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Integration of UAS LiDAR system, data acquisition and assessment

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The LiDAR sensor mounted on a UAV becomes a new powerful tool for geomatic technology. This study we integrate autonomous unmanned helicopter Pulse Aerospace Vapor 55, carrying RIEGL VUX-1 UAV LiDAR with Trimble AP20 for the surveying mission. Based on the drone and instrument capacity, adjusted by the terrain landform, the optimal drone mission planning and scanning parameters are thus assigned, thus capable to acquire dense point clouds by > 200 points/m2 for a single fly line. To access the dataset, several software packages are used, including: the Trimble POSPac Mobile Mapping Suite software, GNSS-Aided Inertial post-processing for georeferencing data collected from UAS LiDAR. The RIEGL RiPROCESS designed for managing, processing, analyzing, and visualizing and data export for the data acquired based on RIEGL Laser Scanners. And finally, access and evaluate the dataset Terrasolid TerraScan for managing, processing and classification the LiDAR point clouds, so as to compare the UAS dataset with the airborne's. The study first evaluated the parameters for fully-automatic point cloud classification by TerraScan, which is used coordinately in Taiwan. This paper analyzes the influence and efficiency of different parameters for point cloud classification, to separates the non-ground point from the ground point so as to construct the digital elevation model. Finally, the density of the ground point is higher than 100 pts/m2, thus the spatial resolution of digital elevation model (DEM) is about 10 by 10cm. Compared with the data point measured from site surveying by e-GNSS, RTK (real time kinematic GPS survey) and total station, ground control point and check points, the elevation errors is less than five centimeters; thus the high resolution and high precision digital terrain models (DTMs) are capable to construct. UAS LiDAR point cloud after instrument calibration and flight trajectory adjustment, the surveying data acquisition can achieved as centimetric precision. According to the results, the technology of UAS LiDAR is capable and suitable for high resolution geoinfomatic studies and data acquisition.