

# 無人機空拍應用於地形測繪之高程誤差探討

## Applications of Drone Aerial Photography in Terrain Mapping: A Study on Elevation Errors

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### 摘 要

本研究以無人機拍攝後，透過Pix4d軟體製作正射影像及點雲，並以Trimble R8s LTRTK量測控制點及測試點的高程，進行比較。為了驗證高程數據的準確性，我們使用水準儀及地面RTK（實時動態技術）進行控制點及測試點的高程量測，並將這些數據與無人機空拍生成的高程數據進行比較。經研究發現無人機空拍照片直接匯入Pix4D得到的高程值與水準測量和RTK（實時動態技術）的高程有一定程度誤差，尤其是在沒有使用控制點的情況下，誤差顯著增加。這表明，無人機地形測繪中控制點的設置對於提高數據精度至關重要。本研究以水準儀進行水準測量和RTK（實時動態技術）的高程數據較差介於2mm~35mm。

關鍵詞：無人機，地形測繪

### Abstract

This study involves using drones to capture images, creating orthophotos and point clouds through Pix4D software, and comparing them with elevation measurements of control points and test points taken with Trimble R8s LTRTK. To verify the accuracy of the elevation data, we used a leveling instrument and ground RTK (Real-Time Kinematic) for measuring the elevations of these points, and compared these measurements with the elevation data obtained from drone aerial photography. The study found that the elevation values obtained by directly importing drone photos into Pix4D had certain discrepancies compared to those from leveling measurements and RTK, especially when control points were not used. This underscores the critical importance of setting up control points in improving data accuracy for drone terrain mapping. Specifically, the elevation data obtained from leveling measurements and RTK in this study showed discrepancies ranging from 2mm to 35mm.

Keywords : UAV , terrain mapping