



SGA

August 2018
Numbers 42 & 43

News

SGA: a quick look at the last two years ...

Jorge Relvas¹

¹ Dep. Geologia, Fac. Ciências, Univ. Lisboa, 1749-016 Lisboa, Portugal

Now that my term has come to an end, it is time to say a few last words as the outgoing President of SGA. The last two years have been a vibrant period for our Society and a challenging time for all of us who have guided its path. Despite the difficulties that currently characterize the world of economic geology, SGA kept bringing inspired people together in a wide variety of activities. In 2016–17, the SGA continued to organize highly successful metallogeny short courses in Latin America and Africa, and has sponsored student activities and regional meetings, workshops and short courses in all continents, with partner organizations such as the SEG, IAGOD, EAG, GSAf, IUGS and UNESCO. The SGA visibility kept growing across the world. Today, the Society is a stronger, healthier and renowned organization, recognized for its pioneering role in supporting educational activities for students through the SGA Educational Fund, with a very active and quickly growing network of student chapters, and a large, truly global and strongly involved membership, composed of over 1400 people from more than 70 countries.

A big source of pride for all of us is our highly ranked official journal – *Mineralium Deposita*. Bernd Lehmann and Georges Beaudoin, the MD chief editors with their editorial team, are to be congratulated for their excellent work. The impact factor of *Mineralium Deposita* in 2016 reached an impressive value of 3.4, the highest in our field. This is naturally due to the journal's high quality standards, driven by a significant

increase in submission pressure. A new 10-year publishing agreement for *Mineralium Deposita*, starting on January 1, 2018, between SGA and Springer, was negotiated and signed on November 14, 2016, in Brussels. The agreement enables SGA members to buy all Springer publications with 40%

CONTENTS

SGA: a quick look at the last two years...	1
A message from the President of SGA	3
News of the Society (I)	4
News of the General Assembly	7
The 14 th Biennial SGA Meeting, Québec, August 2017	8
SGA Awards at the 14 th Biennial Meeting in Québec City, Canada	11
Call for SGA Award Nominations	17
News of the Society (II)	18
The international project to replicate the teaching mineral collection of the University of Barcelona	22
Field Trip through Catalonia: Barcelona, Prague and Siberia Student Chapters	23
Activities of the SGA Siberian Chapter in 2017: collaborative field trip with Prague and Barcelona Student chapters to Catalonia, September, 4–10, 2017	27
Activities of the SGA Siberian Chapter in 2017: Field trip to the Verkhnetoiskoe iron deposit	28
SGA Student Chapter of Nancy report	30

Report on the 4 th SGA Short Course on African Metallogeny: Granite-related Ore Deposits in the Great Lakes Area, Kigali, Rwanda, 5–9 June 2017	32
ECROFI 2017 International Conference – Report for SGA NEWS	34
Annual of the SGA Peru Student Chapter	35
A fieldtrip through Colombia's western cordillera: ore deposits and relationship with continental crust-forming processes	40
Various metal and fluorite deposits in central part of the Krušné Hory Mts. – Erzgebirge (SGA Student Chapter Prague)	42
Historical mining area Kutná Hora and its surroundings (SGA Student Chapter Prague)	43
XXXV SEG-SGA-UNESCO Latin American Metallogeny Course	45
The VIUI Russian young-geoscientists scientific school "New knowledge in ore-forming processes"	47
News from the SGA Baltic Student Chapter: Field trip to the Kupferschiefer-type Cu-Ag deposits in Poland	49
The 9 th annual Baltic Student Chapter meeting in Poland	50
SGA Baltic and Prague Chapters pre-conference Field Trip – Québec	52
The 8 th Geochemistry Symposium in Antalya, Turkey, 2–6 May 2018	56
5 th SGA-SEG-UNESCO-IUGS Short Course on African Metallogeny	58

discount and includes an annual budget for SGA promotion, in addition to other benefits. A new contract was also signed on “Springer Briefs”, a new Springer Series, in which SGA can participate via invited editorship of different volumes. Moreover, the SGA special publications, as well as some co-editions involving our Society, have achieved remarkable success and new excellent titles are scheduled for the future. A sincere word of great appreciation is due to John Slack, the SGA Special Publications editor, for his excellent work.

The SGA Webmaster, Nikola Koglin, is doing a fantastic job as well. In addition to a more attractive layout, the SGA webpage now includes a number of new functionalities, such as membership renewals, e-ballot, shopping, archives, dynamic info, etc. The number of new webpage visitors has increased immensely, and the SGA Network Facebook profile is extremely dynamic. Furthermore, the SGA newsletter, led by Massimo Chiaradia, is read by an increasing number of people worldwide. However, after 21 years of dedicated effort, Massimo Chiaradia decided to step down from the position of Editor of SGA News. Massimo was involved jointly with Lluís Fontboté in editing SGA Newsletter since the issue no. 1, which came out in June 1996. The SGA Council greatly acknowledges Massimo’s long-term commitment with the SGA Newsletter.

A long process of revision of the SGA Constitution and By-Laws began almost two years ago. The Council at the Spring Meeting of 2017, in Geneva, approved the changes introduced in both documents. Finally, the Constitutional changes were sent to electronic ballot to SGA membership and formally approved. So, the “new” SGA Constitution and By-laws are already in force.

A special highlight was the 14th SGA Biennial Meeting, in Québec City. The global community of ore deposit geologists has acknowledged the Québec Meeting as the premier platform for the exchange of scientific knowledge on the latest developments in our field. The Québec Meeting represented a major milestone for SGA, as it was our first Biennial Meeting in North America. The meeting gathered academic and government scientists, and industry geologists from all over the world. More than 600 participants from 44 countries made this meeting a truly global initiative. The meeting also contributed to promoting excellent research by students, and fostered their proximity with representatives of many mining companies. The SGA Educational Fund distributed 61 grants, worth some

30,000 Euros, to students from 25 different countries. Thanks are due to the meeting sponsors and to the SGA Educational Fund sponsoring organizations for supporting the training of the next generation of economic geologists.

The success of the Québec Meeting was the result of the effective collaboration between many entities, involving a large number of people with a common purpose: the Université Laval, the Geological Survey of Canada, the Ministère de l’Énergie et des Ressources Naturelles du Québec, the Institut National de la Recherche Scientifique “Centre Eau, Terre, Environnement”, and the DIVEX Network and Tourisme Québec. The members of the local organizing committee did a fantastic job and the Council would like to thank them for their energy, competence and professionalism during the organization process. A very special thanks goes to Georges Beaudoin, the chairman of the meeting, not only for his fundamental work in motivating such an outstanding group of colleagues to share with him the organization of the meeting, but also for his flawless leadership and endless dedication, and for his continuous communication and coordination with the SGA Executive Council. I would like to especially express my great appreciation to the session’s chairpersons, keynote speakers, presenters and delegates for their active participation in the meeting and willingness to share their knowledge, research results and expertise. The quality of the presentations was quite high, and the many debates during this meeting provided abundant “food for thought”, which is instrumental in identifying new and promising ideas and areas for future research, analysis and advances. On April 2016, in Lisbon, the Council voted in favour of the Glasgow bid to organize the 15th SGA Biennial Meeting in 2019. The preparations for it have already taken off and I am sure that it will again be a great meeting and a major success.

These lines represent my last opportunity to publicly acknowledge the exceptional collaboration, help and insight that I have received from Jan Pašava, the SGA executive-secretary; Karen Kelley and Anna Vymazalová, the SGA vice president and the SGA vice president for student affairs, respectively; Hartwig Frimmel, the SGA treasurer; Pasi Eilu, the SGA promotional manager, and to all the Regional vice presidents, and remaining SGA Council members throughout my term as SGA president. It was a privilege to serve SGA with you. Thank you so much for your endless trust and willingness. Your

support and advice have always been precious to me.

Last but not least, my final words are to congratulate the newly elected (or re-elected) Council members who took over our Society as of January 1, 2018, led by Karen Kelley, the new SGA President, to whom I wish all the best for her mandate.

SGA News

Nos. 42 & 43 August 2018

CHIEF EDITOR

Jochen Kolb
Institute of Applied Geosciences
Karlsruhe Institute of Technology (KIT)
Adenauerring 20b
D- 76131 Karlsruhe
GERMANY

SGA News is a publication of SGA (Society for Geology Applied to Mineral Deposits) and appears twice a year.

SGA News can be also read in the SGA homepage on Internet:
<http://www.e-sga.org>

CONCEPT AND PRINTING

WMXDesign GmbH
Heidelberg, Germany

LAYOUT

Jochen Kolb, Karlsruhe, Germany

DEADLINE FOR SGA NEWS No. 44
31 October 2018

SGA NEWS – MAILBOX

Prof. Dr. Jochen Kolb
Institute of Applied Geosciences
Karlsruhe Institute of Technology (KIT)
Adenauerring 20b
D- 76131 Karlsruhe
GERMANY

e-mail: editor-sga-news@e-sga.org
jochen.kolb@kit.edu

A message from the President of SGA

Karen D. Kelley¹

¹ USGS MS 973 Box 25046 Denver, CO 80225

As incoming President of SGA, I would like to express my thanks to the many dedicated members who represent our Society. My sincere thanks especially go to the past council members and our past president, Jorge Relvas, for making the society the exceptional international professional organization that it is. They deserve our sincere appreciation for many hours and effort put forth. I also would like to thank Pasi Eilu, promotion manager, and Massimo Chiaradia, editor of SGA News, who have both stepped down after many years in these roles. Jorge Relvas and Jochen Kolb have graciously agreed to take over these tasks. This is also an opportunity to welcome all new members of council, all of whom are listed in this issue. I look forward to the next two years, and will do my best to work with council and others to maintain and grow the high standards of the Society.

Elsewhere in this newsletter, Jorge Relvas nicely summarizes the impressive recent achievements of SGA. There are many aspects of the Society that are a source of pride. These include the growing membership numbers, the growing network of student chapters, our highly ranked journal – *Mineralium Deposita*, our newly revived SGA Special Publications, and our highly successful Biennial Conference held in Québec City in August, 2017. The Québec venue was the society's first Biennial Conference held in North America, and it reflects SGA's commitment to our growing community of ore deposit geologists.

Looking to the future and particularly the next two years as President, I think it is important to remind ourselves of the overall objectives of the Society:

- To advance the application of scientific knowledge in the study and the development of mineral resources and their environment,
- To promote the profession of geology in science and industry,
- To cultivate personal contacts for mutually beneficial relationships and
- To protect and improve professional and ethical standards among its members

The Society meets these objectives through conferences, short courses and workshops, and our publications. Along

these lines, there are many upcoming events in 2018 that SGA is supporting or participating in, and in some cases will provide keynote speakers or field trip leaders. These include the 8th Geochemistry Symposium in Turkey 2–6 May (organized by Karadeniz Technical University), a short course on Gold deposits organized by the Prague student chapter (19–20 May), short course on Fusing geochemistry and structural geology for exploration, mining and research, Helsinki, Finland (21–22 May) and Lulea, Sweden (24–25 May), the Resources for Future Generations (RFG) Conference in Vancouver (16–21 June), the Goldschmidt Conference (organized by the Geochemical Society, Boston 12–17 August), the 15th Quadrennial IAGOD Symposium, 28–31 August in Salta, Argentina, the SEG Keystone Conference in Colorado (22–25 September) and the 5th African Metallogeny short course in Gabon in October. Membership in our society allows reduced rates for many of these activities, and participation in these events connects mineral deposit geologists from academia, government, and industry. This networking ultimately leads to education, mentoring, and high-quality research opportunities.

As with past years, the future role of SGA will be dictated by global trends. The availability of mineral resources will require continued exploration for deep covered resources, better cheaper ways to extract metals in an environmentally sustainable manner, and a better understanding about how mineral deposits form so that we can predict where they are likely to occur. These tasks will require professionals who are well trained in multidisciplinary geosciences, who can work in teams, and who are aware of ever-changing cultural and societal issues. The role SGA can play is to continue to provide education and opportunities for today's students. For those who have attended our biennial conferences, you undoubtedly have noticed the interest and engagement of students and young professionals in scientific talks and in presenting their own research projects. I am confident that our biennial meeting, SGA 2019 in Glasgow, Scotland will be equally vibrant and a great scientific success for



Karen D. Kelley
President of SGA

SGA. We have an impressive Organizational Committee, chaired by Adrian Boyce and strongly supported by his colleagues at the University of Glasgow and other organizations in the UK.

In spite of recent successes of SGA, we need to ask ourselves how we can improve. How can we ensure proper training of the next generation of economic geologists? How can SGA grow its membership among the international community of economic geologists? Our regional VP's are committed to continuing to make SGA visible at events that take place in their regions. But perhaps the biggest key to success is based on the phrase "there is power in numbers". I would like to see continued growth in our membership, not only in terms of total numbers, but also in the breadth of countries from which these members come, and growth in terms of active involvement of members. If you are a student, consider forming a new chapter. We currently have 14 student chapters, with several new ones added in the past two years, from countries such as Peru, Turkey, South Africa, and Russia. I urge you to join our membership and help shape the future of SGA. I look forward to working together to make it a bright future.

News of the Society

SGA Ordinary Council Meeting, Quebec City, Canada, August 19, 2017

J. Pašava (SGA Executive Secretary), Czech Geological Survey, Prague,
jan.pasava@geology.cz

J. Relvas (SGA President) welcomed all council members and IAGOD and SEG representatives and thanked G. Beaudoin for organization of the meeting. Then Georges Beaudoin (Chairman of LOC SGA 2017 and Chief Editor Mineralium Deposita, North American Office) welcomed all council members on behalf of the LOC/SGA 2017. Council approved suggested agenda.

Minutes of previous Council Meeting (April 3rd 2017, Geneva, Switzerland)

After checking the actions, the minutes were unanimously approved.

Presentation of a potential bid for the SGA 2021 in New Zealand (T. Christie)

The draft of proposal for the organization of the 15th SGA Biennial Meeting in Rotorua, New Zealand was presented by T. Christie. J. Pašava emphasized that a call for bids for the 15th SGA Biennial Meeting will be published at the SGA website in late August 2017 with a deadline for submission of bids on February 15th 2018. The council in its spring meeting will decide a location for the 16th SGA Biennial Meeting in 2021.

Reports of officers on Council

- Report from President
- Report from Executive Secretary
- Report from Treasurer
- Report from Promotion Manager
- Report from Chief Editor, SGA News
- Report from Chief Editors, Mineralium Deposita
- Report from Chief Editor SGA Special Publications
- Report from the Chief Editor SGA website
- SGA Educational Fund (K. Kelley)
- Reports from Regional Vice Presidents (Asia, Australia/Oceania, Europe, North Africa and Middle East, Sub-Saharan Africa, North America, South America)

Council was sorry for all missing Reports. After discussion, council approved the presented reports with great thanks and the following motions:

A.S. ANDRÉ-MAYER to inform SGA Executive Council on any progress regarding VAT issue of the 13th SGA Biennial Meeting (2015, Nancy).

ALL COUNCIL MEMBERS who help in promoting SGA and signing up new SGA members to make sure that the correct information is given on the application forms. In particular, the name of the applicant MUST BE THE SAME as the name of the credit card holder. We cannot process payments in the future, for which we do not have the explicit authority of the credit card holder. It is also important to use latest version of application forms (attached to website), asking for 3 digit credit card security code.

J. PAŠAVA to inform Representative of Curran Associates, Inc. on a council decision regarding suggested collaboration on a joint production of print-on-demand versions of SGA proceedings.

P. EILU to continue looking after distribution of SGA promotional

items upon request of SGA Regional Vice Presidents and possibly other council members organizing SGA major and/or co-sponsored geo-events and to help with a smooth transfer of Promotion Manager office after SGA 2017 ballot.

P. EILU to work with help from J. Relvas (and possibly design people from the Lousal Science Centre) in preparation of several drafts of layouts for new portable SGA roll ups (Council would expect to have highlighted major benefits for joining SGA, SGA Educational Fund, Mineralium Deposita and recent collaboration with EAG, which resulted in reduced fee for SGA members when participating at Goldschmidt conferences). These roll ups should then be ordered and distributed in early 2018 to all Regional Vice Presidents.

M. CHIARADIA with help from J. KOLB to prepare the SGA News 42 (deadline for contributions is October 31, 2017).

ALL COUNCIL MEMBERS to help B. Lehmann and G. Beaudoin to identify suitable theme and authors for “milestone papers” for Mineralium Deposita.

J. SLACK to continue editorial efforts associated with 3 SGA Special Publications, which are at different stages of preparation and report to next council meeting (Isotopes in Mineral Exploration; A Hydrothermal History of the Yilgarn Craton and its Relevance to Gold Exploration; and Supergene Mineral Deposits). The publishing of a book on “Agromining” was delayed by about one month (expected date of publication is in September 2017).

N. KOGLIN, J. PAŠAVA, H. FRIMMEL AND CH. LINGE to continue working jointly on introducing a smooth and safe admission process to SGA via website.

N. KOGLIN to arrange for SGA website update during the 2nd half of September.

N. KOGLIN to add new SGA Educational Fund flyers compiled by K. Kelley and J. Relvas and designed in the Lousal Science Centre to SGA website.

K. KELLEY to update list of potential contributors to the SGA Educational Fund and give it to the new Chairman of the SGA Educational Fund Committee and SGA Vice-President for 2018-2019, David Huston after SGA 2017 ballot.

HUAYONG CHEN with help from FAN HONGRUI and other Chinese SGA members to try to set up a new Student Chapter in China.

HUAYONG CHEN to organize jointly with other SGA Council members SGA booth and promotion at the SEG 2017 Beijing Meeting and to promote SGA at the 12th Ore Deposit Model and Exploration workshop to be held in November 2017 in Changsha, China.

S. PIERCEY to ensure a smooth transfer of his Regional Vice President duties to a new North America Regional Vice President after SGA 2017 election.

Constitutional and By-Laws changes – result of election (J. Pašava)

The report was presented by J. Pašava. The vote on the change of the SGA Constitution was closed on June 4th 2017. We received 95 votes, 94 of which were in favour of suggested changes and 1 vote

against. The newly approved version became effective on July 4th 2017. The vote on changes of the SGA By-laws was mailed out to councillors on July 12th 2017 and closed on August 20th 2017. The document was approved by requested three-quarter majority of council vote (24 votes). Council accepted the report with great thanks.

Actions:

J. PAŠAVA to provide Nikola Koglin with the approved version of the SGA Constitution and By-laws for display at SGA website.

H. FRIMMEL to inform Swiss authorities on the approved changes in the SGA Constitution and By-laws.

Report from the Chairman of the Nominating Committee including result of Council vote (J. Relvas, J. Pašava)

The report was presented by J. Relvas who thanked both members of the Nominating Committee (former SGA Presidents – F. Tornos and P. Weihed). J. Pašava informed that the final list of officers nominated for upcoming SGA election was approved by a majority vote by SGA Council on July 20th 2017. Council accepted the report with great thanks.

Action: J. PAŠAVA and N. KOGLIN to organize SGA ballot by October 15th 2017 at the latest.

SGA 2017 – update (G. Beaudoin)

The report was presented by G. Beaudoin (Chair of the LOC). Abstract submission which was closed on March 6th 2017 resulted in submission of 435 abstracts with finally accepted 402 abstracts from which there will be 204 oral presentations and 198 posters. As of July 18th 2017, LOC received 517 registrations to the meeting, almost ½ non-members and almost ½ students.

Actions:

G. BEAUDOIN to prepare the final report for the next council meeting and a brief article for the upcoming issue of SGA News (by 31 October 2017).

J. PAŠAVA to prepare an article on SGA Awards at the 14th SGA Biennial Meeting for the upcoming issue of the SGA News (by 31 October 2017).

SGA 2019 – update (A. Boyce)

The update, including a video – an invitation to the 15th SGA Biennial Meeting, was presented to SGA Council on behalf of Adrian Boyce, who could not make it to the meeting, by SGA liaison - David Banks. The meeting under the title “Life with Ore Deposits on Earth” will be held in Glasgow, Scotland on August 27–30, 2019. The flyer was printed and distributed to participants at the 14th SGA Biennial Meeting in Québec City. A new conference website was set up at www.sga2019glasgow.com. A brief presentation – an invitation to the 15th SGA Biennial Meeting – will be presented at the SGA Closing and Student Awards Ceremony. Council approved the presented report with great thanks.

Actions:

A. BOYCE to sign a Memorandum of Understanding between SGA 2019 LOC and SGA and send it to J. Pašava for further administration.

A. BOYCE to provide basic info on the 15th SGA Biennial Meeting for the upcoming issue of SGA News (by 31 October 2017).

Call for bids for the 16th SGA Biennial Meeting (2021)

The report was presented by J. Pašava. Council accepted the report with great thanks and approved that a call for bids for the 16th SGA Biennial Meeting (2021) will be announced at the SGA website by

the end of August 2017 with a deadline of February 15th 2018 for submission of bids.

Action: J. PAŠAVA to provide N. Koglin with a text of call and revised guidelines for the organizing and managing of SGA Biennial Meetings to be displayed at the SGA website by the end of August 2017.

Progress report on membership drive from the last SGA Council Meeting (P. Eilu, A. Vymazalová and J. Pašava)

P. Eilu presented this report. The Society had 1,220 paid-up members by December 31st 2016. Presently SGA has 1,322 paid-up members. During the past four months, we received 255 new members: 1 senior, 45 regular and 209 student members. It is important to attract student members to become regular members and to make regular membership more attractive. After discussion, council approved the report with great thanks and the following motion:

J. Relvas to address all Regional Vice Presidents with a request for their collaboration regarding non-renewing members.

Status of development of SGA Student and Young Scientist network (A. Vymazalová)

The report was presented by A. Vymazalová. In 2017, three new SGA Chapters were created: NW Russia, Western Cape (South Africa) and Turkey. In total SGA has 13 student chapters (Baltic, Barcelona, Colombia-Bucaramanga, Colombia-Bogota, Laval, Nancy, NW Russia, Morocco, Peru, Prague, Siberia, Turkey, Western Cape) and a proposal from China (having already over 30 student members) is in preparation. To enable participation in the 14th SGA Biennial Meeting, SGA Council offered 61 student grants to students from 25 countries plus one professional from economically disadvantaged country with the total value of 29,222 EUR. Nine presentations by different chapter representatives are planned for the SGA General Assembly (August 21, 2017). Council approved the report with great thanks.

SGA Awards – update (S. Piercey)

The report was presented by S. Piercey (Chair of the Award Committee) who informed SGA Council about results of Council vote on 2017 SGA awards, which will be presented at the Opening Ceremony of the 14th SGA Biennial Meeting (for further details see article on SGA Awards at the 14th SGA Biennial Meeting in this issue of SGA News). Council approved the report with great thanks.

Action: J. PAŠAVA to organize presentation of the SGA awards at the Opening Ceremony of the 14th SGA Biennial Meeting.

Requests for sponsorship

Prague Chapter – Short Course on Gold Deposits – May 2018 – D. Groves (3000 EUR). – The request was approved without any change.

Action: J. PAŠAVA to inform applicants about council decision. Freiberg Short Course in Economic Geology – “Skarn deposits” – requested EUR 3,000. – The request was approved with a budget of EUR 2,000.

Action: J. PAŠAVA to inform applicants about council decision. Barcelona Chapter – keynote speakers program – workshop on “PGE (Platinum Group Elements) / PGM (Platinum Group Minerals) in the oceanic paleolithosphere” – requested EUR 1050. – The request was approved without any change.

Action: J. PAŠAVA to inform applicants about council decision. MAESA 2017: Breaking New Frontiers, November 2–3, 2017 Myanmar – Khin Zaw et al. – The request was not approved.

Action: J. PAŠAVA to inform applicants about council decision. Kratz Conference – The XXVII Youth Scientific Conference (October 2–7 Saint Petersburg, Russia) – Russian NW SGA Chapter requested EUR 1,000 (SGA keynote and student support). - The request was approved without any change.

Action: J. PAŠAVA to inform applicants about Council decision.

Any other business

Report on the SGA-IUGS-SEG-UNESCO Short Course on African Metallogeny – Rwanda (P. Muchez et al.)

- The Report was presented on behalf of P. Muchez by H. Frimmel. Council greatly appreciated efforts of Phillippe Muchez and his team, which resulted in extremely successful event attended by about 45 participants from a dozen countries (Rwanda, DR Congo, Burundi, Cameroon, Nigeria, Kenya, Zambia, South Africa, Belgium, Germany, Sweden and China). The report will be published in upcoming SGA News.

SGA presence at the IAGOD 2018 Salta, Argentina – update (J. Pašava et al.)

- In order to finalize SGA activities at the 15th Quadrennial IAGOD Symposium (28–31 August, Salta, Argentina), a meeting of SGA President, SGA Vice-President, SGA Executive Secretary and SGA Treasurer with IAGOD President is planned during the 14th SGA Biennial Meeting.

Program of SGA General Assembly (August 21, 2017 Québec City) – J. Pašava

- Considering the limited timing of the SGA General Assembly (scheduled for 1 hour) and presentations of SGA Chapters Representatives, the program was slightly adapted.

Business proposal on SGA proceedings (J. Pašava)

- This item was discussed during reporting of SGA Executive Secretary.

Date and place of the next SGA Council meeting (spring 2018, Glasgow, Scotland, UK) a precise time and venue to be specified in due time.

Informative list of past activities

- Geochemical Exploration Course for the SGA Baltic Student Chapter (May 21–22 Cracow, Poland) – D. Schlatter et al. – sponsored via SGA keynote speakers program
- 4th SGA-SEG-UNESCO-IUGS Short Course on African Metallogeny – Rwanda (June 5–9, 2017 Kigali, Rwanda) – P. Muchez et al.
- FUTORES II Conference (4–7th June 2017 Townsville, Australia). D. Leach approved as SGA keynote speaker (USD 3,000), free booth from LOC

- ECROFI XXIV (European Current Research on Fluid Inclusions) Nancy, France, 23–29 June 2017 <http://2017.ecrofi.uni-lorraine.fr/> – J. Pironon
- SGA presence at Goldschmidt 2017 (August 13–18, 2017 Paris) – possible SGA promotion via Springer booth or independent SGA booth – active involvement of SGA officers attending the Conference

Informative list of future activities

- Vth International Conference “Ultramafic-mafic Complexes, Geology, Structure, Ore Potencial (September 2–6, 2017 Gremyachinsk, Russia) – E. Kislov et al – approved EUR 2000 for SGA student support
- Subduction Related Ore Deposits, September 23–26, 2017 Trabzon, Turkey. I. Uysal et al. – SGA sponsored (keynote speaker and 1,000 EUR for SGA student member support).
- Kratz Conference – The XXVII Youth Scientific Conference (October 2–7, 2017 Saint Petersburg, Russia) – approved EUR 1,000 (for SGA keynote and student support)
- XXXV UNESCO-SEG-SGA Curso Latinoamericano de Metalogenia (November 7–16, 2017 Buenos Aires, Argentina) – a long-term support of USD 2500 approved via a joint SEG-SGA agreement
- 12th Ore Deposit Model and Exploration workshop (November 2017, Changsha, China) – SGA sponsored
- Barcelona Chapter – keynote speakers program – workshop on “PGE (Platinum Group Elements) / PGM (Platinum Group Minerals) in the oceanic paleolithosphere” (November 30–December 1, 2017) – accepted SGA support of EUR 1050
- Freiberg Short Course in Economic Geology – “Skarn deposits” (December 4–6, 2017 Freiberg, Germany) – M. Burisch et al. – approved EUR 2,000 for SGA student support
- Short Course on Gold Deposits (May 19–20, 2018 Prague, Czech Republic) – D. Groves-SGA speaker, organized by the Prague Student Chapter – EUR 3,000 approved
- RFG 2018 (June 16–21, 2018 Vancouver, Canada) – SGA session organized by J. Gutzmer et al. on Geometallurgy
- 15th IAGOD Symposium (August 28–31, 2018 Salta, Argentina) – complimentary booth, SGA session on “Magmatic-hydrothermal mineralizing systems, field trip to Chilean ore deposits, SGA keynote presentation and possible two short courses discussed with the IAGOD President (a subject of approval by IAGOD Council)
- 15th SGA Biennial Meeting (August 27–30, 2019 Glasgow, Scotland, U.K.) – A. Boyce et al.

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.

>>> SGA CORPORATE MEMBERS are offered the special opportunity to advertise for free on SGA News for a space of 1/4 of a page!!!

News of the SGA General Assembly

August 21st 2017 Québec City, Canada

J. Pašava (SGA Executive Secretary), Czech Geological Survey, Prague,
jan.pasava@geology.cz

The General Assembly was opened by the SGA Executive Secretary, Jan Pašava at 11.00 and closed at 12.10. Over 70 people attended the meeting.

1 – Report of the President (J. Relvas)

After presentation of the agenda by J. Pašava (SGA Executive Secretary), J. Relvas (SGA President) delivered the SGA activity report that covered the period from the previous SGA General Assembly (August 25th, 2015 Nancy, France) to date. He highlighted recent developments of the society, approved changes of the SGA Constitution and By-laws, the importance of the foundation and further development of the SGA Educational Fund (he thanked all sponsors who contributed during this period). He also emphasized increasing interest of students in joining the society, with increasing number of new SGA Chapters and overall increase in membership in the years of Biennial Meetings, increasing quality of SGA Biennial Meetings, increasing quality of the societies' journal *Mineralium Deposita* (which achieved the highest impact factor amongst mineral deposit journals for the current reported period), and the signing of a new long-term contract between SGA and Springer. He also commented on the importance of re-introducing the SGA Special Publications, the increasing quality of the SGA website, the need of better collaboration with industrial partners, and the desire of SGA to continue making the society more attractive to all membership categories. He also thanked M. Chiaradia who stepped down from his position of Chief Editor, SGA Newsletter and to all Council members who served during his term (2016–2017). J. Pašava then thanked the present SGA President for his extraordinary work for SGA. The report was approved by the General Assembly.

2 – Report of the Treasurer (H. Frimmel)

H. Frimmel presented the Financial Report covering the period from August 2015 to August 2017. The balance on the SGA account on December 31st 2015 was € 754,360.65 and on July 16th 2017 it was € 795,595.54, showing that the society is financially healthy. The balance on the account of the SGA Educational Fund on July 16th 2017 was € 65,389.03. Two SGA members who do not serve on Council (as per SGA Constitution) audited all SGA books for the Years 2015 and 2016. These were Dr. T. Graupner and Prof. M. Okrusch, who did not find any discrepancies with the accounting. SGA is actively moving towards an on-line membership admission process. The report was approved by the General Assembly.

3 – Report of the Vice-President on the SGA Educational Fund (K. Kelley)

The SGA Educational Fund was established in May 2013. The objective of the SGA Educational Fund has been and remains to provide financial support for training activities in mineral deposit geology. SGA Educational Fund sponsorship should be a seal

of approval of the scientific validity of the training activities in relation to understanding mineral deposit formation and how to explore to find new mineral deposits. Specific objectives are:

1. to support student participation at national and international scientific meetings organized or sponsored by the SGA;
2. to support student participation on field trips, workshops and short courses sponsored by the SGA;
3. to support SGA-sponsored student activities.

K. Kelley (chair of the SGA Educational Fund Committee) thanked all members of the Committee (H. Frimmel, J. Relvas, D. Leach and S. Redwood), which is responsible for the management of the SGA Educational Fund funds, including granting funds according to the objectives of the SGA Educational Fund.

Thanks to generous contributions from the Geological Survey of Sweden, SGA, Sinotech, AngloGold Ashanti Australia, Tintina Resources, BHP Billiton and Barrick Gold, we were able to support over 60 students at this SGA 2017 Meeting, student's participating in the Gold Short Course (Prague, September 2013) and many other geoeducational events including the African Metallogeny Course (Kigali, Rwanda, 2017). The report was approved by the General Assembly.

4 – Report of Student Chapters Representatives (A. Vymazalová et al.)

Anna Vymazalová (SGA Vice-President of Student Affairs) guided this part of the SGA General Assembly when representatives of the following student chapters presented their past and future activities:

Baltic Chapter (Krzysztof Foltyn), Barcelona Chapter (Nuria Pujol Sola), Colombia-Bogota Chapter (Ahmed Bonilla), Colombia-Bucaramanga Chapter (Matheo Espinel), Nancy Chapter (Julien Perret), Laval Chapter (Alexandre Krushnisky), Prague Chapter (Marek Tuhý), Peru Chapter (Miguel Quintana Hernandez), Siberia Chapter (Evgenyi Yakovlev) and Turkey Chapter (Gulcan Bozkova).

5 – Presentation of the list of the Officers nominated for SGA 2017 ballot (J. Relvas)

J. Relvas presented a list of nominated officers for the upcoming SGA ballot, which was completed by the Nomination Committee and approved by SGA Council. The ballot will be distributed to SGA Membership in October 2017.

6 – Miscellaneous

No other topics were raised by the SGA members present.

The 14th Biennial SGA Meeting, Québec, August 2017

Georges Beaudoin, Chair; Université Laval

The 14th Biennial SGA Meeting took place at the Québec Convention Center, from August 20–23, 2017, under the fair summer weather of Québec city. For its first edition in North America, the meeting was a great success, cementing the SGA's Biennial Meetings as the premier conference on mineral deposits, worldwide. The 566 delegates included 34% students, all of which came from 42 countries from five continents, making the SGA meeting truly international gatherings. About 170 delegates, including 127 students, participated to the widely popular Student-Industry Event, organized by the the Université Laval-INRS SGA Student Chapter.

Tab. 1: Scientific program of the 14th Biennial SGA Meeting, Québec 2017

	SYMPOSIA
SY01	Gold through time and space
SY02	Magmatic sulfide and oxide ore deposits in mafic and ultramafic rocks - a symposium in memoriam of the work and life of Prof. Hazel Prichard
SY03	IOCG-IOA ore systems and their magmatic-hydrothermal continuum: A family reunion?
SY04	Critical and precious metal deposits: theory, experiment and nature - a symposium to recognize the work of A.E. Williams-Jones
	SESSIONS
S01	Geology, geodynamics and metallogeny of the Rhyacian (2.35 - 2.05 Ga)
S02	Ore-forming magmatic-hydrothermal processes along active margins
S03	Key controls on the quality (size and/or grade) of metal deposits in volcanic and sedimentary basins
S04	Uranium deposits: from source to ore
S05	Iron ore - deposit to global scale processes
S07	Developments of geochronological methods and their application to date ore forming events
S08	From fertility to footprints: New vectoring tools for mineral exploration
S09	Geometallurgy: risk reduction through communication, optimization and innovation
S10	GSC@175: How can government promote exploration success
S11	Resources development and perception/acceptability: The role of geosciences
S12	Gem Research: Beautiful windows into Earth's interior
GS01	General session

Tab. 2: Short courses

Short Course	Title	Leaders
SC1	Physical processes in magmatic sulfide ores and architecture of their host intrusions	Stephen J. Barnes (CSIRO) James Mungall (University of Toronto)
SC2	High Technology metals (REE, Nb-Ta, Li)	Iain Samson (University of Windsor), Robert Linnen (Western University), Anthony Williams-Jones (McGill University)
SC3	Exploration geophysics – new methods, cases studies, modeling	Lyal Harris (INRS-ETE), Bernard Giroux (INRS-ETE), Christian Dupuis (Université Laval)
SC4	IOA, IOCG and affiliated deposits	Louise Corriveau (Geological Survey of Canada), Hamid Mumin (Brandon University), Patrick Williams (Clump Mountain Geoscience Pty Ltd)
SC6	Exploration management and targeting with 3D multidisciplinary models	G. Perron (Mira Geosciences)
SC8	Recent advances in CT and LA-ICP-MS applied to mineral exploration	Charley Duran (UQAC), Sarah Jane Barnes (UQAC)

The scientific program consisted of 4 symposia and 12 sessions (Table 1). The symposia and sessions addressed the current major topics relevant to mineral deposits. The scientific program presented leading-edge research on mineral deposits in 396 abstracts assembled in the 1681 pages of the four volumes of the conference proceedings. The program comprised 203 oral presentations, including 22 keynote addresses, and 194 poster presentations that were displayed for the 4 days of the meeting. The oral and poster sessions were well attended and inspiring.

The scientific program was complemented by six short courses (Table 2). The short courses were very well attended, with 122 delegates and up to 36 registrations in SC8! Each course included a free student registration. Likewise, we organized five field trips, from the Ungava to Guyana, which were fully subscribed by 80 delegates (Table 3). The strong participation included 30% from industry, 23% from academia, 16% from government and 31% students, including a free student participation in each field trip attesting to the strong focus of SGA on student training (Figure 1).

The 14th SGA Biennial Meeting was also a financial success. This was largely a consequence of the strong industry and government support that contributed 107,500 CAD to the sponsorship

Tab. 3: Field trips

Field Trip	Title	Leaders
FT-01	Physical volcanology and metallogenesis of the Ni-Cu-PGE deposits in the Cape Smith Belt, Québec, Canada	C.M. Lesher (LU), M.G. Houlé (GSC)
FT-02	Iron oxide and alkali alteration, skarn and epithermal mineralizing systems of the Grenville Province, Canada	L. Corriveau (GSC), O. Blein (BRGM), F. Gervais (Polytechnique), P.H. Trapy, S. De Souza (UQAM)
FT-03	Gold mineralization in the Guyana Shield, Guyana and Suriname, South America	M. Bardoux, M. Moroney, F. Robert (Barrick)
FT-05	Québec fortified city: geological and historical heritage (for all)	S. Castonguay (GSC)
FT-06	Precious and base metal deposits of the southern Abitibi greenstone belt, Superior Province, Canada	P. Mercier-Langevin (GSC), J. Goutier (MERN), B. Dubé (GSC)

Tab. 4: Composition of the Local Organizing Committee

President/Chair		Georges Beaudoin	Université Laval
Vice-President		Jean-Yves Labbé	Ministère de l'Énergie et des Ressources naturelles du Québec
Treasurer		François Huot	Université Laval
Scientific Program	Chair	Patrick Mercier-Langevin	Geological Survey of Canada, Natural Resources Canada
	Co-Chair	Benoît Dubé	Geological Survey of Canada, Natural Resources Canada
		Claude Dion	Ministère de l'Énergie et des Ressources naturelles du Québec
		Pierre-Simon Ross	Institut national de la recherche scientifique (INRS)
		Marc Bardoux	Barrick Gold Corporation
Field Trip	Chair	Michel Houlé	Geological Survey of Canada, Natural Resources Canada
	Co-Chair	Anne-Aurélien Sappin	Université Laval
Short Course	Chair	Jean-Yves Labbé	Ministère de l'Énergie et des Ressources naturelles du Québec
	Co-Chair	Marc Constantin	Université Laval
Registration	Chair	Valérie Bécu	Geological Survey of Canada, Natural Resources Canada
		Émilie Bédard	Université Laval
		Laurène-Marie Wavrant	Université Laval
Publication		Claude Dion	Ministère de l'Énergie et des Ressources naturelles du Québec
Communications		Jean-Daniel Bourgault	Institut national de la recherche scientifique (INRS)



Fig. 1: Photos with the participants of each field trip at the 14th SGA Biennial meeting held in Québec City. A) Participants of the FT-01 field trip at the NC20C area in the Cape Smith belt, Nunavik, Québec. B) Participants of the FT-03 field trip at the Karouni Project site in Guyana. C) Participants of the FT-02 field trip in the Bondy Complex, southeast of Mont Laurier. D) Participants of the FT-05 field trip at the Plains of Abraham in Québec City. E) Participants of the FT-06 field trip at the Dufresnoy gabbro outcrop with the former Norbec mine in the background.



Fig. 2: The Gala Dinner at the Château Frontenac.



Fig. 3: Delegate showing music skills during the Famille Painchaud concert.

program. The surplus from the meeting of ca. 112,000 CAD was shared 50-50 between the SGA and the LOC. The share of the LOC has been placed in the Université Laval Foundation, where it is designated to provide for bursaries to Laval and INRS students presenting at future SGA meetings.

A SGA Biennial Meeting does not happen without a few well attended social activities. Between the walking tour of the Old Quebec World Heritage Site, the sweet treats at the Sugar Shack and the visit and dinner at the magnificent Traditional Huron Site, the highlight was the Gala Dinner in the Ballroom of the Chateau Frontenac, where 230 guests (Figure 2) were treated to the excellent cuisine of the most photographed hotel in the world and enjoyed the outstanding and stunning performance by the Famille Painchaud, where some delegates showed their unsuspected skills (Figure 3).

A successful international meeting such as the SGA's flagship Biennial Meeting is the product of the team of dedicated volunteers of the Local Organizing Committee (Table 4). During the last 4 years, we shared the pains of planning such an event, but also the joy of seeing unfold successfully with engaged delegates. It is their enormous contributions that allowed welcoming the delegates in our beautiful city of Québec. In addition to the members of the LOC listed in Table 4, I extend my gratitude to the members of the scientific committee that organized symposia and sessions, and which revised the 396 abstracts of the proceedings. I also want to thank the short course and field trip organizers for their contributions to the success of the 14th SGA Biennial Meeting. Finally, I extend special thanks to the numerous students, who volunteered to help running the meeting.

SGA Awards at the 14th Biennial Meeting in Québec City, Canada

J. Pašava (SGA Executive Secretary), Czech Geological Survey, Prague,
jan.pasava@geology.cz

Similarly as at the 11th, 12th and the 13th SGA Biennial Meetings, the Awards Ceremony was a part of Opening Ceremony at the 14th SGA Biennial in Québec City. The following SGA awards were presented during the Opening Ceremony, which was held on August 20, 2017 from 9.00 to 11.00 and attended by Mr. Pierre Keating (Deputy Minister Energy and Natural Ressources, Québec), Dr. Donna Kirkwood (Chief Scientist, Natural Resources Canada), G. Beaudoin (Chair of the LOC-SGA 2017), J. Relvas (SGA President) and J. Pašava (SGA Executive Secretary):

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 a travel grant to the biennial meeting for the presentation.

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

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

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

The fourth recipient of the SGA-Newmont Gold Medal became Dr. Michel CUNEY at the 12th SGA Biennial Meeting in Uppsala, Sweden (2013).

The fifth recipient of the SGA-Newmont Gold Medal became Dr. Steve D. SCOTT at the 13th SGA Biennial Meeting in Nancy, France (2015).

The sixth recipient of the SGA-Newmont Gold Medal became Dr. David LEACH who was nominated by K. Kelley and finally selected by SGA Council out of two pre-selected candidates. After introduction and explanation of the history of the medal by J. Pašava, citation was presented by K. Kelley. The medal was presented by J. Relvas (SGA President), who also congratulated David on behalf of G. Simon (Vice-President, Exploration Newmont) and J. Pašava (SGA Executive Secretary). Then D. Leach, who accepted the award, presented the acceptance speech. The following citation was prepared and delivered by K. Kelley (USGS Denver):

President Relvas, ladies and gentlemen, I am honoured to present the citation of Dr. David LEACH – the sixth recipient of the SGA-NEWMONT GOLD MEDAL. This is our society's highest award for an exceptional career in ore deposit research. Dave graduated with an undergraduate degree from Virginia Polytechnic Institute, and then continued at the University of Missouri, where he obtained his Ph.D. degree in 1973. He worked for the Lawrence Livermore National Laboratory for several years, and joined the USGS in 1976.

He “retired” in 2009 from the USGS and has been with Global Geoscience Consulting ever since. He also currently serves as a Research Professor at the Colorado School of Mines.

I first met Dave when I started my career with the USGS in 1980. At that time, he was building a world-class fluid inclusion laboratory, and together with a group of young scientists, he took the lead on ore fluid studies of MVT Pb-Zn deposits in the US. These data led to a number of classic papers in the 1980s that indicated the then-existing MVT model relating ore formation to normal sedimentary basin evolution was incorrect. Instead, David and colleagues showed how orogeny led to continental-scale flow systems that formed MVT deposits. In subsequent years, he tested these pioneering ideas that proved consistent for deposits all over the world, including those in Europe, northern Australia, and North Africa.

David also became active in the study of clastic dominated Pb-Zn deposits, otherwise known as SEDEX deposits, including the giant Red Dog deposit in Alaska. This work allowed my path to cross directly with Dave's, and I spent many gratifying years working with and learning from Dave's vast experience with sediment-hosted deposits. As evidenced by his invitation to take the lead on the benchmark paper in the Economic Geology 100th Anniversary Volume, the research conducted by Dave has greatly influenced our present-day thinking on ore genesis of sediment-hosted Pb-Zn deposits. Most recently, David has focused his research on the secular evolution of sediment-hosted Pb-Zn deposits, with significant papers relating ore formation to ocean evolution, passive margin development, changes in Earth oxidation, and supercontinent evolution. He has applied his knowledge to Pb-Zn deposits in China, and has developed a salt diapir model for the giant Jinding deposit, a model that has changed exploration criteria for Pb-Zn deposits. In summary, no one has contributed more in the past 40 years to our understanding of Pb-Zn metallogeny than David Leach.

One of his greatest contributions is his role as a leading mentor in economic geology. He has devoted endless time to helping students and young scientists within the USGS, as well as Australia, China, Europe, and northern Africa. David's collaborations and mentorships are obvious from his extensive publication record. He has authored or coauthored more than 150 papers, including articles in Economic Geology, Geology, Mineralium Deposita, and several book chapters. He has presented invited talks on his research in more than 25 countries, some as an SEG-International Exchange Lecturer, and he has chaired or led countless sessions and workshops at international conferences. David's accomplishments have led to numerous awards, including the 2009 USGS Meritorious Service award and the SEG gold medal in 2010.

Among his most significant contributions has been his long-term involvement and commitment to SGA, first serving as Regional Vice-President for North America, then Vice-President and President of SGA, and then as Treasurer. His involvement was instrumental in bringing SGA to North America and in making it an international society of ore deposits research.

On behalf of SGA, I would like to congratulate Dr. David Leach for this prestigious award. We look forward to many more



Fig. 1: Presentation of the SGA-Newmont Gold medal during the Opening Ceremony of the 14th SGA Biennial Meeting in Québec City, Canada. D. Leach – recipient of the award (in the middle) with J. Relvas – SGA President (left) and J. Pašava – SGA Executive Secretary (right). Photo by L. Leblanc.



Fig. 2: David Leach (recipient of the 2017 SGA-Newmont Gold Medal) with his wife Susan at the 14th SGA Biennial Meeting in Québec City, Canada. Photo by L. Leblanc.

achievements from him in the geosciences, and we wish him well on all his endeavors, together with his wife Susan and their children and grandchildren.

The following acceptance speech was delivered by D. Leach:

Thank you, Karen, President Relvas and Dr. Pasava.

I am deeply honored to receive the prestigious SGA Newmont Gold Medal. I am thankful to the SGA council and the nomination committee.

As a recipient of a career award, I recognize that professional success depends on the people that have been part of my life's journey. I view this award as a reflection of the exceptional people that I have worked with and the opportunities provided by organizations I have been associated with.

The study of ore deposits has been more than a profession or a job, it is a life style that I have approached with passion and excitement. The most difficult part of my journey has been trying to find a balance between my love for science and the most important love in my life – my family. Fortunately, my wife Susan has been the rock of my family, understanding, encouraging and truly essential to my journey.

My journey began when I started graduate work under Alden Carpenter, a pioneer in the study of sedimentary brines that would become a foundation for understanding the genesis of sedimentary rock-hosted ore deposits. I was fortunate to have joined the USGS during its golden age of ore deposit research. My first projects included working on the giant polymetallic veins of the Coeur d'Alene district with Al Hofstra and Gary Landis, and on MVT deposits in North America with Don Sangster, Elisabeth Rowan, Dwight Bradley and John Viets. An adventurous and colorful time during my journey was the early work on orogenic gold systems with Rich Goldfarb - I could write a book on the "Goldfarb period." The most intensely productive period in my journey was the USGS Red Dog deposit project with Karen Kelley, Erin Marsh, Craig Johnson, John Slack, Julie Dumoulin and the Red Dog team. Lessons learned from the Red Dog studies provided the foundation for new perspectives on world sediment-hosted ores that included contributions from Dwight Bradley, Sergei Pisarevsky, David Huston, Ryan Taylor and Garth Graham.

A remarkable period of my journey began after I visited the University of Paris in the early nineties and met Professor Ghislain de Marsily. Thanks to Ghislain, I began a nearly 10-year period of

collaboration on MVT deposits in Europe and North Africa – which marked my transition from a provincial perspective of MVT ore systems to global systems.

After retirement from the USGS in 2010, I am now enjoying a period of "re-discovering MVT systems" and learning about the importance of evaporite-bearing rocks in ore genesis with Song Yucai at the Chinese Academy of Geoscience in Beijing and Salah Bouhrel at the University of Tunis.

Finally, my career included working with SGA – sharing time with dedicated and generous geologists to advance ore deposit studies and to help students move forward in their career. My time serving SGA will continue to be one of my most satisfying professional memories.

My great appreciation to SGA and Newmont for this recognition of my geological journey with my colleagues.

The SGA Young Scientist Award

The SGA Young Scientist 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 Levesse (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 the SGA-Barrick Young Scientist Award was Dr. Huayong CHEN (China) – 2015

The following citation was prepared and presented by S.J. Barnes:

Sarah Dare is an adventurous soul, which is probably what led her into geology. Her Ph.D. was on ophiolites from United Arab Emirates and involved field work in a country where driving is a blood sport. On her arrival in Canada, to begin her post doc on trace elements in magmatic sulfides, I sent her to Sudbury to commence sampling while the snow was still on the ground. But she did not complain she just asked where to buy thermal underwear. During her first post-doc we visited some of the remote corners of China and sampled some of the most exotic dishes, and here I do not mean chicken feet, there are bits of animals that westerns have never thought of eating, but she gamely ate it all. Of course, I should mention that everything was washed down with a fiery white alcohol called Baijiu and after a few glasses the food does not seem exotic anymore.

I consider Dr. Sarah Dare as one of the best post-doctoral students that it has been my pleasure to supervise. Sarah has accomplished a lot in a very short time. She obtained her Ph.D. in 2008 from Cardiff University with the world famous Prof. Julien Pearce. The topic was trace element contents of chromites and their use in petrogenetic studies. This work resulted in two publications one in Chemical Geology and in Gondwana Research and has been well received in the academic community.

For her post-doctoral work, she moved to the Université du Québec à Chicoutimi and into world of economic geology. This work was funded by the Canada Research Chair in Magmatic Ore Deposits and directed by myself. The topic of her post-doctoral work was chalcophile and siderophile element contents of pyrrhotite, pentlandite, pyrite and chalcopyrite from the Sudbury Igneous Complex, the World's largest or second largest magmatic nickel sulfide camp. The project addressed both petrogenetic and economic topics by considering the question of the role of base metal sulfides in controlling these elements as against the role of platinum-group minerals. The detailed laser and SEM analyses produced surprising variations in the minerals controlling platinum, such as the result that in some deposits sperrylite crystallized early and depleted the sulfide minerals in Ir, Rh and Pt, whereas in other deposits these elements are concentrated in pyrite. She also showed convincingly that many elements such as As, Bi, Te, Sb along with Pt, Pd and Au concentrate into the fractionated sulfide liquid and thus should be found in the most fractionated ore or in veins. This work has produced 4 papers in Economic Geology and Mineralium Depositia and again has been well cited.

From 2011 to 2014 she carried out her second post-doctoral fellowship funded at first by Vale-DIVEX-NSERC and later by TGI4 on the use of trace elements in magnetite as an exploration tool. This work was co-directed by Professors Barnes and Beaudoin. Sarah's work focussed on magmatic magnetites first from Vale's Ni-Cu sulfide deposits; Sudbury, Thompson and Voisey's Bay. Here she was able to show that the magnetites show a strong variation in trace element contents with crystallization of the sulfide liquid and that we can use the trace elements to distinguish magnetites from this type environment from magnetites from other settings. She then moved on to magnetites from layered intrusions and massive type anorthosites. In each case showing that their compositions differed and could potentially be used in exploration. Finally, in the world of Fe-oxides there is an outstanding question of whether immiscible Fe-oxide liquids exist. The El Lago deposits of Chile are always cited as an example of such a liquid. Sarah visited and sampled these and showed that there is an evolution in the trace elements content of the magnetites. Disseminated magnetites in the

andesites have trace element patterns that resemble igneous magnetites whereas trace element patterns from magnetites from the massive Fe-oxides resemble skarn deposits. These observations suggest that the massive Fe-oxides form by replacement rather than from an iron-oxide liquid. The magnetite studies have produced 4 papers in Mineralium Depositia, Geochimica et Cosmochimica Acta and Journal of Exploration Geochemistry. Her work in magnetite studies led to her being the keynote speaker at SGA in 2013 in the Fe-oxide session.

In 2015, she moved to University of Ottawa to take up a position as an assistant professor. Her research in using magnetite as an exploration tool continues with projects funded by the GSC and NSERC. In addition, she has expanded her repertoire to include the trace element content of apatites with a project funded by DIVEX. She is currently supervising 3 M.Sc. students.

In 2016, she was awarded the Gross Medal by the Geological Association of Canada. This medal is awarded to a geoscientist less than 40 years of age (as of December 31 of the nomination year) who has made a significant contribution to the field of economic geology in a Canadian context.

Quite apart from her academic credentials, Sarah is a good manager. When working on the Fe-oxide project, she has had to learn to deal with the different needs and personalities involved in the projects, from the academic/fundamental approach at one end (me), through the bureaucratic (GSC) to the applied end (Vale-INCO). This skill should stand her in good stead in the changing funding environment.

Finally, I should mention that Sarah is cheerful and helpful. As part of the chair team, she was generous with her time, helping graduate students and supervising B.Sc. projects.

As you can tell from the above, Dr. Dare is a can-do person. She is very competent and energetic. She is also very optimistic and enthusiastic and I think is an excellent choice for the young scientist award.

The following acceptance speech was delivered via video by S. Dare:

It is an absolute honour to accept the SGA Young Scientist Award this year. Thank you, Sarah-Jane, for the nomination and citation. And thank you to the SGA committee for selecting me amongst the other strong candidates. I really wanted to attend the conference this year, and to be here in person to receive the Medal today, but I had to decline as it is just too close to the end of my pregnancy.

I count myself very fortunate to have worked with, and learnt from, such wonderful and inspiring mentors and collaborators. I would like to take this opportunity to thank them all so very much for investing their time and sharing their knowledge with me. In particular, I would like to thank my post-doc supervisor, Sarah-Jane Barnes, for giving me the opportunity to work on a number of great research projects with her. I learnt so much from her and I would like to thank her for her guidance and friendship along the way.

I would also like to thank my co-authors for their expert collaboration during my Post-Doc: Hazel Prichard of Cardiff University, for teaching me about Platinum Group Minerals, and Georges Beaudoin (Laval University) for involving me in trace element studies of magnetite, which has now become the focus of my own research program.

I would like to dedicate this Medal to the dear memory of Hazel Prichard, who sadly passed away at the beginning of this year. Her passion and dedication to her research and teaching was an



Fig. 3: Presentation of the SGA Young Scientist Award during the Opening Ceremony of the 14th SGA Biennial Meeting in Québec City, Canada (from left to right: J. Relvas – SGA President, S.J. Barnes – who nominated Sarah Dare – recipient of the award who couldn't make it to Québec City and J. Pašava – SGA Executive Secretary). Photo by L. Leblanc.

inspiration to me. During my PhD at Cardiff University, we shared many enjoyable weeks teaching both in the labs and on field trips. It was a pleasure to finally collaborate with her during my post-doc. She is sorely missed.

Finally, I'd like to thank my parents and husband, Dominique Genna who also works on sulfide deposits – but the non-magmatic kind, for their continued love and support.

I wish you all an enjoyable and productive conference.

Thanks again, merci beaucoup.

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 new 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 grant to the place of presentation of the award.

The first recipient of this award became Dr. Francis Saupé from France in 2015.

The second recipient of the SGA-KGHM Krol Medal became Dr. Maurice Pagel (France), who was nominated by J. Pašava and accepted by the SGA Council. After introduction of the award and citation presented by J. Pašava, the award was presented by G. Krol (son of G.L. Krol) and his wife, J. Relvas (SGA President) and J. Pašava (SGA Executive Secretary). Dr. M. Pagel (France) delivered the acceptance speech.

The following citation was prepared and presented by J. Pašava (SGA Executive Secretary):

Mr. Chairman, Ladies and Gentlemen,

I am honored to present the citation of Dr. Maurice PAGEL – the second recipient of the very prestigious SGA-KGHM KROL MEDAL.

Maurice Pagel was born on April 24, 1947 in Toul, France. After elementary and high school education in Toul, he joined the Uni-

versity of Nancy from which he graduated in 1975. He received his Ph.D. in 1981 from the Polytechnic National Institute of Lorraine where he successfully defended the thesis “U and Th distribution and concentration factors in some granites of the European Hercynian Chain”. After the university studies, he shortly served as engineer at the Mokta Company (focused on U-prospecting). In 1976, he joined the Petrography and Geochemistry Research Centre in Vandoeuvre les Nancy (CNRS) and in 1979, he changed for the Uranium Geology Research Centre where he served as a team director from 1987 to 1997. In 1997, he left CNRS and became Professor and in 2009 Professor of Exceptional Level (Classe Exceptionnelle) at the University Paris-South at Orsay, where he acted as Chair of the Department of Earth Sciences (2004–2009). He retired from the University in 2012 and received the status of Emeritus Professor.

His scientific interests were fluid mineral interactions in sediments (diagenesis), thermal history of sedimentary basins, genesis of unconformity-type uranium deposits and sediment-hosted U-deposits, genesis of fluorite deposits, U-Th-REE accessory minerals in rocks and uranium mill tailings and nuclear wastes storage.

He directed or co-directed some 35 PhD thesis and was responsible for 60 research contracts with national institutions, the EU and also Oil and Mining Companies. He reviewed papers for 29 scientific journals including Mineralium Deposita, Ore Geology Reviews and Economic Geology. He also organized about 35 national and/or international scientific meetings.

Recently, he was responsible for two national research programs. Firstly, a research consortium between CNRS and ANDRA on “Present and past transfer in a sedimentary aquifer/aquitard system”, he was a Guest Editor of a “Marine and Petroleum Geology Volume” involving 56 authors. Secondly, since 2007, he has been co-Director of a CNRS-AREVA-CEA program on Uranium Resources.

He has edited several books of which the best known book on Cathodoluminescence in Geosciences in 2000.

Maurice Pagel is also recipient of numerous honors and awards (e.g., Braconnot Prize from the Stanislas Academy in 1982, SGA Honorary Membership in 1999, Meeting organized in honour of M. Pagel by the French Sedimentological Association in 2014 and others).

Maurice Pagel is one of the key persons who played an important role in the development of the SGA. In 1989, he was nominated and elected as the SGA Executive Secretary, replacing F. Saupé – the first recipient of the SGA-KGHM Krol Medal (2015, Nancy). M. Pagel served in this position until 1997. In 1991, he organized the 25 years SGA Anniversary Meeting on “Source, transport and deposition of metals” (Nancy, August 30–September 3, 1991) and thus launched the tradition of SGA Biennial Meetings. Since 1991, M. Pagel was actively involved not only in routine SGA administration but also in the logistical support and/or co-organization of the 2nd, SGA Biennial Meeting (1993 – Granada, Spain), the 3rd SGA Biennial Meeting (1995 – Prague, Czech Republic), the 4th SGA Biennial Meeting (1997 – Turku, Finland) and the 5th SGA Biennial Meeting (1999 – London, UK). During his term, he was jointly with David Ricard (Chief Editor, Mineralium Deposita) also involved in establishing new relationships with Springer Publishing House and actively collaborated with David Leach on further international development of the society.

Many of us have had the pleasure of interacting and collaborating scientifically with Dr. Pagel. Although now retired, he remains interested in mineral deposits. On behalf of SGA, I would like to congratulate Dr. Pagel on this and his other successes and we wish him all the best.

The following acceptance speech was delivered by Maurice Pagel:

Mr Chairman, Ladies and Gentlemen

I warmly thank Jan Pašava, the present Executive Secretary of the SGA, for nominating me for the SGA-KGHM KROL MEDAL. I also thank all colleagues who supported my nomination by writing kind letters. I appreciate very much the recognition for what I have done as Executive Secretary of the SGA from 1989 to 1997. This was a big challenge for me because I was not a member of the SGA at that time and did not know exactly how the society worked. However, Francis Saupé from the Petrographic and Geochemical Research Center and the SGA Secretary since fifteen years in Nancy thought that I was a right person for this job. At that time, the role of the Executive Secretary was crucial. Internet was not yet the means to communicate easily and Francis Saupé and Viktor Koeppel, the SGA President, agreed with me that SGA must organize more meetings and especially a big meeting every two years. At that time, I was doing research on uranium metallogeny in the Uranium Research Center. The Director, Bernard Poty, knew a lot of people all around the world which facilitated my first years of SGA Secretary.

There was a need to open the society to western and eastern Europe, US, Australia, South America and also to China. The international visibility of the society was a major goal during that time and the new involvement of David Leach must be recognized. I am pleased that Jan Pašava was open to actively participate in this development.

During my period as Executive Secretary, I had a pleasure to work closely with several presidents: Viktor Koeppel at the beginning, Frank M. Vokes (1990 - 1991), Heikki Papunen (1992), Ian Plimer (1993), Zdenek Johan (1994 - 1995), and Eugen Stumpf (1996-1997). I learned a lot from these personalities in very different research fields and with different cultures.

As I already said, the contact with the SGA members was not easy at that time and therefore one of my first proposals in 1989 was to edit a biannual Newsletter. The Council Members expressed their pleasure over the start of this new communication. It was black and white and different compared to what is being done now by Massimo Chiaradia. I appreciate the current presentation and new content of the SGA Newsletter. I think that this is an important way for communication.

The second important point concerned Mineralium Deposita. It was necessary to give a new breath. This was a very difficult task because the impact factor of a journal and the citation index were still vague notions for the editors and the presidents. However, after the nomination of David Rickard as Chief Editor, the impact factor increased to reach the top of metallogenic journals. There was also a difficult time with Springer-Verlag and a meeting in the presence of Mr. Springer himself was necessary. We discovered that Mineralium Deposita is a title that belongs to Springer Verlag. Fortunately, this period ended with good agreements between Springer-Verlag and the SGA and a significant financial gain.

The third important point was the start of the biennial meetings. I organized the first meeting in Nancy in 1991. There was a good attendance, the main metallogeny labs were represented and many participants from the eastern countries came to Nancy. I received a handwritten letter of congratulations from the Minister of Research and Technology (France), Hubert Curien.

I think that if the SGA wants to attract more people outside of metallogeny, it must organize meetings that break the framework of metallogeny. In 1996, I organized a SGA meeting on catho-



Fig. 4: Presentation of the SGA-KGHM Krol Medal during the Opening Ceremony of the 14th SGA Biennial Meeting in Québec City, Canada (from right to left: J. Pašava – SGA Executive Secretary, M. Pagel – recipient of the award, G. Krol (son of G.L. Krol after who the medal was named) with his wife Els and J. Relvas – SGA President). Photo by L. Leblanc.

doluminescence in earth sciences and related fields with Vincent Barbin, Guy Remond, Philippe Blanc and Daniel Ohnenstetter, a good opportunity to combine physics and earth sciences. I think that we enter a new period for the characterization of fluid circulation, especially in sedimentary basins and probably a meeting on this topic would be welcomed by a broad community.

In 1997, I was Director of Research at Nancy and decided to change for a position at the University in Orsay. Since then, I have worked on diagenesis rather than on mineral deposits. Since my nomination as a Professor at the University of Paris-South, I realized that the students do not learn enough mineralogy. I am starting to organize a collection of minerals in Orsay, a “small museum”. The problem is to obtain representative samples, I take advantage of your presence. If you have good samples, I will be happy to receive some of them.

To conclude, you may be sure that I appreciate to receive the SGA-KGHM KROL medal. It is a well-deserved recognition of my ideas and work as Executive Secretary of the SGA. I again thank Jan and the SGA Council and I wish everyone a very good meeting.

The SGA Award for the Best Paper in Mineralium Deposita

The award (established in 1999) is presented every two years at the Society Biennial Meetings and consists of a citation, certificate, EUR 1500 and travel expenses for the first author associated with the receipt of the award.

Based on pre-selection of five papers by Chief Editors, Mineralium Deposita, and after Council vote, it was decided that the paper by Frimmel HE, Hennigh Q (2015) First whiffs of atmospheric oxygen triggered onset of crustal gold cycle, published in Mineralium Deposita 50: 5–23, will receive the award.

After introduction by J. Pašava and citation by B. Lehmann, the award was presented by B. Lehmann (Chief Editor, Mineralium Deposita, European Office), G. Beaudoin (Chief Editor, Mineralium Deposita, North American Office), and J. Pašava (SGA Executive Secretary). On behalf of the authors the award was accepted by H. Frimmel.



Fig. 5: Presentation of the award for the best paper in *Mineralium Deposita* during the Opening Ceremony of the 14th SGA Biennial Meeting in Québec City, Canada (from right to left: B. Lehmann – Chief Editor *Mineralium Deposita*, European Office, J. Pašava – SGA Executive Secretary, H. Frimmel – recipient of the award, J. Relvas – SGA President and G. Beaudoin – Chief Editor *Mineralium Deposita*, North American Office). Photo by L. Leblanc.



Fig. 6: Presentation of Student Awards during the Closing Ceremony of the 14th SGA Biennial Meeting in Québec City, Canada (front row from left to right: M. Polivchuk – best oral presentation, J. Farré de Pablo – best poster presentation, M. Tuhý – best oral presentation, T. Belgrano – best poster presentation, Ch. Voisey – best oral presentation; second row from left to right (members of the Conference Student Committee): D. Huston, J. Kolb, D. Banks, E. Della Giustina, P. Acosta-Gongora and A. Vymazalová (Chair of the Committee). Photo by L. Leblanc.

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.

A Conference Student Committee, constituted by David Huston, David Banks, Patrick Ledru, Jochen Kolb, Emilia Della Giustina, Pedro Acosta-Gongora and Anna Vymazalová, decided to attribute the awards to three students for oral presentations and three students for poster presentations, based on high quality and scientific merit of the student's presentations (each of them received a certificate and prize money of 250 EUR).

The best student oral presentations:

CHRIS VOISEY: The Silver Bullet: Ag isotope systematics in native gold from the central Victorian goldfields, Australia.

MAREK TUHÝ: Mineralogy of smelter- and mining-derived particles

in semi-arid soils and their potential mobilization during wildfires.

MATTHEW POLIVCHUK: The formation of vanadium deposits of the Archean Bell River Complex, Québec, Canada: Insights from Fe-Ti oxide chemistry.

The best student poster presentations:

JÚLIA FARRÉ DE PABLO: PGE mobility and PGM neoformation by low-temperature hydrothermal fluids – evidence from uvarovite-bearing chromitites in the Dominican Republic.

THOMAS BELGRANO: A new volcanic map for VMS exploration in the Oman ophiolite based on field, geochemical and aeromagnetic data.

CAIO DE MELLO: U-Pb geochronology of the igneous rocks associated to the Rio Tinto VMS deposit.

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

APPLICATIONS to SGA for meeting sponsorship must be submitted to Jan Pašava, SGA Executive Secretary, on appropriate forms available at the SGA home page on Internet: www.e-sga.org

Other requests will be not considered.

Your suggestions and ideas for any topic of interest to SGA are welcome!

They can be addressed to any Council member or to

Dr. Jan Pašava

SGA Executive Secretary

Czech Geological Survey
Klárov 131/3
CZ-118 21 Prague 1
Czech Republic

Tel.: +420 2 5108 5506
Fax: +420 2 518 18 748
e-mail: jan.pasava@geology.cz

Call for SGA Award Nominations

J. Pašava (SGA Executive Secretary), Czech Geological Survey, Prague,
jan.pasava@geology.cz

At Glasgow 2019, the Society for Geology Applied to Mineral Deposits will recognise the achievements of two scientists for geological research applied to mineral deposits. The **SGA-Young Scientist Award**, which recognises scientists at the beginning of their career, consists of a citation, prize money of EUR1500 and travel to Glasgow 2019. Previous award winners included Noreen Vielreicher (2003), Alexandre Raphael Cabral (2005), Gilles Levresse (2007), David Holwell (2009), Kalin Kouzmanov (2011), David Dolejš (2013), Huayong Chen (2015) and Sarah Dare (2017).

The **SGA-Young Scientist Award** is based mostly upon senior-authored papers published early in the candidate's career. To be eligible for this award, the awardee must be less than 40 years old on 01 January 2019 (i.e. born on or after 01 January 1979). Eligibility is not restricted by the candidate's nationality, place of employment or membership in the Society. Nomination forms can be downloaded from the society's web site (<https://e-sga.org/awards/sga-young-scientist-award/>). Nominations should include a biographical summary, a list of publications upon which the award is based, a statement explaining the significance of the research, other scientific contributions and accomplishments and the name and contact details of the nominator. In addition, copies of abstracts for most important (maximum five) papers upon which the nomination is based should be attached to the application.

The **SGA-Newmont Gold Medal** recognises the career of the awardee involving "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, a 999.99 fine gold medal and travel to Glasgow 2019. Previous medallists include Zdenek Johan (2007), Shunso Ishihara (2009), David Groves (2011), Michel Cuney (2013), Steven Scott (2015) and David Leach (2017).

The **SGA-Newmont Gold Medal** is based upon career accomplishments. It must be stressed that published scientific research is only one measure. Other measures include leadership, both in research and in industry, success in exploration or mining geology and service to SGA and like organisations. The award covers all aspects of research applied to mineral deposits, from field geology and mineral exploration through development of analytical techniques, ore system models and metallogeny, and to the management of research and exploration projects and institutions. Eligibility is not restricted by the candidate's nationality, place of employment or membership in the Society and nomination forms can be downloaded from the Society's web site (<https://e-sga.org/awards/sga-newmont-gold-medal/>). Nominations must include the name and address of the candidate as well as a summary of the candidate's education, significant accomplishments and publications, and the name and address of the nominator.

The **SGA-KGHM Krol Medal** is based on the memory of Gerardus L. Krol (1912–1984), who played a key role in the foundation and development of the society and recognizes outstanding service to SGA. The silver medal is given to worthy candidates at the SGA Biennial Meetings and on ad hoc basis. Eligibility is not restricted by the candidate's nationality, place of employment, or membership in the society, and nomination forms can be downloaded from the Society's web site (<https://e-sga.org/awards/sga-kghm-krol-medal/>). Nominations must include the name and address of the candidate as well as a summary of the candidate's education, significant accomplishments and publications, and the name and address of the nominator. The inaugural winner of the **SGA-KGHM Krol Medal** was Frances Saupé (2015), followed by Maurice Pagel (2017).

For all awards, letters of support from three SGA members are required. All nomination forms and letters should be sent to the SGA Executive Secretary with a copy to the Chairman of the Awards Committee, whose addresses can be found on the nomination form.

All nominations and letters of support (either digital or hard copy) must be received by 31 March 2019.



News of the Society

SGA Ordinary Council Meeting, Glasgow, UK, April 17, 2018

J. Pašava (SGA Executive Secretary), Czech Geological Survey, Prague,
jan.pasava@geology.cz

Karen Kelley (SGA President) welcomed all council members and guests, and thanked A. Boyce for organization of the meeting. Then Adrian Boyce (Chairman of LOC SGA 2019) welcomed all council members on behalf of the LOC/SGA 2019. Council approved suggested agenda.

Minutes of previous Council Meeting (August 19, 2017, Quebec City, Canada)

After checking the actions, the minutes were unanimously approved.

Reports of officers on Council:

- Report from President
- Report from Executive Secretary
- Report from Treasurer
- Report from Promotion Manager
- Report from Chief Editor, SGA News
- Report from Chief Editors, MD
- Report from Chief Editor SGA Special Publications
- Report from the Chief Editor SGA website
- SGA Educational Fund (D. Huston)
- Reports from Regional VPs (Asia, Australia/Oceania, Europe, North Africa and Middle East, Sub-Saharan Africa, North America, South America)

Council was sorry for missing Reports.

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

K. KELLEY to work jointly with G. GRAHAM and other Council members on securing SGA promotion at SEG 2018 Keystone meeting.

K. KELLEY to negotiate with SEG Executive Director terms and conditions of SGA participation in future SEG (2020 and 2021) conferences.

J. PAŠAVA to prepare a draft of letter to IUGS SG.

H. FRIMMEL to transfer EUR 20,000 to SGA EF account.

ALL COUNCIL MEMBERS who help in promoting SGA and signing up new SGA members to make sure that the correct information is given on the application forms. In particular, the name of the applicant MUST BE THE SAME as the name of the credit card holder. We cannot process payments in the future, for which we do not have the explicit authority of the credit card holder. It is also important to use the latest version of application forms (attached to website), asking for the 3 digit credit card security code.

J. KOLB to finalize SGA News 42/43 for publishing as soon as possible.

A.S. ANDRÉ-MAYER to inform SGA EC on any progress regarding VAT issue of the 13th SGA Biennial Meeting (2015, Nancy).

J. RELVAS to continue looking after distribution of SGA promotional items upon request of SGA RVP's and possibly other council members organizing SGA major and/or co-sponsored geo-events.

J. RELVAS (with help of design people from the Lousal Science Centre) to prepare several drafts of layouts for new portable SGA roll ups (Council would expect to have highlighted major benefits for joining SGA, SGA EF, MD and recent collaboration with EAG, GS, which resulted in reduced fee for SGA members when participating at Goldschmidt conferences). These roll ups should then be ordered and distributed in 2018 to all RVPs.

ALL COUNCIL MEMBERS to help B. LEHMANN and G. BEAUDOIN to identify suitable theme and authors for "milestone papers" for MD.

J. SLACK to continue editorial efforts associated with three SGA Special Publications, which are at different stages of preparation and report to next Council Meeting (Isotopes in Mineral Exploration; A Hydrothermal History of the Yilgarn Craton and its Relevance to Gold Exploration; and Supergene Mineral Deposits). The book on "Agromining: Farming for Metals" was published in October 2017

N. KOGLIN, J. PAŠAVA, H. FRIMMEL and CH. LINGE to continue working jointly on introducing a smooth and safe admission process to SGA via website.

Following new EU regulations, N. KOGLIN to contact all SGA members to seek their approval with keeping their personal data in SGA database.

N. KOGLIN to inform BGR library people that they are allowed to store the pdf of purchased SGA Conference papers on their document server.

N. KOGLIN to inform SGA EC on any request for advertising on SGA website (no commercial advertising accepted).

N. KOGLIN to arrange for SGA Twitter account (rights have to be with SGA).

N. KOGLIN to update structure of SGA website.

N. KOGLIN and J. KOLB to adapt SGA website for e-submission of contributions to SGA News.

ALL COUNCIL MEMBERS to provide D. HUSTON with names of relevant officers in mining companies, who should be contacted to consider donations to SGA EF.

ALL COUNCIL MEMBERS to provide D. HUSTON (co-editor, SGA Special Publication on Isotopes in Economic Geology) with names of potential authors on the Ar/Ar system.

In order to avoid duplicities in fund raising for SGA 2019, A. BOYCE to inform D. HUSTON on approached companies for sponsorship.

S. DECREE to inform Italian Journal of Science and Engineering about rejection of their request for SGA becoming sponsor of this journal.

S. DECREE to continue her deserving SGA liaison activities with EAG and GS and keep SGA EC informed on any progress.

HUAYONG CHEN with help from FAN HONGRUI and other Chinese SGA members to try to set up a new Student Chapter in China.

SGA 2019 – Update

After an introduction of the SGA 2019 conference venue – the University of Glasgow, A. Boyce jointly with representatives of the

Abbey Conference Partners and Glasgow Conventional Bureau guided a visit to individual sites that will be used during the conference. Subsequent presentations by A. Boyce and S. Brierton, K. Goodenough and the follow up discussion with SGA Council resulted in the following motions:

A. BOYCE with LOC to finalize a list of proposed sessions (names/convenors), short courses, field trips and important deadlines and submit it for approval to SGA Council by the end of May. After the final approval, to revise the present leaflet accordingly and to print it so that it could be distributed to SGA Council members and others for further promotion at various local and international geo-events. This leaflet (1. Circular) should contain basic info on the 15th SGA Biennial Meeting including registration fee, proposed list of sessions, short courses, field trips and important deadlines.

A. BOYCE with LOC to plan for students-industry evening meeting rather than lunchtime event.

A. BOYCE with LOC to try to link thematically short courses, sessions and field trips where possible.

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

Presentation and evaluation of bids for the 16th SGA Biennial Meeting (2021)

After introducing the procedure of handling of the received bids (Rotorura/New Zealand and Newcastle/Australia) and getting additional information from proponents (J. Pašava), D. Huston presented a bid for Newcastle/Australia. After D. Huston left room and after an intensive discussion, the majority of the Council voted in favour of the New Zealand bid.

Action: J. PAŠAVA to inform both proponents about council decision and to provide chair of the LOC of the Rotorura bid with MOU to be signed between SGA and LOC.

Final Report – SGA 2017

The report was delivered by G. Beaudoin (Chair of LOC) with additional info from P. Mercier-Langevin. This very well attended and high-level scientific meeting contributed significantly to SGA promotion in North America and resulted in significant revenue for SGA. Council greatly appreciated all efforts by LOC under leadership of G. Beaudoin and approved the report with great thanks.

Progress report on membership drive from the last SGA Council Meeting

J. Relvas presented this report. The society had 1386 paid-up members by December 31, 2017. Since August until December 2017, we received 90 new members: 14 regular and 76 student members. There is a long-term trend of increasing number of student members and regular members with on-line subscription of MD at the expense of regular members with printed MD. It is important to attract student members to become regular members and to make regular membership more attractive. After discussion, Council approved the report with great thanks and the following motion:

J. RELVAS to address all RVPs with a request for their collaboration regarding non-renewing members.

ALL COUNCIL MEMBERS to make sure that only the new version of SGA application forms (those requesting 3 digits credit card security number) will be used when applying for SGA membership.

Status of development of SGA Student and Young Scientist network

A. Vymazalová presented the report. SGA has 14 student chapters (Baltic, Barcelona, Colombia-Bucaramanga, Colombia-Bogota, Laval, Nancy, Morocco, Peru, Prague, Siberia, and four Chapters were created in 2017: NW Russian, Western-Cape, Turkey and Black Forest-Alpine). There is a proposal for a new Chapter in Brazil to be considered by council. Reports were received from all chapters except Laval, summarizing their activities in 2017 and plans for the following year and financial requests from SGA. SGA Council approved a creation of the new chapter in Brazil with EUR 500 as a start-up budget and presented chapter reports with the following budgets for 2018:

Chapter name	Suggested support for 2018 (€)
Alpine-Black Forest	n.r.
Baltic	4.000
Barcelona	2.500
Bucaramanga-Col	3.000
Bogota-Col	2.300
Laval	n.r.
Nancy	1.500
NW-Russia	2.500
Morocco	1.000
Prague	4.000
Peru	4.000
Siberia	2.100
Turkey	n.r.
Western Cape	n.r.
Brazil	500
Total	27.400

n.r. = no request

Action: A. VYMAZALOVÁ to inform all Chapters on approved budget for 2018 and Brazilian applicants on approval of their new chapter.

Requests for sponsorship

- Short course on "Exploration Geology" (March 19–22, 2018 Freiburg, Germany) – organized by Black Forest-Alpine SGA Chapter – M. Junge/D. Dolejš et al. – SGA speaker H. Frimmel – approved support of EUR 290.
- Baltic Chapter – Short Course on "Fusing geochemistry and structural geology for exploration, mining and research" (May 24–25, 2018 Lulea, Sweden) – EUR 350 approved to lower costs associated with SGA student member participation.
- SGA at Platinum Conference – South Africa 2018 (2000 EUR for SGA student members) – approved.
- Goldschmidt 2018 (August 12–17, 2018 Boston USA) – sponsorship to SGA session on "From Cradle to Grave: Isotopes in the Life Cycle of Mineral Deposits" – I. Ridley and R. Wanty – EUR 1,000 approved for keynote and/or SGA speaker.
- 15th IAGOD Symposium (August 28–31, 2018 Salta, Argentina) – F. Tornos et al - request for financial support to keynote speaker(s) expected.
- Freiberg Short Course in Economic Geology (most likely December 2018, Freiberg, Germany) – a long term approval for EUR 2000 for student support.

Any other business

SGA new initiatives (D. Huston, K. Kelley, R. Skirrow)

K. Kelley and D. Huston introduced new SGA initiatives. After discussion, council noted that apart from existing SGA Keynote speakers program, it is possible and desired to use council meetings for offering lectures in these locations/regions, if requested. It is important that SGA Chapters clearly identify topics and possibly suggest speakers who they would like to have for lectures. Council also discussed a concept of SGA field workshops organized in the off years between SGA Biennial Meetings in a district and approved preparation of a proposal for a first field workshop in Australia (e.g. Mt. Isa ore district) by D. Huston, R. Skirrow and their teams.

SGA Proceedings issue

request is whether they are allowed to store the pdf on the library document server of BGR if they purchase the conference papers. This item was covered in SGA webmaster report.

Report on SGA – GS and SGA – EAG partnership including a possible role of SGA in Goldschmidt 2019 – Barcelona

This item was covered in SGA President and RVP Europe reports.

Report on the 5th Short Course on African Metallogeny – Gabon

B. Orberger presented the report. This 5th Short Course on African Metallogeny will take place in October 2018 in Moanda, Gabon and will focus on sediment-hosted Mn-Fe-U deposits. Council greatly appreciated the leading role of B. Orberger in the preparation of this event and asked SGA website and News editors to promote the course via both SGA means.

Action: N. KOGLIN and J. KOLB to promote the Short Course on SGA website, via SGA membership (emails to members) and Newsletter.

SGA presence at the IAGOD 2018 Salta, Argentina – update

The update was given by J. Pašava based on info from F. Tornos – a SGA liaison person and SGA plenary speaker at this event. SGA will have a complimentary booth. It will be important to secure staffing the booth. Organization of SGA session and field trip is progressing well, and we can expect a request for financial support to keynotes for our session soon.

Action: J. PAŠAVA to contact R.E. DE BARRIO and E. FERRARI to secure staffing the SGA booth.

Possible collaboration between MAESA and SGA

J. Pašava introduced request of MAESA. Council recommended providing SGA Chapter with info on a possible SGA student field trip in Myanmar and recommended redirecting request for free MD copies to Springer.

Action: J. PAŠAVA to inform Khin Zaw on SGA Council decision.

Date and place of the next SGA Council meeting

Next SGA Council meeting will be held in Würzburg, Germany in late October 2018 (the precise venue and date to be determined).

Informative list of past activities

- Vth International Conference “Ultramafic-mafic Complexes, Geology, Structure, Ore Potential (September 2–6, 2017 Gremyachinsk, Russia) – E. Kislov et al. – approved EUR 2000 for SGA student support.
- Subduction Related Ore Deposits, September 23–26, 2017 Trabzon, Turkey. I. Uysal et al. – SGA sponsored (keynote speaker and 1000 EUR for SGA student member support).

- Kratz Conference – The XXVII Youth Scientific Conference (October 2–7, 2017 Saint Petersburg, Russia) – approved EUR 1000 for SGA keynote and student support).
- XXXV UNESCO-SEG-SGA Curso Latinoamericano de Metalogenia (November 7–16, 2017 Buenos Aires, Argentina) – a long-term support of USD 2500 approved via a joint SEG-SGA agreement – a brief Report was provided by F. Tornos.
- 12th Ore Deposit Model and Exploration workshop (November 2017, Changsha, China) – SGA sponsored.
- Barcelona Chapter – keynote speakers program – workshop on “PGE (Platinum Group Elements) / PGM (Platinum Group Minerals) in the oceanic paleolithosphere” (November 30–December 1, 2017) – accepted SGA support of EUR 1050.
- Freiberg Short Course in Economic Geology – “Skarn deposits” (December 4–6, 2017) – Freiberg, Germany) – M. Burisch et al. – approved EUR 2000 for SGA student support
- Short course on “Exploration Geology” (March 19–22, 2018 Freiburg, Germany) – organized by Black Forest-Alpine SGA Chapter – M. Junge/D. Dolejš et al. – SGA speaker H. Frimmel – approved support of EUR 290.

Informative list of future activities

- Short Course on Gold Deposits (May 19–20, 2018 Prague, Czech Republic) – D. Groves-SGA speaker, organized by the Prague Student Chapter – EUR 3000 approved.
- Baltic Chapter – Short Course on Fusing geochemistry and structural geology for exploration, mining and research (May 24–25, 2018 Lulea, Sweden) – EUR 350 approved to lower costs associated with SGA student member participation.
- 8th Geochemistry Symposium in Turkey 2–6 May (organized by Karadeniz Technical University) – sponsorship to SGA student members (up to 1000 EUR) and keynote speaker (up to 1000 EUR).
- RFG 2018 (June 16–21, 2018 Vancouver, Canada) – SGA session organized by J. Gutzmer et al. on Geometallurgy; a joint SGA/Springer booth.
- Goldschmidt 2018 (August 12–17, 2018 Boston USA) – sponsorship to SGA session on “From Cradle to Grave: Isotopes in the Life Cycle of Mineral Deposits” – I. Ridley and R. Wanty – EUR 1000 approved for keynote and/or SGA speaker.
- 15th IAGOD Symposium (August 28–31, 2018 Salta, Argentina) – complimentary booth, SGA session on “Magmatic-hydrothermal mineralizing systems, field trip to Chilean ore deposits, SGA keynote presentation and possible two short courses discussed with the IAGOD President (a subject of approval by IAGOD Council) – request for financial support to keynote speaker(s) expected.
- SEG 2018 Conference (September 22–25, 2018 Keystone, CO) – K. Kelley et al. – SGA complimentary booth.
- XIX Peruvian Geological Congress (September 23–26, 2018 Lima, Peru) – SGA institutional partner – E. Ferrari et al.
- 5th Short Course on African Metallogeny (October 10–14, 2018 Moanda, Gabon) – B. Orberger et al.
- Freiberg Short Course in Economic Geology (most likely December 2018, Freiberg, Germany).
- PACRIM 2019 (April 3–5, 2019 Auckland, New Zealand) – SGA accepted to become a sponsor in advertising without any financial obligations in exchange of SGA logo on all conference materials.
- XXXVI UNESCO-SEG-SGA Curso Latinoamericano de Metalogenia (23–25 May 2019 Lima, Peru and Field trip, 26–29 May), the PUCP university (directly after PROEXPLO 2019).
- 15th SGA Biennial Meeting (August 27–30, 2019 Glasgow, Scotland, U.K.) – A. Boyce et al.



Fig. 1: A Ordinary Council Meeting held on April 17, 2018 in Glasgow, UK.

First row from left: K. Goodenough (member, LOC/SGA 2019), G. Beaudoin (Chief Editor, MD), I. Butler (Vice-chair of LOC/SGA 2019), A. Boyce (Chair of LOC/SGA 2019), J. Relvas (SGA Promotion Manager), K. Kelley (SGA President), B. Orberger (SGA Council member) and G. Bozkaya (SGA Council member). Second row from left: S. Mikulski (SGA Council member), D. Huston (SGA Vice-president), I. Pitcairn (SGA Council member), J. Kolb (Chief Editor, SGA NEWS), D. Banks (SGA Council member), A. Vymazalová (SGA Vice-president for student affairs), N. Koglin (Chief Editor, SGA Website), J. Slack (Chief Editor, SGA Special Publications), H. Frimmel (SGA Treasurer) and J. Pašava (SGA Executive Secretary). Photo by A. Fischer.

The international project to replicate the teaching mineral collection of the University of Barcelona

Joan Carles Melgarejo, Núria Pujol-Solà, Júlia Farré-de-Pablo, Cristina Villanova-de-Benavent

Barcelona SGA-SEG Student Chapter, Facultat de Ciències de la Terra, Universitat de Barcelona, Carrer Martí i Franquès s/n, 08028 Barcelona, Catalonia; joan.carles.melgarejo.draper@ub.edu, npujolsola@ub.edu, jfarredpablo@ub.edu

The mineral collection for undergraduate teaching at the Faculty of Earth Sciences of the University of Barcelona was created in 1980, and it comprises about 1500 hand specimens, 400 thin sections and more than 2000 polished sections.

This mineral collection is used during practical lessons, which are structured as self-learning independent sessions as a complement to the theory given in class. The practical lessons are structured based on the idea of mineral associations rather

than mineral groups. This way, students learn to identify minerals according to their occurrence in different rocks or ore types. For instance, quartz, K-feldspar, plagioclase, muscovite, biotite, cordierite, almandine and hornblende would be studied together as components of granitic rocks and students would learn to identify them in this type of hand samples and thin sections.

In the practical lectures involving hand specimens, there are 5 to 30 representative samples for each studied mineral, which

show the different features of the mineral in a specific type of rock. Samples are organized according to the difficulty of the identification of the mineral. For instance, the students learn to identify a mineral starting by a perfect euhedral crystal, continuing with more anhedral ones and finally finer-grained or even altered. Regarding the microscope lectures, students learn the optical properties of minerals by examining thin and polished sections of the most common mineral assemblages (e.g. acidic and

basic plutonic rocks, metamorphic rocks, sandstone, evaporites) and of the main ore deposit types (e.g. chromite, skarn, volcanic-hosted massive sulfide), respectively.

The creation and update of the teaching collection, together with the elaboration of guidebooks for the students including descriptions of the samples, was an enormous task. Nevertheless, this methodology has proven successful and students are able to achieve a great knowledge in mineralogy. However, over the years, many samples were damaged by their intensive usage and the samples need to be renewed. Furthermore, the collection needs to be updated in order to meet the current industry interests, which include critical elements such as In, Ge, Ta, Nb and REE. The renewal and updating of the collection includes a list of 222 minerals that are interesting for both scientific (as rock forming minerals) and industrial (as ore forming minerals) purposes. This list includes all those minerals that students must be able to recognize as future, professional geologists both in hand specimen and/or in thin and polished sections. The collection must include the listed species as individual crystals and as components of different rock types and/or ores.

Initially, the University of Barcelona joined the Universidad Nacional Autónoma de México (UNAM) in order to renew the collection and create a new one, with the same minerals and samples to be used during practical mineralogy lessons at the Institute of Geology of the UNAM. Nonetheless, the project was lately thought to be expanded to other universities that wanted to participate. The idea was to replicate the collection and the teaching material of Mineralogy from the University of Barcelona and donate it to the participating universities free of charge. The collection will comprise hand

samples and slabs from the rocks for the preparation of thin and/or polished sections. The teaching material, consisting of guidebooks, exercises, etc., will be translated from Catalan to other languages (Spanish, English, French), and could be translated to still other languages by the recipient universities. In exchange for the material, the universities will have to take charge of the shipment and custom fees, they will have to store the material in good conditions and use it, and they will be asked to provide, when possible, samples from their respective countries that could be useful to the collection.

Now, several samples from the 222 listed minerals have been already collected and are available; others are going to be collected in the next months and some will have to be bought or exchanged from different localities.

In order to make this project possible, we count with the support and help from the vice principal of the University of Barcelona. The available financial support has been used to organize fieldtrips to visit certain mineralogical sites and collect samples. The Barcelona SGA-SEG Student Chapter is actively helping in this project by joining the fieldtrips and organizing and classifying the recollected samples once, they arrive at the university. This is an additional voluntary practical lesson for the students and they are very enthusiastic about doing it.



Fig. 1: Nice chabazite specimen collected for the project.

The benefits of the project are multiple. Students, lecturers and professors will be participating in an international collaboration, building a network of universities with high quality material for advanced teaching of mineralogy, based on the model proposed by the University of Barcelona. It will also help universities to get affordable and useful material for teaching. As a result, the level of mineralogy training of students from developing countries will increase and, hence, they will reduce their external dependence in matters of science. The project can also be a way to find a consensus between research centres, institutions and mining companies in order to cover the necessities of science and the industry correctly.

Now, universities from Angola, Argentina, Brazil, Croatia, Dominican Republic, India, Macedonia, Mexico and Senegal are involved. However, we aim to reach as many people as possible and we would welcome any other university or industry that might be interested to join this collaborative project.



Fig. 2: Dr. Joan Carles Melgarejo Draper, the organizer of this project, Dr. Javier Casado (voluntary collaborator) and undergraduate students in a mine dump in the Pyrenees collecting samples.



Fig. 3: Some students in the Regia Antiga mine dump (Bellmunt del Priorat, Catalonia) collecting mineral samples for the mineral collections.

Fieldtrip through Catalonia: Barcelona, Prague and Siberia Student Chapters

Núria Pujol-Solà¹, Júlia Farré de Pablo¹, Cristina Villanova de Benavent¹, Jan Kulhánek², Marek Tuhý²

¹ Barcelona SGA-SEG Student Chapter, Facultat de Ciències de la Terra, Universitat de Barcelona, Carrer Martí i Franquès s/n, 08028 Barcelona, Catalonia; npujolsola@ub.edu, jfarredepablo@ub.edu, cvillanovadb@ub.edu

² SGA Student Chapter Prague, Charles University, Faculty of Science, Albertov 6, Prague 2; jan.kulhanek@natur.cuni.cz, tuhymar@gmail.com

The Barcelona SGA-SEG Student Chapter organized a five-day fieldtrip through Catalonia from September 5th to 9th, in which members from the Siberia and the Prague SGA Student Chapters joined. The fieldtrip was sponsored by the SGA Educational Fund. The organization was in charge of Núria Pujol Solà (PhD Student), Diego Domínguez Carretero (4th year undergraduate), Júlia Farré de Pablo (PhD Student) and Cristina Villanova de Benavent (young researcher) from Barcelona in coordination with Jan Kulhánek (Master student) from Prague and Maria Cherdantseva (PhD Student) from Siberia. The participants coming from Barcelona also collaborated actively in the organization.

The participants from the Barcelona Student Chapter were: Eva Agut (4th year undergraduate), Sandra Baurier (Master student), Arnau Blasco (4th year undergraduate), Malena Cazorla (2nd year undergraduate), Diego Domínguez (4th year undergraduate), Júlia Farré de Pablo (PhD Student), Joan Gutiérrez (4th year undergraduate), Álvaro Martínez (4th year undergraduate), Núria Pujol Solà (PhD student), Dani Rodríguez (young researcher), Berta Sagués (2nd year undergraduate), Oriol Vilanova (2nd year undergraduate). The Czech students were: Dominik Brém (4th year undergraduate), Jan Kulhánek (Master student), Matej Nemec (PhD student), Ivan Petrov (2nd year undergraduate) and Marek Tuhý (PhD student); and the Siberian participants were: Ivan Chaika (4th year undergraduate), Dmitriy Chebotarev (PhD student) Maria Cherdantseva (PhD student), Alina Lap-ega (Master student), Anna Nekipelova (Master student) and Maria Shapovalova (PhD student).

The different ore deposit types visited during the fieldtrip are explained in detail below. The fieldtrip explanations will be divided in the different days:

Pre-fieldtrip dinner (September 4th)

To begin this international collaborative fieldtrip, the participants met on Monday evening for a touristic tour in Barcelona old town and then head for a pre-fieldtrip dinner in order to get to know each other a bit more.

Day 1: Cap de Creus (September 5th)

The first day of fieldtrip was to the national park of Cap de Creus (NE Catalonia), which presents one of the nicest examples of rare-elements pegmatites described in the world. For this fieldtrip, we counted with the excellent guidance of one

of the Barcelona Student Chapter supervisors: Professor Joan Carles Melgarejo. The park of Cap de Creus offers the possibility to visit different types of barren and fertile pegmatites. The aim of this fieldtrip was to



Fig. 1: Fieldtrip flyer.

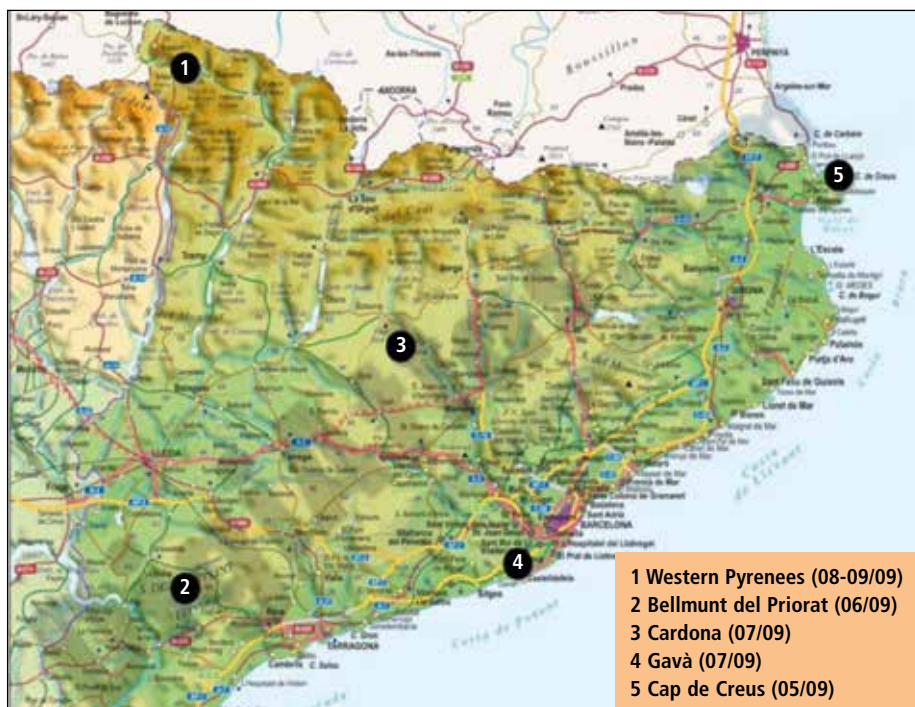


Fig. 2: General Catalonia map, where the different visit areas are shown. [http://www.digiatlas.com/mapas/esp/mapa-de-cataluna-\(catalunya\).html](http://www.digiatlas.com/mapas/esp/mapa-de-cataluna-(catalunya).html)



Fig. 3: Barcelona, Prague and Siberia student chapters in Plaça Reial in Barcelona during their visit in the old town.



Fig. 5: Students were able to recognize phosphates (i.e. mitridatite) resulting from weathering alteration, which are used as a critical tools for fertile rare elements pegmatite exploration.

show some of these outcrops and discuss the different processes that take place during pegmatite formation. Pleasant bonus, especially for foreign students, was the opportunity to observe some crystals of beryl and columbite in pegmatite and also to walk through beautiful nature with a view on shores and cliffs of the Cap de Creus natural park.

The Cap de Creus represents the Hercynian basement at the E end of the Pyrenees and it is constituted of a 2000 m thick metapelitic sequence dated as Vendian (554 ± 4 Ma). The sequence was affected by two main phases of Hercynian deformation that resulted in the development of a main foliation and a posterior folding, which in addition, produced NW-SE-trending shear bands. Between the two deformation stages, a low pressure – high temperature (LP-HT) regional metamorphism took place. The intrusive rocks found in the area mainly consist in pre-Hercynian granites and Hercynian granitic rocks. The pegmatites occur as dykes and are associated to these granitic rocks. Four types of pegmatites are recognized in the Cap de Creus: type I, type II, type III, and type IV. They represent different grades of evolution of

the pegmatites, with type I being the most primitive and barren, less enriched in rare-earth minerals and phosphates, and type IV the most evolved ones with abundant phosphates. All the types are progressively distributed according to the metamorphic zones of the area: type I occurs in the sillimanite – K-feldspar zone, and type IV in the cordierite – andalusite zone.

Day 2: El Priorat (September 6th)

The second day of fieldtrip was to the El Priorat area (SE Catalonia), which is well known for its polymetallic deposits but also for the good wine. Doctor Lisard Torró lead the fieldtrip and gave the different explanations.

El Priorat is located in the Catalan Coastal Ranges, an area affected by three geological cycles: a pre-Hercynian, a Hercynian and an Alpine cycle. The mineralization is mostly hosted by the Hercynian rocks, although the mineralizing processes took place later during the Alpine cycle. The Hercynian series are also important for forming the soils, where the vineyards grow in quite special conditions.

The first stop of the day was to visit the Eugenia Mine and its museum in Bellmunt del Priorat. The museum shows the story of the mine since its opening, the mining exploitation through times and how it changed the life from people of the village during the XXth century. The underground mining started in order to exploit a polymetallic vein deposit. Galena was extracted mainly for its Pb but with Zn and Ni as byproducts. From the underground mine, it is possible to visit the first of 20 floors of galleries that were dug following the ore veins, which strike E-W within an area of 4 by 6 km. The ore veins are hosted by a Carboniferous turbiditic series, which is crosscut by the Permian – Triassic discordance.

Two other mines were visited in the area: Linda Mariquita and La Serrana mines. The Linda Mariquita mine is an open pit with exploitation of some barite veins, which contain Ag ores as argentian tennantite or native Ag. They are hosted by Hercynian rhyodacitic sills. The participants of the fieldtrip were able to collect samples of primary and secondary minerals (conichalcite, olivenite, malachite, azurite) from the dumps of the mine. The other mine, La Serrana, is actually an underground prospect for Mn exploitation. The Mn sedex mineralization is stratiform and hosted in Tournaisian lydites. The primary Mn minerals are silicates such as rhodonite, pyroxmangite and spessartine. The primary Mn minerals were oxidized into black Mn oxides, which are the target for the exploitation. There, the students also visited an old mine reconverted into a wine cellar.

Day 3: Cardona, Manresa and Gavà (September 7th)

During the third day of the fieldtrip, we visited the Cardona salt diapir and mine, the geology museum of the Universitat Politècnica de Catalunya (Manresa) and the Neolithic Gavà mines.



Fig. 4: Group photo taken at the surroundings of the Lighthouse of Cap de Creus, where the geological situation of the Cap de Creus was explained. This area is representative for the type I pegmatites, b) example of microclinal pegmatite mineralization of the same outcrop with schörl veins and mm to cm size cordierite grains.



Fig. 6: Close-up picture of the mineral assemblage of a type IV pegmatite. The albitic alteration is widespread and muscovite and quartz cores are evident, b) picture of Siberian Chapter members studying the last outcrop visited.



Fig. 8: Students in front of the main shaft of the Eugenia Mine in Bellmunt del Priorat ready to go inside the underground mine.



Fig. 9: Students inside the Eugenia Mine, in one of the 20 m high galleries following the galena veins.



Fig. 10: Mineral collecting in the Linda Mariquita dump. In the left part of the picture, the barite vein is observed.

The Cardona mine has been exploited since Neolithic times, when artisanal works were performed in open pit to extract the halite. The first underground mine was opened during 1902 in order to exploit sylvite and it was active until 1990, when it had to close down due to the depth of the remaining sylvite. The mine exploited a salt diapir located in the E sector of the Ebro Tertiary Basin, in the southern foreland basin of the Pyrenees. The evaporitic sequence was deposited during the closing of the Ebro Basin (Upper Eocene). Afterwards, during the Lower Oligocene, the folding produced by the Alpine orogeny created the space for the Cardona salt to accumulate in the Cardona-Pinós anticline core. Erosion in the crest of the growing anticline thinned the overburden above the salt, increasing the differential loading between the anticline and the synclines and allowing the salt to flow towards the anticline. Nowadays, the Cardona salt mine is reconverted into a museum.

The “Valentí Masachs” geology museum is located in the “Escola Politècnica Superior d’Enginyeria de Manresa” belonging to the Universitat Politècnica de Catalu-

nya. The museum has a wide collection of minerals, rocks and fossils, and allows the visitors to interact with several techniques of mineral recognition and characterization. It also has a section referred to industrial applications of minerals, strategic resources and energy saving.

The Gavà Neolithic Mines is an archeological site located at the coast of Catalonia, next to Barcelona. The mines were dug in the Neolithic in order to exploit variscite replacing Silurian apatite layers and infilling Quaternary veinlets. The stratabound phosphate mineralization is hosted in Silurian black shales and is interpreted to have formed due to exhalative processes in the seafloor. The primary phosphates (apatite) are associated with chert, hematite, nontronite and pyrite. In addition, there is contemporaneous alkaline magmatic activity in the Catalan Coastal Ranges, which triggered the formation of VHMS deposits. After the Hercynian and Alpine orogenic cycles, these formations were emplaced close to the surface. The interaction of the black shales hosting the mineralization with meteoric waters caused: 1) the oxidation of the pyrite present in the black shales, resulting

in acidic fluids; 2) the remobilization of the primary phosphates and the subsequent precipitation in late veinlets; and 3) the replacement of Ca in the apatite layers by Al and Fe forming variscite, strengite and phosphosiderite.

Days 4 and 5: Vall Fosca and Vall d’Aran (September 8th and 9th)

The two last days of fieldtrip took place in the NW part of the Catalan Pyrenees. The first visit was to the uranium Eureka Mine, in the village of Castell-Estaó. The deposit is a red-bed where the mineral precipitated due to a redox trap. The red-beds are coarse sediments from the Permo-Trias, which present some coal layers. When the oxidized fluids carrying U, V and other elements encountered the coal layers, the elements precipitate as minerals due to the change on the redox conditions. These elements can be later remobilized and precipitate as secondary minerals. Most U minerals that can be found in the mine were formed due to remobilization of uraninite, like carnotite, tyuyamunite, sengerite, zeunerite and dozens of rare minerals. The Eureka Mine is also unique by occurrence of the rare



Fig. 11: Panoramic view of the Cardona "salt mountain", where the entrance of the mine is located.



Fig. 12: Czech, Russian and Barcelona students inside the Cardona mine. Some halite layering can be observed and the multiple stalactites are secondary salt products due to the water infiltration.



Fig. 13: Some students in the "Valentí Masachs" geology museum in the Politecnic University of Catalonia in Manresa.



Fig. 14: Original Neolithic galleries in the Gavà Archaeological Park.



Fig. 15: Czech, Russian and Barcelona students in the Gavà Archaeological Park.

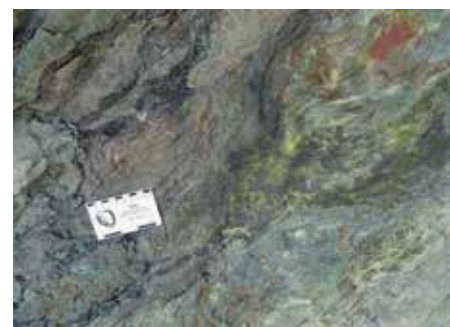


Fig. 16: Detail of the Uranium mineralization in Eureka Mine, Vall Fosca.



Fig. 17: The group of students in the red beds of the Eureka uranium Mine, Vall Fosca.



Fig. 18: Students looking for different minerals in El Cierco Mine dumps.



Fig. 19: Galena hand sample from El Cierco mine dumps.

mineral *čejkaite* $\text{Na}_4(\text{UO}_2)(\text{CO}_3)_3$, described in its type locality Jáchymov in Czech Republic and named in the honor of famous Czech mineralogist Dr. Čejka.

Final remarks

We intended to show in this field trip a representation of many different styles of mineralization, by using the large diversity in types of ore deposits found in Catalonia. In addition, some of the deposits were considered for other aspects, such as archaeology or the environment. It is the first time that three different student chapters

met in a fieldtrip, therefore, we can say, it is a great achievement for the three student associations and for the SGA Educational Fund, which offered us this opportunity and sponsored the fieldtrip. For this reason, we really want to thank the SGA for this great task of allowing students to meet, share geology and enlarge their knowledge. We also want to thank all the people who made this fieldtrip possible by helping with the organization tasks or leading the fieldtrips. And last but not least, we thank all the participants for joining us and sharing these geological days!



Fig. 20: Students looking at metamorphic rocks outcrops with three different stages of mineralization.

Activities of the SGA Siberian Chapter in 2017: collaborative field trip with Prague and Barcelona Student chapters to Catalonia, September, 4–10, 2017

Anna Nekipelova^{1,2}, Dmitry Chebotarev², Maria Cherdantseva^{1,2}

¹ Novosibirsk State University, Novosibirsk, Russia

² V.S. Sobolev's Institute of Geology and Mineralogy, SB RAS, Novosibirsk, Russia

The joint field trip with the Prague and Barcelona Student chapters took place in the vicinity of Barcelona, Catalonia on September, 5th – 9th. Six members of the Siberian Student Chapter, five students of the Prague Student Chapter and 13 members of the Barcelona Student Chapter took part in the excursion. This field trip was attractive by its specialization and spectacular landscapes of different parts of Catalonia. The geological setting of Catalonia is a folded region formed as a result of the Hercynian and Alpine cycles. The program of the field trip included studying sedimentary, metamorphic, skarn and igneous complexes, illustrating different moments of the geological history of the area, visiting Mn-SEDEX, polymetallic, lateritic phosphate and salt deposits. The professors of the University of Barcelona, Juan Carlos Melgarejo and Marc Campeny, led some of the excursions.

We managed to visit some interesting geological objects. The first object was the rare-element Ta-Nb-REE-Be porphyritic granite pegmatites of the beryl-columbite-phosphate type in the Cap de Creus pegmatite field, Girona. Pegmatites are found generally as dykes tending to follow the main foliation. They are affected by late shearing. There are four types of pegmatites. The different types of pegmatite represent different grades of evolution. The distribution of the different types of pegmatites and the mineralogical and

geochemical data suggest that all these pegmatites formed by fractional crystallization from a single source.

The second object visited was the Pb-Zn and Ba-Cu-Ag seams in the basement. Deposits of this type, dated from the Upper Ordovician to the Upper Devonian age, are located between the villages of El Molar and Bellmunt del Priorat, Tarragona. Two large areas can be distinguished, one is in the west of the Siurana Fault, and the other one is in the east. The former has mineralization, which is mainly hosted by a thick layer of porphyries. In the eastern zone, either slates or porphyries host the seams. According to that, the western part represents a deeper sector of the porphyry intrusions than the eastern zone. The mineralogy of these seams is simple. It comprises galena and other accessory sulfides within a barite-carbonate matrix. We visited the Eugenia lead mine, which operated almost without interruption from 1870 to 1972. It consists of more than 14 km of galleries up to 620 m deep distributed in 20 levels, reaching more than 300 m below the sea level. A worker colony and a metallurgical ore-processing complex was built around the mine during the first years of the 20th century. In addition, we managed to visit the small Joaquina Primera mine with the world's best outcrop of Mn ores with rhodonite.

Moreover, we visited the Gava Neolithic

mining complex, in which ancient people extracted variscite, green aluminium phosphate, for making jewellery. At the exposition of the museum, the conditions for the occurrence of layers of phosphate mineralization and ways of developing ore deposits are displayed. Phosphate veins and veinlets occur in grey and brown shales of the Lower Silurian. The thickness of ore veins varies from a few centimetres to 1.5 meters.

The next stop was the Central Cardona mine, where the salt diapir was developed. It is located in the eastern sector of the Ebro Tertiary Basin, in the southern foreland basin of the Pyrenees. The sediments correspond to the marine Cardona Saline Formation, Upper Eocene and a series of Upper Eocene-Lower Oligocene detrital continental formations. The tectonic style shows the typical characteristics of folded strata overlying evaporites, with wide and flat-bottomed synclines and narrow anticlines related to the migration of salt from the adjacent synclines and controlled by thrust structures. The Cardona salt diapir is made up of sylvite (KCl), carnalite (KClMgCl₂·6H₂O) and halite (NaCl) layers, which are intensely folded. Inside the salt mine, thin folded clay layers embedded in the red to brown halite can be observed.

In the Western Pyrenees, we visited the Vall Fosca mines: Eureka uranium and Cierco Pb-Zn. One of the most interesting points



Fig. 1: Members of the Siberian Student Chapter in the Bellmunt Mine.



Fig. 2: Outcrop of Mn-SEDEX in the small Joaquina Primera mine.

was the Eureka Cu-U-V mine, Castell-Estaó, Pallars Jussà. The mineralization of the Eureka mine is located in Permian-Triassic, red, continental, detrital rock (conglomerates and sandstones). There are primary and secondary uranium minerals like Uraninite (UO_2), Carnotite ($\text{K}(\text{UO}_2)_2(\text{V}_2\text{O}_8) \cdot 3\text{H}_2\text{O}$), Zeunerite ($\text{Cu}(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 10\text{--}16\text{H}_2\text{O}$), Metatorbernite ($\text{Cu}(\text{UO}_2)_2(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$), Jo-

hannite ($\text{Cu}(\text{UO}_2)_2(\text{SO}_4)_2(\text{OH})_2 \cdot 6\text{H}_2\text{O}$). The Cierco mines consist of Pb-Zn mineralization, represented mostly by sphalerite and galena, superimposed on skarn. The ores were exploited from the early 20th century until the 1980s.

Fig. 3: Fine interbedding of clay with halite. (see also text and figures in chapter above)



Activities of the SGA Siberian Chapter in 2017: Field trip to the Verkhnetioiskoe iron deposit

Anna Nekipelova^{1,2}, Igor Yakovlev^{1,2}, Maria Cherdantseva^{1,2}

¹ Novosibirsk State University, Novosibirsk, Russia

² V.S. Sobolev's Institute of Geology and Mineralogy, SB RAS, Novosibirsk, Russia

In June 2017 (12.06-15.06), nine students of the Siberian Student Chapter visited the Verkhnetioiskoe iron deposit located in the Republic of Khakassia in a distance of 600 km from Novosibirsk. Local geologists discovered this deposit in 1930 but the development started in 1957 in an open pit. The quarry is located in the northern part of the Verzhina Tioi settlement (53°16'35"N 89°34'48"E), which was built for the miners. Mining operations stopped in 2015. The depth of the quarry is approx. 400 m. The first thing that catches one's eye at the entrance to Verzhina Tioi settlement is the row of modest coloured houses, set against a background of huge dumps along the entire perimeter of the village.

The deposit is confined to the submeridional Tioisky Fault. The length of the fault zone along strike is 1500 m. The host rocks are steeply dipping limestone and dolomite of the Middle Cambrian. The ore zone is a hydrothermally altered magnetite breccia, with unsorted, coarse fragments of orthopyre, microsyenite, limestone and granite. It is composed of 12 steeply lenticular ore bodies in the footwall of the breccia. The ores are divided into magnetite (5%), serpentine-magnetite (60%), carbonate-magnetite (25%), carbonate-serpentine-phlogopite-magnetite (2%), hematite-magnetite



Fig. 1: General view of the Verkhnetioiskoe mine.

(8%) zones. They have massive, spotted, brecciated, rhythmically banded and colloform textures.

During the field trip, we visited the mining department of the Verkhnetioiskoe deposit, its quarry and the local history museum. On the first day, we went half the way down into the quarry, accompanied by local geologists, who provided us with safety instructions and told us about how the work was carried out at the quarry and actively helped with collecting samples. We were able to visit the observation platform, to study the geological structure and distribution of the mineral assemblages. The structure of the ore bodies associated with the dykes penetrating the entire quarry was well visible. On the second day, we independently organized a route along the pit dumps and looked for interesting and rare specimens. Stu-



Fig. 2: Group picture of participants in the Verkhnetioiskoe quarry.

dents found large brightly-coloured green serpentine and chlorite nests and blocks with cubic and pentagon-dodecahedron crystals of pyrite, octahedral crystals and oolites of magnetite, and particularly spectacular veins of purple fluorite and pink calcite. On the third day, we visited the museum of local lore. The main hall is dedicated to the history of the Verkhnetioiskoe deposit. We were told in detail, how the history of the discovery of the deposit began, and about the famous geologists, who worked in the field. In addition, we were shown 5 or 6 stands with museum samples from this deposit.

In general, the trip gave new practical and theoretical knowledge. Everybody was able to replenish their collection with valuable specimens, some of which may take their place in the geological museum of Novosibirsk State University.



Fig. 3: Calcite-fluorite vein with sulfide mineralization.



Fig. 4: The nest with pink calcite and purple fluorite.



Fig. 5: An oolite mag-netite sample from the museum of local lore.

Salta

ARGENTINA

28-31 AUGUST 2018



The Geological and Mining Survey of Argentina and the Geological Association of Argentina warmly invites you to the 15th Quadrennial International Association on the Genesis of Ore Deposits Symposium

THEMATIC SESSIONS

- Porphyry Cu (\pm Au, Mo) deposits
- IOCG deposits related to the non-accretional Andean Orogen
- Epithermal gold deposits
- Ore deposits in rift environments
- PGE metallogeny
- Base metals in sedimentary sequences (MVT, SEDEX and VMS deposits)
- Light metals (Li, B) related to evaporitic environments
- Metallogeny of gemstone deposits
- Metallogeny of the Andes
- Metallogeny of cratonic areas
- Global tectonics and large to giant ore deposit settings
- Non conventional ore sources: Exploration and extraction
- Geochemistry of ore forming fluids
- Precision Geochronology of ore-forming processes
- Isotope geology applied to ore deposits
- New tools for mineral exploration
- Predictive modelling applied to mineral resources
- Ore mineralogy and processing

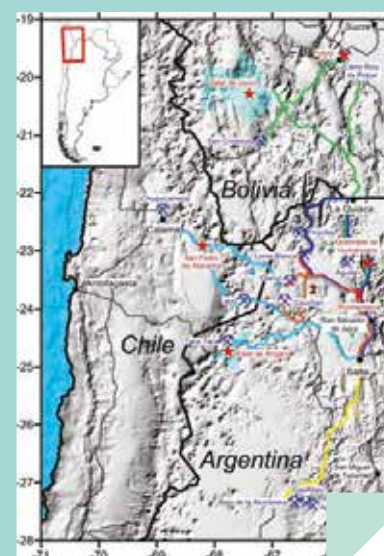


SPONSORSHIP

Sponsors have the opportunity to reach a broad international audience through this Symposium, having their sponsorship promoted in various ways.

FIELD TRIPS

The rich mining history of this part of America that began with the exploitation of Ag in the Cerro Rico de Potosí (Bolivia) continues today with the exploitation of Cu and Au porphyries in the Andean region of Chile and Argentina, as well as Li from the salt lakes in the Puna - Altiplano triangle that comprises Argentina, Bolivia and Chile. Trips will be organized in these three countries in order to visit world class deposits of metals (Ag, Sn, Cu) and nonmetals (B, Li) having the opportunity to discover the cultural aspects of this region and their inhabitants.



FOR FURTHER DETAILS VISIT
www.15iagods.org



SGA Student Chapter of Nancy report

Exploration Challenge in Québec Mines (Canada, November 2016)

Four student members of the SGA Student Chapter of Nancy participated in the Québec Mines annual meeting (from 21th to 24th of November 2016): Pierre Argoud, Julien Perret, Alexandre Crépon and François Turlin. They had the opportunity to represent their university as well as the SGA organization. Their presence was a way to show that SGA is present in France and supports students. Furthermore, the students were able to participate in a team for the exploration challenge that takes place every year during this congress. The other teams that participated are all from Canadian universities: Laval (Québec), UQAM (Montréal) and UQAC (Chicoutimi). This challenge is a 12 hours rush, during which each team has to work on the same geological region and has to propose an exploration campaign according to the available data (geochemistry, geochronology, stream sediments, structure, cartography, geophysics...). This event was fully financed by the University of Lorraine (France) and LabEx Ressources 21.



Fig. 1: From left to right: Alexandre Crépon, Julien Perret and Pierre Argoud during their participation in the exploration challenge of Québec Mines 2016.

Help in the organization of the international workshop "Recent advances in W-Sn and Rare Metal deposit metallogenesis"

This event took place in Nancy (November, 30th and December, 1st, 2016) on the occasion of the PhD defence of Dr. Matthieu Harlaux. This event was organized around four keynote lectures, which introduced oral communication sessions. Moreover, poster sessions were also planned to promote a wide discussion about the recent lab works dealing with tungsten, tin and rare metal deposit metallogene-

sis. This event ended with Dr. Matthieu Harlaux PhD defence intitled "Tungsten and rare-metal (Nb, Ta, Sn) hydrothermal metallogenic systems in the late-Variscan orogenic context: example of the French Massif Central".

PDAC, Toronto, Canada – March 2016

The SGA Student Chapter partially financed the participation of a student member (Fortune Tolumba Niemba, M.Sc.) to the PDAC 2017 meeting that took place in Toronto from March 5th to March 8th 2017. It is the fourth year that the SGA Student Chapter of Nancy financially supports students attending this congress. Our participation was the opportunity to demonstrate the implication of the SGA Student Chapter, both to finance a motivated student and to help him to develop its social network with industrial actors in a mining country. It costed the SGA Student Chapter approx. 250 € to provide financial support for this event. The University of Lorraine and the Labex Ressources 21 complemented the financial support.

Organization of a public conference about travel/field trip experience of geologists

The Student Chapter organized two lectures given by experienced geologists who shared their memories of previous field missions with both informed audience (students in geology and GeoRessources lab members) and the public on the 7th February, 2017. During this event, Michel Jébrak (professor at UQAM) and Gaston Guliani (CNRS Research Director at CRPG) were invited to present their best memories of travelling in Uzbekistan and in East Africa "on the road of gems" as geologists by showing and commenting numerous pictures and movies. As the targeted audience was the public, these presentations were not focused on geological aspects, but rather on the cultural and geographical contrasts experienced by the two lecturers. This event has brought together about 100 people among them: scientists, non-scientists, adults and young people. The audience appreciated the conference. Drinks and food were provided at the end of the event in order to allow discussions to go on in a good atmosphere.



Fig. 2: Presentation poster of the event.

News from the trip to Greece, involving 11 students of the Student Chapter SGA – Nancy, from the 8th to the 15th of April, 2017

The Student Chapter SGA Nancy from the University of Lorraine (France) organized a one-week field trip to visit the Tertiary hydrothermal ore deposits of Northern Greece with eleven students. During the field, we were accompanied by Alexandre



Fig. 3: The field-trip participants with from top left to bottom right : Sonya Rakotoma, Nathanaël Kirch, Simon Hector, Marie Guilcher, Mélanie Dejean, Julien Boulliung, Pierre Wadier, Alexandre Crépon, Pierre Argoud and Clara Deruy.



Fig. 4: The Olympias deposit mineralization with a vein of pyrite, arsenopyrite and the associated alteration.



Fig. 5: Top, high-grade mineralization of Sb-sulfides (stibine) within a barite vein. Bottom, stibine and realgar in quartz.



Fig. 6: District of Sapes. Qtz-Py-Mo type A-B veins intersected by D veins crosscutting sericite alteration of the granodiorite porphyry.

Tarantola and Panagiotis Voudouris (Athens University).

Northern Greece and Southern Bulgaria, with the Rhodope-Serbo-Macedonian massif, represent a world-class case to study exhumation processes in an extensional back-arc setting, supra-detachment basin formation, contemporaneous magmatism and gold mineralization, analogous to the basin and Range Province of the western United States. Mining activities are dating back to prehistoric times, and the area is one of the most promising regions for future gold exploitation in Europe. Indeed, the Rhodope metallogenic province of northern Greece and its post-collisional magmatism gave rise to a variety of styles of hydrothermal mineralization, which include skarn- and manto-type Pb-Zn-Au-Ag, intrusion-related gold and Mo-W, intermediate- to high-sulfidation epithermal gold, sedimentary rock-hosted gold and porphyry Cu-Au/Cu-Mo-Au-Re deposits. The deposits of northern Greece are part of the Western Tethyan metallogenic belt, expanding from Serbia to Turkey, Armenia and Iran.

The excursion started at Stanos, a shear zone-related mineralization (North-West Greece). This area is recognized as a region with significant mineral potential, where a variety of metal occurrences exists. The most important mineralization types in the district are porphyry Au-Cu, carbonate-hosted Pb-Zn-Ag-Au, Cu-skarn and oxidized Mn ores. The main outcrop of the day was the Olympias deposit, which is a massive stratabound polymetallic replacement

deposit located at the marble-gneiss contact. The main mineral assemblage is pyrite, sphalerite, galena, arsenopyrite and chalcopyrite. Gangue minerals include quartz, rhodochrosite and calcite. The proven and probable reserves are 13.5 Mt at 4.4% Pb, 5.9% Zn, 132 ppm Ag and 8.7 ppm Au, with a total of 3.8 Moz Au and 57.7 Moz Ag (Eldorado Gold 2012).

The second day, the participants travelled east to Kallintiri, where we observed a polymetallic mineralization. The detachment-related, polymetallic Kallintiri Sb-As-Ag-Au-Te deposit formed at the brittle-ductile transition. It was extensively mined for Sb during the last century. The Kallintiri mineralization is controlled by a major low-angle, ductile-brittle shear zone that parallels the regional east-west structural trend. This shear zone separates high-grade metamorphic rocks of the Rhodope massif from low-grade metamorphic marble and calc-schist. The marble and calc-schist hosting the mineralization are strongly mylonitized and exhibit silicic and sericitic-argillic alteration, mainly consisting of quartz, muscovite, kaolinite and carbonates. The mineralization has a polymetallic assemblage that includes sulfides, sulfosalts, tellurides and native elements and occurs as: a) high-grade ore shoots within the quartz-barite veins; b) disseminated within the silicified marble and calc-schist; and c) breccia, within the quartz-barite veins but also in large bodies in the hanging wall of the shear zone.

The other days were spent on several major outcrops in the eastern region near

Alexandroupolis. This area hosts a lot of porphyry-epithermal deposits and is a target of interest for exploration, in particular, the Sapes-Kassiteres prospect that we have visited and which belongs to Eldorado Gold. The total measured and indicated reserves are 0.82 Moz at 9.8 ppm Au, with proven and probable ore reserves of 637,000 oz at 15.1 ppm Au, using gold cut-off grades of 4 ppm. This district represents a deeply eroded Tertiary volcanic centre built upon a sedimentary sequence of Middle to Upper Eocene age, discordantly overlying the metamorphic basement of the Circum Rhodope belt. Less altered volcanic rocks plot in the subalkaline field and display a calc-alkaline to high-K calc-alkaline affinity. The porphyry-style mineralization, with a surface exposure of about 3 km x 2 km, is characterized by disseminated pyrite and chalcopyrite in sericite-altered granodiorite porphyry, which is crosscut by sinuous to planar, banded quartz stockwork, and quartz-pyrite-molybdenite veins. High-temperature K-Na silicate alteration is probably associated with early quartz stockwork, which were overprinted and obliterated by lower temperature sericite alteration and contemporaneous D-type pyrite-bearing veins.

Such an interesting and successful field trip would not have been possible without the help from our teacher Alexandre Tarantola and our friends and guides from Athens University Panagiotis Voudouris. We would like to thank our sponsors SGA, LabEx Ressources 21, Mairie de Vandoeuvre-lès-Nancy and ADINPL.

Report on the 4th SGA Short Course on African Metallogeny: Granite-related Ore Deposits in the Great Lakes Area, Kigali, Rwanda, 5–9 June 2017

Sharad Master

Economic Geology Research Institute, School of Geosciences, University of the Witwatersrand, Johannesburg, South Africa; sharad.master@wits.ac.za

This short course was organized by Prof. Philippe Muchez of the KU Leuven University, Belgium in collaboration with Prof. Stijn Dewaele (University of Ghent and Royal Museum for Central Africa, Tervuren) and Dr. Niels Hulsbosch (KU Leuven). The Rwanda Mines, Petroleum and Gas Board (RMPGB) hosted it, under the auspices of Mr. Francis Gatare (CEO of RMPGB). Mr. Alain Ntege and Ms. Ariane Kanyana were responsible for the local logistics. The lectures of the short course took place at the Lemigo Hotel in Kigali, with three and a half days spent visiting mines and outcrops in the field. At the Lemigo Hotel, we were welcomed by Dr. Emmanuel Munyengabe, COO of the Rwanda Mines, Petroleum and Gas Board.

The workshop had around 45 participants from a dozen countries (Rwanda, DR Congo, Burundi, Cameroon, Nigeria, Kenya, Zambia, South Africa, Belgium, Germany, Sweden and Hong Kong (China)). On Monday the 5th, there were lectures presented by the three speakers, which included an introduction to the regional geology of Rwanda and the Karagwe-Ankole belt in surrounding areas; an introduction to mineral deposits hosted by granites (Sn,

W, Ta-Nb, Au); and detailed accounts of the geology of the areas that were to be visited over the coming week. A very welcome and much appreciated move on the part of the speakers was to upload all the talks, as well as pdfs of all the publications on the deposits to be visited, on a website before the meeting, so that participants in the workshop could come prepared, having had time to go through some of the literature beforehand.

On Tuesday, the participants piled into two buses and were driven to the Musha-Ntunga Sn-Ta mines, some 40 km east of Kigali. The deposits are currently being re-opened and mined by a company called Piran Resources, who generously allowed us to visit both mines and the plant, with very instructive underground and open pit visits. The Musha deposit consists of a series of quartz-cassiterite veins, emanating from a nearby granitic pluton and emplaced



Fig. 1: Prof. Philippe Muchez explains the mineralogy of tungsten ores

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.



Fig. 2: Prof. Stijn Dewaele (right) explains the geology using a map, while Dr. Niels Hulsbosch (left, holding the Geological Map of Rwanda), look on.



Fig. 3: Co-organizer Alain Ntengye (at the front) in one of the two excursion buses.



Fig. 4: Dr. Sharad Master at the Musha mining camp.

into the Musha Formation metasedimentary rocks of the Mesoproterozoic Akanyaru Supergroup. These veins are weathered in the near surface environment, and in geological recent times, they have been eroded and deposited as colluvial aprons on the flanks of the valleys. We visited an adit, which was driven into this loose colluvium, which contained large broken angular blocks of brecciated quartz veins, running at a grade of 0.35% Sn, overlying mineralized quartz veins running at 1.2% Sn. The Ntunga deposit consists of highly weathered and kaolinised quartz-feldspar pegmatites containing both Sn (as cassiterite) and Ta (as tantalite), intruding quartzites and phyllites of the Musha Formation. One of the great features of the workshop, which greatly aided in the learning and training aspects, was the field exercises that needed to be carried out by groups of 5 or 6 participants, who were given a list of questions to answer and a number of tasks to perform, like making observations and measurements of structural features like dip and strike of lithology, cleavage, folds, etc. The pedagogic value of such an exercise cannot be overempha-

sized - there simply is no substitute for doing fieldwork and learning in the field, in mines and on the outcrop. The explanations were aided in the field by large-scale colour printouts of maps and diagrams, so that participants could benefit from detailed explanations at the actual outcrops. After the mine visits, we examined a very interesting outcrop of the Musha Formation, where there was abundant evidence of soft-sediment deformation features, ascribed to rapid sedimentation in a delta-front setting. There was some discussion at the outcrop about the possible role of seismicity during sedimentation, to produce these structures. The group then returned to Kigali.

On Wednesday 7th June, the group went 20 km northwest from Kigali to the Nyakabingo W deposit, which is situated on the eastern flank of a large regional anticlinal fold. The tungsten mineralization occurs as ferberite crystals in quartz veins in black shales of the Nduba-Shyorongi Formation. The ferberite crystals are altered in the oxidation zone to anthoinite, which forms box-work-type replacements, intergrown with ferberite, called "reinite". The geology of

this deposit was examined in a spectacular roadcut exposure, on quarries and in an underground adit.

The night was spent in Gitarama. On Thursday 8th June, we visited the Sn-Ta-Nb pegmatites of the Gitarama-Gatumba area, northwest of the Gitarama granite batholith, about 50 km west of Kigali. We started with a road traverse looking at pegmatite mineral zonation going from intrabatholithic pegmatites containing biotite, to biotite and muscovite-bearing pegmatites, to muscovite pegmatites, and then mineralized pegmatites containing Sn and Ta-Nb minerals intruding Karagwe-Ankole metasedimentary rocks. We also looked at unmineralized muscovite pegmatites, which were structurally emplaced in anticlines in metasedimentary rocks near the contact with the batholith. In the Gatumba area, we looked at several pegmatites, which had been mined in shallow open pits and saw interesting assemblages containing Li-minerals like spodumene and the Li-amphibole holmquistite. After a packed lunch at the now abandoned Gatumba mine, we looked at boudinaged pegmatites intruding rippled



Fig. 5: Group discussion on the geology of the Gatumba Sn-Ta-Nb pegmatite field.



Fig. 6: Short course participants examining outcrops in the Gisuma River section near Gatumba.

quartzites in the Nyabarungu River. We ended the day at the famous Buranga pegmatite, which is the type locality for two phosphate minerals, burangite and gatumbite, and from which more than a hundred phosphate minerals have been described. The margins of the pegmatite contain large books of muscovite crystals, while the core is made of quartz. We found large masses of heterosite, $(\text{Fe,Mn})\text{PO}_4$, with brightly coloured secondary phosphate minerals. Why this pegmatite is so rich in phosphate mine-

erals, while others around it lack phosphates, is a big mystery.

On Friday 9th June, we looked at roadside outcrops of pegmatites at varying distances from the Gitarama granite, showing the zonation quartz-muscovite-tourmaline, to muscovite-biotite-tourmaline, to biotite only with increasing distance away from the granite. We also saw boudinaged zoned pegmatites with large tourmaline crystals growing perpendicular to the sidewalls. We then returned to Kigali, where in a session

after lunch, we went through the highlights of how these granite-related mineral deposits are formed, and then had group exercises to determine strategies for exploring for these deposits, in a lively session that was instructive as well as fun to do.

Professors Muchez and Dewaele and Dr. Hulsbosch are to be congratulated on organizing and executing this workshop with superb professionalism and infectious enthusiasm, and with a great deal of foresight and preparation, which resulted in an extremely informative, educative and enjoyable experience for all the participants. Their great generosity in sharing their knowledge and insights as well as their publications and their presentations means that a new group of young and keen geologists from the Central African region have had an outstanding, unforgettable training experience, which they could not get anywhere else. The Rwanda Mines, Petroleum and Gas Board is sincerely to be thanked for making this workshop possible, with flawless organization.



Fig. 7: Group photo.

ECROFI 2017 International Conference – Report for SGA NEWS

The biennial international conference European Current Research on Fluid Inclusions (ECROFI 2017) took place from 23 to 29 June 2017 in Nancy (France). The conference was jointly organised by the GeoRessources and the Centre de Recherches Pétrographiques et Géochimiques (CRPG) laboratories and gathered over 120 participants.

The conference comprised three days of presentations plus days devoted to workshops and field trip, and was dedicated to the investigation of fluids and magmas at all scales through the study of fluid and melt inclusions. Among the many topics addressed during the three days of presentations, fluid and melt inclusions represented the main focus, highlighting new developments in analytical, experimental, and thermodynamics techniques, and with applications to diagenetic, metamorphic, magmatic and volcanic environments and their related mineral, geothermal and petroleum systems. The careers of Jean Dubessy

and Bernard Poty have been celebrated in a special session.

The conference presentations (June 26–29) have been preceded by visits to the Tellure Mine and Sainte-Marie-aux-Mines Mineral and Gem International show (June 23), a workshop entitled “The Fundamentals of Fluid Inclusions”, given by Larry W. Diamond (Univ. Bern) (June 24), and laboratory workshop (June 25).

On June 27, the whole conference moved to Champagne region for a special session devoted to new frontiers in fluid inclusions research and a visit of the Nicolas Feuillate vineyard and factory.

SGA supported the venue of two student members: Matthew Valetich (ANU, Canberra) and Ildar Nizametdinov (Novosibirsk State University). Matthew gave an oral presentation entitled “Recalculating boninitic melt inclusion compositions from Chi-chi jima, Japan: the role of post entrapment crystallization” and Ildar gave an oral

presentation entitled “The features of melt inclusions composition from Menshiy Brat volcano basalts, Iturup Island, Southern Kurile Islands”.

Next ECROFI meetings are planned to take place in Budapest (2019) and Reykjavik (2021).

The book of abstract can be downloaded from the website: <http://2017.ecrofi.univ-lorraine.fr/>

Organising Committee:

Jacques Pironon (GeoRessources)
Antonin Richard (GeoRessources)
Alexandre Tarantola (GeoRessources)
Marie-Camille Caumon (GeoRessources)
François Faure (CRPG)
Véronique Ernest (GeoRessources)
Maria-Anna Reina (GeoRessources)

ECROFI 2017

Annual Report of the SGA Peru Student Chapter

Jhon Trebejo Inocente

President SGA Peru Student Chapter 2017

1. Conference: Perspectives of the Investment in Mining and Exploration in Peru and in the World

The conference was carried out in one of the auditoriums of the School of Geology of the National University of Engineering in Lima, on April 7, 2017, at 6 p.m. The conference focused on the latest perspectives of geochemical exploration in the world and in Peru.



Figs. 1 and 2: Dr. José Machare in full exhibition on the perspective of investment and mining exploration in Peru.



Fig. 3. President of SGA PERU, delivering the recognition to Dr. José Machare.

2. Participation in the PROEXPLO 2017

Proexplo is one of the main geological-mining encounters in Latin America and a mandate meeting for companies and professionals working in exploration, in which we have a stand thanks to the support of our industrial sponsor Ferrari engineer and also support of the outstanding PhD Daniel Moncada.



Fig. 4: Students from Chile, together with the board of directors of SGA Peru.



Fig. 5: Students from Chile, together with the board of directors of SGA Peru.



Figs. 6 and 7: Members of the SGA Peru along with Dr. Daniel Moncada. The President Jhon Trebejo with Daniel Moncada.



Fig. 8: Members of the SGA Student Chapter Peru.

3. Field Trip "Geology, Alteration and Exploration Guides of Epithermal High Sulfidation Mineralization and Geological Field Work in the Pichu-Pichu Volcanic Complex" (directed by Ing. Eduardo Fernando Bernahola Portugal)

We carried out a review of the geology, alteration and exploration guides of the high sulphidation epithermal mineralization, and we also established the actions to be carried out in an initial exploration campaign. We conducted a field study (stratigraphic columns, mapping, rock chip sampling) in the Pichu-Pichu volcanic complex. The main objective is to study the hydrothermal alteration and mineralization of the volcanic complex and at the end, we discuss and interpret the results obtained in the field.



Figs. 9, 10 and 11: Access to the study area, view of the Pichu-Pichu volcanic complex.



Figs. 12, 13, 14 and 15: Pichu-Pichu volcanic zone where you can observe the hydrothermal alteration and the different volcanic rocks.



Figs. 16 and 17: Some members of the chapter with a view of the Pichu-Pichu volcanic complex.

4. Conference: "Metallogenetic Characteristics and Types of Deposits South of Peru" (by Dr. Fernando Nuñez Chavez)

The conference was held together with the promotion of geology 2017-1 of the UNI (national university of engineering). It dealt with the most recent topics related to exploration and copper deposits of southern Peru, for which we had the presidium of Southern Peru exploration manager Dr. Fernando Nuñez.



Fig. 18: Auditorium of the faculty of the UNI.



Fig. 19: Dr. Fernando Nuñez Chavez receiving a present from the president SGA Peru Student Chapter Jhon Trebejo.

5. Geochemical Exploration Project in the Attic Area, Arequipa

As part of the academic development, UNI students belonging to the SGA UNI chapter worked in the study of the northern area of Arequipa, in a geochemical, structural and metallogenetic study of the area. It is an area of great mining potential and located in the metallogenetic area of gold and copper. The studies and results of the project will be ready by mid 2018 with the support of teachers from the National University of Engineering.



Figs. 20 and 21: Structural mapping and alteration in the study area.



Figs. 22 and 23: Mapping of the study area and Zone of alteration with great presence of sulfides.

6. Participation in the Biennial SGA Conference in Québec, Canada

Students from the Universidad Nacional de Ingeniería, presented a research study by a team of four people, Miguel Quintana, Jhon Trebejo, Renzo Velasco and Wualdo Blas, which was presented by the first author, Miguel Quintana in the city of Quebec, Canada.



Fig. 24: SGA representatives in Québec during the Biennial Conference.

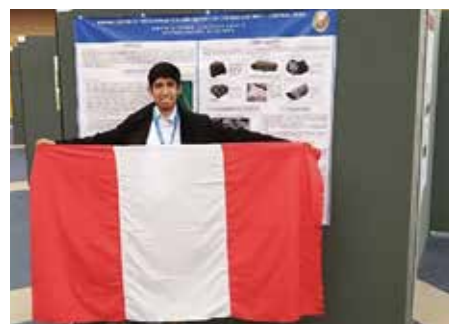


Fig. 25: Poster presentation during the 14th SGA Biennial Meeting – Québec, Canada about mineralisation of a skarn deposit of the Miocene belt - central Peru.

7. Field Trip: Tectonic and Stratigraphic Analysis of the Cordillera La Viuda (by MSc. Javier Jacay)



Figs. 26 and 27: Widow's access area to the mountain range.



Fig. 28: Widow's access area to the mountain range.



Fig. 29: View of the mountain range, located on the border of Cerro Pasco and Lima.



Figs. 30, 31 and 32: Members of SGA-UNI in the Cordillera La Viuda.

8. Field Trip "Structural Mapping", 27–29 September 2017 in La Loca-Lidad de Casapalca y Ticlio (directed by Luis Ayala)



Figs. 33, 34 and 35: Members of SGA Peru in the central mountain range.

Figs. 36, 37 and 38: Members of SGA Peru in the central mountain range, Cerro de Pasco region.

9. Workshop: Theory – Practicality of Geological Mapping – Structural and Tectonic Interpretation of the Zones of Huambutio and the Tambomachay Gallery



Figs. 40, 41 and 42: Members of SGA-PERU in the department of Cusco.



10. Participation in the Project Fair of the National University of Engineering



Figs. 43 and 44: Members of SGA in the project fair of the National University of Engineering, disseminating the chapter in order to obtain new members.



Fig. 45: The president of SGA Peru, together with the members of SGA-UNI.

11. Meeting of the SGA Peru at La Sociedad Geológica del Peru



Figs. 46 and 47: left, the president of SGA Peru, presents a recognition to alumno Abraham Arana for his presentation. Right, the current president Renzo Velasco presents a present to Ph. D Cesar Vidal.



Fig. 48: Members of SGA Peru.



Fig. 49: Ph. D. Cesar Vidal with President Jhon Trebejo congratulating him for his work with the chapter in 2017.

SGA COUNCIL 2018

President	K. Kelley (USA)
Vice-President	D. Huston (Australia)
Executive Secretary	J. Pašava (Czech Republic)
Treasurer	H. Frimmel (Germany)
Promotion Manager	J. Relvas (Portugal)
Chief Editors	B. Lehmann (Germany) – Mineralium Deposita, European Office
	G. Beaudoin (Canada) – Mineralium Deposita, North America Office
	J. Kolb (Germany) – SGA News
	N. Koglin (Germany) – SGA website
	J. Slack (USA) – Special Publications

Vice-President (Student Affairs)
A. Vymazalová (Czech Rep.)

Regional Vice-Presidents

Asia	H. Chen (China)
Australia/Oceania	R. Skirrow (Australia)
Europe	S. Decree (Belgium)
N. Africa-Mid. East	M. Bouabdellah (Morocco)
North America	G. Graham (USA)
Sub-Saharan Africa	G. Tourigny (Canada/Ivory Coast)
South America	E. Ferrari (Peru)

Councillors through December 31, 2019

Y. Lu (Australia)
D. Banks (U.K.)
A. S. André-Meyer (France)
B. Orberger (France)
P. Ledru (Canada)
E. Naumov (Russia)

Councillors through December 31, 2021

A. Idrus (Indonesia)
P. Mercier-Langevin (Canada)
I. Pitcairn (Sweden)
S. Mikulski (Poland)
X. Sun (China)
S. Petersen (Germany)
T. Aiglsperger (Spain)
G. Bozkaya (Turkey)
R. E. de Barrio (Argentina)

Ex officio Members, SEG

President	J. Bruce Gemmell (Australia)
Executive Director	B. G. Hoal (USA)

Ex officio Members, IAGOD

Secretary General	D. Lentz (Canada)
Regional Councillor, Europe	D. Holwell (U.K.)

A fieldtrip through Colombia's western cordillera: ore deposits and relationship with continental crust-forming processes

Daniel Franco, Pablo Porras

The SGA student chapter Colombia-Bogotá has been organizing a series of fieldtrips since it was founded in 2016. These trips aimed at improving our understanding on the main kind of ore deposits present in the Colombian territory, which is rich in active geological processes related to convergent margins such as magmatism, volcanism, compressional faulting and accretion of ophiolite terranes. We first started visiting La Mina, Antioquia in July of 2016, which is a porphyry mine located in one of the western provinces of Colombia.

This first field trip was an early approach to the considerable number of subduction-related ore deposits present in the western cordillera of the Colombian Andean region. It made us clear that in order to get a true understanding of the metallogenic processes involved in the formation of the western cordillera, it is essential to analyse the individual mineral deposits as parts of a greater metallogenic evolution. Keeping that in mind, the main goal of the second visit to the western cordillera was to analyse a group of important gold deposits related to a single tectono-magmatic event. The trip was designed to visit three important locations related to what is called the Middle Cauca Metallogenic belt. One magmatic event provided the Colombian territory with many of its more productive porphyry deposits, epithermal lodes and other magmatism-related deposits. In addition due to Colombia's position in the tropical belt, the rain caused

by the humid climate washed away many shallow ore deposits formed during the uplift of the western cordillera, generating a series of highly enriched placer deposits in the neighbouring valleys. Gold can be extracted from these placer deposits using low technology processes obtaining a high profit. This has stimulated many small-scale mining extractions especially in the western flank of the cordillera (Chocó Department).

The trip started on September 18th at Jericó, Antioquia; a town in which AngloGold Ashanti has been exploring a series of porphyritic rocks from which Au, Ag and Mo can potentially be mined. We saw many of the cores that were drilled in order to generate a preliminary three-dimensional model of the deposit. The intrusion that generated the potential deposit has a calc-alkaline affinity and cuts through a series of basaltic and volcanoclastic rocks (named the Combia Formation) during the late Miocene, approximately 7.1 million years ago (ages provided by the Colombian Geological Service, through K/Ar dating in hornblende). In all the core samples, we could recognize three differently altered zones (quartz-sericite, phyllic



Fig. 2: Breccia with basalt clasts and a calcite matrix, Miraflores Mine

and potassic) and two separate magmatic pulses with slightly different ages, which were clearly related to the higher gold concentrations found throughout the entire core.

We then moved to the town of Quinchia, Risaralda to visit a nearby mine called "Mina de Miraflores," in which gold has long been extracted from a breccia pipe formed during a volcanic extrusion during the Miocene (the age of this deposit has not been dated accurately, but it is inferred due to its stratigraphic position). The operation is also in an exploration stage, but there is a small number of tunnels made by early miners, who used to extract gold from lodes associated with narrow zones of argillic alteration. Only the lodes have enough gold to be profitable for small-scale miners, however the entire breccia has profitable amounts of gold for bigger mining projects.



Fig. 1: Getting ready to enter the Marmato underground gold mine.



Fig. 3: SGA team analysing core samples in the AngloGold project at Jericó, Antioquia

It is composed mainly of calcite and a much smaller fraction of quartz and was, from the three locations we visited during the field trip, the least understood prospect. The magmatic fluid migrated through a sequence of basaltic rocks from the Cretaceous Barroso Formation, however, there were also fragments of andesitic rocks in between the basalt fragments whose origin is not well understood. The composition of the magmatic fluid was by far the more puzzling feature of this deposit.

Our third stop was the famous Marmato mine, which is one of the biggest active gold operations in Colombia. The mineralization present in this huge deposit is classified as an intermediate-sulphidation epithermal deposit, with some areas classified as low-sulphidation type. Five different magmatic pulses have been identified so far, which intruded into a complex of porphyritic rocks of granodioritic, dioritic and tonalitic composition that formed during early Miocene times, with two of them

being mined. The mineralization has been dated by many studies and has an approximate age range between 6.5 – 5.5 million years (late Miocene).

At a terrane-scale, the numerous deposits found all over the Middle Cauca Metallogenic belt are related to a single continental crust-forming event. From the perspective of a considerable number of authors, this magmatic occurrence was due to the accretion of an oceanic terrane called the “Baudó Terrane”, which is nowadays located in the north-western corner of the Chocó department. However, the mechanism through which new crustal material has been added to the western Colombian margin is still a mat-

ter of intense debate and controversy, since many authors do not agree with a theory that explains crustal growth with the accretion of terranes. Perhaps a better understanding of many of the Colombian ore deposits located in the western cordillera will help to create the path towards a sound theory on the processes that led to crustal growth in the western margin of Colombia.



Fig. 4: The SGA fieldtrip team outside the Miraflores tunnel.

The SGA website

Nikola Koglin, Chief Editor SGA website

Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Stilleweg 2, 30655 Hannover, Germany
email: Nikola.Koglin@bgr.de

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

SGA SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS

About News Publications Members Educational Fund Awards Meetings Students Contact us

LOGIN SHOP

Join SGA

Renew Membership

find us on facebook follow us on twitter

We are glad to announce the

15th SGA Biennial Meeting
"Life with Ore Deposits on Earth - LODE 19"
 Glasgow, Scotland
 27 - 30 August 2019

Application forms for new members

Membership to SGA is open to all persons interested in economic geology, mineral resources, industrial minerals and environmental aspects related to mineral deposits. The SGA is an international society with

Various metal and fluorite deposits in central part of the Krušné Hory Mts. – Erzgebirge (SGA Student Chapter Prague)

Jakub Mysliveček, Jan Kulháněk

Faculty of Science, Charles University, 128 43 Praha 2, Czech Republic

The region of the Krušné Hory Mts. / Erzgebirge located at the border of Czech Republic and Germany is known as an old European mining district. The whole area belongs to the NW part of the Bohemian Massif, specifically to the Saxothuringian Zone of the Variscan Orogen. There were mined base metal and Ag deposits even from the early medieval ages, and in the last century were mined also fluorite, uranium and tungsten. Lithium mining is currently being prepared. This two-day field trip focused on iron, copper and fluorite deposits. Eight students were led by Jakub Mysliveček.

Most of the ore deposits in this area are hosted in the Neoproterozoic and Lower Paleozoic volcano-sedimentary and intrusive sequences, which were metamorphosed to produce phyllite, gneiss, migmatite and red orthogneiss. The Variscan post collisional igneous activity (327-290 Ma) was characterized by the emplacement of large granitic plutons, silicic dykes, and rhyolites, accompanied by redwitzite intrusions and several stages of lamprophyre dykes. The silicic magmatic activity produced highly fractionated, Li-Sn-F-rich magmas and their associated hydrothermal systems. Additional hydrothermal and ore-forming stages were related to brittle deformation in the foreland of the Alpine Orogen. The Erzgebirge domain has been richly endowed in iron, base-metal, tin-tungsten, molybdenum silver-bismuth-cobalt-nickel-uranium, hematite-quartz and fluorite-barite deposits. Starting in the Paleogene, the Erzgebirge area was uplifted along two major fault structures – the Erzgebirge (NE-SW trending) and the Marienbad faults (NNW-SSE trending). Extensive volcanic activity was associated with the rifting, which produced the Eger Graben, where volcanic products, hydrothermal activity, and CO₂ outgassing are still observable today, for example in the SOOS reservation.

We started the excursion in the historical mining district of Horní Blatná, where ores of Sn, Ag, Fe, Co and Mn were mined. The deposits are located on the fault zone perpen-



Fig. 1: Introduction talk on the heap of the Concordia adit in the Horní Blatná area. Photo by J. Loun.

dicular to the Erzgebirge fault in granite and phyllite. Veins were exploited by shallow pits, surface cuts and adits. Here, we visited a heap of the Concordia adit, where Fe and Mn ores, mainly pyrolusite and hematite, from a vein of Marie Terezie were mined.

After the visit of Horní Blatná, we moved to the surroundings of the Měděnec village. The Měděnec area is a famous historical mining district, where ores of Fe, Cu and Ag were mined. Here, we can observe two different deposit types: firstly quartz veins in micaschist in NW – SE direction perpendicular to the Erzgebirge fault. These veins are located near Horní Halže in the old mining district “Rothe Sudel”, where mostly Fe ores (hematite, limonite, pyrite and magnetite) were mined in medieval times. It is also a world-known mineralogical locality with beautiful red carnel agates called “lightning agates”; secondly the magnetite skarn on the Mědník hill. This small hill was a classical historic mining location with many shallow pits and adits. We went to the top of the Mědník hill and visited the touristic adit Země Zaslíbená and the inactive mine (1968 to 1992), from where ores of Fe and less Cu and Ag were mined. Then, we visited also the interesting petrological and touristic locality called Sphinx made by rocks of augengneiss, which is located near Měděnec v.,

and where large deformed porphyroclasts of feldspar form the Augen.

On the second day, we needed to change our programme because of bad weather. We skipped some fluorite deposits and started our day with the locality Hradiště near Kadaň. Here, we had the chance to observe Erzgebirge gneiss and micaschist penetrated by quartz-fluorite-barite-hematite veins in NW – SE direction. Since the 15th century, ores of Fe and in 20th century barite (1928 – 1938) and fluorite (1950 – 1977) were mined. Because of strong rain, we moved to near the chateau of Klášterec nad Ohří, where it was possible to admire an exhibition of local mineral samples. Near the chateau, there is also a thermal spring, where we moved and had a talk about



Fig. 2: Sample of pyrolusite from the Concordia adit, Horní Blatná. Photo by J. Mysliveček.

volcanic activity in the Ohře Rift, which is going through this area. Then on the way to Mikulov, we made a short stop in Ahníkov, former village that was demolished because of coal mining. Here, we had the chance to observe a body of laterite (lens of weathered pyroxenitic peridotite and pyroxenite) intensively permeated by silica mineralization. From this locality, polished samples of chalcedony are famous. The last stop was in the historic mining town Mikulov, where we visited the Lehnšafter adit. This adit shows very nice example of mining Ag and As ores in the Mikulov district in the 16th century.

This field trip gave us a valuable insight, mainly into Fe, Ag, Cu and fluorite deposits in the Czech part of Krušné Hory / Erzgebirge Mts. We would like to thank all our guides for their time (especially to Pavel Chaloupka from the Lehnšafter adit) and their efforts to make the mine visits possible, enjoyable and inspiring. Finally yet importantly, we would like to thank the company Vitana, a.s. for providing us dry meals for our hungry stomachs on our field trips.



Fig. 3: Observing the skarn body in the adit Země Zaslíbená. Photo by Š. Matoušková.



Fig. 5: Members with Vitana products on the Sphinx locality. Photo by Š. Matoušková.



Fig. 4: Our group in front of the Lehnšafter adit in Mikulov. Photo by Š. Matoušková.

Historical mining area Kutná Hora and its surroundings (SGA Student Chapter Prague)

Lucie Kunstmüllerová

Faculty of Science, Charles University, 128 43 Praha 2, Czech Republic

In April 29–30, the field trip of the SGA Student Chapter Prague was carried out in order to visit the city of Kutná Hora and its surrounding mines. The city is world-famous because of its silver mining history. The earliest traces of silver have been dated back to the 10th century - silver dinars belonging to the period between 982–995 have been discovered. During the medieval era, the city could compete with Prague economically,

culturally and politically.

The basement of the area is made up of the Kutná Hora Crystalline Complex, disrupted by faults which are often filled with ore-bearing veins. The Kutná Hora Crystalline Complex has many similarities with the Moldanubian Zone and therefore, both are sometimes joined in spite of the general lower metamorphic grade of the Kutná Hora Crystalline Complex. Cretaceous sedimenta-

ry rocks overly the crystalline complex, later followed by Tertiary and Quaternary rocks.

The field trip started with a visit of the medieval adit of St. Jiří, located in the area between the Czech Museum of Silver and St. Barbara Church directly in Kutná Hora. The mine was rediscovered in 1967 and at first mistaken for the lost Osěl Mine, which is said to be the deepest and richest mine of Kutná Hora. The subsequent exploration



Fig. 1: Our group in front of the entrance to the adit of St. Jiří. Photo by Š. Matoušková.



Fig. 2: Práchovna quarry with exhibition of local rocks. Photo by Š. Matoušková.

showed it to be perfectly preserved medieval drainage gallery, dug in a long period from the 14th until the beginning of the 16th century. The gallery was dug out in the gneiss of the Kutná Hora Crystalline Complex tightly in contact with base chalk conglomerate. Quartz and gneiss pebbles of this conglomerate can be seen on many places on the roof. As there are sedimentary rocks containing calcite in the roof, similar phenomena as in karst caves can be observed in the gallery.

The second stop of the day was the Práchozna Quarry, where we could see an example of Cretaceous transgression. Sedimentary rocks of the Korycany Beds overly migmatized gneiss bedrock, where the members of the Alpine paragenesis can be found. Part of the quarry is reserved for a geological exhibition of the typical local rocks. The geopark is interesting for geologists as is for the public.

We continued to the Vrchlice river valley, where the next three localities are. The first of it is the quarry at Vrbovský Mlýn. There are different types of gneiss in the quarry (two-mica gneiss, biotitic gneiss, and hybrid gneiss). Minor part of the rocks represents mica schist, garnet schist and amphibolite lenses. In the NE part of the quarry a garnet-kyanite rock occurs. Amphibolite often contains coarse-grained parts represented by amphibole, plagioclase and apatite. The younger association of Alpine type usually penetrates it. In the quarry, there are also feldspar-rich pegmatite dykes with biotite, chlorite, apatite, schörl, zirkon and rutile, penetrated by small veins of pyrite and chalcopryrite. In the SW mylonitic part of the quarry, quartz-berthierite veins with pyrite, arsenopyrite, kutnahorite, sphalerite, galenite, chalcopryrite, etc. are found.

On the other side of the river, the last remains of the Kutná Hora metallurgical plant can be found – the slag heaps, containing an

estimated 400 000 tons of slag. Because of the inefficiency of the medieval metallurgy, the slag heaps were reused several times through history, however the elements of interest are still present in the residuum. The residuum is said to still be consisting of 42.6% SiO₂, 28.9% Fe, 4.1% Ca, 2.3% Al, 2.3% Zn, 1.3% sulfidic S, 0.3% Cu, 0.3% Pb, 0.2% Ag and 0.07% Sn. The locality represents the most interesting slag dump in the term of mineralogical point of view. The main mineralogical component of the slag represents silicate glass-like matrix, skeletal hematite and recrystallized quartz. During the metallurgical process, new minerals of the olivine group (fayalite) and the melilite group (gehlenite, ackermanite, hardystonite) crystallized in the matrix.

The last stop in the area was the underground gallery of Saint Anthony of Padua, which was active from the year 1752 to 1943-44 and followed a vein with a high content of antimonite and silver ore. Nowadays, the most interesting minerals are miargyrite, diaphorite, pyrrargyrite, freieslebenite, pyrostilpnite and native silver. The local rarity is the mineral kutnahorite – a calcium manganese carbonate mineral with magnesium and iron.

One of the most interesting and unique stops of this trip was the one at the Turkaňk Mine. The mine is now closed but we were able to witness the process of treating the mine water in the built-up cleaner and the near waste pond.

The penultimate stop was very close to the Turkaňk Mine. A large basin in the southern part of the Turkaňk Zone was created by the mine collapse in 1969. In the eastern wall of the basin is a gallery of an old mine about 100 m long. This old gallery belongs to the oldest phase of Kutná Hora mining.

We finished the first day of the excursion

visiting the old heaps near the village of Kaňk, which were left after mining of ores. The Kaňk dumps are an interesting occurrence of rare arsenic minerals. For the last two years, heaps have been exposed to erosion or by mineral collectors. Hopefully, due to the timely intervention of experts, there will be no complete disposal of the heaps as was previously thought. The place is a type locality for several minerals – the most interesting ones are probably bukovskite and kaňkite.

The second day, 30th of April, started with the visit of Malešov – a 300 m thick body of magnetite skarn opened by deep mines. The entrance to the underground gallery can be found in the slope approximately 200 m underneath the Vrchlice Dam. Migmatized two mica paragneiss serves as a host rock to the following minerals: magnetite, garnet, pyroxene, amphibole, prehnite, calcite and epidote. This locality is also protected as a wintering ground of bats.

The second stop of the second day was an active amphibolite quarry called Markovice. The rocks of the Kutná Hora Crystalline Complex are locally overlain by Cretaceous surf facies. The quarry is the classical locality of the Alpine vein minerals with high calcium content. The participants were able to find crystals of minerals of interest as titanite, albite and calcite. Moreover, big samples of prehnite were found there, although they are anomalous for this locality.

Our final stop was a small fluorite deposit with a high content of quartz close to the village Kožlí near Ledeč nad Sázavou. Apart from fluorite and quartz, rare calcite, alkali feldspar, pyrite, pyrrhotite, lepidocrocite and limonite can be found.

We would like to thank all our guides and the company DIAMO, s. p. for showing us the cleaner of mine water from the former Turkaňk Mine.



Fig. 4: Amphibolite quarry Markovice with Alpine vein minerals. Photo by Š. Matoušková.



Fig. 3: In front of the closed Turkaňk Mine. Photo by Š. Matoušková.

XXXV SEG-SGA-UNESCO Latin American Metallogeny Course

Fernando Tornos, Nora Rubinstein, Anabel Gomez and Carolina Méndez

The most recent edition (2017) of the SEG-SGA-UNESCO Latin American Metallogeny Course was held in Buenos Aires, Argentina in November 2017. The course returned to Argentina after an absence of thirteen years, when we had the 2004 edition in Mendoza. This year the course was run under the general title of “Geology and geochemistry of magmatic-hydrothermal deposits from the Central Andes” and included 66 geologists interested in the knowledge and exploration of ore deposits from six Latin American countries (Argentina, Brazil, Colombia, Chile, Ecuador and Peru), Australia, Spain, Canada, and the UK. The Organizing Committee provided grants to 14 post-graduate students to support their travel expenses to attend the course.

As in previous editions, the course was structured in three parts, including theoretical talks, workshops and a field trip.

The first talk covered recent advances in the geology and exploration of porphyry and epithermal systems and was presented by David Cooke (CODES, Australia). The second group of talks was devoted to the general aspects of the geochemistry and geochronology of ore forming systems, including the presentations by Fernando Tornos (CSIC, Spain) on the geochemistry of hydrothermal systems, John Hanchar (Memorial University of Newfoundland, Canada) on U-Pb geochronology of zir-



Fig. 3: Attendants at the course in the University of Buenos Aires.

con, and Colombo Tassinari (Universidade de Sao Paulo, Brazil) on the use of isotopic tracers and other geochronological methods for studying ore deposits. The regional geology and metallogeny, the topic of the third group of talks, included presentations by Eduardo Zappettinni (SEGEMAR) on the metallogeny of Argentina, Victor Ramos (Universidad de Buenos Aires) on the geologic evolution of the Andes, Martin Gonzalez (SEGEMAR) on the lithium resources of Argentina, Nora Rubinstein (CONICET-UBA) on porphyry deposits, and Diego Guido

(Universidad Nacional de La Plata) on epithermal deposits.

Two workshops were devoted to hydrothermal alteration and its implications in mineral exploration (Nora Rubinstein) and the application of radiogenic isotopes to geochronology and geochemistry of ore deposits (John Hanchar and Colombo Tassinari). Student participants presented their ongoing research projects in a poster session.

This year, the SGA awarded prizes for the best three posters presented by the student participants. The recipients were



Figs. 1 and 2: Dave Cooke teaching on porphyry copper deposits, the international speakers.

Caio de Mello (Universidade Sao Paulo), Cecilia Pavón (CONICET-Universidad Nacional del Sur), and María José Espeche (CONICET-Universidad Nacional de Córdoba).

The field trip was organized by Carolina and Vicente Mendez (UBA and consultant, respectively). The trip took us to northern Argentina, departing from San Antonio de Jujuy after a short flight from Buenos Aires. The first day was devoted to drive northwards through the spectacular landscape of the Quebrada de Humahuaca to the town with the same name, where we spent the night. That was necessary for acclimatization to the high altitude of the Altiplano. The morning of the second day was used to travel to the Chinchillas Mine through the Altiplano and its amazing geology with several short stops along the way, thoughtfully explained by Vicente Mendez. As soon as we arrived to the Chinchillas Mine, we passed a mandatory medical test. Mina Chinchillas is the highest town in Argentina at ca. 4120 m. It was followed by a safety induction and a short explanation on the deposit that is currently mined by SSR Mining and that is one of

the largest silver mines Latin America. The lectures were followed by a visit to the open pit and stock piles. Due to the high altitude, the medical centre at the mine was rather busy but a small dose of oxygen helped people to keep on going. The next day, fully restored, we visited the well-exposed Chinchillas project, a large epithermal Zn-Pb-Ag system owned by SSR and Golden Arrow. We had the unique chance to hike around the area looking for different types of mineralization and alteration and then were given the opportunity to examine some selected drill core in a superb visit organized by Hugo Caranza. On the way back to Pirquitas, we visited the Carhuasi project, of similar characteristics to Chinchillas. The final day included a long drive from Pirquitas to Salta via the Salar de Olaroz and the lithium mine, where we had the chance to learn about lithium mining. After a breath-taking drive off the Altiplano and a short stop in Purmamarca, we made a late evening arrival in Salta. The next day, we had a free morning for visiting such a great city. After lunch, the First Quantum team that came with us on the field trip organized a superb visit to the

drill core shack of the Tata Taca porphyry project, giving an excellent end to the course. An unofficial end was at a small “Peña” in Salta, where a group of us had the opportunity of hearing the local folklore and taste excellent local wines.

This edition has been the 35th of the course and it could not have been lasted so long without the full support of the SEG, SGA and UNESCO, and the many speakers involved. In this edition, we would like to also thank the University of Buenos Aires, the SEGEMAR (Argentinian Geological Survey) and the companies SSR Mining, Golden Arrow, First Quantum and Salar de Olaroz for their support. Further information can be found on https://www.unige.ch/sciences/terre/research/Groups/mineral_resources/latinometal/buenos_aires17/buenos_aires17.html

The next edition will be held in Peru in 2019 and will be coordinated by Lluís Fontboté. The coordination group is open to suggestions for future venues where to run the course and of volunteers that can help to organize it. More information can be found on the web page of the course.



Fig. 4: At the Chinchillas project.



Fig. 5: Hugo Caranza and the Chinchillas project.



Fig. 6: The Cerro de los Siete Colores in Humahuaca.



Fig. 7: The informal farewell at the Salta square.

The VII Russian young-geoscientists scientific school "New knowledge in ore-forming processes" (13th to 17th of November 2017; Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry, Russian Academy of Sciences (IGEM RAS))

The program of the school included lectures by world-class researchers and experts in the geology of ore deposits, oral and brief poster presentations by young geoscientists, students and PhD students. All presentations were divided into 9 scientific sections: (1) geological features, tectonics and mineralogy of ore deposits; (2) petrology and geochemistry of ore-bearing magmatic rocks; (3) metamorphism, metasomatism and ore-formation processes; (4) physical and chemical conditions of mineral formation; (5) sources of metals and fluids in the ore-forming systems; (6) geochronology of ore-forming processes; (7) uranium geology and radiogeocology; (8) environmental aspects of mineral exploration and exploitation; and (9) GIS in ore geology and metallogeny. In total 121 people from 2 countries, 24 cities and 36 organizations have taken part in the school. Participants from Russia came from Moscow, St. Petersburg, Novosibirsk, Petropavlovsk-Kamchatsky, Apatity, Syktyvkar, Cherepovets, Arkhangelsk, Blagoveshchensk, Vladivostok, Vladikavkaz, Dubna, Yekaterinburg, Irkutsk, Krasnoyarsk, Tomsk, Miass, Rostov-na-Donu, Ulan-Ude, Chernogolovka and Yakutsk; Republic of Kazakhstan was represented by researches from Alma-Ata. In total 5 plenary reports and lectures, 56 oral presentations and 18 posters were presented.

On November 13, the workshop "Application of the LA-ICP-MS method for the analysis of microimpurities in geological samples" included the lecture "The basic principles of laser ablation with inductively coupled plasma. How to prepare for the session". Demonstration of the analysis was held by the analysts of IGEM RAS, Vera D. Abramova and Elena A. Minervina. Additionally, the Organizing Committee held the competition of short scientific projects of studying rock and ore minerals with LA-ICP-MS for the participants. The authors of

the winning projects were able to analyze their samples using the LA-ICP-MS method at the Laboratory of mineral analysis (IGEM RAS) during the School.

Also on November 13, the photo contest of the School, dedicated to the professional

activities of young geoscientists, students and PhD students was opened. In the IGEM RAS hall, photo works of the participants were presented in two groups: (1) "Following the traces of past expeditions", which included expeditionary and field



Fig. 1: Young geoscientists of Saint-Petersburg mining University.



Fig. 2: Group photo of participants of the VII Russian young-geoscientists scientific school «New knowledge in ore-forming processes».

photographs reflecting the natural beauty of geological objects; and (2) "We know how to distinguish expensive ore from the rock in the life", in which macro- and microphotographs of rock and ore samples were presented. During the whole period of the event, an exhibition of the Museum of the Universe History was held in the IGEM RAS hall. The library of geological literature, which is the structural division of the Natural Sciences Library of the Russian Academy of Sciences, located within the walls of the IGEM RAS, also invited the School participants to visit the thematic exhibition of scientific work of the IGEM RAS staff members. The first day of the School was completed by an excursion to the ore-petrographic museum of IGEM RAS. The museum has a unique systematic collection of all known types of igneous rocks and the main types of ores of most Russian ore districts and a number of foreign countries.

During the 14th to the 16th of November, nine scientific sessions with lectures, oral presentations and poster session were held. On 17th of November, the excursion to the Mineralogical Museum named after the famous mineralogist Alexander E. Fersman was organized for participants.

The Conference Scientific Committee selected the Best Student oral and poster presentations, based on the quality and scientific merit of the student's presentations. The awards were announced at the VII Russian young-scientists scientific school «New knowledge in ore-forming processes» closing ceremony. Participants chose two best photos of the School photo contest and the photographers were awarded during the Closing ceremony.

SGA sponsorship was used to partly cover travel expenses for seven students from St. Petersburg, Blagoveshchensk, Petropavlovsk-Kamchatsky, Novosibirsk and Almaty, Republic of Kazakhstan. Olga Yakubovich presented the SGA North-West Russia chapter activities during the Opening ceremony.

The Organizing committee is grateful to SGA for help in organization. We are pleased to invite you to participate in VI-II Russian young-geoscientists scientific school «New knowledge in ore-forming processes», which will be held from 26th to 30th of November 2018 at IGEM RAS.



Fig. 3: Awarded photo of the School photo contest "The halt", author Anton Andreev (IGEM RAS).



Fig. 4: Awarded photo "Skeletal crystals Aphthalite extracted from volcanic fumaroles", photographer Dmitriy Khanin (Lomonosov MSU, IEM RAS).

News from the SGA Baltic Student Chapter: Field trip to the Kupferschiefer-type Cu-Ag deposits in Poland

Judyta Kazmierczak, Szczepan Bal, Krzysztof Foltyn, Barbara Zygo

Faculty of Geology, Geophysics and Environmental Protection, AGH University of Science and Technology, Krakow, Poland

This winter, thirteen members of the SGA Baltic Student Chapter from Krakow attended an excursion to the Cu-Ag deposits of the Lubin-Sieroszowice district (Lower Silesia, Poland). The first discovery in this area was made by the eng. Jan Wyżykowski's team in 1957. This area is classified as the example of huge sediment-hosted, stratabound copper deposit with the geological resources of 1,480 Mt @ 1.96% Cu (www.kghm.pl). The deposit is currently exploited in the three underground mines: Lubin, Rudna and Polkowice-Sieroszowice. The mineralization occurs in three distinct lithologies of Permian age (from the bottom to the top): the Weissliegendes sandstone, the Kupferschiefer (copper-bearing shale) and the Zechstein dolomite.

The first day of the field trip started on the 22nd of the February with the visit in the Rudna Mine and a ride in a shaft to the -1,000 m level. The characteristic deposit profile was shown to us, and we observed the mineralization in all three lithologies. The average thickness of the Rudna deposit reaches up to 4 meters, with the predominance of sandstone ore, whereas the

Kupferschiefer is most abundant in copper (up to > 6%). Although copper is the main commodity, a significant amount of silver is also produced from the ore. Thanks to that, KGHM PM S.A., which operates the mine, is in one of the world's top silver-producing companies (the exact position varies from year to year).

After the underground trip, we visited a mineral processing plant next to the mine. We witnessed how crushing, milling, classifying and flotation are used in order to change ore into concentrate. During such a visit, the big scale of such an operation is clear – the Rudna Concentration Plant processes 40 000 tons of rocks every day (around 16 million tons per year)!

During the second day of our trip, we visited the Polkowice-Sieroszowice Mine. Apart from the rich metal deposit, this mine also has rock salt, overlying the copper orebody and successfully extracted as well. This commodity is mainly used for winter road maintenance. While walking in the underground corridors, we observed the stratigraphic profile from the copper deposit, including carbonates, anhydrite and rock salt.



Fig. 3: The short underground introduction about the geology of the deposit in the Polkowice-Sieroszowice Mine.



Fig. 4: Underground exploitation corridors in rock-salt deposit, Polkowice-Sieroszowice Mine.

The last point of our excursion was located in Kwielice, where a new ventilation shaft GG-1 is being built to provide access to new, deeper parts of the deposit. The sinking of this shaft requires application of the rock mass freezing technique in the area passing across waterlogged Tertiary sands



Fig. 1: Safety first! The escape respirator training, Rudna Mine.



Fig. 2: Participants of the fieldtrip in the Rudna Mine.



Fig. 5: Participants of the fieldtrip in front of Jan Wyżykowski's monument.

and layers of sandstone. In this method, a cylindrical freezing wall around a shaft is created. The wall counteracts the pressure of the rock mass and prevents the seepage of water into the shaft face. The GG-1 shaft will be the 31st shaft in the Lubin-Sieroszowice district, and it is going to be the deepest one in Poland and one of the deepest in Europe (1,340 m).

This fieldtrip was a great chance to see the geology of the deposits and to observe

how the underground mine and processing plant operate. The visit in Kwielice (the GG-1 shaft site) was a unique opportunity to observe and get familiar with the shaft sinking techniques and equipment. The representatives of PeBeKa presented us extraordinary know-how and technology in underground construction - including conventional and special methods, such as the rock mass freezing technology and advance cementation. It allows us to enrich

our background in mining methods used in difficult geological conditions.

We would like to thank the authorities of Rudna Mine, Polkowice-Sieroszowice Mine as well as Rudna Concentration Plant and PeBeKa for making our trip possible. Additionally, we would like to express our gratitude to all the people involved in organizing this trip. We are immensely grateful for SGA for sponsoring our excursion to the Kupferschiefer-type Cu-Ag deposits.

The 9th annual Baltic Student Chapter meeting in Poland

Krzysztof Foltyn, Slawomir Mederski, Wladyslaw Zygo

Faculty of Geology, Geophysics and Environmental Protection, AGH University of Science and Technology, Krakow, Poland; kfaltyn@agh.edu.pl

SGA Baltic Student Chapter was founded in 2009 and now connects students from four universities: AGH University of Science and Technology in Cracow, Poland; Luleå University of Technology (LTU), Sweden; University of Oulu (OU), Finland; University of Tromsø – The Arctic University of Norway, Norway. Twenty chapter members from Poland, Sweden and Finland gathered in Cracow to continue tradition of the annual meeting, this year hosted by AGH.

The event started on May 21st and was accompanied by the International Raw Materials Career Fair organized by EIT Raw Materials in cooperation with AGH and their affiliate Institute of Freeway of Technology and Innovation (IATI). Thanks to that, students from TU Bergakademie Freiberg (Germany), University of Wroclaw, Jagiellonian University (Poland), Masaryk University Brno (Czech Republic), Montanuniversität Leoben (Austria) and Ivano-

Frankivsk National Technical University of Oil and Gas (Ukraine) who were invited to visit AGH for the Career Fair, were able to participate in some of the activities taking place during the meeting.

After registration, we started with the short course Overview of Geochemical Exploration led by Dr. Denis Schlatter, CEO of the Helvetica Exploration Services GmbH with over 20 years of experience in mineral exploration and numerous field seasons in Greenland. The first day covered general information, sampling, QA/QC and characterization of the hydrothermal alteration. The next day, we focused mainly on hydrothermal alteration, its size and style depending on ore deposit type, followed by a case study of VMS deposits in Northern Sweden. Reporting standards were introduced using an (in)famous example of Bre-X (which last year was adapted into movie "Gold"). After that, we proceeded to stu-

dent presentations, which covered topics of gold deposit in the Czech Republic, IOCG deposits in Vietnam and magmatic sulphide deposits from Canada. After lunch, we moved to a nearby urban park (Jordan Park) for a GIS field exercise and to demonstrate how digital field data capturing is carried out. The short course concluded with an example of a holistic geochemical exploration approach, utilizing mineral potential mapping, remote sensing, neural network analysis and microprobe data for Ni and Au exploration in western Greenland.

Tuesday, 23rd of May was dedicated to the International Raw Materials Career Fair, which opened by a session, consisting of talks given by company representatives (including Volcanic Gold Mines Inc.; Hunter Dickinson Inc.; Boliden Group.; DMT; Institute of Non-Ferrous Metals; ZGH Bole-slaw; KGHM). Numerous exhibitors in the main university building gave everyone an



Fig. 1: Short course participants with Dr. Denis Schlatter. Photo by Tomasz Ćwiertnia.



Fig. 2: Participants of the trip to Wieliczka Salt Mine with full equipment. Photo by Filip Zych.



Fig. 3: Even chandeliers (like one presented above) are made of salt. Photo by Filip Zych.



Fig. 4: When nothing can stop you from getting the best mineral specimens. Photo by Tomasz Ćwiertnia.



Fig. 5: Group photo in the Olkusz-Pomorzany Mine. Photo by Tomasz Ćwiertnia.



Fig. 6: Olkusz-Pomorzany mine shaft "Dabrowka" behind field trip participants. Photo by Tomasz Ćwiertnia.

opportunity to talk with professionals, to network, and to ask for career advice.

Wednesday, 24th of May, participants visited the famous Wieliczka Salt Mine, located a few kilometres away from Cracow. The mine opened in the 13th century and produced salt continuously until 2007. Currently, it is one of the most popular tourist attractions in Poland. In 1978, the Wieliczka Mine was placed in the UNESCO World Heritage Sites list (containing only 12 sites at that time). Sculptures, statues and four chapels carved out of the rock salt by the miners wonder everyone so no wonder it is one of the most visited tourist mine in the world. Notable visitors to this site include Nicolaus Copernicus, Johann Wolfgang von Goethe, Alexander von Humboldt and Dmitri Mendeleev. We cannot rule out the possibility that we touched salt, which was licked by those famous men! The group

participated in the Miners' Route, including more geological and mining features than typical Tourist Route. The day ended with a sightseeing tour in Cracow's old town.

The highlight of the last meeting day, May 25th, was a field trip to the MVT type Olkusz-Pomorzany deposit, the last operating Zn-Pb underground mine in Poland. The history of the mining industry in the Upper Silesia Zn-Pb ore district dates back to the Middle Ages. Nowadays, annual production of the Olkusz-Pomorzany mine reaches 2.17 Mt of ore grading 4.09% Zn and 1.77% Pb. The deposit is hosted by dolomite of the Muschelkalk (middle Triassic). Triassic carbonates were converted by the dolomitization process into Fe-Zn dolomite. Ore bodies (stratiform layers, lenses and dolomite breccias cemented by sulfides) reach up to 25 m in thickness. Spectacular examples of mineralized col-

lapse breccia and hydrothermal karst occur in this locality. The ore is composed mainly of banded or colloform sphalerite, marcasite, pyrite, galena, and Fe- and Zn-dolomite with oxysulfides.

We would like to express sincere gratitude to all people whose help and dedication made this event possible. We appreciate the effort of Dr. Michal Mlynarczyk in organizing the Career Fair, Dr. Denis Schlatter for sharing his experience and knowledge on geochemical exploration and mine geologist Tomasz Wójcik from the Olkusz-Pomorzany Mine. Special thanks are directed to SGA for financial support and the SGA Keynote Speaker Program, which allowed us to organize this successful meeting.

Dziękuję/Tack/Kiitos!

SGA Baltic and Prague Chapters pre-conference Field Trip – Québec

Krzysztof Foltyn¹, Marek Tuhý², Sławomir Mederski¹

¹ Faculty of Geology, Geophysics and Environmental Protection, AGH University of Science and Technology, Kraków, Poland; kfolty@agh.edu.pl; mederski@agh.edu.pl

² Institute of Geochemistry, Mineralogy and Mineral Resources, Faculty of Science, Charles University, Albertov 6, 128 43 Prague 2, Czech Republic; tuhy@mar@gmail.com

In August 2017, three members of the Prague and Baltic SGA chapters participated in the 14th SGA Biennial Meeting in Québec, Canada. Our chapters decided to use this opportunity to organize a short field trip before the conference. The main objective of the field trip was to visit local deposits and interesting geological sites mainly in the Québec, Montreal and Ontario regions and to become familiar with the local natural heritage.

We started our excursion in Ottawa and after sightseeing Canada's capital, we encounter our first geological destination. At the shore of the Ottawa River, there are rocks that do not attract attention of the regular people passing by, but in geologist's eyes, they hold a great significance: stromatolites. Although these particular ones are of Ordovician age, they immediately bring into mind crucial events in the history of Earth, in which they play a significant role, to name a few: origin of photosynthesis, Great Oxygenation Event, Huronian glaciation, Banded Iron Formation and red bed formation etc.



Fig. 1: Stromatolite outcrop. Photo by M. Tuhý.



Fig. 2: Black lustrous spinel crystals (combination of rhombic dodecahedron and octahedron) with calcite on forsterite matrix. Photo by M. Tuhý.



Fig. 3: Black lustrous spinel crystal on forsterite matrix. Photo by M. Tuhý.



Fig. 5: Typical carbonatite specimen, Oka. Photo by M. Tuhý.

On the next day, 15th of August, we visited two famous spinel localities 80 km north of Ottawa. The first one is the Parker Mine near Notre-Dame-du-Laus. The mine was developed in pyroxenite in order to extract mica in the beginning of the 20th century (Sabina 1986). Nowadays, several small pits, trenches and overgrown dumps are observed. We found black lustrous spinel (combination of rhombic dodecahedron and octahedron), euhedral dark greenish



Fig. 4: Metasomatic zone at the Des Cèdres spinel occurrence. I – antiperthite granofels; II – marble; A – phlogopite zone; B – forsterite-spinel-calcite skarn; C – calcite-rich zone. Photo by M. Tuhý.



Fig. 6: Carbonatite from the Oka complex. Photo by M. Tuhý.



Fig. 7: Dyke cutting limestone, Montreal. Photo by M. Tuhý.



Fig. 8: Asbestos specimen, Asbestos. Photo by M. Tuhý.

forsterite, black mica books and white and pink carbonates (calcite and dolomite). The most beautiful spinel crystals occur at the contact with olivine and carbonate.

The second spinel locality is Des Cèdres Dam (Belley et al. 2016). The outcrop is observed along the north bank of the Du Lièvre River (downstream side of the dam). The spinel-bearing rock is a forsterite-spinel-calcite skarn. We distinguish three metasomatic zones between blocks of antiperthite granofels (I) and Precambrian Mg-rich marble of the Lièvre Group (II): A - phlogopite zone; B - forsterite-spinel-calcite skarn; C - calcite-rich zone (Belley et al., 2016). The spinel occurs as euhedral purplish-blue crystals surrounded by grey forsterite, calcite and phlogopite. Spinel specimens are difficult to obtain without hard equipment. However amazing views below the dam makes this place “geological heaven”.

The Oka complex, our next destination, is located 40 km west of Montreal. The locality had drawn attention due to the strong enrichment in Nb as a result of increased pyrochlore group mineral content. Niobium ores were historically exploited (1961-1977) by the St. Lawrence Columbium and Metals Corporation. The mine produced niobium oxide concentrate with increased content of La and Th. Niobium is an important high tech metal, which is an integral part of many industrial applications, such as steel production, space and nuclear industry etc. The element niobium does not occur in nature in its native form and in minerals, it is usually followed by tantalum (e.g. coltan ore) but in carbon dioxide-rich melt, niobium is preferentially enriched over tantalum, which leads to tantalum-poor niobium minerals in carbonatite (Möller 1989). The

most frequent niobium-bearing minerals are tantalite, columbite, fergusonite and in the Oka deposit pyrochlore group minerals. The Oka complex is a carbonatite-urtite-ijolite-jacupirangite pluton represented mainly by an oval elongated carbonatite body emplaced into metamorphic rocks and ~120 Ma anorthosite. Ultramafic dykes (e.g. jacupirangite) surround the intrusion. The carbonatite complex consists of strongly silica-undersaturated rocks, like okaite, melteigite, ijolite and urtite. The majority of carbonatites are represented by sövite (coarse-grained calcite-carbonatite) with accessories such as augite, biotite, apatite, nepheline, monticellite, melilite, richterite, pyrite, pyrrhotite, pyrochlore, niobium-rich perovskite (latrappite) and niocalite $(\text{Ca,Nb})_4(\text{Si}_2\text{O}_7)(\text{O,OH,F})_2$, which was first described at Oka. During our visit to

the open pit and the waste dumps, we had the opportunity to collect carbonatite samples with ore minerals and small elongated brownish-orange crystals of niocalite. A melilite-rich rock with accessory amounts of nepheline, hauyne, perovskite, apatite, biotite, magnetite and calcite also occurs.

The possibility of reopening the mine (which has not been completely mined) in the near future cannot be ruled out. The geology and geochemistry of the Oka deposit has been recently reinvestigated for possible reopening and not only produce niobium.

Our next stop was Mount Royal, a hill located in downtown Montreal (the city has its name from this mountain), with slopes covered by an urban park and with a magnificent view of the city. The mountain is an eroded volcanic complex that was active in



Fig. 9: Panoramic view of the Jeffrey mine, Asbestos. Photo by M. Tuhý.

the Cretaceous. The mountain chain of the Monteregian Hills includes the Oka complex and the famous Mont Saint-Hilaire (Lentz et al. 2006). The mountain chain is formed by a group of small alkaline plutons and associated dykes, extending along a linear trend in the vicinity of Montreal. They intruded when North American Plate moved across the Great Meteor hotspot. Magma intrusions into sedimentary rocks (shale and limestone) formed more or less circular plutons in outcrop, with, associated hornfels halos and numerous dykes and sills. Dominated by gabbro and pyroxenite, the plutons are more resistant to erosion than the surrounding sedimentary rocks and therefore form topographic heights. They can even be easily recognized from space (e.g. using Google Maps). Mount Royal is a great place for a walk and it is very easy to spot a squirrel or small dykes cutting limestone.

The last place we visited before returning to Quebec City is called Jeffrey Mine and is located in Asbestos. The open pit, almost 2 km in diameter, produced asbestos and was one of the biggest mines of this commodity in the world until mine operations stopped in 2011. The Jeffrey Mine is well known amongst mineral collectors due to its beautiful specimens of vesuvianite, grossular, pectolite and prehnite. Ultramafic rocks are cut by dolerite and granite dykes, circulation of fluids led to the formation of mineral grains of extraordinary quality, very sharp and with bright lustre. Unfortunately due to the lack of time, we were not able to collect minerals directly in the open pit and we could only take a look from the observation platform...

We all would like to gratefully acknowledge the SGA educational fund, without which our attendance at the 14th SGA Biennial Meeting in Quebec would have been unaffordable.

REFERENCES

Belley P.M., O'Neil J., Hattori K. (2016) Spinel and Aspidolite from the Des Cèdres Dam Occurrence, Notre-Dame-du-Laus, Québec, Canada. *Rocks & Minerals* 91, 5: 448-452

Lentz D., Eby N., Lavoie S., Park A. (2006) Diatremes, dykes, and diapirs: re-

visiting the ultra-alkaline to carbonatitic magmatism of the Monteregian Hills. GAC/MAC 2006 post-conference field trip B4

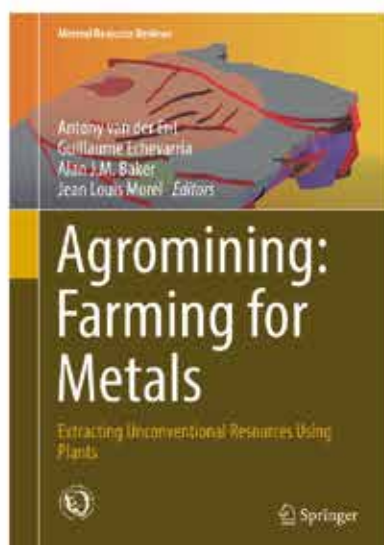
Sabina A.P. (1986) *Rocks & Minerals for the collector*; Buckingham - Mont-Laurier - Grenville, Québec Hawkesbury - Ottawa, Ontario. GSC Misc. Report 33, 27: 38-41

Möller P. (1989) REE(Y), Nb, and Ta enrichment in pegmatites and carbonatite-alkalic rock complexes. In: Möller P., Černý P., Saupe F. (eds.) *Lanthanides, Tantalum and Niobium*. Berlin Heidelberg: Springer-Verlag.



Fig. 10: All field trip participants in Asbestos.





1st ed. 2018, VIII, 312 p.

Printed book

Hardcover

139,99 € | £119,99 | \$169,99

[1] 149,79 € (D) | 153,99 € (A) | CHF 154,00

eBook

118,99 € | £95,50 | \$129,00

[2] 118,99 € (D) | 118,99 € (A) | CHF 123,00

Available from your library or
springer.com/shop

MyCopy [3]

Printed eBook for just

€ | \$ 24,99

springer.com/mycopy

A. van der Ent, G. Echevarria, A.J.M. Baker, J.L. Morel (Eds.)

Agromining: Farming for Metals

Extracting Unconventional Resources Using Plants

Series: Mineral Resource Reviews

- The first book on global agromining/phytomining technology
- Written and edited by leading experts in the field
- Provides a comprehensive overview of the complete agromining chain: from soils and hyperaccumulator plants to agronomy and processing of bio-ores

This is the first book on global agromining/phytomining technology. It presents the complete metal farming or agromining chain; an emerging technology expected to be transformative in the extraction of resources of those elements not accessible by traditional mining techniques. Meeting the demand for critical minerals (rare earth elements, platinum group elements, nickel cobalt) is increasingly difficult in the 21st century due to resource depletion and geopolitical factors. Agromining uses hyperaccumulator plants as "metal crops" farmed on sub-economic soils or mineral waste to obtain valuable elements. This book, which follows the metal farming chain, starts with the latest information on the global distribution and ecology of hyperaccumulator plants, biogeochemical pathways, the influence of rhizosphere microbes, as well as aspects of propagation and conservation of these unusual plants. It then presents the state of the art in new tools for identifying hyperaccumulator plants and for understanding their physiology and molecular biology. It goes on to describe the agronomy of "metal crops," and opportunities for incorporating agromining into rehabilitation and mine closure, including test-cases of nickel, cobalt, selenium, thallium, rare earth elements and PGEs. Finally, it concludes with an overview of the latest developments in the processing of bio-ores and associated products. This book is edited and authored by the pioneers in the field who have been at the foreground of the development of agromining over the past three decades. It is timely as agromining is now at a pivotal point in its development with rapid expansion of activities in the field around the globe. As such it is of interest to environmental professionals in the minerals industry, government regulators and academics.

Lifelong 40% discount for authors



Order online at springer.com / or for the Americas call (toll free) 1-800-SPRINGER / or email us at: customerservice@springernature.com / For outside the Americas call +49 (0) 6221-345-4301 / or email us at: customerservice@springernature.com.

The first € price and the £ and \$ price are net prices, subject to local VAT. Prices indicated with [1] include VAT for books; the €(D) includes 7% for Germany; the €(A) includes 10% for Austria. Prices indicated with [2] include VAT for electronic products; 19% for Germany, 20% for Austria. All prices exclusive of carriage charges. Prices and other details are subject to change without notice. All errors and omissions excepted. [3] No discount for MyCopy.

Part of **SPRINGER NATURE**

The 8th Geochemistry Symposium in Antalya, Turkey, 02–06 May 2018

Ibrahim Uysal

President of the Organizing Committee; Karadeniz Technical University, Trabzon, Turkey

The 8th Geochemistry Symposium hosted by Karadeniz Technical University and sponsored by SGA was held at Crystal Admiral Resort Suites & Spa Hotel (Antalya, Turkey) between 02–06 May 2018. The symposium started with an opening cocktail party on May 2, attended by a large number of participants. On 03–05 May, different geochemistry topics were presented simultaneously in three different halls. A total of 174 presentations (135 oral and 39 poster) were given under the sessions of "Magmatic Petrogenesis", "Mineral Deposits", "Environmental, Plant and Soil Geochemistry", "Organic Geochemistry", "Hydrogeology", "Application of GIS to Geochemistry" and "Geochemistry Related Other Topics". Approx. 300 scientists from Turkey, Iraq, Iran, Greece, China, Indonesia, Brazil, Britain, Russia, Finland, Egypt, India, Germany and the United States attended the meeting. On May 6, short courses were given by Dr. Axel Schmitt, Dr. Lukas Ackerman and Dr. Yalçın Ersoy.

The following invited talks, which have been highly appreciated by all attendees, were given during the symposium:

Dr. Aral İ. OKAY (İstanbul Technical University, Turkey)

Subduction processes, magmatic arcs and ophiolites in geology of Turkey

Dr. Xiaoyong YANG (University of Science and Technology of China)

Formation and genesis of the Bayan Obo Fe-REE-Nb deposit in Inner Mongolia: The geochemical constraints

Dr. Michael SEITZ (Goethe-University, Frankfurt, Germany)

Lithium and its isotopes: Aspects in geochemistry and cosmochemistry

Dr. Mehmet Yılmaz SAVAŞÇIN (Dokuz Eylül University, Turkey)

Environmental geochemistry, our problems, our responsibilities

Dr. Julian PEARCE (Cardiff University, UK)
Geochemical interpretation of collision volcanism

Dr. Axel SCHMITT (University of Heidelberg, Germany)

Accessory mineral petrochronology for igneous and metamorphic rocks

Dr. Martin PALMER (University of Southampton, UK)

Crustal growth and recycling in Western Anatolia: The boron isotope study

Dr. Lukas ACKERMAN (The Czech Academy of Sciences)

Highly siderophile elements and Re-Os isotopes: versatile tools for complex mantle processes

Dr. Donald B. DINGWELL (Ludwig-Maximilians University, Germany)



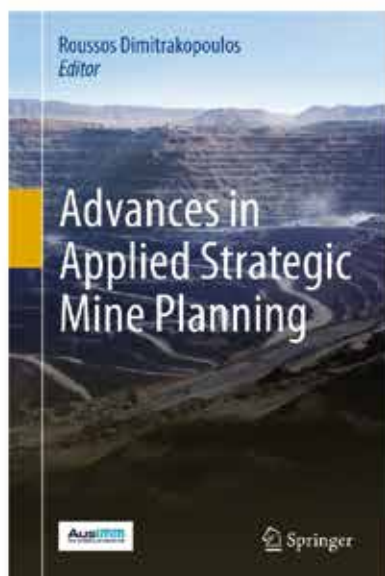
Fig. 1: The SGA speaker Dr. Robert Moritz is receiving his plaque from Dr. Lukas Ackerman after his invited talk.

A subtle chemical control on the style of silicic volcanism?

In addition to above invited talks, Dr. Robert MORITZ (University of Geneva, Switzerland) gave an invited talk as SGA speaker, entitled "Subduction-related to post-collision porphyry and epithermal systems: lessons from the SE European-Anatolian-Caucasian segment of the Tethys belt".



Fig. 2: Group photo of participants and organizers of the 8. Geochemistry Symposium.



Roussos Dimitrakopoulos (Ed.)

Advances in Applied Strategic Mine Planning

- Addresses core aspects of the sustainable, responsible, and optimal development and utilization of Earth's mineral resources
- Presents both state-of-the art methods and major applications in the global mineral resources industry
- Includes contributions from international experts in the field

This book presents a collection of papers on topics in the field of strategic mine planning, including orebody modeling, mine-planning optimization and the optimization of mining complexes. Elaborating on the state of the art in the field, it describes the latest technologies and related research as well as the applications of a range of related technologies in diverse industrial contexts.

1st ed. 2018, XIII, 800 p. 385 illus., 262 illus. in color.

Printed book

Hardcover

199,99 € | £175.50 | \$249.00

^[1]213,99 € (D) | 219,99 € (A) | CHF 220,00

eBook

166,59 € | £140.00 | \$189.00

^[2]166,59 € (D) | 166,59 € (A) | CHF 176,00

Available from your library or
springer.com/shop

MyCopy ^[3]

Printed eBook for just

€ | \$ 24.99

springer.com/mycopy

Lifelong 40% discount for authors



Order online at springer.com / or for the Americas call (toll free) 1-800-SPRINGER / or email us at: customerservice@springernature.com. / For outside the Americas call +49 (0) 6221-345-4301 / or email us at: customerservice@springernature.com.

The first € price and the £ and \$ price are net prices, subject to local VAT. Prices indicated with [1] include VAT for books; the €(D) includes 7% for Germany, the €(A) includes 10% for Austria. Prices indicated with [2] include VAT for electronic products; 19% for Germany, 20% for Austria. All prices exclusive of carriage charges. Prices and other details are subject to change without notice. All errors and omissions excepted. [3] No discount for MyCopy.

Part of **SPRINGER NATURE**



5th SGA-SEG-UNESCO-IUGS Short Course on African Metallogeny

SEDIMENT HOSTED Mn-Fe-U deposits: from exploration to metal

organized by
Society for Geology Applied to Mineral Deposits (SGA)
in cooperation with
Ministry of Mines of Gabon
School of Mines and Metallurgy, Moanda
University of Science and Technology, de Masuku, Franceville
Université Paris Sud, France

supported by
SEG, UNESCO and IUGS

to be held in

Moanda, Gabon, 10 – 14th October 2018



School of Mines and Metallurgy, Moanda, Gabon

5th SGA-SEG-UNESCO-IUGS Short Course on African Metallogeny

Sediment-hosted ore deposits are widespread all over Africa. Many were formed during the Proterozoic (e.g. Central African Copperbelt, Kalahari Mn-fields...).

Gabon's sedimentary basins are located around Archean magmatic and metamorphic rocks. The Proterozoic Francevillan Basin in the southeastern part of the country hosts one of the world's famous manganese deposits. Uranium was mined in the same region until 1999.

Gabon is the 2nd largest Mn producer in the world after South Africa where Mn is mined from the famous, time-equivalent Kalahari Mn-fields, the world's largest on-shore Mn-deposits.

COMILOG, belonging to ERAMET Group, was founded in 1953. It has been operating the mine in Gabon since 1962 in Moanda, about 50 km from Franceville. Manganese (production of ~4 Mt/year) is exploited from laterites with an average grade of 46% Mn. The ore is sintered and transported over 600 km by rail to the port of Owendo, close to Libreville, and shipped for steel production to clients in Europe, USA and China. Manganese metal is also produced at Moanda for the chemical industry.

Gabon has been a significant uranium supplier in the past. Uranium has been produced (In total about 28,000 t U) from the famous Mounana and Oklo deposits, discovered in 1956 and 1968, respectively, mined from 1960 to 1999. The Oklo deposit (total production 14,000 t U), is famous for its fossil nuclear reactors, which operated naturally in the wet sandstone orebody about two billion years ago.

Iron ore is not yet mined in Gabon, but the Bélinga iron ore deposit in NE-Gabon hosts estimated resources of ~384 Mt of high grade ore (Fe > 60% and P < 0.09%), and more than 1 Gt at grades of Fe > 50% and P < 0.18% (Kondja et al. 2017).

In 2016, the School of Mines and Metallurgy (<http://e3mg.ga/>) was founded at Moanda by the Gabon government and Comilog. There engineering students from all over Africa are educated in the field of exploration, extraction and metallurgy to insure high qualification for the African mining and metallurgical industries.

The aim of the 5th Short Course on African Metallogeny is to train geoscientists and engineers on metallogeny, including the metallurgy of Mn and U, for the purpose of providing skilled workers in academia and industry for future exploration, mining and processing.

With great pleasure, we announce this 5th international workshop, which is being organized by the Society for Geology Applied to Mineral Deposits (SGA), in close collaboration with the Ministry of Mines of Gabon, the School of Mines and Metallurgy at Moanda, Comilog-Eramet, the University of Sciences and Technologies of Masuku, Franceville, supported by UNESCO, IUGS and SEG. Following the four successful courses organized in Burkina Faso, Zambia, Morocco and Rwanda, this course will take place in Moanda, Gabon from Tuesday 10th to Saturday 14th of October. (These dates were chosen to coincide with the flight connections for all participants from Libreville to Franceville and the transfer to Moanda, as there are no flights on Saturday).

The course will comprise five days of training with lectures, practical exercises and field excursions and visits to the Mn-mine and metallurgical plants (see program below).

Venue

The five-day short course will be held in Moanda and the surrounding Mines and plants. The lectures will be held in the School of Mines and Metallurgy.

An optional visit to the port of Owendo will be organized. A touristic excursion to the National park close to Moanda can be organized upon request.

Number of participants

A maximum of 45 participants is set for logistic reasons and in order to ensure maximum benefits for each participant. It is expected that participants from industry meet and exchange with academia (researchers, lecturers and students).

Accommodation

45 rooms are available at the School of Mines and metallurgy. The rooms are equipped with air conditioning, shower and toilettes. This accommodation is included in the inscription fees.

A 3-star hotel: Heliconia Moanda (12.5 km from mining school) can be booked on request.

Costs:

1000 €: The course fees include the five-day workshop, lectures, field trips, course material, full-board accommodation (except alcoholic beverages), excursions (meals included), flight Libreville-Moanda, hotel and transport in Libreville.

500 €: The course fees include the five-day workshop, lectures, field trips, course material and full-board accommodation (except alcoholic beverages), excursions (meals included).

VISA:

After inscription and payment, a formal letter will be sent for VISA application.

Language:

The workshop will be held in French

CONTACT BEATE ORBERGER

beate.orberger@u-psud.fr

Lecturers:



MAURICE PAGEL is emeritus professor at the University of Paris Sud, Orsay, France. Prior to his position as university professor, he was a senior scientist at CNRS (Centre National de la Recherche Scientifique, 1976 à 1977) at the famous Centre de Recherche sur la Géologie de l'Uranium (CREGU, Nancy). His research concerns unconformity-type and sediment-hosted uranium deposits. Maurice Pagel's research contributed significantly to the role of accessory minerals in granites and fertile volcanic rocks, the effect of radiation on these minerals, fluid mineral interactions, and the thermal history of U-mineralized basins. At present, he co-directs a French national project (CNRS, CEA, AREVA) on U-resources.



BEATE ORBERGER is Associate Professor at the University of Paris Sud, Orsay, France and president of Catura Geoprojects (Geoscience Conseil). She has 30 years of experience in economic geology and geometallurgy, mainly on sediment-hosted Iron and Manganese deposits (Brazil, Australia, South Africa, Zimbabwe, Gabon), but also on Ni and Mn laterites. She worked for 5 years for ERAMET and co-directed a PhD thesis

financed by COMILOG on the Mn-carbonates at Moanda. Her major research contributions are in the field of metal transfer and trapping during fluid circulation (magmatic, hydrothermal and weathering processes). At present, she is scientific coordinator of several EU financed projects (H202, EIT) constructing combined drilling and on-line-on-mine-real time analytical expert systems to increase resource efficiency during exploration, mining and processing.



THIERRY DE PUTTER is Head of the Geodynamics and Mineral Resources Unit at the Royal Museum for Central Africa (RMCA), Tervuren, Belgium. He has been for 7 years (2006-2013) co-Chair of a task force of the Belgian Foreign Affairs on good governance in the mining sector in D.R. Congo. His present research focuses on the world-class Neoproterozoic sediment-hosted Cu-Co-U deposits in the Katanga Copperbelt (DRC); on the mineral wealth of the Kasai Block (Congo Craton), including the poorly-known Paleoproterozoic manganese deposit at Kisenge, Western Katanga; and on the timing of the formation of recent supergene deposits in southeastern DRC. He also published on the role of natural resources in the persistence of conflicts in Eastern DRC, and on the development in DRC.



JACQUES THIRY is chemical engineer graduated from Ecole Nationale Supérieure Chimie – Toulouse. He worked for AREVA in many positions during his career. He was Process Engineer and heap leaching uranium plant manager in SOMAIR (Niger) and Process Engineer in the Lodeve (France) alkaline process plant. He managed the R&D and Technical Services Department of Areva Mines (SEPA), the Metallurgical Processes and

Plants Department. At the end of his career he was Technical Director of the Areva BU Mines in charge of the Process and Mining studies for scoping or prefeasibility phase. He was awarded as fellow expert in the Areva (now Orano) group from 2011 for its uranium's ore processes knowledges and skills. He retired from the Company in September 2017, but is still President of a working Group within the French Industrial Mining Society for Ore Processing and Hydrometallurgy.



ANTOINE ANGO MARTHURIN is an engineering geologist, at present counselor at the Ministry of Mines in Gabon, in charge of the iron ore deposit at Belinga since 2005. As administrator of the SOSEM society, he directs the work on future mining activities on gold and related metals. During his career, he worked on the uranium mine at Oklo. Directing the exploration work, he was head of the department of geology

and drilling at COMUF and managed the mine development of ETEKE for the Canadian society Golden Star in joint venture with the Australian company Lafayette Mining. He also held the position of the director general of the Ministry of Commerce and industrial development of Gabon.

Two lecturers will be appointed for lecturing the Economic geology of Gabon and the Metallurgy of the Mn-ore.

Program

5th Workshop on African Metallogeny Moanda, Gabon

10th – 14th October 2018

arrival/departure: Sunday and Monday

(flights: Libreville-Franceville and transfer from Franceville to Moanda)

Sediment-hosted Mn-Fe-U deposits: from exploration to metal

Day 1:

9H00-9H45: Welcome

9H45-10H30: Introduction to the geology and metallogeny of Gabon
(Francis, Maya-Mikolo, Direction Générale de la Géologie et de
la Recherche Minière (DGGRM), Gabon)

Coffee break

Day 1 URANIUM

11H00-12H00: Physico-chemical properties of uranium and natural fission
reactors (Oklo) (*Maurice Pagel*)

12H00 – 13H00 Uranium deposits (*Maurice Pagel*)

13-14h: Lunch

14H00-15H00: Unconformity-type uranium deposits (*Maurice Pagel*)

15H-16H00: Uranium deposits of Niger (*Maurice Pagel*)

Coffee break

16H30 – 18H30: Metallurgy of Uranium: from ore to yellow cake
(*Jacques Thiry*)

Day 2 Manganese

9H00-10H30: Physico-chemical properties of Manganese and Iron
Mn- Fe ore types (*Beate Orberger*)

Coffee break

11H00-13H00: Sediment hosted Mn-Fe deposits in Southern Africa and
Brazil (*Thierry de Putter et Beate Orberger*)

13H00-14H00: Lunch

14H00-15H30: The Manganese deposit of Gabon: from Mn-rich black shales to Mn-laterites (*Beate Orberger*)

Coffee break

16H00-18H30: Metallurgy: from Mn-oxide to product (COMILOG)

Day 3: Iron Ore

9H00-10H30: Iron ore BELINGA (*Antoine Mathurin Ango*)

Coffee Break

11H00-12H00: Perspectives and Conclusions

Lunch and preparation for departure

Afternoon

Excursion: Visit the famous fossils (2.1 Ga) in the black shales close to Moanda-(Franceville) – and the COMILOG plant (depending on the number of participants 2 groups)

Day 4

Morning: EXCURSION Comilog Plant

Lunch

Afternoon: Mn-Mine Comilog

Day 5

Morning: Mine visit and closure of the short course

Visit of Animal Park



Registration Form for Individuals

5th SGA-SEG-UNESCO-IUGS Short Course on African Metallogeny 10 – 14th October 2018, Moanda, Gabon

“SEDIMENT HOSTED Mn-Fe-U deposits: from exploration to metal”

Title:

First name:

Surname:

Company name

Company address:

Country:

Contact Tel.:

e-mail:

☐ The registration fees include the five-day workshop, lectures, field trips, course material, full-board accommodation (except alcoholic beverages), excursions (meals included), flight Libreville-Moanda, hotel and transport in Libreville. 1000 €

☐ The course fees include the five-day workshop, lectures, field trips, course material and full-board accommodation (except alcoholic beverages), excursions (meals included). 500 €

I am an academic without sufficient funds or a student and apply for a subsidy (see separate form – application for subsidy) YES ____

NO ____

E-mail this form to beate.orberger@u-psud.fr not later than 10 September 2018.

On confirmation of your places, we will ask you to transfer the registration fee to the following bank account:

Name of the bank: Credit Suisse

Address: Postfach 500, CH-8070 Zuerich, SWITZERLAND

Account holder: SGA

IBAN (International bank account number): CH4604835181963192000

BIC (Bank identification code): CRESCHZZ80A

Guide to authors for the SGA News

Jochen Kolb; chief editor SGA News

Institute of Applied Geosciences, Karlsruhe Institute of Technology, Adenauerring 20b, 76131, Karlsruhe, Germany; editor-sga-news@e-sga.org

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.

Title and affiliations

Every submission needs to provide: (1) a concise and informative title; (2) the name(s) of the author(s); (3) the affiliation(s) and address(es) of the author(s); and (4) the e-mail address of the corresponding author.

Text formatting

Manuscripts need to be submitted in Word. Use a normal, plain font (e.g., 10-point Times Roman) 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).



*Jochen Kolb
Chief Editor SGA News*

References

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

NEW SGA MEMBERS (June 1, 2017 until May 31, 2018)

408 Student Members, 22 Regular and
1 Senior Member applied for membership

REGULAR MEMBERS

CANADA	7
UNITED KINGDOM	2
ARGENTINA	1
AUSTRALIA	1
BELGIUM	1
CHINA	1
FINLAND	1
GERMANY	1
NEW ZEALAND	1
SWEDEN	1
TURKEY	1
USA	1

STUDENT MEMBERS

PERU	171
COLOMBIA	60
CZECH REPUBLIC	24
RUSSIA	15
SPAIN	14
SWITZERLAND	11
GERMANY	10
POLAND	10
FRANCE	9
FINLAND	8
MOROCCO	8
UNITED KINGDOM	8
BRAZIL	5
TURKEY	3
SWEDEN	2
NIGERIA	2
USA	2
ZAMBIA	2
ALGERIA	1
ARGENTINA	1
BULGARIA	1
CHINA	1
GHANA	1
IRAN	1
IRELAND	1
KAZAKHSTAN	1
PORTUGAL	1
SLOVAKIA	1

SENIOR MEMBER

CANADA	1
--------	---

Pre-Registration Form and Application for Financial Support

Please send this form by e-mail to

<mailto:beate.orberger@u-psud.fr>

For more information on the Short Course see <http://e-sga.org/>

PERSONAL INFORMATION

First name:		Surname:		
Date of birth:	Place:	Country:	Male / Female <input type="checkbox"/> / <input type="checkbox"/>	Member SGA: <input type="checkbox"/> Member SEG: <input type="checkbox"/>

PERMANENT RESIDENCE

Street name and number:		Place:	
Province:	Country:	Postal Code:	
Telephone:	Fax:	e-mail:	

EDUCATION

Education	Institution	Place	Country	Degree	Duration	
					from:	to:

INFORMATION ON HOME INSTITUTION OF APPLICANT

Name:						
Street name and number:					City:	
Province:		Country:		Postal code:		
Telephone:		Fax:		e-mail:		
Position:						
Head of department:						
Type of institution	University <input type="checkbox"/>	Geological Survey <input type="checkbox"/>	Research Centre <input type="checkbox"/>	Public enterprise <input type="checkbox"/>	Private company <input type="checkbox"/>	Other (detail) <input type="checkbox"/>

INFORMATION ON PARTICIPANTS REQUESTING A SCHOLARSHIP

I am currently preparing/conducting the following:

- a) BSc thesis (university) ☐
- b) MSc thesis (university) ☐
- c) PhD thesis (university) ☐
- d) Research work outside university (most relevant, institution) :
- e) Other:

Brief motivation for your participation in the course :

Have you participated in previous SGA-SEG short courses?	YES <input type="checkbox"/>	NO <input type="checkbox"/>	I request a grant for:	Transport <input type="checkbox"/>	Accommodation <input type="checkbox"/>
I have received support from UNESCO, SGA, SEG or any other organization/institution for previous similar short courses	YES <input type="checkbox"/> Year:	NO <input type="checkbox"/>	I have received support/scholarship from UNESCO for other activities <input type="checkbox"/>	Which activity? Year:	

LIABILITY

I assume full responsibility in case of accident, disability, illness or death that might occur during the course or the field trip. I herewith renounce any claim to financial compensation in respect of damage that could affect me as a result of participating in the course and/or the field trip and thus release the course organizers from whatever responsibility. I confirm that all information provided above is correct.

Name:

Date:

Signature:



The SGA, MDSG, IOM³ and SUERC together
with
The Lord Provost of the City of Glasgow
Eva Bolander
Scotland's First Minister
Nicola Sturgeon
extend the warmest invitation to
The University of Glasgow
for the
SGA's 15th Biennial 27-30 August, 2019.

sga2019glasgow.com

University of Glasgow

Visit Scotland™

Geology Applied in Industry

MDSG

IOM³
The Institute of Materials,
Minerals and Mining

NATURAL HISTORY MUSEUM

SUERC
Scottish Universities Environmental Research Centre

GLASGOW CITY MARKETING BUREAU

Geology Applied in Industry

SGA Glasgow 2019

LIFE with ORE DEPOSITS on EARTH – THEMES AND SESSIONS

- The influence of Ore Deposits on the emergence and evolution of life
- Security of supply for E-tech minerals
- Advances in understanding hydrothermal processes
- New Techniques for ore discovery
- New discoveries – new views – finding the giants
- Magmatic-hydrothermal systems from porphyry to epithermal
- Magmatic sulphide and oxide systems
- Gold - from orogenesis to alluvial
- Economics of ore deposits
- The changing face of metal extraction – geology, biology and geometallurgy
- Sustainable development of ore deposits
- Supergenes, gems and non-metallic ores
- Young Geologist Forum - prospects in mineral deposits industries
- Open session

KEY DATES

21 st January, 2019:	Registration and abstract submission open
March 11 th , 2019:	Abstract submission closes
	Student grant applications close
May 8 th , 2019:	Abstract acceptance notified
May 15 th , 2019:	Fieldtrip/Short Course confirmation
May 22 nd , 2019:	Early Bird registration closes



@sga_2019 @ #sga2019



www.sga2019glasgow.com



sga2019@abbey.ie

Business Card
Staple HERE



Society for Geology Applied to Mineral Deposits (www.e-sga.org)

APPLICATION FORM FOR NEW MEMBERS

I would like to become a member of the **Society for Geology Applied to Mineral Deposits** and to receive my personal access to **Mineralium Deposita**. Membership fees will be due after acceptance of the membership application.

- Note that incomplete forms and those that are not legible will NOT be processed! -

<u>Last name*</u>	
<u>First name*</u>	
Title	
<u>Postal address*</u>	
Phone	
<u>e-mail*</u>	
Academic degrees	

Select your Membership Dues*

* mandatory fields

- ☐ 75.00 EUR Regular Member (Printed copy + online access **Mineralium Deposita** and **SGA News**)
- ☐ 60.00 EUR Regular Member (Online access only **Mineralium Deposita** and **SGA News**)
- ☐ 10.00 EUR Student Member (Online access only **Mineralium Deposita** and **SGA News**, certificate required)
- ☐ 60.00 EUR Student Member (Printed copy + online access **Mineralium Deposita** and **SGA News**, certificate required)
- ☐ 60.00 EUR Senior Member (Printed copy + online access **Mineralium Deposita** and **SGA News**, after retirement, certificate required)
- ☐ 300.00 EUR Corporate Member (includes 3 printed copies of **Mineralium Deposita**) (for industry only, no academic)

Applications **until September 30th** will be processed for the current year. **From October 1st** membership starts with the following year.

Donation for the SGA Educational Fund

- ☐ I want to donate _____ EUR to the SGA Educational Fund and
- ☐ agree that my (or company) name as donor will be published in SGA media/conferences
- ☐ wish to remain anonymous

* ☐ I agree to the SGA data privacy policy as published at <https://e-sga.org/contact-us/data-privacy-policy>

If my application is approved, I authorize the "Society for Geology Applied to Mineral Deposits" to charge the above amount (please tick) to the given credit card:

- ☐ VISA ☐ MASTERCARD/EUROCARD

Card Holder* _____ Expiry date (MM/YY)* _____

Card No* _____ 3-digit security code* _____

Signature* _____ Place and date: _____

(If you do not intend to pay by credit card, please make a note here and an invoice will be issued after acceptance of your application)

Sponsor (SGA member):

Name

Place

Date

Signature

Send the membership application form to:

Dr. Jan Pašava, SGA Executive Secretary, Czech Geological Survey, Klárov 131/3, CZ-118 21 Praha 1, CZECH REPUBLIC
Phone: ++(420)-2-51085506, Fax: ++(420)-2-51818748, e-mail: secretary@e-sga.org

Please note that bank charges will not be covered by SGA.

Version June 2018