

Welcome and opening address [PM Dight](#), Australian Centre for Geomechanics, The University of Western Australia, Australia

## KEYNOTE ADDRESSES

KEYNOTE: BHP mine water management: integrated approach to manage risk and optimise resource value [C Ahumada Calderon](#), BHP, Australia

KEYNOTE: Slope performance monitoring: system design, implementation and quality assurance [R Sharon](#), Sharon Geotechnical LLC, USA

KEYNOTE: Geomechanics of Australian open cut coal mining [JV Simmons](#), Sherwood Geotechnical and Research Services, and The University of Newcastle, Australia

## SAFETY AND RISK MANAGEMENT (1)

Practical waste rock dump and stockpile management in high rainfall and seismic regions of Papua New Guinea [N Bar](#), Gecko Geotechnics Pty Ltd, Australia; [J Semi](#), M Koek, Ok Tedi Mining Limited, Papua New Guinea; [G Owusu-Bempah](#), A Day, Harmony Gold Mining Company Limited, Papua New Guinea; [S Nicoll](#), [J Bu](#), Newcrest Mining Limited, Papua New Guinea

New techniques for characterising damage in rock slopes: implications for engineered slopes and open pit mines [D Donati](#), [D Stead](#), Simon Fraser University, Canada; [D Elmo](#), University of British Columbia, Canada; [E Onsel](#), Simon Fraser University, Canada

Economic consequences of geotechnical instabilities in open cut coal mines [K Young](#), [A Robotham](#), [G Virk](#), BHP, Australia

Regulation of open pit slope stability in Russia [A Makarov](#), [I Livinsky](#), [V Spirin](#), SRK Consulting (Russia) Limited, Russia; [A Pavlovich](#), Saint-Petersburg Mining University, Russia

An overview of the slope monitoring program at the Serra Sul Iron Ore Project, S11D, northern Brazil [MF Souza](#), [E Friguetto](#), [WJ Souza](#), AHCR Castro, Vale S.A., Brazil

Trigger action response plan development and optimisation at the Bingham Canyon Mine [K Bakken](#), [GK Chapin](#), [MG Abrahams](#), Rio Tinto Kennecott Copper, USA

Management of geotechnical hazards through embracing technology and innovative thinking [KT Mandisodza](#), Evolution Mining Ltd, Australia

InSAR investigation of sackung-like features and debris flows in the vicinity of Hawkesbury Island and Hartley Bay, British Columbia, Canada [D Huntley](#), [D Rotheram](#), [P Bobrowsky](#), [G Lintern](#), [R MacLeod](#), [C Brillon](#), Geological Survey of Canada, Canada

Use of laser scanner technology as part of the slope stability risk management strategy at Letšeng diamond mine [N Lefu](#), Letšeng Diamonds (Pty) Ltd, Lesotho; [V Nokwe](#), Maptek, South Africa

Managing ice walls and other operational challenges while optimising Victor Mine late stage opportunities [M Rougier](#), Golder, Canada; [PJH de Graaf](#), Anglo American, De Beers Group of Companies, Australia; [M Desjardins](#), De Beers Canada, Inc., Canada; [M O'Leary](#), Mount Polley, Canada (formerly De Beers, Canada); [N Yugo](#), Independent Consultant, Canada (formerly De Beers Canada, Inc., Canada); [B Kilbride](#), De Beers Canada, Inc., Canada

Evolution and management of large-scale instability: a case study from Ok Tedi [G Kennedy](#), [D Casagrande](#), PSM, Australia

InSAR in the clouds: satellite-based monitoring at Grasberg Mine [JM Leighton](#), 3vGeomatics Inc., Canada; [M Sullivan](#), Freeport McMoRan, Indonesia

Brumadinho Dam InSAR study: analysis of TerraSAR-X, COSMO-SkyMed and Sentinel-1 images preceding the collapse [D Holden](#), [S Donegan](#), [A Pon](#), 3vGeomatics Inc., Canada

Post-shearing data collection with enhanced network smart markers [T Beingessner](#), [R Yost](#), Teck Resources Limited, Canada; [S Steffen](#), [D Whiteman](#), Elexon Mining, Australia; [AM Thomas](#), [M Royle](#), SRK Consulting (Canada) Inc., Canada; [E Widzykcapehart](#), University of Chile, Chile

Risk management and alarming based on a new atmospheric correction algorithm for ground-based radars [A Cabrejo](#), [P Bellett](#), [G Stickle](#), GroundProbe Pty Ltd, Australia; [R Silva](#), [Y Gunaris](#), [J Pérez](#), Compañía Minera Doña Inés de Collahuasi, Chile

The use of strain threshold in slope stability trigger action response plans [S Coetsee](#), Reutech Mining, South Africa; [R Armstrong](#), [P Terbrugge](#), SRK Consulting (South Africa) (Pty) Ltd, South Africa

Influence of the hydrothermal alteration rocks on the stability of an open pit mine of the south of Peru: a case study [S Castro](#), [C Huaman](#), Anddes, Peru

## PROCESSING OF GEOTECHNICAL DATA AND LIMIT DESIGN

Evolution of a geotechnical model for slope design in an active volcanic environment [FM Weir](#), [MJ Fowler](#), [TD Sullivan](#), [M Kobler](#), PSM, Australia; [J Bu](#), Newcrest Mining Limited, Papua New Guinea

Geotechnical evaluation of the east wall of the Cerro Corona Pit [J Dueñas](#), [G Becerra](#), [R Ordoñez](#), Gold Fields, Peru; [PG Andrews](#), Gold Fields Australia Pty Ltd, Australia

Introducing G.RE.T.A. – an innovative geo-resistivimeter for long-term monitoring of earthen dams and unstable slopes [G Tresoldi](#), Politecnico di Milano, Italy; [A Hojat](#), Shahid Bahonar University of Kerman, Iran and Politecnico di Milano, Italy; [L Zanzi](#), Politecnico di Milano, Italy; [A Certo](#), LSI Lastem s.r.l., Italy

**SAFETY AND RISK MANAGEMENT (2)**

BHP Western Australia Iron Ore geotechnical open cut slope design system: a simple pragmatic process for slope risk decisions [A Haile](#), [D Ross](#), [A Maldonado](#), [M Neyaz](#), [C Rajbhandari](#), BHP, Australia

Characterisation of a rock slope showing three weather-dominated failure modes [M Roustaei](#), [R Macciotta](#), [M Hendry](#), [J Rodriguez](#), University of Alberta, Canada; [C Gräpel](#), [Klohn Crippen Berger](#), Canada; [R Skirrow](#), Alberta Transportation, Canada

Monitoring and managing large deformation pit slope instabilities at a British Columbia copper mine [G Dick](#), BGC Engineering Inc., Canada; [S Nunoo](#), [S Smith](#), Gibraltar Mines Ltd., Canada; [W Newcomen](#), [D Kinakin](#), [I Stilwell](#), [J Danielson](#), BGC Engineering Inc., Canada

**ASSESSMENT AND IMPLICATIONS FOR UNCERTAINTY IN DESIGN**

3D limit equilibrium method for rock slope stability analysis using generalised anisotropic material model [NS Kumar](#), Universiti Sains Malaysia, Malaysia & Centre of Excellence for Engineering and Technology JKR, Malaysia; [MAM Ismail](#), Universiti Sains Malaysia, Malaysia. Presented by [SK Nagendran](#), Universiti Sains Malaysia, Malaysia

An overview of bench design for cut slopes with an example of an advanced dataset assessment technique [S Coetsee](#), Reutech Mining, South Africa

Toe rock mass strength in footwall failures [A Duran](#), PSM, Australia; [D Cardona Lopez](#), Prodeco, Colombia

Increasing the reliability of mining plans by predicting geotechnical instabilities with structural control: case study at a BHP mine, northern Chile [C Roa](#), [J Calderón](#), Minera Escondida, Chile; [R Castellón](#), [M Vargas](#), TIMining, Chile

Tuff bands and the stability of coal mine slopes [K Koosmen](#), PSM, Australia

**PROCESSING OF GEOTECHNICAL DATA AND LIMIT DESIGN (2)**

Capturing/interpreting non-obvious slope controlling structures [J Mathis](#), Zostrich Geotechnical, USA

Post-blast slope stability monitoring with slope stability radar [P Saunders](#), GroundProbe Pty Ltd, Australia; [JM Kabuya](#), ArcelorMittal Mining Canada, Canada; [A Torres](#), GroundProbe, USA; [R Simon](#), École Polytechnique de Montréal, Canada

Combining structural data with monitoring data in open pit mines to interpret the failure mechanism and calibrate radar alarms [P Farina](#), [F Bardi](#), Geoapp s.r.l., Italy; [L Lombardi](#), [G Gigli](#), Università degli Studi di Firenze, Italy

The shear strength of bedding partings in shales of the Pilbara: the similarity of non-dilatational angles, mineralogy relationships, and nominal roughness [A Maldonado](#), The University of Western Australia, Australia; [PM Dight](#), Australian Centre for Geomechanics, The University of Western Australia, Australia

Disrupting rock engineering concepts: is there such a thing as a rock mass digital twin and are machines capable of learning rock mechanics? [D Elmo](#), University of British Columbia, Canada; [D Stead](#), Simon Fraser University, Canada

Tools for validating and creating reliable fault models [J Danielson](#), [D Kinakin](#), [I Stilwell](#), BGC Engineering Inc., Canada

Rock mass behaviour of deep mining slopes: a conceptual model and implications [R Rimmelin](#), The University of Queensland and BHP, Australia; [J Vallejos](#), University of Chile/Advanced Mining Technology Center, Chile

Bayesian approach for the assessment of sufficiency of geotechnical data [LF Contreras](#), SRK Consulting, Australia; [M Serati](#), [DJ Williams](#), The University of Queensland, Australia

**NUMERICAL ANALYSIS, IN SITU STRESS AND DISPLACEMENT DESIGN OF SLOPES (1)**

A new approach to simulate the dynamic response of high-tensile chain-link drapery systems [S Tahmasbi](#), [A Giacomini](#), University of Newcastle, Australia; [R Bucher](#), Geobruigg Australia Pty Ltd, Australia; [O Buzzi](#), University of Newcastle, Australia

Application of a hybrid approach to the design of anchored wire meshes on steep slopes [A Galli](#), Politecnico di Milano, Italy; [M Deana](#), Officine Maccaferri SpA, Italy; [N Mazzon](#), Maccaferri Innovation Center, Italy

Steep wall mining: engineered structures used in the management of rockfall hazards at Kanmantoo Copper Mine [BJ Hutchison](#), Hillgrove Resources Ltd, Australia; [AT Morrison](#), Geobruigg Australia Pty Ltd, Australia; [DS Lucas](#), Mining One Pty Ltd, Australia

A case study: assessing the impacts of open cut coal mining on the Maryvale Field (Yallourn) Open Cut and Morwell River Diversion through the use of finite element modelling [S Narendranathan](#), [J Stipcevic](#), GHD Pty Ltd, Australia; [S Rastogi](#), EnergyAustralia Pty Ltd, Australia

Modelled versus observed open cut performance in weak transition rock: The Dubbo Quarry case study [D Trani](#), GHD Pty Ltd and University of Wollongong, Australia; [J Hellmuth](#), [J Thompson](#), GHD Pty Ltd, Australia

Slope performance monitoring and management of a pit wall experiencing large-scale deformations near Kalgoorlie, Western Australia [JW Watton](#), [MJ Fowler](#), PSM, Australia

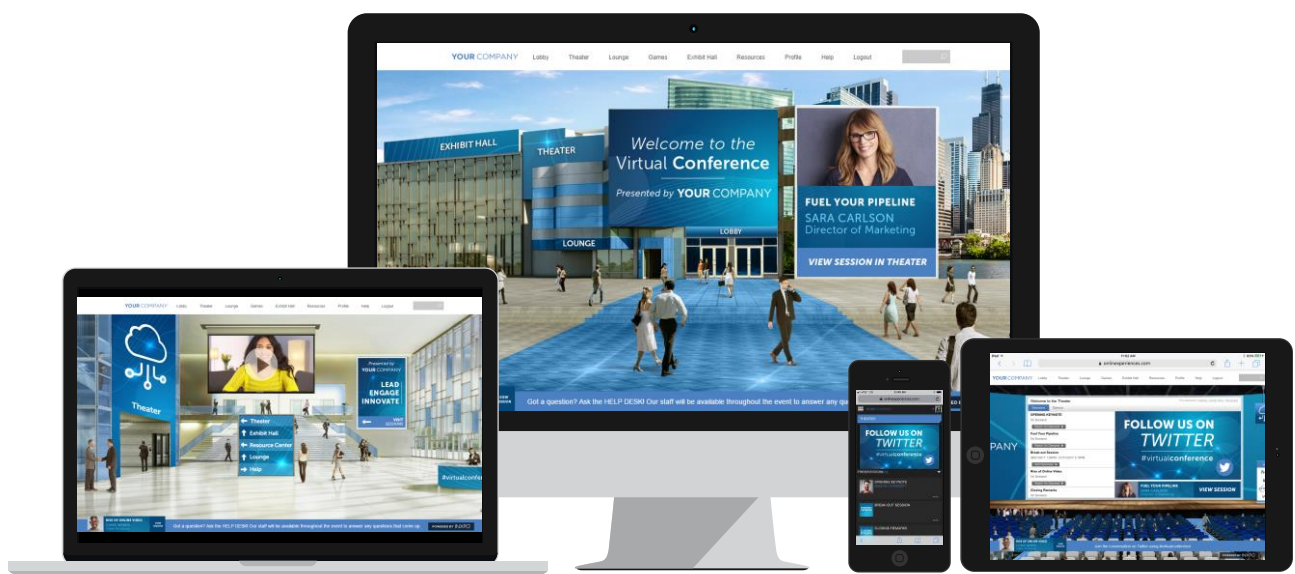
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**PROCESSING OF GEOTECHNICAL DATA AND LIMIT DESIGN (3)**

- Utilising data science to test similarity of rock mass unit strength distributions in the Pilbara [L J Hayman](#), Rio Tinto Iron Ore, Australia
- Assisting better decision-making of geotechnical slope design by using in-house software at BHP Iron Ore [A Maldonado](#), A Haile, C Meegamarachichi, L Sasmita, BHP Australia
- Mechanical and physical properties of chalk and impacts on mining operations and slope designs [P Ebeling](#), Holcim Technology Ltd, Switzerland; [A Iwanoff](#), BGW Geotechnik GmbH, Germany
- The effect of anisotropy orientation on the sedimentary rock strength estimated by point load testing strength, Pilbara, Australia [X Gao](#), Rio Tinto Iron Ore, Australia
- Influence of particle size-shape correlation on the shear strength of scaled samples of coarse mine waste [S Linero](#), University of Newcastle and SRK Consulting, Australia; [S Fityus](#), University of Newcastle, Australia; [JV Simmons](#), Sherwood Geotechnical and Research Services, Australia; [E Azéma](#), University of Montpellier, France; [N Estrada](#), University of Los Andes, Colombia; [J Dixon](#), Fortescue Metals Group, Australia
- Waste rock characterisation and stability assessments for feasibility level studies [D Dwumfour](#), J Dixon, Fortescue Metals Group Ltd, Australia; [J Mylvaganam](#), SRK Consulting, Australia
- The intact rock strength of anisotropic rocks in the Pilbara: the use of field estimations, practical limitations of calibrations and statistical bias [A Maldonado](#), The University of Western Australia, Australia; [PM Dight](#), Australian Centre for Geomechanics, The University of Western Australia, Australia; [K Mercer](#), 3rd Rock Consulting, Australia
- Geotechnical data aggregation and visualisation supporting informed risk management: the one-stop geotech shop [SDN Wessels](#), R Dixon, Rio Tinto Iron Ore, Australia

**NUMERICAL ANALYSIS, IN SITU STRESS AND DISPLACEMENT DESIGN OF SLOPES (2)**

- Use of discrete fracture networks in 3D numerical modelling for stability analysis in open pits [E Montiel](#), P Varona, Geocontrol Minería, Chile; [C Fernandez](#), Z Espinoza, Antofagasta Minerals, Chile
- Numerical back-analysis of highwall instability in an open pit: a case study [JM Kabuya](#), R Simon, École Polytechnique de Montréal, Canada; [J Carvalho](#), D Haviland, Golder, Canada
- Validation of the improved unified constitutive model for open pit applications [A Ford](#), DS Lucas, [A Vakili](#), Mining One Pty Ltd, Australia
- Quantifying excavation-induced rock mass damage in large open pits [L Lorig](#), D Potyondy, Varun, Itasca Consulting Group, Inc., USA
- Understanding the sensitivity of numerical slope stability analyses to geotechnical and other input parameters [DR Wines](#), Itasca Australia Pty Ltd, Australia
- Automated geolocalised identification of polyhedral blocks and their safety factor calculation in open pit mining [F González](#), A Calderón, Antofagasta Minerals, Chile; [R Castellón](#), M Vargas, C Mena, L Orellana, S Wiche, C Calderón, TIMining, Chile
- Discrete fracture network based approaches to assessing inter-ramp design [M Valerio](#), S Rogers, Golder, Canada; [KP Lawrence](#), KM Moffitt, Golder, USA; [B Rysdahl](#), M Gaida, Rio Tinto Kennecott, USA



\*Programme is subject to change. Please check [www.slopestability2020.com](http://www.slopestability2020.com) for updates

# PROGRAMME\* DAY THREE

Large Open Pit Project Phase III – Open Pit of the Future *P Stacey, Stacey Mining Geotechnical Ltd., Canada*

## NUMERICAL ANALYSIS, IN SITU STRESS AND DISPLACEMENT DESIGN OF SLOPES (3)

Numerical modelling of underground and open pit interaction in a gold mine *K He, G Swarbrick, TD Sullivan, PSM, Australia*

SlopeX: a plug-in to simplify and fast-track advanced numerical modelling for open pit applications *A Vakili, Cavroc Pty Ltd, Australia; J Watson, Cavroc Pty Ltd, Canada; B Abedian, Cavroc Pty Ltd, Australia; T Styles, Cavroc Pty Ltd, UK*

Reinforced soil bund as passive protection structures: the New Zealand experience *E Ewe, Geofabrics New Zealand Ltd, New Zealand*

Three-dimensional numerical modelling for successful design of steep slopes at the Kanmantoo copper mine *DS Lucas, A Vakili, Mining One Pty Ltd, Australia; BJ Hutchison, Hillgrove Resources Limited, Australia*

## OPEN PIT/UNDERGROUND INTERACTION

Computational tools for the estimation of Factor of Safety and location of the critical failure surface for slopes in rock masses that satisfy the Hoek–Brown failure criterion *C Carranza-Torres, University of Minnesota, USA; E Hormazabal, SRK Consulting (Chile) S.A., Chile*

## ROCKFALL ANALYSIS AND CONTROL

Calibration of a rockfall simulator with a fragmentation model in a real-scale test *G Matas, N Lantada, J Corominas, R Ruiz-Carulla, A Prades, J Gili, Universitat Politècnica de Catalunya, Spain*

Runout of open pit slope failures: an update *J Whittall, BGC Engineering Inc., Canada; A Mitchell, S McDougall, The University of British Columbia, Canada*

A new radar-based system for detecting and tracking rockfall in open pit mines *A Micheli, F Viviani, M Bianchetti, N Coli, L Leoni, IDS GeoRadar s.r.l., Italy; CJ Stopka, IDS GeoRadar, USA*

On the use of acoustic records for the automatic detection and early warning of rockfalls *G Ulivieri, S Vezzosi, GeCo S.r.l., Italy; P Farina, Geoapp S.r.l., Italy; L Meier, Geopraevent AG, Switzerland*

## SURFACE WATER AND GROUNDWATER MANAGEMENT, DEPRESSURISATION, MONITORING AND REMEDIATION

Between a rock and a hard place *PJ Lombard, GHD Pty Ltd, Australia*

Development of a mine dewatering and pit slope depressurisation review process *E Reano, Piteau Associates Peru S.A.C., Peru; G Beale, Piteau Associates UK Ltd, UK; J Dowling, Piteau Associates, USA; LC Tejada, M Lacey, H Hazwezwe, Freeport-McMoRan Inc., USA*

Development of an integrated workflow for pit slope pore pressure reconciliation *J Dowling, G Beale, P Haas, B Kaya, S Mak, Piteau Associates, USA; LC Tejada, K Kramer, J Johnson, RE Zea, C Palmer, Freeport-McMoRan Inc., USA*

Simulating fracture network permeability in brown-coal slopes *R Hu, SDC Walsh, Monash University, Australia; J Missen, N Anderson, AGL Loy Yang Pty Ltd, Australia*

Outcomes of an aquifer assessment on the M1B aquifer ahead of Loy Yang Mine and considerations for future dewatering/depressurisation *R Turnbull, G Foley, GHD Pty Ltd, Australia; J Missen, AGL Loy Yang Pty Ltd, Australia*

Pit dewatering optimisation of a 3D FEFLOW unstructured groundwater model at geologically complex Antamina mine site in Peru *RM Dufour, DHI Peru SAC and UNINE, Peru; C Aguirre, M Sanchez, Antamina, Peru; A Maqueda, Université de Neuchâtel, Switzerland; JM Zwinger, A Renz, DHI WASY GmbH, Germany; J Cho, Independent Consultant, Canada; D Evans, FloSolutions, Peru*

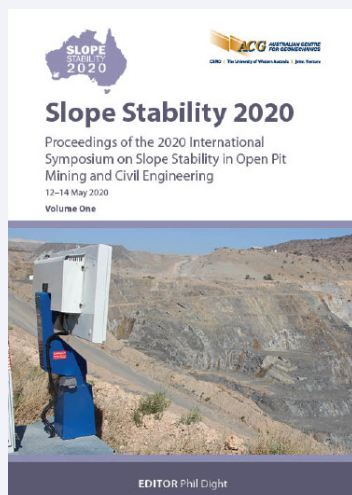
Three-dimensional slope stability modelling and its interoperability with interferometric radar data to improve geotechnical design *A McQuillan, Roscience Inc., Australia; T Yacoub, Roscience Inc., Canada; N Bar, Gecko Geotechnics Pty Ltd, Australia; N Coli, L Leoni, IDS Georadar, Italy; S Rea, J Bu, Newcrest Mining Limited, Papua New Guinea*

Cockatoo Island: pit dewatering and wall depressurisation behind critical seawall infrastructure *CL Powell, Newmont Australia, Australia; J Hall, AQ2 Pty Ltd, Australia*

Elimination of structure controlled highwall failures at an open cut coal mine *J Li, BHP, Australia*

Advanced three-dimensional geomechanical and hydrogeological modelling for a deep open pit *L Cotesta, Vale, Canada (formerly Itasca Consulting Canada, Inc.); J Xiang, Itasca Denver Inc., USA; B Paudel, Vale, Canada (formerly Itasca Consulting Canada, Inc.); R Sterrett, Itasca Denver Inc., USA; J Sjöberg, Itasca Consultants AB, Sweden; T Dilov, I Vasilev, Z Yalamov, Ellatzite-Med AD, Bulgaria*

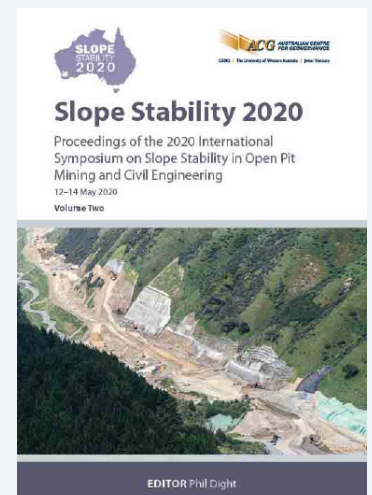
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## Proceedings of the 2020 International Symposium on Slope Stability in Open Pit Mining and Civil Engineering

Two volumes

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**SLOPE DESIGN IMPLEMENTATION, EXCAVATION CONTROL, BLASTING AND LEGACY ISSUES FOR FINAL WALLS; QUALITY CONTROL**

New approach to detect imminent slope failure by utilising coherence attribute measurement on ground-based slope radar [FA Cahyo](#), [R Dwitya](#), [RH Musa](#), *Groundprobe, Indonesia*

The safest way to increase overall pitwall slope [SP Durkin](#), [BT Moore](#), *Safescape, Australia*

Development of an early warning system for shallow landslide in the Grasberg area, Indonesia [P Farina](#), *Geoapp Italia S.r.l., Italy*; [F Catani](#), [A Rosi](#), *Geoapp Italia S.r.l. and Università degli Studi di Firenze, Italy*; [I Setiawan](#), [A Junaidi](#), [K Afrizal](#), [A Wijayanto](#), *PT Freeport Indonesia, Indonesia*

Integrating unmanned aerial vehicle photogrammetry in design compliance audits and structural modelling of pit walls [F Medinac](#), [K Esmaeili](#), *University of Toronto, Canada*

Utilising satellite-based techniques to identify and monitor slope instabilities: the Fagraskógarfjall and Limnes landslides [H Larkin](#), [N Magnall](#), [A Thomas](#), [R Holley](#), [H McCormack](#), *CGG Satellite Mapping, UK*

Pit wall optimisation and effective wall management strategies at Invincible Open Pit, St Ives Gold Mines [M Abdulai](#), [PG Andrews](#), [D McMahon](#), [E Bona](#), [J Walker](#), *Gold Fields Australia Pty Ltd, Australia*

Optimisation of crest blasting and excavation techniques for controlling spillover at Bingham Canyon Mine [J Morkeh](#), [J Cefalo](#), [K Robertson](#), *Rio Tinto Kennecott Copper, USA*

Monitoring of structurally controlled deformations at the Kanmantoo copper mine [BJ Hutchison](#), *Hillgrove Resources Limited, Australia*; [J Chambers](#), *Maptek Pty Ltd, Australia*

Addressing pit wall instabilities in Africa's largest open pit copper mine [GC More O'Ferrall](#), *First Quantum Minerals Ltd, Zambia*; [NS Simbile](#), *Kansanshi Mining Plc, Zambia*

New satellite sensors for monitoring mining areas: a look at the future [J Morgan](#), [A Boudreau](#), *TRE ALTAMIRA Inc., Canada*; [MA Verdugo](#), *TRE ALTAMIRA S.L., Spain*; [F Meloni](#), [D Colombo](#), *TRE ALTAMIRA s.r.l., Italy*

Monitoring applications for safe mining practices: case studies of sub-bench scale failures in hard rock and coal open cut mines [S Gale](#), [L Farrington](#), *Thiess, Australia*; [P Bergström](#), *Boliden, Finland*; [M Suikkanen](#), *YARA, Finland*; [N Boldrini](#), [M Rubino](#), [N Coli](#), *IDS GeoRadar, Italy*; [S Naude](#), *IDS Georadar, Australia*; [CJ Stopka](#), [C Preston](#), *IDS GeoRadar, USA*

Closing address [PM Dight](#), *Australian Centre for Geomechanics, The University of Western Australia, Australia*

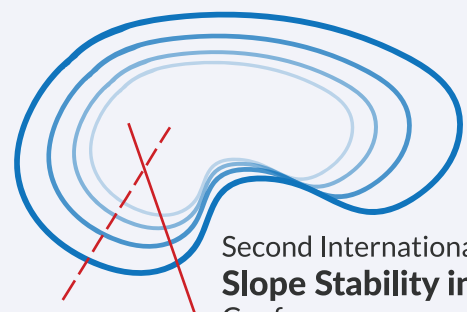


## Second International Slope Stability in Mining Conference

26–28 October 2021 | Perth, Western Australia

The Second International Slope Stability in Mining Conference (SSIM 2021) will provide a forum for open pit mining practitioners, consultants, researchers and suppliers worldwide to exchange views on best practice and state-of-the-art slope technologies.

Best practice with respect to pit slope investigations, design, implementation and performance monitoring will be discussed during the conference.



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