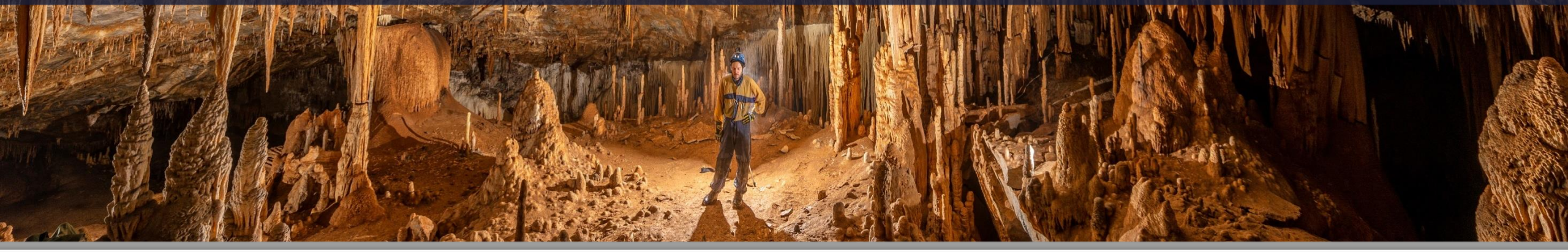

# Documenting caves in Turkmenistan

Annie GUIRAUD & Philippe CROCHET

July 25 2025



Union Internationale de Spéléologie

Brazilian Speleological Society

CECAV NATIONAL CENTER FOR CAVE RESEARCH AND CONSERVATION ICMBio-MMA

ICMBio INSTITUTO CHICO MENDES MMA

# Documenting caves in Turkmenistan



## Genesis of the project

- 2019 during an expedition to Uzbekistan, the huge limestone cliffs of the Koytendag massif at the border with Turkmenistan are spotted (1200 m high, 50 km long) by a french expedition
- The Cupp Coutun cave system was studied in the 1980's by russian geologist Vladimir Maltsev.
  No other studies or explorations have been carried out since then.
- A project of expedition was born in 2020
- The Covid pandemic occurred
- Long administrative procedures: an invitation letter from the Turkmen state is needed.
- The Koytendag massif is a nature reserve and a military zone : many permits are required

# Documenting caves in Turkmenistan



## Location


- A central Asian country
- Independent since 1991 (former USSR)
- Capital city : Ashgabat

# Documenting caves in Turkmenistan



## 2023 : reconnaissance expedition


Jean-Pierre Gruat
Jean-Marie Briffon
Claire Falgayrac
Philippe Crochet
Annie Guiraud
Bernard Lips
Josiane Lips
Véronique Olivier
Philippe Auriol
Jean-Philippe Grandcolas

# Documenting caves in Turkmenistan

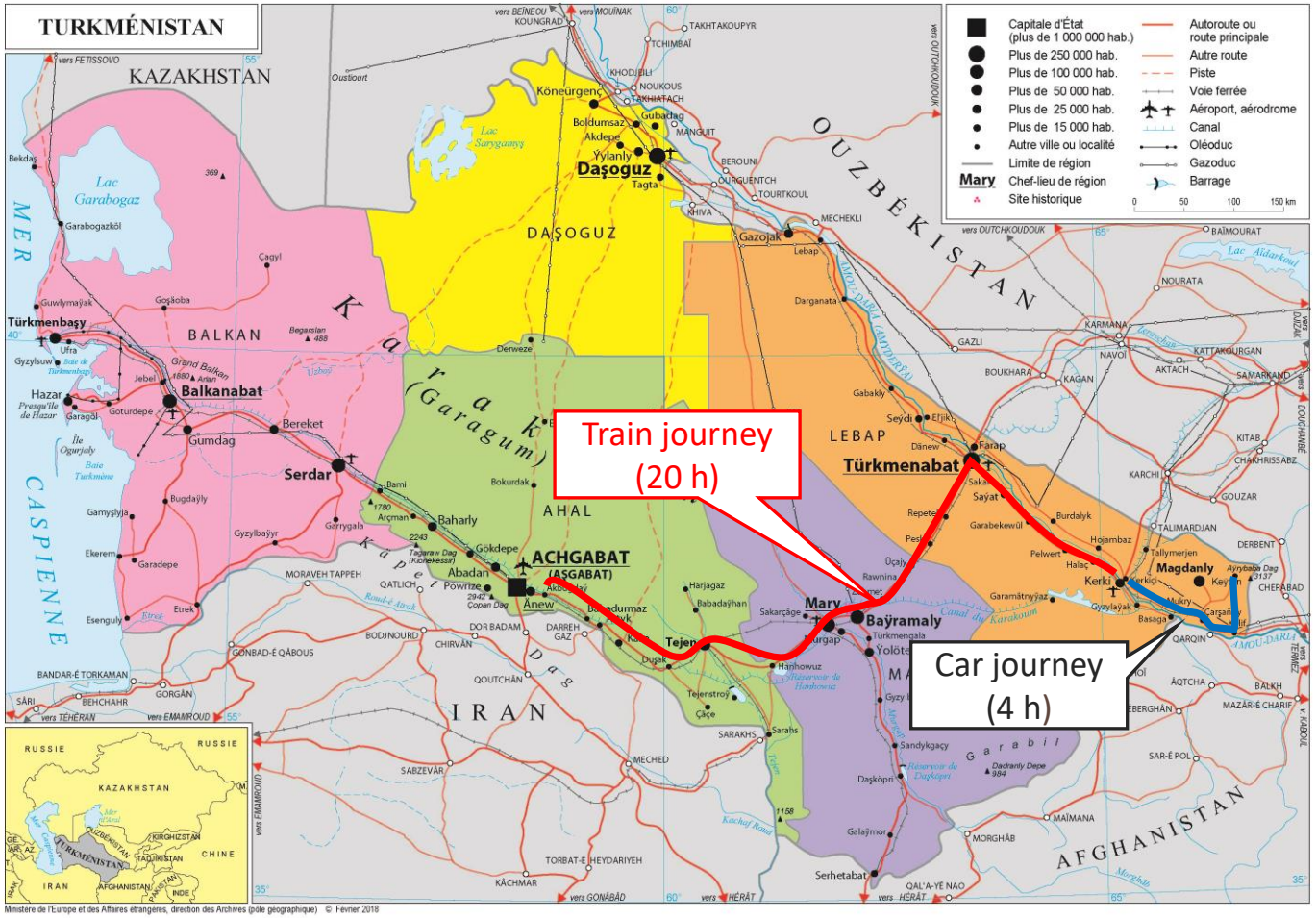


## 2024 : second expedition with a multidisciplinary team


Jean-Pierre Gruat
Jean-Marie Briffon
Claire Falgayrac
Philippe Crochet
Annie Guiraud
Lionel Barriquand
Philippe Audra
Jo de Waele
Jean-Paul Hereil
Alexandre Pont
Jean-Philippe Grandcolas
Bernard Lips
Josiane Lips
Gaël Cazes
Josef Grego
Fredo Poggia
Xavier Robert

# Location

## Journey to the Koytendag region





Mt Ayrybaba
3139 m

caves

# Multi disciplinary expedition with specialists

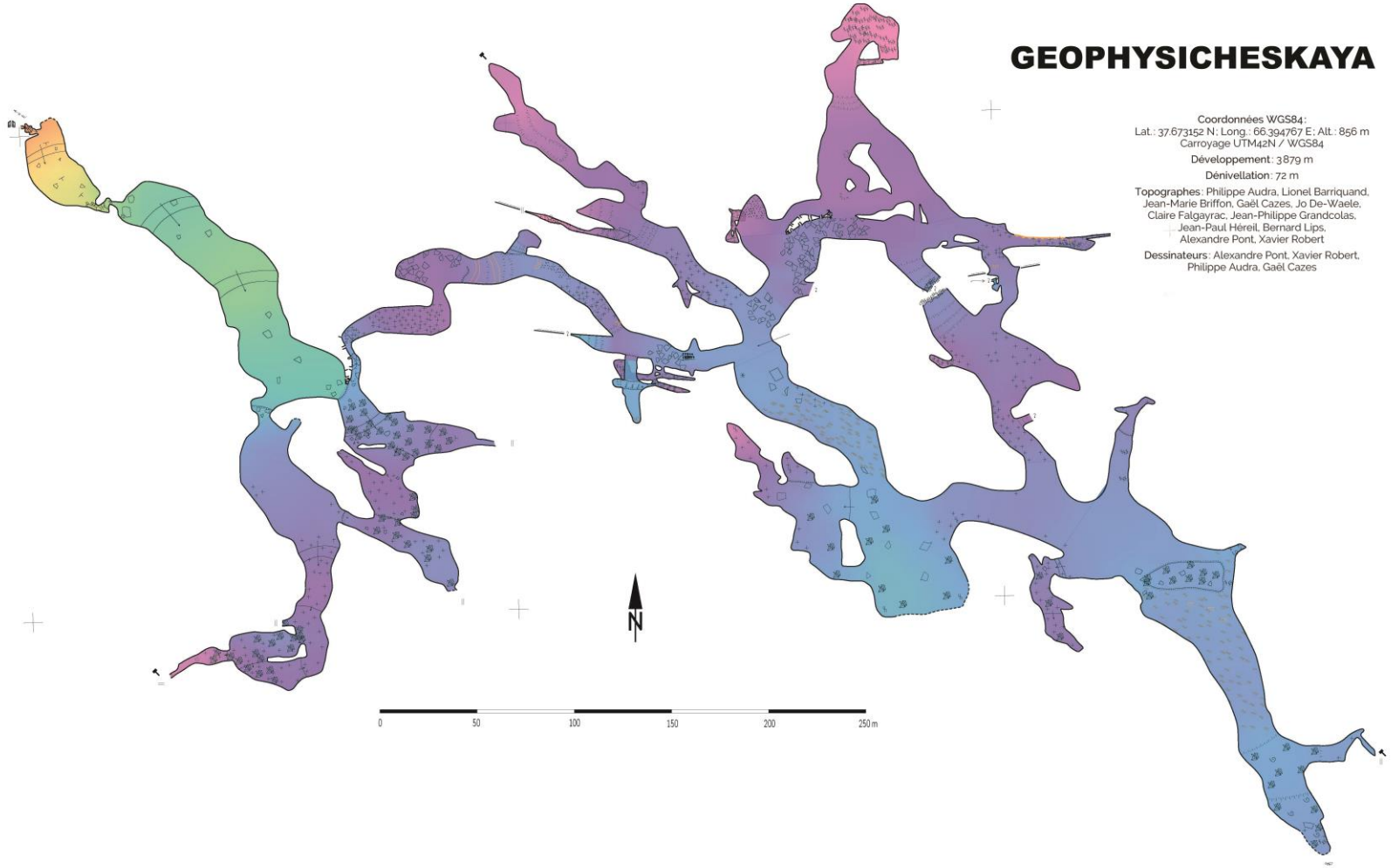


- **Karstology team :**
  Philippe AUDRA & Jo de WAELE
- **Biospeleology team :**
  Josef GREGO, Josiane LIPS, Bernard LIPS & Lionel BARRIQUAND
- **Survey team :**
  Jean-Paul HEREIL, Alexandre PONT, Jean-Pierre GRUAT, Jean-Philippe GRANDCOLAS, Jean-Marie BRIFFON, Xavier ROBERT
- **Photogrammetry :**
  Gaël CAZES
- **Photography :**
  Philippe CROCHET & Annie GUIRAUD

# Twelve caves mapped again with new techniques



- Up to 5 survey teams every day
- 12 caves visited
- 19 km surveyed
- 8571 survey stations
- Maximum depth : -157m

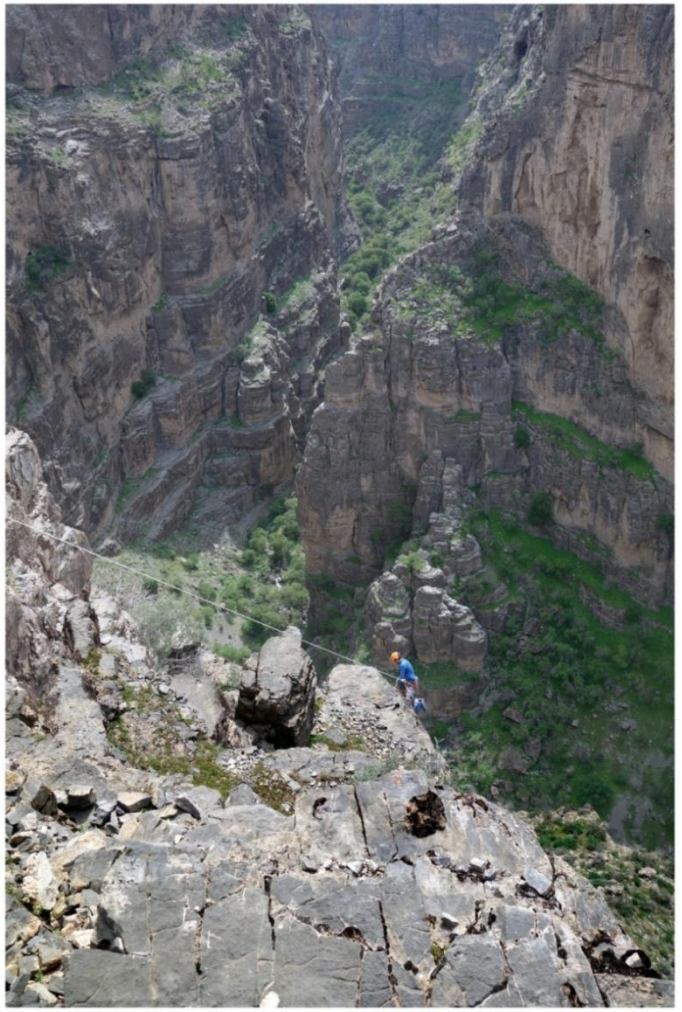


# Looking for new caves



## One of the main objectives, but difficult for two reasons :

- The slopes are cut by many deep canyons (300 m to 700 m)
- No permits to access the border zone



# Main interest : gypsum caves with specific formations



**Gypsum = calcium sulfate ($CaSO_4 . H_2O$)**

Chandeliers

Crusts

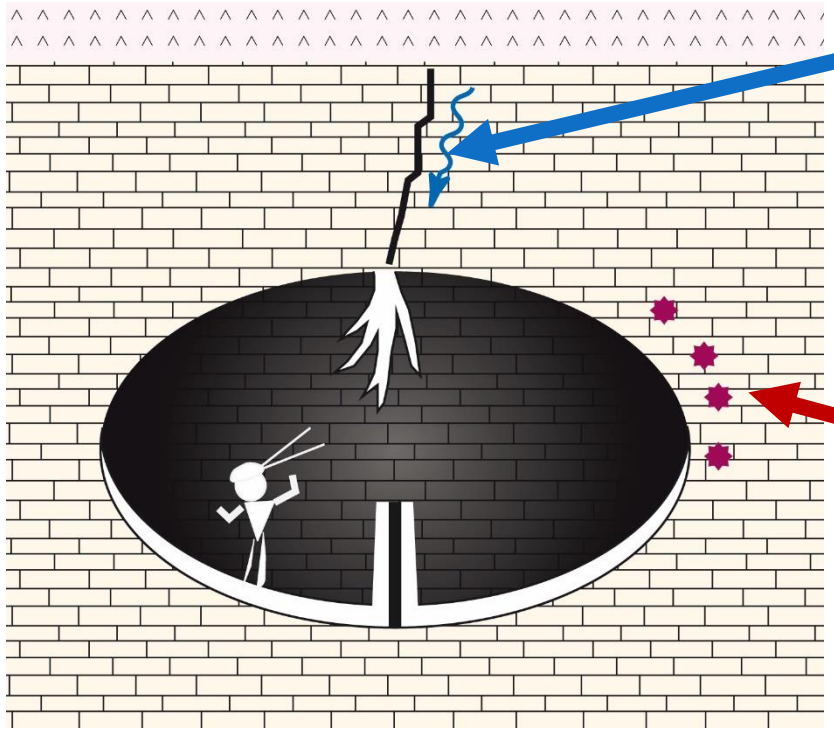
Hollow stalagmites

Collapsed crusts

# How gypsum formations develop in these caves



## Dry conditions (50 % humidity)



**1st origin of the sulfates**

- Gypsum on the surface
- Infiltration through cracks
- Crystallization in the cave

**2nd origin of the sulfates**

- Sulfures in the rock (= pyrite, $H_2S$)
- Oxydation
  - ⇒ Sulfuric acid !
  - ⇒ Substitutes for limestone → gypsum

- **Exceptional !**
- **Research under way(Philippe Audra)**

# Photographic documentation of the caves



## An important part of the expedition

- It was put forward to get permits from the local authorities: a way to highlight the richness of their heritage
- A challenge:
  - these caves had little photo documentation : Maltsev's black and white photos dating back from the 80's.
  - a few photos by Swiss cave photographer Remy Wenger made in the 90's
- A photo trip every day (for13 days)
- An average of 12 shots a day.
- Help everyday by one or several members of the expedition
  (Claire FALGAYRAC Alexandre PONT Jean-Pierre GRUAT Fredo POGGIA Jean-Marie BRIFFON)

# Photographic documentation



## Hushm – Oyeek

Entrance in a sinkhole

# Photographic documentation



## Hushm – Oyeek

Suffered from a lot of damage from onyx and gypsum mining

# Photographic documentation



## Hushm – Oyeek

- Large passages
- Ceilings covered with gypsum crusts

# Photographic documentation



## Hushm – Oyeek

Gypsum slabs on the ground collapsed from the ceiling

# Photographic documentation



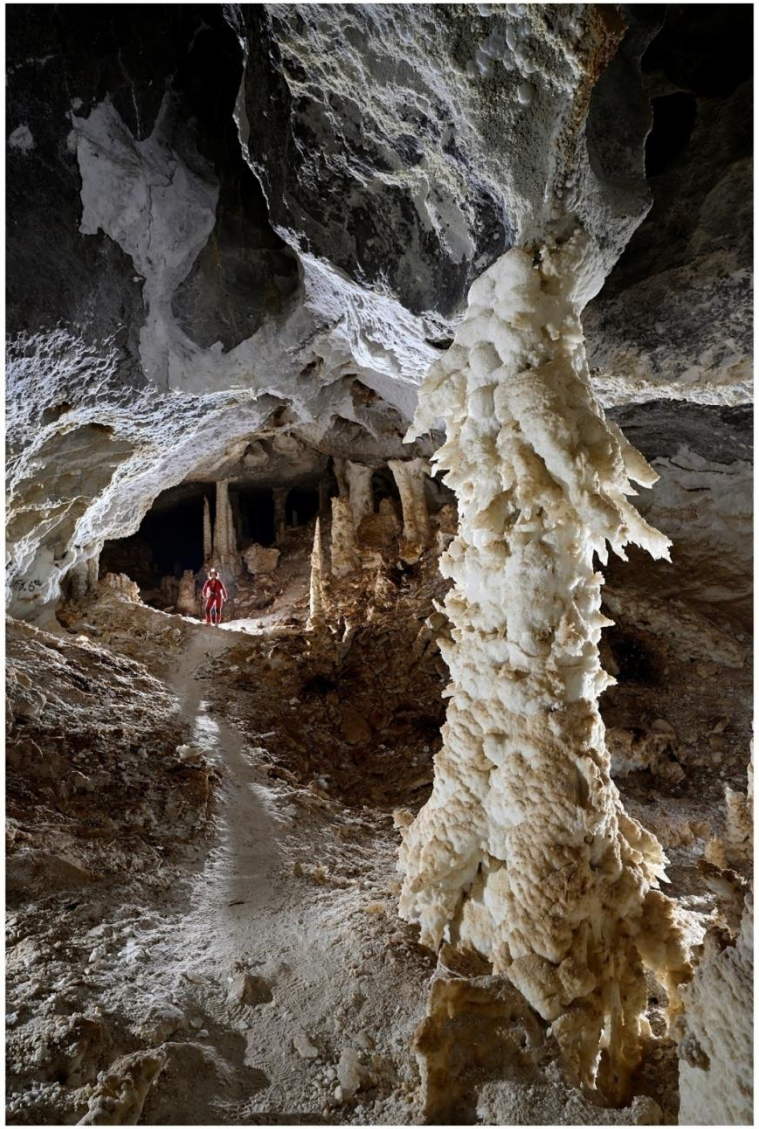
## Hushm – Oyeek

Massive columns (all hollow)

Originally stalagmites that grew into columns

# Photographic documentation



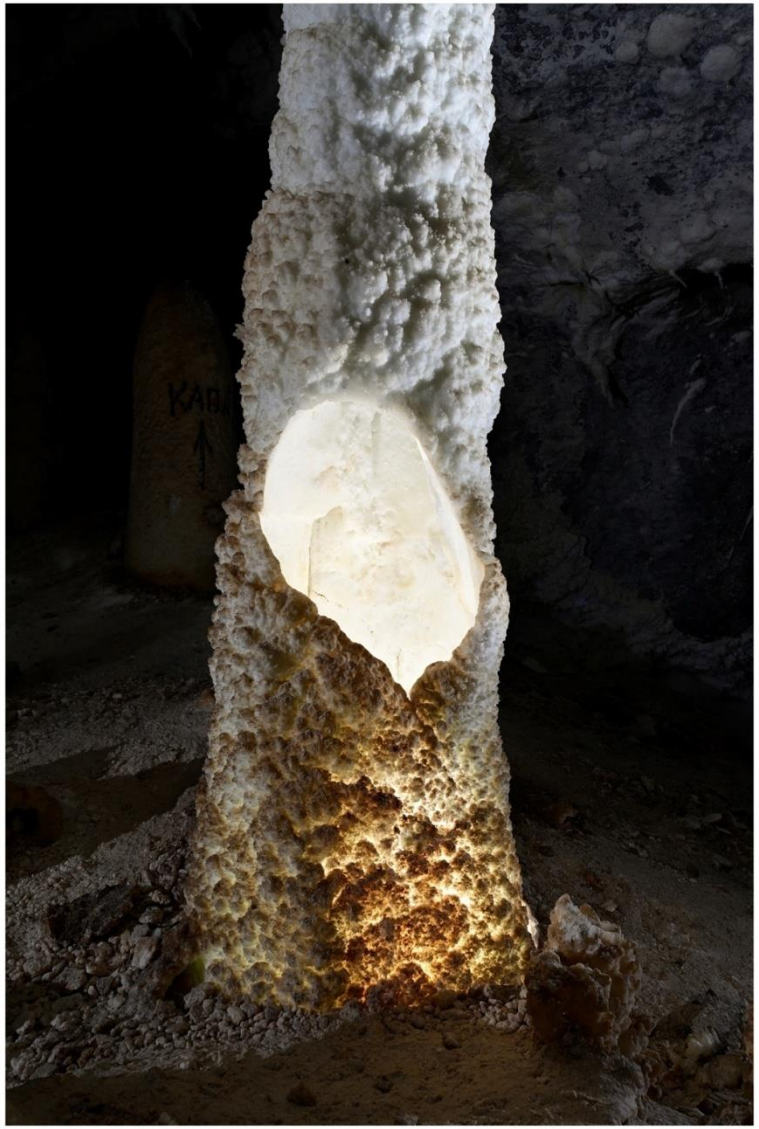


**Hushm – Oyeek**

Gypsum cristals develop on the columns

# Photographic documentation





## Hushm – Oyeek

Hollow formations lit up
when a light is placed inside

# Photographic documentation



## Hushm – Oyeek

“The Prison”:
an incredible five-meter-deep, two-meter-wide hollow gypsum formation

# Photographic documentation



## Geophysicheskaya

8 days were devoted to document this exceptional cave.

# Photographic documentation



## Geophysicheskaya

This exceptional cave remained practically untouched thanks to its late discovery (1986)

# Photographic documentation



## Geophysicheskaya

The big red chamber

Comfortable conditions for the photos sessions.
Temperature of about 21 ° C (69°F)

# Photographic documentation



# Photographic documentation



## Geophysicheskaya

The red passages

The red color could be due to the oxidation of pyrites

# Photographic documentation



**Geophysicheskaya**

The red passages

Gypsum streaks on the ceiling

# Photographic documentation



## Geophysicheskaya

The red passages

Gypsum streaks on the walls

# Photographic documentation



## Geophysicheskaya

Red passage with yellow clay on the underground

# Photographic documentation



## Geophysicheskaya

The White passage

Gypsum covers the whole passage

# Photographic documentation



## Geophysicheskaya

The White passage

Muffled sounds due to the thick layer of gypsum

# Photographic documentation



## Geophysicheskaya

The White chamber

No tracks left on the ground
(dry atmosphere, no mud)

# Photographic documentation



## Geophysicheskaya

Yellow aragonite formations
and gypsum chandeliers

# Photographic documentation



## Geophysicheskaya

Backlight is necessary to enhance the translucence of the chandeliers.

# Photographic documentation



## Geophysicheskaya

No direct light, we play on reflection with back-lights

# Photographic documentation



## Geophysicheskaya

Some large chandeliers seem similar to those in Lechuguilla

# Photographic documentation

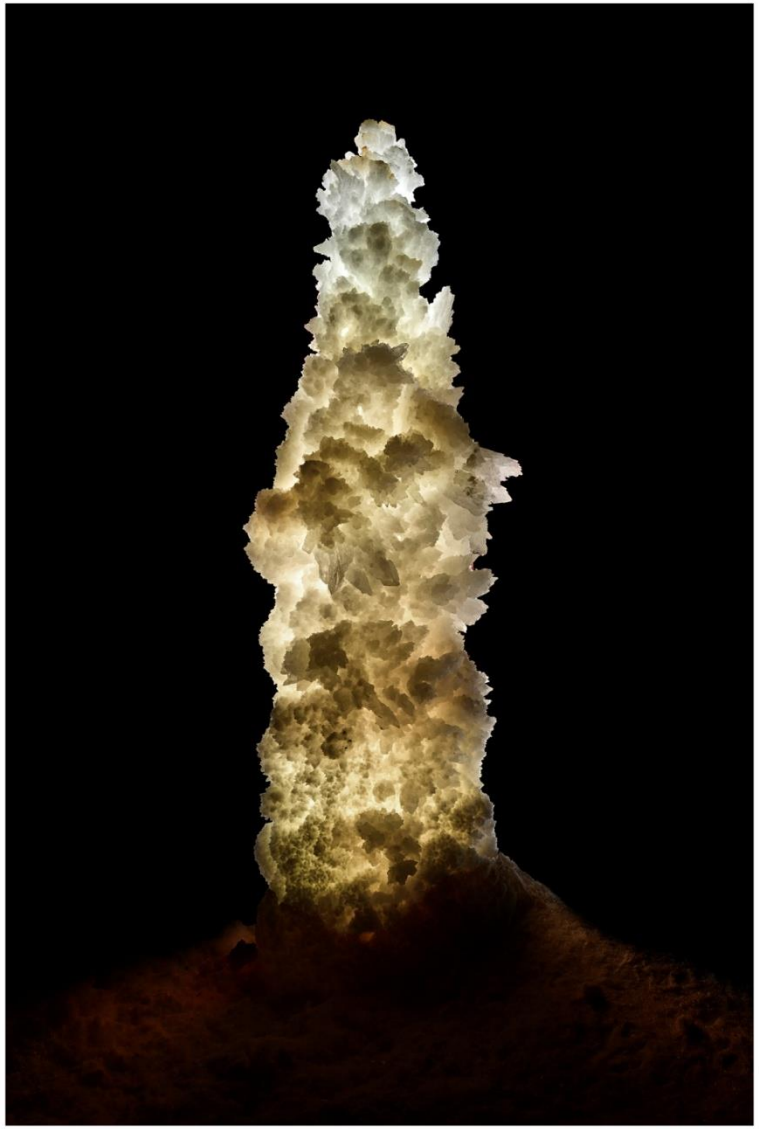


## Geophysicheskaya

Big stalagmite look like fir trees covered in snow

# Photographic documentation





## Geophysicheskaya

Strange gypsum formations

# Photographic documentation



## Geophysicheskaya

Thousands of gypsum needles cover the floor of a chamber.

# Photographic documentation

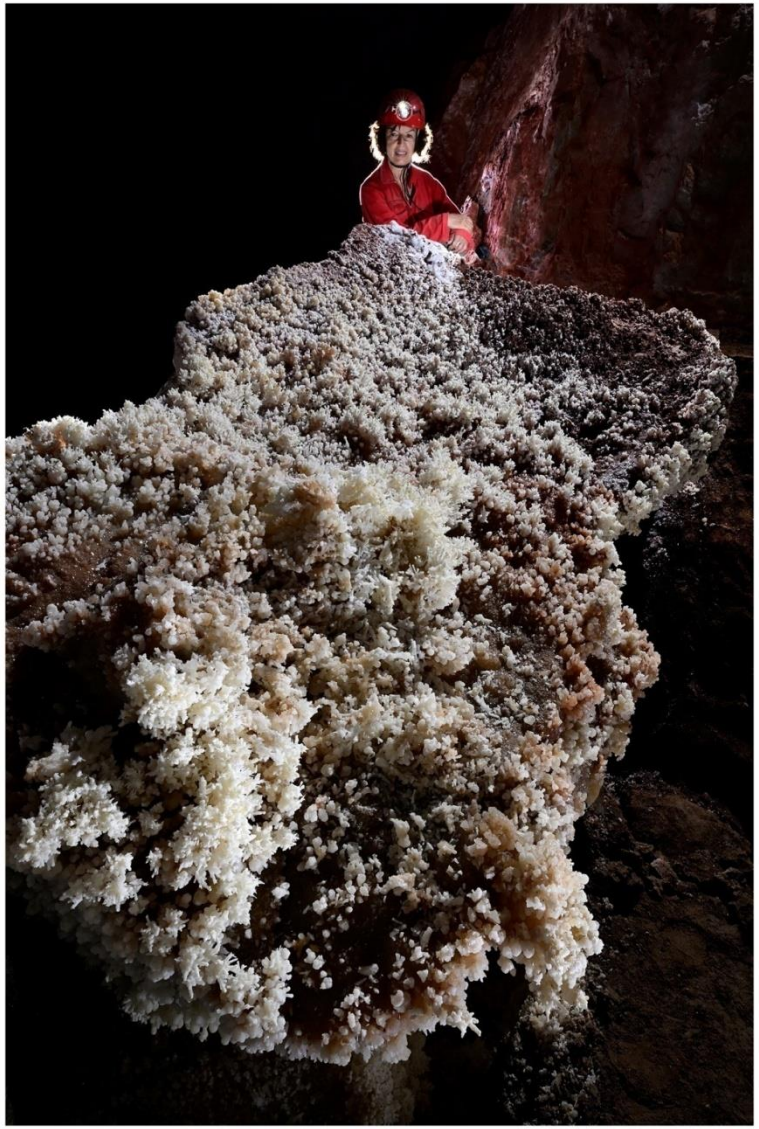


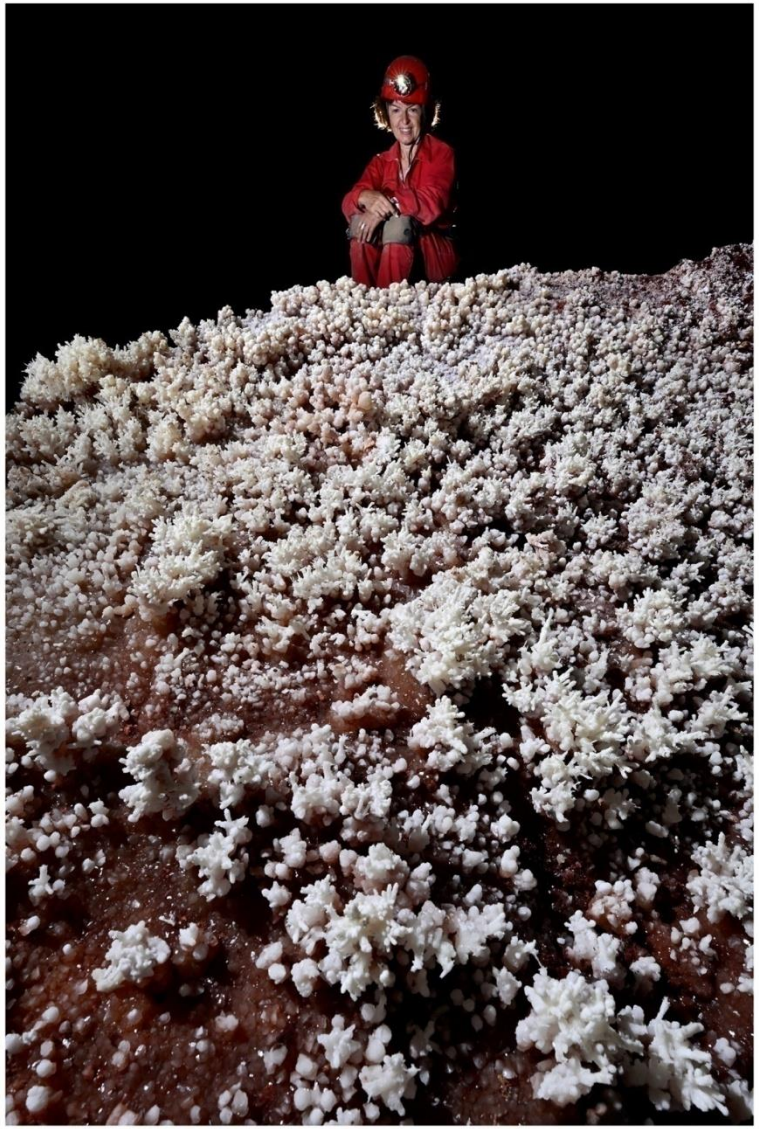
## Geophysicheskaya

Gypsum needles nests

# Photographic documentation





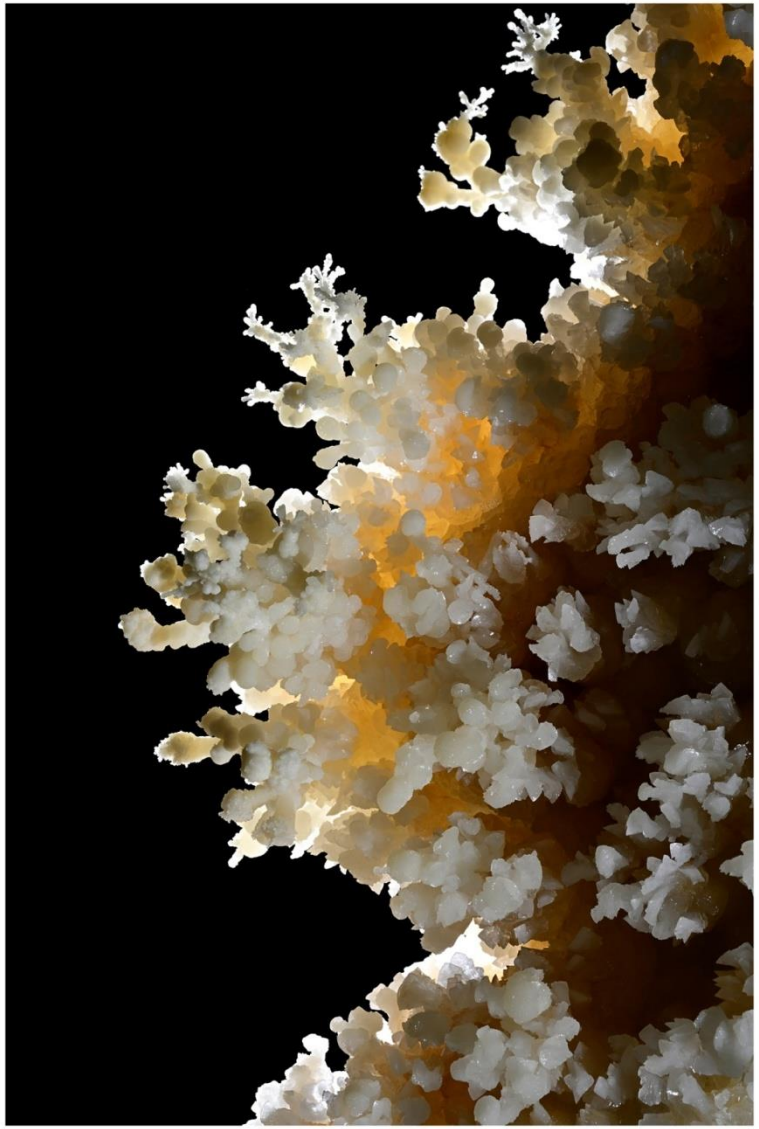


## Geophysicheskaya

Many aragonite formations on the rocks

# Photographic documentation





## Geophysicheskaya

Yellow colored aragonite formations

# Photographic documentation



## Geophysicheskaya

The formations have remained undamaged despite the absence of marked trail.

# Photographic documentation



## Geophysicheskaya

Many aragonite bushes.

# Photographic documentation



## Geophysicheskaya

Great contrasting colors

# Photographic documentation



## Geophysicheskaya

Many original aragonite formations.

# Photographic documentation



## Geophysicheskaya

Original aragonite bunch on the ceiling

# Photographic documentation



## Geophysicheskaya

The Grey passage
Natural colors, no Photoshop!

# Photographic documentation

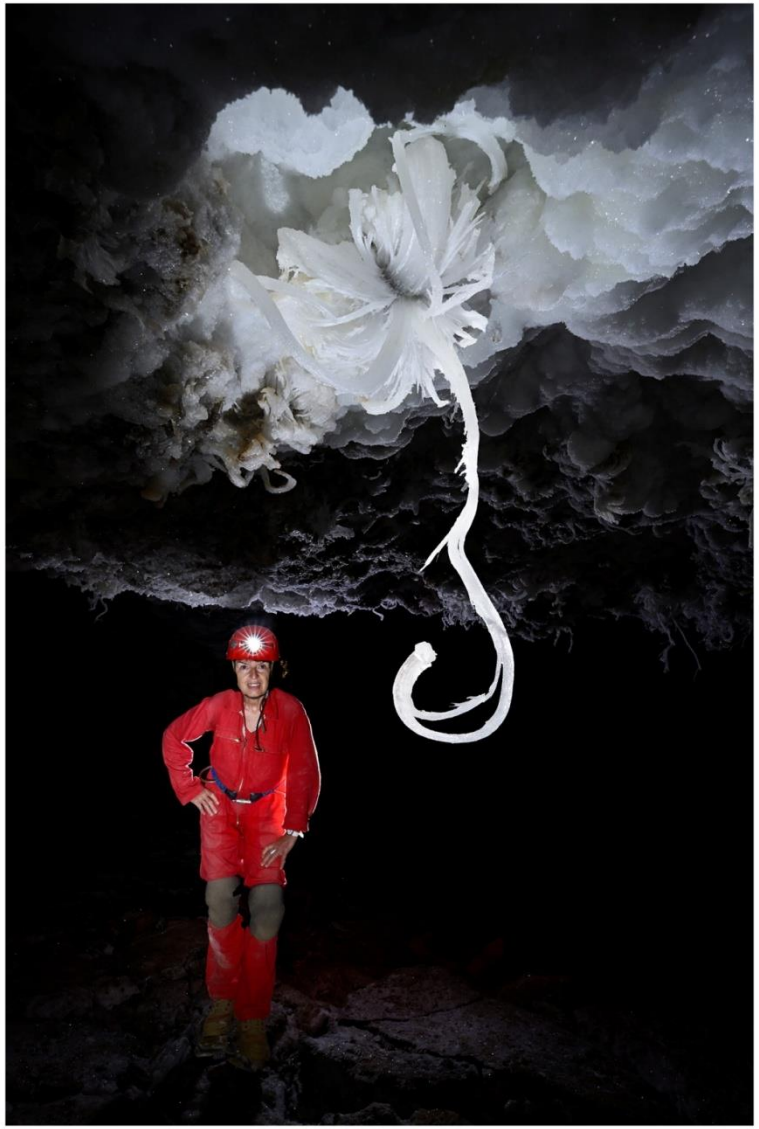


## Geophysicheskaya

Many gypsum flowers.

# Photographic documentation





## Geophysicheskaya

A 30 cm long gypsum flower.

# Photographic documentation



# Documenting caves in Turkmenistan



## How the photos were used

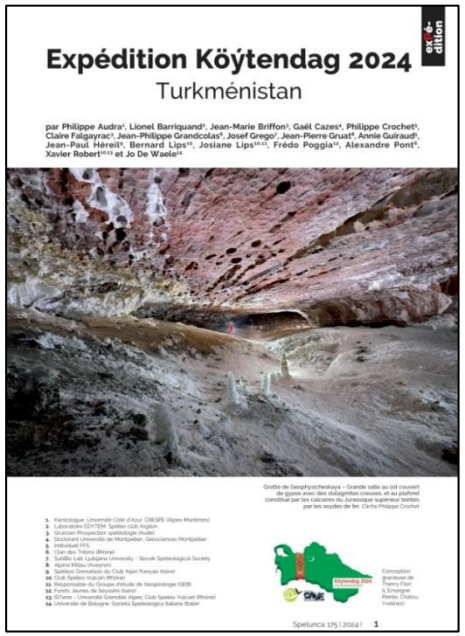
- All the photos were donated to the Turkmen authorities.
  They will be used to support an application for a UNESCO classification
- They were used for the promotion of the expedition and helped to get permits for future expeditions
- An exhibition of 60 photos was held at the French Institude of Ashgabad for 2 months
- A 90-page brochure was published (in French and English)
- Short slide show (« Beyond dreams, reality »)

# Documenting caves in Turkmenistan



## Publications in magazines

- Spelunca n°175 (septembre 2024)
- NSS News
- Speleologia n°90
- French magazine Terre Sauvage



# Documenting caves in Turkmenistan



## Conclusion

**Quality photos are essential for communication and promotion**

**If you are planning an expedition, don’t forget to include a photographer in your team!**


# THANK YOU!

Annie GUIRAUD & Philippe CROCHET

**More pictures on our website : www.philippe-crochet.com**

Union Internationale de Spéléologie

Brazilian Speleological Society

CECAV NATIONAL CENTER FOR CAVE RESEARCH AND CONSERVATION ICMBio-MMA

ICMBio INSTITUTO CHICO MENDES MMA