



# Expedition: Northern Caves at c.82°N

Entering the underworld to study the Arctic's response to a global warming

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## SUMMARY

Palaeoclimatologist and polar explorer Gina Moseley specializes in improving our understanding of how the Arctic responds to times of anthropogenic climate change.

Gina carried WINGS flag #39 for her 2023 Northern Caves Expedition, located in North Greenland at c.82°N, where she expanded her pioneering work and original research in this remote, sensitive, and little-studied region.

Exploring the world beneath our feet, Gina seeks to improve our knowledge of Greenland's response to warmer climates through geochemical investigation of mineral deposits found in caves.

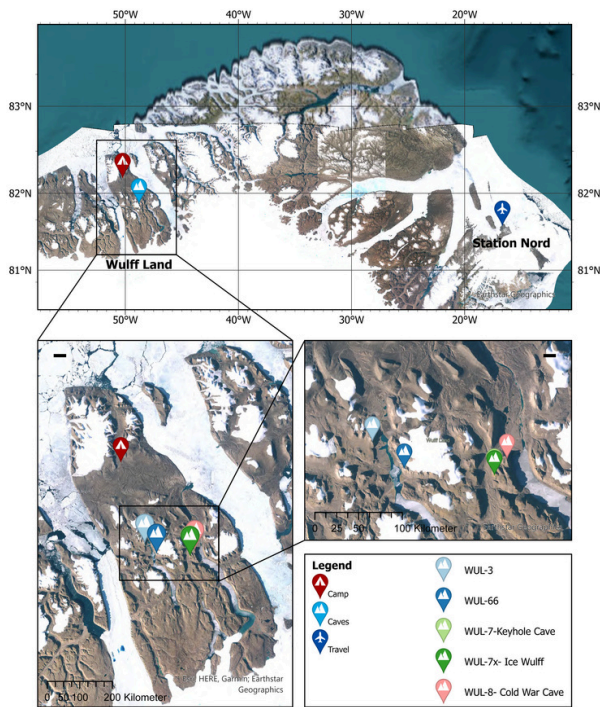


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## THE EXPEDITION

In 1958, a large cave, high up on a cliff face was photographed during aerial reconnaissance in Wulff Land, North Greenland. Despite the best efforts of many cavers and explorers over the following decades, it remained completely unexplored. Gina learned about the cave during a trip to the pub with her caving club in 2008, which set off years of dreaming, hoping to explore it herself one day. Over the next years, Gina led expeditions in 2015, 2018, and 2019, to other areas of Greenland, and these served as good practice to finally attempt 'the big cave in the north'. In 2023, Gina led a 6-person team to Wulff Land, North Greenland.

Despite challenging conditions, on 22nd July, 2023, 65 years after being photographed, a team of cavers descended into and explored the giant cave in Wulff Land. It really was a monster! Over the next two days, the cave was explored, photographed, mapped, and sampled. Despite its large size, it was not long, ending after about 350 feet in an icy boulder choke. The team didn't invest more than two days and turned their attention to other previously unexplored caves. It was challenging to find speleothems (cave mineral deposits) for Gina's paleoclimate research, but in the end, in the very last cave during the last hour that was available before the weather turned, speleothems were found!



**WHO:** Prof. Dr. Gina Moseley (UK),  
Project and expedition leader

**WHAT:** Exploration of several caves in Northern Greenland, including one that was previously unexplored, to collect data and specimen samples.

**WHEN:** July 19 - 31, 2023

**WHERE:** Wulff Land, North Greenland  
(Kalaallit Nunaat)

**WHY:** Improving knowledge of Greenland's response to warming climates through geochemical investigation of mineral deposits found in caves.

## EXPEDITION GOALS

- To access (for the first time), explore, document and sample a giant cave in Wulff Land, North Greenland, that had been photographed during aerial reconnaissance in 1958.
- To access, explore, document and sample other caves now known to exist in North Greenland.
- To collect samples of speleothems (cave mineral deposits) for Arctic paleoclimate research.
- To collect samples for microbiological studies from caves and the surface.
- To collect samples of soil for a modern palynology study from sites around East and North Greenland.
- To collect a sample of insects for the first entomology study from Wulff Land, North Greenland.
- To collect water samples for hydroclimate studies.



**Above:** Chris Blakeley and Gabriella Koltai look out over a vast valley in Wulff Land, North Greenland. Photo: Robbie Shone/Greenland Caves Project

**Below:** Chris Blakeley inside a cave newly-discovered on this expedition. Photo: Robbie Shone/Greenland Caves Project





## EXPEDITION RESULTS

Despite challenging weather conditions, the expedition achieved all of its goals. The large cave in Wulff Land that had been known about since 1958, was finally accessed and explored on 22nd July, 2023, 65 years since its (known) discovery. Several other caves were accessed and explored for the first time, too. Samples were collected for speleothem-based paleoclimate research, as well as microbiology, palynology, hydroclimate, and entomology studies. The final results of the expedition will be realized many years from now when the scientific analyses and interpretation are complete.

## CHALLENGES AND LESSONS LEARNED

Huge logistical challenges were faced in the lead-up to the expedition. Due to regulatory changes and permitting, transportation by helicopter had to be carefully negotiated. The team logistics organiser invested a considerable amount of time in finding a successful plan. This had knock-on effects when applying for permits and insurance. In the end, the whole team travelled to Iceland without the final permit, which did finally come through while at dinner the night before flying to Greenland.



Gabriella Koltai (L) and Gina Moseley (R) with Wings flag #39 in North Greenland. Photo: Robbie Shone/Greenland Caves Project

The weather turned, and only 3.5 out of 10 days were utilized for cave exploration. A new challenge not faced before on the expedition was the limited working day of the helicopter pilot (8 hours). This meant that from the point of starting up the rotors, we had 8 hours to fly two groups to the caves, refuel, rig, explore, map, sample, photograph, derig, and get everyone back to camp. On previous expeditions, the helicopter hadn't been used in quite the same way and it meant that the long 24-hour daylight could be fully utilized. On this expedition it could not.

Future expeditions will therefore either require two pilots in order to maximise the length of the working day, or plan to create small fly camps at the location of the caves. The problem with the latter is that we have no idea what we might find, and after setting up a fly camp, the caves might turn out to be too small or scientifically uninteresting to invest days of an expedition in. Furthermore, if the weather changes, it might prevent the personnel at the fly camp from being picked up. For this reason, a dual pilot approach is preferred to allow for maximum flexibility.

The other large challenge related to finding speleothem samples for paleoclimate research. It was always accepted that they would be difficult to find, however, the limited days in the caves added a further complication. Because of the bad weather, only 3.5 days were used for cave exploration, and after 3 days the team still had no speleothems. Thankfully, the expertise on the trip was fabulous, and together the team were able to assess and identify the most likely place to find them. It still involved visiting the cave to see if their ideas were correct, but all paid off and the speleothem samples were finally discovered.



## ABOUT THE FLAG CARRIER

Gina Moseley is a Professor of Paleoclimatology at the University of Innsbruck, Austria, a 2021 Rolex Laureate, National Geographic Explorer, main protagonist in the Ancient Caves giant screen film, and mother to daughter Madeline. She began developing the Greenland Caves Project in 2013 and has now led four pioneering expeditions to explore, document, and investigate remote Greenland caves. Through these expeditions, Moseley leads a team of (nearly) all-female researchers working to understand the variability of climate in the Arctic over the last few million years.

### Expedition Team Member Names/Titles:

Prof. Dr. Gina Moseley (UK) - Project and expedition leader, paleoclimatologist, speleologist; Chris Blakeley (UK/France) - Expedition member, rope-access specialist, speleologist; Dr. Nathan Hudson-Peacock (UK) - Expedition member, medic; Dr. Gabriella Koltai (Hungary) - Expedition member, paleoclimatologist, speleologist; Robbie Shone (UK) - Expedition member, photographer, speleologist; Matthias Vogt (Liechtenstein) - Helicopter pilot; Hans Erik Lange (Greenland) - Archaeologist (unfortunately poor weather prevented him from joining the expedition); Sebastian Rasmussen (Denmark) - Logistics organiser; Sue and Pete Moseley (Gina's parents) – child care.



(L-R) Gabriella Koltai, Chris Blakeley, Nathan Hudson-Peacock and Gina Moseley look over the geological maps and satellite images of North Greenland. Photo: Robbie Shone/Greenland Caves Project

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### CONTACT INFORMATION

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