Design methods for variable-stress, variable-geology environments

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Summary:

This research will produce a method by which entry deformation's causes can be better understood, leading to improvements in design and support procedures. These changes will improve worker safety and reduce environmental impact. The primary focus of this work is the complex environment experienced in areas where excavations exist on multiple levels, or where excavations change over time due to new construction or mining. They are further complicated by the high variability that can exist when geological units with drastically different properties are in the same vicinity.

The field study is currently implemented at LKAB's Malmberget mine. Stress and deformation monitoring instrumentation have been installed in mine entries to track changes in stress and deformation. The geology in the instrumentation areas have been logged for rock quality assessment and variability assessment.

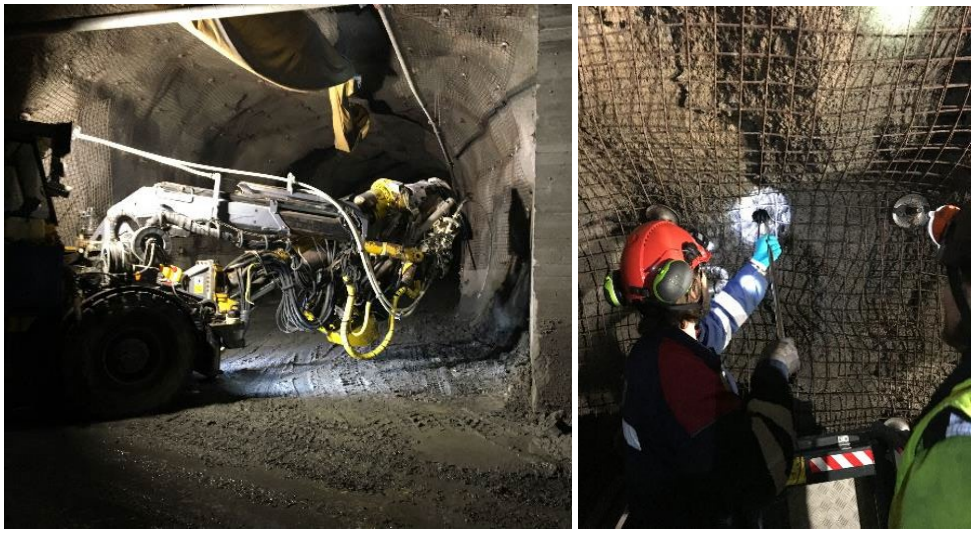

Figure A: Drilling and installation of 3D load cells for stress measurements

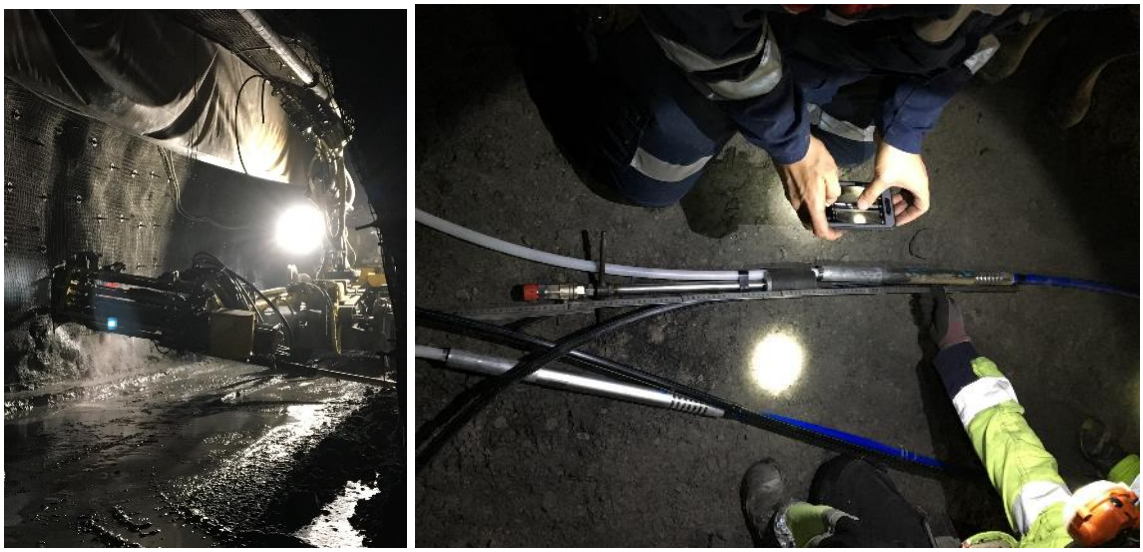

Figure B: Drilling and installation of extensometers for entry deformation measurements