

Combining Field Data-Driven Characterization and Modeling to Enhance Insight in Applied Rock Engineering

Abstract

This half-day workshop will present an integrated perspective on how field data-driven characterization and modeling can enhance practical decision-making in applied rock engineering. Beginning with innovative approaches for remote geological mapping, the sessions aim to highlight how high-resolution digital models of rock mass structures can now be generated without direct physical access. These models provide a foundation for advanced three-dimensional block stability analyses, supporting the evaluation of both natural and engineered slopes, as well as underground excavations in civil and mining contexts. Incorporation of uncertainty in these assessments to improve risk and hazard evaluation will also be discussed.

Following the foundation in mapping and modeling, critical role of instrumentation and monitoring will be addressed. Key considerations will include designing fit-for-purpose monitoring systems by selecting appropriate sensor types, data acquisition components, and software platforms — while optimizing overall cost and applicability. The benefits of real-time data collection are to be emphasized, particularly in its use as a performance indicator and forecasting tool for the future behavior of geotechnical structures.

The final section will focus on emerging strategies for calibrating numerical models using field monitoring data. Presentations will cover recent developments that align observed behavior with predictive modeling frameworks, helping to improve safety margins, reduce design conservatism, and support life-cycle optimization. These approaches also offer valuable guidance for upcoming projects, reinforcing the long-term value of data-integrated rock engineering.

Collectively, the sessions offer a comprehensive overview of how modern technologies and data-informed methodologies are reshaping the practice of rockmechanics to achieve more reliable, efficient, and adaptive outcomes.

SessionTitles

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| Session 1 | Contact Free Geological Mapping of Rock Mass Using Digital Software Tools -3D Block Stability Based Risk Assessment for Surface and Underground Structures in Civil and Mining Applications |
| Session2 | State of the Art in the Practice of Instrumentation and Monitoring as a Real Time Performance Indicator and PredictiveTool-Advances in Model Calibration Using Field Monitoring Data: A Synthesis of Present Techniques and Emerging Trends |