Comparison of Data Fidelity of Drone Orthomosaic Imagery to Traditional Satellite Imagery

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Abstract

Unmanned Aerial Systems (UAS), or drone imagery is a small but rapidly growing field becoming a widely used technology within the discipline of Spatial Science. The purpose of this project will be to test the effectiveness of drone imagery, and especially composite imagery, as an alternative to more traditional methods of data acquisition such as satellite imagery or aerial photography from a plane or helicopter. Drone imagery functions similarly to these methods on a smaller scale, and is typically associated with image resolution that is much higher than these methods, but covers a much smaller field of view. This is offset somewhat by the creation of composite imagery by drones which creates an image of a large area without sacrificing the improved resolution that drones provide. The goal of this project will be to assess the image fidelity of drone composite imagery with and without ground control points (GCPs). This will determine how accurate these images are to reality, especially uses involving precision such as calculation of property lines or herbicide treatments within small area stands. This project will use the DJI Phantom 4 Pro drone, and Pix4DCapture software to collect orthomosaic images, and Drone2Map software to process these images.

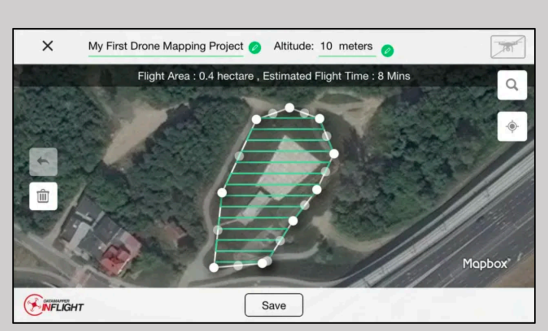


Image 1. Drone to Map Software in use

Image 2. An Orthomosaic Photo being created by a drone using Pix4D Capture

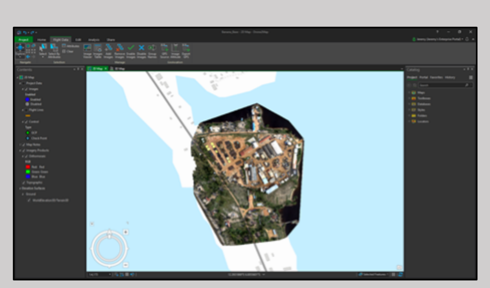


Image 3. An orthophoto in Drone2Map

Objectives

Determine average distortion within a drone derived orthomosaic when using Drone2Map software to create high spatial resolution orthomosaics within different land cover types.

Assess drone derived orthomosaic using Drone2Map software as a useful mapping tool. For example, precision work such as surveying.

Consider which factors may be likely to increase or decrease distortion within a drone produced orthomosaic using Drone2Map software. For example, most likely drone acquired imagery over homogenous land cover types with little spectral signature variation will have greater distortion and a lower level of geometric accuracy.

Hypotheses

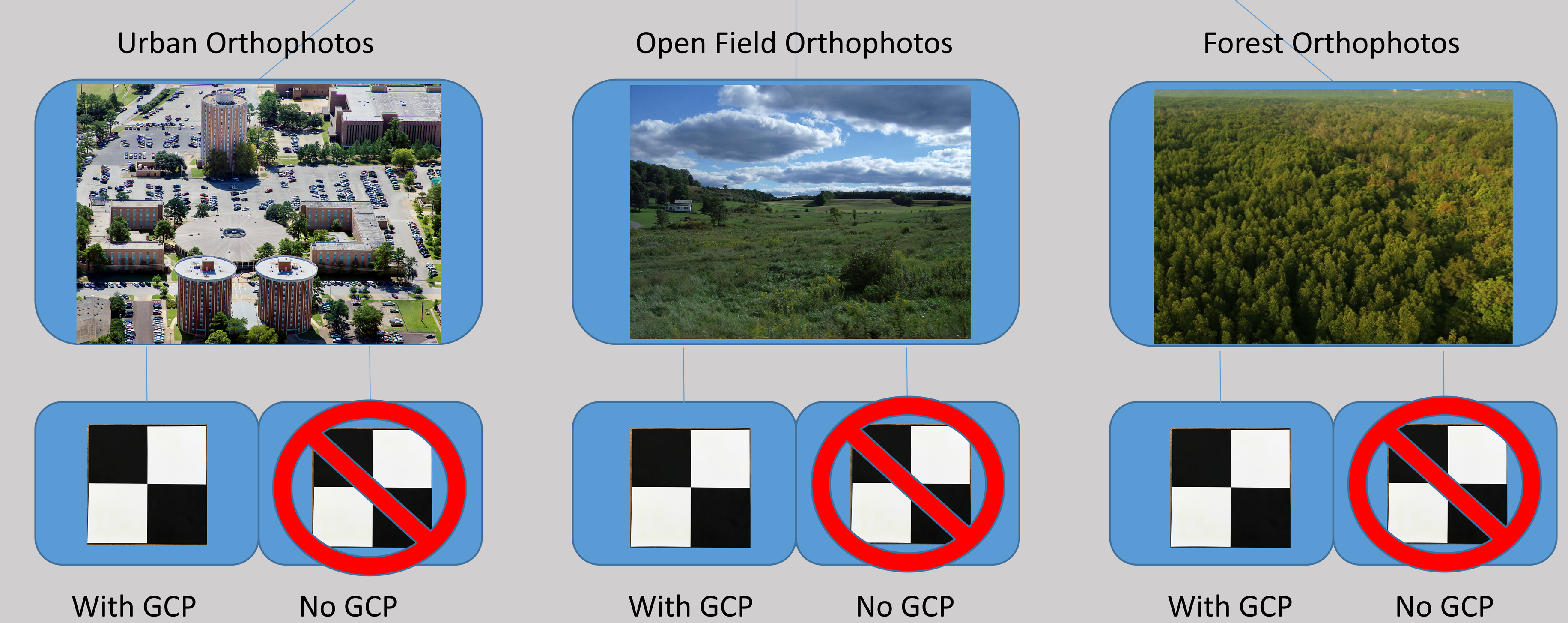
Drone orthomosaics with a high degree of spectral variance such as images covering heterogeneous cover types, will contain less distortion than orthomosaics of homogenous cover types.

Drone orthomosaics that use GCPs will have less distortion than orthomosaics that do not use GCPs

The impact of GCPs on drone accuracy will be most significant in orthomosaics with homogenous cover types.

Experimental Design

In order to assess drone accuracy across varying cover types, orthophotos will be gathered from urban, open field, and forest environments. Two images will be obtained from each location, one using a Ground Control Point (GCP), one without a GCP.



Orthophoto Statistics

All Orthophotos will be taken
- Using the same Phantom 4 Professional Drone System
- From a constant height of 200 feet above ground level
- In an area of 20 acres
- Using Pix4DCapture Software