



16TH BIENNIAL MEETING
SGA 2022

FOURTH CIRCULAR



VIRTUAL EVENT • 28 – 31 March 2022 • www.sga2022.org
HOSTED BY ROTORUA, NEW ZEALAND

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

Technical Program

The technical program 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. It includes:

- 13 Keynote speakers in Plenary sessions
- 16 Keynote speakers in Concurrent sessions
- 220 Oral presentations in Concurrent sessions
- 23 Speed talks in Concurrent sessions
- 79 Posters
- 3 Discussion sessions
- 3 Pre-conference short courses
- 4 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

The 16th SGA Biennial Meeting offers a great opportunity to interact with leading scientists, other young researchers and industry in an informal environment.

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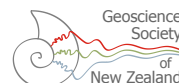
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Chalcopyrite in drill core, Lala IOCG deposit, SW China. Lithium and REE are typically the first elements we think of as critical to achieving a carbon neutral future, but more mundane elements such as Cu, Ni and Co also feature high on national lists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

Virtual Conference Format

The 16th SGA Biennial Meeting will have a virtual format with the program 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 program.
- ✓ 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.



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TECHNICAL PROGRAMME

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 the more than approximately 320 presentations. Check www.sga2022.org for dates and times of the sessions.

Broad theme	Sub-theme	Component sessions	
Mineral resources for the carbon neutral economy	Critical metals including rare earth elements (REE)	Peralkaline and carbonatite magmatism and related critical metal mineralisation	
		Critical metals and base-metal ore deposits: discovery to recovery	
		Unconventional sources of critical metals	
		Enrichment mechanisms and processes of critical metal deposits	
Specific mineral systems	Hydrothermal	Intermediate and low sulfidation epithermal deposits	
		Hot spring deposits and epithermal environments	
		Porphyry and high sulfidation 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 Zn-Pb deposits	
		Sediment hosted Cu deposits	
		Sediment hosted Carlin Au and other types of 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	
Regional		Metallogeny of Central Tethyan Belt	
		New Zealand mineral deposits and metallogenesis	
Ore-forming processes		Ore forming processes and regional settings, including pegmatite-related critical metal deposits	
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	
		Geochemical anomaly classification and modelling in mineral exploration	
		Mineral exploration in weathered and covered terrains	
Sustainable mining, environment, and social performance and acceptance		Trace elements in minerals: where do we stand on the road between the holy grail and a can of worms?	
		From sustainable mining to sustainable mining regions	
		Secondary prospectivity of mine waste: from metals to construction materials	
		Development geosciences and mineral resources for society	



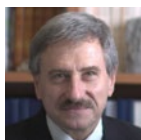
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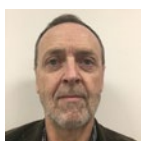
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PLENARY SESSION KEYNOTE SPEAKERS



David Cohen – University of New South Wales, Sydney, New South Wales, Australia

Pining for an anomaly: Vectoring towards mineralisation using biogeochemistry



David Cooke – CODES, University of Tasmania, Hobart, Tasmania, Australia

Geological evolution of the Lihir gold deposit, Papua New Guinea



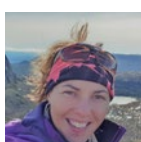
Dave Crow – University of Otago, Dunedin, New Zealand

Orogenic gold mining and exploration in the Otago Schist, New Zealand



Cornel de Ronde – GNS Science, Lower Hutt, New Zealand

Submarine hydrothermal systems as the shallow parts of porphyry Cu systems: the case for Brothers volcano



Angela Escolme – CODES, University of Tasmania, Hobart, Tasmania, Australia

Trace element deportment – knowledge is power



Scott Halley – Mineral Mapping Pty Ltd, Hawley Beach, Tasmania, Australia

Estimation of gangue mineral percentages from routine drill hole analyses

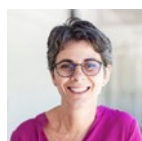


Keenan Jennings – BHP Metals Exploration
Mines and mineralisation – How a quality gap illustrates the need to enhance search spaces



Teresa McGrath – Curtin University, Perth, Western Australia

Gravity Recovery of Gold - Past, Present and Future



Sandra Occhipinti – CSIRO Mineral Resources, Perth, Australia

Resourcing a low emissions future through mineral discovery and responsible recovery



Anita Parbhakar-Fox – University of Queensland, Queensland, Australia

The critical importance of ‘secondary prospectivity’ in a dynamic global climate



Julie Rowland (JR) – The University of Auckland, New Zealand

Inherited structures and golden triggers: controls on the localisation of Cretaceous-to-Recent gold deposits, Aotearoa New Zealand



Tobias Schlegel – CSIRO Mineral Resources, Kensington, Western Australia

Mineral zonation and ore formation in IOCG deposits: new insights from the integration of mineralogy, geochemistry and petrophysics



Stuart Simmons – Hot Solutions Ltd, Auckland, New Zealand

Advances in the understanding of epithermal ore forming processes from studies of modern environments in the TVZ



Champagne Pool at Waiotapu with Artists Palette sinter (left) and Au-bearing orange precipitate (right)





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CONCURRENT SESSION KEYNOTE SPEAKERS



Hooshang Asadi Haroni – Isfahan University of Technology, Iran. The University of Western Australia

A Carlin-type gold mineral system for exploration targeting in NW Iran

In concurrent session: Metallogeny of Central Tethyan Belt



Shawn Hood – GoldSpot Discoveries Corp., Toronto, Ontario, Canada

Machine Learning applied to mineral deposits

In concurrent session: Data-driven geoscience: machine learning and multivariate data analysis



Regina Baumgartner – Teck Metals Ltd, Trail, BC, Canada

Beyond conventional geometallurgy: a broader view to be prepared for a circular economy

In concurrent session: Complex orebodies - unlocking future resources through orebody knowledge and geometallurgy



Giada Iacono-Marziano – Institut des Sciences Université d'Orléans-BRGM, Orléans, France

The critical role of magma degassing in sulfide melt mobility and metal enrichment

*In concurrent session: Metallogenic processes within mafic-ultramafic magmatic systems
The critical role of magma degassing in sulfide melt mobility and metal enrichment*



Nigel Cook – University of Adelaide, Adelaide, South Australia

Trace elements in minerals: where do we stand on the road between the holy grail and a can of worms?

In concurrent session: Trace elements in minerals: where do we stand on the road between the holy grail and a can of worms?



John Jamieson – Memorial University of Newfoundland, St. John's, Newfoundland, Canada

Evaluating hydrothermal episodicity and rates of ore-forming processes at the seafloor

In concurrent session: VMS Systems: modern and ancient



Anthony Harris – Newcrest Mining Ltd, Melbourne, Victoria, Australia

Alkalic Au-Cu deposits of the Cadia Valley (New South Wales) and Red Chris (British Columbia) – unconventional ancient porphyry deposits associated with postsubduction magmatism

In concurrent session: Porphyry and high sulfidation epithermal deposits



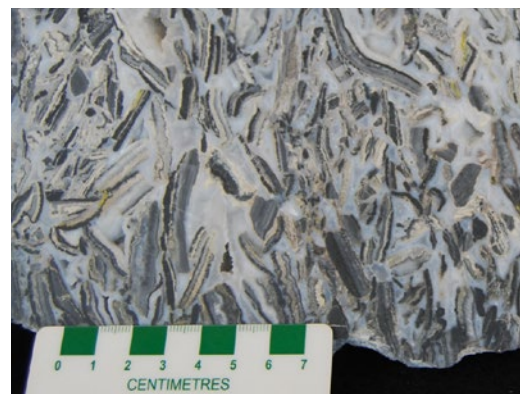
Nicole Januszczak – BHP, Toronto, Ontario, Canada

Using multidimensional mineral systems-based predictive models to tackle the growth challenge facing the mining industry

In concurrent session: Spatial data analysis for mineral exploration



Banded epithermal quartz vein, Golden Cross



Epithermal breccia of vein fragments, Favona, Waihi



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Peter Megaw – Chief Exploration Officer, MAG Silver Corp, Tucson, Arizona, USA

Manganese-based vectoring in distal carbonate replacement deposits

In concurrent session: Distal signatures and vectors toward mineralisation in carbonate rocks: porphyry, skarn, vein and replacement deposits



Dietmar Müller – The University of Sydney, Sydney, New South Wales, Australia

Deep time exploration

In concurrent session: Geochemical anomaly classification and modelling in mineral exploration



Gregor Partington – Kenex Australia, Dongara, Western Australia, Australia

Outcomes from using mineral potential modelling as a tool to support decision making in mineral exploration and resource development

In concurrent session: Spatial data analysis for mineral exploration



Franco Pirajno – CET, The University of Western Australia, Crawley, Western Australia

Subaerial hot springs and near-surface hydrothermal mineral systems past and present, and possible extraterrestrial analogues

In concurrent session: Hot spring deposits and epithermal environments



Anthony Pochon – French Geological Survey (BRGM), Orléans, France

Toward a better understanding of Sb metallogeny in the Variscan belt

In concurrent session: Antimony and related elements mineralisation: magmatism, fluids and sediments



Shannon Richards – OceanaGold, Waihi, New Zealand

The Influence of host rocks on epithermal veining in the Waihi area of New Zealand

In concurrent session: New Zealand mineral deposits and metallogenesis



Robert Seal – US Geological Survey, Reston, Virginia, USA

Expanding the perspective on mine waste value with an emphasis on critical minerals and environmental mitigation

In concurrent session: Secondary prospectivity of mine waste: from metals to construction materials



Julian Vearncombe – Auckland, New Zealand
Function and status of structural geology in resource management

In concurrent session: Gold in metamorphic terranes - new research approaches, new models, and new target areas



Rift and red scoria deposits formed in the Mt Tarawera rhyolite dome during the 1886 basalt eruption



Mt Ngauruhoe active andesite volcano



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DISCUSSION SESSIONS

As part of the 16th SGA Biennial Meeting plenary session program there will be three discussion sessions. These discussion sessions will take the form of a moderated panel discussion. Each will address a broad topic and have a panel of key invited experts. Check www.sga2022.org for dates and times of the discussion sessions.

The future of the minerals industry; essential for modern lifestyles and climate change mitigation or environmentally and socially problematic?

Global metal and mineral production has increased significantly over the past century, enabling the development of modern standards of living as well as low-CO₂ energy and transport solutions. Indeed, hitting climate change mitigation-related CO₂ targets will require even higher levels of a range of base, precious and by-product metals compared to current levels of production. However, the global minerals industry is seemingly facing a conundrum where the positive aspects of mining, namely underpinning a low-CO₂ energy and transport future, are offset by environmental and social risk that may impede both current mining and exploration activities as well as future metal and mineral production.

This panel discussion will focus on environmental and social performance, and the impacts on mineral exploration and mining. We will also discuss knowledge gaps relating to how we provide the mineral and metal resources needed for modern standards of living while mitigating climate change, and the development of new technologies, approaches and knowledge that can help produce these minerals and metals in a socially acceptable manner.

Moderators and organizers

Simon Jowitt, *University of Nevada Las Vegas, Las Vegas, USA*
John Thompson, *PetraScience Consultants, Vancouver, Canada*

Panelists

Jocelyn Fraser, *BRIMM-UBC*
Sinead Kaufman, *CEO Minerals, Rio Tinto*
Gavin Mudd, *RMIT University, Melbourne*
Anita Parbhakar-Fox, *University of Queensland*



Southern Alps

Lifting the hood on the relationship between academia, industry, and geological surveys

The academic, industry, and government sectors of the minerals community need to work seamlessly and symbiotically if we are to deliver the minerals necessary for the energy transition. Strong opinions and misunderstandings within this relationship abound, so join Ore Deposits Hub and the SGA for a 'group therapy' session between the academic, industry, and geological survey sectors of minerals geoscience.

Moderators and organizers

Thomas Belgrano, *Ore Deposits Hub and the University of Southampton*
Halleluya Ekandjo, *Ore Deposits Hub and iCRAG, University College Dublin*

Panelists

David Cooke, *CODES, University of Tasmania, Australia*
Anna Nguno, *Geological Survey of Namibia, Namibia*
Glen Nwaila, *University of the Witwatersrand, South Africa*
Sandra Occhipinti, *CSIRO, Australia*

Geoscience outreach – how can Baby Boomers connect with Gen-Z?

Communicating the social and physical roles of geoscience in addressing our shared needs around the UN Sustainable Development Goals requires intergenerational outreach.

So too attracting, teaching and developing the future generations of geoscience professionals to deliver these needs. The panel brings passionate geoscience educators/communicators together to address a simple question; How can we, as the current geoscience cohort, better communicate with and inspire our future professionals?

Moderator and organizer

Dale Sims, *President, Dale Sims Consulting dalesims@tpg.com.au*

Panelists

Peter Betts, *Monash University, Melbourne Australia; GSA President*
Richard Lilly, *University of Adelaide, South Australia; CEO of NeXUS*
Genna McDonagh, *AIG, NGG (NextGenGeos) Group*
Haydon Mort, *Managing Director, Geologize*
Alanis Olesch-Byrne, *PhD student, James Cook University, Townsville, Queensland, Australia*
Craig Pereira, *Exploration Geologist*



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SHORT COURSES

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 modelbased 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.

REGISTRATION

The registration fee includes access to all technical sessions, the virtual exhibition plus all virtual social and networking events. Registration for short courses 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	Standard \$NZ
Member*	490.00
Non-member	725.00
Student member*	155.00
Student non-member	180.00
Retired or non-working member**	175.00
Retired or non-working, non-member**	195.00

* Member includes membership of SGA and our co-sponsors: AAG, AIG, AusIMM, IAGOD, GSA, GSNZ and SEG.

** Non-working registration is intended for those on parental or carer leave. If someone you know falls into this category, please let them know of this option as those on career pauses may not be receiving our emails.

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.

Using Leapfrog Geo – an introduction to modelling data in 3D

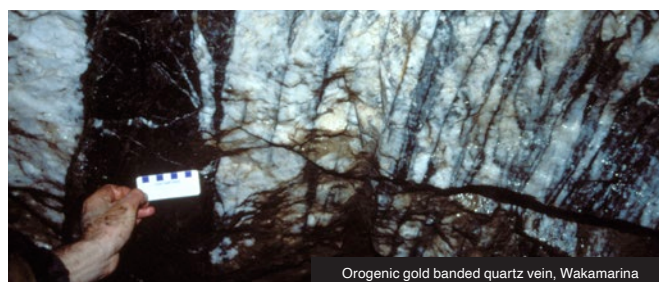
2-days (1-2 April), presented by Dale Sims (Dale Sims Consulting)

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 sulfidation 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 (\pm Au \pm Mo) and high sulfidation 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.



Orogenic gold banded quartz vein, Wakamarina