Geophysical Research Abstracts
Vol. 21, EGU2019-5321, 2019
EGU General Assembly 2019

UAS LiDAR data processing, quality assessment and geosciences prospects

Kuo-Jen Chang (1), Yu-Chung Hsieh (2), Yu-Chang Chan (3), and Mei-Jen Huang (1)

(1) National Taipei University of Technology, Civil Engineering, Taipei, Taiwan (epidote@ntut.edu.tw), (2) Central Geological Survey MOEA, Taipei, Taiwan (hsiehyc@moeacgs.gov.com), (3) Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan (yuchang@earth.sinica.edu.tw)

The LiDAR sensor mounted on a UAV becomes a new powerful tool for geoinfomatic technology. We integrate autonomous unmanned helicopter Pulse Aerospace Vapor 55, carrying Riegl VUX-1 UAV LiDAR with Trimble Applanix AP20 for surveying missions. In this study, we applied the instruments for three regions for different purposes, including bore sight and lever arm parameter determination, and for multiple flight missions tests. Based on the drone and instrument capacity, adapted with the terrain landform and topographic elevation changes, the optimal drone mission planning and scanning parameters are thus assigned, thus capable to acquire dense point clouds higher than 159 points/m^2 in nadir direction within single fly line. To access the dataset, several software packages are used, including: the Trimble Applanix 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 by means of Riegl RiPROCESS and TerraMatch softwares for managing, processing, especially for fly-line adjustment and classification the UAS LiDAR point clouds, so as to compare the UAS dataset with the airborne's. The study tries to evaluate the parameters for fully-automatic point cloud classification by TerraScan, which is used regularly in Taiwan. This study analyzes the influence and efficiency of different parameters for point cloud classification, to separates the ground point from the all point so as to construct the digital elevation model. Finally, the averaged point clouds density of the all and the ground point are higher than 400 and 25 points/m2, respectively. Thus the spatial resolution of digital elevation model (DEM) is about 20 by 20cm. Compared with the data points measured from site surveying, ground control points and check points by means of e-GNSS, RTK (real time kinematic GPS survey) and total station etc., 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 data acquisition and for multi-disciplinary applications.