Crnopac
Foto/Photo: Nataša Cvitanović

JAMSKI SUSTAV CRNOPAC
CRNOPAC CAVE SYSTEM

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Predgovor

Svjetska pandemija COVID-19 je za neko vrijeme odgodila mnoga događanja pa tako i održavanje 18. Svjetskog speleološkog kongresa u Savoie - Mont Blanc u Francuskoj 2021. S namjerom da se predstavi istraživanje Jamskog sustava Crnopac (JSC) složen je članak kojim se nastojalo opisati povijest istraživanja, ali i u kratkim crtama opisati položaj i karakteristike ovog prostora. Posebno su naglašene posebnosti ovih istraživanja koje bi mogle biti zanimljive stranim speleolozima. Najgori aspekt sastavljanja ovog teksta su nova otkrića pa tekst stalno doživljava promjene; od prijavljenog sažetka u proljeće 2020., preko povezivanja JSC i Muda Labudovih, sve do novih otkrića u Duši početkom 2021., a prava sezona istraživanja tek počinje.

Foreword

The COVID-19 pandemic postponed many events for some time, including the 2021 18th International Congress of Speleology in Savoie - Mont Blanc in France. The article presents the exploration of Cave system Crnopac (CSC), and briefly describes the position and characteristics of the area of Crnopac. The peculiarities of these researches, which could be of interest to foreign speleologists, are particularly emphasized. The worst aspect of composing this article is the constant new discoveries, which is why the text continuously undergoes changes; from the submitted summary in the spring of 2020, through the connection of CSC and Muda Labudova, all the way to new discoveries in Duša cave at the beginning of 2021, and yet, the actual research season is just beginning.

Uvod

U studenome 2020., nakon 16 godina i 227 zabilježenih istraživanja, hrvatski speleolozi su uspjeli povezati Jamski sustav Crnopac s jamom Muda Labudova (7.414 m) te je nakon još nekoliko istraživanja krajem 2020. i početkom 2021. dosegnuta duljina od 54.709 m, što je sustav smjestilo među 66 najduljih svjetskih špilja. Time je završena višegodišnja frustracija jer su još 2016. procijenjena udaljenost između ova dva speleološka objekta bila svega 60 m. Da bi drama bila još veća, sljedeće 2017. godine je pronađena nova jama – Oaza čiji se sjeverni ogranak „našao" između dvije najbliže točke. Kroz dvije godine uzbudljivih istraživanja u kojima su speleolozi u završnoj fazi mogli čuti bušilice i eksplozije pirotehničkih smjesa ekipa u drugim jamama, spoj između Oaze (4.190 m) i glavnog dijela sustava je pronađen kopanjem kanala oko 200 m niže kad je sustav dobio svoje sadašnje ime. Spoj između Jamskog sustava Crnopac i jame Muda Labudova također je pronađen 300 m dublje i dalje od „misterioznog trokuta" u kome se dulje vremena tragalo za spojem.

Geografski položaj, geologija i hidrologija

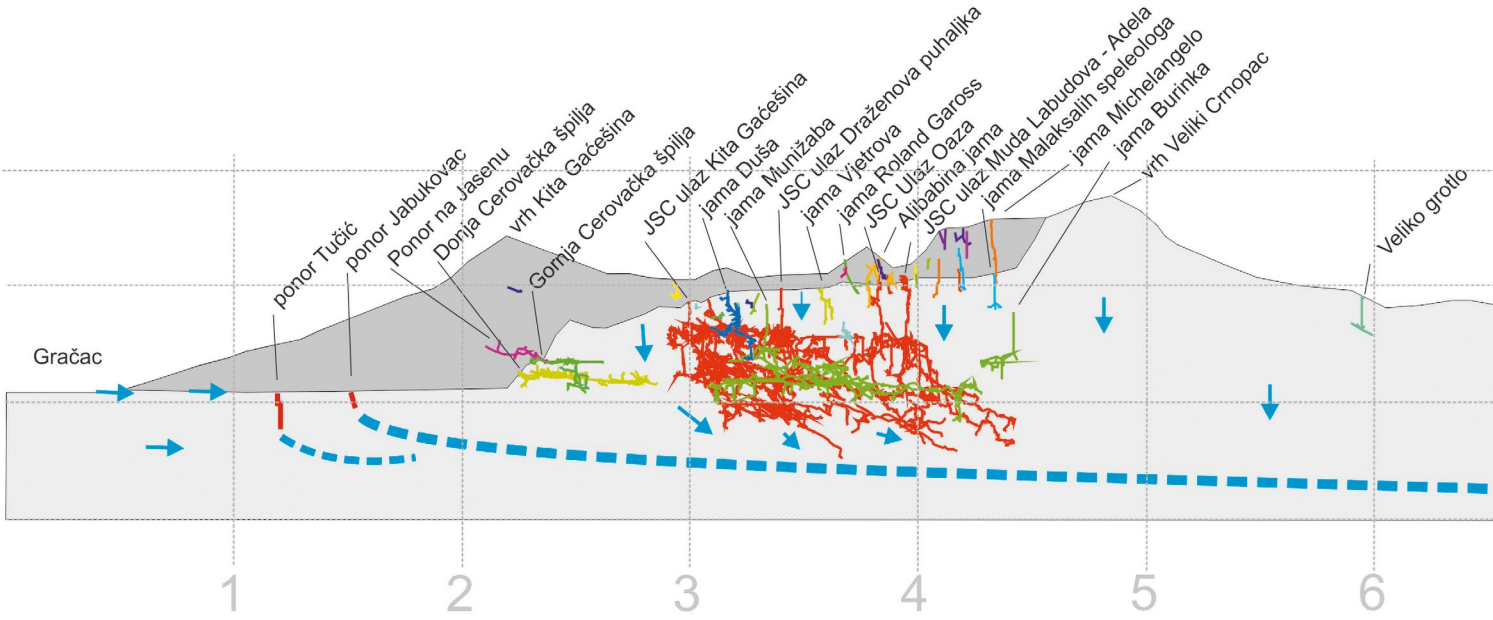
Masiv Crnopca je sastavni dio jugoistočnog Velebita. Izdiže se južno od Gračačkog polja (550 mnv) s dva izrazita grebena dinarskog pružanja: sjeverni greben s vrhovima Kita Gaćešina (1.227 m) i Munižabin vrh (1.089 m) i južni greben; Veliki Bat (1.381 m), Veliki Crnopac (1.403 m) i Sedlo (1.214 m). Prema jugu prelazi u brežuljkasti teren ispresijecan dubokim kanjonima rijeka Krupe, Krnjeze i Zrmanje. Na zapadu se nalazi prijevoj Prezid dok na

Introduction

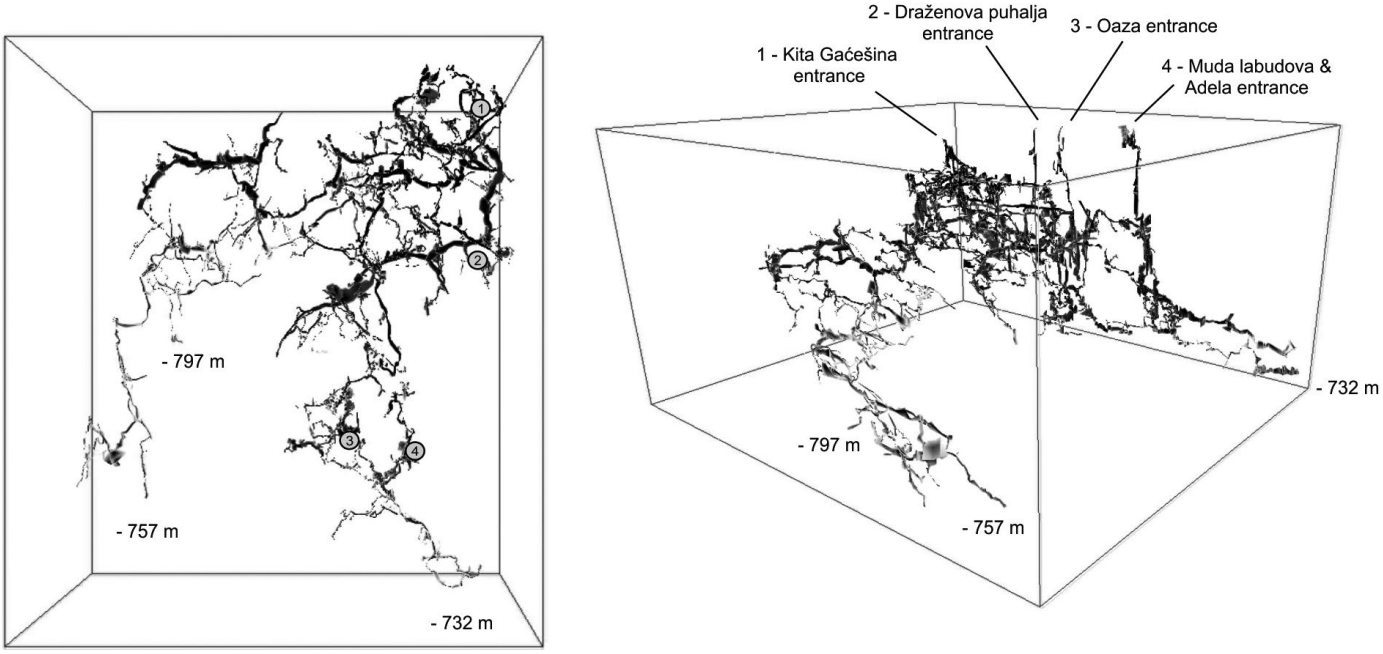
In November 2020, after 16 years and 227 recorded research actions, Croatian speleologists managed to connect the Crnopac Cave System with the Muda Labudova Cave (7,414 m), and after another exploration, a length of 54,709 m was reached, which placed the system at 66th place on the list of the longest caves in the world. This put an end to the long-standing frustration of researchers because back in June 2016, a new fossil canal was found in the Muda Labudova pit, the distance from the then system of Kita Gaćešina – Draženova puhaljka was estimated at only 60 m. To make the drama even greater, the following year (2017) began exploration of the newly discovered Oasis Cave, whose northernmost branch was "located" between the two closest points. After two years of exciting research in which speleologists in the last phase of exploration in two separate caves heard the sounds of drills and detonation of pyrotechnic mixtures. The connection between the Oasis (4,190 m) and the KG-DP system was found by digging a narrow passage on August 13, 2019., 200 m lower than of the presumed compound. On that occasion, the new large system was named after the mountain under which it is located - the Crnopac Cave System. The junction between the CCS and Muda Labudova was also found 300 m deeper and farther from the "mysterious triangle" in which the search was sought.

Geography, Geology and Hydrology

The Crnopac Massif in Croatia is the most northern, the highest and the most karstified part of the south-eastern Velebit mountain ridge (part of Dinaric coastal mountainous



Presjek Crnopca sjever-jug
North-south cross section Crnopac

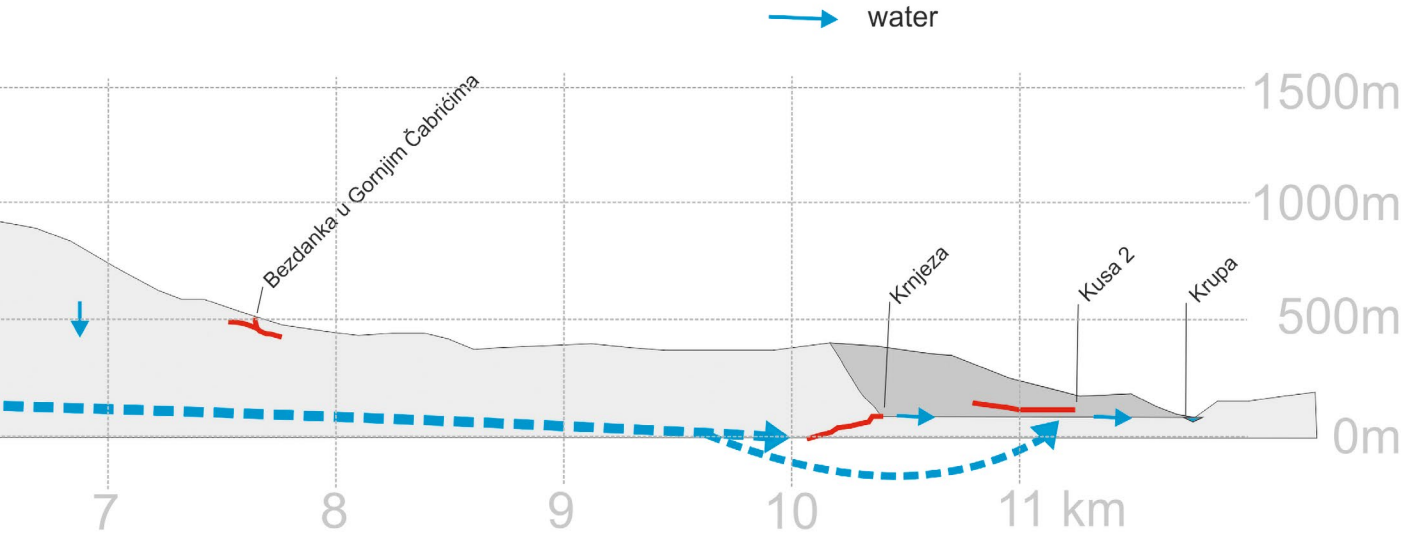


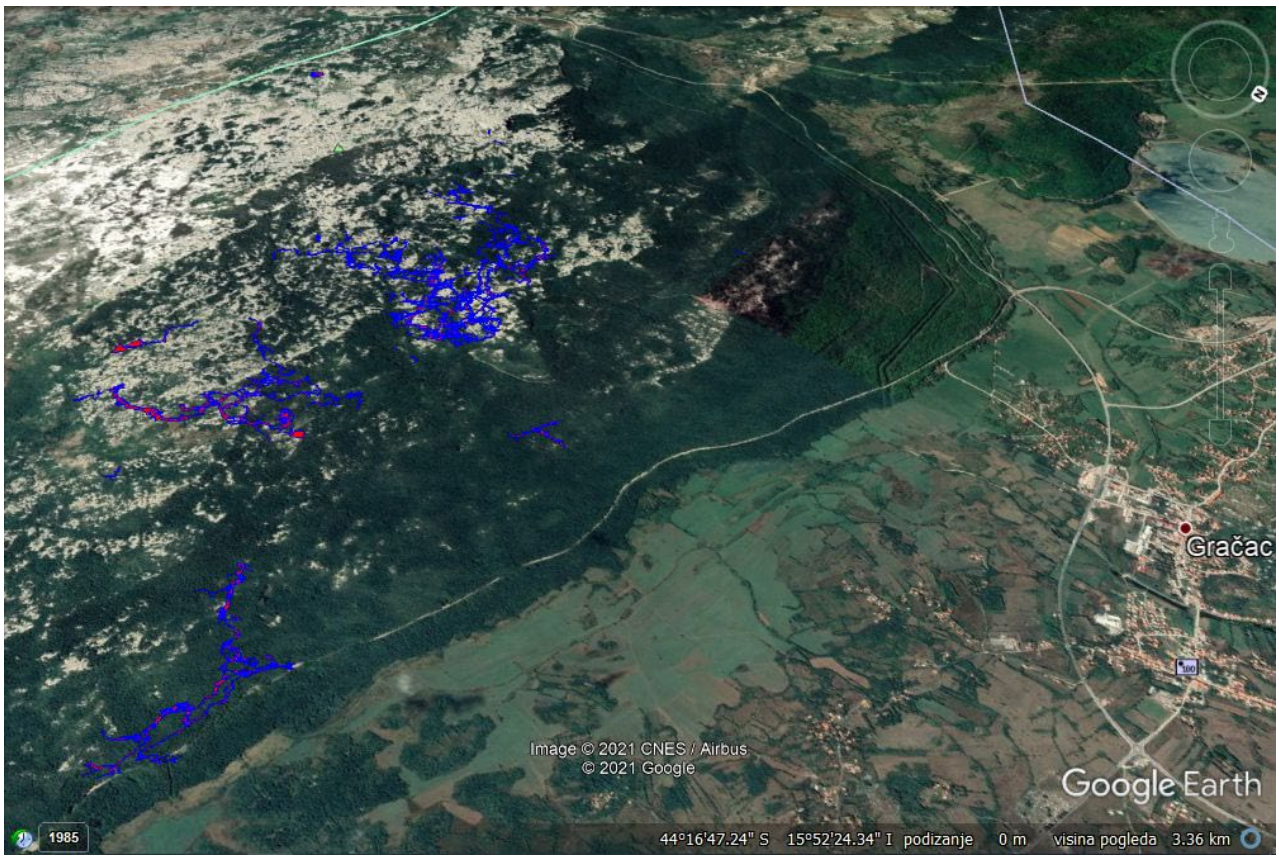
3D model JSC-a
3D model of CSC

istoku Crnopac prelazi u planinu Tremzinu. Središnji dio Crnopca, pod kojim se nalazi Jamski sustav Crnopac, čini raščlanjena i okršena, morfološki fragmentirana zaravan s labirintom dubokih vrtača, stijena i kukova koja se prostire na prosječnim visinama 900 – 1100 m.

Krajnji sjeverozapadni dio Crnopca izgrađuju karbonatne stijene srednje i gornje trijaske te jurske starosti i te uslojene strukture tonu ispod centralnog dijela masiva Crnopca koji grade karbonatne breče tercijarne starosti (tzv. jelar naslage). Na krajnjem južnom dijelu Crnopca

karst). It rises south of Gračačko polje (550 m above sea level) with two distinct ridges of the Dinaric extension; northern with the peaks of Kita Gaćešina (1227 m) and Munižabin vrh (1089 m) and southern; Veliki Bat (1381 m), Veliki Crnopac (1403 m), Sedlo (1214 m) while to the south it turns into hilly terrain intersected by the deep canyons of the rivers Krupa, Krnjeza and Zrmanja. To the west is the Prezid pass, while to the east is Crnopac crossing into the Tremzina mountain. In the most rugged, central part of Crnopac, between the sinkholes, there are narrow, steep rocky ridges and slopes, and this area has the characteristics





Google Earth prikaz speleoloških objekata na Crnopcu
Google Earth image of caves on Crnopac

prema zaravni oko rijeka Krupe i Zrmanje nalazimo karbonatne naslage kredne starosti.

Zbog dominantno karbonatne građe ovog dijela Velebita, vode teku podzemno kroz masiv Crnopca generalnim smjerom prema jugu. Podzemne vode prihranjuju se ponornicama iz krških polja ličko-gračačkog područja. Uz brojne manje površinske tokove, najznačajnije ponornice su Ričica i Otuča. Ovi tokovi poniru u zoni ličkog rasjeda i teku podzemno prema jugu tj. prema rijeci Zrmanji s pritokama Krupi i Krnjezi. Njima se pridružuju padalinske vode koje se procjeđuju kroz okršene stijene masiva Crnopca. U tim uvjetima nastala je poligenetska mreža vadoznih vertikalnih i kosih kanala koji probijaju fosilne horizontalne kanale, ostatke podzemnih tokova iz smjera Gračačkog polja prema Zrmanji. Kad se govori o objektima na Crnopcu redovito se polazi od činjenice da su objekti razvijeni u vapnenačkim brečama za koje se smatra da su pogodne za nastanak volumenom velikih speleoloških objekata. Najznačajniji speleološki objekti na Crnopcu su: Jamski sustav Crnopac (54.709 m, -797 m, 2,4 miljuna m³), Munižaba (9.911 m, -510 m, 2,3 milijuna m³), Burinka (930 m, -290 m, 1,1 milijuna m³), Duša (1.667 m, - 318 m, 0,2 milijuna m³), Gornja Cerovačka špilja (4.035 m, -192 m) i Donja Cerovačka špilja (4.058 m, -68 m)

of a polygonal karst of slopes and sinkholes (Bočić 2009).

The massif is composed of thick upper Triassic, Jurassic and Cretaceous carbonate deposits. In higher parts of the massif, rocks are covered with Oligocene to Lower Miocene carbonate breccias, probably deposited on the flanks of tectonically uplifted areas during older tectonic phase (Korbar 2009).

Due to dominantly carbonate structure of this part of Velebit, water flows underground through the Crnopac Massif, generally southwards. Underground water is from sinking streams that come from karst polje in Lika and Gračac areas and re appear as springs on right side of Zrmanja and Krupa river valleys. In such conditions, polygenetic multilevel caves have developed. Speleogenesis of the caves in the Crnopac Massif was probably ongoing from the beginning of the massif uplift (upper Miocene). Mechanical properties of the Oligocene to Lower Miocene carbonate breccias (Jelar breccias) play a significant role in the cave morphology. Low frequency of cracks and joints in these massive breccias enables the preservation of underground passages and chambers of very large dimensions. The most important caves of the Crnopac Massif are Crnopac Cave System (54.709 m, -797 m, volume 2,4 million of m³). Cave Munižaba (9.911 m, -510 m, volume 2.3 million of m³), Burinka (930 m, -290 m, volume 1.1 million of m³), Gornja (Upper Cave) (4,035 m, -192 m) and Donja (Lower Cave) Cerovačka pećina (4.058 m, -68 m) and Duša (1.667 m, -318 m)

Povijest istraživanja

Ulaz u Gornju Cerovačku špilju je lokalnom stanovništvu poznat iz davnina, dok je ulaz u Donju Cerovačku špilju otkriven pri izgradnji željezničke pruge 1913. godine. Tom su prilikom otkriveni brojni arheološki i paleontološki nalazi poput špiljskih medvjeda, lava, ali i špiljske galerije bogato ukrašene najraznovrsnijim sigastim oblicima. Obje špilje, s ukupnom duljinom od 4 km su postale najljepše i najposjećenije uređene hrvatske turističke špilje.

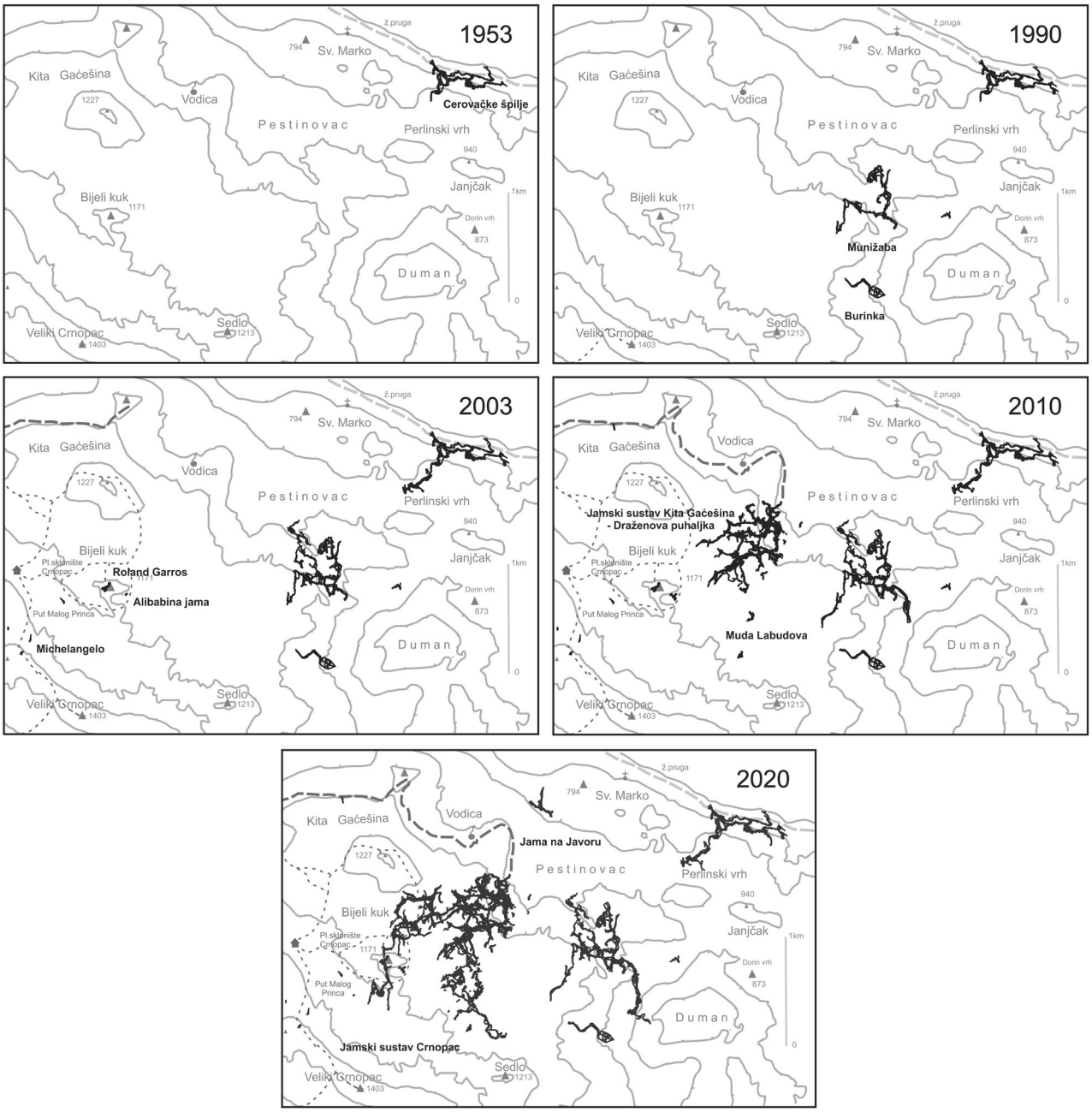
Moderna speleološka istraživanja s uporabom užeta su započeta u kasnim sedamdesetim godinama prošlog stoljeća. Teško prohodan, izrazito okršen teren na kome nema izvora pitke vode je godinama odbijao speleologe. Članovi SO PD Željezničar, vođeni lokalnim vodičem su

History of exploration

While the Upper Cerovačka Cave entrance was known to local people, Lower cave entrance was discovered during the building of railway in 1913. Newly discovered cave yielded many archaeological and paleontological findings, among them, a cave bear, cave lion and amazing speleothem forms. Both caves with a total length of 4 km became the most popular destinations for tourists visiting caves in Croatia.

Modern cave explorations with rope techniques started in late seventies. Due to the extremely harsh, impassable terrain without drinking water only few cavers succeeded to rich summit plateau. Members of Speleological section (SS) Željezničar (Zagreb) in cooperation with others clubs have

Crnopac 1954 - 2020



pronašli impresivne ulazne dvorane u Burinci (160 x 90 x 90 m), Munižabi (185 x 60 x 70 m) i Velikom Grotlu (100 x 85 x 130 m). U društvu sa speleolozima iz prijateljskih društava istražili su Munižabu do 2,4 km duljine kad je u Hrvatskoj izbio Domovinski rat (1991.-1995.), a područje Crnopca se našlo na okupiranom terenu.

Nova istraživanja su nastavljena početkom novog milenija. Zahvaljujući novo probijenom šumskom putu članovi SO Željezničar su mogli lakše pristupiti vršnom platou te su pronašli desetine novih ulaza na sjeverozapadnom dijelu platoa, među kojima jamu Michelangelo (-274 m), Alibabinu jamu (-218 m) i Roland Garros (-146 m). Članovi SO PDS Velebit su nastavili s istraživanjima Munižabe uz višednevne boravke u podzemnim bivcima, alpinistički se i tehnički penjući istražili dodatnih 6 km špiljskih kanala. Godine 2004. su speleolozi SO Sveti Mihovil iz Šibenika pronašli prvi poznati ulaz u Jamski sustav Crnopac – ulaz Kita Gaćešina. Kroz sljedeće godine su im se pridružili speleolozi PDS Velebita i SO Mosor iz Splita, a potom i mnogih drugih speleoloških udruga u Hrvatskoj. Šumski put je probijen gotovo do samog ulaza što je dovelo do još intenzivnijeg istraživanja i nova jama je brzo dobivala na duljini. Zanimljivo je da su u svom napredovanju speleolozi podzemljem prošli 300 m ispod novog površinskog kampa koji su speleolozi SO Željezničar postavili bliže središtu centralnog platoa između planinskih grebena. U tome su dijelu pronašli više od stotine novih ulaza od kojih su neki vodili u nove velike objekte koji su se povezali s glavnim dijelom sustava – Draženova puhaljka 2009., jama Oaza 2019. i konačno jama Muda Labudova 2020. Tijekom 2010. sustav je postao najdulja špilja Hrvatske, a sljedeće godine i Dinarskog krša, nakon što je postao dulji od Postojnske jame. Karlovački speleolozi iz Speleološkog društva Karlovac su u međuvremenu kopajući i šireći uske prolaze udvostručili duljinu Cerovačkih špilja, a pronašli su i istražuju Jamu na Javoru, još jedan speleološki objekt kojeg karakteriziraju široki kanali i koji je zacijelo u prošlosti bio ulazni dio sustava. U isto vrijeme su u kanjonu Zrmanje, Krupe i Krnjeze speleolozi DDISKF korištenjem tehnika speleoronjenja istražili vodene izlaze iz sustava Špilja Kusa (3.010 m) i izvor Krnjeze (sifon dubina -106 m).

Sva speleološka istraživanja na Crnopcu su poduzeta od strane hrvatskih speleoloških udruga, u njima su sudjelovale stotine hrvatskih speleologa, uz povremene goste speleologe iz drugih država; Slovenije, Bosne i Hercegovine, Srbije a sve češće i sad već stalne prijatelje iz SC Pod Rub iz Bugarske.

Iako su u speleološkim objektima Crnopca vršena djelomična geološka istraživanja, mikroklimatska mjerenja, utvrđivana koncentracija radona, rađena fizička i kemijska analiza vode i prikupljani uzorci špiljske faune, a dijelom i arheološka i paleontološka istraživanja može se reći da je sustavno znanstveno istraživanje područja tek u začetku.

found impressive chambers in Burinka (160 x 90 x 90 m), Munižaba (185 x 60 x 70 m) and Veliko Grotlo pit (100 x 85 x 130 m). Caves exploration stopped during the war years 1991 - 1995.

Explorations continued at the beginning of the new millennium. Thanks to a newly built forest road and a network of hiking trails members of SS Željezničar have found dozens of new pit caves and caves on the NW side of the Crnopac Massiff (Michelangelo pit -274 m, Alibabina jama -218 m, Roland Garros -146 m). The SS PDS Velebit (Zagreb) continued exploration of Munižaba channels employing alpine techniques; drilling and bolting whilst spending lot of time in underground camps. They added further 6 km to the overall cave length. In 2004 cavers from the SS St. Mihovil (Šibenik) found Kita Gaćešina entrance. Following year cavers from the SS PDS Velebit and SS Mosor (Split) joined them. Forest road was extended closer to the entrance, exploration intensified and new cave rapidly grew in length. It is interesting that the speleologists underground passed 300 m below the new surface camp that the cavers of Željezničar established closer to the central part of the plateau between the two mountain ridges. They found more than hundred new entrances around the new camp and some of them led to new big caves that were connected to the main system, – Draženova puhaljka in 2009, Oaza in 2019 and finally Muda Labudova in 2020. In 2010, the system became the longest cave in Croatia and in 2011 the longest in Dinarides. Speleologists the Speleological society Karlovac discovered Jama na Javoru, cave that is characterised by wide passages, and they also doubled the length of Cerovac caves by digging and widening narrow passages using cave diving techniques, the DDISKF Dinaridi explored Kusa II Cave (3,010 m) and Krnjeza spring (sump, -106 m) in Zrmanja and Krupa river valleys – the outputs of the hydrologic system.

Cavers from other countries also took part in explorations, Bulgarian cavers from SC Pod Rub joined couple of times in recent years, also guests from Slovenia, Bosnia and Hercegovina and Serbia. Croatian speleologists from various clubs and all parts of country took part in all the explorations and research.

With all the ongoing geomorphological research, microclimatic measurements, radon, physico-chemical analysis of water, the collection and analysis of animal species, the systematic scientific investigation of the whole area is still in its infancy.

Recent exploration

Crnopac Cave System was not only explored in direction of the Muda Labudova Cave for reasons of connecting two systems, in the period from November 2019 to November 2020, a total of 4.6 km of new channels were mapped, of which 1 km in the Muda Labudova Cave before connecting. It was on this particular search that a large meander was

Zadnja speleološka istraživanja

Speleološka istraživanja u jamskom sustavu Crnopac u posljednje vrijeme nisu vršena samo u smjeru povezivanja s jamom Muda Labudova. U periodu od studenog 2019. do studenog 2020. topografski je snimljeno više od 4,6 km kanala od čega oko 1 km u jami Muda labudova prije spajanja. Upravo je ovdje na krajnjem jugoistočnom dijelu sustava pronađen široki meandar koji bi mogao biti odvodni kolektor istočnog dijela sustava. Tu postoji mogućnost pronalaska uzvodnih dijelova koji bi mogli voditi pod jame Burinku i Munižabu (udaljenost procijenjena na 550 odnosno 670 m).

Brzi prirast duljine u sustavu se temelji na činjenici da se radi o vrlo složenom sustavu, vrlo gustoj mreži kanala u sve tri dimenzije pod prostorom od svega 2 kvadratna kilometra. U tim uvjetima, prolazeći širim kanalima, svojevrsnim glavnim prometnicama se može relativno brzo doći blizu zone istraživanja. Crnopac se nalazi u središtu Hrvatske tako da je brzo dostupan hrvatskim speleolozima iz svih krajeva. Manja nadmorska visina i blaga klima uvjetuju da se istraživanja mogu vršiti gotovo cijele godine. Sve ovo skupa je utjecalo da se tijekom godine poduzimaju veliki broj vikend ili prošireni vikend istraživanja u kojima speleolozi u petak navečer ulaze u sustav te noće u nekom od bivaka blizu zone interesa. Sljedeći dan se koristi za istraživanje dok se zadnji dan ostavlja za izlazak što je od izuzetnog značaja za nošenje s eventualnim problemima pri izlasku. Speleolozi najčešće iz sustava izlaze odmorni i sposobni za sigurnu vožnju natrag do svojih domova. Izlaženje sredinom dana je posebno važno zimi kad je najmanja razlika između vanjskih i unutarnjih temperatura, kad je i ulazna hladna zračna struja najslabija. Iako ovi uvjeti omogućuju lakše istraživanje ono je tehnički gledano ipak jako zahtjevno jer su iscrpljene brojne lakše varijante, dok su ostali silasci u dugačke uske, vodene kanale koji se mogu istraživati samo za povoljnijih hidroloških uvjeta. Tu su naravno i brojne uzlazne kosine i dimnjaci s izazovnim zračnim strujama kroz koje se koriste alpinističke i tehničke tehnike penjanja koje se kombiniraju sa širenjem suženja. Ako se pogledaju mjesta gdje su ta istraživanja vršena može se primijetiti da su ona vršena svukuda. Odluku o mjestu istraživanja donose vođe manjih timova. Kako ne bi došlo do zasićenja mjesto istraživanja se povremeno mijenja i timovi zamjenjuju. Složena morfologija sustava često nagrađuje ovakve zahtjevne radnje pa se povremeno otvaraju lakše prohodni, horizontalni kanali koji ponovo motiviraju svoje istraživače. Neki teže dostupni dijelovi sustava ipak zahtijevaju ekspedicijski način istraživanja. Stoga se jednom ili dvaput godišnje organiziraju speleološki logori u duljem trajanju, ali ne više jer je brojne druge speleološke objekte u Hrvatskoj moguće istraživati jedino na ovaj način. Na površini iznad sustava su pronađene desetine manjih speleoloških objekata među kojima i oni sa značajnim zračnim strujanjem. U nekima od njih je stalno prisutan led čija se količina mijenja pa traže povremen obilazak radi provjere da li se topljenjem leda „otvorio“ prolaz u

found in the extreme southeast, which could be a large drainage collector in the eastern part of the Crnopac Cave System. There is a possibility in future to find active upstream branches towards Munižaba and Burinka which are 550 m and 670 m away from it, respectively.

The rapid increase in adding to the length of the system must be due to the fact that the system is very complex. It is a dense network of more than 53 km of channels in all three dimensions under an area of only 2 square kilometres. In these conditions, by passing through large spacious channels, it's easy and quick to reach the places of interest. Location of Crnopac in the middle of the country, easily accessible entrances at a relatively low altitudes and mild climate facilitates exploration and research which can be conducted almost all year round conveniently on weekends or extended weekends. Cavers usually enter the system on Friday or early Saturday morning after their working week is over and descend through one of the five entrances to one of nine permanent underground bivouacs where they sleep, prepare equipment and go to the designated research area. The last day of the stay is usually spent in just getting out to surface so the participants are rested enough to deal with any unexpected complications as well as drive home safely. Reaching surface in the middle of the day during the winter period is also important because of the smallest difference in temperature when the dangerous flow of cold incoming air is the weakest. Although a dense network of channels makes exploring easier, the exploration is still technically very demanding because many easier options have been exhausted, so the remaining options mean descents into narrow wet channels that can only be explored at lower atmospheric precipitation and often require painstaking long-term expansion. There are also steep ascending slopes and chimneys on almost the entire network of channels through which air often flows, so that techniques of technical climbing and even widening in the tops of chimneys are increasingly used. Looking at the raft of places where research has been done recently, its notable that research has been done almost everywhere. Decision on where to continue research is made by the leader of the smaller team. Research participants thus often change the place of research to avoiding repetition of researching same places. Researching new areas is more motivating and rewarding. The massive use of climbing techniques and the suitable morphology of the cave makes the long ascents rewarding, by enabling entry to more horizontal and less demanding sections which allow better progress.

Some more remote parts of the system still have to be explored in an expeditionary way that requires a minimum of seven days of camping due to more difficult access or more remote entrances. Only one or two camps are organized annually in these areas due to the fact that many other speleological objects in Croatia can be explored only in this way.

On the surface above the Crnopac Cave System, more than

Ulaz Kita Gaćešina
The Kita Gaćešina entrance of the CSC
Foto/photo: Teo Barišić

Igre bez granica
Foto/photo: Teo Barišić

Prema Šoderici
On the way to Šoderica
Foto/photo: Teo Barišić

DM
Foto/photo: Teo Barišić

Talijanette
Foto/photo: Ana Mijić

Kimoja
Foto/photo: Teo Barišić

Kita u Velebita
Foto/photo: Teo Barišić

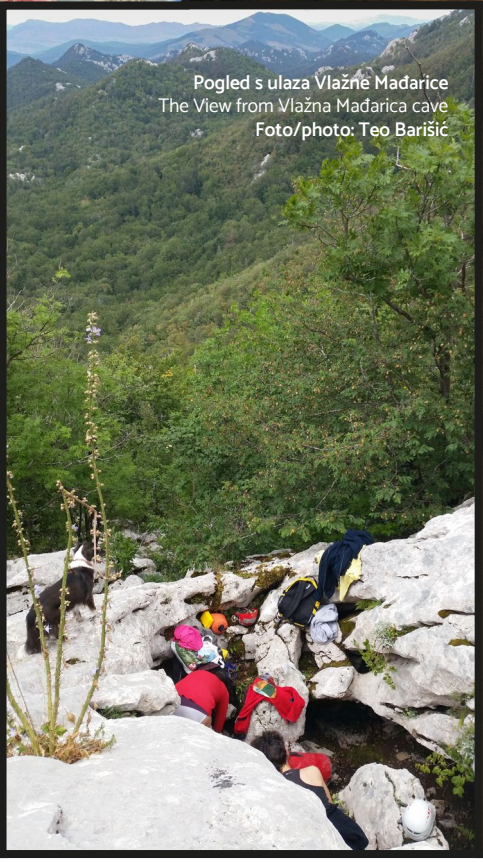
Ramiz
Foto/photo: Teo Barišić

Svinjske nogice
Foto/photo: Teo Barišić

Talijanette
Foto/photo: Aida Barišić

Al jezeera
Foto/photo: Teo Barišić

Makovnjača
Foto/photo: Teo Barišić



Pogled s ulaza Vlažne Mađarice
The View from Vlažna Mađarica cave
Foto/photo: Teo Barišić

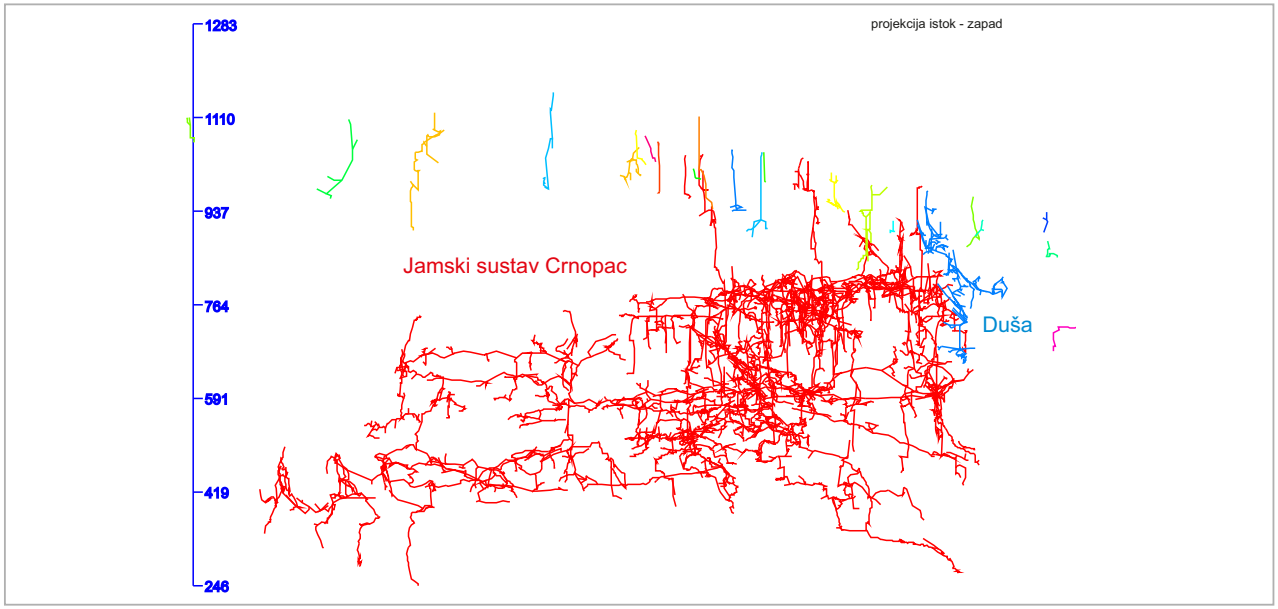
Bezprizorni
Foto/Photo: Teo Barišić

nove dijelove. Procjena je da nije pregledana niti četvrtina površine tako da speleolozi pri dolasku u nadzemne logore mogu birati između višednevnog boravka u podzemlju ili pretraživati površinski labirint dubokih vrtača.

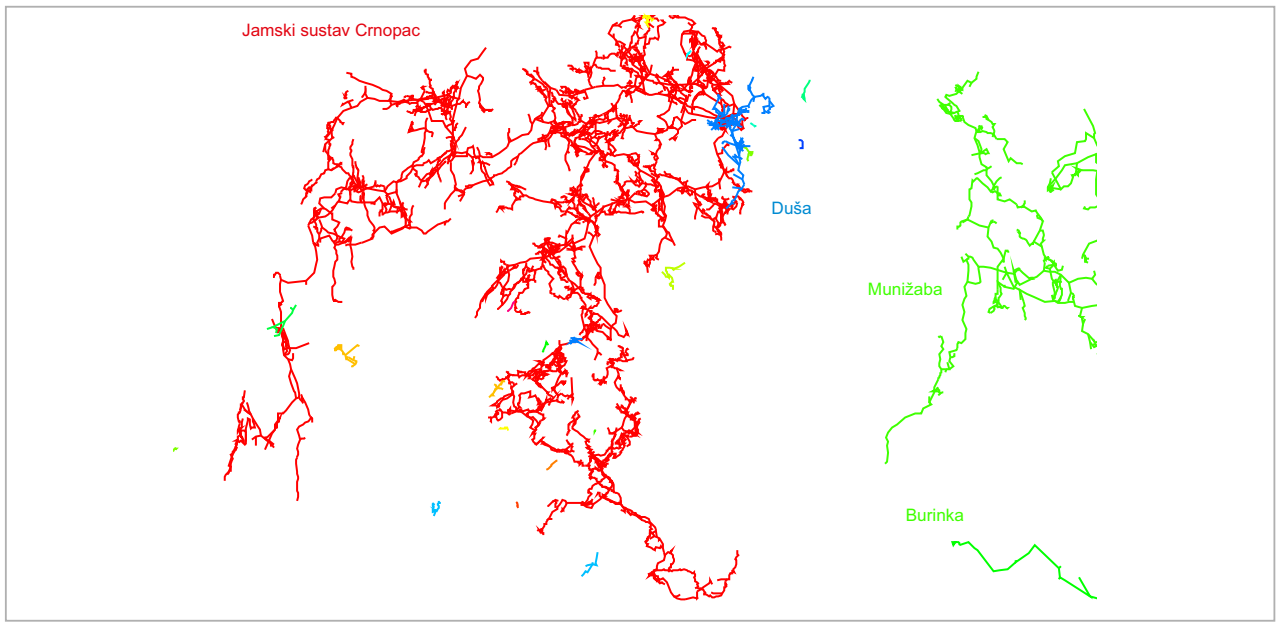
Početkom 2021. speleolozi SO Sveti Mihovil su uspjeli proširiti dno u jami Duši, jednoj od jama blizu prvog poznatog ulaza u sustav te je u nekoliko kratkih akcija jama dosegla 318 m dubine i 1.667 m duljine, dok je udaljenost od sustava na tri mjesta procijenjena na 45 m. Početkom godine su i speleolozi SO Velebit i Željezničar topografski snimili prve stotine metara u dijelovima sustava, tako da nova sezona istraživanja na Crnopcu tek kreće.

a hundred smaller speleological objects have been registered, many of them with air flow, some with constant presence of ice and it is necessary to visit them periodically and check that there is no change in conditions. Only less than 25% of the area has been surveyed, so speleologists can choose to enter the underground for several days through familiar entrances or wander outside through a maze of slopes, rocks and sinkholes in search of a new openings.

At the beginning of 2021, speleologists from Sveti Mihovil managed to widen the bottom in Duša cave, one of the pits near the first known entrance to the system, and in a few short actions that cave reached 318 m depth and 1,667 m length, while the distance from the system was estimated at 45 m. At the beginning of the year, speleologists from Velebit and Željezničar also topographically recorded the first hundred of meters in parts of the system, so that the new season of research in Crnopac is just beginning.



Položaj jame Duša prema JSC - projekcija prema sjeveru
Position of Duša cave in relation to CSC - projection facing north



Položaj jame Duša prema JSC - tlocrt
Position of Duša cave in relation to CSC - plan

Poligon za uvježbavanje tehnika speleospašavanja Hrvatske gorske službe spašavanja

Često se kaže da Hrvatska ima više speleospašavatelja nego aktivnih speleologa. Mnogi mladi speleolozi dobivaju poziv za ulazak u HGSS. Nakon ulaska u službu, mnogi od njih kreću s obukom u brojnim vidovima vještina potrebitih za gorsko spašavanje: skijanje, helikopterska spašavanja, spašavanja iz vode, stijena i zimskim uvjetima tako da se uvelike ili potpuno smanjuje njihova aktivnost u speleologiji jer jednostavno nemaju vremena za oboje. Gorski spašavatelji koji nisu došli iz speleološkog miljea se uče tehnikama speleospašavanja i kasnije sudjeluju u vježbama i akcijama spašavanja pri čemu njihove vještine ne zaostaju za onima koji se i dalje aktivno bave speleologijom. Prave akcije speleospašavanja su srećom vrlo

Large training ground for Croatian mountain rescuers to advance their cave rescue techniques

Saying goes that Croatia has more speleo-rescuers than active speleologists. Many young speleologists are invited to join the Croatian Mountain Rescue Service (CMRS). After joining the service, many of them start training for other skills required for the service: climbing, skiing, helicopter rescue etc. They stop been actively involved in speleology simply because there is not enough time for both. Mountain rescuers who are not speleologists undergo basic speleological rescue training and later engage in regular speleological rescue exercises, often their skills are equal to those of experienced speleologists. Real speleological rescue actions are fortunately rare and when they occur there is never a problem of recruiting enough speleo rescuers. If

Preko jezera u sonji
Foto: Marin Glušević

rijetke i kad se dogode nikad nije problem s mobilizacijom dovoljnog broja speleospašavatelja jer oni vrlo rado odvajaju vrijeme od svog redovnog posla da bi sudjelovali u spašavanjima za koje se pripremaju i treniraju godinama. S druge strane priprema vježbe s velikim brojem sudionika traži pomno planiranje u kome vrijeme čini ključni faktor. Da bi se ono što bolje iskoristilo potrebno je imati speleološki objekt s relativno lakšim pristupom i dovoljno složenom morfologijom za izvođenje vježbe.

Jamski sustav Crnopac se pokazao kao dokazano pouzdana i primjerena lokacija za ovakvu vrstu obuke. Od 2006. je u njemu izvođeno 5 završnih vježbi početnog tečaja, jedna međunarodna, dvije državne vježbe i tri završne vježbe naprednog tečaja speleospašavanja za vođe timova. Složena morfologija špilje je omogućila da se vježbe izvode raznim pravcima i poligonima prema nekom od izlaza. S ciljem povećanja sigurnosti kretanja, HGSS je omogućio i izveo pojačavanje sidrišta na nekim od najfrekventnijih pravaca prolaska kroz objekt, a na nekim mjestima u sustavu su isprobane i trajno postavljene antene za Cave – link radio komunikacijske uređaje. U Jamskom sustavu Crnopac su se dogodile i povijesno gledano dvije najsloženije akcije speleospašavanja u Hrvatskoj u kojim je sudjelovalo 75 (2011.) odnosno čak 114 spašavatelja (2012.).

needed, rescuers take time of work and are happy to apply their skills in which they have been trained for years. When preparing courses and complex exercises with a large number of participants, time is more precious and becomes a key factor in planning. In order to achieve time efficiency a sufficiently complex speleological object with relatively quick access to vehicles is needed in order to allow as much time as possible on training and exercises in the actual environment.

The Crnopac Cave System proved to be an ideal location for conducting this training. Since 2006, five final exercises of basic courses, one international, two state and three final exercises for participants in advanced speleological techniques for team leaders have been performed. The indentation of the cave enables all the exercises to be performed in different polygons towards the entrance. In addition to practicing speleological rescue exercises, in frequently surveyed facilities CMRS invests in equipping frequently used sections with quality anchorages for advancing and rescue. There are permanently installed Cave link antennas buried in designated places. The two largest speleological rescue operations in Croatia took place in the Crnopac Cave System, where 75 rescuers took part in the first (2011) and as many as 114 in the second one (2012).

Zaključak

Crnopački masiv je područje izvanredne prirodne ljepote, izuzetno okršen teren koji čini labirint dubokih vrtača, strmih grebana i bijelih kukova sa stotinama jamskih i špiljskih otvora koji vode u gustu trodimenzionalnu mrežu podzemnih kanala. U ovim uvjetima, kako iskusni speleolozi, tako se i oni manje iskusni mogu uključiti u brojne speleološke aktivnosti na površini i u najvećim dubinama. Dosad su istraženi brojni speleološki objekti među kojima se posebno ističe najdulji sustav Dinarskog krša – Jamski sustav Crnopac sa svojih 54.709 duljine i 797 m dubine. Atraktivnost i učestalost speleoloških istraživanja će zasigurno dovesti do novih velikih otkrića.

Conclusion

The Crnopac massif is a space of exceptional natural beauty, extremely rocky terrain creates a labyrinth of deep sinkholes, steep cliffs and white limestone slopes with hundreds of entrances to pit caves and caves leading to a dense, deep three-dimensional network of cave channels. In these conditions both less experienced speleologists and those ready to descend and spend several days and demanding technical research in areas kilometers away from the entrance can engage in speleological research.

So far, speleological objects of enormous dimensions have been found and researched, among which the longest cave of the Dinarides is in the forefront - the Crnopac Cave System with 5 entrances and 53.3 km long, 797 m deep, 2.4 million m^3. The attractiveness and frequency of speleological research will certainly lead to new discoveries.

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Crnopac Cave System

The Crnopac Cave System (CCS) was created by connecting the cave system Kita Gaćešina – Draženova Puhaljka (KG-DP) with the Oaza Cave in August 2019. The cave system got its new name Crnopac after the so-named mountain ridge. A year later, it was also connected to the nearby Muda Labudova Cave. With its new total length of 54,355 m, a depth of 797 m, and five known entrances, the Crnopac Cave System is both the longest cave in Croatia and the longest cave in the Dinaric Karst. Given its location in the centre of Croatia, relatively mild climatic conditions, and easy access, exploration and research can be done almost all year round, and most of the research is being done on weekends. There are several other large caves nearby, such as the Munižaba Cave (9,911 m), the Upper Cerovac Cave (4,035 m), the Lower Cerovac Cave (4,058 m), Duša Cave (1,225 m), and dozens of smaller caves with strong air currents which makes Crnopac an area with great speleological potential. In recent years, the Croatian Mountain Rescue Service has made exceptional use of the benefits of this training ground to practice and advance cave rescue techniques.