, on which Branka Vranešević enriched and expanded remarkably the entries on the religious monuments (see below). With his publication "Popis sela u srednjevekovnoj Srbiji" ("Gazetteer of Villages in Medieval Serbia") Miodrag Purković provided a list of villages together with references to the used written sources, which is very similar to the aforesaid "Popis crkava".[52] From both, "Popis crkava" and "Popis sela" we were able to extract roughly 60 entities.

In order to close some gaps in the localisations, David Schmid used the "Imenik naseljenih mesta u Federativnoj Narodnoj Republici Jugoslaviji" ("Gazetteer of Settlements in the Federal People's Republic of Yugoslavia") from 1951.[53] The "Imenik geografskih naziva srednjovekovne Zete" ("Gazetteer of Geographical Names in Medieval Zeta") by Gavro Škrivanić proved to be very useful.[54] Škrivanić did not only identify medieval places based on written sources and archaeology, but he also provided localisations in modern Croatia, Bosnia and Hercegovina, Serbia (including Kosovo), Montenegro and Northern Albania and a map with the localised places. Thus, we extracted 300 entities on villages, towns, fortifications, churches and monasteries based on the monograph by Gavro Škrivanić.

For additional localisations of fortresses and fortifications in modern Montenegro, we used the monograph "Gradovi i utvrđenja u Crnoj Gori" ("Towns and Fortresses in Montenegro") by Pavle Mijović and Mirko Kovaćevič.[55] We were able to extract 53 settlements, fortified towns, fortresses and monasteries. The publication by Pierre Cabanes and his co-authors entitled "Carte archéologique de l'Albanie" provided 12 entities.[56] The last book consulted by David Schmid in the first project year was "Albanien. Ein Archäologie- und Kunstführer von der Steinzeit bis ins 19. Jahrhundert", which provided 57 entries for our TIB OpenAtlas Database.[57]

Apart from the aforesaid secondary literature, David Schmid consulted the editions of the charter for the Banja Monastery, which was issued by the Serbian King Stefan Uroš II Milutin (reigned 1282-1321) between 1314 and 1316[58], and the first charter for the Monastery of Dečani, which was issued by the Serbian King Stefan Uroš III Dečanski (reigned 1321-1331) in 1330[59], in order to extract relevant toponyms and settlements in the area of research. In such a way, David Schmid created a very solid basis of data in our database, on which our colleagues from Art History were able to build on.

At the beginning of HOLDURA the Art Historian Ass.-Prof. Dr. Branka Vranešević (University of Belgrade, Faculty of Philosophy, Department of Art History), being part of the Team Leipzig University of Applied Sciences, created a list of monuments in the area of research in close cooperation with Prof. Dr. Johannes Tripps. This list was made following the ground plan of the churches in "Duklja" and "Raška", Western or Eastern influences on churches and their decoration. It was divided into three parts (i.e. three work packages),

49 Cf. on the entities and the aspect of fuzziness in the OpenAtlas database: Popović et al. 2016.
50 Goss 1987.
51 Purković 1938.
52 Purković 1939/1940.
53 Imenik naseljenih mesta 1951.
54 Škrivanić 1959.
55 Mijović/Kovačević 1975.
56 Cabanes/Korkuti 2008.
57 Zindel et al. 2018.
58 Mošin et al. 2011, pp. 457-469.
59 Grković 2014, pp. 64-81.

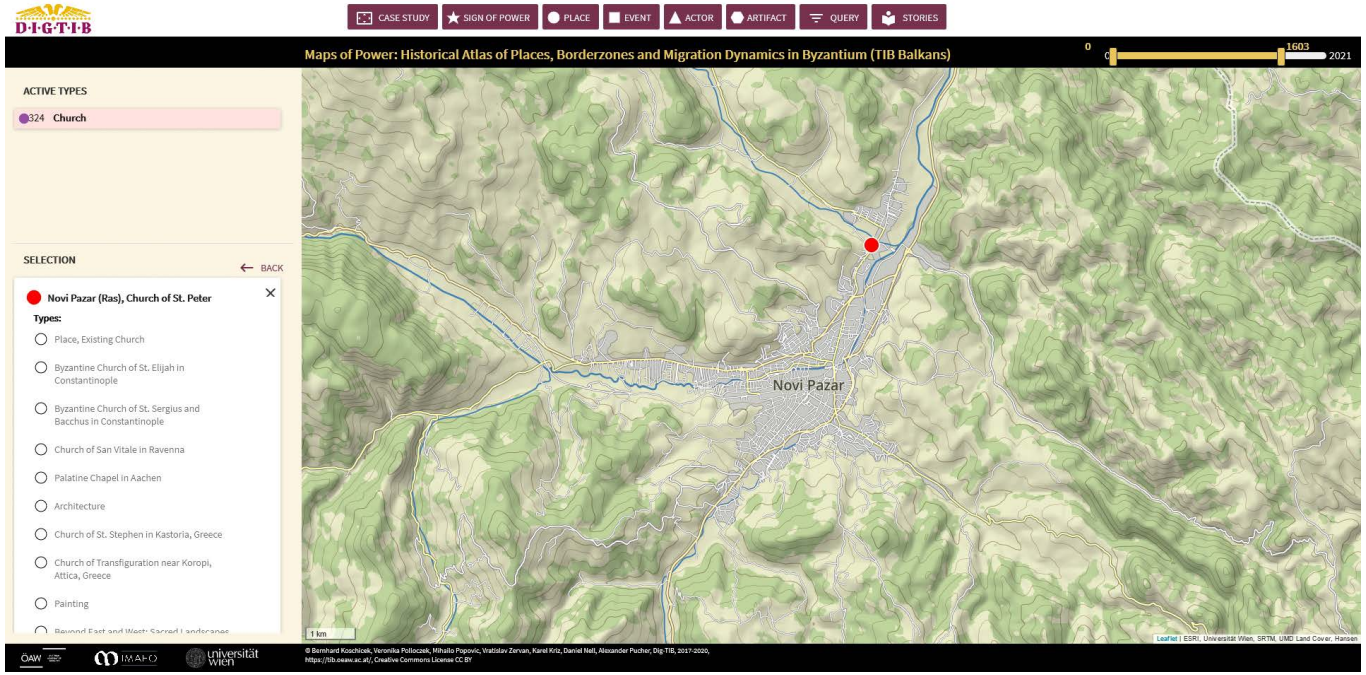

Fig. 25 The Church of St. Peter in Ras in the Frontend "Maps of Power" (Screenshot by Mihailo St. Popović, 2021)

which mirror the project's duration of three years. In the first year of the project, Branka Vranešević focused on churches and monasteries from the 8th until the 12th century. Until October 2020 she had researched altogether 68 monuments and embedded respective data into the TIB OpenAtlas Database. At the moment she is focusing her research on the churches and monasteries from the 13th and 14th centuries as well as small objects of art.

We have established a best practice for the embedding of data on churches and monasteries in the area of research by expanding the entity of "Place" in our database with specific Custom Types like "Dedication" (i.e. to which Saint the object is dedicated), "Denomination" (i.e. Latin, Orthodox or Mixed Orthodox-Latin), "Ground Plans" (i.e. Central, Central Plan Basilica with a Dome, Cross-Shaped, Cruciform and Cruciform with a Dome, all of them with respective sub-types), "Stylistic Classification" (i.e. Byzantine, Late Antique and Early Medieval before 900 AD, Latin, Latin-Byzantine Combination, Medieval, Roman Antique before 313 AD), "Evidence" (i.e. Archaeology, Existing Monument, History, Oral History, Toponymy) and finally "Analogies" (i.e. analogies in Byzantine and medieval Slavonic art).

This enables us to query our data systematically and address our aforesaid research questions. Moreover, all users of the WWW may freely query and browse our data via our frontend "Maps of Power: Historical Atlas of Places, Borderzones and Migration Dynamics in Byzantium (TIB Balkans)" live and always up to date, because all embedded data in the database is immediately shown in our frontend, too.

As an example, we would like to highlight a monument, which was researched in the first year of HOLDURA. It is the Church of St. Peter in Ras (Црква Светог Петра у Расу, Crkva Svetog Petra u Rasu; **Fig. 25** and **Fig. 26**).[60]

It is at this point that we would like to return to the essence of the 3D capture of the relief map of Montenegro. Neither the story behind the creation of the relief map, nor the 3D capture, nor the GIS analysis, nor the digital preservation stand isolated for themselves, but they do form a holistic approach

60 Cf. the following permalink in our frontend with quotations from the respective bibliography: TIB Map Application (Novi Pazar (Ras), Church of St. Peter), https://data1.geo.univie.ac.at/projects/tibapp/#activetypes=76&center=43.145837669496494%2C20.514221191406254&selection=119427&selectioncategory=PLACE&story=&storystep=&time=0%2C1603&zoom=12.

Fig. 26 The Church of St. Peter in Ras from the South (Photograph Collection "Dipl. Kfm. Wolfgang Milan [1924-2015]", 1970s)

with the aim to contextualise the artefact and to use it as a means to address the aforesaid research questions of HOLDURA. As a first step, the georeferenced orthophoto of the Austro-Hungarian Relief Map of Montenegro was embedded as a map layer into the TIB OpenAtlas Database as well as into the frontend "Maps of Power" in the spring of 2021 (**Fig. 27**).

In a second step, we queried our TIB OpenAtlas Database for the embedded churches and monasteries in the area of research in order to address the aforesaid research questions. Via map visualisation of this data, several patterns of the "Sacred Landscape" of the given area can be observed in the time range between the 11th and 15th centuries. When considering the territory of today's Montenegro including some of its neighbouring areas (on the Northern boundary, South-East to the Lake Shkodra, and West on the coastal area towards Dubrovnik), the location of 43 ritual places[61] can be determined for the beginning of the 11th century. For the time following, the building or founding of churches and monasteries increases in the area to the North of Bjelo Polje, in the Eastern Boka Kotorska, in the South-Eastern coastal area and in the vicinity of the Lake Shkodra, while in some hinterland areas, as for instance in the North-West from the Boka Kotorska, a development of a "Sacred Landscape" seems to stagnate throughout the High Middle Ages. In the given landscape, there is a total increase of 27 churches and monasteries in the time span between the 11th and the first half of the 15th centuries. In this respect, the focus of research lies on the specific clusters and patterns emerging from the perspective of dedications. In observation of all the located ritual places in the area of research (**Fig. 28**), dedications to several patron saints can be perceived, of which the seven most widespread dedications can be viewed on the map below (**Fig. 29**).

On the one hand, there is a visible increase in Marian devotion in the South-Eastern coastal area, as well as in its Northern hinterland. Dedications of Saint Nicholas augment near the Lake Shkodra and in Budva as well. On the other hand, in some parts, e.g. in the city of Kotor or the Northern hinterland, dedications to patron saints from the 11th century onwards are rather heterogenic.

Based on this data, it is possible to raise several further research questions and bring to light diverse aspects. Firstly, an important determining aspect of the "Sacred Landscape", as defined earlier in this article, is the distribution of the Latin and the Orthodox rite (dedication respectively) among the ritual places: which places tended more to one or to the other, which were clearly Latin, which not? At this stage of research, it is not yet possible to provide distinctive answers, but a consideration of the following aspects might offer a well-founded ground for further examination: the increasing Latin monastic tendencies from the 13th century onwards (i.e. Franciscan and Benedictine),

61 The term "Ritual Place" refers to a an item or instance type used as a category of search in the TIB OpenAtlas Database; see: https://data1.geo.univie.ac.at/projects/tibapp/#activetypes=76&center=42.58446177114571%2C19.02099654078484&selection=&selectioncategory=&story=&storystep=&time=0%2C1004&zoom=8.

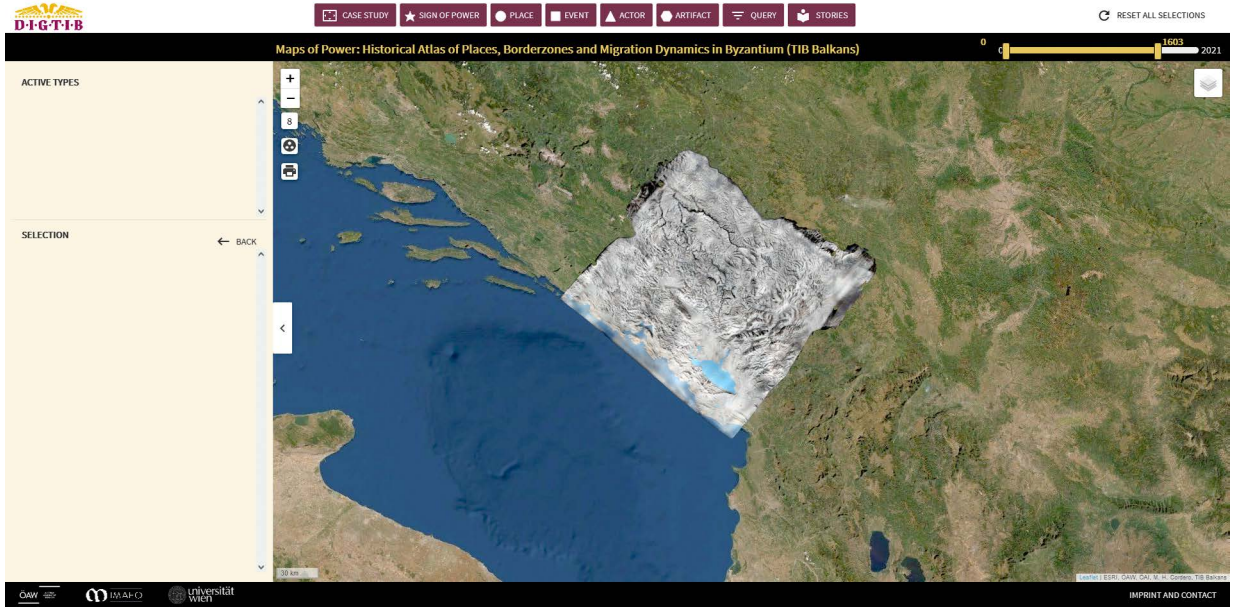

Fig. 27 The Map Layer "Historical Relief of Montenegro in Cetinje" in the Frontend "Maps of Power" (Screenshot by Mihailo St. Popović, 2021)

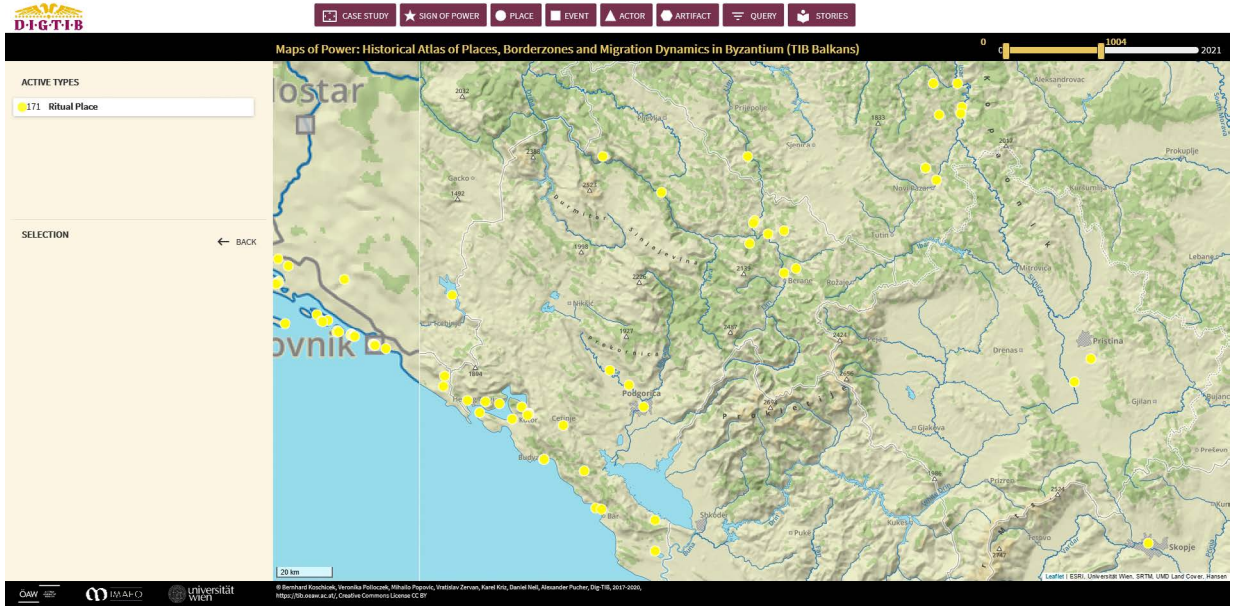

Fig. 28 The Location of the Ritual Places in the Area of Research in the Frontend "Maps of Power" (Screenshot by Mihailo St. Popović, 2021)

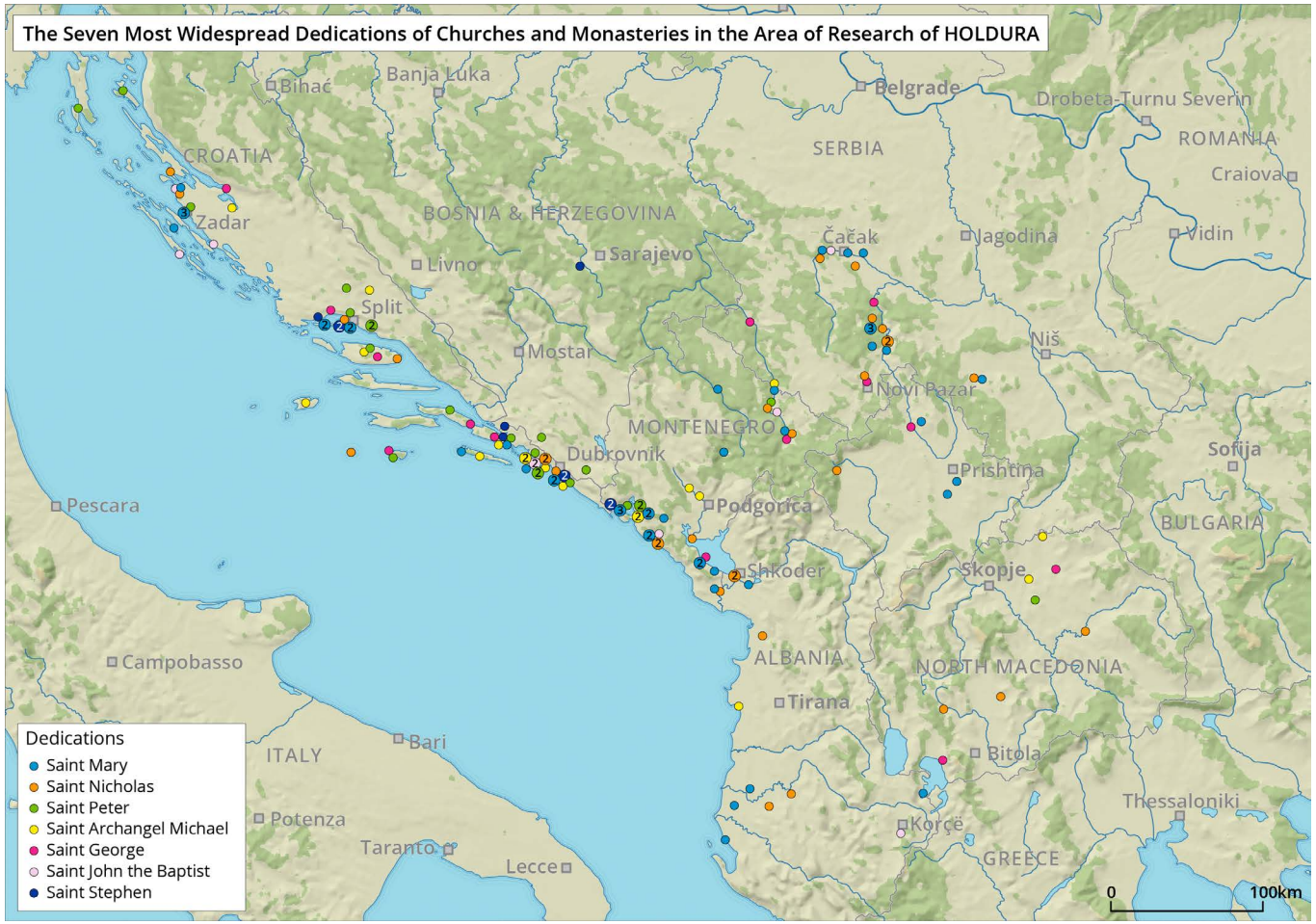

Fig. 29 The Seven Most Widespread Dedications of Churches and Monasteries in the Area of Research of HOLDURA (Markus Breier, 2021)

further, the dissemination of cult objects (e.g. a miraculous icon of the Madonna of Punta in the Church of John the Baptist in Budva) and the exploration of the founding of ritual places and its tendency towards one of the said ecclesiastical directions (e.g. when a church was founded or used as a tomb of a ruler etc.).

Secondly, some clusters of ritual places as viewed on the maps suggest an interdependency between road connections and ritual places or settlements (e.g. the cluster around Bjelo Polje and Brodarevo, or the augmenting sequence of churches from the North-Western shore of the Lake Shkodra to the Ždrebaonik monastery).

For these research questions, the database provides a solid ground. Some of its features, as for example the in some cases problematic dating of churches etc. and its subsequent potentially misleading visualisation on the maps, will be gradually corrected though.

In a third step, we have begun to address the question of the location of ritual places and their interdependency with the medieval road network. For this purpose, we are using the georeferenced orthophoto of the Austro-Hungarian Relief Map of Montenegro as a layer in our TIB OpenAtlas Database and compare its preindustrial roads with the bibliography on the road network in the area.[62] Then, we draw lines of these roads based on the orthophoto, if the evidence in the relief and the bibliography match. Thus, we are acquiring a consistent picture of the medieval road network, which enables us to pose the research question, if certain dedications (cults of Saints) were spreading

62 Still fundamental is the publication by Škrivanić 1974, pp. 62-71.

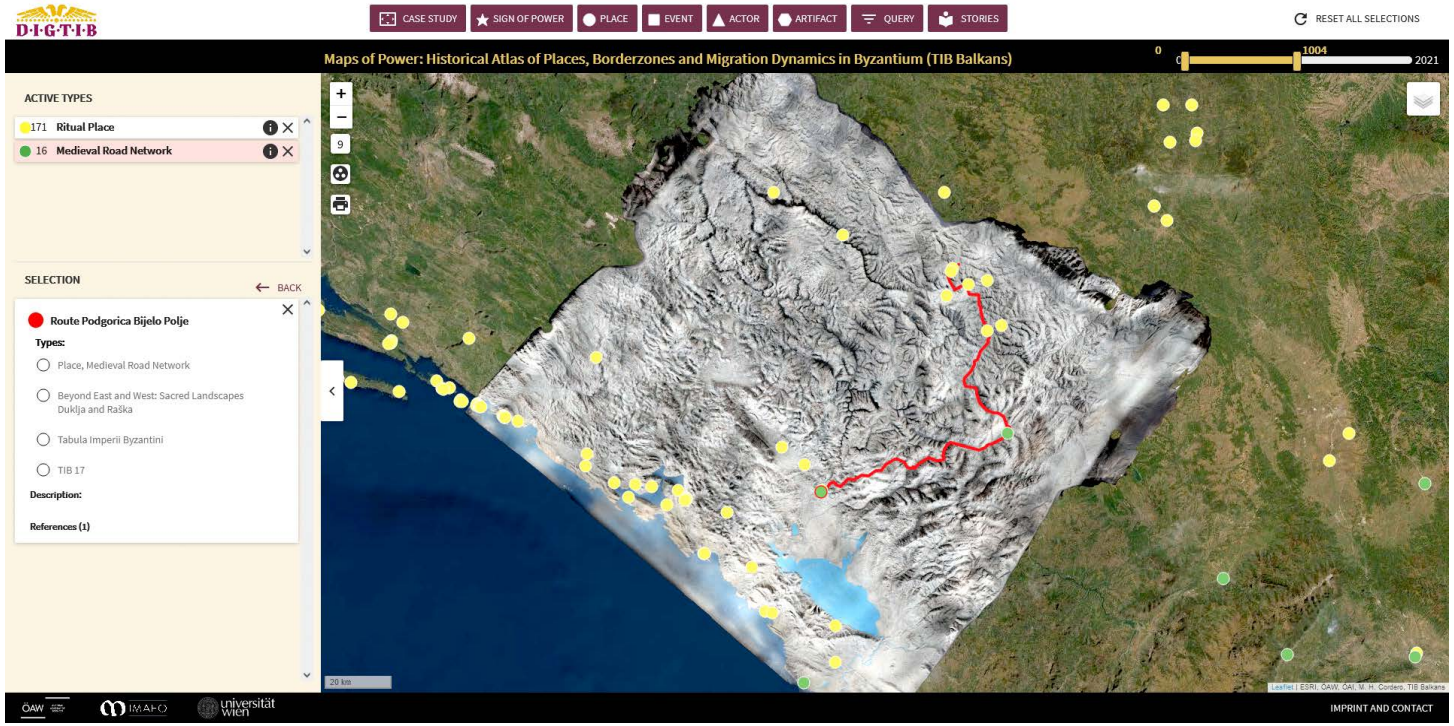

Fig. 30 The Ritual Places in the Area of Research (in Yellow) and Their Relation to the Medieval Route Podgorica-Bijelo Polje (in Red) in the Frontend "Maps of Power" (Screenshot by Mihailo St. Popović, 2021)

to the coastal areas from the hinterland or *vice versa* via these routes of communication. This again will help us to understand better, in which way the "Sacred Landscape" was shaped through the centuries. Our research is ongoing, and we plan to publish our results accordingly (**Fig. 30**).

6. Outlook for 2021 and 2022

Prof. Dr. Johannes Tripps and Branka Vranešević will compose a list of small objects of art in the second year of HOLDURA, which are kept in churches and monasteries as well as museums and similar collections in the Republics of Serbia and Montenegro (e.g. the National Museum of Serbia, the Museum of the Serbian Orthodox Church, the Museum of Applied Arts, the Gallery of Frescoes, all in Belgrade; the National Museum of Montenegro in Cetinje etc.). Moreover, Johannes Tripps has started to define specifications for the description of these objects, which will be implemented into the TIB OpenAtlas Database through Custom Types. In the third year of HOLDURA both Art historians will analyse and compare them, date and/or re-date them and input them into our TIB OpenAtlas Database. In this way, we will be able to reconstruct the cultural and religious interchange in the area of research.

In 2021 all three project partners have continued to engage in and evolve their respective work packages as outlined in the project proposal. The Team Austrian Academy of Sciences (M. St. Popović) continues to collect, read and analyse Byzantine, Latin and Slavonic written sources on the area of research. David Schmid has accomplished his task within the project's first year, and a new scholarly co-worker, Dorota Vargová, BA, has been recruited for the second and third year of HOLDURA. Her task is to engage in Latin sources (e.g. historiography, inscriptions etc.), the Church History in the area of research and digital aspects of the project. Together with the Team Leipzig University of Applied Sciences (J. Tripps, B. Vranešević) the Team Austrian Academy of

Sciences will continue with the collection and analysis of the secondary literature. The Team Leipzig University of Applied Sciences will research and interpret churches and monasteries from the 13th and 14th centuries. In 2021 we will enter the second phase of the embedding of the respective data into the TIB OpenAtlas Database and the frontend "Maps of Power".

The Team Department of Geography and Regional Research (University of Vienna; K. Kriz, A. Pucher, M. Breier, L. Neugebauer, D. Nell, L. Brunauer) will enter the second phase in the development of the aforesaid framework and of GIS analyses. The GIS analyses will comprise Heatmaps as well as Viewshed- and Accessibility-analyses.

In 2021 and 2022 Johannes Tripps, Branka Vranešević, Mihailo St. Popović, Markus Breier, Lukas Neugebauer, Moisés Hernández Cordero and Bernhard Koschicek will conduct surveys in the area of research and document respective monuments in detail. Both aforesaid projects – "Beyond East and West: Geocommunicating the Sacred Landscapes of 'Duklja' and 'Raška' through Space and Time (11th-14th Cent.)" and "Cultural Heritage in Times of World War I: The Case of the Austro-Hungarian Relief Map of Montenegro (1916-1918)" – will cooperate and facilitate surveys of all three teams in Serbia and Montenegro scheduled for autumn 2021, subject to the development of the pandemic crisis. While the Team Leipzig University of Applied Sciences will do research in archives, collections and libraries in Serbia as well as on churches and monasteries in Montenegro from the viewpoint of Art History, the Teams Department of Geography and Regional Research (University of Vienna) and of the project "Cultural Heritage in Times of World War I" will gather images of important monasteries, churches and small objects of art. The use of drones will allow to take aerial images. These images will provide the basis for 3D Models, but selected images will also enhance the database. Furthermore, these images will be used to create interactive panoramic views of the "Sacred Landscapes" of "Duklja" and "Raška". For selected monasteries and churches, 3D models will be calculated. These 3D models will be created by the technique "structure from motion", a photogrammetric method to create a 3D structure from two-dimensional image sequences. The method requires multiple overlapping pictures of an object at various angles. To get even coverage required for this method, a drone will be used to acquire the images. Moreover, we will capture in 3D selected objects of art from monastic treasuries in Montenegro. Finally, all three teams will contribute to a joint article in 2022 in order to make the "Sacred Landscape" of "Duklja" and "Raška" comprehensible to academia and the general public.

7. Acknowledgements

The present article is based on scholarly results of the projects "Beyond East and West: Geocommunicating the Sacred Landscapes of 'Duklja' and 'Raška' through Space and Time (11th-14th Cent.)/HOLDURA" (FWF Austrian Science Fund International Project I 4330-G; in cooperation with the DFG German Research Foundation) and "Cultural Heritage in Times of World War I: The Case of the Austro-Hungarian Relief Map of Montenegro (1916-1918)/ Kulturno nasleđe u vreme Prvog Svetskog Rata: Slučaj austro-ugarske reljefne karte Crne Gore (1916-1918)" [Austrian Agency for International Cooperation in Education and Research (OeAD), Project No. ME 07/2019]. We are indebted to the FWF (Austrian Science Fund) and the DFG (German Research Foundation) as well as the Austrian Agency for International Cooperation in Education and Research (OeAD) for their funding and support.

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MEMO_quer 4 (2022). DOI: 10.25536/2022q004

Title
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DOI of article
http://dx.doi.org/10.25536/2022q004

Initial pulication
October 2022

Last check of all references
22.10.2022

Recommended citation
Popović, Mihailo St. et al.: On the Crossroads between East and West: Geocommunicating Medieval Sacred Landscapes in Today's Montenegro. First Project Results. MEMO_quer 4 (2022). Pdf-Format, doi: 10.25536/2022q004.