

EXCURSION OF HUNGARIAN GEOLOGISTS IN 2019.

“Across Dinaric Terrains of Serbia, Montenegro and Bosnia & Herzegovina”

- itinerary (preliminary version) –

General:

Preferable time: early May (alternative Mid to Late September)

Group: Up to 20 (mini bus), or up to 45 (big bus). In both cases transportation to be with HU bus.

Accommodation: Will be in moderate (3 to 4 stars) hotels; To keep reasonable prices most rooms should be 2-bed, and just very few with single occupancy. In case of small group there is option to pay at spot each individually for his room, while if a large group we should look for agency for making reservation and payment. Most hotels will be asked to provide half board (dinner upon arrival, room & breakfast). Also, for small group the lunches could be local restaurants on the way and each pay upon food/beverage ordered.

Very roughly assessed cost: For half board in double-bed rooms per stay: 35-40 euro; lunch: 12-15 euro.

Demand: To make an inquiry among the colleagues to see the interest before this summer months.

Possible route:

Day 1

Budapest-Szeged-Belgrade (overnight stay)

Day 2

Belgrade - Faculty of Mining & Geology (welcome meeting of the Serbian Geological Society and University of Belgrade).

Proceed to Valjevo, Bajina Bašta, Tara Mt. (karst spring Perućac, Reservoir Bajina Bašta on the border with B&H), Zlatibor ophiolite belt (overnight stay).

Bajina Bašta is situated on the right bank of the river Drina. Hydrographic picture of the area comprise course of the river Drina with its tributaries. Reservoir Perućac was built on the river Drina, the biggest one in the whole course, covers 12 km² of area, 50 km in length, 70 m deep, at 290 m asl.



The Perućac spring and big waterfall, downstream of dam has average yearly discharge is $Q_{av} \sim 1.2 \text{ m}^3/\text{s}$. The recorded minimum discharge is $0.4 \text{ m}^3/\text{s}$, and the maximum is $9.0 \text{ m}^3/\text{s}$. The catchment area is about 65 km².

The Tara National Park with its 19200 hectares covers most of Mountain Tara which lies on far west of Serbia.

The Mt. Tara area is covered by forests that are among the richest and most valuable of Europe in view of their diversity and extent of preservation. Among over 1000 herbal species, a special place is reserved for the "Queen

of all Endemic Species in Europe" - the Pančić spruce. Deep canyons and preserved vegetation present the ideal habitat for many animal species. The Slopes of Mt. Tara are a temporary or permanent home for more than 100 species of birds, such as the golden eagle, the griffon vulture, the peregrine falcon, the big owl, the great grouse. In this area 24 species of mammals also live, and out of this number 17 are protected as natural rarity. Especially attractive are the brown bear, chamois, roe deer, wildcat, otter and others.

In the Tara canyons there are many traces of pre-history, ancient, Roman and Byzantine culture. The reconstructed Rača Monastery, the tombstone necropolis in Perućac and Rastište, are precious examples of Serbian medieval heritage, and it should also be stressed that Mt. Tara is a well known mountain tourist center.

Day 3

Zlatibor – Prijepolje (border with Montenegro) – Pljevlja – Durmitor Mt. (Žabljak, overnight stay)

Zlatibor Mt. is the fast growing mountain resort in Serbia and become one of the main touristic sites. Some of the remarkable geological sections with highly folded Late Paleozoic, Triassic and Jurassic formations will be visited.

Pljevlja city in Montenegro is the most beautiful mixture of Islamic and Christian spirit in every sense. The symbol of the city and everlasting tolerance are two cultural historic and architectonic monuments Monastery of Holy Trinity and Husein-Pasha mosque (built in 1569). Monastery of Holy Trinity dates back to 1537. Pljevlja coal basin is the largest in Montenegro and is situated in Neogene basin surrounded by thick Triassic limestones. Dewatering of mine is gravitational by big multiple-stage pumps, they let out water into the settling pond at the elevation 754 asl, and then into the Čehotina River. To enable coal extraction original riverbed has been abandoned and new constructed.

On the way to Durmitor Mt. we shall cross Tara River, one of the UNESCO protected reserve. Tara canyon is more than 80 kilometers long and its deepest point is 1300 m below river bank, making to be the deepest canyon in entire Europe. Both banks are mainly built from Triassic limestones, while river water is turquoise clean.

Optionally: We may extend our stay for one more day to make rafting on the jewel of Europe, violent, clear and wild river Tara. There are several paths organized by experienced teams: long (all day), median (half day) and short (a few hours). The cost of short, including lunch and way back by vans should be ca. 40-45 euro. You may visit some web sites such as <https://www.raftingmontenegro.com>.



Day 4

Durmitor Mt. “Geological paradise” – Podgorica – Virpazar (Skadar Lake, overnight stay)

Durmitor is second highest mountain of Dinarides behind Prokletije mountain. The inhabitants of the region on the plateau between the rivers Tara and Piva, use the name Durmitor for the mountain which rises from this plateau, the highest peak being Bobotov Kuk (Ćirova Pećina) 2523 m high. In geographical writings, this highland area is referred to as "Durmitor in the limited sense". The word originates from a Celts expression: Dur-mi-tor (Water from the mountain, The mountain of many waters).



The great massive of Durmitor and the surrounding area consists of Triassic and Jurassic reef limestone. Their thickness is estimated at over 2000 m. Along with them there are Cretaceous limestones. All the peaks east of this line are formed from massive upper Jurassic limestone and from limestone of the Upper and Middle Triassic. These are sharp, rocky peaks with narrow valleys cut into the limestone. The peaks west of this line (Cretaceous limestone) are almost all rounded cupolas, with gentler and broader valleys.

The coming of the ice age or the Pleistocene considerably changed the condition which formed the area of Durmitor and its immediate surroundings. The contemporary appearance of the peaks and valleys show vivid traces of the action of those powerful glacial deposits and streams. The peaks are very sharp and notched; the depressions were turned into cirques, and valleys partly into cirques and partly troughs.

After the plateau glaciers had melted, the Jezera plateau changed its appearance: numerous sinkholes, pits, depression covered by thick water-proof moraine drifts, numerous new escarpments and gentle slopes, this time formed from drifts. In this basins water accumulated, lakes (Vražje and Riblje jezero and many pools) and rivers however short, were created along with a rich covering of vegetation. The valley glaciers moved down on the southern side from many cirques.



Visit of glacial lake Crno jezero with two smaller basins are envisaged. Veliko (Great) and Malo (Small) length of the lake (both basins) is 1155 m and maximum width is 810 m. Maximum depth at the highest water level is 49m in Malo Jezero and 24,5m in Veliko Jezero.

Winters with a lot of snow and cool summers are characteristic of mountain climate of Durmitor. Average monthly temperatures at Žabljak is 4,9 °C. Annual sum of precipitation on the plateau is 1500mm. (mean) and on the mountain 1750 mm.

River Morača is the biggest tributary of the Skadar Lake. Surface of Morača basin is about 2600 km² – up to Podgorica. The Platije is the most beautiful part of very deep Morača Canyon.

The Morača Monastery is situated in an extended part of picturesque canyon and is one of the most monumental medieval monuments of Montenegro. It was built in 1252 by Stefan, son of King Vukan and Nemanja's grand son.

Day 5

Skadar Lake (boat tour) – Bolje sestre water intake - proceed to Adriatic Coast – Kotor (Prčanj, overnight stay)



Skadar Lake is the largest lake on the Balkan Peninsula. The name is derived from the city of Shkodër on the Albanian side of the lake. It is situated in the south-eastern part of the Republic of Montenegro, in the Skadar – Zeta depression, and in the karstic terrain of the southeast Dinaric Alps in Albania. The mountains Lovćen, Sutorman, Rumija and Tarabosh lie on the southern side of the lake, while the Skadar lowland lies on the eastern shore. Its northern coast is flat, gradually descending toward the lake, and it is covered with lush vegetation. The southern coast is steep and rugged. Skadar Lake is relatively shallow and the deepest part of the lake bed sinks below sea level, meaning the lake lies in a crypto-depression. Altitude is 5 m above sea level, the depth is minimum 5-9 m; maximum more than 60 m (Raduš spring eye). The Morača River, with its two tributaries, Zeta and Cijevna/Cemi, contributes 62% of the lake's water. About 30% of it comes from many sublacustrine springs called "eyes."

Around 60% of the lake is in Montenegro, while 40% is in Albania. Average surface is 475 km². During the summer season it reduces to 370 km², while during the winter season it reaches 540 km². Skadar Lake has a peculiar water regime, with water level fluctuations of up to five meters. Skadar Lake has the status of a National Park since 1983. Ramsar site since December 25, 1995. It represents a real winter safe haven for the most of European birds.

Bolje sestre is one of the submerged springs "eye" tapped today for the water supply of the entire Montenegrin Coast.

After a boat tour around the lake the trip will continue via the Sozina tunnel and cities along the coast of Montenegro (Petrovac, Budva) until Kotor, the world heritage city and old port in Boka Kotorska bay.

Day 6

Kotor – Risan - Trebinje (Bosnia & Herzegovina)

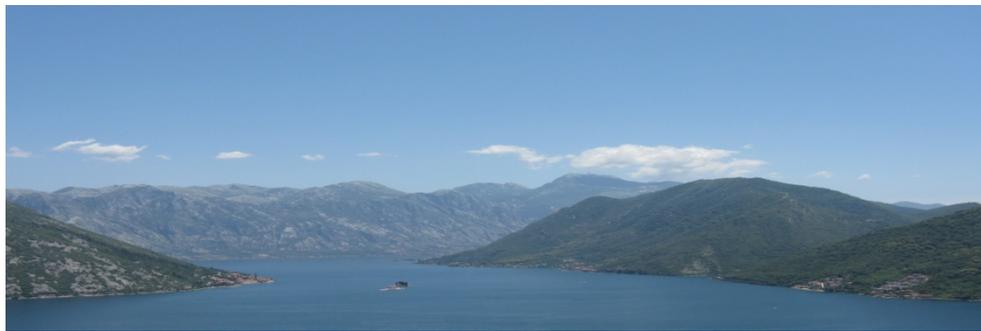
The Old Town of Kotor is one of the best kept mediaeval towns in this part of the Mediterranean. It has managed to keep its structure typical of towns from the XII to XIV century. The asymmetric structure of narrow streets with medieval monuments contributed, among other beautiful buildings, to Kotor being entered into the UNESCO Registry of World Cultural Heritage and Natural Beauties. The fortification of Kotor is of world value. It includes a 4.5-km long wall, which is 20 m high and 15 m wide and protects the town from waves. The construction of the wall started in Illyrian times and continued until the XVIII century. A representative example of Romanesque architecture on the Adriatic coast is the magnificent St Tryphon's Cathedral which was built in 1166 on the remains of a previous temple from the IX century. Frescoes in the cathedral date back from the XIV

century and there is a rich treasury with local and Venetian jewellery from the XIV-XX century. In addition to the cathedral, a great heritage of sacral architecture from the XII-XX century has been kept at several cathedrals and churches.



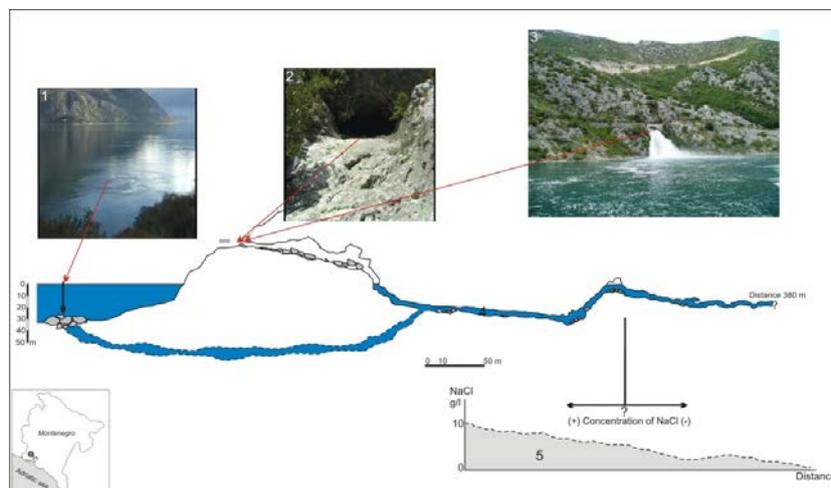
The city of Kotor and the Boka Kotorska Bay. Panoramic view from Mt. Lovćen (www.unmissable.com)

Most of the karstic brackish groundwater in the area of Kotor is drained through the karst springs of Gurdić, Škurda and Tabačina. The catchment area of these springs is quite broad and includes the karst terrain of Mt. Lovćen and the village of Njeguši.



The Boka Kotorska Bay (photo Z. Stevanović)

The Sopot Spring is located on the right side of the main Risan - Herceg Novi road, 2 km away from Risan. The upper outlet is the cave but it is active only during periods of intensive rain that cause big floods underground. Rainfall from the Orjen Mountain and Stone Sea zone above Risan quickly infiltrates into the highly karstified massive Cretaceous limestones. The discharge is predisposed by the contact with Eocene flysch sediments. This periodical discharge is impressive and the spring cave functions with one of the world's largest discharge, over $150 \text{ m}^3/\text{s}$ (some estimates even indicate $200 \text{ m}^3/\text{s}$, but measurements are extremely difficult due to local topography). Water then flows for some 50 m and over a cascade of around 20 m high falling noisily to the sea. During the summer season only the two submarine springs (locally 'vrulja') are active and they drain the Sopot aquifer system. The diving exploration located main discharge points in a small bay near the Sopot, at depths of 28 m and 36 m. Concentric circles in the bay indicate the discharge zone. Actually, they represent the erosive basis of the entire catchment area.



Cross section of the Sopot Spring (after Milanović S., published in Stevanović Z. et al. 2010)

The Stone Sea (Kameno more) area is based at the hinterland of Boka Kotorska (Montenegro), north from Risan Bay. The direct distance from the furthest southern point of Kameno More to the sea is about 600 m. The altitudes range from 500 m.a.s.l. to 1,200 m.a.s.l., but the largest part of the Kameno More area is between 600 m.a.s.l. and 800 m.a.s.l.



The karstified limestones are completely exposed and heavily fractured and folded. Typical holokarst phenomena such as karren, sinkhole, and pits are widely present.

Detail of the Stone Sea area (photo S. Milanović)

Day 7

Trebinje – half day excursion to Dubrovnik (optionally) or via Popovo polje, Stolac to Mostar (optionally) – Trebinje (overnight stay).



Panoramic view of Trebinje (<http://www.visitmycountry.net>)

The area of Trebinje City is in the southernmost part of Bosnia & Herzegovina and the Republic of Srpska. Trebinje City covers an area of 904 km², and it is just 30 km far from famous Dubrovnik (Croatia) UNESCO heritage city. Visit of Vjetrenica cav, Hydropower structures – Grančaravo and Gorica dams, visit of Tvrđaš Monastery and some of the local wineries are envisaged.

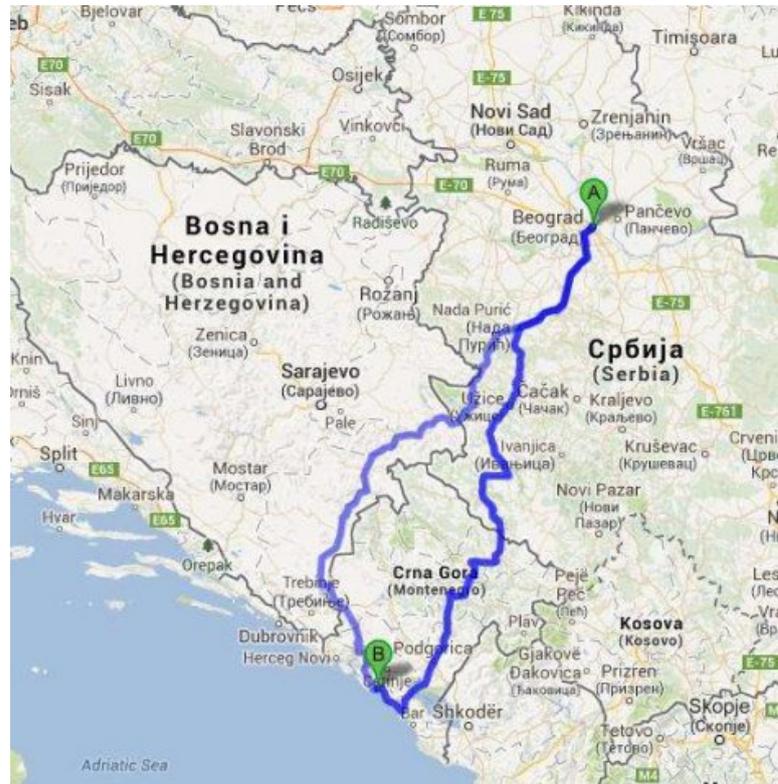


The Arslanagića (Perovića) Bridge built by Mehmed-pasha Sokolović, the Great Vezir (Prime Minister) of the Ottoman Empire in 1574 to commemorate the death of his son killed in war against the Venice Republic. The bridge was removed from its previous location during the construction of the Trebišnjica HE system (photo P. Milanović)

Day 8

Travel back to Belgrade,
Budapest

*Very approximate path – more
precisely will be drawn later on.*



Proposal made by Zoran Stevanović