SGA News

April 2025
Number 56

SOCIETY for GEOLOGY APPLIED to MINERAL DEPOSITS
60
1965-2025

60th Anniversary

SGA News

No. 56 April 2025

Chief Editor
David Banks
School of Earth and Environment
University of Leeds
Leeds, UNITED KINGDOM
editor-sga-news@e-sga.com
d.a.banks@leeds.ac.uk
26banks26@gmail.com

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e-mail: editor-sga-news@e-sga.org
26banks26@gmail.com

Contents

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Society for Geology Applied to Mineral Deposits

NEW MEMBERS OF SGA
January 1, 2024 to December 31, 2024

11 regular and 232 student members applied for membership from January 1, 2024 until December 31, 2024

Algeria	1
Argentina	2
Australia	4
Austria	2
Brazil	2
Canada	7
Chile	1
Colombia	28
Congo	2
Czech Republic	39
Finland	4
France	17
Germany	15
Hungary	1
India	5
Ireland	1
Kazakhstan	7
Morocco	2
Netherlands	1
Peru	54
Poland	2
Russia	5
Senegal	15
Spain	16
Sweden	7
Turkey	2
United Kingdom	5
United States	6

The SGA Mobility Grant - update

Are you in contact with an SGA member who runs a laboratory that could answer some of your research questions? The SGA Mobility Grant can help to bring you together!

SGA Council approved a maximum of 15 grants with a maximum of up to 2000 Eur each (total of up to 30 000 EUR in 1 year) and also decided that students applying for the grant have to be SGA members and at the same time their supervisors must have been SGA members for at least 3 continuous years. To be eligible applicants must have been an SGA member for at least 3 continuous years (i.e. paid up membership fees for the last 3 years). Student members are not eligible for the grant but up to 2 years of student membership can count toward the required 3 years of membership. To apply send your completed application form to the SGA Mobility Grant coordinator (thomas.aiglsperger@ltu.se).

A list of laboratories and application form is available from the SGA Website.

Publication of SGA Student's Theses Abstracts

The SGA Newsletter wil now publish abstracts of Undergraduate, Masters and Doctoral theses submitted by student members. A great deal of student research from around the world is undertaken, but much of this valuable work is not recognized. This is an opportunity for students to gain recognition and to publish work that may be valuable to others For a U/G thesis the length should be approximately 300 words and for MSc or PhD thesis up to 500 words. No figures or tables can be published. We will publish current thesis and those completed within the last 2-3 years.

Abstracts should be sent to the editor of the SGA Newsletter.

Front cover of the SGA Newsletter.

Initial discussion on the formation of the SGA in the office of C. Amstutz, Heidelberg.
l-r A. Maucher, J. Lombard, P. Routhier, P. Ramdohr, G.L Krol, standing, A. Bernard, C. Amstutz

INVITATION TO THE SGA GENERAL ASSEMBLY

The SGA General Assembly will be held on August 6th 2025 in Colorado School of Mines, Golden, CO, USA within the 18th SGA Biennial meeting.

The following agenda was approved by SGA Council:

1- Report of the President (S. Mikulski)

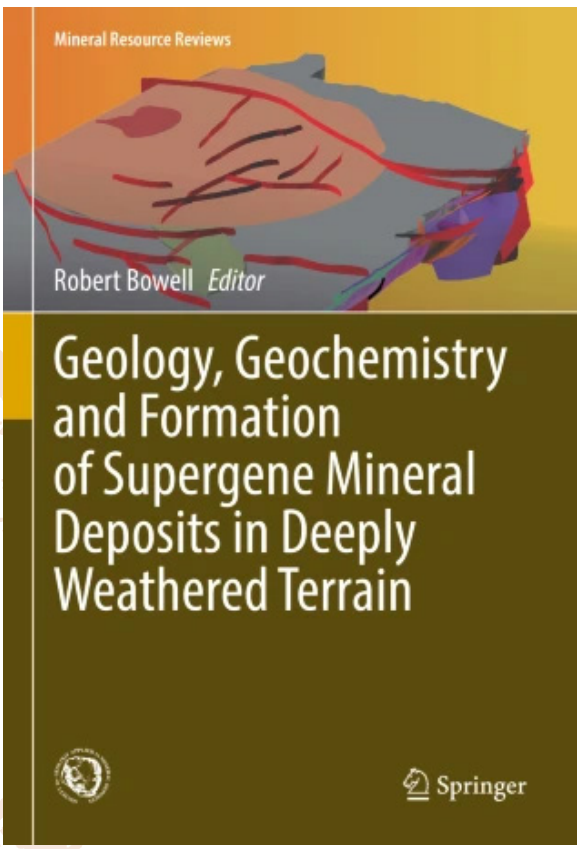
2- Report of the Treasurer (H. Frimmel)

3. Report on activities of SGA Chapters (Representatives of Chapters)

4. Other business

https://sga2025.org

New from Springer published on 7 June 2025
Editors: Robert J. Bowell, Charles R. M. Butt



This book provides a comprehensive overview of the major supergene mineral deposits formed in intensely weathered lateritic terrains. It discusses both contemporary and pre-existing supergene deposits, describing their geological, mineralogical and geochemical characteristics. Supergene processes of enrichment are those that occur under ambient near-surface conditions, compared to hypogene processes mostly at depth under higher temperatures and pressures. Supergene processes include the predominance of meteoric water circulation with concomitant oxidation and chemical weathering. Descending meteoric waters oxidize the primary (hypogene) minerals and redistribute the chemical elements. Residual supergene enrichment occurs as a physical process when the predominant rock-forming minerals oxidize and dissolve, concentrating ore elements hosted in resistant stable minerals; absolute chemical enrichment occurs when the ore elements themselves are leached and migrate in groundwater and precipitate due changes in the pH, oxidation potential and chemical composition of water. These processes can enrich commercially important elements to produce orebodies formed entirely by supergene processes. These include Al (bauxite), Fe ore, Ni-Co laterites, kaolinite, REE (clay deposits), Nb and REE (on carbonatites), base metals (secondary sulfides and oxidate minerals including gossans), gold and surficial U (in calcretes).

Mineral Resources for Our Ever-Changing World

18TH SGA Biennial Meeting

2025 Colorado School of Mines Golden, Colorado USA

August 3-7, 2025
https://sga2025.org/

COME CELEBRATE OUR 60TH ANNIVERSARY WITH US!

SGA was founded in 1965 in Heidelberg, Germany. Therefore, the 18th Biennial SGA meeting in 2025 will celebrate the 60th anniversary of the Society! Please join us in Golden, Colorado for this premier forum for exchange of ideas on a broad range of issues related to mineral deposit research, exploration, development, and the environment. Don't miss the opportunity to engage in four days of exciting technical sessions, oral and poster presentations, topical plenary talks, field trips, workshops, and other social activities.

Golden is an ideal location for meetings because it has the feel of a Colorado mountain yet is only a 40-minute drive from an international airport. It is packed with history, yet it offers modern lodging options, high-quality restaurants, breweries, and museums. Colorado School of Mines was founded in 1874 and has a mix of renovated historic architecture and state-of-the-art buildings. The Green Center on campus is ideal for the Conference because it has 85,000 square feet of event areas with beautiful Kafadar Commons in front of the Green center to enjoy during coffee breaks or lunch. And best of all, some of the most important mineral districts in the world are just a short drive away. See our website to register for field trips to many of these!

support a circular economy in Europe

REGISTRATION NOW OPEN!

Registration Link: https://na.eventscloud.com/ereg/newreg.php?eventid=815470&

REGISTRATION FEE INCLUDES:

- Full participation in the 18th Biennial Conference
- Welcome Ceremony on August 3rd , 2025
- Four lunches
- Three exhibit hall receptions
- Coffee/Tea breaks
- Daily exhibit entrance
- Access to SGA abstracts

REGISTRATION FEE BREAKDOWN

	Early Registration January 6 – May 15, 2025	Late Registration May 16 – Aug 2, 2025	Onsite Registration August 3, 2025
SGA Member	$695	$795	$875
Non-Member	$795	$895	$985
SGA Student Member	$195	$245	$295
Student Non-Member	$245	$295	$345

FAST FACTS

WHAT

Conference on mineral deposit research, exploration, development, and the environment

WHEN

August 3-7, 2025

WHERE

Colorado School of Mines campus, Golden, CO, USA

WHAT

Four days of oral and poster presentations, pre- and post-conference short courses and exciting field trips

EXPECTED NUMBERS

600-700 national and international delegates.

FIELD TRIPS

FT01	Alaska Gold
FT02	Butte Porphyry System
FT03	Climax Porphyry Molybdenum
FT04	Cripple Creek Gold Mine
FT05	Yellowstone Hydrothermal Complex
FT06	San Juan World-Class Deposits: Creede, Silverton
FT07	Carlin-Type Gold and Bingham Porphyry

PRE-CONFERENCE SHORT COURSES

1. **Exploration of sediment-hosted metals – 2 days**
2. **Orogenic Gold – 1 day**
3. **Ore microscopy – 2 days**
4. **Tectonic and structural framework for precious metal deposits in North America – 3 days**
5. **Advanced open-source tools for mineral predictive mapping - 1 day**
6. **Database design to capture and archive geological observations – 1 day**

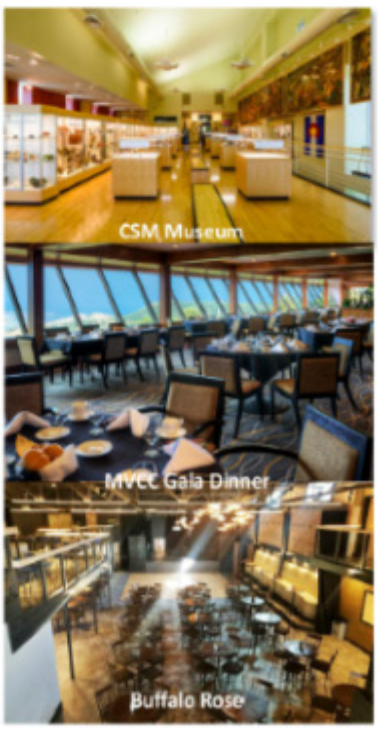
POST-CONFERENCE SHORT COURSES

1. **Fluid and melt inclusions in ore systems – 2 days**
2. **Mineral Markets: How Economics informs strategy -1 day**
3. **UAV-borne hyperspectral mapping – 1 day**
4. **Concepts and Application of Machine Learning to Mining Geoscience: A Practical Course - 2 days**
5. **Geological mapping in exploration – 1 day**

Check out our program sessions, plenary speakers, and more on our website!

PROGRAM AT A GLANCE

	Sunday (August 3)	Monday (August 4)	Tuesday (August 5)	Wednesday (August 6)	Thursday (August 7)
8:30 AM-Coffee break	Set-up, Registration	Welcome presentations and SGA awards	Plenary	4 Concurrent Sessions	Plenary
			4 Concurrent Sessions		4 Concurrent Sessions
Morning coffee break		Coffee break	Coffee break	Coffee break	Coffee break
Pre-lunch		Plenary	4 Concurrent Sessions	4 Concurrent Sessions	4 Concurrent Sessions
Lunch (~12 to 1:30 pm)		Posters & Exhibition in Friedhoff Hall	Posters & Exhibition in Friedhoff Hall	Posters & Exhibition in Friedhoff Hall	Posters & Exhibition in Friedhoff Hall
Pre-pm coffee break		4 Concurrent Sessions	4 Concurrent Sessions	4 Concurrent Sessions	4 Concurrent Sessions
Afternoon coffee break		Coffee break	Coffee break	Coffee break	Coffee break
Post coffee to 5 pm		4 Concurrent Sessions	4 Concurrent Sessions	Plenary	Closing ceremony and student awards; presentation of SGA 2027
				4 Concurrent Sessions	
Early Evening (~5 to 7 pm)	Ice Breaker in Green Center (lobby and Friedhoff Hall)	Posters & Exhibition in Friedhoff Hall & Grand Lobby	Posters & Exhibition in Friedhoff Hall & Grand Lobby	Posters & Exhibition in Friedhoff Hall & Grand Lobby	
Late Evening		Student Industry Event ~7pm to 10 pm Buffalo Rose	One of two choices: 1. Gala Dinner (MVCC) 2. Night at the CSM Museum	Food trucks, games, music on the Commons	



DATES AND DEADLINES

May 2: Student grants approved

May 15: Early bird registration ends

June 16: Last day to register for field trips; no changes or refunds allowed after this date

July 1: Last day to register for short courses; no changes or refunds allowed after this date

August 3-7: 18th Biennial SGA Conference

THANK YOU SPONSORS!

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A Glimpse of Golden, Colorado

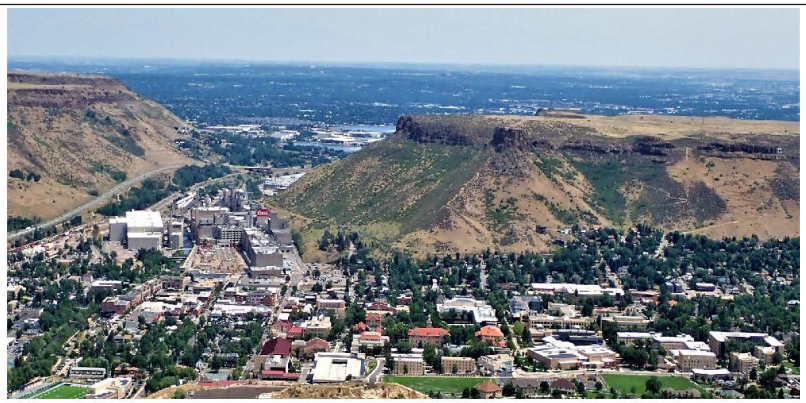
- Golden offers world-class outdoor recreation, cultural attractions, local charm, and several breweries, including the Coors Brewery, the largest single-site brewery in the world.
- Located in the foothills of the Rocky Mountains and nestled between South and North Table Mountains and Lookout Mountain, it has the feel of a mountain town. And due to the gold-rush-era roots, it also has the feel of an historic old gold mining town.
- Visit https://www.visitgolden.com/ to see all it has to offer!

Mineral Resources for Our Ever-Changing World

18TH SGA Biennial Meeting 2025

Colorado School of Mines
Golden, Colorado USA

August 3-7, 2025



THE VENUE

Golden is home to the Colorado School of Mines (CSM), which was founded in 1874. The Conference will be held in the Green Center on the CSM campus.

2025 THEMES WITH SESSION CHAIRS

- Metallogenic evolution of the North American continent (R. Goldfarb, C. Hart, E. Holley, S. Piercey)
- Sustainability of future critical mineral resources (M. Harlaux, S. Jowitt, P. Verplanck, Z. Chang)
- New frontiers in analytical techniques for the explorationist (M. Steele-MacInnis, A. Vymazalova)
- Applications of structural geology to understanding ore controls (A. Hughes, Y. Kuiper, D. Ryhs, N. Thébaud)
- Environment, Society, and Governance (ESG): Challenges related to economic geology (K. Goodenough, M. Hitzman)
- Ore deposits associated with magmatic systems
  - Porphyry/epithermal deposits (G. Bozkaya, P. Chadwick, T. Christie, D. Cooke, Z. Yang)
  - Alkaline magmatism and carbonatites (S. Decree, N. Coint, D. Ollinger
  - Volcanogenic massive sulfides: a session in remembrance of Jim Franklin (M. Hannington, J. Relvas)
  - Tin-tungsten deposits (B. Lehmann, J. Mao)
  - Magmatic Ni-Cr-Cu (PGE) deposits (S. Dare, C. Li, W. Maier, E. Mansur
- Sedimentary processes and ore formation: Special session to honor the career of David Leach (S. Boulel, L. Fontboté, K. Kelley, J. Pašava, Y. Song, S. Spinks)
- Targeting mineral deposits in metamorphic terranes (A. André-Mayer, P. Garofalo, S. Hagemann, J. Kolb, P. Mercier-Langevin, I. Pitcairn)
- Plate tectonics and secular distribution of mineral systems (D. Huston, H. Frimmel, Y. Li, S. Pehrsson)
- SGA-SEG session: Geochemical processes in ore deposition (J. Hedenquist, C. Laflamme, G. Pokrovski, S. Simmons)
- Discovery through geophysics, remote sensing, and hyperspectral techniques (E. Anderson, J. Austin)

Plus some exciting plenary speakers to be announced soon!

FAST FACTS

SGA CONFERENCE OVERVIEW

The SGA Conference is a premier forum for exchange of ideas on issues related to mineral deposit research, exploration, development, and the environment.

WHEN

August 3-7, 2025

WHERE

Colorado School of Mines campus, Golden, CO, USA

WHAT

Four days of oral and poster presentations, pre- and post-conference short courses and exciting field trips, plus accompanying persons program and other social activities

EXPECTED NUMBERS

600-700 national and international delegates. Delegate representation includes academia, industry, government research organizations, consultants and service providers.

HISTORY

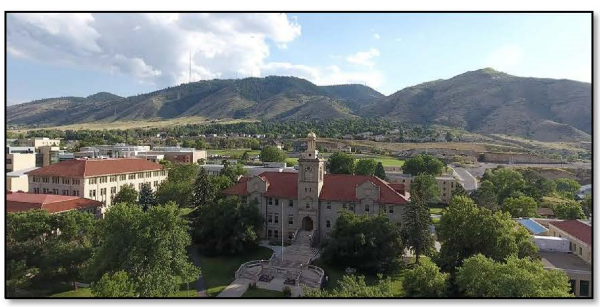
SGA conferences have been held in Australia, Canada, Chile, China, Czech Republic, Finland, France, Greece, Ireland, New Zealand, Poland, Scotland, Spain, Sweden, Switzerland, and the UK

SGA 2025 WILL BE THE FIRST EVER IN THE U.S.

ABSTRACT SUBMISSION AND REGISTRATION ALONG WITH STUDENT GRANT APPLICATIONS WILL OPEN JANUARY 6, 2025

PLAN AHEAD!

Colorado School of Mines



FIELD TRIPS

Trip itineraries are subject to change slightly. Additional information on field trips including pricing will be available on the Conference website as they are finalized

PRE-CONFERENCE TRIPS

ALASKA GOLD

Duration: 7 days
Leaders: Doug Kreiner and Erin Marsh

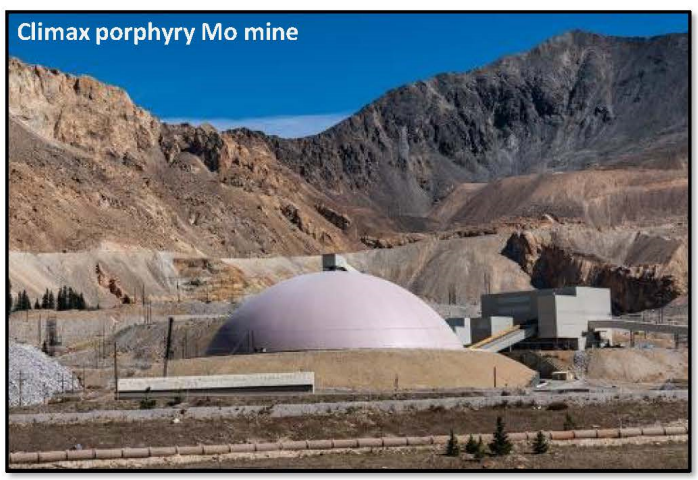
Beginning in Fairbanks and ending in Anchorage, this trip will include Fort Knox, Livengood, Shorty Creek, Pogo, Manh Choh, and the Valdez Creek placer. It will also highlight the critical minerals work that has been done in the upland and supported by the USGS Earth Mapping Resources Initiative. Lastly, it would provide an overview of a number of different deposit types: 1) Paleocene porphyry Au(-Cu) (Shorty Creek), 2) Cretaceous intrusion related Au (Fort Knox, Livengood/Money Knob), 3) quartz-hosted Au (Pogo), 4) Late Cretaceous skarn Au related to a porphyry (Manh Choh), and 5) Placer Au related to orogenic Au veins at Valdez Creek.


Pogo mine from Leise Ridge

CLIMAX PORPHYRY MO, COLORADO

Duration: 1 day
Leaders: Mac Canby, Freeport McMoRan geologists

The world-class molybdenum deposit at Climax has produced Mo concentrate intermittently for more than 100 years. The Climax deposit, which is genetically associated with Oligocene rhyolitic and granitic stocks, is a complex igneous hydrothermal system characterized by multiple intrusive and mineralizing events. The orebodies are composed of molybdenite stockwork veinlets that form dome-shaped masses centered on an intrusive stock. This trip will emphasize current knowledge of these deposits as well as mining history.


Climax porphyry Mo mine

BUTTE PORPHYRY SYSTEM, MONTANA

Duration: 5 days
Leaders: Eric Anderson, John Dilles, Kyle Eastman, Mark Reed, Chris Gammons, Karen Lund, Kaleb Scarberry

The world-class deposits of the Butte mining district, Montana have a long history of production leading to the area being referred to as the "Richest Hill on Earth." The deep porphyry Cu-Mo deposits are overlain by shallow Cu-rich (Au-Ag-Pb-Mn-Zn bearing) zoned-lode deposits hosted in the Butte granite phase of the Boulder batholith. This 5-day field trip will explore the geology and mineral deposits that occur within and around the Boulder batholith. We will visit underground and open pit workings and observe mineralization and alteration in historic deep drill holes of the Butte district. This trip will compare the Butte mining district to other types of deposits associated with the batholith including skarn, carbonate replacement, stockwork, and lode-vein deposits. In addition, we will discuss environmental issues associated with historical mining, and provide updates on current research and future directions for critical commodity production.


Continental Pit: supergene portion of Butte orebody


Butte ore from Continental Pit (chalcocite, bornite)

POST-CONFERENCE TRIPS

SAN JUAN VOLCANIC FIELD, COLORADO

Duration: 5 days
Leaders: Mario Guzman, Doug Yager, Mary Doherty, Steve Enders
Note: High elevation (>3 km above sea level)

The San Juan Volcanic Field in Southwest CO provides an opportunity to compare several intermediate-sulfidation (IS) and high-sulfidation (HS) type epithermal mining districts, and porphyry, as well as various volcanic welded tuffs, lavas and caldera features. The trip will include visits to subeconomic Cu-Mo porphyry prospects, the world class Creede epithermal deposit, and the Summitville HS- epithermal deposit. The trip will focus on mineralization in a geologic context, but each site visited has legacy mining issues, and thus we will explore topics in volcanology, mining history and environmental stewardship.

YELLOWSTONE HYDROTHERMAL SYSTEM, WYOMING

Note: This is a combined SGA and SEG trip

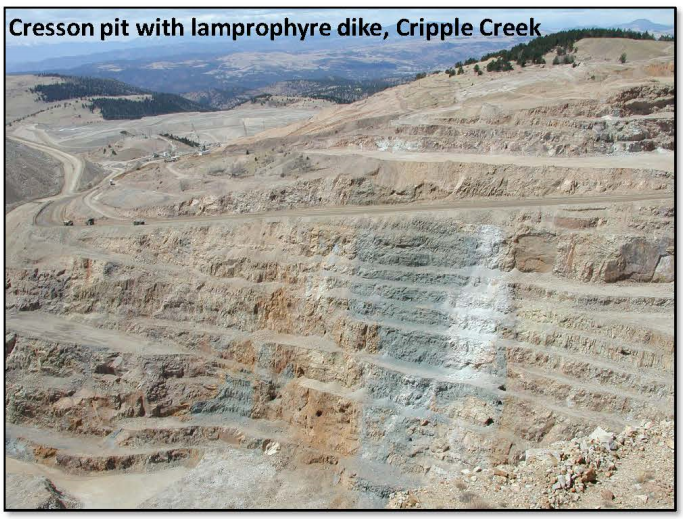
Duration: 5 days
Leaders: Jeff Hedenquist and Stuart Simmons
Note: High elevation (>2 km above sea level) and a 7 km hike

This tour will focus on the geology and geochemistry of the Yellowstone hot spot, volcanic and hydrothermal deposits. As the largest concentration of active geysers known globally, we will view active travertine deposits and learn about the dynamic geologic environment associated with one of the largest known calderas, 10,000 hydrothermal features including over 500 geysers, and highly active seismic zone.

CRIPPLE CREEK AU-TE DEPOSIT, COLORADO

Duration: 1 day
Leaders: Richard Piilco, other Newmont geologists
Note: High elevation (>2.5 km above sea level)

This trip will include an overview of the active mining area and deposit discussion with Newmont geologists at the core shed. Cripple Creek is a world class alkalic epithermal deposit and has produced more than 20 million ounces of gold (historical and modern production) from a diatreme complex. The Oligocene-aged volcanism hosts vein and disseminated-style mineralization extending to depths of more than 1,000 m from present-day surface.



TOPS AND BOTTOMS OF CARLIN-TYPE SYSTEMS, UTAH AND NEVADA

Duration: 5 days
Leaders: Mike Ressell and Jim Wise

This field trip focuses on three aspects of Eocene Carlin-type gold deposits in the Great Basin of Nevada and Utah, western United States: 1) recent discoveries of deep, high-grade deposits and overviews of some major deposits, 2) the shallow expressions of Carlin-type systems, and 3) the relationships of deposits to regional Eocene processes including arc magmatism and intrusion, sedimentary basin development, and extension. The links between these regional processes led to the unique metallogeny of this region.

SHORT COURSES

Please see our website for description of each course
www.sga2025.org

PRE-CONFERENCE

1. **Mapping micro-XRF and automated mineralogy for mineralogical and geochemical characterization – 1 day**
   Nigel Kelly (Bruker)
2. **Exploration of sediment-hosted metals – 2 days**
   Ali Jaffri (Applied Stratigraphix)
3. **Orogenic Gold – 1 day**
   Jochen Kolb (Karlsruhe Institute of Technology), Georges Beaudoin (Université Laval), Iain Pitcairn (Stockholm University), Nicolas Thébaud (University of Western Australia), and Rich Goldfarb (Colorado School of Mines)
4. **Ore microscopy – 2 days**
   Simon Kocher (Colorado School of Mines), and Tobias Fusswinkel (RWTH Aachen)
5. **Tectonic and structural framework for precious metal deposits in North America – 3 days**
   Dave Rhys (Panterra), Franck Valli (Newmont), and Amanda Hughes (University of Arizona)
6. **Database design to capture and archive geological observations – 1 day**
   Wiley Skewes (Alamos Gold Inc.)

POST-CONFERENCE

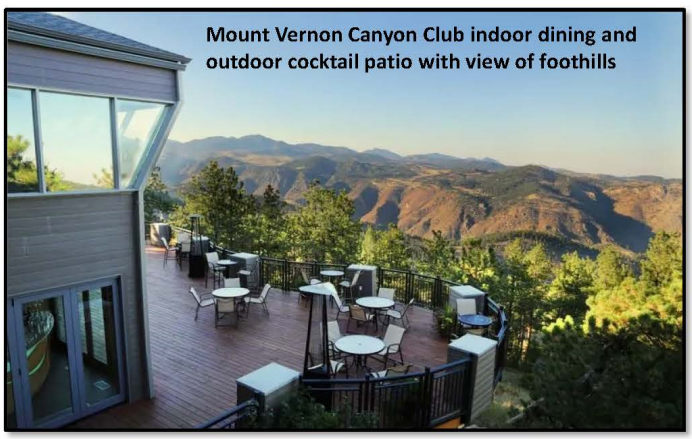
2. **Mineral Economics – 1 day**
   Rod Eggert (Colorado School of Mines)
3. **UAV-borne hyperspectral mapping approaches – 1 day**
   Frederike Koerting (HySpex) and Katerina Savinova (University of Queensland)
4. **Concepts and Application of Machine Learning to Mining Geoscience: A Practical Course - 2 days)**
   Francisca Maepa (BHP)
5. **Geological mapping in mineral exploration – 1 day**
   Andreas Dietrich (Dietrich Consulting)

SOCIAL ACTIVITIES

The 2025 SGA Conference social program aims to provide a mix of organized social events and a relaxed atmosphere for registrants and accompanying persons to interact in an informal setting. Planned events include:

- Sunday evening icebreaker and Welcome Function at the conference venue (Green Center, CSM campus)
- Monday evening student-industry event in downtown Golden (Buffalo Rose event center)
- Tuesday evening Gala Dinner at the Mount Vernon Canyon Club
- Wednesday evening of optional organized activities TBA

Plus craft brewery night, event at the Colorado School of Mines mineral museum, and other activities



Mount Vernon Canyon Club indoor dining and outdoor cocktail patio with view of foothills

ACCOMPANYING PERSONS PROGRAM

A full and varied accompanying persons program will be offered and may include some or all of the following activities and visits:

- Goldens finest museums that include the Buffalo Bill, the Museum of Mountaineering, the Colorado music Hall of Fame at Red Rocks amphitheater, and the Dinosaur Ridge museums.
- Visit to Boulder and Chautauqua park at the foot of the "Flatirons"
- Denver cultural tour of Botanical Gardens and Natural history museum

STUDENT PROGRAM

As with all SGA Biennial Meetings, a strong student program is planned. The following incentives will be offered to encourage strong student participation at the conference:

- Heavily discounted registration fees
- Cash prize for best oral presentation
- Cash prize for best poster presentation
- Industry-Student Evening function (Monday) where students can meet Industry representatives
- Student travel awards
- One free student registration on selected field trips

We highly encourage student participation in oral and poster presentations

Visit our website at www.sga2025.org for more details

Questions? Send queries to sganetwork2023@gmail.com

Georges Beaudoin is the 2025 recipient of the Duncan R. Derry Medal

The Duncan R. Derry Medal is the highest award bestowed by the Mineral Deposits Division (MDD). It is awarded annually to the outstanding economic geologist who has made significant contributions to the science of economic geology in Canada. Candidates should be recognized for their skill and stature as professional economic geologists, and also by their public contributions to the science field. It is acknowledged that publication is the prime, but not only method, of disseminating scientific information in any discipline.

The citation reads:

Prof. Georges Beaudoin is a global leader in his contributions to mineral exploration and the genesis of hydrothermal ore deposits. He received his BSc (1985) and MSc (1987) from Université Laval, and his PhD (1991) from the University of Ottawa. Following this he completed a 2 year postdoctoral fellowship at the Geological Survey of Canada. He was an assistant (1993-1998), associate (1998-2002) and full professor (since 2002) in metallogeny at Université Laval. From 2012 to 2022, Prof Beaudoin held the NSERC-Agnico Eagle Industrial Research Chair in Mineral Exploration at Université Laval. He now leads the Agnico Eagle-Eldorado Gold Québec Research Chair in Mineral Exploration. From 2013 to 2022, he was the Founding Director of the Centre de recherche sur la géologie et l'ingénierie des ressources minérales (E4m), a recognized research centre at Université Laval, consisting of 34 researchers and 150 graduate students and HQP. From 2009 to 2019, he was Director of the DIVEX research network, regrouping researchers in metallogeny from 7 universities in Québec. Georges is an internationally recognized expert in metallogeny, hydrothermal mineral deposits, and isotope geochemistry, in addition to his world-leading research in indicator mineral methodologies for exploration. With his team of HQP he has developed indicator minerals for orogenic gold deposits, in addition to establishing magnetite and hematite as ubiquitous fertility indicator minerals (Dupuis and Beaudoin 2011, 704 citations; Dare et al. 2014, 548 citations). Prof Beaudoin was Chief-Editor of Mineralium Deposita between 2012-2022, contributing to increasing the international scientific journal's impact factor to the highest (5.1) in the field. He was elected as the first Canadian President (2014-2016) of the Society for Geology Applied to Mineral Deposits (SGA), during which he presided over the organization of the 14th Biennial Meeting in Québec in 2017. Prof Beaudoin has published 174 peer-reviewed papers and more than 230 conference abstracts (+8200 citations, h-index=48). He has experience leading large research teams, as shown by his leadership as Research Chair, and his involvement in large research initiatives such as the NSERC CRD Footprints and CFREF Metal Earth programs. In and outside of these initiatives Prof Beaudoin has trained 10 PDFs, 24 PhD students, 32 MSc students, 24 BSc students, and 12 Research Assistants. Evidently, Professor Beaudoin is an outstanding geologist in the field of ore deposit geology, having contributed to our understanding of ore deposits and indicator mineral exploration, and therefore a worthy recipient of the Duncan Derry award.

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Guide to authors for the SGA News

David Banks; Chief editor SGA News
School of Earth and Environment, University of Leeds, Leeds, UNITED KINGDOM; editor-sga-news@e-sga.com

There are three types of submission: (1) regular article; (2) reports of SGA student chapters; and (3) reports related to SGA. Regular articles should present scientific studies of the geology, mineralogy and geochemistry of mineral deposits or other topics related to mineral deposits. Reports of SGA student chapters should represent detailed description of activities. They must be reviewed by the scientific supervisor of the respective chapter prior to submission. Make sure that the field reports include the exact location (coordinates if available) of each station described. There is no restriction to the length of a contribution, but it should be concise and informative. All figures should be informative and of good quality. The language of SGA News is British English and all contributions need to be formatted as such. When submitting a text, do not include figures or tables and their captions. Present the latter at the end of the Word file and submit the figures separately, instead.

New Opportunity

Members of student chapters can choose to submit an abstract of their U/G, MSc or PhD thesis for publication in the Newsletter. Abstracts should be approximately 300 words for U/G and up to 500 words for MSc and PhD thesis.

Text formatting

Manuscripts need to be submitted in Word. Use a normal, plain font (10-point Times) for text. Format the text as little as possible. For emphasis, use the format tools of Word (e.g., italics or capitals). Do not use the shift button for capitalizing a whole word. Do not use field functions, tab stops or other commands for indents, or the space bar. Do not insert extra lines between paragraphs; use the Word formatting tools instead. Use the table function, not spreadsheets, to make tables.
Abbreviations should be defined at first mention and used consistently thereafter. Please always use internationally accepted signs and symbols for units (SI units).

References

SGA News uses the style that is also used in Mineralium Deposita. Check https://www.springer.com/earth+sciences+and+geography/geology/journal/126?detailsPage=pltci_1060362 for further information.

Figures and Tables

All figures and tables are to be numbered using Arabic numerals. They should always be cited in text in consecutive numerical order. The format in the text is "(Figure 1; Table 1)". For table and figure captions use "Fig. 1: xxxxx." and "Tab. 1: xxxxx."

Figures need to be submitted as separate files in jpg-format at a resolution of 300 dpi. They need to be formatted to fit the column format of SGA News: (1) 4 cm wide or (2) 8.3 cm wide for the 3-column part and 6.1 cm wide for the 2-column part. Make sure that the figures are of good quality.

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to receive an e-mail every time a new issue of the journal is published – with an overview of the articles published.

APPLICATIONS to SGA for meeting sponsorship must be submitted to Jan Pašava, SGA Executive Secretary. Please contact Jan Pašava for forms and further information.

Ideas and Suggestions for SGA-sponsored activities are welcome and should be addressed to Jan Pašava or any other member of the Council (see e-sga.org for list of members).

Dr. Jan Pašava, SGA Executive Secretary
Czech Geological Survey, Klárov 131/3
CZ-118 00 Prague 1
Czech Republic

News of the Society

Jan Pašava (SGA Executive Secretary)

Czech Geological Survey, Geologická 6, 152 00 Praha 5, Czech Republic, jan.pasava@geology.cz

The Hybrid-Council Meeting was organized on October 22, 2024 from 8,30 to 17,00 CET at the National Park of Monte Amiata in Abbadia San Salvatore, Italy by Paolo Garofalo (SGA Council member). Thirteen Council members and Assistant, SGA Treasurer were present in person and ten were on-line. The rest of the Council members sent their apologies.

Stanislaw Mikulski (SGA President) and Jan Pašava (SGA ES) welcomed all SGA Council members and also thanked Paolo Garofalo from the University of Bologna for hosting the meeting and providing hospitality. Then Council approved suggested agenda.

Roll call and Apologies:
Present: G. Beaudoin, G. Bozkaya, H. Frimmel, P. Garofalo, Shao Yong Jiang, K.D. Kelley, B. Lehmann, S. Mikulski, Luis Fernando Páez Sinuco, J. Pašava, , J. Slack, D. Schlatter, and A. Vymazalová.

On-line: D. Banks, C. Conde, T. Christie, D. Holwell, N. Jansson, C. Laflamme, P. Mercier-Langevin, S. Petersen, I. Pitcairn, and N. Saintilan

Guests - present: L. Wasitschek (Assistant, SGA Treasurer)

Apologies for absence: T. Aiglsperger, Cam McCuaig, S. Decree, A. Idrus, R. Laouar, F. Mbingeneeko, B. Orberger, and X. Sun.

1. Minutes of previous Council meeting (May 7, 2024 Madrid, Spain)
After checking the actions by the SGA Executive Secretary (with some of the items pending), the Minutes were unanimously approved.

2. Reports of officers on Council:
- 2.1. Report from President
- 2.2. Report from Executive Secretary
- 2.3. Report from Treasurer

Besides reporting on SGA finances, SGA Treasurer´s Office identified several areas, which require changes or improvements regarding recruitment and administration of members. These were presented to SGA Council members by Lisa Wasitschek (Assistant of SGA Treasurer).

- 2.4. Report from Promotion Manager
- 2.5. Report from Chief Editor, SGA News
- 2.6. Report from Chief Editors, MD
- 2.7. Report from Chief Editor SGA Special Publications
- 2.8. Report from the Chief Editor SGA website
- 2.9. Report from the Chairman of the SGA Educational Fund
- 2.10. to 2.16 - Reports from Regional VPs: Asia – presented by Shao-Jong Jiang, Australia/Oceania – on behalf of Cam McCuaig presented by J. Pašava, Europe – presented by D. Holwell, North Africa and Middle East – missing, Sub-Saharan Africa – missing (some information provided by H. Frimmel), North America – missing, South America – presented by Luis Fernando Páez Sinuco

Council expects to receive full missing reports at the next Council meeting.
After discussion, Council approved the presented reports with great thanks and suggested the following motions:

Jan Pašava to inform Tania Martins (IAGOD President) on Council decision regarding IAGOD presence at the 18th SGA Biennial Meeting (August 2025, Golden, Colorado, USA) – approved free booth and Council left on LOC to to work out details regarding IAGOD keynote/invited presentation.

Jan Pašava to inform Tania Martins (IAGOD President) on acceptance of IAGOD offer on free SGA booth at the IAGOD Quadrennial Meeting (2026, Porto, Portugal) and IAGOD to consider a SGA session on Critical Raw Materials at this meeting.

Sophie Decree to link with President of the Geochemical Society to prepare a new MoU between SGA and GS (similar as for 2022-2023) for 2025 and 2026.

Council approved that future SGA field conferences will be organized based on MoU between SGA and interested party so that net revenue from the conference is to be split between SGA and the LOC at a rate to be decided in advance for each meeting by the SGA Council (typically at least 50 % of excess revenue will go to SGA).

Council approved Lisa Wasitschek (SGA Treasurer´s Assistant) to start working on streamlining membership admission and administration process. This extra job will be honoured by a renumeration based on time needed for such service (a subject of evaluation by H. Frimmel-SGA Treasurer). The first step will include removal of all pdf and printed application forms from SGA website (responsible I. Pitcairn), SGA News (responsible D. Banks) and Mineralium Depositsa (responsible B. Lehmann/K. Kelley) and replacing them by QR code which was approved by Council. Her job will also cover re-designing of SGA website within Typo 3 web management system. Lisa will report on her progress to next Council meeting.

Lisa Wasitschek to delete from SGA database all members who have not paid their fees for more than 1year.

Sophie Decree to place a new QR code (available from Lisa Wasitschek) possibly on all SGA promotional items and work with Karen Kelley on selecting appropriate gifts (one of them will be green Drybag 5L) to be distributed to SGA membership at the 18th SGA Biennial Meeting (2025). A new logo for the promotion of the 60th SGA Anniversary needs be designed.

Sophie Decree (with help of Council members) to adapt all roll-ups used in Zurich (Anna Vymazalová to update info on student support from SGA EF including also data from Zurich-2023) and inform all RVP´s on this so that new versions could be used for SGA booth/promotion in different regions. We need to have complete sets of updated posters/roll-ups and other promotional items containing a new QR code at every RVP´s office.

All Council members to consider nominations of SGA Honorary members for spring 2025 Council meeting and summer SGA General Assembly vote.

David Banks to work jointly with SGA Council on the preparation of the SGA News no. 56 (deadline for contributions – February 28, 2025). Council approved to continue with printing of reasonable amount of SGA News.

SGA Council already approved that reasonable travel and accommodation costs (subject of the SGA Executive Committee approval) are offered for recipients of the SGA-Newmont Gold (or SGA Gold) Medal, SGA Young Scientist Award and SGA-KGHM Silver Krol Medal. Iain Pitcairn to add this info to texts describing these SGA Awards on website – pending motion.

Iain Pitcairn to advertise Council decision on creating a new category of SGA members who could be exempt from further SGA membership fees provided they have reached a minimum age of 70 years and have been fully paid-up members of SGA for at least 30 years – pending motion. SGA Council decided that applications for SGA student membership can be accepted as long as an applicant can provide valid document of student status/enrollment without a time limit. Iain Pitcairn to add this info to https://e-sga.org/nc/members/membership-information/

Bernd Lehmann and Karen Kelley to talk to Annett Büttner if Springer would consider publishing future books on Economic Geology aspects via SGA Special Publications Series.

Patrick Mercier-Langevin to continue representing SGA at negotiations with SEG on a recently proposed MoU between SGA and SEG, finalizing the EF Committee and update of prosperous companies that could potentially be solicited.

Shao-Yong Jiang to help to organize SGA Student Chapter in Wuhan and/or other part of China (Anna Vymazalová to provide basic info on requirements for setting up Chapters).

Council greatly appreciated BHP commercial sponsorship (USD 40,000) to the 18th SGA Biennial Meeting and thanked Cam McCuaig for this donation.

David Holwell to find out the possibility of re-establishment of UK Student Chapter and/or formation of SEG-SGA Chapters in UK.

Luis Paez to inform Micromine Company on proposed strategic partnership approved by SGA Council and to prepare a brief text on Micromine offer (free software licenses for academic use only) to be sent to Anna Vymazalová who will distribute it to SGA Student Chapters. After identification of prospective users, they will contact Luis Fernando Paez who will check on their SGA membership status and finally link them with Micromine. Luis Fernando Paez to collaborate with Eugenio Ferrari to secure SGA promotion at the upcoming proEXPLO 2025.

3. The 17th SGA Biennial Meeting – Final Report

The Report was presented by N. Saintilan. The Meeting took place at the Eidgenössische Technische Hochschule (ETH), Campus Hönggerberg, in Zürich (Switzerland) between 28th August and September 1st 2023. It was entitled "SGA 2023 –Mineral Resources in a Changing World". The meeting was co-organised by ETH Zürich, the University of Geneva in Switzerland and Karlsruhe Institute of Technology and the University of Freiburg in Germany. A total of 424 participants (including 40% of students, 37% of postdocs, senior researchers and professors, and 23% of industry and government representatives) registered for SGA 2023. The original concern of hosting a biennial meeting at the heart of Europe in one of the most expensive cities in the world was (1) not evident considering the worldwide origin of the participants (54% from Europe, 15% from North America, 11% from Australia-New Zealand, 20% from Africa, South America and Asia), and (2) counterbalanced by the scientific and financial success of the meeting. Indeed, based on personal testimonies during the conference, hearsay and post-conference written thank you notes to us, we can report that this biennial meeting is considered as having been "a successful, very-high-standard conference with excellent organization, scientific content, and a great choice of venue for optimal scientific exchange". In addition, we ended up with an unexpectedly high surplus of which half was given back to the SGA and the second half belonging to the LOC was generously donated to support the initiative of the creation of the "SGA Analytical Fund " to work with the existing scheme of the "SGA Mobility Grant".

Council again highly appreciated all efforts by the LOC and generous donation and approved presented report with great thanks.

4. The 18th SGA Biennial Meeting – update

The report was presented by K. Kelly. The 18th SGA Biennial Meeting will be held on the Colorado School of Mines (CSM) campus in Golden, Colorado, USA, from August 3-7, 2025. The details on the meeting are available at https://sga2025.org/. Council approved the following events:

August 2 (Saturday), 2025 – a joint Council dinner

August 3 (Sunday), 2025 – Council Meeting

No more than two oral presentations will be permitted per 1 delegate.

Actions:

All Council members to promote the 18th SGA Biennial Meeting.

K. Kelley to adapt budget (SGA seed money also to "expenses").

K. Kelley to provide an alert info at Conference website on checking up on getting US visa for participation in scientific conference (tourist/business?; possibility of getting a letter of invitation from LOC?)

5. The 19th SGA Biennial Meeting (2027) – update

The report was presented by Jan Pašava on behalf of Steffen Hagemann (Chair, LOC SGA 2029). As far as status of preparation for SGA 2027 is concerned, the LOC will have its first organizing committee meeting at the beginning of December 2024. Activities towards attracting sponsorship will be launched in mid 2025.

Council highly appreciated presented

report.

6. SGA Awards – update

This topic was covered by the Report of Chief Editor, SGA website and presented by I. Pitcairn. A call for nominations for the SGA awards was sent out by email and published in the website. The application forms were updated for 2025 - see https://e-sga.org/awards/. Further emails will be sent out to members soliciting nominations.

7. Nomination Committee – update

The Report was presented by S. Mikulski. The Committee chaired by S. Mikulski and having 2 other members not on Council, plans to contact present SGA Council members to seek nominations.

Action:
S. Mikulski to present on behalf of the Nomination Committee a list of suggested officers for SGA 2025 ballot at the upcoming SGA Council Meeting (spring 2025).

8. Status of development of SGA Student and Young Scientist network.

The report was presented by Anna Vymazalová. In 2024 SGA has 21 Student Chapters (Baltic, Barcelona, Black Forest-Alpine, Colombia Bogota, Bucaramanga and Cordoba, Erlangen, Kazakhstan, Laval, Moscow, Nancy, NW Russia, Peru, Prague, Senegal, South Africa, Siberia, Turkey, UK, Western Australia, and last year re-established Morrocco. A new application for creation of SGA Iberian Student Chapter requesting EUR 1,000 intial budget was submitted for Council evaluation. I will be asking for reports and list of members by the end of January 2025 at the latest. So, Lisa can check the membership before the financial support for the next year will be allocated from the Council.

I asked several students for testimonials accompanied with photos for Sophie Decree to prepare a new banner for SGA EF. I received very nice feedback from 5 students (Spain, Poland and Peru). We are going to choose the best ones.

I would like to ask the Council to preliminary approve an amount EURO 30,000 to 50,000 for student support for the 18th SGA Biennial Meeting in Colorado 2025.

SGA Network on Facebook is still active, it has 1900 likes and followers.

After discussion, Council approved the presented report including application for creation of the new SGA Iberian Student Chapter with proposed budget and also preliminary budget for student support at the SGA 2025 Meeting with great thanks.

Action:
Anna Vymazalová to inform representative of the SGA Iberian Student Chapter about the positive Council decision with a budget (1,000 EUR).

9. Requests for sponsorship

- ProEXPLO2025 (May 5-7, 2025 Lima, Peru) – E. Ferrari and Luis Fernando Paez Sinuco – SGA sponsored student awards – 1050 EUR, possibility of keynote speaker, free booth, field trip – F. Tornos agreed to act on behalf of SGA –speaker/field trip leader – possible SGA support for F. Tornos will be a subject of Council approval.
- UNESCO-SEG-SGA Curso Latinoamericano de Metalogenia (November 2025 Universidad Austral de Chile, Valvidia, Chile) – L. Fontboté – international coordinator, L. F. Sinuco (SGA RVP SA) - a long-term support of USD 2500 approved via a joint SEG-SGA agreement; F. Tornos approved as SGA Representative on the Steering Committee for 3 years
- VMSG-MDSG 2025 (January 6-8, 2025 Dublin, Ireland) – request for donation to lower student registration fee

Action:
SGA Council approved sponsorship to the VMSG-MDSG 2025 meeting via supporting early registration fee for up to 5 SGA student members (a total of up to EUR 950), participating in the Mineral Deposit Study part of this event. J. Pašava to inform LOC on Council decision.
- Prague SGA Chapter Meeting (December 2-4, 2024 Prague) - invited lecture by Dr. Jakub Ciążela from the Institute of Geological Sciences (Wroclaw) on Unlocking the Ocean's Treasure: Metal Migration, Ore Formation, and Exploration of Polymetallic Deposits in the Oceanic Lithosphere" – requested a total of 440 EUR – approved by SGA EC (letter emailed on Oct. 7, 2024)

10. Any other business

- Adapted SGA Mobility Grant – update

The Report was given by A. Vymazalová on behalf of T. Aiglsperger. Two applications were obtained since last SGA council meeting in April 2024 – one by a PhD candidate (and hence not eligible) from the School of GeoSciences, University of Edinburgh and one by Dr. Hamida Diab, postdoctoral researcher from the University of Annaba, Algeria. Dr. Hamida Diab provided a complete application (invitation letter from Prof. David Holwell; University of Leicester) containing a clear research idea ("assessment of heavy and clay mineral distribution in oolithic iron ore sediments of Djebel Had - Tebessa, Eastern Algeria: understanding sediment origins and depositional environments"). Her request for 2000 € (1000 € travel costs and 1000 € analytical costs) was granted after reviews by Prof. Hartwig Frimmel and Associate Prof. Iain Pitcairn.

After discussion, Council agreed to open the grant to any paid-up SGA member and to improve advertising of this product.

Action:
T. Aiglsperger in collaboration with S. Decree, I. Pitcairn, D. Banks, B. Lehmann, A. Vymazalová, all RVPs and other SGA Council members to improve promotion of the SGA Mobility Grant via all available means.

- The 9th SGA-UNESCO-IUGS-SEG Short Course on African Metallogeny – update

The Report was presented by J. Pašava on behalf of B. Orberger. The course was organized from November 26 to November 29, 2024 in Dakar, Senegal and Council greatly appreciated efforts by Beate Orberger and her team and emphasized the importance of this very successful geo-educational event,

which will be organized under financial sponsorship of UNESCO and IUGS and in collaboration with other societies. More details on the course is available at https://e-sga.org/home/

- SGA-SEG collaboration - update (P. Mercier-Langevin, S. Mikulski, J. Pašava)

The Report was presented by P. Mercier-Langevin. In order to improve collaboration between both Societies a draft version of Memorandum of Understanding (MoU) delineating areas of collaboration and ways to proceed has been prepared in early 2024 and shared to the SGA and SEG Executive Committees. It was agreed that more discussion is necessary to better frame the MoU and its items. Such discussions will be held in the fall 2024. The idea is to build on previous agreements between the SGA and SEG that need to be updated. Our aim is to have the MoU finalized and submitted for approval at the next SGA Council Meeting (Spring 2025).

Action:
P. Mercier-Langevin to continue representing SGA at negotiations with SEG.

11. Date and place of the next SGA Council meeting (spring 2025, Wroclaw, Poland – more details will be announced in due time).

12. Informative list of past activities
- SGA Keynote speakers program - SGA Baltic Chapter Meeting (May 6-9, 2024 Lulea, Sweden) – EUR 981 approved to support José María González-Jiménez (Univ. of Granada)
- GAC-MAC (May 19-24, 2024, Brandon, MB, Canada,) - silver-level sponsorship plus a booth (total of a. 1200 Euro), approved – M. Anderson, P. Mercier-Langevin et al.
- Ni-Cu symposium (August 6-8, 2024 Thunder Bay, Canada) – M. Anderson et al. – a. EUR 1000 approved to sponsor SGA student members and to have a table for SGA2025 promotion.
- European Mineralogical Conference 2024, (18–23 August 2024 Dublin, Ireland) – A. Vymazalová et al. – up to EUR 2 000 approved for 4 student grants
- SEG 2024 Conference: Sustainable Mineral Exploration and Development (September 27-30, 2024, Windhoek, Namibia) - SGA booth – H. Frimmel et al.

Hartwig Frimmel reported on activities related to SGA promotion at the SEG 2024 Conference in Namibia.

13. Informative list of future activities

- The International Seminar on Plate Tectonics, Sedimentation and Metallogeny Through Time, (November 26-28, 2024) Dharwad, India) organized by the Geological Society of India and the Geology Wind of Civil Engineering Dept., SDM College of Engineering and Technology in Dharwad. SGA sponsored - approved 2000 Euro for travel support of two SGA invited speakers (S.-Y. Jiang, H.E. Frimmel).
- The 9th SGA-UNESCO-IUGS-SEG Short Course on African Metallogeny (November 26-29 2024 Dakar, Senegal (B. Orberger et al.)
- ProEXPLO2025 (May 5-7, 2025 Lima, Peru) – E. Ferrari and Luis Fernando Paez Sinuco – SGA sponsored student awards – 1050 EUR, possibility of keynote speaker, free booth, field trip – a subject of Council approval
- 18th SGA Biennial Meeting (August 3-7, 2025, Golden, Colorado, USA) – K. Kelley et al.
- 19th SGA Biennial Meeting (preliminarily - late August/early September 2027, Perth, Australia) – S. Hagemann et al.
- IAGOD Quadrennial Meeting (August 30 – September 2, 2026 Porto, Portugal) – free SGA booth accepted by IAGOD – SGA asked for a special session on CRM.

Participants of the SGA Hybrid Council Meeting (October 22, 2024) in front of the Headquarters of the Monte Amiata National Park, Abbadia San Salvatore, Italy.

Back row from left to right: B. Lehmann, Shao Yong Jiang, S. Mikulski, H. Frimmel, A. Vymazalová, J. Pašava, J. Slack.
Front row from left to right: L. Wasitschek, P. Garofalo, G. Beaudoin, K.D. Kelley, D. Schlatter, G. Bozkaya, Luis Fernando Paez Sinuco.

News of the Society

Jan Pašava (SGA Executive Secretary)

Czech Geological Survey, Geologická 6, 152 00 Praha 5, Czech Republic, jan.pasava@geology.cz

The Hybrid-Council Meeting was organized on April 1, 2025 from 9,00 to 16,45 CET at the Haston Old Town Hotel in Wroclaw, Poland by Stanislaw Mikulski (SGA President). Fourteen Council members and Assistant, SGA Treasurer were present in person, 11 Council members including SEG and IAGOD representatives were on-line. The rest of the Council members sent their apologies.

Stanislaw Mikulski welcomed SGA Council and introduced Mr. Michal Nowosielski from the Ministry of Climate and Environment who welcomed all participants on behalf of Mr. Krzysztof Galos (Undersecretary of State, Ministry of Climate and Environment). After that Jan Pašava (SGA ES) welcomed the Council and thanked Stanislaw Mikulski and Michal Nowosielski for hosting the meeting and providing hospitality. The whole event was a part of the Polish Presidency of the Council of the European Union.

Roll call and Apologies:
Present: D. Banks, G. Beaudoin, G. Bozkaya, H. Frimmel, D. Holwell, N. Jansson, S.-Y. Jiang, K.D. Kelley, B. Lehmann, C. McCuaig, S. Mikulski, J. Pašava, I. Pitcairn, and A. Vymazalová
On-line: M. Burnett (SEG Representative), C. Conde, T. Christie, A. Dolgopolova (IAGOD Representative), P. Garofalo, L. Greyling (SEG Representative), C. Laflamme, P. Mercier-Langevin, L. F. Páez Sinuco, J. Slack, N. Saintilan

Guests - present: M. Nowosielski (Ministry of Climate and Environment, for opening the meeting), L. Wasitschek (Assistant, SGA Treasurer, for website changes)

Apologies for absence: T. Aiglsperger, S. Decree, A. Idrus, R. Laouar, F. Mbingeneeko, B. Orberger, S. Petersen, D. Schlatter, G. Tourigny and X. Sun.

1. Minutes of previous Council meeting (October 22, 2024 Abbadia San Salvatore, Italy)

After checking the actions by the SGA Executive Secretary (with some of the items pending), the Minutes were unanimously approved.

2. Reports of officers on Council:
- 2.1. Report from President
- 2.2. Report from Executive Secretary
- 2.3. Report from Treasurer
Besides reporting on SGA finances, Lisa Wasitschek (Assistant of Treasurer) presented progress report on website changes including streamlining membership admission and administration process.
-2.4. Report from Promotion Manager
-2.5. Report from Chief Editor, SGA News
-2.6. Report from Chief Editors, MD
-2.7. Report from Chief Editor SGA Special Publications
-2.8. Report from the Chief Editor SGA website
-2.9. Report from the Chairman of the SGA Educational Fund
-2.10. to 2.16 - Reports from Regional VPs: Asia – presented by Shao-Yong Jiang, Australia/Oceania – presented by C. McCuaig, Europe – presented by D. Holwel, North Africa and Middle East – missing, Sub-Saharan Africa – missing, North America – missing, South America – presented by Luis Fernando Páez Sinuco)
Council expects to receive full missing reports at the next Council meeting.

After discussion, Council approved the presented reports with great thanks and suggested the following motions:

Jan Pašava to publish Agenda for the SGA General Assembly (August 6, 2025 Golden, USA) in S[illegible] as approved by Council.
Council approved Lisa Wasitschek (SGA Treasurer´s Assistant) to continue working on streamlining membership admission and administration process and to go for freelance website and its upgrade (without Blueways).

Hartwig Frimmel will ask Blueways for transferring all data from the present SGA website and terminate the existing contract with Blueways as soon as the new website is functioning. Lisa´s time and efforts to develop, design and set-up a new SGA website will be honoured by a remuneration that corresponds to fees typically paid to comparable service providers with past fees paid to Blueways serving as reference (a subject of evaluation by H. Frimmel-SGA Treasurer and formal approval by SGA Council). Lisa was also proposed by the Nomination Committee and approved by Council for the position of Chief Editor, SGA website for 2025 SGA ballot. All Council members are encouraged to get back to Lisa regarding a design, structure and content of the new website, draft of which was presented to Council. Lisa will report on her progress to next Council meeting.

All RVP´s to encourage SGA Chapters to inform all students about possibility of publishing 300 words for undergraduate/graduate and 400-500 words for MSc and PhD theses in SGA News.

SGA Council decided that applications for SGA student membership can be accepted as long as an applicant can provide valid document of student status/enrollment without a time limit. Iain Pitcairn to add this info to https://e-sga.org/nc/members/membership-information/ - pending.

Bernd Lehmann and Karen Kelley to talk to Annett Büttner on if Springer would consider publishing future books on Economic Geology aspects via SGA Special Publications Series – pending.

Shao-Yong Jiang to help to organize SGA Student Chapter in Wuhan and/or other part of China (Anna Vymazalová to provide basic info on requirements for setting up Chapters) – pending.

David Banks to work jointly with SGA Council on the preparation of the SGA News no. 56. Council approved to continue with printing of reasonable amount of SGA News.

Iain Pitcairn to advertise Council decision on creating a new category of SGA members who could be exempt from further SGA membership fees provided they have reached a minimum age of 70 years and have been fully paid-up members of SGA for at least 30 years – pending motion.

The Educational Fund (EF) Committee consisting of Patrick Mercier-Langevin (chair), SGA´s Treasurer (Hartwig Frimmel) and two external members from industry: Quinton Hennigh (San Cristobal Mining) and Alexandre Aubin (Cameco) including Cam McCuaig (advisor) to work jointly with the Golden LOC 2025 to avoid overlap or duplication in sponsorship requests.

Patrick Mercier-Langevin to send the updated donation letters for the SGA EF.

SGA Council to work jointly with the SEG and IAGOD Councils towards a mutual benefit of their respective memberships.

SGA Council welcomed the possibility of advertising its activities via European Association of Geochemistry means (EAG).

Stanislaw Mikulski, Jan Pašava and David Banks to finalize the article on SGA Celebrating its 60th Anniversary for upcoming SGA News no. 56.

All Council members to consider or recommend someone for submitting main article for future SGA News.

Cam McCuaig and Steffen Hagemann to send a draft of the 19th SGA Biennial Meeting Flyer to Jan Pašava for SGA Council comments. It will be distributed at the 18th SGA Biennial Meeting in Golden, Colorado.

John Slack to find out if SGA would be in position to accept agreement for books from other Publishing companies than Springer without violating the existing contract with Springer Nature.

Luis Paez to work with Anna Vymazalová and other Council members to identify appropriate persons to meet the following requirements set up by Micromine Company before granting free licences for academic use only from SGA Student Chapters:
(1)We need a person under the IT role, who will be responsible for managing the licenses;
(2) a person in charge of the program;
(3) a person responsible for evaluating the proposals coming from the members, as the only use for the licenses will be for academic purposes, such as thesis work, research programs, etc. (Luis offered to help with this, and also assist the individuals we choose as mentor). We must generate a simple report every 4 months to show that the licenses are being used. Luis Fernando Paez to collaborate with Eugenio Ferrari to secure SGA promotion at the upcoming proEXPLO 2025.

3. The 18th SGA Biennial Meeting – update

The report was presented by K. Kelly. The 18th SGA Biennial Meeting will be held on the Colorado School of Mines (CSM) campus in Golden, Colorado, USA, from August 3-7, 2025. The details on the meeting are available at https://sga2025.org/. The following update was reported by K. Kelley:

-SGA News article submitted February
-SGA website updated; social media (LinkedIn, Facebook, Instagram) updated; we will begin regular "teasers" on the LinkedIn page to advertise program. After abstract submittal closed, SGA sent email to members promoting the science to increase registration
-Updates are continuing on SGA 2025 conference website (www.sga2025.org)
-Obtained $170,000 in promised donations so far; companies that have committed include BHP, Freeport-McMoran, Newmont, San Cristobal Mining, Glencore, Rio Tinto, Barrick, Minsur, Portable PPB Lty, EldoradoGold, USGS Minerals program, Teck, Codelco, Agnico Eagle, and Miner AI.
-We have only 3 more booths to sell (available)
-DREGS (Denver Region of Exploration Geologists Society) sponsored $1500 towards the CSM Museum Night
- COORS has agreed to donate ~140 cases of product if we have 700 people (lesser amount if less people)
- 385 abstracts submitted; a few late ones were admitted (keynotes that had not made the deadline)
- All session chairs are actively reviewing the abstracts

Council highly appreciated presented report and re-confirmed the following events:
August 2 (Saturday), 2025 – a joint Council dinner
August 3 (Sunday), 2025 – Council Meeting
August 6 (Wednesday), 2025 – SGA General Assembly

Actions:
All Council members to promote the 18th SGA Biennial Meeting.
K. Kelley to set up timing for SGA General Assembly on Wednesday, August 6, 2025.

4. The 19th SGA Biennial Meeting (2027) update

The report was presented by Cam McCuaig on behalf of Steffen Hagemann (Chair, LOC SGA 2029). The LOC had its second SGA 2027 committee working group meeting on the 10th of March 2025. Individual sub-committee chairs reported on:

1. The scientific program
2. Field trips
3. Workshops

The programs and activities were discussed, and suggestions collected; all committee chairs will present their revised work at the next committee working group meeting to be held on the 4th of June 2025. Based on these results, the LOC will prepare a presentation for the August SGA 2025 meeting in Golden/Colorado. The goal for 2025 is to have a preliminary program ready at the end of this year when the conference website will be launched. The LOC has also decided to engage the event management company Encanta to assist in the preparation for, and execution of, the conference.
Council highly appreciated presented report.

Action:
Steffen Hagemann and Cam McCuaig to prepare a draft of the 19th SGA Biennial Meeting Flyer for Council discussion and distribution at SGA 2025 (Golden).

5. The report from the Chairman of the Award Committee

The report was presented by I. Pitcairn (Chair of the Award Committee). The deadline for the nominations for the SGA awards 2025 passed on the 31st March, 2025. We received an excellent set of nominations for all our awards. The nominations with details of who nominated and who has written the letters of support are summarized in Item 5. The complete nominations will be distributed to the Council via a file link. Please remember that these nominations are confidential and should not be shared with anyone outside the SGA Council.
Council highly appreciated presented report.

Action:
Iain Pitcairn to send the complete nominations to SGA Council for a vote with a sharp deadline of April 25, 2025.

6. The report from the Chairman of the Nominating Committee

The Report was presented by S. Mikulski. After communication with possible candidates the Committee chaired by S. Mikulski and having 2 other members out of Council (David Huston from Australia and Jorge Relvas from Portugal) came up with a list of nominations for 90% of offices, only several positions need to be reconfirmed.
K. Kelley commented that new officers may lack information when accepting new roles within the SGA.
P. Mercier-Langevin suggested that onboarding documentation (brief, bullet-point or ppt-style documents) for each position should be prepared and be ready for distribution to solicited candidates so that they get a good idea of what the duties, roles, responsibilities and expectations are for each position within SGA.

J. Pašava pointed out to a letter of welcome with basic duties accompanied by recent Minutes with all supporting documents and to all newly coming SGA officers including Regional Vice Presidents.
Council highly appreciated presented report.

Actions:
The Nomination Committee to finalize the list and send it to Jan Pašava (SGA ES) who will distribute it to Council vote before going for SGA ballot.

7. Annual report on membership drive

The report was presented by Jan Pašava on behalf of Sophie Decree. This report - for 2024 - makes the transition with the previous system of reporting, which was prepared by period (April 2023-March 2024, for the last one).

One can report for 2024 the application of 232 new student members, mostly linked to the Student Chapters, and 11 new regular members. A decrease of the regular members is noted (from 38 in the last report to 11). A slight decrease of the membership balance for regular electronic members and students can be documented, compared to 2023. This is most likely due to the limited collection period for the data (i.e., 9 months instead of a full year). Hence, the numbers should be considered as overall similar.

Crystal Laflame suggested, and Council approved, considering the possibility of offering members the option of renewing membership and paying dues for more than 1 year at a time.
Council highly appreciated the presented report.

Action:
H. Frimmel/L. Wasitschek to explore ways to implement the possibility for members to pay membership dues for more than one year (up to a maximum of five years) in a single payment.

8. Status of development of SGA Student and Young Scientist network
The report was presented by Anna Vymazalová. In 2025, we have 19 SGA Chapters. However, active Chapters in terms of activities and membership paid are only 11 (Baltic; Bogota; Bucaramanga; Erlangen; Kazakhstan; Nancy; NW-Russia – with no budget from SGA, but membership paid; Peru; Prague; Senegal and Morrocco). Moscow and Siberia Chapters are considered as dormant. There are 2 requests to create new SGA Chapters: Bolivia and Caldas (Colombia) and in addition, an application for the Toronto Chapter but the list of members was not received.

After discussion, Council approved applications for creation of the two new Chapters with proposed budgets and also budgets for SGA Chapters for 2025 (see the Table 1) and also student support at the SGA 2025 Meeting (40 000 EUR).

Approved funding for Chapters in 2025.

Chapter/Approved support 2025 (in Eur)	
Baltic	3500
Barcelona/SEG	0
Black Forest-Alpine	0
Colombia-Bogota/SEG	3000
Colombia-Bucaramanga	3500
Cordoba	0
Erlangen	1500
Kazachstan*	1500
Laval/SEG	0
Nancy	1000
NW-Russia	0
Peru	1500
Prague	4000
Senegal	1000
Turkey	0
UK	0
UWA - Australia/SEG	0
South Africa	0
Morrocco	3000
Toronto	0
New Chapters:	
Bolivia	750
Caldas-Columbia	1000
Moscow	dormant
Siberia	dormant
Total	25250

Regarding student support for the 18th SGA Biennial Meeting in Colorado 2025, 84 applications for Travel grants, 25 applications for short courses and 33 applications for field trips were received and will be evaluated.

Council highly appreciated presented report.

Action:
Anna Vymazalová to inform representatives of all Chapters about approved budgets for 2025 and representatives of the two new Chapters about Council approval including budgets. Anna Vymazalová to evaluate applications for travel grants to the SGA 2025 Meeting (Golden).

9. Requests for sponsorship
-The 19th MinPet meeting (September 21 to 23, 2025 Leoben, Austria)
– SGA sponsored keynote speaker(s)
– EUR 1,000 approved by Council

10. Any other business

- Adapted proposal for the SGA Mobility Grant which should offer a limited support for analytical works for students – update

The report was presented by I. Pitcairn on behalf of T. Aiglsperger. A total of 9 applications have been submitted since December 2024, showing that the re-advertisement of the grant (via web, personal communication, etc.) has been successful. In addition, the SGA Council decision regarding opening the grant for PhD students has shown a positive impact. Seven applications have been granted after internal review by Hartwig Frimmel and Iain Pitcairn.

SGA Council approved a maximum of 15 grants with a maximum of up to 2000 Eur each (total of up to 30 000 EUR in 1 year) and also decided that students applying for the grant have to be SGA members and at the same time their supervisors must have been SGA members for at least 3 continuous years. Council also approved suggested deadline and process of handling of applications including its distribution between regular and student members as proposed in the Report.
Council highly appreciated the presented report.

Action:
T. Aiglsperger to adapt guidelines and continue organizing the SGA Mobility Grant.

- The 9th SGA-UNESCO-IUGS-SEG Short Course on African Metallogeny
– update
The report was presented by Jan Pašava on behalf of Beate Orberger. In 2024, SGA offered the 9th SGA-SEG-UNESCO-IUGS Short Course on African Metallogeny under the title "How can West Africa best use its mineral wealth for economic development", which was held in Senegal and hosted by the SGNS and the University Amadou Mactar Mbow. Great thanks go to Dr. Rokahaya Diene (Director of the Geological Survey of Senegal) who coordinated the LOC and a very active Senegal SGA Chapter, which came up with the idea to organize the course in Dakar. Our special thanks are also to all lecturers, active participants and all supporting staff. It would not be possible to organize such a successful event without all sponsors including local mining industry. West Africa plays a key role as an important supplier of raw materials essential for the agriculture and/or the energy transition, in particular Titanium, Aluminium and Phosphates, examples selected for this short course.

Can West Africa mine, concentrate, and produce intermediate metal compounds? This could enable the economic transition envisaged by the African Mining Vision 2050 and the Agenda 2063 of the African Union. The two days fascinating program illustrated well the current situation including industrial projects, such as titanium-zirconium processing in Senegal, phosphate blending in Burkina Faso or the HYPHEN AFRICA project on Hydrogen production in Namibia. It paved the way for the panel discussion before leaving for mine and geosites visits.

It was suggested that the 10th SGA-UNESCO-IUGS-SEG Short Course on African Metallogeny will be organized in Algeria in early 2026.

Council highly appreciated the presented report.

Action:
Beate Orberger and her team to try to organize future African Metallogeny Courses so that registration of people from industry would help to cover student participation in order to avoid financial losses to SGA and/or the LOC.

- SGA-SEG collaboration
The Report was presented by Patrick Mercier-Langevin (on-line). The SGA and SEG have agreed that mutual benefits would result from closer cooperation and affiliation between the two societies. Both societies desire reinforcing their cooperation in developing their respective conferences/meetings with the objective of fostering and facilitating communication to the benefit of both societies, their membership, and the conference/meetings' participants. A draft version of a Memorandum of Understanding (MOU) delineating areas of collaboration and ways to proceed has been prepared in early 2024 and shared to the SGA and SEG executive committees and then discussed several times. The latest version of the MOU was commented and approved by SGA Council. The aim is to have the MOU finalized and approved so that it can be jointly announced by SGA and SEG at the 18th biennial SGA meeting in Golden (August 2025).

Action:
Patrick Mercier-Langevin, after incorporating comments by Cam McCuaig (to be sent asap) to inform SEG that SGA Council approved the MOU with relevant appendices (addressing specific past agreements) and that SGA President is ready to sign it.

11. Date and place of the next SGA Council meeting (August 3, 2025 Golden, Co., USA) - precise venue and timing to be announced in due course.

12. Informative list of past activities

-The 9th SGA-UNESCO-IUGS-SEG Short Course on African Metallogeny (November 26-29, 2024 Dakar, Senegal - B. Orberger et al.

-VMSG-MDSG 2025 (January 6-8, 2025 Dublin, Ireland) – SGA student member sponsorship up to 5 early registration fee payments (950 EUR)

13. Informative list of future activities

- The EGU General Assembly 2025 - session "Innovative Approaches in Mineral Exploration" (April 27 – May 2, 2025 Vienna, Austria) – SGA sponsored

- ProEXPLO2025 (May 5-7, 2025 Lima, Peru) – E. Ferrari and Luis Fernando Paez Sinuco – SGA sponsored student awards – 1050 EUR, SGA keynote – F. Tornos, free SGA booth

- The 18th SGA Biennial Meeting (August 3-7, 2025, Golden, Colorado, USA) – K. Kelley et al.

- The 19th MinPet meeting (September 21 to 23, 2025 Leoben, Austria)
– SGA sponsored keynote speaker(s) –1,000 EUR approved by Council

- UNESCO-SEG-SGA Curso Latinoamericano de Metalogenia (November 2025, Universidad Austral de Chile, Valvidia, Chile)
– L. Fontboté – international coordinator, L. F. Sinuco (SGA RVP SA).
- a long-term support of USD 2500 approved via a joint SEG-SGA agreement; F. Tornos approved as SGA Representative on the Steering Committee for 3 years

- 16th IAGOD Quadrennial Symposium (August 30 – September 2, 2026 Porto, Portugal)
– SGA sponsored (free booth, proposed session and plenary/keynote speaker)

- The 19th SGA Biennial Meeting (September 2027, Perth, Australia). S. Hagemann et al.

Participants of the SGA Hybrid Council Meeting (April 2, 2025) in Wroclaw (Poland).

Members of the party who participated in a visit to the KGHM Rudna mine and processing plant. Photo by Gulcan Bozkaya.

In 2025, SGA Celebrates its 60th Anniversary. Happy Birthday

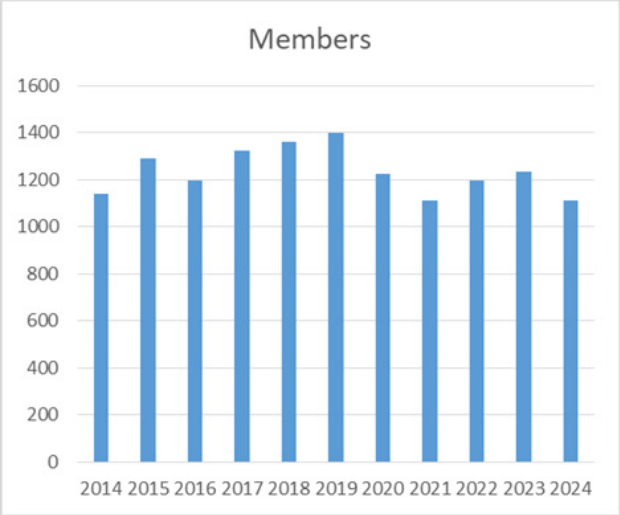
Stanislaw Z. Mikulski[1], David Banks[2] and Jan Pašava[3]

[1]Polish Geological Institute – National Research Institute, Warsaw, Poland
[2]University of Leeds, Leeds, UK
[3]Czech Geological Survey, Prague, Czech Republic

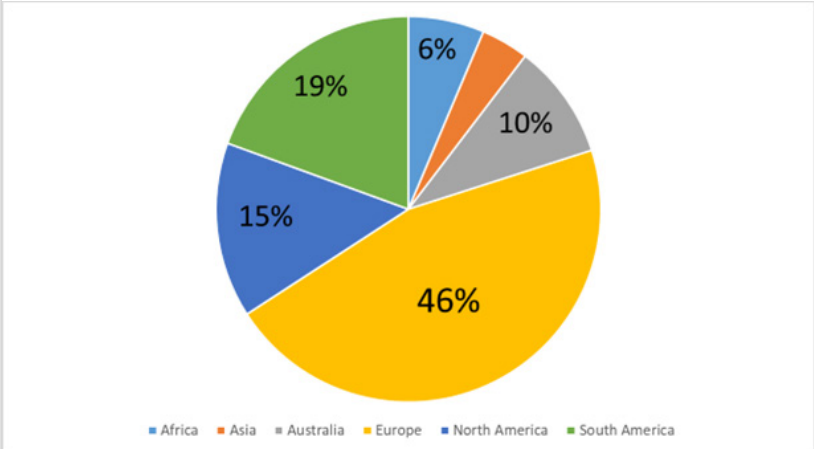
G.C. AMSTUTZ deserves an outstanding place in the celebration of the 60th Anniversary as he was the first to think of a European journal of economic geology, SGA was founded, also at the suggestion of G.C. AMSTUTZ, to support Mineralium Deposita. The name of the journal was suggested by P. ROUTHIER and unanimously accepted by the founding committee.

In June and November 1965, two important meetings were held in Heidelberg and the Hague, during which a group of prominent scientists in the field of the Economic Geology, discussed and prepared the foundation of the Society of Geology Applied to Mineral Deposits (SGA) and publication of a Society journal - Mineralium Deposita. This was due to a desire to establish cooperation and exchange knowledge between ore geologists from Western and Central Europe and with and strong support from the SEG. However, political events in 1968 related to the Soviet invasion of the former Czechoslovakia caused the formal establishment of the SGA to be postponed, which had been scheduled to be announced at the International Geological Congress in Prague. A few years later, the SGA was legally incorporated in Switzerland and became part of International Union of Geological Sciences (IUGS). The SGA is a non-profit organization that from its inception has promoted as its main goals the application of the latest scientific knowledge in the study and exploration of mineral resources, the promotion of the profession of geologist in science and industry, the cultivation of personal contacts for mutually beneficial relationships, and the protection and improvement of professional and ethical standards among its members (www.e-sga-org). Throughout the 60-year history of SGA, the political, social, and economic changes taking place in the world, and most recently the COVID pandemic, have had an impact on SGA, but thanks to the commitment and determination of its members, SGA has become stronger, more integrated, and has continued to develop into new areas. We can´t list all the people and officers who have contributed to make the SGA the successful and attractive society it is today, but all deserve our greatest appreciation.

From the beginning of the SGA, the number of members were approximately 400-500. This reflected the interest in the exchange of knowledge and experience in the field of research and exploration of ore deposits, especially basic metals. In the following years membership increased to the level of 800-1000 and in the last decade, membership has remained between 1100-1400. Currently, our members come from over 60 countries and there has been an increase in members from outside Europe, especially from the Americas, Australia and Africa). Being a member of SGA provides tangible benefits such as discounts on conference fees, access to our flagship journal Mineralium Deposita and the possibility of co-financing participation in events organized by SGA. Our members also enjoy discounts on conference fees organized by other Associations, with which we have signed an agreement on mutual cooperation (Society of Economic Geologist - SEG, International Association on the Genesis of Ore Deposits - IAGOD, European Association of Geochemistry - EAG, and Geochemical Society. This allows members to participate in conferences that are organized at non-conflicting dates and offer an even wider and complementary range of scientific issues.



SGA membership development during the last 11 years.



Distribution of SGA membership by region at the end of 2024.

The SGA website provides extended conference abstracts from these events which are freely downloadable. They are a real "mine of knowledge" in the field of research and exploration of raw materials (https://e-sga.org/publications/sga-biennial-meetings-abstract-volumes).

The key to achieving and maintaining our very high scientific position in the field of economic geology is our flagship journal Mineralium Deposita. The journal´s IF consistently places it in the top 2 economic geology journals. The 5-year IF has shown a significant increasing trend in recent years. The journal publishes about 90-110 articles annually in 8 issues, including especially popular thematic issues. We encourage you to read and publish in MD, as well as to familiarize yourself with the very interesting monographic publications appearing in the popular series - SGA Special Publications and other occasional publications (https://e-sga.org/publications/other-publications). On the occasion of the 60th Anniversary, we thank all the authors for their excellent research, which they decided to publish in our publications. We would also like to express our special thanks to Chief and Associate Editors of Mineralium Deposita and Special Publications and their teams and also to all referees for their insights steering submissions through the peer-review process.

As an organization, we sponsor many scientific conferences, courses and field trips, and we also co-organize various regular scientific conferences on various aspects of raw materials around the world (https://e-sga.org/meetings/sga-sponsored-international-meetings/). At this point we would like to thank our long-term sponsors, without whom the organization of the conferences and many other events that enable the wide participation of scientists would not be possible on such a large scale.

From our website (https://e-sga.org) and social media (Facebook, and X, previous Twitter) you can find out about upcoming events and read reports from completed SGA events. We also

SGA President J. Relvas holds the Contract signed between SGA and publisher Springer for the Mineralium Deposita journal. On the left, SGA VP K. Kelly and on the righ Annette Büttner, (Springer, 2016). Photo by Jan Pasava.

encourage you to follow SGA News, which has been published twice a year since 1996 in print and online (https://e-sga.org/publications/sga-news/news-archive). We present the latest information on the functioning of the SGA, dedicated thematic articles, upcoming meetings, as well as reports on the activities of the SGA Student Chapters. Since 2002, when the first Student Chapter was established in Prague, we now have 25 Student Chapters, in 21 countries on 6 continents. We would like to congratulate students, chapter members for their activity in establishing direct scientific contacts for the exchange of knowledge. In the SGA News you can read reports from current meetings and field trips to interesting deposits of mineral resources. All Chief Editors of SGA NEWS deserve our great thanks. The SGA is committed to support the activities of the next generations of young economic geologist and for several years research grants financed by the SGA Educational Fund have been available. We strongly encourage students to submit applications for funds to finance their research in the field of Economic Geology (https://e-sga.org/educational-fund/sga-mobility-grant).

The 13th SGA Biennial Meeting Nancy, France 2015. Student Chapter Representatives and volunteers helping to organize the conference. Photo by Jan Pasava.

Student Chapters Representatives during the 13th SGA Biennial Meeting in Nancy, France 2015. Photo by Patrick Lagrange.

SGA President P. Weihed presents the SGA-Newmont Gold Medal to M. Cuney at the 13th SGA Biennial Meeting (Nancy, France, 2015). Photo by Patrick Lagrange.

The 14th SGA BM Quebec, Canada 2017. D. Leach, accompanied by his wife Susan, holding the SGA-Newmont Gold Medal with which he was awarded. Photo by L. Leblanc

We are proud that outstanding scientists choose to co-operate and identify with SGA. We can honor their great contribution to science and commitment to work for economic geology society. We acknowledge some of the most outstanding world senior scientists, but also young ones starting their scientific careers with distinctions and awards in different SGA categories. The awards ceremony always takes place every 2 years during the ceremonial sessions of SGA Biennial Meetings.

In recognition of the services to the organization, since 2015, we have awarded the SGA-KGHM Krol Medal. Members, whose commitment and enormous contribution to the Society that have been honored are: F. Saupe, M. Pagel (2017), D. Leach (2019), J. Relvas (2022) and F. Tornos (2023). Since 2007, we have awarded the SGA-Newmont Gold medal in recognition of outstanding scientific achievements. So far, the medal has been awarded to: Z. Johan (2007), S. Ishihara (2009), D.I. Groves (2011), M. Cuney (2013), S.D. Scott (2015), D. Leach (2017), R. Sillitoe (2019), R. Goldfarb (2022), and L. Fontboté (2023). Other awards and honors of the SGA include the Best Paper Published in Mineralium Deposita (since 1999). Since 2003, we have been awarding the SGA-Barrick Young Scientist Award which became the SGA Young Scientist Award in 2017, and since 2005, the award for Best Student Oral and Posters Presentations at the biennial meeting(https://e-sga.org/awards).

R. Sillitoe awarded the SGA Newmont Gold Medal at the15th SGA BM in Glasgow, Scotland 2019. On the left is J. Pašava, Executive Secretary, and on the right is SGA President K.D. Kelley. Photo by D. Drummond

Draft of the SGA-KGHM Krol Medal proposed by Prof. J. Kucharski from the Academy of Fine Arts, University of Wroclaw (Poland)

The KGHM Krol medal is awarded to members of the SGA who have contributed greatly to the maintenance and advancement of the Society over many years.

The medal is awarded through the generosity of the Krol family in recognition of Gerardus Krol who was a founding member of the SGA and its first President.

Photos of Gerardus Krol provided by G. Krol family.

Francis Saupé (SGA Treasurer between 1967-1971, Executive Secretary 1982-1988) during his acceptance speech after he received the SGA-KGHM Krol Medal at the 13th SGA Anniversary Meeting in Nancy (2015). Photo by Patrick Lagrange.

M. Pagel delivering acceptance speech for his SGA-KGHM Krol Medal in Quebec 2017. Photo by L. Leblanc

The SGA Young Scientist Award for 2023 is presented to Clifford Patten by SGA President D. Banks and SGA Executive Secretary J. Pašava with J. Kolb who nominated Clifford and delivered the citation. Photo by Christos Tzikas.

SGA is always open to co-operation in the broad field of Economic Geology with interested and leading scientific centers and geological services, industry and government organizations worldwide. SGA Biennial Meetings are a special place when it comes to establishing contacts by economic geologists from all over the world. Our meetings present a wide range of topics at the highest scientific level due to the participation of outstanding scientists in the field of Economic Geology, their genesis, detailed geochemical-mineralogical and isotopic characteristics, as well as the application of various modern research, analytical, computer and prospecting techniques. All aspects of the broad field of Economic Geology will continue to be at the forefront of SGA Biennial Meetings. The meetings are an excellent opportunity to exchange scientific knowledge and verify research concepts, and also create opportunities to establish scientific and business contacts. The strong interest of the community in the SGA conferences is always proven by the large attendance at these meetings, usually with some 600-700 participants from all over the world. We always attach particular importance to organizing workshops at this time with a very wide and modern scope of issues covered, thematically meeting current expectations for improving knowledge and professional qualifications.

To further integrate our members and meet the requirements of the modern exploration and mining industry, meetings of students with industry representatives are organized during the SGA Biennial Meetings. The last such meeting, organized during the 17th SGA Biennial Meeting in Zürich, was attended by over 200 students. It is great that the 18th SGA Biennial Meeting will take place in the anniversary year, at the Colorado School of Mines in Golden, the first time in the USA. The LOC, under the leadership of Karen Kelley, is providing an exceptional scientific program together with workshops and field trips to some exciting areas and deposits. For 5 days in early August, Golden will be the most important place in the world for the exchange of the latest knowledge on the results of modern research and prospecting of critical raw materials, as well as the possibility of establishing direct contacts with specialists from around the world. Let this be our great

scientific celebration, which will allow us to take another step forward in integration, research and the prospecting for ore deposits. As an organization, we will continue to co-finance the largest possible participation of students from various countries. We want as many as possible to take part not only in the conference, but also in workshops and field trips. We warmly invite you to Golden for a true celebration of the science of Economic Geology.

Over the last 60 years, SGA has been developing steadily despite changing economic trends and the wave of interest in economic geology. From a strong interest in raw minerals in the 1950s-1970s, through a slowdown in the 1990s, to a boom in the last decade in the field of research and exploration of critical raw materials (CRM). SGA, having a wealth of experience, will once again be able to be a bridge in the field of broad cooperation and transfer of knowledge and experience between stakeholders representing academia, science, prospecting and mining industry and government organizations. There are enormous challenges today in the search for and understanding of the resources we need for the World's conversion to the modern green technologies. As a Society we are not afraid to take up these new challenges as we have done since our inception 60 years ago.

We cordially invite you to join the ranks of our SGA and actively participate in events organized by us around the world. The best opportunity will be a wide participation in the 18th SGA BM organized on August 3-7, 2025 in Golden, Colorado (USA). See you in Golden at the science conference during which we will celebrate the SGA 60th Anniversary. We must ensure that the next years see the same growth in activity and reputation. On the occasion of this important anniversary, we wish all our members and supporters all the best in their professional and personal lives and spectacular success in achieving ambitious scientific and research goals.

Industry-Students meeting during the 12th SGA Biennial meeting in Uppsala, Sweden 2013. Photo by Jan Pasava.

The major sponsor's BHP booth at the 17th SGA Biennial meeting in Zürich 2023. Cam McCuaig (BHP and SGA RVP Oceania) discussing with meeting participants. Photo by Christos Tzikas.

SGA Council meeting (April 30, 2003, Halle, Germany). Photo by Jan Pasava.

SGA Council meeting (April 22-23, 2005, Salamanka, Spain. Photo by Jan Pasava.

SGA Ordinary Council Meeting held on August 23, 2015 in Nancy, France – year of celebration of the 50th SGA Anniversary. Photo by Jan Pasava.

SGA Council meeting, Wuerzburg, 2018. Photo by Jan Pasava.

Birthday cake celebrating the 50th SGA Anniversary during the gala dinner at the 13th SGA BM in Nancy, France 2015. From the left: J. Slack, P. Weihed, F. Tornos, D. Groves, G. Beaudoin, M. Pagel, A.S. André-Mayer, N. Koglin and P. Eilu. Front row from left: A. Vymazalová and J. Relvas. Photo by Jan Pasava.

Members of the SGA Executive Since 1965 (Compiled by Jan Pasava)

	President	Vice-President	Executive Secretary	Treasurer	Promotion Manager	Chief Editor(s), MD	Chief Editor(s), SGA News	Chief Editor, SGA website	VP for Student Affairs
1965-1966 (Provisional E Committe)	G.L.Krol (Holland)	A.Maucher (F.R.G.)	A.J. Bernard (France)	J. Ottemann (F.R.G.)	None	G.C. Amstutz (F.R.G.)	None	None	None
1967-1969	G.L.Krol (Holland)	A.Maucher (F.R.G.)	A.J. Bernard (France)	F. Saupé (France)	None	G.C. Amstutz (F.R.G.)	None	None	None
1970-1971	I.De Magnée (Belgium)	G.R. Davis (U.K.)	A.J. Bernard (France)	F. Saupé (France)	None	G.C. Amstutz (F.R.G.)	None	None	None
1972	I.De Magnée (Belgium)	G.R. Davis (U.K.)	R. Moussu (France)	A. Emberger (France)	None	A.Maucher (F.R.G.)	None	None	None
1973-1974	A. Wilke (F.R.G.)	W. Uytenbogardt (Holland)	R. Moussu (France)	A. Emberger (France)	None	A.Maucher (F.R.G.)	None	None	None
1975-1976	P. Zuffardi (Italy)	P. Evrard (Belgium)	R. Moussu (France) A.Emberger (France)	(75)-A. Emberger (France) R. Hoell (F.R.G.)	None	A.Maucher (F.R.G.)	None	None	None
1977-1978	P. Routhier (France)	S. Jankovic (Yugoslavia)	A.Emberger (France)	R. Hoell (F.R.G.)	None	A.Maucher (F.R.G.)	None	None	None
1979-1980	L. Kostelka (Austria)	A. Mikkola (Finland)	A.Emberger (France)	R. Hoell (F.R.G.)	None	A.Maucher (F.R.G.) D.D. Klemm H.J.Schneider (F.R.G.)	None	None	None
1981-1982	----------	G. Friedrich (Germany)	A.Emberger (France) F. Saupé (France)	R. Hoell (F.R.G.)	None	D.D. Klemm and H.J.Schneider (F.R.G.)	None	None	None
1983-1985	P. Evrard (Belgium)	A. Aribas (Spain)	F. Saupé (France)	R. Hoell (F.R.G.)	None	D.D. Klemm and H.J.Schneider (F.R.G.)	None	None	None
1986-1987	P. Omenetto (Italy)	E.F. Stumpfl (Austria)	F. Saupé (France)	R. Hoell (F.R.G.)	None	D.D. Klemm and H.J.Schneider (F.R.G.)	None	None	None

1988-1990	V. Koeppel (Switzerland)	A. Evans (U.K.)	F.Saupé (France) M.Pagel (France)	R. Hoell (F.R.G.)	None	D.D. Klemm and H.J.Schneider (F.R.G.)	None	None	None
1991-1992	F.M. Vokes (Norway)	J.C. Duchesne (Belgium)	M. Pagel (France)	R. Hoell (Germany)	None	I.R. Plimer (Australia)	None	None	None
1993-1994	I.R. Plimer (Australia)	J.C. Touray (France)	M. Pagel (France)	R. Hoell (Germany)	None	D. Rickard (UK)	None	None	None
1995-1996	Z. Johan (France)	B. Lehmann (Germany)	M. Pagel (France)	P. Herzig (Germany)	None	D. Rickard (UK)	L. Fontboté (Switzerland) M. Chiaradia (Switzerland)	None	None
1997-1998	E.F. Stumpfl (Austria)	J. Pašava (Czech Rep.)	(97)-M.Pagel (France), (98)-J.Pašava (Czech Rep.)	P. Herzig (Germany)	(98)-G. Borg (Germany)	(97)-D. Rickard (UK), (98)-D.Rickard (UK) R. Goldfarb (USA)	(97)- L. Fontboté (Switzerland) M. Chiaradia (Switzerland) (98)-M.Chiaradia (Switzerland)	None	None
1999-2001	H. Papunen (Finland)	(99)-B.Lehmann (Germany), (00- 01) P. Fenoll-Hach Alí (Spain)	J. Pašava (Czech Rep.)	P. Herzig (Germany)	G. Borg (Germany)	(99)-D. Rickard (UK), B.Lehmann (Germany) R. Goldfarb (USA)	M. Chiaradia (Switzerland)	None	None
2002	P. Fenoll-Hach Alí (Spain)	D. Leach (USA)	J. Pašava (Czech Rep.)	P. Herzig (Germany)	G. Borg (Germany)	B. Lehmann (Germany) R Goldfarb (USA)	M. Chiaradia (UK)	None	None
2003	D. Leach (USA)	P. Fenoll-Hach Alí (Spain)	J. Pašava (Czech Rep.)	P. Herzig (Germany)	G. Borg (Germany)	B. Lehmann (Germany) L Meinert (USA)	M. Chiaradia (UK)	None	None
2004-2005	D. Leach (USA)	H. Frimmel (South Africa)	J. Pašava (Czech Rep.)	P. Herzig (Germany)	G. Borg (Germany)	B. Lehmann (Germany) L Meinert (USA)	M. Chiaradia (Switzerland)	None	(05)-A.Vymazalová (Czech Rep.)
2006-2007	H. Frimmel (South Africa)	D. Groves (Australia)	J. Pašava (Czech Rep.)	D. Leach (USA)	G. Borg (Germany)	B. Lehmann (Germany) L Meinert (USA)	M. Chiaradia (Switzerland)	(07)- G.Beaudoin (Canada)	A.Vymazalová (Czech Rep.)

2008-2009	D. Groves (Australia)	F. Tornos (Spain)	J. Pašava (Czech Rep.)	D. Leach (USA)	(09) H.Frimmel (Germany/South Africa)	B. Lehmann (Germany) L Meinert (USA)	M. Chiaradia (Switzerland)	G. Beaudoin (Canada)	A.Vymazalová (Czech Rep.)
2010-2011	F. Tornos (Spain)	P. Weihed (Sweden)	J. Pašava (Czech Rep.)	D. Leach (USA)	H.Frimmel (Germany/South Africa)	B. Lehmann (Germany) P. Williams (Australia)	M. Chiaradia Ch. Heinrich (Switzerland)	G. Beaudoin (Canada)	A.Vymazalová (Czech Rep.)
2012-2013	P. Weihed (Sweden)	G. Beaudoin (Canada)	J. Pašava (Czech Rep.)	H. Frimmel (Germany/RSA)	P.Eilu (Finland)	Lehmann (Germany) (12)- P. Williams (Australia), (13)-G. Beaudoin (Canada)	M. Chiaradia Ch. Heinrich (Switzerland)	Daniel Layton-Matthews (Canada)	A.Vymazalová (Czech Rep.)
2014-2015	G. Beaudoin (Canada)	J. Relvas (Portugal)	J. Pašava (Czech Rep.)	H. Frimmel (Germany/RSA)	P.Eilu (Finland)	G. Beaudoin (Canada) B. Lehmann (Germany)	M. Chiaradia Ch. Heinrich (Switzerland)	N.Koglin (Germany)	A.Vymazalová (Czech Rep.)
2016-2017	J. Relvas (Portugal)	K.D. Kelley (USA)	J. Pašava (Czech Rep.)	H. Frimmel (Germany/RSA)	P.Eilu (Finland)	G. Beaudoin (Canada) B. Lehmann (Germany)	M. Chiaradia (Switzerland)	N.Koglin (Germany)	A.Vymazalová (Czech Rep.)
2018-2019	K.D. Kelley (USA)	D. Huston (Australia)	J. Pašava (Czech Rep.)	H. Frimmel (Germany/RSA)	J. Relvas (Portugal)	G. Beaudoin (Canada) B. Lehmann (Germany)	J. Kolb (Germany)	N.Koglin (Germany)	A.Vymazalová (Czech Rep.)
2020-2021	D. Huston (Australia)	D. Banks (UK)	J. Pašava (Czech Rep.)	H. Frimmel (Germany/RSA)	S.Decree (Belgium)	G. Beaudoin (Canada) B. Lehmann (Germany)	J. Kolb (Germany)	I.Pitcairn (Sweden)	A.Vymazalová (Czech Rep.)
2022-2023	D. Banks (UK)	S. Mikulski (Poland)	J. Pašava (Czech Rep.)	H. Frimmel (Germany/RSA)	S.Decree (Belgium)	G. Beaudoin (Canada) B. Lehmann (Germany)	J. Kolb Germany)	I.Pitcairn (Sweden)	A.Vymazalová (Czech Rep.)
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How West Africa can best use its mineral wealth for economic development: Case study: Senegal

Mary Immaculate Neh Fru[1], David Baratoux[2], Edmund Nickless[3], Malick Faye[4], Rokhaya Samba[5], Ishmahen Chouche[6], Doro Niang[7], Beate Orberger[8]

1) Center for Geological and Mining Research (CRGM) Garoua, Cameroon
2) Institut de Recherche pour le Development (IRD), France
3) International Union of Geological Sciences (IUGS), Resourcing Future Generations
4) African Star Resources
5) Geological Survey of Senegal (SGNS), Dakar, Senegal
6) Université des sciences et de la technologie Houari-Boumédiène (USTHB), Algeria
7) Association of Young Geologists and Environmentalists of Senegal
8) Géosciences Conseils-CATURA Geoprojects, Université Paris Saclay, France

Corresponding author: Mary Immaculate Neh Fru, Center for Geological and Mining Research Garoua, Cameroon
immaculateneh.minf@gmail.com

Abstract

The Society for Geology Applied to Mineral Resources (SGA) is an international scientific society that promotes the science of mineral deposit geology. Realizing there is a need for upskilling in academia and industry professionals, the SGA decided to playing an important role in contributing to capacity building of African early career scientists by organizing regular short courses on African metallogeny. These short courses have been a great learning and networking platform for students from different African countries. In November 2024, Senegal hosted the 9th short course entitled "How can West Africa best use its mineral wealth for economic development".

Different activities were carried out during this short course including: including lectures on the specific mineral deposits in Senegal (gold, titanium-zirconium, phosphates) and their importance in the context of growing demands of metal for the energy transition and of fertilizer needs for agricultural developments of Africa. Also, some enriching enlightening workshops were communicated, proposed to improve on the skills of these learners participants. These lectures and workshops were followed by panel discussion on opportunities and risks associated with the exploitation of mineral deposits in Africa, and on the necessary evolution of higher education systems in geosciences. Excursions to geosites and mines were organized during this short course, including a visit to the titanium-zirconium site (ERAMET Grand Côte Senegal) and to the BOABAB phosphate mine.

The impact of these short courses is monitored through feedback from the students, based on questionnaires sent to students and lecturers. The respondents, who are encouraged to make suggestions to improve the organization and the adequacy of the contents to meet the both academic expectations of the students, the academia and industry needs.

Introduction

Africa hosts about 30% of the world's mineral reserves indispensable for the global energy transition and agriculture including cobalt, manganese, graphite, copper,

a) Opening ceremony

b) Group picture

phosphates. Phosphates as fertilizers play an important role in providing food to the growing population. An important summit, Critical Minerals of Africa (CMA) was held November 6th and 7th, 2024 in Capetown, with policy makers, service providers, service providers, industry leaders and investors. They discussed the urgent demands of Africa's critical minerals value chain, with case study in South Africa. Later in November, the 9th SGA Short Course on African Metallogeny held in Dakar Senegal, focused on West Africa, its mineral wealth, and its potential role in economic development. Safeguarding these minerals for economic development is crucial, as is the need to better understand these resources, to explore and to exploit them. Ideally, a sustainable and responsible exploitation of these resources should involve multiple stakeholders including local communities, governments, investors, suppliers, environmental groups, indigenous peoples, company employees and trade unions (Ziessler et al., 2013). Involvement of such groups can boost the different activities involved in mineral search, thereby enhancing economic growth and controlling societal and environmental impacts. In striving to better use its mineral wealth for economic growth, Africa has introduced several initiatives like "The Big Table" and the Adaptive Model for Research Empowerment in Communities AMREC (African Bank 2007, Chapter 4; Tunde, Arisekola, 2021). The Society of Geology Applied to Mineral deposits (SGA) contributes to this vision by organizing biennial short courses for African geoscience students, aimed at increasing their knowledge and understanding of various mineral deposits and metallurgical processes in different African countries. Senegal hosted the 9th SGA-SGNS-IUGS-SEG-UNESCO short course on African metallogeny in collaboration with the Service Géologique Nationa l(UAM) and the National Geological Survey of Senegal (Service Géolo gique National du Sénégal, SGNS), the Universityé Amadou Mahtar Mbow SGA Senegal chapter from the 25th to the 30th of November 2024. 62 participants attended the short course, mainly from Senegal, but also from Algeria, Mali, Cameroon, Nigeria, Namibia, UK, France and Switzerland.

Participants during lectures

The short course was made possible through generous sponsorships from local exploration and mining companies (ERAMET Grande Côte, Managem, African Star Resources, BOTO, Baobab, Catura Geoprojects), academic institutions including the French National Research Institute for Sustainable Development (IRD), the Society of economic Geology (SEG), the International Union of Geological Sciences (IUGS). and the considerable input of the local organizers, as well as from international members of the organizing committee is acknowledged.

Activities of the short course

Different activities were undertaken during this short course. They were lectures from professionals from West Africa (Nigeria, Burkina Faso, Namibia and Senegal), Switzerland, France and the UK. These lectures took place during the first three days and focused on different aspects of exploitable minerals in Senegal. The lectures were interspersed by various workshops and ended with a panel discussion. Beate Orberger led the conversation on the role of technology minerals in the energy transition; Rohkaya Samba Diene and Mabada Diagne considered opportunities and risks for West Africa associated with the titanium-zircon oxide deposits, and extraction of phosphates, respectively as opportunities and risk for West Africa; Mababa Diagne, discussed the risks and opportunities for West Africa associated with the extraction of phosphates; Doro Niang led a discussion on Bauxite, critical raw material, also presenting highligting opportunities and risks for West Africa. And lastly, David Baratoux moderated a discussion on Sustainability. Excursions were organized during the last two days, with visits to different geosites in Senegal.

Lectures:

"All lectures given to the students were on Exploiting the mineral wealth of West Africa" was the common theme to all lectures provided to the students. In

detail,
Lectures on the first day, 25th of november, covered:
- Mineral wealth of West Africa, importance of critical minerals in the energy transition, opportunities and challenges for West Africa in the current geopolitical situation,
- Titanium-Zirconium resources and reserves in West Africa and Senegal,
- Sediment hosted Titanium Zirconium deposit from exploration to mining,
- Heavy mineral sands exploitation Grande Cote: Mining and Processing,
- Current destination and material flows of Titanium and Zirconium materials from West Africa and Senegal.

The lectures on the last day, November, 27th, were concerned with:
- Metallurgical waste: sustainable critical metal resources. The importance of environmental management in the mining sector,
- HYPHEN Africa: Pioneering the Africa Green Hydrogen Revolution.

Workshops:

For the first time, we organized workshops were then organized for the students and early career geoscientists, providing an opportunity for them to interact with different Diop) moderators, to learn hands on skills like:
-Mendeley referencing software for research (Mary Immaculate Neh Fru).

Panel on an Action Plan for Africa

The panel constituted by Gbenga Okunlola (Nigeria), David Baratoux (France), Mahamadane Diene (Senegal), Ousmane Mbaye (Senegal), Felix Ekra (Senegal Ivory Coast), Robert Moritz (Switzerland). Each Panel member is expert on crucial topics for economic development (See program and Panel memorandum). Education, sustainable mining, processing of minerals, infrastructure needed and promising ongoing projects for industrialization implemented, were discussed and debated. A memorandum was written up and submitted to relevant stakeholders.

Education challenges were highlighted starting with the teaching curricula, getting hands on skills by African students from higher education facilities, enabling them to fit into the industry context. Also, creating collaborations with foreign partners and renewed investment for Africa's higher education highlighted also by Jessell et al., 2018. A conclusion was, that there is a critical need to increase investment in the higher education facilities for Africans (Report from the World Bank and Elsevier, 2018). and a stronger involvement of industries in the training of African students is highly desirable.

The importance of processing of African minerals by their locally-based companies, in order produce more value and to keep more revenue, in the various countries was also emphasized. Building additional infrastructure (roads,

a), b) Participants and workers at the Grand Côte Mine

On the second day November, 26 th :
- Phosphate deposits, resources and reserves, phosphate deposits from exploration to mining, phosphates and opportunities for West Africa,
- Phosphate mining and treatment processes, the case of Burkina Faso: Valorization of natural phosphates and blending, the production of alumina and phosphate concentrate from Thies alumina and phosphate deposits, valuation of the deposit, ore and process.
- Bauxite resources, reserves and trade(s?) in West Africa,
- Bauxite deposits: from exploration to Aluminum compound production: example/case study,
-How to write project proposals: Research and Go-to-market (Beate Orberger).
-Tailings management (Cheikh Tidiane).
-The different mineral resources in Africa (Ishmahen Chaouche).
-The geosites of Senegal (Ibrahim Youm).
These workshops were very enriching and successful, students loved these and activities received extremely positive feedbacks from the students. Based on these great reviews, it is proposed to systematically include such workshops into future African Metallogeny short courses.

harbours, railway, airports) is crucial for the growth of every country, but requires support by national governments and Trans african government initiatives. The HYPEN project on Hydrogen production in Namibia brings out an excellent example of how industrial projects can be implemented.

- Valorization of natural phosphates and blending: the case of Burkina Faso, (Saga SAWADOGO, SEPB).
- HYPHEN Africa, Namibia: Pioneering the African Green Hydrogen revolution (Tony BEUKES, HYPEN).

a) Participants and lecturers at BAOBAB Phosphate mine, b) Chief geologist and students

Major takeaways highlighted in this Panel

- Mind set change, for Africans to assume responsibility rather than hoping for others to change their countries.
- Increase public (national) investment in infrastructure.
- Creating high-level, long-term industrial projects along the entire value chain at national and international level: Trans-Africa, with other continents to produce semi-and final industrial products in West-Africa.
- Enabling the region to be self-sufficient in agriculture to feed the growing population, through development of the phosphates value chain into fertilizer, one of the key-materials in West Africa.

Four important projects of our program are exemplary:

- Titanium-Zirconium mining and processing (ERAMET Grande Côte Senegal (Khadim Bamba NDIAYE, ERAMET GC).
- Alumina and phosphate concentrate from Thiès, Senegal: valuation of the deposit, ore, and process (Abdoul Aziz NDIAYE, ENSG & ESP).

Excursions

Half a day was dedicated to visit GOREE Island with a guided tour to the historical memorial sites for of the sad, dark and crual history of slavery in Senegal and Africa. Afterwards, a very nice short course dinner was organized at the harbour's restaurant.

The last two days of the course were dedicated to mine and geosites visits. A group of 22 people visited the ERAMET Titanium- Zirconium mine: Grand Cote about 3 hours north of Dakar). After a warm welcome and introduction to the Grand Cote Mine. Visiting the mine started with the mine and processing sites as well as the laboratory followed by the visit to rehabilitation and re-vegetation areas with local plants. Interestingly, on the mine concessions, an oasis was created to accommodate tourists for a short stay to appreciate the beautiful coast and dune landscape. Another group of about 20 people visited the BAOBAB Phosphate mine. It was a 4 hours' drive West of Dakar.

After a warm welcome from the project coordinator, there was a visit to the mine. The phosphates at BAOBAB are found under a huge overburden of about 15 metres. The area which had already been exploited was being rehabilitated with the overburden from the area which had been exploited. The mine invested much in the environment, and is trying to reduce air pollution by always regularly watering the area to minimize dust emission. Also, there was visit to the processing plant sites (dry and wet), to the laboratory, and the visit was the occasion for a in-depth explanation of the mining code of Senegal from the Chief Geologist. Some of the phosphates after processing are given to the government who in turn gives them out to the population. Benefit sharing seems to be highly respected from an interview with a random villager who says they are satisfied with what they gain from the company. However, more research is needed to evaluate the degree of satisfaction of the population. Most of the geologists working in this mine are from this locality, enabling easy and fast communication and negotiations.

On the second day all participants went to the coastal Geosites and joined lectures on Mesozoic sedimentary and volcanic rocks by Ibrahim YOUM, UCAD, Senegal. The SGNS organized a cultural visit to Gorée Island and a delicious

Final Goodbye from Dr. Rokaya Diene

conference dinner in Dakar, close to the harbour.

a) Explaining the Geosites,

b) Beautiful geologic formations

he final event was a good-bye lunch with the Director of the Geological Survey, Dr Rokhaya Samba-Diene.

Feedback/testimonials

Je tiens tout d'abord à vous remercier chaleureusement pour l'organisation du 9e cours sur la métallogénie africaine qui s'est tenu à l'Université Amadou Mahtar Mbow. Ce fut une expérience enrichissante et inspirante, qui m'apermis d'approfondir mes connaissances en métallogénie et d'élargir mon réseau professionnel.
Les présentations sur les minéraux critiques liés à la transition énergétique, ainsi que les discussions autour de la gestion durable des rejets miniers, notamment la présentation du Dr Tidiane DIOP, mont particulièrement marqué. Parmi les interventions notables, je retiens les points de vue éclairants de Dr Saga SAWADOGO, Ekra Koffi FELIX et Olugbenga OKUNLOLA. Par ailleurs, la présentation de M. Tourki NOURI m'a permis d'acquérir des concepts essentiels pour un futur ingénieur géologue comme moi. J'ai également beaucoup apprécié l'atelier de Dr Mary Immaculate NEH FRU sur le logiciel de référence Mendeley, qui a significativement renforcé mes compétences en rédaction scientifique. Cependant, je souhaite partager quelques suggestions pour enrichir les prochaines éditions :

Accordé plus de temps pour les sessions de questions-réponses après les présentations. Il serait pertinent de renforcer la communication auprès des universités (les clubs) et des réseaux professionnels. Une meilleure diffusion de l'information aurait pu permettre à une activité de cette envergure d'avoir un impact encore plus significatif. Inclure des ateliers pratiques supplémentaires pour favoriser une application concrète des concepts présentés.

Enfin, Je vous remercie une fois de plus pour cette initiative remarquable, qui joue un rôle crucial dans la formation de jeune géologue en Afrique. Je reste à votre disposition pour toute contribution ou collaboration future, notamment en vue d'élargir le réseau dans notre université et de contribuer à la préparation des prochaines sessions.

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This workshop could not be held with our generous sponsors and partners:

The Panasqueira Mine (Portugal): a landmark in W (-Sn-Cu) mining and geological research.

António Mateus[1], Fernando Noronha[2], Filipe Pinto[3]

[1] Faculdade de Ciências da Universidade de Lisboa e Instituto Dom Luiz
[2] Faculdade de Ciências da Universidade do Porto e Instituto de Ciências da Terra
[3] Beralt Tin and Wolfram

The Panasqueira Mine, located in central Portugal, is the main wolframite mining operation in Europe and one of the most significant worldwide, exploiting W(-Sn-Cu) vein-type magmatic-hydrothermal ores. With a rich history dating back to 1896, this underground mine continues to play a vital role in the global supply of high-grade wolframite concentrates along with cassiterite and chalcopyrite concentrates as by products. Beyond its economic importance, the Panasqueira deposit is a remarkable geological treasure trove, providing magnificent mineral specimens and valuable insights into metallogenic processes related to peraluminous granites. This brief note intends an overview of the mine's history, geological setting, current mining practices, and ongoing research that makes Panasqueira a key site for both industry and academia.

Geological setting

The Panasqueira W(-Sn-Cu) vein-type deposit is a notable example of the European W-Sn-rare metal metallogenic province, spreading across the Palaeozoic Variscan Belt (Neiva, 1944; Thadeu, 1973; Routhier, 1976; Derré, 1982; Goinhas and Viegas, 1983, Blundell et al. 2005; Kerrich et al., 2005; De Vos et al., 2005; Jérémie and Gloaguen, 2015; Romer and Kroner, 2015, 2016). In the Iberian Massif, this metallogenic province is by and large hosted in the Central Iberian Zone CIZ), a major geotectonic unit forming the NW Iberian Variscides autochthon domain (Fig. 1). The exposed country rocks include various sedimentary and volcano-sedimentary sequences (mostly from Neoproterozoic to Silurian) intruded by voluminous granite bodies. The former sequences record evidence of polyphase Variscan deformation (D1, 360-337 Ma, to D3, 320-315 Ma, phases) and low-grade regional metamorphism.

The granite bodies form various suites classified according to their age and geochemical/isotopic features. Most of these suites were generated and emplaced during the Variscan orogenic stages, the more abundant comprising peraluminous, muscovite>biotite or biotite>muscovite monzogranite to granite rocks, sometimes porphyroid and locally accompanied by leucogranites (Fernandez-Suarez et al., 2000; Mateus and Noronha, 2010).

The generation/emplacement of Variscan granite melts occurred within a wide period, although peaking at ca. 320-315 Ma, 310-305 Ma and 296-290 Ma (Albuquerque, 1971; Capdevila et al., 1973; Priem and Tex, 1984; Ferreira et al., 1987; Pinto et al., 1987; Dias et al., 1998; Henk et al., 2000; Fernandez-Suarez et al., 2000). The post-D3, 310-305 Ma and 296-290 Ma, periods correspond to the main timeframes for the development of W- and/or Sn-dominant mineralization (as skarns, aplite-pegmatite bodies, greisen cupolas and peri-batholitic quartz lodes) in the Central Iberian Zone (Conde et al., 1971; Pinto, 1979; Inverno and Ribeiro, 1980; Neiva, 1996, 2008; Roda-Robles et al., 2018). The indicated three time-windows also embrace the nucleation and subsequent reactivation of large-scale shear zones, subsequently complemented by a pervasive network of strike-slip fault zones (Arthaud and Matte, 1975, 1977; Iglésias and Choukroune, 1980; Iglésias and Ribeiro, 1981; Mateus and Noronha, 2001, 2010; Marques et al., 2002). Both structural sets display discontinuous and multistage (often mineralised) hydrothermal infillings, documenting their important role in the long-lasting control of crustal permeability and focused fluid flow.

The lode system

The swarm of mineralized quartz veins is hosted in a pre-Ordovician, tightly folded sequence of pelites and greywackes (Beiras Group) recrystallized under greenschist facies conditions, and crisscrossed by several ENE-WSW and N-S fault zones (Fig. 2 Neftali da Costa, 1943; Bloot and Wolf, 1953; Thadeu, 1951, 1979; D'Orey, 1967; Kelly, 1977; Derré et al., 1986). Locally, the slates are spotted by biotite and more rarely cordierite (retrogres sed) blasts which should trace an aureole of contact metamorphism contiguous to a concealed granite body whose configuration remains unclear. A straightforward association between this concealed body with the greisen cupola intersected by underground works is hard to established. Therefore, the possibility of a huge plutonat depth feeding various large-sized apophyses or, alternatively, of having granite bodies emplaced during the late stages of the Variscan orogeny, must be kept open. Both alternatives are compatible with the available geochronological, geochemical and geophysical data (Clark, 1964, 1970; Lourenço, 2002; Póvoa, 2011; Pinto, 2014; Gonçalves et al., 2018; Mateus et al., 2020; Marignac et al., 2020; Cathelineau et al., 2020; Breiter et al., 2023). The significant enrichment in cassiterite and topaz across the SW domain of the lode system favours the hypothesis of an additional concealed granite body to which the high Sn-F inputs are related (Pinto et al., 2015). Nonetheless, according to the geophysical model reported in Ribeiro (2017), the main granite body at depth should depict a laccolithic shape (ca. 1 km thick, 6.5 km in length and 4.5 km in width), with a large keel descending to around 2 km and elongated NNW-SSE. This voluminous body (ca. 32 km^3) has a rather flat roof from which the greisen cupola emerges, also elongated NNW-SSE.

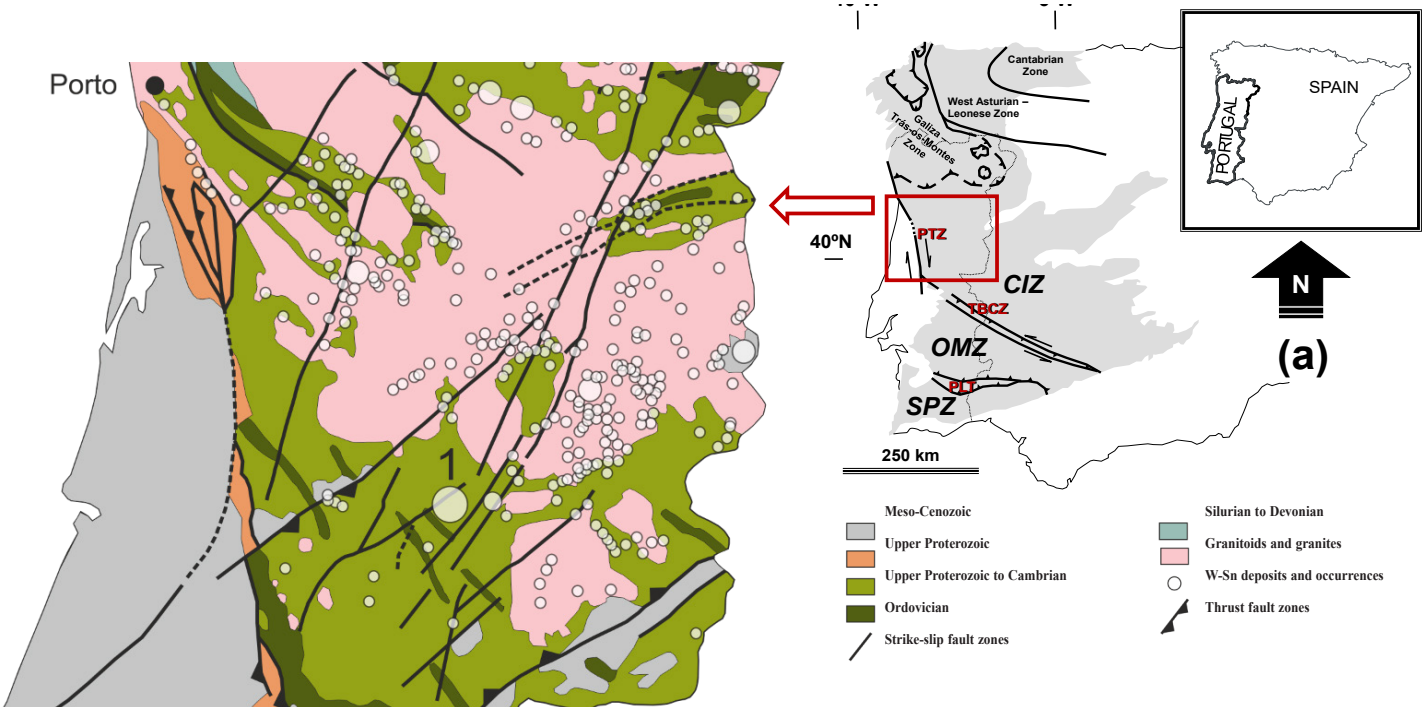

Figure 1: (a) Schematic illustration of the main geotectonic units in the Iberian Variscides and some major shear zones: CIZ – Central-Iberian Zone; OMZ – Ossa-Morena Zone; SPZ – South Portuguese Zone; PLT – Pulo do Lobo Terrane (contiguous to the SW Iberian suture); PTZ – Porto-Tomar Shear Zone; TBCSZ – Tomar-Badajoz-Córdoba Shear Zone. (b) Simplified geological map of central Portugal with location of the main tungsten and tin deposits and occurrences. 1 – Panasqueira Mine. Adapted from "Carta Geológica de Portugal 1:1,000,000", Geological Survey of Portugal, LNEG, 2010. Information on mineral deposits provided by the official national catalogue SIORMINP (LNEG). Modified from Mateus et al. (2020).

The limits of the lode system are not-definitely known, and several geological indicators suggest there is potential to expand the demonstrated resources. Even so, at the mine scale, the remarkable irrgularity of veins density and their mineral infillings, as well as differences in mineralization attributes between several fault-bounded domains, put added difficulties on proving the geological continuity of grades and tonnage laterally and towards deeper levels. Presently, the lode system extends for ca. 2,500 m in length, ca. 400 to 2,200 m in width, ca. 500 m in depth (Fig. 3). The heterogeneous network of quartz (± topaz ± muscovite ± tourmaline ± siderite ± chlorite)-veins comprises variable amounts of wolframite (composition ferberite endmember), cassiterite, sulphides (typically chalcopyrite, arsenopyrite, (Fe-rich) sphalerite, pyrrhotite, pyrite, stannite, galena), apatite and other phosphate minerals, and a large diversity of Bi-Ag-bearing phases. At the mine scale, some mineral phases show a zoned distribution, the most relevant being the increase of topaz and sphalerite abundance from the NE to the SW, at all the mine levels, often coupled with an increase in cassiterite (Pinto, 2014; Pinto et al., 2015, Mateus et al., 2020).

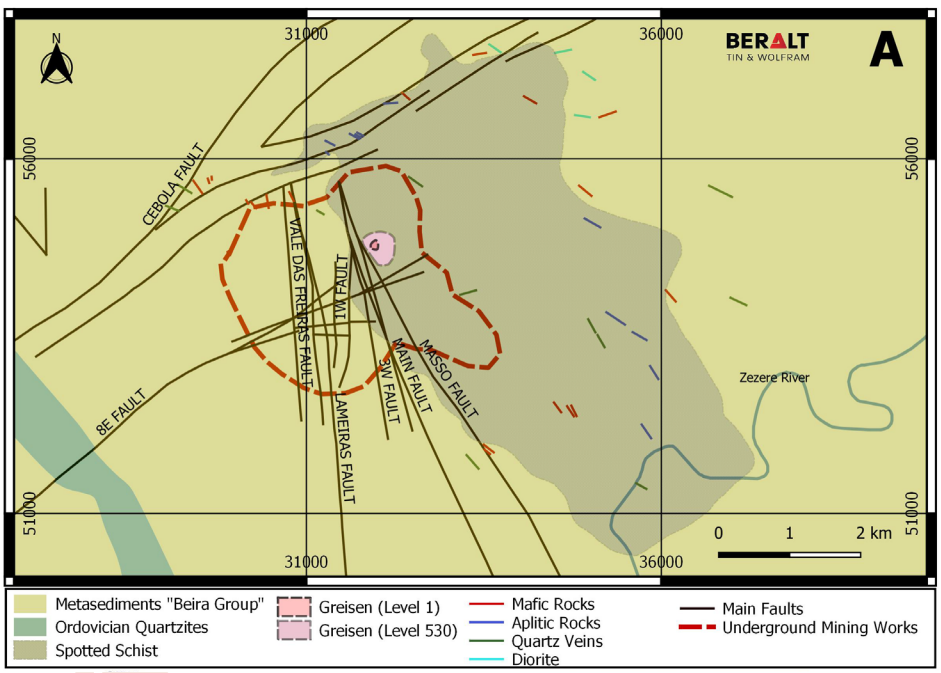

Figure 2: Simplified geological map of the Panasqueira Mine area. Adapted from the official map of Beralt Tin & Wolfram Portugal, after (Thadeu 1951, 1979). Modified from Mateus et al. (2020).

The dominant set of lodes is sub-horizontal (8–10°SW) with an average thickness of 0.3 m (although ranging from 0.1 to 1.0 m); various subsets of subvertical veins, usually thinner and lesser enriched in mineral ore phases, complement the lode network (Thadeu,

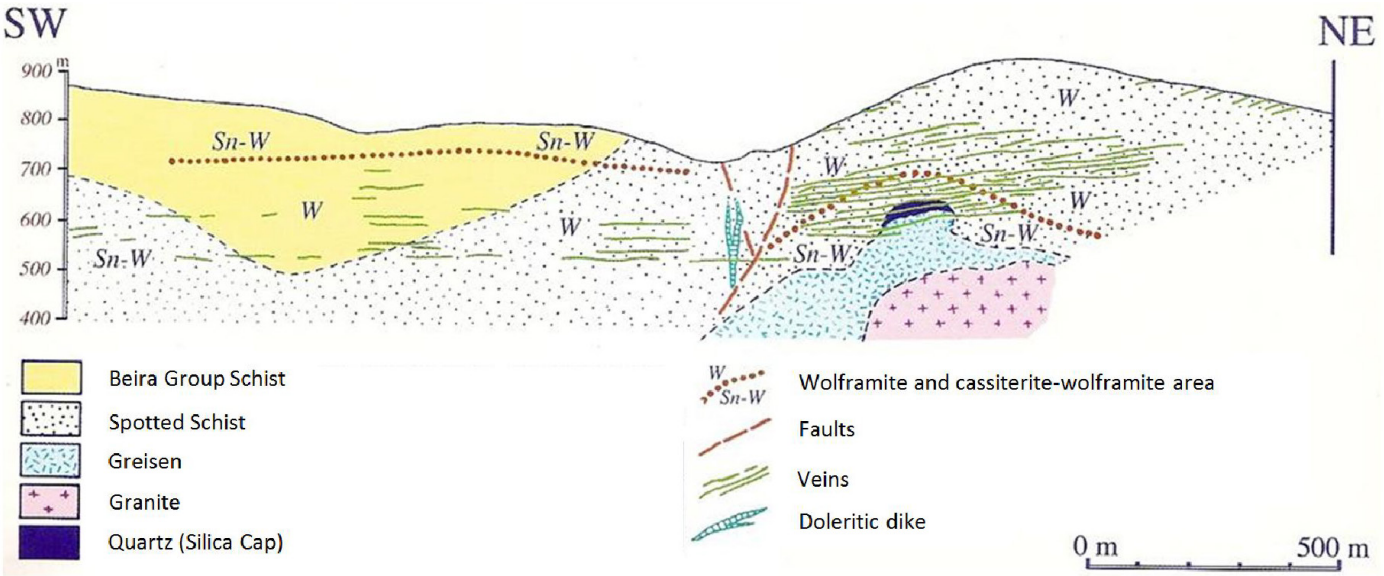

Figure 3: Conventional geological cross-section of Barroca Grande sector across the swarm of quartz lodes bordering the greisen-granite cupola, after (Thadeu 1951, 1979). Modified from Mateus et al. (2020).

and Rye, 1979; Foxford et al., 2000; Jaques, L., Pascal, C. 2017; Jacques et al., 2018; Marignac and Cathelineau, 2022). Significantly, several ENE-WSW and N-S fault-zone segments comprise minera lized hydrothermal infillings (Lourenço and Noronha, 2000; Lourenço, 2002; Pinto, 2014; Pinto et al. 2015). Some typical features of the lodes are illustrated in Fig. 4.

The ore-forming process

During the protracted exploitation history of the Panasqueira mine many studies were performed, documenting a long history of well-succeeded collaboration between industry and academia. Research activities carried out since 1943 have focused on numerous topics and contributed to a significant collection of multidisciplinary data that complement each other. These data provided also critical information to the understanding of the ore-forming process, systematically improved over time. Despite the recorded advances in knowledge, many questions remain open, and some interpretations favoured in previous analyses are often arguable in light of new findings, which prove the uniqueness of the Panasqueira deposit and its remarkable heterogeneity.

The spatial distribution of quartz lodes and their relationship with the greisen-granite cupola were addressed in many surveys (Thadeu, 1951, 1979; Bussink, 1984; Polya, 1989; Lourenço, 2002; Pinto, 2014; Launay, 2018; Launay et al., 2018, 2019). The mechanisms involved in the re-opening of quartz lodes and the possible influence of pre-existent flat discontinuities in their development were also examined in detail (Marignac 1973; Ribeiro and Pereira, 1982; Noronha et. al 1992, Foxford et al. 1991, 2000; Jacques et al. 2018; Launay, 2018). Despite the controversies that remain on these topics, there is widespread consensus on the role played by fluid overpressure in the multiple reopening of lodes, as well as on the influence of local stress fields resulting from both the granite emplacement and the mechanical interaction of closely spaced lodes. The relative chronology established between the main lode set and the (older) subvertical veins also does not raise major doubts (Noronha et al. 1992), and the mineral infillings found in many fault zones (criss-crossing and displacing the lodes) are unanimously ascribed to late hydrothermal events. Considering the structural record regionally preserved in the hosting metasedimentary sequences, the origin of the sub-horizontal (8–10°SW) lode system at Panasqueira should be concomitant of the last manifestations of the third Variscan (D3) deformation phase (Ribeiro and Pereira 1982).

Adjoining the lodes, the metasedimentary rocks are systematically affected by intense hydrothermal alteration, notably ubiquitous silicification and tourmalinization, often complemented with the growth of muscovite and, at times, topaz; fine disseminations of arsenopyrite are also locally observed, as well as veinlets bearing fine-grained apatite or siderite aggregates (Codeço et al., 2017, 2020; Mateus et al., 2020; Carocci et al. 2021). The alteration pattern, particularly evident until ca. 20-30 cm far from the lodes, can be plausibly correlated with the successive stages of the lode's infillings. However, its fingerprint in the whole-rock geochemistry extends far more in space, documenting a long-lasting fluid-rock interaction across a huge crustal volume, even though intensified in domains of higher permeability enclosing the lodes (wherein the channelling of fluid flow was more effective), as firstly noted by Oosterom et al., 1984).

The chronological relationship between the mineralizing events and the development of the greisen cupola is not so easy to establish. In some studies (Kelly and Rye, 1979; Polya, 1989; Lourenço, 2002; Marignac et al., 2020), the greisen development is placed prior to the ore-forming process. In other studies, the granite greisenization is envisaged as simultaneous and genetically linked to the mineralized fluid inflows (Bussink et al. 1984; Codeço et al. 2017; Launay et al. 2018), being also synchronous with the tourmalization (± muscovitization) at the lode walls (Codeço et al, 2017; Lecumberri-Sanchez et al., 2017). Despite this controversy, a geochemical anomaly halo extends

by more than 5 km from the centre of the deposit (Polya 1988b), and the most important anomalies (60 ppm W and 110 ppm Sn, co-varying with highs in F, Li and Rb contents), roughly oriented NW-SE, are pinpointed in metasediments on top of rocks domain enclosing the quartz lode system. These results are comparable to those reported in Gonçalves et al. (2018), where an additional large W anomaly (up to 409 ppm) is delimited to the west of the deposit; Sn and W anomalies are clearly superimposed, exhibiting a preferential NW-SE direction. These authors also show that the Sn and W contents in the whole rock covary with (F, Li and As) and with (Nb, Ta and Ti), respectively. The latter feature was assigned to rutile dissemination, which abundance in the rocks surrounding the quartz lodes was subsequently demonstrated by Carocci et al. (2021).

Deposition stages

Since the seminal work of Kelly and Rye (1979), several proposals have been made for the mineral deposition sequence forming the Panasqueira quartz lodes, collating evidence collected at different scales in various sectors of the mine (Polya 1987, 1989; Polya et al. 2000; Lourenço 2002; Pinto et al. 2015; Martins 2017; Carocci 2019; Martins et al., 2020; Cathelineau et al. 2020; Mateus et al. 2020; Marignac and Cathelineau, 2022). The remarkable heterogeneity of mineral infillings that can be found in a single lode or in subsets of lodes occurring in specific domains of the mineralized system, makes the task of finding an overall sequence of mineral deposition free from dispute very difficult. Indeed, at Panasqueira, multiple opening events of lodes do not necessarily occur at the same time throughout the entire system, as recorded by the variation in composition of some mineral phases and their distribution at the mine scale (Wimmers, 1985, Polya, 1988a, 1989, 1990; Pinto, 2014; Carocci et al., 2017; Mateus et al., 2020), mineralizing fluids might also experience significant compositional changes in time and space, introducing additional sources of uncertainty in the mineral paragenetic succession. Even so, there is some consensus regarding the identification of three main stages for the formation of the Panasqueira lodes: an early period of oxide (rutile, wolframite, cassiterite) and silicate (quartz, muscovite I and II, tourmaline, topaz) deposition, the so-called "Oxide-Silicate Stage (OSS)" where one earlier sub-stage with tourmaline ± topaz ± muscovite I ± rutile can be

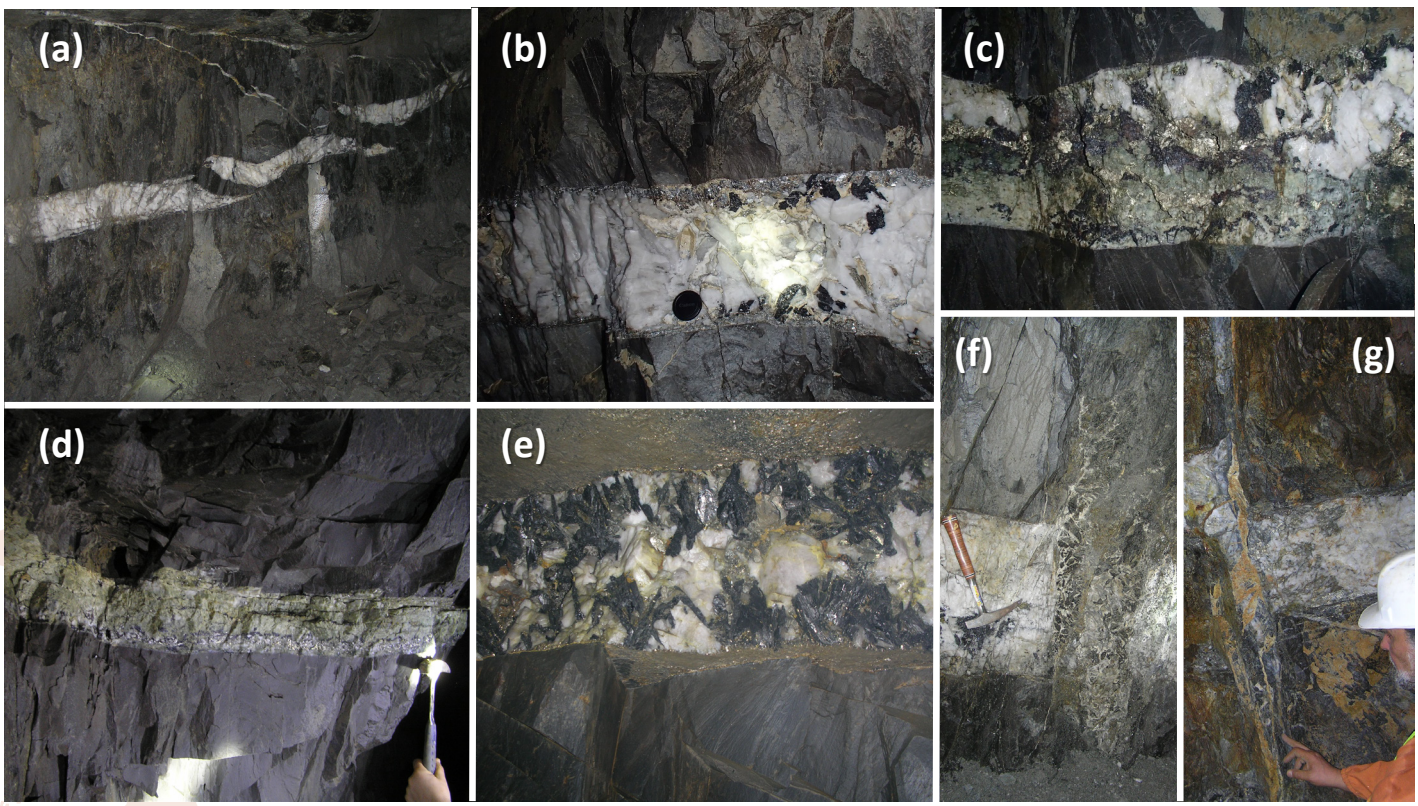

Figure 4: Some typical features of the quartz lodes at Panasqueira – (a) common spatial arrangement of the quartz lodes, displaying bevel-shape endings also known as "eel tails"; (b) coarse-grained muscovite in thinner selvages (along with accessory tourmaline) of a quartz lode bearing some wolframite and minor amounts of sulphides (SE sector of the mine); (c) re-opening of a thick topaz selvage (including fine-grained Cst I) followed by the deposition of quartz and sulphides (SW sector of the mine); (d) lodes enriched in topaz, sphalerite and cassiterite (NW sector of the mine, transitional to the SW sector); (e) wolframite-rich quartz lodes bordered by thin muscovite selvages (NE sector do the mine); (f, g) mineralized, brecciated infillings of late strike-slip fault zones (NE and SW sectors of the mine, respectively).

considered; an intermediate period during which the largest sulphide volume (mostly pyrrhotite, sphalerite, chalcopyrite, pyrite) was produced, known as the "Main Sulphide Stage" (MSS); and a late period typified by the prevalent growth of carbonates (siderite, dolomite, calcite). There are many variations on this general sequence, some of them considering different generations of the same mineral phase (due to depositional recurrency and events of thermal and chemical rejuvenation) and setting the formation timing for many accessory mineral phases. Among all the existing proposals for the paragenetic sequence forming the Panasqueira quartz lodes, the most disruptive solution is the one presented in Carocci (2019) and Cathelineau et al. (2020), comprehensively discussed in Marignac and Cathelineau (2022).

Mineralizing fluids

The composition and origin of the fluids involved in the metallogenic process at Panasqueira were also investigated in several works, mostly based on fluid inclusion studies but also considering stable isotope systematics (Kelly and Reye, 1979; Bussink et al., 1984; Campbell et al., 1988; Noronha et al., 1992, 1999; Lüders, 1996; Polya et al., 2000; Lourenço et al 2001, Lourenço 2002; Burnard and Polya, 2004). According to these datasets, the composition of successive fluid inflows trapped in different mineral phases is chiefly confined to the C-O-H-N-NaCl system, although distinguishing fluids which composition falls nearby the H_2O-CO_2-(CH_4) pole from those with variable H_2O-CH_4-N_2 ratios, where either N_2 or CH_4 could predominate. Fluid salinity values range usually from low to moderate values. Fluids that coexist with much of the tungsten deposition period display a volatile component characterized by a CO_2-N_2-(CH_4) mixture, whereas fluids associated with the following evolving stages present a volatile phase gradually enriched in methane.

Non-magmatic fluids have played a relevant role in the mineralization process, particularly those whose composition was buffered by country rocks (modified fluids). These "external" fluid flows, although dominant and largely implicated in granite cooling process, must have incorporated,by dilution, variable portions of granite-derived fluids, especially during the deposition periods of mineral phases dependent on the geochemical availability/saturation in Al-F-Sn-P and Al-F-Li-Sn-P.

Therefore, based on fluid inclusion and isotopic studies, it can be assumed that the intervening fluid inflows at Panasqueira do not have features of a simple magmatic to hydrothermal system.

P-T conditions

The assessment of P-T conditions under which the ore-forming process proceeded was done in many fluid inclusion studies, later complemented with approaches based on isotopic data and mineral compositional changes. The period of tungsten deposition (OSS) should have occurred at pressure and temperature conditions of 50 to 100 MPa and ca. 300^{o}C, and the deposition of sulphides at ca. 30 MPa and 300^{o}C (Kelly and Rye, 1979; Bussink et al., 1984; Polya, 1987; Lourenço, 2002; Codeço et al., 2017, 2019). The drop in pressure through time could denote the effects of crustal exhumation at the end of the Variscan orogeny, caused either by an important isostatic rebound event at ca. 300 Ma or by a generalised orogenic collapse peaking at the Carboniferous-Permian transition (Mateus and Noronha,2001, 2010; Marques et al., 2002).

However, it is important to note that some authors (Cathelineau et al., 2020, Carocci et al., 2021; Marignac and Cathelineau, 2022), studying fluid inclusions in topaz, present debatable results that are based on controversial relative chronological relationships, proposing, for the initial stage of the formation of the ore, pressure and temperature conditions of 250±20 MPa and 500±20 ^{o}C, equivalent to those of crustal depths around 8-10 km.

Age

Until recently, geochronological data for the Panasqueira system was limited to K-Ar and Ar-Ar gathered in different generations of muscovite and one whole-rock Rb-Sr age. Based on K-Ar muscovite ages, Clark (1970) proposed that greisenization processes and hydrothermal mineralization were completed in a relatively narrow period, between 293±10 Ma and 289±10 Ma. Using high-precision 40Ar/39Ar age-spectrum technique on muscovite, Snee et al. (1988) established for the major ore-forming stages several short-lived pulses over a relatively long time, ranging from 296.3 ±0.8 Ma to 291.6± 0.8 Ma. Isotopic determination of a two-mica granite (muscovite dominantly secondary) cut by drilling, provided a Rb-Sr whole-rock age of 289 ±4 Ma with a high initial 87Sr/86Sr ratio of 0.713 (Priem and den Tex, 1984).

Considering the relationships with regional deformation, the Panasqueira granite cannot be older than 310-305 Ma and could have been coeval with the nearby batholiths in the Gouveia area (Serra da Estrela): the U–Pb zircon ages reported by Neiva et al. (2012) for late- and post-D3 Sn-bearing two-mica granites are 310.1 ± 4.3 Ma and 297.3 ± 3.1 Ma, respectively, both rocks preserving muscovite displaying an 40Ar/39Ar age of 286 ± 3 Ma. The U-Pb zircon age estimated for the Capinha pluton is 301±3 Ma (Gonçalves et al., 2023).

The ore-forming processes at Panasqueira has occurred within the 313 ± 3.2 Ma and 291.6 ± 0.8 Ma time window, as indicated by the U-Pb ages obtained for ferberite (313 ± 3.2Ma; Yang et al., 2020) for early rutile grains (305.2 ± 5.7 Ma; Carocci et al., 2021) and for cassiterite (303 ± 3.3 Ma and 301 ± 4.2 Ma; Zhang et al., 2019). The main mineralizing events are confined by the U-Pb ages gathered for uraninite (298 ± 2 Ma; Mateus et al., 2020) and hydrothermal apatite (294.5 ± 5.3 Ma; Launay, 2018). Therefore, the quartz lode system at Panasqueira documents a protracted and complex metallogenic process, beginning at middle Pennsylvanian and extended over nearly 15(-20) Ma, into the lower Permian.

Mining and ore treatment/processing

At Panasqueira, mining is exclusively underground, using a mechanized

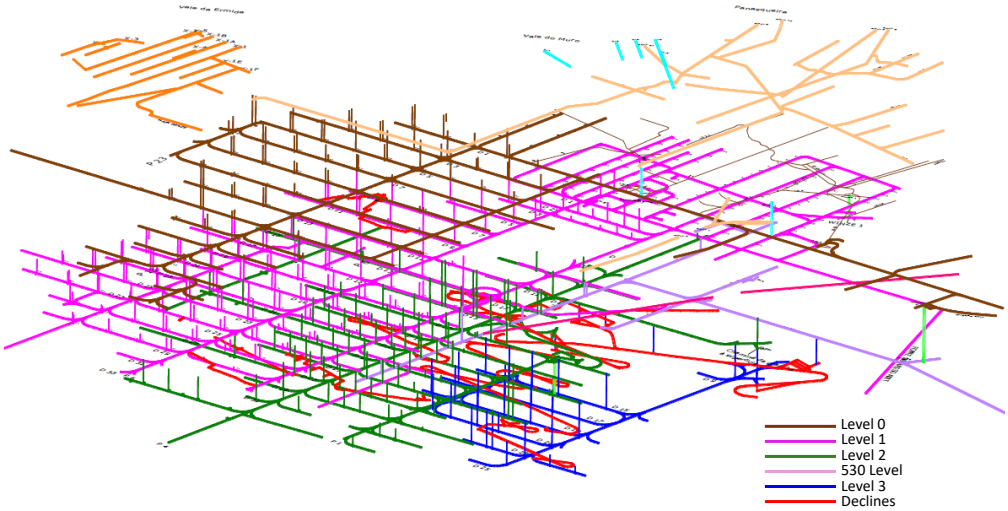

Figure 5: General 3D perspective of the installed infrastructure supporting the underground mining works at the Panasqueira mine.

room and pillar method (Figs. 5 and 6) with galleries running E-W (drives) and N-S (panels), and stope height of ca. 2.1-2.3 m; the resulting average dimensions of mined blocks are ca. 100 x 50 x 2.2 m3. The extraction works took place on four horizontal levels (from level 0 to level 3) and the mine development has progressed from the upper level 0 (680 m altitude) down to the lower level 3 (470 m altitude), which are interconnected through a series of access ramps, shafts, and a well-established ventilation system. Currently, production operates mainly at the levels 1and 2. Once dismantled and crudely crushed, the ore is carried by an underground conveyor to the treatment plant at surface where various steps of screening, washing, grinding and flotation allow the production of the intended mineral concentrates. Concomitantly, residues of this process are separated and stored: coarse-grained (silicate-dominant) aggregates are stockpiled and sold to local companies for road works; fine-grained tailings are disposed in dedicated dumps. The optimization of this production flow reflects continued efforts in new technology and systematic methodological improvements over many decades, justifying some additional notes on the subject. In 1904, a mechanized treatment plant was built near the Zêzere River. In 1911, ma Cabeço do Pião (Rio), and major investments were made, upgrading this plant to receive the ore gathered in different mining sectors by means of an aerial 5,100 m rope-tramway meanwhile installed. Increased levels of mechanization allowed higher rates of production of wolframite concentrates in the following decades (from levels 0 and 1), subsequently complemented by the production of cassiterite concentrates and the beginning of recovery of metals from sulphides (namely copper) in late 1940's. During the 1950's, recognizing the importance of water quality, a water treatment plant was built at Salgueira, placed circa one kilometre downstream from the main mining operations.

The modernization of underground operations was accelerated in the 1970's, aiming at labour costs reduction and the complete replacement of the long-wall mining by the mechanized room and pillar method. The opening of a new inclined shaft began in 1977 and, five years later, the exploitation of level 2 started. Another shaft, connecting levels 2 and 3, was concluded some years after, besides the installation of a 284 kW winch. In 1998, the complete shaft system with automated mine car handling was operational.

The Cabeço do Pião (Rio) treatment plant, gradually disassembled since mid-eighties, ceased working in 1998, when all the ore handling procedures were relocated to its present-day site at Barroca Grande (Fig. 7). Here, the treatment plant is fed by a 1,203 m conveyor belt and three large storage bins continuously supplied by <100 mm fractions obtained underground with a jaw crusher. After the crushing refinement, separation of the silicate-dominant residues (quartz and host rock fragments) is done with a hydro-cyclone using a dense slurry media with very fine ferrosilicon. This Heavy Media Separation (HMS) method removes approximately 80% of the fractions lacking significant ore minerals and the obtained pre-concentrate is then used to feed the main concentration plant via various screening, washing and grinding steps. The conventional gravity concentration method, followed by sulphide removal through flotation and dry magnetic separation, assist the final production of wolframite and cassiterite concentrates.

As currently assembled, the treatment plant of Barroca Grande allows processing 900,000 to 1,000,000 tonnes of ore, yielding an annual production capacity of high-quality (74%-75% WO3) wolframite concentrates equivalent to ca. 100,000 mtu WO3 with a stable WO3 recovery rate (ca. 80%). Additionally, efficiency improvements are recorded in the production of cassiterite and chalcopyrite concentrates as by-products: 69 t of cassiterite concentrate at 72% Sn in 2016, from 53 t in 2015; 384 t of chalcopyrite concentrate at 28% Cu in 2016, from 361 t in 2015. According to the figures available, the plant enjoys also an electro-mechanical availability above 90%.

Environmental impacts

As with all modern mining operations, environmental responsibility is a key consideration at the Panasqueira Mine. A range of measures to minimize the environmental footprint have been implemented and supervised, including water treatment facilities (a new unit was added in 2011), dust control measures, and rehabilitation of disturbed land. Efforts to reduce energy consumption through the implementation of more efficient technologies were also pursued, and currently a solar energy power

Figure 6: Modern underground works at Panasqueira – (a) the spatial continuity of the lodes as a permanent challenge, both due to the original (irregular-)lentiform shape and common fault-related detachments; (b, c, f) planning and execution of exploration/evaluation drillings in active fronts; (d, e) general views of the mechanized room and pillar method.

station is being constructed, near the Main Office, in Barroca Grande.

Significant investments were completed after 2012 to assemble a new thickener and lime dosing system (according to high-demanding EU regulations), and to build a new tailing disposal to properly enclose the sludges generated by the ore treatment plant. Even so, the impacts, particularly on the landscape, exist, reflecting above all a heavy historical legacy that cannot be completely erased, but are being closely monitored and confined.

Quite recently, a research team from the Faculty of Sciences and Technology of the University of Coimbra has implemented a pilot system at the Panasqueira tungsten mine to recover critical metals from mining waste using microorganism-based processes. This clean, cost-effective and innovative bioprocess is an output of the "REVIVING - Revisiting Mine Tailings to Innovate Metals Recovery" R&DT project, which aims to recover mining waste, promote recycling, reduce hazardous waste, and support a circular economy in Europe.

Economic and social impacts

The Panasqueira mine has been operational continuously for over 129 years, despite various periods of downturn, or even stoppage (during which closure was imminent), due to constraints imposed by market conditions. It has always remained as the chief source of tungsten in Portugal, often representing more than 65% of the national production and, after the late eighties of the XX century, being the sole producer. The global impact of this mining activity is significant, especially when appraised across long time series. From 1910 to 2020, the Portuguese production of contained tungsten in mineral concentrates totalled 121.53 kt, i.e., ca. 3.3% of the world production documented for the same period (3.71 Mt). The 1910-20 and 1940-50 periods were exceptional, during were exceptional, during which Portugal accomplished more than 10% of the global production (for details see Mateus et al., 2021). were exceptional, during which Portugal accomplished more than 10% of the global production (for details see Mateus et al., 2021).

The continuous historical records available for the Panasqueira mining operation indicate over 128 kt of wolframite concentrate produced since 1934, together with several thousand tons of cassiterite and chalcopyrite concentrates (Wheeler, 2016). Exploitation of wolframite ores started in the Panasqueira area, followed by mining works in the Vale das Freiras, Vale da Ermida and Barroca Grande areas. All the individual concessions were later grouped into one single area known as the "Couto Mineiro da Panasqueira", which covers the same ground as the present-day concession. The successful accomplishment of various technological improvements through time increased the overall mining efficiency, expanding the production capacity of wolframite concentrates with one of the highest grades available in the market (74-75% WO3). In recent years, the annual production has remained between ca. 85,000 and 95,000 mtu WO3 (1 mtu – metric tonne unit, equal to 10 kg), depending on the ore grade displayed by lodes under exploitation.

Throughout its long history, the Panasqueira mine has been a vital part of the local and regional economy. The social contributions of this large mine were especially decisive in times of great deprivation, guaranteeing subsistence and access to healthcare for thousands of people, in addition to educational and professional training for the youngest. Considering current criteria, the absolute reliance on the mining activity would be controversial, and the abuses of power played by the employer-protector not tolerated; in those times, however, the company's support was crucial to survival. Fortunately, labour relationships evolved, and new occupational alternatives have appeared. Even so, the Panasqueira mine remains the largest heavy industrial infrastructure across the administrative district, providing employment to almost three hundred people and fostered community development in the neighbouring region.

Future perspectives

Despite the ups and downs recorded over time, the Panasqueira Mine has remained a cornerstone of the Portugal's mining industry, for many years being at the forefront of mining innovation. Looking ahead, the future appears promising, even though circumstances may change suddenly due to the great unpredictability of markets, volatility in commodity prices and fluctuations in the EU mining policy decisions.

Recent exploration endeavours assisted estimations of indicated and inferred resources at Panasqueira of ca. 8,08Mt and 5,16Mt of ore tonnes, respectively; the extent of proved and probable reserves was 775Kt and 1,17Mt of ore tonnes, respectively (Wheeler, 2016). With significant reserves still present and auspicious resources increasing, Panasqueira is well-positioned to preserve its status as a key player in the global mining industry.

The growing demand for tin, driven by its use in electronics and renewable energy technologies, coupled with an increasing need for strategic metals like tungsten and copper, suggest that foreseeable market conditions should not influence decisively the mining operations at Panasquiera. If so, this historical mine will be able to continue its mission, contributing to the W(-Sn-Cu) market supply needs for many years to come.

Furthermore, the expected integration of advanced mining technologies, including automation and data analytics, will likely enhance both productivity and safety. As the mining industry continues to evolve, Panasqueira will remain a model for integrating geological research with practical mining applications, ensuring that it not only sustains its operations but also contributes to the broader field of mineral exploration and development.

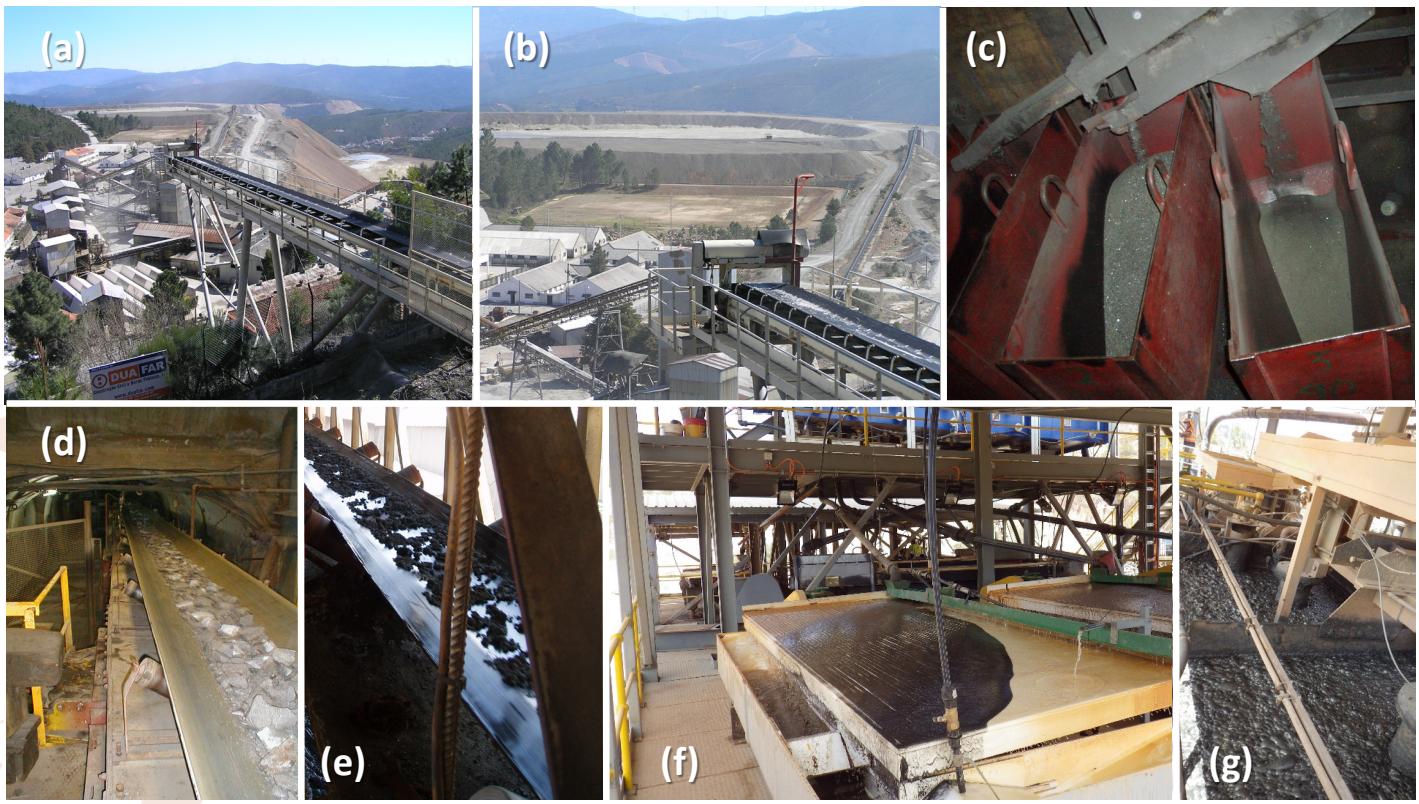

Figure 7: Some elementary illustrations of the Barroca Grande treatment plant – (a) general overview of the treatment plant with the main conveyer belt in first plane; (b) tailing disposal areas; (c) pre-concentrates of wolframite and cassiterite; (d) underground conveyer belt; (e) secondary conveyer belt used after crushing refinement and mineral separation with hydro-cyclone; (f) shaking tables; (g) flotation cells.

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António Mateus

Fernando Noronha

Filipe Pinto

Abstracts of Theses by SGA Student Chapter Members

Determination of Migration Events of Hydrocarbons in the Mesetas Sector withn the Lejanias Area in the Eastern Llanos Basin, through the Chracterization of the Associated Fluids

Gabriel David Moreno Aguilar
Undergraduate Thesis.
Universidad Nacional de Colombia, sede Bogotá
E-mail: gamorenoa@unal.edu.co

Thesis Advisors: Juan Carlos Molano Mendoza, Ariel Oswaldo Cadena

Within the Mesetas sector in the Lejanías area of the Llanos Orientales Basin, defined as part of the ANH's Caracterización de Arenas Bituminosas (CAB) project, six hydrocarbon-impregnated sandstone samples were studied. These samples were collected from two stratigraphic columns (Río Cafre and San Antonio columns) within the Guadalupe Group in the project. Various techniques were used, including petrography, cathodoluminescence, SEM images, and UV epifluorescence, which helped differentiate the diagenetic events of the rock and temporally locate the formation of fluid inclusions (FI) in these processes, followed by FI petrography. Among the fluid inclusion assemblages (FIA's), three main types of FI were studied: Type 1 inclusions consisting of light to dark brown liquid hydrocarbon, gaseous hydrocarbon, and occasionally black irregular solid (insoluble organic material); Type 2 inclusions composed of liquid and gaseous hydrocarbon along with water and sometimes solids (insoluble organic material); and Type 3 inclusions consisting of water and gas. Data on homogenization temperature (Th), final ice melting temperature (Tm), salinity, pressure, Raman spectroscopy, and UV epifluorescence were obtained from these inclusions. The various data allowed for the differentiation of at least two hydrocarbon migration events in the area. One event shows a temperature of around 62 – 86 °C, predominantly greenish-blue fluorescence and salinities around 0.18% wt. NaCl equiv. The other event shows a temperature of around 88–100 °C, predominantly strong blue-green fluorescence and salinities around 2.41% wt. NaCl equiv. Both hydrocarbons must have API gravities between 20 and 50 degrees, with the predominantly blue fluorescence indicating lighter hydrocarbons. Finally, a qualitative comparison was made between the fluorescence of hydrocarbons present in fluid inclusions and those in the rock pores, showing significant degradation of the latter, evidenced both by the loss of fluorescence and the characteristics observed in hand samples.

Mineralogical and Petrographic Characterization of the Emerald Deposits in the Chivor Formation, Colombia, Macanal Municipality, Boyacá.

Juan Alejandro Gonzalez Sanchez
Undergraduate Thesis

Department of Geology, National university of Colombia, Bogota., Colombia.
E-mail: jugonzalezsa@unal.edu.co

Thesis Advisor: Romero Ordoñez Fernando Eli

The Eastern Cordillera of the Andes is an orogenic belt whose main uplift phase occurred after the Middle Miocene (Cooper et al., 1995). It hosts the Colombian emerald deposits, which are hosted in Early Cretaceous sedimentary rocks (Cheilletz & Giuliani, 1996). The unique origin of the mineralizing fluids, along with the geological setting, makes Colombian emeralds unique worldwide. These deposits are defined within two mineralized zones located on both flanks of the mountain range (Cheilletz & Giuliani, 1996): the Western Emerald Belt (CEOC), which includes the mining districts of Peñas Blancas, Coscuez, Muzo, and Yacopi, and the Eastern Emerald Belt (CEOR), encompassing the mining districts of Gachalá, Chivor, and Macanal (Cheilletz & Giuliani, 1996).
Emerald, Colombias enigmatic mineral, has experienced fluctuations in exports over the past 10 years, with an average of approximately 120-130 million USD (considering both cut and rough gemstones), according to data provided by DANE (Dempsey, 2022). Emeralds represent a significant source of income for the country, and consequently, they were declared a strategic mineral along with their by-products (Agencia Nacional de Minería, 2023). These resources are of great importance for the present and future of mining in Colombia.

The primary objective of this study is to conduct a mineralogical, petrographic, Emerald, Colombia's emblematic mineral, and geochemical analysis of the emerald deposits within the CEOR, specifically in the Guavio area, located in the Macanal municipality, Boyacá department. In this region, the Macanal Shale Formation and the Chivor Formation outcrop, the latter being a Berriasian-age unit deposited in very shallow marine environments with evaporitic episodes that host emerald mineralizations in the area (Terraza et al., 2013).

Multiparametric Analysis to Identify White Hydrogen Generation in Isotropic and Anisotropic Intrusions of the Ginebra Ophiolitic Complex, Valle del Cauca, Colombia

Angie Camila Roldan Bedolla

Department of Geociencias, Universidad Nacional de Colombia, sede Bogotá, Colombia.
E-mail: aroldanb@unal.edu.co

This study was carried out in a W-E transect located in the western margin of the Central Cordillera of Colombia and focused on the implementation of a surface methodology based on four phases for the exploration of white hydrogen and the evaluation of a possible system that favors the production of this resource in mafic rocks with oceanic affinity, toleitic trend and low in potassium, affected by hydrothermal processes. Eight samples from the

Ginebra Ophiolitic Complex (COG) were analyzed and field results showed H_2 concentrations up to 175 ppm and magnetic susceptibility up to 130x10-^{3} SI. Petrographically, minerals such as plagioclase, clinopyroxene, hornblende, magnetite, secondary hematite, ilmenite, epidote, apatite and the presence of hydrothermal alterations such as uralitization, epidotization and Martitization, minerals and alterations conducive to the generation of this resource, were identified.

In addition to the above, a detailed characterization of the premineral, fracturing and alteration events present was carried out; likewise, 47 families of fluid inclusions were analyzed to establish their origin, morphology, content and trapping, as well as a qualitative level of high salinity in the primary and secondary fluids of these rocks. These inclusions, hosted in minerals such as quartz, plagioclase, clinopyroxene and apatite, contain water vapor, which was confirmed by Micro-Raman spectroscopy. These results contribute to a better understanding of the hydrothermal processes that facilitate the generation of this energy resource in crystalline rocks, opening new opportunities for the development of renewable energies in Colombia. H_2 concentrations up to 175 ppm and magnetic susceptibility up to 130x10-^{3} SI. Petrographically, minerals such as plagioclase, clinopyroxene, hornblende, magnetite, secondary hematite, ilmenite, epidote, apatite and the presence of hydrothermal alterations such as uralitization, epidotization and Martitization, minerals and alterations conducive to the generation of this resource, were identified.

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Elemental and isotope characterization of the Lithium-rich Tuff from the Macusani Volcanic Field, Puno, Peru

Johan S. Ramirez Briones
Master thesis

Pontifical Catholic University of Peru (PUCP) ramirezb.js@pucp.edu.pe
April 2025

The transition to eco-efficient technology, particularly rechargeable Li-ion batteries, is causing a significant increase in the demand for lithium. The recently discovered, unconventional, volcanogenic Falchani deposit, situated within the Neogene Macusani Volcanic Field in SE Peru, represents one of the most significant global resources of lithium. The lithium ore is primarily hosted in the so-called Lithium-rich Tuff, a tuffaceous mudstone that is sandwiched between the Upper and Lower Breccia units, which are also Li-rich. The main objective of this thesis is to conduct a geochemical (elemental and isotopic) characterization of the Lithium-rich Tuff with a main focus on parental magma petrogenesis and post-depositional modifications.

The major and trace element composition of the Lithium-rich Tuff differs from that of previously reported ash-flow tuff in the Macusani Volcanic Field. Rather, it approximates the composition of highly evolved peraluminous obsidian glasses known as macusanite. The Lithium-rich Tuff shows the distinctive geochemical fingerprint of peraluminous rare metal-rich granites and Li-Cs-Ta (LCT) pegmatites, with high contents of F, Sn, W, and other rare metals such as Nb, Ta, Li, and Cs, in addition to a strong depletion in Zr, Th, Y, rare earth elements (REE), and Sr compared to archetypal muscovite-bearing peraluminous granites (MPG).

The parental magmas to the Lithium-rich Tuff have been modeled as containing ~15-30% of a mantle contribution-with an isotope signature similar to that of regional late Miocene potassic –ultra-potassic basaltic melts. The remaining ~70-85% is attributed to Proterozoic and Paleozoic paragneiss and/or Paleozoic metapelite contributions. An early enrichment in incompatible elements in the Lithium-rich Tuff parental magmas is in part explained by fractional crystallization. Additionally, subsequent metasomatic processes in a pre-eruptive stage in the presence of fluids exsolved from a volatile-rich, highly fractionated, crystal-rich magmatic reservoir potentially contributed to the extreme enrichment in Li and other incompatible, fluid-mobile elements. Consequently, such enrichment was not related to in-situ, post-depositional, clay and zeolite alteration processes as described in volcanogenic sedimentary deposits elsewhere.

Thesis available at http://hdl.handle.net/20.500.12404/28552

SGA Student Chapter North-West Russia: Field Trip to Central Karelia.

Saratova A., Titova A., Kichigin V., Suslikova O., Sveshnikov N., Masloboeva A.
Institute of Earth Sciences, Saint-Petersburg State University, 199034 Saint-Petersburg, Russia

From September 19 to September 22, 2024, members of the North-West Russian SGA student chapter participated in their seventh field trip, which was organized as a geological excursion. The field trip area is located in Central Karelia on the western side of the Onega structure, which is situated in the northwest of the Archean core of the Karelian Craton (Vodlozersky block). The excursion route included sites such as Girvas Palaeovolcano, Viksha platinum-group metals deposit, shungite outcrops, Big Vaara Mountain, and Yalguba ridge. During the geological excursion, we studied structural and textural characteristics of Archean and Proterozoic rocks and learned about the geological history of the Karelian Massif.

On the first day of the field trip, we arrived at the local art installation "Valley of the Hares", where pyroclastic rocks of the Suisar Formation of the Lyudikovian suprahorizon (Rhyacian period) are exposed. They consist of agglomerate tuffs, often with volcanic bombs from 10 centimeters up to 1 meter in diameter, which indicate explosive volcanic activity about 2 billion years ago. Volcanic hydrothermal processes are responsible for the subsequent precipitation of carbonates with idiomorphic calcite crystals along fracture zones. The geological excursion continued along the canyon of the Suna River, where we observed metamorphosed Jatulian (Rhyacian period) basalts, quartzite sandstones with ripple marks on the interlayer surfaces, and lavas.

The next stop was the Girvas Palaeovolcano, which was also active during the Jatulian time (Rhyacian period). The excellent exposure allowed us to examine part of the eruptive vent of the ancient volcano, five lava flows, a volcanic pipe, and rope lavas. On the next day we set out to the Viksha deposit, which is a platinum-group metals site. This deposit is concentrated in the Ludicovian (Orosirian) Koikara gabbro-dolerite sill that has a differentiated structure with a distinct titano-magnetite ore horizon. We were able to measure the magnetic susceptibility of the gabbro-dolerite sill using SM-20 handheld kappameters and confirm the presence of the titano-magnetite horizon. Not far from the deposit, there were outcrops of Archaean komatiites, which are part of the greenstone belt. The age of the rock was estimated as 3 billion years. The komatiites have largely lost their primary mineral association due to weathering and are now mostly composed of chlorite and amphibole. We were impressed with these observations as Archaean komatiites were the oldest rocks we have ever observed on our field trips.

The following site was a historical adit located in the village of Shunga, where we studied bedrock outcrops of shungite. Shungite is a unique, rare Palaeoproterozoic black rock with a dull sheen that stains the hands like coal does, which is composed of 20-90% carbon. Some hypotheses suggest that the carbon in shungite originates from ancient organic matter, potentially petrified oil. In addition to shungite, a rarer variety was found. It is anthraxolite, and its' carbon content exceeds 90%. The chemical composition of anthraxolite makes the rock lightweight and even gives it a diamond-like metallic lustre.

On the last day of the excursion we visited outcrops in different parks located along the Petrozavodsk Bay of Lake Onega. The movement of glaciers during Quaternary period created roche moutonnée, or sheepback ("ram's forehead" in Russian), structures on the coast, where pillow lava is exposed. Glacial striation was often evident on the surfaces. Moving up to the top of the Big Vaara Mountain, we observed breccia, tuffs, that is the remnant of 2 billion years old volcanic ash. The Big Vaara is crowned by the unique natural complex "Devil's Chair". The Big Vaara Palaeovolcano, as well as previously mentioned Girvas Palaeovolcano, had been erupting during Jatulian time (Rhyacian period). Subsequently, the area was exposed to Quaternary glaciation. During the post-glacial earthquakes, one of the rocks was torn off and formed a „step" that made it resemble a "Devil's Chair". Lastly, we ascended to Yalguba Ridge, located northeast of Petrozavodsk, where a cross-section of massive lavas, pillow lavas, and pyroclastic rocks is

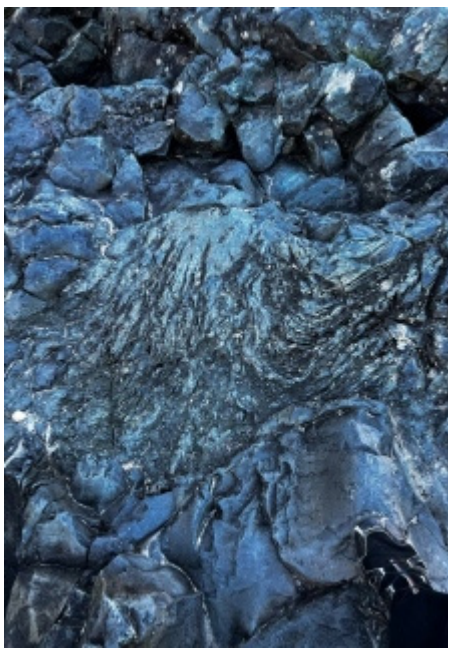
Members of the North-West Russian SGA student chapter, supervisor Olga Yakubovich, and guide and scientist of Karelian Research Centre Svetlana Egorova at the "Valley of the Hares"

exposed. At the base of the hill, we examined sheepback, composed of pillow lavas. Climbing higher, we observed unique volcanic rocks with a special variolite texture. Variolites are formed by many spheres up to 3 cm in diameter, which look like light spots due to weathering. They formed as the result of the differentiation of initially homogeneous magma into immiscible components as the temperature decreases during crystallization. An interesting mineralogical feature of the Yalguba volcanic rocks is green chalcedony and carbonate mineralization that was formed by hydrothermal alteration of basalts. We gladly added unique variolites and chalcedony to our collections.

The participants of the excursion are grateful to the staff of the Institute of Geology of the Karelian Scientific Center O.A. Maksimov, V.V. Ustinova, S.V. Egorova, including the project "GeoKarelia", for accompaniment during the field trips and informative lectures; to the staff of JSC "Polymetal" A.S. Vikhko and N.N. Prikhodko for conducting the excursion at the Viksha deposit. The group would also like to thank Director of the Institute of Earth Sciences of Saint Petersburg State University K.V. Chistyakov for his support in making the field trip possible.

Vein with idiomorphic calcite in the pyroclastic rocks of "Valley of the Hares"

Master's student Olga Suslikova with an SM-20 kappameter at the Viksha deposit



Ancient lava tongues indicating flowing basaltic lava on Girvas palaeo-volcano.

The synclinal fold of shungite-bearing rock in the historical adit of the Shunga village.

Student Chapter ULaval-INRS SGA-SEG 2024 Peru field trip.

Mineral deposits of the Andes of southern Peru (Sept 10 to 21)

The ULaval-INRS SEG-SGA student chapter organized an eleven-day field trip to Peru. The purpose of this trip was to allow students to learn about the different mineral deposits in the Andes of southern Peru. The objectives of the trip included learning about the regional geology and Andean tectonics, including the metamorphic units of the Arequipa-Antofalla basement, the Mesozoic sedimentary units and the Cenozoic extensional basins in southern Peru, providing a regional context related to the location of mineral deposits. At the same time, learning about the main types of mineral deposits in southern Peru with typical examples that included VMS-type deposits, low-sulfidation epithermal deposits, as well as giant porphyry-type Cu and Cu-Mo deposits.

Maria Teresa mine

The first visit by the ULaval-INRS SEG-SGA student chapter was to the Maria Teresa mine approximately 65 km north of Lima. This mine is a high-grade Zn-Pb±Ag±Cu±Ba VHMS deposit hosted in an Upper Cretaceous volcanic sequence. The students first had the opportunity to go underground to see the ore bodies. This was followed by looking at key sections of core showing the variation in mineralization styles at the Maria Teresa deposit where the students engaged in discussion with the mine geologists regarding VHMS deposits and exploration strategies.

Pisco Basin

The second visit of the trip was to the Pisco Basin within the Coastal Desert of Peru. This visit was in collaboration with the Petrology and Petrography Student group of Universidad Nacional Mayor de San Marcos, the SEG student chapter of Universidad Nacional San Antonio Abad del Cusco, and the SEG student chapter of Universidad Nacional de Puno. The visit was led by the director of mineral resources for INGEMMET (Peruvian Geological Survey) Walther León Lecaros.

During this visit, students had the opportunity to learn about the extensional tectonics related to the formation of the Pisco Basin, which controls the position of major structural trends related to the occurrence of several mineral deposits in the area, visiting at the same time, one of the most important and impressive coastal natural reservations in Peru, which hosts a rich diversity of flora and fauna.

Antapite Mine

The third visit of the trip was to the Antapite mine, located approximately 129 km east of the city of Ica, south of Lima. This mine is a high-grade, low-sulfidation epithermal gold deposit, hosted in volcanic and volcaniclastic rocks from the Eocene to Oligocene. The visit consisted of a general presentation of the operations and geology of the deposit, followed by a visit to the processing plant, where the grinding, separation and gold extraction process was learned. Subsequently, the students visited the drill core logging room, where they learned about the main lithological and mineralization characteristics of the deposit. Finally, a visit was made to the underground mine, where an exploration front with in-situ mineralization was visited. The visit culminated with a general discussion with the exploration and mine geologists regarding LS epithermal deposits, exploration tips and strategies.

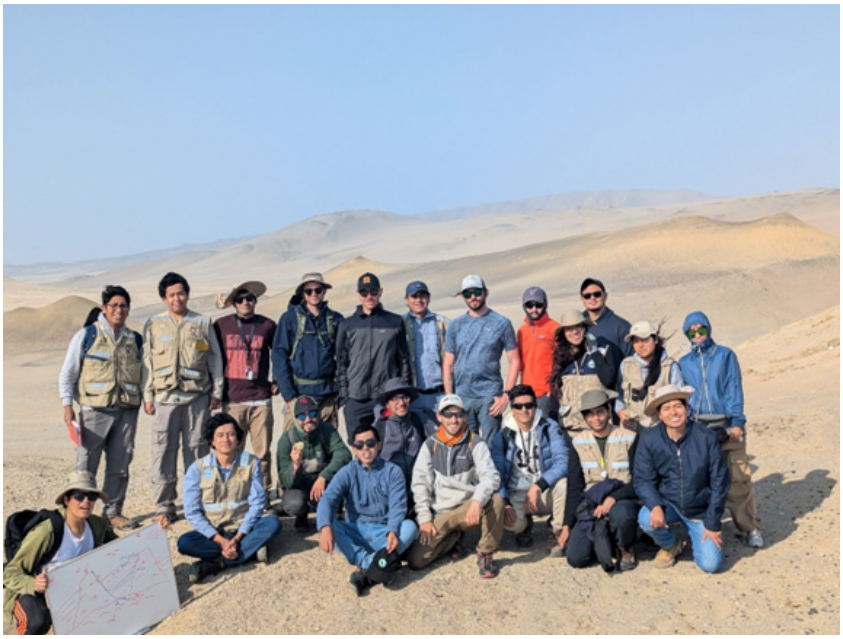
Cerro Verde mine

The delegation then moved to the city of Arequipa in southern Peru. From here, a visit was made to the Cerro Verde mine, the fifth largest copper deposit in the world. This mine is a world-class porphyry Cu-Mo deposit, hosted in the intrusive rocks of the Tiabaya and Yarabamba batholiths, part of the Costa Batholith. The mineralized system of Cerro Verde is a typical case of a porphyry Cu-Mo system, which meets the classic characteristics of these systems recognized around the world. The visit consisted of an overview of the deposit's operations, a visit to the mine's viewing points with explanations about the mining, extraction, ore processing processes, and operations at the tailings dams and wastewater treatment plants.

Arequipa Massif

In collaboration with the SEG Student Chapter of Universidad Nacional de San Agustín de Arequipa (UNSA), we visited the southern coast of Peru to explore the outcrops of the Basal Coastal Complex, a series of metamorphic massifs that extend throughout southern Peru and represent the oldest units of the Andean basement. As part of the activities of the field visit, the main lithological units of the Complex were reviewed, including the occurrence of pegmatites.

Finally, the trip culminated with the transfer of the delegation to the city of Moquegua, in southern Peru, from where the visit to the Cuajone mine was made. This is a porphyry type Cu deposit, which is hosted in the intrusive rocks of the Yarabamba batholith, and the volcanic rocks of the Toquepala Group, of Upper Cretaceous age. The visit consisted of a close look at the operating processes of the mine, processing plant, and its direct comparison with the porphyry type Cu-Mo deposits of Cerro Verde in Arequipa.



Students of the ULaval-INRS SEG-SGA chapter with students from the Universidad Nacional Mayor de San Marcos, Universidad Nacional San Antonio Abad del Cusco

Students of the ULaval-INRS SEG-SGA chapter underground at the Antapite Mine.

Students of the ULaval-INRS SEG-SGA chapter with SEG Student Chapter of Universidad Nacional de San Agustín de Arequipa.

SGA Moroccan Student Chapter Activities

Marieme JABBOUR, Ismail BOUSKRI, Imad AFLLA, Zoubair EL OUAD, Fatiha ASKKOU
Department of Geology, Faculty of Sciences, Ibn Zohr University, B.P 8106, Dakhla city, 80 000 Agadir, Morocco.

The Moroccan-SGA Student Chapter was created in 2015 and it was firstly hosted by the Cadi Ayyad University (Marrakech, Morocco). This Chapter is the first SGA Student Chapter from North Africa. Motivated PhD and Master students took the initiative to reactive the Moroccan-SGA Student Chapter in 2023, and it is hosted this time by Ibn Zohr University (Agadir, Morocco).

This year, the Moroccan SGA Student Chapter proudly organized its first-ever field excursion, a three-day journey of exploration and learning through the Central Anti-Atlas region of Morocco. From November 22nd to 24th, 2024, this field trip brought together 15 participants, including 11 geology PhD and under-graduate students and 4 professors, in an effort to deepen understanding of the region's unique geology and mineral resources. Covering over 1,100 kilometers, the trip combined academic rigor with camaraderie, leaving participants with unforgettable experiences and valuable insights.

The Central Anti-Atlas, known for its complex Precambrian geology and rich mineral deposits, was an ideal setting for this excursion. Participants were immersed in a variety of geological phenomena, ranging from hydrothermal systems and structural complexities to sedimentary processes and economic mineralization.

Day 1 began with a visit to the famous Bou Azzer ophiolitic complex, renowned for its unique assemblage of ultramafic rocks and cobalt mineralizations. This complex provided participants with insight into the tectonic processes that formed the ophiolite, as well as the metallogenic characteristics that make it an important cobalt source. Observations were complemented by discussions on magmatic differentiation, serpentinization, and the geochemical signatures of associated mineral deposits.

Day 2 was dedicated to the Bleida copper mine and the Aït Abdellah copper deposit. At the Bleida mine, participants were welcomed by the mine staff, who provided an in-depth overview of the deposit's geology and mining operations. Students were able to visit and study copper sulfide mineralization and hydrothermal alteration patterns first hand. The second stop, the Aït Abdellah deposit, offered further opportunities to observe structural controls on copper mineralization, as well as the interaction between hydrothermal processes and host rock lithologies.

Day 3 concluded the field excursion with visits to two remarkable sites: the Jbel N'Zourk copper deposit and the Tizi N'Taghatine double discontinuity. The Jbel N'Zourk deposit showcased large-scale copper mineralization zones, with participants examining both primary and secondary ore features (Pictures). At the Tizi N'Taghatine, students explored one of the region's most famous geological structures, characterized by its impressive double discontinuity, which reveals a complex history of tectonic activity. This stop provided an exceptional opportunity to link theoretical concepts with observable field evidence, making it a highlight of the excursion.

The three-day excursion was made possible by the dedication of the Moroccan SGA Student Chapter and the support of several key individuals and institutions (Managem Group and Faculty of Sciences, Ibn Zohr University) and Support of the professors who accompanied the group were instrumental in guiding discussions and providing expert insights into the region's geology. Special thanks are extended to the Bleida mine staff and local experts for their warm hospitality and invaluable contributions to the learning experience. Beyond the geological observations, the field trip provided an opportunity to fos ter collaboration and networking among students and professors. The four participating professors played an instrumental role in guiding students, answering questions, and encouraging critical thinking during field discussions. Their mentorship enriched the experience, ensuring that participants gained both knowledge and confidence in their fieldwork skills. This field trip not only strengthened participants' geological knowledge, but also fostered collaboration and networking among students and professors. The chapter remains committed to offering students opportunities to engage with the field, explore Morocco's geological diversity, and connect with professionals in the industry.

This first field trip marks a significant milestone for the Moroccan SGA Student Chapter. It underscores the chapter's commitment to providing geology students with opportunities to engage directly with the field, explore Morocco's geological wealth, and connect with professionals in the industry. With this successful excursion setting the tone, the chapter looks forward to organizing more activities, including workshops, lectures, and field trips, to promote the study of economic geology and foster collaboration among students and professionals.

This Chapter has been established with the aim of organizing short courses, lectures and field trips related to Economic Geology and Geology in general, in order to complement the undergraduate studies of the Student Chapter's components, of other students of geology, and to enrich the training of geologists interested in those topics.

Participants in the mission at the Bleida mine.

Professors at the Jbl N'Zourk deposit.

Participants in the mission at the Bleida mine.

SGA Moroccan student chapter at the ophiolitic series of Bou Azzer.

The SGA Peru Student Chapter in 2024: Growing our Mineral Deposits Digital Platform (PDYM) and learning in the field.

SGA Peru Student Chapter leaders 2025* Contact information: Erick Florencio Dionisio Martinez, erickdionisio620@gmail.com

We are pleased to present an overview of the activities undertaken by the SGA Peru Student Chapter throughout 2024. Below we highlight some accomplishments and the positive impact they have had on the Peruvian student community. Throughout the year, our activities and events focused on two main pillars:

The organization of virtual and hybrid conferences, given by prominent local and international speakers, within the framework of the Digital Platform for Mineral Deposits (PDYM; https://www.pdym.org/).

The 6th Annual Meeting of the SGA Student Chapter in Peru, a key opportunity to strengthen the interaction and exchange of knowledge between students and professionals in the sector.

Talks and workshops

The SGA Peru Student Chapter organized ten talks under the Mineral Deposits Digital Platform (PDYM), a project initiated by the chapter in 2020. The recordings of the conference are stored in our digital platform and regularly accessed by both students and professionals in the field. We aim that all the SGA community to visit our PDYM webpage to learn more about our next talks and access our "digital bookstore" with previous ones.

In 2024, three of the talks were carried out in a hybrid modality:

The first took place on April 8, 2024, led by Dr. Lisard Torro i Abat, with the title "Lithium: Geology and Mineral Deposits".

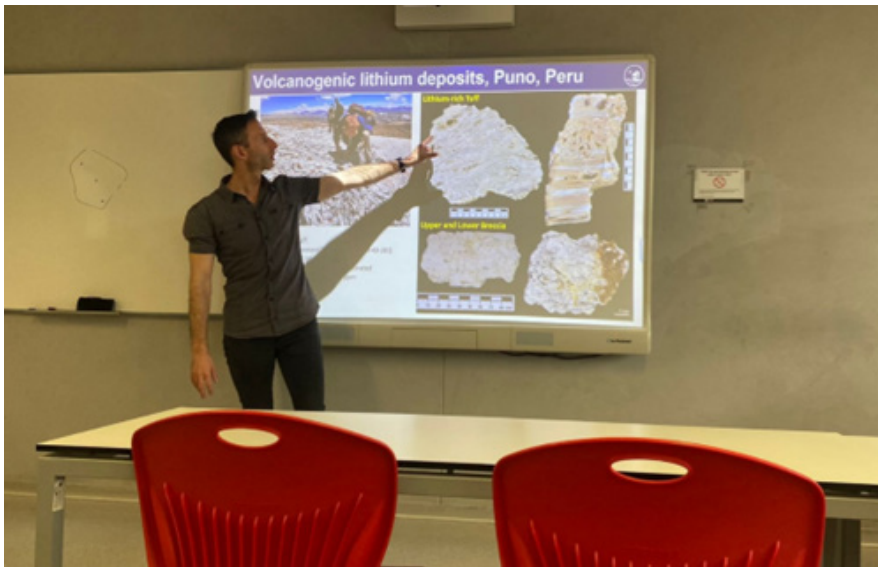
The second conference was held on October 2, 2024, by Dr. Alberto Ríos Carranza, with the title "New Gold and Copper Projects (Alpha Mining)".

Finally, on November 8, 2024, the conference titled "The Mid-Cretaceous VMS Belt of the Peruvian Coast: Recent Results" was held, led by Dr. Lluís Fontboté.

It should be noted that this last talk was organized in collaboration with other Peruvian student chapters with the aim to promote interaction among attendees and organizations.

6th Annual Meeting of the Student Chapter of the SGA in Peru

The annual meeting is probably the most important activity of our



Dr. Lisard Torró during the conference "Lithium: Geology and Mineral Deposits", organized by the Student Chapter of the SGA Peru on April 8, 2024 at the Pontificia Universidad Católica (PUCP) del Perú, Lima.

Members of the SGA with Dr. Alberto Ríos after his conference "New Gold and Copper Projects (Alpha Mining)", held on October 2, 2024 at the Pontificia Universidad Católica (PUCP) del Perú, Lima.

country-wide Student Chapter, with members from the eleven Peruvian universities that teach Geology, and usually the only opportunity we have to meet in person. The 6th National Meeting of the SGA Student Chapter in Peru was held on November 28, 2024, in the Auditorium of the Professional School of Geological Engineering at the National University of Cajamarca. The event was attended by 13 students representing eight of the eleven universities that make up our chapter.

During the meeting, in addition to presenting the results of the 2024 term, general guidelines for the 2025 period were established. As an activity associated with the National Meeting, on November 29, we visited the high-sulfidation epithermal Tantahuatay deposit (Minera Coimolache, operated by Compañía de Minas Buenaventura). This mine is located at 4,000 meters above sea level between the districts of Hualgayoc and Chugur, in the province of Hualgayoc, Cajamarca region. The visit began with a talk by Eng. Juan Calisaya, who provided a detailed explanation of the geology of the deposit (Fig. 5). Later, the team toured the open-pit mine and the core logging facility, where Eng. Calisaya presented geological maps, selected drill core samples, and explained key aspects of the mineralization, lithology, and alteration.

With this successful meeting concluded, it is time to transition responsibilities to a new group of students who will continue the chapter's legacy. We are confident they will exceed all expectations, and we extend our best wishes to them.

With hearts full of gratitude for being part of the SGA family!

Members of different SGA and SEG student chapters with Dr. Lluis Fontboté after his conference "The Mid-Cretaceous VMS Belt of the Peruvian Coast: Recent Results", held on November 8, 2024 at the Pontificia Universidad Católica del Perú ((PUCP), Lima.

SGA leaders after the VI National Meeting of the SGA Student Chapter in Peru, held on November 28, 2024 in the Auditorium of the Professional School of Geological Engineering of the National University of Cajamarca.

Talks organized by the Student Chapter of the SGA in Peru in 2024 within the framework of PDYM Conference program.

Edgar Pichardo	VMS deposit, Huaral: Discovery of the Sofía D orebody	14/03/2024
Lisar Torró i Abat	Lithium: Geology and Mineral Deposits	08/04/2024
Sebastian Benavides	Mining prospection and exploration	29/05/2024
Miguel Quintana Hernández	Geology, mineralization and alteration of the Laramidic Cu-(Mo) Santo Tomás porphyry, Northern Sinaloa, Mexico	01/06/2024
José Ricardo Arce Allevas	Deep Geophysical Methods	06/07/2024
Juan Carlos Castelli	Thick scales, intrusive centers and their relationship with mineralized systems	06/08/2024
Juan Diego Rojas López	Geology, sulfide mineral chemistry and Geochronology of the Ollachea Orogenic Gold Deposit	18/09/2024
Alberto Ríos Carranza	New Gold and Copper Projects (Alpha Mining)	02/10/2024
Lluís Fontboté	The mid-Cretaceous VMS belt of the Peruvian coast: Recent results	08/11/2024
Joaquín Proenza	Mineral deposits and energy transition: challenges and opportunities	20/12/2024

Members of the SGA Student Chapter together with mine geologists at the pit of the Tantahuatay Project.

Members of our student chapter examining drill cores and reinforcing the initial theoretical knowledge provided by Eng. Juan Calisaya about the Tantahuatay deposit.

SGA Student Chapter Prague Field trip to Western Bohemia, Czech Republic.

Jakub Ptáček[1,2], Jan Mráček[1,2]
[1]Faculty of Science, Charles University, Prague, Czech Republic, [2]Czech Geological Survey, Prague, Czech Republic.

SGA Student Chapter Prague organized its 2024 autumn field trip to selected geological sites in Western Bohemia. From October 25 to 28, 2024, a total of 25 members participated in the excursion.

1st day

The first stop of our field trip was the Příbram mining district, located in Central Bohemia. This district is one of the largest uranium-polymetallic hydrothermal vein-type deposits in the world (Pauliš et al. 2016). The veins in this district were formed during the Variscan orogenesis, with the vein system extending over an area of approximately 25 x 2 km at the boundary between the Teplá-Barrandian Unit (TBU) and the Moldanubian Zone. The veins are hosted in Neoproterozoic to Lower Paleozoic sedimentary or volcano-sedimentary rocks of the TBU, in close exo-contact with the Upper Devonian to Carboniferous granodiorites of the Central Bohemian Plutonic Complex, separating TBU and the Moldanubian Zone of the Bohemian Massif (Černoch et al. 1995; Janoušek et al. 2010; Pauliš et al. 2016). On numerous tailing heaps, it is possible to collect primarily calcite vein material, occasionally accompanied by sphalerite, hematite, galena, and, more rarely, radioactive uraninite.

Our next stop was a historical underground kaolin mine in Nevřeň. The site features extensive hand-dug spaces, with halls reaching up to 12 meters in height and 8 meters in width, carved into Carboniferous arkosic sandstones and arkoses. The elevated kaolinite content in these sediments resulted from the weathering of nearby feldspar-rich plutonic bodies. Kaolinite remains one of the most significant natural resources in Western Bohemia.

The third stop of our journey was the Pb-Zn-Ag polymetallic deposit of the Stříbro mining district. Mining in Stříbro began in the 12th century. The village was given the name Stříbro which translates to English as "Silver" because silver ore was found right under the surface. Unfortunately, the silver mineralization was present only at the uppermost part of the deposit. Upon our arrival, we visited a locality directly above the historical mine to collect samples with pyromorphite, which is a supergene mineral of Pb ore. Continuing our exploration of the deposit, we arrived at a nearby spoil heap close to the village of Sytno, where we found numerous quartz crystals, galena, and occasionally sphalerite. We concluded our visit to the Stříbro mining district with a guided tour of the historic Prokop adit, located right in the town of Stříbro. Most common minerals include galena and sphalerite and in smaller amounts pyrite, marcasite, and chalcopyrite.

To conclude the first day, we visited Vlčí Hora hill near Černošín to collect crystals of amphibole (kaersutite) and pyroxene (augite). Vlčí Hora is a Neogene volcano formed as part of Cenozoic Central European Volcanic Province (CEVP), estimated to be approximately 12 million years old. It is located on the northwestern edge of the TBU, emplaced within the chlorite-sericite phyllites of the Proterozoic Blovice Accretionary Complex (Pauliš 2000; Navrátil and Šrein 1997). Well-formed crystals of kaersutite and augite weather out of the pyroclastics from this volcano. These crystals can reach lengths of over 5 cm, making this site highly sought after by local collectors.

2nd day

The second day of the trip focused on the mining district of Michalovy Hory, located in the western part of the Teplá-Barrandian area. This region is primarily composed of Proterozoic metamorphic volcano-sedimentary rocks, including gneisses, amphibolites, and llic mineralization), Michalovy Hory (Ni ores), Chodová Planá (Cu-Pb-Zn mineralization). crystalline limestones. A distinctive feature of Michalovy Hory is the occurrence of supergene minerals, which form primarily through the weathering of common sulfides in the supergene zone. During our visit, we explored three locations: Dolní Kramolín (Ag-Pb-Zn polym-polymetallic mineralization), Michalovy Hory (Ni ores), Chodová Planá (Cu-Pb-Zn mineralization).

The highlight of the second day was a nighttime collection of secondary uranium minerals using a UV light at Kladská, one of the many geologically fascinating localities in the Slavkovský Les area. The Slavkovský Les lies on the boundary between the Saxothuringian Zone and TBU. Kladská, located in the western part of the Slavkovský Les, was historically mined for tin ore in greisen-type deposits. Today, it is well known for its uranium mineralization, primarily represented by uranium micas and various stages of altered uraninite (Plášil et al. 2016).

3rd day

The first stop of the third day was the National Natural Monument Křížky, part of the Mnichovské hadce — the largest uncovered serpentinite body in the Czech Republic. This geological formation appears in a belt that stretches about 9 km in length and 2 km in width. In addition to the fascinating geology, we also explored the connection between different science fields. At this site, the influence of the serpentinite on the composition of the derived soils is clearly evident, as seen in the subsequent occurrence of endemic plants (e.g. Cerastium alsinifolium). These plants thrive in soils characteristic of serpentinite bedrock, which are rich in magnesium but

deficient in essential nutrients (N, P, K).

The second stop of the day was the National Nature Reserve Soos, located in the center of the Cheb Basin. This site is a beautiful example of post-volcanic activity, where the movement of Tertiary tectonic faults opened a pull-apart basin with developing peat bogs and several mineral springs, highly enriched in CO_2. The carbon dioxide can be also released from the water underground, accumulate within the layers of Tertiary sediments and rise to the surface through fractures, forming mofettes.

After a walk through the peat bog, the excursion continued north of Hazlov to the day's next site, known as "U Cihelny." In this small area in the westernmost part of the Czech Republic, contact metasomatic calcareous-silicate rocks called erlan are well exposed. The mineral vesuvian is fairly abundant here, alongside with other typical erlan minerals, such as diopside, grossular, anorthite, and quartz.

The final stop of the day was the radioactive spring Břetislav – Radonka, located in the Skalná – Bad Brambach area. In this area, there are 117 springs with elevated radon content (222Rn). Of these, 48 springs exhibited activity levels exceeding 1,500 Bq/l, the threshold in the Czech Republic for classifying water as mineral water. The Břetislav – Radonka spring is the most radioactive surface outflow in the Czech Republic, with activity levels ranging from 11,431 to 13,138 Bq/l and a flow rate of 2.5 l/min. Apart from its delicious taste, this spring is considered to be beneficial for your health.

4th day

The final day began with a visit to the Silvestr lignite mine, situated on the southern edge of the Sokolov Basin. Mining began here in 1939 as a small-scale operation. The lignite was extracted from the Antonín and Anežka seams, which reached thicknesses of up to 65 meters. With an overburden of only 10 meters, the site offered highly favorable conditions for mining development.

In 1953, significant investments transformed the operation into a large open-pit mine. By 1955, annual lignite production exceeded 1 million tons, peaking in 1971 at 4.153 million tons. Mining ceased in 1981, with a total output of 90 mega tons of lignite and roughly 50 million m^3 of overburden extracted. As the recultivation was only carried out in part of the Silvestr mine, the visited southern unrecultivated slope, represents a unique example of an open-pit mine "taken back by nature". Here, the mine slope is dissected by a network of erosion gullies, rill washes, and erosion ravines, separated by ridges and pyramids, resembling the "Badlands" of the American West. This location provides an exceptionally instructive and active site for studying erosion processes, accumulation, and the impact of vegetation cover on geological processes. Despite (or perhaps because of) the absence of recultivation, this area has become a habitat for protected species and a nesting site for the sand mart in (Riparia riparia) birds (Rojík 2008). Through the decision not to recultivate the site, a unique record of the cyclic wildfires of Miocene rainforests has been preserved. Rojík (2008) documented 57 trees in this location and interpreted it as a forest burning approximately 22 million years ago. The charred remnants of the forest are manifested by the presence of fusain, which is often mineralized by SiO_2 modifications.

After visiting the lignite mine, the group traveled to Karlovy Vary to explore its world-famous spa springs. The highlight of this stop was an excursion to the technical utility room of Vřídlo, the largest thermal spring in Karlovy Vary. Vřídlo emerges at a temperature of 73°C and, due to the high pressure of CO_2 gas, reaches a stable height of up to 12 meters. The spring has a flow rate of up to 2,000 l/min, and with a mineralization of up to 6.45 g/l the intake pipes in the complex need to be replaced frequently. While this location was not a collecting site, every participant took home a piece of aragonite pipe infill, a form of aragonite commonly known in the Czech Republic as vřídlovec.

A group photo at the exhibition of the mineralogical collection of the Prokop Adit in Stříbro.

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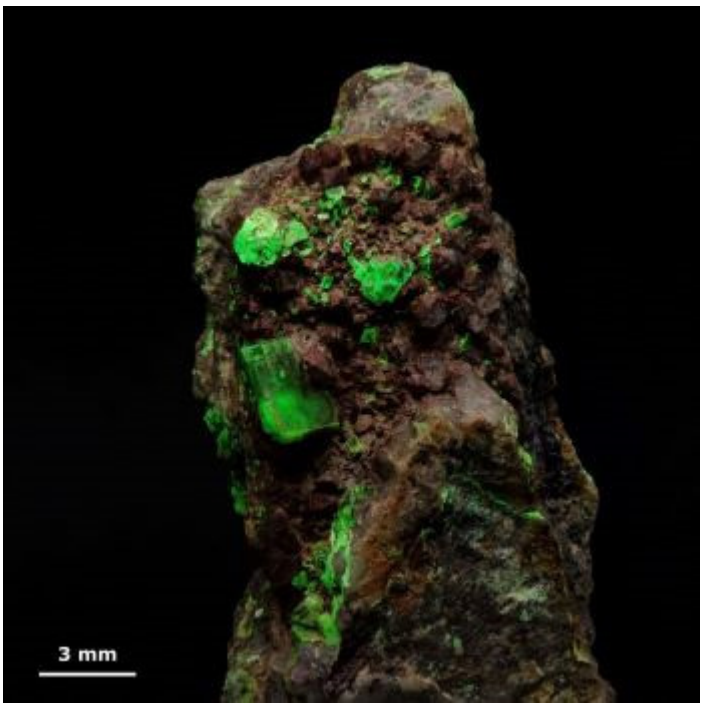
A group photo at the National Nature Reserve Soos

Hyalite [SiO2 · nH2O] and staffelite [Ca5(PO4,CO3)3(F,O)] from the site Valeč.
Photo by J. Mráček.



Meta-autunite [Ca(UO2)2(PO4)2 · 6H2O] found at Kladská. Combination of white and UV (365 nm) light.
Photo by J. Mráček

SGA Student Keynote Speaker Dr. Jakub Ciążela Prague

Jan Mráček, SGA Student Chapter Prague

The SGA Student Chapter Prague had the honour of welcoming Dr. Jakub Ciążela to a special seminar titled Unlocking the Ocean's Treasure: Metal Migration, Ore Formation, and Exploration of Polymetallic Deposits in the Oceanic Lithosphere. The lecture took place on December 3rd at the Faculty of Science, Charles University in Prague.

Dr. Ciążela completed his master's and PhD degrees at Leibniz Universität Hannover, Germany, where he focused on the geochemistry of chalcophile elements in the oceanic crust. During his postdoctoral studies at the Polish Academy of Sciences, he became actively involved in extraterrestrial geology. He is now an Assistant Professor at the Polish Academy of Sciences, where he continues to explore these two interesting fields – planetary geology and ore formation processes in the Earth's mantle and the lower oceanic crust.

This lecture provided a unique perspective on the fascinating processes of metal migration, which are crucial for understanding geological processes and the formation of mineral deposits. In his lecture, Dr. Ciążela introduced us to the different types of polymetallic deposits in the oceanic lithosphere, explained their formation, and presented the results of his research. He shared his own experiences from drilling ship expeditions and introduced us to a fascinating methodology for studying such polymetallic systems. The seminar was also streamed online, with 20 participants joining from various countries around the world, including Poland, Germany, Italy, Australia, and Argentina. The lecture was recorded as well – if you are interested in accessing the recording, please email the president of the SGA Student Chapter Prague, Jan Mráček (mracekja@natur.cuni.cz).

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Dr. Ciążela delivering the lecture in the Mineralogy Lecture Hall.

Active SGA Student Chapter Contacts 2025

SGA CHAPTER	PRESIDENT	E-MAIL	FOUNDATION
Baltic	Konrad Kluza	kluzakonrad@agh.edu.pl	2009
Black Forest - Alpine	Regina Albrecht	regina.albrecht@kit.edu	2017
Bolivia	Segrid Vicente Lavayen Navia	sgabolstudentchapter@gmail.com	2025
Colombia-Bogota	Juan Pablo Beaume Pantoja	jbeaume@unal.edu.co	2015
Colombia-Bucaramanga	Rafael Francisco Comas Sanguino	rafaelfcomas@gmail.com	2012
Colombia-Caldas	Alex Julián Insuasty Espaňa	alex.insuasty23424@ucaldas.edu.co	2025
Erlangen	Nico Mueller	nico.nm.mueller@fau.de	2023
Iberia	Gonzalo Ares	g.ares@csic.es	2024
Kazakhstan	Darya Semerikova	emerik0va62@gmail.com	2023
Morrocco	Marieme Jabbour	marieme.jabbour@edu.uiz.ac.ma	2023
Nancy	Jean-Charles Fidalgo	jean-charles.fidalgo@univ-lorraine.fr	2013
North-West Russia	Lidia Sokolova	sokolovalidia@inbox.ru	2017
Peru	Erick Florencio Dionisio Martínez	erickdionisio620@gmail.com	2013
Prague	Jan Mráček	mracekja@natur.cuni.cz	2002
Senegal	Malick Faye	fayepapmalick@gmail.com	2020