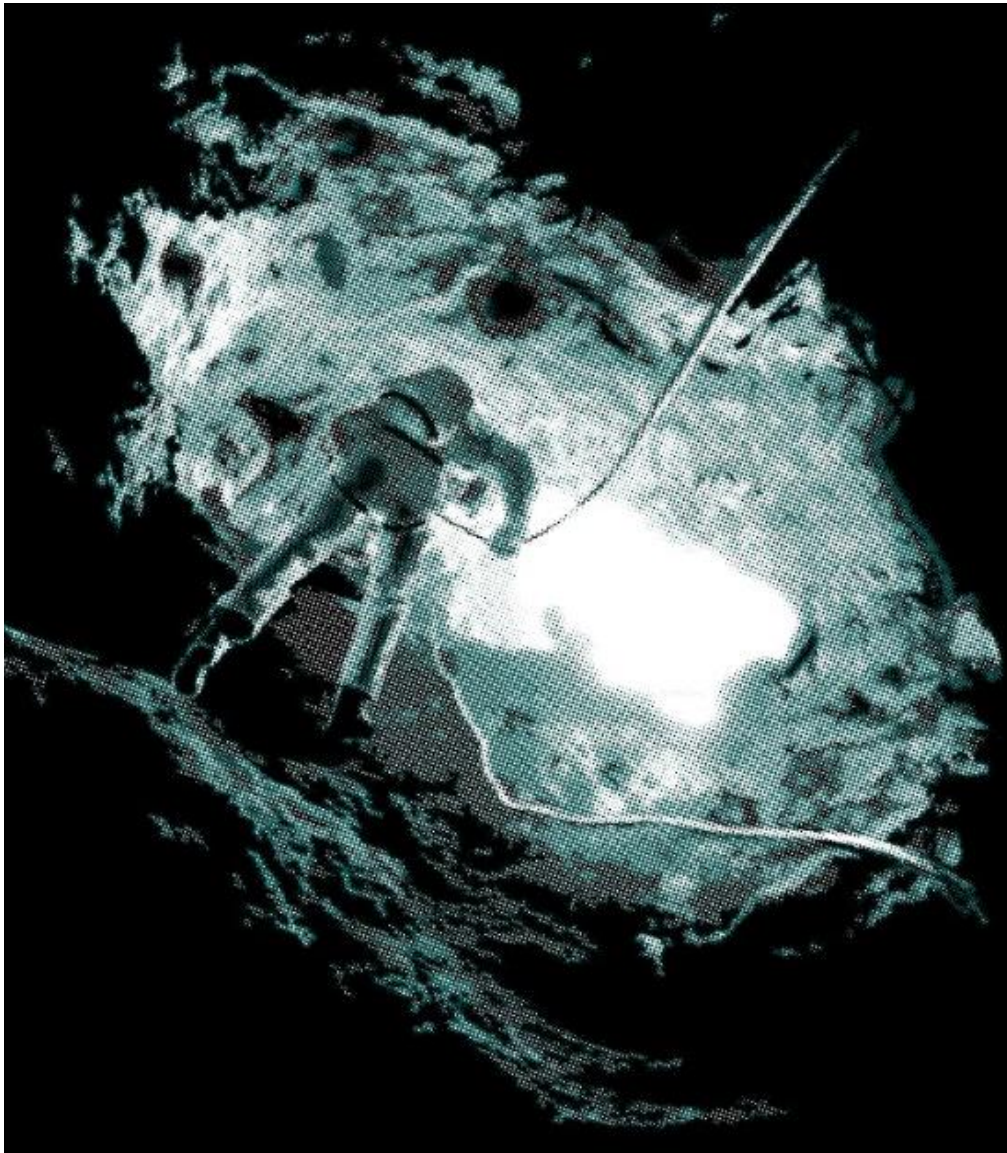


**SPELEOLOGICAL EXPEDITION
STERNES 2023**



**CRETE, GREECE
August-September 2023**

**Organized by
the Speleological Club of Crete (SPOK)**



**With the support of EuroSpeleo Projects FSE
(ESP 2023-07)**



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The expedition was supported by:



European Federation of Speleology (Eurospeleo Projects initiative)



Union Internationale de Spéléologie

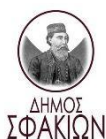


National Speleological Society (International Exploration Grants)

The expedition used gear of the following brands, made available through sponsorship:



The expedition was also assisted by the in-kind contributions of:



Municipality of Sfakia (transport)



Anopoli Rooms – Glymenakis Family (meal)



Orfanoudakis bakery (bread and biscuits)



gourgouthakas 2023 expedition (cave food)

The expedition was also supported by the following caving clubs:



Ypogaia Caving Club



Speleological team of the Mountaineering Club of Hania



Naturalistic, Mountaineering, and Caving Club of Sitia

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1. Synopsis

The expedition “Sternes 2023” was the seventh annual expedition organized by SPOK to the Sternes cave on the Lefka Ori (White Mountains) massif of Crete. Last year’s expedition (2022) explored and recorded 1,200m of new cave passages below -500m depth and this year’s expedition was organized to push new leads discovered in 2022. The expedition was supported by the FSE’s Eurospeleo Projects initiative (and their sponsor Aventure Verticale), the UIS, the NSS, the Municipal Authority of Sfakia and individual donors.

The expedition had participation from the following countries: Australia, Canada, Ireland, Italy, Israel, Greece, UK, and USA. There was participation from all caving clubs of Crete and some from mainland Greece, too. Of the 46 cavers participating in some capacity, 16 (35%) were women.

The core objectives and the corresponding results of the expedition were the following:

- *Continuation of exploration of Sternes cave, survey of new passages found, recording of the exploration effort:* about three kilometers of almost exclusively horizontal cave have been explored and surveyed this year.
- *Further enlargement of meanders between -428m and -530m to allow easier access in case of accident:* the objective was achieved, with very few improvements remaining to be made for the 2024 season.
- *Continuation of exploration of pits discovered in 2011, suspected to be linked to Sternes Cave:* efforts were focused on nearby pits (to the west of the deepest point of the cave), pit 1111 was explored and surveyed early in the first week.
- *Recording of geological information within the cave:* measurements of dip and dip direction were taken of geological strata encountered within the cave to assist in the hydrogeological model being created by the UNESCO-supported project “IGCP 715 A new karst modeling approach along different tectonic contacts”.
- *Surface exploration:* more than 10 new entrances were marked by the multiple surface teams. Most significantly, the ice-cave Lagonia (LA2-LA3) was re-surveyed digitally and explored below the ice-plug which had denied access to many decades worth of visitors. Several other caves were discovered and surveyed near to basecamp.
- *Continuation of recording of cave life forms and collection of samples in a systematic way:* cave life was sampled from a number of locations within Sternes cave, resulting in the collection of collembola, arachnids and some winged insects which will be shared with laboratories for identification and / or description.

The Sternes cave is now **5.6km** long and **616m** deep. This places the cave in third place for longest cave on Crete, behind Ano Peristeras and Tafkoura.

Significantly, this year's expedition has again provided an opportunity for the members of SPOK and other Greek cavers to exchange ideas and experiences with international cavers from seven countries on four continents.

The number and diversity of leads remaining to be explored is exciting. Needless to say, planning is already under way for Sternes 2024.

2. History

The Sternes Cave was discovered and explored to below -400m by the Groupe Speleologique d'Orsay (GSO) between 1989 and 1992 (the survey ended some meters before the meander at -428m). The cave was subsequently 'lost' until it was rediscovered in 2005 by cavers of SELAS Caving Club who repeated the exploration and resurveyed the cave over the course of four expeditions in the years 2009-2012. The expeditions focused on the main route of the cave, which ended in a narrow section with a strong air current some tens of meters below the end of the survey of 1992. In 2017, after supporting the continuing exploration of the Lion led by SELAS Caving Club (2013-2015), the cavers of the Speleological Association of Crete (SPOK) took up the mantle of expedition organizer and organized the first international expedition to Sternes in five years.

The potential of the cave is well recognized. It has its entrance at 2095m altitude, well above the 1650m altitude of the entrance of the Lion (-1,110m) and the 1550m altitude of Gourgouthakas (-1,100m), Greece's two deepest caves, which lie a few km to the north. The Lefka Ori massif is also home to Pralina (-617m) and Colossus (-553m), the fifth and tenth currently deepest caves of Greece correspondingly.

The 2017 expedition succeeded in enlarging the passage at -428m to allow cavers to pass the narrow section and continue exploration. The 2018 expedition continued the clearance work in the meanders and managed to pass through a narrow meander under the final pit of 2017. This led to a series of pits separated by meanders. Of these, Bulldozer pit (P.42) stands out for its size¹. Progress terminated at twin meanders after the final pit, a point where the air flow is no longer discernible. The expedition in 2019 found that the meander in the plattenkalk continues for 58m before reaching a narrow and unpromising lake at -595m. The airflow had been lost and it was clear that a different route would need to be followed. An attempt to circumvent Bulldozer pit was unsuccessful and a bolt climb was proposed for the 2020 expedition.

During the first expedition without international support for years, this was quickly done in late summer 2020, but led nowhere. The ledge located halfway down the pit became the target of tentative exploration. Initially, this ledge led on to an inclined muddy narrow slope with some frostwork and a strong airflow blowing into the cave. This ended in a window after 25m to the west. This was too narrow to pass without clearing. Beyond this window, there seemed to be a chamber of about 3x3m. On the penultimate day of the expedition, after carefully passing the window, the team found themselves in a fossil conduit with a diameter of about 2.5 to 3m. The conduit slopes gently in a north/south direction for about 70m. The southern (uphill) branch required a climb to continue, after which the galleries continue towards the south, while the northern branch curves to the west and continues for roughly 500m more with some question-marks. 2021 was the year that was spent rigging with stainless steel bolts the cave, preparing it for the many to come future expeditions, due also to COVID that restricted the participation to the expedition. In 2022, again in the context of an international effort, the focus was mainly the exploration of the conduit, which led to about 1,200 meters of new cave passages, in two different levels of the gallery. The exploration terminated in the upward branch at a large pit which was not explored and was left as the main objective of this year's expedition, along with many other leads.

SPOK organized the expeditions from 2017 to 2022 with the participation of about 30 cavers annually from many clubs within Greece, and with cavers coming from all over the world in the years 2017-2019 and 2022. There was smaller participation in the difficult years of 2020 and 2021. The expeditions of 2018² and 2019³ were supported by the FSE's Euro Speleo Projects initiative and the reports are hosted on the FSE website. The results of the expeditions of 2017-2020 were presented at the 18th ICS in the proceedings of the congress⁴.

¹ The pit was named in honour of the Balkan Cavers from Romania who moved through the meander like bulldozers to reach the pit.

² https://www.eurospeleo.eu/wp-content/uploads/2022/09/ESP2018-02_Sternes_Report.pdf

³ https://www.eurospeleo.eu/wp-content/uploads/2022/09/ESP2019-04_Sternes_Report.pdf

⁴ Stelios Zacharias, et al.: Sternes: the deep cave in the White Mountains (Lefka Ori) of Crete (Greece), still attracting cave

3. Objectives of 2023 Expedition

The major aim for this year's exploration was set to be the continuation of the exploration of the upstream leads of the conduit, the survey of the new passages, and the recording of the exploration effort. The most important lead was the 'full moon' pit that was discovered during the last day of the 2022 gallery exploration. The pit was rather big and deep, making it a promising lead for going deeper into the cave. Moreover, a small passage with strong air current near the sandy bivouac location that was discovered in 2022 was also an important lead for exploration. The passage was quite narrow, full of aragonites and moon-milk, and needed enlargement for cavers to pass.

For reasons of safety, to allow easier access in case of an accident, and reasons of comfort, the enlargement of the meanders was again a main objective. The focus this year was set for the deeper parts of the cave, mainly the meander at -428m and some narrow entries to the pits at -480m and -530m, since the meanders at the higher parts of the cave have been successfully enlarged.

After the discovery of the conduit, the cave has mainly developed horizontally in various directions (~2.5km of horizontal passages). Consequently, unexplored pits or pits with question marks located in the nearby region of the cave became more important since they could intersect the horizontally developed conduit. The possible discovery of a new, easier and safer passage to the conduit, that would allow avoiding the narrow meanders and the parts of the conduit that are covered with fragile speleothems, would be a welcomed development. The main pits were the ones that were discovered in 2011, which are suspected to be linked to the Sternes Cave, and are located to the west of the deepest point of the cave (e.g., pit 1111).

The surface exploration of remote places, for locating and recording of other unknown and promising caves further away from the camp, is always an aim for cavers that take a break from the Sternes cave and go for a hike.

Regarding the scientific aspects, an important objective was the recording of geological information within the cave, in terms of measurements of dip and dip direction. In the same direction, the continuation of the recording of cave life forms and collection of samples in a systematic way was again a main objective.

4. Funding and Collaborations

Internationally, support was provided by the FSE, UIS, and NSS. The FSE grant was given through the Eurospeleo Projects initiative, and was provided by the FSE's official sponsor Aventure Verticale (AV). The grant was 401.38Euros. The material requested was all tackle sacks for transporting the materials for the rigging of the cave and the preparation of the bivouac. These were three AVSP31 35 liter kit bags, two AVSP32 45 liter kit bags and one each of the AVSP36 40 liter kit bag and AVSP22P flat waist bag with skirt. The UIS support was materialized through a 550 euro grant that was used for buying 200m Kordas ropes and stainless steel bolts. Finally, the NSS International Exploration Grant of 800\$ was used for buying 250m of Edelrid and 200m of Korda ropes and the 2 RAB sleeping bags/pads for the bivouac. Finally, the caver Colin Magee donated 500\$ which was used for buying the other 2 RAB sleeping bags/pads for the bivouac.

The expedition was endorsed by the Hellenic Federation of Speleology. In addition, the expedition each year receives support from the Municipality of Sfakia and presents each year's findings to the local community with an emphasis on conservation issues. As part of the expedition's outreach, articles were also prepared

for the local press. Finally, as done every year, the expedition shared the findings of the expedition with the Management Body of the Samaria National Park (White Mountains)⁵, which is designated a Natura 2000 area.

In terms of scientific collaborations, the expedition is aligned with the efforts of the project “*IGCP 715: A new karst modeling approach along different tectonic contacts*”⁶ of UNESCO’s International Geoscience Programme, as already mentioned. This project seeks to study the unknown or “extended” watershed areas contributing to the inter-catchment flow in specific karstic areas (one of which is the Lefka Ori of Crete). There is collaboration with the project and it is hoped that measurements from the depths of the cave will be exploited by the IGCP project.

There is also collaboration with HISR⁷, the *Hellenic Institute of Speleological Research*, which provides access to the ‘*Cave Fauna of Greece Database*’ as well as links with some scientists that are experts on different cave macroinvertebrates.

Finally, ultrasound microphones provided by the *EU Project LIFE-GRECABAT (LIFE17 NAT/GR/000522)*⁸ will allow members of the expedition to make recordings of bat fauna inside the cave, but also in the broader area in the evenings of the expedition. Recordings and other data will be shared with bat researchers to increase understanding of bat distribution on the island of Crete and assist in the monitoring of bat populations, subject to the European Habitats Directive 92/43/EU.

5. Participants

In total there were 46 members of the main expedition (listed below) who stayed a minimum of two nights and contributed to the camp financially. Among the expedition members, beyond the Greek cavers, there were 2 from Australia, 1 from Canada, 1 from Ireland, 4 from Israel, 2 from Italy, 1 from Russia, 2 from the UK and 3 from the USA who responded to our call for participation. In sum, a total of **233** overnights were made at Sternes basecamp for 2023 (not including visitors).

The manpower of the expedition by day and by nation is shown in Table 1 on the next page. Twelve cavers stayed the full duration of the camp (14 overnights), while another fifteen stayed for a week. Together with the weekend support, on average each caver spent six overnights on the expedition.

⁵ <https://www.samaria.gr/>

⁶ <https://en.unesco.org/international-geoscience-programme/projects/715>

⁷ <https://inspee.gr/>

⁸ <https://www.lifegrecabat.eu/en>



Group photo on the first day of the expedition.

Front row LtoR: Dustin Kisner (US), Colin Magee (CA), Petie Barry (IE), Georgia Schneider (US), Tristan Stahl (US), Antigony Haikalis (AUS), Kristen Wills (AUS), Sotiria Perou (GR), Katerina Smarianaki (GR)

Middle row LtoR: Vasilis Pantelios (GR), Rosa (GR), Panagiotis Papadakos (GR), Kostas Kostidis (GR), Methodios Psomas (GR), Eva Kamilaki (GR)

Front: Tonia Lazopoulou (GR)



Group photo on the last day of the expedition.

Front row LtoR: Antigony Haikalis (AUS), Kristen Wills (AUS), Xenia Georgopoulou (GR), Eva Kamilaki (GR), Stelios Zacharias (GR), Michalis Tsopelas (GR), Georgia Schneider (US), Katerina Smarianaki (GR), Rosa (GR), Panagiotis Papadakos (GR)

Middle row LtoR: Yoav Negev (IL), Dustin Kisner (US), Yeara Einav-Levy (IL), Yaaron Einav-Poznanski (IL), Dave Ramsay (UK), Methodios Psomas (GR), Tristan Stahl (US), Vasilis Pantelios (GR), Dimitris Asimidis (GR)

Back row: Colin Magee (CA), Petie Barry (IE)

#	Ctry	Name and surname	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10
1	GBR	Dave Ramsay		1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
2	GRC	Methodios Psomas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
3	USA	Tristan Stahl	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
4	USA	Georgia Schneider	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
5	USA	Dustin Kisner	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
6	IRL	Petie Barry	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
7	AUS	Kristen Wills	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
8	AUS	Antigony Haikalis	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
9	CAN	Colin Magee	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
10	GRC	Katerina Smarianaki	1	1	1	1	1	0			1	1	1	1	1	1	1	0
11	GRC	Tonia Lazopoulou	1	0						1	1	1	1	0				
12	GRC	Panagiotis Papadakis	1	1	1	1	1	1	1	1	0			1	1	1	1	0
13	ITA	Roberto Pettrossi	1	1	1	1	1	1	1	0								
14	ITA	Daniele Moretti	1	1	1	1	1	1	1	0								
15	GRC	Mavrokosta Chryssa	1	1	1	1	1	1	1	0								
16	GRC	Vasilis Papavasiliou	1	1	1	1	1	1	1	0								
17	GRC	Christina Zervou	1	1	1	1	0											
18	GRC	Sotiria Perrou	1	1	1	1	0											
19	GRC	Iro Alikatora	1	1	1	0												
20	GRC	Stelios Zacharias		1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
21	GBR	Darren Mackenzie		1	1	1	1	1	1	1	1	1	1	1	1	1	0	
22	GRC	Vasiliki Konstantiadi		1	1	1	1	1	1	1	0							
23	GRC	Katerina Vasilopoulou		1	1	1	1	0										
24	GRC	Kostas Kostidis	1	1	1	1	0											
25	GRC	Ilias Kazais				1	1	1	1	1	1	0						
26	GRC	Yiannis Vavourakis				1	1	1	1	1	1	0						
27	GRC	Eustratios Alexandrou				1	1	1	1	0								
28	GRC	Hara Papailiou						1	1	0								
29	GRC	Thodoris Vourvachakis						1	1	1	0							
30	GRC	Ioannis Soultatos						1	1	1	1	1	1	0				
31	GRC	Alexandros Margiolis							1	1	1	1	1	1	1	1	1	0
32	RUS	Evgenia Kouzmina							1	1	1	1	1	1	1	1	1	0
33	GRC	Michalis Tsopelas							1	1	1	1	1	1	1	1	1	0
34	ISR	Yoav Negev							1	1	1	1	1	1	1	1	1	0
35	ISR	Yaaron Einav-Poznanski							1	1	1	1	1	1	1	1	1	0
36	GRC	Kostas Niamouris							1	1	1	1	1	0				
37	GRC	Yiannis Zacharakis								1	1	1	1	0				
38	GRC	Vaso Hatzisavva							1	1	1	0						
39	GRC	Vasilis Pantelios							1	1	1	0						
40	ISR	Yuval Green								1	1	1	1	1	0			
41	GRC	Michalis Xigkis								1	1	1	1	0				
42	GRC	Komninos Boutaras								1	1	0						
43	GRC	Xenia Georgopoulou									1	1	1	1	1	1	0	
44	GRC	Vasileia									1	1	1	0				
45	ISR	Yeara Einav-Levy													1	1	1	0
46	GRC	Yannis Sourlatzis				1	1	1	1	1	0							
47	GRC	Eva Kamilaki															1	0

AUS CAN GRC IRL ISR ITA RUS GBR USA

Table 1. Participants of 2023 expedition

6. Financial breakdown

The financial breakdown of the expedition is listed below. Transportation costs for the members are not included but are estimated to approach the amount of 12,500 Euro if we count the travel of the Athenian cavers to Crete (we didn't receive any ferry-boat sponsorship this year) or from Heraklion to Chania and the traveling for the foreign cavers. The costs (where known or possible to estimate) of items provided in-kind by sponsors have been included on both sides of the table (both as incoming and outgoing) so as to acknowledge the sponsorship and to have an estimate of the costs for future expeditions. Caving equipment offered / owned by the members of the expedition and the caving team of the EOS mountaineering club has not been calculated in terms of financial value (this includes survey equipment, car batteries and other items for the charging station, drills, etc.). This equipment was returned to the clubs or the individuals who made it available.

#	Incomes	Amount
1	Participant flat fee	2,490.00
2	From SPOK Club reserve	59.50
3	From T-shirts	190.00
4	Participants' food and material fee	5,370.00
5	Sponsorship (Foodstuff)	85.00
6	Sponsorship (various persons)	640.00
7	Sponsorship of FSE (in kind)	400.00
8	Sponsorship of UIS	550.00
9	Sponsorship of NSS	~ 737.86
	Total Received	9,784.50

#	Costs	Amount
1	Food	1,362.50
2	Camp consumables	2,215.00
3	Vehicles, petrol, transfer of materials	387.00
4	Caving material	3,842.00
5	Transfers	1,750.00
6	Others	480.00
7	Food and material sponsorship	485.00
	Total Spent	9,784.50

7. Food facilities and provisions

Again this year we followed the lessons learned from previous expeditions, regarding caloric intake, ratio of protein to carbs to fats, the difficulty of barbecue at altitude, etc., and about the importance of having a dedicated cook on the team who would make sure that the food would be ready at the set time. The doubled up kitchen duties meant that while complex meals could be prepared more easily, there was also time to play with the available ingredients, or yesterday's leftovers, and make some tasty snacks or cheeky deserts. Particularly popular this year was a mountain Halva cooked up by Christina which had some participants asking for the recipe after their return to the USA. This year we also experimented offering smoked herring which was received with enthusiasm by the participants. The sponsorship from the expedition of "Gourgouthakas 2023"⁹ included cave food with various sources of quick calories, such as chocolate croissants and snack bars.

In terms of day to day menu, a lot of emphasis was again placed on locally sourced products. The proximity to Anopolis and frequency of visitors from the road meant that the menu could be enriched with more fresh and meat products – both of which would normally have been limited by their shelf-life in a non-refrigerated environment. This proximity to the road also resulted in not only the arrival one night of 6kgs of delicious roast chicken prepared by the Glymenakis family! We also had the chance to celebrate two birthdays on the mountain with chocolate cakes!

In addition, this year we had to support the bivouac that was accommodating 4 cavers. The food of the bivouac, although not as tasty as the food cooked at the camp, included buckwheat, eggs, various already prepared soups and noodles, cheese, salami, bread, tortillas, nuts, snack bars, chocolates, praline, muesli, cookies, coffee and tea.

The menu – to which we almost completely adhered is reproduced below.

MENU STERNES - 2023						
day	cavers	menu	veg. cavers	vegetarian menu	portions	ingredients (in greek)
26/8	16+3	Chickpeas soup - Rice with Quinoa - Smoked Herring - Sausage - Salad	3		22	1,3 kg ρεβύθια (X60 γρ.), 250γρ. Λάδι/kg, 3 κρεμμύδια/kg, 0,8 kg καρότο/kg, σέλινο, μανιτάρια, γλυκοπατάτα, 0,8 kg ρύζι (X30), κινόα, σαλατικά, 3 λουκάνικα X400γρ., 2 ρέγγες
27/8	19+4	Spaghetti Bolognese - Salad	4	Spaghetti with mushrooms & vegetables	22+5	2,750 kg κιμάς (X125γρ.), 3,5 kg μακαρόνια (X120gr.), 2,5 πουμαρό 500γρ.(1/κιλό), 2 κρεμμύδια/κιλό, μαιντανός, μπουκόβο, 170 ml λάδι/κιλό, 800 gr. τυρί τριμμένο (30γρ./άτομο), σαλατικά, κρεμμύδι, μανιτάρια & πιπεριές για 5 χορτοφάγους
28/8	19+4	Briam with vegetables - Feta cheese - Salad	4		26	6,5 kg λαχανικά (κολοκύθια, μελιτζάνες, μπάμιες & πιπεριές) (X250 γρ.), 2,5 Kg πατάτες (80γρ../άτομο), 2,5 πουμαρό, 1 Kg κρεμμύδια, 1 σκόρδο, μαιντανός, 1,5 kg φέτα (X50 gr.)
29/8	22+3	Pork with leeks & potatoes - Salad	3	Black eyed beans with salad - Feta cheese	25+4	6,5 kg χοιρινό (X250), 0,5 kg καρότα, σέλερυ, 3 μάτσα πράσα, 1,5 Kg πατάτες (60γρ../άτομο), 2 πουμαρό 500γρ. / 250 γρ.μαυρομάτικα, 1 πιπεριά, 1 κρεμμύδι, 1 πράσο

⁹ <https://www.facebook.com/gourgouthakas>

30/8	19+3	Lentil soup - Rice - Quinoa - Salad - Sausage	3	Anchovies instead of sausage	25	1,5 kg φακές (X60 γρ.), 1 πουμαρό 500 γρ/kg, 250γρ. Λάδι/kg, 3 κρεμμύδια/kg, σκόρδο, δάφνη, 1 kg καρότο/kg, 1 κολοκύθια 0,5/κιλό, πιπεριές κόκκινες, σέλινο, ξίδι, 0,6 kg ρύζι (X20), κινόα, σαλατικά, 15 αντζούγιες, 3 λουκάνικα X400γρ.
31/8	20+3	Chicken soup with vegetables & sour wheat - Salad	3	Briam with vegetables - Feta cheese	23+3	6 kg κοτόπουλο (X250), ξινόχοντρος (150γρ./kg), καρότα, σέλερυ, κολοκύθια, 4 κρεμμύδια, 1 kg ντομάτα, 1 πουμαρό 500 gr., λαχανικά για μπριάμ, φέτα 250 γρ.
1/9	25+5	Penne with tuna, tomato, peppers, garlic, onion- Salad	5		33	2,150 kg τόνος (X65 γρ.), 1 kg πιπεριές, 0,5 kg καρότο, 4 κρεμμύδια, σκόρδο, 2 Πουμαρό 500γρ.1 /κιλό, ... ml λάδι, 4 kg βίδες (X110gr.), 1kg ντομάτες, μαϊντανός
2/9	27+5	Spaghetti Bolognese - Salad	5	Spaghetti with gorgonzola	30+6	3,750 kg κιμάς (X125γρ.), 4,5 kg μακαρόνια (X120gr.), 1 πουμαρό 500γρ./κιλό κιμά, 2 κρεμμύδια/κιλό κιμά, μαϊντανός, μπουκόβο, 170 ml λάδι/ κιλό κιμά, τυρί τριμμένο 30γρ/άτομο, 250 γρ. γκοργκοντζόλα, 3 πιπεριές χρωματιστές, μαντζουράνα
3/9	26+6	Lentil soup - Rice - Quinoa - Salad - Sausages	5	Anchovies instead of sausage	35	2,1 kg φακές (X60 γρ.), 1 πουμαρό 500 γρ/kg, 250γρ. Λάδι/kg, 3 κρεμμύδια/kg, 0,5 κολοκύθια/κιλό, πιπεριές κόκκινες, σκόρδο, δάφνη, 0,5 kg καρότο/kg, σέλινο, ξίδι, 0,7 kg ρύζι (X20), κινόα, σαλατικά, λουκάνικα, 10 αντζούγιες
4/9	22+5	Mushrooms & vegetables risotto - Quinoa - Feta cheese	5		30	1,5 kg μανιτάρια, 1 kg κολοκυθάκια, 1 kg καρότο, 1 kg κολοκύθια, 0,5kg πιπεριές κόκκινες, 0,5 kg κινόα, 2,7 kg ρύζι (X90 gr/άτομο), λάδι, 1,5 kg φέτα (X50 gr.)
5/9	20+5	Roast chicken with potatoes - Salad	5	White beans soup - Salad	23+6	6 kg κοτόπουλο (X250gr.), ... λάδι (150γρ/κιλό), 3 kg πατάτες (X100 gr/άτομο), ... σαλατικά / 0,5 κιλό φασόλια, 1 πουμαρό 500 γρ., 250γρ. Λάδι, 1 κρεμμύδι, 0,5 kg καρότο, σέλινο
6/9	15+5	Penne with tuna, tomato, peppers, garlic, onion- Salad	5		23	1,5 kg τόνος (X65 γρ.), 1 kg πιπεριές, 0,8 Kg κρεμμύδια, 0,5 kg καρότο, 1 σκόρδο, μαϊντανός, ... Πουμαρό 500γρ./κιλό, ... ml λάδι, 2,5 kg πένες (X110gr.),
7/9	16+3	Cretan potato salad with eggs and tomatoes - Salami - Feta cheese	3		22	2,2 Kg πατάτες (100γρ./άτομο), 44 αυγά (2 αυγά / άτομο), 3 kg ντομάτες, 0,5 Kg κρεμμύδια, σαλάμι
8/9	16+3	Beef with rice pasta - Salad	3	pea with potatoes	19+3	5 kg μοσχάρι (X250gr.), 3 Πουμαρό 500γρ., 750γρ. λάδι (150γρ/κιλό), 2 κιλά κριθαράκι (X90 gr/άτομο) / 0,5 κιλά μπιζέλια 0,5 kg πατάτες, 1 Πουμαρό 250γρ., σαλατικά
9/9	14+3	Plexoudes pasta with mushrooms & vegetables	3		20	1 kg μανιτάρια, 1kg κολοκυθάκια, 1 kg καρότο, 1Kg πιπεριές, 1Kg κρεμμύδια, 1 σκόρδο, 2,5 kg ζυμαρικό (X120 gr/άτομο), λάδι



A selection of kitchen photos. The last two are from the bivouac.

8. Expedition diary

Prelude – warm winter, white mountains were just ‘grey’

The winter of 2022 to 2023 was not particularly heavy, with no extensive rainfall or snowfall. The warm weather, along with the ‘late’ expedition dates, that were set for late summer instead of July, meant that the entrance to the cave itself should be clean of snow, aside from the usual column of ice, and there should be no need to force a way into the cave. The state of the road was in good condition, since the grader had already opened the road early in July. When we reached the camp, we found that both the snow plug at the kitchen and the iconic ice column at the entrance of the cave were not there. This was the occasion that set as an objective for the expedition the revisiting of the Lagonia cave, where an ice plug restricts access to the deeper parts of the cave, which have not been seen for some decades.



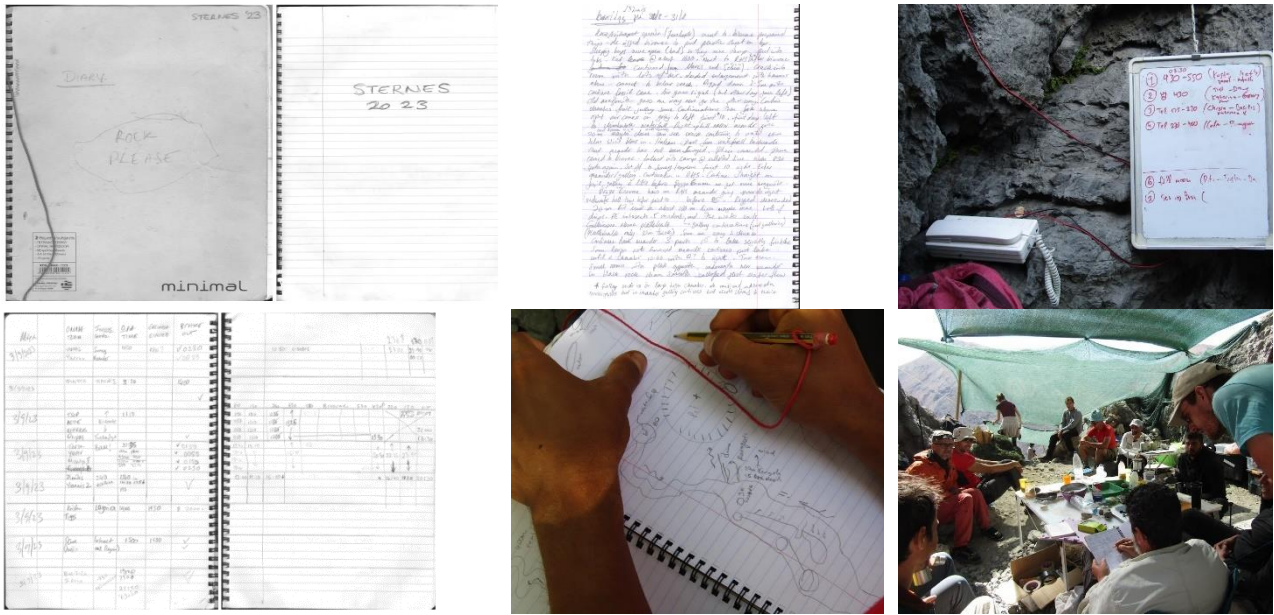
The ice plug in the kitchen, our refrigerator for the previous expeditions



The ‘iconic’ ice column at the entrance was missing this year

Expedition Diary

The text which follows is a summary of the text of the movement diary kept on-site by the camp secretariat. The results of the work in Sternes and the surface survey work are presented after the diary. The camp diary which was kept at the basecamp secretariat is essentially a movement schedule recording each team which left the camp, the time of departure from camp, objectives and expected return date and time to allow the camp secretariat to keep track of all members and raise the alarm if cavers did not return within their specified time. A second document was kept keeping track of arrivals and departures for the purposes of planning dinner portions and collecting participation fees per overnight spent at camp.



The camp diary was kept diligently at the secretariat

Day 0 – 26 August 2023 – Saturday

The team arrived at the basecamp. Tasks focused on setting up the camp and kitchen.

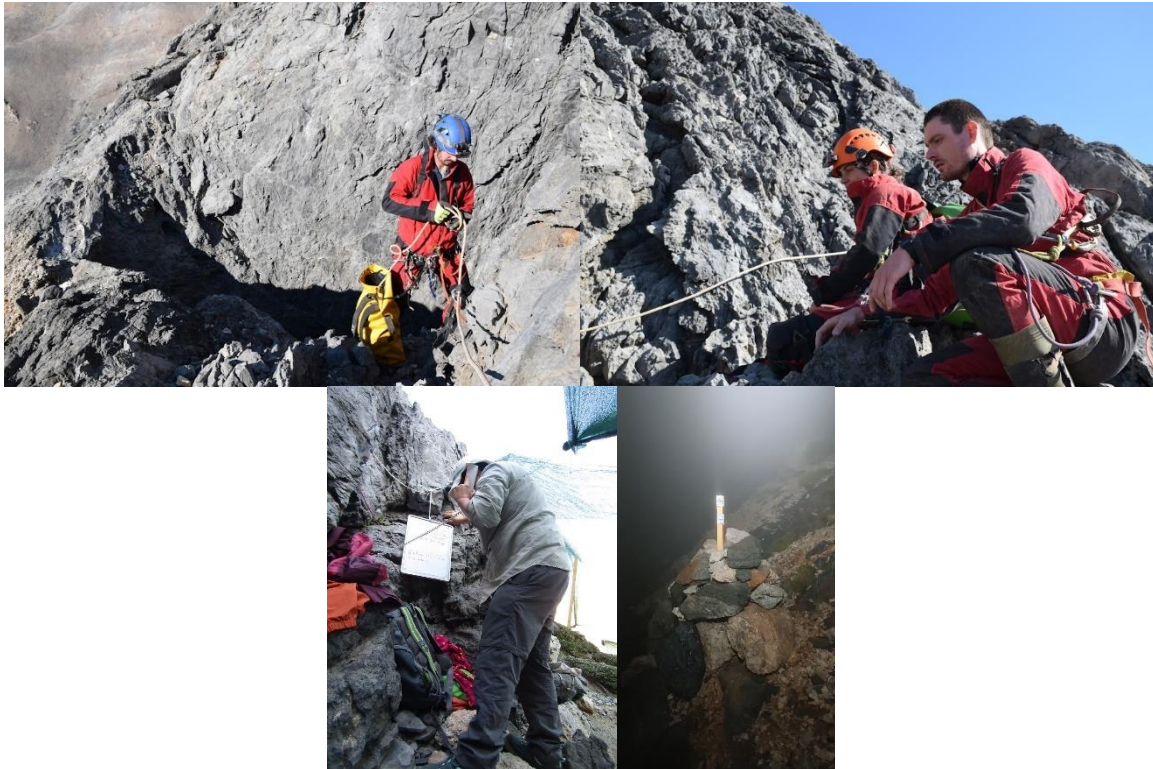


Day 0: Setting up the camp

Day 1 – 27 August 2023 – Sunday

Tristan, Georgia and Petie set off for rigging to -130m followed by Dustin, Colin, Kristen and Antigony who rigged till -400m and left a telephone device at -230m. In between those two teams, Sotiria, Papavasiliou and Tonia started setting up the phone cable from the base camp till -135m. In the evening, Panagiotis, Kostidis,

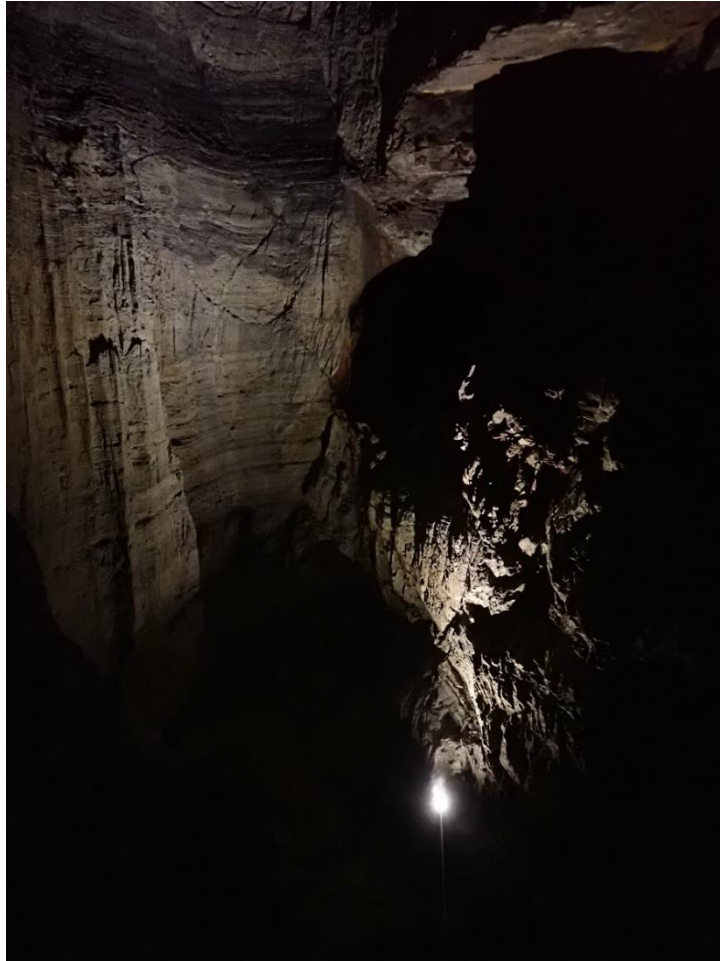
Iro and Maria installed some stone pillars with reflectors on, creating an easy and visible path from the base camp to the entrance of the cave and vice versa. This is important since there are some foggy nights and there are many potentially dangerous pits on the route. The phone left at -230m did not work on the first day, meaning that there was an issue in the old cable from -135m - to -230m.



Day 1 - Rigging telephone setup, and setting up the reflectors

Day 2 – 28 August 2023 – Monday

Methodios, Kostidis, Roberto and Daniele continued the rigging to -550m and carried the materials for the bivouac. Dave, Tristan, Georgia and Smarianaki made some enlargements in the meanders from -430 to -460. Papavasiliou, Chrysa, VK and Vasilopoulou left a first aid kit at -130m and set up the phone cable from -135m till -230m. They were followed by Colin and Panagiotis who checked and repaired the old cable from -235m to -430m, left the rest of the telephone cable at -430m, and joined the enlargement team. Dustin re-rigged the entrance and Petie calibrated the Disto-X. Sotiria, Maria, Antigony and Kristen went out for surface prospection at Katsiveli, while Petie and Dustin went to Troharis.



Day 2 - Rigging until the Bulldozer pit -P42 (-560m)

Day 3 – 29 August 2023 – Tuesday

Petie, Dustin, Colin and Dave went to explore the 'Full Moon' pot. First, they had to set up a trail to the bivouac, in order to protect the aragonites en route and then to set up the bivouac itself. Then they rigged the full moon pit which is a ~70m pit that goes east. The rock quality in the pit is not good and the rigging was difficult. The pit leads to a canyon that descends even deeper. There is an active stream and gravel in both directions, however it gets tighter. The team spent the night in the cozy bivouac. In the meantime, Chrysa, Maria, Papavasiliou, Christina and Iro started rigging the Lagonia cave near the basecamp. Sourlatzis, Sotiria and Xaritakis went to -300m for acclimatization. Vasilopoulou and Methodios installed the phone cable until -560m. There were some problems with initiating a call deeper than the phone station at -430m. However, calls from above -430m reach the bivouac and the sound quality is really good even at -560m. Roberto, Daniele and VK explored nearby pits discovered in 2011, namely 1106 and 1111 with not so promising results. Kristen and Antigony went for surface survey work.



Day 3 - The clean bivouac in the first days of the expedition (above), Danielle rigging P1106 (bottom).

Day 4 – 30 August 2023 – Wednesday

Petie, Dustin, Colin and Dave continued exploring the 'Full Moon'. They managed through some digging to find a large horizontal passage in the canyon that splits in two brackets. They surveyed around 250m of horizontal passage. However the surveying of the pit itself was left for another time. Then they exited the cave. In the meantime, Daniele, Kostas, Panagiotis, and Roberto went down, bringing bivouac supplies and with the aim to explore the 'New Moon' gallery, the tight passage near the bivouac. They first set up the telephone cable to the bivouac, meeting Petie, Dustin, Colin and Dave as they were exiting the conduit. The two teams exchanged information about the current state of the 'Full Moon' exploration and the bivouac. Then they spent one hour adjusting the bivouac, because the roof was collecting water. Finally, they set off to explore the 'New Moon'. They managed to break through two tight passages and a collapsed part of the gallery, discovering and surveying ~350m of a new part of the conduit, similar in dimensions and speleothems with the rest, however with more impressive leopards. In most parts of the conduit, on the floor there is a narrow meander where there is an active stream some meters below which was not explored. Also two big windows, parts probably of another level of the gallery, were left unexplored. The exploration ended in a promising lead in an ascending meander that has air flow but needs enlargement, near a room with a waterfall. The traverse that was rigged nearby to help the cavers pass a slippery muddy steep slope, leading to the meander at the right and the waterfall at the left is not safe (the rope is still there)! Another split of the conduit was set as the main goal for next day exploration. The team returned to the bivouac as arranged at 11pm, to inform the outside camp, to eat and get some rest. Chryssa, Tristan and Georgia got some geological measurements and tried to resurvey the Damocles room at -240. However, there was an issue with the distoX. Ilias, Thomas, Yiannis B. and Stratis went for acclimatization until -240 and Antigony and Kristen went prospecting.



Day 4 - Finding the new part of the gallery at 'New Moon'

Day 5 – 31 August 2023 – Thursday

Daniele, Kostas, Panagiotis, and Roberto woke up early in the morning and set off to the unexplored split of the gallery. They surveyed around ~150m of new path when they reached a huge pit ~15m from the bottom. The diameter of the pit is more than 20m and it was intersecting the gallery in multiple parts, showcasing that the gallery has multiple levels. Two parts of the conduit with a diameter around ~3m were on the opposite side, while two others could be seen at a higher level at the right. After rigging the team was able to appreciate the scale of the pit. The height of the pit was estimated to be more than 80 meters. However, the roof was not clearly visible. The pit is active with constant rainfall. This is probably the most impressive pit of the cave up to now. The Italians proposed its name, 'Pozzo Enorme'. The team decided to not explore the conduit entrances but followed the meander that was developing at the bottom. After some narrow parts and small rooms the meander led to a chamber with plattenkalk. On the floor there was a hole, where the meander continued in clean black dolomite stone with extensive fine-grained scalloping and constant water flow. The team was extremely excited since this is the first time such a clean meander with constant water flow was found in Sternes. The team surveyed until the entrance of the black meander and then they continued the exploration. Time was pressing since they had to start the trip to get out. The meander was really curly and after ~400m they reached a big room with plattenkalk. A huge plattenkalk mirror could be seen on the roof and the dropped rock on the floor. The team explored the big room, but all leads were closed. Except one that needed rigging. However there was no rope left to continue the exploration. The sound of the active waterfall that was filling the room below brought hopes for more unexplored paths that could lead deeper into the cave. The Greeks proposed to name the room the 'Italian chamber', to honour the Italian participants of the team and took a picture before starting their ascent. When they reached the bivouac they met the new team that brought supplies and was going to spend the night inside, Methodios, Sourlantzis, Stratis and Theodor.

After enthusiastically explaining to them what they have explored and discussing the problem with the phone (the line is cut from 230m and below), the new team set off to explore the Italian room lead and survey the black meander. Luckily enough they were able to find their way to the 'Pozzo Enorme' and continue until the entrance of the black meander. It was already late at night (22:40). The team split into two. The first team,

Sourlatzis and Stratis surveyed the black meander, while Methodios and Theodor took ropes to continue the exploration. They rigged the 3m pit and found that the water from the meander was going under some boulders. However, on the other side they found a waterfall with inflow water at 3m up. The water was going down in a rift in the plattenkalk. They rigged the rift that was about 10m and found a joint fracture of around 4-5 that had to be rigged. They found a water lake, but unfortunately the water gets lost below rocks. There is a small balcony with a window at the first 10m drop in plattenkalk that could potentially give a continuation. The team managed to survey until the first rigged pit under the Italian chamber. It was late at night (01:00), so the team decided to get back to the bivouac. On their way back they also annotated the path to the black meander with red-white tape since it is easy for newcomers to get lost. Finally, they enlarged one of the narrow parts near the bivouac, and managed to get some rest. At the upper parts of the cave, Ioannis, Papavasiliou and Vasilopoulou were expanding the meander at -460m, and were followed later on by Gregory and VK. Antigony, Colin and Kristen calibrated the distoX and resurveyed the cave around the Damocles pit, to fix an anomaly in the data (stations 43 - 51). Ilias and Thomas went prospecting for some GPS points from Ilias phone in the Kakovoli area. Respectively, Dave, Dustin, Georgia, and Tristan went prospecting for some pins from Dustin's phone and rigged Lagonia. Petie went for a walk to get access to the phone signal.



Day 5 - Finding 'Pozzo Enorme' (left and middle), 'Black Meander' (right).



Day 5 - The Greek-Italian team at the 'Italian Chamber' (left) and the waterfall below it (right).



Day 5 - Methodios rigging the rift below the Italian Chamber (left) and at the lake below the rift (right).

Day 6 – 1 September 2023 – Friday

Methodios, Sourlatzis, Stratis and Theodor, woke up late in the morning. Before taking the route back home they changed the cable of the bivouac phone with no improvement in connectivity. While they were leaving the camp they heard the phone ringing. It was Elias, Thomas and Yiannis from -230m who had fixed the problem with the cable as they descended to -430m for acclimatization. The old bivouac team met the new one, Colin, Dustin, Georgia, and Tristan on their way up and exchanged with them data and information. The new team reached the bivouac at 16:00 with supplies. They took the survey gear and went to finish the survey at the 'Full Moon' pit. The team managed to find a breakdown, and by climbing to the top they managed to avoid the tighter bottom part and get themselves into a continuation of the canyon 0.5 wide and 6m high with water. The team surveyed everything and connected the survey to the 2022 survey. Then they returned to the camp. Petie and Dave visited Lagonia. This time the cave was rigged. Inside the cave, the snow and ice that usually restricts access deeper into the cave was not so thick due to the warm winter. As a result the team managed to get deeper into the cave. However, after a few meters below the ice plug, no continuation leading deeper to the cave was found. The place is not promising due to shattered rock. The team surveyed the deeper parts of the cave.



Day 6 - Lagonia cave was rigged

Day 7 – 2 September 2023 – Saturday

Colin, Dustin, Georgia, and Tristan woke up, ate some breakfast and at 9am headed towards the 'Italian Chamber' and the 'Black Meander'. They also brought gear to do the aid climb at 'Pozzo Enorme'. Their first aim though was the waterfall that was not explored the previous day and carries the most significant stream of water in the cave until now. After a 3m climb they found a large walking meander heading upstream. The team also found a passage downstream, in the part the previous team has rigged down to the pool that rocks that were filling the passage. After some digging and expansion the team managed to find 15m of horizontal passage that led to a sump. Through a very tight passage above the sump they managed to pass over it and get to the other side. From there the 1x1m passage continued over 0.5m of water. However, to continue you would need to get wet. Since there was no airflow, the team went back to station 10.10 at 'Pozzo Enorme'. They did a 6m free climb and rigged a rope to the window opposite to the entrance to the pit as you come from the bivouac. This is the continuation of the phreatic upper level. The passage has a lot of breakdown

and a canyon in the floor, probably the upper part of the black meander. This upper part carries a lot of air and should be pursued in the future. After surveying this part, the team exited the cave.

Another team, Ioannis, Gregory, VK and Dave, went exploring the gallery with various projects. Dave was the only team member that had been to the gallery before, so his help was crucial in order to find the positions of the assigned tasks. The team expanded some narrow parts in the gallery. In addition they rigged a 15m pit in the gallery at point MA00, However they did not manage to continue since the pit needs expansion. At the bottom there is water. Another 10m pit close to the previous one probably with the same water was not explored, although it can be descended easily. The team prepared a hole for a dyneema and there is a natural anchor for future rigging. The team continued surveying the upstream (point MA06), until they found a connection with the downstream fossil gallery (PR16 0922) (connection of the 'Leopard gallery' upstream with the 'Plastic gallery downstream'). Dave got cold and preferred to start the ascent while the rest of the team went to the bivouac to eat and relax. They left the bivouac at 21:30 and reached the basecamp at 04:00. Some members of the team commented that a day trip to the gallery is a waste of energy and time, when there is work to be done there. Alexandros, Evgenia, Elias, and Vasilis were the next team to spend the night in the bivouac. The aim again shifted towards the other part of the leads, the 'Full moon', where the U.S.A. team had stopped. They continued the exploration in a very narrow meander. They rigged a pitch and continued the meander until a 3-4m drop that they descended freely. After a sharp turn they reached a siphon. The team thinks that this might be linked to the 2019 bottom at -595m. Finally they returned to the bivouac at 2am. Further up in the cave, Panagiotis and Tsopelas went to expand some narrow parts at the pit at -460m to make the exit from the cave more comfortable for tired cavers. Also, Yoav and Yuval made an acclimatization trip to -240. Kristen and Antigony went surveying Lagonia while Pettie made some adjustments to the rigging. At the same time, Markos, Tonia and Xygis collected the loggers that were left at Lagonia last year. They did not manage to get one of them (Number 3). Finally, Stratis, Chara, and Zaxarakis hiked at Pachnes and Trocharis summits.



Day 7 - Happy faces in the bivouac and the meander at -430m



Day 7 - Dustin after completing the climb to the gallery window at 'Pozzo Enorme'.

Day 8 – 3 September 2023 – Sunday

The next day the bivouac team woke at 7am, because Vasilis had to leave the mountain early in the afternoon. The team headed to the 'Pozzo Enorme' and explored the right gallery window, opposite the passage coming from the 'New Moon' to the Pozzo Enorme. They found where the U.S.A. team had stopped previously. There was a small rope dropping into an active meander about 15m down, but the passage continued high up. Elias and Vasilis decided to go back and exit the cave, while Alexandros and Evgenia continued as far as the lack of equipment would allow them and did the survey. There were many places in the meander where you could descend. They walked upstream about 100m in this 'candlestick' meander which was difficult to explore either along the high route or the low route. At some point continuation without equipment became impossible and they turned back downstream. The upstream has not been surveyed. On the way back they met Markos, Petie, Thomas and Tsopeles. Thomas just left supplies to the bivouac and left the cave, while the rest would spend the night at the bivouac. They headed to the black meander with the aim to explore the meander at the waterfall. After climbing the 4m waterfall, they found that the dimensions of this meander are larger than that of the black meander. They followed the meander in the opposite direction of the water flow. Some places in the meander had breakdowns with potential continuations, but the team kept following the water flow in the opposite direction. No one recalls how long they had been walking but at 10pm they decided to start surveying as they were going back. After a while the team split, and Markos continued surveying while the rest rigged the 4m waterfall. In total they surveyed 480m of new paths. Finally, they set off to the bivouac. They reached the bivouac at 3am, cooked and slept. On other parts of the cave, Yuval and Yaaron re-surveyed the meander explored in 2017 / 2018 between the old bottom and Bulldozer Pit, finishing a little before Bulldozer. Tonia, Yoav, Xygis and Yannis went to expand some narrow parts below -430. Dimitris and Zacharias went to -240m, and Vasilis and Xenia went to -130m for acclimatization. Kristen, Antigony, Dave and Dustin visited Lagonia. Filipa hiked to Pachnes.



Day 8 - Exploring the Con-Crete Canyon.

Day 9 – 4 September 2023 – Monday

In the morning, at 8:30am Petie tried to phone the camp. Unfortunately the phone had stopped working and he went back to sleep. At 11am Markos, Petie, and Tsopelas woke up and had breakfast. Petie would spend one more night in the bivouac with the next team of Methodios, Tristan, and Xenia, while Markos and Tsopelas started ascending the cave. Markos on the way up took geological dip measurements at various depths. The team of Methodios, Tristan, and Xenia entered the cave late at 12:15, also checking the telephone wire on their way down. At the bivouac they met Petie at 15:30 and decided to continue the 'Con-Crete Canyon', as the meander after the waterfall had been named. Methodios de-rigged the part that goes downwards. Tristan and Petie started surveying while Methodios and Xenia explored. About 500m into the 'Con-Crete Canyon' there is a passage where the exploration had stopped the day before. Methodios and Tristan went in, and shortly afterwards there was a small chamber. To our right there was a small stream coming from a very narrow passage, but over it there was a short meander leading to a 3m climb on the rock. Methodios climbed up and found the cave continues upwards. The team left this part and decided to continue on the other side of the chamber, following the main stream of water. It was a rocky meander, with deep pools that snakes around, that continued for about 200m, until the cave split again towards two different directions. The team decided to stop there and go back (around 21:30). Tristan and Petie had started surveying the new part. Finally, after surveying 310m, with their feet numb and cold, having fallen in the water a few times they turned back at 23:30. The team went back to the bivouac at around 1:15, where they had had dinner and went to bed about an hour later. Further up in the cave Colin replaced a worn rope below Sisiphos at -130m. On other fronts, Tonia and Georgia surveyed a small cave (23GS 002 / White rock cave) around Pachnes, while Dustin, Zacharias, and Smarianaki, Yoav went to explore some GPS points from Dustin's phone around Thodoris summit, including two dolines. Yuval and Vasilias visited Lagonia.



Day 9 - Con-Crete Canyon. Methodios free climbing at the left. There is strong water flow.



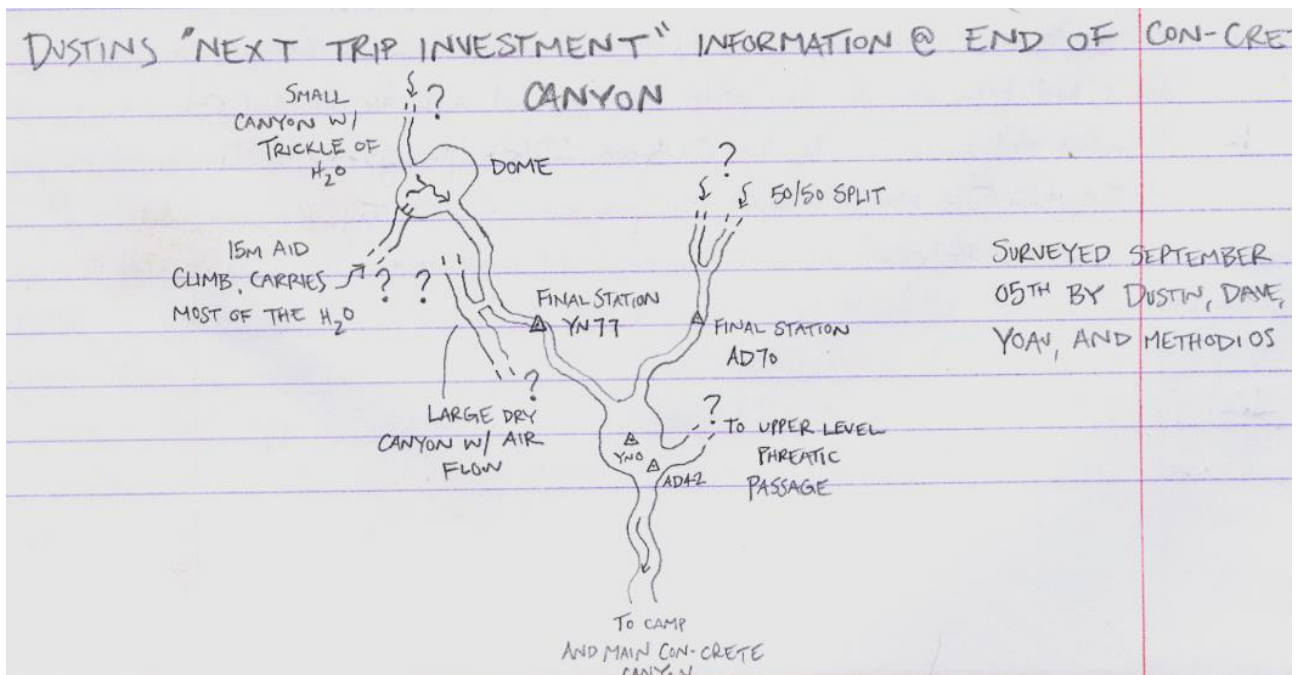
Day 9 - Georgia (left) and Tonia (middle) surveyed the 23GS 002 (White rock cave).

Day 10 – 5 September 2023 – Tuesday

The next day we had a lot of rain due to Storm Daniel. The storm lasted two days and created issues in the outside camp, destroying some tents and parts of the kitchen. Most cavers in the basecamp were wet and cold. However at the deeper parts of the cave the teams had no problems, noticing only an increase in the water flow down in the meanders after 'Pozzo Enorme'. At around 10:30 in the morning the bivouac team had breakfast and then Petie, Tristan, and Xenia started their way up leaving Methodios in the bivouac. In the meantime, Dave, Dustin, and Yoav, entered the cave. They met Methodios at the bivouac site at around 3:00 PM. They went to the known end of the 'Con-Crete Canyon' at station BB59. Dave and Dustin began surveying from there via the AD designation, while Yoav and Methodios went ahead to survey the branch Methodios had found the day prior. Both teams surveyed until about 21:00, around 500m approximately. The team scooped both passages to find much more passage ahead and leads branching off, with all leads having strong air flow. Finally, the team returned to the camp at 2:00 AM. It takes about 3 hours of fast travel to reach the current end of exploration in upstream Con-Crete Canyon. At the beginning of the 'Con-Crete Canyon' there is a good location for a camp which would reduce travel time to the current lead of the exploration to about 45 minutes or an hour. Yaaron made a detailed survey from the meander at -430m to as far as the Bulldozer pit, while Yuval set up loggers at the entrance of the cave, at -430m and at the bivouac.



Day 10 - Cooking inside the bivouac (left), and views outside the bivouac (middle, right)



Day 10 - Con-Crete Canyon. Sketch of leads at the final stations.

Day 11 – 6 September 2023 – Wednesday

In the morning, after breakfast Methodios and Yoav exited the cave, while Dave and Dustin went to check a lead Dave had surveyed with Ioannis a few days prior. This lead was between the bivouac and the entrance to the gallery. Dave had left a pit with a tight pitch head. The team rigged down two pits and left the 3rd as they were out of gear. They tried to make the survey, however there were issues with the distoX. Dave exited the cave while Dustin returned to the bivouac to wait for the next team. The next team was Antigony, Colin, and Kristen. The team made their way up to the cave in atrocious weather, with heavy rain, wind and a couple of hail showers. So it didn't matter much that most of the pitches had turned into mini waterfalls since the team was already well and truly soaked. They reached the bivouac at 17:00. Since the newcomers were already tired, wet and cold from the storm outside and the waterfalls inside the cave, the team decided to sleep and explore / survey in the morning.



Day 11 -The Daniel storm hit the camp hard for two days.

Day 12 – 7 September 2023 – Thursday

In the morning, Antigony, Colin, Dustin, and Kristen woke up at 5:00, and after breakfast at 6:00 they headed to survey / continue the exploration of what Dave and Dustin did the day prior. They surveyed with the AE&CD designation and connected to the CA survey in the passage at the bottom of the 'Full Moon' pit. There were some issues with the distoX, perhaps because of all the water, but luckily the team had two with them so we were able to finish the job. They derigged the pit series and went back to the bivouac at around 11 for some snacks and to pack some things. Antigony, Dustin, and Kristen exited the Cave while Colin returned to the bivouac to wait on the next team. In the meantime the last team to stay at the bivouac, Georgia, Panagiotis, and Tsopelas, entered the cave at around 12:00. They found Colin at the bivouac at around 16:00 and split into two teams. Colin and Georgia went to derig the 'Full Moon' part of the cave while Panagiotis and Tsopelas went to derig the 'New Moon'. Panagiotis replaced the aluminum carabiners with Dyneema in the climb at the left window of 'Pozzo Enorme' that was done on Day 7, in order to leave the rope for next year. In addition, he further explored this part of the gallery, revealing a passage by removing some stones that lead to two new rooms. However there are many loose rocks in those chambers with no hope for continuation. The two teams met late at night at the bivouac, with all the gear packed in bags from the two leads. After a very rich dinner, eating all the leftovers, they slept. Petie hiked at Pachnes and to the British expedition basecamp.



Day 12 - During the expedition many cavers visited the Pachnes and Trocharis summits.

Day 13 – 8 September 2023 – Friday

In the morning, at 11:00 the bivouac team had a rich breakfast with the leftovers and started packing the bivouac. The decision that was taken the previous days was to get everything out (tent and sleeping bags) and only leave the plastic film protecting the bivouac underneath and above in a safe place. The team spent a few hours packing all the gear in the bags, when Dustin arrived. All together they spent some time moving the bags from the bivouac outside the gallery. It was then that Tristan, Methodios, and Petie arrived and all together started the trip upwards. Dustin was de-rigging, leaving the ropes protected in bags at safe places inside the cave. In the meantime, at 12:00 Yaaron, Yeara, Yoav, Smarianaki, and Xenia, got into the cave to take photographs. Yaaron and Yeara went down to -135m and then started their way out. The rest continued down, with Yoav taking photographs down to -300, where they met the fellow cavers coming from underneath at around 16:00. A rock that fell just below -135m to the hippocampus pit scared the series of cavers that were on the consecutive ropes, luckily without finding any caver or rope in its way down. The team managed to de-rig until -240m that day.



Day 13 - Images from the first 300m of the cave

Day 14 – 9 September 2023 – Saturday

The next day, Dave and Alexandros completed the de-rigging of the whole cave. Yuval, Yoav, Yaaron and Vasilia visited and de-rigged Lagonia. The rest of the team had a small party at basecamp, eating watermelon, eggs, cheese and cooking the leftovers, while drinking the last bottles of raki. Many discussions about the results of the expedition and the objectives for the next year took place.



Day 14 - Team from Israel (Yaaron, Yoav, Yuval) at Lagonia cave.

Day 15 – 10 September 2023 – Sunday

This was the last day of the expedition. The whole team was busy packing up the camp and moving the equipment off the mountain. Other members of SPOK, including Eva and Christina, also joined the team on the mountain to help with the transport. After a delicious lunch at Anopoli Rooms – Glymenakis Family the members of the 2023 expedition headed some to their homes and others to sandy beaches, with a promise to meet up again next year to continue the exploration even deeper in the cave.



Day 15 - Packing up the camp and back to civilization.

9. Biospeleological and other biological notes

In order to study the biodiversity of the Sternes cave, macro-invertebrates (organisms which are visible to the naked eye) were sampled with forceps after careful observation of the rocky cave walls and without the use of traps. The collection of the different organisms was applied at several different depths of the explored cave sections and during all speleological expeditions carried out from 2017. In total, several troglobiont invertebrates were collected constituting: 9 mites (Arachnida), two individuals of the same coleoptera species of the family Staphylinidae collected in previous years and four collembola. Among troglaxene species were diptera, some of which of the genus *Tipula* (observed alive even at the depth of 390 m), spiders, chilopods, trichoptera of the *Limnephilidae* family and a bat observed at the depth of 70 m constituting the highest record of chiroptera in Greece. During the last expedition a troglobiont isopod was collected for the first time from the depth of 100m while one more troglobiont springtail (collembola) was collected from the upstream part of the underground river at the depth of 600m and more than 1,5km from the cave entrance.



An individual of the troglaxene trichoptera family *Limnephilidae* (A), a troglobiont collembola (B) and a troglobiont arachnid 1mm long (C).

In the context of the next expedition we aim to place traps in several stations mainly distributed from the cave entrance to the depth of 325m, where higher species richness and abundance of taxa has been observed, in order to collect more cave species. All the identifications and descriptions (which are in progress) are taking place in collaboration with experienced taxonomists from different universities and countries. Further, there is interest in collecting bacteria from water pools, especially in the conduit.

10. Study of the geological stratigraphy of the cave

In order to study the geological history and the stratigraphy of the cave, several measurements were taken in different rocky substrates. Several cracks and rifts were recorded as well as their mirrors (when visible) and the inclination and orientation of different rocky layers distributed along the cave were measured. All measurements were collected with a geological compass in different depths of the cave and several samples were collected for further crystallographic analysis with the use of special microscopes. The different rock types were also recorded in order to make a geological map of the cave and its surrounding area. Furthermore, three temperature and humidity detectors were placed in different stations of the cave (cave entrance, -430m and the bivouac) which will collect cave environmental data throughout the year. All collected data which will be transferred during our next expedition as well as more measurements will provide useful information for the reconstruction of the geological map of the area in collaboration with expert geologists of the University of Sharjah (UAE) and the Natural History Museum of Crete.



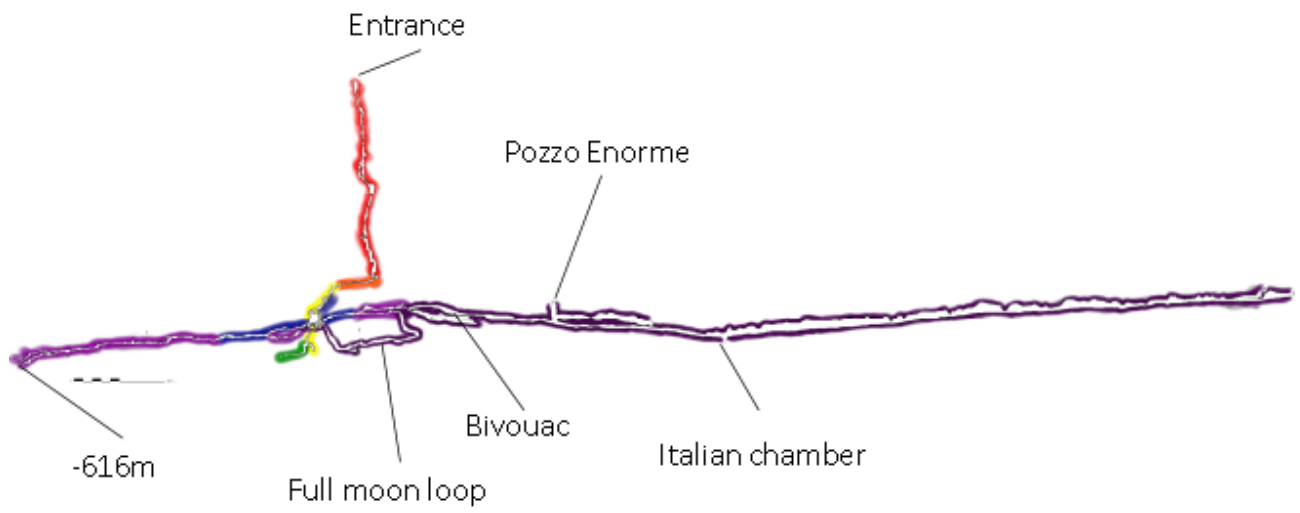
Measurements of the inclination and orientation of different rocky types with the use of a geological compass (A,B), a type of pyroclastic rock (C) and the three detectors placed inside the cave (D).

11. Outcomes at Sternes

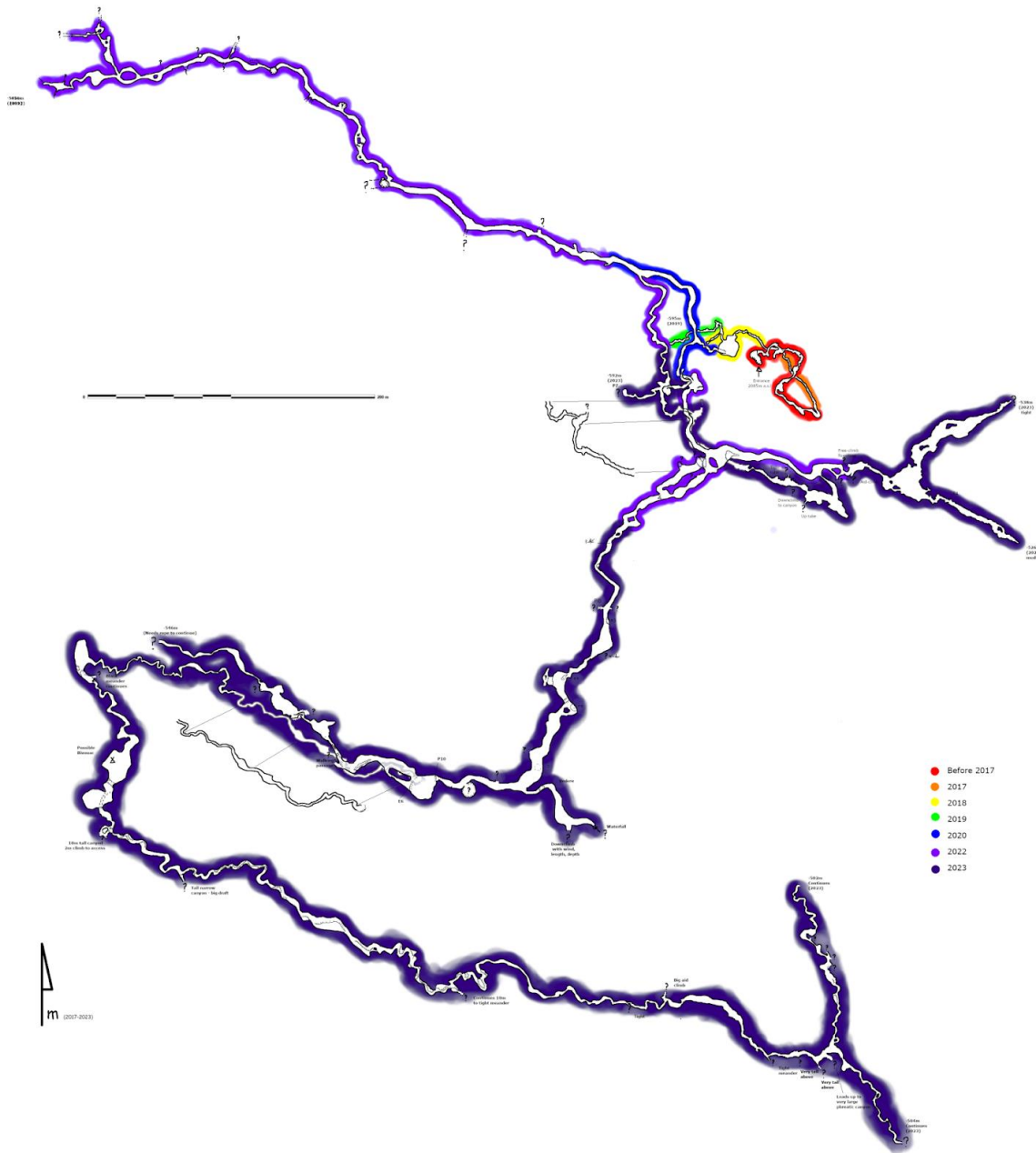
The outcomes of this year's **exploration** were impressive. The Sternes cave is now **5.6km** long and **616m** deep. In particular **3162m** of new, almost exclusively horizontal passages have been explored and surveyed this year (as shown in the following figures). This places the cave in the third place for longest cave on Crete, behind Ano Peristeras and Tafkoura. The new passages include the 'New Moon pot' that was explored this year, a new part of the gallery named 'New Moon' gallery, 'Pozzo Enorme', a huge pit that was reached 20m from the bottom that intersects the gallery in multiple points and another big pit nearby 'Pozzo Enorme II' that were not explored upwards, the impressive 'Black Meander' in dolomite rock that develops for more than 300m and the 'Con-Crete Canyon' that develops upstream for more than 500m. Both of them have water flow and meet in the 'Italian Chamber', a big room with plattenkalk. Below this room there is a rift that ends in a water lake that needs to be explored further. Many more promising leads are still waiting to be explored as discussed later on. Based on previous years' experience, the expedition members were focused on exploring the gallery. This will allow us to understand the development of the gallery, which is the oldest part of the cave system, while in the meantime it will intersect other newly created parts of the cave and pits, like 'Pozzo Enorme', **fleshing out the fuller knowledge of the cave**. So many of the deep caves of Greece are explored only to the deepest point with little work being done on parallel routes or side-chambers.



Profile of Sternes Cave in 2022.

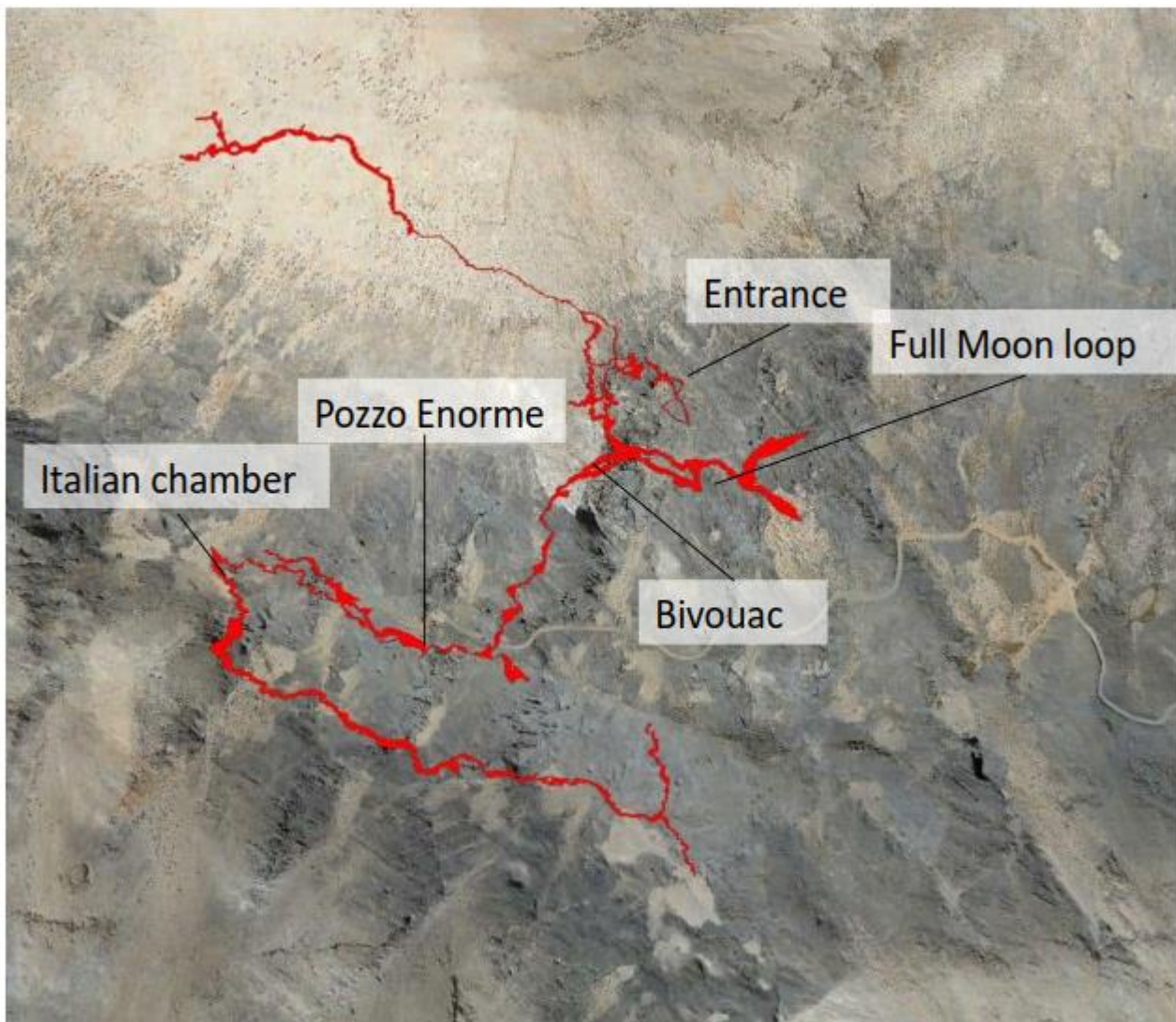


Profile of Sternes Cave in 2023.



Plan of the Sternes Cave showing progress from 2017 to 2023

As it can be seen from the plan and the figure below, the downstream part of the gallery is directed west (up and right red line) towards the Pachnes summit. On the other hand the newly discovered ‘New Moon’ part of the gallery (red line below the bivouac), starts heading south and west until the ‘Italian Chamber’, and then turns 180 degrees heading south east towards the Lagkonia cave.



Sternes Cave overlaid on top of the map.

Progress was made in 2023 in **surveying / resurveying / sketching** the cave for publication of a new survey which will include a plan view in addition to the section completed in 2010 (which is based on the original GSO survey of 1992). The new detailed survey is not yet completed at the time of submission of the present report but will be ready for the next expedition.

In addition, a lot of effort was spent on making **access to the deepest parts of the cave** easier, by enlarging the tight passages and the meanders from -428m to -530m. This is a prerequisite for a more comfortable trip to the gallery in both directions. It is also needed for a safer trip. However, more work is still needed to allow access for stretchers in case of an accident.

In other fronts, cavers **continued the exploration of nearby pits** that were discovered in 2011 that have been suspected to be linked to the Sternes Cave and are located to the west of the deepest point of the cave - 616m. Pit 1106 was explored and surveyed in the early days of the expedition. In addition, more than 10 new entrances were marked by the multiple surface teams. Most significantly, the ice-cave Lagonia (LA2-LA3) was re-surveyed digitally and explored below the ice-plug which had denied access to many decades worth of visitors. Several other caves were discovered and surveyed near to basecamp.

Finally, **in the scientific front**, the expedition was able to take measurements of dip and dip directions of geological strata encountered within the cave to assist in the hydrogeological model being created by the UNESCO-supported project "IGCP 715 A new karst modelling approach along different tectonic contacts". Sampling and recording of cave life from a number of locations within Sternes cave, resulting in the collection

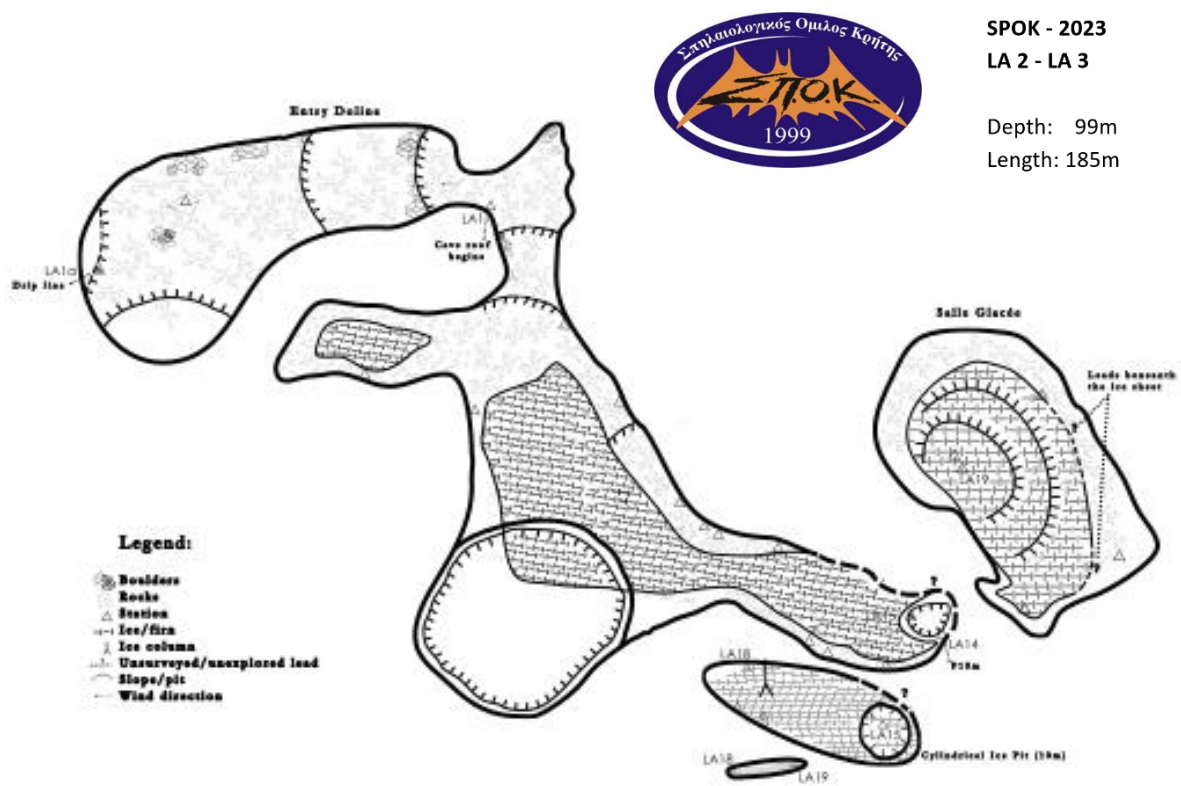
of collembola, arachnids and some winged insects which are shared with laboratories for identification and / or description.

However, **the most significant outcome** is that for one more time the expedition has provided an opportunity for the members of SPOK and other Greek cavers to exchange ideas and experiences with international cavers from nine countries on four continents. The number and diversity of leads remaining to be explored is exciting. Needless to say, planning is already under way for Sternes 2024.

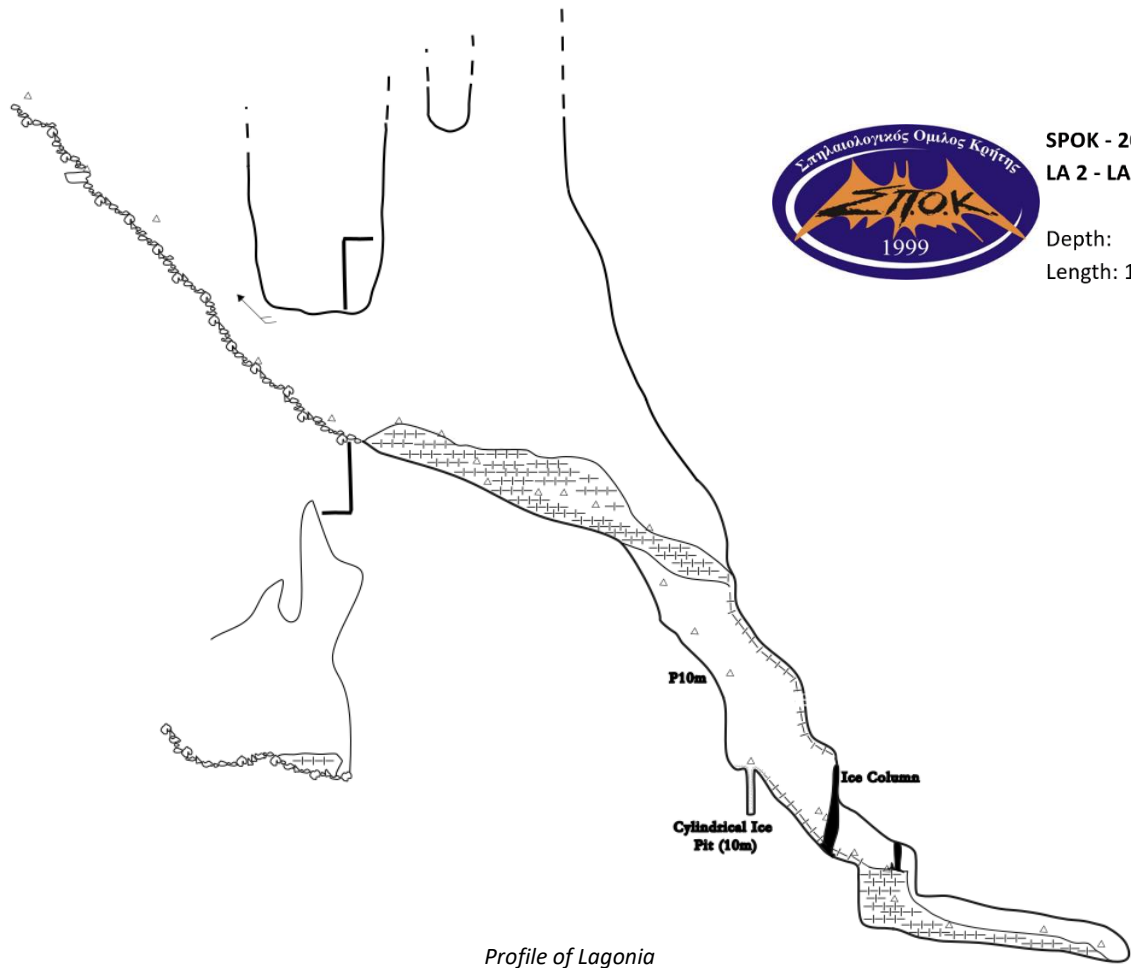
12. Surface survey and other caves

Surface survey in 2024 focused on two goals. One was to check the pits found in previous expeditions (especially 2011) which are at a distance of a few hundred meters further West of the line of the 2022 survey, for possible connection; and to search above the central survey-line of the newly discovered parts of the cave. In addition, free-form surface survey was done by numerous teams while out walking.

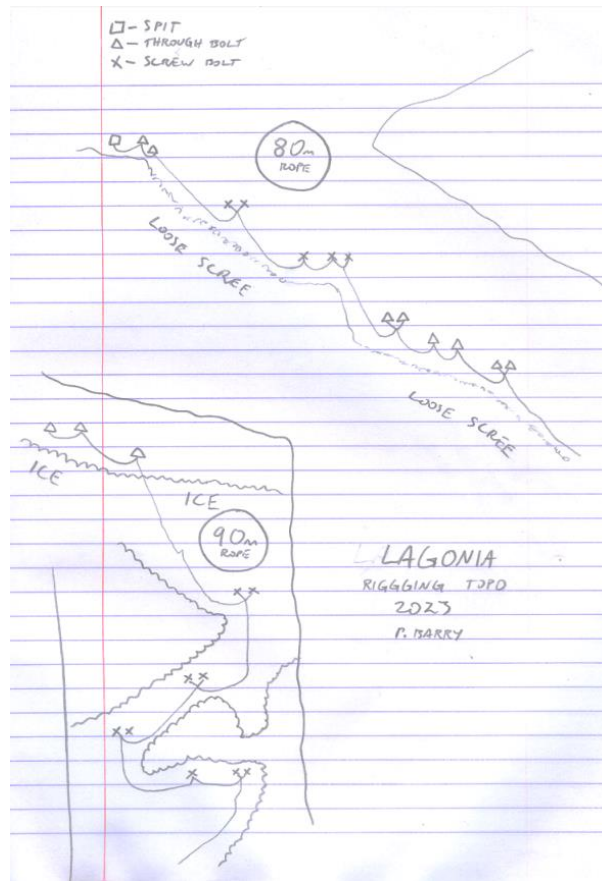
In the context of the expedition the team explored the caves of Lagonia, P1106 and 23GS 002 (White rock cave). All of them are nearby the camp and could be connected to the Sternes cave. Of special interest was the ice-cave of Lagonia (LA2-LA3). This is a cave that is visited every year since it is very close to the camp and ends at an ice-plug that restricts access deeper in the cave. However this year, due to the very warm winter the cavers managed to pass through the ice plug. Unfortunately the cave ends a few meters below. Antigone, Petie and Kristen surveyed the whole cave. The depth of the cave is now 99m and the length 186m.



Plan of Lagonia

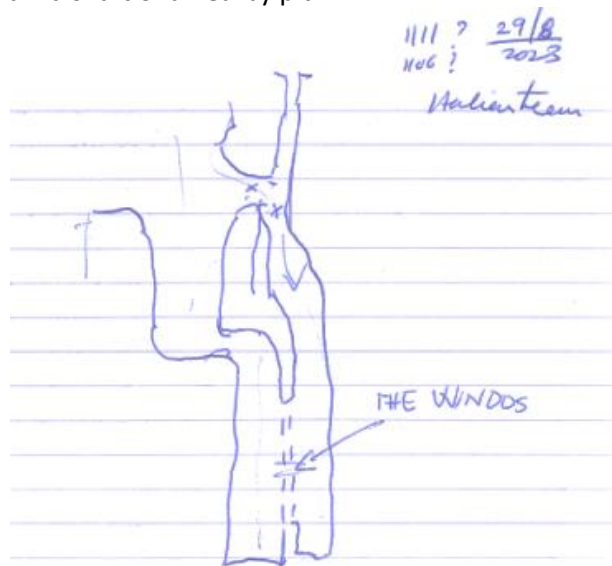


Profile of Lagonia



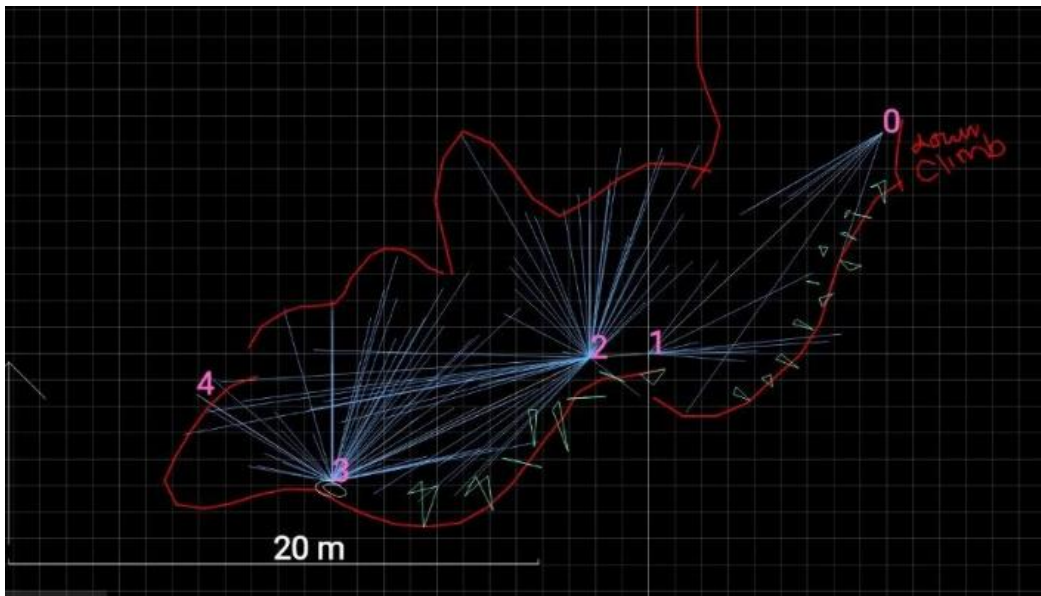
Rigging of Lagonia

P1106, a cave that was originally thought to be connected with the Sternes cave was also explored. There was a window left unexplored from previous years. The Italian team went there on the 3rd day of the expedition. The pit ended without continuation, since the exciting window a few tens of meters below the entrance, connected to the blind shaft of a nearby pit.

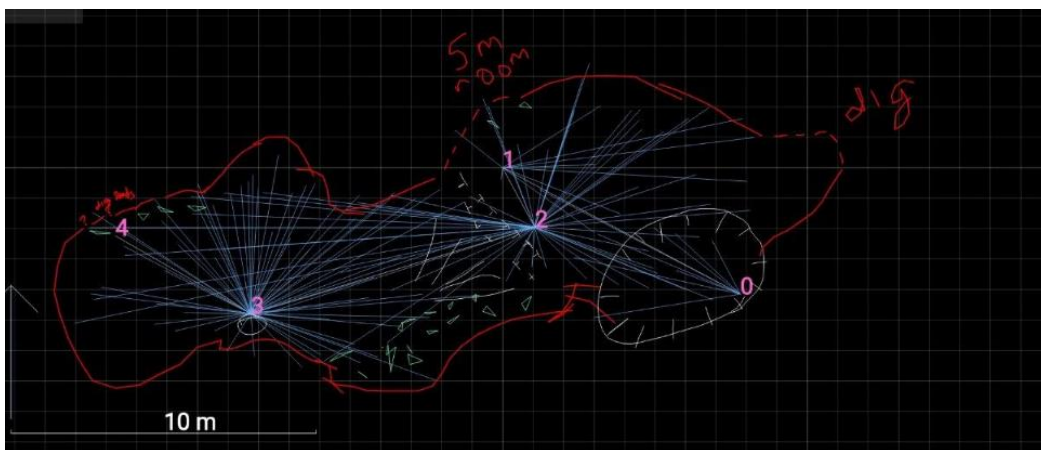


P1106. The unexplored window connected to the blind shaft of near pit

Finally, Georgia and Tonia explored and surveyed the GS23 002, the 'White rock' cave which is on the road towards the Pachnes summit. Unfortunately the cave was not of much interest without digging.



Profile of GS23 002







Plan of GS23 002




Other points of Interest




Getting ready to leave the camp and checkout some holes

The 2024 surface survey added the following points of interest to the database:

Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23AH001	35°17'32.17"N	24° 3'51.44"E	2126	8.5 deep, Pit.
				
23AH002	35°17'34.07"N	24° 3'57.79"E	2135	Oval opening with small window entrance at bottom. Window 1.7m off floor. Descended 5.5m cave depth from overhang is 9.6m. Spider life. No further leads. Rubble choke.
				
23DK001	35°17'9.02"N	24° 3'11.88"E	2157	1s free fall with a bit of tumbling down, decent rock for bolting

Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23DK002	35°16'52.86"N	24° 2'50.21"E	2229	Possibly 23DR001, also
23DK003	35°16'53.84"N	24° 2'48.17"E	-	Several pits in black rock. Best looking one has a cairn by it.
23DR002	35°17'22.59"N	24° 3'54.07"E	1881	Has cairn, draughts out. Loose packed rubble and blocks.
				
23GS002	35°17'23.03"N	24° 3'16.27"E	2000	-
23IS001	35°17'32.23"N	24° 3'40.56"E	2264	Big pit. 20-30m. Nice opening
				

Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23KK001	35°17'23.06"N	24° 3'27.46"E	1978	Window. bring rope to explore
				

23KK002	35°17'22.55"N	24° 3'27.07"E	1973	there is a window in the ceiling. cold air but no air flow
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Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23KK003	35°17'21.42"N	24° 3'26.88"E	1964	Looks like 10-15m. to explore. Koukos / Cairn



23KK004	35°17'20.55"N	24° 3'26.75"E	1954	Explored, 7m.
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Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23KK005	35°17'20.12"N	24° 3'21.66"E	1963	Sinkhole closed with mud. Big draining surface. lots of water probably sinks there.
				
23KK006	35°17'19.14"N	24° 3'14.62"E	2010	Pit. at least 20 m. 2 koukous
				



Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23KK007	35°17'19.69"N	24° 3'14.87"E	2009	5m pit
				
23KK008	35°17'22.68"N	24° 3'17.42"E	1992	Nice pit, 15m
23KK009	35°17'22.58"N	24° 3'17.30"E	1993	-
23KK010	35°17'22.46"N	24° 3'19.34"E	1979	3 openings to the same cavity. Small arch.
				


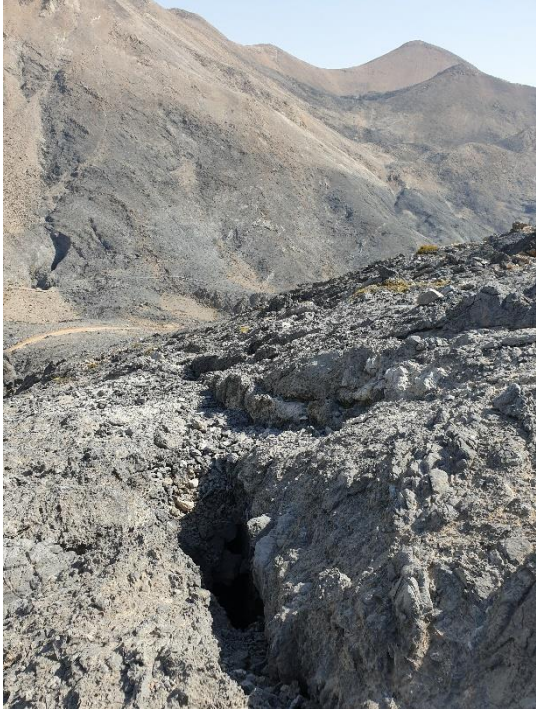

Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23KK011	35°17'23.12"N	24° 3'18.49"E	1986	Airflow, a bit impossible to open it up. Roberto




23KK012	35°17'23.05"N	24° 3'25.48"E	1983	Small opening
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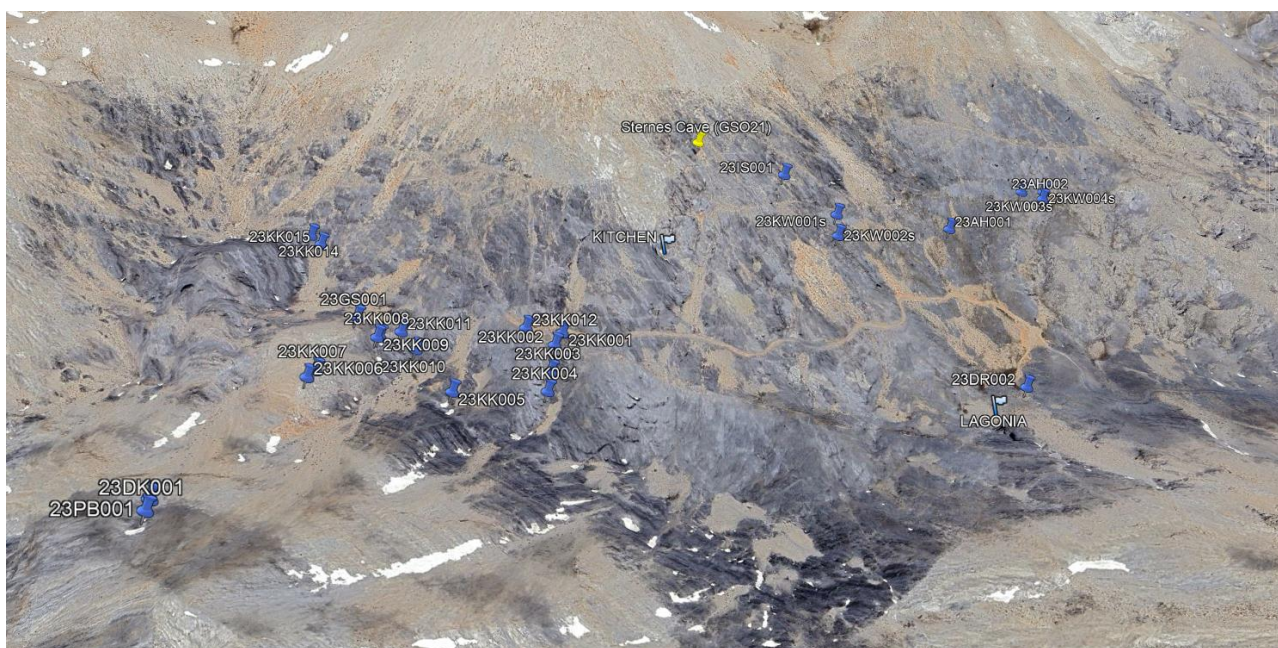


Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23KK014	35°17'28.91"N	24° 3'12.20"E	2011	10m pit, little air
				
23KK015	35°17'28.47"N	24° 3'12.85"E	2006	pit of 8-10m, no air
				

Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23KW001s	35°17'31.17"N	24° 3'43.87"E	2162	Small pit 4.4m deep. Life: spiders
				
23KW002s	35°17'29.81"N	24° 3'43.78"E	2144	10.3m deep. Narrow and prickly (cave suit recommended) did not descend.
				

Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23KW003s	35°17'34.35"N	24° 3'56.45"E	2142	? Need rope. 3 holes?
				
23KW004s	35°17'34.51"N	24° 3'57.94"E	2138	Open air Descent into small crawlspace. Decently explored, one too tight and other very uncomfortable squeeze - no airflow for either, see photo.
				
				

Unique identifier	Lat degs N	Long degs E	Altitude (m)	Description / comment
23PB001	35°17'9.78"N	24° 3'11.63"E	2146	Needs to be enlarged, rock tumbles down for 2s
23TS001	35°16'50.41"N	24° 2'58.56"E	2251	-
23YN001	35°16'59.95"N	24° 2'24.32"E	2221	-



POIs of surface survey of 2023



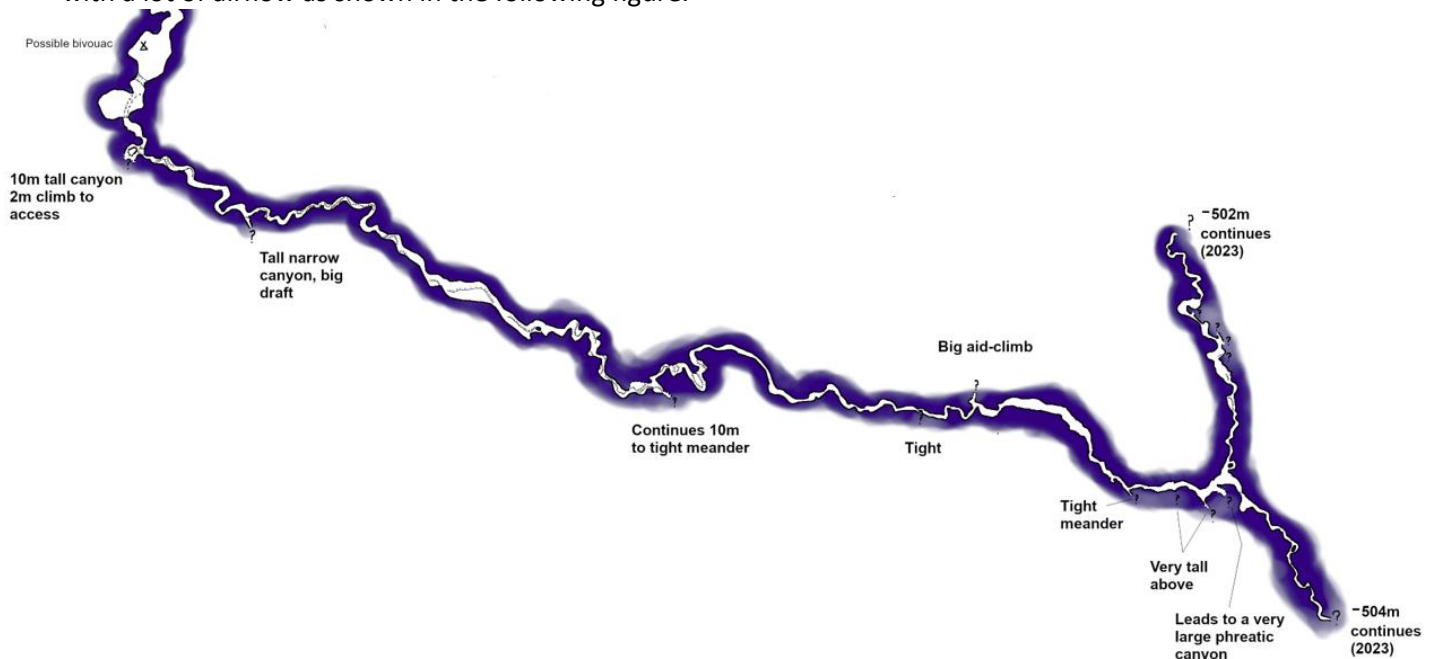
Whole lotta cross-checking and processing going on

13. Objectives for 2024

The 2023 expedition was hugely successful and has opened a plethora of leads for the next expedition. Specifically:

'Con-Crete canyon'

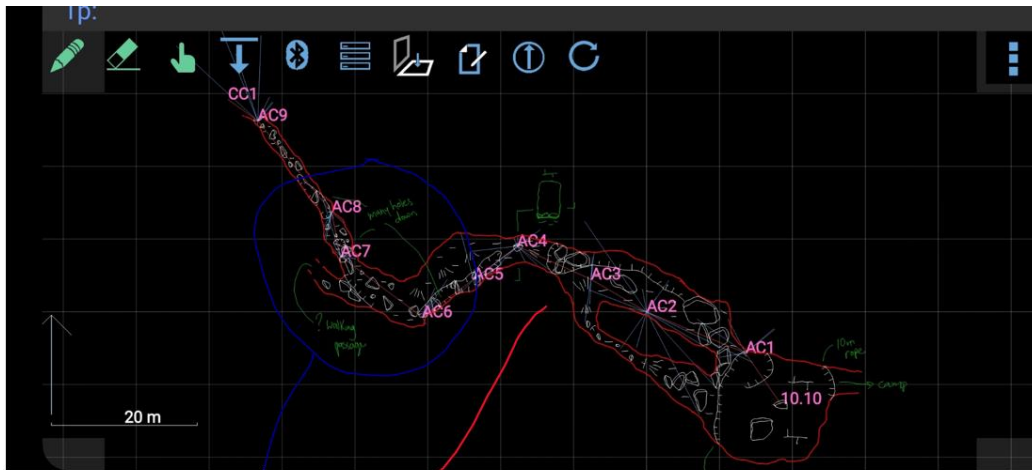
The exploration of the 'Con-Crete Canyon' has not finished. There are numerous question marks for next year with a lot of airflow as shown in the following figure.



Con-Crete Canyon Survey. At the left up the place of the possible bivouac, and at the right split the end of 2023 expedition exploration. Many question marks in various places.

'Pozzo Enorme'

'Pozzo Enorme' has not yet been explored. This is a really huge pit for Sternes, intersecting the gallery in various points. Technical climbing will need a lot of effort. However the potential of a new route that will allow cavers to avoid entering the rather sensitive gallery is a huge plus. Maybe a drone could help exploring it and identifying possible continuations higher up. A problem for the drone will be the rather active rain in the pit. Additionally, only two of the four visible gallery continuations have been explored, and the second one needs further exploration as shown in the figure below. The exploration of any gallery route is probably the most important objective for Sternes.



The two windows connect here

Needs further exploration

The two gallery windows are connected. Still not totally explored.

‘Pozzo Enorme II’

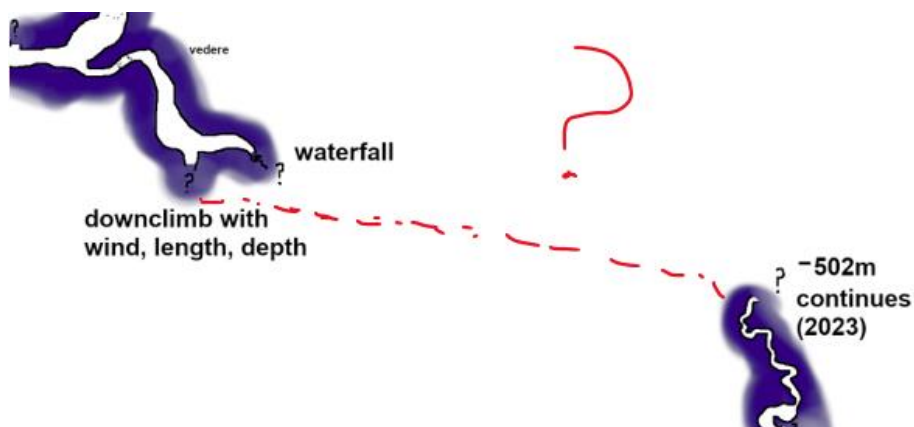
Near ‘Pozzo Enorme’ there is another big pit that has not been explored. This is smaller than ‘Pozzo Enorme’ and seems to be a blind pit. Ideally this can be explored with a drone. There is no rain there.

‘Italian Chamber’

The rift that was rigged in Day 5 at -576m needs further exploration. The lake was not searched for any kind of continuation in the water. Most of the cavers that visited it agree that there might be a continuation behind, or that it might need unblocking. However, a neoprene suit is needed since the cave is rather cold.

Meander found at the end of Day 4

On day 4 the cavers stopped in an ascending meander with air flow, near the waterfall after a not safely rigged traverse. The meander stops at a tight left turn that needs expansion. Underneath the meander gets tighter and has not been explored. This meander could possibly connect with the leads at the ‘Concrete Canyon’ as shown in the figure below.



The meander found on Day 4 might be connected with the leads at the ‘Con-Crete Canyon’ reached at the end of the exploration. Both of them have air flow.

The tight meander below the ‘New Moon’ gallery

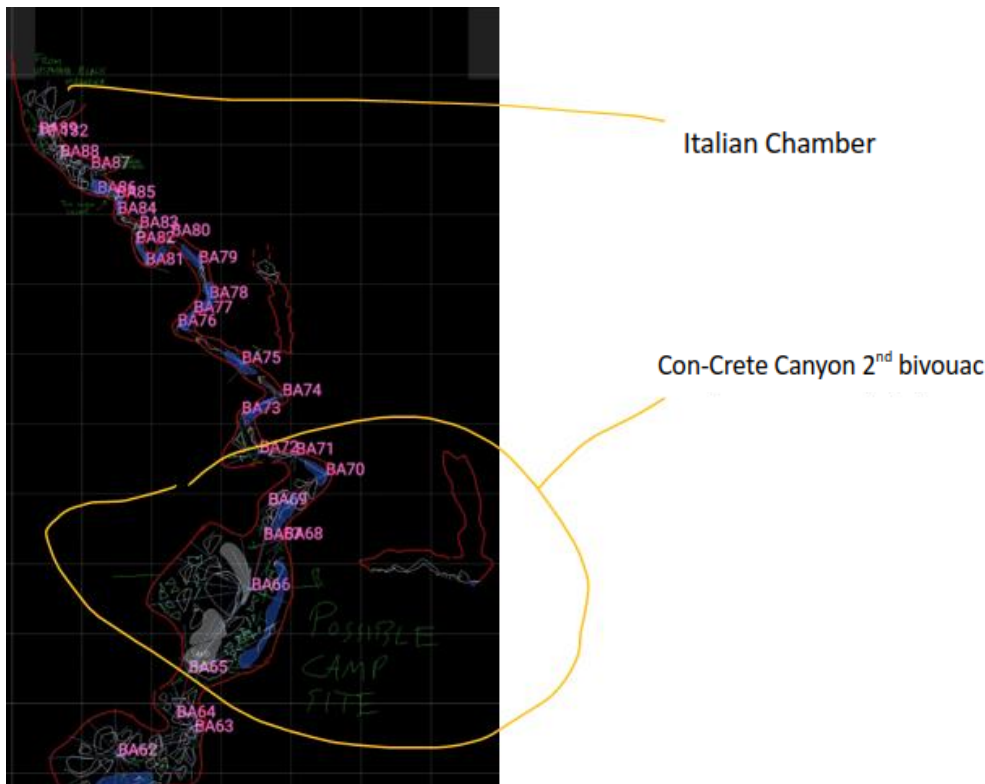
In various places of the ‘New Moon’ gallery there is a tight meander below, where the water seems to gather. None of the tight parts below has been explored.

Windows in the 'New Moon' gallery

In two places in the 'New Moon' gallery that was explored in Day 4 there are gallery windows that require a few meters of technical climb. One is in the big room before the tight passage below dropped rocks and the other one after. This is probably a higher level of the gallery that might connect with the other windows in 'Pozzo Enorme'.

Second bivouac / Enlargement of current one

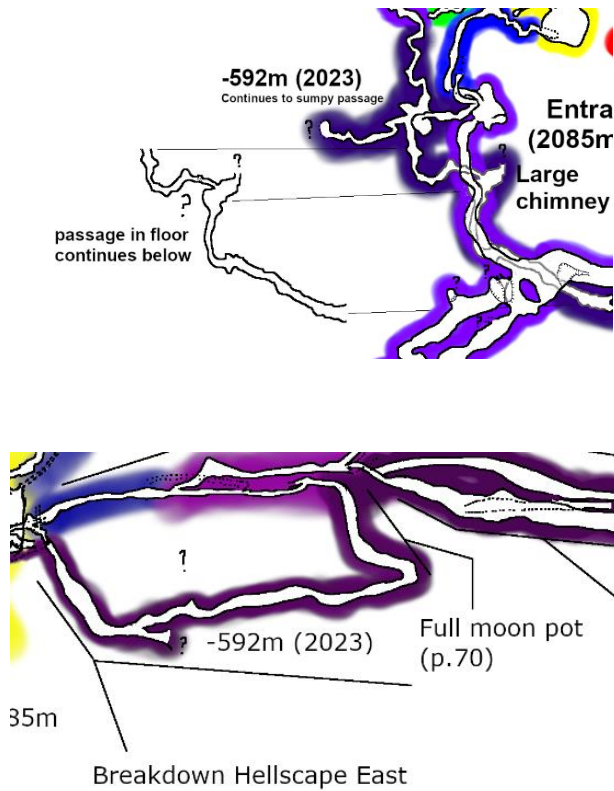
At the beginning of the 'Con-Crete Canyon' there is a good location for a camp which would reduce travel time to the current lead of the exploration to about 45 minutes or an hour. The new expedition can pursue setting up a second bivouac closer to the current leads. However we have to make sure that the expedition has the (wo)manpower to sustain two bivouacs. Else another option is to consider enlarging the current one. The 'Italian Chamber' is not a great place for a bivouac due to the fallen roof and the loose rock.



Possible location of second bivouac

'Full-Moon'

In the full moon pit or pot (as it was named after finding the loop), there are two question marks at -592m. One leads to a sumpy 7m drop and the other is a large chimney.



Two possible exploration points in the Full Moon

'Down-stream'

The down-stream part of the gallery, which was explored in 2020 when the gallery was found, still has various question marks.



Many possible exploration points in the downstream

Expansion of tight passages

Further enlargement of meanders between -428m and -530m to allow easier access in case of accident. There are still some improvements remaining to be made for the 2024 season, especially in the meander at -428 in order for the stretcher to pass.

Survey and Exploration of all caves around Sternes

Since the Sternes cave has developed a lot this year in various directions, there is a need to make a complete survey of all caves in the area around the Sternes and Trocharis summit. It is probable that another entrance to the gallery might exist that will allow an easier and safer descent to the current leads. The area above 'Pozzo Enorme' and the area below the camp towards Lagonia, where the current leads of the 'Con-Crete Canyon' direct, are rather interesting targets.

14. Dissemination

All these years SPOK and the Sternes expedition organizing committee tries hard to disseminate the results of each year's expedition at a national and international level. Especially, due to the importance of this year's findings, we were filled with enthusiasm to present our expedition to various local and international fora. The results were also presented to the local media, newspapers and sites.

Specifically, in November of 2023 we presented Sternes to the International Speleology Meeting¹⁰ that was held in Costacciaro, Italy, after an invitation from the Italian cavers that participated in the expedition. 7 members of the caving club were present there and ~1000 people were present. The audience raised a lot of questions and there many cavers were eager to join us in 2024. A joined presentation with the other important greek expedition of "Gourgouthakas 2023", organized by the Geological Society of Greece and the Hellenic Federation of Speleology, was presented to Greek cavers and geologists on the 26th of January, at the Harokopio University at Athens, Greece. In addition, the expedition was also presented to the Slovenian cavers of the Jamarski Klub Novo Mesto (JKNM)¹¹ on the 5th of May at Novo Mesto, Slovenia. Again 7 members of SPOK were present. At least two slovenian cavers promised to join our effort this summer. On the 9th of May, SPOK presented the results of the expedition to the local people of Crete in Heraklion¹².

More presentations are scheduled for the near future. The most important ones include a presentation to the 17th Balkan Cavers Camp¹³ and one to the local people of Sfakia.

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¹⁰ <https://costacciaro2023.it/>

¹¹ <https://www.jknn.si/>

¹² <https://www.facebook.com/events/1403133151086902/>

¹³ <https://www.balkan-cavers.org/>

Prepare for 2024!



<https://www.facebook.com/SternesCaveExpedition>