



29th International Applied Geochemistry Symposium IAGS2022

Facing the challenges of today using applied geochemistry

Viña del Mar, Chile

Held in memory of our friend and colleague Dr. Peter Alan Winterburn

SCIENTIFIC PROGRAM

Monday, October 24th – Enjoy Convention Center - Room Gran Caracola

Technical Session 1: Exploration geochemistry: present and future challenges
Chair: Carmina Jorquera, Teck Resources Chile Ltda.

Keynote Lecture

09:00	Fundamental Laws of Geochemical Elements and Anomaly Recognition for Mineral Exploration.	Qiuming Cheng, Sun Yat-Sen University, China.
10:00	Stream sediment geochemical and indicator mineral signatures of the Casino porphyry Cu-Au-Mo deposit, Yukon, Canada.	Beth McClenaghan, Geological Survey of Canada, Canada.
10:20	Detrital zircon chemistry, a tool for exploring copper porphyries: the Cerro Colorado district case study.	Joaquín Copaja, BHP, Chile.
10:40-11:10 Coffee Break		
11:10	Extending the size of the alteration footprint around the Hemlo Au deposit, N. Ontario: application of epidote and chlorite mineral chemistry in Archean greenstone terranes.	Pete Hollings, Lakehead University, Canada.
11:30	Discrimination of porphyry-related epidote using mineral chemistry in the Andes of central Chile.	José Piquer, Universidad Austral de Chile, Chile.



11:50	Actinolite as a proxy for characterizing the evolution of Iron-Oxide Copper Gold deposits.	Irene del Real, Universidad Austral de Chile, Chile.
12:10	Base metals and PGE behavior in slab-decoupled oceanic felsic melts: insights from the Fatu Kapa area (NW Lau back-arc basin, SW Pacific).	Aurélien Jeanvoine, Seoul National University, France.
12:30	The challenges of geochemical exploration in the subarctic terrain of the Scandinavian Peninsula.	Joachim Albrecht, Boliden Mineral AB, Sweden.

13:00-14:30 Lunch

14:40	Newmont Geochemistry, the Untold Story.	Simon Marshall, Newmont, Australia.
15:00	Finding a Walton like Zn deposit; a case study using deep penetrating geochemical exploration methods Maritimes Basin, Eastern Canada.	Peter Rogers, Independent Consultant, Canada.
15:20	Microbial biosensors of buried mineralization.	Bianca Iulianella Phillips, University of British Columbia, Canada.

15:40-16:10 Coffee Break

16:10	Impacts of environmental variables on biogeochemical results - orientation survey in the Peräpohja Belt, northern Finland.	Maarit Middleton, Geological Survey of Finland, Finland.
16:30	Pathfinder dispersion in fractures above the Oberon gold deposit, Tanami region, Northern Territory, Australia.	Collette Pilsworth, Queen's University, Canada.

16:50-18:00 Poster Session

Technical Session 1: Exploration geochemistry: present and future challenges and Visit to Sponsors and Commercial Exhibitors Booths



Monday, October 24th – Enjoy Convention Center - Room Gran Estrella

**Technical Session 8: Linking geology and geochemistry to viticulture and wine /
1st IGVWS2022.**

**Chairs: Brian Townley, Universidad de Chile and Ignacio Serra, Universidad de
Concepción, Chile**

10:00	Geology, mineralogy, and geochemistry in viticulture.	Brian Townley, Universidad de Chile, Chile.
10:20	Mineralogical influences in soil properties: Data and insights from Chilean vineyard soils.	Pamela Castillo, Universidad de Concepción, Chile.

10:40-11:10 Coffee Break

11:10	Geochemical and Mineralogical Changes during Soil Development: Preliminary Study of a Brunisolic Soil from Nova Scotia.	Clifford Stanley, Acadia University, Canada.
11:30	Application of a weak leach as a measure of bioavailability in vineyard soils for management of soil nutrient levels in British Columbia, Canada.	Hugh de Souza, Geochemical Consultant, Canada.
11:50	Geo-winegrowing characterization from the Atacama to the Aysen regions of Chile.	Francisca Olivares, Orica, Chile.
12:10	Agricultural landscapes for people and biodiversity.	María José Martínez, Pontificia Universidad Católica de Chile, Chile.

13:00-14:30 Lunch

14:40	Viticultural potential of the Nagche territory of the Araucania Region.	Ignacio Serra, Universidad de Concepción, Chile.
15:00	The terroir of Carignan in the Maule Valley: from the soil to wine.	Gastón Gutiérrez- Gamboa, Universidad Mayor, Chile.



15:20	Vine capacity, abiotic stress severity, and wine composition of a non-irrigated vineyard along an Inceptisol catena in the Itata Valley.	Arturo Calderón-Orellana, Universidad de Concepción, Chile.
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15:40-16:10 Coffee Break

16:10	Climatic study of the Chilean viticultural production zones over three decades.	Nicolás Verdugo, INIA, Ministerio de Agricultura, Chile.
16:30	Effects of climate change on the viticultural zoning of continental Chile: background for non-sparkling wines.	David Morales, Pontificia Universidad Católica de Chile, Chile.
16:50	Consortio I+D Vinos de Chile, its role in associative research in the viticulture sector.	Patricio Parra, I+D Consortio de Vinos de Chile, Chile.

17:10-18:00 Poster Session

Poster Session Technical 8: Linking geology and geochemistry to viticulture and wine / 1st IGVWS2022 and Visit to Sponsors and Commercial Exhibitors Booths



Tuesday, October 25th – Enjoy Convention Center - Room Gran Caracola

Technical Session 1: Exploration geochemistry: present and future challenges

Chair: Irene del Real, Universidad Austral de Chile

10:00	Magmatic sulfide-bubble compound drops are crucial for the formation of Cu-rich massive sulfide ores in oceanic settings.	Aurélien Jeanvoine, Seoul National University, France.
10:20	Geochemical Exploration for Critical Metals in The Carboniferous Maritimes Basin, Eastern Canada.	Peter Rogers, Independent Consultant, Canada.
10:40-11:10 Coffee Break		
11:10	Tectonic Controls of Mineralization in the Central Atacama Desert: The Antofagasta Transect.	Constantino Mpodozis, Independent Consultant, Chile.

Technical Session 2: New field portable technologies: improving the analysis and turnaround times in exploration

Chair: Andrew Menzies, Bruker Nano Analytics GmbH, Germany

11:50	New applications of Portable XRF (pXRF) in mineral exploration.	Edgardo Jiménez, Evident Olympus, United States
12:10	Comparative pXRF and ICP ES/MS data for regional till samples: East Arm of Great Slave Lake, NT, Canada.	Ross Knight, Geological Survey of Canada, Canada.
12:30	Re-inventing the laboratory for the digital age: high resolution XRF core scanning to characterize the distribution of critical metals.	Hugh de Souza, Geochemical Consultant, Canada.

13:00-14:30 Lunch



14:40	Getting the most out of real-time portable XRF; The TruScan Solution.	Lori Martin, Boart Longyear, Canada.
15:00	Cathode to phyllode via <i>in situ</i> mode - Field use of pXRF to analyse pine needles in regional and deposit scale geochemical mapping in the Cobar Basin.	David Cohen, University of New South Wales, Australia.
15:20	Rapid and robust: An assessment of Handheld XRF in the field settings.	Kathrin Schneider, Bruker Nano GmbH, Germany.

15:40-16:10 Coffee Break

16:10	Field analysis of low-level gold using novel detectORETM technology.	Melvyn Lintern, Portable PPB Pty Ltd., Australia.
16:30	A population-based approach to pXRF calibration to provide near-time litho-geochemistry for guiding drilling decisions at Carlin-type gold projects.	James Buskard, Nevada Exploration Inc., Canada.

16:50-18:00 Poster Sessions

Technical Session 1: Exploration geochemistry: present and future challenges

Technical Session 2: New field portable technologies: Improving the analysis and turnaround times in exploration

and Visit to Sponsors and Commercial Exhibitors Booths



Tuesday, October 25th – Enjoy Convention Center - Room Gran Estrella

Technical Session 5: Environmental geochemistry: Closing the gap for sustainable mining and development / Mine tailing revalorization (UNESCO-IGCP682)

Chair: Katja Deckart, Universidad de Chile

Keynote Lecture

09:00	Sourcing of critical elements and industrial minerals from mine waste/ore deposits – The role of Geochemistry.	Bernhard Dold, SUMIRCO, Germany.
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10:00	Reactive transport modelling of a multistage copper leaching experiment: Implications for <i>in situ</i> recovery.	Pablo Ortega-Tong, University of Western Australia, Australia.
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10:20	Improving and diversifying mine tailing revalorization through detailed mineralogical and geochemical analysis at a current tailings recovery plant (Minera Valle Central, Chile).	Sebastián García, Universidad de Chile, Chile.
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10:40-11:10 Coffee Break

11:10	Column leaching of oil sands froth treatment tailings: Comparison of capping scenarios.	Nicholas Utting, CanmetENERGY Devon, Canada.
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11:30	Electrokinetic <i>in situ</i> leaching of copper.	Pablo Ortega-Tong, University of Western Australia, Australia.
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11:50	Environmental geochemistry of seven fluvial systems in Chile: Lluta, Copiapó, Huasco, Limarí, Rapel, Valdivia and Aysén river basins.	Juan Pablo Lacassie, SERNAGEOMIN, Chile.
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13:00-14:30 Lunch



Technical Session 7: Isotopic Geochemistry: New uses in applied geochemistry
Chair: Katja Deckart, Universidad de Chile

14:40	Sr-Nd-Pb isotopes from the Chollay Plutonic Complex, a Triassic non-compressive arc batholith of the SW margin of Gondwana.	Verónica Oliveros, Universidad de Concepción, Chile.
15:00	The application of U-Pb age dating of <i>in-situ</i> carbonates by LA-ICP-MS to resolve timing of fluid flow in the Michigan Basin in southern Ontario.	Chelsea N. Sutcliffe, Teck Resources Ltd., Canada.
15:20	Isotopic and geochemical tools to monitoring ecosystem services provided by native forest: the case study of the Nonguén National Park in the coastal area of south-central Chile.	Verónica Oliveros, Universidad de Concepción, Chile.

15:40-16:10 Coffee Break

16:10	Copper isotopes in mineral exploration	Ryan Mathur, Juniata College Huntingdon, USA.
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16:50-18:00 Poster Session

Technical Session 5: Environmental Geochemistry: Closing the gap for sustainable mining and development / Mine tailing Revalorization (UNESCO-IGCP682) and Visit to Sponsors and Commercial Exhibitors Booths



Thursday, October 27th – Enjoy Convention Center - Room Gran Caracola

Technical Session 3: Big Data: Squeezing multi-element geochemical data by means of science and self-learning techniques

Chair: Álvaro Egaña, Alges, Chile

Keynote Lecture

09:00	Data Digs Deeper: using data science to transform geochemical understanding into discovery.	Britt Bluemel, GoldSpot Discoveries, Canada.
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10:00	Integration of Texture and SWIR Spectroscopy with Geochemistry to Improve Machine-driven Classification of Geological Characteristics.	McLean Trott, Queen's University, Canada.
10:20	Petrology & Lithochemisrty of the Wildcat Brook Mo-W deposit, Charlotte County, New Brunswick, Canada: Insights into Log-Ratio Analysis.	Clifford Stanley, Acadia University, Canada.

10:40-11:10 Coffee Break

11:10	Mineral Resource Prediction Using Advanced Data Analytics and Machine Learning Based on Stream Sediment Geochemical Data, British Columbia.	Dennis Arne, Telemark Geosciences, Australia.
11:30	New technologies capable to optimize the big-data generated in exploration; The symbiotic case of TruScan and TruVision.	Lori Martin, Boart Longyear, Canada.
11:50	Conserved Element Ratio Analysis in Lithochemisrty: From Scatterplots to Spider Diagrams.	Clifford Stanley, Acadia University, Canada.
12:10	Using machine learning to facilitate the analysis of multi-element geochemistry datasets in the Abanico and Farellones formations in Central Chile (32°-33°S).	Abigail Jackson-Gain, Universidad de Chile, Chile.
12:30	Multi-digestion regional rock geochemistry of Variscan granites and elvans in SW England: delineation of composite intrusions and Sn-Li potential.	Charlie Moon, Moon Geology, United Kingdom

13:00-14:30 Lunch

14:40	Gold recovery prediction using geostatistical and machine learning tools.	Felipe Navarro, Laboratorio Alges, Chile
15:00	Rapid Estimator of geometallurgical variables based on hyperspectral images and a Bayesian processing scheme; methodology and case studies.	Felipe Navarro, Laboratorio Alges, Chile



Technical Session 6: Water and hydrogeochemistry: Challenges in exploration, mining, and sustainable development

Chair: Luciano Achurra, Amphos 21 Consulting Chile

15:20	Stream Sediment Sample Catchment Analysis using Open-Source Tools.	Matthew Bodnar, GoldSpot Discoveries, Canada.
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15:40-16:10 Coffee Break

16:10	The Geochemical Anomalies of the Turbio River, Coquimbo Region, North Central Chile, and its Environmental and Economic Bearings.	Ricardo Oyarzún, Universidad de La Serena, Chile.
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16:30	To be confirmed	Paula Ramírez, HydroFlow, Chile
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16:50-18:00 Poster Session

**Technical Session 6: Water and Hydrogeochemistry: Challenges in exploration, mining, and sustainable development
and Visit to Sponsors and Commercial Exhibitors Booths**

17:45	AAG Annual General Meeting
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Thursday, October 27th – Enjoy Convention Center - Room Gran Estrella

Technical Session 4: Geochemistry applied to mineral characterization for geological, geometallurgical and resource modeling

Chair: Andrew Menzies, Bruker Nano Analytics GmbH, Germany

10:00	Transformational Ore Body Knowledge Workflows: The data behind the vision.	Ayesha Ahmed, Teck Resources Ltd., Canada.
10:20	Multi-scale, multi-modal and multi-dimensional workflow for the rapid characterization of exploration drill cores – a Au-Co case study from Finland.	Andrew Menzies, Bruker Nano Analytics GmbH, Germany.

10:40-11:10 Coffee Break

11:10	Critical Minerals: An opportunity to be considered in Chile.	José Cabello, Sociedad Geológica de Chile, Chile.
11:30	Potential sources of Cobalt in Chile: from primary by-products to tailing reprocessing.	Brian Townley, Universidad de Chile, Chile
11:50	Geometallurgy of Cobaltiferous Copper Ores of the Chilean Iron Belt.	Romke Kuyvenhoven, MDE Minerals Consulting, Chile.
12:30	Applied Mineralogy techniques used to verify the normative mineralogy modeling based on the geochemical data: The strength and limitations of the common mineralogy techniques.	Mahdi Ghobadi, Activation Laboratories Ltd. (Actlabs), Canada.

13:00-14:30 Lunch

Chair: Bianca Iulianella Phillips, University of British Columbia, Canada

14:40	Alteration Zonation Patterns Characterized by Hyperspectral Data within Orogenic Gold Deposits of the Ahafo South Camp, Sefwi Granite-Greenstone Belt, Ghana.	Jeffrey Bigelow, Newmont, Australia.
15:00	Mapping porphyry alteration more specifically: integrating geochemistry and hyperspectral imaging data at the Caspiche Porphyry, Chile.	Sam Scher, LKI Consulting, United States.



15:20	High-Resolution 3D Geoscientific Information for Material Control and Short-term Decision Making in Open Pit Operations.	Luis Farfán, IMDEX, Chile.
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15:40-16:10 Coffee Break

16:10	The Role of Geochemistry and Geometallurgy in Sustainable Resource Development.	Pim van Geffen, CSA Global, an ERM Group Company, Canada.
16:30	Characterizing the geochemical and geophysical properties of an orebody to select the optimal sensor for sensor-based sorting.	Rob Millar, Saskatchewan Research Council, Canada.
16:50	REE Deposits in South-Central Chile: An exploration overview of Ion-Adsorption Deposits.	Martín Marquardt, GEOK Ltda., Chile.

17:10-18:00 Poster Session

**Technical Session 4: Geochemistry applied to mineral characterization for geological, geometallurgical and resource modeling
and Visit to Sponsors and Commercial Exhibitors Booths**



Friday, October 28th – Enjoy Convention Center - Room Gran Caracola

Technical Session 6: Water and hydrogeochemistry: Challenges in exploration, mining, and sustainable development

Chair: Luciano Achurra, Amphos 21 Consulting Chile

09:00	Hydrogeochemistry of mine tailings from a carbonatite-hosted Nb-REE deposit, Oka, Québec, Canada.	Alexandre Desbarats, Natural Resources Canada, Canada.
09:20	Geochemical signatures of porphyry deposits in ground and stream waters: erosion, enrichment, and alteration.	James Kidder, Geological Survey of Canada, Canada.
09:40	Hydrogeochemical Modeling of Waste Rock Dumps on an Early-Stage Mine Development: Uncertainties and Opportunities.	Javier Rivera, SRK Consulting, Chile.
10:00	Geothermal fluids and lithium deposits in the salt flats: An assessment of their association at Laguna Verde, Atacama Region, Chile.	Mohammad Ayaz Alam, Universidad de Atacama, Chile.
10:20	High-altitude Chilean hot springs: hydrogeochemistry characterization and biogeological relationships in Lirima, a window to early Earth.	Pablo Paquis, Universidad Católica del Norte, Chile.

10:40-11:10 Coffee Break

11:10-12:10 Poster Session

**Technical Session 6: Water and Hydrogeochemistry: Challenges in exploration, mining, and sustainable development
and Visit to Sponsors and Commercial Exhibitors Booths**

12:10	Closing Ceremony
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13:00	Lunch
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Friday, October 28th – Enjoy Convention Center - Room Gran Estrella

Technical Session 4: Geochemistry applied to mineral characterization for geological, geometallurgical and resource modeling

Chair: Brian Townley, Universidad de Chile

09:00	The formation of the Exótica deposit at Chuquicamata, Chile.	Bernhard Dold, SUMIRCO, Germany.
09:20	Meteorite classification using QEMSCAN: First results for ordinary chondrites from the Atacama Desert.	Millarca Valenzuela, Universidad Católica del Norte, Chile.

Technical Session 9: Analytical geochemistry technologies and Quality Control Assurance / Quality Control

Chair: Irene del Real, Universidad Austral de Chile

09:40	Blank Analyses in Geochemical QAQC: How to Get Something from Nothing.	Clifford Stanley, Acadia University, Canada.
10:00	Standardless quantification with micro-XRF – are we there yet?	Falk Reinhardt, Bruker Nano GmbH, Germany.
10:20	Certified Reference Material Accepted Values and Tolerances: Some Idle Thoughts and an Idea or Two.	Clifford Stanley, Acadia University, Canada.

10:40 – 11:10 Coffee Break

11:10-12:10 Poster Session

Technical Session 4: Geochemistry applied to mineral characterization for geological, geometallurgical and resource modeling and Visit to Sponsors and Commercial Exhibitors Booths

12:10	Closing Ceremony (In Gran Caracola Room)
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13:00	Lunch
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