The Third International Slope Stability in Mining Conference (SSIM 2023) 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.

PRINCIPAL SPONSOR

CONFFERENCE CHAIR

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

JOIN THE ACG MAILING LIST

Stay up-to-date with ACG events and news of interest by joining our mailing list. Scan the QR code to join.

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Welcome Function WOPM Networker Conference Dinner Student Networker

acgsurfacemining.com
Day One: Tuesday 14 November 2023

Third International Slope Stability in Mining Conference

Program*

07:00 REGISTRATION

PLENARY SESSION 1 – GRAND BALLROOM 2 & 3
CHAIR FM Weir, PSM, Australia

08:30 Welcome to Country Freda Ogilvie, Whadjuk/Ballardong Elder

08:40 Welcome and introduction PM Dight, SSIM 2023 Conference Chair, Australian Centre for Geomechanics, The University of Western Australia, Australia

08:45 OPENING ADDRESS: PG Andrews, Gold Fields, Australia

09:00 KEYNOTE ADDRESS: Safe management and optimisation of deforming pit walls GAbrahams, Rio Tinto, USA

10:00 Principal Sponsor Address: PSM MJ Fowler, PSM, Australia

10:03 MORNING BREAK

PARALLEL SESSIONS

SESSION 2A: SLOPE OPTIMISATION (1) – GRAND BALLROOM 2
CHAIR F Pothitos, Newcrest Mining Limited, Australia

10:35 Pit slope optimisation through a deep oxide zone at Newman Boddington gold mine C Powell, Newman, Australia

11:05 Comprehensive three-dimensional geological–geostatistical–numerical model for geotechnical design considerations for ‘nose’ geometries in pit design PG Andrews, Gold Fields, Australia

11:35 Integrated hydrogeological and geotechnical studies at the Diavik Diamond Mine in support of pit slope design optimisation J Levenick, D Chorley, C Dourado, K Jain, M Valerio, S Ross, WSP, Canada; M Chivas, Rio Tinto, Canada

12:05 Rio Tinto Iron Ore mines actual failure percentages case study J Parkes, D Young, JD Jung, D Goldstein, Rio Tinto, Australia

12:35 LUNCH

SESSION 3A: SLOPE OPTIMISATION (2) – GRAND BALLROOM 2
CHAIR TAV da Costa, Vale, Brazil

13:30 Guidelines to improve geological confidence in geotechnical model definitions in Western Australian iron ore J Fenton, A Maldonado, BHP, Australia

14:00 Preliminary pit slope design using a simple analytical approach V Spirin, I de Bruyn, SRK Consulting, Australia

14:30 Evolution of the pit slope design process at Western Mesquite Mines HW Newcomen, E Schmidt, BGC Engineering, Canada; S Sabo, Western Mesquite Mines, USA

15:00 Probabilistic pit slope stability analysis targeting a reliability-based design acceptance criteria: a parametric study G Velarde, R Macciotta, University of Alberta, Canada

15:30 AFTERNOON BREAK

SESSION 4A: SLOPE OPTIMISATION (3) – GRAND BALLROOM 2
CHAIR DJ Hutchinson, Queen’s University, Canada

16:00 A risk-based approach to pit slope design and slope management approval, and assurance P Knight, Rio Tinto, Australia

16:30 Geotechnical design considerations for ‘nose’ geometries in pit design A Huaman, SRK Consulting, Canada

17:00 Geotechnical model development in a geologically complex porphyry setting: East Wall, Ok Tedi Mine, Papua New Guinea BR Jones, G Kennedy, PSM, Australia; CL Allikson, G Pahina, Ok Tedi Mining Limited, Papua New Guinea

17:30 Mine slope design and the role of confidence and consequence EK Jones, J Player, G Sweeney, MineGeotech, Australia

18:00 DAY ONE CLOSE

*Correct at time of printing and subject to change. See acgsurfacemining.com for updates.
### Day Two: Wednesday 15 November 2023

#### Third International Slope Stability in Mining Conference

**PLENARY SESSION 2 – GRAND BALLROOM 2 & 3**

**CHAIR** | KA Le Roux, Rio Tinto, Australia
---|---

**08:30** | KEYNOTE ADDRESS: Critical challenges impacting the advancement of slope design reliability<br>K Moffitt, Equilibrium Mining, Australia

**09:00** | KEYNOTE ADDRESS: Engineering geological models in open pit slope engineering<br>MJ Eggers, PSM, Australia, and University of Canterbury, New Zealand

**10:30** | Industry Sponsor Address: Rio Tinto<br>K A Le Roux, Rio Tinto, Australia

**10:35** | MORNING BREAK

### PARALLEL SESSIONS

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<th>SESSION 2B: CASE STUDIES (1) – GRAND BALLROOM 3</th>
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<td><strong>CHAIR</strong></td>
<td>C Powell, Newmont, Australia</td>
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<td>G Abrahams, Rio Tinto, USA</td>
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**11:05** | Structural data collection as a key input for discrete fracture network analysis<br>C Byrne, L Zorzi, S Rogers, WSP, Canada


**12:05** | The value of senior-level practitioners logging core<br>C Morrell, WSP, Australia; V Pere, formerly WSP, Australia

**12:35** | LUNCH

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<th>SESSION 3A: STRUCTURAL DATA (2) – GRAND BALLROOM 2</th>
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<tr>
<td><strong>CHAIR</strong></td>
<td>J Price, MMG Limited, Australia</td>
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<td>A Maldonado, BHP, Australia</td>
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**13:30** | Getting more out of drillhole televiewer data: geotechnical toolbox edition<br>J Danielson, MA Clayton, L Kelly, D Kinakin, BGC Engineering, Canada

**14:00** | Shale geochemistry: a proxy for shear strength in the Pilbara<br>C Kavanagh, PSM, Australia; N Daczko, Macquarie University, Australia; MJ Eggers, PSM, Australia

**14:30** | Geotechnical slope design in hard rock lithium deposits<br>F M Weir, PSM, Australia; D Hemraj, Shannon & Wilson, USA; MJ Fowler, JW Watton, D Strang, PSM, Australia

**15:00** | The use of random limit equilibrium models to enable the selection of equivalent shear strength parameters in spatially variable heterogeneous weak rock masses from the Pilbara basin<br>JG Tirado, Klohn Crippen Berger, Australia; A Maldonado, BHP, Australia

**15:30** | AFTERNOON BREAK

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<td><strong>CHAIR</strong></td>
<td>A McQuillan, Rocscience Inc, Australia</td>
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<td><strong>CHAIR</strong></td>
<td>J Wesseloo, Australian Centre for Geomechanics, Australia</td>
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**16:00** | Development of a fully constrained structural model in a volcano caldera and its influence on open pit slope design<br>B Stoch, WSP, Australia; T Dandijian, L Zorzi, WSP, Canada; S Luck, D Luck, WSP, Australia; K Moffitt, Equilibrium Mining, Australia; S Nicol, D Tennant, F Pothitos, Newcrest Mining Limited, Australia

**16:30** | Using drone photogrammetry to optimise geotechnical analysis through efficient data collection<br>T Nguyen, G Dampers, C Seymour, H Harris, Dempers & Seymour Pty Ltd, Australia

**17:00** | Using discrete fracture networks to understand wedge failures for open pit slope design<br>JW Watton, FM Weir, PSM, Australia

**17:30** | DAY TWO CLOSE

**18:00** | DINNER – Alfresco Networking Dinner

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**Alfresco networking dinner**

The ACG is delighted to host the SSIM 2023 alfresco networking dinner in the DFES courtyard in Hibernian Place at The Westin Perth, Western Australia.

**Date:** 15 November 2023  
**Time:** 18:00–22:00  
**Location:** DFES Courtyard, Hibernian Place, 480 Hay Street, Perth  
**Dress:** Smart casual

acsurfacemining.com
Day Three: Thursday 16 November 2023

PLENARY SESSION 3 – GRAND BALLROOM 2 & 3

CHAIR: E. Sellers, CSIRO Mineral Resources, Australia

08:30 KEYNOTE ADDRESS: Integrating monitoring data into risk assessment and management for geological engineering projects
DJ Hutchinson, Queen’s University, Canada

09:30 INVITED SPEAKER: Observing usages and measurements to establish a relation between modelled movement and Probability of Failure in a large open pit
V. Levkovitch, A Flatten, Beck Engineering, Germany; V. Bushkov, Polyus Project LLC, Russia; D. Selivanov, MC Polyus LLC, Russia; D. Beck, Beck Engineering, Australia

10:00 MORNING BREAK

PARALLEL SESSIONS

SESSION 2A: STRUCTURAL DATA (4) – GRAND BALLROOM 2

CHAIR: N. Harries, Hexagon Mining Monitoring, Australia

11:00 Development of Leeb hardness field test methodology to be used during rock core logging
MA Naik, C. Powell, Newmont, Australia

11:30 Observing the anatomy of slope failure using time-lapse seismic velocity changes
G. Taylor, T. de Wit, Institute of Mine Seismology, Australia

12:00 Rocks around the clock: a 24/7 approach to radar slope monitoring
L. Tovey, R. Dixon, M. Morgan, BHP, Australia; E. Shiloy, IDS GeoRadar, Australia

12:30 LUNCH

SESSION 3A: SLOPE MONITORING (2) – GRAND BALLROOM 2

CHAIR: C. Heaven, Glencore, Australia

13:30 Unconventional remote prism installation using a modified heavy payload release drone at Savage River mine
C. Woodward, Z. Corbett, Grange Resources, Australia; A. Davies, Taz Drone Solutions, Australia; W. Darlington, I. Snyders, P. Gregory, K. Venugopal, A. Reeve, Grange Resources, Australia; E. Souza, Taz Drone Solutions, Australia

14:00 Stabilisation of open pit wall movements detected by InSAR using horizontal drains
P. Ramakrishnan, SkyGeo, Netherlands; J. du Toit, First Quantum Minerals, Zambia; J. Scoular, P. Bas Leenzen, SkyGeo, Netherlands

14:30 Satellite monitoring supporting mining pipeline integrity
A. Hauck, GD Oliveira, JVO Badard, Samaco Mineração, Brazil; D. Alboli, N. Devanthery, J. Lluch, A. Giralt, C. Athayde, B. Payais, Sixense Iberia, Spain

15:00 Investigating potential long-term geotechnical risks with slow movement analysis
T. Peyrogy, B. Setiaji, A. Ursulic, S. Ziaudras, J. Earle, Rio Tinto, Australia

15:30 AFTERNOON BREAK

SESSION 4A: SLOPE MONITORING (3) – GRAND BALLROOM 2

CHAIR: C. van der Loon, Pangea Geosystems, Australia

16:00 A low-cost terrestrial stereo-pair photogrammetric monitoring system for highly hazardous areas
DE Guccione, A. Giacomini, K. Thoeni, F. Bahootoroody, The University of Newcastle, Australia; R. Roncella, University of Parma, Italy

16:30 A proactive approach to slope failure alarming by utilising velocity ratio as a parameter to deal with line-of-sight concerns for a Slope Stability Radar
J. Putra, A. Yudono, FA Sari, GroundProbe, Indonesia; AG Cabrejo, GroundProbe, USA

17:00 Preventing a pit wall failure through early detection monitoring, geotechnical analysis and execution of a toe-stabilisation buttress
V. Jonsson, L. Nairn, BHP, Australia

17:30 Line-of-sight and total vector displacement discussion in slope monitoring: a case study at an open pit mine
MF Souza, TAV da Costa, RG Santos, DL Gonçalves, KCAP Maia, FCF Guimarães, Vale, Brazil

18:00 CLOSING ADDRESS: PM Dight, SSIM 2023 Conference Chair, Australian Centre for Geomechanics, The University of Western Australia, Australia

18:10 CONFERENCE CLOSE

acgsurfacemining.com
Keynote and Invited Speakers

Keynote Speakers

Greg Abrahams
Manager – Geotechnical and Hydro
Rio Tinto, USA

Dr Jean Hutchinson
Professor, Geological Engineering
Department
Queen’s University, Canada

Mark Eggers
Principal Engineering Geologist
PSM

Karen Moffitt
President, Mining Rock Mechanics
Equilibrium Mining

Invited Speaker

Dr David Beck
CEO
Beck Engineering Pty Ltd

Learn more about the featured speakers at acgsurfacemining.com/speakers.

Associated Events

Hydrogeological Uncertainty and Implications in Slope Design Workshop
12 November 2023 | Wisteria Room, The Westin Perth, Western Australia
acgsurfacemining.com/hydrogeological-uncertainty-workshop

This workshop seeks to introduce the concept of hydrogeological uncertainty and its impact on
gеotechnical engineering works. The workshop aims to raise awareness of groundwater uncertainty,
hydrogeological risk and implications on slope design, and demonstrate the latest open-source technologies
available for data assimilation and uncertainty quantification.

Dr Eduardo De Sousa – Co-presenter
Principal Hydrogeologist
INTERA Inc.

Dr Rui Hugman – Co-presenter
Senior Groundwater Modeller
INTERA Inc.

See overleaf for more associated events
Associated Events

Instrumentation and Slope Monitoring and Implementation Workshop
13 November 2023 | Ballroom 3, The Westin Perth, Western Australia

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

WORKSHOP PROGRAM – 13 NOVEMBER 2023*

08:00–08:45 REGISTRATION
08:45–09:00 Welcome and introduction Professor Phil Dight, Australian Centre for Geomechanics
09:00–09:30 GNSS Tracked Mobile Survey Control/Infrastructure Systems Clint van der Loon, Pangea Geosystems
09:30–10:00 Learnings from LiDAR-based pit slope monitoring Lance Steel, Maptek
10:00–10:30 MORNING BREAK
10:30–11:00 Wireless in-ground monitoring of dynamic and challenging ground Simon Steffen, Elexon Mining
11:00–11:30 Establishing and maintaining a pit slope monitoring database Sharla Coetsee, Reutech Mining, South Africa
11:30–12:00 Instrumentation & Monitoring: What major civil construction projects can bring to mining? Eric Audigé, Blanca Payas, Sixense Satellite, Spain
12:00–12:30 The role of autonomous sensor technology in slope stability monitoring Anthony Nieves, Position Partners
12:30–13:30 LUNCH
13:30–14:00 Advanced InSAR techniques for geotechnical hazard identification and monitoring Jessica Morgan, TRE Altamira Inc.
14:00–14:30 Guidelines and examples of an integrated approach to slope performance monitoring Martin van Balkom, Canary Systems Inc., USA
14:30–15:00 Processing slope movement monitoring data for presentation and interpretation Adam Beer, AMC Consultants
15:00–15:30 AFTERNOON BREAK
15:30–16:00 Assessing, analysing and reporting geotechnical hazards on the fly Alison McQuillan, Rocscience Inc
16:00–16:30 Total monitoring approaches: benefits of using multiple technologies in slope monitoring Neal Harries, Christian Jacobsen, Hexagon Geosystems
16:30–16:45 Discussion
16:45 WORKSHOP CLOSE AND FAREWELL

Women in Open Pit Mining Networker
14 November 2023 | The Westin Perth, Western Australia

Spaces for this event are limited. Preference will be given to SSIM 2023 delegates. More details at: acgsurfacemining.com/wopm

Student and Early Career Graduates Networking Function
16 November 2023 | The Westin Perth, Western Australia

Attendance is strictly limited to Western Australia university students from open pit mining engineering, geotechnical engineering, civil engineering, mechanical engineering, geology and computer science, SSIM 2023 conference attending early career graduates and industry sponsors.
This event is open for sponsorship.
More details at acgsurfacemining.com/student-networker

REPOSITORY OF CONFERENCE PROCEEDINGS

SSIM 2023 Conference papers will be freely available for download through the ACG Online Repository. A printed, colour, softbound book will be available for purchase. View the full range of open pit papers available at papers.acg.uwa.edu.au/openpit

*Subject to change. See acgsurfacemining.com for updates.
acgsurfacemining.com/instrumentation-workshop
Associated Events

Sampling and Laboratory Testing for Open Pit Slope Design Workshop
17 November 2023 | Cassia & Karri Rooms, The Westin Perth, Western Australia
acgsurfacemining.com/sampling-workshop

This workshop for pit slope stability practitioners, developed in collaboration with the Large Open Pit Project, provides guidelines for rock sampling and laboratory testing for open pit slope design applications.

Discrete Fracture Network Analysis for Open Pit Slope Stability Workshop
18 November 2023 | Cassia & Karri Rooms, The Westin Perth, Western Australia
acgsurfacemining.com/discrete-fracture-workshop

This workshop aims to introduce attendees to some of the theory behind DFN modelling and some practical examples of how they are used, whilst gaining hands-on experience with WSP’s DFN code, FracMan. A 30-day free licence of FracMan Geotechnical Edition will be given to all attendees as well as a workshop workbook with supporting material. WSP shall distribute the software the week before the SSIM 2023 conference.

Dr Steve Rogers – Presenter
Senior Principal Geoscientist
WSP, Canada

Ciara Byrne – Presenter
Senior Geological Consultant
WSP, Canada

Conference Venue
The ACG is delighted to host the SSIM 2023 conference at the Westin Perth, located at 480 Hay Street, Perth, WA 6000. There is a special group rate for SSIM 2023 delegates to book accommodation at the hotel. Visit acgsurfacemining.com/venue for more information.

Registrations are open for this event. Register your attendance at acg.uwa.edu.au/event-registration/product/ssim-2023-registration
Sponsor and exhibitor opportunities are available for this event. Visit acgsurfacemining.com/sponsors to learn more.