

The use of automated drones in underground hard rock mines.

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ABSTRACT

Mining within deep and high stress conditions inherently involves increased risks to both safety of operators, as well as to the operations. In order to safely and efficiently operate within such extreme environments it is a necessity to both understand the rock mass in which you are mining, and the behaviour of the rock mass as a response to the ever changing stress field. Mobile scanning data acquisition methods and interpretations have emerged since 2012 and have been shown to improve the decision making processes used by mining and geotechnical engineers for both safety and design. These methods have continued to advance such that the acquisition of data can be attained through the use of autonomous and semi-autonomous drones. Just as mobile scanning has provided new data for design within accessible areas, these drones are now providing exciting new data for inaccessible areas.

This paper aims to discuss the current state of the Emesent Hovermap autonomous flight system in underground and GPS deprived areas; outlining the applications and results throughout the development and early adoption of the hardware. Limitations of the system and subsequent data interpretation will provide the context to which Hovermap is currently able to be used. The use cases discussed highlight the focus on improving safety by better understanding the behaviours and mechanisms commonly observed and encountered in deep and high stress mining conditions, and ways in which the outcomes can be fed back into the design process. The final topic of discussion outlines the future developments regarding the hardware and the associated data analytics.