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Commission on Volcanic Caves

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No.77 – January 2021

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The Commission on Volcanic Caves Newsletter has been published regularly since December 22, 1993. The Newsletter is available free of charge to all members of the commission, and to others who are interested in Volcanic caves.



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MISSION STATEMENT

The UIS Commission on Volcanic Caves encourages exploration and scientific investigation of volcanic caves, and hosts the International Symposium on Vulcanospeleology about every two years



COVER PHOTO

Cueva Maguez, Lanzarote

By Lisette de Graauw

Editorial

When I took on the role of editing this Newsletter back in 2016 one of my main worries was how I was going to fill enough pages to keep everyone interested. How wrong I was! I have been blessed over this time to receive a plethora of material, culminating in this bumper issue of over 80 pages. Is this a record for the commission newsletter? I am sure someone will let me know.

I guess that many of you are in the same situation as me, having a forced abstinence from caving due to restrictions arising from the ongoing pandemic. Hopefully then this newsletter will at least allow you to read about the adventures of others, and to look forward to later in 2021 when I hope we will all be back to a much more normal way of living.

The contents of this newsletter cover contributions from three continents and cover a wide range of differing material. This includes exploration, archaeology, surveying and a fond farewell to a legendary volcanospeleologist. I have also included, in full, the third circular for the postponed 19th International Symposium on Vulcanospeleology to be held in Sicily in August and September this year.

It only remains to thank all of the contributors for this issue, and to invite all readers to submit any material related to the subject of volcanic caves and / or any observations and comments about the content and look of this, your newsletter.

Ed Waters, 17th January 2021

Message from the Chairman

Hello everyone

I wish you all a very happy and safe New Year.

2020 was a difficult year and I doubt that there would be many members of the Commission who were not affected in some way by the events that unfolded during the year, particularly in relation to Covid-19. Our household had a very quiet New Year's Eve with festivities (?) directed more at ensuring 2020 really did end rather than celebrating the start of the new year.

Of course, there was some good news in 2020 including the development, testing and subsequent approval of several Covid vaccines. And in some countries, vaccination programs were initiated before the year's end.

The vaccine initiatives gave reason to be optimistic that 2021 would see significant improvements in the Covid situation around the world. This is important for vulcanospeleologists as two major international meetings are scheduled during the year. First, in late July there is the 18th International Congress of Speleology at Le Bourget-du-Lac in France. Then, in late August-early September there is the 19th International Symposium on Vulcanospeleology (ISV) at Catania (Sicily, Italy).

Of course, the ISV is the premiere forum for exchanging news, information and results on all aspects of research, exploration, documentation and use of volcanic caves. In addition, some Commission members also attend the ICSs and there are usually several presentations on volcanic caves. It is my hope that both the ICS and the ISV can be run as planned and that many of you are able to attend and participate in the activities.

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However, three recent developments are of considerable concern. New waves of Covid infection are spreading out of control in an alarming manner in several countries that have first-class health care systems. In addition, recently-identified and highly infectious variants of the Covid virus are already spreading beyond national boundaries. Then there is the sobering news that the rollout of vaccination programs in several countries have been progressing much more slowly than anticipated.

If these Covid issues cannot be satisfactorily resolved in the near future, it may prove to be impractical or impossible to stage large international events such as the ICS. With all the planning and organisation involved in running such an event, it would not surprise me if a decision on whether the ICS should proceed will need to be taken within the next couple of months. The Catania ISV, on the other hand, is a much smaller event. With a maximum of 80 participants, small excursions and field trips and simple arrangements for presentations, the organisers are confident they will be able to stage a safe, viable and enjoyable symposium. However, just in case, they are also working on contingency plans. The latest news on the 19th ISV at Catania can be found elsewhere in this issue.

Late last year Greg Middleton and I were informed of the passing of Jim Simons back in March 2018. I never had the pleasure of meeting Jim, but was aware of some of his caving exploits. Jim lived in Kenya for many years and was a stalwart of the Cave Exploration Club of East Africa (CECEA). He documented the volcanic caves of Kenya and about ten years ago he completed a comprehensive report on the lava caves of Mt Kilimanjaro across the border in Tanzania. He was the key organiser of the 8th ISV that was held in Nairobi in 1998. Greg Middleton was among the relatively small group of participants at the ISV and also visited some lava caves with Jim and Clive Ward on his last trip to Kenya in 2013. Greg has written a belated obituary for Jim that appears in this issue.

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As a memorial to Jim Simons, Clive Ward has been the driving force within the CECEA, to produce an updated limited edition hard-cover version of Jim's report on the Caves of Mt Kilimanjaro. Clive has several spare copies of the report. If you are interested in purchasing a copy, please contact me and I will put you in touch with Clive.

Over the last year, many of us have been restricted in our ability to travel freely and to visit volcanic areas to pursue our exploration and research passions. Fortunately it is still possible to undertake some of these activities vicariously. In this issue of the Newsletter, you can immerse yourself in research and exploration activities in Vietnam, Argentina and in the Canary Islands. Enjoy.

John Brush

Chairman / President

Commission on Volcanic Caves.

International Union of Speleology

UIS Commission on Volcanic Caves Newsletter No.77
**Lavas pahoehoe y fauna endémica de
cavernas basálticas en Payunia,
Malargüe, Mendoza, Argentina**

[Pahoehoe lava and endemic fauna of
basaltic caves in Payunia, Malargüe, Mendoza, Argentina]

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RESUMEN

Se pone de relieve la importancia de haberse descubierto, en el distrito volcánico de Payunia, los flujos de lavas pahoehoe más extensos del planet lo que, si bien no han sido explorados aún espeleológicamente, fue actualizada la bibliografía y surgen estudios que permiten datar algunos de ellos. Se estudiaron formaciones pahoehoe desde 3.8 millones de años hasta -10.000 años (Plioceno a Pleistoceno). Es muy relevante el reciente descubrimiento de una nueva familia de arácnidos troglobios en un tubo lávico en la región. Cronología de los principales estudios científicos realizados en una zona basáltica que comprende tres provincias argentinas

SUMMARY

The importance of having discovered, in the volcanic district of Payunia, the most extensive flows of pahoehoe lavas on the planet is once again highlighted, which although they have not yet been explored speleologically, the bibliography was updated and studies emerge that allow dating some from them. Pahoehoe formations were studied from 3.8 million years to -10,000 years (Pliocene to Pleistocene). The recent discovery of a new family of troglobitic arachnids in a lava tube in the region is very relevant. Chronology of the main scientific studies carried out in a basaltic area that includes three Argentine provinces.

Introduction

In 2008, Dr. Giorgio Pasquaré and his collaborators published results of their work carried out five years earlier on the Payunia volcano plateau, also known as Payenia (Pasquaré et al, 2008). That same year we published, at the III Argentine Congress of Speleology, a summary of the speleological explorations carried out up to then in the region, both in the province of Mendoza and in the north of Neuquén and west of La Pampa (Benedetto, 2008). The latter includes findings that had been partially published by Benedetto, Forti et al (1998) and Benedetto (1999), but where the true dimension of these formations had not yet been perceived.

Later, in 2019, Argentine and Italian researchers who had been working in the area with Dr. Pasquaré published updates with complementary data, with more precise dating of the age of the pahoehoe lavas (Bernardi, Bertotto, G. et al, 2019). The same year, the description of the first family of troglobitic opilions from South America was known in a basaltic cave, also in the Payunia district (Acosta 2019).

Geographic location

Payunia is a region of backarc volcanoes that are mainly found in the province of Mendoza (Department of Malargüe) and to a lesser extent in Neuquén and Mendoza. These volcanoes are the product of the subduction of tectonic plates and are located east of the Andes mountain range (Fig. 1).

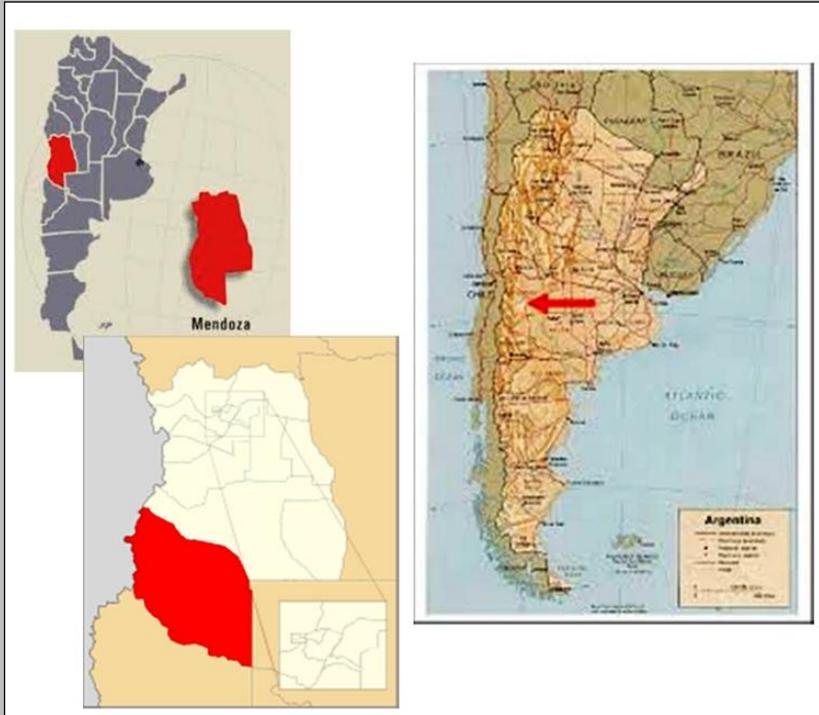


Fig. 1

In the Geomorphological map (Fig. 2) it can be seen that these basalts are located for the most part to the east of National Route 4 (oblique lines). To the west rises the Andes Mountains (squared lines). Thus, the karst caverns surveyed are all in the mountain range, while the basaltic caves are all in Payunia and extend towards the beginnings of the Pampean plain.

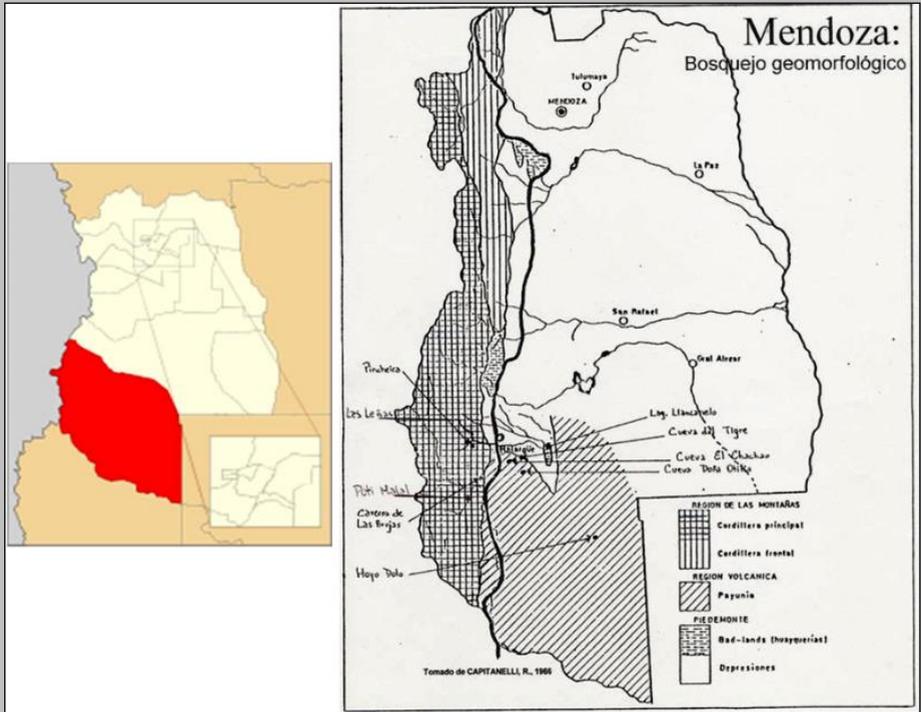


Fig 2

In 2008 we published the same sketch superimposing it on a satellite photograph, marking in both the caverns discovered up to that date (Fig. 3).

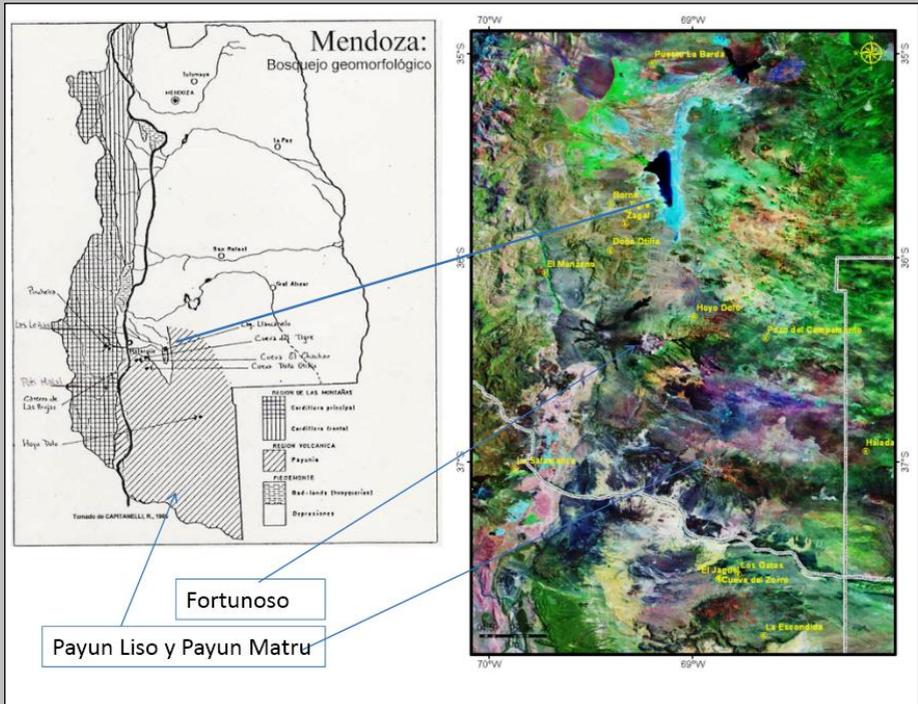


Fig. 3

That same year, Dr. Pasquaré published his first images of the largest basalt lava flow on the planet, almost 190 kilometres long. Five years earlier he had informed us of the detection of large underground arborescent galleries, but for which the entrances had not yet been found (Pasquaré pers. comm.). These flows originated in the Payun Matrú Volcano (PM) (Fig. 4, 5 and 6), in the extreme south of Malargüe, but they spilled towards the northeast and south.

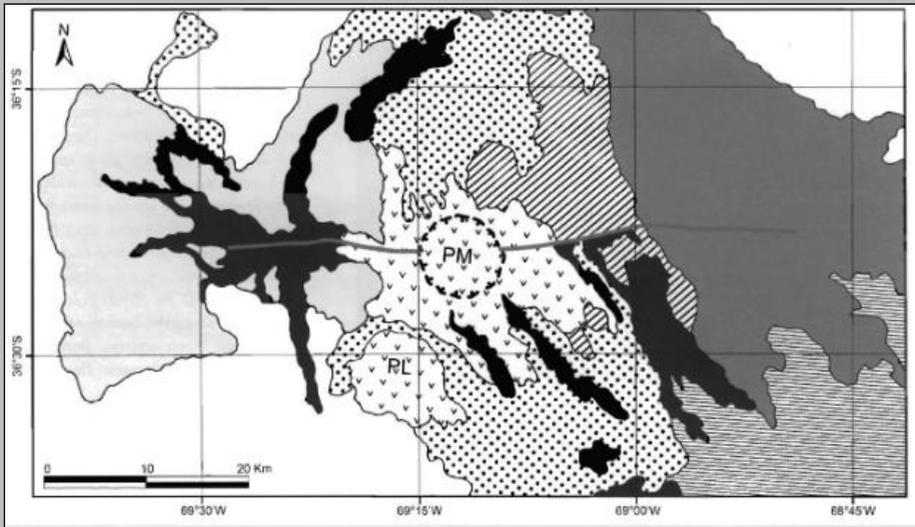


Fig. 4

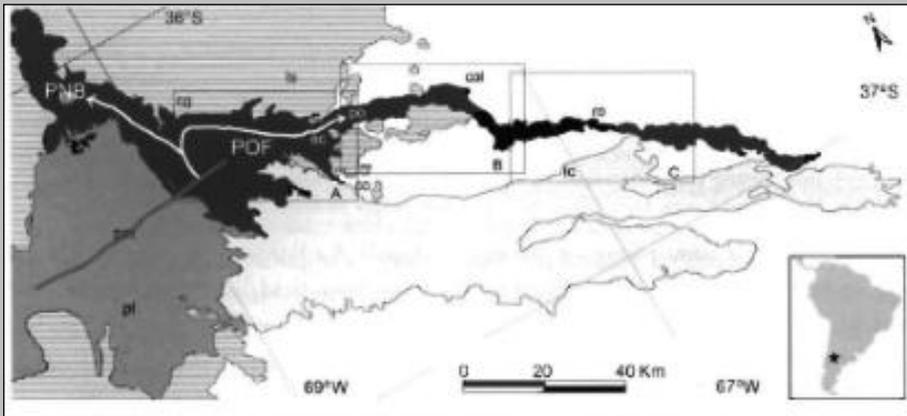


Fig. 5



Volcán Payún Matru. 3.600 m s.n.m. Cráter: 8 Km de diámetro

Fig. 6

Eruptive centres and time periods

Later (Bertotto, *op. cit.*) concluded that “the eruptive centres and the time periods established for the surveyed flows are the following:

Lower Pliocene-Pleistocene: Pampa de Ranquelcó (K-Ar 3.8 ± 0.8 -5, 1 ± 0.9 Ma) and Pampa de Luanco (K-Ar 2.85 ± 0.18 Ma) with effusive centres in peripheral volcanoes of the Chachahuén igneous complex.

Lower Pleistocene-Middle Pleistocene: El Puesto with an effusive centre in the Morado volcano (C) (K-Ar age 0.200 ± 0.027 Ma); Pampa de Los Carrizales (K-Ar 0.40 ± 0.10 Ma) originating in the eastern sector of the Payún Matru Volcanic Field; The Corcovo with an effusive centre in the Huanul volcano (K-Ar 0.84 ± 0.05 Ma) and the Valle del Colorado Basalt Plateau (K-Ar age of basal pouring 0.862 ± 0.056 Ma). Based on longitudinal development of the flows, two categories were defined:

1) flows of great longitudinal extension (30 to 100 km): flows from the Basaltic Plateau Valle del Colorado (40 to 60 km), El Puesto (70 km) and El Corcovo (70 km); and

2) extremely long flows (≥ 100 km): Pampa de Ranquelc3 (116 km), Pampa de Luanco (122 km) and Pampa de Los Carrizales (181.2 km)". and stated that "The values of the thicknesses of the flows vary between 1 and 13 m, with thicknesses of 4 to 8 m being more frequent. The lobes of the flows present an internal structure of P-type pahoehoe flows with two external vesicular sectors; an upper vesicular cortex that makes up between 30 and 50% of the total thickness of the flow and a lower vesicular cortex with less development. Both enclose a massive crystalline nucleus, which frequently houses segregation structures in situ, highly vesiculated and of varied geometry. In the upper vesicular cortex, the distribution, shape and size of the vesicles resulted from the thermal and rheological contrast existing between the underlying superficial and internal sectors during the degassing and solidification of the flow".

Likewise, "Two types of flows were established on the basis of their external morphostructure and surface topography: laminar flows or sheet flows and hummocky-type flows. The former were located through the development, inflation and lateral coalescence of lobes in the fronts of the flows giving rise to successive mantle-shape flows with increasing lateral amplitudes and uniform thicknesses of great lateral continuity. The microrelief of the hummocky-type flows was given by local inflation processes that gave rise to burial mounds, flat-roofed elevations, inflation ridges and inflation wells. The bulges show annular or radial fractures that occurred in favour of previous planes of weakness and are the result of the swelling stresses generated by the process. The studied flows shifted following the inflation mechanism modelled for the Hawaiian active streams, as evidenced by the associations of their morphological and structural features.

It is proposed that the Payenia lava flows were initially emplaced as laminar flows under a sustained regime of high effusion rates, with a maximum limit of $\approx 15 \text{ m}^3 / \text{s}$ established for the formation of inflated pahoehoe flows in Hawaii. The slopes on which the surveyed flows were displaced were relatively smooth and with a very low angle ($\leq 1.5^\circ$), with a predominant northwest-southeast direction and with local changes as a result of stepping and irregularities in the topography. The inflation values could increase between 8 and 20 times the initial thickness of the laminar flows. As the supply of lava from the source was reduced, the circulation of lava was restricted to an internal network of capillaries and secondary tubes that in some flows evolved into master tunnels. Through these, localised inflation episodes took place that covered the entire scope of the wastes or specific sectors of the same. It was estimated that large-area streams ($\geq 70 \text{ km}$) experienced very low cooling rates ($5 \text{ to } 10 \text{ }^\circ\text{C} / \text{km}$) during the emplacement of the lamellar flow "and dating was established, showing that there are pahoehoe formations dating from the Lower Pliocene".

Fig. 7 shows the map of the nine lava flows surveyed, in the three aforementioned provinces and in different colours to distinguish them.

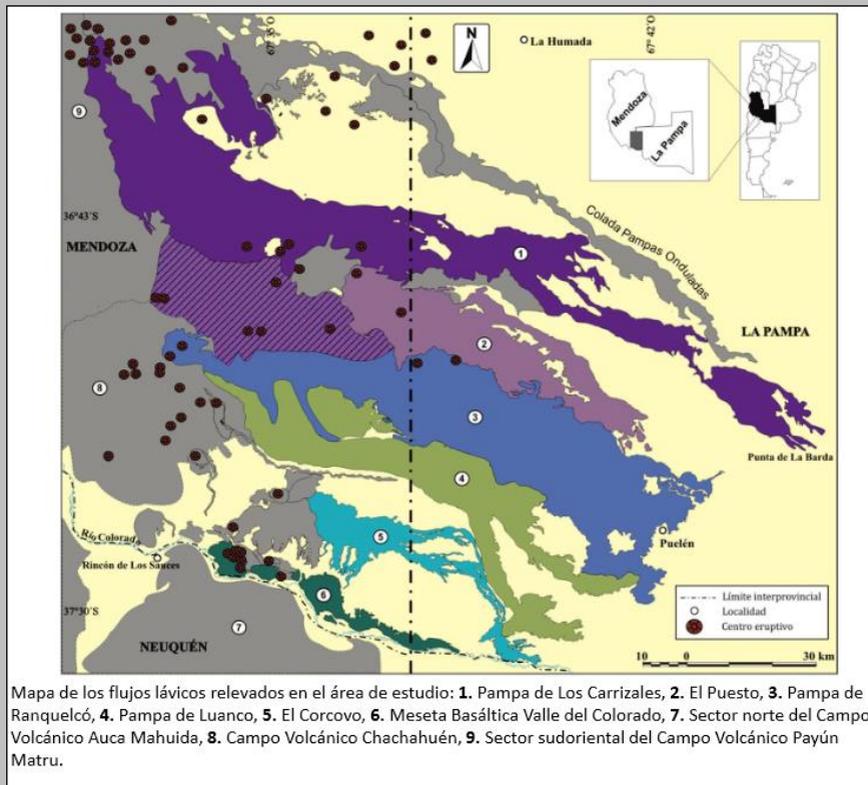


Fig. 7

Likewise, Tables 1 and 2 show the ages obtained from samples of some of the flows.

EDADES K-Ar (*UNSPIKED*) OBTENIDAS A PARTIR DE MUESTRAS DE ALGUNAS DE LAS COLADAS DE LAVA CONSIDERADAS EN ESTE ESTUDIO.

Muestra No.	K (Wt.%)	40Ar Rad10-8 Cm3stp/G	38Ar/36Ar	Edad (Ma)	Fracc. Aire (%)	
M129	0,829 0,0008	± 0,200	0,041 ±	0,644 0,027	± 96,51	0,084 0,18805 ±
MO148	1,034 0,00053	± 0,795	0,052 ±	3,19 0,050	± 85,84	0,18 0,18793 ±
RI42	1,444 0,00075	± 0,984	0,072 ±	6,26 0,092	± 89,26	0,35 0,18954 ±
MD37	0,853 0,0007	± 2,73	0,043 ±	2,73 0,14	± 89,92	0,14 0,18820 ±
MD46	1,127 0,0006	± 0,862	0,056 ±	3,77 0,056	± 71,68	0,22 0,18840 ±
MD63	0,389 0,0007	± 2,85	0,019 ±	4,31 0,18	± 77,58	0,23 0,18861 ±

Table 1

TABLA 2. CARACTERÍSTICAS Y EDADES DE LAS COLADAS DE LAVA CONSIDERADAS EN ESTE ESTUDIO. EL ORDENAMIENTO ESTRATIGRÁFICO SE LLEVÓ A CABO SOBRE LA BASE DE LAS RELACIONES DE CAMPO Y EDADES RADIMÉTRICAS OBTENIDAS POR OTROS AUTORES Y EN EL TRANSCURSO DE ESTE TRABAJO.

Época eruptiva	Colada	Centro eruptivo	Edad (Ma)	Long. (km)	Sup. (km ²)	Vol. (km ³)	Tipo de flujo
Pleistoceno medio	CEP	VN Morado (C)	0,200±0,027 (1)	70	856,2	4	<i>Pahoehoe</i> tipo "P". Relieve <i>hummocky</i> uniformemente distribuido
	CPO	CAMPO Volcánico Payún Matrú	0,307±0,02 (1)	167 (a)	739 (a)	7,2 (a)	<i>PAHOEHOE</i> tipo "P". Techo plano con relieve <i>hummocky</i> localizado.
			0,373±0,01 (2)	181 (b)	978 (b)		
CPC			0,40±0,10 (4)	181,2	2.570	16,5	<i>Pahoehoe</i> tipo "P". Techo plano con relieve <i>hummocky</i> localizado.
Pleistoceno inferior	CDM	VN Morado (S)	0,795±0,050 (1)	2,6	4,2	0,01	<i>Pahoehoe</i> tipo "P". Techo plano.
	CEC	VN Huanul	-0,84±0,05 (5)	70	415	2	<i>Pahoehoe</i> tipo "P". Techo plano con relieve <i>hummocky</i> localizado.
	MBVC	CAMPO Volcánico Auca Mahuida	0,862±0,050 (1)	40-60	176	-	<i>Pahoehoe</i> tipo "P". Techo plano.
	CLB	N/D	-1,8±1 (6) -2,3±1 (6)	-	-	-	-
Plioceno superior	CPL	CAMPO volcánico Chachahuén	2,85±0,18 (1)	122	1.020	7,5	<i>Pahoehoe</i> tipo "P" con transiciones locales <i>pahoehoe</i> a u. Techo plano.
Plioceno inferior	CPR		-3,8±0,3 (7) -5,1±0,9 (7)	116	1.890	9,5	<i>Pahoehoe</i> tipo "P". Techo plano con relieve <i>hummocky</i> localizado.

Referencias. Edades: (1) K-Ar, este trabajo; (2) Ar⁴⁰/Ar³⁹, Espanon *et al.* (2014a); (3) He - ³He, May *et al.*, 2018; (4) K-Ar, Melchor y Casadio (1999); (5) K-Ar, Bertotto *et al.* (2006a); (6) K-Ar, Núñez (1976); (7) K-Ar, Cortezález y Dirac (1969). Morfometría: este trabajo excepto (a) Espanon *et al.* (2014a); (b) Passarini *et al.* (2008). **Siglas de coladas:** CPR: Pampa de Rarquelco; CPL: Pampa de Luanco; CLB: La Barranca; MBVC: Meseta Basáltica Valle del Colorado; CEC: El Corcovio; CDM: Del Morado; CPC: Pampa de Los Carrizales; CPO: Pampas Onduladas; CEP: El Puesto.

Table 2

Recent speleological explorations

In the different speleological explorations carried out in the surroundings of these large formations, georeferencing data, surveying and observations of the environmental characteristics of the main cavities of each of the three provinces involved in this study have been recorded, but without having been able to initiate even the surface explorations on the flows described for the discovery of new cavities. The caverns so far registered show signs of extreme subterranean dryness but with traces of having ancient water supplies, which is evident in the Cueva del Tigre and in Cueva La Salamanca, which present small hydrologically inactive stalactites. We present only one topography of each province, carried out by different speleological groups since the early 1970s, that is, prior to the discoveries of Pasquaré, Bertotto and others (Figs. 8.a and 8.b, 9, 10.a and 10.b).



Cueva La Halada – el Puesto – La Pampa

Fig. 8.a

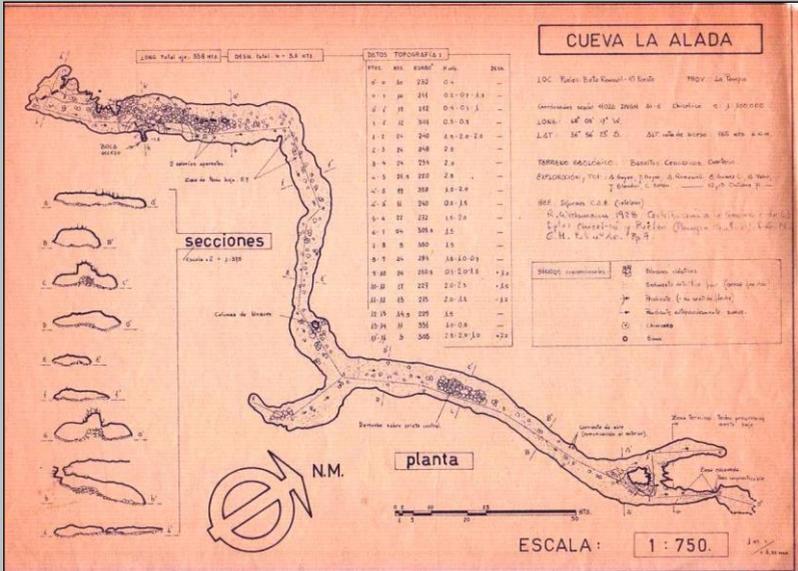


Fig. 8.b. Old (1971) map of Cueva La Halada by the Argentine Speleology Centre (at that time, the cave had a different name).

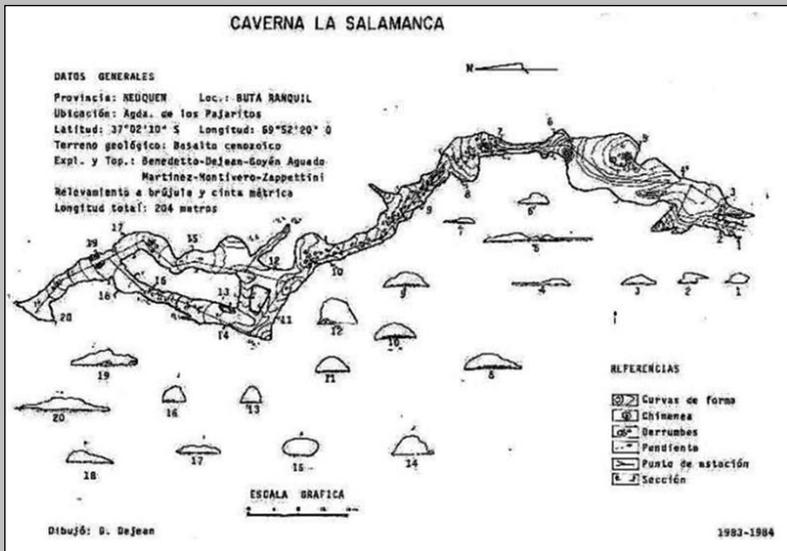


Fig. 9



Fig. 10.a. Entrance of Cueva del Tigre.

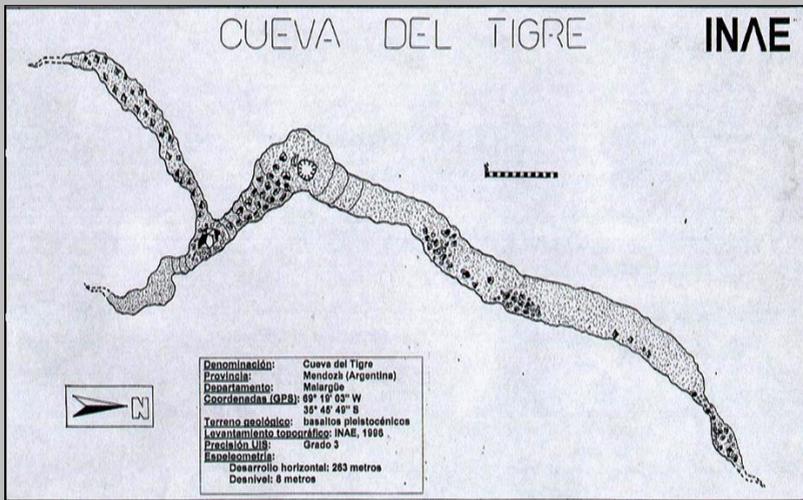


Fig. 10.b

The case of Cueva Doña Otilia is different, since it is located in a hollow of the land, a plateau surrounded by volcanoes. It is the longest lava tube in the country to date (838 m). At almost 2,000 meters above sea level, it is an area that is covered with snow in winter, which penetrates the cave in the form of water, accompanying the roots of small surface bushes. Inside the cave there are seasonal underground watercourse features. The cave is located exactly on the edge of a shield of a pahoehoe formation. The topography also shows the subsurface areas where the roots penetrate, contributing organic debris to it (Figs. 11 to 14).

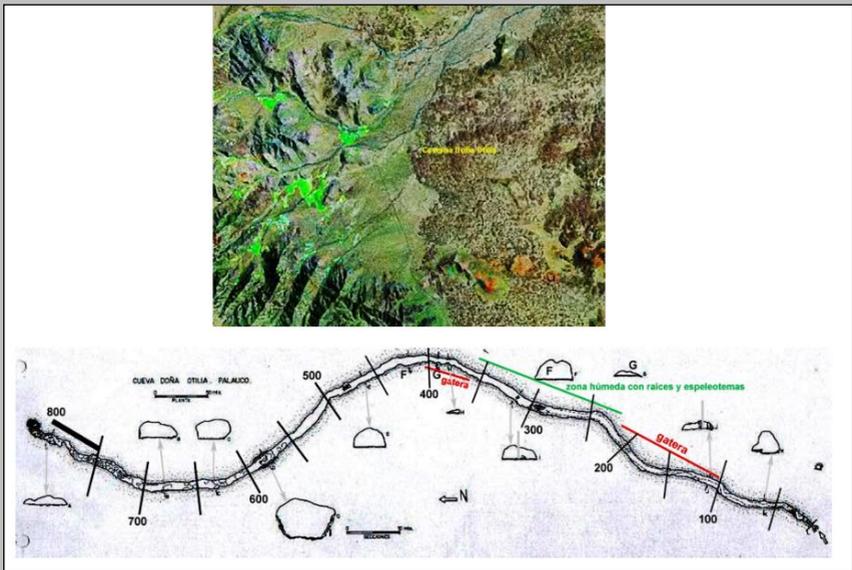


Fig. 11



Fig. 12. Winter view of the hollow in which Doña Otilia is located.



Fig. 13. Visit in the summer of 2012. Leading the group is Dr. Mladen Garasic from the Croatian Federation of Speleology.



Fig. 14. Like almost all basalt caves, Doña Otilia's entrance is small and can go unnoticed by explorers who do not know the terrain.

Not far from Doña Otilia, but at a higher altitude, is the Zagal Cave, which presents a drier underground landscape (Fig. 15).

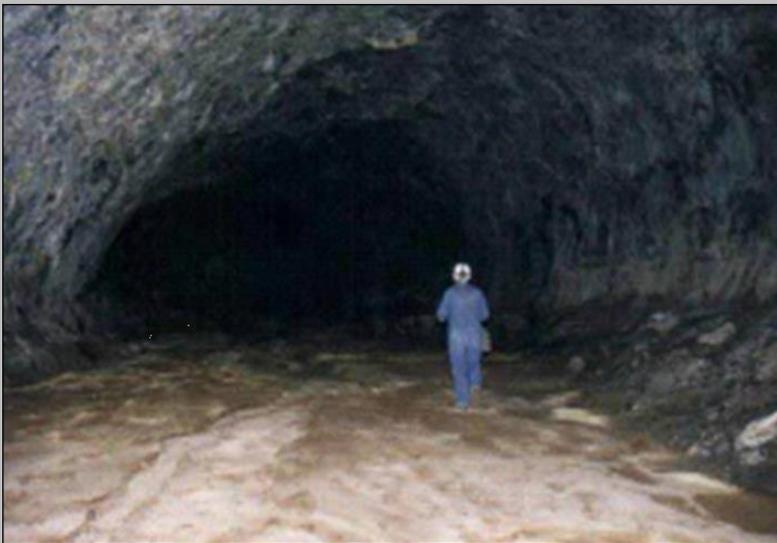


Fig. 15



Fig. 16. Interior view of Doña Otilia showing roots penetrating from the ceiling and speleothems (gypsum and calcium carbonate) formed from minerals dissolved in the water.

The subsurface landscape of Doña Otilia is different from the rest of the caves surveyed to date: permanent very high humidity, a large aphotic zone and a lot of organic contribution in the form of plant debris. As shown in Fig. 11, the cave has been zoned by Dr. Marcela Peralta (Miguel Lillo Foundation, Tucumán) and later by Dr. Luis Acosta (National University of Córdoba), where it can be seen that at least a quarter of the extension of the cave presents conditions for biospeleological studies. In fact, nematodes, mites, myriapods, collembola, homoptera, etc. have been observed. It was in 2006 that Dr. Peralta (Fig. 17, left) collected a specimen of opilión, transferring it to Dr. Luis Acosta.



Fig. 17

In 2016 Dr. Acosta carried out a personal survey in Cueva Doña Otilia and at the same time the author of these lines did the same with Caverna de Las Brujas and, in 2018, in Doña Otilia herself, with collections authorised by the Directorate of Resources Natural Renewables of Mendoza. As a result of this comparative sampling between a mountain karst cave and a basaltic cave on the plateau, Dr. Acosta described a new family of opiliones, which constitutes a “record” situation since it is the first Mendoza troglobite, the first troglobite in basaltic caves in the country and South America, and a new Family, which has been highlighted by the author of this work in a teleconference in which some attendees also highlighted this importance (Benedetto, 2019 and 2020) (Fig. 18). Dr. Acosta named this new species as *Otilioleptes marcelae*, since Otilia was the name of the peasant's grandmother who lives near her and guards the place and Marcela is the name of the researcher who discovered and referred the specimen to the specialist (Fig. 19).



Fig 1. *Otilioleptes marcelae* gen. nov., sp. nov. Paratype male (FML-OPIL 00218), dorsal view. Photo: Abel Pérez-González.

<https://doi.org/10.1371/journal.pone.0223828.g001>

Fig. 18



Fig. 19: Dra. Marcela Peralta and Dr. Luis Acosta.

When evaluating his work on this biogeographical relic, Dr. Acosta maintains that *"it is very common to find Opiliones among the cave fauna. Around 80 strictly troglobiont species are known in the world. In South America 11 species of Gonyleptoidea troglobites were known in Brazil and Venezuela in different types of caves. The new species of Doña Otilia is added to this list, being the first species in a lava tube (Arachnida, Opiliones, Gonyleptoidea) from Doña Otilia. The species found attracted attention from the beginning due to the lack of common morphological characters with the already known groups of opiliones. When developing descriptive studies and kinship reconstructions through cladistic analysis, it turns out that Otilioleptes marcelae would be the only representative of a basal lineage (Laminata group) that differentiated early, that is, it would be an extremely primitive lineage in the whole of the Gonyleptoidea superfamily. Its uniqueness is so great that it justifies the creation of a new family called Otilioleptidae. The "uniqueness" of this taxon is given by a combination of characters considered "primitive" with exclusive characteristics of this species. The particularities of this taxon allow us to think of a scenario of a long period of isolation. The closest relative, that is also "primitive", is the genus Osornogyndes that currently inhabits the Valdivian jungle (Osorno, Chile). Most of the opiliones inhabit places with high humidity, that is, humidity is a determining environmental factor in its distribution. In Argentina, the largest number of opilion species is concentrated in 3 regions with high rainfall and exuberant vegetation (Yungas forest, missionary jungle and Andean Patagonian forests). Considering the paleoenvironmental records of the Payunia, it is possible to propose the hypothesis that the Doña Otilia species is a distributional remnant of a fauna that would have been widely distributed in the past (when the climate of the region was humid). By changing the environmental conditions on the surface and becoming an arid region, the species of Doña Otilia was able to persist until today due to the particular environmental conditions of this cave "*

Conclusion

The geological information provided by the authors mentioned at the beginning and the fact that what was found in Doña Otilia is a new family (not just a species or a genus) of endemic animals, suggests that the potential caves to be discovered could host faunal communities of great interest for Historical Biogeography and for Biodiversity studies in semi-arid zones such as the Payunia in North Andean Patagonia. Not only can numerous new caves be discovered, but also numerous new species of cave fauna



Fig. 20. Guanacos (*Lama guanicoe*) on volcanic scoria in Payunia.

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Cuevas de la Atalaya , Cuevas de Maguez or Las Cuevas Lanzarote- Islas Canarias..... EXPLORATION

By Laurens Smets. Speleo Nederland/Vulcan Vertical Lanzarote

Situated in the North east of Lanzarote you can find the highest volcanoes from the Island. Vulcan la Corona with its height of 609m is the highest on Lanzarote. West of this Volcano you can find Vulcan los Helechos which with its height of 581m, is the second highest. These 2 volcanoes form together with La Quemada a former eruptive system (Ref. Romero et al 1986) which are the basis for enormous lavaflows over and over again which in the end resulted in the spectacular eroded landscape as we can see nowadays.



The Three Volcanoes, lava flows and some of the associated caves (After Gonzales)

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Lavatubes such as the well-known 10km long Tubo de la Corona, but also including caves like The Cuevas de la Atalaya and Cueva de Lago Né were formed tens of thousands of years ago and are the remainders of old underground lavaflows which give us a view into the morphology of deep mother earth.

About 90.000 years ago (Ref. Romero et al 1986 and Ref. F. Sauro june 2020) the Cuevas de la Atalaya originated as pyroducts (lavatunnels) from the eruption of the Vulcan Los Helechos.

The same happened about 21.000 (+/- 6.500) years ago when the last eruption from Vulcan La Corona (Jantschke et al. 1994 and Church et al. 2001) took repeatedly use of the existing pyroducts and formed the Tubo de la Corona as now can be seen in the 2 existing show caves.

Cuevas de la Atalaya or the so called Cuevas de Maguez are situated on the border from Malpais Maguez and Malpais de Corona. These caves were already known for a long time, but for unknown reasons not very often visited, nor subject to scientific studies. The reason is unknown why these caves were so unpopular, it could be because of the fact that the caves are situated on private land and that the former owner was not very happy with visits.



Carmen & Rogier at a Typical Maguez Entrance (Photo: L. Smets)

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It also could be that the reason for the unpopularity was the former completely wrong description from the cave. It was said to be pyroclastic and mostly artificial (mined). Nevertheless, these caves are really very, very, interesting both for morphology and for archaeological reasons. Although there is a lot of crawling inside it is really worth it as there are even nowadays almost virgin passages and the phenomenon's are in some places spectacular.

At the end from the 1960s the first and only known report was published about these caves in the Magazin Karst, number 22 october 1969. The article is short but based on professional studies from Joaquín Montoriol-Pous and Jorge de Mier who visited the caves.

They talk about a System Inferior of 200m in length and a System Superior of 400m in length. At that time some of the Tubos Inferior were connected to each other, which now is not the case as at least 2 tubes are blocked at the end by an artificial wall for stopping blowing air through the tunnels as they were used as barn or as shelter for humans.

It is indeed through that at least which shows that some parts of the caves have been altered by human hand. Entrances, but also small parts of some tubes, have been used for living or as barn for sheep and goats. As such these can appear to be quite artificially made as is mentioned before. In one tube there is still a friend of ours living (called Martin), a friendly person originally from Germany who has been living in here with permission of the owner for more than 20 years. You will not believe it but his job is in the ICT business.

Beside this it can be said that still more than 90% of the cave is wild in its natural state and not artificial or mined as claimed before.

Our surveying in 2020 confirms now that the length from the superior part is 773m. and from the inferior sections (3 separated ones) is indeed 200m. So all together the system of Cuevas de Atalaya or Maguez is having a length of totally 974m.

Tubo superior Cueva de Maguez (A1) Length 773m,

This is the biggest tube-like system. As the cave is already 90.000 years old it is completely different from its adjacent sister system “the corona Lava tube”. Whereas the Corona tube is an enormous, even monstrous, lavatube with heights which are amongst the biggest in the world, the Maguez lavatube system is a small labyrinthic low sized lavaduct. The superior system is, because of its age, in a degraded state with some collapses from the roof, loose hanging layers, cracks everywhere and lots of gateras (low crawling size galleries). All tubes end impenetrable into collapses. Mostly no remarkable airflow notable. The tube is situated just under the surface, with an average thickness of this sublayer of somewhere in between 3 and 5m.



Carmen in Cueva Maguez A1 (Photo: L. Smets)

The superior system consists of 4 entrances. All easy to enter except the entrance near La Rotonda which is an awkward free climb pitch of 4m. The entrances of this cave have been used as a barn for animals, probably also a while for tourist-trips as the Boca Principal is really a very nice constructed entrance with walls, stairs and smooth footpaths. The entrances are frequently used through the centuries, so it could be that this site is of archaeological interest.

Between Entrance La Rotonda and de Boca Principal a small Grave can be found, probably from an animal. The entrance from La Rotonda has been used as a waste dump, which is a shame as the rest of the cave is in fact very clean. The most interesting part of the lavatube is Las Gateras Mágicas. Here some galleries on several levels can be found. Even some very nice white-ish streambeds can be seen. Several lava beds, mid-level and bottom level are really in an untouched condition.



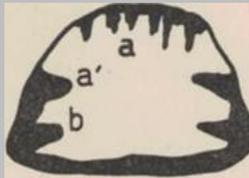
Lisette at the Gateras Magicas (Photo: L. Smets)



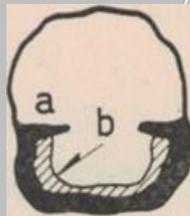
Gateras Magicas (Photo: L. Smets)

All through the cave the roof is consisting of lots of helictites (estafilitos). The cave entrances are situated on private land and as owners change it is not always clear if you can enter the cave without permission.

Some secondary forms can be found underneath;



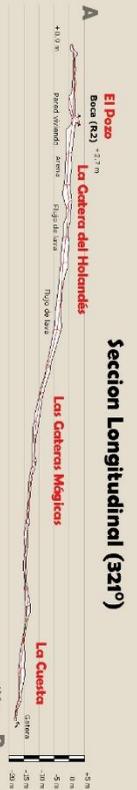
Repeatedly use of the tunnel as lavaduct and forming of Estafilitos (ref. Karst 22 1969)



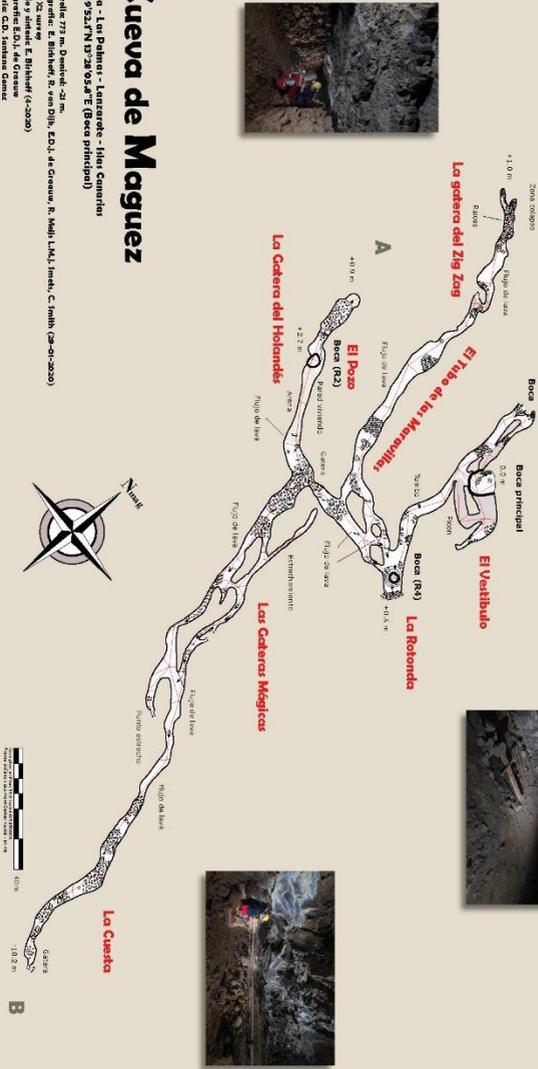
Secondarily use of the tunnel as lavaduct (ref. Karst 22 1969)



Estudios y topografías para el Cuidado y Conservación de nuestros Tubos Volcánicos



Planta



Cueva de Maguez

Horas: - 1. en Palmitas - Lanzarote - Islas Canarias
 29° 09'52.1" N 13° 28' 05.6" E (Boca principal)
Desnivel: 775 m. Desnivel -24 m.
 1. en Palmitas - Lanzarote - Islas Canarias
 29° 09'52.1" N 13° 28' 05.6" E (Boca principal)
Datos: 22 surcos
Desarrollado por: E. Rühlhoff (4-2002)
Elaborado por: E. Rühlhoff (4-2002)
Fotografías: C. Sánchez, S. Serna

Survey of Cuevas de Maguez



Cueva Maguez (Photo: L. de Graauw)



Cueva Maguez A1, Typical Gallery (Photo: L de Graauw)

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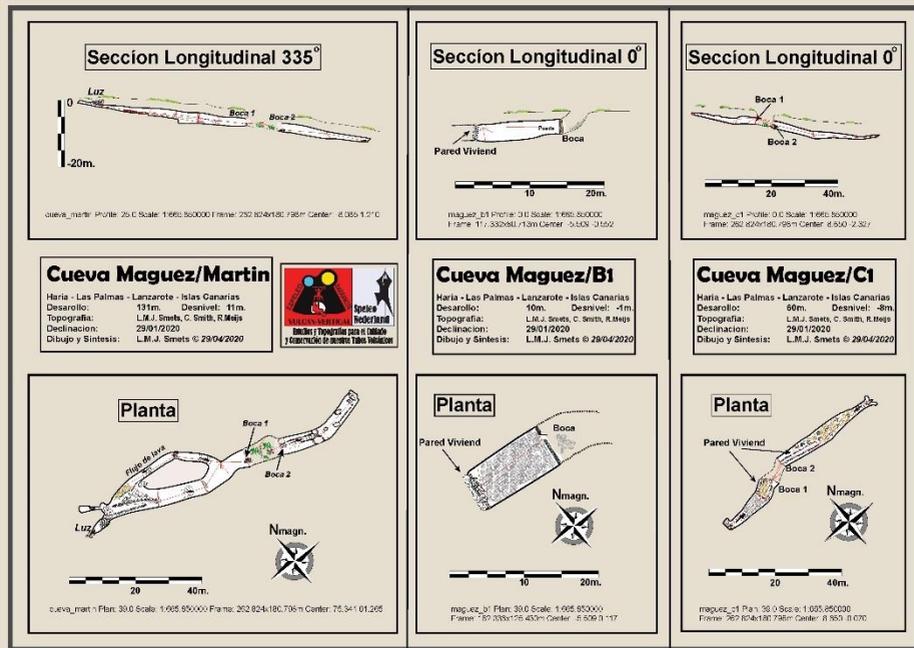
Tube inferior Cueva Maguez (Martin, B1 and C1) Length 131, 10 and 60m. These 3 caves are completely different than the A1 system. They have been mostly used for living or as barn . They are high walking size and there is a draught so these 3 tunnels were ideal for habitation. In fact these 3 tunnels have been one long lavaduct once connected to each other and to the maincave A1. Now they are split up by walls and separated into 3 tunnels. In fact all is artificially hand made in here. Nice clear floors, rocks removed, a shower place, plants, walls, lounge, etc. Only the outer walls are original and left as they were.



Cueva Maguez, Martin (Photo: L. Smets)

What is very remarkable is that Martin stated that these tunnels leak like a shower when it is raining outside. This is not what we would expect from these melted lavaflows. But as said before the tunnels are already 90.000 years old, so cracks can be found everywhere. To overcome this problem Martin has to put a plastic cover in the roof as a shelter against the rain!!

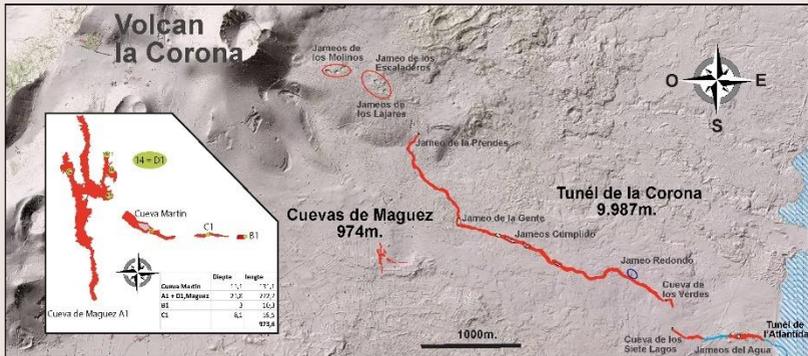
As there are almost no animals in Lanzarote and no mosquito's, living in a cave entrance seems to be an ideal idea on this sub-tropical Island. The only advice from Martin which you have to consider living in a cave. Please do not keep animals like a dog or cats in a cave as flees spread like a plague and you will be covered by bites all over. He has been living in caves for more than 20 years, so bear this in mind when you consider becoming a cave(wo)man.



Survey of Cuevas Martin, B1 & C1

Tubos de la Corona, Lanzarote

Dibujo y síntesis: L.M.J. Smets 06/03/2020 ©



Map showing the relationship between the Cuevas Maguez and the Corona System

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geovol, departamento de geografía y ordenación del territorio
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- *Karst, number 22 october 1969. By Joaquín Montoriol-Pous and Jorge de Mier*

Thanks to the exploration members February 2020:

Speleo Nederland: R.van Dijk, L.Smets, E. Birkhoff, L de Graauw,
R. Meys

UK: C. Smith

Vale Jim Simons

We have been greatly saddened to hear of the passing – in March 2018 – of Jim Simons. Jim, who was based in Nairobi, Kenya, was a mainstay of the Cave Exploration Group of East Africa. Although he was interested in caves generally, he had a special interest in the lava caves of Kenya which he had studied, written about at length and was doing his best to conserve.

I first met Jim on the occasion of the 8th International Symposium on Vulcanospeleology which Jim and friends from CEGEA had organised in Nairobi in February 1998 (with the encouragement of Bill Halliday). Although small, due to fears of political instability and diseases, it was a most successful symposium with some highly memorable field excursions including a visit to a cave inhabited by elephants and the supposed origin of the deadly Ebola virus. Jim produced an authoritative guidebook on the lava caves of Kenya and especially those we visited on excursions.



Jim at the 3m tall lava stalagmite in Mathaioni Cave, 1998



Participants outside Leviathan Cave, 8th ISV. Jim standing, 4th from right, beside Rod Greeley. Bill Halliday, Paolo Forti and Takanori Ogawa crouching in front (L-R).

Jim told us how he had come to Kenya many years before and liked the place so much he wanted to stay. Even though he was a British citizen he had to have a reason to stay in Kenya, such as operating a company, and he needed a source of income. Because of his interest in caves he knew of Kimakia Cave in the Chyulu Hills and its huge guano deposits. Kenya needed fertilizers for its coffee and tea plantations, its flower growers and home gardens. Jim set up Kenya Guano Ltd to help meet that need from Kimakia Cave, which also became known as Ithundu Mine. The venture was reasonably successful for a number of years, though a great deal of guano remains in the cave. Later Jim was able to set up a safari company which enabled him to escape the overpowering ammonia fumes of Ithundu and become a Kenyan citizen.

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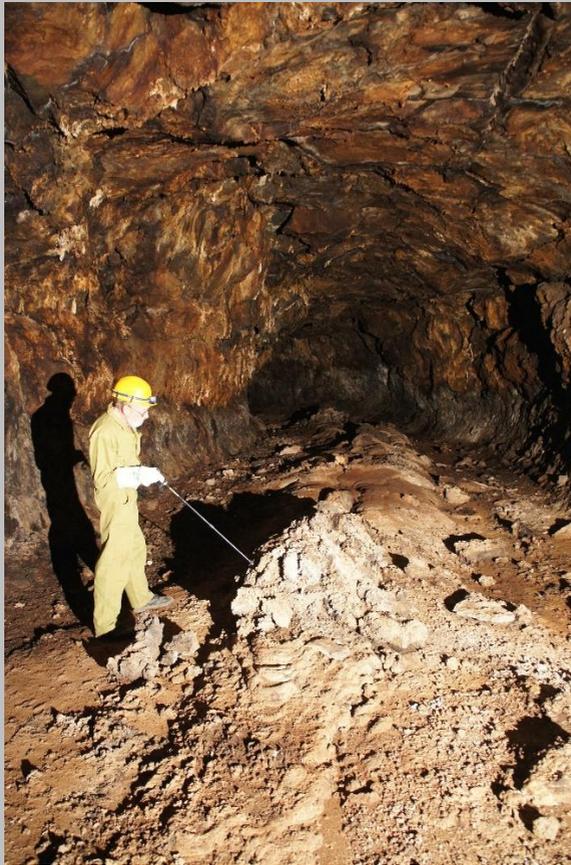


Jim Simons, Jan Paul Van der Pas and Paolo Forti drink a toast to retiring chair of the Commission on Volcanic Caves, Dr Bill Halliday, on the roof of the Panafric Hotel in Nairobi, 8 February 1998.

In September 2013, on a stopover while returning from the 16th ICS in Brno I was able to visit Jim in Nairobi and cave again with him and Clive Ward at Mt Suswa. Jim, by this time was using a walking stick to get around but he was still able to get visit his much-loved lava caves. He was, at the time, heavily involved in setting up the Suswa Conservancy as a vehicle to enable the local people to protect the caves and operate some as show caves.



GM, Clive (a safari guide), Clive Ward and Jim Simons, Nairobi, 10 September 2013.



Jim examining the unusual central ridge in the main passage of Cave 20 at Mt Suswa, 13 September 2013.

The international lava cave community has lost a staunch advocate for lava cave protection and management; Kenya has lost an extremely knowledgeable vulcanospeleologist.

Greg Middleton 21 December 2020

LAVA CAVE IN KRONGNO – GLOBAL OUTSTANDING MIXED HERITAGE OF DAK NONG UNESCO GLOBAL GEOPARK, VIETNAM

La The Phuc, Dang Thi Hai Yen, Nguyen Trung Minh & Luong Thi Tuat*, *Vietnam National Museum of Nature, Vietnam Academy of Science and Technology (VAST) (*) Corresponding author.*

Nguyen Khac Su & Nguyen Lan Cuong, *Vietnam Archaeological Association*

Vu Tien Duc, *Institute of Social Sciences of Central Highlands*

Le Xuan Hung, *Dalat University*

I. INTRODUCTION

The Krongno lava cave system in Dak Nong province, Vietnam was discovered in 2007 by Dr. La The Phuc (1;2), and has been known as the largest lava cave system in Southeast Asia and China up to now (3;8;9). These caves are embedded entirely in the Xuan Loc basaltic formation (β Q12 xl), produced by the eruption of Chu B'Luk volcano (0.7-0.2Ma) (6).

Since 2007, the cave system (including cave C6.1) had been known only as a heritage site for its volcanic geological values. However, in 2017, 10 years after these lava caves were discovered, Dr. La The Phuc and colleagues, including Luong Thi Tuat, Vu Tien Duc and Nguyen Thanh Tung found archaeological traces in 10 lava caves (4;5). During the same year, C6.1 cave was chosen for an archaeological survey and to study the potential for archaeological heritage.

Based on good survey results, in 2018 the Ministry of Culture, Sport and Tourism of Vietnam granted permission for excavation of a total area of 20m² in C6' and C6.1 caves. Two archaeological excavations took place in 2018 and 2019 hosted by the Vietnam National Museum of Nature and lead by Assoc. Prof. Nguyen Khac Su – a famous pre-historic archaeologist of Vietnam.

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The excavation team uncovered a series of archaeological relics in C6' and C6.1 caves in the Krongno area (10;11). However, the excavation results show that C6' cave is simply a temporary hunting camp of ancient people in Krongno with many signs of their activities, such as traces of ancient wood-fires and bones of many animals such as fish, bat, deer, squirrel, turtle, etc, but not as a residence of ancient people.

On the other hand, C6.1 is an important archaeological cave, which contains many significant relics consistent with it being a residence site: graves, tool-making site, etc. (10;11). In this paper, we focus on some typical lava formations and the archaeological relics identified in C6.1 lava cave only.

II. TYPICAL LAVA FORMATIONS IN THE C6.1 LAVA CAVE

The C6.1 volcanic cave is located in Nam Da commune, Krong No district, Dak Nong province. The sole entrance is near the Chu B'Luk volcano at an elevation of 346m asl. The cave has a depth of 4.6m and a length of 293.7m (1;3); (Fig.1). It is one of 50 caves discovered in the Krongno lava cave system up to now. Geological heritage features in C6.1 include typical lava formations such as lava level marks on the cave walls, lava shelves, lava linings, pahoehoe lava, lava levees, slide-marks, different types of lava stalactites, lava glaze, etc. (5;6;7); (Fig.2-7).

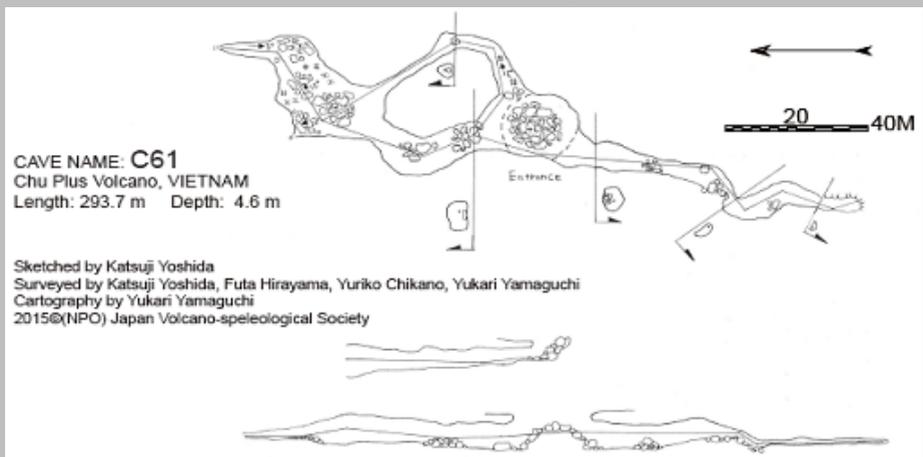


Fig.1. Map of C6.1 lava cave in Krongno area, Dak Nong province, Vietnam.



Fig.2. Lava shelf on the wall near the entrance N02 of C6.1 lava cave



Fig.3. Ropy lava near the entrance N03 of C6.1 lava cave



Fig.4. A thick lava lining at the end of the branch N03 of C6.1 cave



Fig.5. Two stalactite generations near the entrance N01 of C6.1 cave



Fig.6. Vertical slide-marks on the wall in the branch N03 of C6.1 cave



Fig.7. Lava glaze on the wall in the branch N03 of C6.1 cave

III. ARCHAEOLOGICAL RELICS IN C6.1 LAVA CAVE

In accordance with the excavation permission of the Ministry of Culture, Sport and Tourism of Vietnam and agreement from Dak Nong province, in 2018 and 2019, Vietnam National Museum of Nature held excavation work in both C6' and C6.1. However, because of limited excavation results in C6' cave, in this paper we only cover excavation results in C6.1 as mentioned above.

The excavation team consisted of archaeologist, Assoc. Prof. Nguyen Khac Su - the excavation team's leader, Assoc. Prof. Nguyen Lan Cuong - Paleoanthropologist, geologist Dr. La The Phuc – the Project's leader, our archaeological and geological colleagues, and several local workers. The site for the excavation pit was chosen in the N01 entrance/branch (Fig.8), on the thickest sedimentary layer of the cave floor (Fig.9).

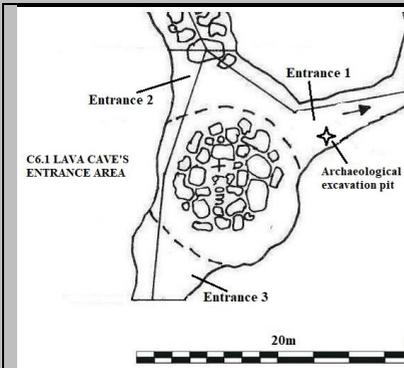


Fig.8. Map of the C6.1 entrance area and the excavation pit.

Fig.9. The archaeological site at the entrance N01 of C6.1 cave, seen from inside.

The excavation works were carried out in 2018 and 2019 (Fig.10;11). As a result, many types of archaeological relics have been identified in the C6.1 lava cave, including residence and burial relics and relics of a tool making site (10;11). They were revealed in the 8 cultural layers in the excavation pit of the 1.85cm deep (Fig.12).



Fig.10. The excavation pit in 2018 in C6.1 lava cave



Fig.11. The excavation pit in 2019 in C6.1 lava cave



Fig.12. The stratum of the excavation pit and date of 14C in the C6.1

There are 80,568 artifacts belonging to different types collected from the excavation pit, including: stone and bone tools (Fig.13-18); animal bones and teeth (Fig.19-23); mollusc shells (Fig.24); and hundreds of broken pottery pieces (10).



Fig.13. Discoidal unifacially-flaked implement

Fig.14: Oval-shape implement

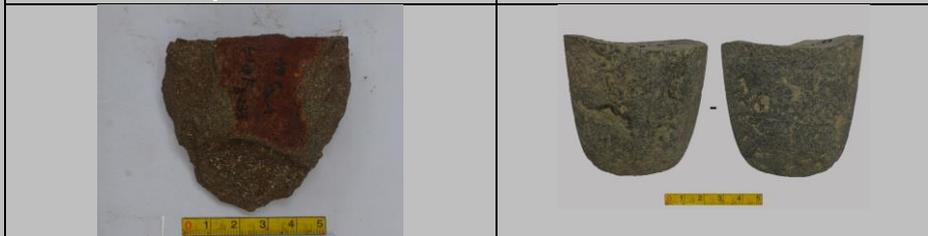


Fig.15: Short stone axe

Fig.16: Edge-polished stone axe



Fig.17: Stone scraper

Fig.18: Bone spearhead tools



Fig.19. Fish bones in C6.1 cave



Fig.20. Turtle bone in C6.1 cave



Fig.21. Tiger upper jawbone (?) in C6.1 cave



Fig.22. Mouse lower jawbone in C6.1 cave



Fig.23. Ape molar



Fig.24. Jewellery made of marine mollusc shells

Besides, six black sediment/soil hole relics identified as fire-structures and waste-food holes have been found in the pit, in which there are two relics (Fig.25: N0F8 and Fig.26: N0F9) being kept for museum building and on-site conservation (7;10).



Fig.25. The F8 black sediment/soil hole relic in the C6.1 lava cave



Fig.26. The F9 black sediment/soil hole relic in the C6.1 lava cave

However, the most important archaeological artifacts excavated from C6.1 cave are 7 ancient human skeletons in the pit (Fig.27).

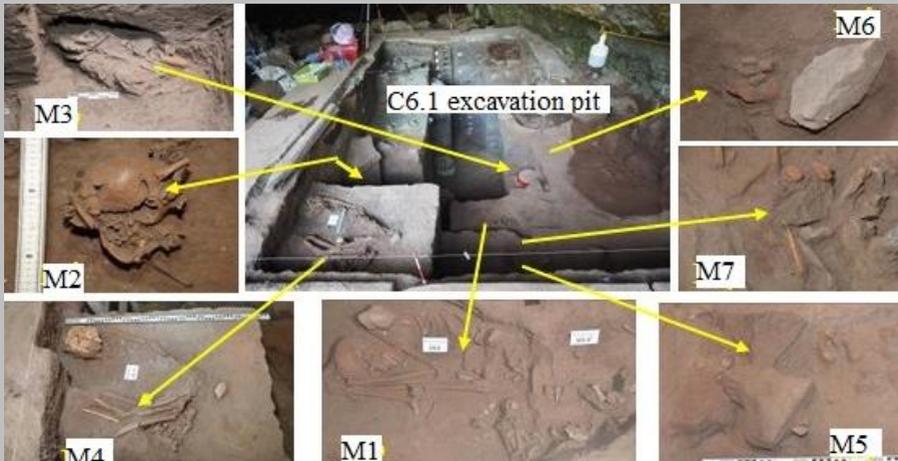


Fig.27. Distribution of 7 ancient human skeletons in the C6.1 excavation pit.

Among them, three complete ancient skeletons have been unearthed and studied: M1 (Fig.28a-j); M2 (Fig.29a-f) and M4 (Fig.30a-f), so we could go to some remarks as follows:

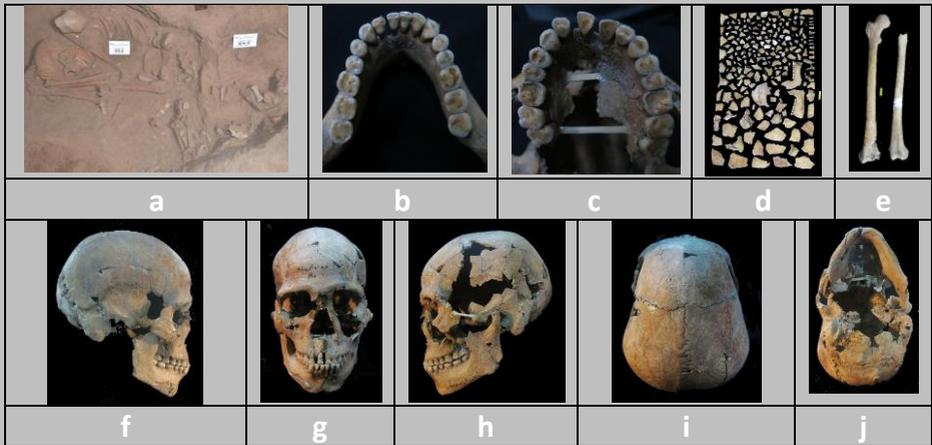


Fig.28. a: The M1 skeleton of a man 1,85m tall, unearthed from the pit in 2019 in C6.1 cave; b: entire 16 teeth of the complete lower jaw; c: entire 16 teeth of the complete upper jaw; d: 119 broken pieces of the M1 skull; e: femur 51.8cm long; f-j: Five views of the M1 skull after restoration.

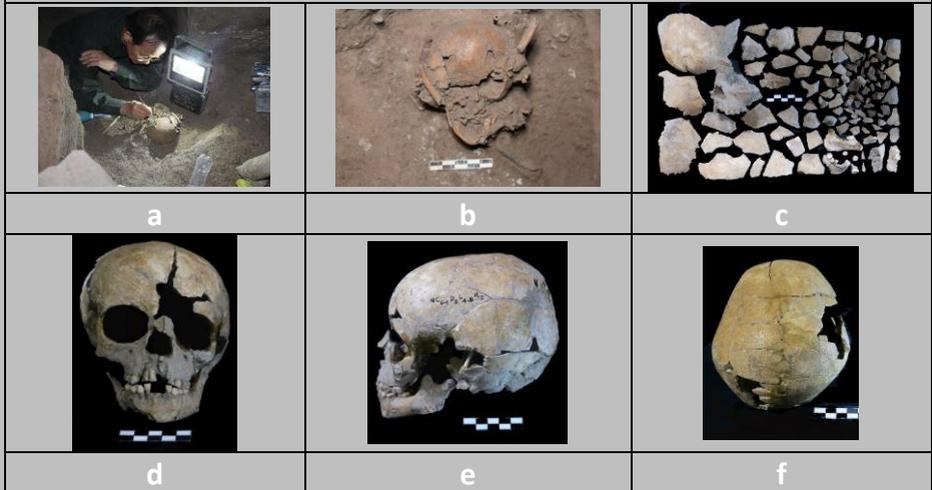


Fig.29. a: Assoc.Prof. Nguyen Lan Cuong-Paleoanthropologist is carefully unearthing M1 skull; b: M1 – a 4-year-old girl’s skeleton in the pit; c: More than 100 broken pieces of the M2 skull before restoration; d-f: Three views of the M2 skull after restoration.

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- M1: Based on the degree of coarseness of the cranial joint, Paleoanthropologist - Assoc. Prof. Nguyen Lan Cuong identified that the man was aged between 25 and 35 years old. Based on the formula for calculating the height of M. Trotter (1958), the Paleoanthropologist calculated the height of this individual:

* According to the length of the femur (51.8cm) this individual is high: $1m84 \pm 3.8mm$;

* According to the length of the arm bone (37.9cm) this individual is high: $1m85 \pm 4.16m$. So, M1 is the tallest prehistoric man in Vietnam so far (13).

- M2: Based on tooth maturity and several other features, such as feature of the cranial joint, the Paleoanthropologist identified that M2 is a 4-year old girl (12).

- Meanwhile, M4 was preliminary identified is an adult female person, etc.

According to the 13 charcoal sample results of the radiocarbon dating made at the Radiocarbon Laboratory of the Institute of Geography RAS (Russia) and at the Center for Applied Isotope Studies, University of Georgia (USA) (14) (Fig.12); (Table 1), C6.1 cave ancient people lived in the Krongno area from 7,000BP to 4,500BP, even later than the latest sample's data.

Concerning to the age and origin of the ancient people in the C6.1 cave, in the middle of 2019, in the frame of cooperation between Vietnam National Museum of Nature with Centre for Geogenetics, Global Institute, University of Copenhagen, Denmark, some ancient skeletons in C6.1 in Krongno have been studied on DNA, ^{14}C age, etc. and achieved preliminary good results, equivalent to the ^{14}C age of charcoal samples and almost results mentioned above. Unfortunately, COVID-19 destroyed the general plan, so that many works had to stop.

No.	Sample	Depth (cm)	Material	14C, BP	cal. BP
1	18.C6-1.C4.L1.2	16	Charcoal	4.680±20	5.391BP
2	17.C6-1.D3.L3	32	Charcoal	5.070±20	5.815BP
3	17.C6-1.D3.L.6	43	Charcoal	5.110±20	5.815BP
4	17.C6-1.D3.L.7	56	Charcoal	5.225 ±20	5.965BP
5	17.C6-1.D3.L.8	63	Charcoal	5.230±20	5.966BP
6	18.C6-1.C2.L4.3	58	Charcoal	5.760±25	6.560BP
7	18.C6-1.D4.L4.5	99	Charcoal	5.780±25	6.686BP
8	18.C6-1.D2.L4.7	125	Charcoal	6.030±25	6.876BP
9	18.C6-1.C2.L4.9	126	Charcoal	5.850±25	6.672BP
10	18.C6-1.D4.L4.10	138	Charcoal	5.945±25	6.768BP
11	18.C6-1.C4.L4.12	154	Charcoal	5.945±25	6.768BP
12	18.C6-1.D4.L4.13	175	Charcoal	5.970±25	6.800BP
13	18.C6-1.C3.L4.16	183	Charcoal	6.090±25	6.954BP

Table 1. Results of 14C analysis of charcoal samples in C6.1 lava cave, in Krongno, Dak Nong.

IV. CONCLUSION

Cave C6.1 is one of the authentic scientific evidence of endogenous origin of the Krongno lava cave system. The interior lava formations in the cave reflect the nature and periodicity eruptions of Chu B'Luk volcano in the middle Pleistocene (Q12). On the other hand, the archaeological relics in cave C6.1 are quite intact preserved with hundreds of stone tools, bone tools, mollusc shells, jewellery made of marine mollusc shells, tens of thousands of animal bones, crustaceans, special burial systems, etc. reflect human activities from 7,000 to 4,500 years BP, and testify to the lives of prehistoric residents and their compatibility with the fluctuations of the middle Holocene environment on the red basaltic weathering plateau of The Central Highlands in Vietnam.

Although C6.1 cave is neither the longest nor most beautiful cave of the Krongno lava cave system, but thanks to a combination of its typical geological heritage and unique archaeological values, it is evaluated as a global - outstanding mixed heritage of Dak Nong UNESCO Global Geopark.

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Figure 1: Etna's summit craters from Barbagallo craters - ph. G. Priolo

DATES

The 19TH International Symposium on Vulcanospeleology (ISV) will be held in Catania, Italy from **Saturday August 28 to Saturday September 4, 2021.**

LOCATION

The 19th ISV will take place in the prestigious setting of the University of Catania, in the middle of the city. Catania is only 35 kilometres from the top of Mt. Etna which is an active strato-volcano that reaches 3.325 m a.s.l. Its pyroclastic products cover a large area of about 8100 hectares/ 20,000 acres, located in the eastern part of Sicily.

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ORGANIZING TEAM

The symposium will be organized jointly by Gruppo Grotte Catania (GGC) and University of Catania. The GGC caving group is part of the Catania section of the Club Alpino Italiano (CAI). The University of Catania is one of the oldest in Italy.



Letter of invitation from the Chairman of Gruppo Grotte Catania;

Dear Caving Friends,

I am pleased to invite you to the 19th International Symposium on Vulcanospeleology which will take place near one of the highest and most active volcanoes in Europe, Mount Etna.

On June 21st, 2013, UNESCO included Mount Etna in the list of world heritage sites defining it as one of the "most emblematic and active volcanoes in the world". Sicily itself has always been one of the most visited destinations by tourists as it is one of the most beautiful islands of the Mediterranean Sea, rich in varied landscapes, history and typical products. Of the over 14 million visitors a year who come to Sicily, about half of them do not miss an excursion on Mount Etna.

The volcano, more than 500 thousand years old, born from the sea and developed in height, owes its charm to its continuous eruptive activity that, from the historical eruptions and the lava flows that overlapped one on another over the years, today attracts thousands of tourists who enjoy the view of spectacular fountains and fireworks.

For you we are planning guided tours to admire the pillows and columnar basalts, evidence of the first eruptions of our volcano, the famous Bove valley, a large basin 1km deep and 5km wide, the result of an ancient depression of the volcano and, finally, both lava flow caves and fracture caves.

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More than 300 volcanic caves are known on Mount Etna and our speleological group, Gruppo Grotte Catania, within the Club Alpino Italiano section of Catania, has more than 80 years of experience in the area, spent in exploring and cataloguing all the Etna caves.

In the past, our group organized the second symposium back in 1975, but with great pleasure I wanted to dedicate myself to organizing a new symposium to offer all members of the group a new chance to participate, sharing our latest research and thus giving the opportunity to all the participants to enjoy the beauties offered by the Etnean landscape.

Furthermore, coming to Sicily, you will be able to admire also the Baroque architecture of Catania and the different architectural works as proof of the populations who conquered Sicily over the centuries (Greeks, Romans, Arabs, Normans).

Hoping to see you all in Catania.

Dr Carmelo Bucolo, Chairman, Gruppo Grotte Catania

A handwritten signature in black ink, reading "Carmelo Bucolo". The signature is written in a cursive style with a long, sweeping underline that extends to the right.

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NEW SYMPOSIUM PROGRAM (August/September 2021).

SATURDAY AUGUST 28TH

- All day:** Minibus from the airport to registration desk and hotels, WNS decontamination procedures (GGC Headquarters).
- Afternoon:** **Opening of the exhibition: “MONGIBEDDU COLOURS AND FLAVOURS”**

SUNDAY AUGUST 29TH

PRE-SYMPOSIUM EXCURSION¹: **GEOLOGY OF MT. ETNA** an overview of the volcano guided by a geologist, with comments at the most significant points (all day).

All day: Minibus from the airport to registration desk and hotels, WNS decontamination procedures (GGC Headquarters).

Evening: **Visit of the exhibition: “MONGIBEDDU COLOURS AND FLAVOURS”**

Welcome party (GGC headquarters)

MONDAY AUGUST 30TH

Morning: **Opening ceremony and beginning of work sessions - coffee break incl. (University of Catania – Geological Faculty)**

Afternoon: **Catania’s natural and cultural heritage (guided short trips) Mt. Etna selected caves¹ (short caving trips)**

Evening: **Recent discoveries video or slide presentations (GGC Headquarters)**

¹ Extra fee required.

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TUESDAY AUGUST 31ST

- Morning:** Lectures and work sessions - coffee break incl.
(University of Catania – Geological Faculty)
- Afternoon:** Catania's natural and cultural heritage (guided short trips)
Mt. Etna selected caves (2) (short caving trips)
- Evening:** Participants video or slide contributes (GGC
Headquarters)
- Partners' Program² – Taormina and Alcantara Gorges guided tour

WEDNESDAY SEPTEMBER 1ST

- Morning:** Lectures and conclusion of work sessions - coffee break
incl.
(University of Catania – Geological Faculty)
- Afternoon:** Catania's natural and cultural heritage (guided short trips)
Mt. Etna selected caves² (short caving trips)
- Evening:** Gala Banquet in a typical Sicilian restaurant
- Partners' Program² – Syracuse and Noto guided tour

THURSDAY SEPTEMBER 2ND

GENERAL EXCURSION:

Visit of the summit craters or the "Valle del Bove"
depending on the volcano activity. (All day - for all
participants).

- Evening:** musical event with a folk group (GGC Headquarters)

FRIDAY SEPTEMBER 3RD

SPECIAL EXCURSION:

Following the 1669 Lava Flow from Monti Rossi craters to
the seaside of Catania, including a special caving trip to
Grotta delle Palombe.

- Evening:** Closing ceremony and Farewell party (GGC
Headquarters)

SATURDAY SEPTEMBER 4TH

POST SYMPOSIUM EXCURSIONS.

Post symposium excursions will start on this day.

All day – transport by minibus of the participants to the airport or the
station.

² Extra fee required.

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GETTING THERE

In general, the best way to reach Catania is by plane. Catania–Fontanarossa Airport is the closest airport to Catania and among the busiest airports in Italy. Major airlines such as Alitalia, Lufthansa, KLM and Air Berlin offer services here and connect numerous European big cities, while low-cost airlines such as EasyJet and Ryanair offer extensive flights from many destinations.

If you want to reach Catania by bus from other cities in Italy and European countries, you can check [Flixbus website](#).

If you want to reach Catania by train from other cities in Italy and European countries, you can check [Trenitalia website](#).

If you like boats, you can reach Catania by ferry from Salerno ([Homepage - Grimaldi Lines \(grimaldi-lines.com\)](#)). We can send more information if you are interested.

LODGING

Unfortunately, Catania is an expensive town for lodging, especially during summer as it is high season for tourism. Because of the great variety of possibilities offered by in the town, lodging is not included in the Symposium fee and you can choose your preferred solution using for example, “booking.com”.

The organizing team will try to confirm the special prices in selected structures, reserved to all participants, resulting from 2020 agreements with the Management.

There will be three options:

- an hotel near the Centre of the Town or along the seaside,
- a university campus that also offers special prices for lunch and dinner,
- a camping site with the possibility to camp or rent a bungalow (4 beds).

More information on the arrangements will be provided in the next circular (Spring 2021). You will have to book as soon as the details come out, using a special booking form, to get the special fares.

MEALS

With the exceptions of the Welcome Party, the Gala Banquet and the Farewell Party, meals are not included in the Symposium fee. Catania offers a large variety of restaurants, “trattorie” and bars able to satisfy the most demanding cavers and scientists. During the three days of lectures, a lunch deal with a restaurant near the University will be proposed to participants. There will be also a deal for dinner in hotel restaurant, near the GGC headquarters, throughout the Symposium week.

Lunch is included in the excursions outside Catania (partners’ program).

A packed lunch is included in the general excursion to Mt. Etna.

A special taste of Sicilian cakes is included in the 1669 excursion.

REGISTRATION

The **new registration procedure will be available on-line**, on the Symposium website, by April 2021. It is already possible to pre-register free to get priority to attend the Symposium in case registration requests exceed the maximum limit.

The participation fees will remain unchanged for all those who have already registered and have waived the reimbursement of the paid fee. All those pre-registered or registered without paying the fee, will receive a personal email by February 28, 2021 with the request to confirm their participation in the Symposium and to pay the 2020 fee.

In compliance with the well-known Sicilian hospitality and the speleological traditions, the Organizing Committee will work to **minimize the increases for those who still have to register** even though the new anti-covid provisions will certainly determine an increase in operating costs.

The Registration fee includes:

- 19th ISV booklet
- Transport from and to the airport
- Welcome Party
- Morning lectures at the University of Catania
- Catania's natural and cultural heritage³
- Evening programs at GGC Headquarters
- Gala Banquet
- Farewell Party
- Cave rescue Insurance
- General excursion to Mt. Etna
- Special 1669 excursion
- Proceedings of the Symposium (on paper book or USB key)

The fee for accompanying members will be lower than the full fee because it will not include the proceedings book.

To encourage students' participation to the lectures, the Organizing Team decided to create a special pass, valid only from Monday to Wednesday. This special student pass includes:

- 19th ISV booklet
- Morning lectures at the University of Catania
- Evening programs at GGC Headquarters
- Proceedings of the Symposium (on USB key)

Despite the difficulties imposed by compliance with anti-covid rules, the organizers confirm the limit at **80 attendees** (including accompanying members).

More information on new registration fees, accommodation options and excursions will be provided in the next circular which will presumably be published in Spring 2021.

⁽³⁾ an extra fee might be required for some excursions

COVID-19 PREVENTION MEASURES

At the time of writing this circular, the vaccination campaigns against Covid-19 are starting all over the world. This fact allows us to hope that we may be able to return to a “fairly” normal life in summer 2021.

The Organizing Committee, which met in early December, decided that there will not be a new postponement and the **19th Symposium on Volcano Speleology will be held regularly, from August 28 to September 4.**

All the necessary prevention measures will be put in place so that all theoretical sessions and all practical excursions can be carried out in complete safety.

This goal seriously requires the cooperation of all participants. At the moment, to attend in person an indoors or outdoors event, it is necessary to wear a face mask, keep the social distance of at least one meter and clean hands frequently with soap and water or sanitizing gel. The Italian Alpine Club and the Italia Speleological Society, in June 2020, have developed the guideline to be respected in order to carry out safe speleological and hiking activities. It will require smaller numbers of participants and not too demanding activities.

The organizing committee did not consider it appropriate at the moment to cancel any caving trip but there may be cancellations even at last minute due to health and safety reasons.

Let us not forget that Etna is an active volcano that can only be faced when it is quiet.

WHITE-NOSE SYNDROME

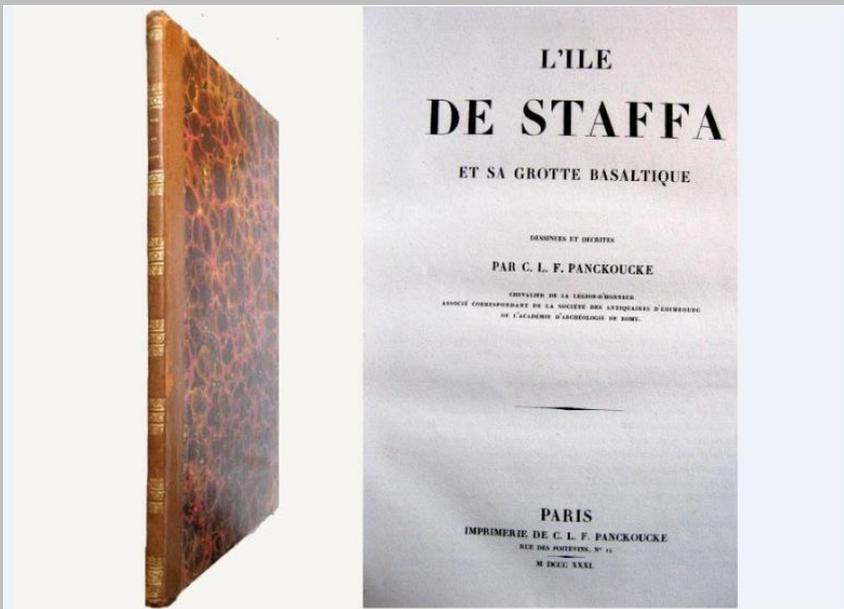
There is no evidence of WNS in the Mt. Etna area so far therefore do not bring cave gear to this area that has been used in a place where WNS has been identified, even if that gear has been decontaminated. Decontaminate your gear if it has been used in areas where WNS has not been identified. Please go to whitenosesyndrome.org for the latest up to date recommendations for gear decontamination.

The organizing team will give you the opportunity to decontaminate your gear and garments for free on Saturday 28Th and Sunday 29Th at the Gruppo Grotte Catania Headquarters.

For those who come from abroad, the organizing team will have a small number of basic caving equipment sets for rent (helmet, light). Please, ask for this opportunity upon registration.

EXHIBITIONS

- **MONGIBEDDU COLOURS AND FLAVOURS:** On the occasion of the symposium, the organizers decided to invite the best artisans and agricultural producers from the area around Catania to come and present their products at a fair that will be hosted at the headquarters of Gruppo Grotte Catania. The exhibition will be open to general public on Saturday August 28th and Sunday August 29th. Symposium participants can freely visit it on Sunday evening, before the welcome party.
- **L'ILE DE STAFFA ET SA GROTTA BASALTIQUE:** This is the title of the rare book by Panckoucke, printed in Paris in the year 1831, the same year in which the great English painter William Turner completed the famous painting that made the Fingal's cave famous all over the world. This book, recently purchased by the Library of the Franco Anelli Italian Speleological Documentation Centre at the University of Bologna, will be showed in Catania, in an important exhibition that will include many other rare "pieces" of the same Library. Symposium participants can freely visit this exhibition during the Symposium.



EXCURSIONS

All excursions planned for the Symposium are confirmed according to the original program.

The organizers reserve the right to postpone or cancel any excursion even at the last minute if environmental or medical conditions do not allow the excursion to be carried out in complete safety for all participants. In this case, any amount paid will be fully refunded.

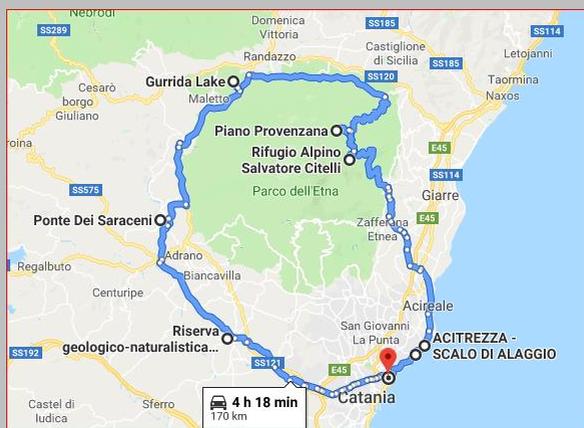
The cost of any of the proposed excursions could undergo a small adjustment due to the need to comply with the anti-contagion provisions. The final fee and the limit of participants for each of them will be communicated with the next circular scheduled Spring 2021.

PRE-SYMPIOSIUM

A) GEOLOGICAL TOUR OF MT. ETNA

The purpose of this excursion is to provide participants with a first geographical and geological overview of the Etna volcano. The excursion will be led by the senior geologist Dr. Giuseppe Priolo and will last a whole day.

A circular tour is planned on the mountain slopes (see following map), stopping at the most significant points in the history of volcano eruptions. Lunch is included in a typical mountain lodge; return on time to attend the welcome party.



DURING THE SYMPOSIUM

B) GENERAL EXCURSION

Mt. Etna is an active volcano. From the summit craters there is often the emission of gasses and steam. During periods of high activity, the hike to the craters is strictly forbidden. Thus, the organizers will be able to confirm the destination of this excursion only during the Symposium.

If the volcano is quiet, our goal will be to take all participants as high as possible on the volcano, towards the summit craters. The idea is to reach the highest parking place, by 4x4 minibuses, at 2.700 m a.s.l. From that point, there is a two hour walk on cinder and unconsolidated lava to reach the summit of the north east crater at 3.350 m a.s.l. In this excursion you will see many volcanic features and the fantastic panorama from the top of the mountain.

This part of the excursion will be led by the rangers of the Etna Park. It requires good health and to be trained for long walks. Sack lunch and drinks included.

C) ALTERNATIVE GENERAL EXCURSION

This excursion is an alternative program in case that the activity of the volcano doesn't permit the ascent to the craters. The participants will reach the parking place near "Case Pirao" at 1.850 m a.s.l. by bus.

From that place a long and winding track named "Sentiero della Schiena dell'Asino" will lead us to a panoramic point at 2.050 m a.s.l. Where there is the possibility to see the inside of the depression whose name is "Valle del Bove". This depression is famous because most of the lava flows coming from upper craters, stop there.

From the panoramic point it is possible to see the most spectacular features of the valley: hornitos, lava bridges, columnar basalt, etc.

Requires: good health and good shoes. Packed lunch and drinks included.

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D) FOLLOWING THE 1669 FLOW

This excursion is designed to show the path followed by the biggest lava flow that reached the town 350 years ago. In the morning, a bus will take all participants to the erupting cones of that flow whose name is "I Monti Rossi" at 750 m. a.s.l. There will be an explanation of the highlights of the event starting from the description as were given by the witnesses of that time.

In the afternoon, the excursion will follow the path of the lava, visiting the town of Nicolosi and then reaching the centre of Catania. There will be some stops near monuments that were left untouched by the lava flow.

This excursion will end at the seaside, at the edge of the area, more than 2 square kilometres, that was added to the land with that flow. A sweet lunch is included at the typical restaurant attached to the Condorelli confectionery factory.

E) CAVING TRIPS

More than 300 volcanic caves are known on Mount Etna, scattered on the slopes of the mountain, from the upper part of the volcanic cones, to the dark beaches of the seaside.

The caves of the upper part of the volcano are generally very far from the roads or located in dangerous areas because of the volcano activity. Moreover, the highest part of the volcano is included in the Park of Etna and the access is subjected to restrictions due to the dangerousness of the volcano itself.

It is therefore not possible to plan the visit of the highest caves of the Etna in a half-day excursion during the period of the symposium.

For the days of the Symposium, the organizing team has selected some caves, very representative of Mt Etna caves features, so close to the town to permit the visit them in a short caving trip, from afternoon to the evening. Due to their beauty and importance, the organizing team particularly has selected the caves "Grotta dei 3 Livelli" and "Grotta KTM". Since they have small internal jumps to overcome, the organizers will set up ladders to allow all participants to visit them.

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In addition, other easy-to-walk cavities have been selected for the excursions during the symposium period. You can find a non-exhaustive list of them, with the description of each cave on the First Circular of the Symposium. More caves will be added in the future.

Finally, near the town of Catania there is an area in which some simple caves have been prepared for a didactical tour (Grotte di San Gregorio). The access to that area is possible to all participants and is included in the cultural heritage program.



Figure 2: Tre Livelli Cave, from first level to the second – ph. G. I. Sanfilippo

PARTNER'S PROGRAM

F) CATANIA'S NATURAL AND CULTURAL HERITAGE

Catania was founded in the 8th century BC by Chalcidians, a Greek population coming from Thrace. In 1434, the first university in Sicily was founded in the city. In the 14th century and into the Renaissance period, Catania was one of Italy's most important cultural, artistic and political centres.

The city is well known for its history, culture, architecture and gastronomy. Its old town, besides being one of the biggest examples of baroque architecture in Italy, is a World Heritage Site, protected by UNESCO.

During the 3 days of the symposium, in the afternoon, after the morning lectures, short trips will be planned to visit relevant artistic or scenic places. Organizers selected some places that are connected with the volcanic features of its territory.

At the moment the following visits are planned:

- Walking through the Baroque
A wonderful walk in the centre of the town.
- Etna's endemic species
Guided tour of Catania botanical gardens.
- The caves of San Gregorio
The natural reserve is characterized by the presence of numerous lava flow caves in a relatively small area. The reserve was established in order to "preserve and protect the important complex of lava flow caves colonized by cave fauna and bat colonies".
- The "Paternò mud cones"
The idea is to go and visit the mud "vulcanelli" near Paternò, including also a stop at a winery to taste the famous wines of Etna.
- Boat trip from Aci Trezza to the Coast of Cyclops
A boat trip from the port of Aci Trezza to go and see the columnar basalts of the faraglioni up close and see the stretch of coast affected by the 1669 flow.

- **Living on an active volcano**
Over 150 fixed detection stations (seismic, GPS, infrasonic, clinometric, extensometric, etc.) are installed on the Etna slopes, thus making this volcano one of the best monitored volcanoes in the world. Visit of the “monitoring room” of the INGV (Istituto Nazionale di Geofisica e Vulcanologia) in Catania.
- **The beach of San Giovanni li Cuti**
Black sand beach with the possibility to see the front of a lava flow.

Participation on some visits could be limited due to logistic reasons; entrance to museums or monuments is to be paid on site and an extra fee might be required to cover transport outside the town.



Figure 3: Acitrezza port, in background the Lachea island

G) TAORMINA AND ALCANTARA GORGES

All day excursion specially organized for accompanying members. Lunch is included.

Taormina is a hill town on the east coast of Sicily. The city is known for the Ancient Theatre of Taormina, an ancient Greek-Roman Theatre still in operation today. Near the theatre, the cliffs that descend to the sea form inlets with sandy beaches. A narrow strip of sand connects to the tiny Isola Bella, which is a nature reserve.

Unique in the Italian and European natural landscape, the Alcantara Gorges are one of the must-see attractions of Sicily. Located about 20 km from Taormina, the gorges are real canyons made of black lava walls up to 50 metres high, in the typical shape of a prism that the rocks have taken during the cooling process. Within the grooves, the toning and crystal and clear waters of the river Alcantara run surrounded by an unspoiled landscape, with rare flora and fauna. The purity of the natural habitat has been facilitated by its hidden position, which has preserved its existence; until the fifties in fact this site was completely unknown. The Alcantara Gorges have by now become a famous attraction even beyond national borders, and it is considered one of the most beautiful and natural sites in Italy.



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H) SIRACUSE AND NOTO

All day excursion specially organized for accompanying members. Lunch is included.

Siracusa is a city on the Ionian coast of Sicily. It is known for the ruins of antiquity. The central Archaeological Park of Neapolis encloses the Roman amphitheatre, the Greek Theatre and the Ear of Dionysius, a cave carved into the limestone in the shape of a human ear. The Paolo Orsi Regional Archaeological Museum exhibits terracotta finds, portraits from the Roman period and scenes from the Old Testament carved in white marble.

Noto: This small town in the south-east was founded again in the 1700's. It is the heart and at the same time the starting point for a visit to the valley of the Sicilian Baroque. Its cathedral, also perfectly raised and rebuilt again after 10 years of difficult work, was included in the UNESCO World Heritage Sites.

Piazza Armerina: The Villa del Casale recognized by UNESCO and included in the "World Heritage", with its 3500 square metres of mosaic floors famous throughout the world, hunting lodge of Massimiliano Ercoleo, is evidence of life in Roman times ...



POST SYMPOSIUM

I) ISOLE EOLIE

This excursion will be organised by the local section of Club Alpino Italiano and the Gruppo Grotte Catania. It will start and end in Catania, lasting from Saturday September 4th in the morning to late afternoon on Thursday September, 9th.

The idea is to see the main volcanic features on the islands of Vulcano, Lipari and Stromboli. The complete program published in the second circular is confirmed.

In the excursion fee are included navigation on a dedicated small boat and the accommodation in small hotels with full board.

To organize this excursion a minimum of 20 participants is needed.

The cost of this excursion will be subject to an adjustment due to anti-covid restrictions; the exact fare will be communicated in the next circular.



Figure 4: Eolie islands - ph. G. Priolo

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J) LAVA FIELDS CAMP

Unfortunately, the limitations imposed by the health situation might reduce the number of participants that can attend the Aeolian Islands excursion.

Therefore, the Organizing Committee has decided to set up, on the same dates, an exploration camp on the slopes of Etna dedicated to the in depth analysis of the scientific themes dealt with in the Symposium and to the search for new cavities.

Accommodation will be in facilities made available by the park authority and food will be provided by the organization.

This camp will not have a maximum limit on the number of participants and activities to be carried out will be agreed on day by day on the basis of the technical skills and experience of the participants themselves. Participants will be accompanied to the camp on Saturday September 4th and will be driven back to Catania in the late afternoon of Thursday September 9th.



Figure 5 (left): Valle del Bove, 1996 exploratory expedition (ph. Priolo) and Figure 6 (right) Monte Scavo (ph. Bucolo).

CALL FOR PAPERS

The Organizing Committee is going to print a book with the proceedings of the Symposium to be delivered to the participants who will be in Catania. For this reason we ask all Speakers to send their work as soon as possible to the e-mail address indicated below, even if they have not yet completed their registration.

The Scientific Committee of the Symposium that has already been set up will evaluate the works received and will decide, on the basis of the topic dealt with, the order of presentation in the three days available for discussions.

The deadline for the delivery of the articles is May 31st, 2021. By that time, all those wishing to present their work at the Symposium must complete the registration procedure.

Papers and abstracts will be published only if the author (or at least one of the authors for joint work) has paid the full participant registration fee.

English is the official language of the International Symposium on Vulcanospeleology. Translation services will not be provided.

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