

## PRELIMINARY PROGRAM

(70 technical presentations as of October 10, 2018)

**Represented Countries (17):** Australia, Brazil, Canada, Chile, Colombia, Ecuador, Finland, France, Germany, Mexico, Peru, Romania, South Africa, Spain, Sweden, UK and USA

**Inaugural Ceremony** (Wednesday November 28, 7:00 pm)

Words of Welcome

**Carlos Barahona**, Procemin-Geomet 2018 Conference Manager  
Gecamin, Chile

**Alice Clark**, Procemin-Geomet 2018 Co-Organizer  
Director of Production Centres, SMI The University of Queensland, Australia

**Leopoldo Gutiérrez**, Procemin-Geomet 2018 Co-Organizer  
Associate Professor, Metallurgical Engineering Department, Universidad de Concepción, Chile

**Oscar Jerrez**, Procemin-Geomet 2018 Co-Organizer  
Associate Professor, Institute of Applied Economic Geology, Universidad de Concepción, Chile

**Cristian Ramos, Procemin-Geomet 2018 Chair**  
Concentrator Manager, Minera Los Pelambres, Antofagasta Minerals, Chile

Opening Address

**Minera Los Pelambres: Goals and Challenges**

**Mauricio Larraín**, General Manager, Minera Los Pelambres, Antofagasta Minerals, Chile

**Plenary Presentations** (Thursday Nov. 29 and Friday Nov. 30)

**Future Vision for Codelco's El Teniente Division**

Nicolás Rivera, General Manager, El Teniente Division, Codelco, Chile

**Geometallurgy as a Foundation for Value Based Ore Control**

Craig Morley, Vice President of Mining, Geosciences and Reconciliation, Corporate Office, Anglo American, Chile

**Data management in Antofagasta Minerals**

Pablo Carvallo, Manager of Operations Optimization, Antofagasta Minerals

**Innovation and Productivity in Minera Collahuasi (TBC)**

Dalibor Dragicevic, Vice President of Processes, Cía. Minera Doña Inés de Collahuasi

**Real-Time Data Platform for Productive Ecosystem**

Lautaro Osorio, Manager Real-Time Data Platform, BHP, Chile

**X-ray Transmission Based Sorting at the San Rafael Tin Mine**

Pedro Condori, Minsur, Peru; Angel Pinto, Ronald Machaca, Mina San Rafael, Minsur, Peru; and Christopher Robber, Tomra Sorting Mining, Germany

**An Empirical Methodology for the Operational Optimization of SAG Mill Performance: The Pelambres Case**

Jaime Sepúlveda, J-Consultants; Michel Morales and Cristian Leiva, Minera Los Pelambres, Antofagasta Minerals, Chile

**Technology Innovation and Strategic Developments at Cerro Verde (TBC)**

Manager of Metallurgy and Strategic Development, Cerro Verde, FreePort-McMoRan, Peru

**Operational Integration and Water Management at Los Pelambres (TBC)**

Cristian Ramos, Concentrator Manager, Cía. Minera Los Pelambres, Antofagasta Minerals

**Technical Presentations** (Thursday Nov. 29 and Friday Nov. 30)**Applied Mineralogy and Mineral Characterization****(A35) Mineralogical Characterization of Three Samples of Mines Different from Jacobina Mining Ba-Yamana Gold**

Antonia Miranda, Debora Santos and Vladiclerisson Santos, Yamana Gold, Brazil

**(A47) The Optimum Number of Size Fractions: A Discussion on Number of Fractions per Sample for an Automated Mineralogy Test**

Mahdi Ghobadi and Rino Bindi, Activation Laboratories, Canada

**(A62) Mineralogical and Metallurgical Examination of Phyllosilicate Mineral Flotation in Chinalco Peru Mine**

Johan Cobeñas Salcedo, Minera Chinalco, Peru

**(A20) Quantifying Mineral Liberation Using X-ray Micro-CT: What Can a 3D Analysis Tell Us?**

Francisco Reyes, J. Cilliers and Stephen Neethling, Imperial College London, UK

**(A30) Uncertainty Assessment in Particle Tracking Processing Models of Cassiterite in Complex Skarn Ores**

Edgar Schach, Raimon Tolosana-Delgado, Robert Möckel, Urs Peuker, Martin Rudolph, Gerald van den Boogaart, Helmholtz Institute Freiberg for Resource Technology, Helmholtz-Zentrum Dresden-Rossendorf, Germany; Markus Buchmann and Thomas Leißner, Institute of Mechanical Process Engineering and Mineral Processing, Technical University Bergakademie Freiberg, Germany

**(A96) Online Mineralogy Analyser on Copper Slurry at Chuquicamata Division Concentrator Plant**

Héctor Carreño, Radomiro Tomic Division, Codelco, Chile; Gabriel Berkowitz, Héctor Lizama, Cristian Rodríguez, Patricio Lara, CodelcoTec, Chile; Osvaldo Maldonado, Rubén Vásquez and Nicolás Turén, Sax Soluciones Analíticas, Chile

**Geometallurgical Modeling****(A69) Estimating Geometallurgical Risk in Undeveloped Complex Orebodies**

Rick Valenta, Alice Clark, Rhonda O'Sullivan and Joel Thomas, SMI, University of Queensland, Australia

**(A63) Upgrade of Esperanza Geometallurgical Model**

Leyla Vaccia, Charles Lozano, Minera Centinela, Antofagasta Minerals, Chile; Orlando Rojas<sup>2</sup> and Javier Olivares, GeoEstima, Chile

**(A34) Geometallurgy to Small Mining**

Dario Lozada, Ecomining, Ecuador; and Ana Milena Salazar, Compañía Minera Minereicis, Ecuador

**(A91) Low Cost Methodology of Geometalurgical Analysis to Improve the Small Scale Gold Mining Metallurgical Process at the Gualconda Mine in Nariño, Colombia**

Eliana Molina and Gabriel Pantoja, Faculty of Exact and Natural Sciences, Universidad de Caldas, Colombia

**(A61) Geological Contributions to a Geomet Programme in Brazil: Cuiaba's AngloGold Ashanti Mine**

Luiz Da Costa, Fernando Peixoto de Villanova and Reuber Cota, AngloGold Ashanti, Brazil

**(A79) Hyperspectral Core Imaging Applied to Geometallurgy**

Paul Linton, TerraCore, USA and Miguel Martínez, ALS Global, Chile

**(A85) Short-Term Geometallurgy at El Teniente Mine: A Great Challenge**

Úrsula Contreras, División El Teniente, Codelco, Chile

**(A01) Geometalurgical Characterization of Vizcachitas Cu/Mo Ore, Chile**

Antony Amberg, Los Andes Copper, Chile; Gonzalo Saldías, Minera Vizcachitas, Chile; Romke Kuyvenhoven, Francisco Soto, Empirica Consultores, Chile; Heriban Soto and Catherine Souza, SGS Minerals, Chile

**(A77) Geometalurgical Characterization of Nelsonite Bodies from Catalão I Carbonatitic Complex to Find Favorable Process Targets**

Leonardo Rangel, Bruno Milanezi, CMOC International, Brazil; Víctor Correia and Douglas Mazzinghy, Universidade Federal de Goiás, Brazil

**(A45) A Methodology for the Simulation of Synthetic Geometalurgical Block Models of Porphyry Ore Bodies**

Mauricio Garrido, Felipe Navarro, ALGES Laboratory, AMTC, Universidad de Chile; Exequiel Sepúlveda, School of Mining Engineering, Universidad de Talca, Chile; and Brian Townley, Department of Geology, Universidad de Chile

**(A84) Application of two Multivariate Techniques on Exploratory Analysis of Geometalurgical Data**

Cristian Jeraldo, Cristian Quiñones, Ademir Ramírez and Rafael Venegas, Wood, Chile

<b>Testing and Prediction of Process Performance</b>
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**(A81) Comminution Sampling: Why Size Matters**

Alex Doll, Sagmilling, Canada

**(A92) Model Based Laboratory/Plant Scale-up of HPGR Circuit Performance**

Jaime Sepúlveda, J-Consultants, Chile; Edson Tobar, Ricardo Galdames and Santiago Figueroa, Antofagasta Minerals, Chile

**(A33) Correction of Bond Ball Mill Work Index Test for Closing Mesh Sizes**

Yardin Josefin, N.B. Keevil Institute of Mining Engineering, University of British Columbia, Canada; and Alex Doll, SAGMILLING, Canada

**(A08) Accuracy of the Bond Ball Mill Test and Its Implications**

Matt Weier and Tapiwa Chenje, JKTech, Australia

**(A40) Quantifying the effect of Texture and Mineralogy Over the Physical Properties of Rocks Using the Single Impact Load Cell**

Pia Lois-Morales, Benjamin Bonfils and Cathy Evans, Julius Kruttschnitt Mineral Research Centre, SMI, University of Queensland, Australia

**(A16) Evaluation of the LCPC Test for Application in the Operations of Mining and Processing of Compact Ores: Case Study of Sossego Mine**

Petterson Barbosa, Maurício Bergerman, Escola Politécnica, Universidade de São Paulo, Brazil; and Elisabeth da Fonseca, Vale, Brazil

**(A42) A Multivariable Sensor to Measure Solid and Gas Holdup in Flotation Machines**

Miguel Maldonado, R. Cretier, Department of Metallurgical Engineering, Universidad de Santiago de Chile; and Cesar Gomez, Department of Mining and Materials Engineering, McGill University, Canada.

**(A46) Phase-Exclusion Cells: A Primary Sensing Component for In-Situ Measurement of Gas Holdup**

César Gómez, Department of Mining and Materials Engineering, McGill University, Canada; and Miguel Maldonado, Department of Metallurgical Engineering, Universidad de Santiago de Chile

**A70) Pilot Scale Assessment of Stage Flotation Reactor as Part of SGO Project's Cu-Mo Separation Circuit**

Victor Iriarte, Fernanda Orellana, Leonardo Flores and Cristian Palacios, Spence Growth Option Project, BHP, Chile

**(A71) Upgrading Mo Concentrate Grade: Ferric Leaching Potential on Mo Concentrate Obtained from Pilot & Bench Scale Testwork**

Leonardo Flores, Fernanda Orellana and Víctor Iriarte, Spence Growth Option Project, BHP, Chile

**(A07) Rheological Behavior of Suspensions Generated from Sulphide Ores from Minera Centinela Under Different Physicochemical Conditions**

Andrés Ramirez, Leopoldo Gutiérrez, Department of Metallurgical Engineering, Universidad de Concepción, Chile; Fabiola Rivadeneira and Francisco Melo, Minera Centinela, Antofagasta Minerals, Chile

**(A38) Water Consumption Spatial Modeling Based on Quantitative Mineralogy and Metallurgical Tests**

Rodrigo Riquelme, Rafael Ciri6n and Rodrigo Glasner, GeInnova, Chile

<b>Comminution Processes</b>
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**(A37) Effect of Grinding Media Type on Ball Mill Capacity**

Levi Guzman and Dante Garcia, Moly-Cop Adesur, Peru

**(A51) Exploring the Impact of Other Parameters on Grinding Media Wear - the Minas Rio Case**

Peter Radziszewski, Sudarshan Martins, Metso, Canada; Roberto Panzera, Metso, Brazil; Jens Lichter, Anglo American, South Africa; Jonathan Silva and Lorene Fonseca; Minas Rio, Anglo American, Brazil

**(A90) Operational Comparison Associated to Obstructed SAG Mill Grates, Using Discrete Element Method (DEM) Simulation**

Ignacio Molina, Rodrigo Muranda, Pablo Pichinao and Guillermo Flores, Moly-Cop, Chile

**(A52) Optimize Fragmentation with Split-ShovelCam**

Cristian Rodríguez, Split Engineering, Chile; Peter Cameron, Split Engineering, Australia; and Tom BoBo, Split Engineering, USA

**Flotation: Fundamentals, Reagents and Industrial Applications****(A11) Role of Dispersants in the Interactions Between Clay Minerals and Copper Sulphides in Seawater**

Andrés Ramírez, CRHIAM, Universidad de Concepción; Leopoldo Gutiérrez, Department of Metallurgical Engineering, Universidad de Concepción, Chile; and Janusz Laskowski, N.B. Keevil Institute of Mining Engineering, University of British Columbia, Canada

**(A21) Tecflote: New Collector Chemistry for Sulphide**

Andrew Lewis, AkzoNobel, Sweden and Odair Lima, AkzoNobel, Brazil

**(A23) Characterization of Flotation Froths Using a Rhodococcus Opacus as Bioreagent**

M. Cortes, M.L. Torem, R.H. Rojas, A.R.M. Pereira, Department of Chemical and Materials Engineering, Pontifícia Universidade Católica do Rio de Janeiro, Brazil; and H.J.B. Couto, Mineral Technology Center, Mineral Technology Center, CETEM; Brazil

**(A32) Frother Characterisation Using Hydrodynamic Methodology**

Patricio Velarde, Levi Guzman and Dante Garcia, Moly-Cop Adesur, Peru

**(A29) Hematite and Quartz Bioflotation: Adsorption and Selective Study**

Carlos Olivera, Antonio Gutiérrez and Maurício Torem, Department of Chemical and Materials Engineering, Pontifícia Universidade Católica do Rio de Janeiro, Brazil

**(A53) Alternative Depressants for the Reverse Cationic Flotation of Iron Ores**

Carlos Veloso, ArcelorMittal; Université de Lorraine, France; Levi Filippov, Inna Filippova, Université de Lorraine, France; and Armando Araujo, ArcelorMittal Global, France

**(A82) Effect of Dispersants (type and dose) on The Selective Flotation of a Sulphide Copper Ore**

Carmina Quintanar, Solvay, Chile; Ítalo Manzo and Marco Vera, Universidad Técnica Federico Santa María, Chile

**(A94) Impact of Hydrodynamic Conditions and Frother Strength over Coarse and Fine Particle Flotation**

Rob Thorpe, Metrix Plant Technologies, Canada; Frank Cappuccitti, Flottec, USA; and Juan Anes, Flottec, Canada

**(A25) Iron Ore Direct Flotation Using a Crude Biosurfactant Extracted from a Rhodococcus Opacus Strain**

A.R.M. Pereira, R.H. Rojas, M.L. Torem, M. Cortes and A.G. Merma, Department of Chemical and Materials Engineering, Pontifícia Universidade Católica do Rio de Janeiro, Brazil

**(A24) Froth Flotation of Low Grade Iron Ore Using Fatty Acid**

R. Rojas, A. Pereira, M. Torem, M. Cortes, A. Merma, Department of Chemical and Materials Engineering, Pontifícia Universidade Católica do Rio de Janeiro, Brazil; A. Lamon, Hidroveg Chemical Industries, Brazil

**(A65) Reducing Fine Molybdenite Losses in Bulk Copper/Molybdenum Flotation**

Rodrigo Araya, Glencore Technology, Canada; César Gómez, Department of Mining and Materials Engineering, McGill University, Canada; and Virginia Lawson, Glencore Technology, Australia

**(A80) Evaluation of Flotation Reagents Formulations in Cupru Min Ores**

Marco Orellana, Proquimin, Chile; Gheorghe Chindris and Cornel Mera, Cupru Min, Romania

**Modeling, Simulation and Optimization of Mineral Processes****(A59) Underflow Mechanical Energy Dissipation in Hydrocyclones: Operation State Control**

Lina Chica, Universidad de Medellín, Colombia; M.O. Bustamente, Universidad Nacional de Colombia; and Arturo Barrientos, Awke, Chile

**(A58) Grinding Efficiency Optimisation of a Semi Autogenous Mill Through Liner Design Using Discrete Element Simulation**

Michael Arroyo, Levi Guzman and Dante Garcia, Moly-Cop Adesur, Peru

**(A03) Improvement of Magnesite Ore Reverse Flotation by Changing the Milling Circuit**

Matheus Moraes, Paschoal Bonadia, Cassandro Matos, RHI Magnesita, Brazil; and Douglas Mazzinghy, Mining Engineering Department, Universidade Federal de Minas Gerais, Brazil

**(A06) Upgrade of the Cleaner Circuit of the Mount Isa Mines Copper Concentrator**

Rodrigo Araya, Glencore Technology, Canada and Virginia Lawson, Glencore Technology, Australia

**(A83) Influence of the P80 parameter in the Molybdenum recovery at El Teniente Cu porphyry deposit, Chile**

Karen Osorio, Gonzalo Zúñiga and Ludovina Burgos, El Teniente Division, Codelco, Chile

**(A74) Vertimill as the Definitive Step Before Concentration**

Sebastián Villalobos, Juan Opazo, Metso, Chile; and Serkan Dikmen, Metso, Australia

**(A78) Mineral Occurrence of Molybdenum at El Teniente, Chile: Implications to Metallurgical Recovery**

Gonzalo Zúñiga, Ludovina Burgos and Brian Townley, División El Teniente, Codelco, Chile

**(A60) Mineralogical Characterization and Impact on the Recovery of Molybdenum in the Chuquicamata Deposit, Antofagasta Region, Chile**

Ayrton Tapia, Chuquicamata Division, Codelco; Universidad Católica del Norte, Chile; Mauricio Romero, Marlen Reyes and Domingo Muñoz, Chuquicamata Division, Codelco, Chile

**(A15) Evaluation of the Performance of an Industrial Rougher Flotation Bank of a Scheelite Ore Through Automated Mineralogy**

Nathalie Kupka and Martin Rudolph, Department of Mineral Processing, Helmholtz Institute Freiberg for Resource Technology, Helmholtz-Zentrum Dresden - Rossendorf

**(A28) Evaluation of Valuable Minerals Along an Industrial Rougher Circuit Using QEMSCAN Analysis**

Paulina Vallejos, Juan Yianatos, Centre for Mining Industry, Universidad Técnica Federico Santa María, Chile; and M. Morales, Minera Los Pelambres, Chile

**(A41) Application of the Taguchi Method to Optimize Parameters in a Rougher Circuit of Copper and Molybdenum Flotation**

Alejandro Mayta, Department of Mathematics, Universidad Nacional de San Agustín, Peru; and Miguel Mayta, Southern Peru Copper, Toquepala, Peru

### Technology Innovations

**(A26) Using Artificial Intelligence and 3D Imaging for Real-Time Fragmentation Analysis on Conveyor Belts**

Ian Bell, Motion Metrics International, Canada

**(A18) Coarse Separation at the Mine Face**

Michael Scott, CRC ORE, Australia

**(A49) Application of Continuous Elemental Analysis and Sampling Zones for Flotation Plants**

Tom Strombotne, Thermo Fisher Scientific, USA

**(A04) Real-Time Monitoring of Precious Metals in Slurries**

Yves Van Haarlem, Brianna Ganly, Joel O'Dwyer, Jack Drury and David Abernethy, Mineral Resources, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

**(A93) Artificial Intelligence and its Application in the Current Automated Mineralogy**

Mauricio Belmar, Felipe Martínez, Melisse Henry, Tomas Hrstka, Yeslainge Fuentes, Paulina Andaur and Hector Suazo, SGS, Chile

**(A89) Technical Feasibility of Recovering Cobalt During the Processing of Copper Ore**

Romke Kuyvenhoven, Sustainable Minerals Institute – International Centre of Excellence, Chile; Verónica Hernández and Brian Townley, Universidad de Chile

**(A43) Identification, quantification and (bio) technological extraction of valuable elements contained in tailings from Chilean mining Industry**

Ivan Restrepo, Roberto Collao, Patricio Martínez, Codelco Tech, Chile; Manuel Caraballo, Brian Townley, Universidad de Chile; and Felipe Noriega, Minera Valle Central, Chile

**(A72) An Innovative Department Study as the Key to Assess the Potential Contribution of Lower Grade Precious Metals in Base Metals Concentrates**

Leonardo Flores, Fernanda Orellana, Víctor Iriarte and Cristian Palacios, Spence Growth Option Project, BHP, Chile

**(A09) Improving Buenavista del Cobre Flotation Performance with Outotec TankCell® e630 Technology**

Rodrigo Grau, Alejandro Yáñez, Matthew Hicks, Outotec, Finland; Juan Tapia, Buenavista del Cobre, Grupo México

### Throughput Estimation and Plant Management

**(A76) Creation of a Production and Feed Simulator from the Phosphate and Niobio Plants in Catalão Using Geometallurgical Information**

Leonardo Vasconcelos Rangel, CMOC International, Brazil

**(A86) Building a Geometallurgical Model for Throughput Estimation Based on SGI and BWI**

Héctor Montes, Independent Consultant, Chile; and Marcelo Aguilar, GRT Ingenieros, Chile

**(A57) Integral Planning of the Process-Chain Performance**

Jorge Menacho, Guillermo Vega and Sebastián Manríquez, De Re Metallica Ingeniería, Chile

**(A50) Integrated Optimization of Mining and Minerals Processing Operations**

Walter Valery, Erico Tabosa, Kristy-Ann Duffy, Sergio Vianna, Riza Mariano, Hatch, Australia; and Roberto Valle, Hatch, Peru

**(A14) How to Write off/in In-Process Inventories at Month End in Compliance with AMIRA P754**

Luc Lachance, Simon Gariépy and Myriam Cousineau, Canada

**(A55) New Predictive Blasting Model Oriented to Optimum Production Planning**

Jorge Menacho and Guillermo Vega, De Re Metallica Ingeniería, Chile

**(A22) Throughput Modelling for Copper Sulfide Deposit, Pará, Brazil**

Elisabeth da Fonseca, Wesley Silva and Petterson Barbosa, Vale, Brazil

**(A95) Application of Process Reliability for Mining Operations Efficiency Assessment**

Juan Carlos Duarte, Ausenco, Chile

## PAPER DISTRIBUTION

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Anglo American, South Africa  
 Antofagasta Minerals, Chile (1)  
 AngloGold Ashanti, Brazil (1)  
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 Buenavista del Cobre, Grupo México, Mexico (1)  
 Chuquicamata Division, Codelco, Chile (1)  
 CMOG International, Brazil (2)  
 Codelco Tech, Chile (1)  
 Compañía Minera Minereicis, Ecuador (1)  
 Cupru Min, Rumania (1)  
 El Teniente Division, Codelco, Chile (3)  
 Los Andes Copper, Chile

Minas Rio, Anglo American, Brazil  
 Minera Centinela, Antofagasta Minerals, Chile (2)  
 Minera Chinalco, Peru (1)  
 Minera Los Pelambres, Antofagasta Minerals, Chile (1)  
 Minera Valle Central, Chile  
 Minera Vizcachitas, Chile  
 MINSUR, Peru (1)  
 San Julián Mine, Grupo Fresnillo, Mexico  
 Southern Peru Copper, Toquepala, Peru (1)  
 Spence Growth Option Project, BHP, Chile (3)  
 Vale, Brazil (1)  
 Yamana Gold, Brazil (1)

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CRC ORE, Australia (1)  
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 Outotec, Mexico  
 RHI Magnesita, Brazil (1)  
 SGS Minerals, Chile (1)  
 Solvay, Chile (1)  
 Solvay, Chile (1)  
 Terra Core, USA  
 Thermo Fisher Scientific, USA (1)  
 Tomra Sorting Solutions, Germany  
 Proquimin, Chile

## Universities and Research Centers

(15 abstracts)

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