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Geology and mineral deposits of New Zealand

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Introduction

The New Zealand landmass contains a large number of diverse mineral deposits. For example, the metallogenic map of New Zealand (Brathwaite and Pirajno 1993) lists more than 600 metallic mineral deposits classified into 25 different mineral deposit types. This abundant mineral endowment for a land area of only 270,500 km^2 results from a varied and complex geology reflecting New Zealand's location at active plate boundary settings over the past 600 million years. Its current location, as part of the continent of Zealandia (Mortimer et al. 2017), lying on the boundary between the Pacific and Australian plates (Figs 1 and 2), is manifest by a number of active volcanoes, areas of geothermal activity, and frequent earthquakes. These provide examples of formation processes for several mineral deposit types, particularly for orogenic, epithermal and placer gold.

Current mineral production consists of gold and silver, titanomagnetite ironsand, specialised industrial minerals and a range of materials for domestic use including aggregate, limestone, diatomite, dolomite, perlite, pumice, serpentinite and zeolite. Other commodities that have been produced in the past include antimony, chromium, copper, lead, manganese, mercury, phosphate, platinum, sulfur, tin, tungsten and zinc.

Geological setting of New Zealand's mineral resources

The older rocks of New Zealand comprise three main basement elements formed on or near the margin of Gondwana: Western Province (Cambrian to Devonian), Eastern Province (Permian to Cretaceous) and intervening Median Batholith (Devonian

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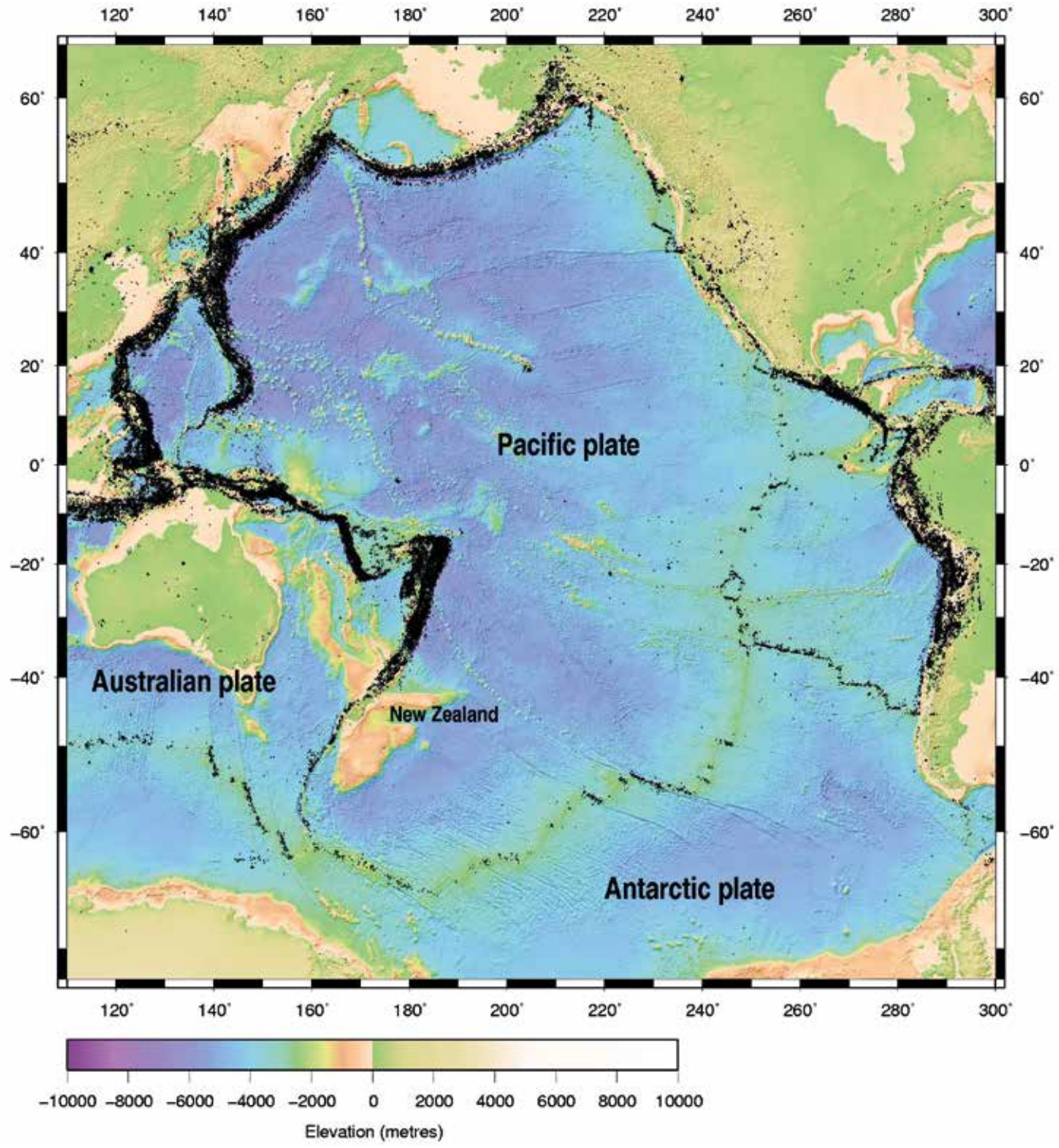

Fig. 1 New Zealand straddles the boundary between the Pacific and Australian plates in a zone of intense earthquake activity shown by black dots

to Cretaceous) (Figs 3 and 4). In the South Island, these three units are displaced into north-west and south-east segments by 480 km of Late Cenozoic dextral movement along the active Alpine Fault. The basement rocks are overlain by Late Cretaceous to Recent sedimentary basins that developed after the separation of New Zealand from Gondwana ~83 Ma in the Late Cretaceous (Figs 3 and 4).

The Western Province rocks include metamorphosed sandstone, mudstone, limestone and volcanic rocks, intruded by granite batholiths and mafic–ultramafic igneous complexes. The main associated mineral deposits are orogenic gold-quartz veins hosted by Paleozoic greywacke and argillite recently mined at Globe-Progress in the Reefton Goldfield (Figs 3 and 5). Other types of deposits present include volcanogenic massive sulfide Pb-Zn; vein and greisen W and Sn; granite-related Au; and mafic magmatic Ni-Cu sulphide, platinum group element, and magnetite–ilmenite deposits. Granodiorite stocks, intruded during the Early Cretaceous, have associated porphyry Mo mineralisation.

The Eastern Province includes the greywacke rocks forming the axial ranges of the North and South islands, and a belt of schists in Marlborough, the Southern Alps and Otago. These rocks host volcanogenic massive sulfide Cu deposits and volcanogenic Mn-chert deposits. A belt of Permian ultramafic rocks (Dun Mountain Ophiolite) has associated Cu, Cr and chrys-

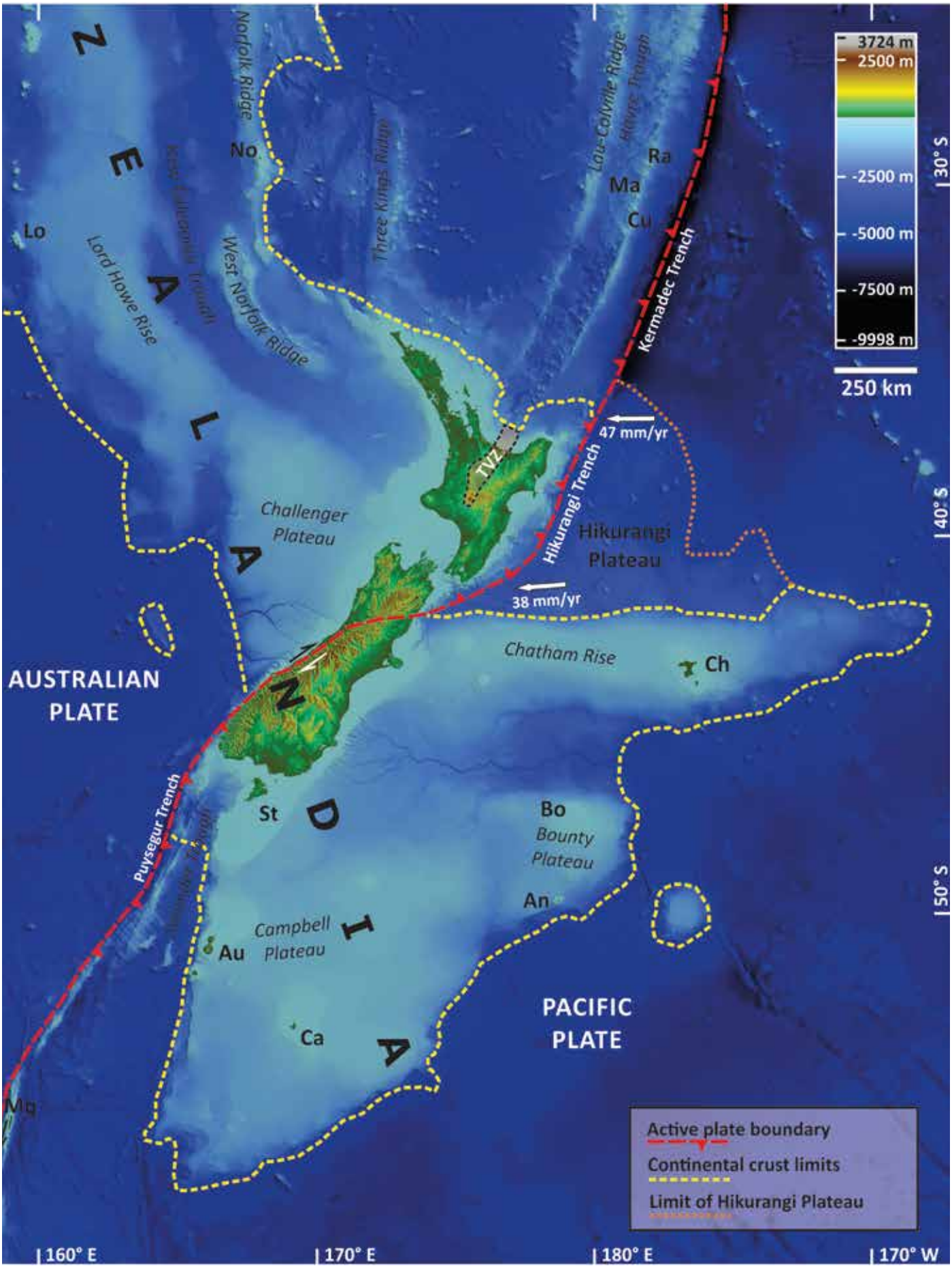

Fig. 2 The New Zealand continent of Zealandia is largely submerged, with only approximately 5% of its area above sea level (after Kósik et al. 2019)

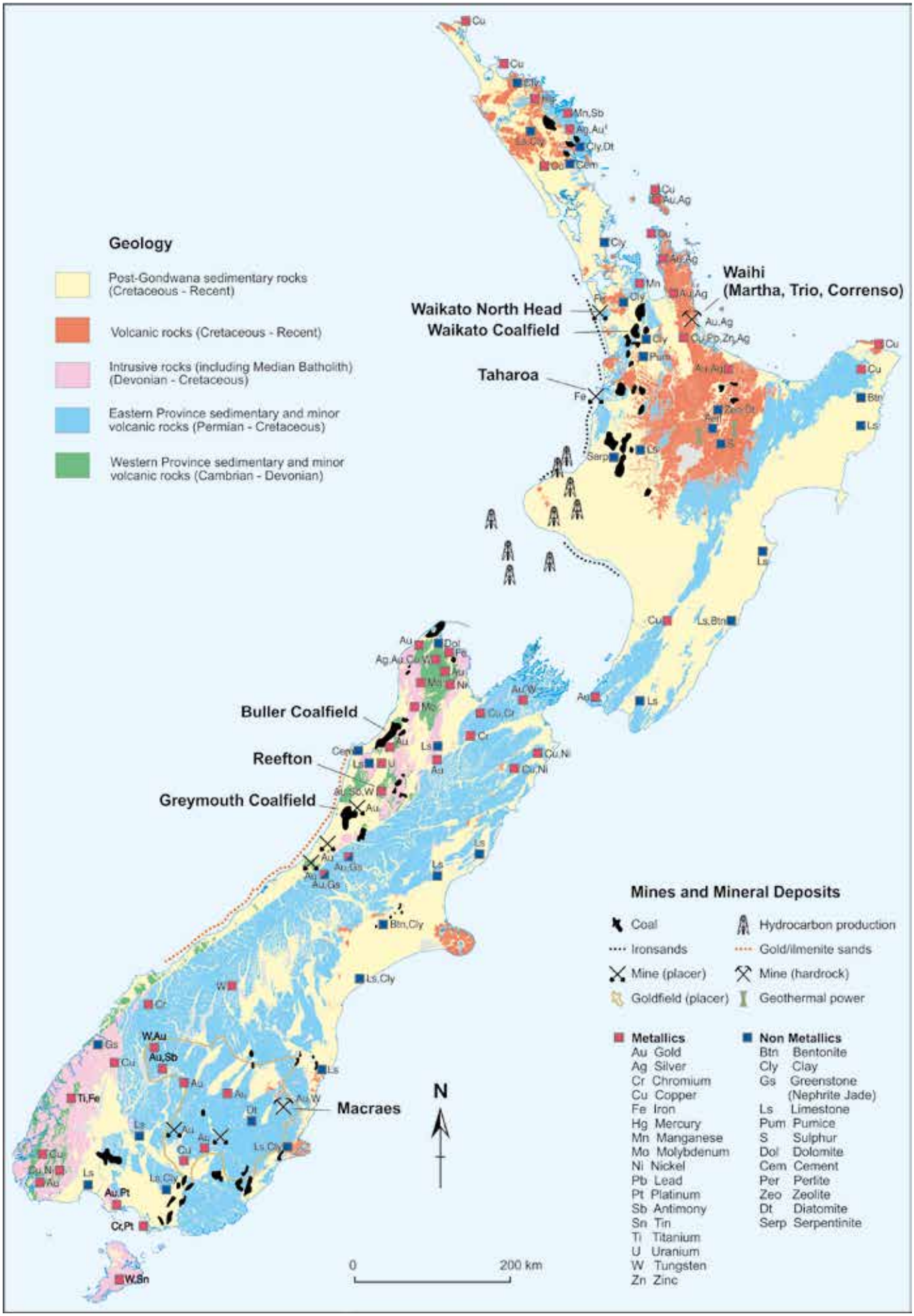

Fig. 3 Onshore geology, mines and mineral deposits (after Christie and Barker 2013)

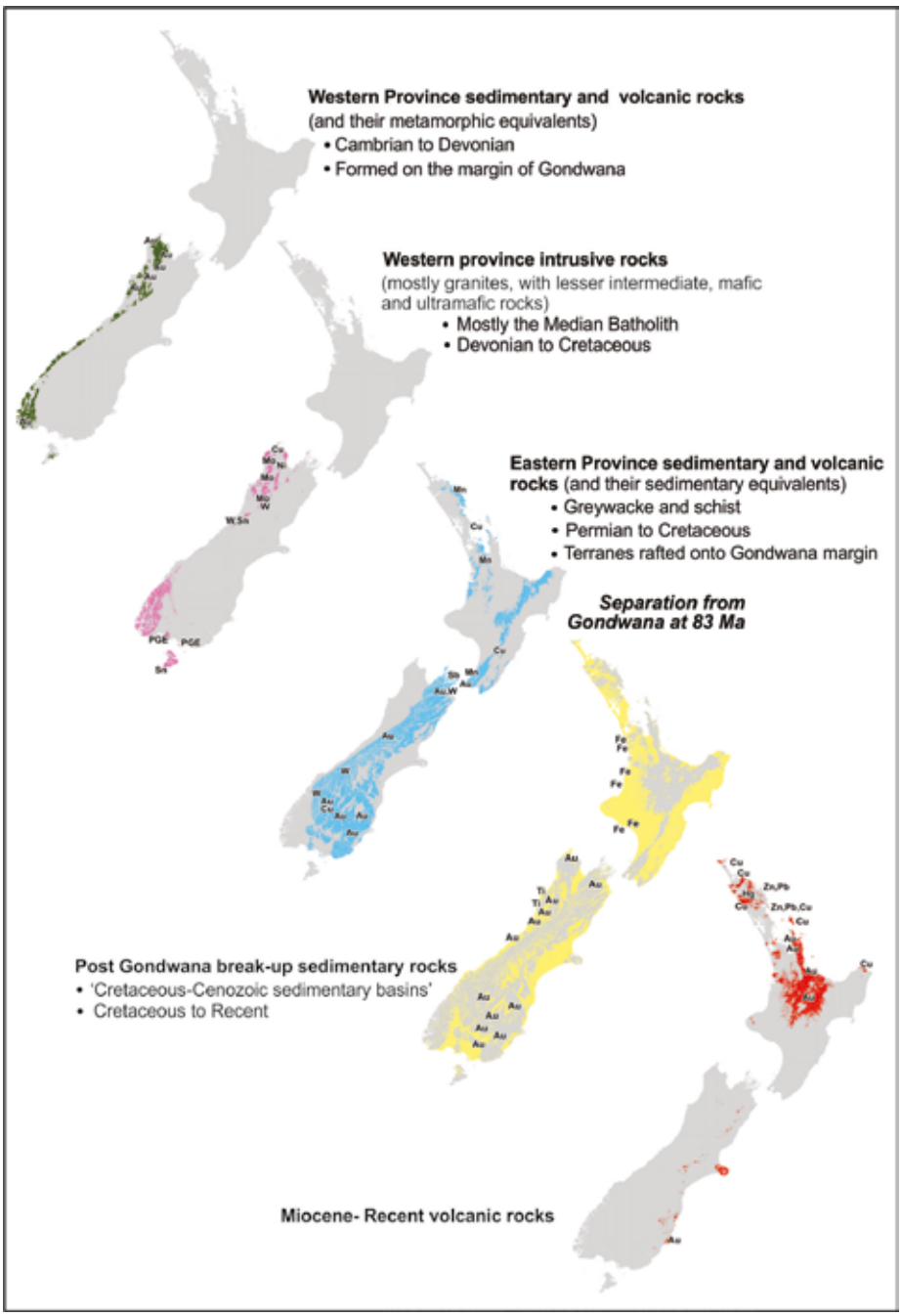

Fig. 4 Geological evolution of New Zealand and associated metallic mineral deposits (after Christie and Barker 2013). Au = gold, Cu = copper, Mn = manganese, Mo = Molybdenum, Ni = nickel, Pb = lead, PGE = platinum group elements, Sb = antimony, Sn = tin, Ti = titanium, W = tungsten, and Zn = zinc

otile asbestos mineralisation. Chlorite-zone schists in Otago and Marlborough contain widespread Au±W±Sb mineralisation in shear zones and quartz veins (Fig. 5), including the large (>6 Moz Au) currently mined Macraes Au-W deposit in east Otago (Fig. 3). Lenses of serpentinite with talc-magnesite and nephrite jade (greenstone or pounamu) occur in ultramafic schists in the Southern Alps.

The Late Cretaceous to Cenozoic sedimentary basins contain New Zealand's economic petroleum, coal and limestone deposits. Gold bearing quartz gravels associated with Miocene coal measures are widespread in Otago and eastern Southland. The Oligocene–Miocene boundary is marked by the emplacement of allochthonous rocks in Northland and East Cape and the initiation of volcanic arcs in northern New Zealand. The allochthons consist of dismembered Cretaceous to early Cenozoic marine sediments, ophiolitic basalts and minor serpentinite. The ophiolitic basalts contain volcanogenic massive sulfide deposits.

From the Miocene, volcanic rocks occur in eastern South Island (e.g. intraplate basaltic volcanoes on Banks and Otago peninsulas) and feature prominently as basalt–andesite–dacite–rhyolite arc volcanoes in the North Island (Northland, Coromandel, Taupo Volcanic Zone and its offshore extension along the Kermadec Arc and Taranaki). There are economically important volcanic-hosted epithermal Au–Ag deposits (Hauraki Goldfield in the Coromandel region; Fig. 5), and deposits of halloysite (Northland), zeolite, microsilica, perlite, pumice and native sulfur (Taupo Volcanic Zone). Epithermal Au and Ag are currently mined from several vein systems at Waihi (Martha and until recently Favona-Moonlight, Union-Amaranth-Trio and Correnso). Miocene porphyry Cu mineralisation is associated with subvolcanic intrusive rocks in northern Coromandel and in eastern Northland, where Pb–Zn skarn mineralisation has also been found. Active seafloor massive sulfide mineralisation (Cu, Ag, Pb, Zn and Ba) is associated with several submarine volcanoes (e.g. Brothers Volcano) in the southern Kermadec volcanic arc (Fig. 6).

Erosion of the Taranaki andesite volcanoes and volcanic rocks erupted from the Taupo Volcanic Zone have shed titanomagnetite onto the west coast of the North Island forming significant Holocene to modern coastal and offshore placer deposits currently mined onshore at Waikato North Head and Taharoa (Figs 6 and 7).

From the Late Miocene to the present day, large regional uplifts along the Alpine and related fault systems and subsequent erosion, have formed 'giant' Au placers in riverbed and terrace (glacial outwash) gravels in Westland and Otago (Fig. 5). Erosion of garnet schist along the Southern Alps has resulted in the formation of ilmenite–garnet–Au placer deposits along, and offshore from, the west coast of the South Island (Figs 6 and 7). Offshore, 670 km east of the South Island, extensive fields of marine phosphorite nodules, typically 10–40 mm in diameter, are found on the Chatham Rise (Fig. 6) in water depths of approximately 400 m. Also offshore, an extensive ferromanganese nodule field occurs at abyssal depths south of New Zealand adjacent to the Campbell Plateau in the south-west Pacific Ocean. A conservative estimate of the amount of ferromanganese nodules in the New Zealand EEZ is 283 Mt containing about 1.5 Mt of Ni, Co, Cu and REE.

Gold deposits

Orogenic quartz veins in Paleozoic metagreywacke — These are quartz veins in steeply dipping shear-and-fault structures in Ordovician greywacke and argillite (Greenland Group) in the west of the South

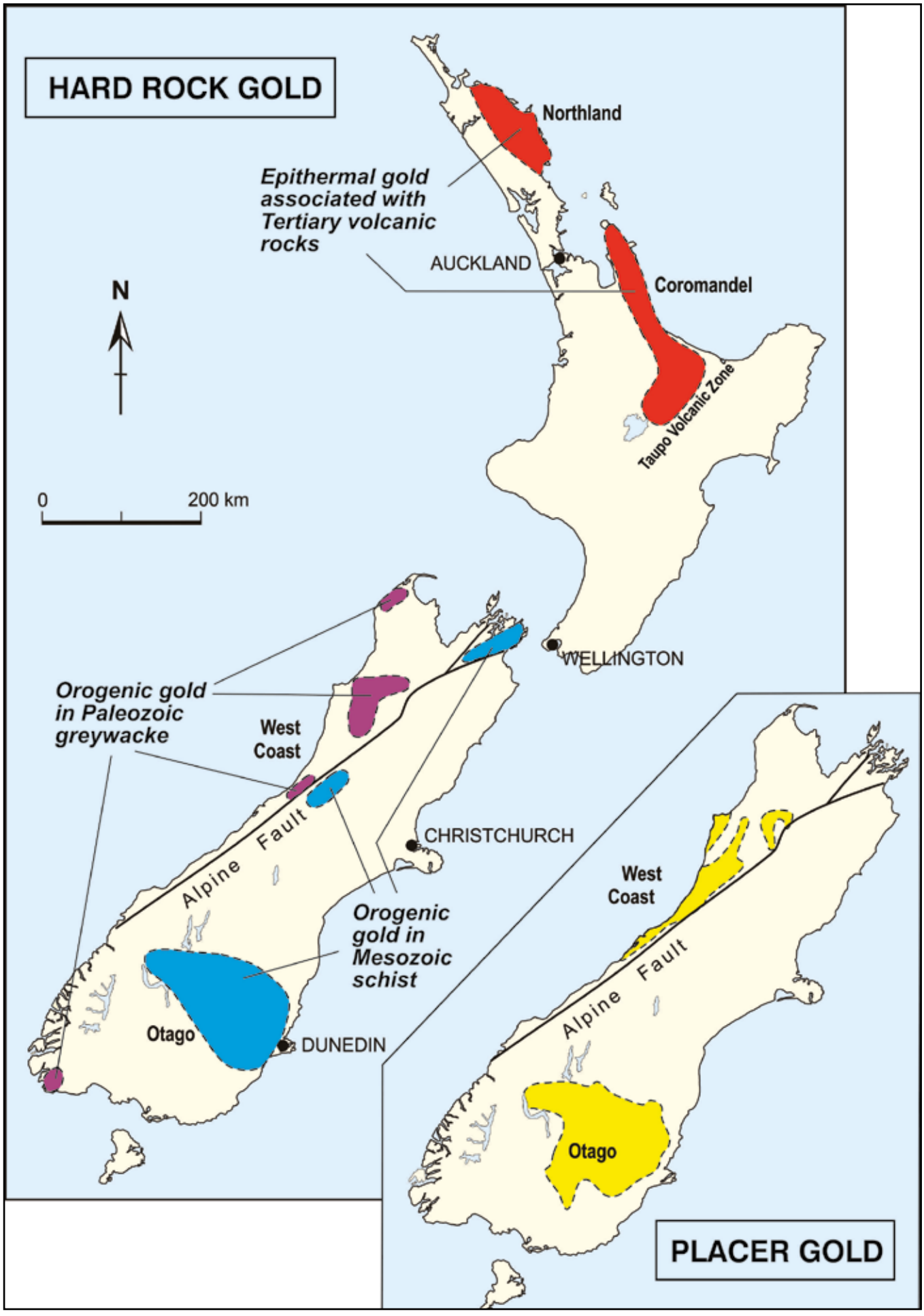

Fig. 5 Main areas of past gold mining and potential for future discoveries (after Christie and Barker 2013)

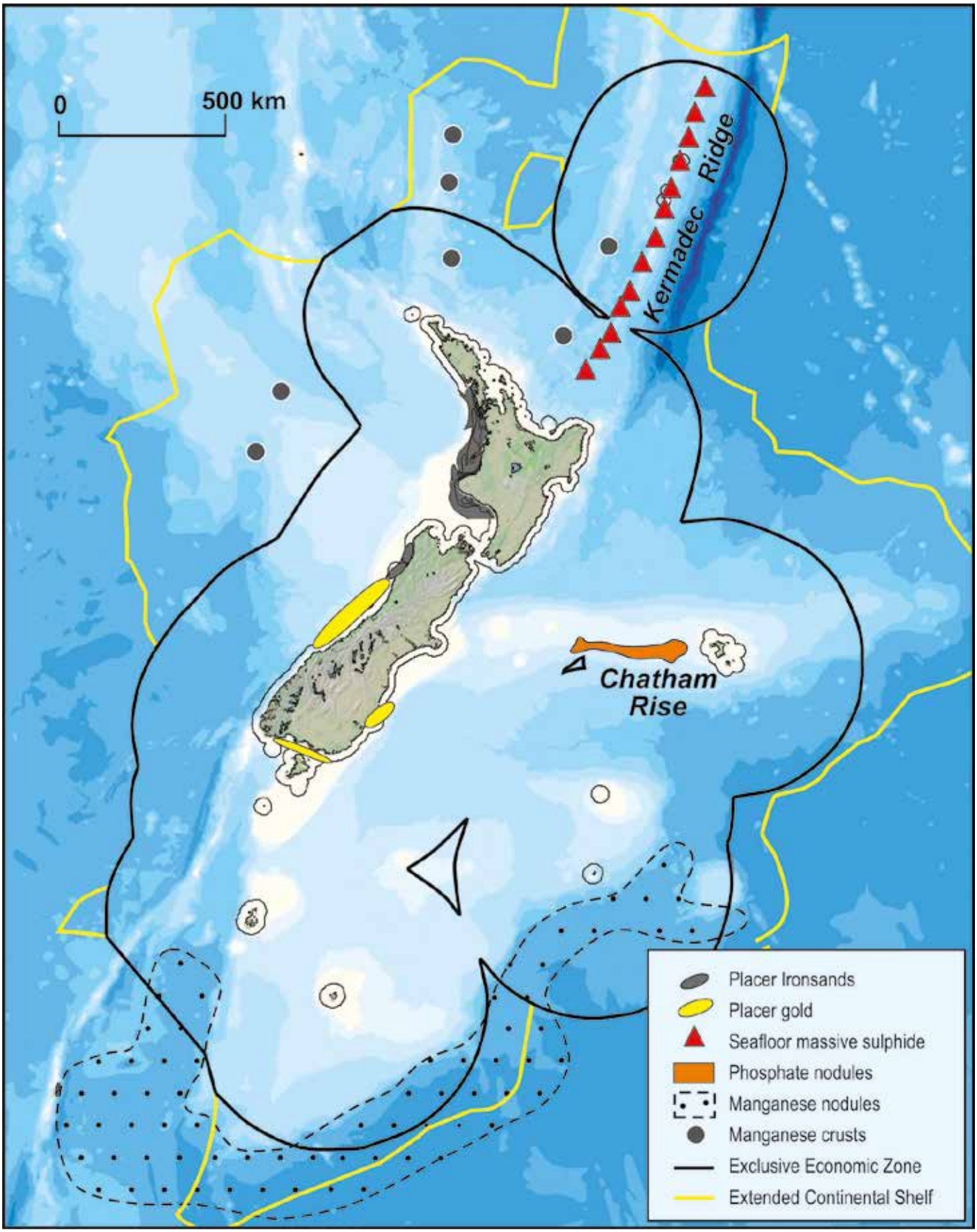

Fig. 6 Offshore minerals (after Christie and Barker 2013)

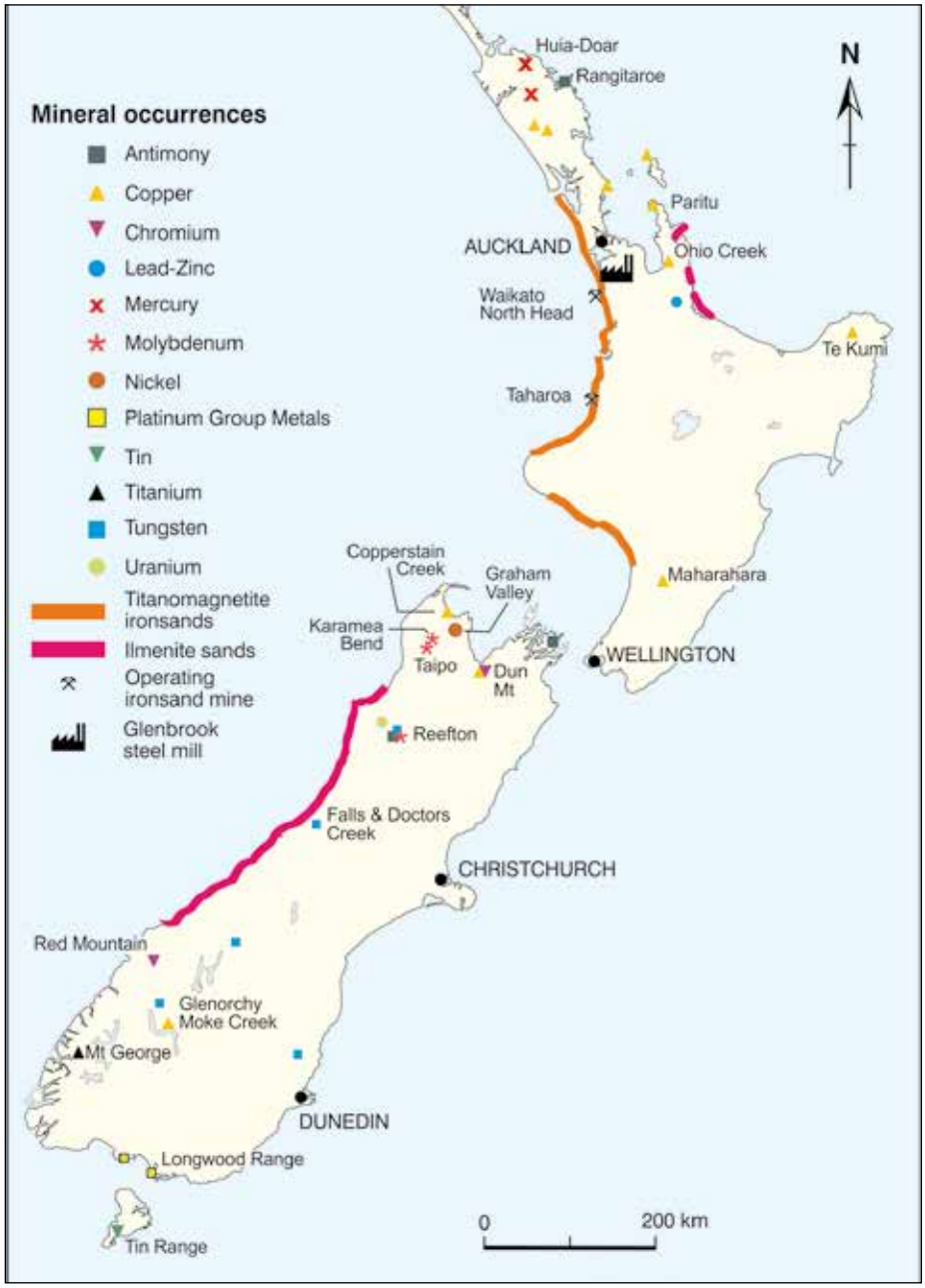

Fig. 7 Locations of metallic mineral occurrences, excluding gold (after Christie and Barker 2013)

Island (Fig. 8). The veins were deposited by hydrothermal fluids released during greenschist facies metamorphism. The most important are those in the Reefton Goldfield, where over 2 Moz Au were produced from 84 mines between 1870 and 1951, and open pit mining at Globe Progress between 2007 and 2015 produced 665,432 oz Au. The largest vein, Blackwater, dips steeply, is 0.6 m wide, ~1 km long and has a vertical extent of ~1,300 m. Underground development is being carried out at Blackwater and drilling programmes are advanced at Capleston, Big River and Alexander.

Orogenic quartz veins in Mesozoic schist — These deposits are found in the Haast Schist of Otago, Marlborough, and the Southern Alps (Figs 3 and 8). The gold-bearing lodes typically occur as lenses, less than 1 m wide and localised along single or multiple parallel shear zones that generally dip steeply. A notable exception is at Macraes mine, where mineralisation occurs in shear veins, stockwork veins and disseminated within the gently dipping (c. 30°) Hyde–Macraes Shear Zone. The shear zone is 26 km long, with ore mined from a series of pits along the zone. Mining from 1990 has produced more than 5 Moz Au. Mining and exploration continue at Macraes. A major drilling programme is underway on the Rise & Shine shear zone and its extensions between Bendigo and Ophir.

Intrusion-hosted gold deposits — The Sams Creek gold deposit in west Nelson (Fig. 8) is the only deposit identified to date that has characteristics of an intrusion-related gold deposit (Faure and Brathwaite 2006). It is hosted by an alkali granite porphyry dyke that intrudes Ordovician to Early Devonian metasedimentary rocks. The age of the dyke is contentious; either Carboniferous (319 ± 8 Ma based on Ar-Ar dating of amphibole; Tulloch and Dunlap 2006) or Cretaceous (109 ± 9 Ma from U-Pb dating of zircon; Phillips 2015). The dyke is up to 60 m wide and has a strike length of c. 20 km. Sheeted and local stockwork vein complexes of thin veins comprise a Main Zone 600 m long, up to 60 m wide and explored for 1 km downdip of the host dyke. Resources of more than 1 Moz Au have been determined to date (Angus et al. 2016).

Epithermal quartz veins in Cenozoic volcanic rocks — Epithermal Au–Ag deposits in Northland and in the Hauraki Goldfield were formed in past geothermal systems associated with volcanism that was active in the Miocene–Pliocene (Fig. 9). Epithermal gold is being deposited today in active geothermal systems in the Taupo Volcanic Zone, in association with Quaternary volcanism (Fig. 9).

The Hauraki Goldfield contains about 50 known epithermal Au–Ag deposits that produced about 44 Moz of Au-Ag bullion between the 1860s and 1952, mostly from vein deposits hosted by andesite and dacite (Williams 1974; Christie et al. 2007).

The Martha Mine is the largest producer in the Hauraki Goldfield with 35 Moz of Au-Ag bullion produced from underground workings between 1878 and 1952. The mine was reopened in 1988 as an open pit. Four major veins (Martha, Welcome, Empire, and Royal) and numerous smaller veins strike in a north-easterly direction and form a braided vein system over 2.5 km long by 600 m wide extending to a depth of over 600 m. Several other vein systems are also present in the Waihi area. Historical mining at Union Hill south of Martha focused on the Union and Amaranth veins. Underground mining has been on the recently discovered Favona, Trio and Correnso vein systems and currently on the Martha vein system beneath the level of open pit mining. A large programme of exploration drilling is continuing at the Wharekirauponga (WKP) deposit 8 km north of Waihi where indicated and inferred resources of 1.1 Moz of Au and 2.0 Moz of Ag have been established. Small-scale mining is intermittently carried out at Karangahake and Broken Hills.

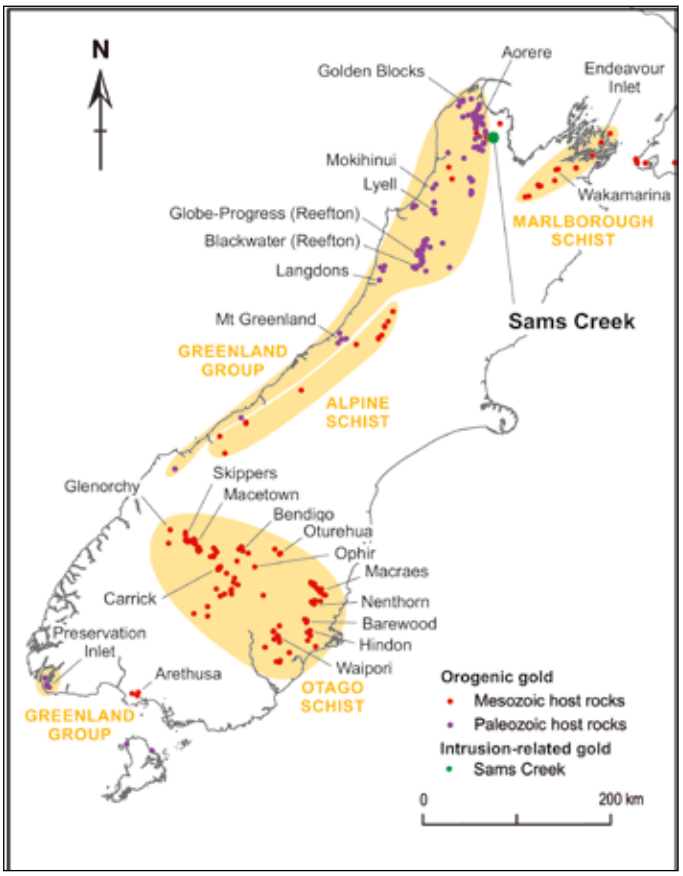

Fig. 8 Location of orogenic gold deposits and Sams Creek intrusion-hosted gold deposit (after Christie 2016, p. 92). The coloured areas show the broad areas of occurrence and do not correspond to specific geological units

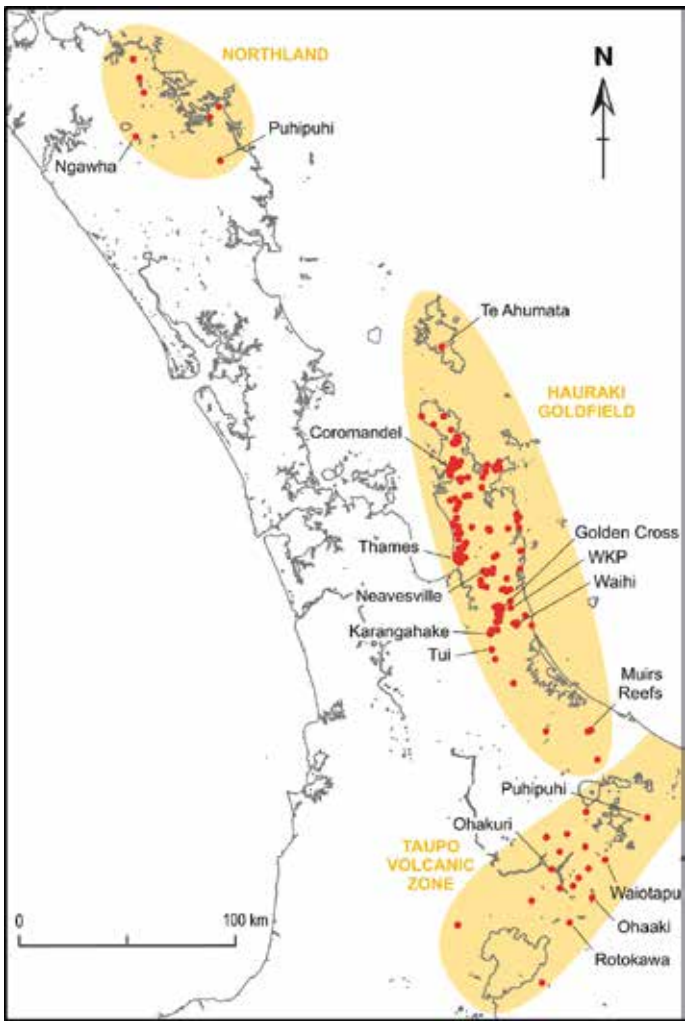

Fig. 9 The main areas of epithermal gold deposits (after Christie 2016, p. 218). The coloured areas show the broad areas of occurrence and do not correspond to specific geological units

Small quantities of ore-grade Au–Ag mineralisation have been deposited by geothermal fluids in several active geothermal fields of the Taupo Volcanic Zone, including Ohaaki (Broadlands), Rotokawa, Waiotapu and Kawerau. Silver–Au mineralisation is also present in fossil geothermal systems in the Taupo Volcanic Zone, notably at Ohakuri (Fig. 9).

Several hot-spring-type epithermal deposits are known in Northland. Small quantities of Ag and Hg have been produced at Puhipuhi, north of Whangarei, and Hg at Ngawha, near Kaikohe (Fig. 9). Reconnaissance drilling to intersect feeder quartz veins at Puhipuhi intersected potentially economic Au grades.

Placer gold deposits — Placer gold is found in alluvial, beach, glacial and seabed deposits. Giant placer gold fields are present in Cenozoic gravel and sand in West Coast and Otago–Southland, and smaller placers are found in west Nelson and Marlborough (Fig. 10). About 20 Moz Au were produced in the past, initially during the gold rushes of the 1860s and 1870s, and later by sluicing and dredging operations. Since 1980, there have been a large number of small- and medium-scale gold recovery operations using hydraulic excavators and mobile gold recovery plants. About 30 are currently operating. A reconditioned gold dredge has operated intermittently in the Grey River valley.

Titanomagnetite ironsand

Onshore and offshore placer titanomagnetite ironsand resources are present along 480 km of the North Island's western coastline (Fig. 7). Up to 2 Mt of ironsand concentrate (c. 55% Fe) has been produced annually from mines at Waikato North Head (1969 to present), Taharoa (1972 to present) and Waipipi (1971-1987) for export and for local steel production at Glenbrook. The ironsand placers formed in Quaternary onshore beach and dune, and offshore marine deposits. Quaternary andesitic volcanic rocks of western Taranaki are the main source of the titanomagnetite, which has been concentrated by marine currents, wave and wind action (Brathwaite et al. 2021). Onshore resources have been estimated at about 1,300 Mt of titanomagnetite. Offshore, Trans-Tasman Resources has reported a resource of 482 Mt of concentrate (48% Fe) in deposits offshore from Patea. Geological modelling of source rocks suggests potential for total resources of about 39,000 Mt of titanomagnetite (Christie et al. 2009). Exploration of these resources using aeromagnetic surveys and drilling is continuing both onshore and offshore.

Placer ilmenite and REE

Ilmenite-rich black sands occur at intervals along 320 km of the west coast of the South Island (Fig. 7). The ilmenite and other heavy minerals have been derived from erosion of garnet-grade Haast Schist in the Southern Alps. Many of the deposits consist of narrow, elongate Holocene beach and dune deposits, generally parallel to and backing the modern storm beach. In the beach sands, ilmenite has been concentrated by wave

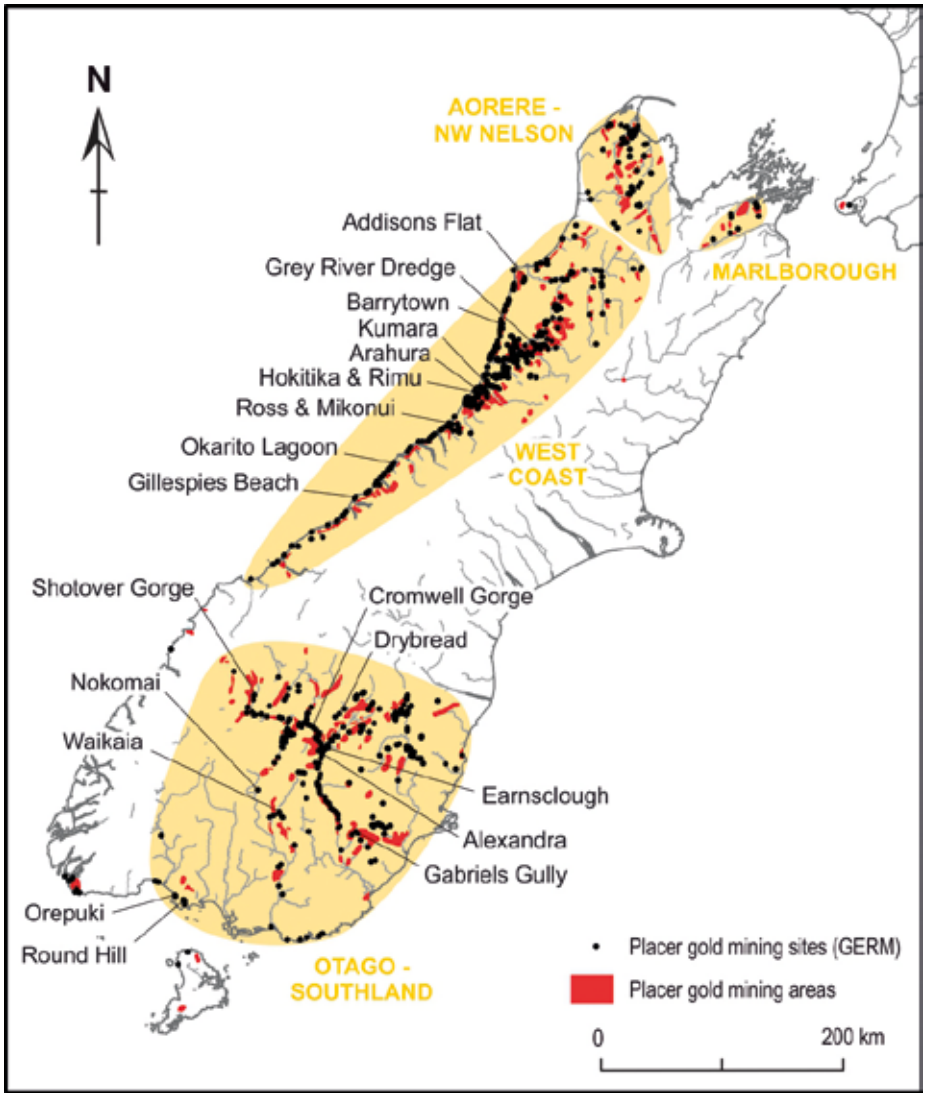

Fig. 10 Location of placer gold deposits (after Christie 2016, p. 334). The coloured areas show the broad areas of occurrence and do not correspond to specific geological units

action into blacksand leads with average grades of 10–25% ilmenite. The two largest deposits, at Barrytown (6.9 Mt ilmenite) and near Westport (5.5 Mt ilmenite), have accumulated in embayments of the coastline where progradation has been protected by resistant headlands of Paleozoic granite or greywacke. The heavy mineral sands also contain locally high concentrations of gold, garnet and REE-bearing minerals that are being considered as possible by-products of proposed ilmenite mining.

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News of the Society - Council Meeting

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Due to continued COVID-19 restrictions, the e-Council Meeting was organized on September 24, 2021 from 12,00 to 15,00 CET via Zoom (H. Frimmel is thanked for technical preparation of this meeting). After welcoming, the Agenda was handled by J. Pašava (SGA Executive Secretary). Council members received all Reports in advance and more discussion was spent on items that needed Council decision. At the end of the e-meeting all submitted Reports were approved with great thanks.

Roll call and apologies

Present on-line: D. Banks, G. Beaudoin (for part of the meeting), S. Bouhlel, R. de Barrio, T. Christie, H. Frimmel, G. Graham, P. Ledru, C. McCuaig, S. Mikulski, E. Naumov, J. Pašava, S. Petersen, I. Pitcairn, J. Slack, Yucai Song, G. Tourigny and A. Vymazalová.

Apologies for absence: G. Bozkaya, C. Conde, S. Decrée, E. Ferrari, P. Garofalo, D. Huston (SGA President), A. Idrus, J. Kolb, B. Lehmann, P. Mercier-Langevin, B. Orberger, N. Saintilan, X. Sun

1. Summary of previous e-Council Meeting (April 18, 2021) (J. Pašava)

2. Reports of officers on Council

2.1 Report from President

2.2 Report from Executive Secretary

Council discussion needed – on a full Program of the SGA General Assembly:

1. Report of the President (including info on upcoming SGA ballot)
2. Report of the Treasurer (SGA GA approves the SGA accounts of the preceding two years after having been presented the reports of the auditors, approves the SGA budget presented by the Treasurer).
3. Other items (brief update on SGA 2022 Rotorua by T. Christie, activities of SGA Chapters by A. Vymazalová).

Actions:

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

D. Huston to cover info on upcoming SGA ballot in his Presidential Report for the SGA GA (October 6, 2021).

T. Christie and A. Vymazalová to report briefly on the status of preparation of the 16th SGA Biennial Meeting and SGA Chapters, respectively.

2.3. Report from Treasurer

Council decision not needed – important message from auditors:

- Proper documentation of the expenses incurred by the various student chapters: Since a considerable proportion of the SGA member's money flows into the support of student chapters, it is pivotal that these expenses are accounted for, not only within the student chapters but also for the Treasurer (and future auditors). This can be achieved by short financial reports from the student chapters, signed by the chapter's representatives. To a large extent such reports have been sent in the past to the Vice-President for Student Affairs, A. Vymazalová and forwarded by her to Council. This year, so far, no such reports have been received yet. It should be ensured that such reports are provided by all student chapters for every year for which they have received financial support from SGA.
- The same applies also to any other external SGA activities, such as short courses and workshops. All financial transactions in the context of such activities need to be properly documented and summarised in a final account that forms part of the SGA books.

Actions:

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

A.Vymazalová jointly with H. Frimmel to prepare a template for financial report that should be sent to SGA Chapters for annual reporting.

2.4. Report from Promotion Manager

Council discussion needed:

Draft proposal for rewarding important anniversary of SGA membership:

- 5 years Anniversary - safety neon jacket
- 10 years Anniversary - mug
- 15 years Anniversary - backpack
- 20 years Anniversary - flask isotherm
- (From 20 years onwards, offering a more important present is suggested, but only every ten years)
- 30 years Anniversary – tie/scarf
- 40 years Anniversary – cufflinks/shawl

Another very nice idea (from A. Vymazalová) would be to offer a significant discount (50 %?) for registration fees to the SGA meeting after 40 years (maybe free after 50 years?). These are just general thoughts to discuss in the future. We could try to organize these anniversary presents for the SGA Biennial meeting 2023 or 2025.

Creation of SGA virtual booth – can we do that ourselves or do we need to hire a professional company?

Actions:

After discussion, Council approved suggested concept and that a possible significant (50%?) discount for registration fees to future SGA meeting(s) after 40 year membership would be covered from SGA budget.

We need to improve communication with membership.

S. Decrée in collaboration with other Council members to prepare a set of basic documents for a virtual booth.

C. McCuaig and T. Christie to discuss a suitable platform for a virtual booth at SGA 2022 (Rotorua).

2.5. Report from Chief Editor, SGA News

Council decision not needed – only to remind a sharp deadline of October 31, 2021 for submission of contributions to Anniversary issue of SGA NEWS no. 50.

After discussion, Council approved the presented report with great thanks.

2.6. Report from Chief Editors, MD

Council decision not needed.

After discussion, Council expressed great thanks both Chief Editors and members of Editorial Board for keeping MD on top of economic geology journals (IF = 5.11, Q1).

2.7. Report from Chief Editor SGA Special Publications

Council decision not needed – brief info by J. Slack.

After discussion, Council approved the presented report with great thanks.

2.8. Report from the Chief Editor SGA website

Council decision needed:

Problems/questions

1. Should other publications such as field trip guides be available as free downloads to all web users or for logged-in members only?
2. The abstract volume from the Dublin 2007 biennial meeting is not available. Does anybody have a copy or are their copyright issues?

Actions:

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

I. Pitcairn to keep free access to field trip guides only to SGA members.

I. Pitcairn to send a reminder to SGA membership when new SGA News is available.

A. Vymazalová to ask Representatives of Student Chapters to send info to I. Pitcairn on planned activities to be displayed at SGA website/student folder.

D. Banks to contact IAEG (Dublin) to seek permission for free downloads of Proceedings of the 9th SGA Biennial Meeting (Dublin) to SGA members via SGA website.

2.9. SGA Educational Fund (D. Banks)

Council decision not needed.

2.10. to 2.16. Reports from Regional VPs (Asia, Australia/Oceania, Europe, North Africa and Middle East, Sub-Saharan Africa, North America, South America)

Council decision needed on:

- possible virtual booth option at PDAC, March 2022
- continued support of funding (~€1,000) to Hydrothermal deposit short course (Colorado School of Mines – January 2022) to either 1) sponsor student attendance, or 2) fund a sponsored evening event for students and other attendees during the short course in order to increase visibility of SGA.

Actions:

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

G. Graham to organize SGA promotion (budget of up to EUR 1,000) related to the Hydrothermal deposit short course at the Colorado School of Mines (January 2022) in the form of either 1) sponsoring student attendance, or 2) funding a sponsored evening event for students and other attendees during the short course.

3. The 16th SGA Biennial Meeting – update (T. Christie)

New dates approved by Council: March 28-31, 2022.

Hybrid, with both in-person and online attendance options.

COVID-19 issues

- Ongoing issues with COVID-19, including a recent outbreak in New Zealand during August and September have further highlighted the likelihood that conference delegates from many countries, particularly those countries regarded by the New Zealand Government as high risk, will not be able to travel to New Zealand to attend the SGA 2022 Biennial Meeting in-person.
- The LOC is currently working on the hybrid conference format for conference delivery to in-person and virtual attendees. Shifting a large part of the attendance to online has major ramifications on the viability of some short courses and field trips. The LOC is currently working through these with short course presenters and field trip leaders. Similarly, a physical Trade Exhibition may not be possible if exhibitors are unable to travel to New Zealand.
- Reduced in-person attendance may result in a shortening of the in-person technical programme.

We seek suggestions from Council for:

- Keynote speakers
- Advice based on your experience with virtual and hybrid conferences on what works and what doesn't, e.g. methods of audience participation in discussion sessions.

Council decision needed on:

- Timing and mode of SGA award ceremony
- Timing and programme of the SGA GA, if any
- Mode of presentation of SGA awards

Actions:

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

T. Christie to reserve 1 hour for presentation of all SGA awards.

T. Christie to discuss and select the most proper e-platform for the virtual SGA Rotorua meeting.

D. Huston to invite all awardees and nominators to Rotorua for presentation of individual SGA awards (including citations and acceptance speeches). In the case of travel restrictions, they should send a video.

No SGA GA will be organized at the 16th SGA Biennial Meeting.

4. The 17th SGA Biennial Meeting – update (N. Saintilan)

Council decision not needed.

Expected dates: August 28 – September 1, 2023 (Zürich)

Last LOC meeting (July 15, 2021) discussed the following:

- Website, registration process, abstract submission and management platform
- Social/professional events on Tuesday, Wednesday and Thursday evenings of the conference week
- Manned booth for the 2023 SGA conference in Rotorua

After presentation of the report by J. Pašava (on behalf of N. Saintilan), Council approved the report with great thanks.

5. Report from the Chairman of the Nominating Committee (D. Huston)

Council decision not needed – a voting slip prepared for upcoming SGA ballot

Actions:

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

D. Huston to inform SGA GA (October 6, 2021) on the result of the Nominating Committee and Council decision regarding extension of the term for President, Vice-President and S. Mikulski (Council position before becoming VP).

I. Pitcairn to send invitation to relevant SGA membership categories to SGA ballot between October 7, 2021 and October 15, 2021.

6. Report from the Chairman of the Award Committee (I. Pitcairn)

Council decision not needed – Council vote resulted in identification of SGA awards recipients (yet, publicly confidential – only recipients and nominators were informed by SGA President)

After discussion, Council approved the presented report with great thanks.

7. Progress report on membership drive from the last SGA Council Meeting (S. Decrée et al.)

Council decision not needed.

Compared to August 2020, a decrease of the membership balance can be noticed and is likely due to a decreasing number of student members (602 vs. 420 student members in 2020 and 2021, respectively). The relative proportions of regular print members, regular electronic members, corporate and senior members remain roughly the same as in August 2020.

After discussion, Council approved the presented report with great thanks.

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

Council decision needed.

A. Vymazalová received an application to create SGA - Berlin Chapter but so far, they have not specified the financial request. There seems to be only seven members (she will check with Ch. Linge). A. Vmazalová suggested that Council preliminary approves the start-up support of 500 Eur and as soon as the application is completed, she would inform the Chapter.

There is also an application to create a SGA/SEG Cordoba Chapter in Argentina, they request 700 Euro but as there are only 6 members, A. Vymazalová suggested to approve 500 Eur as start-up.

Actions:

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

After completion of application, A. Vymazalová to inform Representative of newly creating SGA Berlin Chapter of the approval of an initial budget of Eur 500.

A. Vymazalová to inform Representative of a newly created SGA/SEG Cordoba Chapter of the approval of an initial budget of Eur 500.

A. Vymazalová and T. Aiglsperger to prepare a questionnaire on desired activities for SGA Chapters.

9. Requests for sponsorship

7th SGA-IUGS-SEG-UNESCO Short Course on African Metallogeny (November 29 – December 3, 2021, Windhoek, Namibia 2021) – face to face meeting - B. Orberger et al.; the amount of SGA contribution in negotiation.

Action:

After discussion, Council confirmed that it is ready to support this well-deserving and traditionally organized geo-educational event as needed.

10. Any other business

- SGA future activities with respect to COVID-19 (D. Huston et al.)
- SGA new initiatives – update on SGA Sub-committee on New Initiatives (D. Banks et al.)
- The 7th Short Course on African Metallogeny – Namibia – update and new plans (B. Orberger)
- SGA Mobility Grant – update (T. Aiglsperger)

Action:

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

T. Aiglsperger to prepare a list of laboratories willing to participate in this project and publish it on the SGA website.

Call for the 18th SGA Biennial Meeting – revision of Guidelines for organizing and managing SGA Biennial meetings

Action:

After discussion, Council approved the revised Guidelines with great thanks and asked J. Pašava to organize jointly with I. Pitcairn a Call for the 18th SGA Biennial Meeting at the Society website. The deadline for submission of bids is March 30, 2022.

11. Date and place of the next e-SGA Council meeting.

After discussion, Council approved the tentative dates for the next Council meeting which should be organized by S. Mikulski in Warszawa between May 10-13, 2022.

12. Informative list of past activities

- 38th IGC (March 2-8, 2020 New Delhi, India) – SGA sponsors the Theme 28: "Ore Forming Processes and Systems" – J. Pašava/A. Vymazalová - SGA link – *cancelled*
- Short Course "From Concept to Oil - The E&P Lifecylce" (May 2020, Würzburg) – H. Frimmel – SGA in-kind sponsorship approved by Council - *cancelled*
- 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*
- QUARTZ2020 International Symposium (June 7-12, 2020 Tonsberg, Norway) – SGA sponsored – a budget of up to 1,000 EUR approved by SGA Council for SGA student membership support – *postponed*
- Virtual Seminar SGA-IUGS-Namibian Geological Survey: Impact on COVID 19 on the raw material sector 1 (June 16, 2021) – B. Orberger et al.
- Virtual Seminar SGA-IUGS-Namibian Geological Survey: Impact on COVID 19 on the raw material sector 2 (July 2, 2021) – B. Orberger et al.
- Virtual Seminar SGA-IUGS-Namibian Geological Survey: Impact of COVID on the geoscience education sector in Africa (July 12, 2021) – B. Orberger et al.
- Virtual short course entitled "Exploitation of Geochemical Data: Manipulation and Interpretation" has been held online the 14 and 28 of August 2021. Five student members of the SGA chapter participate in the training that was led by Dr. Wilfrid Digbeu.
- SEG 100 Conference (September 14-17, 2021 - Whistler, Canada) – hybrid – SGA invited to run a virtual booth (rejected).

13. Informative list of future activities

- 10th Russian students and early-career scientists school "New knowledge of ore-forming processes" which will be held in the Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry of the Russian Academy of Sciences (IGEM RAS), Moscow, Russia, November 29 – December 03, 2021.
- Short Course on Hydrothermal Deposits (Colorado School of Mines, January 2022) – SGA sponsorship of about 1,000 EUR
- 16th SGA Biennial Meeting (March 28-31, 2022 Rotorua, New Zealand) – T. Christie et al.
- Inaugural SGA Field Conference Mount Isa and Cloncurry, Queensland (20-24 July 2020) – D. Huston and. V. Lisitsin – *postponed to July 2023*

News of the Society - General Assembly

Jan Pašava[1] (SGA Executive Secretary)

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The meeting was opened by the SGA Executive Secretary, J. Pašava on October 6, 2021 at 12:00 CET. Following Article VII, Section 2 of the SGA Constitution it was found that there was no quorum reached in the virtual room and the Executive Secretary called immediately for an Extraordinary General Assembly. Then he presented the suggested Agenda, which was approved. The Extraordinary General Assembly was attended online by 28 people and closed at 13:20 CET.

Report of the President (D. Huston)

The President´s report covered the period from the previous SGA General Assembly (August 29, 2019 Glasgow, Scotland) to date. Despite the global Covid-19 pandemic, the Society continued to be active and adapted to the new situation using virtual and/or hybrid type events. The President highlighted that SGA has become a globally recognized society with a large membership (1110 members in more than 50 countries), which is financially healthy and contributes to the training of the next generation of economic geologists through the SGA Educational Fund. He also emphasized the vibrant and growing student chapters and high impact factor (5.1 in 2021) for the flagship scientific journal Mineralium Deposita (ranking #2 of Mineralogy and #8 of Geochemistry and Geophysics), highly-ranked special publications, and cutting-edge workshops and short courses offered by SGA. Widely attended, high-quality Biennial Meetings have become a traditional and important part of SGA since 1991, and he invited all SGA members to the 16th SGA Biennial Meeting, which will be held in Rotorua, New Zealand in March 2022. He also presented a list of nominated officers and explained an extension of the term of the present president and vice-president to March 31, 2022, for the upcoming SGA ballot, which was proposed by the Nomination Committee and approved by the SGA Council. The ballot will be distributed to the SGA members with voting right by mid-October 2021. J. Pašava thanked the SGA President for his extraordinary work for SGA. The report was unanimously approved by the Extraordinary General Assembly by online vote.

Report of the Treasurer (H. Frimmel)

H. Frimmel presented the Financial Report for 2019 and 2020. The balance of the SGA account on 31/12/2018 was € 768,735.63 (incl. € 7,877.20 brought forward by various SGA offices), and on 8/9/2021 it was € 864,390.78, showing that the Society is financially healthy. The balance of the account of the SGA Educational Fund on 31/12/2018 was € 63,430.02, on 31/12/2020 it was € 68,683.65 and on 8/9/2021 it was € 98,426.05. All SGA financial accounts for the Years 2019 and 2020 were audited by two SGA members who do not serve on Council (as per SGA Constitution). These were Prof. Dr. G. Borg and Dr. S. Höhn who did not find any discrepancies with the accounting. J. Pašava thanked the SGA Treasurer for keeping Society finances in such a good shape. The report was unanimously approved by the Extraordinary General Assembly by online vote.

Other Business

T. Christie (Convenor and Chairperson of the LOC of the 16th SGA Biennial Meeting, Rotorua, New Zealand) presented the status of the preparation of the meeting which will be very likely run as virtual meeting. After discussion of various aspects of the meeting preparation and organization, the Extraordinary General Assembly was closed at 13:20 CET as no other business was raised by the SGA members present.

President's Corner

David Leach: President of SGA 2003 - 2005

I was fortunate to serve as President during SGA's progression from a mainly European-based professional organization to a strong and robust international society. Central to this transformation was the SGA News. SGA News connects people throughout the world and cultures a sense of belonging that is a catalyst for increasing SGA membership, student participation and professional growth. The SGA News provides invaluable insights into our activities from Council meeting, student field trips, professional conferences and especially our Biennial Meetings. The SGA News will continue to be an invaluable part of who we are as a society.

Hartwig Frimmel: President of SGA 2006 and 2007

Election to SGA President for the term 2006-2007 was surely one of the absolute highlights in my career. I experienced it not only as a great honour and recognition but also as a vote of confidence and trust. As I had been already serving on the SGA Council for many years before, I knew that heading SGA will be also a most pleasurable experience thanks to a great team of excellent professionals and fantastic personalities. Working for SGA has always felt like contributing towards the well-being of a large family. For me, the most exciting development during my term as president was the transformation of SGA from a rather Europe-centred organization to a truly global one. This transformation started with the 8th Biennial SGA Meeting in Beijing in August 2005. It was the first such meeting outside of Europe, with my predecessor, David Leach, as mastermind behind the scenes. It was, without doubt, a great success and a milestone for mineral deposit research in China but it also brought to the fore the financial risks involved with operating on a global scale. One of my main objectives as SGA President was, therefore, to assist in creating a sound financial base for SGA. In hindsight this objective seems to have been achieved as the wealth of SGA started to grow from a shaky level of around 200,000 € to a now healthy four-fold volume. This was achieved inter alia thanks to a splendid 9th Biennial SGA Meeting in Dublin in August 2007 – the pinnacle of my presidency. Much of the success of that meeting was achieved through the sterling efforts by the Irish Association for Economic Geology and the Geological Survey of Ireland. It set an example of true collaboration between Ireland and Northern Ireland (with live transmission of talks to Belfast). A further initiative, by now a well-established SGA tradition, had its beginnings at that meeting: the presentation of the first SGA-Newmont Gold Medal for lifelong achievements in the fields of mineral deposit research and economic geology, and that of the first SGA-Barrick Young Scientist Award. Since then these awards have become the highest expression of recognition for the respectively senior and not so senior scientists in our field. I'm most grateful for the opportunity I was given to contribute to these great developments within SGA. During my term as SGA President I also learned that one of the biggest challenges for any organisation run entirely by volunteers, such as SGA, is effective communication with its members. During my term, communication was still conducted largely in analogue form – principally through the SGA News. Now, with issue No. 50 appearing, this situation has changed and websites have taken over from printed media. Nevertheless, the importance of having some kind of newsletter, be it in old-fashioned printed or in digital form, remains unabated and I wish SGA News all the best for the next 50 issues.

David I Groves: President of SGA 2008 and 2009

I was President of SGA in 2008 and 2009 after acting as Vice-President for the previous two years. I believe I was the first person to become President of both SEG and SGA.

During my Presidency, I helped change the format of SGA Committee meetings to receive pre-meeting Committee reports instead of verbal reports at meetings, thus freeing up time for discussion of important matters of SGA business at the meetings. I also headed a campaign to attract more Student Members and expand Student Chapters globally. I also negotiated with both Newmont and Barrick to support the SGA medals, with a promise from Newmont to provide the gold for the SGA Gold Medal for the immediate future. I also organised to bring the SGA 2009 Biennial Meeting to Townsville with the co-operation of EGRU at James Cook University. I must acknowledge the enormous support I received from Jan Pasava to initiate these actions.

The SGA News has become increasingly professional with time. It is a good blend of short geoscience articles related to our profession, news from SGA Student Chapters, news of SGA and other conferences and workshops, and summaries of new geoscience books from Springer.

Fernando Tornos: President of SGA 2010 and 2011

SGA News is a fundamental part of the life of the SGA. A society needs not just an scientific journal such as Mineralium Deposit, but a way to connect members and keep us updated with recent news. SGA News covers perfectly this niche and I would try to recommend to be imaginative enough to expand contents and visibility at the same time that acknowledge the present and past editors their hard work keeping SGA News alive and fresh.

George Beaudoin: President of SGA 2014 and 2015

SGA presidents have the privilege of giving addresses at the SGA Biennial Meetings and our General Assembly. The most satisfying, however is to hand medals and prizes to worthy members, particularly when the selected individuals have been colleagues, co-authors or mentors. I am also delighted that we completed the establishment of the SGA-KGHM Krol Medal, in honour of our first President G.L. Krol, to recognize outstanding service to our Society. The medal was presented for the first time in Nancy in presence of members of the Krol family. Of course, the SGA News is the vehicule to bring the information to members who could not attend the ceremonies. Importantly, it is our channel to keep members up-to date with the progress of the SGA, from Council decisions to Student Chapter activity reports.

Jorge MRS Relvas: President of SGA 2016 and 2017

SGA is a universe of good and generous people, where I only made very good friends. I joined the SGA Council in 2006, when the President was David Leach, and since then I served the Society in several different ways. My term as SGA President took place in 2016-17, followed, in 2018-19, by my last term in the Executive Committee, this time as Promotional Manager. These years represented a challenging time for our Society and a vibrant period for me. Despite the highs and downs of the world of economic geology, SGA kept bringing inspired people together in a wide variety of highly successful activities in all continents, while our flagship journal, MD, reached impressive impact factors, the highest in

our field. I believe we all feel very proud for what the Society has accomplished. Serving the SGA, over the many years that I have been on the Council, has undoubtedly represented one of the best components of my professional and personal life, and I sincerely thank SGA for this. I feel that any contributions I may have given to the Society have been far less than what the Society has given to me. The privilege was mine. Being able to learn from the best ones was a benefit I received from sharing my stay on the SGA Council with so many giants.

Throughout the life of SGA, our newsletter – SGA News – has played a very important role in connecting the Society with its membership, disseminating and promoting the activities, meetings and initiatives of SGA and, in particular, of its growing network of Student Chapters spread across the world. SGA News also plays a crucial role in ensuring transparency, by making public the decisions and commitments made by the Council, the Educational Fund Committee and the Society's governing bodies, as well as the strategic guidelines issued by each acting President. Last but not least, it is worth noting the growing impact of the authored articles published in SGA News, whose quality and relevance deserve the attention of a growing number of readers. For all this, it is my greatest pleasure to congratulate the current editor of SGA News, my good friend Jochen Kolb, for the very positive evolution of the quality of our Newsletter and, through him, for the publication of SGA News' issue no. 50. This is clearly an occasion that fills all SGA members with pride and joy.

Karen Duttweiler Kelley: President of SGA 2018 and 2019

Serving as President of SGA (2018-2019) has been one of the most gratifying roles of my career. I was lucky because my Presidency was sandwiched into a time period that began as the visibility of SGA was growing rapidly across the world, and it ended close to the start of a pandemic that changed the world. It was sandwiched between the highly successful 14th SGA Biennial Meeting in Québec City and the 15th SGA Biennial Meeting in Glasgow. And in between those two conferences, SGA saw enormous growth in its membership, it saw a growing network of student chapters, it saw its highly ranked official journal – Mineralium Deposita – continue to produce top scientific research papers, and it saw exceptional collaboration and commitment from its members.

It also saw changes in the management and editorship of SGA News – the most important avenue for maintaining a connection to current inner workings of SGA. In addition to a scientifically-oriented article at the beginning of each issue, SGA News provides an overview of discussions and actions made by Council members, and it provides perspectives of the President. However, in my opinion, the best parts of SGA News are the updates from various student chapters. Here, you read about field trips, research avenues, and other activities, all reported by enthusiastic young SGA student members from different parts of the world. As I read these, it renews my belief that the core purpose of SGA is to support educational activities and grow the next generation of economic geologists!

David Huston: President of SGA 2020 and 2021

The last two years have seen many challenges to SGA due to the continuing COVID epidemic. Since Glasgow 2019, virtually all of the activities of SGA have taken place on-line, including Council meetings and, most recently, the General Assembly. The 16th Biennial meeting in Rotorua, New Zealand, originally scheduled for November 2021, was rescheduled for March 2022 and now will be an entirely on-line meeting. Because of the difficulties for face-to-face meetings, the SGA Newsletter has become an essential tool to communicate with our membership.

Over the last couple of years, Jochen Kolb and contributors to SGA News have initiated series of articles of specific interest not only to the society, but also to our science in general. For example, in this issue there are a series of reports on the activities of student chapters. From these reports, SGA membership can see the continuing important role the student chapters have, both within the Society but also in geological education. The last two issues saw a series of articles on the growing importance of critical minerals, both to resource geology, but also to society in general. This series of articles, and, no doubt, future series highlight topics important to the Society's membership that are not readily publishable in more technical journals. SGA News provides an important outlet for such information.

Reports from the SGA student chapters

SGA chapter	President	E-mail	Foundation
Prague	Jan Kamenský	jan.kamensky@natur.cuni.cz	2002
Baltic	Krzysztof Foltyn	krzyfoltyn@gmail.com	2009
Siberia	Anna Devyatiyarova	anna13502@gmail.com	2011
Barcelona	Pol Suñer	pol.pol.sunyer@gmail.com	2012
Colombia-Bucaramanga	Fabian Samuel Reyes Santos	samuelrt97@hotmail.com	2012
Nancy	Alix Hauteville	alix.hauteville@etu.univ-lorraine.fr	2013
Peru	Saul Romero Enriquez	presidente.sgastudent.peru@gmail.com	2013
Colombia-Bogota	Daniel Felipe Solano Gil	dfsolanog@unal.edu.co	2015
Laval	Ana Carolina R. Miranda	acrmiranda1@gmail.com	2016
North-West Russia	Evgenyi Eremenko	st013196@student.spbu.ru	2017
Turkey	Fatih Ozbas	fatih.ozbas@istanbul.edu.tr	2017
Black Forest-Alpine	Simon Hector	simon.hector@kit.edu	2017
Brazil	Julia de Souza Pimenta	juliaspim@gmail.com	2018
United Kingdom	Lauren Tuffield	ltuff@bgs.ac.uk	2018
Ivory Coast	Sahy Anthelme Veh	vehsahy@gmail.com	2019
Moscow	Maria Komarova	ivanchenko.marija@gmail.com	2019
Urals	Daria Kiselova	podarenka@mail.ru	2019
La Plata	Morena Pagola	morenapagola@gmail.com	2020
Senegal	Malick Faye	fayepapmalick@gmail.com	2020
UWA-Australia	Anne Brandt Virnes	anne.virnes@research.uwa.edu.au	2021
Berlin	**Laura Schulz**	**schulz.laura.b@gmail.com**	2021
Cordoba - Argentina	**Pablo Exequiel Petri**	**pablo.petri@mi.unc.edu.ar**	2021

Introduction to reports from SGA Student Chapters

Anna Vymazalová, SGA V.P. for Student Affairs

In 2021, the Society has in total 22 SGA Student Chapters from around the world, three of them (Berlin-Germany, Cordoba-Argentina, UWA-Australia) created this year. The first SGA Chapter was created in Prague in 2002. It was founded as joint Prague-Freiberg Chapter with an initial number of 10 members (5 from Prague and 5 from Freiberg). Since then, the Prague Chapter has grown to a group with about 50 student members.

In 2005, at the 8th Biennial Meeting in Beijing, the Society initiated establishment of travel grants in order to support SGA student members to attend SGA biennial meetings. This successful initiative became a tradition at SGA biennial meetings and enables a large numbers of SGA students to actively participate at SGA conferences. Since the Beijing meeting in 2005, there were almost 500 SGA students awarded with travel grants from about 30 different countries with a total support of 238,000 EUR from the SGA Educational Fund.

After the Prague Chapter, the Baltic Chapter was created in 2009 linking up students from Poland, Sweden and Finland, followed by the Siberia Chapter in 2011 and the Barcelona Chapter in 2012 reaching over 60 student members in a year. With the growing number of student members and enlarging of their activities, Chapter Representatives were invited to present the Chapters at the SGA General Assembly during the 12th SGA Meeting in Uppsala in 2013 and since then Chapter Representatives are regularly presenting at biennial meetings and their contributions became a part of the SGA General Assembly program.

With an active promotion during biennial meetings and other SGA related events, the Chapters enhanced joint and networking activities. Also new members and groups were interested and a number of other new Chapters were created in recent years: in Argentina, Australia, Colombia, Canada, Brazil, Ivory Coast, France, Germany, Peru, Russia, Senegal, Switzerland, Turkey and the UK. The Society supported SGA Chapters with more than 200,000 EUR since 2015.

The number of SGA Chapters has grown up to 22 in 2021 covering various regions spread all over the world. In the following, we present each active SGA Chapter with its brief history and most interesting events that have been performed.

SGA Prague – The oldest Student Chapter of SGA

Jan Kulhánek[1]* and Marek Tuhý[1]
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**jan.kulhanek@natur.cuni.cz*

Fig. 1 Participants of Gold Short Course 2018. Photo by V. Santolík

During the spring of 2002, several SGA student members from Charles University in Prague established the first SGA Student Chapter. Since then, our chapter has been gratefully using every year the opportunity of being run under the auspices of the SGA to organize various events, such as field trips, lectures, short courses, student conferences and member gatherings and we gladly cooperate on these events with other chapters across the world. Our chapter has consistently counted more than 50 members in recent years, most of whom are geoscience students at Charles University.

Among the significant events organized by our chapter, we can mention SGA Student Conferences (2011 and 2019) and two Gold Short Courses (2013 and 2018) held at the Faculty of Science, Charles University. The first conference united more than 60 students from 7 countries

Fig. 2 Post-Gold Short Course 2018 field trip. Taking a bath in warm radioactive spring Běhounek directly in Svornost mine (Jáchymov – historical uranium ore deposit) more than 500 m under the surface. Photo by L. Kyrc

Fig. 3 Joint field trip of Barcelona, Prague and Siberia Student Chapters through Catalonia. Photo by M. Tuhý

and the second conference consisted of 26 students from 12 countries. The Gold Short Courses were led by Prof. David I. Groves, an Emeritus Professor at the University of Western Australia and former president of the SGA, SEG and the Geological Society of Australia. The course was focused on the orogenic gold deposits and deposits of gold on craton margins. The first course was attended by more than 45 students from 5 countries and 4 SGA Student Chapters and the second one was attended by 77 participants from 13 countries and 6 chapters (Fig. 1). The first conference and second short course were followed by the multi-day long field trips covering the interesting geological and historical sites, also emphasising the gold deposits/occurrences in the Bohemian Massif (Fig. 2).

Thanks to the possibility of participating in the SGA Biennial Meetings (especially 2017, 2019), our chapter members befriended the other SGA chapter representatives. These newly formed contacts resulted in both many thriving field trips (Colombia, Catalonia, Russia, etc.; Fig. 3) and into friendships that are still lasting.

Our current aim is to spread the geological interest among the new geosciences students and to bring opportunities to cooperate with students from abroad. For this purpose, we are annually arranging several field trips with a particular emphasis to connect students of different levels of reached geoscience knowledge (BSc, MSc and PhD) and countries.

A Brief history of the SGA Baltic Student Chapter

Krzysztof Foltyn[1], Sławomir Mederski[1]
[1]*Faculty of Geology, Geophysics and Environmental Protection, AGH University of Science and Technology, 30-059 Kraków, Poland*
contact: kfoltyn@agh.edu.pl

The SGA Baltic Student Chapter was formed in 2009 as a result of the initiative of professors Adam Piestrzyński (AGH) and Pasi Eilu (GTK). The first meeting of the chapter was held in Cracow (Poland) in December 2009 and included a session of student presentations followed by field trips to the Rudna Cu-Ag and Bochnia salt mines. Eventually this led to a fruitful long-term collaboration between students representing three universities forming the backbone of the group: AGH University of Science and Technology in Cracow (Poland), Luleå University of Technology (Sweden) and University of Oulu (Finland), but over the years additional chapter members were students from University of Warsaw (Poland), University of Wroclaw (Poland), Uppsala University (Sweden), Stockholm University (Sweden), University of Turku (Finland), University of Helsinki (Finland) and University of Tromsø – The Arctic University of Norway. The first event also kick-started the tradition of annual chapter meetings rotating between Cracow, Oulu and Luleå and consisting of workshops, lectures, student presentations and field trips providing an opportunity for networking and meeting peers interested in ore geology. The 10th anniversary of the chapter was celebrated in 2019 during a special annual Baltic Chapter meeting in Cracow. It attracted more than 40 participants (mostly Europeans but also students from Kenya, Morocco, Myanmar, Peru and USA) and featured a course focused on sedimentary-rock hosted Zn and Cu deposits led by Prof. Sarah Gleeson and Prof. Murray Hitzman, as well as field trips to Zn-Pb and Cu mines in Poland. Due to safety measures, the 12th Annual Chapter Meeting organized by students from Luleå was an online event but we hope to resume on-site meetings in 2022.

The name of the Chapter has a double meaning: in a geographical sense it is associated with the Baltic Sea but in wider geological interpretation it relates to the Baltica paleocontinent which now constitutes part of Europe between the Trans-European Suture Zone (Teisseyre-Tornquist Zone) and the Ural Mountains. While in Sweden and Finland, rocks of the East European Craton are exposed as the Baltic Shield (Fennoscandian Shield), in Poland they are hidden under more than 3-km thick sediment cover of the East European Platform. The chapter provides a great opportunity for learning and exchange of experience as students from Poland can see the older outcrops of Archean and Proterozoic rocks with associated mineralization, while students from the Nordic countries have a chance to familiarize themselves with the sedimentary rocks and mineral deposits found overlying them.

Scandinavia and Poland are characterized by numerous mining districts exploiting base and precious metal deposits, as well as energy and chemical raw materials and over the years many international students visited active mines there. Highlights include the famous iron oxide-apatite (IOA) deposit in Kiruna and the Cu-Au-Ag Aitik deposit (modified porphyry) in Gällivare, the Kemi stratiform chromitite deposit, Pyhäsalmi and Kylylahti VHMS deposits in Finland, the Zn-Pb MVT-type Pomorzany deposit and Kupferschiefer-type Cu-Ag deposit in Rudna mine in Poland. The Baltic Chapter has hosted visiting groups from SGA and SEG Chapters (e.g. from Prague, Brno, Zürich, Dublin and La Salle to name a few in recent years) providing introductory lectures and social meetings in addition to help and assistance during field trips. Cooperation is bilateral, as we have also participated in activities organized by other chapters, most notably by Prague, North-West Russia and Siberia SGA chapters. Thanks to kind invitation from the NW Russia Student Chapter, students from Poland and Finland took part in trips to Kola Peninsula (2018) and Ural Mountains (2019) and had a chance to visit unique places such as the Khibiny Massif (world's largest alkaline massif), the Monchegorsk layered intrusion, the Kovdor magnetite-apatite-baddeleyite deposit in the phoscorite–carbonatite complex, Ural-Alaskan Type Massifs with associated placers and the Berezovsk gold deposit. In addition, Baltic chapter members organized several fieldtrips to the Balkan region, visiting deposits in Greece, Kosovo, Northern Macedonia, or Bulgaria.

Fig. 1 The Baltic Chapter logo since 2018

Over the years, more than 100 students were introduced to economic geology or expanded their interest in it thanks to activities of the Baltic Chapter and the opportunity to meet people with similar passion. It led many of them to pursue a career in mining and exploration companies, in academia or in geological surveys all around the world. Many friendships and a sizeable network of professionals are a testimony to the success of the Baltic Chapter.

Fig. 2 Baltic Chapter members during 15th SGA Biennial Meeting in Glasgow in 2019

Fig. 3 Participants of the field trip to Cu-Ag Rudna mine during the first chapter meeting in 2009. On the right, typical ore hosting series consisting of Weissliegend sandstone, thin Kupferschiefer layer near roof and Zechstein carbonates above

Siberian SGA Student Chapter

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Fig. 1 The group of students near the open pit of the Stepnoe deposit (Rudniy Altay, September, 2019)

Fig. 2 A group picture of SGA students against a background of Khibiny Mountains (September, 2018)

The Siberian SGA Student Chapter was established in 2011 by students from the Novosibirsk State University (NSU, Novosibirsk, Russia) and PhD students from the Institute of Geology and Mineralogy Siberian Branch Russian Academy of Science (IGM SB RAS, Novosibirsk, Russia). The Siberian Chapter is a group of undergraduate (3rd and 4th year), master and PhD students, specialized in geology, mineralogy and geochemistry of ore deposits. The president of the Siberian Chapter from 2011 to 2017 was Maria Cherdantseva and from 2018 to the present, Anna Deviatiiarova.

The purpose of Siberian SGA Student Chapter is organization of international cooperation between scientists who deal with ore geology, mineralogy and geochemistry. We organize scientific lectures and field trips to the mineral deposits for students. Thus, experienced specialists share their knowledge with young students and inspire them to get involved in geological studies.

During the existence of the chapter, we have organized 15 field trips for geology students. As part of the trips, we managed to visit ~ 30 ore deposits associated with different types of mineralization. The geography of these trips is wide - across Russia from the Kola Peninsula to Baikal Lake, as well as several collaborative field-trips.

In 2012 our first field trip took place within the Novosibirsk region. We managed to take students to the Skalinsky opencast pegmatite mine. During the field trip, students were able to observe features of the pegmatite mineralization, including the structure of veins and cavities, distribution of minerals and much more. Moreover, the basic principles of open pit mining were observed within the mine. A trip to this deposit has become an annual traditional mineralogical field trip for our chapter. In the same year, members of the Siberian chapter organized mineralogical lectures for participants of the Siberian Geological Olympics. More than 100 pupils from different Siberian cities attended the talks and showed interest in geological science.

In subsequent years, we tried to broaden the geography of our field trips. We managed to bring students to regions of Russia such as South Urals (Plast old mining region, alkaline complexes of Vishneviye and Ilmenskiye mountains), Kemerovo region (Kamenushinskoe Cu and Salairskoe Pb-Zn deposits), Republic of Khakasia (Sorsk Cu-Mo deposit and Verkhnetioiskoe iron deposit) and Irkutsk region (Slyudyanska deposit of Mg skarns).

In 2016 and 2019, we organized collaborative field trips with the Barcelona and Baltic SGA Student chapters. We have had two successful trips to Rudniy and Gornyi Altai (Fig. 1). We visited famous ore deposits, including the Sinyukhinskoe gold deposit, the Kyzil-Chin polymetallic deposit, the Lazurskoe Au-Ag-Cu-Pb-Zn deposit, polymetallic deposits - the Stepnoe Zn-Cu-Pb-Ag, the Korbalikhinskoe Zn-Pb-Cu, the Zmeinogorskoe Au-Ag-polymetallic deposits, the Kolyvan W-Cu-Bi deposit and pegmatites of the Savvushinskoe field.

In 2017 and 2018, we participated in collaborative field trips with the Prague, Barcelona and North-West Russia SGA Student chapters. The first collaborative field trip

Fig. 3 Participants of excursion "Geology, Magmatism and Metallogeny of Gorniy Altai" (September, 2016)

took place in the vicinity of Barcelona, Catalonia. The geological program of the field trip included studying sedimentary, metamorphic, skarn and igneous complexes, illustrating different moments of the geological history of the area; visiting Mn-SEDEX, polymetallic, lateritic phosphate and salt deposits. The professors of the universities of Barcelona, Juan Carlos Melgarejo and Marc Campeny, led some of the excursions. The second collaborative field trip took place in Kola Peninsula, Russia (Fig. 2). During the field trip, we tried to observe different examples of mineralization occurring in the region. Alkaline intrusions with rare earth element mineralization, carbonatites and mafic-ultramafic intrusions with sulfide mineralization were visited.

One more interesting event was the Siberian International Early Career GeoScientists Conference. The Siberian Chapter participated in organization of two post-conference field trips: "Mineralogy and Metallogeny of Northwestern Altai" and "Geodynamic, Magmatism and Stratigraphy of Gornyi Altai" (Fig 3.). Both excursions were unique opportunities to visit geological examples of different types of deposits, magmatic and sedimentary rocks and geodynamic complexes and enjoy wonderful views of Altai nature. These excursions have also become traditional field trips (2012, 2016, 2018 and the trip is planned for 2022).

In August 2019, several members of the Siberian SGA Student Chapter took part in the 15th SGA Biennial Meeting in Glasgow, Scotland, UK. They presented their work both as oral and poster presentations.

During the trips, students get acquainted with the geology and mineralogy of the area, the structural and mineralogical features of mineralization, consolidate the skills of mapping, in practice, they master the methods of conducting field research, the correct selection of samples (geochemical, etc.) and have the opportunity to collect representative samples for their personal collections or for collections of museums of NSU and IGM SB RAS.

Thus, NSU students, with the organizational and financial support of SGA, have the opportunity to receive additional education, develop skills in practical geology, studying various deposits outside the curriculum and also gain important experience in the independent organization of field work and scientific seminars. In addition, the chapter helps students with a professional orientation and contributes to the development of contacts with foreign specialists, which, undoubtedly, is a good start for students as future scientists and specialists in ore geology.

Brief history of the SGA Barcelona Student Chapter

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Fig. 1 Practical section where members of the SGA BCN Student Chapter can see thin sections of meteorites

The SGA Student Chapter of Barcelona was founded by members of the University of Barcelona in 2012. Since then, we have done many activities and met great people.

Most significant field trips

August 2016 Collaborative expedition Siberia-Barcelona

The expedition was the first collaboration with any other Student Chapters and it comprised a thoroughly planned week-long field trip throughout SE Siberia composed by 7 members of each Chapter.

Firstly, the students visited ore deposits of Siberia: the Kamenushikoe Cu deposit, the Salairskoe Pb-Zn deposit, Kemerovo Region and the Sinyuhinskoe Au deposit, northeastern Altai. The Salairskoe Pb-Zn ore field was characterized by massive carbonate-quartz-barite ore and disseminated barite-polymetallic ore whereas, at the Kamenushikoe Cu deposit ore minerals were represented mainly by pyrite and chalcopyrite, students also had the chance to collect hand samples of azurite, malachite and chrysocolla.

Into the Altai Mountains, the chapters visited the "Paleopark", "Dragon's Teeth", middle Devonian volcanic rocks related to fold belt activity, a glacial mega flood deposit called Inskoy "stone garden", the confluence of Chuya and Katun' rivers, fossil-bearing Silurian limestones of the Gromatukhinskaya series, petroglyphs of Turkic peoples, the Kol'ka Snegiryov Monument, the Shirlak waterfall and the blue lake near Aktash Village.

September 2017 Fieldtrip to Priorat, Catalonia. Siberian and Prague's student chapters visit

The Barcelona SGA-SEG Student Chapter organized a field trip through Catalonia in which members from the Siberian and the Prague SGA Student chapters joined. It took place September 16th to 18th and was sponsored by the SGA Educational Fund. The organization was overseen by Núria Pujol Solà (PhD Student), Diego Domínguez Carretero (4th year undergraduate), Júlia Farré de Pablo (PhD Student) and Cristina Villanova de Benavent (young researcher) from Barcelona in coordination with Jan Kulhánek (Master's Student) from Prague and Maria Cherdantseva (PhD Student) from Siberia. In addition, the expedition was led by our advisor Dr. Joan Carles Melgarejo, who carried out his PhD thesis in this area.

The excursion included a first part that consisted of visiting different abandoned mines, some of them now converted into wineries or tourist mines. Mines such as "La Serrana", stratified Mn mine, "La Règia" mine, "Eugènia" mine and "Linda Mariquita" barite mine were visited. On the other hand, a second part consisted of

visits to other mineralized areas such as the occurrences in the "Mas del Mestre" area, near the town of Falset, and some outcrops near the town of Valls. These outcrops were really helpful in order to understand the complex geological and metallogenetic history of the area.

Morocco 2017 in collaboration with the SGA-Moroccan Student Chapter

Detailed below in workshops

Betic massif in 2018. Fieldtrip to the Iberian Pyrite Belt (collaboration with the SGA Siberian Student Chapter and the SGA Prague Student Chapter)

The collaboration consisted of a field trip to the Iberian Pyrite Belt region (SW Spain), one of the largest (if not the largest) concentrations of massive sulfides in the world and hosts a large number of active and inactive mines.

Workshops

- September 2012. Pegmatites

The Pegmatites workshop was the first activity organized by the BCN-SGA Student Chapter. More than 50 people participated in this activity, developed at the Faculty of Geology of the University of Barcelona, which drew in students and professors from the faculty and other universities. The workshop comprised a lesson on basic understanding of pegmatites by MSc Sandra Amores, a diverse lecture program by international senior speakers and a final field trip to Cap de Creus, led by our advisor Dr. Joan Carles Melgarejo and Dr. Pura Alonso, to visit several outcrops of representative rare-element pegmatites.

- September 2013. Acid magmatism

The aim of this workshop was to provide an advanced overview of mineral deposits related to acid magmatism, including mineralogy, textures, petrology, geochemistry and the economic interest of these deposits. The workshop included an introductory lesson on felsic magmatism and hydrothermal systems plus an extensive lecture catalog by our international and national specialists in which was discussed topics as the economic potential of closed tin mines in Europe as well as tungsten ore deposits, rare-metal mineralization related to granite or the relation between gold deposits genesis and the evolution of the Phanerozoic acid-magmatism in the Colombian Andes.

- October 2017. PGE (Platinum Group Elements)/PGM (Platinum Group Mineral) in the oceanic paleolithosphere

The workshop was structured in a "theoretical" part and a "practical" part. The "theoretical" part included an introductory course to PGE with some talks with different experts, mainly aimed to undergraduate students, to learn the basics of PGE/PGM.

The "practical" part consisted on a fieldtrip to Bou Azzer, Morocco. The fieldtrip was coordinated with members of the Morocco SGA Student Chapter. The participants were able to visit the Bou Azzer Mine, a full ophiolitic sequence and the chromitites from Ait Ahmane.

- December 2017. Leapfrog course

Thanks to the participation of Clare Baxter the members of the student chapter learned to use the program Leapfrog at user level.

- February 2019. Short course of meteorites

On 14 and 21 February 2019, the Barcelona SGA-SEG Student Chapter organized the meteorite short course presented by Dr. Jordi Llorca and David Allepuz at the Faculty of Earth Sciences of the University of Barcelona. The course consisted of two sessions; a seminar where the classification and characterization of meteorites were presented and a practical class to be able to visualize different thin sections and put into practice the knowledge acquired during the seminar (Fig. 1).

Fig. 2 Part of the mineral collection packed and organized

Annual coffee stands

Fruitful activity to collect new members. In them, we explain what activities we do in the Student Chapter, which activities are taking place or will be taking place and how it is beneficial for a student to be part of such an organization.

Talks in the 12th and 14th SGA biennial meeting

Several talks given by specialists from all over the world about the most diverse topics were organized by our Student Chapter. Some of them includes:

- Júlia Farré de Pablo, member of our Student Chapter since 2012: PhD thesis "Genesis and evolution of chromitites in ophiolite complexes from a mineralogical perspective", directed by Dr. Joaquín A. Proenza and Dr. José María González Jiménez
- Dr. Lluís Fontboté, University of Geneva, "Cordilleran polymetallic deposits as a deposit class in porphyric systems"
- Dr. Robert F. Martin, McGill University (Canada), "The clusters of accessory minerals in Grenville marble crystallized form globules of melt"
- PGE workshops talks
- Dr. Fernando Gervilla, University of

Granada. "The role of arsenic in collecting and concentrating PGE"

- Rubén Piña, Computense University of Madrid. "Using La-ICP-MS for in situ determinations of PGE and other related elements in magmatic sulfide minerals: implications for metallogenesis and exploration"
- Malte Junge, University of Freiburg. "PGE from the Bushveld Complex (South Africa) - from pristine to weathered ores"
- José María González, University of Granada. "Petrogenesis of PGE in chromite deposits"
- Thomas Aiglsperger, University of Lulea. "PGE mobilization and PGM neoformation in the supergene environment"
- Anna Vymazalová, Czech Geological Survey. "How to make a PGM?"
- Ariana Carrazana, ex-president and member of the BCN Student Chapter: Ph.D. thesis "Calc-alkaline and peralkaline volcanism of SW Sardinia, Italy", directed by Dr. Domingo Gimeno
- David Holwell (SGA Vicepresident of Europe), University of Leicester: "Recipes for making a magmatic Ni-Cu-PGE deposit"
- Dr. José M. González-Jiménez, University of Granada: Short Course of "Mineral deposits down to the nanoscale"
- Dr. Jun Cowan, structural consultant, Fremantle, Australia: Seminar "What is deposit-scale structural analysis? - An interactive presentation"
- Dr. Joaquín A, University of Barcelona. Proenza: "Conventional and non-conventional PGE deposits"
- Leduar Ramayo Cortés, Senior Geoscientist-Business Development in Quantec Geoscience LTD (Canada): "Introduction to geophysical methods applied in mining exploration"
- Dr. Ignasi Casanova, Universitat Politècnica de Catalunya: "Martian resource exploration with the 2021 Perseverance rover and the Mars sample and the return program"

Project of the international repository store for cloning mineral collections

As you may already know, the SGA BCN Student Chapter is fully involved in a Cloning Mineral Collection. The aim of the project is to organize 30 mineral collections comprising +222 mineral species for sending to 30 different universities in developing countries (Fig. 2).

Given the situation developed with respect to COVID-19, the restrictions made field trips difficult in large distances, therefore, this year, most of the trips were carried out close to Barcelona. Some members of the SGA-SEG Student Chapter, along with Dr. Joan Carles Melgarejo, made different field trips to collect samples for the Repository, among them the following:

Fig. 3 Rodalquilar area collecting samples of hydrothermal alteration in high sulfidation domains

- 2 day trip to the Iberian Range in Spain, to collect secondary copper minerals (azurite, bindheimite and other) in the Pardos mines and U ores (torbernite) in Pobo de Dueñas in Guadalajara as well as Fe minerals (ankerite, hematite) in Ojos Negros mine in Teruel
- The fluorite mines (Sant Marçal) in the Montseny massif, Catalonia (4 students)
- The Socau Mine in Figaró (Catalonia), a magnetite-grossular skarn (2 students)
- The outcrops of sedimentary series in the Sant Feliu de Codines area (2 students, calcite as component of Terciary reefs, quartz in Paleogene litharenites)
- A 5-day field trip to the South East of Spain (2 students, through the area of Almeria). We went to the mines of Huercal-Overa taking samples of Cu-Co minerals (erythrite, asbolane, chalcocite, tetrahedrite, azurite; Fig. 3). Also, we visited the Rodalquilar area (gold mines) and we have been collecting samples of very good examples of hydrothermal alteration in high sulfidation domains (primary and secondary alunite, jarosite, mordenitized tuffs, chloritized rocks, primary fresh rock, opal, kaolinite, montmorillonite). Meanwhile, we collected several samples of sanidine in trachytes, kaersutite as xenocrysts in alkaline basalts, dunites and xenoliths in alkaline basalts, alabaster, albite-chlorite and almandine in schists, talc in talc schists and chrysotile in serpentinites, etc.
- The trip in Menorca (2 students) allowed sample chalcocite replacing fossil wood, as well as phosphate rock in Miocene outcrops
- Vein quartz mines in the Montseny mountains (Catalonia) (quartz crystals)
- Enclusa area (Catalonia): secondary copper minerals (azurite, malachite) and glauconite in sandstones (6 students)
- Calella de Palafrugell (1 student): kaersutite crystals in camptonites
- Chiastolitic and andalusite from Tossa d'Alp mines (1 student)
- Anapaite outcrops in Cerdanya (1 student)
- Quartz in rhyolite outcrops in Grèixer (1 student)
- Gypsum in Eocene evaporites in Osona (1 student)
- Low-T-P metamorphic minerals in metadiabases in the Pyrenees (2 students)

SGA Student Chapter Colombia – Bucaramanga

Fabián Samuel Reyes and Luis Fernando Paez[1]
[1] *Industrial University of Santander, Colombia*

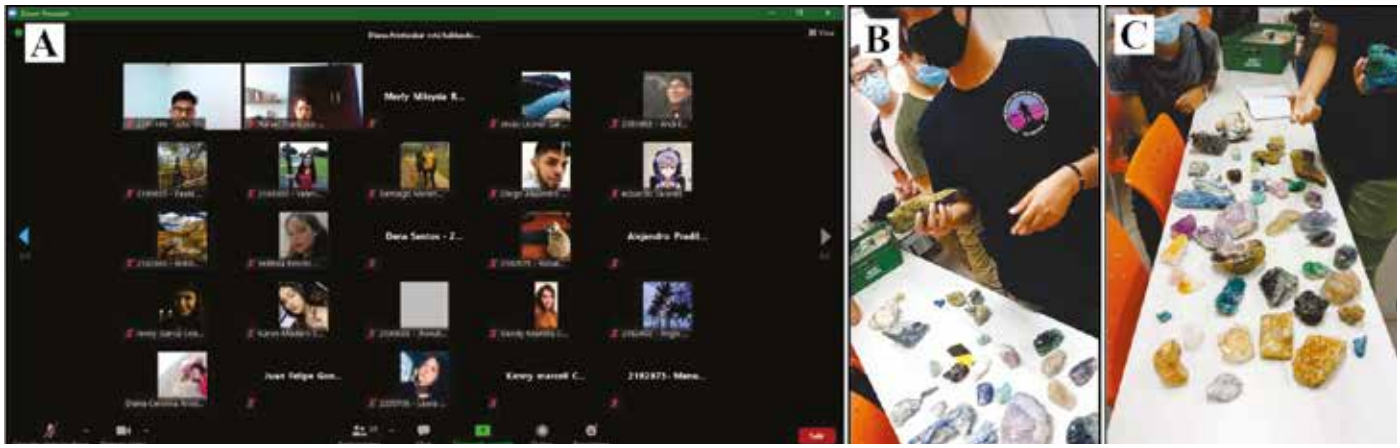

Fig. 1 SGA UIS Chapter members in virtual and face-to-face meetings

The Industrial University of Santander SGA UIS Student Chapter was founded in 2012, which is now comprised of 99 student members of different academic levels. Many proposed activities such as field trips, underwent a major adjustment due to the pandemic, marking a new era of virtual talks and courses.

Regular meetings and courses

Talks and meetings have been continued during the last year, on general topics of geology, geochemistry and economic geology, with a focus on the genesis of Colombian mineral deposits. The activities were virtual which allowed us to have professional speakers in different areas of geology and bring basic courses to our members, including mining modeling and Python lessons.

Academic activities have returned in hybrid mode. The SGA UIS Student Chapter is committing to its members the proposal of a return of face-to-face talks, mainly oriented to the identification of ore minerals, alteration minerals and the rock characteristics.

Field trips

To accommodate the large number of members for the 2021 term (99 members), a number of field trips to mining projects throughout Colombia have been planned. Visits have been carried out mostly to the gold project in the Vetas - California mining district, with the presence of the Minesa mining company during the years 2019 and 2020. The outputs of the current year have been developed following all the guidelines of the government's sanitary measures.

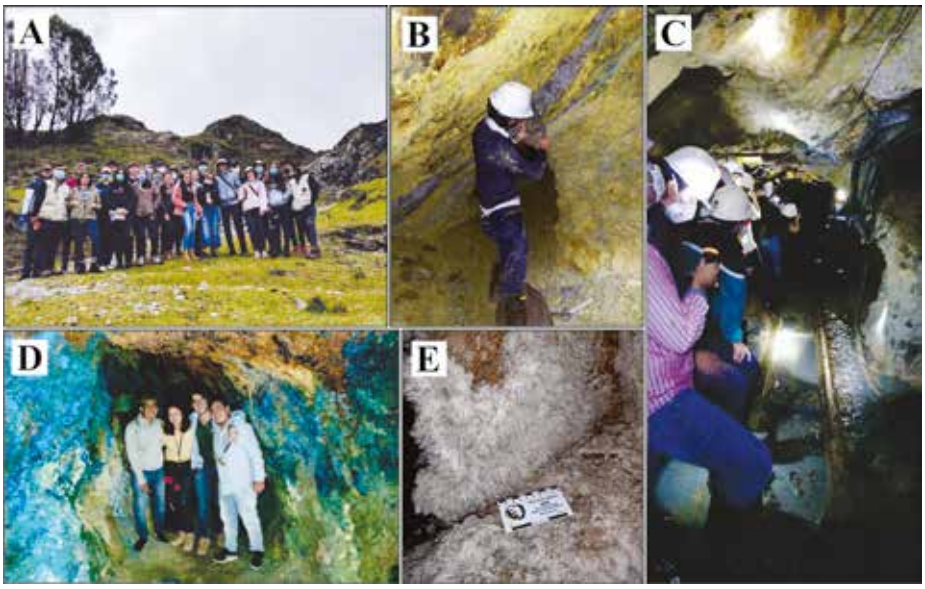

Fig. 2 Field trip participants in Vetas - California mining district. (A) Participants of the field trip in marble quarry; (B) President SGA UIS Chapter in vein containing pyrite, native gold and chalcopyrite; (C) Our group of members in the Reina de Oro mine; (D) and (E) Copper sulfates in abandoned exploratory and extractive operation

The four field trips carried out in the Vetas - California mining district and the Santurbán Paramo made it possible to identify and describe the outcropping lithologies in the Santander Massif, hydrothermal alteration, as well as some marble deposits of economic importance (Fig. 2). The legal gold mining projects visited correspond to the Reina de Oro mine and the Elsy mine, in which a significant variation is observed in the way ore minerals occur (the grains of gold are included in silicates and sulfides, and how this directly affects the operation of the beneficiation plant. As part of the environmental responsibility education, illegal operations developed in the same mining district were inspected, which made it possible to contrast mines that follow the quality standards according to Colombian law and those whose operations lack social and environmental responsibility.

Abandoned exploratory and extractive operations allow the formation of copper sulfates with colorful colours in shades of green, white and blue (Fig. 2 D,E).

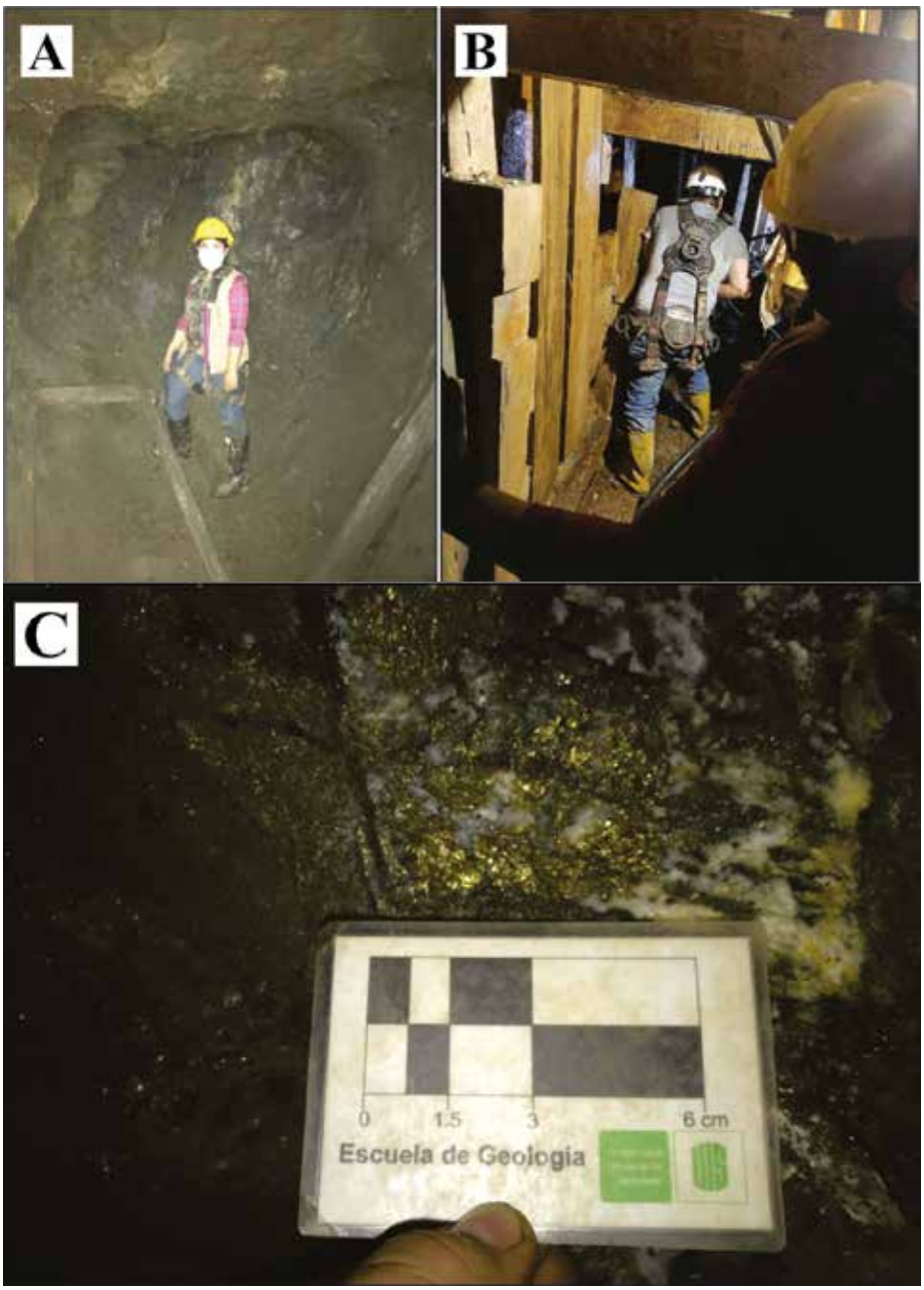

Fig. 3 Field trip participants and mineralization in Sarco Mine. (A) Mine front; (B) Tunnel and support; (C) Hydrothermal vein containing pyrite, galena and chalcopyrite

The copper sulfates are mainly calcanthite and brochantite according to the scanning electron microscopy analyses carried out in the Microscopy Laboratory of the Guatiguará Technology Park. The genesis of these copper sulfates is related to processes of infiltration and oxidized waters that transport and crystallize minerals in tunnel walls, sometimes forming as stalactites and stalagmites.

The SGA UIS Student Chapter made a visit to the Sarco mine, a gold project located in the Department of Bolívar, in Serranía de San Lucas and with access road from the municipality of Santa Rosa. The deposit is considered by different authors as an Intrusion Related Gold Deposits, which consists mainly of fractures filled by iron sulfide (pyrite), galena, milky quartz and to a lesser extent chalcopyrite, with a marked sericitic alteration of the granodioritic host (Fig. 3). Some areas have a high degree of fracturing, such that mine support is important to develop an operation with optimal quality and safety standards. The average values reported reach 100 g/t of Au and 34 g/t of Ag, considering data from different mine fronts. Field activities, as well as the first face-to-face meetings, have been carried out in compliance with safety measures to prevent the spread of COVID-19.

Back to the Nancy SGA Student Chapter's activities

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Fig. 1 Poster of the event, "Geologists in unexplored territories"

Fig. 2 Photograph of a gallery from the Varangéville salt mine

The Nancy SGA Student Chapter was created in 2013 to enable geology students to access several activities dealing with economic geology and mineral deposits. Since its creation, the Student Chapter frequently organised conferences, speeches and field trips through France and Europe mainly. The board members are mainly constituted of MSc and PhD students in order to be active and dynamic, to develop their network and to keep a continuance from year to year. Hereafter are listed some of the key events performed during the last years with some of them typical of the Student Chapter.

An annual event well-known as, "Geologists in unexplored territories" was created in 2013 and has become a tradition through the years in Nancy. Once a year, two researchers present their field trip experiences obtained through the years in different parts of the world. This annual event consists of stimulating exchange between researchers and students from all disciplines, other researchers and any person interested to take part in this event. Last year, Yoram Teilter (Postdoc, Georessources, Nancy) and Patrick Ledru (Chair Orano, GeoRessources, Nancy) discussed their respective expeditions in French Guiana, New-Caledonia and Canada among others (Fig. 1).

The Nancy SGA Student Chapter took part in the organisation of several international workshops including the "Recent advances in W-Sn and rare metal deposit metallogenesis" in Nancy (2016) and the "Orogenic gold workshop" in Karlsruhe (2019, Germany). These workshops allowed students to discover the academic world from another point of view and to make contact for future projects and internships.

The former president of the Nancy SGA Student Chapter for the academic year 2019-2020, had the opportunity to participate in the PDAC convention in Toronto, Canada. As a result, the Student Chapter has been active in the booth of the University of Lorraine to expand the network of the chapter.

Co-organized with the ORAGE program (Observatoire Régional des Affleurements Géologiques de Lorraine) dedicated to the preservation and valorisation of Lorraine's regional geology, the Varangéville salt mine visit allowed 24 persons to discover the last operating mine in metropolitan France. After discussing the mine plan and the mining approach through decades since its opening in 1855, visitors had the chance to follow a tour in mine galleries down to 160 m underground (Fig. 2). The visit ended with a warmly received lunch that allowed exchanges with the salt mine geologists and employees.

Since its creation, the Nancy SGA Student Chapter organized each year a one-week field trip to discover the geology and the mining history of different regions in Europe. In that respect, field camps have already been performed in Bretagne (France), in Mts Velence and Mts Tokaj (Hungary) and in the Lavrion area (Greece). The last field trip organised by the chapter took place in Morroco and enabled students to discover various base metals, PGE and phosphate deposits hosted in numerous geological domains (Fig. 3). During this one-week field expedition, the students started with the visit of the Draa Sfar VHMS deposit operated by the Managem group. This deposit is hosted within various Hercynian volcano-sedimentary rocks (e.g. black-shale, siltstone, sandstone, lava

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The former president of the Nancy SGA Student Chapter for the academic year 2019-2020, had the opportunity to participate in the PDAC convention in Toronto, Canada. As a result, the Student Chapter has been active in the booth of the University of Lorraine to expand the network of the chapter.

Co-organized with the ORAGE program (Observatoire Régional des Affleurements Géologiques de Lorraine) dedicated to the preservation and valorisation of Lorraine's regional geology, the Varangéville salt mine visit allowed 24 persons to discover the last operating mine in metropolitan France. After discussing the mine plan and the mining approach through decades since its opening in 1855, visitors had the chance to follow a tour in mine galleries down to 160 m underground (Fig. 2). The visit ended with a warmly received lunch that allowed exchanges with the salt mine geologists and employees.

Since its creation, the Nancy SGA Student Chapter organized each year a one-week field trip to discover the geology and the mining history of different regions in Europe. In that respect, field camps have already been performed in Bretagne (France), in Mts Velence and Mts Tokaj (Hungary) and in the Lavrion area (Greece). The last field trip organised by the chapter took place in Morroco and enabled students to discover various base metals, PGE and phosphate deposits hosted in numerous geological domains (Fig. 3). During this one-week field expedition, the students started with the visit of the Draa Sfar VHMS deposit operated by the Managem group. This deposit is hosted within various Hercynian volcano-sedimentary rocks (e.g. black-shale, siltstone, sandstone, lava and tuff) that belong to the southern part of the Jebilet massif (Belkabir et al. 2008). The group has been able to reach a depth of 400 meters to observe and describe the mineralized quartz-pyrrhotite extension veins hosted within black-shale (Fig. 3a). The students were also able to study drill core in order to discuss lithologies, hydrothermal alteration, ore assemblages and structural analyses with the geologists in charge of the project (Fig. 3b). The next day, a field expedition was organized within the Anti-Atlas area with Amina Wafic (Prof. Cadi-Ayyad University, Marrakesh, Morroco) with a focus on the formation of the Bou-Azzer inlier and its relation to the geodynamical history of the Atlas Belt. A cross-section through the Bou-Azzer ophiolites allowed students to observe various lithologies (e.g. gabbro, serpentinite, dykes and basaltic pillow-lavas) marking the transition between the mantle to the oceanic crust (Fig. 3c). The following day was dedicated to the visit of the Bleida Cu mine, located 320 km south-east to Marrakesh. This deposit is hosted by mafic and intermediate volcanic rocks metamorphosed under low-grade greenschist facies conditions and belonging to the upper part of the Bou-Azzer ophiolite sequence (Belkabir et al. 2008). The copper mineralisation consists of chalcopyrite closely-associated with secondary quartz veins, silicification and sericitisation. The group has been able to observe the open pit during mining activity to discuss about regional geology and ore-bearing structures (Fig. 3d). The final stop before the end of the field trip was within a phosphate-rich prospect hosted by the Gantour basin and owned by the OCP group. After a brief presentation and discussion about the deposition of the late Cretaceous-early Eocene marine sedimentary rocks that host the phosphate ores, the group went directly to the open-pit at Ben Guerir to observe the lithologies and the mining activity (Figs. 3e and f).

Fig. 3 Photographs of the different places visited during the field trip in Morroco. a) Extension veins filled by a quartz-pyrrhotite assemblage at the Draa Sfar VHMS deposit. b) Margarita Melfou is logging drill cores at the Draa Sfar mining site. c) Key outcrop marking the transition between mantle and oceanic crust and its schematic interpretation. d) Open pit in activity from the Bleida copper deposit. e-f) Open pit in activity from the Ben Guerir mining site

The association has contributed to the scientific and cultural formation of Nancy students thanks to the SGA and every contributor that helped us through the years. Therefore, the Nancy SGA Student Chapter board members would like to acknowledge them and will surely continue to organise happenings focused around geology and mineral resources.

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SGA Student Chapter Peru

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A brief history of our chapter

The SGA student chapter in Peru brings together 81 SGA student members from 11 Peruvian universities where geological sciences are taught. During 2013, the Peruvian student chapter was founded by initiative of students from the National University of Engineering (UNI), National University of San Marcos (UNMSM) and the SGA Regional Vice-President. From 2014 onwards, students from other local universities joined the Chapter. Currently all the Peruvian Geological Schools are represented at the chapter by its student delegates.

Current activities and future plan for 2021

Due to the impact of the Covid-19 pandemic, most activities and events planned for 2021 have been to be canceled or substituted by virtual courses and conferences through our Digital Platform of Mineral Deposits (PDYM, in its Spanish acronym). So far, this year we carried out 26 conferences (available at https://www.pdym.org/) and one short course, "Green Rock Environment", led by Dr. David Cooke (CODES, University of Tasmania).

We have planned a program of activities for the last quarter of 2021 that includes conferences and talks at the Digital Platform of Mineral Deposits and a course on "Indicator Mineral Methods as a Tool for Mineral Exploration". We are also planning for a 2021 National SGA Student Chapter Meeting to be held during December.

We hope to return to normality to continue strengthening links among our members through face-to-face activities.

We welcome local and international SGA students to visit our social media: Facebook, Instagram and LinkedIn, where our events and activities are continuously updated.

SGA News

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SGA Colombia - Bogotá: Adopting the COVID-19 Pandemic as an opportunity to diversify knowledge

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The SGA Bogotá student chapter was founded in 2016, in the Department of Geoscience of the University of Colombia, Bogota with one objective, to help the student community exchanging knowledge related to mineral deposits and economic geology. Before the COVID-19 pandemic, we organized conferences and on-site courses, some of which were given by professional members of the chapter such as Mateo Espinel, who gave the last course called "Manejo de datos geoquímicos orientados a la exploración mineral". When the pandemic began, many aspects changed abruptly, thus, we structured a well-prepared team of dedicated student volunteers with the goal of helping the students from other semesters to assimilate the virtuality and improve their professional qualities. During this period, we had to modify the work plan that was based on weekly meetings and conferences to learn about mineral deposits with the support of Professor Thomas Cramer's mineralogical collection (see https://sites.google.com/unal.edu.co/coleccionmineralunalbog-gegema/pagina-principal). Our interest is to create a geological community that supports each other academically and professionally.

On the other hand, board members launched some research projects with the sponsorship of the chapter and the university´s PGP project which enrich their professional training and could be part of divulgation activities within and outside the student chapter and inspire other members to the same thus creating a larger network of knowledge. One actual project study a metamorphic body called the Neis de Termales associated with the Guaviare complex located in the southeast of Colombia, in the Guaviare Department, which shows evidence of regional metamorphism but still lacks petrological studies. With the support of the chapter and the university, different methods of analysis such as cathodoluminescence, petrographic analysis, DRX, RAMAN, mineral chemistry in microprobe (EPMA) are being used for the study (Fig. 1).

Fig. 1 Raman analysis for the PGP project

Fig. 2 Presential Mineralogy course

Fig. 3 Palaeontological Museum, Boyaca Field Trip

During this unpreceded time of the pandemic, we managed to continue with the lectures virtually using the different meeting platforms. Also, to motivate and help the first-year students that started the undergraduate program remotely, we created a small program called "Jóvenes aprendices en geociencias" which consisted of small interactive talks of basic geological knowledge, from mineralogy to tectonics. In addition, we offered together with another chapter three different courses given by professors and people from the industry, with around 100 participants each. The first course, called geological drawing, was a guide for sketching different geological structures by hand, given by Professor Luis Naranjo. Then, in the second course, the main objective was the use of GIS programs in geosciences, and it was taught by Ph.D. student Fabian Saavedra. Finally, the last course, titled "Taller Análisis de datos geoquímicos multielementales: Conceptos y práctica aplicada.", had the scope of teaching the students the use of the software ioGAS™ in different scenarios of ore deposits.

Additionally, a virtual cycle of mineralogy lectures was carried out, in which the different mineral groups were explained by some graduates and members of the chapter (identification, potential ores, uses). One goal was to prepare the geology students at our university for a meeting about mineralogy, although in the end, different universities participated. In the mineral meeting, we used our mineral collection as well as personal collections from the hosts and from professors to educate our fellow students. This activity stimulated the new students to participate in our chapter and created an antecedent for activities in the context of the pandemic applying the proper health measures (Figure 2).

Furthermore, led by student Juan Felipe Correa, a small one-day field trip to the Eastern Cordillera was made to the "Quebrada San Francisco" near Bogota where first semester students joined the chapter and went for the first time on a geological field trip where they were taught basic fieldwork tools such as the use of the Brunton compass, location on the map, describing a rock, making correct annotations in the field notebook. The field trip was conducted under relevant safety protocols and was well received by several students who still support us in the chapter.

Another 2-days field trip centred on sedimentary rocks and palaeontology allowed also focusing on their uses in the construction industry. We travelled to the Boyaca Department, known for its extensive record of the Cretaceous, making some stations along the main road from Bogota to Villa de Leyva, among them a 50-m outcrop of an important angular discordance between the Devonian and Cretaceous. In Villa de Leyva, known as an important fossil site, we visited the paleontological museum which is managed by our university. The trip finished with a visit to, copper occurrences near Chiquinquira led by Luis Mahecha whose B.Sc.-thesis was about this possibly Sedex-Cu-deposit. Here we collected some well-crystallized samples of siderite and sulfides like sphalerite and chalcopyrite (Fig. 3).

Finishing this report, we want to emphasize that it is amazing to see how geosciences could get together good-hearted and great dreamers, and currently, SGA Bogota's team is decided in carrying out a social function in which mineral deposits are a mechanism to arise interest and motivate more members of the community to lead a scientific life and thus improve our society.

SGA ULaval-INRS Student Chapter, Quebec, Canada

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Founded in 2016, the SGA ULaval-INRS student chapter is currently represented by 15 graduate and undergraduate students. Since its establishment, the student chapter has been engaged in promoting short courses, national and international field trips and participating in the organization of local student conferences. Due to the outbreak of COVID-19 and ensuing restrictions, all activities planned for 2020 had to be cancelled. These included the annual international field trip and the short courses typically organized at conferences. However, to keep the student chapter active, we have maintained our meetings and short talks online, in addition to preparing new activities to host after the pandemic. In this report, we summarize the main activities that were done from 2016 to date.

Fig. 1 Core observations of the plug No. 4 ore zone of the Lamaque Sud project with Luc Théberge (Integra Gold Corp)

Short Courses and Conferences

Every year the SGA Ulaval-INRS student chapter organizes short courses in local conferences related to economic geology and mineral exploration such as Xplor in Montreal and Quebec Mines in Quebec City. In addition to bringing speakers from different areas of study, the short courses are one of our most important fund-raising activities, which help support the field trips. Among the participants are students, academics and industry professionals alike.

National and International field trips

Between 2017 and 2018, the SGA Ulaval-INRS student chapter have been to United States and Spain, besides of national field trips.

Niobec Mine Visit, Canada (March 3rd, 2017): Located in Saint-Honoré, QC, the Niobec Mine has produced niobium since 1976. The deposit is hosted in a carbonatite, dated between 565-582 Ma. Following a brief presentation of the installations and an introduction to the uses of niobium, Guillaume Matton and Marc Lavoie led a group of 7 students underground to show the geology of the mine and the associated metallurgical aspects. Niobium is mainly found as calc-sodic pyrochlore [$(Ca,Na)_2(Nb,Ti)_2O_6(OH,F)$] and columbite [$(Fe,Mn)(Nb,Ti)_2O_6$]. These minerals are concentrated along nicely bedded carbonatite units exhibiting red apatite-rich beds alternating with calcite-rich beds, and containing xenoliths of syenite. Niobium-rich zones form elongated lenses of complex shapes.

Abitibi Metallogeny Field Trip, Canada (March 26-30, 2017): The Abitibi greenstone belt, the largest greenstone belt in the world (310 km × 720 km), is located in western Quebec. This greenstone belt host major VMS deposits, Ni-Cu-PGE magmatic deposits and orogenic gold deposits. The field trip was a great opportunity for students to learn about the geology of major mining camps such as the Central Noranda, Doyon-Bousquet-LaRonde and Val d'Or camps. Two advanced exploration projects, the Horne 5 project (Falco Resources Ltd.) and the Lamaque project (Integra Gold Corp; Fig. 1), were visited. In addition, the group met geologists from the MERN (Ministère de l'Énergie et des Ressources naturelles) to learn about mapping programs (Jean Goutier, Patrice Roy and Anne-Marie Beauchamp) and quaternary geology (Hugo Dubé-Loubert).

Arizona-Nevada-Utah, USA (May 2017): Nine students from ULaval-INRS Student Chapter participated in a fifteen-day field trip to Arizona, Nevada and Utah visiting mines, exploration projects and geological sites. The field trip itinerary was built to cover a wide variety of deposit types such as porphyry, epithermal, skarn and Carlin-type gold. The objectives of the trip were to learn about regional and local geological settings and the factors that contributed for the metallogeny of this region. Moreover, the students had the opportunity to visit many mines such as Round Mountain open pit mine (Au-Ag epithermal, Kinross; Fig. 2), the Marigold open pit mine (Carlin Au, Silver Standard), the Cortez underground mine (Carlin Au, Barrick) and the Midas underground mine (epithermal Au, Klondex mines), as well as experience the daily life of exploration and mining geologists and environmental management in the mining industry.

Iberian Pyrite Belt, Spain (May 2018): Four students participated in a fifteen-day field trip in the Iberian Pyrite Belt, Southern Spain (Fig. 3). The Iberian Pyrite Belt was chosen because it hosts a large variety of deposits including VMS, skarn, epithermal,

Fig. 2 Student chapter members in the open pit of Round Mountain mine, an Au-Ag epithermal deposit, Nevada

Fig. 3 The Magdalena mine, Cu-Zn-Au deposit (VMS), Spain

nickel-chromium, strontium and mercury deposits. The main objectives were to acquire firsthand knowledge about the economic geology of southern Spain through guided visits by local industry and academic personnel; to visit mining districts, underground and open mining operations; to learn about ore deposit geology, exploration methods and mining, as well as get to know different types of mining infrastructure and the machinery used; to understand the impact of mines on the environment and the population, in addition to learning about mining waste management methods and environmental rehabilitation techniques.

Currently, the student chapter is organizing a one-day field trip to Portneuf region, located at 100 km west of Quebec City, to visit Montauban-des-mines, an inactive, highly metamorphosed gold-rich VMS deposit that was exploited between 1914 and 1990.

In addition, the student chapter is planning the annual 15-day field trip that will take place in Newfoundland, Canada, in May 2022. Newfoundland hosts several deposits types, which include VMS, epithermal, MVT and orogenic gold deposits. The island offers a remarkable transect through platform carbonates, ophiolites and accreted arc terranes of the northern Appalachians. It is also undergoing a modern day staking rush for gold following the recent discoveries of high-grade epizonal orogenic gold systems along major structural breaks.

The North-West Russia SGA student chapter

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Fig. 1 The first chapter line-up in the Karelia field trip in 2017. Photo by E. Eremenko

The North-West SGA student chapter was founded in 2017 by active students from various geological institutes of Saint-Petersburg (Saint-Petersburg State University, Mining University, VSEGEI, VNIIokeangeologia, IPGG RAS), Moscow (IGEM RAS, MGRI) and Voronezh (Voronezh State University). During these years more than 40 students were a part of our chapter under the guidance of two presidents: Yulia Beznosikova (2017) and Eugeniy Eremenko (2018-2021) and the advisement of Dr Olga Yakubovich. Nowadays, the core staff is based on students of Saint-Petersburg University and consists of 10 active members.

The main activity of our chapter during the last five years was the organization of a series of field trips within the European part of Russia, which covered a wide variety of deposits. Locations visited are magmatic, hydrothermal, sedimentary and supergene ore deposits:

- Layered intrusions of Monchegorsk, Kola peninsula
- Kovdor alkaline-ultramafic and carbonatites massif, Kola peninsula
- Khibiny alkaline massif, Kola peninsula
- Lomonosov kimberlite deposit, Arkhangelsk
- Vorontsovskoe gold deposit, Middle Urals
- Iovskiy and Nizhniy Tagil dunite-clinopyroxenite massifs (Ural-Alaska type), Middle Urals
- Volkovskoe deposit of Cu-Fe-V ores, Middle Urals
- Berezovskoe gold deposit, Middle Urals
- Platinum placers of Is-Turinsk river system, Middle Urals
- Visokogorskoe Fe-skarn deposit, Middle Urals
- Mednorudyanskoe deposit of malachite, Middle Urals
- Axtinskoe siderite deposit, Southern Urals
- Zolotaya Gora gold deposit, Southern Urals
- Karabash filed VMS deposits, Southern Urals
- Kusinskiy titano-magnetite deposit, Southern Urals

And some other smaller ore-bearing localities and rocks of the basement and sedimentary cover of the Russian platform, such as Salminskiy rapakivi granites and related cassiterite deposit, Janisjarvi impact crater and Linnavara ceramic pegmatite deposit (Karelia); Yartsevskiy bauxite and Pikalevo limestone deposit (Leningrad district), Porokxovskoy tungsten deposit and famous kopi of the Urals (Ilmen natural park), Southern Urals, etc.

Below is a short review of the most interesting events that our chapter took part in.

In September 2018, we organized a week-long trip through Kola Peninsula, in which members from the Siberia and Baltic SGA Student Chapters joined us. The Kola Peninsula geology is represented by alkaline, ultramafic and metamorphic rocks. Throughout the trip we visited a number of locations in the west of the peninsula, including a famous Khibiny Mountains, where different resources, such as apatite, nepheline, mica, iron ore, copper and nickel, have been mined for years.

Excursions took place through mountain landscape in the area of Lake Small Vudyavr, Mount Takhtarvumchorr and in the Blue Lakes and Pyrrhotite gorges. We had a great opportunity to observe molybdenite excretions in albitites, huge crystals of phlogopite, alkaline pegmatite with “aegirine bombs” - unique formations composed of aegirine radiating aggregates with crystals of milky white analcime in the center. Besides this, we noticed the unique Tinguaita dyke rocks, which have unusual “tortoise” textures and beautiful green color. It is believed that the Tinguaita with such a texture was found only in two places: the Tingua Mountains in the province of Sierra de Tingua (Brazil) and the Khibiny massif.

The participants of the excursion, including geological students from Poland and Finland, showed genuine interest in the geology and mineralogy of such a unique feature and selected a number of representative mineral samples.

Fig. 2 Visit to the Vorontsovskoye gold deposit quarry in 2019. Photo by Polymetal International PLC

Fig. 3 Chapter members in the excavator bucket in Pikalevsky Alumina plant in 2021. Photo by S. Kalashnikova.

In September 2019, our chapter organized a trip to Middle Urals to get acquainted with geology of platinum-bearing ultramafic belt. The group consisted of 18 people, including students from the Baltic chapter. During the field trip we observed different types of mineralization (predominantly, platinum and gold) in mafic and ultramafic rocks. Also, we had a great opportunity to explore placers on the first stages of their formation. Overall, we visited 8 deposits and 2 museums.

Among all the deposits that we visited each was unique in its own way. The Serebryanskiy Stone massif impressed us with the presence of titanomagnetite ore and copper-sulfide-titanomagnetite mineralization with Au-Pt-Pd specialization. Also, we visited the Vorontsovskoye gold deposit located in the Tagil zone of the Northern Urals and developed by Polymetal Company. Another location was the Iovskoye dunite-clinopyroxenite body located high in the Northern Urals Mountains. The massif is well exposed and we were able to observe relationships between different types of rocks, specifically dunites, clinopyroxenites and chromites. Then we observed a karst failure served as a natural enrichment facility for Quaternary placer formation of platinum on the Kamenyushka river. Next, we had an opportunity to see copper-sulfide ores with gold and PGE mineralization in the Volkovskoye deposit, located near the Nizhniy Tagil city in the Middle Urals. The Vysokogorskoye Fe-skarn deposit was observed by our group as well. Thick layers of magnetite and titanomagnetite ores represent mineralization there. Moreover, at the old Mednorudyanskiy deposit we observed azurite, malachite and iron. The last location visited was the famous Berezovskoye gold deposit, where we observed a metasomatized granite rocks in mine at a depth of 600 m.

In October 2021, our chapter organized a field trip in the north-west part of Russia. The main aim of trip was to observe aluminum and diamond deposits. The group consisted of 9 members of our chapter. We visited 3 deposits and Northern (Arctic) Federal University named after M.V. Lomonosov and went to several geological locations.

We started our trip with an excursion to the natural monument "River Ragusha", which is located 29 km from Boksitogorsk town. We saw early Carbon organogenic and clastic limestones. Next stop was Yartsevskiy bauxite quarry. Its bauxites formed as a result of laterization of Devonian clay rocks. Also, we visited the Vostochniy quarry which was developed by Pikalevsky Alumina plant. We got acquainted with the technological process of limestone extraction. After that, we moved to Arkhangelsk. We visited Northern (Arctic) Federal University named after M.V. Lomonosov there, where we learned about lab equipment and academic research. Then we observed explosion pipe "Kurtyaevo" which is composed of olivine melilitites and two mineral springs in Kurtyaevo. And in the end of our trip, we visited diamond deposit named after M.V. Lomonosov which consists of four pipes. Senior geologist Ilya S. Zezin guided us to two quarries and we went to the lowest stage of the Karpinsky-1 quarry, where we were able to see kimberlites. Factory staff showed us stages of diamonds mining and ore preparation. In addition, we had an opportunity to look on the collection of recently mined diamonds.

We are grateful to mining companies for letting us visit their operating mines: Polymetal (Vorontsovskiy mine), Eurochem (Kovdor mine), Severalmaz (Lomonosov mine), PGLZ (Rusal; Pikalevo mine), UMMC (Volkovskoe mine), Uralgeodragmed (Mostovaya placer) and Berezovskiy mine. We are also thankful for geologists who had helped us to organize these field trips and were our guides: P.V. Pripachkin, E.L. Kunakuzin, S.Yu. Stepanov, R.S. Palamarchuk, V.V. Mikhailov, V.V. Melnikov, N.B. Belenkov, V.A. Popov, I.S. Zezin, T.N. Zorenko. Academic institutes that provide us with support are the Zavaritskiy Institute of Geology and Geochemistry UB RAS (Ekaterinburg), the Geological Institute, the Kola Scientific Center RAS (Apatity) and the Institute of Precambrian Geology and Geochronology RAS (St. Petersburg), and personally E.V. Anikina, D.A. Zedgenizov, S.V. Krivovichev, N.E. Kozlov and A.B. Kuznetsov are highly acknowledged. We are grateful to K.V. Chistyakov, Director of the Institute of Earth Sciences, Saint-Petersburg State University for the constant financial support of our SGA activities. Special thanks to the St. Petersburg State University Alumni Association for their support.

We are very grateful to the SGA for the financial support and opportunity to visit various types of deposits. We look forward to meeting other SGA chapters representatives at our future SGA events!

Society for Geology Applied to Mineral Deposits Student Chapter Turkey

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Fig.1. Group photo of partipicants of colloquium

Fig.2. Group photo of our speakers at the end of the colloquium

Fig. 3. Prof. Dr. Georges Beaudoin giving his talks

The SGA Turkey Student Chapter was established in 2017. We are interested in economic geology, mineral deposits and mineralogy as well as further economic application of geologic research. The aim of our chapter provides a basis to link students interested in economic geology with professional geoscientists in industry, academia and government. Our first organization, Colloqium, was held at the Pamukkale University in the city of Denizli on 14 April 2019. 70 participants joined the Colloquium. Most of the attendees were undergraduates, MSc and PhD students; the remaining participants were from mining companies (Fig. 1). There were six keynotes talks given by; Prof. Dr. Jorge Manuel Rodrigues de Sancho Relvas from the University of Lisbon, Portugal; Dr. David Huston from Geoscience Australia; Dr. Sven Petersen from Geomar Helmholtz Centre-Germany; Dr. Karen Kelly from USGS, USA; Dr. David A. Banks from Leeds University-UK; and Prof. Dr. Georges Beaudoin from Laval University-Canada (Fig. 2). We would like to acknowledge SGA support via the Keynote Speaker Program.

There were no in-person workshops, meetings or field trips in the last 2 years because of the pandemic. The online lectures are a very flexible opportunity for high-quality talks from around the world during that time. Thus, we aim to keep our ideas and plans to create more online-based events and field excursions in 2022.

The 2021-2022 officers of the student chapter are: Fatih Özbaş (President), Oktay Canbaz (Vice-President), Taylan Akın (Treasurer), Hüseyin Kocatürk (Secretary) and Halil Atan (Social Chair).

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The Rapid Uplift of the Black Forest – Alpine Chapter

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An Unexpected Collision

Metal rich collisions usually begin well-grounded on the Earth's surface but for this chapter's ore deposits story, fluids started moving 31,000 feet above the Atlantic Ocean. Two strangers sat oblivious to the other. One perused a paper on the way to SGA Quebec in 2017 and the other glanced over, eyes caught by oddly familiar columns and intersecting lines on a laptop screen. This stranger quickly realised those intersecting lines were none other than the stock-work of a volcanogenic massive sulfide deposit! It was in this moment that Malte Junge turned to face this stranger, Alannah Brett, beside him and asked, "Are you going to the SGA conference in Quebec?" As you can imagine this quickly developed into a discussion of VMS deposits and exclamations of enthusiasm for the ROV videos from Malte's latest IODP cruise. Just like an ore deposit, a special series of factors are required to start a student chapter, especially one between three universities and two countries. This momentous and unexpected collision started as founding members Malte Junge, Alannah Brett, Tom Belgrano and Lisa Richter shared a taxi into downtown Quebec, set for the adventure of the SGA 2017 Biennial Conference.

Uplift Commences

The conference was a huge success at connecting young scientists and shortly after an inaugural chapter meeting took place in November 2017. It saw the naming of the Black Forest – Alpine Student Chapter, that connects geoscience students at Karlsruhe Institute of Technology (KIT), the University of Freiburg and the University of Bern. Malte Junge and freshly voted first chapter president Tom Belgrano lead the group to scramble down the medieval ladders of the Schauinsland mine (Fig. 1a). Students delved into the hearth of the orthogneises inspecting hydrothermal fluorite-barite-quartz veins with silver-rich galena and sipping a local and well needed warming schnapps at the end (Fig. 1b).

Fig. 1 Medieval ladder in Schauinsland mine. b) Inaugural chapter members outside the Schauinsland mine, Schwarzwald, Germany

With this starting momentum, rapid uplift ensued and mixing of hydrothermal ingredients intensified over the next year; all essential components for ore deposit chapter formation. Chapter members co-organised and participated at the Exploration Geology short course in March 2018 with guest lecturer Hartwig Frimmel. Then the chapter ran its first field trip to the Harz region in May 2018 and visited the famous Kupferschiefer (Fig. 2a) and the Rammelsberg mine in Germany led by Larryn Diamond and Lisa Richter. In June with the retirement of two of Switzerland's great ore geologists Chris Heinrich and Lluis Frontboté, the chapter co-organised an Ore Deposits Symposium at the University of Bern with a special beer brewed by President Tom Belgrano to celebrate the two incredible careers and coasters to go with them (Fig. 2b). In October 2018 the chapter organised a one-day Seafloor Resources workshop by Sven Petersen, after which the Annual Chapter Meeting voted in the new President, Lars Wihanto along with Vice President Alannah Brett and planned out an exciting program for 2019. With visits from members of the North-West Russia Chapter and Columbia-Bogota Chapters to Freiburg, the first year of the Black Forest – Alpine Chapter concluded, which provided a steady build-up of metalliferous concepts in the minds and hearts of student chapter members.

Growth to new heights

After a solid first year of orogeny and member mobilisation, the chapter charged upwards (and eastwards), into the Erzgebirge region for a six-day field trip led by David Dolejs and Lisa Richter in June 2019. The group of 16 explored the mines for uranium in Svornost (Jachymov; Fig. 2c), skarn & fluorite-barite mineralisation at Pöhla (Fig. 2d), Lithium in Zinnwald (Fig. 2e), Ag-bearing veins in Reiche Zeche and Li-rich drill core from Sadisdorf greisen. This was a fantastic trip, which culminated with a grill with the Freiberg SEG chapter.

The Orogenic Gold Workshop organised by the chapter in November 2019 at KIT brought collaboration with the Nancy SGA chapter and keynotes from Jochen Kolb, Ferenc Molnar and Anne-Sylvie André-Mayer, plus many more fantastic speakers over the 2 day event, with ~60 attendees (Fig. 3a) and plenty of samples (Fig. 3b)! As this workshop drew to a close the

Fig. 2 Kupferschiefer outcrop in the Harz district. b) Student chapter drink coaster. c) Chapter members at the Svornost mine, Jachymov entry where Marie Currie worked. d) Green garnet skarn at Phola mine. e) Quartz and zinnwaldite (Li-mica) vein at the Zinnwald mine

Chapter elected its new committee; President Alannah Brett, VP Simon Hector and Treasurer Ludwik de Doliwa Zeilenski and made plans to lead a field trip to the mines and outcrops of Finland in 2020. Little did the new committee know what erosive challenges were ahead for the fellowship of mineral minded chapter members and the world.

An erosive stage gives way to a cupola of hope

The rapid uplift of the chapter ground to a halt in March of 2020. The Finland field trip quickly eroded and although a back-up trip was planned to the metamorphosed VMS and orogenic gold deposits of Aosta Valley in northern Italy, it was soon clear that the chapters mountain building phase had reached a plateau. Although welcome beers for the new influx of students in February had just been held, the lockdowns that descended led to period of self isolation and a real difficulty to connect with new chapter members and keep existing members involved.

What a difficult time it has been, but with this erosive stage, the chapter president (Alannah Brett) and one past chapter president (Tom Belgrano) searched for the cupola of hope. They found it in co-founding Ore Deposits Hub (ODH). ODH grew much larger and faster than expected, a global collaborative effort between early career volunteers and the main economic geology societies (the SGA, SEG and IAGOD) but the project had roots in the collaborative and educational spirit of the SGA chapters.

As nearly 100 talks on ODH funnelled through the 2020 timewarp, the Black Forest – Alpine chapter stayed in a somewhat dormant state. Plan after plan was truncated by the difficulties of uncertain travel and need for people to manage the

Fig 3 a) Attendees at the Orogenic Gold Workshop held in KIT 2019. b) Workshop attendees looking at samples from Finland. c) Malte Junge experiencing a magnetic attraction with Cyprus, 2021. d) Chapter members past and present looking for the next field trip stops, Cyprus, 2021

basic challenges of pandemic life, home office and work-life balance. With adaptations to the semi-lockdowns that continue and Zoom communication the chapter has initiated monthly meetings to begin to re-build momentum. Over the summer of 2021 students and postdocs presented on what it is like to do a PhD in ore deposit geology and on the building of Ore Deposits, to chapter members, new students and members from the Geneva SEG student chapter. An exciting first in person contact was made in August 2021 when the Geneva SEG student chapter visited Bern to hear about the Oman VMS project, see VMS samples and explore the historic Bern old town, as they made their way up to their main field trip in Freiberg.

Re-connecting with the feeder zones

Re-connection of chapter members has begun and the committee is hopeful to plan a solid campaign of field trips and workshops for 2022, as well as continued virtual events to connect the students of the three universities. Simon Hector will be the new Chapter president and has just been exploring VMS and their feeder zones on Cyprus (Fig. 3c,d) to prepare a field trip for the Chapter in 2022. In build-up to this trip the chapter plans to run a seafloor workshop exploring felsic and mafic, seawater versus magmatic systems, alongside the Journée Metallogenic one day conference on ore deposits next spring in Switzerland.

After the unexpected collision and rapid uplift of the Black Forest – Alpine chapter and the erosional challenges of the past year and a half, chapter members are excited to go out and explore the rocks and hydrothermal connections, as well as making the most of our essential albeit hard leant virtual connectivity skills.

SGA Brazilian Student Chapter: Prospecting our pathway

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Fig. 1 Participants of the Workshop during the regional field trip

Fig. 2 Participants of the Workshop in gold panning practice

The SGA Brazilian Student Chapter was founded in 2018 by Alexandre Raphael Cabral and Francisco de Abreu, future advisers of the chapter and long-time members of SGA. They invited students interested in mineral deposits to join the SGA and found the Brazilian student chapter. This way was born the first board of the chapter.

The first event promoted by the chapter was the 1st SGA Brazilian Student Chapter Workshop that took place on September 9-12, 2019, in Ouro Preto, Minas Gerais, Brazil. Ouro Preto is one of the most important gold-mining centres in Quadrilátero Ferrífero, being also of great relevance in the history of Brazil. It is not by chance that the theme of the workshop was gold mineralisation in the Ouro Preto region. It was hosted by the School of Mines of the Universidade Federal de Ouro Preto (UFOP) and sponsored by SGA and AngloGold Ashanti.

The workshop program began with theoretical lectures on regional geology of the Quadrilátero Ferrífero and the different types of gold mineralisation in the region. The theory was supported by field trips contemplating regional stratigraphy (Fig. 1) and styles of gold mineralisation in old galleries and mines from the colonial period. The participants were even taught how to make pan concentrate in the river bed (Fig. 2). The field trips were guided by two professors, Alexandre Raphael Cabral, from Universidade Federal de Minas Gerais and Maximiliano Martins, from UFOP.

The highlight of the workshop was the short course of underground mapping (Fig. 3), which had its practical part held at the historical Veloso mine, currently a tourist attraction in Ouro Preto. The course was voluntarily taught by experienced geologist Diógenes Vial (Alkmine).

Fig. 3 Participants of the Workshop in one of the practical classes of the underground-mapping short course held in Veloso mine

The event was a providential opportunity to introduce the SGA Brazilian Student Chapter to the Brazilian geological community.

In 2020, we were affected by the Covid 19 pandemic, which made us postpone the plans for the second workshop. We focused on further developing the social media channels, increasing interaction with the public interested in the sciences related to mineral deposits. During this period, we even performed a live interview about the occurrence and particularities of the imperial topaz, a gem typical from the state of Minas Gerais.

Still in 2021 we are planning to publicize some virtual field trips, as face-to-face events are not yet safe. The idea is to publish a guide in audiovisual format with all geological and locational information for different kind of experiences. Will attend to those who want to travel without leaving their homes, but also for those who want to organize and carry out the field trip in the way they feel safer to do it.

The change of management was also postponed due to the pandemic, but soon we will have our first change of board, which makes us very excited about the new challenges.

Introducing the newly shuffled UK SGA Student Chapter Committee

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Owing to a shuffle around in leadership and the UK attempting to come out of the other side of the pandemic and adjust to a new normal, the UK SGA Student Chapter has had a fairly uneventful couple of months.

We've had a change in presidency – our previous president is now writing up his PhD thesis (good luck Lewis!), and so has passed the duties on to me, a fresh new PhD student still full of hope. I am going to introduce our new committee.

President: Me, Lauren Tuffield (she/her), a first year PhD student at the British Geological Survey with the University of Leicester. I went on fieldwork to Lesvos in Greece in August and am now tied to the lab trying to get all sorts of geochemical analyses sorted out on the rocks I collected. My PhD is looking at post-subduction Cu-Au porphyry systems in the Aegean in Greece, using zircon U-Pb dating and zircon and other accessory mineral geochemistry. I like cycling and masquerading as a brass player in brass bands (I play the flute).

Vice President: Our outgoing President, Lewis Banks (he/him), PhD student at the British Geological Survey with the University of Leicester. He is now tied to his desk writing up his PhD thesis, now that he finally finished his data collection. His PhD is looking at improving isotopic and trace element ICP-MS techniques for application to ore genesis and exploration.

Secretary: Rose Clarke (she/her). Rose is a PhD student at the University of Leicester, looking at post-subduction magmatism and mineralisation in the Tuvatu gold deposit in Fiji, focussing on "critical" elements such as Te, Pt and Pd. She has a knack for organising conferences and meetings, outreach, education and loves doing so.

Treasurer: Dr. Ed Bunker (he/him), a recent PhD graduate from the University of Bristol. Ed studied porphyry copper deposits in Chile, specifically the Spence mine in the Atacama Desert. Ed now works at CGG as an exploration geologist. He is excited about how his work and skills can be linked to industry and can have an impact on normal people's everyday lives.

Webmaster: Inja Thijssen (she/her), a PhD student at the British Geological Survey with the University of Bristol. Inja is in charge of making the website look good and making sure it functions correctly, lots of computer hocus pocus! Inja is studying Archean porphyry deposits, which has taken her on fieldwork to Australia and Finland. In her spare time Inja enjoys hiking up hills and around UK coastlines.

Industry Representative: Dr. Jo Miles (she/her), recent PhD graduate from the British Geological Survey and the University of Bristol. Jo's PhD research was on the hydrothermal systems of Milos, Greece, and she now works for LKAB in Kiruna, Sweden, at the iron ore mine as an exploration geologist. Living in Lapland means that very soon on 11th December there will be no daylight at all and skiing to work is definitely an option.

Industry Representative: Tom Skiggs (he/him), Project Geologist at Rio Tinto. Tom did his MSci at the University of Southampton, his masters thesis looking at the formation and evolution of the Sao Joao do Piaui Ni-laterite deposit. He is now responsible for the technical oversight of the Enonkoski joint venture project with FinnAust Mining PLC, targeting magmatic Ni-Cu sulfides. He follows cricket closely, especially test cricket, I'm more a T20 and The Hundred fan myself!

That concludes the summary of our committee members, and in the coming months we are organising more events, fieldwork, and maybe even meet up in person if that's even possible!

Please keep an eye out on our website (www.sgastudent.co.uk), Twitter (@uk_sga) or Facebook pages for announcements.

SGA Student Chapter Côte d'Ivoire: Overview and Activities

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Fig. 1 Members of the SGA Student Chapter Côte d'Ivoire with Supervisors after a meeting

Fig. 2 Exploration mapping training field trip at Toumodi, Côte d'Ivoire

The SGA-Student-Chapter-Côte d'Ivoire (Fig. 1) was created on April 23rd 2019 with the support of Dr. Ghislain Tourigny (Vice-President Sub-Saharan Africa of SGA). To date, it consists mainly of students and early career geologists from the University Félix Houphouët-Boigny in Abidjan. Its management is ensured by Sahy Anthelme VEH (President), Ziandjêdé Hervé Siagne (Vice-president), Wilfried Digbeu(Secretary) and Koffi Joseph Brou (Treasurer). The Ivory Coast section was set up to promote geosciences related to mineral deposits. Due to the pandemic, we were unable to organize activities during 2020. Thus, the following activities marked its evolution. These were carried out during the last semester of 2019.

1. Field trip – mineral exploration mapping (August 21st-23rd, 2019) – Toumodi, Côte d'Ivoire.

The aim of this activity was to strengthen the professional mapping ability of the participants. It permitted the learners to become more familiar with geological mapping techniques. This campaign consisted of traveling through Toumodi and its surrounding area to find outcrops and to describe them (Fig. 2). The final step in this work was the creating a geological map of the area covered, according to the data collected in the field. This training lasted 3 days, the first day was devoted to theoretical training on the concepts of mapping and the last two days were spent in the field, devoted to practice with our trainers and their many years experience.

2. 6th SGA African metallogeny short course (October 28th – November 1st, 2019)

It has been a few years since this type of short course was introduced. For its sixth year it was held in Côte d'Ivoire at the National Polytechnic Institute Houphouët-Boigny in Yamoussoukro (Fig. 3). The implementation of this event was made by the cooperation between SGA, LMI-Minerwa and the SGA-student-Chapter-Côte d'Ivoire, as members of the organization committee. Thus our Chapter was given some tasks (logistics, badges, notebooks,

field trip) in the organization of the short course. Thanks to Dr. Tourigny and Dr. Ohrberger for allowing our Chapter to participate actively in this event. The main theme was "Gold Deposits: From Exploration to Mining".

3. Academic and field research tools seminar (November 29th, 2019)

This seminar was initiated within the framework of strengthening the knowledge of geology students regarding structural geophysics and the precautions to be taken when presenting research work. The three modules discussed during this seminar were as follows:

- Geophysical data interpretation;
- Preparation of figures and powerpoint for presentations of research works;
- The use of smartphones or tablets in the field.

It was therefore a boon for the students to better understand the methodology for geophysical data interpretation, and also to improve the presentation of their research work. They also discovered a lot of very useful software in geology that can be used in the field with their smartphones.

Fig. 3 6th SGA African metallogeny short course at INPHB Yamoussoukro, Côte d'Ivoire

Acknowledgments

The SGA-Students-Chapter-Côte d'Ivoire would like to thank SGA and the Geology department of UFHB (University Félix Houphouët-Boigny) for their support. Also thanks to Drs. N'Guessan Nestor Houssou (Lecturer & Mining geologist - FHB University of Abidjan), Fossou Jean-Luc Hervé Kouadio (Lecturer & Mining geologist - FHB University of Abidjan) and Lenka Baratoux (IRD, Géosciences Environnement Toulouse, France) for their assistance.

SGA Mobility Grant

Open for Application
The 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.

SGA Moscow student chapter – a brief summary of 2019–2021

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Fig. 1 SGA chapter members, PhD A.V. Lalomov (IGEM RAS) and local geologists (mining company "TITAN"), Ti-Zr placer deposit Centralnoe (Tambov region)

Fig. 2 SGA chapter members on the slope of the Karabash massif, Southern Urals

The Moscow student chapter was founded in April 2019 and consists of 31 young scientists from 4 organizations: Institute of geology of ore deposits, petrography, mineralogy and geochemistry Russian academy of sciences (IGEM RAS), Schmidt Institute of Physics of the Earth of the Russian Academy of Sciences (IPE RAS), Central research institute of geological prospecting for base and precious metals ("TsNIGRI") and Lomonosov Moscow State University (MSU). The academic advisors are Elena Amplieva, IGEM RAS and Evgeniy Naumov, "TsNIGRI".

The main aim of the Chapter is to combine students and young scientists of the Moscow region who share common professional interests and goals in the field of economic geology and mineral deposit research.

Since its foundation, the Moscow chapter has held 5 field trips and explored several geological objects of different ore regions of Central Russia and South Urals.

In 2019 our chapter had already explored unique objects of the Kursk Magnetic Anomaly (KMA) –giant iron-ore basin - during the first field trip. The Kursk Magnetic Anomaly (KMA) – the giant anomaly, for which strange properties is called "Earth's Third Magnetic Pole". The field trip was organized with JSC "Stoilensky GOK" and Voronezh State University. The iron-ore basin covers the territories of the Kursk, Belgorod and Oryol regions in the south-west of Russia—160,000 square kilometers in total. Vast deposits of iron ore, considered to be the largest in the world—30 billion metric tons or almost 4% of the world's proven reserves. The ores are magnetite quartzite disseminated throughout metamorphic rocks and Pre-Cambrian granitoid. The open pit method is used to mine these ores at the Stoylenskoye, Lebedinskoye and Mikhailovskoye deposits. Underground mining methods are also used, but are less effective.

The second field trip of 2019 was the expedition "Mineral deposits of Central Russia" in collaboration with The Russian Geographical Society (RGO): we visited Ti-Zr placer deposit Centralnoe and The Lukoyanovsky deposit - the largest resource of zircon in Russia. Ti-Zr placer deposit Centralnoe (Tambov region) is a horizontal layer of quartz-glauconitic ore sands containing fine grains of zircon, rutile, ilmenite, etc. Ore sands, except the main ore minerals (ilmenite, rutile and zircon), contain phosphorites, kyanite, garnet, glauconite, quartz and gold. Centralnoe ranks #3 in the world on rutile reserves (Fig. 1). The Lukoyanovskoye deposit located 180 km south of Nizhny Novgorod is among five the largest titanium and zirconium placer deposits in Russia. Its confirmed reserves of ore-bearing sands are 30 mt and the inferred resource exceed 100 mt. The Itmanovskaya placer is the richest one at Lukoyanovskoye deposit and its ore-bearing sands have one of the highest titanium and zirconium grade in Russia. Reserves of the placer are about 1 mt of titanium (in ilmenite, rutile and leucoxene) and over 350,000 tons of zirconium oxide (in zircon). These reserves will satisfy the needs of the nuclear industry for many years to come.

Fig. 3 SGA chapter members near the spoil tip of the Chelyabinsk coal mines, Southern Urals

The Moscow chapter had a field trip to the "Gypsum deposit Bebyaevskoe" in September 2020. Young scientists visited the Bebyaevskoye gypsum deposit, the Peshelan gypsum mine and the underground museum of mining, geology and speleology and the Bornukovskaya Cave stone-cutting factory.

The Bebyaevskoye gypsum deposit is located near the village of Bebyaevo in the Arzamas district of the Nizhny Novgorod Region. There are six known deposits of gypsum and anhydrite in the Nizhny Novgorod Region: Annenkovskoye, Bebyaevskoye, Gomzovskoye, Ichalkovskoye, Novoselkovskoye and Pavlovskoye. Mining and production of gypsum at the Peshelan mine began in 1933. Currently, the Peshelan Gypsum Plant (LLC "PGZ") produces gypsum with a very high content of calcium sulfate. The Bornukovskaya Cave stone-cutting factory is located in the village of Bornukovo, Buturlinsky District, Nizhny Novgorod Region. The stone-cutting industry has existed here since the middle of the 19th century, the raw materials for it were mined not far from the village, in the vicinity of a cave on the banks of the Piana River.

In April, 2021 we organized a 4-day field trip "Mines and open pits of Southern Urals". The main ore object was the Karabash ore field. The most famous ore deposits are the Zolotaya Gora Au-deposit and Karabashs VMS cluster. The Zolotaya Gora consists of 6 mineralized ore zones, host rocks – rodingites (Fig. 2). Geological and industrial development of the territory began in the middle of the 18th century and is associated with the discovery of deposits of oxidized iron ores. At the beginning of the 19th century, gold and silver were found and mined in gossan and barite sands, which were part of the oxidation zones of Karabashs VMS deposits. In the 20st century, the mining of pyrite ores began here and an enrichment plant and copper smelters were launched.

In addition, the Karabash ore region is also known as an ecological disaster zone. The source of pollution is the processing complex for copper ores and copper concentrates. Chapter members visited the Sak-Elga river valley, which suffered from uncontrolled discharges of the tailings from the mining of Karabash sulfide ores.

Young scientists visited Taganay National Park. It is a system of mid-mountain ridges. On the territory of the park, there are mines and mineral deposits of Ural gems and collection stones, deposits of mica, brown iron ore, noble minerals and the Nadezhdinsky and Evgrafovsky copper mines. The Tesminskoye and Taganayskoye iron ore deposits are located in the spurs of the Ural ridge.

Members of the SGA chapter in collaboration with the International student's school "Metallogeny of ancient and modern oceans" took part in a geological excursion to the burnt spoil tips of the Chelyabinsk Coal Basin (Fig. 3). The Chelyabinsk Coal Basin is located in the Chelyabinsk Region in the form of a strip from the Techa River in the north to the Uy River in the south, parallel to the Ural ridge. There are 7 known coal-bearing regions in the basin. The mining of coal deposits was carried out by open and underground methods with the accumulation of overburden, waste from mines and processing plants in the form of spoil tips. The waste contains fine carbonaceous matter and small amounts of sulphides, mainly pyrite. Spontaneous oxidation of coal spoil tips occurs when it interacts with atmospheric oxygen with the release of heat. Spoil tips at the Chelyabinsk coal mines have been subjecting to high-temperature (> 1000°C) processing for several decades. Spontaneous combustion usually manifests itself in the form of flameless combustion of the material. Two burnt spoil tips of mines No. 45 and Yuzhno-Kamyshinskaya mine and ammonia technogenic "fumarole" field of the Kamyshinsky section of the Chelyabinsk Coal Basin were visited during the excursion.

In June, 2021 members of the Moscow chapter visited an ancient limestone deposit not far from Moscow. The central part of the Eastern-European platform has different deposits of construction materials. Limestone is very common in architecture, especially in Moscow's Kremlin, because the first walls and towers of the Kremlin were built from white limestone. The unique characteristic of this rock is that it contains uranium mineralization. The local geological guide was the head of a small stone-cutting craft. They produce samples from local siliceous rocks. Young scientists sampled siliceous rocks and took souvenirs from the excursion.

The Moscow student chapter organizes the annual School for Students and Early Career Scientists "New Knowledge of Ore-forming Processes". Usually, more than 100 students and young scientists from above 50 universities and scientific organizations of Russia, Ukraine, Belarus, Uzbekistan, Azerbaijan, Kazakhstan, Czech Republic and the USA take part in this meeting. Members of all Russian SGA student chapters participated in the 9th School for Students and Early Career Scientists in 2019.

The program of the School includes lectures by leading specialists and experts in the study of ore deposits; oral and poster presentations by young geoscientists, students and PhD students. At the end of the School, the authors of best reports are awarded prizes and special prizes, as well as recommended for publication in the journal "Geology of Ore Deposits" (Russian and English versions).

Members of Moscow chapter from "TsNIGRI" organizes of the Youth scientific and educational conference "Mineral Resource of Diamonds, Precious and Base Metals — from Forecast to Production".

The Moscow chapter is grateful to the SGA for financial support, and we are always glad to cooperate with other chapters.

You can find us on Facebook https://www.facebook.com/sga.student.chapter.moscow and Instagram @sga_student_chapter-moscow.

SGA Ural Student Chapter

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Fig. 1 The Konzhak-Serebryansky rock massif. Photo by E.Shagalov

The SGA Ural Student Chapter (http://sga-ural.com) is founded in 2019 and comprises three regular and eight student members from 4 Institutions: the Institute of Geology and Geochemistry, Institute of Mineralogy and Institute of Metallurgy of the Ural Branch of the Russian Academy of Sciences and the Ural State Mining University. We represent two Ural cities – Ekaterinburg and Miass (Russia).

The Urals is a model example of epioceanic orogens, a folded belt, in which large masses of igneous rocks of both mantle and crustal origin are combined. Due to its geological nature, the Urals provides the widest opportunities to study the processes of ore mineralisation and the exploration and exploitation of economic mineral deposits.

Our activities include conferences and workshops for students and young scientists devoted to the different aspects of geological and mineralogical research, from metallogeny to archaeological mineralogy and analytical methods.

The conferences supported by the SGA Ural Student Chapter include:

- The All-Russian Conference for Young Scientists with international participation "Minerals: structure, properties, methods of investigation" (Ekaterinburg, Russia). The conference is devoted to the relevant issues of crystal chemistry and mineral typomorphism; the structure and physico-chemical and technological properties of minerals; the computational modelling of mineral structure and properties. Much attention is drawn to the latest advances and applications of physical methods of investigation of mineral structure and composition, in particular, X-Ray diffraction, spectroscopic (optical, vibrational, ESR, Moessbauer, etc) and microscopic (SEM, TEM, AFM, etc) studies, as well as the methods of chemical and isotopic analysis;
- The All-Russian conference with international participation named after Victor V. Zaykov "Geoarchaeology and archaeological mineralogy" (Miass). The conference is aimed to represent the modern mineralogical and geochemical methods of historical raw material (ores and rocks) analysis and paleometallurgy, the prospecting and ancient mining. The conference is intended to coordinate and improve a multilevel training of scientists in archaeology, geology and mineralogy; to develop partnerships between young scientists and archaeological and mineralogical organisations in Russia and foreign countries;
- The All-Russian Conference for Young Scientists with international participation "Ural Mineralogical School" (Ekaterinburg). The conference is devoted to the issues of mineralogy and petrography of the Ural Region and bordering with Ural territories.

Since the SGA Ural Student Chapter is affiliated to the Institute of Geology and Geochemistry UB RAS, it has the access to the "Geoanalitik" shared research facilities of the IGG UB RAS. The "Geoanalitik" shared research facilities is an interdisciplinary research centre with up-to-date analytical equipment and a variety of analytical techniques providing quantitative information about chemical (elemental and isotope) and phase composition, the crystal and electronic structural parameters and the optical properties of minerals, rocks, soils, sediments, ores and products of their enrichment, as well as synthetic compounds, anthropogenic and biogenic objects (http://eng.igg.uran.ru/?q=node/22). The cleanroom facilities of the "Geoanalitik" include the class 10000 (ISO7) and 1000 (ISO6) rooms and 100 (ISO5) laminar boxes for instrumental isotope measurements by MC ICP-MS and TIMS and chemical preparation and chromatographic purification of the samples. The re-equipment and comprehensive development of the "Geoanalitik" shared research facilities of the IGG UB RAS is financially supported by the grant of the Ministry of Science and Higher Education of the Russian

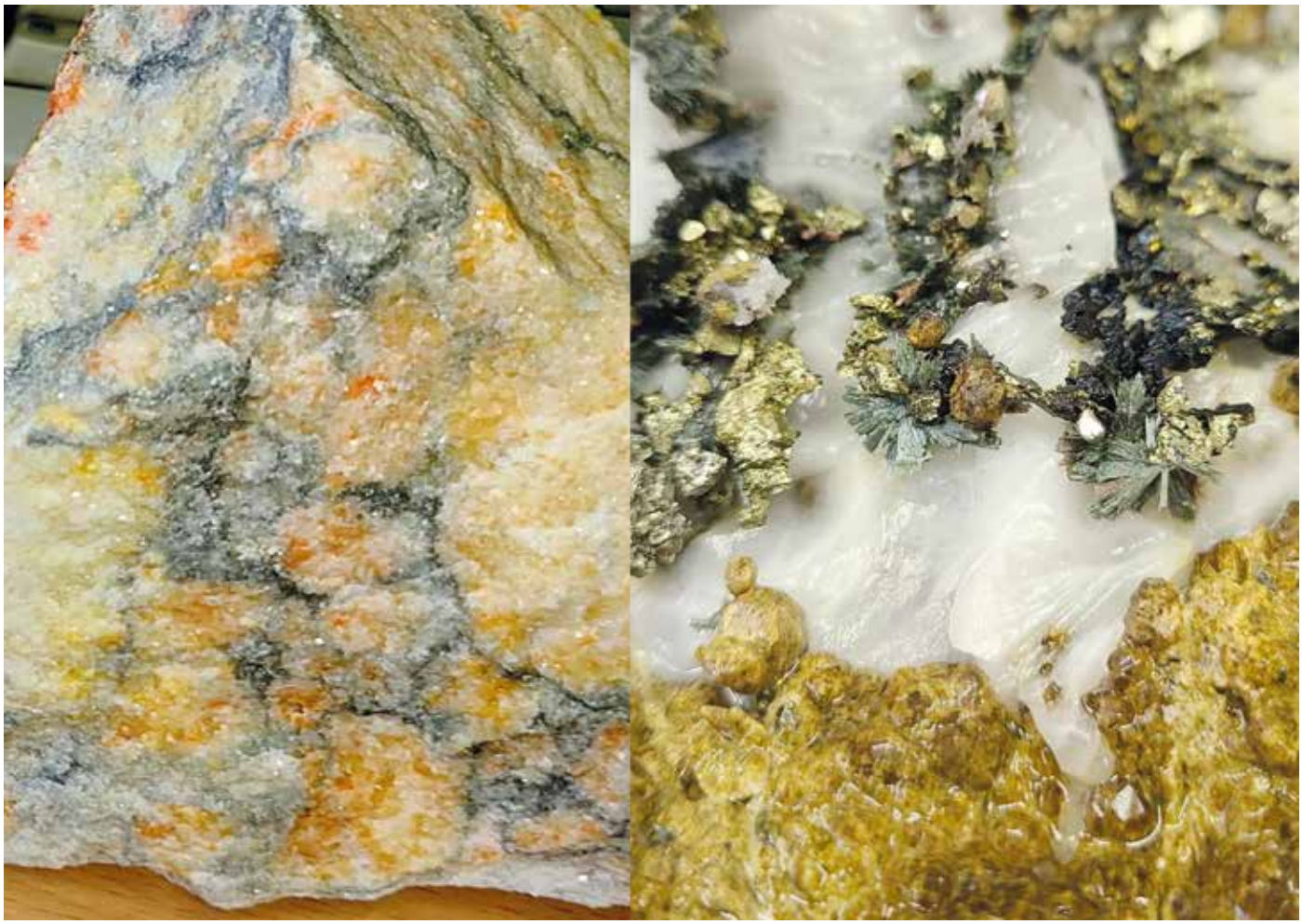

Fig. 2 Marble breccia with realgar and orpiment, the Vorontsovskoe gold deposit (left); skarn with druse cavities filled with the crystals of grossular, pyrite, chalcopyrite, radial fibrous hedenbergite and calcite, the Severopeschanskoe deposit (right). Photo by E. Shagalov

Federation (Agreement No. 075-15-2021-680). The SGA Ural Student Chapter participates in the SGA Mobility Grant programme and encourages the scientists to benefit from using the "Geoanalitik" shared research facilities of the IGG UB RAS to contribute to their research.

The first field trip of the SGA Ural Student Chapter was held in June, 2019 after the 10th Anniversary Geoscience Conference for Young Scientists "Minerals: Structure, Properties, Methods of Investigation", which was hosted by the IGG UB RAS (Ekaterinburg, Russia). The field trip included a visit to a large number of genesis-specific deposits and mineralisation points of the Ilmenogorsky-Vishnevogorsky alkaline complex (IVC) and the Kusa-Kopan stratified intrusion of the Bashkir meganticlinorium, Southern Urals. On the "Pyataya (5th) versta" corundum deposit in the area of Kasli town, discovered by A.P. Karpinsky in 1883, the kyshtymites (unique corundum-blue sapphire-bearing variety of anorthosites) were found. Besides the "5th versta" deposit, some more blue sapphire mineralisation points within the IVC were demonstrated, e.g. in the metasomatites of meta-ultramafic host rocks on the territory of the Ilmen State Reserve (Miass), where sapphire crystals could be found in the micaites of Mine No. 418. The striking representative of granitoid pegmatite veins cutting the Ilmenogorsky alkaline massif was Mine No. 242 with the crystals of aquamarines and topazs as well as the small crystals of blue beryls and picturesque graphic (Hebraic) granite.

Acquaintance with the early history of the Urals continued at the Urals largest Kusa-Kopan stratified intrusion, where the discrete massifs of gabbroids are assumed merged at depth into a huge ultramafic-mafic layered massif with the colossal reserves of titanomagnetite and chromite ores. The geological section of the Kusa titanomagnetite-ilmenite mine is represented by feldspar amphibolites, in which two steeply falling veins of titanomagnetite are explored (Shagalov et al. 2021). The field trip ended with a visit to the alkaline pegmatites of the "Shpat" mine at the Kurochkin Log site located in the middle of the Vishnevye Mountains range and the quarries with carbonatite veins of the Vishnevogorsky deposit with rare-metal mineralisation, where pyrochlores and zircons were collected by the participants.

During the pre- and post-conference fieldtrips of the Ural Mineralogical School in 2020 and 2021 the attendees visited a number of precious metal deposits across the Middle and Northern Urals. The pre-conference one-day field trip was devoted to the first gold ore deposit in Russia – the Berezovskoe deposit, where participants went down to the Severnaya mine and got acquainted with the underground mining processes, took samples of metasomatites and gold-sulphide quartz veins. On the same day, the attendees visited gold placers along the Pyshma River associated with the Berezovsky ore field, one of which was mined by the last dredge in the Urals launched in the 1930s.

The fieldtrip to the Northern Urals started with the classic platinum deposits of the Tagil massif followed by the visiting of the exploited gold-platinum placers on the Mostovaya River, where the participants experienced the mining processes of placer deposits: did manual gold panning, controlled the hydraulic monitor and observed the process of removing precious metals

Fig. 3 Ural Mars(the Poldnevsky site of the Troitsko-Bainovsky deposit of refractory clays). Photo by D. Kiseleva

(gold and platinum) from mining screens. At the Kytlym hyperbasite complex, the attendees examined the development of the Iovsky dunite deposit of high-purity dunite with a minimal degree of serpentinisation and took a look at the ancient copper mines of the Serebryansky gabbro massif. The Serebryansky Kamen' (Silver Stone) is the mountain in the Konzhak-Serebryansky rock massif, some parts of which are recognised as natural monument (Fig. 1).

Several dozen deposits of iron, copper and gold are concentrated within the Auerbakh (Krasnoturinsk) ore region. The Severopeschanskaya iron mine in the Vorontsovka settlement works the Peschanskoye magnetite ore deposit. In November 2010, the asphalt pavement of the main highway to Ekaterinburg from the side of the Severopeschanskaya mine cracked and faulted due to the ore mining located at a depth of about half a kilometer under the road. Initially, the length of the fault crossing the road diagonally was 5 m and the depth was 40-50 cm, though increasing over time. The samples of calcareous skarns with the crystals of grossular, hedenbergite, pyrite and chalcopyrite were collected on the spot (Fig. 2, right).

After that, the participants moved to the quarry and dumps of the Vorontsovskoe gold deposit. The Vorontsovskoe gold deposit has been discovered in 1985 and has calculated reserves of approximately 30 tons of gold, including the off-balance reserves. Some researchers consider the Vorontsovskoe gold deposit to be a peripheral zone of the porphyry copper system; others classify it as magmatic-hydrothermal type or attribute the deposit to the Carlin type. Several types of ores associated with various types of alteration have been identified within the Vorontsovskoe deposit, such as calcareous gold-magnetite-sulphide skarns, quartz-sericite, jasperoids and other alteration types, supergene alterations as well as gold-pyrite-realgar breccias (Stepanov et al. 2020) (Fig. 2, left). Native gold in the breccia ore type associated with thallium and mercury sulphosalts distinguishes the gold mineralisation of the Vorontsovskoe deposit from all previously known gold ore localities in Russia. Eight new mineral species were recently discovered at the Vorontsovskoe gold deposit, in particular: clerite, vorontsovite, ferrovorontsovite, tsygankoite, gladkovskyite, luboržákite, pokhodyashinite, gungerite and auerbakhite.

Another one-day fieldtrip to the town of Asbest included the visit to the Bazhenovsky chrysotile-asbestos deposit, one of the world's largest industrial deposits of asbestos. It is located within the Bazhenovsky ultrabasic massif. In total, 27 asbestos-containing ore bodies are explored at the moment, with the total length of the quarries of 11 km and a width of 1.8 km and a depth of up to 310 m. In the Bazhenovsky massif, rodingite bodies are of the greatest mineralogical interest. To date, the list of minerals from the rodingites of the Bazhenovsky deposit includes 37 names; in particular, the druses of grossular, vesuvian crystals, rare calcium silicates, etc are found in rodingite dikes. The first mineral finds in the Urals include: artinite, brugnatellite, gerhardite, hydroxyapophyllite, hydrotalcite, godlevskite, devilline, xonotlite, likasite, pyroaurite, plombièrite, rosenkhanite, stevensite, schorlomite and some others. Finally, the participants had an impressive view of the blasting operations at the quarry.

During the one-day post-conference fieldtrip to Bogdanovich the participants of the "Minerals…-2021" conference visited the Ural Mars (the Poldnevsky site of the Troitsko-Bainovsky deposit of refractory clays) and enjoyed its alien landscapes (Fig. 3). It occupies a quarry area of about 75 km2 and is the largest in the Middle Urals. The deposit is confined to the Lower Cretaceous continental formations. The clay is kaolinite with mica admixture with colourless grains of quartz, sericite, chlorite, as well as pyrite, marcasite, spherosiderite, rutile, ilmenite and other minerals. In quarries one can find crystals and intergrowths of gypsum, pyrite and marcasite nodules, coalified wood and sulphide pseudomorphs.

Besides the vast geological agenda, several outstanding Ural museums are being visited almost every time during fieldtrips. They include the Natural Science Museum of the Ilmen State Reserve (Miass), one of the few geological and mineralogical reserves in the world. The Museum currently holds 30,000 items, with about 9,000 of them on display. Besides mineralogical collections, the Museum possesses one of the Russia's largest biological dioramas. The "Shtufnoy (Ore) Cabinet" Museum (Severouralsk) is the result of the work of a team of enthusiasts under the leadership of Mikhail Tsyganko, whose collection gave impetus to the emergence of this wonderful museum with minerals collected all over the world, where the most significant importance is given to the samples from the deposits of the Northern Urals.

The historical Ural landmarks are sure not to be missed, such as the visit to the "Old Demidov Plant" Eco-industrial technopark in the town of Nizhny Tagil, or to the Leaning Tower of Nevyansk.

Our future plans include more joint field trips with SGA student chapters across Urals and Russia. You all are cordially invited to participate!

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About SGA-SEG Student Chapter – La Plata, Argentina

Fig. 1 Student Chapter members with the Cordillera de la Sal, San Pedro de Atacama, behind

Brief history of the chapter

The Student Chapter of UNLP was officially founded in 2002 by undergraduate students and PhD students of the geologic sciences from the Universidad Nacional de La Plata (National University of La Plata), Argentina, who are currently professors at the university.

The student chapter started being sponsored by SEG and worked that way for so many years until 2019 when, after a talk given by Dr. Ariana Carrazana Di Lucia in our faculty and in the framework of our student chapter, she introduced us to the Barcelona SGA SEG Student Chapter (at that time she was the president) and told us about its activities and work dynamics. The Barcelona student chapter had been supported by SGA and SEG for some time, something we had not previously considered. Days after Dr. Carrazana's talk, we were already in contact with the people of the SGA and were processing the student chapter with double support!

Currently, we have been bringing together undergraduate and PhD students interested in economic geology and mineral exploration with professionals related to the industry for almost 20 years and for that, we have the support of our academic advisor, Dr. Diego Guido and our industrial advisor, Mr. Silvio Franco.

About the members

The chapter is currently composed of the following members:

Morena Pagola as president. She is in her first year as a geological doctoral student, she started her activity in the chapter in 2017 when she was studying geology at our university. Dr. Diego Palma as vice president and secretary. Diego finished his geological doctoral studies at the beginning of this year. He started his activity in the chapter as an undergraduate student in 2012. As treasurer of the chapter, we have Amanda Galar, she is in her third year as a doctoral student in geology. She has been part of the chapter since 2019.

We also have several members who are undergraduate students of geology at our university, some of them are Alejandro Toloy, member since 2015; Valetin Pozzi, member since 2019; Franco Marelli and Lucas Rolando, members since 2020.

Most relevant activities in recent years

At the beginning of 2020, in the context of the pandemic, we organized the "1st Virtual Ibero-American Meeting of Student Chapters", where more than 20 Student Chapters from all over America and Spain participated. At the meeting we exchanged experiences, ideas, advice and as a result, WhatsApp and Facebook groups were created where we shared activities, information, contacts and we remain permanently connected.

Last year we had the opportunity to work together with the National Mining Secretariat, under the Ministry of Productive Development, to organize a series of talks entitled "Mining as a factor of Argentine development". The cycle was divided into several days where we talked about the technical, legal, economic, social, environmental and territorial aspects of mining.

Throughout these almost 20 years we have made several field trips. Due to the economic crisis that Argentina suffered in the last years and then the pandemic, the trip to Chile (2018) was the last one. Now, we are already planning our next field trip to be held in November 2021. In our last trip we visited the II Region in northern Chile, where important gold, silver and copper mines are located. There, we could know a Cu porphyry mine (Antucoya), a low sulphidation epithermal Au-Ag deposit (El Peñon), a high sulphidation epithermal Au-Cu deposit (Guanaco), a stratabound Cu deposit (Mantos de la Luna) and the Atacama Salt Flat which is exploited for Li and nitrate (Fig. 1). All this was possible thanks to Dr. Guillermo Chong from the North Catholic University (Universidad Católica del Norte - UCN), Chile.

Plans for the future

Our objectives for the next cycle are to carry out the pandemic-postponed trips, continue to maintain a good activity in social networks with the aim of encouraging and promoting our activities and the Student Chapter, to continue with the cycles of thematic lectures and organize short courses on Leapfrog and IOGAS programs since our older members have a lot of experience in the use of these tools.

Short course with field trip on practical aspects in mineral exploration – Senegal Chapter

Malick Faye[1], Doro Niang[1] and Cheikh.A.B.Niang[1]
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Fig. 1 Overview of the geology of the Kédougou Kéniéba Inlier (KKI) and the West African craton; drill core study

Fig. 2 Field trip, RC drilling site

Fig. 3 Group photo with African Star Team

Brief history of the chapter

A short course with field trip on the Practical aspects in mineral exploration was held from June 17 to 19, 2021 in Kédougou Kéniéba Inlier in south-eastern Senegal, led by leaders and advisors from African Star Resources and Cheikh anta Diop University.

Objectives

1. Initiate SGA students' chapter on practical aspects in mineral exploration including geological and structural mapping;
2. Allow students to gain insight into the mining environment with a mine visit;
3. Promote Geotourism and also visit of some Geotourist sites.

It brought together student members from the Society for Geology of Applied Mineral Deposit. This activity went as follows:

1st day

For the first day, an overview on the geology of Kédougou Kéniéba Inlier (KKI) and the West African craton was presented to the participants (Fig. 1). KKI is one of the country's mining areas with more than 60 million ounces discovered.

This day was completed by a study of drill core and various rocks found on the Douta project.

2nd Day

Field trip with geologists from African Star Resources. This excursion ended at a reverse-circulation ("RC") drilling site which allowed students to learn RC drilling sampling procedures (Fig. 2).

3rd Day

Visit to the Dindéfello waterfall. Dindéfello is a nature reserve, which offers a great geological, geomorphological and biological diversity. This geodiversity and the quality of the outcrops that can be observed have made this region a popular destination for field schools (Fig. 3).

Short course with a field trip on the practical aspects in mineral exploration was concluded with a

ceremony and gala dinner offered by African Star Resources.

Results

At the end of this short course, followed by a field trip, participants were reviewed on the practical aspects of mining exploration, particularly on geological and structural mapping and study of drill core.

Acknowledgements

SGA student chapter Senegal thanks the Society for Geology Applied of Mineral Deposit for financial support in order to carry out the short course.

List of participants

Malick Faye, Doro Niang, Cheikh Ahmadou Bamba Niang, Khar Leye Ndiaye, Aissata Thiam, Khadim Faye, Cheikh Boucounta Cisse, Ndeye Marame Ngom, Fatima Niang, Rose Correa

The UWA SGA student chapter – Entering the Australasian territory

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Fig. 1 The first SGA UWA student chapter executive committee. From left to right: Sumail (Vice-president), Anne Brandt Virnes (President), Maria Cherdantseva (Secretary) and Ravi Schreefel (Treasurer). Photo by Sumail

The SGA student chapter at The University of Western Australia (UWA) was established in early 2021, and we are proud to be the first to enter the Australasian scene. While we build on an already existing Society for Economic Geologists (SEG) student chapter, of which several are already present throughout Australasia, we identified the distinct lack of SGA equivalents in this part of the world. With our secretary being a former president of the SGA Siberian student chapter and the president being a former member of the SGA Baltic student chapter, it seemed only natural to initiate the expansion of SGA student chapters Down Under. We have spent this first year establishing the business infrastructure as well as promoting our chapter to both students and the broader mineral industry through UWA student club events, hosting sundowners in relation to technical talks and being present at local conferences. We even managed to pull off a one-day field trip in collaboration with the UWA undergraduate geology student club, Woolnough Society, and the UWA Edward de Courcy Clarke Earth Science Museum to the Toodyay Phantom Quartz locality. A more detailed report on this can be found in the SGA News number 49.

The combined SGA and SEG student chapter at UWA is based at the Centre for Exploration Targeting at the School of Earth Sciences and comprise our core executive committee (Fig. 1) as well as an enthusiastic group of ~ 15, mainly PhD level students and a few undergraduates with mixed SGA and SEG memberships and hailing from more than 10 different countries. Our local SGA advisors are professors Marco Fiorentini and Cam McCuaig, with Cam also representing SGA as the regional vice president of Australia and Oceania. The Australian mining and exploration industry have been very supportive in terms of sponsorships for activities organised by the previous SEG student chapter, and we continue to share that close relationship to keep organising new and exciting events. Besides disseminating ore geology knowledge and forming a link between students, academia and industry, our vision for the future is to expand our chapter to encompass all of Western Australia and collaborate with interstate and international chapters for joint conferences, talks and field trips.

As the year of 2021 has been that of setting up our chapter organisation and infrastructure anew, we did not manage to implement all our initially planned activities. However, with our annual general meeting just around the corner and the chapter infrastructure finally up and running, the upcoming executive committee is excited to get planning for a new year of fun and interesting technical talks, social events, fieldtrips and workshops. Follow us on Facebook (SEGSGAUWA) to stay up to date with our activities or get in touch with us if you want to collaborate.

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

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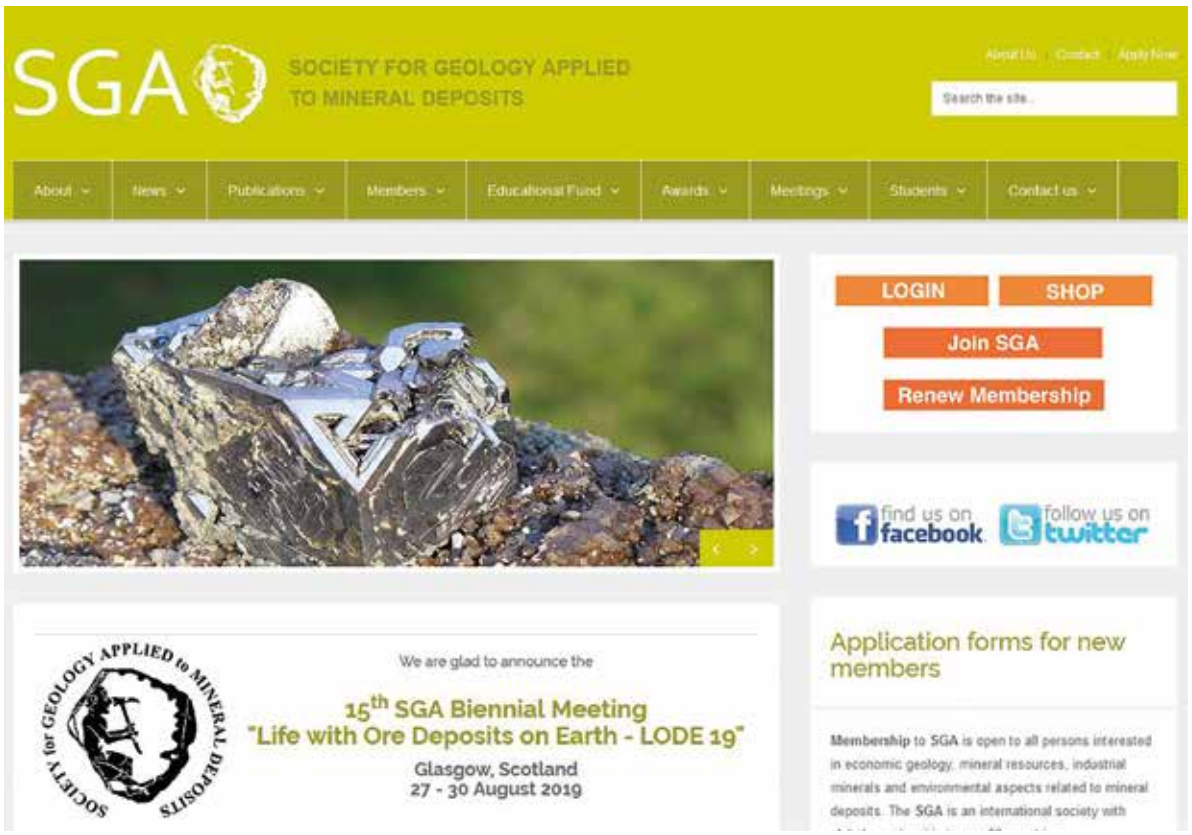

SGA
Society for Geology Applied to Mineral Deposits

New Members from March 10, 2021 until September 5, 2021

46 Student and 5 Regular Members applied for membership from from March 10, 2021 until September 5, 2021.

Student members 46:
Argentina 6
Australia 2
Canada 2
Colombia 5
France 1
Germany 5
Greece 1
Namibia 1
Nigeria 2
Peru 8
Russia 9
Sweden 1
United Kingdom 2
Zambia 1

Regular members 3:
Australia 1
Russia 1
South Africa 1
Sweden 1
United States 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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THE CRITICAL ROLE OF MINERALS IN THE CARBON-NEUTRAL FUTURE

Invitation

Welcome to the 16th Biennial Meeting of the Society for Geology Applied to Mineral Deposits (SGA) which will take place 28-31 March 2022 in a virtual conference format. The meeting will feature presentations related to the theme ***The critical role of minerals in the carbon-neutral future*** and other topics on mineral deposit research, exploration, sustainable development, and environmental and social aspects related to mineral deposits.

The oral and poster presentation sessions, pre- and post-conference short courses and online social events will provide a comprehensive programme of interest to delegates from the minerals industry, universities, research organisations, consulting organisations, service providers and governments.

The conference is organised by SGA with support from professionals in universities, research organisations, minerals industry, government, and service providers.

Programme

The programme will include oral presentation sessions (pre-recorded, streamed and available on-demand), a virtual poster gallery (with video introductions), live discussion sessions and forums, virtual networking opportunities, and pre- and post-conference short courses.

Trade Exhibition

The Trade Exhibition provides a forum for companies and organisations to exhibit their products and services. The exhibition will be run in a virtual format and feature videos and downloads, as well as facilities for person to person discussions.

Students

Students are warmly invited to present their research results at the 16th SGA Biennial Meeting which offers a great opportunity to interact with leading scientists, other young researchers and industry in an informal environment. Incentives include discounts, prizes and opportunity for SGA student members to apply for grants to offset the costs of conference registration.

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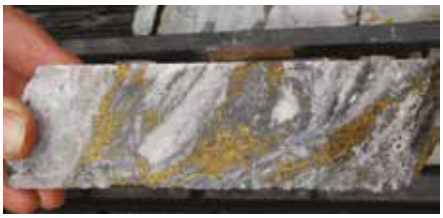

Chalcopyrite in drill core, Lala IOCG deposit, SW China. Lithium and REE are typically the first elements we think of as critical to achieving a carbon neutral future, but more mundane elements such as Cu, Ni and Co also feature high on national lists of critical materials.

Virtual Conference Format

The 16th SGA Biennial Meeting will have a virtual format with the programme designed for maximum engagement for all international time zones.

Advantages of a virtual conference:

- ✓ Low registration fees.
- ✓ No travel costs or travel time commitment.
- ✓ Pre-recorded presentations available for viewing on-demand before and after the scheduled session time in the conference programme.
- ✓ All presentations can be viewed without missing any due to concurrent session time clashes.
- ✓ Quick, informal, group networking sessions to meet other delegates.
- ✓ The ability to connect directly with other delegates via text, audio, or video call.
- ✓ Presentations and posters accessible on the virtual conference platform for one month after the meeting.

KEY DATES

9 November 2021
Online registration open

1 February 2022
Deadline for early bird registration

28 March 2022
16th SGA Biennial Meeting

FOR MORE INFORMATION CONTACT CONFERENCES & EVENTS LTD
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TECHNICAL PROGRAMME

The technical programme will have plenary sessions, several concurrent streaming sessions, discussion sessions, and a separate virtual poster gallery. The main theme for the conference is ***The Critical Role of Minerals in the Carbon Neutral Future*** and several sessions are devoted to this theme. Additionally, there are sessions on a wide range of other topics related to mineral deposit research, exploration, sustainable development and environmental and social aspects related to mineral deposits. The table below lists the topic themes and component sessions that encapsulate more than 400 abstract and paper submissions received for presentation.

Broad theme	Sub-theme	Component sessions
Mineral resources for the carbon neutral future	Critical metals including rare earth elements (REE)	Pegmatite-related critical metal deposits
		Peralkaline and carbonatite magmatism and related critical metal mineralisation
		Critical metals and base-metal ore deposits: discovery to recovery
		Supergene REE enrichment and ore deposits
		Unconventional sources of critical metals
		Enrichment mechanisms and processes of critical metal deposits
Specific mineral systems	Hydrothermal mineral systems	Intermediate and low sulphidation epithermal deposits
		Hot spring deposits and epithermal environments
		Porphyry and high sulphidation epithermal deposits
		Iron oxide copper gold (IOCG) deposits
		Gold in metamorphic terranes — new research approaches, new models, and new target areas
		VMS Systems: modern and ancient
		Distal signatures and vectors toward mineralisation in carbonate rocks: porphyry, skarn, vein, and replacement deposits
		Sediment hosted and stratiform ore deposits
		Antimony and related elements mineralisation: magmatism, fluids and sediments
		Uranium mineral systems and exploration methods
	Magmatic mineral systems	Metallogenic processes within mafic-ultramafic magmatic systems
		Magmatic and hydrothermal deposits related to felsic rocks
	Placer deposits	Placer deposits
	Non-metallic and industrial minerals	Non-metallic and industrial minerals
	Regional	New Zealand metallogenesis and mineral deposits
		Metallogeny of Central Tethyan Belt
Ore-forming processes		Ore-forming processes
Geometallurgy		Complex orebodies - unlocking future resources through orebody knowledge and geometallurgy
New research and exploration developments		Spatial data analysis for mineral exploration
		Data-driven geoscience: machine learning and multivariate data analysis
		Mineral vectors towards ore deposits: advances, applications and novel methods
		Automated 3D geological modelling - new methods and applications
		Geochemical anomaly classification and modelling in mineral exploration
		Mineral exploration in weathered and covered terrains
		Trace elements in minerals: where do we stand on the road between the holy grail and a can of worms?
Sustainable mining and environmental issues		Enabling a sustainable future
		Trajectories of sustainable development for mining territories
		Innovation for enhancing sustainability in mining
		Secondary prospectivity of mine waste: from metals to construction materials
Social performance and acceptance		Development geosciences and mineral resources for society
		The future of the minerals industry; essential for modern lifestyles and climate change mitigation or environmentally and socially problematic?

SHORT COURSES AND WORKSHOPS

PRE-CONFERENCE

Predictive geometallurgy

1-day presented twice (24 and 25 March) by Jens Gutzmer, Jose da Assuncao Godinho, Max Frenzel, Lucas Pereira, Raimon Tolosana Delgado (all of Helmholtz Institute Freiberg for Resource Technology), Richard Taylor (ZEISS) and Marek Dosbaba (TESCAN)

Geometallurgy aims to optimise the mineral value chain based on a spatially resolved, precise and quantitative understanding of the geology and mineralogy of the ores. Predictive geometallurgy goes beyond this current status by introducing forecasting models of the behaviour of ores through beneficiation and taking into account the mineral and operational economics.

Exploration geochemistry: applying the fundamentals (AAG)

1-day (27 March), presented by David Cohen (University of NSW) and Dennis Arne (Telemark Consultants)

The basic geochemical concepts of element distribution, geochemical processes and relationships at various scales will be introduced and combined with sampling theory and practices to provide a model-based geochemical exploration workshop. Sampling strategies, sample types, and key analytical methodologies will be discussed, leading into multi-element strategies for data interpretation and target selection.

Fundamentals of spectral reflectance for mineral exploration and mining

2-days (26-27 March), presented by Jonathan Cloutier and Lejun Zhang (CODES, UTas), and Jessica Stromberg and Carsten Laukamp (CSIRO)

Spectral reflectance can provide accurate mineralogical identification and mineral chemistry information that can be used to inform exploration and mining programs. This workshop covers the fundamentals and applications of reflectance spectroscopy from the visible (350 nm) to the thermal infrared (15,000 nm). It will focus on integration with other geological datasets (e.g. geology, geochemistry) to produce integrated parameters related to alteration and mineralising processes.

POST CONFERENCE

Geology, genesis and exploration of epithermal ore deposits

1-day (1 April), presented by Stuart Simmons (Hot Solutions)

Epithermal deposits host substantial resources of gold and silver that are often blind to the surface and that are sometimes very high grade. This course covers their geological setting and ore-forming processes, and the exploration methods that enable their discovery. Emphasis is placed on interpreting hydrothermal alteration patterns to understand the depth-level of exposure and proximity to upflow zones in which epithermal deposits form.

An introduction to machine learning and multivariate data analysis

1-day (1 April), presented by Michael Gazley (RSCMME), Shawn Hood (GoldSpot) and Matt Cracknell (UTas)

This course provides geologists with the understanding to ask what kind of data analytics is best-suited to their problem, and to demystify this growing field by providing the tools for them to conduct their own simple data analytics. Key concepts discussed include: 1.) Mineral exploration and mineral deposits are often data-rich environments; and 2.) Data-driven geoscience can be an effective method of resource discovery and mineral deposit modelling.

Learn to Leapfrog - model your geochemical data

2-days (1-2 April), presented by Dale Sims (Dale Sims Consulting)

This course teaches the basics of applying Seequent's Leapfrog 3D modelling software to geochemical datasets to better understand elemental distributions, trends, relationships and geological controls for enhanced geoscientific understanding and exploration opportunity.

Porphyry and high sulphidation epithermal deposits – origins, settings, characteristics and exploration

2-days (1-2 April), presented by David Cooke (UTas) and Lejun Zhang (Utas)

This course provides participants with a detailed overview of mineralisation and alteration associated with porphyry Cu (±Au ±Mo) and high sulphidation Cu-Au deposits. Case studies from around the Pacific Rim will be used to highlight the key geological elements of these magmatic-hydrothermal systems that inform genetic models and aid mineral exploration.


Epithermal laminated quartz vein, Golden Cross.

REGISTRATION

The registration fee includes access to all technical sessions, the virtual exhibition plus all virtual social and networking events. Registration for short courses and workshops requires additional payment of fees specific to the course (see www.sga2022.org for details). Registration fees are in NZ dollars and include GST where applicable.

Registration category	Early bird $NZ	Standard $NZ
Member*	350.00	490.00
Non-member	550.00	725.00
Student member*	135.00	155.00
Student non-member	160.00	180.00
Retired or non-working member*	145.00	175.00
Retired or non-working, non-member	175.00	195.00

* Member includes membership of SGA and our cosponsors: Association of Applied Geochemists, Australian Institute of Geoscientists, AusIMM, Geological Society of Australia, Geoscience Society of New Zealand, International Association on the Genesis of Ore Deposits, and Society of Economic Geologists.

FOR MORE INFORMATION CONTACT CONFERENCES & EVENTS LTD
sga2022@confer.co.nz | www.sga2022.org

SGA membership forms can also be downloaded in 5 different languages from the home page of our website www.e-sga.org

Business Card
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SGA

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

APPLICATION FORM FOR NEW MEMBERS

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

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

Last name*	
First name*	
Title	
Postal address*	
Phone	
e-mail*	
Academic degrees	

*** mandatory fields**

Select your Membership Dues*

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

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

Donation for the SGA Educational Fund

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

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

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Signature* _____ **Place and date:** _____

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Send the membership application form to:

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

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

Version June 2018