# **Deep Mining 2019 Conference**

### NINTH INTERNATIONAL CONFERENCE ON DEEP AND HIGH STRESS MINING 2019

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Layout design criteria for deep tabular mines: Quo Vadis?

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Misconceptions and advances in data driven seismic hazard assessment

J. Wesseloo, University of Western Australia, Australia

New trends in data collection and visualisation: Implications for rock engineering

D. Stead, Simon Fraser University, Canada

Deep infrastructure tunnels — experience from the alpine crossings

T. Jesel, Amberg Engineering AG, Switzerland

#### **ABSTRACTS**

Monitoring the ore massif state in deep rock shock mines

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Short range 3D laser scanning: A cost effective solution for underground surface monitoring

G. Slam, United Kingdom

Ultra deep mine dewatering design

KLM Consulting Services Pty Ltd, South Africa

A study on ratio of uniaxial compressive strength and crack damage stress threshold of brittle rock based on uniaxial compression tests *Indian Institute of technology, India* 

Design of a support system for horse-shoe shaped tunnels in squeezing ground using a combination of techniques

University of Adelaide, Australia

Application of laser scanner to determining ground surface displacement rate in block caving mine

Freeport Indonesia, Indonesia

A practical design approach for an improved resin anchored tendon New Concept Mining, South Africa

Time dependent constitutive model for squeezing ground University of Adelaide, Australia

Application of Analytic Network Process in selection of underground mining methods

University of Mines and Technology, Ghana

Planning for a large-scale hydrofracturing and monitoring program at the Kiirunavaara Mine

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An evaluation of the bond strength of multiple resin bolt and capsule combinations through laboratory testing and applied methodologies Groundwork Consulting (Pty) Ltd., and Impala Platinum Ltd, South Africa

Relation between stress ratio and principal stresses

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Identifying relevant ground movement monitoring requirements
New Concept Mining, South Africa

Effect of advancing stope on tunnel conditions in a deep mine University of Leoben, Austria

Investigating the importance of influencing parametrs on rock mass cavability in block cave mines

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New method to evaluate dynamic bolts and development of a new dynamic rock bolt

Sandvik Mining and Rock Technology, Australia

Seismic response to hydraulic fracturing in caving mines

Institute of Mine Seismology, South Africa

The validity of Es/Ep as a source parameter in mining seismology

Australian Centre for Geomechanics, Australia

Full scale rockbolt testing: Analysis of recent results

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Support and reinforcement damage Initiation and design adjustments in a deep mine environment – Case study: Cuiabá Mine, Brazil, MG Anglogold Ashanti, Brazil

Management tools for re-entry rules and exclusion zones following significant seismic events or blasting

ESG Solutions, Australia, Canada

The geotechnical evolution of deep level mechanised mining at South Deep

Gold Fields, Australia, South Africa

Empirical observations of strainbursting on the undercut and extraction levels of a deep block cave mine

Golder Associates Ltd., Canada

Stoping sequence and ground support optimization through large scale numerical modelling

Itasca, Pierce Engineering, USA

Implementation of an implicit buckling scheme in FLAC3D to study the impact of buckling on excavation performance

Itasca, Pierce Engineering, A2GC, USA

High rock stress challenges at Rana Mine

Sintef AS, Rana Gruber AS

Case Story: LKAB Malmberget, self drilling anchors & pumpable resin Epiroc Rock Drills AB, LKAB, Luleå University of Technology, Sweden

Seismic hazard assessment for fault slip during undercutting in block caving

Newcrest Mining Limited – Miner of Choice™, Australia

Geotechnical review of stope design for the SF3 Orebody at Rosh Pinah Zinc Mine

University of the Witwatersrand, Rosh Pinah Zinc Corporation, and Vakili Mining One Consultants, Namibia, South Africa, and Australia

Dynamic bolt development and application in deep mechanised mining New Concept Mining, Gold Fields, South Africa

Long hole stoping optimisation at South Deep Gold Mine Gold Fields, South Africa, Australia

Seismic response to mining the massive ore-body at South Deep Gold

Gold Fields, South Africa

Advanced techniques for the monitoring of pillar and excavation behaviour at a deep level massive mine

Gold Fields, Australia, South Africa

The evaluation of cement modifiers on the backfill product at South Deep Gold Mine

Sustainable Slurry and Backfill Solutions (Pty) Ltd, South Deep Gold Mine, Gold Fields, South Africa, and Australia

*In-situ* stress around earthquake source faults in and beneath South African deep gold mines

Tohoku University, Ritsumeikan University, Fukada Geological Institute, Japan

The correlation between GPR mapped depth of stress fracturing and stope maturity

University of the Witwatersrand and Mponeng Gold Mine, South Africa

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Do stopes contribute to the seismic source?

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Underground geotechnical investigation and design for Kipushi Mine - Case Study

SRK Consulting, South Africa

The effect of load and displacement on short encapsulation pull tests at various pull rates

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The effect of resin annulus on anchorage performance of fully encapsulated helix rockbolts

New Concept Mining, South Africa

Modern seismic illuminating the depths

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Re-evaluation of dynamic failure of tunnels in seismically active, deep level mining environments

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Deformation based shotcrete design

SRK Consulting, South Africa

Spatial and temporal analysis of Gutenberg-Richter b-values and modified Omori Law p-values in mines

University of the Witwatersrand, South Africa

Reprocessing of the legacy reflection seismic data to improve imaging of the causative geological structure of the M5.5 earthquake (2014) in South Africa

University of the Witwatersrand, Uppsala University, SRK Consulting, and Ritsumeikan University

Characterization of the seismogenic zone of M5.5 2014 Orkney earthquake (South Africa) using advanced 3D seismic attributes
Ritsumeikan University, University of the Witwatersrand, South Africa, Japan

Artificial intelligence / big data analytics in rock engineering Mira Geoscience Ltd., Canada

Fracturing model for mitigation of the rockburst based on the concept of deformation energy

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Hydra-U: how a radar can change the monitoring in underground mines IDS GeoRadar s.r.l., Italy

The 2019 overview of drilling into seismogenic zones of M2.0-5.5 earthquakes in South African gold mines (DSeis)

H. Ogasawara, B. Liebenberg, M. Ziegler, Y. Yabe, T. Ito, R.J. Durrheim, S. Mngadi, S. Tau, B. Watson, D. Roberts, N.Z. Nkosi, S. Kaneki, Y. Yokoyama, T. Hirono, A. Funato, T.C. Onstott, T. Wiesberg, M. Zimmer, C. Kujawa, R. Conze, G. van Aswegen, N. Wechsler, and A.K. Ward, *DSeis team, Ritsumeikan University , Moab Khotsong mine, ETH, Zurich, Tohoku University, University of the Witwatersrand, CSIR, Osaka University, Fukada Gological Institute, Princeton University, GFZ, Germany, Institute of Mine Seismology, Tel Aviv University, Japan, South Africa, Switzerland, USA, and Israel* 

Ideal stope configuration to manage seismicity in deep tabular narrow reef mines

AngloGold Ashanti, South Africa

Understanding anisotropic ground behaviour at CSA Mine

Itasca Australia Pty Ltd and Curtin University of Technology- WASM, Australia

Back analusis of extraction level stability at New Afton Mine

Itasca Consulting Group, New Gold Pierce Engineering, USA, Canada

Extraction level performance analysis under caving-Induced stresses at depth using thebonded block model approach

Itasca Consulting Group, Pierce Engineering, USA

Understanding the rock mass response within the Thuthukani shaft pillar area, Kloof operation, South Africa

Sibanye Stillwater, South Africa

Evaluating mining induced seismicity around abandoned mines under dry and flooded conditions in the central rand, Johannesburg using advanced numerical modeling techniques

University of the Witwatersrand, Itasca Consulting Inc., South Africa and USA

Large scale testing of surface support

Geobrugg AG, Geobrugg Ibérica S.A., Switzerland, Spain

Management of seismic risks in metalliferous mines

Australian Centre for Geomechanics, The University of Western Australia, and Newcrest Mining Ltd, Australia

Self-similarity in rock fracturing and the behaviour of large-scale faults in the mining environment

AMC Consultants , Curtin University, WA School of Mines, Curtin University, United Kingdom, and Australia

Mining initiative on ground support and equipment: 12 years of accomplishments

MIGS Consortia of Nordic Rock Tech Centre AB, Sweden

Development of a remote-controlled rock bolting system for narrow-seam hard rock mines

Minova, South Africa

Placement of Footwall Excavations for an ore replacement project: an underground platinum mining case study

Sibanye Stillwater – Platinum Division, Rustenburg, Vimbo Consulting, South Africa

Monitoring the Ore Massif State in Deep Rock Shock Mines Institute of geophysics UB RAS.Ekaterinburg, Russia

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University of the Witwatersrand, Rosh Pinah Zinc Corporation, Vakili Mining One Consultants. Namibia, South Africa, Australia

Analysis of the Gutenberg-Richter b-values of Overlapping Seismic Clusters

University of the Witwatersrand, South Africa

Ideal Stope Configuration to Manage Seismicity in Deep Tabular Narrow Reef Mines

AngloGold Ashanti, South Africa

The response of the rock mass to shaft pillar extraction: Thuthukani shaft, Kloof Operations, South Africa

Sibanye Stillwater, South Africa

Self-similarity in rock fracturing and the behaviour of large-scale faults in the mining environment

AMC Consultants, Curtin University, WA School of Mines, Curtin University, United Kingdom, Australia