Geologic Face Mapping Methodology Utilizing Global Positioning Systems and Drone Technology

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Abstract

Traditional geologic field mapping has been a low-technology process, limited by time in the field and a delicate balance between data collection and coverage area. The development of global positioning systems (GPS) and drone technology offers new tools and techniques for collecting high volume, accurate geologic information at a faster rate while covering a greater area. These tools can expedite geologic mapping and produce spatially accurate results, providing geologists safe and efficient ways to collect and process greater volumes of field data.

This research used the Trimble Geo 7x GPS unit and a Phantom 4 V2 drone to develop safe practices for collecting field data along high walls in the Lhoist New Braunfels limestone quarry. Using these tools for field mapping and data processing yielded point data of bedding contacts and features, with outputs at centimeter-level accuracy. The drone flight of the area of interest created a well-stitched and detailed 3D model of the rock face. Overlapping the point data with the 3D model created a composite geologic map that can be used by quarry managers to predict volumetric inventory and production planning. These three primary results demonstrate efficient and effective methods of geologic data collection and map/model development that are possible with the use of modern technology. This research covers a small scope of a larger continuous question, "How can we be doing this better?"