

KUUR

magazine
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LA VENTA
ESPLORAZIONI GEOGRAFICHE

Yearbook

KUR

magazine
www.laventa.it

Kur, an ancient Sumerian term, means "mountain" or "foreign land", but it is also the name used to indicate the underworld, which one would access by "entering the mountain". On Kur, the location of which is ambiguous in the sacred geography, the brute forces of the universe clash with the gods of the Mesopotamian pantheon. Kur was, then, the sacred mountain but also a supernatural, wild place, far from the human world, a destination of heroic voyages and a theatre of epic undertakings.

Editor in Chief	Tullio Bernabei
Editorial Staff	Carla Corongiu, Ada De Matteo, Antonio De Vivo, Paolo Forti, Alessio Romeo, Natalino Russo, Tommaso Santagata.
Layout	Ada De Matteo
Contacts	Via del Giardino 2 - 02046 Magliano Sabina - Italy tel +39 0744919296 email: kur@laventa.it
Translation	Gordon Fisher - Traduzioni Liquide
La Venta Associazione Culturale Esplorazioni Geografiche	Via Priamo Tron, 35/F 31100 Treviso - Italy www.laventa.it
Cover photo	Taking samples in the Guacharo cave, Colombia
Second cover	Descent from the Fagradalsfjall volcano, Iceland

collaborations & credits

Gaetano Boldrini: 28; Francesco Lo Mastro: 5, 6 top, 30 top, 31 basso; Alberto Righetto: second cover, 18, 20; Alessio Romeo: cover, back cover, 2, 4, 6 bottom, 7, 12, 15, 16, 17, 24, 25, 27; Tommaso Santagata: inside back cover; Francesco Sauro: 11; Marco Vattano: 1, 30 bottom, 31 top.

Tullio Bernabei

The period in which the pandemic and its associated effects made their voices heard was long, and in truth it's not over yet. The impossibility of travelling abroad, or at least the excessive complexity of doing so not as tourists but as explorers/researchers, in effect prevented the association from organising expeditions for more than a year.

Well, this enforced immobility allowed us to publish the book on Naica, the cave of the giant crystals, and to sort out numerous things within the association, including the laborious but inevitable process, strewn with red tape, of changing our status to that of an APS (*Associazione di Promozione Sociale*) – an association for community development and support. But La Venta has always been about conducting research and explorations first-hand, in the most extreme or least-known parts of the world. So it's no surprise that we had trouble coping with the lockdown.

Then, slowly but surely, we got back on the move and, albeit with some additional difficulties, we are getting back up to speed, which for us means committing to 3-4 ambitious projects, year in, year out, as well as the odd reconnaissance mission. As before, this edition of KUR – which is our written memory – bears witness to it; and as usual we have travelled half-way around the world.

We started out from the Colombian quartzites of Chiribiquete, one of those apparently unreachable – or at least unexplorable – places, which in truth are becoming better-known (undergoing *a change of perception*, as Giovanni Badino would put it), thanks to the very close partnerships with the indigenous communities. In the Portuguese Atlantic, south of Madeira, we explored and

documented – using high technology – the lava caves of the uncontaminated Selvagens Islands, another place that is truly out of this world. Not by chance, the basic themes are astrobiology and Martian caves. Also in relation to islands and underground systems bound up with volcanic activity, but much further to the north, we started work on an important exploratory and scientific project on the Icelandic lava tubes generated by the recent eruption of Fagradasfjall. The caves are still very hot, but we could begin to get inside them...not just out of curiosity or to be the first to do so, but because extreme internal conditions generate mineralogical and biological phenomena that are very much worth studying. You really have to be there, in other words.

One of our time-honoured specialisations is going from hot to cold, and so we could not fail to carry out glacier speleology for the Inside the Glaciers project, on which the association is very active. In this issue, you can read all of the updates on the Gorner glacier, where exploratory drones and 3D scanners are now being used. But someone has to find the caves first, and get at least part of the way inside them...

Last but not least, there is a report from the National Park of the Valbona Valley, in Albania, where some of our members joined a Polish expedition concerned with biospeleology, focusing on chiroptera, but not exclusively. And there were plenty of surprises, as there always are on serious explorations.

In the meantime, another bit of good news is that new, highly motivated members have come on board. We are slowly spreading our wings...and in the meantime, as always, we will just keep on rowing.

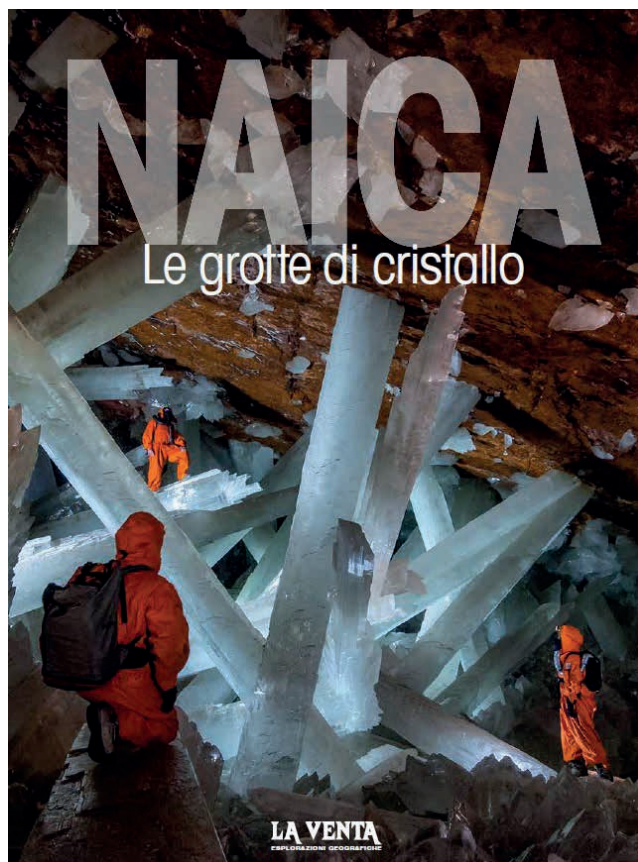


Buri cave, Islanda

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THE BOOK “NAICA – THE CRYSTAL CAVES”



in the Earth’s geological history, destined to become part of human geography.

Exploring and documenting the caves of Naica would take five years of dangerous missions by an international team led by the La Venta Association, which developed the necessary technologies to survive and operate in this mortal environment.

Finally, after many years, in 2021 we succeeded in charting all of the phases of this complex project in a book put together by Tullio Bernabei, Antonio De Vivo, Paolo Forti, Francesco Lo Mastro and Natalino Russo. The purpose was to honour that experience by describing how we managed the project, living to tell the tale and shining a light on what is perhaps the greatest wonder of the subterranean world.

Facts & Figures:

224 colour pages

More than 200 photos and drawings

150 gsm matte coated paper

3 different editions: Italian, English, Spanish

The book is available to buy on Amazon.



At the start of the third millennium, in the depths of a silver mine in northern Mexico, a discovery was made of something almost unique on our planet: a hidden cave, buried 300 metres below the surface, where hundreds of thousands of years ago, Nature created an extraordinary treasure...

It seemed to have come straight out of a comic book, beyond anyone’s wildest dreams, protected and preserved by the constant humidity and, above all, by temperatures impossible for anyone to endure – above 46°C.

We had the privilege and the responsibility of exploring a small window, open for a miniscule fragment of time

BANFF MOUNTAIN FILM FESTIVAL WORLD TOUR

La Venta is doubling up!

After being the host for the evenings held in Padua in 2019 and 2021, in 2022 two of our members were guests on the Italian tour of the BANFF Mountain Film Festival, the international festival of films on adventure, exploration and extreme sports, which this year is celebrating its tenth anniversary.

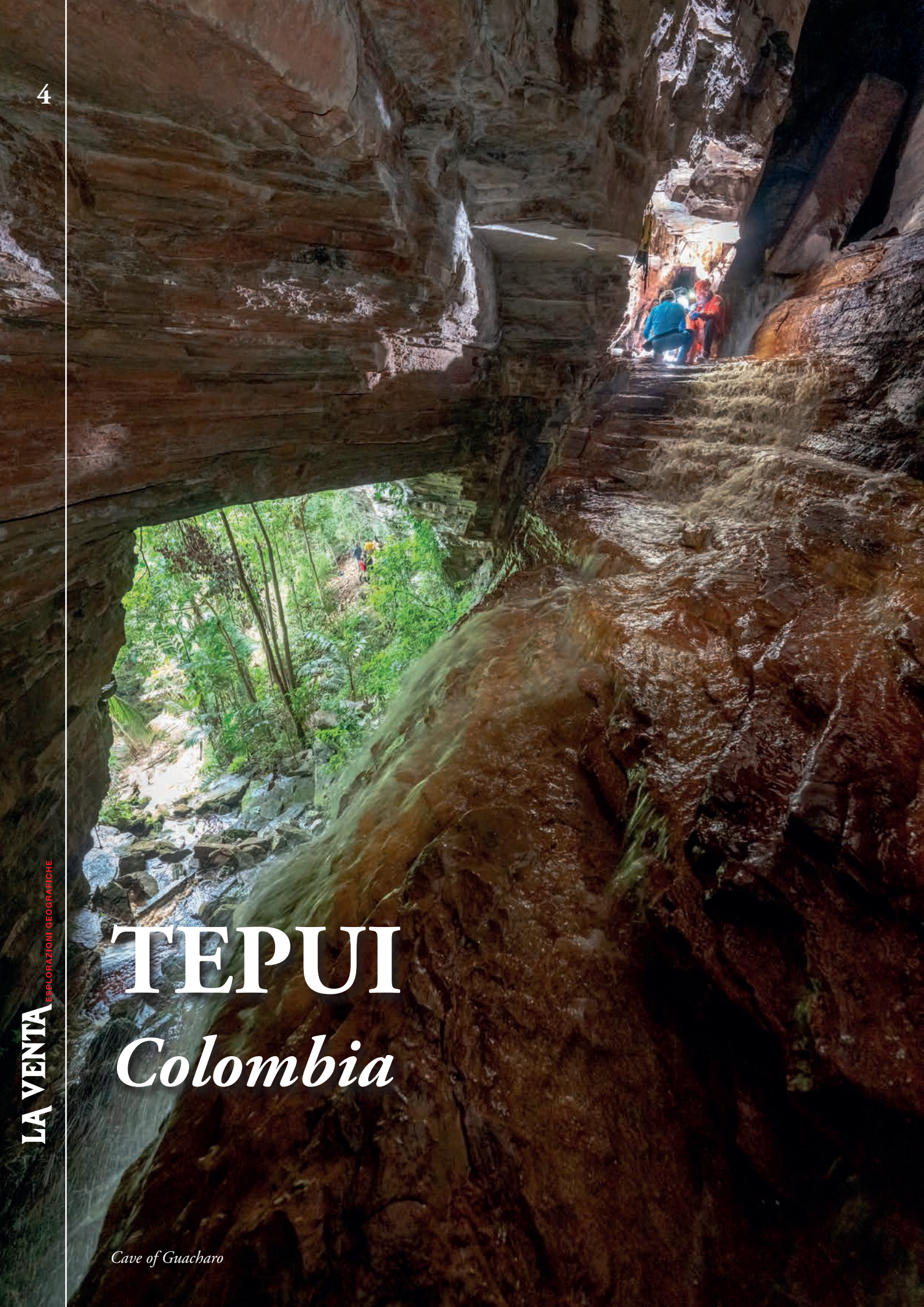
On the evenings of 9 March in Pietra Ligure and 16 March in Padua, Alessandro Beltrame delighted the crowd with a talk on documenting extreme environments, before Tono de Vivo did the same with his talk on Naica, home to the giant crystal cave – a subterranean wonder under the desert in the state of Chihuahua, Mexico.



TEPUI

Colombia

Cave of Guacharo





FOLLOWING THE ROCKS, SCALING THE WATERS – COLOMBIAN QUARTZITES 2022

Francesco Lo Mastro, Antonio De Vivo, Francesco Sauro

The quartzite project, launched in Venezuela in 2008, has expanded over the years, touching upon another two neighbouring countries: Brazil and Colombia. Despite the seeming oxymoron of the title, we arrived in Colombia after thirteen years of research as if we were following the course of an imaginary river of stone. Having initially gone up the Río Negro to explore the Aracà tepui in Brazil, La Venta goes even further upstream with this project to the most remote rivers in the Amazon basin. Indeed, in order to make our way to the Colombian quartzite area involved in our project, we used motor launches to travel long stretches of the River Caquetá, whose waters are characterised by strong currents and where the flow is often interrupted by tumultuous rap-

pids, some of which can only be overcome by abandoning the boats and proceeding on foot.

The “Colombian Quartzite” project aims to explore and study the geological phenomena, caves and environment of the quartzite areas in the south of the country, particularly the Caquetá Department, including the zone in between the protected area of the Ciribiquete National Park to the north and the Amazonas Department to the south; to be precise, an area of primary forest, the Colombian part of the immense Amazon rainforest. This isolated territory is difficult to access as there are no overland communication routes. Most of the territory is only accessible in small aeroplanes, landing on poorly maintained dirt runways near godforsaken military outpo-



Navigating along the Río Caquetá



The village of Araracuara is located on the banks of the Rio Caquetá, downstream from a narrow gully with dangerous rapids

sts or tiny villages. Its inhabitants are mostly fisherfolk and hunters from different indigenous ethnic groups. They get around by canoe and motor launch via a dense network of watercourses that can only be ascertained by looking at maps or flying over the endless tropical forest.

The start of our adventure in the Colombian Amazon

Thanks to our friend, the American speleologist Dan Straley, who has been exploring this region of South America for many years, we were able to make immediate contact with researchers and people with a detailed knowledge of the area, such as the Colombian Carlos Lasso Alcalá, a biologist from the Instituto Humboldt in Bogotá, and Jesus Julio Fernandez from Switzerland, an expert speleologist. However, the project would not have been possible without Jules Domine, a French-Canadian kayaker and documentary maker who has lived in Colombia for some time and has befriended the indigenous people from the *Resguardo Monochoa* (Monochoa Reserve). We asked him to meet with the representatives of the indigenous community to request their permission



Canyon of Araracuara

to explore the quartzite outcrops in the Rio Caquetá area located inside their territory.

In February 2020, having set the date and place for the meeting, a small group formed of Francesco Sauro and Daniela Barbieri for La Venta, Carlos Lasso and our two American friends, Daniel Straley and Brady Merrit, flew in a tiny aeroplane to the village of Araracuara, a small Monochoa settlement on the banks of the Rio Caquetá in the heart of the tropical forest. From there, firstly on foot and then by boat for almost two hours, they made their way up the river, reaching a remote village immersed in the woods, which was to be the meeting place. On the following day, the governor general of the *Resguardo*, Rogelio Mendoza and the governors of the various communities, met inside a *maloca* (large ceremonial hut) and, after lengthy discussions and complex consultations, granted their permission for the expedition. However, there was one condition: the project would be carried out together with the indigenous people themselves, pursuing the shared objective of establishing a cultural exchange between us, helping them to gain more scientific knowledge about their territory and ensuring that the indigenous component was independent in the first part of the exploration. We then left them with the intention of organising an initial prospecting trip in a few months with a team entirely made up of young Monochoa, selected on the advice of the elders representing the villages in the reserve. La Venta would supply the indigenous people with technical equipment and support so that the group could reach a number of cave entrances on the quartzite reliefs within the reserve. As far as we know, it would have been the first totally indigenous expedition in the history of exploration. These were our shared objectives. Unfortunately, once we returned to Italy the world was turned upside down by the pandemic and this dream had to be shelved as we awaited a turn for the better.

February 2022, the project gets going again after the pandemic

The pandemic having loosened its grip, we set out to implement the programme agreed upon with our friends in the Monochoa community during our first visit. Back in Araracuara, an initial group (Francesco Sauro, Alessio Romeo, Daniela Barbieri, Patrizio Rubcich, Alfredo

Brunetti, Tiziano Conte, Jesus Fernandez Audersett, Jules Domine and Daniel Straley) resumed contact with the local inhabitants, organising a new meeting with village leaders to re-plan the project phases and the initial indigenous expedition in search of the caves. The following day, when the rest of the team (Tono De Vivo, Francesco Lo Mastro and Carlos Lasso) arrived on site, they became acquainted with the territory, reaching the *Cueva del Guacharo*, a large resurgence overlooking the River Caquetá, considered a sacred place by the Monochoa, after a two-hour walk through the forest. On that occasion, the cave was explored, photographed and surveyed throughout, while the biologist Carlos Lasso conducted interesting biospeleological research on behalf of the Instituto Humboldt. Over the days that followed, together with the governor Rogelio Mendoza and the young people from the villages in the *Resguardo*, we made preparations for the reconnaissance on the mountains. After presenting and illustrating the project, the young people were given all the technical equipment needed for the expedition: hammocks, backpacks, various items of clothing, water bottles and crockery, as well as freeze-dried food, fresh supplies and everything required for staying in the forest. Subsequently, everyone arranged themselves on board motor launches for a couple of days' reconnaissance up the Rio Caquetá, with an overnight stay in the forest in order to test the logistics and look out for problems that might arise during the operational phases of the actual exploration.

The days spent with the Monochoa community were an opportunity to spend time together and strengthen the already established bonds of friendship and collaboration by talking about each other's experiences and worldviews. In the coming months, the indigenous community will continue to search for cave entrances. Then, in the near future, we will jointly organise a scientific expedition with the aim of uncovering the hidden world that undoubtedly exists within the quartzite mountains of this remote region of the Earth.

A project in the heart of the remotest forest

It wasn't easy to organise and carry out the expedition in that territory. The zone only became accessible again in 2017 after the agreement signed between the Colombian government and the FARC (Fuerzas Armadas Revolucionarias de Colombia). There have therefore been very few scientific explorations of this vast territory over the last twenty years. But other factors also complicated our first steps in Colombia: first and foremost the climate and the natural environment. The former is very hot, wet and unpredictable, while the latter is full of hidden dangers and difficulties. When advancing through the forest, in addition to venomous creepy crawlies, we also had to guard against the onslaught of blood-thirsty mosquitoes and myriad stinging midges, while at the same time being careful not to run into the fractures and blades of rock hidden beneath the layer of decayed vegetation. Before setting out, we also had to evaluate the ethics of an expedition to these areas during the COVID-19 period. Two years ago, at the height of the pandemic, we renounced our expedition to Chiapas precisely so as not to jeopardise the safety of the indigenous communities of the El Ocote jungle. Now, however, with the pandemic on the wane and with valid prevention systems (vaccines and PCR tests) in place, we considered that we could leave safely if we adopted the appropriate precautions. All participants were required to be in possession of a "reinforced green pass" (three doses) and a negative PCR test carried out the day before departure. On the other side of the ocean too, our contacts and collaborators had the same requirements, and as far as the residents of the *Resguardo* Monochoa were concerned, we knew that they had all received doses following a meticulous vaccination campaign.

In conclusion, as we have experienced during expeditions to other countries, the common experiences and shared intentions have enriched everyone, creating a strong bond between those from different backgrounds. This is achieved by, amongst other things, comparing



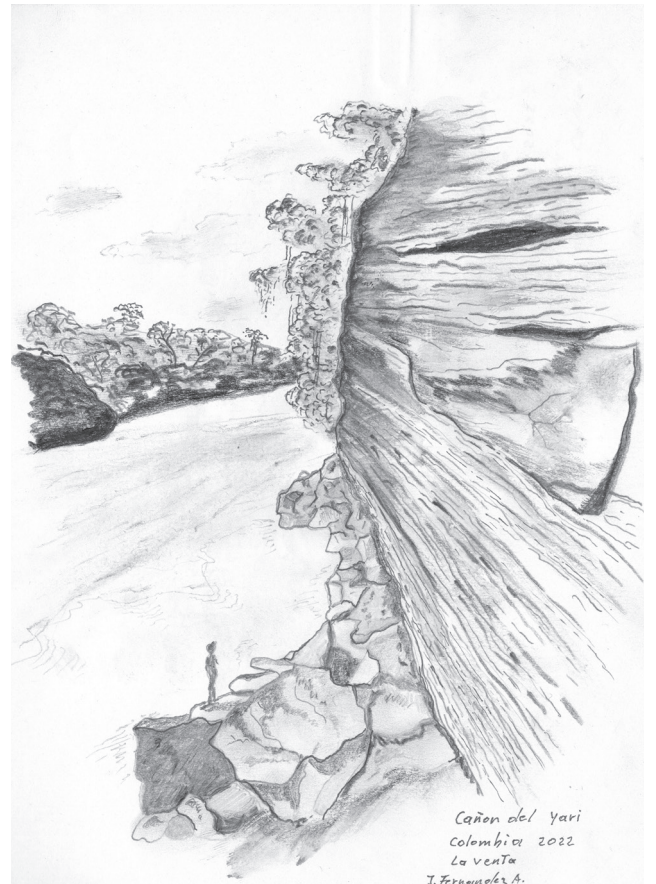
Meeting with the Uitoto native peoples of the Monochoa indigenous reserve in the community's large Maloca (hut)

and contrasting our concepts of geographical research and learning about the profound sacred and ancestral perception that the indigenous people have of the forest and nature as a whole.

Participants: Francesco Sauro, Alessio Romeo, Jules Domine, Antonio De Vivo, Francesco Lo Mastro, Daniela Barbieri, Patrizio Rubchich, Tiziano Conte, Alfredo Brunetti, Daniel Straley, Carlos Lasso Alcala, Jesus Julio Fernandez.

Our heartfelt thanks to the Uitoto indigenous community of Monochoa with whom we are sharing this new adventure, and in particular to Governor Rogelio Mendoza for his friendship and support. Young people in the exploration team: Narcizo Perdomo Cabrera (Comunidad Caso Negro), Efen Jonas Rodriguez (Comunidad Amenaní), Jeth-Li Mendoza Matapi (Comunidad Monochoa), Enoc Ortiz Tivoli (Comunidad Chukikt), Wilmer Anderson Valencia (Comunidad Monochoa). We would also like to thank all the Mendoza siblings and family for their support, especially Eusebio and Nicolas.

With the support of: Rolex, Ferrino, Hennessy Hammocks, Tiberino, Crioproject.



Along the deep canyons in the quartzite that characterise the rivers of the Caquetá region. Drawing by Jesus Fernandez Auderset

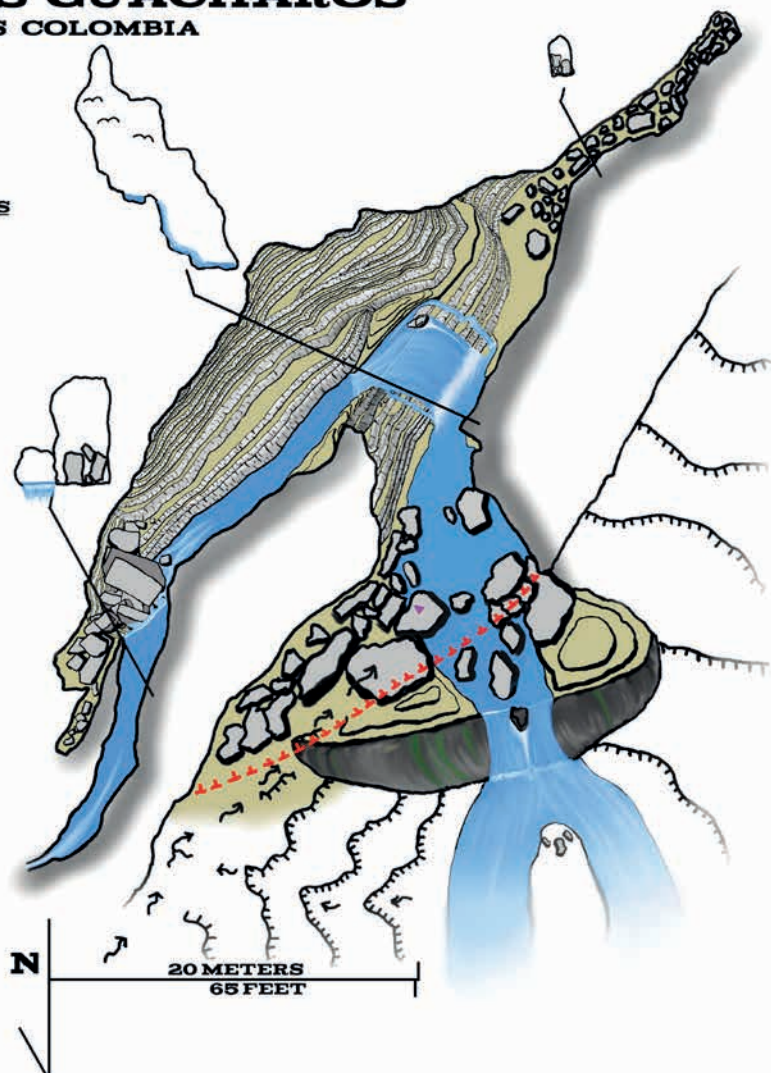
CUEVA DE LOS GUACHAROS AMAZONAS COLOMBIA

GRADE 5 (DISTO-X)
SURVEY & ILLUSTRATION
DAN STRALEY 2022

EXPEDITION 2019 & 2022 TEAMS
MONOCHOA PEOPLE
LA VENTA
INSTITUTO HUMBOLDT

Cueva de los Guacharos is a quartzite cave located in the tepui mountains of the Colombian Amazon. The cave is named after a large colony of guacharo birds (oil bird, tayo) found inside the cave. The guacharo bird is one of two bird groups in the world that can navigate in 100% darkness using echo location.

LEGEND	
ENTRANCE	
TRAIL	
SLOPE	
GUACHAROS	
QUARTZITE LAYERS	
STATION A1	
WATER WORN LAYERS	
BREAKDOWN	



BEFORE US

Francesco Lo Mastro, Antonio De Vivo

During our expeditions we very often find ourselves exploring remote places in the belief we are the first to tread their, to leave a footprint. Our now customary Google Earth consultations lead us to consider those territories covered by immense forests, occupied by arid deserts or isolated by perennial ice, as still unexplored. But often that's not the case.

In fact, during historiographical research on the expedition area, where we don't seem to encounter any reliable evidence, we then unexpectedly stumble upon a report, a map or an ancient document in the vast sea of the internet concerning that very place. These "discoveries" sometimes lead to a turning point, proving an invaluable aid for learning more, and not just on the field, about the territories we explore.

This was the case for the Philippines, when, on the occasion of the publication of the book *A Cave between Land and Sea*, we came across the first report on the Underground River written by a British naval commander called Bates in 1850. This was also the case for the Caquetá region and its rivers in Colombia. A great deal has been written about the Colombian Amazon, so much so that when carrying out in-depth research you can lose yourself in an infinite number of documents, reports and treatises on its inhabitants, economy and natural resources.

Some interesting information on the area was handed down to us from a fellow Italian, the geographer and mapmaker Agostino Codazzi, who as early as 1857 be-

gan exploring Colombia, making his way up the Caquetá river through the "*ilimitadas florestas da la vegetacion exuberante inextricable que se veia por todos lados donde la naturaleza ofrece tenaz resistencia en reconocer el hombre como rey de la creacion*", as described in the fascinating book *Memorie Inedite* di Agostino Codazzi, which provides an account of the life and adventures of this pioneer, considered a national hero in Colombia, Ecuador and Venezuela. The scientific significance of his research was such that his name often features today alongside that of the famous naturalist Alexander von Humboldt, as like the latter he ventured into large unexplored expanses of Colombia, making the first geographical maps.

Another interesting text, useful for learning about the territory, is the more recent *Mi alma se la dejo al diablo*, written in 1976 by the Colombian author Germán Castro Caycedo. It contains a realistic account of the difficulties of living and surviving in the area of the Caquetá and Yari rivers, in the vain attempt to colonise these territories, amidst hunters and *caugheros*, harvesters of natural rubber extracted from the bark of the *Hevea brasiliensis*. This product was publicised in the West by the French explorer and geographer Charles Marie de La Condamine in the mid-1700s, transforming and disrupting the life and economy of the inhabitants of these lands.



Cover of the Codazzi book



Map of Rio Yapurá (Caquetá)

The map

In addition to consulting historical texts of various ages, we also used the means made available to us by today's technology to learn more about the places: internet research, satellite photos, detailed maps and 3D rendering software. This is all to be expected, but in the Colombia project coming across a map dated 1789 was like receiving an unexpected gift. The "Mapa De una parte de los Rios de los Engaños ò Commiari", as the Rio Yari, a tributary of the Caquetá, was known at the time, is perhaps the first to describe the area of these distant offshoots of the Amazon. The Kingdom of Spain commissioned Colonel Francisco Requena to

produce this rare document when establishing the borders with the Portuguese territories neighbouring the Colombian Amazon region. It provides an incredibly precise description, with an abundance of detail, about the entire river network in the Caquetá region with the original names (the River Caquetá is marked on the map as *Yapurá*). The map includes numerous references to the indigenous ethnic groups, as well as marking natural obstacles and the sequence of rapids (sometimes described as "inacesible") along the main watercourses. It will certainly be interesting to compare the information contained in the map in situ with the local people. In short, this valuable document will provide a valid and stimulating method of comparative investigation between the present and the past, comparable to real discovery on a fruitful expedition.



Cover of the Caycedo book



Map of Rio Yari

AT THE WESTERN TIP OF THE GUIANA SHIELD

Francesco Sauro

The Caquetá region represents the western tip of the immense cratonic basin of the Guiana Shield. However, there are some important geological differences compared to the eastern tepuis of Venezuela and Guyana Esequiba. Here too, the geological history of the Serranía de Yarí and Chiribiquete began between 2000 and 1800 million years ago, during the Precambrian period, when the crystalline rocks of the basement were formed. The Guiana basement in Colombia is characterised by two regions or geological provinces: the first is the Mitú Complex formed by migmatic gneiss, granitic gneiss and granitoids, locally associated with some mica schists, quartzites and amphibolites. The second geological province is the so-called Parguaza Rapakivi granite, which is considered an intrusion of the Mitú Complex and emerges in the north-east of the Vichada Department in the eastern plains and on the Venezuelan border, in the form of bare rounded hills. Subsequently, a process of erosion and debris sedimentation occurred above this shield zone in an internal basin. This erosive event is indicated by a non-conformity that brings Precambrian crystalline rocks into contact with Ordovician quartzite sediments: a leap in time from 1.8 billion years, when life still only consisted of unicellular organisms, to approximately 485 million years, with the proliferation of the first complex living organisms, such as trilobites, gastropods and cephalopods. This is a significant difference compared to the quartzite rocks of the Venezuelan tepuis, which instead are much older, dating back to around 1.6 billion years ago.

The Ordovician quartz arenites of Caquetá are referred to as the “Araracuara Formation”, precisely because they emerge along the walls of the large canyon of the same name. Subsequently, the rocks of the Colombian Amazon basin were cut open by horst-type faults in the late Palaeozoic, forming the primordial structure of the long Serranía de Chiribiquete. However, it was only in the Neogene (25–5 million years ago) that this entire area was lifted up along with other Amazonian massifs such as the Lindosa, Tunahi, Naquen and Tigre, in association with the Andean orogeny. Further studies will be needed to establish whether the surface denudation and erosion rates of these mountains are similar to those of Venezuelan tepuis. However, the caves and collapses that can be observed in the plateaus are certainly of a considerable age to have developed into such pure and ancient quartz arenites.

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Mapa de una parte de los rios de los engaños ó Comiari – 1789 - <https://www.loc.gov/resource/g5292y.ct000309/?r=-0.309,0.038,0.678,0.261,0>



The River Caquetá carved the deep Araracuara canyon in the formation of Ordovician quartz arenites of the same name

GORNER

Switzerland

LA VENTA ESPAÑOL INGLÉS FRANCÉS

Night at base camp





ON THE GORNER GLACIER WITH THE “INSIDE THE GLACIERS” PROJECT

Luca Gandolfo, Alessio Romeo

We're in Switzerland, camped on a natural terrace at 2650 m above sea level with a magnificent view extending from the peaks of the Monte Rosa range to the Matterhorn, all enhanced by the majestic tongue of the Gorner glacier that flows beneath us.

The sun has already set a few hours ago, and the long shadows cast by the majestic pyramid of the Matterhorn into the deep Gorner valley have made way for the first stars that begin to dot the skies above base camp, while an almost full moon starts to peep out between the Dufourspitze and Signalkuppe. Its light, reflected by the multiple glacial tongues before us, makes the entire valley almost as bright as day. Although it will be a cold night, these conditions set the stage for a beautiful sunny day tomorrow.

The atmosphere at base camp is typical of the final day of an expedition, reliving the adventures of recent days while sipping a good stiff drink and telling stories and anecdotes about trips to distant worlds, all before seeking refuge in a warm sleeping bag.

This expedition in October 2021 is part of the “Northern Side of the Alps” project, a sort of appendix within the bigger “Inside the Glaciers” project, developed by Alessio Romeo and Francesco Sauro, which began on this very glacier in 2014 with the First International Glacier Caving Camp.

“Northern Side of the Alps” encompasses a documentation, exploration and multidisciplinary scientific research campaign that sees the active participation of prestigious university institutions in Milan and Paris, which study microbiology and nanoparticles. It also involves firms such as VIGEA, specialists in photogrammetric surveys and 3D modelling. Last but not least, various Italian, Swiss and French caving associations are also ta-

king part. Between August and December 2021, more than fifty people contributed to this ambitious project that gathered data and samples from nine different glaciers in the Swiss canton of Valais.

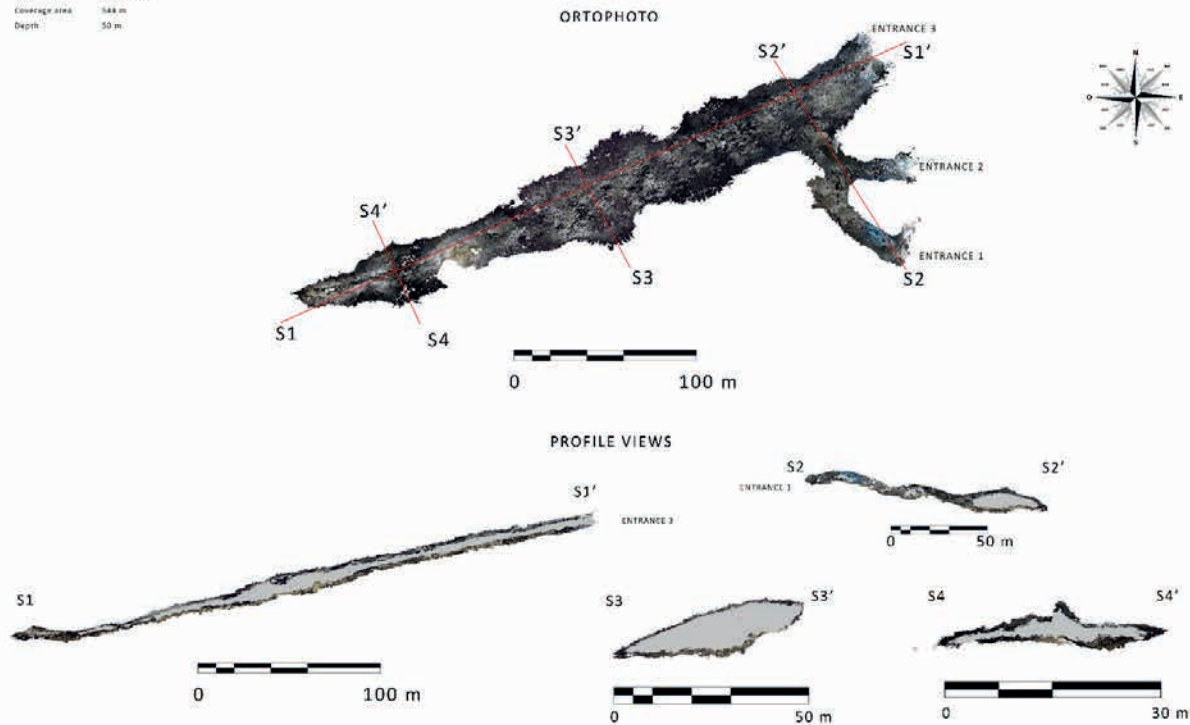
Among the various speleological associations, La Venta's contributions have always made a difference to the numerous “Inside the Glaciers” projects, not only with the supply of materials but also with the active presence of many members. There were seven of us on the Gorner: Norma Damiano, Roberto Trevi and Tommaso Santagata who travelled there specially for this intense three-day period, while Patrizio Rubcich, Sara Di Ferrante, Alessio Romeo and Luca Gandolfo arrived after another action-packed three days of exploring, surveying and sampling in the cavities of the Lang glacier, one of the nine glaciers included in the 2021 research campaign.

This expedition also saw the involvement of three people from the Swiss company Flyability, which has been collaborating with both La Venta and “Inside the Glaciers” for a few years. The firm specialises in developing and building special state-of-the-art drones known as “collision-tolerant drones”. With their spherical structure, they were developed for inspecting industrial sites that are difficult for people to access, such as silos, cisterns and chimneys. These characteristics make them particularly useful in extreme exploring too, where humans can go no further due to particular conditions such as those that might be encountered in glacial cavities, whether contact caves or mills. In the past, these drones have proved fundamental when exploring certain contact caves where speleologists were prevented from entering by raging torrents from the hanging glacier tongues of Monte Rosa. The participants also included the photographer Robbie Shone, an old acquaintance of “Inside the Gla-

GORNERGLETSCHER CONTACT CAVE 1-21

UAV photogrammetry and mobile mapping scanning survey
Realized in: August-October 2021

UAV model: Flyability Elios2
NMS model: Locus BLK260
Coverage area: 348 m
Depth: 30 m



ciers” and La Venta, invited by German *GEO* magazine to take photographs of the project.

The expedition objectives were many and varied, and included: sampling sediments inside the contact caves to analyse them, in collaboration with Professors Andrea Franzetti and Roberto Ambrosini of the University of Milan-Bicocca, in search of bacteria in the ice and cavities; and taking water and ice samples for a study of nanoparticles of both natural and anthropogenic origin. The following investigations will be led by Professor Yann Sivry of the Institut De Physique du Globe de Paris (<https://www.ipgp.fr/>): exploring intra-glacial cavities to better understand glacial and sub-glacial hydrology as the melting ice can lead to the formation of “hanging” pools of water, blocked by fragile temporary dams or unstable ice masses that, should they collapse, could pose a danger to settlements downstream, as in the case of the flash flood that occurred right here in Zermatt in the summer of 2019; carrying out detailed topographical documentation of the cavities using both classical methods and the cutting-edge technology available here thanks to Vigea and Flyability for 3D sub-glacial and surface mapping employing laser scanners and photogrammetry. The 3D models and photographic documentation will be used to carry out morphological comparisons with the material obtained in August and data that will be compiled in the future, for the purpose of monitoring the development and dynamics that govern the process of reduction of the glacial masses.

With regard to explorations, we set ourselves targets for October 2021 of a couple of contact caves at the confluence of the Gorner (or what remains of it) and Grenz tongues. We were fortunate with regard to the first target and managed to complete our exploration and survey. The cave had already been identified in August but we

were able to explore it only partially at the time due to the flow of the river. For the Flyability drones too, it proved difficult in August to overcome certain stretches, but we still managed to go well beyond the limits of what we could have explored ourselves.

Meanwhile, in October we found the river to be totally inactive and we were therefore able to make our way to the sump that marks the end of the cavity, around 200 m from the entrance.

The second contact cavity, on the other hand, no longer featured the spaces explored in August, when two of us made a quick entry into this rather concerning and hazardous environment due to the threatening and clearly visible fractures and cave ins on the walls. By October the cave had collapsed and only the first 17 m of its almost 100 m length (estimated in paces) could be accessed.

On the way back, on the first of the two days available, we also checked another contact cave near the trail accessing the Gorner glacier from the rack railway. We needed ropes to be able to progress through the cavity, but not having much time we took advantage of the last batteries for the Flyability drone to check its stability and assess the degree of interest it held for us. The images showed us that the cavity was closed off due to a collapse in the ceiling of ice around twenty metres in, so it would not have been worth equipping ourselves to make the descent. Happy with the time saved, we returned to camp before nightfall.

The expedition objectives also included some glacial moulins not far from the contact caves, in the zone above the Grenz glacier. Unfortunately, our exploration of the latter was heavily affected by the abnormally high temperatures that, despite the fact it was late autumn, reacti-



Contact Cave 1 in October

vated the surface streams. At around 11 in the morning, roaring cascades made it impossible to access the shafts. However, one of them was sampled at different depths in any case: the ice was used to analyse the nanoparticle content, while some samples of a large *cryoconite*,* embedded at a depth of approx. 20 m, were delivered to the laboratories of Bicocca University in Milan. We hope to find out the test results soon.

The outcome of this expedition and all the others completed over recent months is certainly positive. Lots of activities have been carried out and will enable us to lay the foundations for future studies, painting a picture of the state of health of these glaciers in 2021 and perhaps paving the way for new studies and research.

However, the project is not yet over. A follow-up is also planned in 2022, but on other alpine glaciers. Nevertheless, there will be a couple of expeditions to the Gorner, where the data gathered thus far needs to be added to with the use of monitoring tools and new surveys for the purpose of quantifying the loss of mass during the summer in greater detail.

The sad awareness that we are witnessing the disappearance of these huge glaciers is something that has been with us for years now. Over the centuries, the alpine glaciers have lost dozens of metres of thickness, transforming the valleys into desert-like stony moraine deposits. It is in our interest to gather as much information as possible from these features that are disappearing. The objective is to create an archive that describes the state of the glaciers at the present time, so that we can also gain a better understanding of their potential future evolutions. Speleologists have the ability to observe and therefore describe the internal morphology of a glacier and its hidden voids. It has always been thought that the body of a glacier loses mass from its surface, but that's not the case. Year after year, we are coming to realise the multiple factors that cause this loss.

Mapping the microbiological presence on the surface, and beyond, is important for understanding the role these cold masses play within the life cycle. For the first time, we decided together with microbiologists to also sample the sediments found in the dark, that is to say in-



Contact Cave 1 in August

side the contact cavities, in order to compare them with the external cryoconites on a biological level.

Pollutants such as nanoparticles of human or natural origin have a huge effect on the quality of our lives, both because of the effect they do have or can have on microorganisms (they could interact directly with their genetics given their microscopic dimensions) and because of their environmental effects once carried downstream by the meltwaters. It is therefore very important to quantify them.

Glaciers are sources of the water that is needed for life, the production of electricity, river transport, food production, the fishing industry and agriculture. The premature disappearance of glaciers poses a major problem for a large proportion of the population.

We do not believe we can stop this process. We do not have the power to do so. However, we can certainly make a contribution to obtaining more information and knowledge from this disaster of the Anthropocene!

**cryoconite*: conical basin of natural origin that forms on the surface of the glacier containing water and a fine, dark sediment at the bottom. The sediment usually contains a mineral part, an animal part (including extremophiles) and also a plant and obviously a bacterial part. These basins are of different sizes, from centimetres to metres, and are very widespread on the Gorner glacier. "Inside the Glaciers" began to procure samples for the Muséum National d'Histoire Naturelle in Paris in 2014 thanks to the assistance of Professor Emeritus Alain Couté, who passed away a few years ago. Recent studies suggest that these small biomes have the highest level of radioactivity if compared with other natural structures. These levels are not hazardous for humans, but certainly affect the microorganisms that live there.

INSIDE THE GLACIERS IN 3D

Tommaso Santagata

The rapid roll-out of new drone and 3D scanning technology over recent years is making a growing contribution to the gathering of data through different scientific research activities linked to speleology and, particularly, the study and monitoring of glaciers.

For a number of years now, our association has been working with Flyability, a Swiss firm that develops dro-

nes for safe use in cities and buildings, and in contact with people, making it possible to establish new interactions and services with UAVs (Unmanned Aerial Vehicles) and resolving critical collision issues. Flyability's main product is its Elios drone (model 1 and 2), whose rotors are protected by a mesh that allows the drone to bounce against obstacles without any damage.



A Flyability drone emerges from a cave in October, after having verified its solidity and exploratory interest



Laser scan of the contact cave using the BLK2GO scanner

These types of UAVs are commonly known as “collision-tolerant drones” and their characteristics mean that they are mainly used for inspecting and documenting inaccessible, difficult and hazardous environments. La Venta works regularly with Flyability to test and use their technology in support of numerous caving activities, with particular reference to the exploration and 3D mapping of glacier mills and contact caves. During the two expeditions organised in August and October 2021 as part of the “Inside the Glaciers” project, the Elios 2 drone was used to document and survey contact caves in the Gorner and Aletsch glaciers. The main objectives were mapping the cavities during the summer and winter period to obtain useful starting data for making comparisons in the future and studying developments taking place outside and inside these glaciers.

Flights performed with the Elios 2 drone have made it possible to reconstruct photogrammetric models (from videos recorded by the drone cameras) of the main system of contact cavities in the Gorner glacier.

In addition to using the Flyability drones, the August expedition also carried out 3D mapping of the longest explored cavity that also involved using a state-of-the-art portable laser scanner, the BLK2GO, made by Leica Geosystems and supplied by Vigea, another firm that La Venta has been working with for some time for 3D scanning techniques. This tool meant that it only took a few minutes to scan the most easily accessible areas where the operator was able to walk and simply scan by holding the device and illuminating the area with a basic headlamp, without the need to install fixed lighting systems – as is often the case in most cave operations with laser scanners.

With a range of 60 m and a resolution of 3 mm at an average distance of 10 m, the BLK2GO calculates the trajectory through various components, including a system called Visual SLAM (Simultaneous Localisation and Mapping) and several cameras installed in the front and sides of the instrument, which not only continuously take the photographs necessary to obtain point

clouds in real colour, but also help the device calculate the trajectory, thereby reducing the drift that can occur after long use.

The photographs and films obtained by the Elios 2 drone have been analysed to produce 3D models by means of “structure from motion” techniques, using software and algorithms able to recognise points in common between the photograms and images, in order to reconstruct a point cloud of the documented areas. This technique, known as photogrammetry, is widely used in different contexts where commercial and other drones are employed. In the absence of positioning systems, the data obtained are therefore off the scale, but thanks to the scans conducted with the BLK2GO portable laser scanner and the photogrammetric survey carried out in the external areas, it is possible to scale and orientate the data obtained by the drone inside the cavities. As regards the data captured by the BLK2GO, they were processed by aligning the different point clouds. Interactive models were subsequently produced that make it possible to interact with the data and photographs obtained through an open-source application. Once the point clouds had been obtained from both tools, the digitisation phase began, leading to the development of classic planimetries and 2D sections. In addition, 3D models were produced in the form of meshes (three-dimensional solids obtained by triangulating individual points).

The technologies deployed demonstrated their immense potential in the field of caving, as they are easy to utilise even in difficult contexts such as contact caves with underground rivers.

Nevertheless, these technologies are still only accessible to a small number of people, not only because of their costs but also due to the skill needed to use them both in the acquisition phase and above all in the data-processing phases, during which it is essential to call upon past experience in using certain software programs to process point clouds and digitise the various elements.

Ice coil at the base of the Shpella e Akullt cave

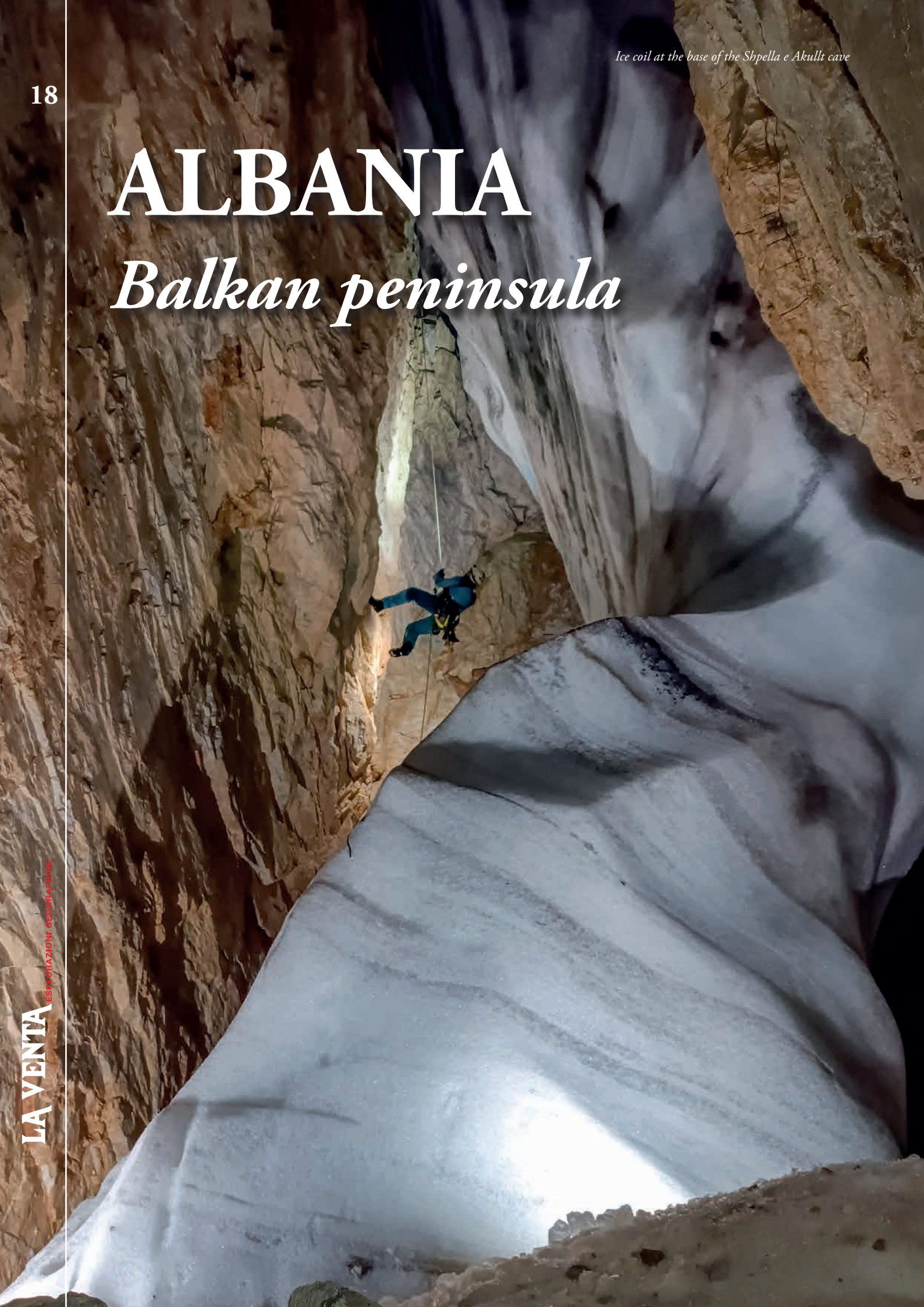
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ALBANIA

Balkan peninsula

LA VENTA

ESPLORAZIONI SCORRANTICHE





ON THE WINGS OF A BAT - STORY OF AN EXPEDITION TO ALBANIA

Sara Di Ferrante, Federico Narduzzi, Alberto Righetto

The cave of Castel Sotterra, in the hill known as Montello, is geographically very close to Treviso. Labyrinthine and very extensive, it is particularly interesting for the characteristic conglomerate within which it is located, and it is also renowned for its impressive quantity of dark-red sticky mud, which is hard to shift once it's on your suit. The cave is visited relatively often, and for around two years now studies have been conducted on the chiroptera that live there. *Rhinolophidae* (horseshoe bats) large and small group together within its chambers in summer and winter roosts. As the GGT (*Gruppo Grotte Treviso* – Treviso Cave Group), we have been working since then with the CERC (*Centro di ricerca Chiroterteri* – Centre for Chiroptera Research) on the project to study the ecology of the chiroptera in the underground caves, positioning the microphones used for the monitoring of these creatures, which we now know to be relatively fragile, especially in specific periods of the year in which human disturbance can cause them irreversible damage. During a spring monitoring session, the chiropterologist responsible for the project, Andrea Pereswiet Soltan, let slip that “in August I may be participating in an expedition, organised by the Polish speleological foundation, to Albania”. And so it came to pass that, after an exchange of emails and a series of meetings, the expedition run by the Fundacja Speleologia Polska became an international project. Delighted to re-establish the historic links between the groups in both countries, the organisers wrote to us: “GGT welcome on board”. And our hearts started beating fast.

The main objective of the expedition was to pursue the exploration of the *Shpella Sportive* cave (Valbona Valley National Park). Those at the forefront said: “A couple of forays, we'll get in and out quick, adventure sport-style”. Instead, we found ourselves facing a deep, multi-layered

cave, which even today we are far from having explored fully. Our aims thus included picking up where the previous research operations had left off, as well as external investigations and surveys with a view to proceeding on the accumulation of the cavities. This latter aspect was entrusted to Magda Slupinska and Mariusz (Maniek) Polok. The activities included the monitoring of the bats – an operation co-ordinated by Andrea Pereswiet-Soltan of CS Proteo in Vicenza, and a researcher at *ISEZ PAN* in Krakow – and the collecting of invertebrates to be sent to the department of Natural History at the Museum of Upper Silesia (Byton), where the biologist Joanna (Asia) Kocot-Zalewska deals with the studying of entomofauna (the insects of a given region), concerning herself specifically with coleoptera, flies and frogs.

In May, we started to make our preparations, with the ghost of Covid and the block on movements lingering over us and our enthusiasm for a new adventure. The fact that the Polish team was well-organised emerged early on from their mails, even though the attached files were in Polish. From Italy, we brought with us some provisions (typical Italian specialities) and a few pieces of equipment: drills, DistoX, radios and solar panels, the latter on loan from fellow members of La Venta who resolved a range of problems for us, also providing us with appropriate tents and, crucially, the exceptionally valuable water filter. Us Italians had two major worries: first and foremost, water, in the knowledge that all we had available was a small container for the animals, and we didn't even know if we could share it with them; the second concerned the transport of the material from the *Kol Gjoni* guest house all the way up to 2100 m above sea level, where we were to set up the camp (*baza*). In relation to the first matter, we decided to take two drinking-water filters and a load of Dissenten tablets in

the event that the filters failed to work; in terms of the second preoccupation, at the guest house they assured us that the horses would take the bags as far as base camp. The transporting of all the material way up high ended up being more complicated than expected: the horses turned out to be unsuitable at carrying the material along the path leading to base camp. As a result, all of us had to go back and forth between base camp and the path in search of bags abandoned along the way. After two days, base camp became fully operational, and we could at last get stuck into the expedition. The teams changed almost every day, based on the exploratory requirements, and the skills and desires of the individual cavers. All of this, along with hassles both large and small, was consummately managed by the expedition leader Michał Macioszczyk (eMc).

From the outset, the explorations offered all manner of thrilling discoveries, including a number of promising entrances as we pressed ahead into “*Shpella Sportive*” and “*Shpella e Valbone*”. All of this zeal had its price, though: our 2 km of ropes and around 200 plates were soon shown to be insufficient. So we set ourselves a number of exploration priorities, electing to continue with the investigation of “*Shpella e Valbone*” and leaving aside “*Shpella Sportive*”. Day in, day out, the remaining material (plates, above all) was parsimoniously sub-divided between the teams in the cave and those involved in external sorties. The lack of material made the exploration of cave AVL-R-52 all the more exciting. The investigation, led by Sara and Alberto, saw the cave being subsequently christened “*Shpella e Akullt*”, which in Albanian means “cave of ice”. At present,

From half-way up, the material for base camp has to be carried over the shoulder



the cave features in its wide entranceway an ice tongue that then narrows, before opening back up as it spirals its way down to the base, creating an environment of unusual and unexpected beauty. The expedition was a success, the depths reached were complemented by the discovery of the ice cave – a rarity at those latitudes. We brought back new technical knowledge and some great friendships. Out of the more than 70 specimens of invertebrates collected, we found a new species of fly and one of beetle which Asia and other academics are still examining. The final surprise, though, came in November: Fundacja received the Waldka Muchy prize for the best Polish expedition, and moreover, featured on the cover of *Jaskininie* – the national speleology journal – was none other than *Shpella e Akullt*, which only the GGT has had the pleasure of seeing up-close.

Biospeleological Research

The biospeleological research carried out concerned two groups of animals: invertebrates, covering an extremely wide variety; and chiroptera, the only vertebrates perfectly adapted to life in the complete darkness of the caves. Taking part enthusiastically in these scientific activities were the expedition team’s speleologists, who collaborated on the captures, signalling the presence of the animals and bringing material to the researchers.

In terms of invertebrate research, a full five caves were sampled (*Shpella Haxhise*, *Shpella Sportive*, *Shpella a Valbone*, *Ice Cave*, *Shpella 52*) as well as a complex of bauxite mines. For the collecting of specimens, two separate techniques were deployed: pitfall trapping with glycol, and capture-on-sight of the invertebrates spotted in the underground caves. Pitfall traps were used in the *Shpella Huxhis* (around 1900 m asl) and in the complex of mines, situated around 1000 metres lower down, where they remained in place for two weeks. In both these caves and others, hand capture (capture-on-sight) was carried out. This led to the collecting of around 70 specimens of invertebrates belonging to the following orders: *Araneae*, *Opiliones*, *Ixodida*, *Coleoptera*, *Diptera*, *Orthoptera* and *Collembola*. Many of the specimens captured display the characteristics of troglobites such as lack of pigmentation, reduced eye size and elongated appendages – typical elements of invertebrates adapted to life underground. The material is currently being analysed by a number of specialists.

The study of chiropterofauna in the valley and on the surrounding mountains was conducted using two main methodologies: bioacoustic monitoring and the monitoring of presence in the underground cavities. The cave monitoring was carried out using a randomised methodology, whereas for the bioacoustic monitoring, Dodo-tronic Ultramic 384K BLE microphones were deployed, to which the speleologist and chiropterologist of the SOLVE CAI Cave Group in Belluno, Gabriele Filippin, made custom changes, fitting them with protective covers and batteries enabling their automatic use for multiple consecutive days. The recordings began at sunset and ended at dawn, utilising a filter function to reduce

the possibility of recording sounds not related to the presence of the chiroptera. At every sampled point, the recordings were made for two consecutive nights, with the exception of the *Shpella Haxhise* cave and the pond at base camp, where the recordings were made across a timespan of around two weeks. The listening points were selected on the basis of the characteristics of the territory: ponds, mines, cave entrances, areas covered in dwarf pine, rocky zones and areas where flocks are kept. In total, ten listening points were chosen in open areas, eight at cave entrances and five within mines. The listening point at the lowest altitude was sited at around 750 m a.s.l., at the little lake at the entrance to the Valbona Valley. Rising upwards, we find those outside and inside the bauxite mines at around 1000 m, and those in the *Shpella Haxhise* cave at 1750 m. This cave is interesting in that it is located several hundred metres higher than the limit of the woodland, and is a relatively hot cave with a south-facing entrance. All of the other listening points selected were sited at an altitude of above 2000 m a.s.l., around base camp.

The data analysed thus far have shown the presence of at least six species of bats: *Rhinolophus hipposideros*, *Rhinolophus ferrumequinum*, *Hypugo savii*, *Nyctalus leisleri*, *Tadarida teniotis* and *Pipistrellus pygmaeus*. It is felt that the number will increase with a more detailed analysis of the sonograms belonging to the genera *Myotis sp.*, *Nyctalus sp.* and *Eptesicus sp.* contacted in this area. Visual monitoring has led to the recognition of the presence of examples of *R. hipposideros* and *R. ferremequinum*, in addition to the discovery of a spellbinding cranium, currently being studied. Over the coming years, the intention is to expand the range of study, making use of the technique that sees the deployment of special nets for the capture of fauna with the immediate release of the specimens (for the accurate determination of their species, gender and age class), and the positioning of microphones within the largest caves, to get a handle on how these are used by chiropterofauna.

The research conducted on this expedition is fascinating and important since these are among the highest mountains in southern Europe, and they enable us to develop our understanding of the ecology of chiroptera at such altitudes, in an environment that is almost primordial. In contrast to other mountainous massifs, the human presence here is almost non-existent, or at most it is found on the valley floor; as such, for survival, shelters and foraging places, the chiroptera have to work solely with what the surroundings can offer them.

A short history of the expeditions

It was 2006 when Maniek and Magda – along with other Polish cave divers – set out in search of new targets in the Balkans and, passing through Shkodra, happened to meet a Polish priest who had a friend in *Kolgjoni* and he duly invited them to go there. They fell in love with the place immediately, and so in 2007 the first expedition got under way, organised by the AVEN Speleoclub of *Sosnowiec*, which was then followed by another fourteen

expeditions, all orchestrated by Maniek. They explored the *Gherlatta Plateau*, the *Gropa e Rupes Valley*, and the *Brykare e Gropa Cet Harushes Valley*, as well as the *Valbona Valley*, with a view to locating the water sources at the base of the karst system. At *Shpella Haxhise*, they found the words GCR and the date 1987, from which they deduced the presence at that time of Roman speleologists. In 2011, a new organisation was established, with the *Fundacja Speleologia Polska* at the helm, carrying out two expeditions per year in the *Ceremit Valley* area near *Maja Gjarperit e Gropa Cet Harushes*.

Since 2018, the data collected have been gradually entered into the database of the international “*Shpellat*” project led by the Società Speleologica Italiana, thus gradually compiling a land survey of the caves of Albania.

By 2021, the total number of caves identified by the Polish expeditions reached 190, covering a total of 5.2 km. The longest is *Shpella Sportive* (664 m long and 263.8 deep), and the deepest is *Shpella e Valbone*, with the exploration carried out in August having reached a depth of – 395 m.

Parku Kombëtar i Luginës së Valbonës

The Valbona Valley National Park is located in the Albanian Alps, in the county of Kukës between the latitudes 42° and 27° N and the longitudes 19° and 53° E. Valbona, situated around 20 km north-west of Bajram Curr, is sited in the U-shaped valley of the river of the same name, at an altitude of 932 m a.s.l., surrounded by towering mountains with summits in excess of 2400 m, including *Maja Jezercë*, *Maja e Kollatës* and *Maja Boshit e Maja e Hekurave*. To the north, the park borders Montenegro, to the east the *Gashi* Nature Reserve, to the south the *Nikaj-Mërtur* Regional Nature Park, and to the west the *Theth* National Park. It covers a total area of 80 Km², which encompasses the river and the surrounding areas, taking in mountainous terrain, Alpine landscapes, glacier springs, deep depressions, waterfalls and woodlands of broadleaved and coniferous trees.

The mountains are one of the most impressive topographical characteristics of Albania, forming the southernmost extension of the Dinaric Alps and a section of the Alpine-Himalayan orogenic belt that stretches from the Atlantic Ocean to the Himalayan mountains. They feature an array of rocks – calcareous, calcareous-siliceous, clayey shists and conglomerates – and they demonstrate significant karst properties. *Maja Jezercë*, which extends into the northern part of the park, is the highest mountain, with an altitude of 2,694 m a.s.l. On its north-eastern edge, there are two small active glaciers.

The region is home to a very well-developed hydrographic network, including the water basins of the lake of *Scutari (Shkodra)* and that of the rivers *Drin*, *Buna*, *Shala* and *Valbona*. The park is situated along the course of the River *Valbona*, which is the longest river in the Albanian Alps (50.6 km) and arises out of the karst springs on the southern slopes of *Maja Jezercë*, on the eastern section of the Valbona Pass.

“THE WEASEL”

Gaetano Boldrini

“A bastard of two cultures”: so Dieter Hermann Comes – later Francised as Didier Comes – liked to define himself. He was born in the German canton of Belgium, in the little bilingual town of *Saurbrodt*, on the border between Belgium and Alsace, on 11/12/42, to a Francophone mother and a Germanophone father. The area itself is divided between those who speak Walloon and those who speak German. He was, then, born right in the middle of a war, between the Latin tradition and the Germanic tradition, from which he drew the influence of the Gothic and the oneiric. He was and will forever be the fruit of the cross-pollination of the two cultures. Comes began to express himself through music, making a name for himself as a percussionist in various jazz groups, both in Europe and in America. He started work at a very young age as an industrial designer and he arrived at cartoons in '72, positioning himself from the outset as one of the main breakaway illustrators on the Franco-Belgian comic scene (and beyond) of the '70s. He died of pneumonia on 7/3/2013 in his beloved Ardennes, where he had spent most of his later years.

La Balette (The Weasel) originally appeared in 1979 in France in *A Suivile*, which came out in Italy in 1982 in *Alteralter* magazine and was then published in a single volume by *Milano Libri* in 1983; in the same year he was awarded the “Gran Prix Saint Michel”. This wonderful graphic novel is based on the initiation of a young man

into the ancient cult of Demeter and on shamanic rites associated with nature and totemic religions.

But it is also and above all a story of conflicts. Perhaps it is this very word that links together the events of this story: conflicts between the Catholic parish priest Schonbroodt and a family of adherents to the ancient religion of the Mother Goddess Demeter, Natale Charrette and his daughter, who live in the same town; conflicts between the new family of citizens settling in the town of Amarcuore, in the Ardennes countryside, and the rest of the community (the locals are not keen on outsiders buying up their houses); conflicts between the inhabitants of the same village who, the wounds of war never having healed, have never accepted the presence of *Kock*, “the Hun”, in their midst; and conflicts even from a graphical perspective, since it is a story illustrated in black and white, which oscillates elegantly, without the slightest friction, between caricature and the search for the perfection of reality (the references to Pratt, to whom Comes was very close, are patently clear).

The little town of Amarcuore, which has its roots in the world of witchcraft and superstition, is stereotypical of those rural communities populated by wicked, ignorant people who eye with great suspicion anyone who is not just like them.

The Valentin family, who hail from the city, have just taken ownership of an old country house. The family members are: Gerardo, an unscrupulous social climber who is a screenwriter of TV programmes; and Anna, who is pregnant and is already the mother of Pietro, a young boy on the autistic spectrum, who is deeply uncommunicative.

From the moment they arrive, the family are visited by people who seem to want to be neighbourly, but are in fact concealing ulterior motives. These include Giulio Volpe, who is obsessed with treasure presumably hidden by the former owner of the Valentins' house, and his son Berto, who suffers from learning difficulties and has his own obsessions – sex and cruelty towards animals; then there's “The Weasel”, as this strange, enigmatic figure likes to be called; and the priest Schonbroodt who, insistently, tries to convince Anna to have her future child baptised, driven by an unhealthy, small-minded conception of the Catholic faith.

In reality, Natale Charrette and his daughter (the Weasel) are followers of the ancient religion of Demeter, the fertility symbol who represents all of the forces that create life. The two of them take an interest in the pregnant woman, who as such is sacred in their eyes, and in the son who does not speak, whom they consider to be one of the chosen ones, one of their race, a sorcerer.

One night, Pietro's initiation rite takes place, during



which he is given the totemic name of Salamander, as well as the powers of telekinesis and of “overcoming fire”. The Weasel reveals herself to Anna for what she is: a priestess who has the power to enter the body of an animal and use it for her own purposes.

The apparent tranquillity of the town starts to crumble. Kock commits suicide. Berto’s body is found after he has drowned in a pigsty. It will be discovered later on that the curate killed him as punishment for his perversions. Natale is also murdered by the priest, for not being a Catholic and for being a sorcerer of the old religion – his death is passed off as suicide. In his twisted, mystical madness, the priest is convinced that he is killing in the name of God and to save the souls of the people in the village. Last of all, having been told by Anna that she does not intend to baptise her new-born child, and that moreover she intends to embrace the religion of Demeter and become a priestess, he will attempt to murder her, too, in the old quarry that he had excavated with his father. The attempt is thwarted at the last minute because he is attacked by an owl – which in reality is the Weasel who, on one of her astral journeys, is watching over Anna – causing him to fall into the quarry. It seems that the story has finally come to an end, but Comes is not accustomed to conclusions of this nature, and goes on to give us the final encapsulations of his tragic yet poetic vision of life. As it is returning home, the owl/Weasel – considered a bad omen – is shot down by Giulio Volpe who can then at last nail the symbol of all the ancestral fears to the door of the house.

With Natale and the Weasel dead, Anna and her son Pietro will become the guardians of the ancient religion, thus perpetuating the cult in that desolate region of the Ardennes.

The “Owl Man” is what Comes was called by his close friends: an old sage who knew how to look, listen and, above all, tell stories. The mountainous landscapes of the Ardennes, the small rural communities and the magical ancestral evocations all serve as the background and structure of his stories.

Immersed in his beloved region, living almost as a hermit, the owl man wrote about ancient phenomenon, ignorance, fears, popular beliefs, the inner reality...and about silences. It was, therefore, natural for Comes, who was so deeply associated with and fascinated by the worlds of the past and of the occult, to set the initiation ritual within a cave where previously, in previous epochs, people had gone in order to pay homage to their gods. In ancient lore – from Egyptian and Jewish, to the more recent Greek and Roman – caves were always the entrance to the place where the divinities and the souls of the dead would dwell.

But Comes could not fail to use the cave in the only way he knew how, translating an occult, ancestral ritual



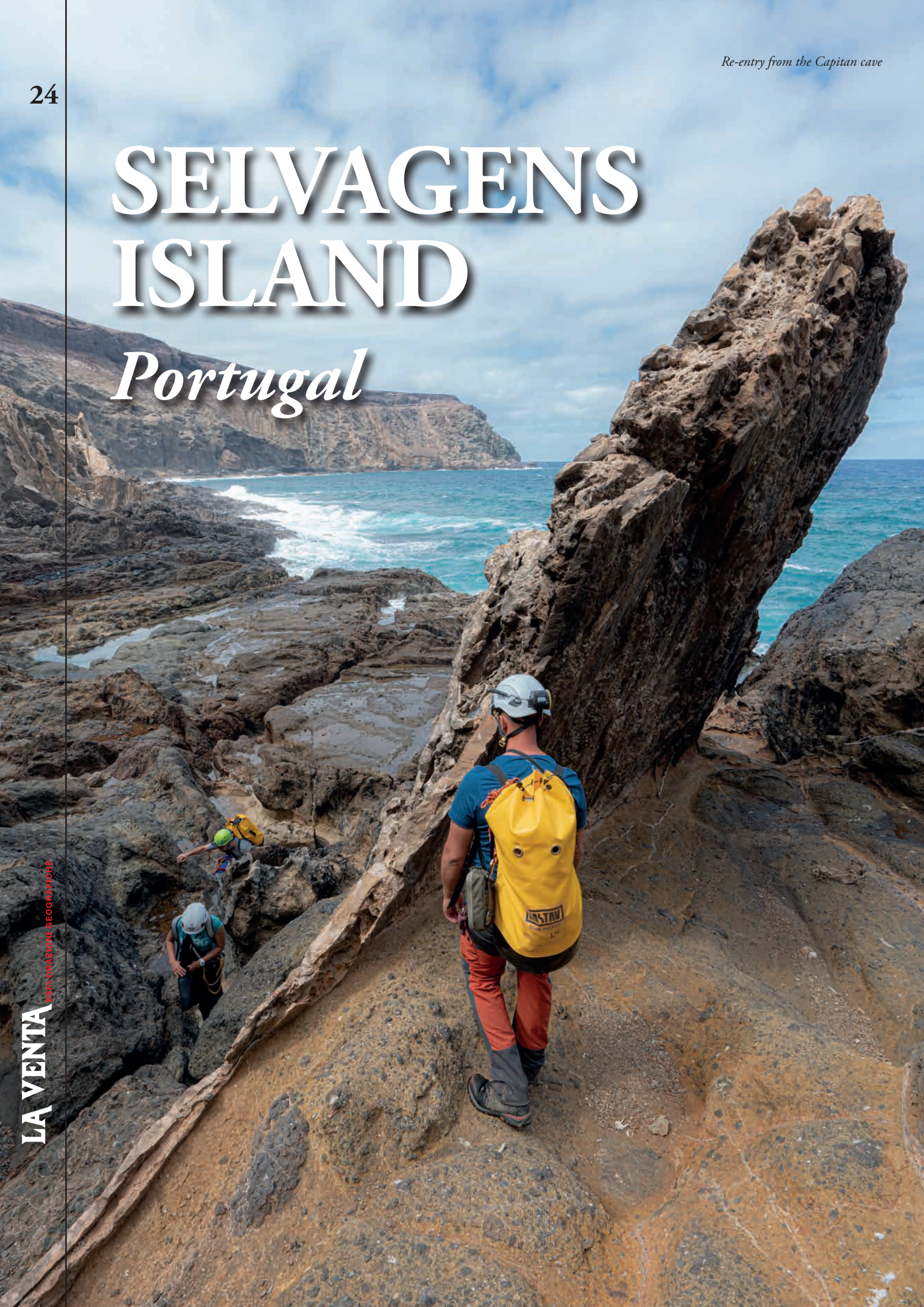
into something basic and poetic. Not a place of action and adventure, not a place where treasures are hidden, protected by dragons or demons, not as a series of intricate tunnels or immense galleries with underground rivers running through them, where the protagonists get themselves involved in swashbuckling adventures, not even a site populated by monsters or wizards who instil terror, but simply as a dry, accessible place that becomes the ideal refuge and shelter, where – as has always been the case – the most significant moments in people’s lives have been played out. For him, it had to be a place that – given its evocative appearance – acquired a deep, symbolic meaning and, as such, was the natural setting for religious and magical rituals.

Comes consummately mixes poetry, tragedy and elements of fantasy, using a striking, deep black and white that brings his characters to life, delineating and almost sculpting them in an expressionistic fashion. He also produces frames that are more static and contemplative to complement the action sequences.

The images, sketched out with precision and illustrated in a dry, pared-back style, leaving almost the entire space for shaded areas and darkness, take us back to another dimension, another time...Or perhaps they throw us into an expansive dystopia that still belongs to us – a cultural heritage that ties what has been to what is, to what perhaps will always be, and which to this day we persist in rejecting.

SELVAGENS ISLAND

Portugal





EXPLORING THE CAVES OF THE REMOTE SELVAGENS ISLANDS: THE MICROCENO PROJECT

Ana Miller, Francesco Sauro

In July 2021, a multidisciplinary speleological expedition to the Selvagens Islands was carried out. This tiny archipelago in Macaronesia, to the south of Madeira, is located within Portuguese territory. The archipelago is renowned as one of the most intact, uncontaminated places in the Atlantic Ocean, frequented in the summer months, as a nesting site, by more than 85,000 birds, mainly of the Cory's Shearwater species (*Puffinus diomedea borealis*). Since 1961, the year in which these islands were first included in international maritime cartography, numerous scientific expeditions have studied the flora and fauna there. However, until today, the archipelago had never been investigated in terms of the numerous sea caves, some of which were known about in previous centuries, particularly through stories of legendary hidden treasures, such as that of Captain Kidd, which was enthusiastically sought in the seven-

teenth century. The Microceno project, financed by the Portuguese Foundation for Technology and Science and co-ordinated by Dr Ana Miller of Evora University, had the objective of enhancing our knowledge of these caves not only in exploratory and documentary terms, but also in terms of their biology, microbiology, geology and analogy with extra-terrestrial environments, given that the volcanic caves in question are similar to those that may, in future, be found on Mars. The expedition involved researchers from a full seven countries (Portugal, Spain, Italy, the Netherlands, the UK, Russia and Canada) in a collective effort that made the most of an innovative technological approach. Indeed, to minimise the environmental impact associated with on-site research, a sophisticated laboratory was set up on the island, including a scanning electron microscope (*SEM Phenom* made by *Thermofisher*) and instruments for DNA sequencing



Sampling in the new cave discovered by the expedition: Furna du Suplo du Dragao

(*Minion* made by *Oxford Nanopore*). In this way, it became possible to conduct many of the analyses on site, thus helping to steer the sampling operations.

The expedition documented and mapped – using three-dimensional technologies (laser scanners made by the Italian company VIGEA) – the two main caves known about on the island, *Furna do Inferno* and *Furna do Capitao Kidd*. The speleogenesis of these caves was revealed by a team of Italian researchers from the universities of Padua and Bologna, including three members of the La Venta Association (Francesco Sauro, Daniela Barbieri and Alessio Romeo). These are very unusual caves formed inside sedimentary seams within magmatic rocks (a very special type of lava known as phonolite). After the formation of the island through volcanic eruptions and the cooling of the volcanic rocks around 30 million years ago, subsequent tectonic movement opened up fractures that were then filled with calcium carbonate sands. It is within these carbon deposits that the caves were formed – a typical process of karst dissolution taking place in the cracks within the magmatic massif.

In addition, the expedition led to the discovery of a large new cave, the *Furna do Suplo do Dragao*, a cavern

with a large salt-water lake in which numerous potential new species of anchialine fauna (i.e. fauna that live at the interface of salt water and fresh water) were identified. Another eight smaller caves were documented and surveyed, including two submerged caves, explored by a team of cave divers to a depth of tens of metres in order to collect and study the sediment.

Also taking part in the expedition were two members of the *PANGEA* team of the *European Space Agency* and the Russian cosmonaut Sergei Kud Sverchkov, who had recently returned to Earth following a mission on the International Space Station.

Thanks

We would like to thank the Portuguese Foundation for Science and Technology for the funding of the MICRO-CENO project (ref. PTDC/CTA-AMB/0608/2020) and the Nature Reserve of the Selvagens Islands of the Institute for the Conservation of Nature and Forests (IFCN IP-RAM). In addition, special thanks go to Dr Manuel Biscoito and Dr Frank Zino, and to all the public and private institutions who supported the expedition for the MICRO-CENO project.

THE SELVAGENS ISLANDS: A GEOLOGICAL ANALOGUE OF MARS

Ana Miller, Francesco Sauro

The Selvagens islands, which have a high level of endemism and numerous terrestrial species living in an uncontaminated state, form a group of small volcanic islands situated in the North Atlantic (around 300 km to the SE of the Portuguese island of Madeira). This sub-archipelago of Madeira has two main islands: *Selvagem Grande* (2.4 km²) and *Selvagem Pequena* (0.3 km²), and various islets. *Selvagem Grande* has a permanent research facility, with two custodians of the nature reserve and three officials of the Portuguese maritime authority, who alternate during the course of the year. These islands have been effectively preserved against human influence, thanks both to their isolation and their location. The geological exploration carried out during this expedition convinced us that *Selvagem Grande* may be considered as analogous to Mars, due to its geology and its position within an area of slow movement of the tectonic plates, similar to the geological processes found on the red planet, where there is no continental drift.

An expedition in the international year of caves and karst

In July 2021, two ships with 17 explorers from seven different countries, armed with an impressive quantity of analytical instrumentation, provisions and survival materials, set sail from the port of Funchal for the Selvagens islands, to carry out a two-week scientific expedition. 2021 marked both the International Year of Caves and Karst (*iyck2021.org*) and the 50th anniversary of

the Selvagens Islands Nature Reserve. This expedition was the starting point for the MICRO-CENO project and included an extensive, multidisciplinary campaign of sampling for further in-depth laboratory analyses, with a view to providing answers to the main questions raised within the framework of this research project and to contributing towards our awareness of the biodiversity of our planet.

An initial three-dimensional model of the Selvagens caves

The geologists Francesco Sauro (La Venta) and Matteo Massironi (University of Padua) studied the genesis of these caves and their minerals for the first time, using state-of-the-art equipment, including a portable x-ray fluorescence spectrometer (*Thermo*) and a portable laser scanner, in partnership with VIGEA (Italy), making it possible to obtain the first high-resolution three-dimensional model of *Selvagem Grande* as well as useful information vis-à-vis planetary caves that have developed on similar terrains on Mars and the Moon.

The unexpected discovery of a new cave

The speleological exploration of the island resulted in the discovery of a new cave, situated on the northern side of *Selvagem Grande*, which has been given the name “*Dragon’s Breath*” due to the strong air current generated by the change in pressure within the cave, resulting from the movement of the waves on the lower



Ana Miller, the project co-ordinator, collects bacterial formations on the walls of "Inferno"

level of the cavity. This cave is 95 m long, 22 m deep, and has salt-water lagoons within it.

A hi-tech expedition

During the expedition, cutting-edge portable analytical technologies were used, providing input on which instrumentation could be utilised on future missions for the exploration of caves in the Martian subsoil, and also for research into extra-terrestrial microbial life. Participating in the programme were a number of members of the *PANGAEA* astronaut training programme at the European Space Agency (*ESA*) and a cosmonaut of the Russian Space Agency (*Roscosmos*). The technologies deployed included the use of drones for photogrammetry, a portable laser scanner (*BLK360* from *Vigea*), a portable DNA sequencer for on-site analysis based on DNA, and a portable x-ray fluorescence spectrometer for the elementary profiling of rocks and minerals.

Down to the smallest resolutions

In relation to the scientific equipment used in situ, of particular note is the "*Phenom XL G2*" portable electron scanning microscope, which is the result of a collaboration with *Thermo Fisher Scientific*. This was the first time that an electron microscope has ever been transported to and installed on such a remote island, lacking in infrastructure. This was an operation never attempted before, which went beyond the performance limits of an *SEM*, marking a technological turning point for expeditions in the field. Small samples of biofilm, minerals and rocks collected in the volcanic caves were immediately studied using the *SEM Phenom*, allowing us to monitor the presence of microbial cells and to select the most significant samples for subsequent in-depth laboratory analysis.

On-site DNA sequencing

The analysis of the DNA of microbiological samples was carried out for the first time directly on the Selvagens Islands. Using miniaturised, portable equipment,

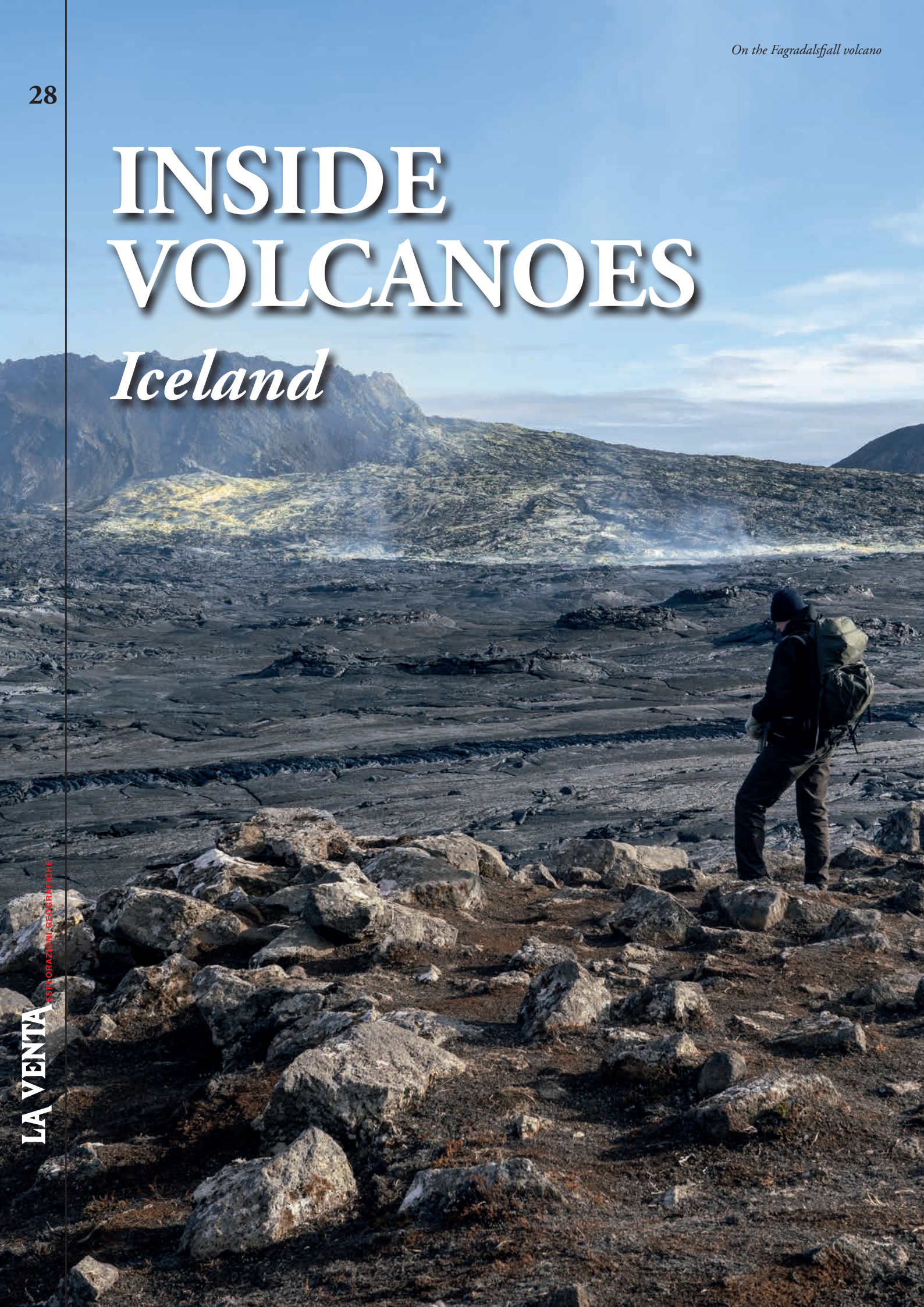
it became possible to extract and sequence the DNA, enabling the identification of the micro-organisms present within 24 hours of the moment of sampling. The use of "*Nanopore*" technology permitted the identification of a large variety of micro-organisms capable of interacting with the minerals, and specifically chemolithoautotrophic bacteria, which use minerals (rather than organic matter) as a source of energy. These bacteria could be used as models for research into past microbial life that may have existed in the volcanic caves of Mars. We also monitored a large number of bacterial species that may be new to science.



Microscopic analysis of a number of samples at base camp

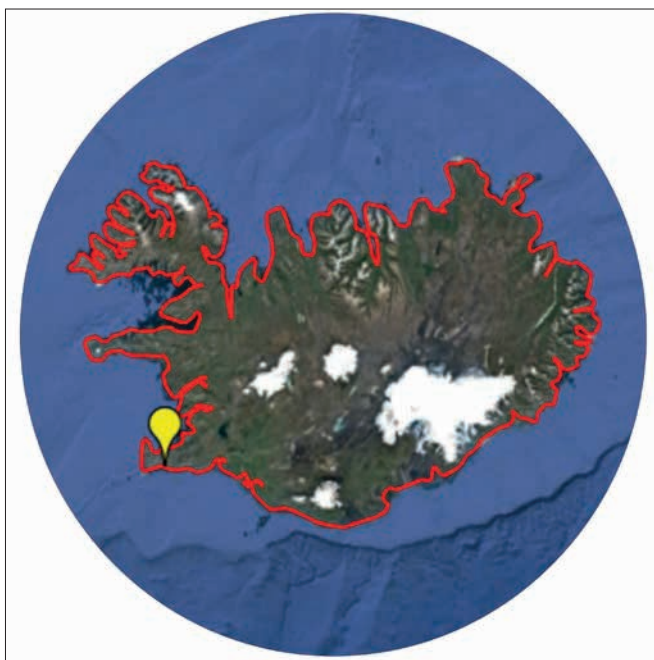
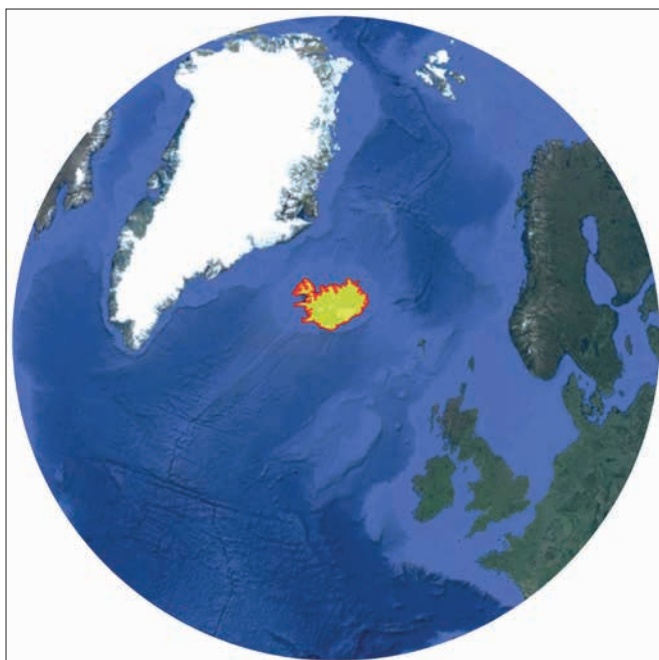
INSIDE VOLCANOES

Iceland



LA VENTA

ESPLORAZIONI GEOGRAFICHE



THE HRAUN PROJECT: NEW VOLCANIC CAVES ON THE REYKJANES PENINSULA

Tommaso Santagata

As speleologists, we are accustomed to exploring ancient caves even if they were formed thousands or even millions of years ago, in the wake of long geological, physical and chemical processes that today allow us to make our way inside them to document them and study their history. We often try to imagine what was their prior to their formation, pondering what the landscape looked like before those processes began to excavate their way through a mountain, eventually creating a link between the outside world and the unknown, but it is not always easy to interpret these processes, which for the most part occurred before we human beings even appeared on this planet.

Over the average lifespan of a human, it is very unlikely that anyone could visit a landscape before and after the formation of a cave – but “very unlikely” is not the same as “impossible”. Volcanic caves are perhaps the only cavities that afford us this possibility. Naturally, glacier mills and contact caves that are located near to and inside glaciers have a genesis that is very rapid, but we are well aware of the fact that the processes leading to their formation are markedly different with respect to those for caves made of rock. In addition, in most cases, the caves in question also have a very short lifespan, closely bound up with that of the glacier and the external climatic conditions. In contrast to glacier caves, volcanic caves develop following eruption events that drastically and permanently modify the landscape both externally and in the subsoil, and as such they can have a far longer duration. Speleologists are far more likely to find themselves exploring volcanic caves that have long ago completed their process of formation, entering them once the lava has solidified. We are talking about hundreds, thousands or millions of years after they have cooled.

In rare cases, speleologists may find themselves investigating caves that formed just a few years before. When this has happened, it has been possible to document hitherto unknown minerals, defined as “metastable”, meaning that they are only found in certain chemical and physical conditions, before they have reached their state of stability.

The project

Last year, we had the opportunity to start work on a new project concerning the study of new volcanic caves formed recently following the eruption of the *Fagradasfjall* volcano on the *Reykjanes* peninsula in the *Suðurland* region. This event was preceded by intense seismic activity and by the rapid rising of the ground near a mountain close to the volcano – Mount Þorbjörn.

After approximately eight hundred years of dormancy, for around six months starting from the night of 19 March 2021, this volcano erupted continuously, providing a unique spectacle, with explosions and lava fountains up to 500 metres in height. Lateral fractures on the volcano emitted around 150 million m³ of lava, forming a lava field stretching for almost 5 km². During the eruption, we could observe how the lava tubes constitute major flow routes that contribute to the sliding of the lava, down into the subsoil and elsewhere.

From the speleological perspective, this phenomenon immediately attracted the attention of geologists and researchers in our association. The event was monitored by means of various webcams installed near the volcano by the island authorities, and a plethora of amateur videos were posted on the internet, fostering the idea to undertake a study of the possible formation of new volcanic caves created as a result of the eruption.



Lava from the latest eruptions of the Fagradalsfjall volcano

This was the genesis of the “*Hraun*” (meaning “lava” in Icelandic) project. October 2021 saw the completion of the first survey, on which eleven members of La Venta participated. It provided an opportunity to get back to work after a prolonged pause due to the pandemic, as we found ourselves dealing with the “new normal” of Covid passes, swabs, masks and hand sanitiser.

In the heart of the volcano

Iceland is an island of volcanic origin, and is geologically very young (around 20 million years old). It is renowned for its geological features and is subject to intense geothermal activity due to the presence of numerous volcanos. Situated on the mid-Atlantic dorsal, in the North Atlantic, east of Greenland and south of the Arctic Circle, out of all the European islands, Iceland is second only to Great Britain in terms of its surface area, covering a little over 100,000 km². The rocks that compose this country mark the dividing line between the European plate and the North American plate.

Out of the volcanos on the island, both active and inactive, we can observe fissure phenomena – a type of

eruption characteristic of the volcanic complexes of the oceanic dorsal. This type of volcanic activity leads to the discharge of lava through cracks that open on the terrestrial surface and can reach several kilometres in length. At the end of the eruptions, these cracks can be filled by the solidification of the lava itself and then covered over by subsequent events. The eruption of the *Fagradalsfjall* volcano was marked out by precisely this type of volcanism. Having observed the volcanic activity remotely for several months, we set ourselves various objectives for this initial survey, including the identification of the main collapses and volcanic tubes. For the future, we plan to conduct research directly within the caves that have been identified, with a view to documenting them and studying the metastable minerals that form only under specific temperature conditions. Considering, however, the high temperatures and the high concentrations of gas there, it will only be possible to carry out these activities several months or even years after the end of the eruptions.

To identify the main collapses in the volcanic conduits, clearly visible by observing the surface of the flows



Heat recordings on the lava field of the Fagradalsfjall volcano

from above, an unmanned aerial vehicle was used. More commonly referred to as a drone, the vehicle in question was equipped with a thermal camera in order to identify more easily the areas of the greatest interest – i.e. those with collapses – and to measure their surface temperatures. During numerous flyovers, 324 thermal images and 21 videos were captured covering various areas, including one with a large portal from which the last active flow was discharged in September 2021. Within the entrances and collapses, at the time of the survey temperature levels of around 200°C were recorded.

Once the images and footage had been captured, we were able to produce various photogrammetric models of a number of channels both through RGB images and thermal images, which will provide the basis for subsequent research.

Alongside the study of these caves, the hospitality of the Icelandic Speleological Society enabled us to visit a number of caves currently being explored on the *Reykjanes* peninsula. Of particular interest was the three-dimensional laser-scanner survey of the *Búri* lava tube, one of the largest and most spectacular conduits in Iceland, which was only discovered in 2005. The study of tubes formed in more ancient eruptions near *Fagradalsfjall* allowed us to glean a better understanding of the speleogenetic processes, helping us to foresee what we may come across inside just-formed caves.

This initial survey also gave us the opportunity to initiate a valuable partnership with *Veðurstofa* – the Icelandic meteorological institute, which works on monitoring volcanic risk – and with some of the researchers of the Museum of Natural History in Reykjavík and the University of Iceland. The foundations were laid for a fruitful collaboration, through the exchanging of data and the sharing of scientific objectives, thanks above all to the support of Sara Barsotti, an Italian researcher who has been working for several years at the meteorological centre as co-ordinator of volcanological risk.

The preliminary activities of the project have highlighted the speleological potential of this area, flagging up numerous areas of considerable interest. At the time of writing, we are preparing for a new exhibition, set to take



Drone surveys on the lava field of the Fagradalsfjall volcano

place in May 2022. This time, we will endeavour to enter inside the caves both in person and through the deployment of other types of drones, thanks to the help of our friends at the Swiss company Flyability, with whom we have been working for several years now on the study of glacier caves.

Thanks

This project is supported by AKU, Ferrino, Amphibious, Scursion, Vigea – Virtual Geographic Agency, Miles Beyond, Kibo.it and Studio Atlante, and carried out in partnership with the National Institute of Astronomy and Physics, the University of Bologna and the University of Padua, under the patronage of the Italian Speleological Society.



3D scanning within the Leidarendi cave

Paolo Forti



Advertising Posters

In the early twentieth century, the tourism sector started to expand rapidly, although it would still be some time before it would become a mass industry.

Private vehicles were still thin on the ground and, as such, the railways – which had been developed very extensively in the late nineteenth century – played a crucial role in allowing tourists to reach the destinations they wanted to visit.

At the beginning of the twentieth century – thanks in part to the parallel development of billboards, which were often created by famous painters – the state railways in many countries produced posters of the main caves

that tourists could reach by train.

Today, these floral- or Deco-style posters are much sought-after, achieving eye-watering prices at international auctions.

Fortunately, the “Franco Anelli” Centre for Speleological Documentation has a substantial collection of them, including this poster advertising the Han and Rochefort caves in Belgium.

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*Inside back cover: Panoramic drone photograph of the lava flows of the Fagradalsfall volcano, Iceland
Back cover: Meeting with the native peoples of the Monochoa community, Colombia*

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