institute of mine seismology & UNSW SYDNEY

Mine Seismology Workshop

4-6 September 2023, University of New South Wales,
School of Minerals and Energy Resources Engineering
(with online streaming)

Monday 4 September	09h00 – 17h00	Primer course on the basics of mine seismology and operating seismic monitoring systems in mines
Tuesday 5 September	09h00 – 17h00	Presentations on implementation and applications of seismic monitoring in mines
Wednesday 6 September	09h00 – 17h00	Demonstration and training in IMS software

See venue map in the last page.

Monday 4 September – Day 1, Room G51 in the Old Main Building at UNSW

Primer Course on the Basics of Mine Seismology and Operating Seismic Monitoring Systems in Mines

The objective of the course is to explain the elementary principles of seismology and seismic monitoring in mines to non-seismologists. This includes operational considerations for maintaining a healthy seismic system.

09:00 | **Basics of mine seismology**, *Dr Dmitriy Malovichko*
Objectives of seismic monitoring in mines; seismic waves and seismic sources; seismic monitoring systems; basic seismic source parameters and source mechanisms.

——— Lunch ———

14:00 | **Managing a seismic system**, *Riaan Enslin*
Planning, budgeting, installing and maintaining a seismic monitoring system in a mine.

Tuesday 5 September – Day 2, Room G51 in the Old Main Building at UNSW

Presentations on Implementation and Applications of Seismic Monitoring in Mines

09h00 | **Welcome and Introduction**
Dr Dmitriy Malovichko (Institute of Mine Seismology)

09h15 | **Estimation of displacement and energy demand for deformation-based support design for strainbursting ground**
Dr Peter K. Kaiser (GeoK & Professor Emeritus, Laurentian University) - on-line lecture

10h15 | **Energies within rock masses and dynamic failure mechanisms**
Dr Ismet Canbulat (University of New South Wales)

——— Coffee/tea break ———

11h00 | **Geotechnical response to large firing induced seismic events and re-entry analysis**
Arya Gao (Newcrest Mining Limited – Cadia Valley Operations)

11h30 | **Seismic system implementation for geotechnical hazards management in deep and high stress Block Caving – Cadia East PC2-3 case study**
William Boyd (Newcrest Mining Limited – Cadia Valley Operations)

12h00 | **Method considerations for effective and reliable seismicity forecast**
Dr Abou Vakili (Mining One & Cavroc) - on-line presentation

——— Lunch ———

13h30 | **Accurately defining failure geometries and their variability**
Bernard Chu & Eamonn Hancock (Engenex)

14h00 | **A review of dynamic energy-absorbing cable bolts**
Dr Sela Akdag (University of New South Wales)

14h30 | **Hydraulic fracturing: an insight from numerical modelling to laboratory experiments**
Xin Zhang (University of New South Wales)

——— Coffee/tea break ———

15h30 | **Recent development in automatic processing of seismic monitoring data**
Dr Ernest Lotter (Institute of Mine Seismology)

16h00 | **Utilisation of seismic data in the assessment of displacement and energy demand imposed on ground support by strainbursts**
Dr Dmitriy Malovichko (Institute of Mine Seismology)

16h30 | **Demand imposed on ground support by seismic shaking: case studies**
Dr Dmitriy Malovichko (Institute of Mine Seismology)

Wednesday 6 September – Day 3, Room G51 in the Old Main Building at UNSW

Demonstration and Training in IMS Software

There will be a combination of demonstrations and practical exercises with IMS software tools. Attendees with modern laptops will receive IMS software with which to perform hands-on tasks during training and gain experience. Note that in order to run IMS software, we strongly recommend a machine with at least 8GB of RAM and a modern 3D graphics card (NVidia or AMD) with up-to-date drivers installed.

09:00 | **Overview of IMS system and software**, *Dr Ernest Lotter*

09:15 | **IMS Synapse - demonstration**, *Riaan Enslin*

- System monitors, configuration and health

09:45 | **IMS Combined - demonstration and training**, *Dr Ernest Lotter*

- IMS Trace and IMS Vantage in combined form
- IMS Trace: Opening events, inspecting seismograms, basic processing and obtaining resulting location, source parameters and mechanism, and saving results
- IMS Vantage: Retrieving data from a database, filtering and querying data. Performing time history, size distribution and other analysis, and interacting with the data in the 3D viewer
- Additional possibilities due to the integration of IMS Trace and IMS Vantage.

11:30 | **IMS Ticker3D - demonstration**, *Dr Ernest Lotter*

- IMS Ticker3D in its most simple form - live view of current seismicity with TARP options and rapid update of events as they are processed
- Analysis mode - bring some of the advanced functionality of IMS Vantage to the Ticker3D context

12:15 | **IMS Nexus - demonstration and training**, *Dr Ernest Lotter*

- Web-based multi-platform (phone, tablet, desktop) and greatly simplified version of Ticker3D
- Demonstration of features, including full 3D interaction and options to inspect individual events and their source parameters

——— Lunch ———

14:00 | **Rockburst hazard assessment (RBHA) tool - demonstration and training**, *Dr Dmitriy Malovichko*

- Importing data: excavation geometries, rockmass properties, stress model results, seismic data, ground support specifications
- Tunnel nodes: creation from excavation geometries, mapping of data, controlling with timeline
- Calculation of results: engineering demand parameters, rockburst potential, rockburst hazard
- Presentation of results: maps, time histories, displacement-energy plot, tabular view, exporting

Venue: Old Main Building at UNSW