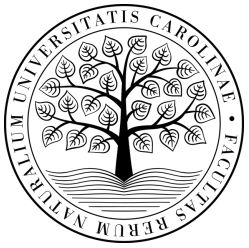

PROGRAM AND BOOK OF ABSTRACTS

UNCE Virtual Student Conference
21th of April 2022

Center for Geosphere Dynamics
UNCE/SCI/006 2018/2023

Faculty of Science, Albertov 6
Charles University, Prague

Program

	Time	Title	Session
14:00 Opening Remarks			
Prof. Michael Petronis New Mexico Highlands University, USA	**14:05**	Structural, Rock Magnetic, and Geophysical Imaging to Better Understand Magma Emplacement and Feeder Conduit Geometries Beneath Monogenetic Volcanoes	Keynote Speech
Alda Vieira	**14:25**	Estimation of fire induced mercury emissions from the forest floor of a pine plantation in central Portugal	Environmental and Isotopic Geochemistry
Ladislav Polák	**14:35**	Carbonatites in terms of radiogenic isotopes	
Petra Venhauerova	**14:45**	Discharged phosphorus affects arsenic mobility in arsenic-enriched streambed sediment	
Rafael Baieta	**14:55**	Effects of forest fires on soil lead elemental contents and isotopic ratios	
Marine Jouvent	**15:05**	Growth and evolution of the Saxothuringian orogenic wedge and its extensional collapse: the Variscan *P-T-t* record of the metasediments of Erzgebirge, Bohemian Massif	Hydrogeology, Petrology and Structural Geology
Petar Pongrac	**15:15**	Influence of H_2O on deformation behavior and microstructure of quartz: deformation experiments on Tana-quartzite	
Mareš Jakub	**15:25**	Moisture distribution, tensile strength, evaporation rate and origin of coastal honeycombs (Tuscany, Italy)	
Petr Vitouš	**15:35**	Magnetic fabrics of Teplice rhyolite from the Altenberg–Teplice Caldera in Bohemian Massif: preliminary conclusions reveal complex emplacement dynamics of pyroclastic density currents	Geology, Paleontology and Astrobiology
Ondřej Kohout	**15:45**	New Acanthoceratid ammonites from Czech Republic and their ornamentation	
Kateřina Němečková	**15:55**	Raman spectroscopy of UV- screening pigments in gypsum	
16:05 Closing Remarks			

Keynote Speaker

Michael Petronis, Ph.D.

New Mexico Highlands University, USA
Assistant Professor

"Structural, Rock Magnetic, and Geophysical Imaging to Better Understand Magma Emplacement and Feeder Conduit Geometries Beneath Monogenetic Volcanoes"

Pliocene La Cienega volcano, Cerro del Rio Volcanic Field, Santa Fe, New Mexico, USA

Estimation of fire induced mercury emissions from the forest floor of a pine plantation in central Portugal

Vieira, A.M.D.[1]*, Vaňková, M. [1], Campos, I.[2], Trubač, J. [1], Baieta, R.[1], Mihaljevič, M. [1]

[1] Institute of Geochemistry, Mineralogy and Mineral Resources, Faculty of Science, Charles University, Albertov 6, 128 00, Prague 2, Czech Republic
[2] CESAM, Centre for Environmental and Marine Studies, Department of Environment and Planning, University of Aveiro, 3810-193 Aveiro, Portugal
domingua@natur.cuni.cz

Mercury (Hg) concentrations in soils and Hg releases from soils during wildfires are not well characterised in Portugal, despite wildfire activity continuing to increase around the Mediterranean. This study focused on the low to moderate severity wildfire in Pombal (Portugal) that occurred in 2019 and consumed 12.5 ha of maritime pine (*Pinus pinaster* Ait.).

We evaluated Hg concentrations in soil profiles and Hg pools in organic horizons to assess the fire-induced Hg emissions. Four soil profiles were sampled, two at the burned area and two at a nearby unburned area. The soil profiles displayed a typical Hg distribution, with higher Hg concentrations (156 μg kg^{-1}) in the organic horizons and a sharp decrease in the mineral layers. The bond between organic matter and Hg was evident along the profiles, with a strong correlation between TOC and Hg.

The mean organic Hg pool at the studied site was calculated at 10.6 g ha^{-1}. If we consider a hypothetical complete combustion of the organic layer (743 Mg), we estimated a release of 133 g of Hg from the burned area.

The study emphasized the importance of the forest floor for Hg retention and its crucial role in Hg emissions during wildfires in a country increasingly affected by climate change.

Acknowledgements: The authors would like to thank the funding agencies Czech Science Foundation (GAČR 19-08614S) and Grant Agency of Charles University in Prague, Czech Republic (GAUK 1066120) for their support. This study was partially supported by institutional funding from the Centre for Geosphere Dynamics (UNCE/SCI/006). Isabel Campos acknowledges the Science and Technology Foundation (FCT) for the financial support to CESAM (UIDP/50017/2020+UIDB/50017/2020).

Carbonatites in terms of radiogenic isotopes

Ladislav Polák[1,2], Lukáš Ackerman[2,3], Tomáš Magna[3], Vladislav Rapprich[3]

[1]Institute of Geochemistry, Mineralogy and Mineral Resources, Faculty of Science, Charles University, Albertov 6, CZ-128 43 Prague 2, Czech Republic.
[2]Institute of Geology of the Czech Academy of Sciences, Rozvojová 269, CZ-165 00 Prague 6, Czech Republic.
[3]Czech Geological Survey, Klárov 3, CZ-118 21 Prague 2, Czech Republic.
polakla@natur.cuni.cz

Carbonatites, extremely Si-undersaturated igneous rocks, are capable to carry an enormous concentration of elements used in isotope geochemistry such as Sr and Nd, which makes Sr-Rb and Sm-Nd isotopic systems in carbonatites almost resistant to further contamination. Also, the process of carbonatite formation (low degree of partial melt and liquid immiscibility) offers the possibility of using non-traditional isotopes such as Re-Os.
Data obtained from eleven carbonatite sites together with Geochemical Rock Database-Query provided a comprehensive view of the evolution of mantle < 3 billion years ago. Part of the mantle has been metasomatized during one of the first subduction events by TTG-like melts whose signature can be sampled by some carbonatites events during recent volcanic events.
Generally, carbonatites are depleted in highly siderophile elements (HSE; <1ppb). However, despite the extremely low concentration of HSE, there are significant differences in the patterns for calciocarbonatites and ferro/magnesiocarbonatites. Calciocarbonatites are more capable to carry more IPGE (Os, Ir, Ru) than other carbonatite types, which is probably based on the fact that the calciocarbonatites cannot originate as a primary magma but rather form from CO_2-rich silicate magma by liquid immiscibility. Increased concentration of IPGE will rather reflect the composition and subsequent processes in silica-rich magma and ferro/magnesiocarbonatites rather reflect the composition of the upper mantle.

Acknowledgments: Thank all those who have helped in carrying out the research.

Discharged phosphorus affects arsenic mobility in arsenic-enriched streambed sediment

Petra Venhauerova[1], Petr Drahota[1], Ladislav Strnad[2], Šárka Matoušková[3]

[1] Institute of Geochemistry, Mineralogy and Mineral Resources, Faculty of Science, Charles University, Prague, Czech Republic
[2] Laboratories of Geological Institutes, Charles University, Prague, Czech Republic
[3] Institute of Geology, Czech Academy of Sciences, Prague, Czech Republic
petra.venhauerova@natur.cuni.cz

Arsenic is considered one of the most toxic elements in the environment and its release into the ground and surface waters can cause severe health problems. For those reasons the recommended limit for As in drinking water is 10 μg/l. Phosphate competition with arsenic is one of the leading causes of As release from sediments into freshwaters. Wastewater treatment plants (WWTP) are an important source of P to freshwaters counting for 25–45 % of all P in surface waters[1].

A stream with a continuous discharge of treated effluent was studied in a locality with naturally enriched concentrations of As in surrounding soils and sediments (> 200 mg/kg). The methods used were XRD, EPMA, bulk analyses, single extractions, and batch leaching experiments. Since 2013, the WWTP effluent supplies 7–23 mg/l of PO_4 into the stream and an increased concentration of As (150–180 μg/l) due to everyday usage of As-enriched well water in the households. This study revealed changes in the fractionation of As and P in the sediments due to exposure to treated wastewater. In the downstream samples, the adsorbed P fraction increased by over 70 %, while the P-retention capacity decreased from 16 % to 10–12 %. In contrast, the adsorbed As fraction decreased by 45 % in the downstream samples. Solid-state speciation showed that P and As distribution within the Fe (oxyhydr)oxides differed significantly between the samples taken upstream and downstream of the effluent discharge point. The samples upstream showed higher As and lower P median concentration (1.3 wt % of As_2O_5 and 0.8 of P_2O_5 wt %, respectively), while the opposite behavior was observed downstream (As 0.7 wt % of As_2O_5 and P 1.6 wt % of P_2O_5). These findings indicate that elevated phosphate is replaced by arsenate in the Fe (oxyhydr)oxides, and the As is mobilized into the aqueous phase. It seems that the stream sediment continuously releases a low concentration of As and aims to remain in equilibrium with fluctuating concentrations of disposed P by either releasing or sequestrating P in the streambed sediment.

Wastewater treatment plants, as a local source of phosphate, can significantly impact As fractionation in As-enriched areas and may be responsible for significant and long-term As mobilization into surface water systems.

Acknowledgements: This research was supported by the Grant Agency of Charles University (GAUK no. 790120), Czech Science Foundation (GAČR no. 22-27939S), and the Center for Geosphere Dynamics (UNCE/SCI/006).

1. *Ekka, S. A., Haggard, B. E., Matlock, M. D. & Chaubey, I. Dissolved phosphorus concentrations and sediment interactions in effluent-dominated Ozark streams. Ecological Engineering* ***26****, 375–391 (2006).*

Effects of forest fires on soil lead elemental contents and isotopic ratios

Rafael Baieta[1], Alda M. D. Vieira[1], Maria Vaňková[1] & Martin Mihaljevič[1]

[1]Institute of Geochemistry, Mineralogy and Mineral Resources, Faculty of Science, Charles University, Albertov 6, CZ-128 43 Prague 2, Czech Republic
santosbaietar@natur.cuni.cz

This study described the behavior of Pb and its isotopes in forest soils affected by different temperature wildfires. We collected samples of burned (and unburned) soil and ash in Abiul, central Portugal, in areas affected by different temperatures. The different soil burned severities were assessed in situ.

The high-temperature fires consumed all organic matter in the topsoil (down to 5 cm), while lower temperatures did not. All the soil and ash samples were analyzed for their lead (Pb) contents and Pb isotopic compositions using inductively coupled plasma mass spectrometry.

The average Pb elemental concentration in the unburned topsoils was 10.7 mg kg^{-1}, and the isotopic composition ranged from $^{206}Pb/^{207}Pb$ = 1.167 to 1.178. No significant accumulation of Pb was observed in the topsoil (and ash) affected by the high-temperature fire, but their respective ratios increased (soil $^{206}Pb/^{207}Pb$ = 1.197; ash $^{206}Pb/^{207}Pb$ = 1.180). However, there was a significant accumulation of Pb (15.3 mg kg-1) in the topsoil and especially in the ash (Pb avg. = 21.8 mg kg^{-1}), affected by the low-temperature fire. The soil $^{206}Pb/^{207}Pb$ isotopic ratios remained stable but decreased in the ash ($^{206}Pb/^{207}Pb$ = 1.174 and 1.166, respectively).

According to the isotopic composition, Pb in the topsoils was of mixed origin (natural and anthropogenic). We assumed that lithogenic Pb ($^{206}Pb/^{207}Pb$ >1.19) occurred in stable mineral forms while anthropogenic Pb mainly originated from leaded gasoline ($^{206}Pb/^{207}Pb$ < 1.16). Anthropogenic Pb was more easily mobilized due to the volatile nature of the emitted compounds of vehicular Pb (oxyhalogenides). Hence, during the high-temperature burning of the soil, Pb with a lower isotopic signature would be preferentially released from the soil Pb pool. Consequently, resulting soils and ash exhibited an increase in $^{206}Pb/^{207}Pb$ isotopic ratios. However, ash and soils affected by low temperatures, which did not volatilize anthropogenic Pb, retained their isotopic signatures.

This work suggests that it may be possible to determine the temperature of a forest fire from the Pb isotopic signatures of the burned materials.

Acknowledgements: This work was supported by the Czech Science Foundation (GAČR 19-18513S), the Center for Geosphere Dynamics (UNCE/SCI/006), and a student grant awarded to Rafael Baieta by the Charles University Grant Agency (GAUK 946120). In addition, the authors would like to thank the contributions from Marie Fayadová, Vera Vonásková, and Lenka Jílková in sample treatment. Finally, Professor Jozef Ježek is thanked for his assistance in interpreting the data. The written English was checked by the native English speakers Madeleine Stulikova, Ph.D and Chris Ash, Ph.D. The authors wish to thank prof. Jorg Matschulat and an anonymous reviewer for the constructive comments on the manuscript.

Growth and evolution of the Saxothuringian orogenic wedge and its extensional collapse: the Variscan *P-T-t* record of the metasediments of Erzgebirge, Bohemian Massif

M. Jouvent[1], O. Lexa[1], V. Peřestý[1], P. Jeřábek[1], S. Scaillet[2], A. Kylander-Clark[3]

[1] Institute of Petrology and Structural Geology, Charles University, 12843 Prague 2, Czech Republic
[2] CNRS/INSU, ISTO, UMR 7327, 45071 Orléans, France
[3] Department of Earth Science, University of California, Santa Barbara, California, USA
marine.jouvent@natur.cuni.cz

The metasediments surrounding the well-studied *(U)HP* rocks of the Erzgebirge crystalline complex (Saxothuringian Domain) are poorly explored, although they provide an important link between deep subduction and mid-crustal processes. Several transects from the low-grade hanging wall phyllites to the footwall medium-grade micaschists have been investigated to understand the Variscan tectonometamorphic evolution of this region. Using field structural geology, thermodynamic modelling and geochronology, we constrained the *P–T* conditions and timing of four deformation events (D1–D4). The first M1-D1 event is characterized by *HP–LT* minerals (garnet, chloritoid, phengite, paragonite and rutile) defining the S1 foliation with an M1 peak *P–T* conditions increasing from 13 kbar and 520°C in phyllites to 25 kbar and 560°C in micaschists. The corresponding geothermal gradient of 6–11°C/km is typical for subduction environments. The M2-D2 event corresponds to the deformation and metamorphic overprint of the S1 fabric during partial decompression. The M3-D3 event is mainly developed in micaschists and becomes more intense towards the footwall. It is accompanied by the development of a subhorizontal S3 cleavage and the formation of *MP–MT* minerals (biotite, staurolite and ilmenite). The M3 event reaches the peak *P–T* conditions of 5–9 kbar and 595°C representing a barrovian-type geothermal gradient of 17–30°C/km. Finally, all metamorphic fabrics were heterogeneously affected by the low-grade M4-D4 upright folding. Nine samples have been analysed by monazite LASS ICP-MS geochronology. The phyllites preserve homogeneous ages around 350–340 Ma. In contrast, the micaschists with intense M3 metamorphism record two groups of ages. Few monazite grains in the garnet cores and in the locally preserved M1-M2 matrix are dated to ~340 Ma, while monazites located in the M3 matrix are younger, at ~330 Ma. ^{40}Ar–^{39}Ar geochronology from micas in phyllites revealed ages ranging between 343–328 Ma, while in micaschists these ages cluster to ~330 Ma. The geochronological data indicate that between 350–340 Ma, at least some phyllites experienced burial and exhumation, while burial of the micaschists is slightly younger (340–335 Ma). The strong M3 metamorphic overprint in the micaschists related to exhumation was dated to ~330 Ma. The D1-D2 events (350–335 Ma) are interpreted to record the growth of the orogenic wedge while its present-day architecture derived from a significant vertical shortening D3 associated with a barrovian-type metamorphism M3 (330 Ma) which resulted in an overall ductile thinning of the wedge. A new tectonic model is proposed, in which the Erzgebirge part of the Saxothuringian Domain reveals a spectacular example of active margin evolving through the formation of accretionary prism towards the building of the orogenic wedge by accretion of subducted continental crust and finally its extensional collapse.

Acknowledgements: This work was supported by the Grant Agency of Charles University (GAUK 384721) and the Center for Geosphere Dynamics (UNCE/SCI/006).

Influence of H_2O on deformation behavior and microstructure of quartz: deformation experiments on Tana-quartzite

Pongrac P.[1], Jeřábek P.[1], Stünitz H.[2,3], Raimbourg H.[3], Racek, M.[1], Nègre L.[3]

[1] Institute of Petrology and Structural Geology, Faculty of Science, Charles University in Prague, Czech Republic;
[2] Department of Geosciences, Arctic University of Norway, Tromsø, Norway;
[3] Institute of Earth Sciences, University of Orléans, France;
pongracp@natur.cuni.cz

Quartz is among the most abundant minerals in the continental crust and one of the first to show plasticity with increasing pressure and temperature. Understanding its mechanical behavior is crucial for estimates on crustal strength and geodynamic modeling. Since the discovery of H_2O-induced weakening of quartz, a remarkable amount of work has been done in order to improve the knowledge about processes and mechanisms controlling that phenomenon. As the weakening effect depends on molecular H_2O, it is a disequilibrium process that is difficult to incorporate into the existing quartz flow laws. We performed a series of coaxial deformation experiments in the solid-medium Griggs-type apparatus, using natural Tana-quartzite. Samples with added H_2O in the range of 0-0.5 wt% were deformed at conditions of 900 °C and 1 GPa, in 1) shortening experiments with constant strain rate of 10^{-6} s^{-1} and 2) strain rate stepping experiments covering 10^{-5}, 10^{-6} and 10^{-7} s^{-1}. Compared to the as-is samples, the 0.1 and 0.2 wt% H_2O-added samples showed slightly weaker mechanical behavior. On the other hand, samples with higher amounts of added H_2O (0.3 to 0.5 wt%) showed more eratic and unsystematic behavior. The strain rate steeping experiments showed surprisingly low stress exponent values of ~2. The most deformed regions in the weaker samples are in the vicinity of thermocouple, characterized by intense flattening of the original grains as well as recrystallization associated with subgrain rotation and cracking. With addition of H_2O, the abundance of SGR-related domains decreases, while the cracking-related recrystallization becomes more dominant. Cracked domains are associated with fluid/melt pockets of up to 100 μm in size, where the cracked fragments underwent subsequent grain growth. The grain growth and reconstitution of quartz by grain boundary migration is facilitated by H_2O and reflected by the blue luminescence. FTIR spectroscopy documents that the original grains during deformation lose H_2O manifested by decrease in H_2O concentration from 600-2000 H/10^6 Si to 0-400 H/10^6 Si. In contrast, the average H_2O concentration present in grain boundaries is increasing with increases in amount of added H_2O. Intense flattening of the original grains accommodated by dislocation creep is associated with loss of H_2O from the grains interior. Recrystallized grains nucleated by cracking and subgrain rotation indicate concurrent operation of brittle and crystal plastic processes. The low stress exponent values, together with the observed microstructural features, suggests contribution of dissolution-precipitation combined with grain boundary sliding in the production of bulk strain. Increased amount of H_2O in the grain boundary space in samples with higher quantity of added H_2O promotes crack-related recrystallization, which however does not significantly affect the strength of the samples.

Acknowledgements: This work is supported by the grant agency of Charles University (GAUK 488119) and the Center of Geosphere Dynamics (UNCE/SCI/006). We thank Rune Stien and Raoul Heilbronner for the assistance during the material sampling within the ELKEM quarry in the Austertana region.

Moisture distribution, tensile strength, evaporation rate and origin of coastal honeycombs (Tuscany, Italy)

Mareš Jakub[1], Bruthans Jiří[1]

[1]Charles University, Faculty of Science, Institute of Hydrogeology, Engineering Geology and Applied Geophysics, Praha 2, Czechia
maresj15@natur.cuni.cz

Cavernous weathering is a typical example of the degradation pattern of both natural outcrops and cultural heritage. It is described from all environments on Earth and also on Mars. The most common examples are honeycombs and tafoni. Honeycombs are known from arid, humid, and cold deserts, but best developed honeycombs are often described from coastal areas. There are many ideas on the origin of cavernous weathering (case hardening, chemical alteration), but currently most authors believe that the origin is caused by salt weathering. Huinink et al. (2004) described a theory that inside the pits, the capillary zone is closer to the surface and therefore the intensity of the evaporation is higher than in walls separation the pits. As more evaporation accumulates more salts the pits enlarges faster than surface outsides the pits is retreating. To verify this theory, in the environment of coastal honeycombs in Tuscany (Italy), the depth of the evaporation front (interface between dry surface zone and deeper capillary zone) was measured by the "uranine-probe" method (Weiss et al., 2020) inside and outside the ten honeycombs. From the depth of the evaporation front and climatic conditions on the study site, the intensity of evaporation was calculated and from the mineralization of water the amount of precipitated salts was estimated. To determine the effect of case hardening, the tensile strength of honeycomb pits and walls was measured. The evaporation front measurements show that for all honeycombs, the evaporation front was closer to the surface in pits than outside. The evaporation intensity was calculated for the mean depth of evaporation front inside the honeycombs (2 mm) and the mean depth outside the honeycombs (7 mm). In marine environment a solution on a evaporation front should be saturated with halite which has an equilibrium relative humidity of 75 %. The evaporation intensity inside the honeycombs is 9.4 mm/year for 75 % RH and 2.7 mm/year outside the honeycombs. Considering that the evaporated water is of the same composition as seawater, 0.1-0.4 g salts precipitate from 1 m^2, most of which is NaCl. Inside the honeycombs precipitate 3 times more salts than outside. The tensile strength inside the honeycombs is approximately the same as outside considering standard deviation (354±339 and 284±157 kPa, respectively), so case hardening does not have any effect. The results correspond to the theory of origin according to Hunink et al. (2004). For a detailed description of the moisture behavior in future studies, it is necessary to better understand the moisture conditions (especially relative humidity on the evaporation front) and it is vital to perform repeated measurements during various seasons.

Acknowledgements: This research was funded by the Czech Science Foundation (GA19-14082S) and supported by the Centre for Geosphere Dynamics (UNCE/SCI/006).

Huinink HP, Pel L, Kopinga K., 2004. Simulating the growth of tafoni. Earth Surface Processes and Landforms 29: 1225–1233.

Weiss T, Mareš J, Slavík M, Bruthans J. 2020. A microdestructive method using dye-coated-probe to visualize capillary, diffusion and evaporation zones in porous materials. Science of The Total Environment 704, 135339.

Magnetic fabrics of Teplice rhyolite from the Altenberg–Teplice Caldera in Bohemian Massif: preliminary conclusions reveal complex emplacement dynamics of pyroclastic density currents

Petr Vitouš[1,2], Filip Tomek[1,2], Michael S. Petronis[3]

[1] Institute of Geology and Paleontology, Faculty of Science, Charles University, Prague, Czech Republic
[2] Czech Academy of Sciences, Institute of Geology, Prague, Czech Republic
[3] Environmental Geology, Natural Resources Management Department, New Mexico Highlands University, Las Vegas, New Mexico, 87701, USA
vitouspe@natur.cuni.cz

The method of anisotropy of magnetic susceptibility (AMS) is commonly used to infer the source areas, flow dynamics, and post-emplacement processes of pyroclastic density currents (PDCs) of young calderas (i.e. Cenozoic). At older calderas, the primary record is usually obscured by post-emplacement deformation and/or long-term erosion. The focus of this study is put on the ~318–314 Ma welded proximal ignimbrites inside the Altenberg–Teplice Caldera (ATC; Bohemian Massif). The pre-caldera ignimbrites (small-volume, moderately-welded) emplaced before ~314 Ma yield a generally westward flow direction as determined from the combined imbrication of the magmatic and magnetic foliation plane. This put their eruptive vents location along the eastern margin of the future caldera. The most voluminous high-grade ignimbrites, products of the caldera-forming event at ~314 Ma, yield a high degree of welding and rheomorphic ductile folding that obscured the primary flow fabrics. Based on the previously published radiometric and field geology data from the ATC, we interpret that these ignimbrites were sourced from a dike swarm along the north-western caldera rim. The PDCs then flowed across the subsiding caldera towards the south and south-southeast, where ~314 Ma extra-caldera ignimbrites are exposed. The final trap-door caldera collapse triggered the emplacement of the microgranite ring dikes. These dikes, together with the post-caldera granites, may have caused a local resurgence along the eastern caldera rim. As exemplified by the ATC, the AMS fabric can be successfully applied to much older caldera ignimbrites including those with strong welding and partial rheomorphism to interpret flow direction, deposition, emplacement, and post-emplacement dynamics. This helps significantly, as when combined with present-day volcanic observations, the volcanic processes can be better comprehended, and in old terrains (such as north-western Bohemian Massif), location of ore deposits connected to volcanic activity can be revealed.

Acknowledgments: This study is an integral part of the Ph.D. thesis of Petr Vitouš. The careful editorial handling by Mike Ort as well as the critical comments by Guido Giordano and an anonymous referee are highly appreciated, all during the process of submission to the Bulletin of Volcanology. We have benefited from discussions with Bedřich Mlčoch, Marta Chlupáčová, Manuel Lapp, Jiří Žák, and Vladislav Rapprich. Milena Vostrá, Marta Tomková, and Jiří Petráček are thanked for laboratory assistance. State enterprises Czech forests (Lesy ČR) and Sachsen forests (Staatsbetrieb Sachsenforst) provided entrance and sampling permits on both sides of the border. Finally, we thank Geomet Ltd. for providing samples from their boreholes.

New Acanthoceratid ammonites from Czech Republic and their ornamentation

Ondřej Kohout[1] , Martin Košťák[1]

[1] Institute of Geology and Paleontology, Faculty of Science, Charles University, Albertov 6, 128 43 Praha 2, Czech Republic.
on.kohoutek@gmail.com

Upper Cretaceous ammonites from the Bohemian Cretaceous Basin (BCB) have been studied for decades, nevertheless revision of deposited material (collected mostly in the first half of the 20th century) within the last years has proven the presence of interesting species so far not known to the science. Especially stratigraphically important index ammonite *Watinoceras coloradoense* (Henderson 1908) which prove presence of the lowermost Turonian eponymous ammonite zone. Another eminent new species from Czech Republic is Kamerunoceras *turoniense* (d'Orbigny 1850) from the southern part of the BCB which is the northernmost occurrence of such Tethydian oriented species in central Europe. Collection of *Kamerunoceras t.* includes ca. 30 well preserved (yet compacted) specimens with typical ornamentation. Ornamentation itself (mainly expressiveness of the ribs) varies, and not only during the ontogenesis of one specimen but intraspecific variability is also present like in the many genera among Acanthoceratoidea. Problematics of the ammonite classification and systematics will be briefly discussed with illustration of extraordinary decorated specimen (*Kamerunoceras t.*) with one part of the shell ornamented clearly with ribs and the other part mainly with tubercules.

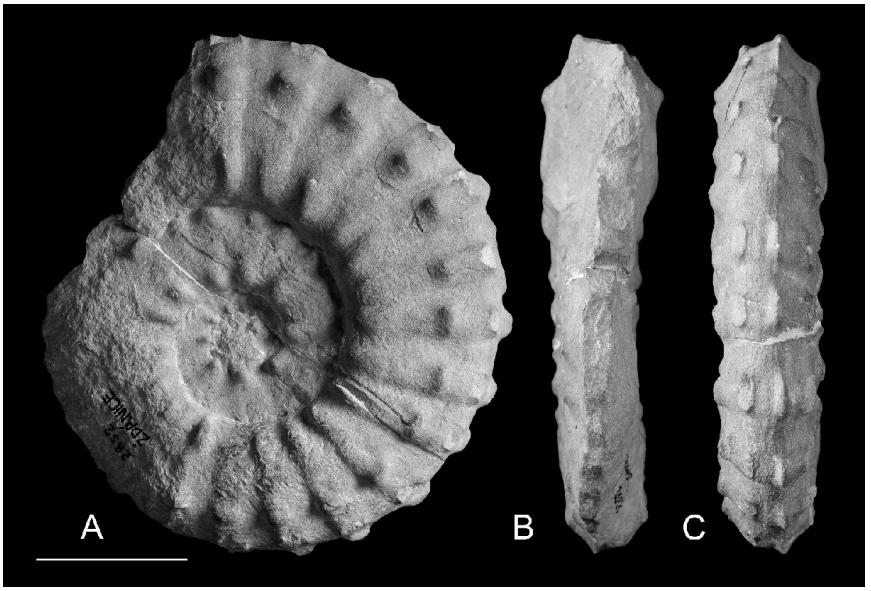

Fig. 1: *Kamerunoceras turoniense* (d´Orbigny, 1850) scale = 5 cm (Foto O. Kohout)

Acknowledgements: This research would not have been possible without the exceptional support of my supervisor and colleague, Martin Košťák. I am also grateful to Palaeontologic department of the Czech National Museum, especially Dr. Jan Sklenář. This research is co-funded by UNCE/SCI/006 and GAUK and I thank for options that are open thanks to these financial resource.

Raman spectroscopy of UV- screening pigments in gypsum

Kateřina Němečková[1], Adam Culka[1] and Jan Jehlička[1]

[1] Institute of Geochemistry, Mineralogy and Mineral Resources, Faculty of Science, Charles University, 1100 Prague, Czech Republic
katerina.nemeckova@natur.cuni.cz

Endolithic microorganisms are one of model organisms in astrobiological studies. Their habitats within the mineral matrix represent hypothetical refugia of Martian biota given that Martian surface (e.g. increased UV-radiation) is very hostile to known life. On Earth, semi-translucent or translucent minerals such as gypsum seem ideal habitats for endoliths, especially phototrophs. Raman spectroscopy is one of the instrumental methods significant in astrobiology since its miniaturized version is a part of the experimental payload of the Perseverance rover that is currently operating in the Martian surface. Dark pigmented colonized gypsum samples were collected from Sicily, Poland and Israel. Samples were investigated using laboratory-based Raman microspectrometers and portable Raman spectrometric devices for presence of UV-protective pigment of endoliths. The synthesis of specialized UV-pigments is regularly required in lithic ecosystems as a survival strategy to the exposure to intense solar radiation. Two unique UV-pigments were detected – gloeocapsin and scytonemin. Both are highly specific for cyanobacteria and therefore serve as biomarkers. Raman spectra of scytonemin were recorded with diagnostic features at around 1593, 1552, 1438, and 1173 cm^{-1}. Gloeocapsin shows characteristic Raman bands similar to parietin at 1665, 1575, 1378, 1310, and 465 cm^{-1}. These two pigments can be used for non-destructive identification of some cynobacteria, especially *Gloeocapsa* sp. and *Nostoc* sp. Scytonin, a scytonemin derivative, was for the first time detected in gypsum samples from Poland with Raman bands at 1675, 1603, 1585 and 1559 cm^{-1}. Other more common pigments were also detected - carotenoids (common Raman bands at around 1525, 1157, and 1004 cm^{-1}), chlorophyll (1326, 1285, 1188, 984 , and 745 cm^{-1}), and phycobiliproteins (1275 cm^{-1}). Raman microspectrometric investigations of colonisations allow to gather detailed information about pigment distribution in micrometric zones of gypsum samples.

Acknowledgements: The project was supported by institutional funding from the Center for Geosphere Dynamics (UNCE/SCI/006) and by the Czech Science Foundation (GAČR project no. 21-03322S)