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The impact of the Covid-19 pandemic on teaching Earth sciences in Central Africa: Gabon and Cameroon

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Abstract

The Covid-19 pandemic has harmed health and education. It caused higher education institutions ("HEI") to be locked down. This new reality has forced African universities to switch abruptly to online, distance learning and teaching. However, the transition was difficult due to poor connectivity. Nevertheless, several universities, especially in sub-Saharan Africa migrated to online and distance learning. Local data reveals the pandemic has had negative effects on the teaching and learning of geosciences in Gabon and Cameroon. However, if governments and HEI's acknowledge the rate of internet and mobile phone usage among students and implement information and communication technology facilities, remote learning would be very useful in training professional geoscientists.

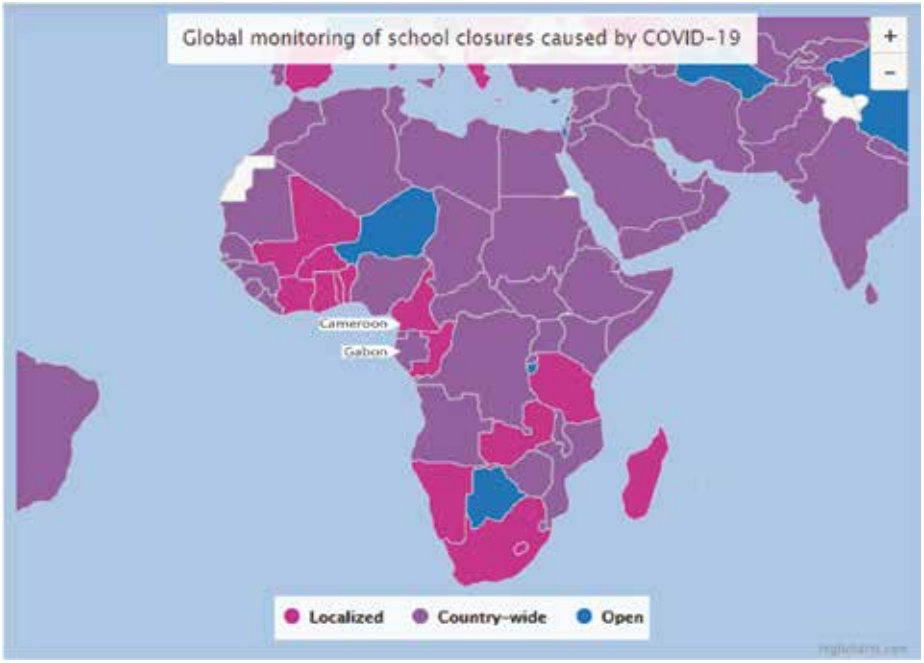

Fig. 1 Global monitoring of school closures caused by COVID-19, source: UNESCO (2020)

CONTENTS

Introduction

According to the World Health Organization (2021), the Covid-19 virus was first identified in Wuhan, China and spread quickly worldwide. Since the start of the resultant pandemic, the world has been facing the extraordinary crisis in all aspects of life (social, health and economy). This crisis caused most governments to bring in swift changes in their country, like enforcing quarantines for sick people and traveller's countries, social distancing, lockdowns and border closures in attempts to contain the virus.

This pandemic resulted in restrictions in the world at large and especially underdeveloped African countries. All countries were unprepared for the pandemic, its rapid spread between countries and its high death tolls as stated by the World Heath Statistics 2021 with 3.2 million death cases by May 2021 (Marinoni et al. 2020; Naconha 2021). In Africa, the Covid-19 pandemic was slow to be unfolded, but when it did, it was upsetting the way it was managed. One of the sectors which was highly affected by the pandemic was education. Due to the poor management of this pandemic, schools were forced to be closed in order that governments can manage the disaster. UNESCO reported on April 2020 the closure of 185 countries' higher education institutions with more than 1,542,412,000 learners being affected, which is approx. 89.4% of the enrolled population and approx. 2000 HEIs being affected by the interruption of face-to-face teaching (Khan 2021; Marinoni et al. 2020; National Education Opportunities Network 2020). Knowledge is power, and with the Sustainable Development Goals in mind, it was essential to foster education at every level, and to do so, as fast as possible.

Previous studies on the effect of the pandemic on the education sector have looked at its effects on girls, mental health consequences, pupils and students learning less or receiving no teaching at all, limits in digital technology, very poor online and e-learning facilities and how it has greatly affected schools leading to school closures and the possible means of reopening schools (ADEA 2020; Béché 2020; Organisation for Economic Co-operation and Development 2020; Watch 2020). Very little has been published specifically on the effects of the pandemic on Earth science education. This paper highlights the negative and positive aspects faced by the education sector in sub-Saharan Africa with an emphasis on Earth sciences from Gabon and Cameroon.

1. Pandemic effect on education in Africa

In November 2020, the World Health Organization reported 51,835,945 confirmed Covid-19 cases and 1,279,963 resultant deaths around the world (Mbunge et al. 2020). In Africa the first case of COVID-19 was reported on the 14th of February 2020. By the 18th of May 2020, cases had been reported in all 54 countries, South-Africa and Egypt being the most affected countries in Africa (Aborode et al. 2020). Since the first cases of Covid-19 in Egypt, several other African countries were affected by the pandemic causing imposed lockdowns which had social and economic implications. In most Earth science departments, students' life on campus, field work, grants for international and national mobility, research activities and article publications were greatly impacted (Fig. 1).

2. Negative impacts of Covid-19 in higher education

2.1 Higher education institutions (HEIs)

According to UNESCO, 9.8 million African students experienced disruption in their studies due to the closure of HEIs. In approx. 2000 HEIs face-to-face classes were suspended for three to six months, or more in some countries which were most affected by the pandemic. More than 98% of teaching and learning could not be performed satisfactorily in sub-Saharan Africa because of the pandemic (Aborode et al. 2020). The temporary closure of universities obliged each institution to deliver academic programs online. The transition from face-to-face, in-person classes to online teaching was not easy for all HEIs (The World Bank 2020). Some universities had to switch from traditional teaching to online, among them are the Kenyatta Digital School, the University of Rwanda (The World Bank 2020), University of Yaounde I, University of Buea and University of Bamenda in Cameroon. Some universities could easily shift from onsite to online learning, like in South Africa, while for others, such as in Cameroon and Gabon, it was not easy to do so. Although African universities experienced a rapid shift to online learning, they were not fully prepared to teach this way having poor and insufficient internet facilities and ICT equipment for students and teachers alike.

2.2 Student life

The effective implementation of social distancing due to Covid-19 and the closure of HEIs for a long time (Fig. 1) has had social and financial impact on student life. They have had to adjust their daily lives to adapt to the confinement usually with no social or psychosocial support. As the pandemic spread, HEIs used ICT technologies to deliver their programs online to their students (Aborode et al. 2020). That transition continues to remain difficult for many African higher education students because of poor internet access and the lack of digital devices. By June 2020, UNESCO reported that 89% of students in sub-Saharan Africa had no access to home computers and 82% had no internet connections making online learning very difficult to deliver effectively (The World Bank 2020).

Even though African students are less connected as compared to other regions in the world, 97% of them use a mobile phone and thanks to the fact that most of them live in urban areas where internet bandwidths are accessible, they tried to attend classes through this means (The World Bank 2020). In Nigeria, around 169.2 million people have a mobile phone and 50% of them live in urban areas (Digital Global Overview Report 2020). This pattern can largely be observed in several African countries and could be an opportunity. Governments should take advantage of this in their strategy to shift toward online teaching and learning. One of the most important impacts was the financial loss students and their families had to face during the closure of universities. Students continued to bear the costs associated with higher education learning, such as the annual fees, even though they did not complete classes, continued to rent accommodation on campus or incurred expensive internet fees to attend online classes from home (The World Bank 2020). In Cameroon most students had access to laptops given to them by His Excellency President Paul Biya some years before the pandemic to encourage research. That greatly helped the students as did the collaboration between the Higher Education Ministry and Cameroon Telecommunications which enabled free internet to most state universities in Cameroon. Learning was still difficult but highly assisted. In Gabon, government in partnership with UNICEF put in place necessary water, sanitation and hygiene (WASH/Infection Prevention and Control (IPC)) equipment and measures to safeguard 25,000 students and 10,000 staff in primary, secondary and tertiary education institutions (UNICEF-Gabon 2020).

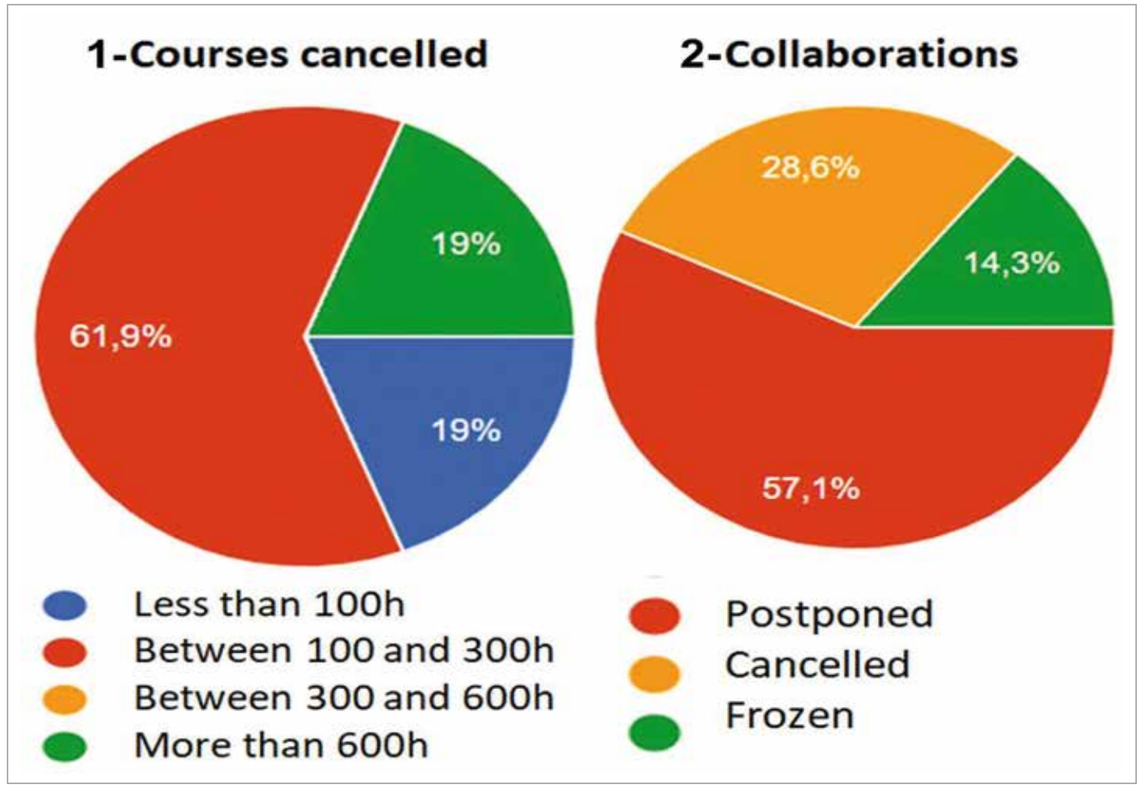

Fig. 2 Covid-19 pandemic effects on courses execution and international collaboration

2.3 International mobility and research activity

Sub-Saharan Africa encounters significant difficulties in training their youth and has less than 10% enrolment rate in higher education (Campus France 2021). According to UNICEF, about 450,000 African students are traveling per year, mainly to the United States, Europe, China and other African countries for their studies (Campus France 2021). For instance, the Chinese government reported that 81,562 African students lived in China in 2018, and about 5,000 of them may have been in Wuhan at the outbreak of the pandemic (IESALC 2020). Consequently, African students have been among the first ones to be affected by the lockdown. Some of those students who were most affected were studying abroad as were those who went back home to their various countries for holidays before the start of the pandemic and could not return to the countries where they were studying.

Due to significant travel restrictions, some African students remained abroad. Those who were self-funded and also lost their temporary jobs during the crisis could no longer support themselves and had to stop school. Also, many students had to postpone their studies and go back home (The World Bank 2020). Even though international travel has been hit by the pandemic, various universities took this crisis as an "opportunity" to embrace virtual mobility. This is the case in the University of Rwanda and the University of Ghana (The World Bank 2020).

The crisis also disrupted research activities due to restrictions on the researchers' international travel programs by greatly limiting access to international laboratories and research collaboration. However, the crisis has benefited African researchers because it encouraged remote collaboration. In addition, African researchers were able to attend international meetings and collaborate on international research projects without worrying too much about the costs which they would have been involved with before the crisis.

3. Positive effects of Covid-19 on education

3.1 Publications

Publications during Covid-19 mostly geared towards Corona virus research and most journals were quick to review and publish articles on this subject. Notwithstanding, 2020 revealed a sharp increase in article publications of every other subject and especially the Earth sciences; more articles were submitted to scientific journals in 2020 with 58% increase as compared to 2019 submissions (Holly 2020). This can be explained by the fact that most people stayed at home and had enough time to write articles rather than doing field work, excess travelling and laboratory work.

3.2 Use of online facilities for webinars, courses, training etc.

Several exchanges between scientific teams continued and were reinforced thanks to online collaboration. At Masuku University in Gabon, University of Buea, University of Yaounde I and University of Bamenda in Cameroon and most other

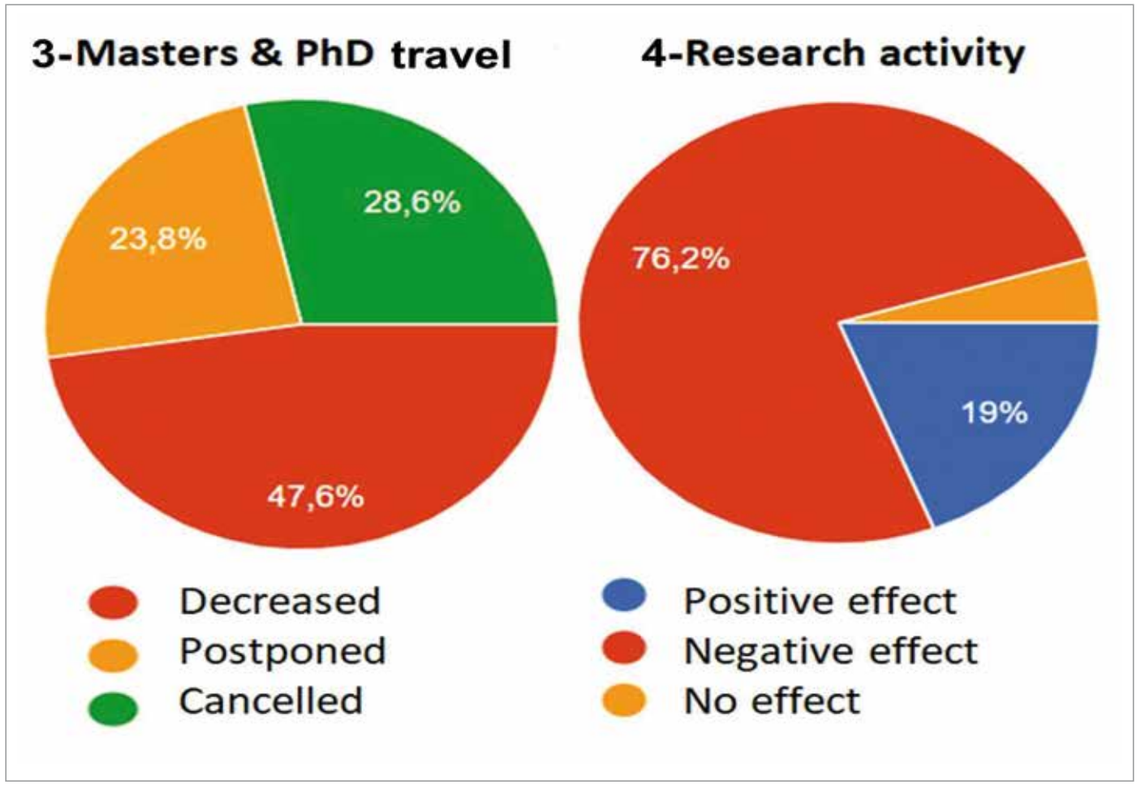

Fig. 3 Covid-19 pandemic effects on Masters-PhD travel for laboratory and research activity, and international collaboration

African universities travel and laboratory visits by geoscientists were replaced with sending samples for analysis, online meetings to discuss results and ways to elaborate common research projects and scientific papers. In addition, researchers have participated in many online webinars and meetings such as: Ore Deposits Hub using a zoom platform jointly supported by IAGOD, SEG and SGA since November 2020. SGA has played an important role in keeping science and collaboration alive especially among students. In 2020, SGA organized a collaborative research meeting on “Green metals for sustainable society” (SGA Virtual Seminar 2020) and in 2021, a panel discussion under the theme “The impact of Covid-19 on the raw material sector in Africa” which involved many students across Africa and Iran.

3.3 Conferences attended

Many students and young professionals have had the opportunity to attend otherwise expensive conferences and webinars online due to the fact that travel was restricted because of the Corona virus. Some examples are online attendance at the IEEE International Leadership Conference, Women In Engineering (ILC WIE), and the 46th Commission on the history of Geological Sciences (INHIGEO) symposium (Polish Geological Institute, 2021) which were sponsored for most students.

4. Survey methodology

This article aims at understanding negative and positive effects of Covid-19 on the education sector in sub-Saharan Africa and on Earth sciences training in Gabon and Cameroon. Data used was collected from published literature and by a survey. We undertook a survey titled "Impact of Covid-19 on Higher Education and Geoscience Learning in Africa", in the framework of a seminar organized by SGA on the impact of Covid-19 on the raw materials sector in Africa with a main focus on education. The survey targeted data collection to understand how the pandemic affected higher education and geoscience training in Gabon and Cameroon. The study involved 24 teachers, researchers, engineers and students, mainly from Gabon and Cameroon. 70.8% of participants were from Gabon, 16.7% from Cameroon and 12.5% participants from Algeria and Guinea (Fig. 2). 95% of the survey participants were from the higher education sector and the remaining 5% from the mining sector. 45.8% of participants were students, 50% of them were teachers and researchers and 4.2% were engineers.

5. Results

5.1 Survey results

The survey collected data in order to understand how the pandemic affected higher education and geoscience training in Gabon and Cameroon. The study involved 24 teachers, researchers, engineers and students. 70.8% of participants were from Gabon, 16.7% from Cameroon and 12.5% participants from Algeria and Guinea (Fig. 2). 95% of the survey participants were from the higher education sector and the remaining 5% from the mining sector. 45.8% of participants were students, 50% of them were teachers and researchers and 4.2% were engineers.

5.2 Impact on course delivery in universities

The study shows that, 83.3% of participants believe that the Covid-19 crisis has had a negative impact on education in general and 70.8% of them say that higher education is the most affected. It was highlighted that measures taken to fight the spread of Covid-19 were mostly to lock down HEIs in the region. 58.3% of the participants point out that universities and colleges closed, while 33.3% remained partially closed. Closure lasted less than 4 months for 25% of the participants and between 4 to 8 months for 75% of them. According to the survey, nearly 70% of respondents say that the execution of theoretical courses, tutorials and practical work was severely disrupted because of the closure of HEIs. 80% of the participants estimate that their home institutions have cancelled between 100 and 600 hours of teaching during 2019-2020 academic year (Fig. 2).

Geoscience requires hands-on laboratory and field courses; however, such courses have been severely disrupted. According to more than 90% of respondents, between 3 and 5 field trips of an educational nature were cancelled. At the University of Science and Technology of Masuku (Gabon) and the University of Buea (Cameroon), for example, the Department of Geology could not organize practical work and field trips, because of the imposed partial and total countrywide confinement. Even after the reopening of the universities, it was still difficult to make up for the lost time with the students because of the social distancing measures imposed by most African governments.

5.3 Impact on research and international mobility at local level

We have shown how the Covid-19 pandemic has heavily affected research activities and international mobility across the continent. At the regional level, our survey clearly confirms this. Indeed, 90% of respondents say that research has been fairly to strongly impacted by the current health crisis and more than 75% of the participants say that the Covid-19 pandemic and the subsequent restriction measures had a negative effect on the scientific output of their institutions (Fig. 2). The drop in research activities can be explained by several factors, such as the closure of universities and research institutes, and the limited access to laboratories due to the repeated confinements. We think that the major factor is undoubtedly the interruption or the sudden freezing of collaborations between our universities, foreign universities and research institutions. Our study reports that more than 80% of foreign collaborations have been cancelled, postponed or frozen, because of the health crisis (Fig. 2). In Gabon and Cameroon, for example, due to the lack of appropriate analytical platforms; in the field of geosciences, research projects and scientific papers are often produced in collaboration with European, Asian or other African research teams. However, the pandemic has undermined international mobility programs that allowed researchers, Master and PhD students to benefit from technical support for the processing and analysis of their samples. Thus, 45.8% of respondents say that international mobility has decreased and more than half of the participants say that travel grants have been postponed or cancelled (Fig. 3). This is the case, for example, for the Erasmus+ 2020-2022 mobility program between the University of Science and Technology of Masuku, Gabon and the University of Tartu in Estonia. However, the reduction in international mobility has not stopped research activity, which has continued through remote collaboration. This allowed Masuku University to be ranked by the Nature Index 2021, as the 37th institution in Africa and the first nationally, in terms of publication quality and number of international collaborations. Geoscience articles have largely contributed to this classification.

5.4 Prospects for geosciences distance learning

The global health crisis caused by Covid-19 has had dramatic and exceptional consequences in the education sector with the closure of HEIs across the continent. However, many HEIs see this crisis as a paradigm shift migrating to innovative teaching and learning methods based on distance, e-learning and online learning. This is also the case within the institutions of our survey participants. In fact, 91.7% of respondents state that the use of connected devices and digital platforms for video conferencing and e-learning has increased significantly. Furthermore, 91.2% of them affirm that distance learning can be an appropriate alternative to the physical classroom. Regarding geoscience education, 87.5% of the participants think that online education can be useful, especially at master and doctoral levels, if combined with face-to-face practical courses. Every participant estimates that the sustainable and effective use of online education in geosciences in Africa is possible but requires the implementation of appropriate technologies and infrastructure. Teachers should also be trained in the use of these technologies.

6. Way forward with the pandemic

Most schools implemented strict measures on face mask wearing, hand washing before getting into campus and social distancing at all times. This resulted in students mostly in Cameroon and Gabon to attending schools in shifts, morning and evening allowing the implementation of social distancing and for schooling to continue through the pandemic. Framework agreements were signed among ministries in Cameroon for internet access to all state universities in Cameroon. Partnering between international bodies like UNICEF and Airtel Africa to provide cash assistance to students through mobile cash transfers for internet use in Nigeria (UNICEF 2020). Moreover, in the framework of “Train my Generation: Gabon 5000” project, the Gabonese Minister of Education signed an agreement with UNESCO to support educational institutions and staff on the implementation of country wide distance learning systems (https://gabon5000.avcn.fr/).

Conclusion

The paper demonstrates that the education sector was greatly affected by the pandemic. As seen in the closure of HEIs because of health restrictions imposed by governments to stop the spread of Covid-19. The interruption of face-to-face courses had both negative and positive consequences on universities, student life, research activities and international mobility. While the problems of connectivity, the cost of the internet and the lack of infrastructure have increased during the health crisis, we noted that it has also had a positive impact on certain areas. We have particularly observed the increase in scientific publications, the ease of creating remote collaboration, the reduction of registration fees for attending conferences and the use of online platforms for work meetings. In Gabon and Cameroon, the survey shows that geoscience education, research and international mobility were strongly affected by the health crisis, but that the establishment of appropriate infrastructure and capacity building of teachers can promote the effective use of distance education in the geosciences as the way forward.

Acknowledgements

We are grateful for the organization and coordination of this panel discussion by Anna-Karen Nguno and Mary Barton of the Geological Survey, Ministry of Mines and Energy, Republic of Namibia. This

article falls within the framework of a seminar organized by SGA on the impact of Covid-19 on the Raw Material Sector in Africa.

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News of the Society – Council Meeting

Jan Pašava[1] (SGA Executive Secretary)

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The hybrid Council Meeting was organized on May 11, 2022 from 9,00 to 15,00 CET in the building of the Polish Geological Institute-National Research Institute PGI-NRI in Warszaw by Stanisław Mikulski (SGA Vice-President). Five Council members were present in person, 13 members joined the meeting virtually and the rest of Council members sent their apologies.

Stanisław Mikulski (SGA VP, host of the Meeting) welcomed all Council members and invited Andrzej Głuszynski (Deputy Director of the Geological Survey, Polish Geological Institute-National Research Institute PGI-NRI) who briefly introduced the host institution. David Banks (SGA President – online) and Jan Pašava (SGA ES – on site) welcomed the SGA Council and thanked the PGI-NRI representatives for hosting the meeting and their hospitality. Then Council approved the suggested agenda.

Roll call and Apologies

Present: S. Decrée, S. Mikulski, J. Pašava, N. Saintilan and A. Vymazalová.

Present on-line: T. Aiglsperger, D. Banks, G. Bozkaya, T. Christie, P. Garofalo, G. Graham, H. Frimmel, B. Lehmann, Cam McCuaig, P. Mercier-Langevin, E. Naumov, S. Petersen, J. Slack.

Apologies for absence: R. de Barrio, C. Conde, E. Ferrari, A. Idrus, J. Kolb, P. Ledru, B. Orberger, D. Schlatter, Y. Song, X. Sun, G. Tourigny.

1. Minutes of previous Council meeting (September 24, 2021) – J. Pašava

After checking the actions, the minutes were unanimously approved.

2. Reports of officers on Council

2.1. Report from President
2.2. Report from Executive Secretary
2.3. Report from Treasurer
2.4. Report from Promotion Manager
2.5. Report from Chief Editor, SGA News
2.6. Report from Chief Editors, Mineralium Deposita
2.7. Report from Chief Editor, SGA Special Publications
2.8. Report from Chief Editor, SGA website
2.9. SGA Educational Fund
2.10. to 2.16. - Reports from Regional Vice Presidents (Asia - missing, Australia/Oceania – presented online, Europe - missing, North Africa and Middle East - missing, Sub-Saharan Africa - missing, North America – submitted, South America - missing) Council was sorry for all missing Reports.

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

David Banks to inform Colin Andrew (IAEG) on offer to sponsor one SGA keynote speaker (topic sediment-hosted ore

Fig. 1 Group photograph of Council members visiting the Geological Museum at the Polish Geological Institute – National Research Institute in Warszaw where the hybrid SGA Council meeting was organized on May 11, 2022. From right to left: S. Mikulski (SGA VP), A. Vymazalová (SGA VP-Student Affairs), J. Pašava (SGA ES), S. Decrée (SGA PM) and N. Saintilan (SGA Council member, Chair of LOC, the 17th SGA Biennial Meeting). Photo by Mr. Robert Bronowicz.

deposits) at the upcoming IAEG 50th Anniversary Meeting.

David Banks to appoint a chairman and two new members of the Nominating Committee who would nominate new auditors for approval by Council and to prepare a list of suggested officers for SGA 2023 election for approval by Council until March 2023.

David Banks to transfer agenda of SGA EF to a new VP – Stanisław Mikulski who will coordinate requests for donations to SGA EF to avoid duplicities with LOC SGA 2023 fund raising activities.

Hartwig Frimmel to transfer 30,000 EUR to SGA EF account.

Hartwig Frimmel to increase salary of the assistant of the treasurer (Mrs. Christine Linge) to a maximum possible limit of about 520 EUR when such a new limit on minijob wages is introduced by the German governmental authorities.

Iain Pitcairn to list SGA Honorary members on SGA website.

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

Iain Pitcairn to prepare a call for SGA awards to upcoming SGA News and update SGA nomination forms at website.

Hartwig Frimmel and Jan Pašava to contact the team who designed and minted the SGA-Newmont Gold Medal to ask for a new proposal for layout and minting of a new SGA Gold Medal, reflecting the new situation. SGA will pay all costs related to this project.

Sophie Decrée in collaboration with Hartwig Frimmel to order neon jackets and scales - gifts for all SGA members (these gifts will be available at SGA booth of the upcoming 17th SGA Biennial Meeting - 2023 in Zurich, Switzerland).

After approval of preparation of a short video on SGA, Sophie Decrée to collaborate with Cam McCuaig and other Council members including those representing industry to find out what might be available for this project from existing sources and to report on any progress at the next SGA Council meeting.

Jochen Kolb to add a section "Forthcoming events" to SGA News.

Bernd Lehmann and Georges Beaudoin to report to the upcoming SGA Council on major statistics/criteria influencing major bibliometric parameters (including IF) of Mineralium Deposita.

Iain Pitcairn to highlight access to SGA News on website.

Hartwig Frimmel/Christine Linge to provide names of people who made any donation to SGA EF to David Banks (SGA President) who will send them a letter of thanks.

3. The 16th SGA Biennial Meeting – update

The report was presented online by T. Christie. This very well attended (500 participants, including 140 students, from 52 countries) and high-level scientific virtual meeting accompanied by short courses contributed significantly to SGA global promotion and achieved an excellent financial result. This would not have been possible without BHP – Patron Sponsor, OceanaGold and GNS Science – Gold Sponsors, Tourism New Zealand – Silver Sponsor and AIG – Session Sponsor. Council greatly appreciated all efforts by LOC under leadership of T. Christie and approved the report with great thanks.

Actions: Tony Christie and his team to finalize SGA Proceedings volumes and send a link for free download and request for indexing to Clarivate Analytics (Jan Pašava to provide more detailed instructions).

Tony Christie and his team to finalize the Financial report for the 16th SGA Biennial Meeting and submit it to SGA Council at the next meeting at the latest.

4. The 17th SGA Biennial Meeting – update

The report was presented by Nicolas Saintilan on site. The conference under the title "Mineral Resources in a Changing World" will be hosted by ETH Zürich and be held on the Hönggerberg campus in downtown Zürich from August 28 to September 1, 2023. The meeting is co-organised by ETH Zürich, the University of Geneva in Switzerland and the Karlsruhe Institute of Technology and the University of Freiburg in Germany.

- The conference format includes a set of exciting technical sessions, topical plenary talks, field trips and workshops
- Student talks will be particularly welcome and student attendance will be supported by the SGA and the meetings sponsors

After presentation and discussion, Council approved the report with great thanks.

Actions: Nicolas Saintilan to send a letter describing upcoming SGA 2023 meeting and asking for BHP Patron Sponsorship to Cam McCuaig.

All Council Members to send to Nicolas Saintilan possible contacts of companies/institutions, which might be interested in exhibiting at the 17th SGA Biennial Meeting.

All Council Members to promote the upcoming 17th SGA Biennial Meeting as much as possible.

5. The 18th SGA Biennial Meeting – status of bidding

The report was presented by Jan Pašava. No bids were submitted by the deadline March 31, 2022 and SGA Council decided to extend the deadline to September 16, 2022 (already announced at website).

6. Progress report on membership drive from the last SGA Council Meeting

The report was presented by Sophie Decrée on site. Since the last report, SGA has got 18 regular members, 1 senior member and 220 student members. Compared to September 2021, an increase of the membership can be seen (from 1063 to 1136 – April 2022) which relates to the increasing number of student members. The number of regular print members decreases, while the number of regular electronic members increases. After discussion, Council approved the report with great thanks.

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

The report was presented by Anna Vymazalová on site. In 2022, SGA has 22 Chapters. Two requests for creation of new Chapters in Cameroon and Namibia were submitted for Council evaluation. Reports were received from most existing Chapters (3 reports missing), summarizing their activities in 2021, plans for the following year and financial requests from SGA. SGA Council approved creation and support of the new Chapter in Cameroon with EUR 1000 and in Namibia with EUR 500 as a start-up budgets, respectively and approved Chapter reports with the following budgets for 2022:

Chapter name	Approved support for 2022
Barcelona/SEG	900
Black Forest-Alpine	500
Colombia-Bogota/SEG	2500
Colombia-Bucaramanga	3500
Cordoba-Argentina	350
La Plata/SEG	500
Peru	1000
Prague	3000
Senegal	1000
UK	200
Cameroon	1000
Namibia	500
Total	14950

SGA Council stressed the necessity of keeping reporting rules for Chapters:

- List of Chapter members – December 31 Chapter Report and request for continuing support – January 31 (the latest date for possible correction of membership list), we will consider for the Chapter report only those who are members January 31 and Chapter Report will be evaluated accordingly.
- The early-bird-fee (10 Eur) won´t be available to Chapter members subscribed after January 31.
- Timely reporting is a key condition for providing financial support for the following year (no support will be considered in case of delayed submission).

Council also approved the suggestion by Anna Vymazalová to nominate two volunteers (Jiři Klepp and Marek Tuhý) from the Prague Chapter who are willing to help with promotion of the SGA 2023 meeting and with grant processing and notifications (introducing a new online application system for student grant proposals) in exchange of offering them a travel grant for Zurich meeting.

The SGA Network on Facebook has 1927 followers and 1827 likes. After discussion, Council approved the presented report with great thanks.

Actions: Anna Vymazalová to inform all existing SGA Student Chapters on Council decision with respect to financial support for 2022 and strict enforcement of the rules for reporting and to inform new Chapters on their approval and budgets.

Anna Vymazalová to ask SGA Chapters to launch massive promotion of the SGA 2023 Meeting via students using various social media.

Tony Christie to provide information on student participation at the 16th SGA Biennial Meeting to Anna Vymazalová.

8. Requests for sponsorship

IMA (18-22 July, Lyon France) – sponsoring of student participation in 2 sessions by SGA (up to 1600 EUR) – Anna Vymazalová et al. - approved via e-mail vote

GAC-MAC-SGA (May 24-27, 2023 in Sudbury, Ontario, Canada) – G. Graham, G. Beaudoin - MoU approved with G. Beaudoin as the SGA liaison person

9. Any other business

- Discussion on how to adjust SGA operation/activities to a new post-COVID situation – D. Banks

This item was introduced by D. Banks (SGA President) and broadly discussed by Cam McCuaig (RVP Oceania), Patrick Mercier-Langevin (Council member), Sven Petersen (Council member), Jan Pašava (SGA Executive Secretary), Hartwig Frimmel (SGA Treasurer) and other Council members. SGA as a non-profit society based fully on volunteering officers should continue its ongoing mission with more efficient and wider promotion. We should direct our efforts to make our society more attractive for our membership (especially students and young researchers) through organizing and (co)sponsoring high scientific quality meetings, supporting especially student members and scientists from economically disadvantageous countries, running and offering premium economic geology journal – Mineralium Deposita, extending collaboration with industrial partners and rewarding our members via SGA awards.

After discussion Council approved a proposal by Patrick Mercier-Langevin to ask selected scientists who presented high quality papers at the recent 16th SGA Biennal Meeting to repeat them for free for SGA Chapters and to ask for feedback existing Chapters on desired activities from SGA towards younger membership (suggested by Sven Petersen).

Action: Patrick Mercier-Langevin to preselect potential speakers and contact senior authors if they would be willing to present for SGA Chapters.

- SGA Mobility Grant – update (T. Aiglsperger)

The report was presented by T. Aiglsperger. No applications have been submitted to date. Only the Laboratory of Physical and Chemical Methods of Analysis based at the Institute of Geology and Geochemistry, Urals branch of the Russian Academy of Sciences (Ekaterinburg, Russia), shows continuous interest in participating in the SGA Mobility Grant. Unfortunately, international exchange with this laboratory is currently not possible due to the war in the Ukraine. More promotion is needed for this SGA benefit. After discussion, Council approved the presented report with great thanks.

Action: Iain Pitcairn to create a window for the SGA Mobility Grant on website.

- MoU between SEG and SGA regarding the timing, venue and scope of each society's scientific meetings (D. Huston, D. Banks et al.)

The information was covered in the Report of SGA President. The 2023 SEG meeting overlaps with the SGA 2023 meeting in Zurich and in order to avoid similar situation in future, both societies decided to sign a Memorandum of Understanding.

Action: SGA President to inform immediately SEG President about the venue and dates for future SGA Biennial meetings when it becomes known.

10. Date and place of the next SGA Council meeting

(late October/early November 2022 in Zurich, Switzerland - details to be provided).

11. Informative list of past activities

- QUARTZ2021 International Symposium (September 5-10, 2021 Tonsberg, Norway) – SGA sponsored – a budget of up to 1,000 EUR approved by SGA Council for SGA student membership
- The 7th Short Course on African Metallogeny (November 29-December 3, 2021 Windhoek, Namibia) – B. Orberger

Despite of financial deficit, this traditional geo-educational and only face-to-face meeting in 2021 was excellent and very important with very positive feedback received from participants. Council greatly appreciated submitted report and all efforts by the principal organizer – Beate Orberger and her team and all sponsors including IUGS, UNESCO, Geological Survey of Namibia and others.

- Short Course on Hydrothermal Deposits (Colorado School of Mines, January 2022) – SGA sponsorship of about 1,000 EUR
- The 16th SGA Biennial Meeting (March 28-31, 2022 Rotorua, New Zealand) – T. Christie et al.

12. Informative list of future activities

- Inaugural SGA Field Conference Mount Isa and Cloncurry, Queensland (20-24 July 2023) – D. Huston and. V. Lisitsin
- III. Symposium on Precambrian geology and metallogeny (May 25 to 29, 2020 in San Ignacio de Velasco, Bolivia) – USD 2,500 approved by SGA Council to support SGA keynote speakers - postponed
- Virtual seminar on "Can Africa reach net C-neutrality by 2050?" (September 2022) - B. Orberger et al.)
- GAC/MAC/SGA meeting (May 24-27, 2023 Sudbury, Ontario, Canada) – Lesher et al. – G. Beaudoin SGA link
- The 17th SGA Biennial Meeting (August 28-September 1, 2023 Zurich, Switzerland) – N. Saintilan et al.

SGA News

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SGA awards at the 16th SGA Biennial Meeting in Rotorua, New Zealand

Jan Pašava[1] (SGA Executive Secretary)

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Similarly, as at past SGA Biennial Meetings, the Awards Ceremony was a part of the Opening Ceremony at the 16th SGA Biennial in Rotorua, New Zealand. The only difference was that the meeting was fully virtual. The following SGA awards were presented during the Opening Ceremony, which was held on March 27, 2022 from 8.00 to 9.30 (chair: T. Christie) and virtually attended by the meeting participants. The award ceremony was guided by J. Pašava (SGA ES).

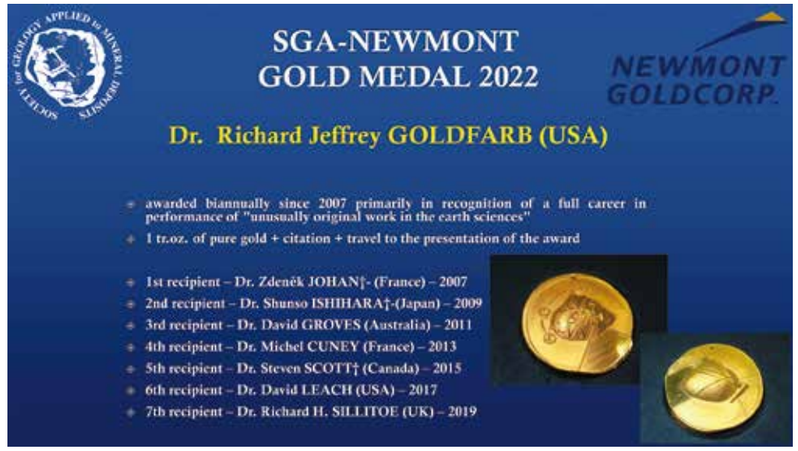


Fig. 1 Introduction to the SGA-Newmont Gold Medal (J. Pašava)

The SGA-Newmont Gold Medal

The SGA-Newmont Gold Medal was established in 2006 to be awarded biannually primarily in recognition of a full career in performance of "unusually original work in the mineral deposit sector, which shall be broadly interpreted to encompass major contributions to (1) the science through research and (2) the development of mineral resources through mine geology, exploration and discovery. The award consists of a citation, pure gold medal and travel to the biennial meeting for the presentation.

The first recipient of this most prestigious award was Dr. Zdeněk 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.

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

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

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

The eighth recipient of the SGA-Newmont Gold Medal is Dr. Richard J. Goldfarb who was nominated by D. Leach and finally selected by SGA Council out of two proposed candidates. After introduction and explanation of the history of the medal, J. Pašava announced the awardee whose citation was presented by D. Leach. Then R.J. Goldfarb, who accepted the award presented the acceptance speech. The following citation was prepared and delivered by David Leach (Emeritus, USGS Denver):

Mr. Chairman, ladies and gentlemen,
I am most honoured to introduce Dr. Richard J. Goldfarb – the eighth recipient of the SGA-Newmont Gold Medal. This is our Society's highest award, recognizing exceptional career accomplishments in Earth science and studies of ore deposits. I have known Rich for more than 40 years, first as a field assistant at the Lawrence Livermore National Laboratory and later as a colleague in the U.S. Geological Survey. It has been a pleasure to witness Rich's accomplishments and his evolution to a world-class Earth scientist.

Rich received his Bachelor's degree from Bucknell University in 1975 and his Master's degree from the University of Nevada in 1981. He was awarded his PhD from the University of Colorado in 1988. He had a stellar career with the U.S. Geological Survey, ultimately becoming a senior research geologist and program leader in the Minerals Program. Prior to leaving the USGS in 2015, Rich provided scientific leadership in the Office of Mineral Resources and served as a Team Leader for many major national research efforts. Following his retirement from the U.S. Geological Survey, Rich is now a Research Professor at Colorado School of Mines and serves as an overseas professor at the China University of Geosciences and as an international consultant to the minerals industry.

Rich's scientific contributions are extensive and broad. He authored more than 250 publications on diverse topics that include orogenic gold, global metallogeny, tectonics, polymetallic veins, magmatic copper systems, exploration geochemistry and secular changes in mineral systems. His early USGS research on orogenic gold systems in Alaska brought together field observations with laboratory investigations. This groundbreaking work defined the links between the timing of orogenic gold mineralization and orogenic events. The results became the foundation for his global synthesis of orogenic gold systems and the role of metamorphism in gold metallogeny. Rich's research yielded major breakthroughs in understanding the genetic processes and keys to exploration for gold in metamorphic rocks. He defined the nature and distribution of orogenic gold deposits in a plate tectonic framework through Earth history. His review papers are considered the "gold standards" for orogenic gold deposits. Rich's accomplishments led to numerous recognitions including the SEG Silver Medal, SEG Thayer Lindsley Lecturer, the SEG International Exchange Lecturer and the Honorary Meritorious Service Award from the USGS.

He is one of the most accomplished editors and reviewers in economic geology. Rich served as the editor of Mineralium Deposita (1996–2002) and additional editorial boards including Acta Geologica Sinica (2014–2016), Economic Geology (2007-present), Geochemistry-Exploration, Environment, Analysis (2000-present), and Gondwana Research (2005-present). He has been the editor in chief or co-editor for over 20 high-impact monographs and special publications, including the Economic Geology 100th Anniversary Volume.

He served as President of SEG and received numerous recognitions, including the Geological Society of Australia's Distinguished Lecturer in Economic Geology, the SEG Silver medal recipient, the 18th Ralph Roberts Distinguished Lecturer in Ore Deposits Nevada (2012) and the Kutina-Smirnov Medal of IAGOD (2014). In recognition of his generous volunteerism and enthusiasm for workshops, committees and editorial duties, Rich was presented the SEG Marsden Award in 2012.

Throughout his scientific career, Rich has been involved in student training and supervising graduate students at the University of Colorado, the University of British Columbia, the University Western Australia and the Colorado School of Mines. Over the past decades, Rich has served as a mentor to hundreds of young geologists, advising them on graduate work and career opportunities.

In the past decades, few individuals have shaped the world of economic geology as much as Rich Goldfarb. His contributions advanced our profession and enriched our understanding of ore-forming processes and changed the way we study ore deposits. Richard Goldfarb's career exemplifies what the SGA-Newmont Gold Medal represents.

D. Leach

Fig. 2 Richard J. Goldfarb, the recipient of the 2021 SGA-Newmont Gold Medal delivering his acceptance speech at the virtual Award Ceremony of the 16th SGA Biennial Meeting (March 27, 2022)

The following acceptance speech was delivered by RICHARD J. GOLDFARB:

Thank you, David Leach, President Huston and SGA.
I am very honoured to receive this prestigious Gold Medal from the SGA. Of course, I would love to have been able to have received the award in person because I always look forward to the biennial SGA conferences. Their diversity in topics, the broad international participation and abundant student interactions have made these meetings events that I have looked forward to during much of my career. In addition, Tony Christie always organizes outstanding conferences within New Zealand and this would have been no exception. However, given the present Covid restrictions, I will simply enjoy the next four days of presentations over the internet and will now give my sincere thanks to SGA in a similar manner.

My career achievements reflect a rich and lengthy series of collaborations with many noteworthy and influential colleagues. In fact, obviously indicating SGA's successful history of leadership, three of my most important and long-term fruitful research interactions have been with three recent SGA presidents, David Leach, David Groves and Karen Kelley.

David Leach and David Groves have been mentors for much of my career, without whose guidance I would not have accomplished the many successful studies that I am being recognized for. They both taught me how to get things done, recognize what is important in a research program, not to be afraid to give an opinion and how to express oneself in a clear manner. David Leach first introduced me to our discipline, brought me to the USGS, and jump-started my career in Alaska. It was his direction and encouragement that led me to develop a clear understanding and a new model for orogenic gold formation in the North American Cordillera in the 1980s and 1990s. During my career in government science, there was no one better than David Leach to show me how to creatively get around restrictive bureaucracy so as to get the needed job done. I first met David Groves in 1997 and this opened a new chapter in my career leading to many holistic and creative studies looking at the big picture in global metallogeny. Spending time in Perth with David Groves at the Centre for Exploration Targeting allowed me to integrate what I had learned early in my career from the young North American Cordilleran orogen with his vast understanding of older mineral systems from around the world, which is a collaboration still ongoing today.

My 30+ years of work in the USGS's Alaska program was made highly enjoyable particularly though numerous collaborations with Karen Kelley. Teaming up with Karen over the many years to deal with various issues, such as Alaskan logistics, funding and difficult bosses, led to a long string of favourable and productive outcomes. And much of the successful studies across the vast and mostly remote state couldn't have been done without many of our great team members over the decades including Barrett "Mag" Cieutat, Carter "Jimmy" Borden, Elmer Pickthorn, Bob "Rollo" Eppinger, Erin Marsh, Ryan Taylor and Garth Graham. More recently, many contributions on China metallogeny could not have happened without collaborations with friends such as Kunfeng "QQ" Qiu, Jun Deng and Jingwen Mao.

Finally, it seems I have been unable to say no to numerous editing responsibilities, which all began with SGA. David Leach's mid-1990s initiative to make SGA more global in extent, led to my appointment as the first head editor of Mineralium Deposita outside of Europe from 1996-2002. Peter Herzig and Jan Pašava helped to get the new office up and running in Colorado, and David Rickard welcomed me as his co-chief editor of the journal. Through working closely with the latter, I improved my skills needed to be a perceptive and critical editor and believe I was able to be influential in increasing the international scope and impact of the Society's journal. After David Rickard's retirement, I was able to enjoy a number of years co-editing with Bernd Lehman, who moved the journal forward into the digital age and amazingly is still on the job some 20 years later.

In closing, I'd like to acknowledge my wife Mary Angeline for her patience and support as I have kept on trucking to various global garden spots even after my supposed "retirement". And once again, I am truly honored to accept this momentus recognition from SGA.

R.J. Goldfarb

Fig. 3 Introduction to the SGA Young Scientist Award (J. Pašava)

The SGA Young Scientist Award

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

The first recipient of this award was DR. NOREEN VIELREICHER (Australia) – 2003

The second recipient of this award was DR. ALEXANDRE RAPHAEL CABRAL (Brazil) – 2005

The third recipient of this award was DR. GILLES LEVRESSE (France) - 2007

The fourth recipient of this award was DR. DAVID HOLWELL (UK) - 2009

The fifth recipient of this award was DR. KALIN KOUZMANOV (Bulgaria) - 2011

The sixth recipient of this award was DR. DAVID DOLEJŠ (Czech Republic) – 2013

The seventh recipient of the SGA Young Scientist Award was DR. HUAYONG CHEN (China) – 2015

The eighth recipient of this award was DR. SARAH DARE (Canada) – 2017

The nineth recipient of this award was DR. CRYSTAL LAFLAMME (Canada) – 2019

The tenth recipient of the SGA Young Scientist Award is Dr. Matthew STEELE-MACINNIS (Canada) who was nominated by F. Tornos and finally selected by SGA Council out of five candidates. After introduction and explanation of the history of the award, J. Pašava announced the awardee whose citation was presented by F. Tornos. Then M. Steele-MacInnis, who accepted the award, presented the acceptance speech.

The following citation was prepared and presented by FERNANDO TORNOS:

President Huston, SGA members and Friends.
It is a privilege and an honour for me to introduce my good friend Matthew Steele-MacInnis to receive the 2022 SGA Young Scientist Award. First, I would like to acknowledge David Banks, Jean Cline, John Hanchar and Chris Heinrich for supporting his nomination and the SGA council for voting for him among a group several other excellent and highly qualified candidates.

We feel that Matt is one of the best possible candidates for the SGA Young Scientist Award and his career thus far and enthusiasm should be an example for other young geologists interested in obtaining a better understanding of how ore deposits form. Nowadays, many published papers tend to use

Fig. 4 Matthew Steel-MacInnis, the recipient of the 2021 SGA Young Scientist Award delivering his acceptance speech at the virtual Award Ceremony of the 16th SGA Biennial Meeting (March 27, 2022)

fancy analytical techniques and develop models without understanding the fundamentals of what is going on. Perhaps, the great merit of Matt is his ability to distance himself from this approach and try to integrate geology, thermodynamics and geochemistry in a rigorous way; something that can only be done with an excellent background in hydrothermal geochemistry. If you are interested in these topics, you should read his many papers to better understand and appreciate his work.

Matt is a native of Newfoundland and graduated with a B.Sc. (Hons) degree from Memorial University of Newfoundland. Matt then completed his PhD studies at Virginia Tech, supervised by Bob Bodnar. Afterwards, he held a Marie Curie Postdoctoral Fellowship at ETH Zurich. He then moved to Tucson for a faculty position at the University of Arizona and later decided to go northwards for a cooler place and is now a tenured Associate Professor at the University of Alberta. He has had a successful group of students from undergraduate to postdocs and has an impressive record of papers oriented to our understanding of Earth's fluids and their relationships with the formation of ore deposits. In just 11 years he has published 75 papers in top international peer-reviewed journals.

As mentioned above, his field of research is dominantly oriented to the geochemistry of ore deposits, including a wide variety of topics such as the basics of fluid and melt inclusions with development of thermodynamic equations for the H2O-CO2-NaCl system, solubility of minerals (specially anhydrite and quartz) in hydrothermal fluids, the origin of fluids in VMS systems and more recently the origin of magnetite-(apatite) systems, where he with his student Wyatt Bain and other colleagues proposed an exciting new model for the origin of these enigmatic rocks the results from which have recently been published in Nature Geoscience (2020) and Geology (2021).

SGA president, on behalf of the large group that probably agrees with us, I am happy to present Matthew Steele-MacInnis as the recipient of the SGA Young Scientist Award.

Fernando Tornos

The following acceptance speech was delivered by MATTHEW STEELE-MACINNIS:

Thank you, Fernando, for such a flattering introduction and for nominating me for this tremendous honor. I can't tell you how much it means to me.

Thanks also to David, Jean, John and Stoeff for supporting my nomination. This award is already very humbling, but finding out that I was nominated and supported by such a group of outstanding scientists whom I admire so much, makes it all the more so.

I want to also thank the entire leadership of SGA for bestowing this honor, and for all of your many efforts that make this society such an active, vibrant and encouraging one for the study of mineral deposits.

As Fernando said, I grew up in Newfoundland and I went to university at Memorial, where John Hanchar was my first academic mentor. John gave me my first hands-on experience in research and set me on the path that led me here. Next was Virginia Tech, where my PhD supervisor Bob Bodnar taught me the ways of fluid inclusions and literally changed my life in the process. It was Bob who made me see the power of using fluid and melt inclusions to understand ore formation, by applying the fundamental constraints of thermodynamics to interpret what they tell us (or as Bob likes to say, looking down the microscope and seeing a phase diagram). It's safe to say that everything about my career and research would be completely different if not for Bob. My postdoctoral supervisors at ETH Zürich, Stoeff Heinrich and Thomas Driesner as well as Christian Schmidt at GFZ Potsdam, all helped expanding my views further by directing my eyes both towards the really big-picture geological processes and questions as well as to the sub-microscopic world of fluids and melts at the molecular scale.

I have no doubt that I would not be here today if not for many others, especially my research collaborators and students. I have been extremely fortunate in having many outstanding collaborators who have allowed me to share in their science and discoveries, including Simone Runyon, Ben Walter and Basem Zoheir. I've also been lucky to have many extraordinary students during these formative years of my research group and this recognition really reflects their efforts and discoveries too. Among them, I want to especially recognize Wyatt Bain, who was my first ever PhD student and who worked with me on what I consider some of my group's most exciting discoveries so far, with regard to the properties of fluids that form magnetite-apatite deposits. That turned out to be one of those projects where the results were truly unexpected; and isn't that the most exciting kind?

Finally, thank you to my most important colleague and collaborator of all, my wife, Pilar Lecumberri-Sanchez. How lucky I am that I get to share not only my life, but also my love of mineral deposits, with you.

Thank you.

Matthew Steele-MacInnis, Edmonton, Alberta, March 14, 2022

Fig. 5 Introduction to the SGA-KGHM Silver Krol Medal (J. Pašava)

The SGA-KGHM Krol Medal

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

The first recipient of this award became DR. FRANCIS SAUPÉ from France in 2015

The second recipient of the SGA-KGHM Krol Medal became DR. MAURICE PAGEL from France

The third recipient of this award became DR. DAVID LEACH from USA in 2019.

The fourth recipient of this prestigious Society award became Dr. Jorge M.R.S. RELVAS who was nominated by J. Pašava. After introduction and explanation of the history of the award J. Pašava announced the awardee and presented his citation. Then Jorge Relvas, who accepted the award, presented the acceptance speech.

The following citation was presented by JAN PAŠAVA:

Mr. Chairman, Ladies and Gentlemen,
I am honoured to present the citation of Dr. Jorge Manuel Rodrigues de Sancho Relvas – the fourth recipient of the very prestigious SGA-KGHM KROL MEDAL.

Jorge Relvas was born on November 27th, 1960 in Lobito, Angola where his parents worked for 7 years. After elementary and high school education in Sintra and Lisbon, he attended the University of Lisbon from which he graduated in 1991. In the year 2000, he successfully defended his PhD thesis on "Geology and Metallogenesis at the Neves Corvo Deposit, Portugal" at the same university and became Assistant Professor. Habilitation from the University of Lisbon came in 2007 and since 2013 Jorge has been Associate Professor with Habilitation. Jorge has played an important role in the development of the SGA during past decades. He joined the Society in 2001 and actively served for two terms as Council member (from 2006 to 2009 and from 2010 to 2013). During these eight years, he worked closely with Anna Vymazalová (and other Council members) on student affairs, which included initiating a new strategy for making SGA attractive for global student community. This long-term and time-consuming effort was very successful, resulting in a steep growth of SGA student membership (from 126 in 2006 to 425 in 2013) while also increasing number of SGA Student Chapters. Much of this success is owed to Jorge´s talent for communicating with students, but also to his always friendly, very open and incredibly pleasant personality. I remember hardly a moment without a smile on his face. His strong dedication to SGA is also reflected by his activities as Vice-President (2014-2015), when he chaired the newly established SGA Educational Fund whose main goal was to seek donations and provide sustained financial support for students and economically disadvantaged professionals to participate in various SGA organized or co-sponsored events. At that time, he was also actively involved in preparation of the 13th SGA Biennial Meeting in Nancy, France (2015) where SGA celebrated its 50th Anniversary. His strong dedication to SGA continued. Well experienced with SGA administration, Jorge was elected as SGA President for 2016-2017. The election of this position itself is already a reflection of the high level of trust, confidence and appreciation of the SGA Council and membership at large for Jorge´s interest and engagement in SGA affairs. His top priority was to keep SGA a strong, healthy and renowned organization, with a highly ranked scientific journal, a large, truly global and actively involved membership, and a vibrant network of student chapters. The highlight of his presidency was surely the very successful 14th SGA Biennial Meeting in Québec City (Canada 2017), the first of its kind on the North American continent, where he was heavily involved in its preparation.

Another example that illustrates Jorge´s heart-felt support for and interest in SGA matters is when, after finishing his presidency and his intention of leaving SGA management, he without hesitation stepped in as interim Promotion Manager in response to a sudden resignation. Jorge served in this position for another two years (2018-2019). He was an active member of several SGA Committees (on membership, awards, and nominations).

Besides, Jorge Relvas has been an excellent scientist and teacher, well recognized especially in the field of VMS deposits, especially those in the Iberian Pyrite Belt and with a lifelong focus on Neves Corvo for which he became THE expert. During his 35 years of teaching and supervisory experience at the University of Lisbon and, for some time, at the Portuguese Military Academy, he supervised 10 PhD students and many MSc students. His strong interest in outreach projects can be documented by him developing the extremely successful Science Centre of Lousal, of which he is president.

Many of us have had the pleasure of interacting and collaborating scientifically with Jorge, who remains to be an active member of the global economic geology community. His deep attachment to SGA continues to date.

Jorge Relvas is surely one of those pillars on which SGA managed to build its success and on behalf of SGA, I would like to thank him for all his efforts in favour of SGA and congratulate him on this and other successes, wishing

Fig. 6 Jorge M.R.S. Relvas, the recipient of the 2021 SGA-KGHM Silver Krol Medal delivering his acceptance speech at the virtual Award Ceremony of the 16th SGA Biennial Meeting (March 27, 2022)

him all the best in his professional and private endeavours. Thank you for your attention.

Jan Pašava, Rotorua, March 27, 2022

The following acceptance speech was delivered by JORGE RELVAS:

Thank you so much for your kind words, Jan.
Dear President, Council and SGA members, dear colleagues,
It is with great honor that I receive the SGA-KGHM Krol Medal. I joined the SGA Council in 2006 and since then I served the Society in several different ways until 2019, including a term as SGA President in 2016-17. These years were challenging and vibrant times for me. I believe we all feel very proud for what SGA has accomplished over its history. The society has always gathered inspired and inspiring people in a wide variety of global activities, including our successful biennial meetings, metallogeny short courses and sponsored student activities and our widely acknowledged journal - Mineralium Deposita. Moreover, the society became a respected organization worldwide, recognized for its pioneering role in supporting graduate students and young professionals through the SGA Educational Fund.

None of this would have been possible without the generous effort and dedication of many presidents, council members, editors, student chapters and many other volunteers. I wish that, in my person, this medal may distinguish all of them, without exception, but I cannot fail to highlight some people to whom I will forever feel indebted for their tireless collaboration during my term as SGA president: Jan Pašava, the SGA Executive Secretary, who is truly the backbone and soul of the society; Karen Kelley and Anna Vymazalová, SGA VP and SGA VP for Student Affairs, respectively; Hartwig Frimmel, treasurer of the SGA, Bernd Lehmann and Georges Beaudoin, editors of Mineralium Deposita, John Slack, editor of the SGA Special Publications, and Massimo Chiaradia, by that time editor of SGA News.

When President David Huston told me that I had been awarded this highly prestigious distinction, I got very proud, but very surprised as well. The truth is that I hardly feel worthy of such recognition because I feel that any possible contribution that I might have given to SGA was far less than what I received in return. Serving the SGA was probably the most pleasant and certainly one of the most rewarding components of my professional life. Being able to learn from the best and being encouraged to raise my standards to the most demanding criteria, were structural aspects of my growth as a scientist and as a man. Moreover, during the many years that I have served at the council, I had the privilege of sharing unforgettable moments with unforgettable people, as SGA is a huge universe of good and generous people, where I only made good friends for life. I want to address a special and sincere thanks to David Leach, the previous recipient of this award, who, as SGA President, has always been an inspiration to me.

Finally, I want to take this opportunity to urge all the non-member, graduate students and young professionals who might be listening today, to join the SGA and bring with you as much young colleagues as you can. At a time when the world is moving at a dizzying speed and the reality of life seems to lack time for reflection and sharing, it is when it becomes more crucial to unite around common values and interests and build new horizons cemented by a strong sense of belonging. Join the SGA; it really makes a difference!

Once again, my dear friends, being awarded the SGA-KGHM Krol Medal by the SGA Council means a lot to me and I will never find words to thank you enough.
I wish all the best for our SGA!! Thank you very much!

Jorge M.R.S. Relvas, March 27, 2022

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

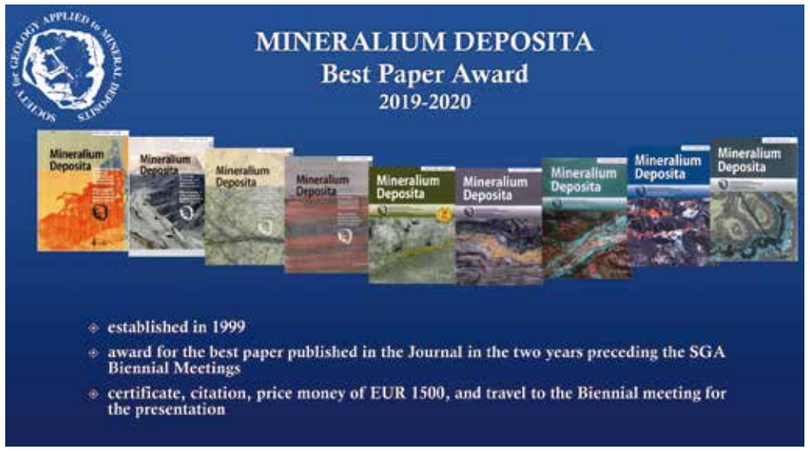


Fig. 7 Introduction to the Mineralium Deposita Best Paper Award (J. Pašava)

The SGA Award for the Best Paper in Mineralium Deposita

After introduction by J. Pašava, the award was announced and presented by BERND LEHMANN:

Ladies and Gentlemen,
I have the honor to present the 2021 Mineralium Deposita Best Paper Award on behalf of the two chief editors - Georges Beaudoin and myself. This award is granted for the best paper published in the journal in the two years preceding the SGA Biennial Meetings; in the current situation it relates to the two volumes of the years 2019 and 2020. The Best Paper Award is decided jointly by the chief editors, with input from the editorial board and consists of a certificate, 1500 Euro and travel expenses for the first author to receive the award.

The 2021 award goes to the paper by Andreas Mueller, Steffen Hagemann and Neil McNaughton with the title „Neoarchean orogenic, magmatic and hydrothermal events in the Kalgoorlie-Kambalda area, Western Australia: constraints on gold mineralization in the Boulder Lefroy-Golden Mile fault system", which was published in Mineralium Deposita in 2020, volume 55, pages 633-663. This comprehensive paper, in fact: 30 pages -- somewhat beyond our usual limits --, is a review and update on the truely worldclass Kalgoorlie gold district. This research emphasizes the magmatic-hydrothermal features of the district and it carries the slightly off-the-road signature of Andreas Mueller as a sharp independent mind and brilliant observer. The paper is part of the thematic issue on the Kalgoorlie gold district which was organized in an exceptionally dedicated fashion by Andreas Mueller, with the kind help of Steffen Hagemann. We honour here both scientific excellence and service to our community. Congratulations, Andreas!

Bernd Lehmann, Co-Editor Mineralium Deposita

The following acceptance speech was delivered by ANDREAS MUELLER:

Thank you Bernd and Georges for your kind introduction as editors of Mineralium Deposita. A special thank you goes to Bernd for his patience and assistance in putting the Kalgoorlie thematic issue together, finally published in April 2020. I appreciate and accept this award. I would like to announce that I shall donate the award money of 1500 Euros to the SGA Educational Fund set up to assist students in need. During my own professional development field trips, mine visits, surface and underground mapping courses and conferences were essential and always fondly remembered. The Educational Fund supports all of these activities, which is why I would like to donate the award money. Thank you for your attention.

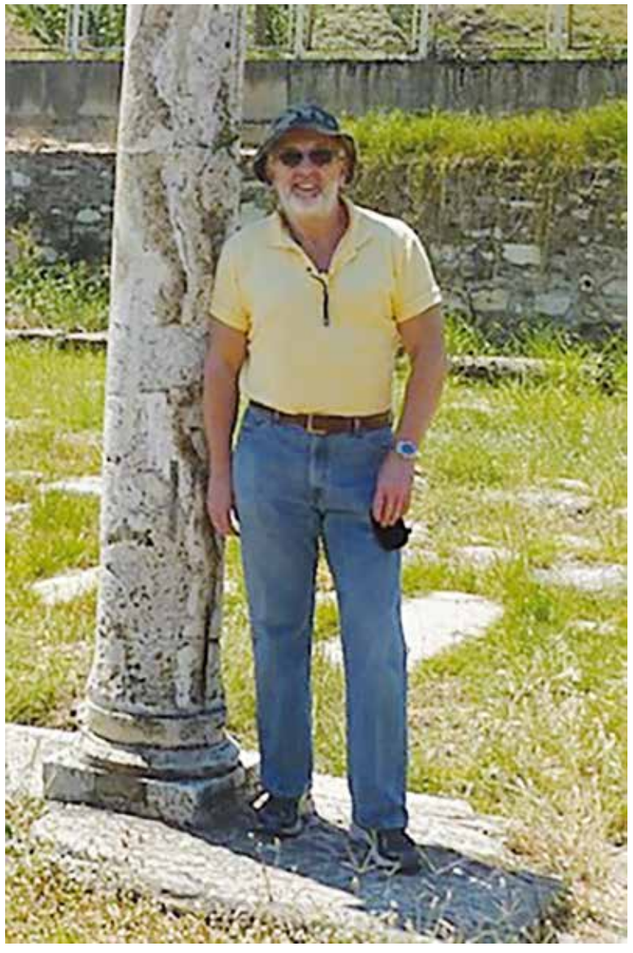
Fig. 8 Alex Müller, the recipient of the 2021 Mineralium Deposita Best Paper Award delivering his acceptance speech at the virtual Award Ceremony of the 16th SGA Biennial Meeting (March 27, 2022)

President's Corner

From the President

As the incoming SGA President, I wish to introduce myself to you the members and thank you and the SGA council for this honour. In our careers we can progress from junior geologists to leading teams for major companies and from junior lecturers to full professors in academia. These are all notable achievements, but for me being recognized by my peers is much more satisfying. I am honoured to have been thought of as suitable to be the President of this prestigious society.

I was born and lived for many years in the small coal mining village of Lesmahagow in the Midland Valley of Scotland. The geology there was particularly good for fossil collecting, trilobites, brachiopods, crinoids and the like could be found quite easily and this was my main interest in my youth. A short distance to the south is, what was once, the major mining district of Leadhills-Wanlockhead where a large number of mines exploited sphalerite, galena and to a lesser extent chalcopyrite. In addition, this area was one of the major gold mining areas in the U.K. some centuries ago and gold can still be found in the streams today. This was where my interest in ore deposits and minerals started. The diversity and beauty of mineral specimens were to me, more attractive than fossils.



I started to study geology at Strathclyde University in Glasgow in 1972, but after 2 years decided to withdraw as the emphasis on wrote learning of stratigraphy, zonal fossils and palaeontology and less mineralogy and crystallography was not to my liking. I started working for the British Steel Corporation as an analyst and eventually became the senior analysts in charge of one of the laboratory sections. I studied on a part-time basis for a number of chemistry qualifications and was awarded an MSc in 1982. My interest in minerals and ore deposits was still present and reflected in my MSc thesis on "The Determination of Indium in Sphalerite and Galena by Plasma Emission Spectroscopy". Through contacts with the geology department, where I had studied as an undergraduate, I was given the chance to study for a geochemistry PhD, with Professor Mike Russell, on the Tynagh Pb-Zn deposit in Ireland. After graduating I moved to Leeds University as a Post-doc, with Professor Bruce Yardley, and worked on a number of NERC and EU funded projects related to crustal fluids from diverse settings. I have been at Leeds since then and I'm currently a Principal Research Fellow.

My research has always been related with crustal fluids, initially using microthermometry of fluid inclusions, determining fluid compositions and sources by crushing and leaching samples to analysing the composition of individual fluid inclusions by LA-ICP-MS. Being able to understand the different processes that lead to a fluid becoming a mineralizing fluid enables better deposit models to be made. Many other groups, around the world, have worked on different deposits and deposit styles, and there is a much greater knowledge base relating the concentrations of metals, the processes that change the metal capacity of fluids and the source of fluids. In recent years I have concentrated on using LA-ICP-MS in combination with other techniques to investigate gold mineralization. With my colleagues Gulcan and Omer Bozkaya we observed gold nanoparticles in fluid inclusions from a base-metal epithermal deposit. With Vsevolod Prokofiev and Sofiya Selektor fluid inclusions were detected and measured from fluid inclusions in samples obtained from the bottom of the Kola Superdeep drill hole, originally trapped at 17 km with gold and silver concentrations as high as several 1000's of ppm. With Rob Chapman and other members of the ores group in Leeds, we have been looking at ways to distinguish the source type of deposit for gold from placers using a variety of observational and analytical techniques.

Since I started as a student the ability to conduct research has changed out of all recognition. The availability of computers and software to model and predict, the variety of analytical instrumentation that produces data my generation would never have considered possible. It is an exciting time to be a researcher as the opportunities for new discoveries are almost limitless. However, regardless of the new instruments we can use, the isotopes we can measure, the smallest particles we can observe we have to remember the bigger picture of the specimen we collected, the mountain we collected it from and make our conclusions in that context.

Our previous President, David Huston, guided the Society through COVID when most of our normal ways of working and interacting ceased. Our biennial meeting in New Zealand had to become an online meeting only. Tony Christie and the LOC did a great job in organising this in the ever-changing circumstances they were presented with. Now that we are emerging from the restrictions of COVID will we go back to the previous ways of working? As we all know those have changed. We found that we could interact in a satisfactory way with colleagues all around the world from a desk in our homes and offices. We could participate in conferences and view online lectures from people in different countries. In this respect the Ore Deposits Hub has played a major role in providing high quality speakers. Going forward, I believe the Society has to assess how best it can use these new platforms to benefit our membership and engage with new audiences. I will propose that at this time we need to review what we do as a Society and build on our strengths. Cam McCuaig's presentation of the future of the Society, at the end of the biennial meeting, was an insightful appreciation of the strengths of the Society and a direction we must consider following in the future. The direction should not just be left to the SGA council, we need the input from you the members. What do we do best, what can be done better, what things would you like us to do in the future, we need you the members to let us know your thoughts. You can e-mail me directly, d.a.banks@leeds.ac.uk, or any of the council members or Regional Vice-Presidents.

Our next biennial meeting will be held at the end of August 2023 in Zurich. You can find details on the website. However, at no fault of either organisation, the SEG are holding their conference in London at the same time as the SGA meeting. Both organisations have been in contact to try and resolve the issue, but for several reasons neither could change their dates. The SGA LOC is working with the SEG LOC to reduce the overlap in themes and to open trip and courses to those attending either meeting. More on this will follow in due course. Many of you will be members of both Societies, but when you are choosing which meeting to attend I urge you opt for the SGA. The LOC are putting on a really stupendous meeting for us.

Open for Application
The SGA Mobility Grant

SGA Mobility Grant

Get ready for SGA networking! Do you know about a SGA member who runs a laboratory that could answer open questions of your research? Then the SGA Mobility Grant can help to bring you together! The SGA Mobility Grant offers an opportunity for regular SGA members to apply for money to travel to a facility with SGA background.

Applicants have to be in good standing for at least 3 continuous years (i.e. paid up membership fees; up to 2 years of student membership count) and apply by sending their request following a template to the SGA Mobility Grant coordinator (thomas.aiglsperger@ltu.se).

The application template is available at https://e-sga.org/home/.

Learning and sharing! That's the spirit of the SGA Mobility Grant.

Reports from the SGA student chapters

SGA chapter	President	E-mail	Foundation
Prague	Jan Kamenský	jan.kamensky@natur.cuni.cz	2002
Baltic	Adam Tomczak	tomczakadam88@gmail.com	2009
Siberia	Anna Devyatiyarova	SiberianChapter@yandex.ru	2011
Barcelona	Pol Suñer	pol.pol.sunyer@gmail.com	2012
Colombia-Bucaramanga	Fabian Samuel Reyes Santos	floramos7.kf@gmail.com	2012
Nancy	Alix Hauteville	alix.hauteville@etu.univ-lorraine.fr	2013
Peru	Saida Yessica Condori Ccallo	sacondoric@est.unap.edu.pe	2013
Colombia-Bogota	Daniel Felipe Solano Gil	dfsolanog@unal.edu.co	2015
Laval	Ana Carolina R. Miranda	acrmiranda1@gmail.com	2016
North-West Russia	Evgenia Borisova	jenyaborisova98@gmail.com	2017
Turkey	Fatih Ozbas	fatih.ozbas@istanbul.edu.tr	2017
Black Forest-Alpine	Simon Hector	simon.hector@kit.edu	2017
Brazil	Lucas de Pádua Ribeiro	lucasdestudo@outlook.com	2018
United Kingdom	Lauren Tuffield	ltuff@bgs.ac.uk	2018
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Moscow	Maria Komarova	ivanchenko.marija@gmail.com	2019
Urals	Daria Kiselova	podarenka@mail.ru	2019
La Plata	Lucas Rolando	lucas.rolando32@gmail.com	2020
Senegal	Malick Faye	fayepapmalick@gmail.com	2020
UWA-Australia	Madeleine Ince	madeleine.ince@research.uwa.edu.au	2021
Berlin	**Laura Schulz**	**schulz.laura.b@gmail.com**	2021
Cordoba - Argentina	**Giselle Veiner**	**giselleveiner@mi.unc.edu.ar**	2021

SGA Student Chapter UniLaSalle – Field trip in Britanny, France, March 2021

Mélanie Bonnefoy

UniLaSalle engineering school, 19 rue Pierre Waguet, BP 30313, 60026 Beauvais, France; melanie.bonnefoy@etu.unilasalle.fr

The SGA Student Chapter of UniLaSalle Beauvais organized a field trip this year in France due to COVID-19, from the 21st to the 24th of March 2021. The main objective was to discover the geology of Britanny. Firstly, we visited the Voutré Quarry from which volcanic-sedimentary rocks are extracted to sell as ballast and aggregates. Then we stopped at the Roche Blain quarry operated by Eiffage near Caen. Finally, we conducted photogrammetry for our study project in the Quarries of Lanhélin operated by SO.CA.L which sells blue granite.

Day 1: Monday 22nd of March - Voutré Quarry, Society of Western Quarries (Voutré, Mayenne, France)

The extraction activity is historical in Voutré since the first exploitation of the quarry dates back to 1858. This quarry has the particularity to be located on 4 communes and 2 departments: Voutré, Vimarcé and Saint-Georges-sur-Erve in Mayenne and Rouessé-Vassé in Sarthe.

It is a quarry of massive rocks, exploited in the open air and dry. There are two pits, "La Kabylie" now under water and in the process of being filled, and "La Massoterie" where extraction is concentrated today. The extracted materials are crushed, screened and partly washed, then shipped by road and rail. These activities are subject to the regulations of Installations Classified for the Protection of the Environment (ICPE). The Voutré Quarry has an average annual production of 2,600,000 tons and a maximum of 3,500,000 tons of ballast and aggregates (Fig. 1).

The Voutré Quarry is part of the geological complex known as the "Coëvrons Syncline". This Cambrian structure, about 30 kilometers long, has a general West-South-West / East-North-East orientation. It is composed of Cambrian sedimentary rocks (sandstone, shale and limestone) within which various volcanic and volcano-sedimentary rocks are intercalated, including in particular the "Voutré pyroclastites" which are exploited in the quarry. Several volcanic, volcano-sedimentary and sedimentary lithologies can be observed. These sets, of a total thickness of 170 meters, are constituted for 150 meters of the Formation of the Pyroclastites of Voutré and the remaining 20 meters at the summit are part of the Formation of the Feldspathic sandstones (Fig 2).

Fig. 1 Open pit of Voutré Quarry

Fig. 2 Unconformity between sedimentary rocks and volcanoclastic rocks (Voutré Quarry)

Fig. 3 Treatment plant (Voutré Quarry)

We had the chance to visit the treatment plant and better understand the processes of recovery of materials (Fig 3).

Day 2: Tuesday 23rd of March – La Roche Blain Quarry, Eiffage (Fresney-Le-Puceux, Calvados, France)

The Roche Blain quarries are located 20 km south of Caen. The exploitable rocks are quartz sandstone (blue-gray) and shale dating back to > 600 Ma. The upper part of the deposit is composed of limestone (yellow grey) which contains lots of fossils. The 19 students made sure to take a bunch of samples (Fig. 4-5). This layer is used as backfill for road structures. The excavation is carried out to a depth of nearly 100 meters with several levels (Fig. 6). The maximum annual production is 2,000,000 tons and the average annual production is 1,600,000 tons. The materials marketed are: sand, gravel for concrete and roadways, ornamental material, gabions and riprap to order. The site receives various inert materials. The reclamation of the quarry is carried out as the operation progresses by reusing these inert materials.

Fig. 4 La Roche Blain open pit

Fig. 5 La Roche Blain open pit (fossils visible on the bottom)

Fig. 6 Fieldtrip members at La Roche Blain

Day 3. La Chauffetière Quarry, SO.CA.L (Lanhélin, Ile et Vilaine, France)

The last day was probably the most interesting. The students visited the site of La Chauffetière, the quarry of SO.CA.L (Groupe CB) located in the city of Lanhélin. In this quarry the famous blue granite of Lanhélin is exploited to supply the ornamental stone market. For the past twenty years, SO.CA.L has been producing and selling rockfill blocks of all sizes (Fig. 7). Its experience as well as the technical quality of Lanhélin have enabled to participate in the development or extension of large ports such as the port of Saint Hélier on the Island of Jersey.

Because of its technical characteristics, Lanhélin granite is one of the rare granites that can be used to make precision tools, controls and verifications. Lanhélin granite is used in the manufacture of funeral monuments as well as derived articles (columbariums, plaques, urns, etc.). SO.CA.L's granite is used all over the world for facade cladding, interior or exterior paving. Produced from first quality blocks, this granite ensures a great quality to the monuments. The production of aggregates is delivered within a radius of 50 km but is also used for the paving of large cities.

The mineralogical composition of the granite is very interesting (Fig. 9) and gives it its blue colour (quartz, potassic and plagioclase feldspar, biotite, muscovite and apatite). The extraction process is unique since it is artisanal. The blocks are extracted by blasting and then cut by a diamond wire (Fig. 8).

In addition to the visit, the students were able to carry out practical workshops as part of a study project. The activities carried out were the following: petrographic description, study of the granite alteration profile, photogrammetric survey and sampling (Fig. 10). We worked and collected data in small groups as we were followed by one of our professors during the fieldtrip. The weather has been nice the three whole days and all the students really enjoyed going out to see some beautiful rocks!

Fig. 7 La Chauffetière Quarry and open pit

Fig. 8 Blocks of granite are being cut (La Chauffetière Quarry)

Fig. 9 Samples of blue granite from Lanhélin

Fig. 10 The 19 students and their professor in La Chauffetière Quarry

Guide to authors for the SGA News

Jochen Kolb[1]; chief editor SGA News

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

References

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

Figures and Tables

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

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

The SGA website http://www.e-sga.org

Iain Pitcairn[1]; chief editor SGA website

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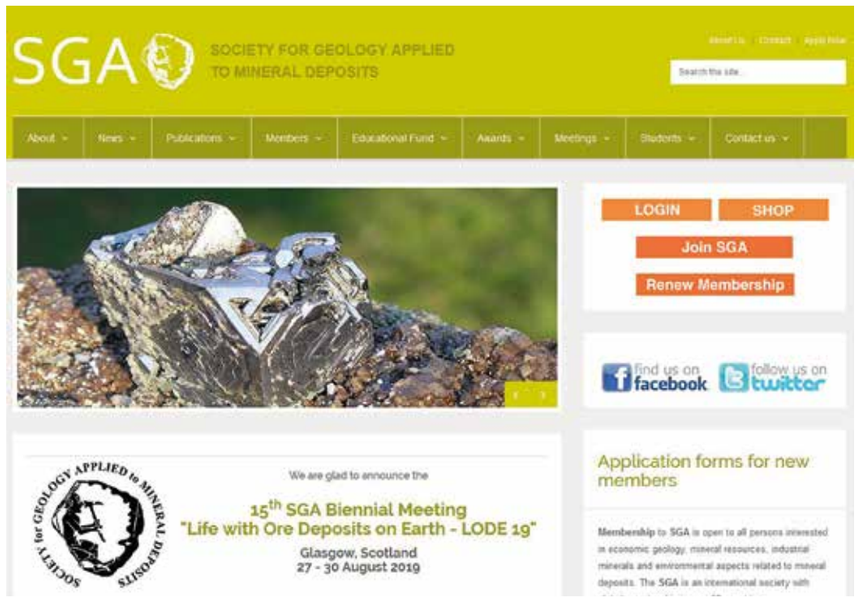

SGA
Society for Geology Applied to Mineral Deposits

New Members from September 5, 2021 until April 10, 2022

220 Student Members, 18 Regular Members and 1 Senior Member joined SGA from September 5, 2021 until April 10, 2022,

Student members 220:
Algeria 1
Argentina 8
Australia 7
Belgium 1
Brazil 8
Cameroon 9
Canada 1
China 2
Colombia 75
Czech Republik 2
Ecuador 1
France 13
Germany 8
India 1
Iran 1
Italy 1
Namibia 14
Peru 32
Russia 9
Serbia 2
Sweden 5
United Kingdom 1
USA 3

Regular members 18:
Australia 3
Cameroon 1
Canada 2
Ecuador 1
Germany 1
Namibia 1
Russia 1
Slovak Republic 1
Switzerland 1
United Kingdom 2
USA 4

Senior member 1:
Canada 1

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

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

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Mineral Resources in a Changing World

Welcome to Zürich and Switzerland
Wilkommen in Zürich und der Schweiz
Bienvenue à Zürich et en Suisse
Benvenuti a Zurigo e in Svizzera
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Co-organised by:

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UNIVERSITÉ DE GENÈVE

KIT Karlsruher Institut für Technologie

UNI FREIBURG

SEG-SGA Student Chapter Meeting

Sustainable Mineral Resources Supply: Challenges for Future Generations

University of Geneva, Switzerland - September 13-16, 2022

The 2022 European SEG and SGA Student Chapter meeting is a unique opportunity for students and postdocs to present their research work during talks and poster sessions. It will allow us to address new research directions and to discuss challenges related to a sustainable supply of mineral resources, in particular in the frame of the energy transition towards a low carbon world.

The meeting from Sept 13th to 15th will be free of charge and it will include: 6 **keynote talks**, 2.5 days of **talks and posters by PhD-MSc students and post-docs**, and 1 **brainstorming afternoon** about sustainable mineral resources supply and challenges for future generations.

A post-meeting **short course on porphyry-epithermal systems** will be organized on Sept 16th. Registration is limited to 50 participants and at a cost of 30 Euros. Speakers are: ***K. Kouzmanov & M. Chiaradia (Geneva), C. Chelle-Michou (Zurich), J. Wilkinson (London)***.

Themes at a glance (non-exhaustive):

Regional controls of ore formation; Ore deposits in metamorphic, magmatic-hydrothermal and sedimentary environments; Exploration of ore deposits; Environmental and Societal impacts of mining and exploration; Geometallurgy; New and cutting edge analytical tools applied to ore deposit research; Future demand and supply of metals **etc**.

Confirmed keynote speakers:

T. Baker *(Eldorado Gold): Geochemical fertility, ore deposit models and geological mapping*
R. Baumgartner *(Teck Resources): Beyond conventional geometallurgy for a circular economy*
K. Goodenough *(BGS) Where will all the lithium for batteries come from?*
D. Holwell *(U. of Leicester) Porphyry fertility starts in the Goldilock's zone*
E. Nickless *(IUGS): Demand for mineral resources and sustainable development goals*
O. Vidal *(U. Grenoble-Alpes): The needs for raw materials and energy in a changing world*

Abstract submission deadline: May 1st 2022 (300 words)

Information, program & registration: https://smrs2022.com/

Conference chairs:

Şafak Utku Sönmez, François Turlin, Ali Aluç & Robert Moritz
University of Geneva, Switzerland - info@smrs2022.com

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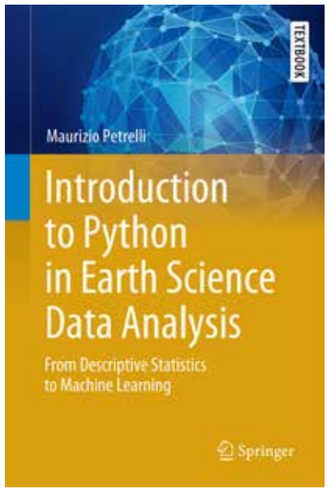

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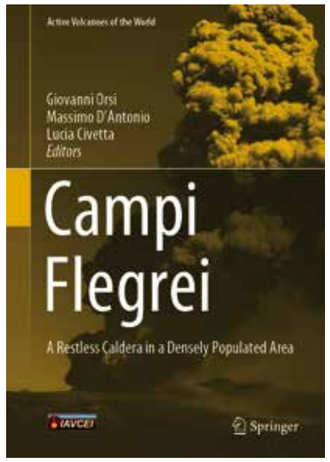

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