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COMBINING TERRESTRIAL SCANNED DATASETS WITH UAV POINT CLOUDS FOR MINING OPERATIONS

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Keywords: Unmanned Aerial Vehicles (UAV), Terrestrial Laser Scanning, Spatial Data Integration, Digital Surface Models, Point Cloud Datasets, Mining Operations

Abstract. Surveyors of open cut mining operations employ multiple data acquisition techniques such as the use of Unmanned Aerial Vehicles (UAV), Terrestrial Laser Scanning (TLS) and GNSS positioning for creating 3D surface models. Surveyors, mine planners and geologists are increasingly combining point cloud datasets to achieve more detailed surface models for the use of material reconciliation and volume calculations. Terrestrial Laser Scanning and UAV photogrammetry have enabled large, accurate and time effective data collection and increased computing capacity enables geospatial professionals to create 3D virtual surfaces, through merging UAV point clouds and TLS data combing with GNSS positioning. This research paper investigates the effects of combining data sets for creating 3D surface models from independent spatial data collection methods such as UAV, TLS and GNSS and assess their accuracy for the purpose of volume calculations in mining operation. 3D surface models provide important information for mining operations, planning of resources, material volumes calculation and financial calculations. A case study of two rehabilitation mine sites in Northern Victoria, Australia was selected for this study. Field data were collected using Terrestrial Laser Scanner and UAV. After each dataset was processed and filtered, the data were merged to create surface models. The accuracy of the combined model was assessed comparing height (Z) values using a fishnet point grid of the surfaces. Volumes between surfaces were calculated, and a cost applied to the results based on the current bulk cubic meter (BCM) haulage rates. The outputs from this study will provide scientific contributions to civil and mining industries where the computation of stockpile values is required.

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