

# 無人載具空拍結合雷射測距儀提升地形測量精度

## Improve the accuracy of surveying using UAV aerial photos and Laser ranging

國立屏東科技大學水土保持系

副教授

大學生

碩士生

江介倫

陳亦旻

鄧可灝

Jie-Lun Chiang

Yi-Min Chen

Ke-Hao Deng

### 摘 要

由於無人機(UAS)技術日新月異，近年來已有很多應用無人機空拍進行地形測繪的相關應用。且精度已經大幅提升，但與光達(Lidar)測繪相較，仍有較大誤差，具有精進空間。

因此本研究嘗試以無人機搭載較低成本的 DT50-2 Pro 雷射測距儀(Laser ranger)，整合雷射測距儀數據及空拍照片建立數值地表模型(DSM)，測試以雷射測距儀資訊校正於空拍照片之數值地形模型，以提升測量精度。結果可以將單純以空拍照片建立之數值地形模型之誤差由原本的 6.13%，經雷射測距數據校正後，提升為 3.09%，故以空拍照片結合雷射測距儀數據可在一定的設備經費成本內有效提高地形測繪的精度。

關鍵詞：無人載具，地形測量，雷射測距，光達

### Abstract

In recent years, due to the rapid development of unmanned aerial system (UAS) technology, more and more related applications of using drone to get aerial photo have been used for terrain mapping and the precision has been greatly improved. However, compared with Lidar surveying and mapping, there is still room for improvement.

This study attempts to use the UAV along with low-cost DT50-2 Pro laser ranger to establish a Digital Surface Model (DSM) by integrating the laser ranger data and aerial photos. The data are calibrated by the Digital Surface Model on the aerial photos to improve the measurement accuracy.

The results show that the error of the Digital Surface Model based only on aerial photos decreased from 6.13% to 3.09% after calibrating by laser ranger.

Therefore, combining aerial photos with laser ranger data can effectively improve the accuracy of terrain mapping within the limited cost.

Keywords: Unmanned Aerial Vehicle, Topography survey, Laser ranging, Lidar