

Abstracts received for AfriRock Symposium 2017 · 30 September–6 October 2017

KEYNOTES

Rock engineering as a creator of value

T.R. Stacey, *University of the Witwatersrand, South Africa*

Mythperceptions in rock engineering

N. van der Merwe, *Stable Strata, South Africa*

Lessons from large failures: geology, stress and support

N. Barton, *Nick Barton & Associates, Norway*

Stress measurements for underground powerhouses – three recent cases

L. Lamas, *ISRM*

The Grosvenor strata control journey: learning and adapting from new and challenging experiences

P.S. Buddery, *Anglo American Met Coal, Australia*

How rock mechanics can help oil well drilling — Latest developments

S. Fontoura, *Pontifical Catholic University of Rio de Janeiro, Brazil*

ABSTRACTS

Rock anchoring beam excavation and shaping technology for the underground powerhouse of Hydropower Stations

China Three Gorges Corporation, China

Deformation and failure analysis of large underground hard-rock chambers under high geo-stress: A case study of the underground powerhouse on the right bank of Baihetan Hydropower Station

China Three Gorges Corporation, China

Research of deformation and failure characteristics, mechanism, and engineering countermeasures for surrounding rocks in underground chambers of Baihetan Hydropower Station

China Three Gorges Corporation, HydroChina Itasca Research and Development Center, Powerchina Huadong Engineering Corporation Limited, China

The dam foundation grouting engineering management based on 3D geological model and monitoring system

China Three Gorges Corporation, China

A case study on a risk based approach to slope design

SRK, South Africa

Comparison between thin spray on liners and shotcrete as surface support mechanisms in tunnels

University of Cape Town, South Africa

Time dependent failure of open stopes at Target Mine

Brentley, Lucas and Associates, South Africa

Reassessing continuous stope closure data using a limit equilibrium displacement discontinuity model

University of Pretoria, South Africa

Geomechanical evaluation enabled successful stimulation of apollonia tight chalk reservoir in Abu-Gharadig Basin, Egypt

Khalda Petroleum Company, Egypt

Techniques for three-dimensional displacement vector using ground-based interferometric synthetic aperture radar

Hexagon Mining, South Africa, IDS GeoRadar, Italy

Slope design aspects considerations for shallow open pit mines: A case study at Mamatwan Mine, Northern Cape Province

University of Johannesburg, South Africa

Assessment of the risks in undermining of a surface stream in a shallow coal mine

Glencore, South Africa

Coal pillar stooping – Partial extraction of coal pillars ensuring panel stability

Glencore, South Africa

Coal pillar stooping – Assessing the stability of snooks

Glencore, South Africa

The effect on undercutting an unstable layer on roof stability

Bafokeng Rasimone Platinum Mine, South Africa

Stability of middling between two tabular chrome seams

Hernic, South Africa

Extraction of hard rock strike pillars

Bafokeng Rasimone Platinum Mine, South Africa

Investigation of a failure associated with a major shear zone in the Main Pit Cut 3 West, at Letšeng Diamond mine

Lesotho Letšeng Diamonds, University of Kwazulu Natal, South Africa

Advanced information on rock mass properties in large open pits by analysing production drill rig parameters in real time

Groundwork Consulting, South Africa

Rock engineering considerations for the extension of a vertical rectangular shaft in a jointed rockmass adjacent to a large open-pit

GeoSindile (Pty) Ltd, South Africa

The mineralogical and geotechnical properties of the sandstone 'parting' between the Alfred seam and the Gus seam in the Magdalena Colliery, Dundee

South Africa University of KwaZulu-Natal, Buffalo Coal, South Africa

Application of controlled blasting to minimize limit wall damage at Letšeng Diamonds Lesotho

University of KwaZulu-Natal, South Africa

Full-scale dynamic tests of a ground support system using high-tensile strength chain link mesh in El Teniente Mine, Chile

Chile University / Codelco El Teniente, University of Applied sciences Zurich, Geobrugg AG, Santa Maria University, Geobrugg Andina Groep T University / Geobrugg Southern Africa (Pty) Ltd, Chile, South Africa

Improving the mining efficiencies as a result of a new support design at Unisel Gold Mine, Welkom, South Africa

Brentley, Lucas & Associates (Pty) Ltd, South Africa

Rockburst prevention due to destress blasting in roof competent rocks in hardcoal longwall mining

Institute of Geonics of the Czech Academy of Sciences, Czech Republic

Optimizing stoping panel spans at an Eastern bushveld platinum mine

Impala Platinum, South Africa

Pillar scaling and pillar fracturing in deep level gold mines in South Africa 1Deep level gold mine

The University of the Witwatersrand, South Africa

Remediation of abandoned mines for residential development

Oweis Engineering Inc, The Falcon Group, USA

A model-oriented, remote sensing approach for the derivation of numerical modelling input data: Insights from the Hope Slide, Canada

Simon Fraser University, Canada

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A Study of multi-reef pillar extraction in the Carletonville area
SibanyeGold, The University of the Witwatersrand, South Africa

Parameters required for the design of rock support in highly stressed rock masses

Norwegian University of Science and Technology, Norway

A tool for the evaluation of departmental effectiveness
Advisian, South Africa

Simultaneous extraction of three coal seams with stowing – A case study

CSIR-Central Institute of Mining & Fuel Research, India

Preliminary investigation to areal shape effect of pillar strength
University of Pretoria, South Africa

Development of a site specific floor deformation index to assess floor heave risks

Anglo American Met Coal, Anglo American Grosvenor Mine, Australia

Characterization and numerical modelling of standard and cabled strapped pillars in a hematite mine

University of Vigo, Spain

Application of rock mass classification and blastability index for the improvement of wall control in hard rock open pit mining: a case study

The University of the Witwatersrand, South Africa

Comparison of observational, empirical and 3D discrete numerical methods to estimate subsidence over longwall coal faces

University of Vigo, Itasca Consultores SL, Spain

A multi-objective hybrid prediction model of slope deformation based on fuzzy optimization algorithm

Yangtze River Scientific Research Institute, China

Numerical simulation of fully grouted rock bolts by considering the non-linear bond-slip behaviour

Nanyang Technological University, Singapore

Otjikoto gold mine – a case study on the pit slope design
SRK, South Africa

The effect of seismic sensor frequency on the results of routine seismic monitoring analyses techniques

Australian Centre for Geomechanics, Australia

Microseismicity characteristic and rockburst risk mitigation during the breakthrough in deep-buried tunnels of the Jinping-II Hydropower Station, China

Chinese Academy of Sciences, China

A holistic open-pit mine slope stability index using Artificial Neural Networks

University of Johannesburg, South Africa

An investigation on the relationships between the petrographic, physical and mechanical characteristics of sandstones from Newspaper Member of the Natal Group
University of KwaZulu University of Johannesburg, South Africa

The significance of identifying potential failure mechanisms from conceptual to design level for open pit rock slopes
University of KwaZulu, University of Johannesburg, South Africa

Support method of hard rock in underground engineering with high geo-stress: A case study of the Baihetan underground cavern, China

Chinese Academy of Sciences, China

A critical review of the findings from *in situ* stress measurements conducted in Southern Africa during the past ten years

Hands on Mining cc, Groundwork Consulting, South Africa

Study of innovative technologies for underground excavations monitoring during construction and operation phases

University of Parma, Italy

Fundamentals of underground pillar design

Middindi Consulting (Pty) Ltd, University of Pretoria, South Africa

An empirical and numerical approach to quantifying raise-bore hole stability

Middindi Consulting (Pty) Ltd, South Africa

Microseismic events for slope stability analysis – A case study at an open pit mine

CSIRO Energy, Australia

Modelling hydraulic fracturing in hard rock using a continuous-discontinuous method

Chinese Academy of Sciences, China

Mining with crush pillars

Lonmin Platinum, University of Pretoria, South Africa

Unravelling the structural mysteries of the Bermuda Triangle at Lonmin's Saffy Shaft Lonmin Plc

Terra Explora Consulting, South Africa

Understanding the influence of geological structures – an often overlooked important aspect in the stability of operating mines

Independent Consultant, Lonmin Platinum, Canada, South Africa

Crack propagation energy determination for rock materials under static and impact loading

Karadeniz Technical University, Turkey

Cautious balst design and practice in close proximity to a railway tunnel and apartment buildings

Middle East Technical University, Turkey

Evaluation of crack displacement in underground excavations using wireless technology crack meters

University of the Witwatersrand, South Africa

Stable beam span re-design and support optimization for a shallow hard rock bord and pillar mine: The case of Unki mine, Zimbabwe

Unki mines (Pvt) Ltd, Zimbabwe

Excavation-induced seismicity: mechanism and implications
Nanyang Technological University, Tsinghua University, China

The impacts of plastic deformation on productivity in low-permeability reservoirs during hydraulic fracturing

Petro-Geotech Inc., Canada

Two phase flow coupled to geomechanics by dual porosity model: simulating fractured reservoirs by finite element method

Petro-Geotech Inc., Canada

Relating source mechanisms to damage phenomena in platinum mines of the western Bushveld complex
Yuba, South Africa

Numerical simulation of a segmental lining and rock mass interaction

Graz University of Technology, Austria

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A numerical study of the influence of pre-existing discontinuities on the hydraulic fracturing process

Amirkabir University of Technology, Iran

Continuum modelling of the behaviour of high rock slopes

Amirkabir University of Technology, Iran

Performance evaluation of the Paboase crown pillar at Chirano gold mines in Ghana Kinross

Chirano Gold Mines Ltd, Ghana

Supercritical CO₂ fracturing on shale under true triaxial stress conditions

Northeastern University, Chinese Academy of Sciences, China

'Early access' microseismic monitoring using sensors installed in long boreholes

Sudbury Integrated Nickel Operations, A Glencore Company, Engineering Seismology Group (ESG), Canada Inc., Canada

Optimizing presplit performance in highly jointed rock formations

Curtin University-Western Australian School of Mines, Australia

Revised pillar design for a Zimbabwe bord and pillar operation using a combination of empirical, linear elastic and non-linear analysis

SRK Consulting (Pty) Ltd, South Africa

Sand management and CHOPS with thermally effects

Petro-Geotech Inc., South Africa

Hydraulic fracturing initiation and the induced stresses near a horizontal well in a thermo-poroelastic medium: Model and applications to enhanced geothermal system

Petro-Geotech Inc., South Africa

Modelling salt rock dissolution in the foundation of a large dam

Tractebel France, Gennevilliers, Independent Consultant, France, Belgium

Stability of large underground rock caverns for crude oil storage operated below atmospheric pressure

Geostock Entrepose, France

Discrete element modelling of rock cutting experiments under confining pressure

University of Mons, Belgium

Controlled damage - unfolding the design, risk and cost

AEL, South Africa

Support design for tunnels with large overburden in weak rock

Graz University of Technology, Austria

Numerical modelling of the shallow crystal stress field in Chinese mainland with the constraint of *in situ* measured stress

China Earthquake Administration, China

Use of plastic composites as friction rock bolt materials

Karadeniz Technical University, Turkey

The evaluation of rock bolt as rock support in underground gold mine Pongkor, west Java, Indonesia

Trisakti University, Indonesia

Assessment of closure by timber pack assessment method and its comparison to MAP3D convergence

University of the Witwatersrand, South Africa

Review of remnant mining practices in South African Gold Mines

University of the Witwatersrand, South Africa

Geotechnical data for Ivanplats

Platreef project Ivanplats (Pty) Ltd, SRK Consulting (Pty) Ltd, South Africa

Geological- and hydrogeological settings for rock engineering an example for grouting design at Åspö Hard Rock Laboratory, Sweden

Chalmers University of Technology, Norconsult AB, Sweden

Acoustic approach to estimation of rock mass state and prediction of induced seismicity parameters: theory, laboratory experiment and case study

Russian Academy of Science, Russia

Issues related to the long-term stability of unlined water tunnels – a case review

Norwegian University of Science and Technology (NTNU), Norway

The sub-surface profiler: A giant leap for ground penetrating radar -

REUTECH Mining, South Africa

Borehole stability and sand production in gas reservoirs

Aristotle University of Thessalonik, SINTEF, Petroleum Research, Greece, Norway

Design of weathered slopes to improve stability and economics

Kansanshi Mine, Zambia

Rock failure modes under uniaxial compression and indirect tension

Indian Institute of Technology Kharagpur, India

Experimental studies of variably saturated flow from a horizontal discontinuity to the vertical with and without an intersection

University of Pretoria, 2GaGE Consulting, South Africa

Characterizing microtremor signals of a slope with deep-seated gravitational deformation

National Taipei University of Technology, Taiwan

Influence of scale on fluid flow through fractured rock masses

BGTech Soil and Rock Engineering, Votorantim Metais, Brazil

Benchmarking of debris flow experimental tests using combined finite-discrete element method, FEMDEM

University of Turin, Imperial College of London, Italy, London

Reducing the risk to a mining project through timely and appropriate geotechnical data collection

First Quantum Minerals Limited, Zambia

Influence of heterogeneity at grain-scale on rockburst proneness Investigations on artificial samples

University of Technology, Austria

Development of a rocks mass quality model for an open pit mine

Norwegian University of Science and Technology (NTNU), Norway

Contributions to geomechanical slope optimization at Goldcorp

Eleonore Mine Goldcorp, Laval University, Canada

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Numerical simulation of hydraulic fracturing process on composite rock mass

Tongji University, China University of Mining & Technology, China

Failure and debris mechanism of karst caves during drill and blast tunnelling

Tongji University, China University of Mining & Technology, China

Microseismic monitoring and stability analysis of deep underground powerhouse at the Lianghekou hydropower station, Southwest China

Powerchina Chengdu Engineering Corporation Limited, Sichuan University, China

Combining different vehicle LiDAR dates to discuss the characteristic of potential geological disaster along changchun Shrine Trail

National Taipei University of Technology, China

Numerical modelling of longwall goaf dynamics and properties for gas drainage design

CSIRO, Australia

Stability analysis and failure evolution of large-scale underground caverns in bedded rock masses from microseismic monitoring

Sichuan University, Powerchina, Chengdu Engineering Corporation Limited, China

Rock engineering for Boschkop intake works

Geoid Geotechnical Engineers, South Africa

Shaft sinking on the platreef project

Ivanplats, South Africa

Numerical model calibration: Process or luck?

University of Pretoria, Middindi Consulting (Pty) Ltd, South Africa

Overburden response to longwall mining

CSIRO, Australia

Design of an *in situ* testing device for the backfill of mechanised driven tunnels in hard rock

Graz University of Technology,

Cost analyses of a mine roadway driven by conventional and mechanized methods

Bulent Ecevit University, Turkey

Analytical and experimental analysis of hard rock indentation process

Ecole Nationale d'Ingénieurs de Tunis, Université de Tunis El Manar, Tunisia

Progress of brittle micro-fracturing in crystalline rocks under cyclic loading conditions

Queen's University, Canada

Predictive strategies and risk management for rockbursting in deep tunnel and mine access development

Queen's University, Canada

Raisebore camera survey using drones

OceanaGold Corporation, Phillipines

Reinforced rock landfill design from coal boiler bottom ash, fly ash and geosynthetics- Şirnak case assessment on restoration

Şirnak University, Turkey

Observational studies in South African mines to mitigate seismic risks

CSIR, The University of the Witwatersrand, Council for Geoscience,

Ritsumeikan University, SATREPS, Japan, South Africa, Switzerland, Australia, Italy, USA

InSAR monitoring for mines: an integrated approach, 'TRE ALTAMIRA'

Optron Pty, Italy

Technology transfer on minimizing seismic risk in the platinum mines

SiM Mining Consultants (Pty) Ltd, Middindi Consulting (Pty) Ltd, Simulated Training Solutions (Pty) Ltd, South Africa

The determination of crustal stress direction based on the borehole geometric shape using panoramic stereopair imaging technology

Chinese Academy of Sciences, China

Investigating crack initiation and propagation by rock-like materials

University of Queensland, Australia

Metolong dam slope stabilization and rock support

Gibb Consulting Engineers Pty Ltd, South Africa

'Design of stoping sequence at deeper horizons for a Lead-Zinc mine in sheared rock mass'

Central Institute of Mining and Fuel Research (CIMFR) Regional Center, Nagpur, India

Tracking cave shape development with microseismic data

Institute of Mine Seismology, Australia

Calibration of modelled seismicity in South African Mines

Institute of Mine Seismology, South Africa

Optimizing stope panel spans at an eastern bushveld Platinum mine by probabilistic analysis

Impala Platinum Limited, Marula Platinum Mine, South Africa

Calibration of a numerical model for bore-and-fill mining

CSIR, South Africa

Active ultrasonic imaging and interfacial characterization of stationary and evolving fractures in rock

University of Minnesota, USA

Experimental study on hydraulic conductivity of a rock joint

Seoul National University, Korea