Journal Comment

The papers in this issue of the *Journal* have been selected from the Sixth South African Rock Engineering Symposium (SARES 2014), which was jointly organized by the South African National Institute of Rock Engineering (SANIRE) and the SAIMM. The theme of this symposium, 'Creating Value through Innovative Rock Engineering', was selected due to the recent global market changes and other challenges facing the mining industry. Mining needs to become still safer and more efficient while addressing the challenges of rising costs, skills shortages, marginal ore, complex geology, and greater mining depth. Innovative rock engineering design is therefore essential for the future of the mining industry.

These papers address rock mechanics issues for a broad range of mines, from deep, high-stress seismically active mines to slope stability in surface mines. They cover fundamental rock mechanics concepts through to practical rock engineering applications. New methods of investigation and analysis should lead to more optimized mine designs. Improved monitoring enables the verification and further optimization of the designs during implementation.

G.S. Esterhuizen's insightful keynote paper discusses the merits of empirical and numerical models and highlights the synergies between the two approaches. Empirical models are based on real observations, which make them extremely valuable, but they are limited to the range of conditions used in the original analysis. Numerical models allow the mechanisms and interactions of various input parameters to be analysed and understood. Esterhuizen explores the possibility of extending empirical methods with numerical models and uses two informative case studies to demonstrate the principles.

D. Nyungu and T.R. Stacey have assessed the long-term tensile strength of Bushveld Complex (BC) rock types and found it to be 70% of the normal tensile strength. This important work will help to understand the behaviour of excavations in BC rocks and will need to be incorporated in future mine designs.

B.G. Tarasov describes a rockburst source mechanism that is at odds with classic earthquake source theory, but which correlates well with the meticulous underground observations of shear ruptures made by the late D. Ortlepp. This novel theory will aid in the understanding of rockbursts.

The very practical paper by A.P. Esterhuizen describes the development of a strategy to manage the risk of large falls of ground in a platinum mine. Borehole camera monitoring is used to identify a weak parting plane in the hangingwall, which triggers the installation of long anchors. As a result, the occurrence of major rockfalls has reduced significantly over time. Also, long cable anchors are now installed only when required, which saves costs. This strategy is being adopted more widely in the jointed Bushveld Complex environment.

A.J.S. Spearing and co-authors describe a comprehensive roofbolt monitoring programme that was implemented in three underground coal mines the USA. The objective of this research was to better understand the performance of different types of rockbolts, in order to optimize support installations.

As platinum mines extend deeper underground, rockbursts are becoming more prevalent and it is becoming more important to understand pillar and rock mass behaviour in this environment. The paper by S.M. Spottiswoode and M. Drummond describes the development and use of a numerical modelling program that incorporates limit equilibrium methods to achieve this purpose.

R. Armstrong and K. Moletsane discuss the management of a slope failure, above which a crusher is located. The available space limits alternative options, and therefore the crusher must remain functional for as long as possible. The paper describes events leading to the failure and the evaluation of real-time monitoring data to determine an appropriate management plan.

The two papers by J. Wesseloo and co-authors describe state-of-the-art three-dimensional analysis of seismic data. This enables the identification of seismically hazardous areas over time, which can then be prioritized for further action. Mine layouts and sequences in deep, high-stress mines can be evaluated and optimized using these tools.

N.L. Ayres and L.J. Gardner describe a testing programme that was developed to test rock tendons under different loading conditions. The paper discusses the many challenges associated with this type of testing, which will be valuable to future researchers. This work has also improved the understanding of the performance of these tendons in the complex underground environment.

Finally, the paper by T Wettanien and J Martinson addresses the potential effects of ground vibrations, caused by mining, on buildings in residential areas. This problem arises due to the ongoing concurrent development of the mine and housing in the mining town of Malmberget in Sweden. A comprehensive analysis of historic seismic data and the development of a model, enables them to predict when houses will need to be relocated.

W. Joughin