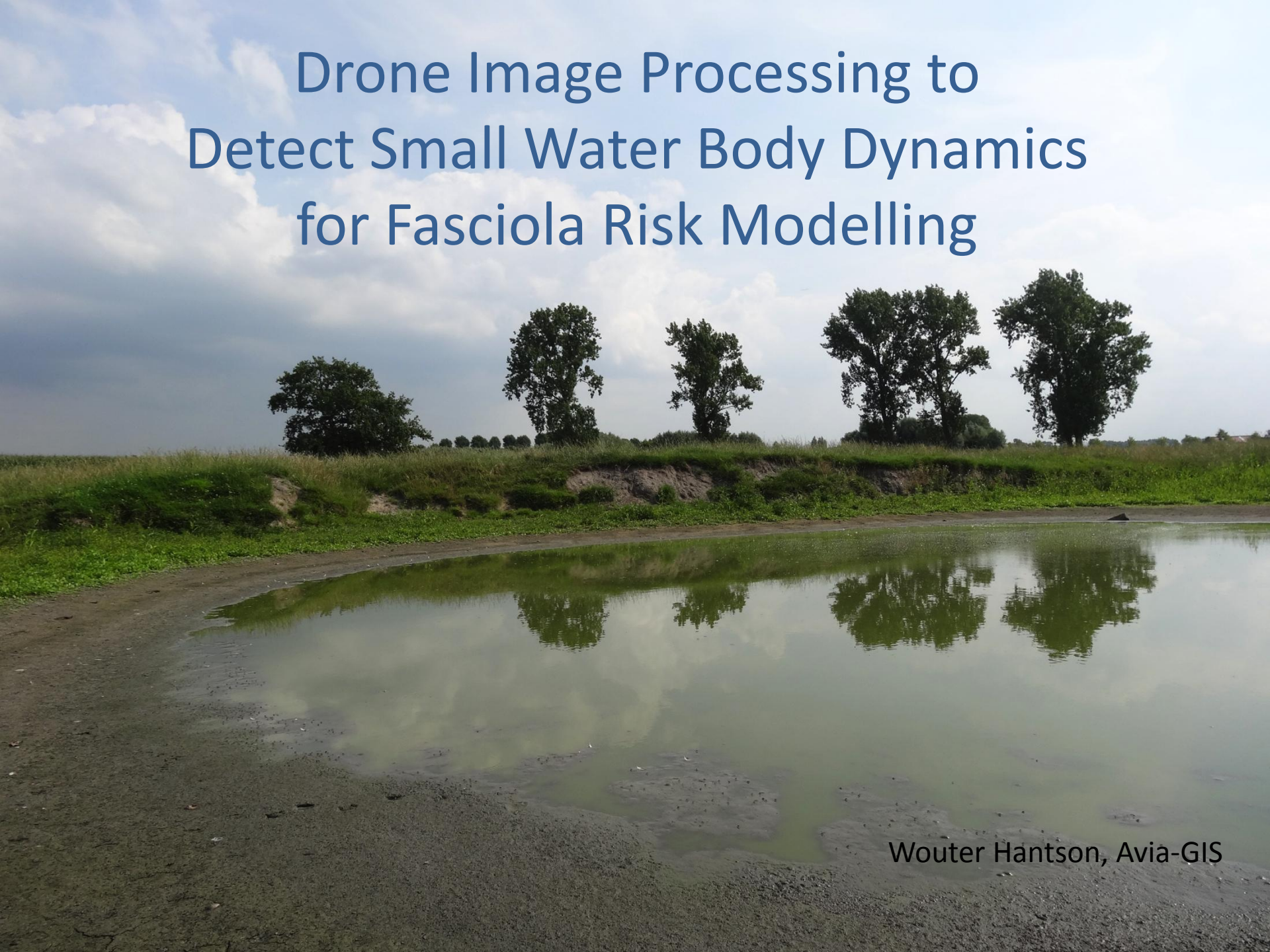
Drone Image Processing to Detect Small Water Body Dynamics for Fasciola Risk Modelling



Wouter Hantson, Avia-GIS

SATHELI Team

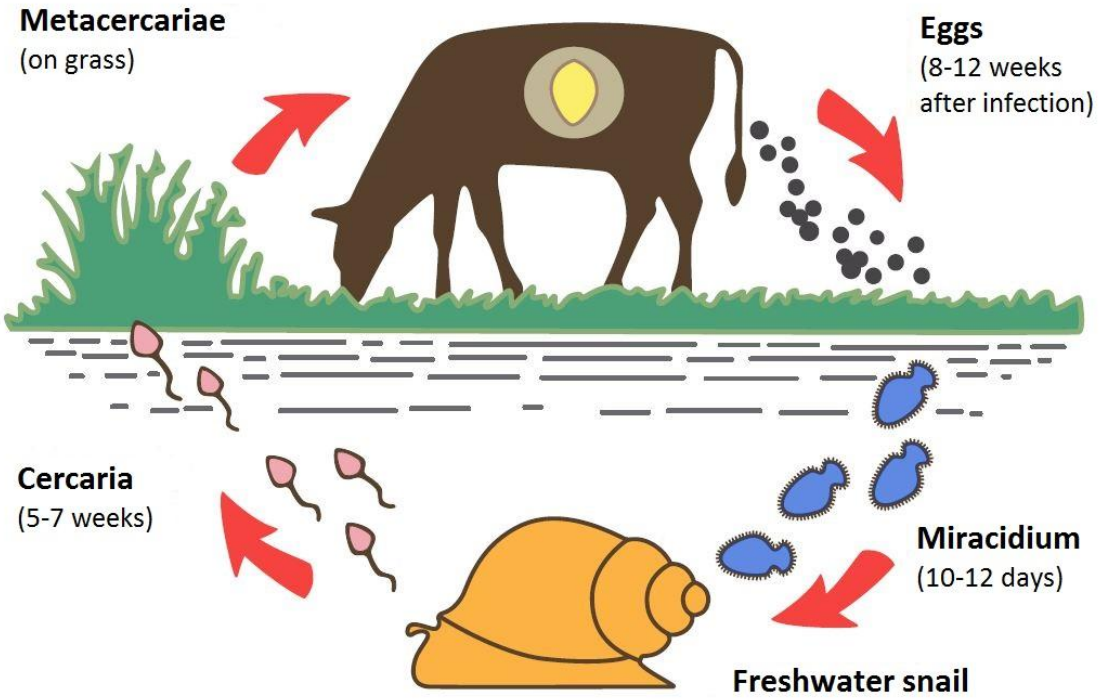
Laboratory of Forest Management and
Spatial Information Techniques (FORSIT)
Faculty of Bioscience Engineering, Ghent University, Belgium

Agriculture and Veterinary Information and Analysis (Avia-GIS)
Belgium

Laboratory of Parasitology (VETPAR)
Faculty of Veterinary Medicine, Ghent University, Belgium

SATHELI

- Common liver fluke disease caused by *Fasciola hepatica*
- Intermediate snail host lives in small water bodies



Where is Galba?

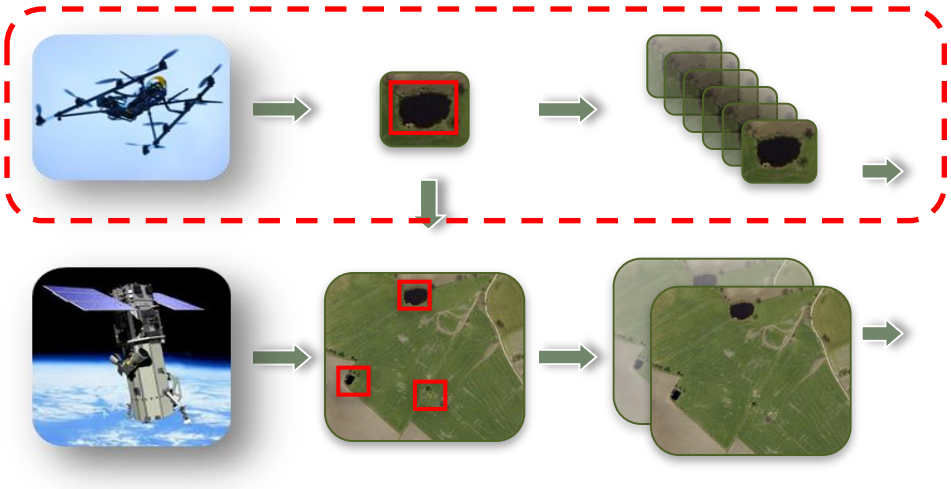
Galba truncatula

Habitat: SWBs like ponds, ditches, trenches and their transition zones

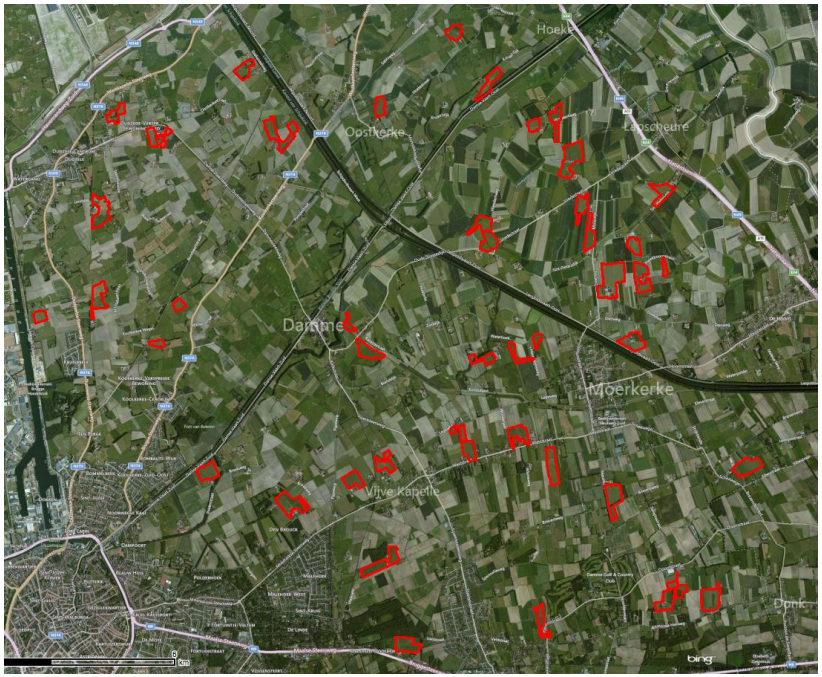
Objectives

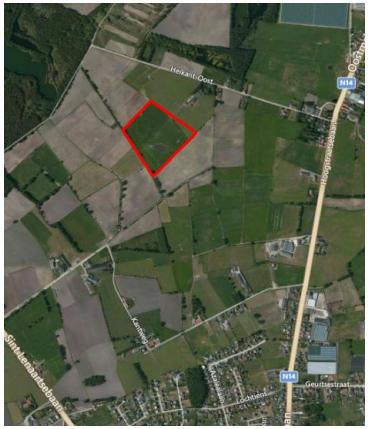
Multi-platform Small Water Body monitoring system
using UAV & Satellite Imagery

→ Infection risk map for liver fluke: from landscape to farm level



Study Sites

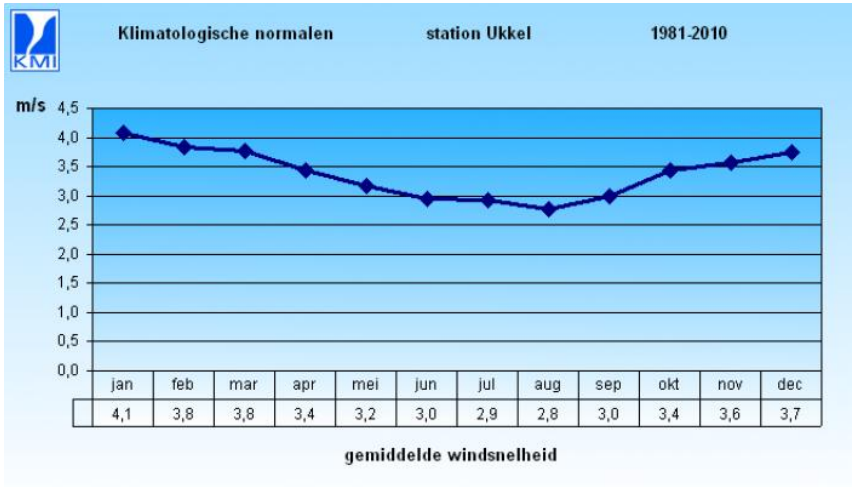

Hoek
Oostkerke
Loppem
Damme
Moerkerke
Vlive Kanelle
Donk



Dudzele Centrum
Dudzele
Dudzede-Verspr Bewoning-Zuid
Damse Steenweg
Landslag
N374

FALCON 8

- 8-copter
  - Stable flight
  - Easy handling
  - Ready to fly
- GPS flight
- 16-18min. flight time
- 500g payload
- Tolerate wind speed up to 10m/s or 36km/h
  - 3 à 4 m/s Ukkel
  - 6 à 7 m/s coast



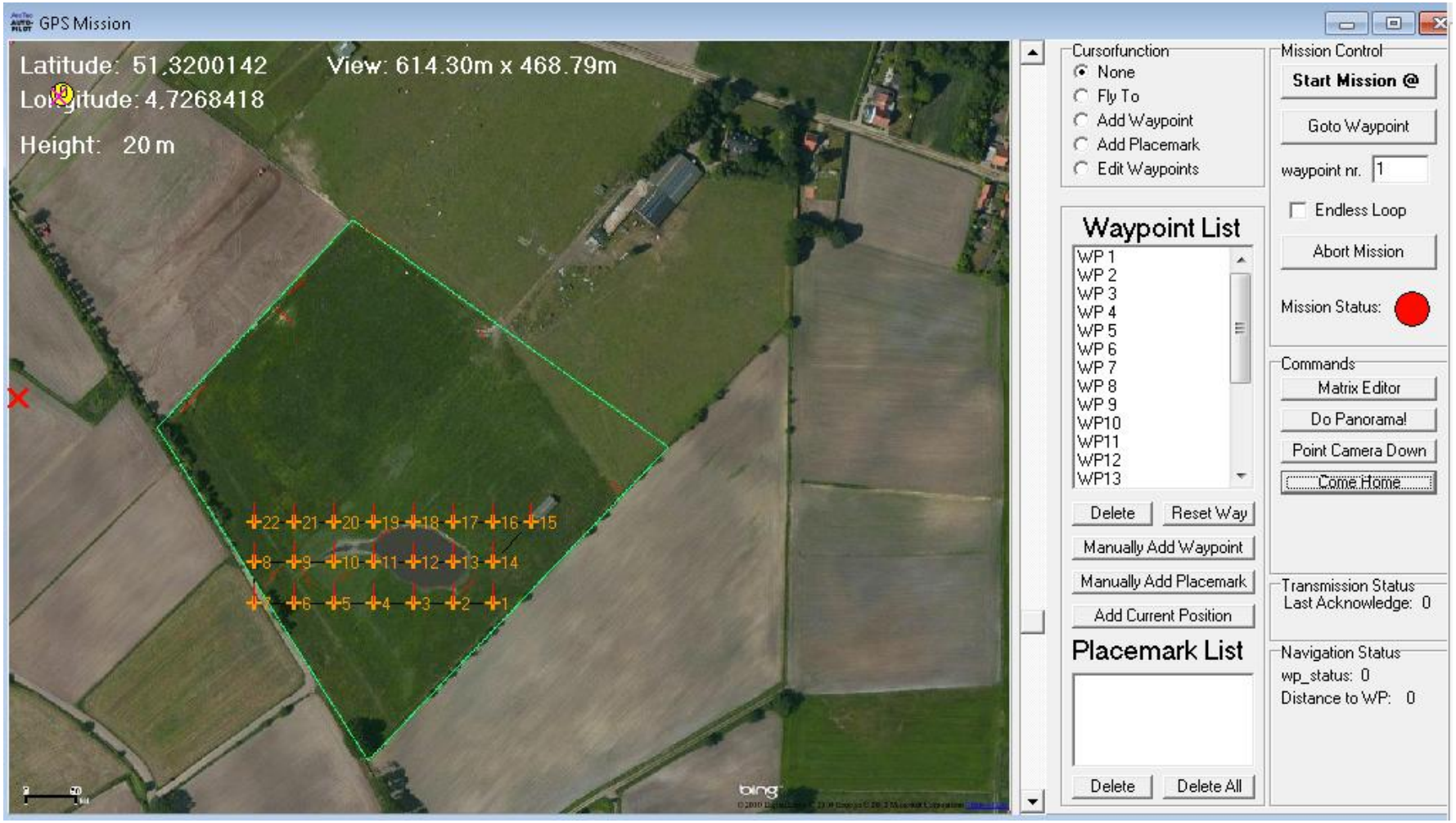
UAV Legislation

Legal UAV flights in Belgium

- Research flights
- Outside airport flight zones
- Signed agreement
  - Mayor of the city
  - Temporal airport: Permission to take of and land
  - Inhabitants within 200m
- Document for ‘Directorate-General for aviation’

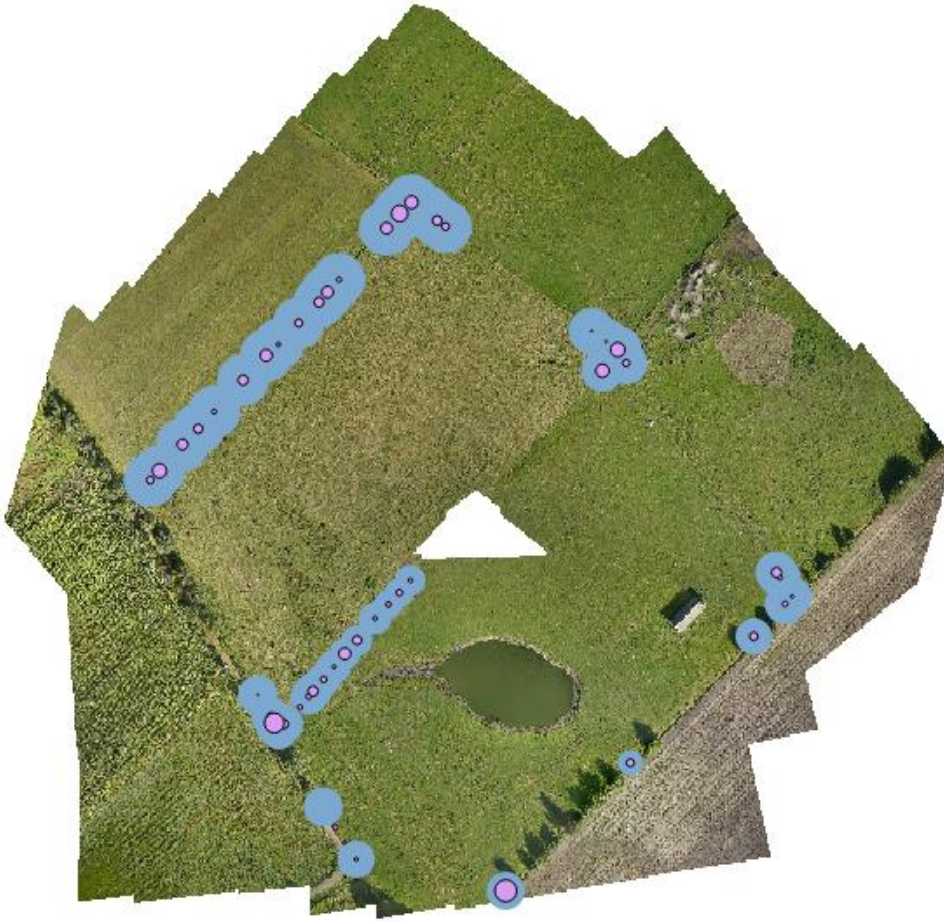
NOTAM: Study sites are marked for other air traffic

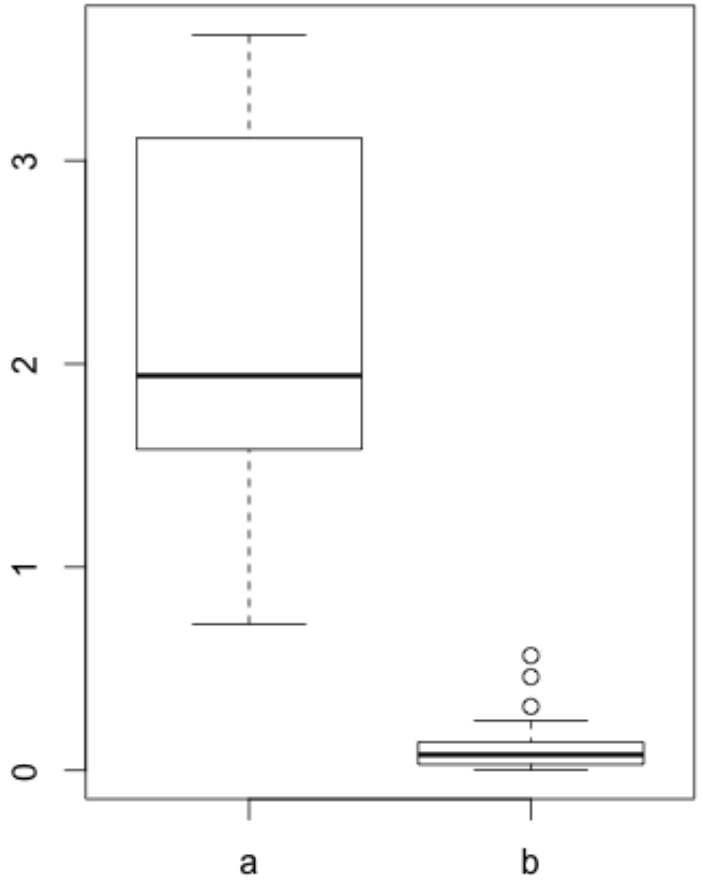
Flight planning



UAV Image Acquisition

Horizontal Image Accuracy





UAV image acquisition

2012				2013									
Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
X	X	X			X			X	X	X	X	X	X

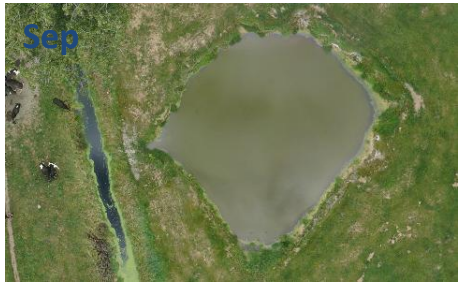
September 2012

October 2012

November 2013

UAV image acquisition

2012

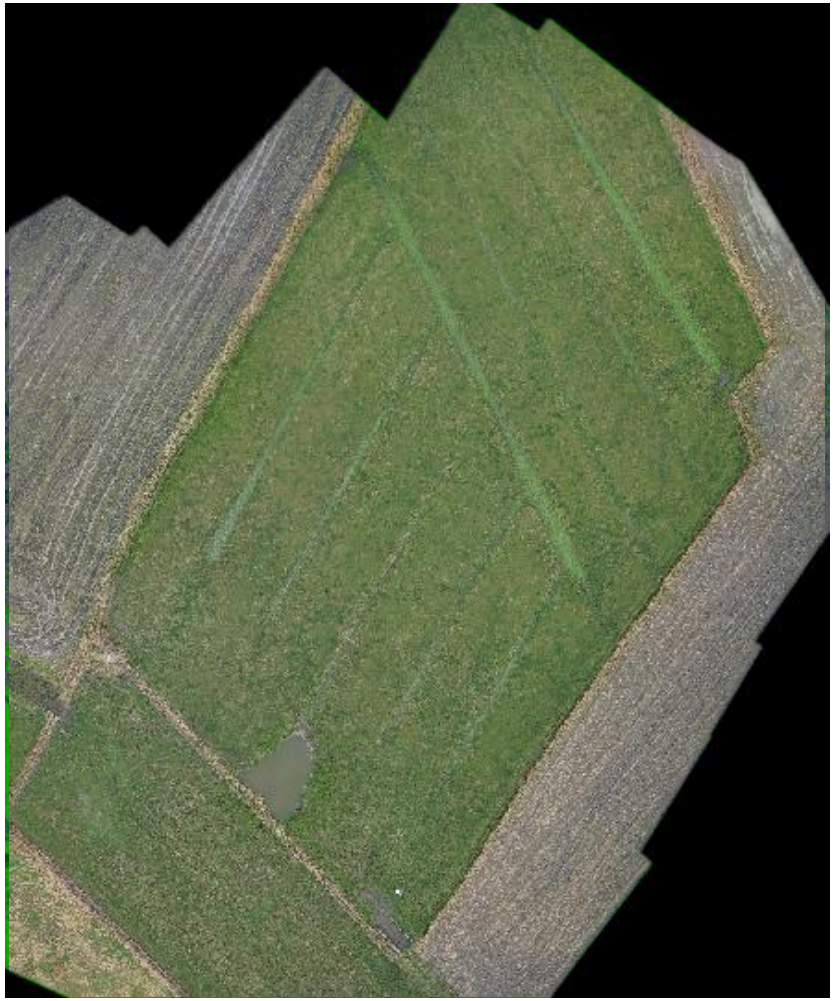


2013

Detection of SWBs: UAV

UAV image classification

1. Collect training data
2. Decision Tree
    1. Object-based
    2. Pixel-based

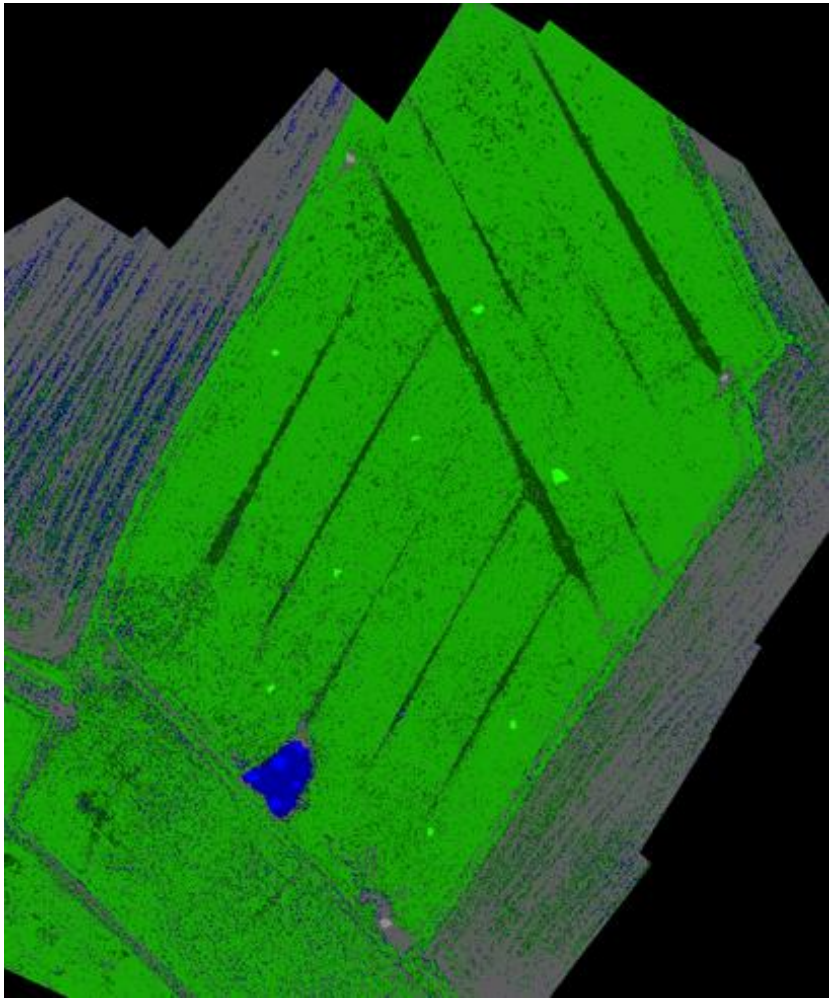


- Water
- Dry grass
- Wet grass/trampled
- Bare Soil

Detection of SWBs: UAV

UAV image classification

1. Collect training data
2. Decision Tree
    1. Object-based
    2. Pixel-based

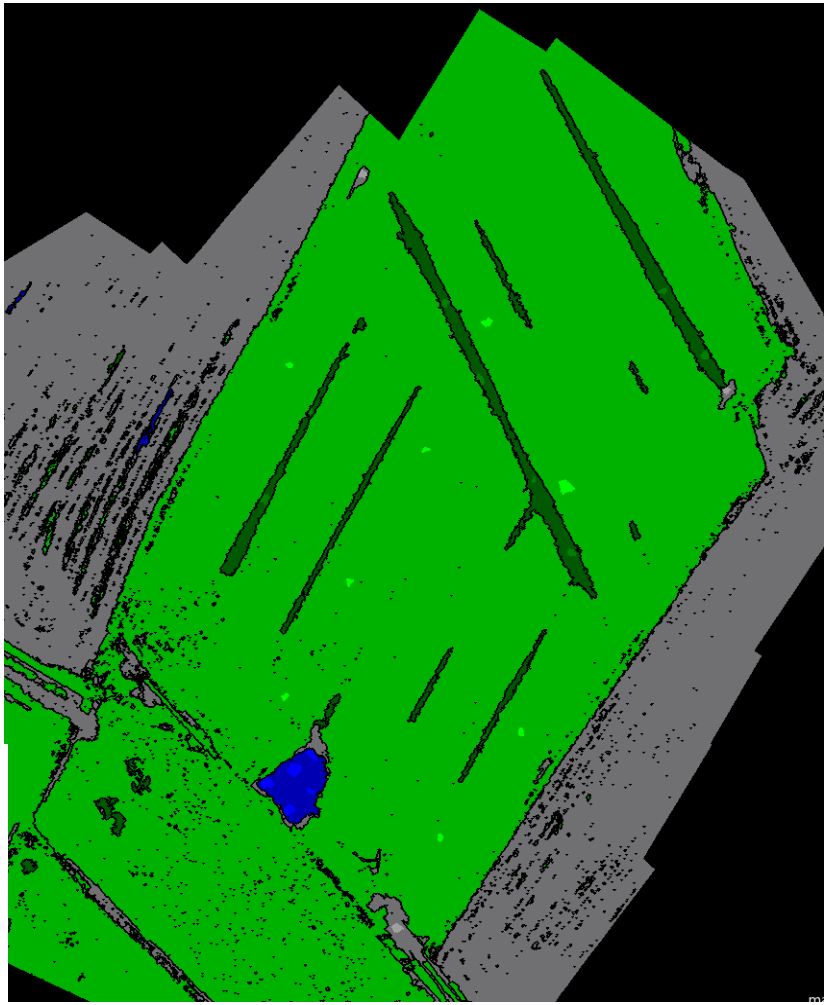


- Water
- Dry grass
- Wet grass/trampled
- Bare Soil

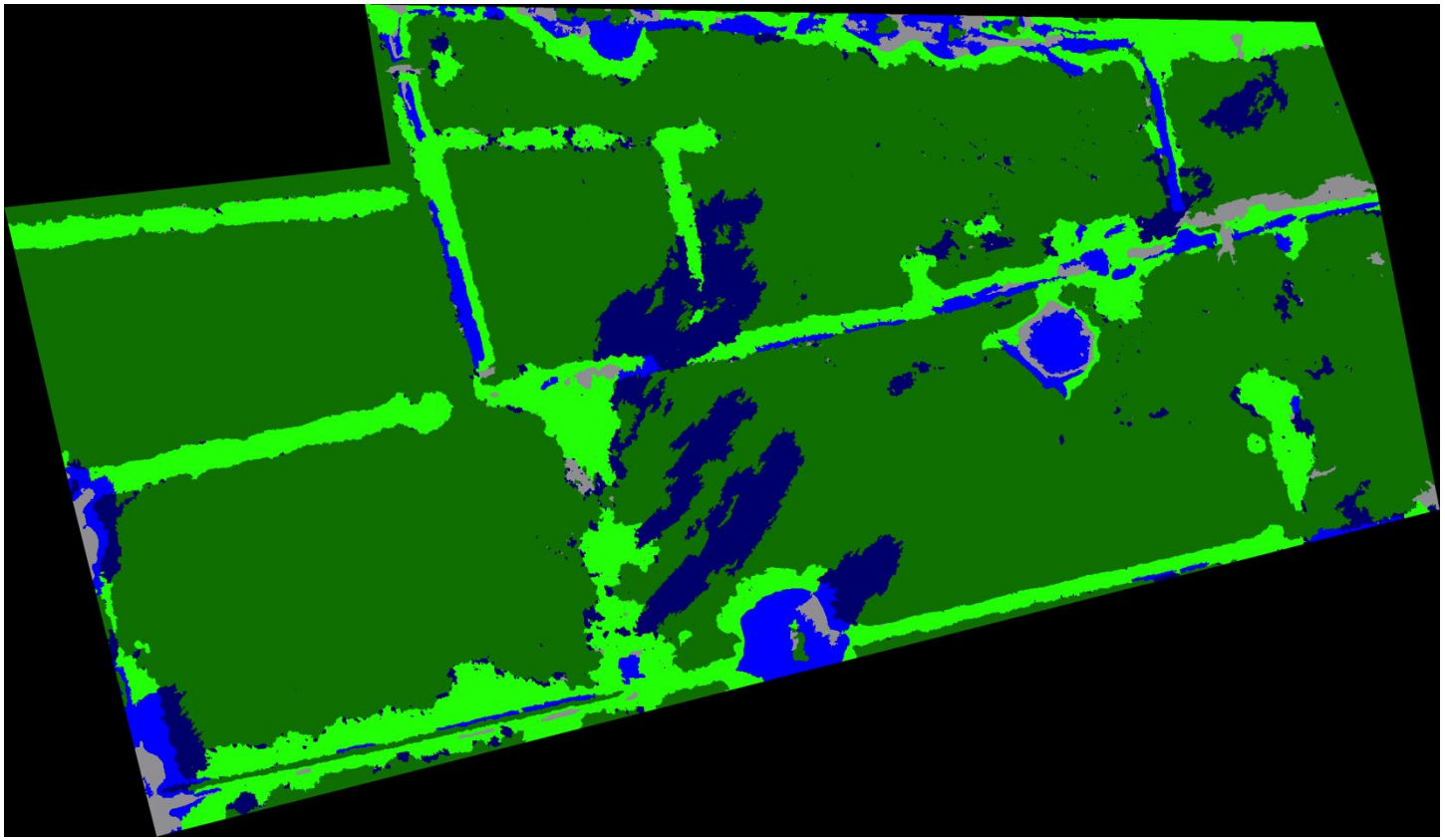
Detection of SWBs: UAV

UAV image classification

1. Collect training data
2. Create Decision Tree
3. Clean up (filter noise)



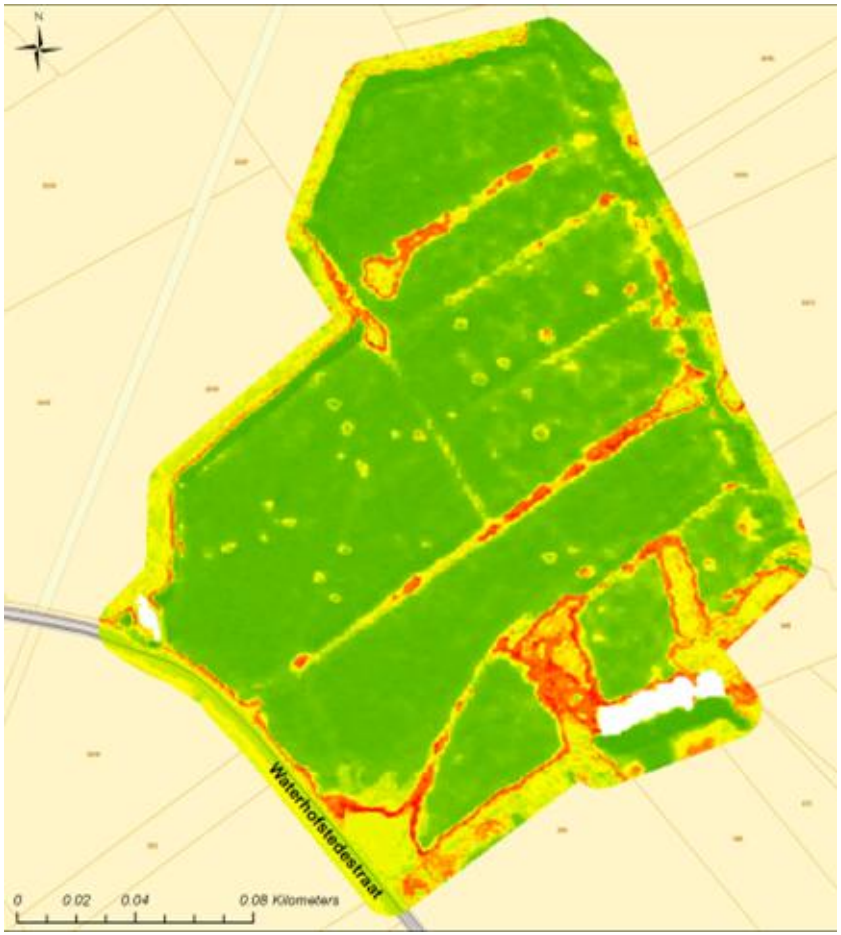
SWB Time Series



On-going

- Change detection
- Selection of the dynamic SWBs
- Improve Digital Elevation Model
- Seeding of WVII imagery

→ Better Infection Risk Map

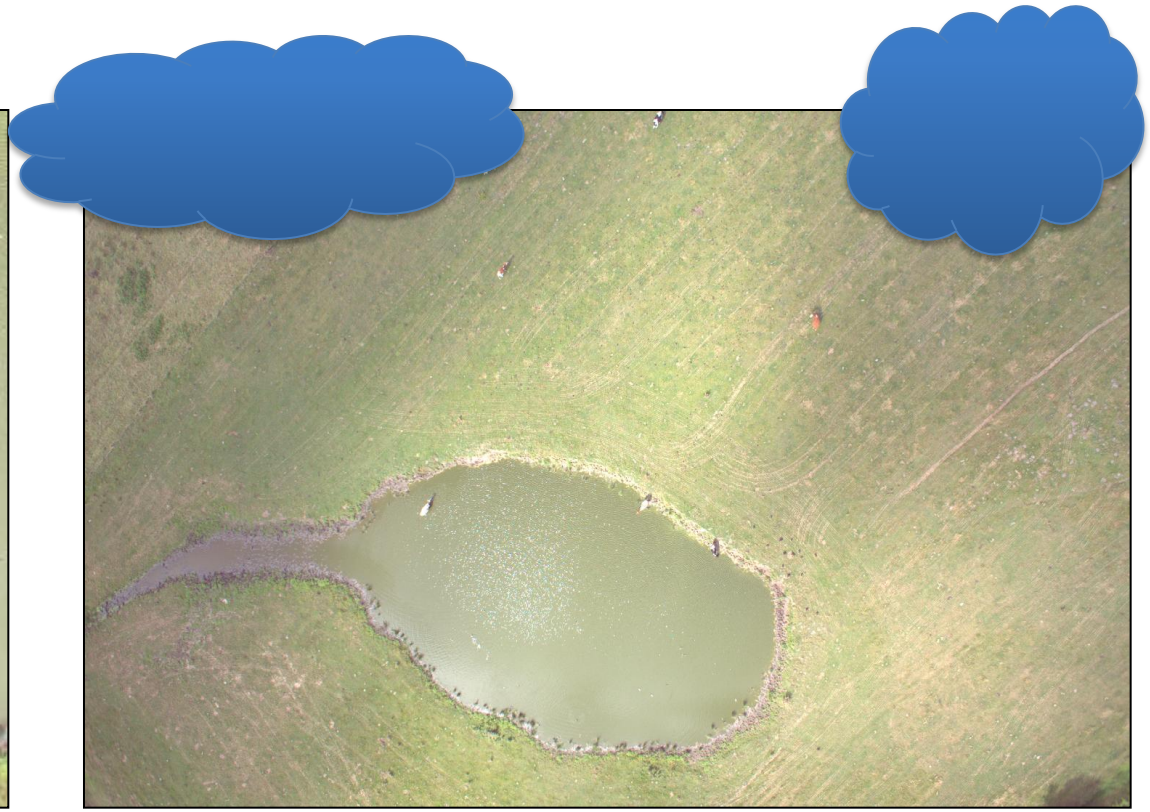


Thank you!

Questions?

UAV imagery & SUN

Sun glitter & shadow



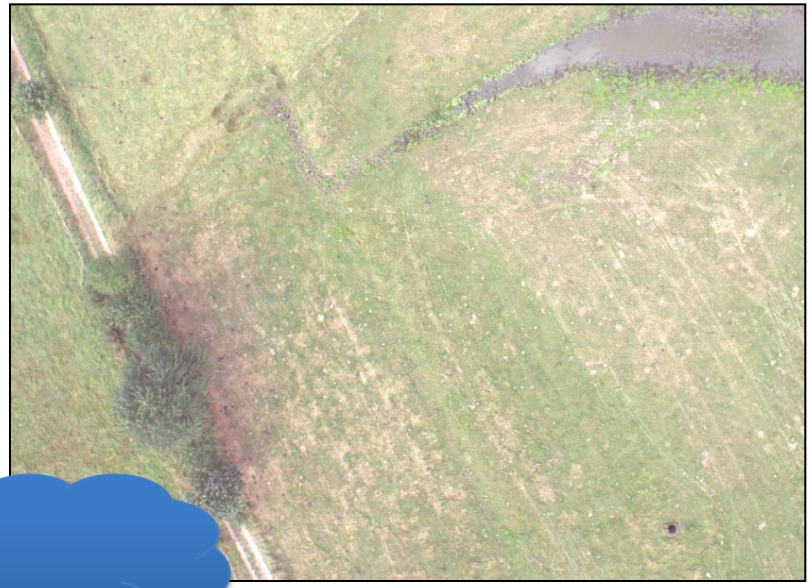
UAV imagery & SUN

Sun: Sharp delineated shadows

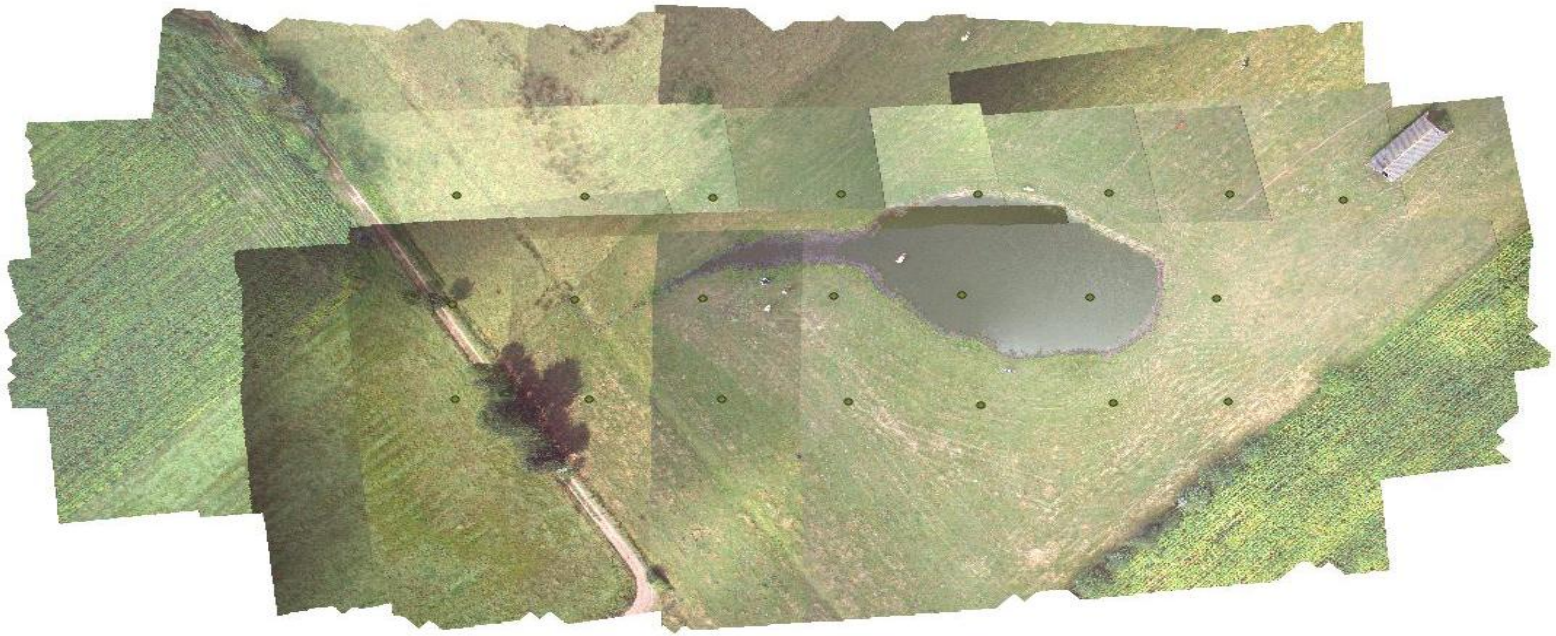
&

Wind: Shadows move along the UAV flight

→+1min



UAV imagery & SUN



Useful?