

ABSTRACTS – HÖHLEN: Die geowissenschaftliche Erforschung der letzten weißen Flecken der Erde, Symposium am Freitag, 12.11.2021

Lukas Plan

Highlights of cave exploration in the Eastern Alps

The Eastern Alps host the deepest and several of the longest caves in Europe. Each year some 300 caves are discovered and several tens of kilometers of new cave passages are found and surveyed by national and international teams. The focus of this presentation will be on the large karst massifs of the Northern Calcareous Alps such as Tennengebirge, Dachstein and Totes Gebirge, where in some parts the underground passage networks are quite dense already. From time to time, significant cave systems are linked due to further exploration which creates very long cave systems. In the western Totes Gebirge a connection of two cave systems appears possible soon and could lead to a 300 km-long cave. Another outstanding example is Lamprechtsofen which has a vertical range of 1727 m. This system “grew” from below by connecting caves that are located higher and higher on the Leoganger Steinberge massif. Special features of these caves are up to 450 m-deep single shafts and chambers that measure almost 19,000 m² ground area.

Lukas Plan is a geologist at the Cave and Karst Group of the Natural History Museum Vienna. He mainly works on speleogenesis, karst morphology and hydrology. He is caver since 1988 and has documented many 10s of kilometres of cave passages in the Eastern Alps especially on Hochschwab, Dachstein, Totes Gebirge and in Lower Austria. He is co-editor of the journal “Die Höhle”.

Aurel Perşoiu

Cave glaciers – genesis, dynamics and paleoclimatic importance

Ice caves occur in mountain regions across the Northern Hemisphere, between 30° N and 77° N, and from sea level to 3300 m above sea level, in areas where a combination of favorable cave morphology, local topography and climatic conditions allow for the perennial accumulation and preservation of ice. These underground deposits harbor a partly unexplored wealth of information on, inter alia, past winter climatic conditions, vegetation variability, pollution history and atmospheric circulation.

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In this talk we review the conditions and factors leading to ice formation and preservation in caves, their dynamics in response to present and past climatic variability and the paleoclimatic information recorded by various proxies in ice (oxygen, hydrogen and carbon stable isotopes, accumulation rate, pollen, chemical elements).

Aurel Perşoiu works at the Emil Racoviță Institute of Speleology in Cluj-Napoca, Romania. His works unfolds at the intersection of speleology (mainly ice caves), stable isotope geochemistry (mainly oxygen and hydrogen) and past climate variability (mainly the Holocene). He studies how present climate dynamics is transferred and preserved in the stable isotope ratios in water, ice and calcite and how the later can be used to understand past climate variability and its role in the dynamic of human societies. He carries out his work in karst and glaciated areas in Europe, Western Asia, South America and Antarctica.

Gina Moseley

The World's Northernmost Caves

Solution caves in the cold and arid north and northeast Greenland were first observed during US aerial reconnaissance missions during the middle of the 20th century. One cave in northeast Greenland was reported as containing a flowstone deposit, thus indicating a warmer and wetter period in the recent geological past. Here, key findings of the Greenland Caves Project 2015 and 2019 expeditions are presented showing that 10% of caves are in excess of 90m in length, whereas the majority of caves are short (<10m) relicts. Such short caves do, however, indicate widespread phreatic passage development that took place prior to glacio-fluvio incision. Deposition of speleothem between c. 580,000 to 540,000 years ago took place during a period of elevated temperatures and moisture availability associated with the Earth's orbital configuration.

Gina Moseley is an Ingeborg-Hochmair Professor at the University of Innsbruck, Fellow of the Royal Geographical Society, Rolex Award for Enterprise Laureate, and Member of the Young Austrian Academy of Sciences. Gina focusses on palaeoclimate reconstruction from speleothems in Arctic and periglacial environments in order to improve understanding of past warm periods and rapid climate change events.

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Stéphane Jaillet

The southernmost karst region on Earth: the limestone archipelago of Patagonia

At 50° southern latitude, the Patagonian Karst is the southernmost of its kind on Earth. It offers a spectacular landscape and exceptional underground cavities in an extreme climatic setting. During the last 20 years, the Franco-Chilean Association "Centre Terre" has organised a series of expeditions to this remote coastal area. During nine expeditions, the most important caves in Chile have been explored and karst morphologies have been discovered that are unknown elsewhere on this planet. These explorations also led to the discovery of the painted caves of the Kawésqar Indians, the "nomads of the sea". As a result of this research, the island of Madre de Dios, the largest of these limestone islands, is now a candidate for inclusion in the World Heritage List by UNESCO.

Stéphane Jaillet is geomorphologist, speleologist and cartographer. He specialises on the study of karst and the origin of caves. After his PhD (University Bordeaux 3) on the covered karst of Barrois (Lorraine area), he joined the French CNRS (EDYTEM laboratory, University Savoie Mont Blanc) and developed the platform "Cartography, Imaging and 3D", specialised in 3D analysis tools, including terrestrial lidar (high mountain, mountain and karst underground). He is currently vice-president of the of French Karstology Association and member of the editorial board of the journal *Karstologia*. He is the scientific co-leader of the Ultima-Patagonia expeditions.

Georg Zagler

14 Tage im Untersberg

Im Untersberg bei Salzburg sind derzeit rund 380 Höhlen bekannt. Ihre Gesamtlänge liegt bei gut 100 km. Sie durchziehen das Bergmassiv von den Gipfeln bis an den Grundwasserspiegel in Talnähe. Das Kolowrat-Gamslöcher-Salzburger Schacht System ist mit derzeit 45 km das längste Höhlensystem des Berges. Auf bayerischer Seite gelegen ist das Riesending mit 1149 m Tiefe das tiefste System im Untersberg und mit einer Ganglänge von 22,6 km die tiefste und längste Höhle Deutschlands.

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Der Vortrag zeigt Bilder der aktuellen Höhlenforschung von den Eingängen am Plateau, über Schächte mit hohen Wasserfällen und Canyons bis zu einer ausgedehnten Seenlandschaft rund 200 m über dem Talboden.

Georg Zagler forscht seit vielen Jahren vor allem im Untersberg und ist maßgeblich an den neuen Entdeckungen im Kolowrat-Gamslöcher-Salzbürger Schacht Systems beteiligt, wozu bis zu zweiwöchige Biwaktouren notwendig sind. Er ist Geologe in Salzburg und führt in den Höhlen am Untersberg umfangreiche Messungen des Karstwasserkörpers durch, der die Landeshauptstadt seit dem 19. Jahrhundert mit Trinkwasser versorgt.

Jiri Bruthans

The world's deepest underwater cave

The Hranice Abyss (HA) in Czech Republic is currently the deepest underwater cave in the world (404 m). It was explored by deep diving and by remotely operated vehicles. It shares a thermal and CO₂-rich water source with an adjacent spa. Based on chemical and isotope composition, water in the HA is a mixture of shallow and thermal groundwaters. Vertical profiling and deep sampling in the HA showed distinct changes with depth in temperature and TDS. Density-driven flow controls the mixing. In winter, the shallow water of the open HA lake is efficiently cooled; the denser surface water sinks to greater depths, which mixes the water column in the HA. During the summer the shallow water stagnates. Periods of stagnation and of accelerated water flow and mixing in the HA perfectly fit with the periodic occurrence of CO₂ evasion in the lake and the overall characteristics of the microbial communities, which showed the absence of any functional stratification. Ferric oxyhydroxide precipitation is the major cause for turbidity in the HA. Interestingly, there is no indication of any major inflow of thermal water into the HA at greater depths which indicates blockage of Hranice Abyss in greater depths.

Jiri Bruthans is professor of applied geology at the Faculty of Sciences, Charles University, Prague. His research topics include karst evolution and hydrogeology, tracer tests, groundwater dating, erosional processes, and the evolution of sandstone landforms. He is a caver and member of the Namak team which discovered several long caves in salt in Iran including 3N Cave.

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Robbie Shone

In the world's deepest-known cave

The premise of this presentation will be photographing the world's most spectacular caves from which Robbie Shone has over 20 years of experience. In his presentation, he will cover expeditions from the four corners of the globe, culminating in his most terrifying experience escaping a flood pulse at the bottom of the deepest-known cave in the world, where he was forced to leave all his photographic equipment behind and take only his valuable memory cards with him leaving everything else to the mercy of the rising waters.

Robbie Shone is a cave explorer and visual storyteller, who is committed to creating unique images of exploration in our extreme subterranean world. Robbie is based in the heart of the Alps in the scenic alpine town of Innsbruck, Austria. Whilst completing a B.A. in Fine Art and Photography, Sheffield, UK, Robbie pursued his love of the outdoors. He developed a strong interest in caving, and in particular the challenges that cave photography has to offer.

Robbie's exciting expedition photography has taken him to the remotest parts of the world where he's photographed the 'deepest', 'largest', 'longest' cave systems known. In September 2018, Robbie spent two weeks solidly underground as part of a National Geographic-funded expedition to the bottom of Veryovkina (-2,212 m), the deepest-known cave in the world located in the Caucasus Mountains of Abkhazia (Georgia). After being at the bottom for a whole week, things turned for the worse when a flood pulse hit; in order to save his own life and not endanger the lives of others, Robbie took only his valuable memory cards with him and left everything else to the mercy of the rising waters. Besides exciting times at the bottom of the deepest-known cave in the world, he's hung on a thin rope, photographing 200m above the floor in the world's deepest natural shaft; explored the far ends of a 189 km long cave system; and photographed Sarawak Chamber, one of the world's largest underground chambers the size of eight soccer pitches. In pitch blackness with no natural light, these are all amazing achievements!

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Yuri Dublyansky

Devils Hole (Nevada)

Devils Hole in Nevada, USA is unique in many respects. Located in a middle of a desert, it gives access to the regional water table. In a small, but deep pool of water in the cave, for thousands of years a small community of the endemic Devils Hope pupfish has been living. Over the last 700 thousand years, water has deposited almost 1 m-thick calcite deposits on cave walls, providing world's longest continuous paleoclimate record from a continent. Finally, with its depth below water table exceeding about 150 m, Devils Hole is likely the deepest underwater cave in North America.

Yuri Dublyansky is a senior researcher at Innsbruck University. Prior to joining Innsbruck University, he worked for 20 years at the Institute of the Russian Academy of Sciences in Novosibirsk and spent 5 years consulting the State of Nevada in the USA on the geology of disposal of nuclear waste. Presently, his main focus is speleothem-based palaeoclimate and paleohydrogeology research. In this vein, he carries out field work in caves located in different countries, including poorly accessible parts of Eurasia, such as Ural and Siberia.