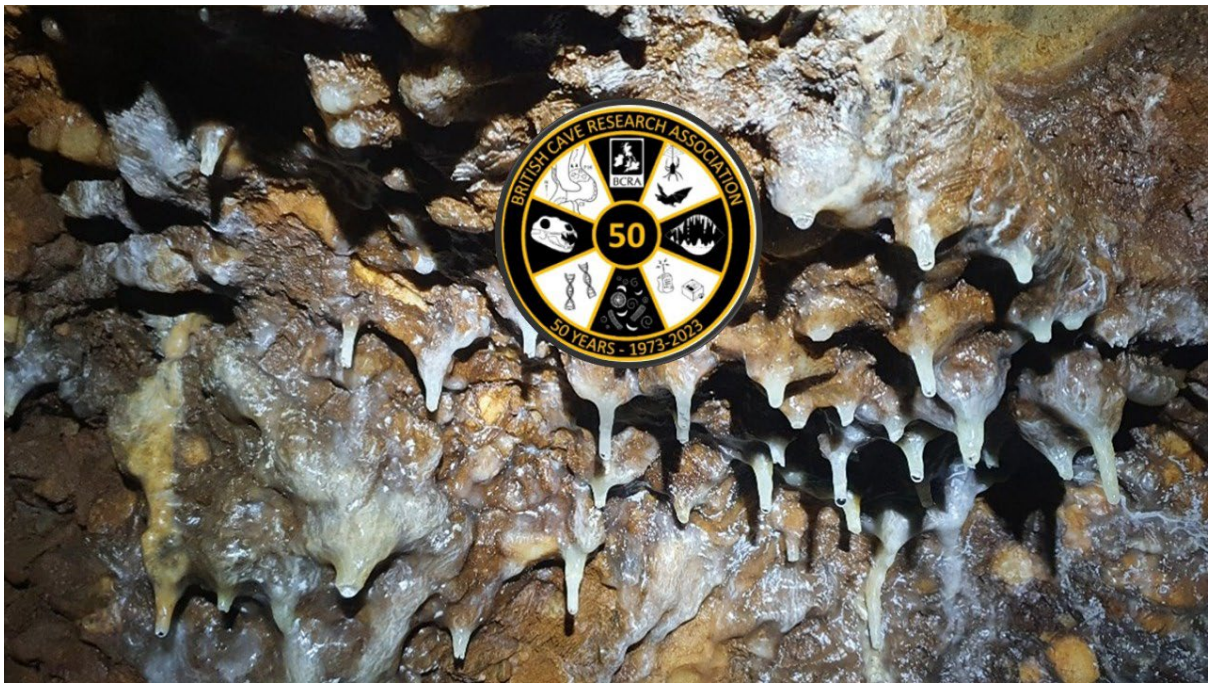

British Cave Research Association
Annual Science Symposium 2025

University of Bristol, School of Geographical Sciences

Saturday October 11th 2025

BCRA Science Symposium, Saturday 11th October 2025

0845	Doors open, registration, book sales, coffee	
0930	Welcome and introductions from those presenting posters	
0945	The application of high-resolution U-Th dating techniques to Assynt speleothems: initial results	**Tim Lawson**
1005	A journey into caves along the northern boundary of the Sahara: beautiful caves, speleothems and research into past rainfall	**Sam Hollowood**
1025	Annually-laminated stalagmite in Northwest Yucatán, Mexico precisely dates and quantifies rainy-season droughts during the Maya civilization decline	**Stacy Carolin**
1045	Refreshment break	
1115	Keynote: From Caves to Conservation: the making of the modern fauna in Britain	**Danielle Schreve**
1145	A 75,000-y-old Scandinavian Arctic cave deposit reveals past faunal diversity and paleoenvironment	**Sam Walker**
1205	A new bio-chronology and taphonomic assessment of the mammalian faunal remains from Reindeer Cave, Assynt	**Alicia Sanz-Royo/Kate Britton**
1225	BCRA AGM and lunch break	
1400	Caving with Caustic Orphans	**Mike Rogerson**
1420	Conditioning of flood pulses produced by intense or prolonged rainfall events during transfer through phreatic and vadose conduits	**John Gunn**
1440	Strange Stories from Stump Cross Caverns – is the answer from below?	**Phil Murphy**
1500	Refreshment break	
1530	Cave invertebrate assemblage monitoring in Ogof Ffynnon Ddu and Ogof Draenen	**Lee Knight**
1550	Fifty years of Mulu cave science	**Andy Farrant**
1610	Fishing for answers at Fishmonger's Swallet	**Adelle Brickell/David Hardwick/Linda Wilson**
1630	Field-trip coordination etc.	
1715	UBSS Museum visit	
Posters	A palaeoclimate record for the Western Mediterranean from Gibraltar speleothems	**Tim Atkinson**
	Spatio-temporal dynamics of speleothem growth and glaciation in the British Isles	**Mike Rogerson**
	Stalagmite-Based Palaeoclimate Reconstruction from West and Central African Karst Regions: Insights from the 2023–2024 National Geographic Society Speleological Expeditions	**Fatai Ilesanmi**

Session 1: Past climates from speleothems.

The application of high-resolution U-Th dating techniques to Assynt speleothems: initial results

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Collection of speleothem samples from caves in Assynt, NW Scotland, in the 1980s and 1990s allowed dating by the U-Th disequilibrium method using the now-outdated alpha mass-spectrometer technique. 53 dates were obtained in this way, allowing a broad understanding of the chronology of fluctuating glacial-interglacial climatic phases over the last 200,000 years. A growing awareness that there was a conflict between the speleothem chronology and the accepted chronology of the build-up and decay of the last British-Irish Ice Sheet has prompted a reappraisal of some of the previously-dated specimens using modern, high-resolution dating methods. This has highlighted certain shortcomings in the initial methodology and underlined the greater advantages of obtaining dates on discrete speleothem growth layers with very small standard errors, compared to the 'bulk samples' required for sampling 30-40 years ago.

We now have 32 high-resolution, MC-IPC-MS dates from Assynt speleothems as part of a wider project hoping to reveal various palaeoclimate indices locked up in the speleothem growth layers. In this talk we will concentrate on what this initial batch of dates reveals about the timing of external conditions conducive to speleothem growth over the last 125,000 years in this key area on the NW edge of maritime Europe, and implications for ice sheet initiation, growth and decay. A suite of 10 dates from three flowstone samples from Rana Hole indicate continuous growth through the last interglacial (MIS 5e). Conditions for widespread speleothem growth continued for much of MIS 5 and up to *ca*. 70 ka BP; a single date of *ca*. 63 ka BP would seem to make an Early Devensian glaciation of Assynt unlikely unless ice-sheet dynamics are much faster than hitherto thought, but we require more high-resolution dates to be sure. We have confirmation of short-lived speleothem growth in Uamh Mhor during the equivalent of Greenland interstadials 14 and 12, but subsequently conditions deteriorated into full glacial conditions, precluding the deposition of speleothems in Assynt. The earliest Holocene date so far obtained indicates a return to conditions conducive to speleothem deposition around 10.3 ka BP.

Annually-laminated stalagmite in Northwest Yucatán, Mexico precisely dates and quantifies rainy-season droughts during the Maya civilization decline

Daniel H. James[1], **Stacy A. Carolin**[1,2], Sebastian F. M. Breitenbach[3], Julie A. Hoggarth[4], Fernanda Lases-Hernández[5], Erin A. Endsley[6], Jason H. Curtis[7], Christina D. Gallup[6], Susan Milbrath[8], John Nicolson[1], James Rolfe[1], Ola Kwiecien[3], Christopher J. Ottley[9], Alexander A. Iveson[9], James U. L. Baldini[9], Mark Brenner[7], Gideon M. Henderson[2], David A. Hodell[1]

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The Maya civilization of Mesoamerica flourished during the Classic Period (ca. 250 to 1000 CE) and is noted for its monumental architecture, hieroglyphic writing, and advanced mathematics, astronomy, and calendar system. During the Terminal Classic Period (ca. 800 to 1000 CE), the Maya civilization declined dramatically. Population centres shifted to the northern lowlands of the Yucatán peninsula (Mexico) where they underwent a series of boom-bust cycles before eventual depopulation. Several explanations have been put forward to explain this cultural transformation, including natural (deforestation, erosion, soil loss, earthquakes, hurricanes, climate change, disease, insect pests, overpopulation) and socio-political factors (civil unrest, inter-site warfare, invasion from outside cultures, etc.). Regional climate proxy records suggest multiple prolonged drought episodes during the Terminal Classic, however these records are sparse and some contain large chronological uncertainties and poor temporal resolution. To further advance our understanding of climate variability in Mesoamerica during this transition period on a local scale, here I will present a stalagmite from northern Yucatán. The stalagmite is exceptionally laminated through the Terminal Classic period, allowing our group -- research led by Daniel H. James -- to construct a seasonal climate proxy record based on calcite oxygen isotope variability with +/- 6 year age uncertainty. Rainfall interpretation of the stalagmite oxygen isotope record is supported by modern rain and drip water monitoring, as well as a replicated lower-resolution stalagmite oxygen isotope record from the same cave. Despite uncertainties in archaeological chronologies, results suggest political activity at major northern Maya sites, including Chichén Itzá and Uxmal, declined at different times during this period of frequent droughts, implying differential cultural responses to climate stress. This work was recently published in *Science Advances* (James et al., 2025).

James D. H. et al. (2025) Classic Maya response to multiyear seasonal droughts in Northwest Yucatán, Mexico. *Sci. Adv.*11, eadw7661. https://doi.org/10.1126/sciadv.adw7661

A journey into caves along the northern boundary of the Sahara: beautiful caves, speleothems and research into past rainfall

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There is abundant evidence of wetter conditions in the Sahara during the early- to mid-Holocene, but a paucity of high-resolution spatial and temporal rainfall reconstructions, which has impeded the robust understanding of climate and archaeology. North of 28 °N there is a particular lack of rainfall records, which limits testing of the processes controlling climate change in the sub-tropics. Cave speleothem records from locations that are arid to hyper-arid in the modern-day are especially helpful. The chronology alone of speleothem growth from these locations informs us of the timing of when climate was wetter in the past. We use additional measurements, for example of oxygen isotopes, that help us to assess the sources of past rainfall. We will present results of stalagmite records from inland, north-west Sahara – south of the Atlas Mountains - which demonstrate peak in increased rainfall between 8.7-4.3 kyr BP (Couper et al., 2025). We propose that much of this additional rainfall is caused by 'tropical-plumes' (plumes of rainfall originating from convecting moisture in the tropics). This rainfall supported a significant increase in the region's population during the Neolithic, as suggested by the combined presence of speleothem growth and rich archaeological artefacts in a region that is sparsely populated under modern-day desert conditions. Improved habitability and increased recharge to rivers flowing south through the Sahara will have facilitated connections, during a key period in the development of land use and animal production.

Couper, H.O. *et al.* (2025) Evidence for the role of tropical plumes in driving mid-Holocene north-west Sahara rainfall. *Earth and Planetary Science Letters*, **652**, 119195. https://doi.org/10.1016/j.epsl.2024.119195

Session 2: Cave fauna, climate and conservation

From Caves to Conservation: the making of the modern fauna in Britain

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Zooarchaeological and fossil collections from caves have traditionally supported research and into a diversity of topics, from palaeoenvironmental reconstruction to the interpretation of early human subsistence practices. However, an area of investigation that has been so far less commonly explored concerns the information that these collections can shed on past climate change and biodiversity for future conservation purposes. Data from Quaternary palaeoecological studies are increasingly applied to modern conservation challenges via the emerging field of conservation palaeobiology, a new and integrated approach that draws on fossil and historical records to inform the conservation, management and restoration of species, communities and ecosystems beyond the limited time frame of modern ecological observations. This presentation will illustrate ongoing

work at the site of Gully Cave in Somerset, a key archive for our understanding of faunal responses to abrupt climate change over the last 70,000 years, before reviewing the potential of collections such as this to provide critical new information for guiding nature restoration.

A 75,000-y-old Scandinavian Arctic cave deposit reveals past faunal diversity and paleoenvironment

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Northern Europe experienced extreme topographical, environmental and climatic changes during the last interglacial-glacial cycle. High-latitude, fossil faunal records are, however, almost non-existent due to glacial erosion and removal of sediments by flushing meltwater from the glaciers that covered extensive parts of the northern region. The effects of the dramatic Quaternary climatic changes on animal distributions in Fennoscandia therefore remain largely unresolved. The Storsteinhola cave system (68°50'N) in Kjøpsvik, northern Norway, is an exception, with one of the conduits of the cave, known as Arne Qvamgrotta, containing a Pleistocene dated bone horizon. We exploit the exceptional opportunity of this deposit for the comparative, interdisciplinary analyses of a high-latitude faunal record from the Last Glacial period.
The excavations at Arne Qvamgrotta identified a clear sub-fossil horizon, which after extensive dating (including C14, OSL, $^{230}Th/^{234}U$ and phylogenetic dating) placing the bones in interstadial MIS 5a. To date we have very little knowledge of the fauna from this interstadial other than occasional spot finds. We combine morphological identification with ancient DNA bulk-bone metabarcoding to maximise taxonomic identification of the highly fragmented bone material. With this multi-method approach we identify over 45 different taxa, including a diverse range of mammals (e.g., *Ursus maritimus* and *Balaena mysticetus), birds (e.g., Somateria spectabilis and Uria aalge) and fish (e.g., Sebastes marinus and Salvelinu*s sp.). Furthermore, we identify the first collared lemming (*Dicrostonyx torquatus*) in Fennoscandia. Mitogenome analyses of *U. Maritimus*, *D. Torquatus* and *V. lagopus* identify extinct lineages which attest to a lack of habitat tracking and the absence of a local refugium during the subsequent fully glaciated periods. Our results highlight the power of a multi-method approach to broaden taxonomic identification, especially of fragmentary material. The Arne Qvamgrotta excavations and analysis highlight the power of multi-method approaches and the potential of past data to understand risks to Arctic fauna in the face of current warming in the region.

A new bio-chronology and taphonomic assessment of the mammalian faunal remains from Reindeer Cave, Assynt

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Reindeer Cave (Creag nan Uamh, Assynt) is one of the few sites where faunal remains that pre- and post- date the Last Glacial Maximum (LGM) have been found in Scotland, an area that was fully glaciated by the last ice sheet. Excavated in the 1920s, the radiocarbon dating, taxonomic and taphonomic study of these remains has great potential to inform on palaeoecological and palaeoenvironmental conditions of MIS 2 and 3 in north-west Europe, and regional glacial dynamics. However, some previously-obtained radiocarbon dates from the site appear to contest the latest models of regional glacial advance and retreat in the area. Furthermore, some early dates in the 2m shaft connecting the inner and outer chambers are not consistent with historically-recorded stratigraphic relationships.

Here we report on our new analyses of the faunal remains from the shaft and the outer chamber of Reindeer Cave. Our results indicate reindeer and bears predominate, although new examples of hare, wild pig, and small carnivores have been tentatively identified. The remains appear to have been accumulated mainly via natural means with minor carnivore modifications, although differences between bear bones and reindeer antlers are evident. New radiocarbon dating on bones and antlers from the shaft align with recorded excavation depths and suggest that deposition began before ~45 ka cal BP. This was followed by at least two further phases of deposition, including a final event pre-LGM at ~34 ka cal BP. The earliest post-LGM dates in the outer chamber place bears back in the region ~14.5 ka BP, with later Holocene dates from the outer cave suggesting some post-depositional disturbance of materials. Further dating and multidisciplinary analyses of materials from the outer chamber will enhance our understanding of ecosystem dynamics into the Late Glacial and early Holocene, and the potential for human presence in the region.

Session 3: Karst hydrology and hydrochemistry

Caving with Caustic Orphans

Mike Rogerson[1], John Gunn[2], Adam Hartland[3], Sebastian Breitenbach[1] and staff at the Buxton Civic Association

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Hyperalkaline leachate is created when rain or surface water penetrates piles of waste from lime making, iron or steel making, aluminium or chromium refining or ash from combustion processes. This bleach-like (caustic) leachate can flow into surface water systems, causing significant ecological harm. A curious side effect when the source is rich in calcium (normally from lime, steel or iron making) is that the solution (which is dominantly Ca(OH)2(aq)) rapidly reacts with CO2(g) in the air, depositing large amounts of calcite (CaCO3(s)). Some of these deposits can be truly dramatic, with the best examples being at Brook Bottom near Buxton and near Consett. However, such rapid and voluminous mineral deposition causes additional problems for aquatic life, chokes stream beds and drainage culverts and can cause severe flooding. As the majority of caustic waste sites in the UK affected by this kind of leachate were made by companies no longer in operation, the "polluter pays" principle cannot be utilised to remediate or manage the site, which essentially becomes an 'orphan'.

Although neglected compared to acid mine drainage, research into understanding the surface impact and remediation of caustic orphan sites is developing. However, very little is known about the behaviour of these leachates in the subsurface. How they affect water quality, how reactive species like Ca2+(aq) and OH-(aq) behave during subsurface transport and what the fate of ecologically harmful materials like Al or Cr carried in them is are all poorly known.

Caves provide a unique window to resolve those problems, especially as lime production requires the same thick, pure limestones as caves do, increasing their co-occurrence. By great fortune, one cave receiving caustic leachate from an overlying orphan site is Pooles Cavern, where the *National Cave Science Centre* has been established. With the assistance of staff at the showcave, we have been able to produce 3 years of nearly continuous monthly average measurement, 9 months of continuous pH and conductivity measurements at 15-minute intervals and are in the process of producing daily water chemistry measurements for one drip which certainly takes leachate, and one which has never been observed to show caustic characteristics. We can now show that the leachate production process interacts with surface weather, so that in normal conditions the leachate only enters the cave in the winter. High rain events also cause changes in infiltration, showing the close coupling of groundwater contamination and surface water surplus. Because the drips are growing stalagmites, we are exploiting three samples which grew between 1927 and 2025 to reveal the long story of how this waste, which was created by a company which ceased burning lime in the 1860s, is slowly being removed by weathering.

Conditioning of flood pulses produced by intense or prolonged rainfall events during transfer through phreatic and vadose conduits

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Springs in Castleton, Derbyshire, UK, drain a mixed allogenic-autogenic karst catchment of c. 13.5 km^2 within which there are some 30km of explored conduit (caves) and a much greater length of smaller tributary conduits. As part of a long-term study, hydraulic head is measured at five underground sites and water depth is measured at three springs fed by the conduits, and in a river fed by the springs. To accurately represent the hydrological complexity measurements are made at short intervals (2-4 minutes). In October 2023 Storm Babet brought heavy and persistent rain (80-100mm) to the English Peak District and there was widespread surface and underground flooding, including property in Castleton. As expected, the conduits fed by sinking streams from the allogenic catchment responded rapidly to recharge but there was also a rapid response from the autogenic catchment where there are no surface streams and only a small number of dolines. Underground there were large increases in hydraulic head (up to 35m) that resulted in two types of flow switching. Firstly, the increased head at the input end of one phreatic conduit system removed an underwater permeability barrier in a relatively low elevation conduit resulting in a dramatic increase in flow out of the conduit and a corresponding decrease in flow from a linked higher elevation conduit that had dominated before the storm. Secondly, increased head upstream of two conduits with limited hydraulic conductivity allowed water to spill over into conduits that were inactive prior to the storm. The flow switching is less evident in the spring hydrographs, and hence the flood pulse in the spring-fed river, than it is underground and this is thought to be at least in part a result of conditioning by the final section of phreas which also: (1) softens the complex signals measured underground and (2) produces a longer but lower magnitude pulse than would be expected in a surface stream. It is

suggested that as intense / prolonged rainfall events become more common, changes within conduits may make the spring response (and hence flood risk) harder to predict.

Strange Stories from Stump Cross Caverns – is the answer from below?

Phil Murphy

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The Stump Cross Caverns cave system is a network of more than 6 kilometres of passages positioned beneath the interfluve between Wharfedale and Nidderdale, the two most easterly glaciated valleys of the Yorkshire Dales. It is formed in folded and faulted limestone strata situated in the Craven Fault Zone, the transition zone between the Askrigg Block high and the Craven Basin. The form of the cave system is unlike that of most caves in the Yorkshire Dales karst because it is formed within relatively steeply dipping limestone beds (15–30°). The cave consists of large tubular passages connected by smaller passages or rifts, and has a distinctive multi-level maze-like plan. The highest (show cave) level contains large volumes of clastic sediment overlain by extensive speleothem deposits. 68 U series dates have been obtained from site making it one of the most comprehensively dated sites in the UK. It also a significant Pleistocene vertebrate palaeontological site. Despite this intensive study very little consideration has been given to the origins of the cave system. A re-evaluation of the cave morphology on a range of scales, hydrological setting and a review of the previous studies undertaken in and around the cave system suggest a possible origin, at least in part, as a result of hypogenic karstification.

Session 4: Further cave science

Cave Invertebrate Assemblage Monitoring in Ogof Ffynnon DDU (OFD) and Ogof Draenen

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The designation of caves as SSSIs has historically relied on geological and palaeontological features and their importance as bat roosts, with their ecology often being neglected. To address this shortcoming Natural Resources Wales initiated base-line surveys of the cave invertebrate assemblages within two major cave systems, to trial the methods required at the study sites and other potential designated cave sites across Wales.

Both caves have been the subject of biological investigations in the past, allowing the results of the survey, undertaken in summer 2023 and winter 2024, to be critically evaluated against historical data.

The survey encompassed five stream sites and four lentic habitats in each cave, sampled by netting. Terrestrial invertebrate assemblages were investigated within the threshold zone of the cave entrances and at four sites within the deep cave environment, the former by manual searching and the latter using a combination of three methods, manual searching, the placement of scouring pads as artificial refugia, and baited pitfall trapping.

The survey in OFD recorded a total of 84 invertebrate taxa, including 30 previously recorded from the cave. This now makes the total number of invertebrate taxa known from the cave 123, including 9 troglobionts, 36 eutroglophiles and 7 subtroglophiles

The survey in Draenen recorded a total of 84 invertebrate taxa, including 34 previously recorded from the cave. This now makes the total number of invertebrate taxa documented from the cave 124, including 12 troglobionts, 21 eutroglophiles and 7 subtroglophiles.

The results of the base-line survey, coupled with an examination of the historical data have enabled the compilation of a set of target invertebrate species and communities that form the basis of conservation objectives for both caves, against which future condition monitoring can be assessed.

Fifty years of Mulu cave science

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Back in April 2025, the Royal Geographical Society celebrated the (almost) 50th anniversary of the 1978 RGS expedition to the Gunung Mulu National Park. The main focus of this RGS expedition was forest ecosystems. Over a period of 15 months, 115 scientists spent 10,000 days-equivalent in this wonderfully rich tropical forest. The research involved 50 separate projects within five programmes: forest ecology and nutrient cycling, geomorphology/hydrology and cave surveying, botanical and zoological inventories, vegetation surveys and management plan studies. The cave science was during the 1978 expedition was cave surveying and limited geomorphological and hydrological studies. In the intervening 47 years, however, there has been comparatively little research done on the rainforest ecosystems in the National Park, but a huge amount has been done in the caves: Mulu science has literally gone underground. This talk will summarize a variety of work that has yielded insights into the age and formation of the caves; past climates based on the chronology of speleothem growth; nutrient cycling and ecosystems within the caves; and the role of bats and birds in making the caves bigger. What discoveries will the next 50 years bring?

Fishing for Answers at Fishmonger's Swallet

David Hardwick[1,2], Adelle Bricking[3], Linda Wilson[1]

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Fishmonger's Swallet in Alveston, South Gloucestershire, just a few miles north of Bristol, is a small stream sink that appears to have had a relatively constrained use as an ossuary as demonstrated by radiocarbon dates on human and animal (dog) bones from the site that suggest a period of deposition in the late Iron Age. This talk will present a brief overview of the site and the insights it has provided into the health of the individuals concerned and the post-mortem treatment of their remains and will also touch on the latest excavations at the site and plans for future work on the wealth of material it continues to provide.

Posters

Stalagmite-Based Palaeoclimate Reconstruction from West and Central African Karst Regions: Insights from the 2023–2024 National Geographic Society Speleological Expeditions

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The karst regions of West and Central Africa remain among the least explored globally, with limited palaeoclimate records hindering understanding of long-term climate variability in the tropics. Despite extensive limestone terrains, stalagmite-based climate reconstructions are notably absent due to challenges, including inaccessibility, dense vegetation, limited funding, and insufficient collaboration between regional and international research institutions. This study presents results from the 2023–2024 National Geographic Society-funded speleological expeditions across these karst landscapes, aimed at documenting cave systems and collecting speleothems for palaeoclimate reconstruction. Explorations led to the successful sampling of stalagmites exclusively in Gabon, where 15 specimens underwent preliminary analysis, including Uranium-Thorium (U-Th) dating and FTIR analysis; isotopic analysis is ongoing at Northumbria University, and lamina counts on two specimens provide initial chronological constraints. The selected Gabonese caves contained well-preserved speleothems, offering high-resolution geochemical archives of past climate variability. This research underscores the untapped potential of Central and West African karst systems as key palaeoclimate archives, while highlighting spatial heterogeneity in stalagmite suitability. The findings contribute to the growing body of tropical African palaeoclimate research and support improved calibration and validation of climate models. Integration of these records into modelling frameworks will enhance reconstructions of regional hydroclimatic variability and inform resilience strategies in the face of ongoing global climate change.

Spatio-temporal dynamics of speleothem growth and glaciation in the British Isles

Sina Panitz[1,2], **Michael Rogerson**[1], Jack Longman[1], Nick Scroxton[3], Tim J. Lawson[4], Tim C. Atkinson[5], Vasile Ersek[1], James Baldini[6], Lisa Baldini[2], Stuart Umbo[1], Mahjoor A. Lone[1], Gideon M. Henderson7, and Sebastian F. M. Breitenbach[1]

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Reconstructing the spatio-temporal dynamics of glaciations and permafrost largely relies on surface deposits and is therefore a challenge for every glacial period older than the last due to erosion. Consequently, glaciations and permafrost remain poorly constrained worldwide before ca. 30ka. Since speleothems (carbonate cave deposits) form from drip water and generally indicate the absence of an ice sheet and permafrost, we evaluate how speleothem growth phases defined by U series dates align with past glacial–interglacial cycles. Further, we make the first systematic comparison of the spatial distribution of speleothem dates with independent reconstructions of the history of the British–Irish Ice Sheet (BIIS) to test how well geomorphologic ice reconstructions are replicated in the cave record. The frequency distribution of 1020 U series dates based on three different dating methods between 300 and 5ka shows statistically significant periods of speleothem growth during the last interglacial and several interstadials during the last glacial. A pronounced decline in speleothem growth coincides with the Last Glacial Maximum before broad reactivation during deglaciation and into the Holocene. Spatiotemporal patterns in speleothem growth between 31 and 15ka agree well with the surface-deposit-based reconstruction of the last BIIS. In data-rich regions, such as northern England, ice dynamics are well replicated in the cave record, which provide additional evidence about the spatio-temporal distribution of permafrost dynamics. Beyond the Last Glacial Maximum, the distribution of speleothem dates across the British Isles offers the opportunity to improve chronological constraints on past ice sheet variability, with evidence for a highly dynamic Scottish ice sheet during the last glacial. The results provide independent evidence of ice distribution complementary to studies of surface geomorphology and geology, and the potential to extend reconstructions into permafrost and earlier glacial cycles. Whilst undersampling is currently the main limitation for speleothem-based ice and permafrost reconstruction even in relatively well-sampled parts of the British Isles, we show that speleothem dates obtained using modern mass spectrometry techniques reveal a higher spatio-temporal resolution of glacial–interglacial cycles and glacial extent than previously possible. Further study of leads and lags in speleothem growth compared to surface deposition may provide newinsights into landscape-scale dynamics during ice sheet growth and retreat.

A palaeoclimate record for the Western Mediterranean from Gibraltar speleothems

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A twenty-year effort of cave monitoring, geochemical analysis and dating of speleothems from caves in Gibraltar has culminated in completion of an extremely detailed and well-dated "Reference Record" of West Mediterranean palaeoclimate covering the past two glacial-interglacial cycles. This poster will present the record of stable isotopes and briefly discuss how they might be interpreted.