

AFRIROCK

2025

PIONEERING PROGRESS :
THE FUTURE OF ROCK ENGINEERING

Venue: Sun City, Rustenburg, South Africa
21-23 JULY 2025 - Conference
24-25 JULY 2025 - Technical Visits



Abstracts Received

Hydro-powered resin bolting

J.P. Gouvea, W. Geel, *Glencore Northam Platinum Holdings Ltd, South Africa*

A review of the stope support system at impala bafokeng north shaft owing to stope closure at shallow mining depths

T. Walsh, *Implats, South Africa*

Exploring the potential of distributed acoustic sensing (DAS) for seismic and stress monitoring in underground mining

S. Dande¹, E. Forbes², T. Butler², A. Senso², *ESG Solutions, ¹USA, ²Canada*

Modern satellite data provide new insights into surface movements above coal longwall mining

A. Vervoort, *KU Leuven, Belgium*

Machine Learning serving as a catalyst to enhance collaboration across generations and disciplines within the South African Rock Engineering context

R.T. Masethe¹, L. Msimango², *¹University of KwaZulu-Natal, ²Gauteng Department of Education, South Africa*

Application of large-scale FEM simulations to determine geomechanical hazard during room-and-pillar mining under a tectonic fault

K. Fuławka, L. Stolecki, P. Mertuszka, R. Kołodziej, *KGHM CUPRUM Ltd, Poland*

Prediction of mine tunnel conditions in a deep Austrian mine by means of numerical back- and forward analysis

P. Gams, *Montanuniversität Leoben, Austria*

Assessing the role of stress distribution on mine layout design in Block Caving Mine

T. Mtshali¹, N.M. Chiloane², B. Makgate¹, T. Chauke², F.M. Mulenga², V.C. Madanda², T. Moyane¹, R.B. Khumalo¹, *¹Palabora Mining Company, ²University of South Africa, South Africa*

Application of flac3d to analyze the effects of induced stresses on the behavior of draw point pillars: A case study of BMC mine in Zimbabwe

A. Velempini, *Zimbabwe National Institute of Rock Engineering (ZINIRE) Zimbabwe*

Geotechnical design of coal bord and pillar panels: Some complementary suggestions

A. Vervoort, *KU Leuven, Belgium*

Controlling tailings backfill leakage through fractured pillars

G. M. Phike¹, D. O'Connor¹, F. Sibanda², *¹Minova, ²Goldfields, South Africa*

Application of MEMS accelerometers for continuous near-wave monitoring of mining-induced seismicity

L. Stolecki, K. Fuławka, P. Mertuszka, *KGHM CUPRUM Ltd, Poland*

Unravelling the past for a safer future: How historic rock mass classification data compare with slope performance monitoring data

M. Pretorius, *Vedanta Resources, South Africa*

HELLOMAC: An integrated rockfall monitoring and alert system for enhanced infrastructure protection in remote areas

W. Esterhuizen, *Maccaferri, South Africa*

Role of machine learning in optimizing blast fragmentation prediction in mines using site-specific geological data

K.S. Makomborero, R.S. Suglo, M. Masialeti, *Botswana International University of Science and Technology, South Africa*

Stabilisation of open pit wall movements detected by InSAR

P. Narshai¹, J. Pretorius¹, J. du Toit², *¹SkyGeo, Netherlands, ²First Quantum Minerals, ²Zambia*

The development of the fast cable anchor

J. Wang, B. Darlington, P. Young, *Sandvik Mining & Rock Solutions, Australia*

Improved ore pass designs at Big Gossan sub-level open stope mine, Indonesia

A. Sjadat¹, J.P.E. Hamman¹, Y. Irab¹, I. Haque², *¹PT Freeport Indonesia, ²Freeport-McMoRan Inc., USA*

Improvements in stope designs, and sequencing at the big gossan sub-level open stope mine, Indonesia

A. Febrian, A. Sjadat, J.P.E. Hamman, *PT Freeport Indonesia, Indonesia*

Rockbolts in shear

G. Knox, J. Hadjigeorgiou, *University of Toronto, Canada*

Transforming geotechnical data acquisition, 3D visualisation and analytics for modern mining

J. Meiring, P. Piper, *Groundwork Consulting (Pty) Ltd, South Africa*

The CHORUS™ SAR constellation: a unique perspective for improved slope stability monitoring and geotechnical risk assessment

P. Oliver, D. Hickson, R. Morin, *Anglo American, Canada*

Seismological and numerical characterisation of stability pillar behaviour at South Deep Mine

S.M. Sibanda, B.P. Watson, *University of the Witwatersrand, South Africa*

Soft computing techniques for predicting mode-II fracture toughness: A cost-effective approach to advancing rock mechanics design and sustainability

N.O. Ogunsola^{1,2}, F. Cawood^{1,2}, H. Grobler¹, *¹University of Johannesburg, ²Sibanye-Stillwater, South Africa*

Klipgat boxcut long-term stability assessment and monitoring

S. Vezir¹, R. T. Masethe², *¹African Rainbow Minerals, ²University of Kwazulu Natal, South Africa*

Comparison of machine learning classification for rockburst prediction: A case study of South African gold and platinum mines

N.P. Khumalo, R.T. Masethe, *University of Kwazulu Natal, South Africa*

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Towards ensuring sustainable mining: Application of a pareto-optimized hierarchical structural interaction matrix for prioritizing slope stability influencing factors

N.O. Ogunsola¹, O. Makinde¹, F. Cawood^{1,2}, H. Grobler¹, ¹University of Johannesburg, ²Sibanye-Stillwater, South Africa

Mitigating pit floor instability above a confined aquifer: Assessing mining block dimensions and sequencing strategies

L. Bruyns, M. Rangasamy, T. Rangasamy, Middindi Consulting (Pty) Ltd, South Africa

Seismic forecasting in mining: Correlating three-dimensional numerical modelling with real-time monitoring

B.S. Vaughan, T. Rangasamy, Middindi Consulting (Pty) Ltd, South Africa

Stabilization of highwall instability using numerical modelling and statistical analysis for open pit mining

N. Umeh, N. Baloyi, S. Darries, T. Rangasamy, Middindi Consulting (Pty) Ltd, South Africa

Development of a multi-stage large excavation crusher chamber at Palabora mining company

M. Matsapola¹, R.B. Khumalo¹, V.C. Madanda², F.K. Mulenga², ¹Palabora Mining Company, ²University of South Africa, South Africa

Effect of pyroxenite layers on the strength of UG2 pillars

T.J. Maphosa, B.P. Watson, University of the Witwatersrand, South Africa

A distributed radar system for narrow reef stope geotechnical convergence monitoring

D. van Rooyen¹, R. Carstens¹, L. Campbell², ¹Anglo American, South Africa ²Geobotica, Australia

Development of a digital ground control management plan (DGCMP) for underground mines using AI algorithms to forecast potentially fall of ground area

D. van Rooyen, R. Carstens, Anglo American, South Africa

Advances in fracture mechanics for deep mining: A review of extensile fracture mechanisms

O. Pillay, B.P. Watson, University of the Witwatersrand, South Africa

Implementation of an automated berm monitoring system at Tarkwa Mine

D. Korsah, M. Seidu, S. Burdam, Gold Fields, Ghana

A proposed method of pre-mining rib pillars and replacing these pillars using cemented rock/aggregate fill

R.M. Arlow¹, I. Malpartida², A. Vivas², J. Nyagumbo², ¹Dayenu, South Africa, ²Alphamin Resources, Congo

Enhanced geotechnical stability monitoring in challenging mining environments through integrated InSAR Techniques and geotechnical sensors

A. Mkandla¹, D. Mikoloni³, F. Meloni², M. Douglass², ¹TRE Altamira, South Africa, ²TRE Altamira, Italy, ³Lubambe Copper Mine, Zambia

From boreholes to light beams: Advancing shaft rock mass quality assessment with laser scanning and digital mapping

M. Maloyi, N. Netshivhazwaulu, IvanHoe Mines, IvanPlats, South Africa

Rectifying, conforming and extracting value from existing geotechnical data sets, the importance of good data management for optimal value extraction

M. van Aswegen¹, D.H. Mossop², ¹Independent Consultant - Data Governance, ²SRK Consulting, South Africa

Repurposing ventilation shaft into a hoisting shaft: A geotechnical design approach for enhanced mine development

N. Netshivhazwaulu¹, T. Gcuda², ¹IvanHoe Mines, IvanPlats, ²University of Witwatersrand, South Africa

Modelling of dynamic fracturing mechanisms in stressed underground rock masses: A review

P. Matshona¹, N. Dzimunya², ¹Zimbabwe School of Mines, ²University of Zimbabwe, Zimbabwe

A benchmark study of RMR and Q rating methods for classification of rock masses

P. Matshona, A. Kwaramba, Zimbabwe School of Mines, Zimbabwe

Optimizing stope design in unstable grounds

P. Matshona, S.K. Hove, Zimbabwe

Evaluating the Effectiveness of Dip Pillars and Adherence to Seismicity Management Principles at Doornkop Shaft

M. Mudau¹, D. Mhlanga¹, T. Gcuda², R.T. Masethe³, ¹Harmony Gold Mine, ²University of the Witwatersrand, ³University of Kwazulu Natal, South Africa

Optimal stoping limits and ground stability analysis for 202 n s1 raise line at Doornkop shaft

M. Mudau¹, D. Mhlanga¹, T. Gcuda², R.T. Masethe³, ¹Harmony Gold Mine, ²University of the Witwatersrand, ³University of Kwazulu Natal, South Africa

Empirical analysis of cavability suitability of AK06 Kimberline

M. Majaule¹, T. Dintwe², A. Asfawossen², B. Pule², and B. Mpe², ¹Lucara Botswana, ²Botswana International University of Science and Technology, Botswana

Using InSAR for surface deformation monitoring in underground mining: A case study of longwall-induced subsidence

L.P. Sebothoma, FieldServe, South Africa

Closure and accelerometer measurements to enhance mine safety

L. Scheepers¹, P. Lenegan¹, F. Pienaar², and H. Hoogenboezem³, ¹Sibanye Gold, ²Mining Product Developments, ³Hoogenboezem Industries, South Africa

Influence of saturation fluids on the elasto-plastic property of shale

L. Chen, L. Wang, China University of Petroleum, China

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Mechanical properties and performance of a styrene-free polyester resin produced with water-based catalyst

G. Smolnik¹, R. Penczek¹, J. Franek¹, J. Drozd¹, D. Bucholc¹, ¹DSI Underground Poland, ²Silesian University of Technology, Poland

Application of the boundary element method for numerical modelling of seismic hazard at Bambanani Gold Mine in South Africa

J. Gerber, Institute of Mine Seismology, Stellenbosch University, South Africa

Determining the applicability of muon tomography for monitoring hazards in deep underground mines - A case study from the Polish copper mine

R. Kołodziej¹, K. Fuławka², L. Stolecki², G. Surányi^{3,5}, M. Holma^{3,4}, H. Gergö⁵, ¹KGHM Polska, ²KGHM CUPRUM sp. z o.o., ³Muon Solutions Oy, Finland, ⁴Kerttu Saalasti Institute, University of Oulu, ⁵Wigner Research Centre for Physics, Budapest, Hungary, ^{1,2}Poland, ^{3,5}Finland, ^{4,5}Hungary

Geotechnical considerations for optimal blasting block size in opencast coal mining

W.B. Motlhabane, A.G. Moyo, University of Johannesburg, South Africa

Determination of stable, partially supported spans from a sequential partial pillar extraction project in a tabular hard rock Platinum mine

M. Musembwa, P. Mushangwe, Zimplats, Zimbabwe

Innovative strategies for rockfall hazard classification, monitoring, and prediction in open-pit mining: Integrating machine learning and advanced geotechnical mapping

B. Mashiatshiti¹, T. Russells², T. Gcuda³, R. T. Masethe⁴, ¹Tharisa Mine, ²Anglo-American, Kumba Iron Ore, ³University of the Witwatersrand, ⁴Durban, South Africa

Transitioning from study to operation at the Kucing Liar Mine

K. Llewelyn¹, A. Perdana¹, A. Ekaputra¹, R. Williams¹, N. Viljoen², ¹PT Freeport Indonesia, Indonesia, ²PT Freeport Indonesia, USA

Structural deformation characteristics of open-pit slopes under excavation disturbance

G. Ockhuizen¹, R. Armstrong², S. MacLennan³, ¹CGNPC Swakop Uranium, ²SRK, ³University of the Witwatersrand, South Africa

Advancing geotechnical risk management and seismicity mitigation through interactive guidelines and industry collaboration

H. Greeff, J. Hanekom, Council for Scientific and Industrial Research South Africa

Ground penetrating radar: An effective tool for numerical modelling calibration

Q. Grix¹, P. Gae², M. Nel³, ¹Open House Management Solutions, ²Assmang Manganese, ³Reutech Mining, South Africa

Blast-on-mesh: Transforming deep level gold mining - success stories from mine X

R. Van Heerden, Harmony Gold Mining Company, South Africa

MASH precision engineering: Advancing mining and engineering solutions

D. Patterson, MASH Precision Engineering, South Africa

Do underground excavations mined by non-explosive mining require less support than when mined by blasting? A challenge to rock engineers to review support design practice

R.G.B. Pickering, D. Arnold, J. Porter, South Africa

Pillar assessment at Bindura Nickel Corporation (BNC) Trojan Mine in Zimbabwe

F. Kwangwari, W.C. Joughin, SRK Consulting, South Africa

3D elastodynamic modelling applied in the design of technical blasts

L. M. Linzer^{1,2}, A. J. Rorke³, M. W. Hildyard⁴, ¹SRK Consulting, South Africa, ²University of the Witwatersrand, South Africa, ³Independent, South Africa, ⁴Leeds University, United Kingdom

Geotechnical and operational risk review for the ultra-long ore pass arrangement at venetia underground mine

J. Walls¹, F. Breed², M. Dlamini¹, T. Mokele², ¹Anglo American plc, ²De Beers, South Africa

Rock fall hazard analysis of a natural slope at the Sungun Copper Mine

J.D. Bosman¹, L. Cilliers¹, H. Reza-Golchin², ¹Open House Management Solutions Pty Ltd, ²Sungun Copper Mine, South Africa

Key block theory for the miner: a novel simplified method for determining block removability

C. van Rooyen, University of the Witwatersrand, South Africa

Understanding corrosion zones and the impact it has on the durability of structures

W.W. Greyling, Maccaferri, South Africa

Underground fire tracking using live feed seismic response and consequent response during the cooling down period

M. Wiggins¹, L. Scheepers¹, J. Gerber², ¹Sibanye Stillwater, ²IMS - Institute of Mine Seismology, South Africa