El cobre es indispensable para el desarrollo de energías limpias, vehículos eléctricos y nuevas tecnologías que no generan emisiones. EN ANTOFAGASTA MINERALS ENFRENTAMOS EL CAMBIO CLIMÁTICO
## MONDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>1:30pm–4:30pm</td>
<td>Student and Early Career Professionals Roundtable</td>
</tr>
<tr>
<td>4:45pm–5:00pm</td>
<td>Welcome and Introduction Pepe Perelló, Conference and Technical Program Chair</td>
</tr>
<tr>
<td>5:00pm–5:30pm</td>
<td>Presidential Address Doug Kirwin, SEG President</td>
</tr>
<tr>
<td>5:30pm–7:30pm</td>
<td>Welcome Reception</td>
</tr>
</tbody>
</table>

## TUESDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
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<tbody>
<tr>
<td>8:15am–10:20am</td>
<td>Session 1: Polymetallic Deposits and Metallogeny I</td>
</tr>
<tr>
<td>10:20am–11:00am</td>
<td>Break and Posters</td>
</tr>
<tr>
<td>11:00am–1:00pm</td>
<td>Session 1 (cont.)</td>
</tr>
<tr>
<td>1:00pm–2:20pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>2:20pm–4:40pm</td>
<td>Session 2: Polymetallic Deposits and Metallogeny II</td>
</tr>
<tr>
<td>4:40pm–5:00pm</td>
<td>Break and Posters</td>
</tr>
<tr>
<td>5:00pm–6:10pm</td>
<td>ST1: Speed Talks</td>
</tr>
<tr>
<td>6:00pm–7:00pm</td>
<td>Reception and Poster Session</td>
</tr>
<tr>
<td>7:00pm–10:00pm</td>
<td>SEG Dinner and Awards Ceremony*</td>
</tr>
</tbody>
</table>

## WEDNESDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15am–10:20am</td>
<td>Session 4: Copper Deposits and Metallogeny I</td>
</tr>
<tr>
<td>10:20am–11:00am</td>
<td>Break and Posters</td>
</tr>
<tr>
<td>11:00am–1:00pm</td>
<td>Session 4 (cont.)</td>
</tr>
<tr>
<td>1:00pm–2:20pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>2:20pm–4:40pm</td>
<td>Session 5: Copper Deposits and Metallogeny II</td>
</tr>
<tr>
<td>4:40pm–5:00pm</td>
<td>Break and Posters</td>
</tr>
<tr>
<td>5:00pm–6:10pm</td>
<td>ST2: Speed Talks</td>
</tr>
<tr>
<td>6:00pm–7:00pm</td>
<td>Reception and Poster Session</td>
</tr>
<tr>
<td>6:30pm–9:30pm</td>
<td>Industry Outlook Dinner*</td>
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## THURSDAY

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:15am–10:20am</td>
<td>Session 7: Gold Deposits and Metallogeny I</td>
</tr>
<tr>
<td>10:20am–11:00am</td>
<td>Break and Posters</td>
</tr>
<tr>
<td>11:00am–1:00pm</td>
<td>Session 7 (cont.)</td>
</tr>
<tr>
<td>1:00pm–2:20pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>2:20pm–4:40pm</td>
<td>Session 8: Gold Deposits and Metallogeny II</td>
</tr>
<tr>
<td>4:40pm–5:00pm</td>
<td>Break and Posters</td>
</tr>
<tr>
<td>5:00pm–6:00pm</td>
<td>Round Table</td>
</tr>
<tr>
<td>6:00pm–6:10pm</td>
<td>Introduction to SEG 2020</td>
</tr>
</tbody>
</table>

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**REGISTRATION**
Main Lobby, Sheraton Santiago Hotel
- Sunday: 7:00am–7:00pm
- Monday: 7:00am–6:00pm
- Tuesday: 7:00am–6:00pm
- Wednesday: 7:30am–5:00pm
- Thursday: 7:30am–12:00pm

**EXHIBITS and POSTERS**
Levels 1 and –1
- Tuesday: 8:30am–6:00pm
- Wednesday: 8:30am–6:00pm
- Thursday: 8:30am–4:00pm

**SPEAKER READY ROOM**
Cochrane Room
- Tuesday–Thursday
  - 7:30am–11:00am
  - 1:30pm–5:00pm
- Deliver flash drive to AV technician 10 minutes before session.

**WIFI ACCESS**
Network: Sheraton_Conference Password: SEG2019

**CORE SHACK – Quixote Room**
- Tuesday–Wednesday
  - 8:30am–6:00pm
  - Thursday
  - 8:30am–4:00pm

All sessions and events are at the Sheraton Santiago Hotel, except as noted for individual off-site events.

*Ticketed events
Bienvenidos! Welcome!

We welcome you to Santiago, Chile, and the SEG 2019 international conference!

This year’s edition of SEG’s international conference series is held for the second time in South America and the first time in Chile. The conference’s broad theme, “South American Metallogeny: Sierra to Craton,” was conceived as an inclusive invitation to all explorers and researchers in the field of metallic mineral deposits of this rich and diverse continent. A wealth of studies on copper, gold, and polymetallic deposits, complemented by sessions on new discoveries and geomet, constitute the main thrust of the conference and, in conjunction with a team of expert colleagues from industry and academia, we have made sure that all regions of the continent are represented, together with studies from abroad. Other areas that impact exploration are included to showcase ongoing research and work on deposit types outside the main scope of the conference.

Although the focus on descriptive and conceptual geology exposes exploration practitioners to new and practical aspects of key deposit types of the continent and beyond, academic participants will benefit from cutting-edge talks by leading researchers in economic geology. The conference features an exceptional lineup of speakers, complemented by poster presentations, and an outstanding group of topical pre- and post-meeting field trips and workshops. In addition, we have included two sessions fully dedicated to students, with competitive speed talks selected from a wealth of geologic topics from most continents. Students, together with early-career professionals, will further participate in round table discussions with mentors to address key issues in managing a successful career in our occupation.

We thank our conference sponsors who have contributed greatly to making SEG 2019 a success. Their generosity especially facilitates student participation and programs.

On behalf of the Organizing Committee and all volunteers, we welcome you to Santiago’s SEG 2019 conference. Enjoy it!

José Perelló, SEG 2019 Conference and Technical Program Chair
Brian Hoal, Executive Director, Society of Economic Geologists
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3 Conference Information
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60 Exhibitors
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63 Media Partners
64 Thank you, Sponsors

Inside
Back cover Conference/Exhibitors
  floor plan
Conference Information*

Conference Organizing Committee

• Conference and Technical Program Chair: José (Pepe) Perelló
• SEG Executive Director: Brian Hoal
• Field Trips: William X. Chávez, New Mexico Institute of Mining and Technology
• Workshops: Richard Tosdal, Consultant
• Poster Sessions: Lluís Fontboté, Université de Genève
• Students/Early Career Professionals: Alina Gaibor, BHP
• Fundraising/Marketing: Nikki Morrison
• SEG Executive Assistant: Alison Cronk
• SEG Managing Editor: Alice Bouley

SEG Contact Information

7811 Shaffer Parkway
Littleton, CO 80127-3732
Tel. 1.720.981.7882
E-mail: seg@segweb.org
Website: www.segweb.org

Conference Organizer

Chile Explore
Iain Cassidy, Caitlin Wheat
E-mail: imc@sterlingcassidy.com
Tel. +562 2 9550755

*For registration and exhibit hours, as well as an overview of schedules, please refer to the inside front cover. A conference center floor plan is located on the inside back cover. All events, except as otherwise noted, will be held at the center.

For updates and latest information, visit www.seg2019.org.
SEG Awardees

Be sure to join us on Tuesday, October 8, from 7:00 to 10:00pm in the El Bohio Restaurant at the Sheraton Santiago Hotel for the SEG Dinner and Awards Ceremony.

SEG R.A.F. Penrose Gold Medal for 2018

**Anthony E. Williams-Jones**
McGill University, Canada

SEG Silver Medal for 2018

**Andreas Audetat**
BGI, University of Beyreuth, Germany

SEG Ralph W. Marsden Award for 2018

**Stuart F. Simmons**
Hot Solutions, New Zealand, USA

SEG Waldemar Lindgren Award for 2018

**Yonjun Lu**
Geological Survey of Western Australia, Australia

SEG Brian J. Skinner Award for 2018

**David P. Braxton**
Anglo American

SEG Distinguished Lecturer for 2019

**John M. Proffett**
Proffett Exploration, Inc., USA

SEG International Exchange Lecturer for 2019

**Yasushi Watanabe**
Akita University, Japan

SEG Thayer Lindsley Visiting Lecturer for 2019

**Sarah A. Gleeson**
GFZ German Research Centre for Geosciences, Germany

Regional Vice President Lecturer for 2019

**Judith A. Kinnaird**
University of the Witwatersrand, South Africa
Pre-Conference Program

San Cristobal Rooms A, B, C  
Monday, October 7, 2019

Student and SEG Early Career Professionals Round Table

1:30pm–4:30pm  
Round Table Discussions  
Open to students and early career professionals

4:45pm–5:00pm  
Welcome and Introduction  
José (Pepe) Perelló, Conference and Technical Sessions Chair

5:00pm–5:30pm  
SEG Presidential Address  
Douglas J. Kirwin, SEG President

5:30pm–7:30pm  
Welcome Reception
Pre-Conference Field Trips

The IOCG Systems of the Carajás Province, Amazon Craton, September 29–
Northern Brazil October 4
Leaders: Roberto Xavier, Gustavo Melo

Porphyry-Epithermal Ore Deposits of September 30–
Northern Chile October 4
William X. Chávez, Jr.

Giant Porphyry Cu-Mo Deposits of the Miocene-Pliocene Age
Farallon District: Examples from the Los Bronces, Andina (Rio Blanco),
and Vizachitas Systems October 5
Tony Amberg, William X. Chávez, Jr.

Pre-Conference Workshops

Epithermal Polymetallic Deposits in the Porphyry System October 6
Lluís Fontboté, Université de Genève

Integrating Hyperspectral Technologies and Geochemistry Through the Mining Value Chain October 6
Sam Scher, Corescan; Solace Hotel
Federico Cernuschi, Eclectic Rock

Creation and Destruction of Permeability October 6
Richard Tosdal, Consultant

Epithermal Gold and Silver Deposits—Geology and Exploration October 7
Antonio Arribas, University of Texas, El Paso

Supergene Processes: Metals Mobility in the Weathering Environment October 7
William X. Chávez, Jr., New Mexico Institute of Mining and Technology

Exploration for Skarn Deposits October 7
Larry Meinert, Consultant
In a world of rapid change, the future belongs to those who can redefine it. Innovators who embrace disruptive technologies and collaborate with a broad range of partners to solve real industry challenges.

Today, building on 100 years of technology and innovation leadership, we are taking a fresh approach to innovation.

FutureSmart Mining™ applies cutting-edge technological advances and broad innovative thinking to find safer, more efficient and more sustainable ways to mine the metals and minerals that the world needs.

We connect people to find solutions and pioneer the future of mining.

At Anglo American, we are redefining our future—today.

www.angloamerican.com

AT ANGLO AMERICAN, WE ARE RE-IMAGINING MINING TO IMPROVE PEOPLE’S LIVES

Real Mining. Real People. Real Difference.
### Technical Program

**Day 1 — Tuesday, October 8, AM**  
**Oral Session 1**

#### Polymetallic I
**Session Co-Chairs: Lena Monteiro, Enrique Garay**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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</thead>
<tbody>
<tr>
<td>8:15am-8:30am</td>
<td>Introduction</td>
<td>Lena V. Soares, Enrique Garay</td>
</tr>
<tr>
<td>8:30am-9:00am</td>
<td>Polymetallic (Pb-Zn-Ag-Sn) deposits in South America</td>
<td>Lluís Fontboté (Invited Speaker)</td>
</tr>
<tr>
<td>9:00am-9:20am</td>
<td>The Paleoproterozoic Volcanogenic Massive Sulfide Deposit of Aripuanã, Amazonian Craton, Northern Brazil</td>
<td>Julio Souza Santos</td>
</tr>
<tr>
<td>9:20am-9:40am</td>
<td>New Exploration Ideas for the Ayawilca Zinc-Silver-Indium-Tin Property, Central Peru</td>
<td>Alvaro Fernandez Baca</td>
</tr>
<tr>
<td>9:40am-10:00am</td>
<td>The Zn-Pb Supergene Nonsulfide Ores in Peru: Examples from the Cuzco and Bongará Regions</td>
<td>Maria Boni</td>
</tr>
<tr>
<td>10:00am-10:20am</td>
<td>The Cerro Lindo VMS Deposit, Peru</td>
<td>Jonas Mota e Silva</td>
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<tr>
<td>Time</td>
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<tr>
<td>8:15am-8:30am</td>
<td>Introduction by Lena V. Soares and Enrique Garay</td>
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<tr>
<td>8:30am-9:00am</td>
<td>Presentation on Polymetallic (Pb-Zn-Ag-Sn) deposits in South America by Lluís Fontboté</td>
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<td>Presentation on The Paleoproterozoic Volcanogenic Sulfide Deposit of Aripuanã, Brazil by Julio Souza Santos</td>
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<td>Presentation on The Cerro Lindo VMS Deposit, Peru by Jonas Mota e Silva</td>
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<tr>
<td>10:20am-11:00am</td>
<td>Refreshment Break and Poster Viewing</td>
<td></td>
</tr>
<tr>
<td>11:00am-11:40am</td>
<td>Presentation on What Can the Chemistry of Magnetite Tell Us About the Origin of Magnetite-Apatite Deposits? by John Hanchar (SGA Lecturer)</td>
<td></td>
</tr>
<tr>
<td>11:40am-12:00pm</td>
<td>Presentation on Exploration and Geology at the VMS Zn-Pb Deposit of Palma Within the Uppermost Cretaceous Volcanic-Plutonic Arc in Central Peru by Gema Olivo</td>
<td></td>
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<tr>
<td>12:00pm-12:20pm</td>
<td>Presentation on Indium in Bolivian Polymetallic Vein Mineralizations: Mineralogical Expression and Distribution in the Huari Huari and Ánimas-Chocaya-Siete Suyos Deposits by Lisard Torró</td>
<td></td>
</tr>
<tr>
<td>12:20pm-12:40pm</td>
<td>Presentation on Age Constraints and Isotope Signature of the Ediacaran Pb-Zn and Cu-Epithermal Deposits, Minas do Camaquã, Brazil by Lucy Takehara Chemale</td>
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<tr>
<td>12:40pm-1:00pm</td>
<td>Presentation on Exploration and Geology at the VMS Zn-Pb Deposit of Palma Within the Uppermost Cretaceous Volcanic-Plutonic Arc in Central Peru by Gema Olivo</td>
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<tr>
<td>1:00pm-2:20pm</td>
<td>Lunch, Networking, Poster Viewing</td>
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<tr>
<td>Time</td>
<td>Oral Session 2</td>
<td>Oral Session 3</td>
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</table>
| 2:20-2:40pm   | Carbonatite-Related Ore Formation Processes in Central Brazil  
Pedro Cordeiro | Controls on Mineralisation at the Aurora Gold Mine  
Boaz Wade |
| 2:40-3:00pm   | The Genesis of the El Laco Iron Oxide-Apatite (IOA) Deposit in the Chilean Altiplano: Evidence from Fe, H, and Triple O Stable Isotopes  
Adam Simon | The Discovery of Silica Cap Au-Ag Veins, Cerro Negro Operations, Santa Cruz Province, Argentina  
German Escorza |
| 3:00-3:20pm   | The Economic Geology of Cobalt  
Anthony Williams-Jones | Genesis of the Giant Serra Verde Ion Adsorption REE Deposit, Brazil  
Richard Herrington |
| 3:20-3:40pm   | Tourmaline as a Monitor of Magmatic-Hydrothermal Transition Processes at the World-Class San Rafael Sn Deposit, Peru  
Matthieu Harlaux | Soledad: An Emerging High-Grade Copper-Gold-Silver Discovery Hosted in Tourmaline Breccia Pipes, Peru  
David Kelley |
<table>
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<th>Time</th>
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<td>3:20pm-3:40pm</td>
<td>Tourmaline as a Monitor of Magmatic-Hydrothermal Transition Processes at the World-Class San Rafael Sn Deposit, Peru</td>
<td>Matthieu Harlaux</td>
</tr>
<tr>
<td>3:40pm-4:00pm</td>
<td>Do Organic Matter and Arsenic Promote or Prevent Gold Precipitation at the Shahuindo Epithermal Deposit (Cajamarca, Peru)?</td>
<td>Jean Vallance</td>
</tr>
<tr>
<td>4:00pm-4:20pm</td>
<td>Hydrothermal Paragenesis and Lifespan of the Haquira East Porphyry Copper Deposit, Southern Peru</td>
<td>Federico Cernuschi</td>
</tr>
<tr>
<td>4:20pm-4:40pm</td>
<td>Defining Criteria for the Distinction of Hydrothermal Alteration Zones Associated with Shallow and Intermediate Crustal Levels in the Carajás IOCG Southern Copper Belt</td>
<td>Angela Santos Costa</td>
</tr>
<tr>
<td>4:40pm-5:00pm</td>
<td>Refreshment Break and Poster Viewing</td>
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<tr>
<td></td>
<td>Discovery and Evolving Geological Understanding of the Unique Falchani Volcanogenic Lithium Deposit, Macusani Plateau Area, Puno, Southeastern Peru</td>
<td>Ted O’Connor</td>
</tr>
<tr>
<td></td>
<td>The Discovery History and Geology of the Cascabel Project in Northern Ecuador</td>
<td>Santiago Vaca</td>
</tr>
<tr>
<td></td>
<td>Discovery History and Geology of the Merian Gold Deposits, Suriname, South America</td>
<td>Santjitsing Radjkoemar</td>
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</tbody>
</table>

*Note: The schedule includes a session on the discovery and evolving geological understanding of the Falchani Volcanogenic Lithium Deposit, Macusani Plateau Area, Puno, Southeastern Peru.*
Day 1 — Tuesday, October 8, PM

Speed Talk 1

Session Chairs: Lisard Torró, Darryl Lindsay

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Poster no.</th>
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<tbody>
<tr>
<td>5:00pm-5:10pm</td>
<td>Introduction — Lisard Torró, Darryl Lindsay</td>
<td></td>
</tr>
<tr>
<td>5:10pm-5:15pm</td>
<td>The Formation of High-Grade Gold Polymetallic Intermediate-Sulfidation Epithermal Veins in Santander and Bolivar Provinces, Colombia Jocelyn Pelletier</td>
<td>P.024</td>
</tr>
<tr>
<td>5:15pm-5:20pm</td>
<td>Mineralising Fluid Exsolution and Migration in Porphyry Systems: New Perspectives from the Yerington District, Nevada Lawrence Carter (Student)</td>
<td>P.102</td>
</tr>
<tr>
<td>5:20pm-5:25pm</td>
<td>Gold Re Concentration by High-Temperature Sulfide Recrystallization Supported by Re-Os Reset Ages: A New Mineralization Style for the Quadrilátero Ferrífero Area, Brazil Mariana Brando Soares (Student)</td>
<td>P.007</td>
</tr>
<tr>
<td>5:25pm-5:30pm</td>
<td>Can Zircon Trace Elements Correlate Whole-Rock Fertility Indicators for Porphyry-Copper Deposits? Application of a New Zircon Oxybarometer at El Teniente District Gonzalo Henriquez (Student)</td>
<td>P.068</td>
</tr>
<tr>
<td>5:30pm-5:35pm</td>
<td>Geology, Geochemistry, and Origin of the Watershed Scheelite Skarn Deposit, Northeast Queensland, Australia Jaime Poblete (Student)</td>
<td>P.145</td>
</tr>
<tr>
<td>Time</td>
<td>Title</td>
<td>Authors/Notes</td>
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<tr>
<td>5:35pm-5:40pm</td>
<td>Ore and Breccia Classification of the GW Orebodies of the Balatoc Diatreme, Acupan Gold Deposit, Philippines</td>
<td>Acer Jian Figueroa (Student)</td>
</tr>
<tr>
<td>5:40pm-5:45pm</td>
<td>Sulfides Geochemistry of the Tiegelongnan Porphyry-Epithermal Cu Deposit, Tibet, China</td>
<td>Chao Yang (Student)</td>
</tr>
<tr>
<td>5:45pm-5:50pm</td>
<td>Automated Mineral Classification from Hyperspectral Data Through Semantic Segmentation</td>
<td>Angela Rodrigues (Student)</td>
</tr>
<tr>
<td>5:50pm-5:55pm</td>
<td>Mineralogical Tracers to Constrain the Denudation of Porphyry Copper Deposits on Sedimentary Fill on Adjacent Basins, Northern Chile</td>
<td>Héctor Pizarro</td>
</tr>
<tr>
<td>5:55pm-6:00pm</td>
<td>First U-Pb LA-ICP-MS In Situ Dating of Supergene Copper Mineralization: Case Study in Chucucamata Mining District, Atacama Desert, Chile</td>
<td>Zia Steven Kahou (Student)</td>
</tr>
<tr>
<td>6:00pm-6:05pm</td>
<td>Geology, Geochemistry, and Geochronology of the Contact Copper Prospect: An Investigation of a Potential Porphyry Root, Nevada, USA</td>
<td>Zacharie Zens (Student)</td>
</tr>
<tr>
<td>6:05pm-6:10pm</td>
<td>Tourmaline Breccia Pipes of the Giant Copper Property, Southern BC: Discerning the Significance of Tourmaline and Breccia Pipes as Vectoring Tools in Porphyry Copper Deposits</td>
<td>Bill Fischer (Student)</td>
</tr>
<tr>
<td>6:00pm-7:00pm</td>
<td>Reception and Poster Session</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Session Title</td>
<td>Speaker(s)</td>
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<td>-------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8:15-8:30am</td>
<td>Introduction</td>
<td>Ricardo Gonzalez, Craig McEwan</td>
</tr>
<tr>
<td>8:30-9:00am</td>
<td>Tops and Bottoms of Porphyry Copper Deposits, Revisited</td>
<td>John Dilles (Invited Speaker)</td>
</tr>
<tr>
<td>9:00-9:20am</td>
<td>Geochronology and Igneous Geochemistry of the Ferrobamba Porphyry-Skarn Deposit, Las Bambas, Southern Peru</td>
<td>James Cannell</td>
</tr>
<tr>
<td>9:20-9:40am</td>
<td>Characterising the Eocene-Oligocene Magmatic-Hydrothermal Evolution of the Quebrada Blanca Cu-Mo Porphyry, Collahuasi District, Chile</td>
<td>Regina Baumgartner</td>
</tr>
<tr>
<td>9:40-10:00am</td>
<td>The Carajás IOCG Mineral System: Diversity and Evolution Through the Archean to Paleoproterozoic</td>
<td>Lena Soares Monteiro</td>
</tr>
<tr>
<td>10:00-10:20am</td>
<td>Geology and Evolution of the Candelaria-Punta Del Cobre IOCG District</td>
<td>Irene del Real (Student)</td>
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</table>
## Day 2 — Wednesday, October 9, AM Oral Session 4

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8:15am-8:30am</td>
<td>Introduction</td>
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<tr>
<td>8:30am-9:00am</td>
<td>Tops and Bottoms of Porphyry Copper Deposits, Revisited</td>
</tr>
<tr>
<td>9:00am-9:20am</td>
<td>Geochronology and Igneous Geochemistry of the Ferrobamba Porphyry-Skarn Deposit, Las Bambas, Southern Peru</td>
</tr>
<tr>
<td>9:20am-9:40am</td>
<td>Characterising the Eocene-Oligocene Magmatic-Hydrothermal Evolution of the Quebrada Blanca Cu-Mo Porphyry, Collahuasi District, Chile</td>
</tr>
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</tr>
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<td>10:00am-10:20am</td>
<td>Geology and Evolution of the Candelaria-Punta Del Cobre IOCG District</td>
</tr>
<tr>
<td>10:20am-11:00am</td>
<td>Refreshment Break and Poster Viewing</td>
</tr>
<tr>
<td>11:00am-11:40am</td>
<td>Early Mineralization with High Copper Grades in Porphyry Copper Deposits: Characteristics and Genetic and Economic Significance John Proffett (2019 SEG Distinguished Lecturer)</td>
</tr>
<tr>
<td>11:40am-12:00pm</td>
<td>Evolving Active Margin Magmatism, Tectonics, and Mineralization in the Northern Chilean Andes: A Short Review Constantino Mpodozis (Invited Speaker)</td>
</tr>
<tr>
<td>12:00pm-12:20pm</td>
<td>Regional Structural Controls on Localizing the Eocene-Oligocene Chuquicamata-El Abra-Toki Porphyry Copper Cluster, Northern Chile Andrew Tomlinson</td>
</tr>
<tr>
<td>12:20pm-12:40pm</td>
<td>Geological Update of the Cobre Panama Porphyry Cu-Mo-Au Project, Panama Michael Sepp (Student)</td>
</tr>
<tr>
<td>12:40pm-1:00pm</td>
<td>Multiphase Copper and Nickel Mineralization in the Curaçá Valley, Bahia State, Brazil Filipe Porto</td>
</tr>
<tr>
<td>1:00pm-2:20pm</td>
<td>Lunch, Networking, Poster Viewing</td>
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</table>
### Day 2 — Wednesday, October 9, PM

#### Oral Session 5
**Copper II**  
*Session Chairs: Craig McEwan, Ricardo Gonzalez*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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</table>
| 2:20pm-2:40pm | Zircon Petrochronology as a Recorder of the Magmatic Evolution Culminating in Porphyry Copper Formation at Rio Blanco-Los Bronces  
Simon J. Large |
| 2:40pm-3:00pm | Role of Intraplate Coupling and Ridge Subduction in the Temporal and Spatial Distribution of Au-Cu Deposits in the Chilean Flatslab Region  
Suzanne Kay |
| 3:00pm-3:20pm | Timescales of Crustal Magmatism and Porphyry Copper Mineralization: Large Magma Chambers Are Essential for Massive Ore Fluid Extraction  
Christoph Heinrich |

#### Oral Session 6
**Geomet**  
*Session Chairs: Regina Baumgartner, Karin Olson Hoal*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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| 2:20–3:20  | Economic Geology, Geomet, and Changing the Industry  
Karin Olson Hoal |
| 2:20–3:20  | Predictive Models of Mineralogy from Whole-Rock Assay Data: Case Study from Productora Cu-Au-Mo Deposit, Chile  
Angela Escolme |
| 2:20–3:20  | Linking Geological and Mineralogical Characteristics to Metallurgical Recoveries: A Case Study from the Vazante Nonsulfide Zn Deposit, Central Brazil  
Fernando Fontana |
<table>
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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>3:20pm-3:40pm</td>
<td>Preservation of Subeconomic Permian-Triassic Porphyry Cu and Epithermal Deposits in Central Andes Contradict Exhumation Models for Temporal Distribution of Ore Deposits</td>
<td>Paula Cornejo</td>
</tr>
<tr>
<td>3:40pm-4:00pm</td>
<td>Relationships between Vein Abundance and Distribution, Timing of Mineralization, and Ore Shell Geometry, Encuentro Porphyry Cu-Au-Mo Deposit, Northern Chile</td>
<td>Jaime Osorio</td>
</tr>
<tr>
<td>4:00pm-4:20pm</td>
<td>The Productora Cu-Au-Mo Deposit: An Example of Spatially Associated Magnetite-Apatite, Tourmaline-Cemented Breccias and Porphyry Mineralization</td>
<td>Angela Escolme</td>
</tr>
<tr>
<td>4:20pm-4:40pm</td>
<td>The Josemaría and Los Helados Porphyry Cu-Au Deposits: The Timing of Porphyry Emplacement, Uplift, and Erosion in the El Potro Region of Chile and Argentina</td>
<td>Fionnuala Devine</td>
</tr>
<tr>
<td>4:40pm-5:00pm</td>
<td>Refreshment Break and Poster Viewing</td>
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<tr>
<td>Time</td>
<td>Presentation</td>
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<tr>
<td>5:00pm-5:10pm</td>
<td><strong>Introduction — Lisard Torró, Darryl Lindsay</strong></td>
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</table>
| 5:10pm-5:15pm | Boiling Horizon Determination at Dios Protege Vein, Castaño Nuevo Mining District, Cordillera Frontal, Argentina  
Maria Cócola (Student) |
| 5:15pm-5:20pm | The Iron Cap Porphyry Cu-Au-Mo Deposit, NW British Columbia, Canada  
Michelle Campbell (Student) |
| 5:20pm-5:25pm | Marmato Gold Deposit, Colombia: A Hybrid Between a Porphyry and a Reduced Intrusion-Related Gold System  
Leonardo Santacruz (Student) |
| 5:25pm-5:30pm | Platinum Group Elements as a Fertility Indicator in the Supergiant Rio Blanco Cu Porphyry Deposit, Central Chile  
Yamila Cajal (Student) |
| 5:30pm-5:35pm | Magnetite Geochemistry Reveals a Continuum between IOCG and IOA Mineralization  
Maria Rodriguez Mustafa (Student) |
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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
<th>Poster No.</th>
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<tbody>
<tr>
<td>5:35–6:10</td>
<td>The Cu-Au Furnas Deposit Metallogeny and Ore Typology, Carajás Province, Pará, Brazil</td>
<td>Maira Alves</td>
<td>P.153</td>
</tr>
<tr>
<td>5:00pm-5:10pm</td>
<td>Introduction — Lisard Torró, Darryl Lindsay</td>
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<tr>
<td>5:10pm-5:15pm</td>
<td>Boiling Horizon Determination at Dios Protege Vein, Castaño Nuevo Mining District, Cordillera Frontal, Argentina</td>
<td>María Cócola (Student)</td>
<td>P.008</td>
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<tr>
<td>5:15pm-5:20pm</td>
<td>The Iron Cap Porphyry Cu-Au-Mo Deposit, NW British Columbia, Canada</td>
<td>Michelle Campbell (Student)</td>
<td>P.101</td>
</tr>
<tr>
<td>5:20pm-5:25pm</td>
<td>Marmato Gold Deposit, Colombia: A Hybrid Between a Porphyry and a Reduced Intrusion-Related Gold System</td>
<td>Leonardo Santacruz (Student)</td>
<td>P.025</td>
</tr>
<tr>
<td>5:25pm-5:30pm</td>
<td>Platinum Group Elements as a Fertility Indicator in the Supergiant Rio Blanco Cu Porphyry Deposit, Central Chile</td>
<td>Yamila Cajal (Student)</td>
<td>P.067</td>
</tr>
<tr>
<td>5:35pm-5:40pm</td>
<td>Magnetite Geochemistry Reveals a Continuum between IOCG and IOA Mineralization</td>
<td>Maria Rodriguez Mustafa (Student)</td>
<td>P.155</td>
</tr>
<tr>
<td>5:40pm-5:45pm</td>
<td>The Cu-Au Furnas Deposit Metallogeny and Ore Typology, Carajás Province, Pará, Brazil</td>
<td>Maira Alves</td>
<td>P.154</td>
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<tr>
<td>6:00pm-6:05pm</td>
<td>The Emigrant Pass Volcanic Field: Petrologic Constraints on Magmas That May Have Contributed to Eocene Mineralization along the Carlin Trend</td>
<td>Nansen Olson (Student)</td>
<td>P.037</td>
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<tr>
<td>6:05pm-6:10pm</td>
<td>Sulfur-Rich Ore Forming Magmas: Evidence from Anhydrite and High-Sulfur Apatite Inclusions</td>
<td>Michael Hutchinson</td>
<td>P.009</td>
</tr>
<tr>
<td>6:00pm-7:00pm</td>
<td>Reception and Poster Session</td>
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**Day 2 — Wednesday, October 9, PM Speed Talk 2**

**Session Chairs:** Lisard Torró, Darryl Lindsay
Day 3 — Thursday, October 10, AM

Gold I

Session Co-Chairs: Thomas Bissig, Marc Bardoux

8:15am-8:30am
Introduction
Thomas Bissig, Marc Bardoux

8:30am-9:00am
Gold in South America
François Robert (Invited Speaker)

9:00am-9:20am
Geological and Structural Evolution of the Epithermal Au-Ag Metallogenic Province Deseado Massif, Patagonia, Argentina
Andreas Dietrich

9:20am-9:40am
Key Learnings from West Africa to Find Gold in NE South America (SAXI)
Mark Jessell

9:40am-10:00am
Geochemical Characterization of K-Free Hydrothermal Alteration and Gold Mineralization at the Karouni Orogenic Gold Deposits, Guyana, South America
Michael Tedeschi

10:00am-10:20am
The Rhyacian Nivré Gold Deposit, Dorlin Project, French Guiana
Dominique Fournier
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>10:20am-11:00am</td>
<td>Refreshment Break and Poster Viewing</td>
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<tr>
<td>11:00am-11:40am</td>
<td><strong>The Business of Mineral Exploration, Challenges, and Future Trends</strong></td>
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<tr>
<td></td>
<td><em>Douglas Kirwin (Invited Speaker)</em></td>
</tr>
<tr>
<td>11:40am-12:00pm</td>
<td><strong>Epithermal and Porphyry Mineralization Potential in Well-Preserved Paleoproterozoic (ca. 2.0 to 1.78 Ga) Continental Magmatic Arcs in the Amazonian Craton, Brazil</strong></td>
</tr>
<tr>
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<td><em>Caetano Juliani</em></td>
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<tr>
<td>12:00pm-12:20pm</td>
<td><strong>Proterozoic Porphyry-Type Versus Oxidized Intrusion-Related Gold Systems in Brazil: Some Insights Relevant to a New Exploration Frontier</strong></td>
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<tr>
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<td><em>Eugenio Espada</em></td>
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<tr>
<td>12:20pm-12:40pm</td>
<td><strong>Mechanisms of Hydrothermal Gold Deposition in Epithermal, Carlin, and Orogenic Deposits</strong></td>
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<td><em>Stuart Simmons</em></td>
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<tr>
<td>12:40pm-1:00pm</td>
<td><strong>Multiple-Staged Rhyacian Gold of the Guiana Shield</strong></td>
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<td></td>
<td><em>Marc Bardoux</em></td>
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<tr>
<td>1:00pm-2:20pm</td>
<td>Lunch, Networking, Poster Viewing</td>
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</tbody>
</table>
### Oral Session 8
**Gold II**
*Session Co-Chairs: Thomas Bissig, Marc Bardoux*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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</table>
| 2:20pm-2:40pm | Gold Metallogeny in the Colombian Andes: Recent Advances and Future Perspectives  
*Hildebrando Leal-Mejia* |
| 2:40pm-3:00pm | Structural Evolution of the El Indio Belt (Chile-Argentina): Mineralisation Events  
*Constanza Jara (Student)* |
| 3:00pm-3:20pm | Metallogenic Evolution of the Maricunga Belt and Adjacent Andean Arc Segments: A Case for Tectonic Domains Controlling Distribution of Epithermal Versus Porphyry Deposits  
*Sergio Gamonal* |
| 3:20pm-3:40pm | Volcano-Tectonic Paleoenvironmental Evolution of the Southern Maricunga Belt  
*José Naranjo* |

### Oral Session 9
**New Discoveries in South America II**
*Session Co-Chairs: Alan Wilson, Juan Carlos Toro*

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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</table>
| 2:20pm-2:40pm | The AntaKori Cu-Au-Ag Project, Northern Peru: New Eyes, New Discovery!  
*Kevin Heather* |
| 2:40pm-3:00pm | Filo Del Sol Project, the Discovery of an Intricate Miocene Porphyry/Epithermal System in the Argentina Chile Andes  
*Diego Charchafie* |
| 3:00pm-3:20pm | Discovery History of RT Norte, Chuquicamata Cluster, Chile  
*Alfonso Calderon* |
| 3:20pm-3:40pm | Geology of Marimaca, Coastal Cordillera, Northern Chile: An Unconventional Copper Deposit in a Very Conventional Place  
*Sergio Rivera* |
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenter/Location</th>
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<tbody>
<tr>
<td>3:40-4:00pm</td>
<td>An Updated Geological Model for High-Sulphidation Epithermal Ag-Au Mineralization, Huantajaya-Chimberos Sector, Nueva Esperanza Project, Maricunga District, N. Chile</td>
<td>Nick Callan</td>
</tr>
<tr>
<td>4:00-4:20pm</td>
<td>Multistage Gold System Formation During Tectonic Regime Switch at the Carboniferous Gondwana Margin, Northern Peru: A New Hallmark for Intrusion-Related Orogenic Gold?</td>
<td>Daniel Wiemer</td>
</tr>
<tr>
<td>4:20-4:40pm</td>
<td>Geodynamic Setting and Origins of the Giant Porphyry Cu-Au Deposits of the East Sunda Arc, Indonesia</td>
<td>David Cooke</td>
</tr>
<tr>
<td>4:40-5:00pm</td>
<td>Refreshment Break and Poster Viewing</td>
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<tr>
<td>5:00-6:00pm</td>
<td>Round Table</td>
<td>Luis Fontboté, François Robert, and Doug Kirwin</td>
</tr>
<tr>
<td>6:00-6:10pm</td>
<td>Introduction to SEG 2020</td>
<td>Murray Allan and Craig Hart</td>
</tr>
<tr>
<td>6:00-6:10pm</td>
<td>The Cerro Bufalo Project, on the Way to a New Discovery in Chile</td>
<td>Patricio Fernandez Mackenzie</td>
</tr>
<tr>
<td>6:00-6:10pm</td>
<td>The Geology of Atacocha and El Porvenir Mines Understood as One Single Polymetallic District: The Pasco Complex</td>
<td>Mervin Tapia</td>
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<tr>
<td>6:00-6:10pm</td>
<td>Mocha Porphyry Copper Deposit: An Update</td>
<td>Edwin Churata</td>
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**John E. Black**, chief executive officer and director of Regulus Resources Inc., is an economic geologist with 35-plus years of exploration experience in the Americas, Central Asia, the Southwest Pacific, and Eastern Europe/Asia. His professional credentials include a B.Sc. degree in geology (1983) and an M.S. degree in geology/ore deposits exploration (1988), both from Stanford University. John was the founding president of Antares Minerals Inc. and was instrumental in acquiring the Haquira project in Peru for Antares. He was the key driver in negotiating the sale of Antares to First Quantum Minerals for C$650 million. John’s early career included work with Bear Creek Mining Company, Kennecott Minerals Corporation, Rio Tinto, and Western Mining Corporation, and he currently serves as the chief executive officer and director of Aldebaran Resources Inc.

**Lluís Fontboté** is a professor of economic geology at the University of Geneva, Switzerland, where he has been since 1990. He studied at the universities of Granada, Spain (M.Sc), and Heidelberg, Germany (Ph.D.). His main area of expertise is epithermal polymetallic deposits linked to porphyry systems, iron oxide copper-gold deposits, and Mississippi Valley-type zinc-lead deposits. In collaboration with his students and coworkers, Lluís has also published work focusing on volcanic-hosted massive sulfide and orogenic gold deposits, on acid mining drainage, and on the future of global mineral resources. He works on mineral exploration for several commodities, mainly in the Andes.
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John M. Hanchar is a full professor, university research professor, and former head of the Department of Earth Sciences and director of the Centre for Earth Sciences Research at Memorial University of Newfoundland, St. John's, Newfoundland, Canada. His research interests are in geochemistry and include the origin, tectonic controls, and fluid-rock alteration history of magmatic-hydrothermal low Ti magnetite-apatite (MtAp) Kiruna-type and iron oxide copper-gold (IOCG) mineral deposits and the related metasomatic alteration of their host rocks, as well as the origin and evolution of the continental crust, understood through studying granites and lower crust granulite xenoliths. To address these problems, he uses a combination of complementary analytical tools including U-Pb geochronology, trace element, and radiogenic isotope studies (Sr, Nd, Hf, Pb), and trace elements in accessory minerals. He is the author of over 90 papers in international peer-reviewed publications, has co-edited two books, and is an associate editor of American Mineralogist and Chemical Geology.

Doug Kirwin is an Australian geologist with 48 years of international experience. His exploration teams have been responsible for several well-known mineral discoveries, which are now being mined. The most notable is the giant Tsumeb copper deposit in Namibia discovered by Rio Tinto. He was executive vice president of Ivanhoe Mines from 1996 to 2012. Since then, Doug went back to being an independent consulting geologist. He is currently exploring the potential for Carlin-type gold deposits in the Kyrgyz Republic and consulting on the future of global mineral resources. He is currently an adjunct professor of geology. He is the 2019 president of the Society of Economic Geologists. He is the author of over 90 papers in international peer-reviewed publications, and has co-edited two books and several special issues.
Constantino Mpodozis, SEG Fellow and 2000 SEG International Exchange Lecturer, obtained a B.Sc. degree at the University of Chile, Santiago, in 1974 and a Ph.D. degree in France (Paris VI University, 1977). He is a specialist in Andean tectonics and metallogenesis who worked for almost 20 years in the Chilean Geological Survey, where he became director of geology. Following a period in the oil industry, he is currently with Antofagasta Minerals (senior exploration geologist). He is the author of more than 200 publications and conference presentations that are frequently cited in the mainstream geologic literature. He has also been a professor of structural geology, Andean geodynamics, and metallogenesis at several Chilean universities. A Guggenheim Fellow and Visiting Scientist at Cornell University, he is also a member of the Chilean Academy of Sciences and Honorary Fellow of the Geological Society of America.

John Proffett received a B.A. degree in geology from the University of California, Berkeley, and a Ph.D., also at Berkeley, working on the Yerington porphyry copper district. He worked for The Anaconda Co. for 14 years, first in the Yerington district, then in the mines at Butte, Montana, followed by exploration in Alaska, focusing on volcanicogenic massive sulfide deposits. Since 1981 he has been a consulting geologist, based in Alaska, working on a variety of ore deposits and districts worldwide. This has included porphyry deposits in Chile, Peru, Argentina, Indonesia, Namibia, Alaska, and Canada, Mt. Isa-type deposits in Australia, and massive sulfide deposits in Alaska. In 2003 he received the SEG Silver Medal and the SEG Brian Skinner Award, for a paper on the geology of the Bajo de la Alumbrera porphyry copper-gold deposit, Argentina. In 2015 he received the first Geological Mapping Award of the Geological Society of America, and he is the SEG Distinguished Lecturer for 2019.
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François Robert holds a degree in geological engineering from Ecole Polytechnique in Montreal, where he also obtained M.Sc. and Ph.D. degrees. His Ph.D. studies focused on the classic orogenic Sigma gold-quartz vein system at Val d’Or, Quebec. This was followed by a postdoctorate at the University of Michigan. He joined the Geological Survey of Canada in 1985 as a research scientist, and he carried out applied research on gold deposits in Canada and abroad. In late 1997, he joined Barrick Gold Corporation where he occupied various positions in Canada, Australia, and South America. He is currently vice president and chief geologist for global exploration. He has published numerous papers in scientific journals and served on several committees of scientific organizations, including presidency of SEG in 2015. He has received several awards, including the Lindgren, Silver Medal, and Ralph Marsden Awards from the SEG.

Richard Sillitoe graduated from the University of London, England, where he went on to obtain a Ph.D. degree. After working for the Instituto de Investigaciones Geológicas (Geological Survey of Chile) and then returning to the Royal School of Mines at the University of London as a Shell postdoctoral research fellow, he has operated for more than 45 years as an independent consultant to more than 300 mining companies, international agencies, and foreign governments. He has worked on a wide variety of precious, base, and lithophile metal deposits and prospects in 100 countries worldwide, but he focuses primarily on the epithermal gold and porphyry copper environments. His specialty is deposit modeling using field observations and drill core. Published research has earned him awards in Europe, Australia, and North and South America, including the SGA-Newmont Gold Medal and the SEG Penrose Gold Medal. He was President of the SEG in 1999 to 2000.
Post-Conference Program

Post-Conference Field Trips

Domeyko Fault Zone Transect: Structural Controls of Giant Porphyry Systems
Leaders: Andrew Tomlinson, John Dilles, Nicolas Blanco
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Imagine the Possibilities When Geoscience Meets Innovation

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Posters

Posters will be on display during regular conference hours in the Pedro de Valdivia A, O’Higgins, and Prat Rooms.

Poster sessions will be held from 6 to 7pm Tuesday and Wednesday, during the evening receptions.

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