



# SGA News

March 2024  
Number 54

## A message from the President of SGA

Stanisław Z. Mikulski

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As incoming President of SGA for the 2024-2025 term, I would like to thank the Council for the nomination and the members of the organization for choosing me for this honorable position. Congratulations to all those elected to the new SGA Council. I would like to thank the current members of the Council whose terms have just ended and those who remained on the Council and will continue to work for the Organization. I would especially like to thank the current SGA President, David Banks, for his work for the Organization. David remains with us because from this year he will take over the duties of editor of SGA News. I would like to thank the outgoing editor of SGA News, Jochen Kolb, for many years of fruitful work in this demanding position. The strength of our Organization are the wonderful people working for it and building cooperation for years. SGA is a non-profit organization and all work performed by SGA Council members for the Organization is pro publico bono. Therefore, their effort, commitment and true passion in implementing the important missions that guided the founders of our Organization, regarding the exchange of knowledge and scientific cooperation across borders, should be emphasized and especially appreciated. I will make every effort to work with the Council and others to advance the Society's priority tasks. The Organization has a good and stable financial situation, thanks to the skills and competence of Hartwig Frimmel Treasurer. We are grateful to Jan Pašava, acting Executive Secretary, for the excellent and professional organization of cooperation, exchange of correspondence, reporting

and coordination of activities. Without his commitment and dedication, it would be difficult for the SGA Council to function. I would like the scientific position of SGA publications to be maintained, including, of course, the highly valued Mineralium Deposita published by Springer. The high position of the journal (IF = 4.8 for 2022) would not be possible without the enormous work and commitment of the Editorial Board members, and in particular the Chief Editors in the persons of Bernd Lehmann and Georges Beaudoin, whom from 2023 replaced Karen Kelly. SGA will also have a new publication offer via invited editorship of different volumes of the Springer Briefs in World Mineral Deposits. We expect interesting submissions in this area, and we also encourage you to submit book offers for publications to John Slack Chief Editor of the SGA Special Publication.

Modern means of communication, so useful in times of pandemic, have become everyday contacts between geologists from different continents, but there is no better form of exchanging views and establishing contacts than during direct meetings at conferences, field trips and accompanying events. The best proof was the successful 17th SGA Biennial Meeting held on the campus of the ETH Zürich. Here, on behalf of the entire SGA community, I would like to thank the LOC led by Cyril Chelle-Michou and Nicolas Saintilan once again for the excellent organization, high scientific level of this conference and the editorial team of the Proceedings.

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Three volumes with extended abstracts from this and other SGA BMs are available to everyone on the organization's website (<https://e-sga.org/meetings/sga-biennial-meetings/>). As during previous SGA Biennial Meetings, the Awards Ceremony was a part of the Opening Ceremony and during Closing Ceremony was presentation of the best student oral and poster presentations. At SGA BM conferences we meet people with great passion and similar interests that unite us. I will not forget my first participation in the SGA BM conference, which took place in London in 1999. I met outstanding scientists and established contacts, most of which continue to this day. This enabled me to carry out various research together with outstanding specialists from all over the world. Of course, we presented the results of our work at SGA BM conferences. I think that other participants of our conferences have very similar experiences. My interests were and are focused on various aspects of Economic Geology on non-ferrous and precious metals especially of the orogenic gold, porphyry systems, MVT and SSC deposits. I am also involved in isotope research (U-Pb and Re-Os) in the aspect of geochronology and evolution of the Variscan and the post-Variscan Metallogeny in Europe. From the beginning of my professional career, I have been employed by the Polish Geological Institute-National Research Institute, which also performs the tasks of the Geological Survey. National Geological Surveys play an important role in contemporary changes related to the development of modern technologies and transformation to low-emission economies. These changes result in a rapidly increasing industry demand for rare elements, considered critical and strategic for the world's leading economies. As an organization of economic geologists, we are in a unique situation. We have the opportunity and obligation to participate and substantively support this global process by enabling the exchange of knowledge and organizing contacts. We must make greater efforts to disseminate the results of the latest research in this area more quickly. On the other hand, we must disseminate general knowledge to inform society that mineral resources are limited, require sustainable management, and overly ambitious goals for a rapid increase in their consumption will be difficult or impossible to achieve in

a short time. I encourage you to present this type of view on SGA News. The processes of searching impossible to achieve in a short time. I encourage you to present this type of view on SGA News. The processes of searching, documenting and finally initiating mineral extraction are long-lasting and, in the best case, require at least a dozen or so years to obtain a ready-made mineral raw material that can be used by industry. There is also a role for National Geological Surveys, which have great potential in collecting, processing, and sharing objective information, also by presenting work results at SGA conferences. Therefore, it is necessary to continue the current open formula of SGA activities based on spreading knowledge, enabling cooperation and exchange of experiences between economic geologists working in various organizations and places around the world.

A great place to start cooperation within the Organization is the SGA Student Chapter. Their activities, coordinated by Anna Vymazalová Vice-President for Student Affairs, deserve recognition and comprehensive support. This activity is very important for the organization and is important for the individual development of young members under the scientific supervision of outstanding specialists. The synergy of cooperation translates into increased scientific activity and allows for direct contact with people from industry and for young economic geologists to gain the required experience. For this purpose, dedicated meetings are organized during the Biennial Meeting. During the 17th SGA BM in Zürich, the Student-Industry event sponsored by Glencore was attended by 200 people. The effects of cooperation are gradual and will be visible after years of cooperation, but it is one of the best ways of professional development. SGA has currently 17 active Chapters and additional 3 new (Erlagen-Germany, Kazakhstan and South Africa) were created in 2023. Among them, there are dynamic ones and those that are just learning how to cooperate. During my term of office, I would like their number to systematically increase and more and more students to have the opportunity for broader professional development. The Organization's funds, within the SGA Educational Fund, come from donations from corporations, institutions and members provide sustained financial support for students and economically

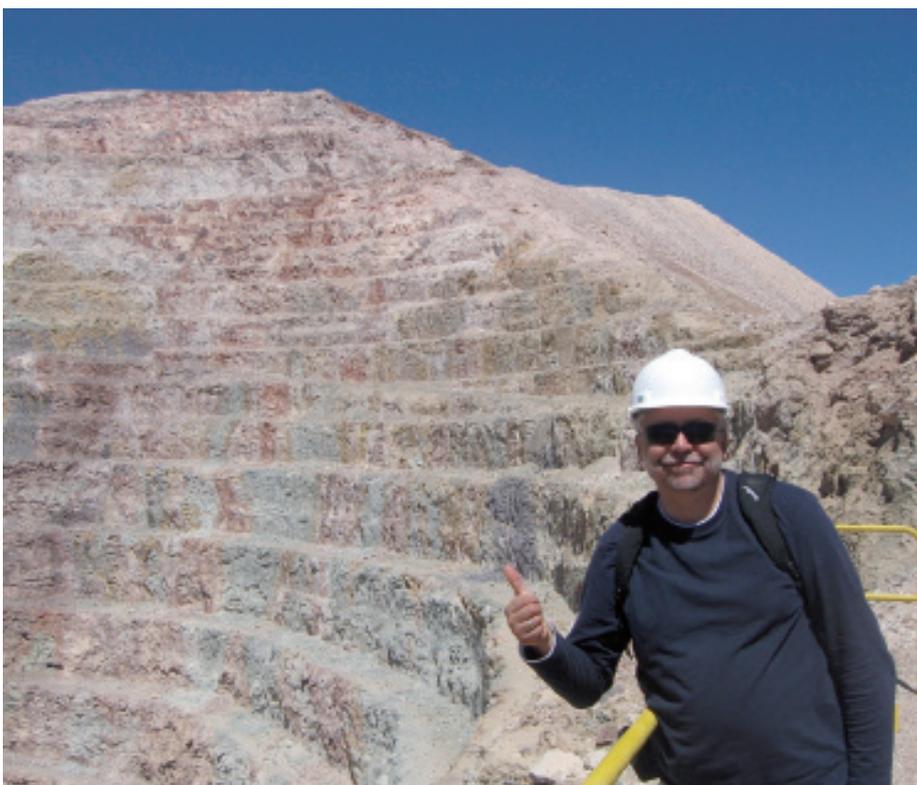
disadvantaged professionals to participate in SGA sponsored workshops and short courses, meetings and field trips.

I would like to thank our sponsors here and ask for further cooperation, because without their financial support, organizing our Biennial Meetings and other events would not be possible on such a large scale. Thanks to sponsors, we also have the opportunity to subsidize the active participation of our members in conferences, workshops, field trips and laboratory tests. We also support the participation of keynote speakers as well as field trip leaders. Membership of our association allows you to benefit from reduced rates to participate in SGA conferences, but also in other friendly organizations (SEG, IAGOD and EAG). I would like to encourage SGA members to take advantage of the Mobility Grant, which covers travel and stay expenses to undertake research on mineral deposits in renowned laboratories run by other SGA members. Grant applications (<https://e-sga.org/home/>) are reviewed by the Council and may be submitted at any time.

Another initiative we will support is the SGA Field Conference with morning lectures and discussions and afternoon field trips. The first inaugural conference of its kind was held in Mount Isa and Cloncurry (Queensland), Australia (July 31 - August 4, 2023). We are open to interesting proposals to support them financially. I appeal to our regional vice presidents to continue to work towards SGA participation and promotion at events in their regions. You have the support of the Council, and in matters of promotion you also have the comprehensive help of Sophie Decree, our Promotion Manager. SGA's mission is to continually advance in providing education and opportunities to train the next generation of economic geologists. Over the next two years and beyond, the Council will work actively to address these challenges and provide SGA members with new and useful initiatives to enhance the value of SGA membership. In 2024, we will support the annual Mineral Deposits Study Group AGM in Edinburgh (January 3-5), the 36th Nordic Geological winter meeting in Gothenburg (January 10-12), EMC in Dublin (August 23-26) and other events, we encourage you to apply to the SGA Council for funding. For more information please visit our website (<https://e-sga.org/home/>),

managed by Ian Pitcairn, and find us on Facebook and Twitter.

Our next 18th SGA Biennial Meeting will be held in Golden, Colorado, USA between August 3rd and 7th 2025, on SEG land. We have common members, and we want our organizations to cooperate harmoniously and coordinate conferences schedules so that they complement each other in activities for the development of the economic geologists community. I am convinced that SGA BM in Golden will be a great scientific success. We have an impressive Organizing Committee, chaired by Karen Kelly, supported by Rich Goldfarb, who have distinguished themselves in the organization and have served as successful SGA Presidents in the past. They have the support of colleagues from the Colorado School of Mines (Mary Carr) and the USGS (Eric Anderson). I strongly encourage you to participate in this important event. We want as many people as possible to take part in it, including students, both from the USA and Canada, as well as from other countries around the world. It will be a fantastic opportunity to learn about the latest research results as well as establish contacts with outstanding specialists. I strongly encourage you to join SGA so that we can together shape the future and scientific development of economic geologists who play an important role during the global transformation to low-emission economies and the development of modern technologies dependent on the increasing use of critical raw materials.



SGA President... Stanislaw Mikulski.

## SGA Member Benefits

Did you realize that you are entitled to order Springer books at a special discount of 40% ?

Visit <https://www.springer.com/> for further details, to browse new books of interest and to order at the discounted rate for SGA members.

Stay up-to-date with what is published in Mineralium Deposita ! Sign up for the Table of Contents Alert at <https://www.springer.com/earth+sciences+and+geography/geology/journal/126> 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](http://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

# SGA COUNCIL 2024

## Executive Committee (2024-2025)

President:	Stanislaw Mikulski (Poland)
Vice-President:	Patrick Mercier-Langevin (Canada)
Vice-President for Student Affairs:	Anna Vymazalová (Czech Republic)
Executive Secretary:	Jan Pašava (Czech Republic)
Treasurer:	Hartwig Frimmel (Germany/South Africa)
Promotion Manager:	Sophie Decree (Belgium)

Chief Editors:  
 Bernd Lehmann (Germany) - MD European Office  
 Karen Kelley (USA) – MD North American Office  
 David Banks (UK) - SGA News  
 John Slack (USA) – Special Publications  
 Iain Pitcairn (Sweden) – SGA website

## Regional Vice-Presidents (2024-2025)

Asia:	Shao-Yong Jiang (China)
Australia/Oceania:	Cam McCuaig (Australia)
Europe:	David Holwell (UK)
North Africa and Middle East:	Rabah Laouar (Algeria)
North America:	Melissa Anderson (Canada)
Sub-Saharan Africa:	Filadelphia Mbingeneeko (Namibia)
South America:	Luis Fernando Páez Sinuco (Colombia)

## Councillors through December 31, 2025

Thomas Aiglsperger (Sweden)  
 Georges Beaudoin (Canada)  
 Gülcan Bozkaya (Turkey)  
 Tony Christie (New Zealand)  
 Arifudin Idrus (Indonesia)  
 Sven Petersen (Germany)  
 Xiaoming Sun (China)  
 Ghislain Tourigny (Canada)  
 Denis Schlatter (Switzerland)

## Ex-officio members, SEG:

President:	Stephen J. Piercey (Canada)
Executive Director:	Jennifer D. Craig (USA)

## Councillors through December 31, 2027

Elena Amplieva (Russia)  
 Carmen Conde (Spain)  
 Paolo Garofalo (Italy)  
 Nils Jansson (Sweden)  
 Crystal Laflamme (Canada)  
 Nicolas Saintilan (Switzerland)

## Ex-officio members, IAGOD:

President:	Tania Martins (Canada)
Chief Treasurer/Membership Secretary:	Alla Dolgoplova (UK)



**18th SGA  
Biennial Meeting**  
2025

**Mineral Resources for  
Our Ever-Changing World**



**SAVE THE DATE**  
August 3-7, 2025  
Golden, Colorado, USA

[www.sga2025.org](http://www.sga2025.org)

**18th SGA Biennial Meeting**  
*hosted at the*



**COLORADO SCHOOL OF  
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**Provisional Technical Program**  
Four days of oral and poster presentations with themes that could include:

- Metallogenic evolution of the North American continent
- Sedimentary processes and ore formation:  
A session honoring the career of Dr. David Leach
- Targeting mineral systems in metamorphic terranes
- Case studies of critical mineral-rich deposits
- Ore deposits associated with magmatic systems
- New frontiers in analytical techniques  
for the explorationist
- Application of structural geology  
to understanding ore controls

**Workshops/Short Courses**  
The meeting will offer a wide variety of workshops and short courses before and after the main conference. Those interested in offering one, please contact the organizing committee.

**Provisional Field Trips**

- Carlin deposits, Nevada
- Major porphyry and skarn deposits, Utah and Nevada
- Epithermal and critical mineral systems
- Porphyry molybdenum, Colorado
- Gold mineral systems, Alaska
- Yellowstone hydrothermal system, Wyoming

Evening social programs and accompanying persons program will also be offered.

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Questions? Contact us at [sga2025@csmines.edu](mailto:sga2025@csmines.edu)

August 3 - 7, 2025 • Golden, Colorado,  
USA

## PRICES FOR ADVERTISING IN SGA NEWS

1 page = 400 EUR; 1/2 page = 200 EUR;

1/4 page = 125 EUR; 1/8 page = 70 EUR

Before sending your advertisement contact SGA News (see address on page 2). Advertisement should be sent as attached files via e-mail to SGA News (see page 2). Credit card payments are welcome.

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## How can West Africa best use its mineral wealth for economic development?

Aluminium and titanium underpin all technologies, as most versatile metals used in a wide range of industries, including aerospace, automotive, construction, and electronics.

Given the current political uncertainties, West Africa plays a key role as an important supplier of these materials. In 2021, West Africa produced about 139,000 metric tons of aluminum metal, the highest production since 2011 (Statista, 2021).

The 9th Short course of African metallogeny will use titanium, zirconium, phosphate, and bauxite as examples to explore challenges and opportunities to add value in-country to mined materials.

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 Short course is aimed at final year undergraduates, masters, and postgraduate students with a background in the geosciences, mining, and metallurgy, as well as young professionals from industry, academia, and governmental organizations.

The course will explore topics that are not traditionally part of geoscience education by broadening knowledge, encouraging networking and collaboration, so adding value to professional careers.

The course comprises lectures, workshops, mine visits and field excursions.

Please contact:

[rokhaya.samba@sgns.gouv.sn](mailto:rokhaya.samba@sgns.gouv.sn)

to receive further information on this course.



## 9<sup>th</sup> Short Course on African Metallogeny

### How can West Africa best use its mineral wealth for economic development ?

**25<sup>th</sup> – 29<sup>th</sup> November 2024 (to be confirmed)**

**Dakar, Senegal**

**organized by**

Society for Geology Applied to Mineral Deposits

National Geological Survey of Senegal.

.United Nations Educational, Scientific and Cultural Organization; Society of Economic Geologists; International Union of Geological Sciences.

Cheikh Anta Diop University of Dakar; Resourcing Future Generations; Association of Young Geologist of Senegal

# 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.

## 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?detail\\_sPage=pltc\\_i\\_1060362](https://www.springer.com/earth+sciences+and+geography/geology/journal/126?detail_sPage=pltc_i_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.

**Smart Exploration Research Centre**

We are proud to announce the opening of the Smart Exploration Research Centre, a centre for knowledge and innovation for exploration of critical raw materials funded from 2024-2029 by the Swedish Foundation for Strategic Research. The centre comprises a consortium in academic institutions and industry partners in Sweden and is hosted by Uppsala University. See the homepage: [www.smartexploration.se](http://www.smartexploration.se) for more details and contact information.

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SMART EXPLORATION RESEARCH CENTRE

# 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 August 28, 2023 from 9,00 to 15,30 CET at the ETH Zurich (HCI building, room J3, Campus Hönggerberg) by Nicolas Saintilan (SGA Council member and Co-chair of the 17th SGA Biennial Meeting) and Cyril Chelle-Michou (Co-Chair of the 17th SGA Biennial Meeting). Twenty Council members were present in person and the rest of the Council members sent their apologies.

David Banks (SGA President) and Jan Pašava (SGA ES) welcomed SGA Council and thanked Nic Saintilan and Cyril Chelle-Michou from the ETH Zurich for hosting the meeting and providing hospitality. Council also greatly appreciated all efforts of LOC of the 17th SGA Biennial Meeting. Then Council approved suggested Agenda.

## Roll call and Apologies:

Present: T. Aiglsperger, D. Banks, G. Bozkaya, T. Christie C. Conde, S. Decree, H. Frimmel, P. Garofalo, G. Graham, K.D. Kelley, P. Ledru, B. Lehmann, Cam McCuaig, S. Mikulski (joined at 12,00), J. Pašava, S. Petersen, N. Saintilan, D. Schlatter, J. Slack, and A. Vymazalová.

Present online: Nobody

Apologies for absence: G. Beaudoin, E. Ferrari, D. Holwell, A. Idrus, J. Kolb, F. Mbingeneeko, P. Mercier-Langevin, E. Naumov, B. Orberger, I. Pitcairn, Y. Song and X. Sun.

## 1. Minutes of previous Council meeting (April 26, 2023 Stockholm, Sweden)

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. Call for the organization of the 19th SGA Biennial Meeting in 2027 was published on SGA website with a deadline for submitting proposals by February 28, 2024.

2.3. Report from Treasurer On 17.07.2023, a sum of 400,000.00 EUR was invested

as a fiduciary placement for a period of 12 months with Credit Suisse Guernsey in order to generate some interest. SGA EF account received a donation of 250,000.00 EUR from SGA. The production of twenty SGA Gold medals is scheduled to be completed by the end of 2023.

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 - missing, Australia/Oceania – presented by Cam McCuaig, Europe

– presented by J. Pašava on behalf of D. Holwell, North Africa and Middle East – missing, Sub-Saharan Africa – missing, North America – presented by G. Graham, South America – presented by J. Pašava on behalf of E. Ferrari

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:

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.

David Banks to inform SEG President and Executive Director about approved joint SGA-SEG session at the 18th SGA Biennial Meeting (August 3-7, 2025 Golden, Colorado). SGA Council expects similar arrangement at upcoming SEG Meeting (i.e. a joint SEG-SGA session).

Karen Kelley to discuss and decide with LOC of the 18th SGA Biennial Meeting on the type of the joint SGA-SEG session.

David Banks to seek on behalf of SGA for nomination for IUGS Émile Argand Medal

and IUGS Early Career Award (deadline for submission December 1, 2023).

Nicolas Saintilan in collaboration with Thomas Aiglsperger, Anna Vymazalová and Hartwig Frimmel to adapt a proposal for the SGA Mobility Grant so that it would also offer limited support for analytical works for students. Council greatly appreciated a decision of the SGA 2023 LOC to donate their part of the expected SGA Meeting surplus to SGA in order to support this initiative.

Hartwig Frimmel to order production of 20 pieces of a new SGA Gold Medal.

Jan Pašava to coordinate preparation of the SGA 2023 Annual Report for IUGS and jointly work with Iain Pitcairn and Christine Linge to prepare SGA 2023 Election.

SGA Council approved that reasonable travel and accommodation costs (subject of 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 adapt texts describing these SGA Awards on website.

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.

Jochen Kolb to work jointly with SGA Council on the preparation of the SGA News no. 54 (deadline for contributions – October 31, 2023). Contributions are expected from Nic Saintilan and Cyril Chelle-Michou summarizing the 17th SGA Biennial Meeting, Jan Pašava on SGA Awards, SGA GA and News of the Society, from SGA Chapters and others.

John Slack to inform editors of the book on "Geology, Geochemistry and Formation of Supergene Mineral Deposits" about SGA Council preference for the book instead of a special issue in Mineralium Deposita. Stanislaw Mikulski to work with Cam McCuaig on finalization of letters requesting annual donations to SGA EF and their dis-

tribution. It is important that this activity is well coordinated with efforts by LOC of the 18th SGA Biennial Meeting. It is important that this activity is well coordinated with efforts by LOC of the 18th SGA Biennial Meeting. Eugenio Ferrari to represent SGA at upcoming proEXPLO 2025. New RVP for South America from January 1, 2024 to collaborate with E. Ferrari  
Anna Vymazalová to recommend a contact person for SGA profile at Linked-In.

### 3. The 17th SGA Biennial Meeting – update

The report was presented by N. Saintilan. As of August 28, 2023, a total of 424 registrations (including 169 students), representing 68% male and 32% female participants from 57 countries were received. Student- Industry event sponsored by Glencore was attended by 200 people.

Great thanks to BHP (Patron Sponsor) and Glencore (Student Patron Sponsor), Swiss National Science Foundation and Zurich, Switzerland (Gold Sponsors), New Boliden, Pan American Silver and Teck (Silver Sponsors) and Royal Road and First Quantum Minerals Ltd. (Bronze Sponsors) for their vital contributions. Many thanks also go to all Plenary and Keynote Speakers, Session Convenors, Short Course and Field Trip organizers, presenting professionals as well as exhibitors. Council highly appreciated all efforts by the LOC and approved presented report with great thanks.

Actions:

Nicolas Saintilan to provide the Final Meeting Report including Financial Report to SGA Council when ready.

Nicolas Saintilan to send a summary report on the 17th SGA Biennial Meeting to SGA News no. 54 (in preparation).

Nicolas Saintilan and Cyril Chelle-Michou to finalize Proceeding volumes so that they could be displayed at SGA website and link provided to Clarivate Analytics for evaluation.

### 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 LOC has chosen Etherio as the professional organizing committee (POC), which best fits our needs for a variety of reasons, foremost of which

is that they have handled geologic conferences in the past (SEG Denver, 2022; EG London, 2023). They also have an office in the Golden area, therefore, an event planner is able to join meetings in person. Members of the LOC (Karen Kelley, Eric Anderson, Garth Graham) and members of Etherio met on July 10, 2023 to discuss abstract submission, and members of the LOC, and members from the City of Golden to discuss sponsorships, hotel discount opportunities, and other collaborations.

In addition, the LOC worked with Etherio to provide a First Circular, or Save the Date flier to be handed out at the SGA Zurich meeting, as well as the SEG London meeting.

Garth Graham also organized a booth at the Denver Mineral Exploration Summit, which will be held in Golden in September, 2023, which will be an excellent opportunity to hand out these fliers. The Denver Mineral Exploration Summit should have close to 200 attendees or more, and will include industry, academia, and students. The organizer is Thomas Monecke, who is also on the SGA Golden LOC.

Other planned activities are:

- 1) K. Kelley will give short presentation at the SGA2023 Conference during the closing ceremony, with information about the 18th SGA Biennial Meeting;
- 2) K. Kelley will prepare a report about the upcoming conference to go into SGA News 54 (deadline 31 October 2023).

Our ultimate goal is to seek sponsorships immediately (after conclusion of the SGA Conference in Zurich) to offset costs associated with creation of website, design and printing of flier for SGA 2025, and other duties needed for planning.

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

Actions:

Karen Kelley with other members of LOC to promote the 18th SGA Biennial Meeting at the Denver Mineral Exploration Summit 2023.

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

Hartwig Frimmel to discuss with Karen Kelley possible financial needs of LOC/SGA 2025.

Karen Kelley to work with Stanislaw Mikulski, Cam McCuaig and Patrick Mercier-Langevin to avoid duplicities in SGA fund

raising for the 18th SGA Biennial Meeting and SGA EF.

### 5. The report from the Chairman of the Nominating Committee

The report was presented by Sven Petersen (Chairman of the Nominating Committee). All nominated officers eligible for re-election confirmed their interest to continue. Council highly appreciated all efforts by the Nominating Committee and accepted report with great thanks.

Action:

Jan Pašava in collaboration with Iain Pitcairn and Christine Linge to organize SGA Election by October 15, 2023 at the latest.

### 6. Status of development of SGA Student and Young Scientist network.

The report was presented by Anna Vymazalová. SGA has presently 17 active Chapters and additional 2 new (Erlangen – Germany and Kazakhstan) were created in 2023, in total 19 Chapters. At the Zurich meeting there will be student representatives from 11 SGA Chapters. They all provided a slide summarizing their activities and they will briefly present the Chapters at the General Assembly (3 minutes each as a maximum) on August 30th.

There is an additional request to create a new SGA Student Chapter South Africa at the University of Limpopo. Council approved a budget of 500 EUR.

Student program – 17th SGA Biennial Meeting in Zürich, 2023

In total we received 92 applications for travel grants from 31 countries. We are going to support 84 students from 31 countries (+2 regular members from economically disadvantaged countries). There are going to be 72 oral and 54 poster presentations given by students. The awards for the best student presentations will be given at the closing ceremony.

Others

Based on statistical evaluation, it was shown that basically one third of supported students at SGA Biennial Meeting between 2005 and 2017 would become SGA regular members.

Council approved presented report and suggested budget for the new SGA Chapter with great thanks.

**Actions:**

Anna Vymazalová to inform representative of the South Africa Student Chapter its approval and initial budgets of 500 EUR.

**7. Requests for sponsorship**

No requests were received.

**8. Any other business**

- SGA Mobility Grant – update (T. Aiglsperger, D. Banks) This item was discussed within the Report of President.
- The 8th SGA-UNESCO-IUGS-SEG Short Course on African Metallogeny – update (B. Orberger/F. Mbingeneeko)

The Report was presented by Jan Pašava on behalf of Beate Orberger. Council greatly appreciated effort by Beate Orberger and her team and emphasized the importance of this very successful geo-educational event, which is organized under financial sponsorship of UNESCO and IUGS and in collaboration with other societies. Council expressed its hope that Beate will be willing to continue her SGA geoeducational activities in the future.

**Action:**

Beate Orberger to provide updated budget on the planned 2023 course to SGA Treasurer when available.

- International Platinum Symposium - brief info (A. Vymazalová/D. Holwell) This item was covered by the Report of RVP Europe.
- GAC/MAC/SGA Meeting – brief info (G. Beaudoin/D. Holwell)
- Nomination for IUGS Awards This item was covered by the Report of President.
- Inaugural SGA Field Conference Mount Isa and Cloncurry, Queensland (20-24 July, 2023) – D. Huston and V. Lisitsin

**9. Date and place of the next SGA Council meeting**

April 2024, precise venue and timing to be announced in due time.

**10. Informative list of past activities**

The 13th International Congress of Prospectors and Explorers 2023 (May 8-10, 2023 Lima, Peru) – SGA sponsored - providing one-year SGA membership and the registration to the 17th SGA Biennial Meeting to the best student presentation, – to date no news from organizers who should get it GAC/MAC/SGA meeting (May 24-27, 2023

Sudbury, Ontario, Canada) – Leshner et al. – G. Graham and S. Perrouty SGA links.

III. Symposium on Precambrian geology and metallogeny (May 25 to 29, 2020 in San Ignacio de Velasco, Bolivia) – USD 2,500 approved by SGA Council to support SGA keynote speakers - postponed

International Platinum Symposium (July 4-7, 2023 Cardiff, UK) – SGA sponsored Goldschmidt 2023 (July 9-14 Lyon, France) – MoU with EAG

Inaugural SGA Field Conference Mount Isa and Cloncurry, Queensland (20-24 July, 2023) – D. Huston and V. Lisitsin

The Report was presented by J. Pašava on behalf of D. Huston (Item 10-6). The Mount Isa Field Conference, the inaugural SGA field conference, was held 31 July to 04 August in Cloncurry and Mount Isa, Queensland, Australia. Lectures were held in the mornings, followed by field trips and visits to core yards in the afternoon. There were a total of 45 delegates, including three overseas speakers who presented on-line.

Of the 42 who attended physically, 8 were from academia, 16 were from government and 18 were from industry. A short article with photos for SGA Newsletter will follow. Council greatly appreciated effort by David Huston and his team.

**11. Informative list of future activities**

- IAEG 50 Meeting (September 8-10, 2023 Galway Bay Hotel, Galway County, Ireland) – D. Banks et al - SGA keynote presentation by S. Decree
- The 8th SGA-UNESCO-IUGS-SEG Short Course on African Metallogeny (October 9-13, 2023 Johannesburg, CIMERA South Africa) – B. Orberger/F. Mbingeneeko et al.
- 18th SGA Biennial Meeting (August 3-7, 2025, Golden, Colorado, USA) – K. Kelley et al.

Prepared by Jan Pašava (SGA ES) on September 4th, 2023. Revised by D. Banks (SGA President), Nic Saintilan (Chair, LOC SGA 2023), Approved by D. Banks (SGA President)

**The SGA website**

<http://www.e-sga.org>

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# Minutes of the SGA Extraordinary General Assembly, August 30th, 2023, Room HPH G1, ETH Zurich, 11:00 – 12:10 CET

The meeting was opened by the SGA Executive Secretary, Jan Pašava at 11:00 CET. Following Article VII, Section 2 of the SGA Constitution it was found that there was no quorum reached in the room and the Executive Secretary called immediately for an Extraordinary General Assembly. Then he presented the suggested Agenda, which was approved. The Extraordinary General Assembly was attended by over 100 people and closed at 12:10 CET.

## 1. Report of the President (D. Banks)

The President's report covered the period from the previous SGA General Assembly (October 6, 2021 – e-SGA General Assembly) to date. The President highlighted that SGA has become a globally recognized society with a large membership (1198 members in more than 50 countries), which is financially healthy and contributes to the training of the next generation of economic geologists through the SGA Educational Fund. He also emphasized the vibrant and growing student chapters and high impact factor (4.8 in 2022) for SGA's flagship scientific journal *Mineralium Deposita*, highly-ranked special publications, and cutting-edge workshops and short courses offered by SGA. He also informed that SGA and SEG are engaging to look for areas of common interest where we can collaborate, an example being the new MoU for registration at each Societies events. Widely attended, high-quality Biennial Meetings have become a traditional and important part of SGA since 1991, and he invited all SGA members to the 18th SGA Biennial Meeting, which will be held in Golden, Colorado, USA in August 2025. He also presented a list of nominated officers for the upcoming SGA ballot, which was proposed by the Nomination Committee and approved by SGA Council. The ballot will be distributed to the SGA members with voting right by mid-October 2023. Jan Pašava then thanked the present SGA President for his extraordinary work for SGA.

## 2. Report of the Treasurer (H. Frimmel)

H. Frimmel presented the Financial Reports for 2021 and 2022. SGA holds two accounts, one for the day-to-day running of the Society and one for the SGA Educational Fund (SGA-EF). The former account is with Credit Suisse. The SGA-EF account used to be also with Credit Suisse but was moved to PostFinance, also in Switzerland, in March 2021. The balance of the SGA account on 31/12/2021 was € 844,218.60 and on 31/12/2022 it was € 733,790.70. In addition, a total of € 7,508.61 € was held in the two SGA office accounts with the SGA Executive Secretary and the Editorial offices by the end of 2021 and of € 5,004.08 by the end of 2022. Following major turbulences and uncertainties around Credit Suisse in 2022, it was decided to transfer € 180,000.00 from the SGA account with Credit Suisse to the SGA-EF account with PostFinance in order to reduce both the potential risk for the SGA members' money and the impact of negative interest rates at the time. The balance of the account of the SGA Educational Fund on 31/12/2020 was € 68,683.65 and on 31/12/2022 it was € 248,307.96. A comparison of the end-of-year balances of both SGA accounts over the past 17 years shows that the SGA finances remain steady after a period of financial consolidation in the 2000's. All SGA financial accounts for the years 2021 and 2022 were audited by two SGA members who do not serve on Council (as per SGA Constitu-

tion). These were Prof. Dr. A. Gilg (Germany) and Prof. Dr. J. Raith (Austria) both of whom did not find any discrepancies with the accounting. J. Pašava then thanked the SGA Treasurer for keeping Society finances in such a good shape. The report was unanimously approved by the Extraordinary General Assembly.

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

This item was coordinated by A. Vymazalová (Vice President, Student Affairs). SGA has presently 17 active chapters and additional 2 new (Erlangen – Germany and Kazakhstan) were created in 2023, in total 19 chapters. It should be noted that student members represent over 40% of all SGA membership. Altogether 11 representatives of student chapters briefly presented their activities and expressed their thanks for continued support by SGA Council.

## 4. Other business

The Extraordinary General Assembly was closed at 12:10 CET as no other business was raised by the SGA members present.

In Prague, September 4th, 2023

Prepared by J. Pašava (SGA Executive Secretary) Checked and approved by D. Banks (SGA President), H. Frimmel (SGA Treasurer), S. Mikulski (SGA Vice President), A. Vymazalová (Vice-President, Student Affairs)



# SGA AWARDS at the 17<sup>th</sup> SGA Biennial Meeting in Zurich, Switzerland

Jan Pašava (SGA Executive Secretary)

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

As at past SGA Biennial Meetings, the Awards Ceremony was a part of the Opening Ceremony at the 17th SGA Biennial in Zurich, Switzerland. The following SGA awards were presented during the Opening Ceremony, which was held on August 29, 2023 from 9,00 to 13,00 and attended by Cyril Chelle-Michou and Nicolas Saintilan (Co-chairs of the LOC-SGA 2023), David Banks (SGA President), Jan Pašava (SGA Executive Secretary who guided the Award Ceremony) and numerous meeting participants:

## The SGA-Newmont Gold Medal

The SGA-NEWMONT Gold Medal was established in 2006 to be awarded biannually primarily in recognition of a full career in performance of „unusually original work in the mineral deposit sector, which shall be broadly interpreted to encompass major contributions to (1) the science through research and (2) the development of mineral

resources through mine geology, exploration and discovery.

The award consists of a citation, pure gold medal, and travel to the Biennial meeting for the presentation.

The first recipient of this most prestigious award was Dr. Zdeněk JOHANT (France) at the 9th SGA Biennial Meeting in Dublin, Ireland (2007).

The second recipient of the SGA-Newmont Gold Medal was Dr. Shunso ISHIHARA (Japan) at the 10th SGA Biennial Meeting in Townsville, Australia (2009).

The third recipient of the SGA-Newmont Gold Medal was Dr. David GROVES at the 11th SGA Biennial Meeting in Antofagasta, Chile (2011).

The fourth recipient of the SGA-Newmont Gold Medal was Dr. Michel CUNEY at the 12th SGA Biennial Meeting in Uppsala, Sweden.

The fifth recipient of the SGA-Newmont Gold Medal was Dr. Steve D. SCOTT at the 13th SGA Biennial Meeting in Nancy, France.

The sixth recipient of the SGA-Newmont Gold Medal was Dr. David LEACH at the 14th SGA Biennial Meeting in Quebec City, Canada.

The seventh recipient of the SGA-Newmont Gold Medal was Dr. Richard H. SILLITOE at the 15th SGA Biennial Meeting in Glasgow, Scotland, UK.

The eighth recipient of the SGA-Newmont Gold Medal was Dr. Richard J. GOLDFARB at the 16th SGA Biennial Meeting in Rotorua, New Zealand.

The ninth recipient of the SGA-Newmont Gold Medal is Dr. Lluís FONTBOTÉ who was nominated by Christoph Heinrich and finally selected by SGA Council out of five proposed candidates. After introduction and explanation of the history of the medal Jan Pašava announced the awardee whose citation was presented by Christoph Heinrich. Then Lluís Fontboté, who accepted the award, presented the acceptance speech.

The following citation was prepared and delivered by Christoph Heinrich (Emeritus, ETH Zurich).



Presentation of the SGA-Newmont Gold medal during the Opening Ceremony of the 17th SGA Biennial Meeting in Zurich, Switzerland. Lluís Fontboté – recipient of the award (second from right) with D. Banks – SGA President (third from right), Jan Pašava – SGA Executive Secretary (left) and Christoph Heinrich (nominator – on right). Photo by G. Beaudoin.

Lluís Fontboté stands out as a leading geoscientist in the field of economic geology —internationally, in Europe and in Switzerland. His extensive work in Peru shaped our present knowledge of the ore geology of this Andean country more than anyone else. Over his long career, Lluís has combined fundamental research into ore-forming processes in diverse geological environments with critical societal and environmental study on all parts of the mineral resource cycle. He is a pre-eminent educator who has instilled in numerous young scientists, now leading professionals, the importance of understanding geological process as a foundation of practical application to exploration and mining.

Lluís is a rigorous and original researcher with close industry contacts who has led detailed investigations of an exceptional variety of ore deposit types: Mississippi Valley-type and sedex lead-zinc, Cordilleran-type lead-zinc-silver-copper, skarn gold, iron oxide-copper-gold, vein tin-copper, orogenic gold, porphyry copper-gold, supergene exotic copper, and polymetallic volcanic-hosted massive sulfide deposits. Among his most influential work is his decade-long study of Cordilleran deposits. With his international team of students and colleagues, he used rigorous field observation and quantitative laboratory analysis to demonstrate that these diverse Pb-Zn-Ag-Cu-Au deposits are part of much larger-scale porphyry – epithermal systems, which formed by interaction of magmatic-hydrothermal fluids with a variety of host rock types. He attracted students from Peru's mining environment and elsewhere to the rigorous Swiss education system, training some of the most influential practitioners and academics currently active in South America. Being a very modest person, Lluís always left first-authorship of the resulting papers to his younger colleagues, even though he carried the long-term intellectual lead with his broad vision and extensive geological experience.

Lluís' educational excellence is best known to all of us who have been fortunate to join one of his big field excursions, involving long days and never taking 'no' for an answer, and which always involve local students and mining companies.

Besides his research and teaching, Lluís is a prominent university leader in Switzerland; he was a founding member of the pro-



Lluís Fontboté Acceptance of the SGA-Newmont Gold Medal.

fessorial group that linked two somewhat disparate schools in western Switzerland (Geneva and Lausanne) to become the now world-renowned Ecole Lémanique des Science de la Terre. Internationally, one of Lluís' influential educational achievements was the expansion and decade-long guidance of the Curso Latinoamericano de Metalogenía SEG-SGA-UNESCO, which brought cutting-edge international thinking about ore formation to students and young professionals in Latin America.

Lluís Fontboté's lasting contribution to global resource policy is the Geochemical Perspectives booklet entitled Future Global Mineral Resources, which he initiated as a collaborative project by bringing together leading ore geologists and resource specialists (authored alphabetically as Arndt et al., 2017). Based on solid observation and empirical research, they demonstrated to a broad readership that scarcity in the supply of critical metals is not a frightening geological limitation but primarily a challenge to technical development, market forces and human behaviour.

Dear Lluís, we are overjoyed that SGA has decided to honour you with this year's Gold Medal. We all congratulate you and wish you well as a wonderful friend!

Christoph Heinrich

The following acceptance speech was delivered by Lluís Fontboté:

President of the Society of Geology Applied to Ore Deposits, Nominators, SGA members, and friends.

I am deeply honored to receive the Newmont Gold Medal of the SGA, and even more honored when I consider the impressive list of previous awardees.

Working on geology applied to ore deposits was my dream since I studied geology at the University of Granada in southern Spain. My father, also geologist, and Prof. Puri Fenoll (she the organizer of the second Biennial SGA Conference in Granada), had a responsibility for this dream. Thanks to the German Academic Exchange Service, the DAAD, I could register for a PhD at the University of Heidelberg in Germany, at that time a center of ore deposit research with Professors Ramdohr, Amstutz, and Moh. It is exactly in the office of Christian Amstutz that SGA and also Mineralium Deposita were established 11 years before I arrived in Heidelberg. At the Mineralogy Institute, involved with students from the whole world, there was an exciting international environment, not devoid of genetic controversies. There, I also experienced that as a student one learns not only from professors, but perhaps even more from

enthusiastic and talented students and post docs. Thanks to all of you!

Subsequently, once established in Geneva and a full professor, I realized that again I was learning the most from enthusiastic and talented students and post docs. Thanks to all of you!

Societies such as SGA and SEG are essential for the advancement of our science and for our profession, particularly for students and young professionals. I have always felt committed to SEG – I was president some years ago – and also to SGA. The SGA News was created in Geneva and I was the first editor, soon followed for many years by Massimo Chiaradia, also in Geneva. I am confident that collaboration and communication between both societies are reinforced and date clashes like the one we have suffered this year with the conferences in Zürich and London will not happen again. In London, I learned from SEG President Stuart Simmons a memorandum has been signed between SGA and SEG along these lines.

To be appointed in 1990 as professor of economic geology in Geneva was an incredible opportunity. I found an absolutely open scene in Switzerland, with unrestricted access to labs and fantastic colleagues. In addition, the 1990s and 2000s was a time when the mining industry was in crisis because of low prices; numerous universities and geological surveys in the northern hemisphere were drastically cutting ore deposit research. In contrast, Switzerland was an anomaly. The government continued to invest in research on ore deposits, including generous projects by SNF. This allowed dynamic groups in economic geology to flourish in Zürich with Chris Heinrich, in Bern with Larry Diamond, and also in Geneva. The exchange between our groups was continuous, as it continues to be today. I feel privileged for this and I would like to express my sincere thanks to all who made this possible.

In Geneva, together with my colleagues Robert Moritz, Massimo Chiaradia, and Kalin Kouzmanov, I worked on many interesting projects, mainly in the Andes – a connection that started in Heidelberg – but also in Europe and other parts of the world. As you have heard, this included MVT deposits (with Hendrik Gorzawski, Jorge Spangenberg and Nicolas Saintilan), IOCG (with Robert Marschik, Karin Requia and Antoine de Haller), VMS (with Marc

Polliand, David Tripodi), gold skarn with Agnes Markowski and Jean Vallance), and orogenic gold (with Yves Haeberlin) deposits, as well as studies on mine tailings and supergene processes (with Bernhard Dold and Marie Caroline Pinget).

Since I had experience on MVT deposits, I was fortunate to be invited to visit a so-called „MVT deposit“, or perhaps „Sedex“, in Peru that was very odd. Indeed, when I arrived in Geneva, we analyzed the samples and discovered that this zinc-lead deposit, San Gregorio in the Colquijirca district, was full of hypogene alunite. We realized that this carbonate-hosted deposit had been massively affected by advanced argillic alteration and the zinc-lead mineralization had been formed close to surface, in the upper part of a porphyry system. This was the beginning of extremely exciting research on Cordilleran polymetallic deposits as part of the porphyry system, together with my colleague Kalin Kouzmanov, and Master and Ph.D students who included Ronner Bendezu, Regina Baumgartner, Honza Catchpole, Bertrand Rottier, and Vincent Casanova. In this context I would like to thank the input and guidance of Marco Einaudi, Jeff Hedenquist, Steve Kesler, and Richard Sillitoe. There are many more colleagues and students that I cannot mention here, but I acknowledge all of you.

All of this would not have been possible without the support of the SNF, DFG and European Commission, plus collaboration with industry, organizations that have funded and continue to fund several research projects, as well as BRGM and the Swedish and Spanish geological surveys. As you have probably understood by now, for me to conduct study on the geology of ore deposits is just fun, and I feel I have still a lot to learn. Therefore, I am very fortunate that, although in theory retired, I am allowed to continue to work both in research and advising exploration groups.

Concerning my present activities, I would like to thank not only my colleagues in Geneva, but also Profs. Silvia Rosas and Lisard Torró from the Pontificia Universidad Católica del Perú in Lima, and Prof. Cyril Chelle Michou at ETH Zürich, for their invitations to collaborate with their research groups.

At the end, a brief message to students and young professionals: as just noted, the 1990s and early 2000s were not so brilliant concerning jobs in Economic Geology.

Now we have the opposite situation. Society has realized that Mineral Resources are critical for a number of key issues, including the transition to a decarbonized economy. Never was knowledge so accessible or analytical tools – including in real time in the field – were so powerful. This means that there has never been a better time to be an economic geologist! Society needs you to solve many pressing issues, as we have heard in the SGA keynote presentations.

Finally, thanks to my family: Both my father and my mother worked at the University of Granada and ensured that I had an excellent education, also in languages; this was despite difficult times, when Granada was far from everywhere and Spain still a dictatorship. My career in Heidelberg and Geneva, including the addition of many administrative obligations, would have not been possible without the strong support of my wife Susanne Theodora Schmidt, an outstanding researcher in the field of low-grade metamorphism and optical mineralogy plus other topics, and an enthusiastic teacher at the universities of Heidelberg, Basel and Geneva. Very sadly, Susanne passed away three months ago at the age of 68 after a long and brave fight with ALS. Our son, Moritz Fontboté Schmidt, Doctoral Student in Quantum Physics at the ETH, and I feel extremely thankful to have had such a wonderful person by our side.

I sincerely thank the nominators for putting my name forward, and the SGA Council for awarding me this recognition.

Lluís Fontboté, 29 August, 2023  
Dept. Earth Sciences, University  
Geneva, Switzerland



## The SGA-KGHM Krol Medal

The objective of this new award is to recognize outstanding service to the Society. The medal is to be awarded to worthy candidates at SGA Biennial Meetings and also on ad hoc basis. This award was for the first time presented at the SGA 2015 Anniversary Meeting in Nancy. The medal is named after Gerardus L. Krol (1912-1984) who played a key role in the foundation and development of the Society and became its first President. The award consists of a medal minted from three troy ounces of pure silver, citation and travel to the place of presentation of the award.

The first recipient of this award was Dr. Francis SAUPÉ from France in 2015.

The second recipient of this award was Dr. Maurice PAGEL from France in 2017.

The third recipient of this award was Dr. David LEACH from USA in 2019.

The fourth recipient of this award was Dr. Jorge MRS RELVAS from Portugal in 2021.

The fifth recipient of this prestigious Society award is Dr. Fernando TORNOS (Spain), nominated by Carmen Conde and Jan Pašava. The citation was presented by Carmen Conde.

It is my great honor and pleasure to introduce Dr. Fernando Tornos as the fifth recipient of the SGA-KGHM Krol Medal.

Fernando Tornos was born in Madrid, Spain, into a large family of six siblings. Despite coming from a background of engineers, lawyers and economists, he developed a passion for geology, especially for mining, at an early age. He studied Geology at the Complutense University of Madrid, where he graduated in 1981 and obtained his PhD with honors in 1990 with a thesis on "Skarns and related mineralizations in the Central Iberian System. Petrology, geochemistry and metallogenic model"

He started as an exploration geologist and obtained a scholarship at the Spanish Geological Survey (IGME), where he worked as a researcher until 2017, combining his research on the geology and geochemistry of ore deposits and hydrothermal systems with teaching at the Complutense University of Madrid and Huelva University. Since 2017, he has been at the Spanish National Research Council, currently as a Research Professor and leader of the Ex MODECSIC team, a research group focused on the



Presentation of the SGA-KGHM Krol Medal (from right to left: J. Pašava – SGA Executive Secretary, F. Tornos – recipient of the award, D. Banks – SGA President). Photo by Christos Tzikas.

exploration and modeling of ore deposits, especially of raw materials. Prof. Tornos is an outstanding scientist with more than 123 papers in prestigious journals on Mineralogy, Geomicrobiology, Geochemistry and/or Economic Geology - and teacher (having supervised 12 PhD Theses and 9 MSc Theses).

Fernando Arroyo has been a key person in the development of the SGA for the past decades. He joined the Society in 1992 and served as Council member, VP and President from 2004 to 2011. During his presidency, he initiated and coordinated implementation of important changes in the SGA Constitution, organized the SGA African Metallogeny Course in collaboration with UNESCO and IUGS, and opened the door of the Latin-American geology and mining world to the SGA. He was also heavily involved in the preparation of the 11th SGA Biennial Meeting, held for the first time in South America (Antofagasta, Chile) in 2011, which attracted a record number of participants. After his presidency, he continued promoting the SGA, especially in South America, as a coordinator and keyno-

te speaker at the SEG-SGA-UNESCO Latin American Metallogeny Course in 2013, 2015 and 2017. He has also been a long-term Member of Editorial Board of *Mineralium Deposita* since 2003.

So, Fernando, simply, THANK YOU, in capital letters, for spreading the SGA Society around the world. Your work over these decades has been simply magnificent. Personally, and as an old former student of yours, I would like to thank you, thank you very much, for your masterful lessons on geology and life. You have shaped the career of so many geologists in Spain and Latin America, and you are a leader in the field of metallogeny in the Iberian Peninsula and Latin American countries. We wish you all the best in your professional career and in your life project with your family and friends.

Carmen Conde

Dear Council members, Dear friends

First of all, I would like to thank Carmen Conde for her warm, despite biased, words. Also, I would like to thank the friends that nominated me for this prestigious award. Secondly, it is rather impressive to be presented by a former PhD student – in fact, one of my first students. This can only mean that I am turning into a really old potato.

A long time ago, when my son was seven years-old he was asked at school what his parent's job was. He said "I don't know, but my father takes pictures of coins on stones and writes long and boring papers in a newspaper that nobody reads" – 23 years later, he continues to think the same.

Yes, taking pictures of rocks and wondering about their significance and origin is perhaps one of the most fascinating and exciting jobs we can imagine. We are lucky people. We are fortunate since ore geologists are perhaps the ones that combine more disciplines in their day-by-day work. On top of this, few other topics in geology need such an interaction between academia and industry – just think of the long list of scientific terms which started as academic concepts and which are now routinely used in exploration and mining.

When I started working for the Spanish Geological Survey, ore deposit geology was mainly associated to the description of ore deposits and mineralogical studies. Then the dark ages came, prices dropped down and globalization arrived. The official message (at least in Spain and probably in the whole of Europe) was that the age of metals was finished and, amazingly, that no more mining was needed. Departments at Universities closed, researchers moved to environmental studies and at the Spanish Geological Survey, the ore deposit group shrunk from almost 150 people to merely a dozen.

But times change and now society has realized that metals are still needed! Politicians have learnt that we need metals for our survival. Even normal people debate on rare earths supply and know that cobalt is not just a word you can find in the weekend crosswords. The study of ore deposits has flourished, and critical ore materials are the flavor of the month.

A lot of great and enthusiastic young people are devoting their careers to understand how to best provide raw materials to the so-

ciety of the XXI c. We have new powerful analytical techniques and have developed concepts that make ore deposit studies not just a matter of description but of understanding systems from the local to the regional scale. But, on the other side, this boom has put a great pressure in publishing, leading in certain cases to the prioritization of quantity over quality.

Perhaps, the role of Societies is to try to encourage the interaction between industry, field geologists, experts in analytical techniques and students. We cannot do good research without collaborating and learning from each other. We cannot lose the geological and geochemical foundation upon which all our science is based. With my newly acquired old potato title, I think that perhaps the most important thing for me now is to try to give young colleagues and students as much as I received from my mentors back in the days.

This is maybe the right moment to acknowledge and to thank the colleagues and students of the ExMODE group of the CSIC and all of you for accompanying me in this exciting journey. I hope that we continue meeting together and taking pictures of coins on stones.

With all this in mind, I am greatly honored and humbled to accept the SGA-KGHM medal. Thank you very much.

Fernando Tornos

The SGA Young Scientist Award

Originally, SGA Young Scientist Award (2003-2006) then the SGA-Barrick Young Scientist Award (2007-2015) changed back to the SGA Young Scientist Award from 2017. The award is offered biannually to a young scientist who has contributed significantly to the understanding of mineral deposits. It consists of a citation, certificate, EUR 1500 and travel expenses to the place of the Biennial Meeting for the presentation. The award is given for contributions to economic geology published before the author's 35th birthday. The recipient must be less than 40 years of age on January 1 of the year in which the award is presented.

The first recipient of this award was Dr. Noreen VIELREICHER (Australia) – 2003. The second recipient of this award was Dr. Alexandre Raphael CABRAL (Brazil) – 2005.

The third recipient of this award was Dr. Gilles LEVRESSE (France) - 2007.

The fourth recipient of this award was Dr. David HOLWELL (UK) - 2009.

The fifth recipient of this award was Dr. Kalin KOUZMANOV (Bulgaria) - 2011.

The sixth recipient of this award was Dr. David DOLEJŠ (Czech Republic) – 2013.

The seventh recipient of this award was Dr. Huayong CHEN (China) – 2015.

The eighth recipient of this award was Dr. Sarah DARE (Canada) – 2017.

The ninth recipient of this award was Dr. Crystal LAFLAMME (Canada) – 2019.

The tenth recipient of this award was Dr. Matthew STEELE-MACINNIS (Canada) - 2021.

The eleventh recipient of the SGA Young Scientist Award is Dr. Clifford PATTEN (Canada) who was nominated by Jochen Kolb and finally selected by SGA Council out of five candidates.

The citation was prepared and presented by Jochen Kolb.



Dear Clifford, Dear SGA members,

I have known Clifford since he came to my institute in Karlsruhe, Germany in 2017, just a few months after I started my professorship. I know that this was a challenging step for him, since he started as a PostDoc directly after his PhD, just had a new family and had to move to yet another country. It helped that he has both a Canadian and a French passport, but a lot of administration had to be dealt with in German. He has been my partner in crime during the last 6-7 years in establishing a new economic geology department at KIT. This involved the design and organization of a completely new study program. Clifford was involved in teaching and the design of the new program from the start. He taught courses in metal deposit and industrial mineral geology, geochemistry and developed a course on mineral exploration. He established a portfolio in lectures and practicals for a variety of economic geology and geochemistry topics. Clifford also took part in a lot of field trips to the Black Forest. He has been a very important contact for students of the SGA Black Forest – Alpine student chapters and supported a lot of their activities.

When he left Stockholm, where he did his PhD on a gold-related topic, his supervisor, Iain Pitcairn gave him a gold pan as a gift, because Clifford was not able to actually see gold in his samples. When he came to my place it didn't take long for him to actually see gold. Clifford started working on Finish orogenic gold deposits and at seafloor massive sulfide (SMS) mineralization at Kolumbo, near Santorini, Greece. He developed the idea from Iain to study metamorphic rocks at increasing metamorphic grade for their gold content in order to test the hypothesis of a metamorphic fluid and gold origin in the orogenic gold systems of Finland. He extended the approach to other elements like As, Sb, Co, etc. in order to explain various hydrothermal element enrichment. He built a conclusive model on the various element enrichment of orogenic gold-only and multi-element deposits for the first time through metamorphic processes in the Central Lapland Greenstone Belt. When we obtained a new LA-ICPMS, he started immediately working with the machine, and he refined a low-detection limit whole rock gold analysis using pressed powder pellets yielding sub-ppb gold data.



Presentation of the SGA Young Scientist Award during the Opening Ceremony of the 17<sup>th</sup> SGA Biennial Meeting in Zurich, Switzerland (from left to right: J. Pašava – SGA Executive Secretary, David Banks – SGA President, Clifford Patten – awardee and Jochen Kolb – nominator). Photo by Christos Tzikas.

This was an important step also for multi-element data sets. On the other hand, he developed his research on SMS by investigating the hydrothermal system of the Kolumbo volcano and metal source in magma and hydrothermally leached wall rock. Interesting publications on this topic are yet to come. On top of that, Clifford developed a new genetic model for ultramafic-hosted volcanogenic massive sulfide deposits including a detailed look at the geotectonic setting. He publishes regularly in well-recognized journals. I am impressed by the broad research, covering various economic geology and analytical aspects, he has been performing at his young age during the last years.

I congratulate Clifford to the SGA Young Scientist Award and wish him all the best for his future at the University of Innsbruck, where he moves in October and has to stand on his own feet in the future. Our collaboration will not stop. Good luck, Clifford and all the best.

Jochen Kolb

Acceptance speech delivered by Clifford Patten:

It is a great honour to receive the SGA Young Scientist Award for which I am extremely grateful and humble. I would like to thank first and foremost Jochen Kolb for the nomination and for the last six years we have been working together at KIT. When I started at KIT as a post-doc, after my PhD, we started as a small but dynamic group. Your support, mentorship and trust allowed me to develop my research in a thriving environment and with great freedom. I fondly remember when we were thinking hard about new research questions and new research topics. Then we had to write the funding proposals, which was a bit less fun...

I am also deeply grateful to Ferenc Molnár, Sven Petersen and Mark Hannington for supporting my nomination. Ferenc, I had a great time logging drill cores with you in Loppi while having endless discussion about orogenic Au deposits and their possible sources. Sven and Mark, although we have not been working directly together, your work has always been inspiring and has made me discover the wonders of the seafloor and of VMS deposits.

I would not be here either were it not for two persons who supervised me during my undergraduate studies: Iain Pitcairn and Sarah Jane Barnes.



Clifford Patten acceptance of the SGA Young Scientist Award. Photo by Christos Tzikas.

Iain, I would like to thank you for supervising me during my PhD and for introducing me to the world of gold and hydrothermalism, which are now a core part of my research. I particularly enjoyed the time we spent in the laboratory together doing low Au analyses and where we had good times just talking science. Sarah, on the other hand, made me discover the world of mafic-ultramafic magmatic ore deposits. The afternoon tea-time breaks were a unique social experience where the whole group would all gather to chat about their research. It was a very British tradition in Québec, the best of two worlds.

Having worked and learned from all of you, as well as from colleagues and friends, has really helped me to push forward some research questions which I find most interesting, and which are related to the source of the metals enriched in ore deposits. Investigating metal sources really helps in understanding the whole system in which ore deposits form. Although such studies can sometimes be difficult because of analytical challenges and the need to combine very diverse disciplines applied to various scales and times, it also makes the whole story more interesting.

As a good friend once told me “We economic geologists are expert in nothing but have to be curious about everything”, which I find quite true, at least for myself. In any case, I think there is still plenty to discover about the sources of metals and metal fluxes applied to various types of ore deposits and I would be happy to discuss that with any of you.

Once again, I’d like to thank the committee warmly for this great award for which I am so very grateful.

Clifford Patten

## The SGA Award for the Best Paper in Mineralium Deposita

After introduction by J. Pašava, the award was announced and presented by Georges Beaudoin:

Ladies and Gentlemen,

I have the honor to present the 2023 Mineralium Deposita Best Paper Award on behalf of the two chief editors - Bernd Lehmann and myself. This award is granted for the best paper published in Mineralium Deposita in the two years, 2021 and 2022, preceding the 17th SGA Biennial Meeting. The Best Paper Award is decided jointly by the chief editors, with input from the editorial board, and consists of a certificate, 1500 Euro and travel expenses for the first author to receive the award.

The 2023 award goes to the paper by Eduardo T. Mansur, Sarah-Jane Barnes and Charley Duran, entitled "An overview of chalcophile element contents of pyrrhotite, pentlandite, chalcopyrite, and pyrite from magmatic Ni-Cu-PGE sulfide deposits," which was published in Mineralium Deposita in 2021, volume 56, pages 179-204. This paper presents an overview of base metal sulfide composition in nickel, copper and PGE deposits. The paper explains in a very clear, detailed, and well illustrated presentation the behavior of several trace metals during the fractional crystallization of magmatic sulfide liquids, which results in metal partitioning between various sulfides at successive stages of the the sulfide liquid crystallization. This knowledge is then applied to exploration targeting. This is thus a benchmark paper that provides a

foundation for future studies on both fundamental and applied research on Ni-Cu-PGE deposits. Congratulations, Eduardo!

Georges Beaudoin,  
Co-Editor Mineralium Deposita

Eduardo Mansur then thanked the editors on behalf of all co-authors.



Presentation of the Award for the best paper in Mineralium Deposita during the Opening Ceremony of the 17th SGA Biennial Meeting in Zurich (from left to right: G. Beaudoin – past Chief Editor, MD, North American Office, E. Mansur – awardee, D. Banks - SGA President and J. Pašava – SGA Executive Secretary). Photo by Christos Tzikas.

The SGA Awards for the Best Student Oral and Poster Presentation

In order to encourage students to participate in the SGA activities and to reward excellence in their scientific work, the Best Oral and Poster Presentations given by students were awarded.

On behalf of SGA, we wish to congratulate all awardees!

The Committee, based on the high quality and scientific merit of the student's presentations decided to attribute the awards to four students for oral presentations and two students for poster presentations (each of them received a certificate and 300 EUR). The Committee evaluated 72 oral and 54 poster student presentations.

A Conference Student Committee constituted by:

Jochen Kolb, University of Karlsruhe, Germany

Gulcan Bozkoya, University of Pamukale, Turkey

Jeffrey Hedenquist, Ottawa, Canada

Daniel Gregory, University of Toronto, Canada

Jeffrey Mauk, USGS, USA

Sam Spinks, Teck Resources, Australia

Thomas Aiglsperger, University of Lulea, Sweden

Sven Petersen, Geomar Institute, Kiel, Germany

Marek Tuhý, Charles University, Prague Czech Republic

Anna Vymazalová, Czech Geological Survey, Prague, Czech Republic

The best student oral presentations:

Diogo Ribeiro: Metal and ligand mobility during prograde metamorphism of metasedimentary belts in the Superior Province: Implications for gold endowment.

Olivia Mejías: Exploration of indium in sulfidic mine waste and acid mine drainage environments.

Yann Mpaka Waku: Pyrite analysis enhanced by dimensionality reduction: investigating texture, trace elements, and sulphur isotope signatures in the Kibali gold district, DRC.

Margarita Melfou: In-situ trace element analyses of pyrite from the Pefka epithermal Cu-Au-Te-In-Se deposit, Rhodope, Northern Greece.

The best student poster presentations:

Bastien Audran: Serpentinization of the Ronda Massif (Spain): structural control and fluid origin, a framework for metal mobility.

Ivana Carcamo Valencia: Cobalt-rich manganese nodules in Pliocene marine deposits of the onshore forearc Pisco Basin, Peru.



Presentation of Student Awards during the Closing Ceremony of the 17th SGA Biennial Meeting in Zurich, Switzerland. From left to right, first row: Bastien Audran, Gulcan Bozkoya, Jeffrey Hedenquist, Olivia Mejías, Ivana Carcamo Valencia, Diogo Ribeiro, Margarita Melfou. From left to right, second row: Sven Petersen, Jochen Kolb, Yann Mpaka Waku, Mauk Jeffrey, Sam Spinks, Anna Vymazalová, Daniel Gregory, Thomas Aiglsperger, Marek Tuhý. Photo by Christos Tzikas.

# SGA Student Chapter Activities

## Meet Erlangen's Dynamic SGA Student Chapter!

Frederik Börner<sup>1</sup>, Jakob Machleidt<sup>1</sup>, Hans Reiser<sup>1</sup> and Malte Junge<sup>2</sup>

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<sup>2</sup> Department of Earth and Environmental Sciences, Ludwig Maximilian University of Munich, 80333 Munich, Germany



Figure 1: Founding members of the SGA student chapter Erlangen.



Figure 2: The new logo of the SGA student chapter Erlangen.

After enduring years of lockdowns and the absence of in-person gatherings, we were pleasantly surprised to witness an overwhelming turnout at faculty talks on mineral deposits at Friedrich-Alexander Universität (FAU) Erlangen Nürnberg, Germany. Encouraged by this enthusiasm, we took the initiative to establish an SGA student chapter, and we were delighted to be met with full support from the SGA (Figures 1 and 2).

Our journey began with three captivating, invited talks, effectively spreading the word about our presence within the faculty and actively recruiting new members. Marcel Harnisch from Knauf Gips KG was our inaugural speaker, offering valuable insights into the world of exploration geology in the German gypsum industry. The event not only drew a substantial audience but also provided students with invaluable networking opportunities in the industry, paving the way for potential collaborations on their BSc and MSc theses.

The second invited talk, „Tracing Metal Fluxing Through the Lithosphere from Magmatic Sulfide Through Porphyry to Epithermal“ presented by Prof. David Holwell from the University of Leicester, garnered significant attendance from both students and faculty, reaching an even broader audience through online broadcasting.

Our final talk of the semester featured Prof. Hartwig Frimmel from the University of Würzburg, who captivated the audience with his presentation on “The Global Gold Cycle: How did it start?”. The strong turnout extended beyond the lecture hall, culminating in a delightful barbecue organized for attendees.

Our chapter's inaugural field trip was an excursion to the Kropfmühl mine in the southern Bohemian Massif (Figure 3). Thirteen eager students embarked on an immersive journey, exploring the underground workings and production shafts that have been operational since 1870. The fascinating, highly-metamorphic paragenesis

comprised dark, graphite-bearing garnet-(plagioclase)-biotite gneisses, luminous quartzitic gneisses, quartzitic insertions, amphibolite layers, calc-silicate marbles (skarns), and calcsilicate formations (Krüger et al., 2017). Furthermore, a tour of the extensive flotation and milling plant at the mine piqued the interest of our enthusiastic students. Overall, the feedback of students and staff from the geology institute at FAU as well as the invited speakers was very encouraging. The SGA student chapter Erlangen is eager to cultivate a mutually beneficial partnership with the SGA and particularly with other SGA student chapters worldwide. We anticipate a promising and prosperous future ahead, Glück Auf!

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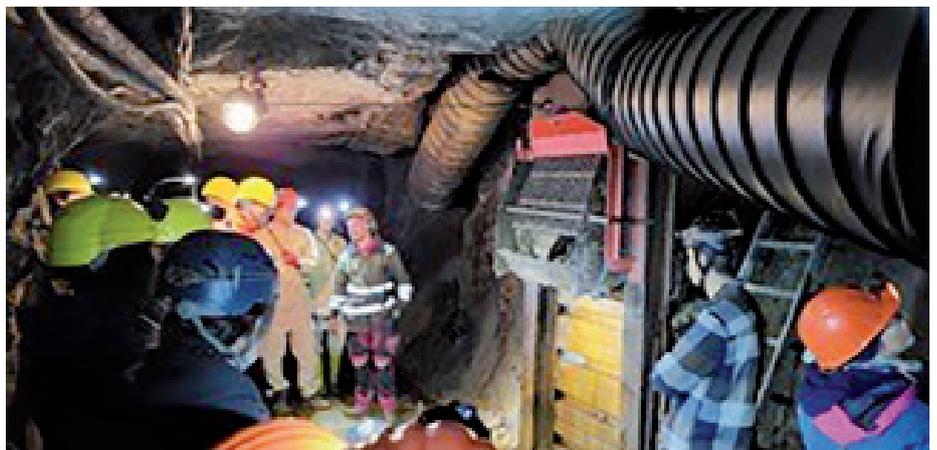


Figure 3: Excursion to the Kropfmühl mine in the southern Bohemian Massif.

# Exploring the depths: A journey into the world's largest underground iron mine

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In April 2023, eight members of the SGA Baltic Chapter embarked on a two-day visit to the Kiruna mine in Norrbotten, northern Sweden (Fig. 1). The mine in Kiruna is operated by the state-owned Swedish mining company LKAB and is the largest underground iron mine in the world. The Kiirunavaara apatite iron ore (IOA) deposit, along with a few other iron mines in the area, serves as the primary source of iron produced in Europe today. The company plays a crucial role in the European Union's iron ore production, accounting for c. 90 percent of the total output (2021)

The northern Norrbotten ore province has a long history of industrial mining dating back to the 17th century. The ore province is dominated by iron and copper production, with the additional extraction of silver and gold. In addition to the conventional iron and base metal resources, the region exhibits promising potential for rare earth elements that could possibly contribute to the transition towards a fossil-free society (Lindberg 2023).

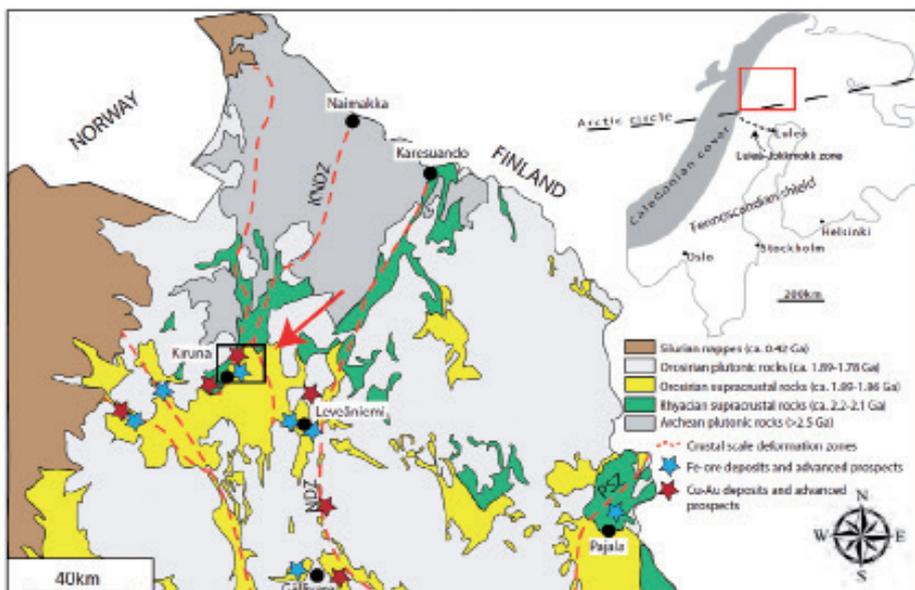
The apatite iron ore in Kiirunavaara is distinguished by the presence of apatite together with high-grade iron mineralisation,

mostly magnetite. Moreover, geochemically, the iron ore demonstrates generally a low Ti content combined with a high content of V (Bergman et al., 2001). The genesis of the Kiruna-type of IOA deposits has been a topic of ongoing research and debate for decades. Two main hypotheses have been proposed to explain the origin of the ores. One well-established hypothesis suggests a magmatic origin, where iron oxide magmas intruded the host rocks (e.g. Frietsch 1978). In contrast, an alternative hypothesis leans towards a hydrothermal explanation, suggesting that the ores were deposited epigenetically by hydrothermal fluids (e.g. Westhues et al. 2017). The Kiruna-type deposit has been discussed to have a potential genetic relation to IOCG deposits due to the presence of Cu and Au (Martinsson et al. 2016). Additionally, during the 1970s, a pseudo-sedimentary-exhalative origin was postulated e.g. Parák 1975). Because of this famous geological dispute, covering the regional geology, host lithologies and deposit related alterations. The stratigraphic column in the area is believed to have formed in an intracontinental back-arc basin. Within the geological setting, the deposit

is found within a succession of porphyritic volcanic and volcanoclastic rocks.

The magnetite-apatite deposit itself consists of a four kilometre-long and approximately 90 meters wide, E-dipping (60°–70°) ore body. The emplacement timing of apatite iron ore in Kiruna is constrained by reported crystallization ages at; 1888 ± 6 Ma (U-Pb, titanite, (Romer et al. 1994), 1878 ± 4 Ma (U-Pb, titanite, Martinsson et al. 2016) and 1877 ± 4 and 1874 ± 7 Ma (U-Pb, zircon, Westhues et al. 2016). The magnetite mineralisation is situated at the contact between a trachyandesitic footwall and a rhyodacitic to rhyolitic hanging wall. Both the footwall and the hanging wall are brecciated by the magnetite ore (Bergman et al. 2001). Based on structural analysis and age dating, it has been determined that the hydrothermal mineral assemblages in Kiruna can be attributed to a minimum of four distinct tectonic events that occurred at different times (Andersson et al. 2021, 2022).

After the coffee break, another presentation was held by Sergio that focused on the structural styles in the ore body. In 2020, the mine was affected by a 4.3 magnitude local-scale seismic event, resulting in significant damage to infrastructure. Since then, there has been a greater focus on detailed structural mapping. After the final presentation we continued our journey deeper into the mine and visited the underground core logging facilities there, we had the opportunity to look at drill core of the different lithologies and alteration styles typical for the Kiruna deposit. The participants learned that the ore types are defined by their Fe and P content and are classified into five categories ranging from high-Fe and low-P to lower-Fe and high-P. The low-phosphorus ore type is massive, fine-grained, and homogeneous with a Fe content of around 68–69% and a low sulphur content. The higher phosphorus ore types contain bands of apatite and often have a higher silica content with a Fe content of around 59–61% and a P content



of approximately 1.5%. We also had the opportunity to get a short introduction to the CAD program used by the drift geologists for mapping lithologies. Just before we left the mine, Sergio philosophically concluded that geology is the most artistic form of science. Like an artist, a geologist must be observant of colours and textures and be able to visualize features in 3D.

After returning to ground level, we made a final stop at the near mine exploration departments of Kiruna and Svappavaara (open pit mine c. 40 kilometres southeast of Kiruna). We were introduced to how a Minalyzer has been successfully implemented in the workflow of core logging. This device uses X-ray fluorescence to scan drill core, causing the minerals to emit characteristic X-ray signatures. The data obtained is valuable for geological interpretation and resource assessment. It is a useful tool to understand the lithology, mineralogy, and geochemical characteristics of the subsurface rocks. Before returning back to Luleå, the participants examined several drill cores and a collection of minerals at the logging facility.

The participants of the trip would like to thank all the staff at LKAB for allowing us to visit their mine and logging facilities.

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Fig. 2 Members of the SGA Baltic Chapter at the Kiruna mine in Norrbotten.

# Finnish pegmatites and Polish copper – 2023 spring and summer activities of the SGA Baltic Student Chapter

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## Polish copper

In March 2023, five members of the SGA Baltic Student Chapter and seven students from the Martin Luther University Halle-Wittenberg took part in a short field trip to the KGHM, Rudna' mine in Polkowice, one of three operational KGHM mines in Lower Silesia. Geologically, the Kupferschiefer area is part of the Fore-Sudetic Monocline. Copper ore is found in Permian rocks, such as Weissliegend sandstones, Basal Limestone, Kupferschiefer shale, and Zechstein limestone. The highest grades of copper, approximately 6%, are found in the shales. Due to the polymetallic character of mineralization, elements such as Ag, Au, Pb, Zn, Re, Ni, and Pt are also recovered. The Rudna deposit is dominated by sandstone ore, accounting for nearly 80% of the resources, while carbonate ores make up approximately 15%, and copper-bearing shale only 5% of the deposit's mass. Before our morning descent into the

mines, we underwent training in the use of self-rescuers and visited the mining rescue station. Following the briefing, we descended more than 1 km underground through the R-1 shaft and switched to Land Rovers specially adapted for mine traffic. After a 15-minute ride through the tunnels, we reached the mining area, where geologists discussed the geology of the deposit and the room-and-pillar system used in this type of stratoidal deposits, as well as the workflow of ore extraction. We also observed mining machines operating underground, such as loaders capable of transporting 16 tons of ore with one scoop, roof bolters, and haulers. Upon resurfacing, we proceeded to the ore enrichment plant located within the same complex. We toured the crushing, grinding, and classification halls, where the technologist introduced us to the secrets of the sulfide ore flotation process in the flotation hall and concentration tanks. We were deeply impressed by the scale and efficiency of the industrial system we had

the opportunity to witness. This visit provided a valuable opportunity to compare the knowledge gained at the university with the geological reality of the largest European producer of copper and silver.

## Hunt for Finnish LCT and NYF pegmatites

On the 27th of April, 13 members of SGA Baltic Student Chapter from Kraków ventured out to Finland with an aim to study selected LCT and NYF Finnish pegmatites finishing in Oulu at the 14th Annual SGA Baltic Student Chapter Meeting. The first stop was closed quarries: Eräpyhä (61.57376, 24.45311), Juurakko (61.57510, 24.52670) and Katila (61.55648, 24.52538) mentioned in the paper by Lahti (1981), located in the Erä järvi district, Orivesi in Southern Finland. Local pegmatite dykes were mined from the beginning of the twentieth century, mainly for feldspar, quartz, beryl, and columbite-group minerals. Our goal was to find minerals such as columbite-tantalite, cassiterite, herzenbergite-teallite series, for the research project focused on pegmatites as an alternative source of Sn and Ta. Unfortunately, the ore minerals weren't as abundant as we would like them to be. After setting up a camp and spending night in the woods, we continued our journey to Viitaniemi pegmatite. Beforehand though, we visited a museum of minerals in Eräjärvi where we could admire a collection of prime specimens of minerals we were after. On the dumps of Viitaniemi, we found both scientifically and aesthetically intriguing ore minerals such as columbite or microlite, as well as fine crystals of topaz, schörl and beryl.



SGA Student Baltic Chapter members exploring the Viitaniemi pegmatite.



Rubelite specimen from Haapaluoma pegmatite dump.

### Viitaniemi

The Viitaniemi Pegmatite is located in the Eräjärvi area, situated in the eastern part of the Early Proterozoic Tampere Schist Belt. The bedrock of this area comprises mica schists, phyllites, and greywackes. Additionally, plutonic rocks intruded into these rocks during the Svecokarelian orogeny (1.80-1.90 billion years ago). Pegmatites containing rare earth metals are considered to be late-stage, post-metamorphic rocks that formed during the Svecofennian orogeny. The Viitaniemi Pegmatite is rich in phosphates, including lithium, boron, and iron-manganese.

It takes the form of a dike, with a width of 100-130 meters, a thickness of up to 10 meters, and a length of several hundred meters. After a full day of digging and breaking rocks, we set up camp nearby and enjoyed lunch while discussing the rocks we had collected.

### Haapaluoma

The third day was dedicated to the Haapaluoma Pegmatite, roughly 30 kilometers southeast of the city of Seinäjoki, near the Ostrobothnian schist belt within the central Finland granite complex. The Haapaluoma Pegmatite consists of two adjacent dikes running in an east-west direction, with dip angles ranging from 50 to 60 degrees northward. These dikes cut through the granodioritic host rock. Additionally, numerous thin apophyses branch out from the dikes.



Group photo of the Student Baltic Chapter members before entering the Pyhäsalmi mine.

The Haapaluoma Pegmatite is complex both in terms of mineralogy and structure.

It contains numerous minerals, including microcline perthite, quartz, albite, and various types of tourmaline (black, green, red), biotite, muscovite, lepidolite, spodumene, beryl, zircon, columbite, cassiterite, apatite, and löllingite. The pegmatite can be divided into three parts: a zoned primary portion, replacement bodies, and fractures filled with fluids that have penetrated the rock. Rare minerals are concentrated in replacement bodies and filled fractures. Despite not being sulfide-rich, we managed to find numerous specimens of Li minerals.

### 14<sup>th</sup> Annual SGA Baltic Student Chapter Meeting in Oulu

The conference kicked off with short presentations introducing the issues of Oulu University and its facilities, the EIT Raw Materials program, and the SGA Baltic Student Chapter. After a short break, it was time for keynote speakers: Prof. Pasi Eilu from GTK, who explored the topic of

Au deposits in Lapland's greenstone belt, and Prof. Shenhong Yang from Oulu Mining School, who delivered a lecture on Ni-Cu-PGE deposits in Finland. In total, the participants listened to 11 lectures and student presentations.

### Pyhäsalmi

The next day, we visited the deepest base metal mine in Europe (1444 m), which also hosts the world's deepest sauna – Pyhäsalmi. While extracting the classic VMS metal suite (Zn, Cu, Ag, Au), common pyrite is also produced in the Pyhäsalmi mine. It is an essential raw material for Finnish fertilizers, sulfuric acid, and phosphoric acid.

Our visit to the mine was conducted by the geological staff of the mine. The mine is in closing mode now. We began with a short lecture, followed by a quick presentation. Afterward, we had lunch and were taken to the processing plant. Nowadays, they are using material from the dump, rich in pyrite. Moreover, we had the opportunity to see the old canyon created by the closed open pit. After a brief walk, we went to the changing room and put on safety uniforms. After a while, we took the elevator and started our underground trip, where we saw the canteen, car park, and some old, non-functioning machines used in the mine. After the walk, we returned to the surface and had a lunch break.

### Kemi

The second field trip of the meeting was a visit to the chromium Kemi Mine, located around 100 km north of Oulu. The deposit was discovered in 1959/1960, and

production started in 1968 using an open pit, concluding with a 1.5 km-long x500 m-wide x 220 m-depth pit completed in 2005. The remnant of that mine activity is a picturesque pit. Efforts underground started in 1999 with an 8 m-wide x 5.5 m-high main decline access on the footwall side of the orebody, about 100 m below the pit rim. It terminates at a depth of 600 m at the base of the hoisting shaft, connecting with several intermediate sublevels. The main workshop at the 500 m level serves the facilities, along with pumping stations and a gyratory crusher. The current mining method is bench-cut-and-fill, a type of sub-level stoping with downhole production drilling. Drifts for the primary stopes are developed laterally from the footwall through the ore zone. Primary stopes are 25 m high, 15 m wide, and between 30 and 40 m long. Secondary stopes are identical but 5 m wider. Cemented fill and fly ash are placed in the primary stopes, while the secondary stopes are backfilled with mine waste rock. The primary stopes are extracted one or two levels above the secondary stopes. Mining sublevels with 5 m x 5 m cross sections are established at 25 m vertical intervals. The Kemi long zone varies from 5-105 m in width with an average thickness of 40 m. The mine chromite deposit is part of the Kemi layered intrusion which is a 2.4-billion-year-old mafic-ultramafic layered intrusion, extending 15 km northeast of Kemi, hosts eleven chromite ore bodies within a 4.5 km chromite-rich horizon appearing 50-200 m above the bottom of the intrusion with an average dip of 70 degrees northwest. Reserves total 50 Mt, grading 25-26% Cr<sub>2</sub>O<sub>3</sub>, with annual mining production of 2.7 Mt of ore and 530,000 t of ferrochrome alloy [2018]. The main immediate host rock is weak talc-carbonate, in which the hanging wall contact is clearly defined. At the footwall, the chromite and host rock are inter-layered and must be mined selectively. However, there is strong granite some 80 m below the footwall (Mindat.org).

Our visit to the mine was conducted by the chief of the geological staff. After a short lecture about the mine, changes, and planned future, we boarded a specially prepared bus for mine travels and headed to our first stop, which provided a view of the Kemi open-pit canyon. The next part involved traveling underground through granitic corridors to reach a depth of 500 m.



One of the student presentations from the Meeting.



Group photo of the Student Baltic Chapter members with Kemi chromite mine in the background.

Since the mine is operational, our trip was limited to observing underground facilities, including the car park, workshop, canteen, breakroom, some offices, the drill core room, and, most intriguingly, the room from which the machines are controlled online, similar to a video game, using a joystick and buttons. After the tour, we returned to the surface for a lunch break.

The final point of our visit to Kemi was to explore outcrops near the mine to see other parts of the layered intrusion. This marked

the last part of our visit and the conclusion of the meeting. After a quick investigation of the outcrops, some rock exchanges, greetings, and gift exchanges, we parted ways and began our journey safely back to our respective homeplaces.

We would like to express our gratitude to every participant of the meeting, especially the keynote speakers and students who contributed with their presentations, and a special thanks to Tapio Soukka for organizing the event in Oulu.

# SGA at the Nordic Geological Winter Meeting

By Nils Jansson and Axel Sjöqvist

The 36th Nordic Geological Winter Meeting (NGWM) was arranged in Gothenburg, Sweden, 10 - 12 January 2024. The Society for Geology Applied to Mineral Deposits had a strong presence at the conference, with several past and current council members giving keynote lectures on mineral deposits, as well as a booth at the trade show.

The Nordic Geological Winter Meeting is a biennial conference, which rotates between the five Nordic countries. Following the 2022 conference in Reykjavík, Iceland, it was now Sweden's turn to host the meeting. The organizing committee consisted of board members of the Geological Society of Sweden supported by a local group from Gothenburg. The NGWM2024 was a great success with 535 attendants from 25 countries, and 337 oral presentations and 130 posters covering the full range of the Earth Sciences. More than 50 of the scientific contributions were within the field of mineral deposit research, spread across three dedicated sessions and a plenary talk on critical raw materials.

The session "Economic Geology – Metallogeny of the Nordic countries and beyond" was chaired by Nils Jansson (Luleå University of Technology, Sweden) and Jukka-Pekka Ranta (Oulu University, Finland) and was the largest session of the conference with 23 talks on a wide range of deposit types (e.g. skarn, VMS, ortho-

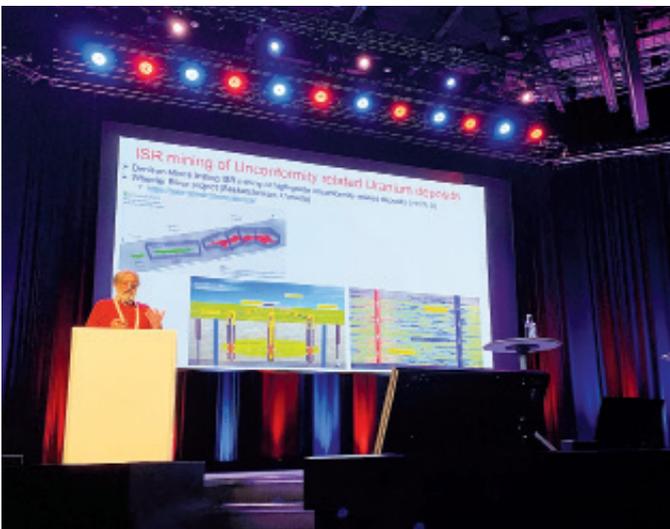


SGA booth manned by Pasi Eilu and PhD student Filip Siman, Baltic student chapter.

magmatic Cu-Ni-PGE, LCT pegmatites, shale-hosted V, orogenic Au). The session had two keynote speakers, Patrick Ledru and Pasi Eilu, whose attendance at the conference was sponsored by the SGA.

Patrick Ledru's keynote was entitled "Exploring uranium mineral systems: challenges and opportunities" and presented a mineral system approach to the exploration for unconformity- and sandstone-hosted U-deposits. It also covered the importance of full consideration for the modifying factors (ESG, processing etc.) and emerging technologies and demands when assessing the feasibility of uranium mining coupled to the increasing interest in nuclear energy in

northern Europe. Uranium mining and exploration is banned in Sweden since 2018 and since 2021 on Greenland, despite the occurrence of significant deposits and a growing interest in mining. Uraniferous deposits of critical raw materials present ethical dilemmas and opportunities. Pasi Eilu's keynote was entitled "Metallogeny of the Nordics: Fennoscandia and Greenland". True to its title, it was a tour-de-force through the diverse mineral endowment of these regions. Pasi provided an overview of key deposit types in relation to the formation and destruction of the supercontinents Kenorland, Columbia, Rodinia and Pangaea. Pasi also pointed to key questions for future research and exploration, such as the increasing evidence for the presence of ancient evaporites in northern Fennoscandia, and their bearing on the potential for sediment-hosted Ni and Au-Co±PGE and Copperbelt-type deposits. Kathryn Goodenough gave one of the three plenary talks at the conference, entitled "Critical Raw Materials for the Energy Transition". Kathryn provided an overview



Patrick Ledru's SGA sponsored keynote presentation.



Pasi Ellu giving an SGA-sponsored keynote on the Metallogeny of the Nordic countries.

iron ores: iron oxide-apatite (Kiruna-type) and iron oxide-copper-gold deposits (IOCG)” was chaired by Valentin R. Troll (Uppsala University, Sweden) Tobias Bauer (Luleå University of Technology, Sweden), Ulf B. Andersson (LKAB, Sweden) and Jens Henriksson (LKAB, Sweden). It had 12 contributions including a keynote by Fernando Tornos entitled “Spatial and genetic links between magnetite-(apatite) and IOCG systems”.

The SGA had a booth at the NGWM2024 tradeshow manned by Pasi Eilu, Patrick Ledru and Nils Jansson with support from members of the SGA Baltic student chapter. We interacted with current and future members of the society, advertising upcoming events such as the SGA Biennial meeting in Colorado next year and the SGA educational fund.

Altogether, the NGWM2024 was a success and the support from the SGA helped to make this a great arena for communicating state-of-the-art knowledge on mi-

of the current raw material supply challenges that must be overcome to provide the metals and minerals that are required for the technologies of the energy transition, such as electric vehicles and solar panels. The high supply risks of some of these materials do not reflect geological scarcity but rather geopolitical uncertainty, which has led to commodity price fluctuations, opportunistic booms (and busts) in CRM exploration and legislative changes (e.g. the CRM Act) that attempt to support Europe’s internal raw material supply chains. She exemplified by delving into the global Li supply chain and elaborated on her current research on LCT pegmatites. Besides discussing fundamentals of the mineral deposit models, Kathryn also touched on the importance of developments in infrastructure and mineral processing to avoid project bottlenecks, and the role of geologists in the entire supply chain.

Two specialised sessions were held on specific mineral deposit styles. The session “Granite and pegmatite mineral systems: New data – new concepts” was chaired by Edward Lynch (Luleå University of Technology, Sweden), Axel Muller (Natural History Museum, University of Oslo, Norway) and Martiya Sadeghi (Geological Survey of Sweden). It had 14 contributions, mainly covering LCT pegmatites. Encarnación Roda-Robles gave a keynote



Plenary Presentation by Kathryn Goodenough BGS.

entitled “Geochemical tracers for LCT Li-rich pegmatites: from granite to apatite compositions as indicators of Li-mineralization in the Central Iberian Zone”. The session “Recent advances in understanding

neral deposits to a broad crowd of earth scientists. Now we are looking forward to NGWM2026, which will be held in Turku, Finland.

# Inaugural SGA Field Conference

David Huston, Vlad Lisitsin, Ioan Sanislav and Nick Cook  
Conference Organisers

The inaugural SGA field conference was held in Mount Isa and Cloncurry, Queensland, Australia from Monday 31 July to Friday 4 August this year. It brought together over 40 geoscientists from industry, academia and government to discuss the genesis and exploration for iron-oxide-copper-gold, basin-hosted zinc-lead and basin-hosted copper-cobalt deposits. Although held in Queensland, the conference covered the world, with presentations covering all continents except Antarctica. Although the bulk of the delegates were from Australia, many of the speakers were from North America and Europe. The speakers represented a cross section of the exploration and ore genesis community, with broadly equal representations from industry, government and academia.

Except for Wednesday, when we transferred from Cloncurry to Mount Isa, each day consisted of a morning of lectures followed by afternoon visits to core yards or short field trips. Presentations on Monday morning included an introduction to the geology of the eastern Mount Isa Province by Ian Withnall followed by a global overview of IOCG deposits by Louise Corriveau, a presentation on the diversity of IOCG and related deposits in the Cloncurry Evolution Mining Limited is thanked for allowing us to view the drill core and facilitating the visit.

The transfer from Cloncurry to Mount Isa, a distance of about 150 km, was accomplished through a series of field trips. In the morning the Snake Creek and Elaine Dorothy field trips were again offered but with the participants swapping visits. After lunch at a rest stop halfway between Cloncurry and Mount Isa, field trips looking at the regional geology around Greens Creek and at the Mary Kathleen U-REE deposit were offered. All participants met in Mount Isa that evening for an informal conference dinner. Amid an oversupply of pizza, a good time was had by all.

On Thursday we went back to morning lectures and afternoon field visits, concentrating on basin-hosted base metal mineral systems. The first talk, by George Gibson, was on the basin architecture and tectonic



Janelle Simpson presenting on the importance of regional geophysical data in understanding and exploring for IOCG deposits in the Cloncurry district. The upper image is an interpreted seismic transect that passed just to the south of the Earnest Henry deposit. The lower image is the corresponding magnetotelluric image. Both highlight the Gidyea Suture, which is interpreted as a major control on the IOCG deposits of the Cloncurry district. The Earnest Henry deposit is located in the hanging wall to this suture, related to a zone of high electrical conductivity at depth.



Field conference participants inspecting exposure of metasandstone and andalusite schist from the Soldiers Cap Group in the Snake Creek Anticline.



Participants looking at excellent exposures of intrusive rocks at Greens Creek.



Participants on the western Mount Isa Province stratigraphic field trip.

evolution of the western Mount Isa Province. This was followed by the geology of the Hilton-George Fisher deposit by Peter Rea, an overview of the Kupferschiefer mineral province in central Europe by Gregor Borg and a comparison of base metal mineral systems in the Mount Isa Province with

those in central Africa by Stuart Bull. The afternoon's field visits included a visit to the Geological Survey of Queensland's core library in Mount Isa and a regional field trip covering the stratigraphy of the western Mount Isa Province.

On the morning of the final day, Friday, the presentations turned the genesis and exploration for basin-hosted deposits. We kicked off with a discussion by Sam Spinks on the timing of mineralisation in the McArthur River district relative to sedimentation and diagenesis. This was followed by talks on metallic stable isotopes (copper and zinc) in northwest Queensland by Ian Sanislav, regional area selection criteria for basin-hosted mineral systems by Karol Czarnota, mineral system mapping using geochemistry in northwest Zambia by David Wood, and the history of exploration at the Dugald River zinc deposit by Nick Dyrw. This completed the presentations for the field workshop. Field visits for Friday were the same as on Thursday, although with the participants swapping visits.

The goals of the field workshop were to facilitate discussion on the origin and exploration for IOCG and basin-hosted base metal deposits, and to enable interactions between industry, academia and government. There was a lot of discussion, some of it lively, during the presentations that no doubt continued on outcrop. Based on feedback during and after the field conference, the format worked. It has resulted in several collaborations between participants that should further enhance the understanding of IOCG and basin-hosted mineral systems.

The organisers would like to thank the many people who made this field workshop

possible. Amanda Nulty and Judy Botting from James Cook University are thanked for organising catering, venues and many other things. Alanis Olesch Byrne and Suttthida Noptalong, also from JCU, assisted greatly with logistics during the field conference. Luciano Stortini and Simon Richards from Geoscience Australia are thanked for facilitating financial arrangements and organising field vehicles, drivers and passengers, respectively. The small surplus generated from the field conference will be split evenly between James Cook University and the University of Queensland to support student travel.

Being a field conference, organising and leading the field component is essential for success. George Gibson, Ian Withnall, Ioan Sanislav and Alanis Burne are thanked for their leadership of field trips, and Vlad Lisitsin, Courtney Dhnaram, Adam Wright and Hans Dirks are thanked for organising the drill core. George and Ian produced a field guide that was of great use to the participants.

Lastly, Simon Richards and Nick Dyriv are thanked for their efficient handling of a medical emergency during the field conference.

# SGA News

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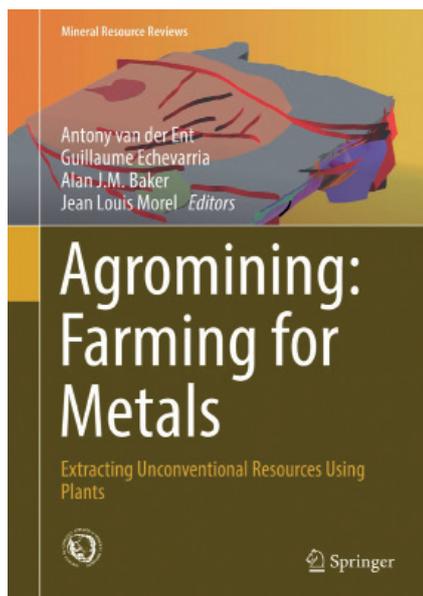
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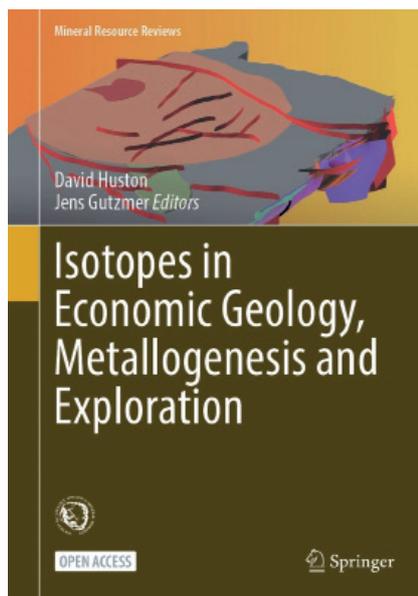
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