

Introduction

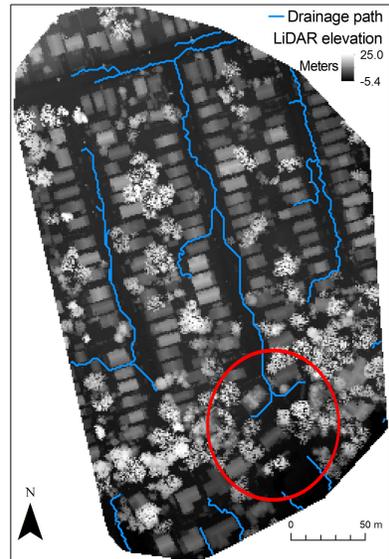
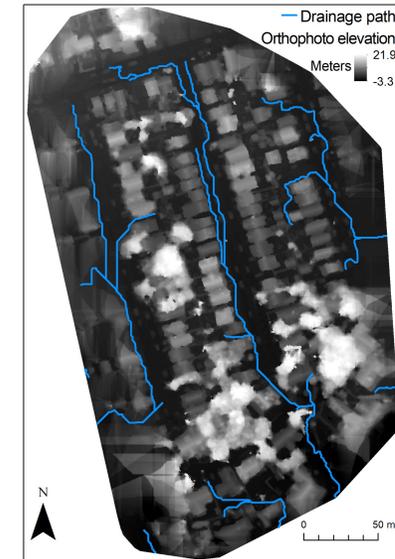
By using aerial drone footage we can study drainage paths to a lake, which may play a role in the occurrence of harmful algal blooms (HABs) in Monmouth County's Lake Como (pictured to the right). Lake Como has an urban watershed that supports a highly active community of residents. Much of the work studying this lake is a first of its kind.

Methods

- Use of **DJI Phantom 4 Pro** for aerial imaging at a height of 100 meters
- WebODM** "stitches" together a to-scale orthophoto map of an area draining to the lake
- Classify orthophoto using **maximum likelihood classes** of surfaces
- A digital surface model (DSM) is constructed using **structure from motion**
- ArcGIS hydrology** tools map drainage paths
- Compare to light detection and ranging (**LiDAR**) data

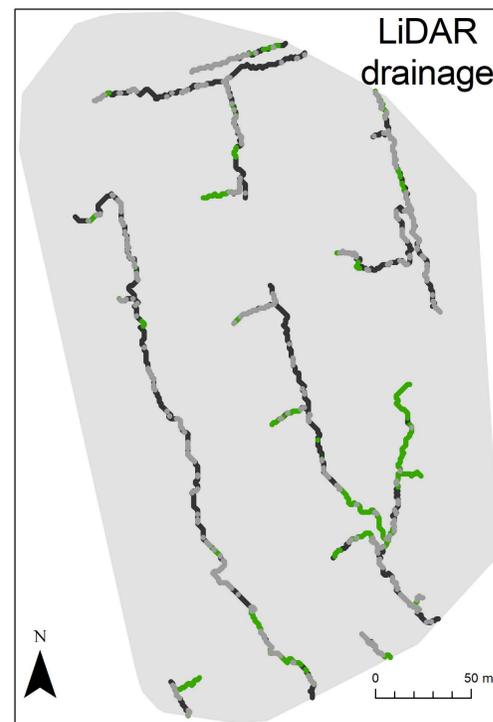
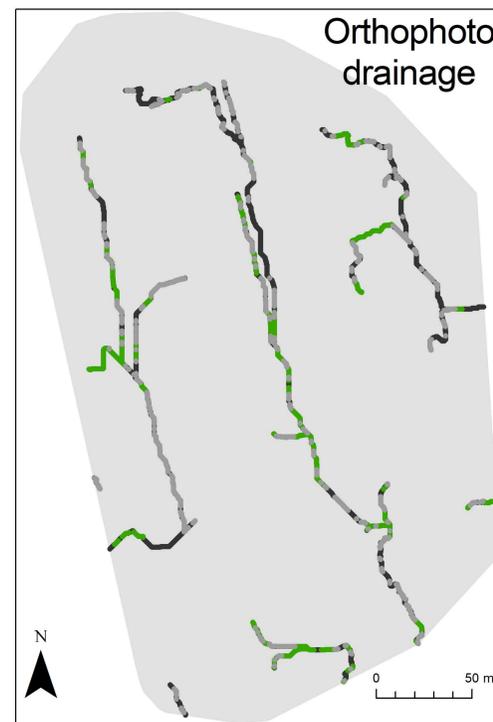
Results

- Orthophoto** of 40 drone images
- Impervious surfaces** assigned to drainage paths
- LiDAR drainage paths require **more processing** (first returns at buildings and last returns elsewhere)
- Comparison of orthophoto and LiDAR drainage paths completed at right, with some **key similarities and differences**



- Surfaces**
- Impervious
 - Vegetation
 - Bare ground

LiDAR ↓ Last returns



Conclusions

- Drone is an **inexpensive** approach to map high-resolution drainage paths in an urban area compared to LiDAR
- Proposed approach allows **surface classification** and **return mapping** on a regular basis
- DSM processing of drone imagery is **automated** as opposed to LiDAR, which requires post-processing
- Due to differences, drainage paths of both approaches need to be **field-verified** during a storm
- Drainage paths of the proposed approach can be used in a **comparative study** of a lake that has HABs and a lake that does not (is this due to drainage?)

Comparison of drainage paths derived from orthophoto and LiDAR

	Length (m)	Average difference (m)	Percent draining to lake	Percent impervious
Orthophoto	1457	14	100	50
LiDAR	1464	-	63	60

Acknowledgements

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