Slope Stability 2020 will provide a forum for open pit mining and civil engineering practitioners, consultants, researchers and suppliers worldwide to exchange views on best practice and state-of-the-art slope stability technologies.

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

The ACG is delighted to host this event in Perth again. It has been more than a decade since it was last held in Western Australia.

SYMPOSIUM CHAIR

Professor Phil Dight
Professor of Geotechnical Engineering
Australian Centre for Geomechanics
The University of Western Australia, Australia

KEYNOTE SPEAKERS

Carolina Ahumada
Principal Water Management
BHP

Dr John Simmons
Principal
Sherwood Geotechnical & Research Services
Title: More on open pit slope stability geomechanics for weak coal measures rocks

Robert Sharon
Director, Sharon Geotechnical LLC
Principal Geotechnical Consultant, Piteau Associates USA
Title: Slope performance monitoring – system design, implementation and quality assurance

Tim Sullivan
Principal
PSM

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# Accepted Papers*

**KEYNOTE PAPERS**

- BHP's Mine Water Management integrated approach to manage risk and optimise resource value: C. Ahumada Caldeon, BHP, Australia
- Slope performance monitoring: system design, implementation and quality assurance: R. Sharom, Sharan Geotechnical LLC, USA
- More on open pit slope stability geomechanics for weak coal measure rocks: J. Simmons, Sherwood Geotechnical and Research Services, Australia

**SAFETY AND RISK MANAGEMENT**

- Downhole monitoring with enhanced network smart markers in an open pit: T. Beissinger, R. Yest, Teck Resources Ltd., Canada; S. Steffen, D. Whiteman, Eleven Mining, Australia; A. Thomas, M. Royle, SRK Consulting Inc., Canada; E. Witszyk-Caperhat, University of Chile, Chile
- Risk management in a large-scale slope instability with active pushbacks in an open pit: A. Cabrejo, GroundProbe North America, USA; Y. Gunaris, Companhia Mineira Doña Inés de Collahuasi, Chile; P. Ballet, GroundProbe Pty Ltd, Australia; J. Perez, Companhia Mineira Doña Inés de Collahuasi, Chile; G. Stickley, GroundProbe Pty Ltd, Australia
- Risk management in a large-scale slope instability with active pushbacks in an open pit: J.A. Calderón, J.J. Muñoz, Minera Escondida Ltda., Chile

**Trigger action response plan development and optimisation: case studies from the Bingham Canyon Mine: G.K. Chapin, K.M. Bakken, M.G. Abrahams, Rio Tinto Kennecott Copper, USA**

- The strain criteria formula: the derivation of indicative displacement alarm thresholds for slope performance and instability assessment: S. Coetsee, Reutech Mining, South Africa; R. Armstrong, P. Trubergue, SRK Consulting (South Africa) (Pty) Ltd, South Africa
- Geotechnical risk management for Victor Mine closure: M. Desjardins, De Beers Group, Canada; P. de Graaf, De Beers Group, South Africa; G. Beale, Piteau Associates, UK
- Implications of slope damage in 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
- The safest way to increase overall pitwall slope: S.P. Durkin, B.T. Moore, SafeScape, Australia
- Development of an early warning system for shallow landslide hazard in the Tembagapura area, Indonesia: P. Farina, Geoapp s.r.l., Italy; F. Catani, A. Rosi, Geoapp s.r.l., Italy
- Increasing the reliability of mining plans by predicting geotechnical instabilities with structural control: case study at a BHP mine, northern Chile
- InSAR investigation of sackung-like features and debris flows in the vicinity of Hawkesbury Island and Hartley Bay, British Columbia, Canada: reducing landslide and tsunami risks for coastal communities and vulnerable infrastructure: D. Huntley, D. Rotheram-Clarke, 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, Lesotho; V. Nakwe, Maptek, South Africa
- InSAR in the clouds: satellite-based monitoring at Grasberg Mine: J.M. Leighton, 3vGeometrics Inc., Canada; M. Sullivan, Freeport McMoran, Indonesia
- Regulation of open pit slope stability in Russia: A. Makarov, I. Livinsky, V. Spirin, SRK Consulting (Russia) Ltd, Russia; A. Pavlovich, Saint-Petersburg Mining University, Russia
- Management of geotechnical hazards through embracing technology and innovative thinking: K. Mandsoda, Evolution Mining, Australia
- Slope monitoring at the Serra Sul Iron Ore Project, S11D: a case study: F. Moragas, E. Friguetto, W.J. Souza, A. Rana, CSIR-Central Institute of Mining and Fuel Research, India
- Waterproothing and slope protection in landfills and reservoirs: D. Romeo, Officine Maccaferri S.p.A., Italy; R. Ratnakar, Maccaferri S.P.A., Asia, India
- Managing ice walls and other operational challenges while optimising Victor Mine late stage opportunities: M. Rougier, Golder, Canada; P. de Graaf, The De Beers Group of Companies, South Africa; M. Desjardins, The De Beers Group of Companies, Canada; M. O'Leary, Mount Polley Mining Corporation, Canada; N. Yugo, Independent Consultant, Canada
- Characterisation of a rock slope showing three weather-dominated failure modes: M. Roux, M. Macciotta, M. Hendry, J. Rodriguez, University of Alberta, Canada; C. Gräpel, K. Lohn Crippen Berger, Canada; R. Skirrow, Alberta Transportation, Canada
- Analysis of velocity and acceleration trends using slope stability radars to identify failure signatures to better inform trigger action response plans: R. Shellam, SRK Consulting (UK) Limited, UK; J. Coggan, University of Exeter, UK
- Remote monitoring of tailings storage facilities using multi-sensor satellite data: A. Thomas, H. Larkin, N. Magnall, CGG Satellite Mapping, UK
- Economic consequences of geotechnical instabilities in open cut coal mines: K. Young, A. Robotham, G. Vírk, BHP, Australia

**ASSESSMENT AND IMPLICATIONS FOR UNCERTAINTY IN DESIGN**

- 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, BHP, Chile; R. Castellón, M. Vargas, Timelapse, Chile
- An overview of bench design for cut slopes: a methodology for assigning nominal and static shear strength parameters to attain dynamic factor of safety and probability of failure values for advanced dataset assessment: S.A. Coetsee, Reutech Mining, South Africa
- An overview of bench design for cut slopes: a methodology for assigning nominal and static shear strength parameters to attain dynamic factor of safety and probability of failure values for advanced dataset assessment: S.A. Coetsee, Reutech Mining, South Africa
- Toe rock mass strength in footwall failures: A. Duran, PSM, Australia; D. Cardona Lopez, Prodeca, Colombia
- Development and application of a reliability based approach to slope design acceptance criteria at the Bingham Canyon Mine: M. Gaida, M. Royle, SRK Consulting (Russia) Ltd, Russia
- 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
- Tuff bands and the stability of coal mine slopes: K. Koosmen, PSM, Australia

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Accepted Papers*

Three-dimensional limit equilibrium method rock slope stability analysis using generalised anisotropic material model NS Kumar, MAM Ismail, Universiti Sains Malaysia, Malaysia

A method for analysis of rock blocks with complex arbitrary geometries J Santos, University of British Columbia, Canada

Epistemic uncertainty propagation in slope stability analysis and implications in safety margins CE Valderrama, M Cofré, E Hormazabal, R Álvarez, SRK Consulting (Chile) S.A., Chile

PROCESSING AND GEOTECHNICAL DATA AND LIMIT DESIGN

Influence of the hydrothermal alteration rocks on the stability of an open pit mine, south of Peru: a case study S Castro, C Huanan, Anddes Associates, Peru

Case study: analysis of a highwall toppling failure and development of a successful mine re-entry plan using RS2, RocFall and Dan-W at a coal mine in Canada C Clayton, A Jackson, J Price, Tetra Tech Canada Inc., Canada; A Bidwell, Teck Coal Ltd., Canada; D Elmo, University of British Columbia, Canada

Bayesian approach for the assessment of sufficiency of geotechnical data L-F Contreras, The University of Queensland, Australia & SRK Consulting (South Africa) (Pty Ltd), South Africa; M Serati, D Williams, The University of Queensland, Australia

Tools for validating and creating reliable fault models J Danielson, D Kinakin, I Stillwell, BGC Engineering Inc., Canada

Improving televiewer data acquisition to optimise slope designs in the Pilbara S Bennett, H Donders, L Fisher, J Thomson, BHP, Australia

Waste rock characterisation and stability parameters for feasibility level studies J Dixon, D Dwumfour, Fortescue Metals Group, Australia; J Mylvaganam, SRK Consulting (Australasia) Pty Ltd, Australia

Geotechnical evaluation of east wall of Cerro Corona’s open pit J Dueñas, G Becerra, J Ordoñez, J Dueñas, Gold Fields, Peru; PG Andrews, Gold Fields Australia Pty Ltd, Australia

Mechanical and physical properties of chalk and impacts on slope designs P Ebeling, Holcim Technology Ltd, Switzerland; A Iwanoff, BGW Geotechnik GmbH, Germany

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

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, University of Florence, Italy

The fracture model influence on rock slope stability assessment IJ Fomenko, DN Gorobtsov, Russian State Geological Prospecting University, Russia

Structural data bias assessment at Jwaneng Mine K Gabanakgosi, O Mogorosi, K Rametoele, B Boitshepo, OM Barei, Debswana Diamond Company, Botswana

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

Utilising data science to test similarity of rock mass unit strength distributions in the Pilbara L J Hayman 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 & SRK Consulting (Australasia) Pty Ltd, Australia; S Fitzys, University of Newcastle, Australia; J Simmons, Sherwood Geotechnical and Research Services, Australia; E Azema, University of Montpellier, France; N Estrada, University of Los Andes, Colombia; J Dixon, Fortescue Metals Group, 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, PM Dight, Australia

The shear strength of bedding partings in shales of the Pilbara: the similarity of non-dilatational angles and spectral mineralogy relationships A Maldonado, PM Dight, Australia

Assisting better decision-making of geotechnical slope design using in-house technology software at BHP Iron Ore A Maldonado, A Haile, C Meegamarachchi, L Sasmita, BHP, Australia

Capturing/interpreting non-obvious slope controlling structures JI Mathis, Zosrich Geotechnical, USA

Determination of the parameters of pit walls with reverse steeply dipping stratification AA Pavlovich, NY Melnikov, Saint-Petersburg Mining University, Russia

Rock mass behaviour at great depth: a conceptual model and implications R Rimmelin, The University of Queensland and BHP, Australia

Post-blast slope stability monitoring with slope stability radar P Saunders, GroundProbe Pty Ltd, Australia; JM Kabuya, ArcelorMittal, Canada; A Torres, GroundProbe, USA; R Simon, Ecole Polytechnique de Montréal, Canada

Characterisation of foliated rock masses using implicit modelling to guide geotechnical domaining and slope design E Saunders, A LaRiche, T Shapka-Fells, W Barnett, SRK Consulting (Canada) Inc., Canada

Slope Design Assessment, Mining Strategy, and Development of Geotechnical Setback Criteria for Excavation of Steep, Natural Escarpments in Rugged Mountainous Terrain MF Scholz, BW Gilmore, MNT King, PM Hawley, Piteau Associates, Canada; C Aguirre-Freyre, Compañía Minera Antamina S.A., Peru

Introducing G.R.E.T.A.: the new Geo REsistivimeter for time-lapse analysis L Zanzi, Politecnico di Milano, Italy; A Certo, LSI Lastem s.r.l, Italy

Mountainous Terrain Slope Design Assessment, Mining Strategy, and Development of Geotechnical Setback Criteria for Excavation of Steep, Natural Escarpments in Rugged Mountainous Terrain MF Scholz, BW Gilmore, MNT King, PM Hawley, Piteau Associates, Canada; C Aguirre-Freyre, Compañía Minera Antamina S.A., Peru

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

Geotechnical data aggregation and visualisation supporting informed risk management: the one stop geotechnical shop SDN Wessels, R Dixon, Rio Tinto Iron Ore, Australia

NUMERICAL ANALYSIS, IN SITU STRESS AND DISPLACEMENT DESIGN OF SLOPES

Directional Hoek-Brown rock mass strength: GSI adjustment NRP Baczynski, Prime Geotechnics Pty Ltd, Australia

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, Department of Civil Engineering, University of Minnesota, USA; E Hormazabal, SRK Consulting (Chile) S.A., Chile

Case study: back-analysis of a historical open pit highwall failure at a coal mine in Canada C Clayton, R Barnett, Tetra Tech Canada Inc., Canada; M Slater, Teck Coal Ltd., Canada

Automated geo-localised identification of polygonal 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

Hybrid design approaches for anchored wire meshes: a simplified two block method for steep slopes A Galli, Politecnico di Milano, Italy; M Deana, Officine Maccagheri S.p.A., Italy; N Mazzon, Maccagheri Innovation Centre., Italy

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Accepted Papers*

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

Geotechnical design considerations for ‘nose’ geometries in pit design A Huaman, SRK Consulting (South Africa), South Africa

Steep wall mining: engineered structures used in the management of rockfall hazards at Kambantoo Copper Mine BJ Hutchison, Hillgrove Resources Ltd, Australia; AT Morrison, Geobrugg Australia Pty Ltd, Australia; DS Lucas, Mining One Pty Ltd, Australia

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

Quantifying excavation-induced rock mass damage in large open pits L Lorig, D Potyondy, Varun, Itasca Consulting Group Inc., USA

Use of discrete fracture networks in three-dimensional numerical modelling for stability analysis in open pit mining E Montiel, P Varona, Geocontrol Minería, Chile; C Fernandez, Z Espinoza, Antofagasta Minerals, Chile

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 Stipevic, GHD Pty Ltd, Australia; S Ristogi, EnergyAustralia, Australia

Back-analysis of in-pit dump slope failure and remediation results at Bara Anugrah Sejahtera open pit coal mine, Indonesia I Rachmad, D Aryanda, GEOMINE Mining and Geotechnical Consultant, Indonesia; M Darooji, Titan Group, Indonesia


Engineering geology investigation and numerical modelling design of the Ramp 12 Highwall B Roache, Mining One Consultants Pty Ltd, Australia; AR Johnstone, BHP, Australia

Benefits of combined radar and geodetic monitoring in open pit mines L Spiranec, Leica Geosystems AG, Switzerland; F Coppi, N Coli, IDS GeoRadar, Italy

A new approach to simulate the dynamic response of chain-link drapery systems S Tahmasbi, A Giacomini, University of Newcastle, Australia; R Bucher, Geobrugg Australia Pty Ltd, Australia; O Buzzi, University of Newcastle, Australia

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

Discrete fracture network based approaches to assessing inter-ramp design M Valerio, S Rogers, Golder, Canada; KP Lawrence, KM Moffitt, Golder, USA; B Rydzahl, M Gaidai, Rio Tinto Kennecott Copper, USA

Slope performance monitoring and management of a pit wall experiencing large-scale deformations near Kalgoorlie, WA JW Watton, MJ Fowler, PSM, Australia

Understanding the sensitivity of numerical slope stability analyses to geotechnical and other input parameters DR Wines, Itasca Australia Pty Ltd, Australia

OPEN PIT/UNDERGROUND INTERACTION

Investigating the influence of the construction of a tunnel on the stability of its adjacent slope: case study - Haji Abad tunnel, Iran M Rezvani, A Golshani, Tarbiat Modares University, Iran

Assessment of depressurisation approaches at Debswana’s Orapa Mine, Botswana M Anderson, B Maswabi, Debswana Diamond Company, Botswana; H Liu, Itasca Denver Inc., USA

A methodology for assessing rainfall-induced pore pressure changes in open pit slopes J Bellin, M Raynor, R Kettle, SRK Consulting UK Ltd, UK; K Tasoren, IAMGOLD Corporation, Suriname

Anglo American framework for strategic dewatering plans C Cintolesi, Anglo American, Chile; G Beale, Piteau Associates, UK; J Dowling, Piteau Associates, USA; J Kotze, Anglo American, South Africa; A Rowland, Piteau Associates, South Africa; S Mansell, Piteau Associates, Chile

Advanced three-dimensional geomechanical and hydrogeological modelling for a deep open pit L Cotesta, Vale, Canada; J Xiang, Itasca Denver Inc., USA; B Paudel, Vale, Canada; R Sterrett, Itasca Denver Inc., USA; J Sjöberg, Itasca Consultants AB, Sweden; T Dílov, I Vasiliev, Z Yalamov, Elatztite-Med AD, Bulgaria

Fast assessment of pore pressures and inflows in open pit slopes using smart models ER De Sousa, DHI Water & Environment, Australia

Uncertainty analysis techniques in pore pressure modelling for slope stability: state-of-the-art and future directions ER De Sousa, DHI Water & Environment, Australia; J Doherty, Watermark Numerical Computing, Australia

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

Development of an integrated workflow for pit slope pore pressure reconciliation J Dowling, G Beale, P Haas, B Kaya, Piteau Associates, USA; LC Tejada, K Cramer, J Johnson, RE Zea, C Palmer, Freepport McMoRan, USA

Pit dewatering initiation of a 3D FEFLOW unstructured groundwater model at geologically complex Antamina mine site in Peru RM Dufour, DHI Peru SAC & University of Neuchâtel, Peru; CF Aguirre, M Sanchez, Antamina, Peru; A Maqueda, University of Neuchâtel, Switzerland; JM Zwinger, A Renz, DHI, Germany; J Cho, Independent Consultant, Canada

Simulating fracture network permeability in brown coal slopes R Hu, SDC Walsh, Monash University, Australia

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

Design and implementation of cost-effective depressurisation systems at Debswana’s Jwaneng Mine, Botswana O Mabote, L Gوظtlang, B Maswabi, Debswana Diamond Company, Botswana; H Liu, Itasca Denver Inc., USA

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

Cocktail Island: pit dewatering and wall depressurisation behind critical seawall infrastructure C Powell, Geomech Consulting Services, Australia; J Hall, AQ2 Pty Ltd, Australia

Impact of pore water pressure on pit slope stability of a coal mine K Rana, IL Mutreja, Visvesvaraya National Institute of Technology, India

A review of vibrating wire piezometer usage in ultra-low permeability and heterogenous fractured rock environments M Raynor, L Sultanov, H El Idrysy, SRK Consulting, United Kingdom

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Accepted Papers*

Development of a mine dewatering and pit slope depressurisation review process E Reano, Piteau Associates, Peru; G Beale, Piteau Associates, UK; J Dowling, Piteau Associates, USA; LC Tejada, Freeport McMoRan, USA

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

Slope depressurisation at Sishen Mine, Northern Cape, South Africa TH White, M Bester, Kumba Iron Ore, South Africa

ROCKFALL ANALYSIS AND CONTROL

Scaling the heights: developing a remote highwall scaling machine for use at the Savage River Mine M S Anderson, Grange Resources, Australia; C Johnson, Joyben, Australia

Risk analysis affectation to people and/or equipment due to rockfall EG Bermeda, MM Schellman, DC Diaz, Anglo American, Chile

Blue water ramp access recovery affected by rockfall DC Diaz, EG Bermeda, MM Schellman, Anglo American, Chile

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

Analysis of the effect of backbreak on rockfall trajectories J Garcia, SRK Consulting (UK) Pty Ltd, UK; S Pastine, SRK Consulting (Argentina) S.A., Argentina

Slope design and control of rockfall hazards in a challenging structural setting at the Kanmantoo copper mine, South Australia DS Lucas, A Vokili, Mining One Consultants Pty Ltd, Australia; BJ Hutchison, Hillgrove Resources Ltd, Australia

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 Politecnica de Catalunya, Spain

RockSpot: a new radar-based method for detecting and tracking rockfall in open pit mines A Michelin, F Viviani, M Bianchetti, N Coli, N Leoni, IDS GeoRadar, Italy; CJ Stoka, IDS GeoRadar, USA

Rockfall risk management: a case study from Morenci Mine, Arizona A Moore, RE Zea, LC Tejada, C Palmer, Freeport McMoRan, Inc., USA; D Morrison, J Connolly, Call & Jefferies, USA

Testing the berm effectiveness through rockfall trials and its calibration A Quilodran, JJ Calderon, JJ Muñoz, Minera Escondida Ltda., Chile

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

A practical rockfall risk model for open pit mines using the space-time concept J Venter, ECF Hamman, AngloGold Ashanti, Australia

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

SLOPE STABILITY IN UNSATURATED MATERIALS

Slope stabilisation of steep overburden dumps with significant height in Singrauli coal mines of India: a case study MR Madhav, JNT University, India; M Korulla, RR Mahajan, Maccareferri Environmental Solutions Pvt. Ltd., India

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

Pit wall optimisation and effective wall management strategies at Invincible Open Pit, St Ives Gold Mine M Abdulai, PG Andrews, D McMahon, E Bona, J Walker, Gold Fields Australia Pty Ltd, Australia

New approach to detect imminent failure by utilising coherence attribute measurement on slope stability radar FA Cahyo, R Dwitya, RH Musa, GroundProbe, Indonesia

Machine learning applied to ground motion prediction equation on an open pit mine in Brazil AQ de Paula, Federal University of Ouro Preto, Brazil; Teta Tech, Brazil; CT Rodrigues, CAS Braga, Teta Tech, Brazil; MG Magalhanes, Federal University of Ouro Preto, Brazil; Teta Tech, Brazil; LA Oliveira, Federal University of Rio de Janeiro, Brazil; Teta Tech, Brazil; SBF Cembraneli, LAP Almeida, Mosaic, Brazil; LS Dias, Federal University of Rio de Janeiro, Brazil; Teta Tech, Brazil

Exploitation of InSAR techniques combined with in situ sensors to improve safety and productivity in mining operations J Duro, R Iglesias, D Monells, R Calvo, DARES Technology, Spain

Monitoring applications for safe mining practices: case studies of sub-bench scale failures in hard rock and open cut coal mines S Gale, L Farrington, Thiess Pty Ltd, Australia; P Bergström, Bolden Mineral AB, Finland; M Suikkanen, YARA Suomi Oy, Finland; N Boldrini, M Rubino, N Coli, IDS GeoRadar, Italy; S Naude, IDS GeoRadar s.r.l., Australia; C, C Preston, IDS GeoRadar, USA

Back-analysis of a major spoil failure at an open pit lignite mine JD Greenwood, MB Haggerty, JL Workman, Barr Engineering Co., USA

Evaluation and management of toppling failures at the McArthur River Mine, Northern Territory CEV Heaven, DBM Bran, WA Norrie, Glencore, Australia

Structural controlled deformations at the Kamtanto Copper Mine BJ Hutchinson, Hillgrove Resources Ltd, Australia; J Chambers, Maptek, Australia

Utilising satellite based techniques to identify and monitor slope instabilities: the Fagaraskögarfjall and Limnes landslides H Larkin, N Magnani, A Thomas, R Holley, H McCormack, CGG Satellite Mapping, UK

Integrating unmanned aerial vehicle photogrammetry in design compliance audits and structural modelling of pit walls F Medinac, K Esmaeili, University of Toronto, Canada

Satellite radar monitoring with InSAR sensor: indication of areas with potential failure – case study Carajás, Brazil FS Moragas, Vale S.A., Brazil

Inverse velocity technic as mine slope collapse forecast: a case study FS Moragas, A Silva, PMS Lopes, MHA Pires, Vale S.A., Brazil; DO Sousa, Vale S.A., Brazil

Addressing pit wall instabilities in Africa’s largest open pit copper mine GC More O’Ferrall, First Quantum Minerals Limited, 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, Canada; MA Verdugo, TRE ALTAMIRA S.L., Spain; F Meloni, D Colombo, TRE ALTAMIRA s.r.l., Italy

Optimisation of crest blasting and excavation techniques for controlling spillover at Bingham Canyon Mine J Markeh, J Cefalo, K Robertson, Rio Tinto Kennecott Copper, USA

Geogrid reinforced soil walls in Myanmar: an overview S Ramasamy, F Rosiello, D Ghoshal, Maccareferri Asia, Malaysia

Factors to be considered when applying atmospheric corrections to distance measurements: a case study of the Leica GeoMoS installation at Orapa, Letlhakane and Damtshaa mines O Randall, Debswana, Botswana; H Thomas, University of Witwatersrand, South Africa

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RISK-BASED DESIGN AND MANAGEMENT OF OPEN PIT SLOPES WORKSHOP

Friday 15 May 2020 | Hyatt Regency Perth, Western Australia

Within the mining community, geotechnical risk is often underestimated, sometimes ignored and seldom properly quantified. The uncertainty and variability that engineers need to deal with necessitates a rigorous process of quantification or, in the very least, robustly qualifying likelihoods and consequences. There appears also to be a large gap between the state-of-the-art and the state of general practice when it comes to the qualification and quantification of geotechnical risk. The aim of this workshop is to provide a forum to discuss the methods used to design for geotechnical risk and those used to manage these risks; to identify shortcomings; and to close the gap between the state-of-the-art and the state-of-practice.

Workshop Facilitator

Professor Phil Dight
Professor of Geotechnical Engineering
Australian Centre for Geomechanics
The University of Western Australia, Australia

Preliminary Programme*

07:30 REGISTRATION
08:20 Welcome and introduction Professor Phil Dight, Australian Centre for Geomechanics
08:30 Risk as a rock engineering design criterion Associate Professor Johan Wesselo, Australian Centre for Geomechanics
09:00 The future of risk-based design in the era of prescribed factors of safety Adjunct Professor Tim Sullivan, PSM
09:30 Risk-based water management in open pit mining Jon Hall, AQ2 Pty Ltd
10:00 Failure investigations – where do you start? Emrich Hamman, AngloGold Ashanti Ltd
10:30 Uncertainty, design reliability and slope risk Michael Dunn, Debswana
11:00 Slope risk and collaborative decision-making under uncertainty Dr Stephan Arndt, Dassault Systèmes
11:30 Risk identification and management in a large open pit Dr Felicia Weir, PSM
12:30 LUNCH
13:30 Practical considerations for applying and understanding risk-based design Julian Venter, AngloGold Ashanti Ltd
14:00 Risk management: is it a number’s game, a process or judgement? Alex Duran, PSM
14:30 Accounting for sources of uncertainty in slope design: from theory to practice Arturo Maldonado, BHP
15:00 AFTERNOON BREAK
15:30 How to determine the minimal number of specimens required for laboratory testing of rock properties and support the classification of rock mass domains David Gaudreau, Newmont Goldcorp
16:00 Lower and upper bounds for slope stability analysis based on the Hoek-Brown criterion Associate Professor Ali Karrech, The University of Western Australia
17:00 WORKSHOP WRAP UP

*Preliminary programme is subject to change.
View received abstracts at www.slopestability2020.com/instrumentation-workshop/

NEWMONT GOLDCORP BODDINGTON SITE VISIT

Friday 15 May 2020 | Boddington, Western Australia

Newmont Goldcorp have generously offered their Boddington operations for a site visit for attendees only of the International Symposium on Slope Stability in Open Pit Mining and Civil Engineering.

More information on the site visit can be found at www.slopestability2020.com/site-visit/
**REGISTRATION FORM**

**IMPORTANT NOTE**
Slope Stability 2020 Symposium speakers please do not fill out this form. Speakers will be contacted by the ACG upon acceptance of their paper and will be advised regarding speaker registration. The speaker registration fee for the Slope Stability 2020 Symposium is AUD1,320.

**CONTACT DETAILS**
Please print. *denotes mandatory fields.

*Title (Mr, Mrs, Miss, Ms, Dr, Prof., Other) ________________________________

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*All confirmations/event updates will be sent via email.

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- I give permission for my details to be included in the SS 2020 and associated events’ attendee lists.
- I give permission for the ACG to forward me ACG research, training and/or education information advice, including electronic communications.
- I require an invitation letter for visa purposes (please forward a copy of your passport information page). For more information regarding Australian education information advice, please visit www.acg.uwa.edu.au/about-events-and-courses/

The registration form for the Newmont Goldcorp Boddington Site Visit is available at slopestability2020.com/site-visit

**PAYMENT**
Total payment AUD ________________________________
Payment to be received by 8 May 2020. All bank fees are the responsibility of the registrant.
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  Register online at slopestability2020.com/registrations/ or alternatively, return this completed form to info-acg@uwa.edu.au and phone us on +61 8 6488 3300 to make payment (Visa and Mastercard are the only cards we accept).