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UAV's: The Guinea Pig Year

Crystal Van Pelt

Purdue Extension- Steuben County

Agriculture, Natural Resources & Community Development

March 5, 2019

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WABASH HEARTLAND INNOVATION NETWORK WHIN

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17 Extension Educators

Several Specialists

2 Coordinators

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33% of the farmers are using drones by themselves or by the third party whereas 31% are thinking of using drones in 2018.

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August 29, 2016

The rules : Title 14 of the Code of Federal Regulations (14 CFR) part 107, *Small Unmanned Aircraft Systems*.

Part 107 addresses:

a) small UAS classification,
b) certification, and
c) operational limitations

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Remote Pilot Certification Requirements

- Be at least 16 years old
- English proficiency
- Pass TSA background check
- Pass written (multiple choice) aeronautical knowledge exam at an FAA approved testing center
- Pass a recurrent aeronautical knowledge test every 24 months
- No aeronautical experience of flight proficiency required
- No airman medical certificate required

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Hardware

Phantom 4 Pro by DJI

Features:
Obstacle avoidance sensors
RGB 4K camera
~30 minute flight time/battery
MicroSD card slot

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Other Options

Can get $$ with additional sensors!

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Imagery & Sensors

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Orthomosaic – 2 dimensional imagery

- Requires standard RGB camera as the sensor
- Takes standard earth images (like Google Maps)
- Useful for finding trends from the “eye in the sky”
- Easily uploaded to most farm software

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$$NDVI = \frac{(NIR - Red)}{(NIR + Red)}$$

NDVI – Normalized Difference Vegetation Index

- Uses reflected light in the green, red, and near infrared light (NIR) spectrum to produce images
- The near-infrared (NIR) light spectrum can be defined as the region between 750 nm and 2,500 nm
- NDVI is beneficial for plant health
- NDVI can be calculated by finding the percentage difference between the near infrared and visible red light spectrums

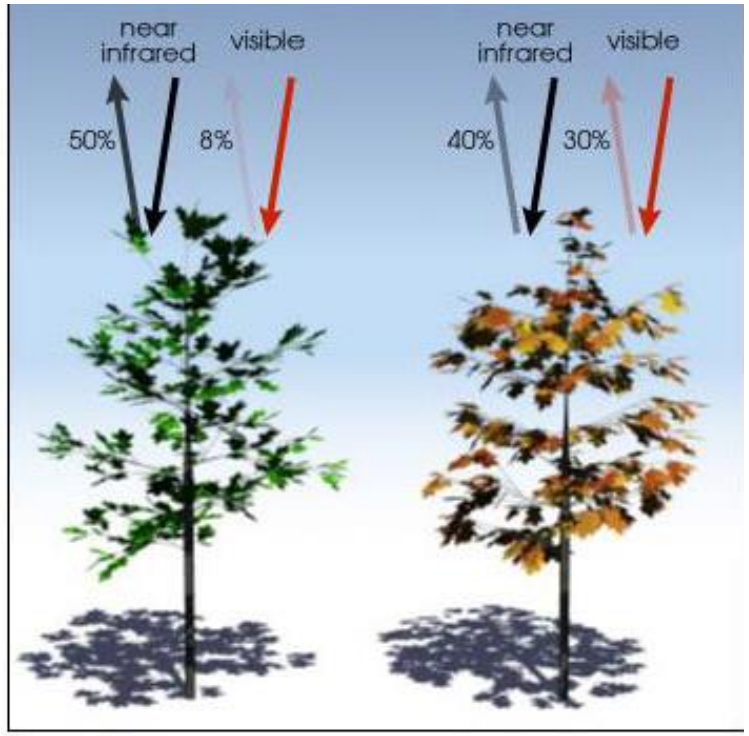

Image courtesy of NASA

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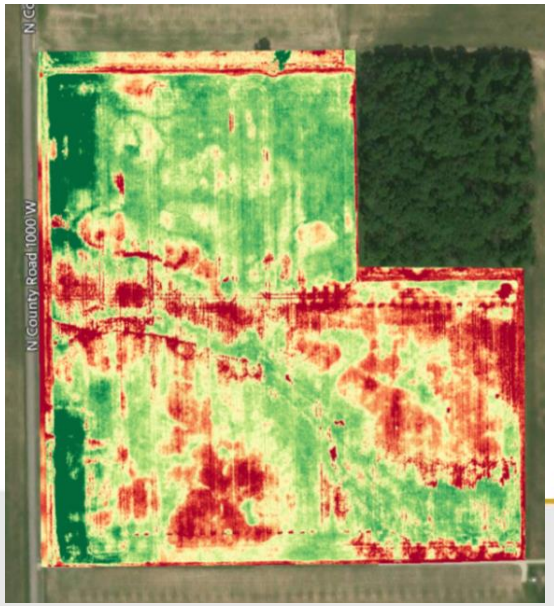
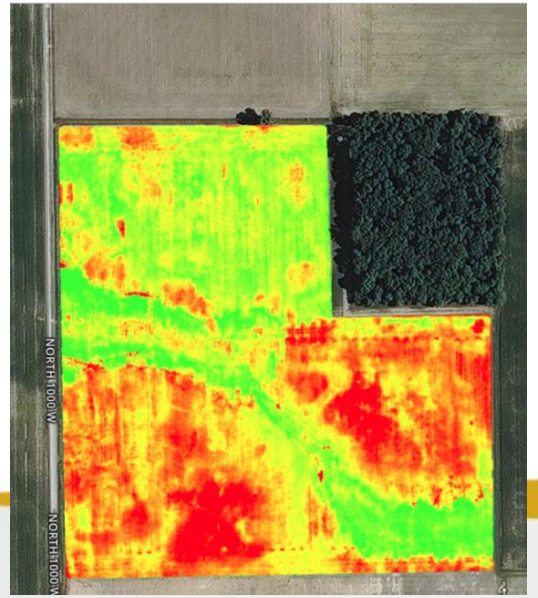
The difference in each map is a result of the difference in light spectrum the original images were captured in. The bottom left was captured in standard red, green, and blue light spectrum which creates a good plant health map. The picture on the bottom right is a true ndvi which requires near infrared light spectrum to be captured (top right).





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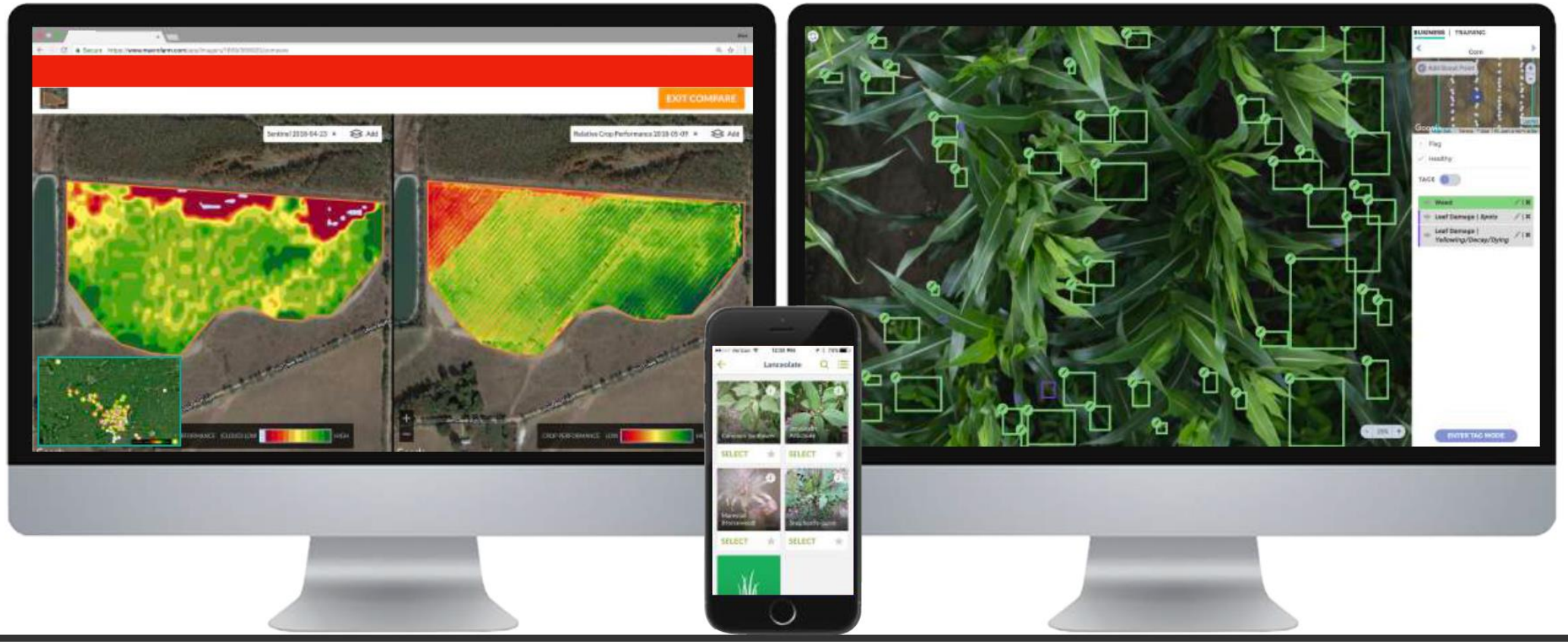

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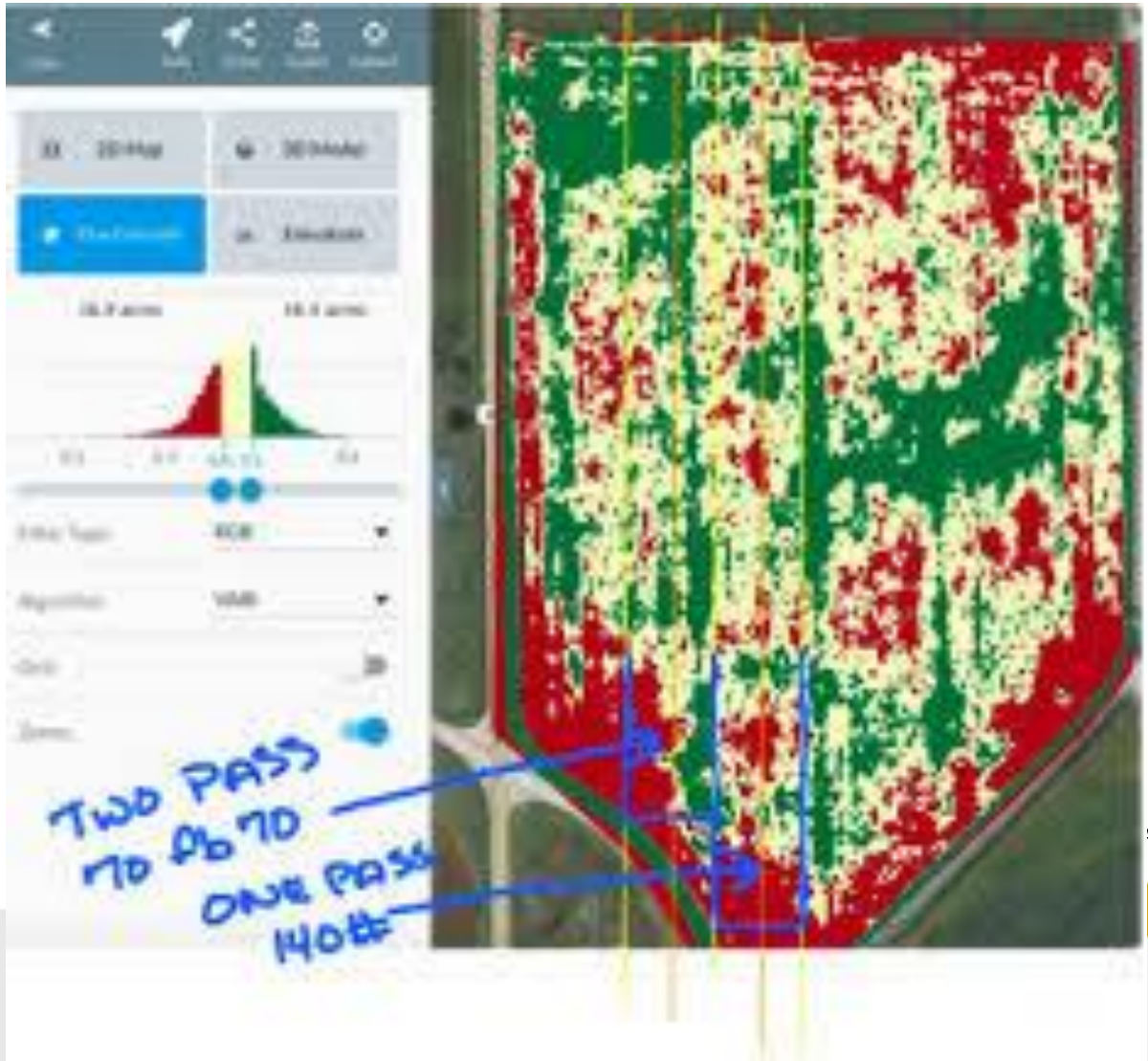
- Don’t have to wait until harvest for map
- Variation of each row



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Software, Apps

sentera

TARANIS

DroneDeploy

agremo™

PRECISIONHAWK

FIELD VIEW™

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Manual Flights

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DJI Display:

- Battery level
- Radio signal strength
- Camera settings
- Launch/Return to home
- Distance from obstacles
- Distance from remote
- Elevation
- Speed
- Camera/video record

Manual Flights

Good for identifying weeds and inspecting problem areas

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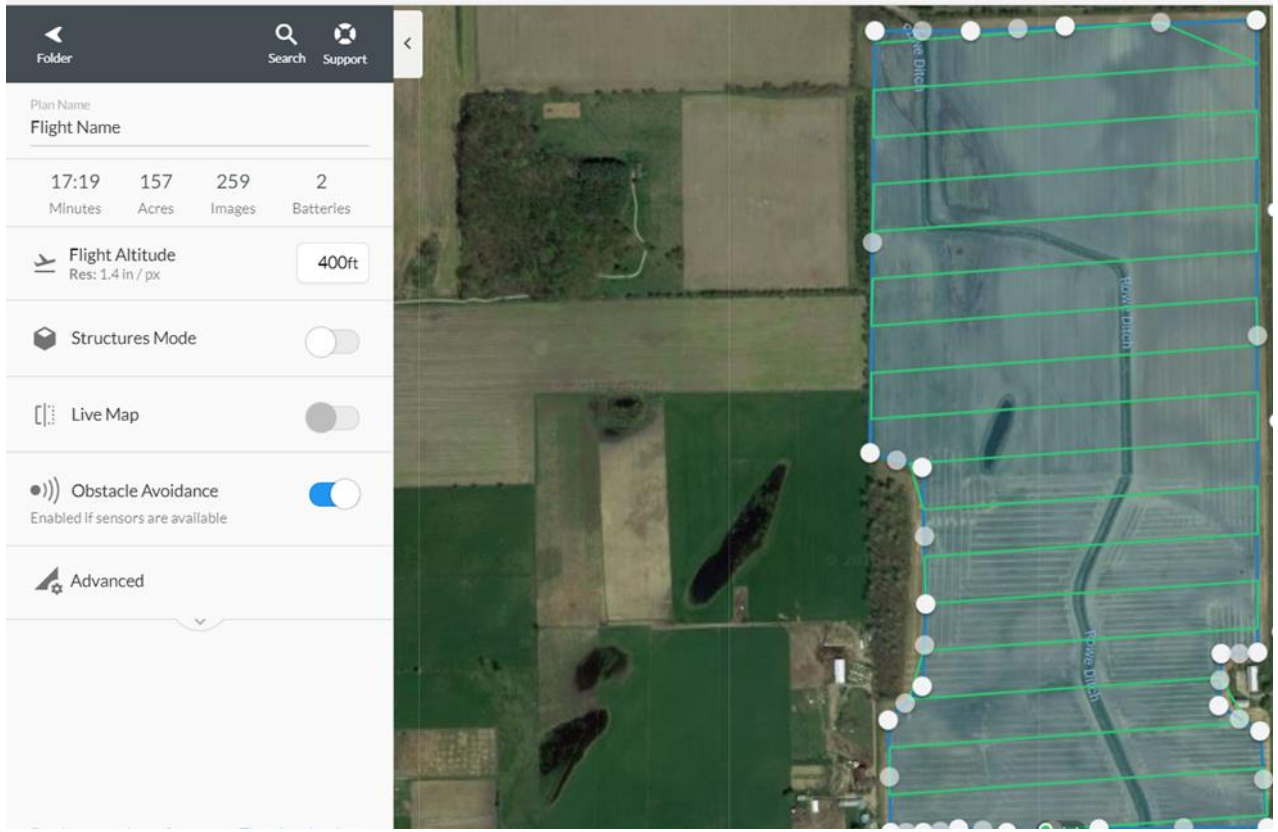
Automated Flights

As easy as drag and drop



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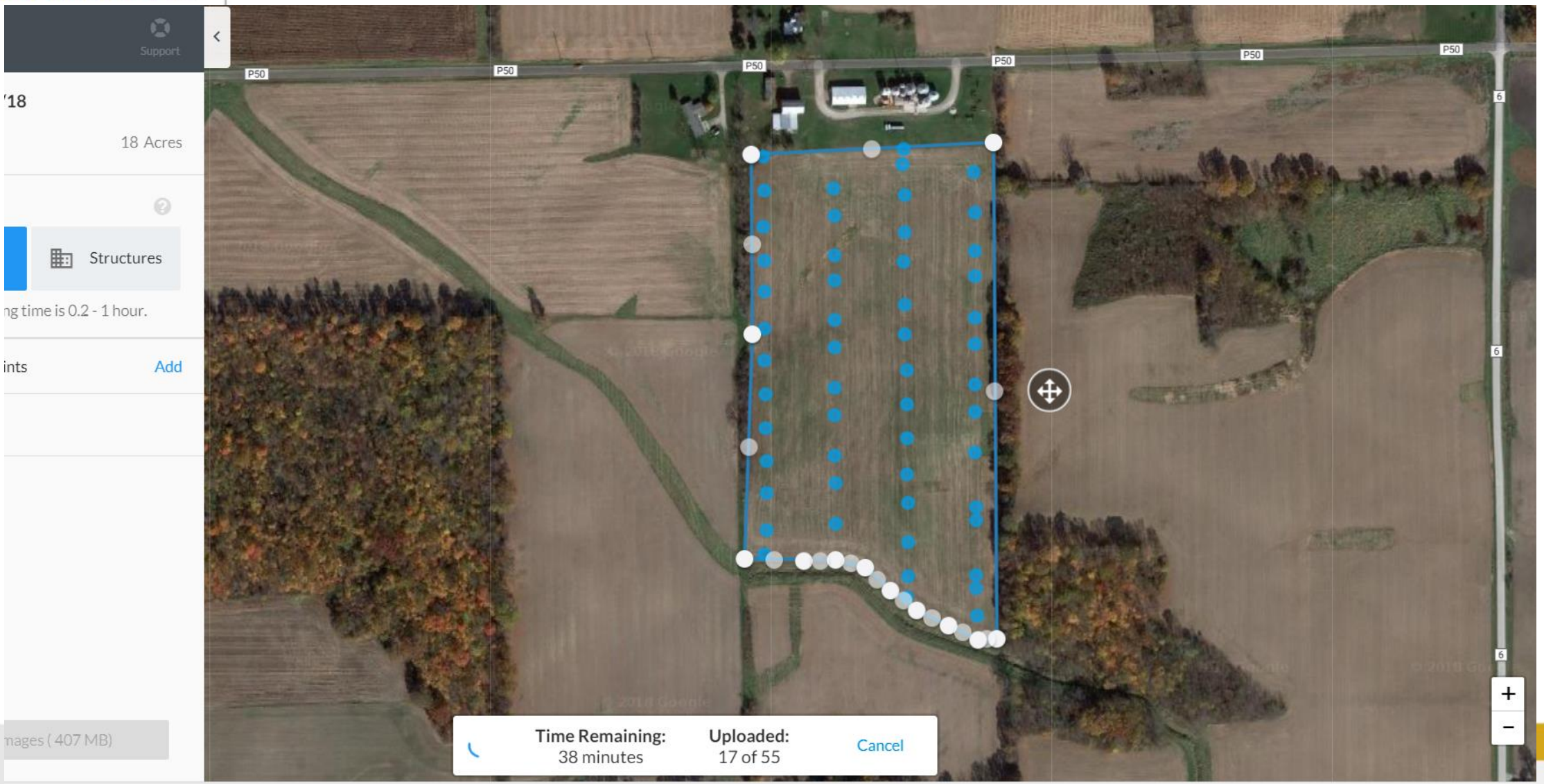

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Dashboard | Share | Export | Support

Hays Farm 8/20/18

Aug 22, 2018

2D Map | 3D Model | Plant Health | Elevation

Annotation & Measurement

Location | Distance | Area | Volume

Images (52)

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Inspect nozzles, pivot path

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Identify tile lines

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Automated vs Manual

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2018 sulfur study, 2019 study to expand to boron

- 230 images for 130 acre field
  - 1.7 GB of raw image data
- No regulation to retain raw images, but good for insurance

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- Multiple 32-64GB+ micro SDs
- External or internal hard drive
- Flash drives, cloud storage for sharing imagery with consultant, partners
- Good internet!

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Questions?

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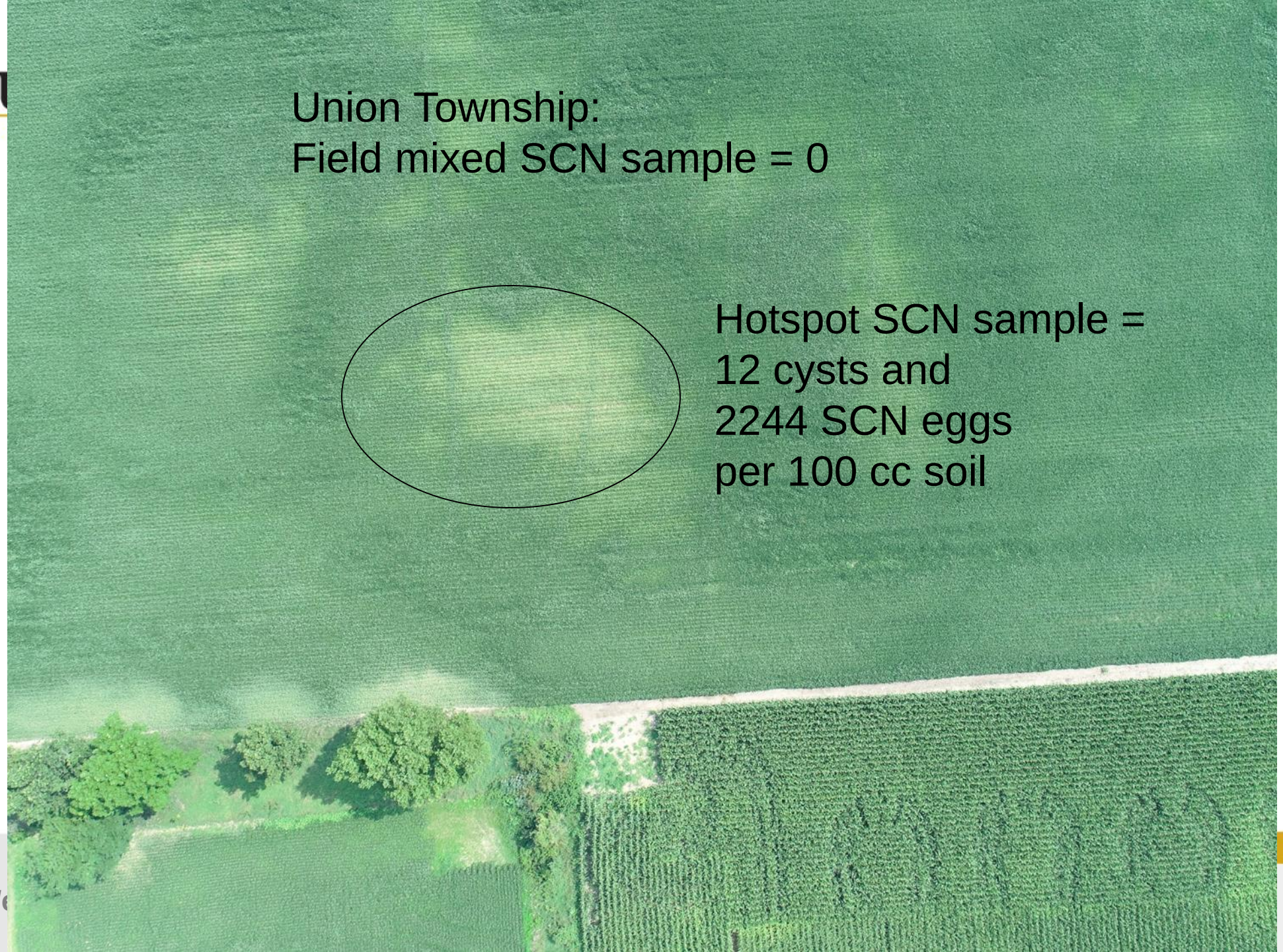
Union Township:
Field mixed SCN sample = 0
Hotspot SCN sample =
12 cysts and
2244 SCN eggs
per 100 cc soil

Jackson Township:
Field mixed SCN sample =
9 cysts and 1683 eggs / 100 cc soil

Hotspot SCN sample =
10 cysts and
2040 SCN eggs
per 100 cc soil


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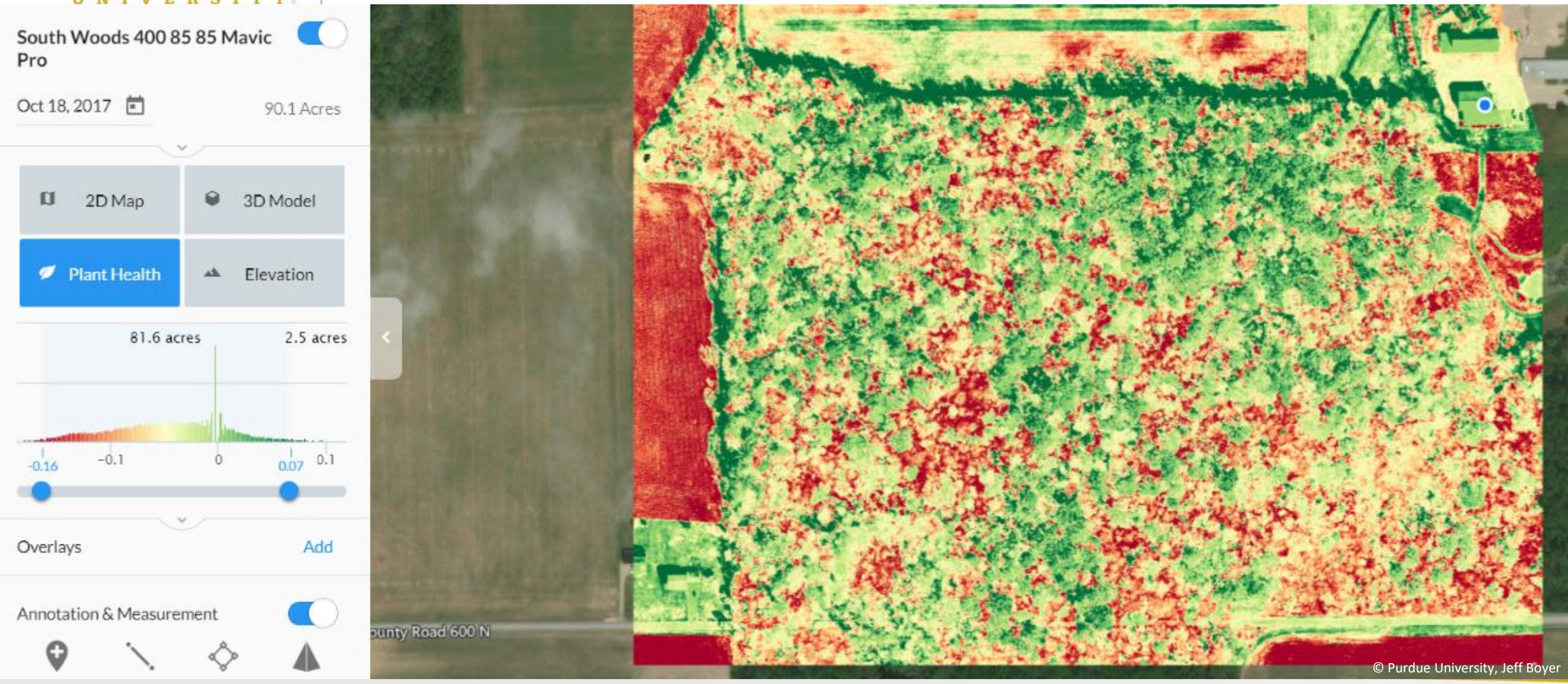

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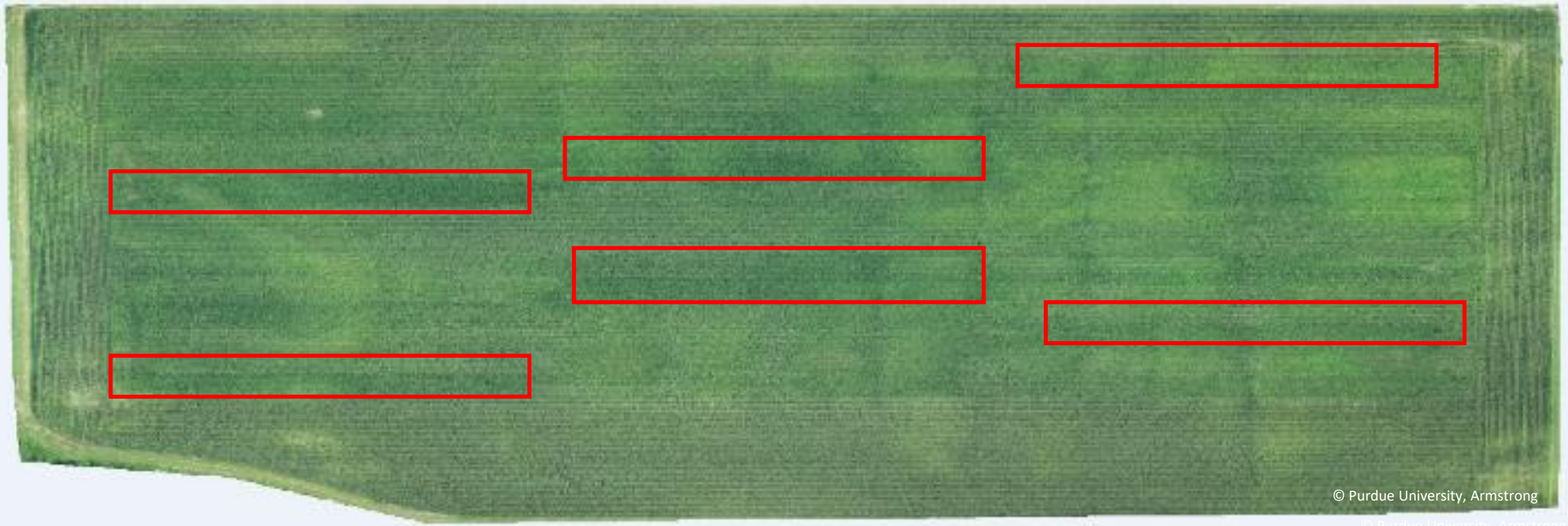

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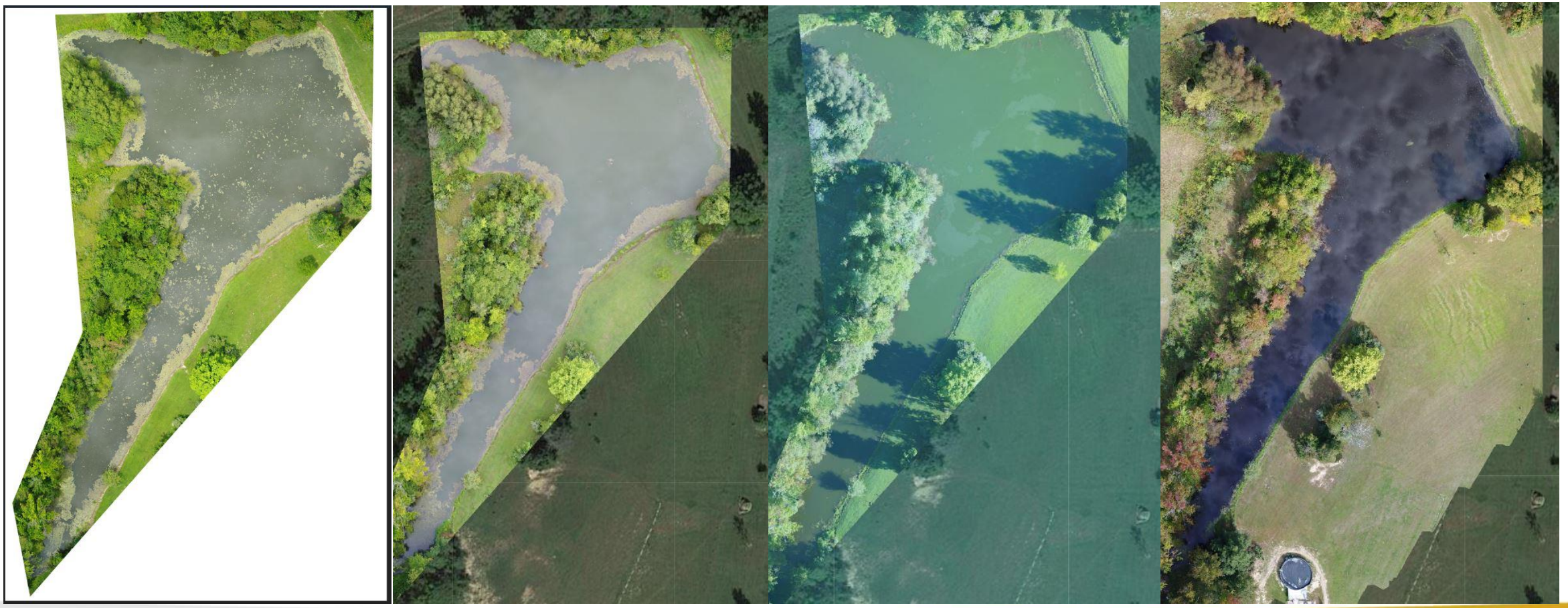
July	August	September	October



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