Reyes-Montes, J.M., Sainsbury, B. L., Andrews, J. R. & Young, R.P. (2016) Application of cave-scale rock degradation models in the imaging of the seismogenic zone. Canadian Institute of Mining Journal, Vol.7, No.2.

Application of cave-scale rock degradation models in the imaging of the seismogenic zone

Abstract

Microseismic monitoring provides insight into the location and extent of rock-mass fracturing induced by cave mining, enabling interpretation of the cave profile and validation of predictive numerical models. Source location uncertainties can lead to misinterpretation of the inferred characteristics of the fracture network. One principal source of uncertainty is the velocity model used to invert the location algorithm. Large-scale 3D numerical models of modulus changes across a caved mass can represent such complexities in the location algorithms, allowing more accurate interpretation of the microseismic activity. A Northparkes mine case study applies this advanced approach to microseismic data interpretation.

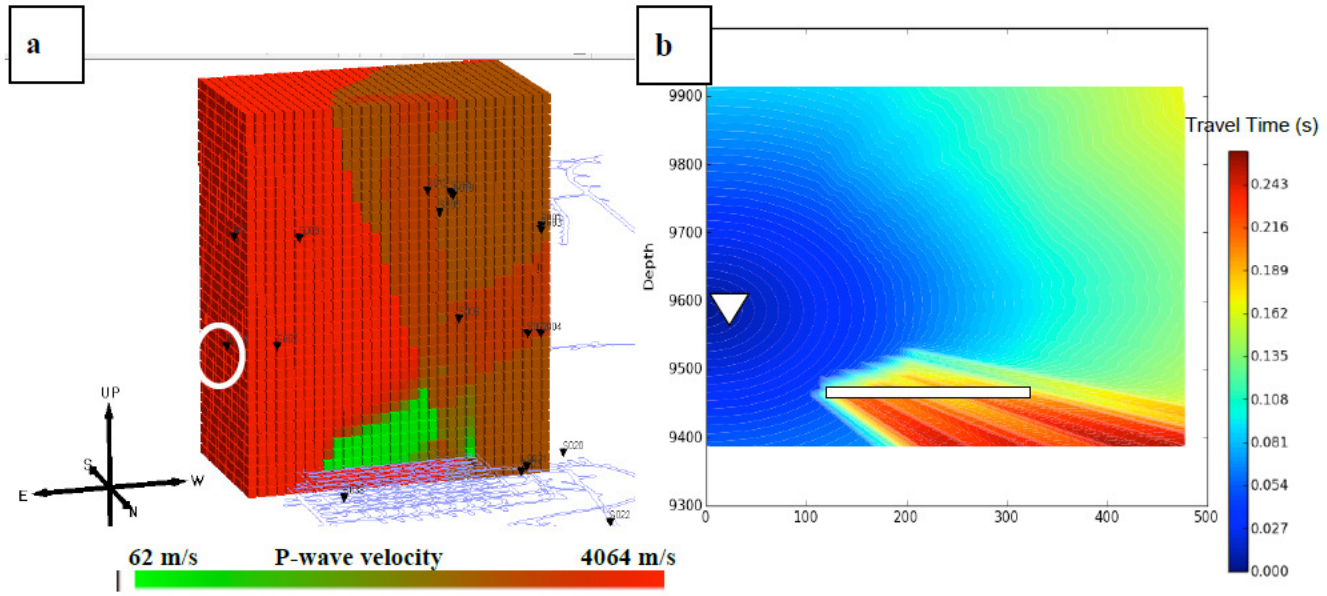

***Figure**: a) section of the wave transmission model built from the FLAC3D-based predictions of modulus/density variability for early drawing stages at Northparkes Lift2. Voxels are colour-scaled to P-wave transmission velocity. (b) Contour plot of travel times calculated through ray-tracing from the station circled in (a) (white triangle in b) to the points in the chosen E-W section. The colour scale represents the travel time with warm colours indicating higher travel time values. The white box shows the approximate position of the undercut.*

Website: http://dx.doi.org/10.15834/cimj.2016.9

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