Acquiring and Processing UAV Data

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Pros and Cons of UAV Data

PROS

Cutting edge

Students gain experience with data acquisition and processing

Resolution of < 10 cm is easily possible

CONS

Coverage area is small

File sizes and quantity

Processing time

Data Acquisition

Shepherd's Drones

DJI Phantom 3 Advanced

Upgraded to include a Sentera NDVI Sensor

Capable of taking:

- RGB images
- NIR images

With Sentera's software, it is capable of performing NDVI's

Shepherd's Drones

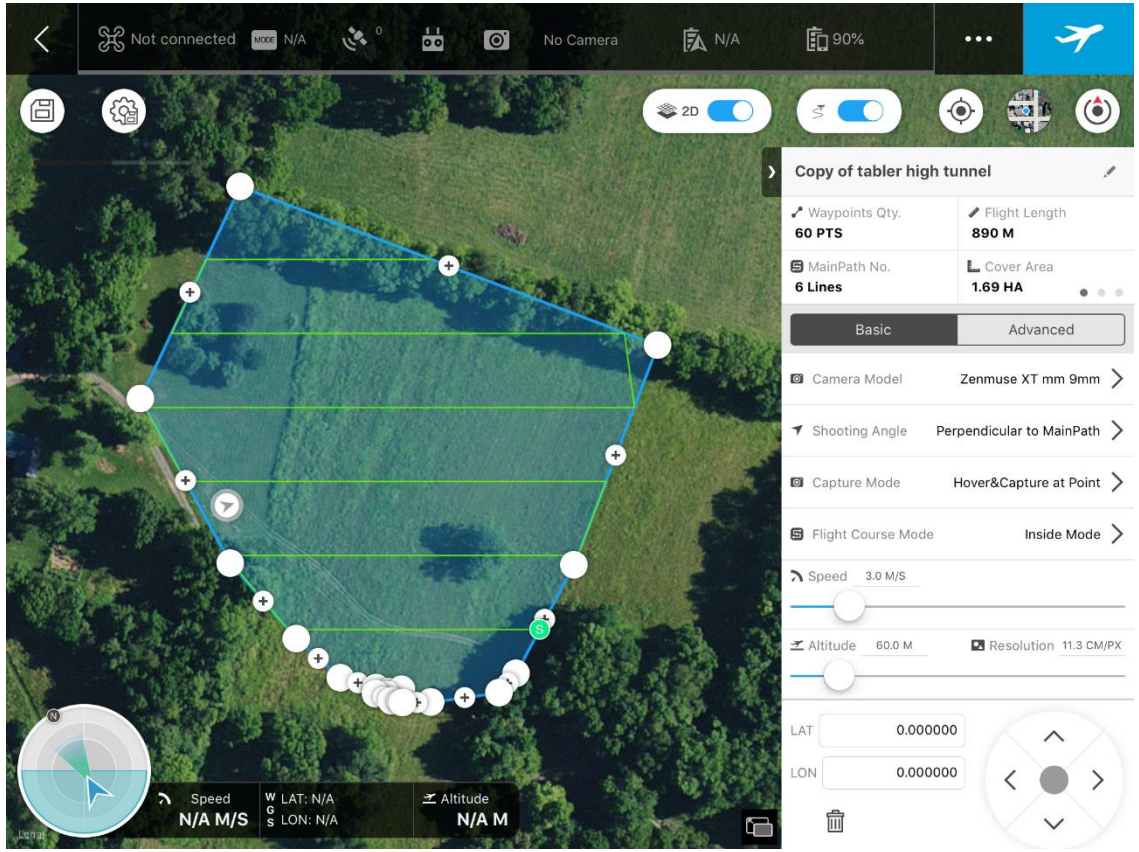
DJI Matrice 100

Capable of taking:

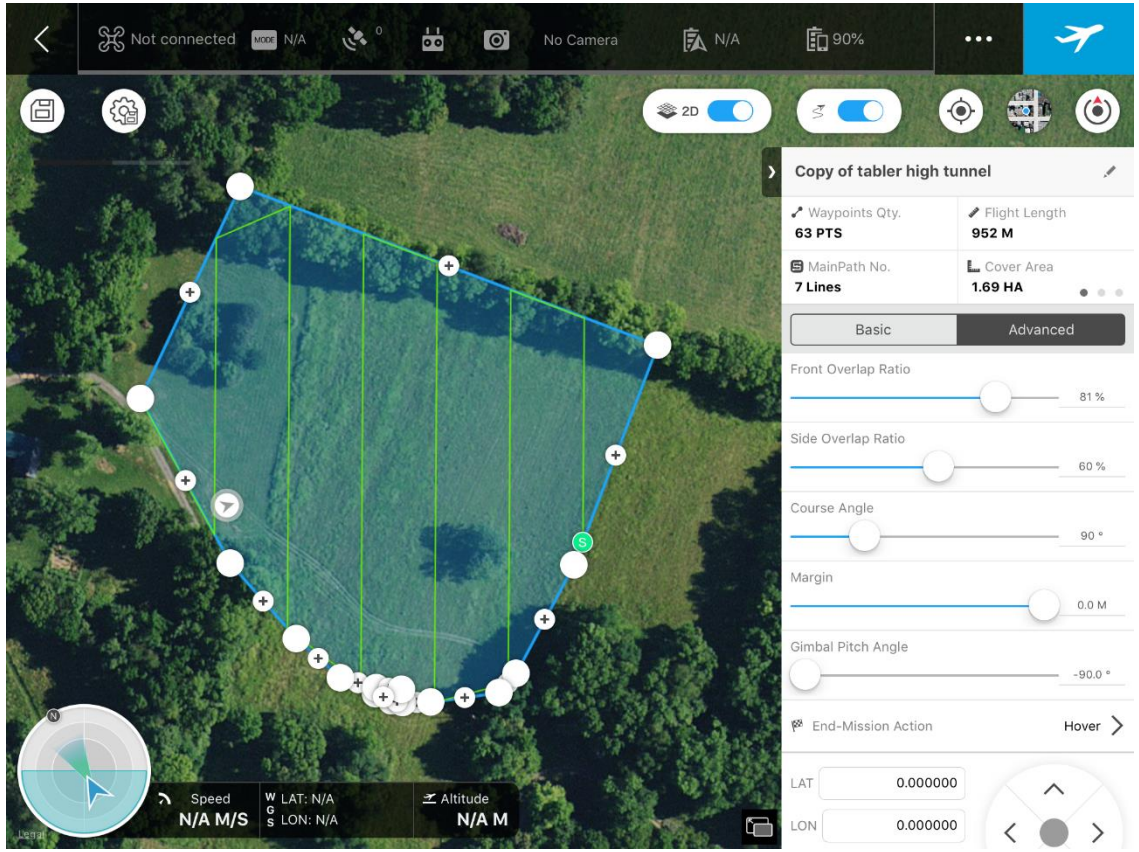
- RGB images
- Multispectral images (R, G, B, NIR, Red Edge)
- Thermal infrared images

Purchased with a WV Science and Research Instrumentation Grant

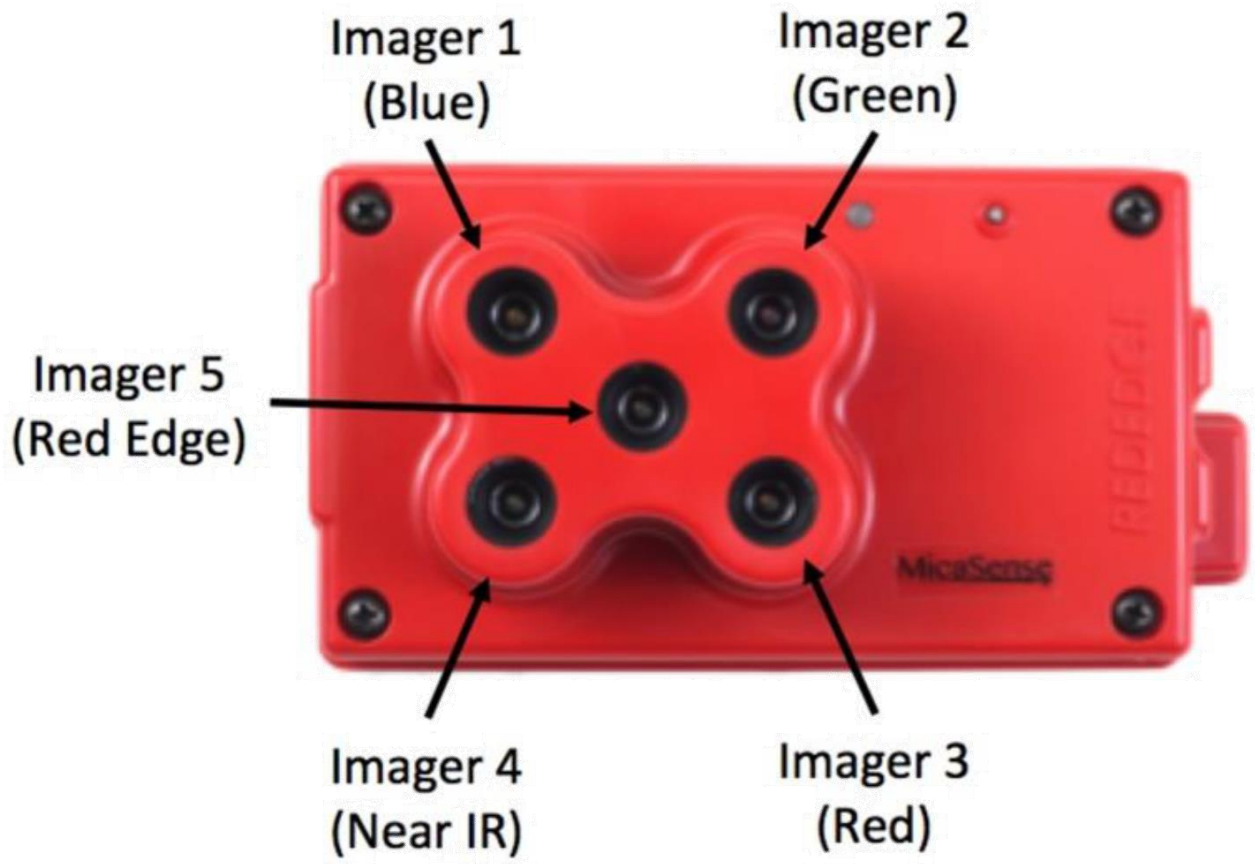
Data Acquisition – DJI GSP



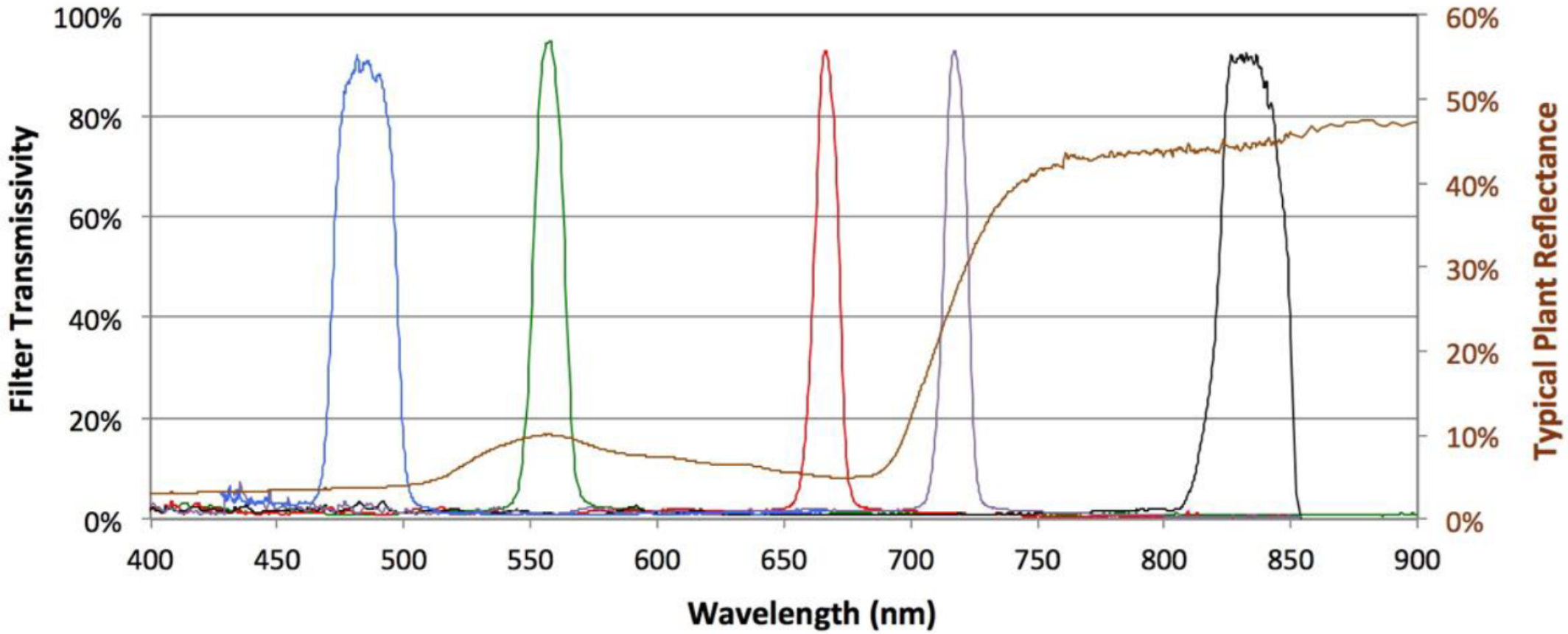
Data Acquisition – DJI GSP

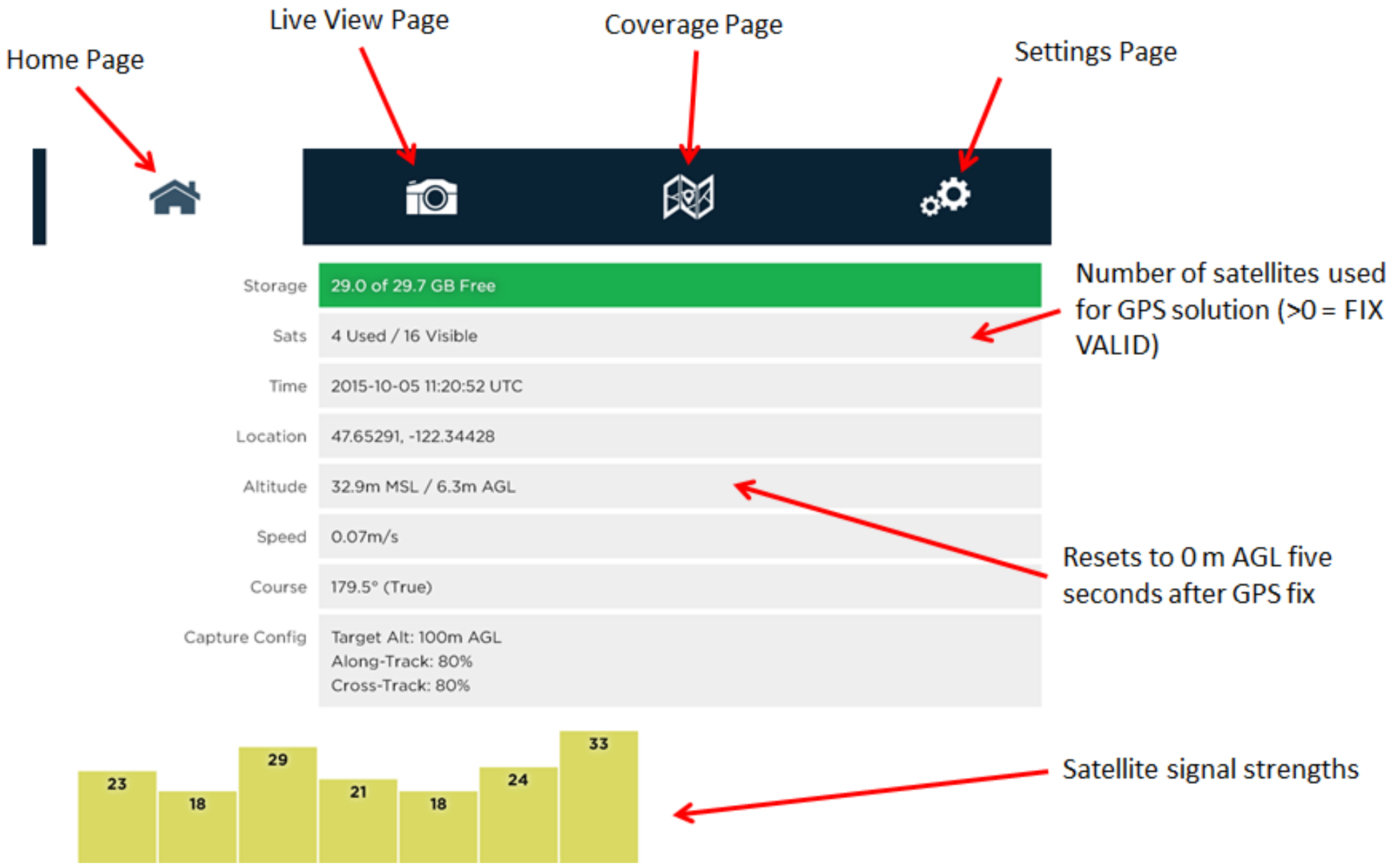


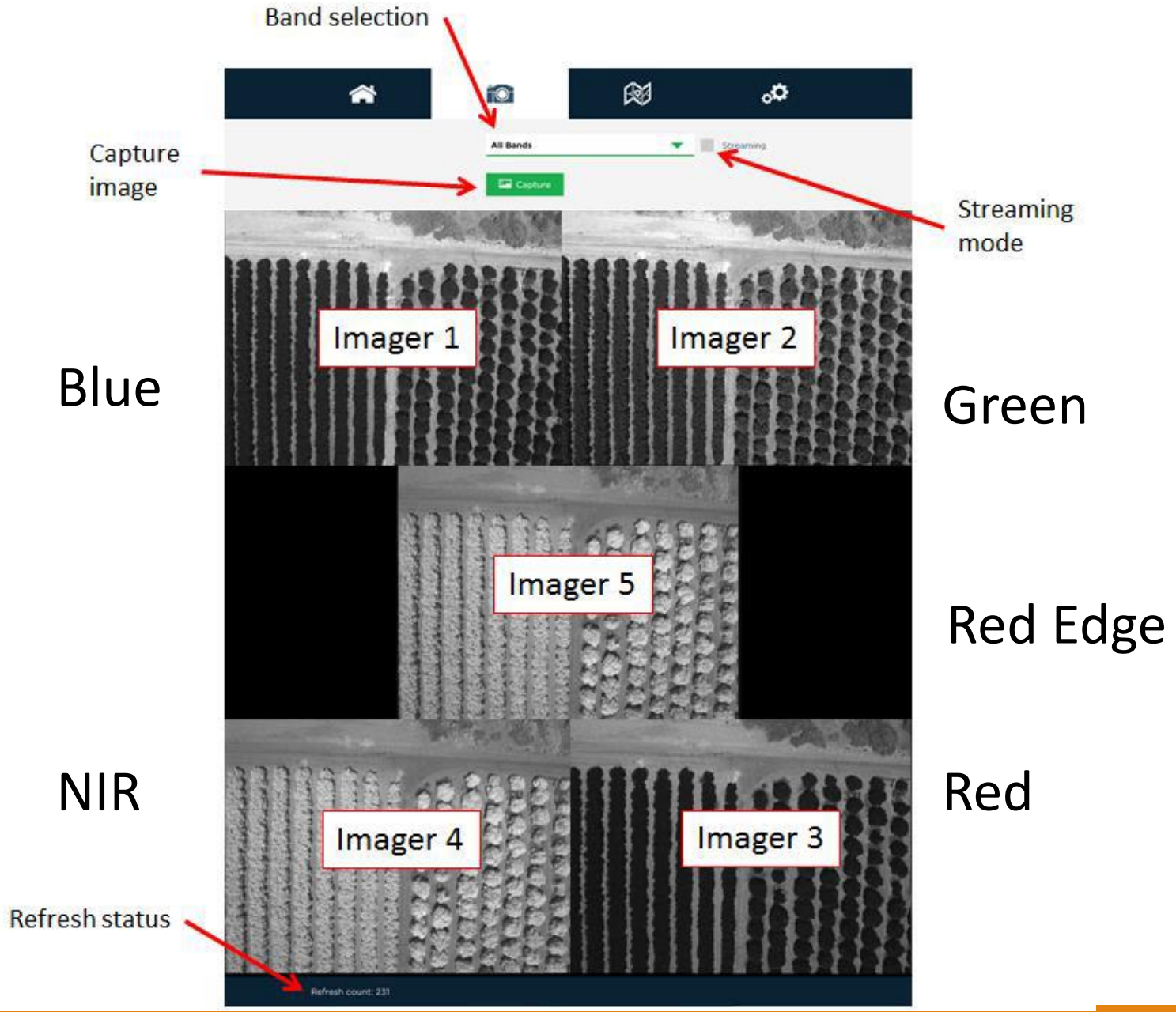
Data Acquisition – MicaSense RedEdge



Spectra


100%
80%
60%
40%
20%
0%
Filter Transmissivity
60%
50%
40%
30%
20%
10%
0%
Typical Plant Reflectance
400
450
500
550
600
650
700
750
800
850
900
Wavelength (nm)


Home Page
Live View Page
Coverage Page
Settings Page
Storage
29.0 of 29.7 GB Free
Sats
4 Used / 16 Visible
Time
2015-10-05 11:20:52 UTC
Location
47.65291, -122.34428
Altitude
32.9m MSL / 6.3m AGL
Speed
0.07m/s
Course
179.5° (True)
Capture Config
Target Alt: 100m AGL
Along-Track: 80%
Cross-Track: 80%
23
18
29
21
18
24
33
Number of satellites used for GPS solution (>0 = FIX VALID)
Resets to 0 m AGL five seconds after GPS fix
Satellite signal strengths


Band selection
Capture image
Streaming mode
All Bands
Streaming
Capture
Imager 1
Imager 2
Imager 5
Imager 4
Imager 3
Blue
Green
Red Edge
NIR
Red
Refresh status
Refresh count: 231

Red Edge Reflectance Calibration

Data

For RGB and Thermal IR cameras: <99 images/flight

For MicaSense camera: thousands of images/flight

For a flight:

- Thermal – 63 images
- RedEdge – 1935 images
  - 1830 images at height
  - 25 calibration images
  - 80 discard images

Data Processing

Sort the Data

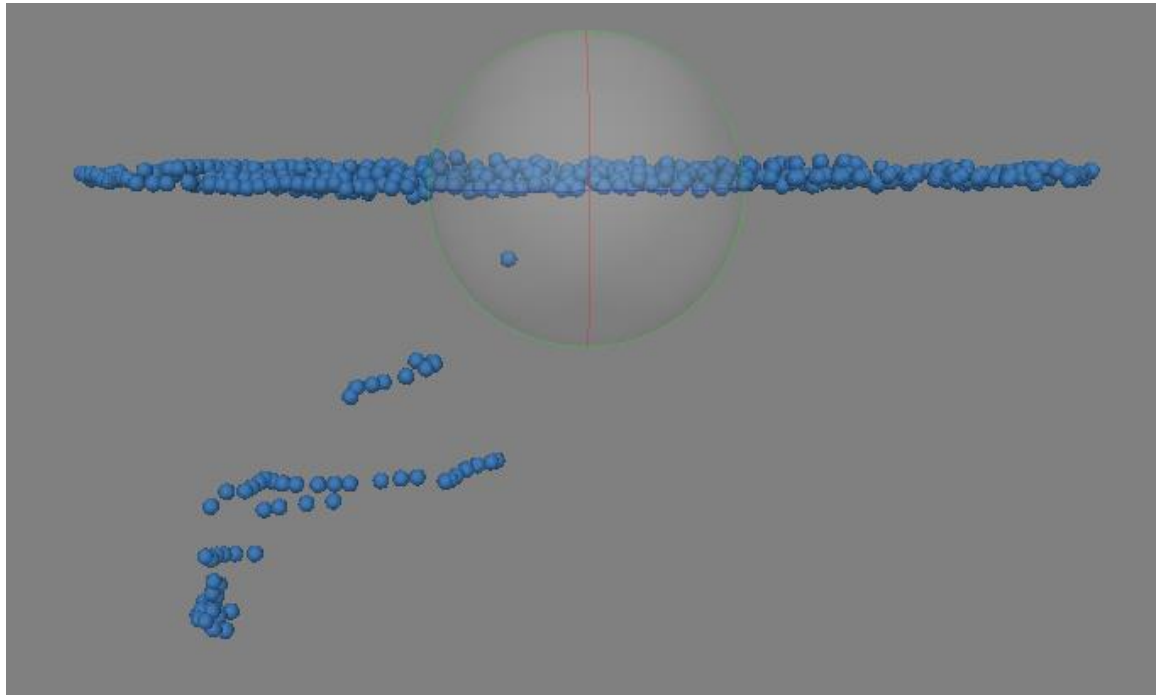
Calibration targets are easy

Low images are grouped at beginning and end of data sets

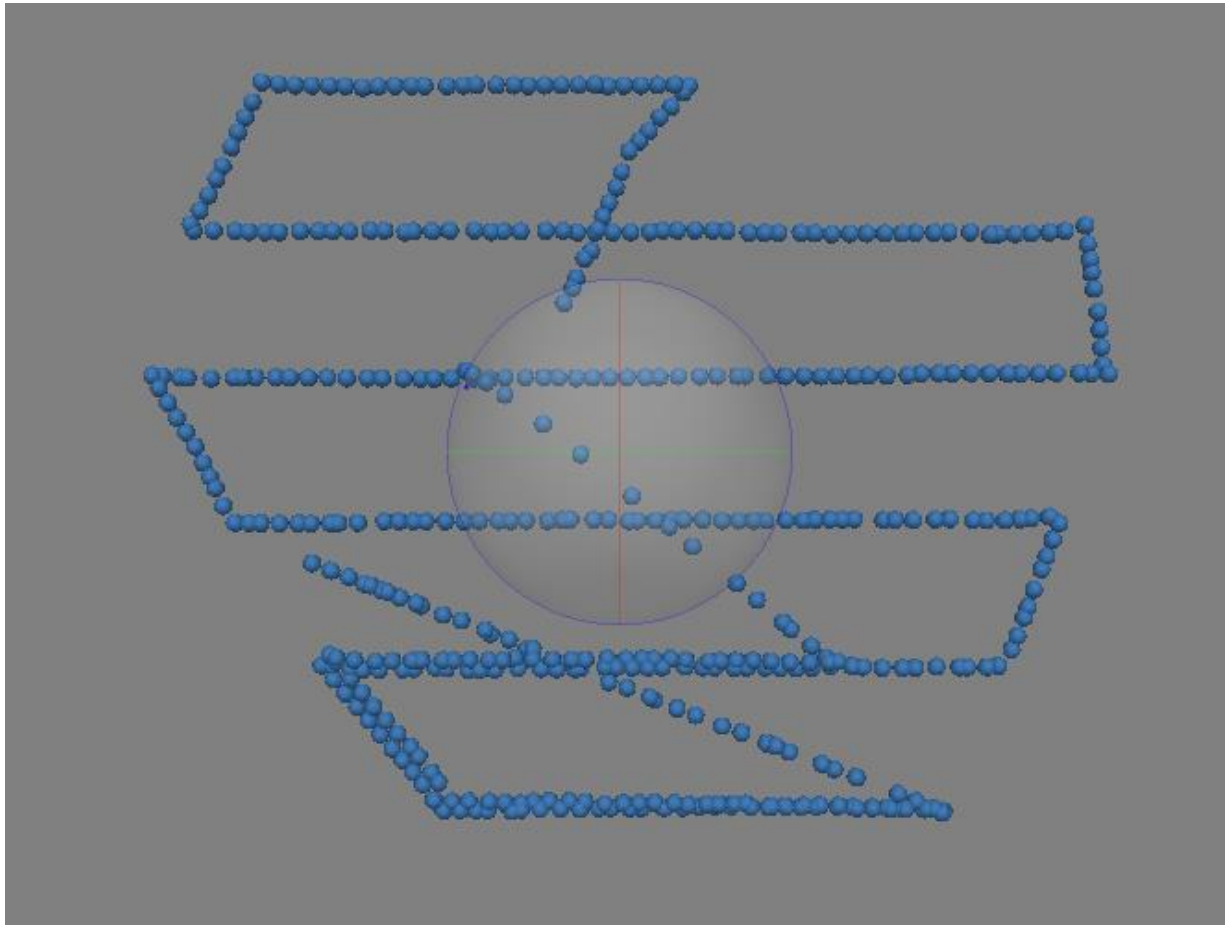
Coarsely sort data by looking at it

Import sorted data into Agisoft PhotoScan to improve sort

20 minutes to sort ~4000 images

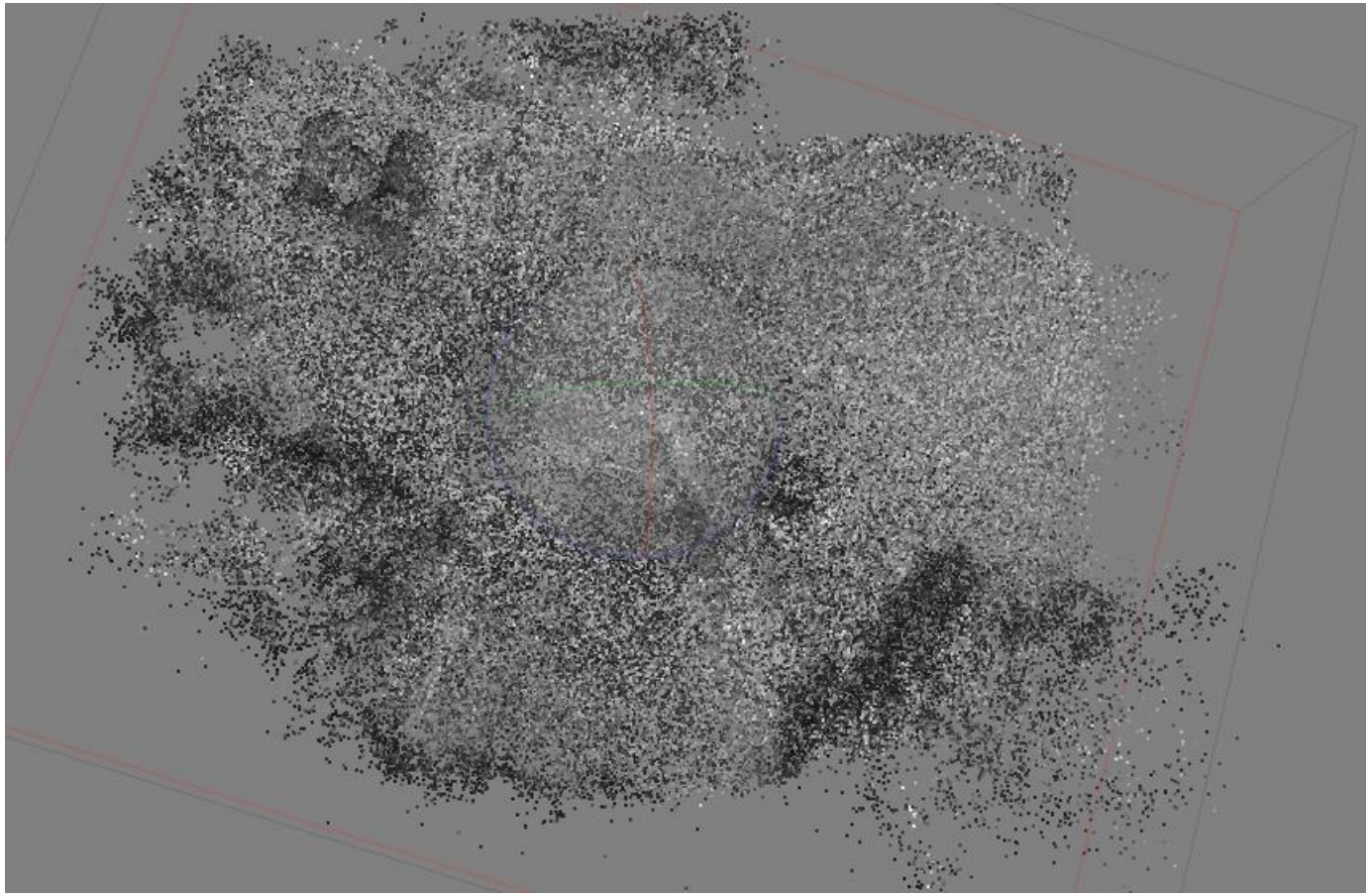


Agisoft PhotoScan – Import Photos



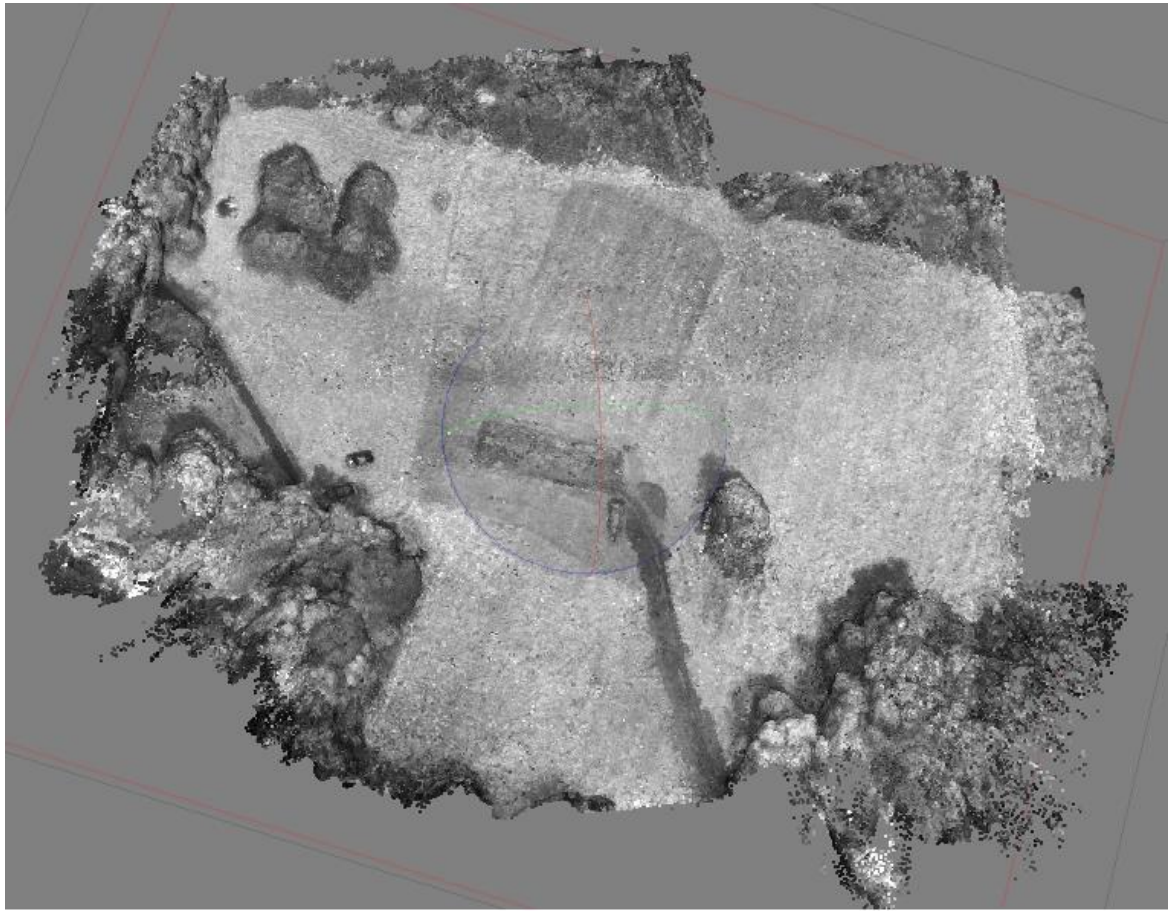
Agisoft PhotoScan – Align Photos

1 hour 20 min
Medium



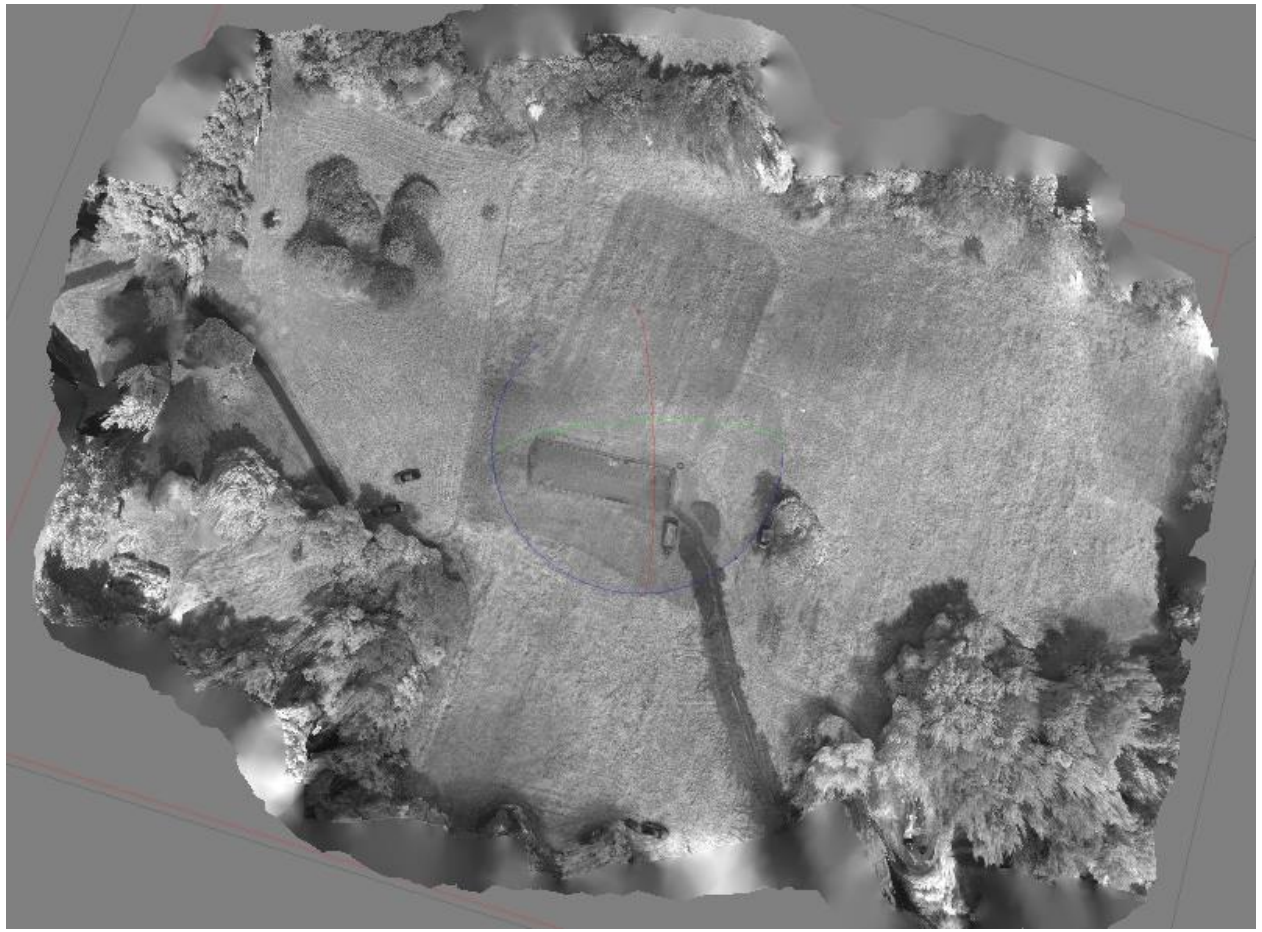
Agisoft PhotoScan – Dense Cloud

13 min
Low



Agisoft PhotoScan – Mesh

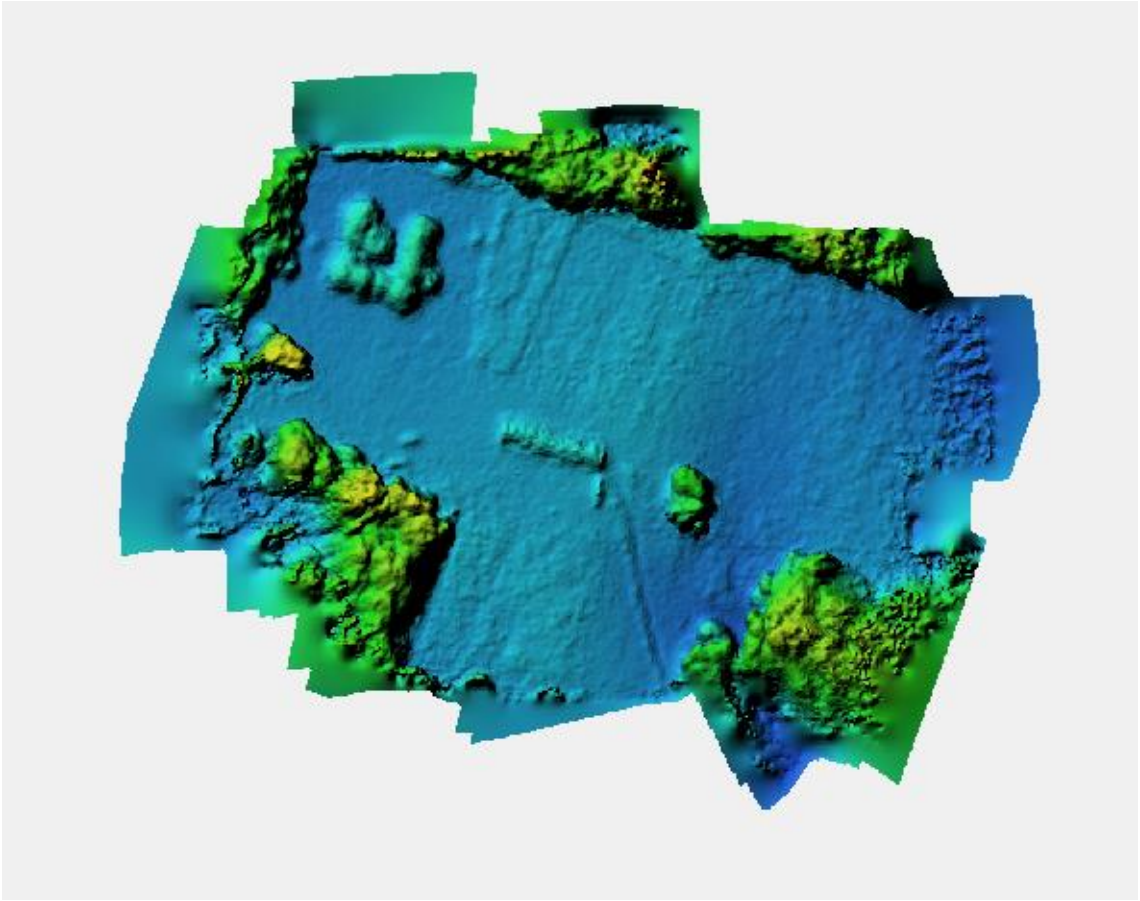
24 min
Medium



Agisoft PhotoScan – DEM

20 s
32.6 cm/px

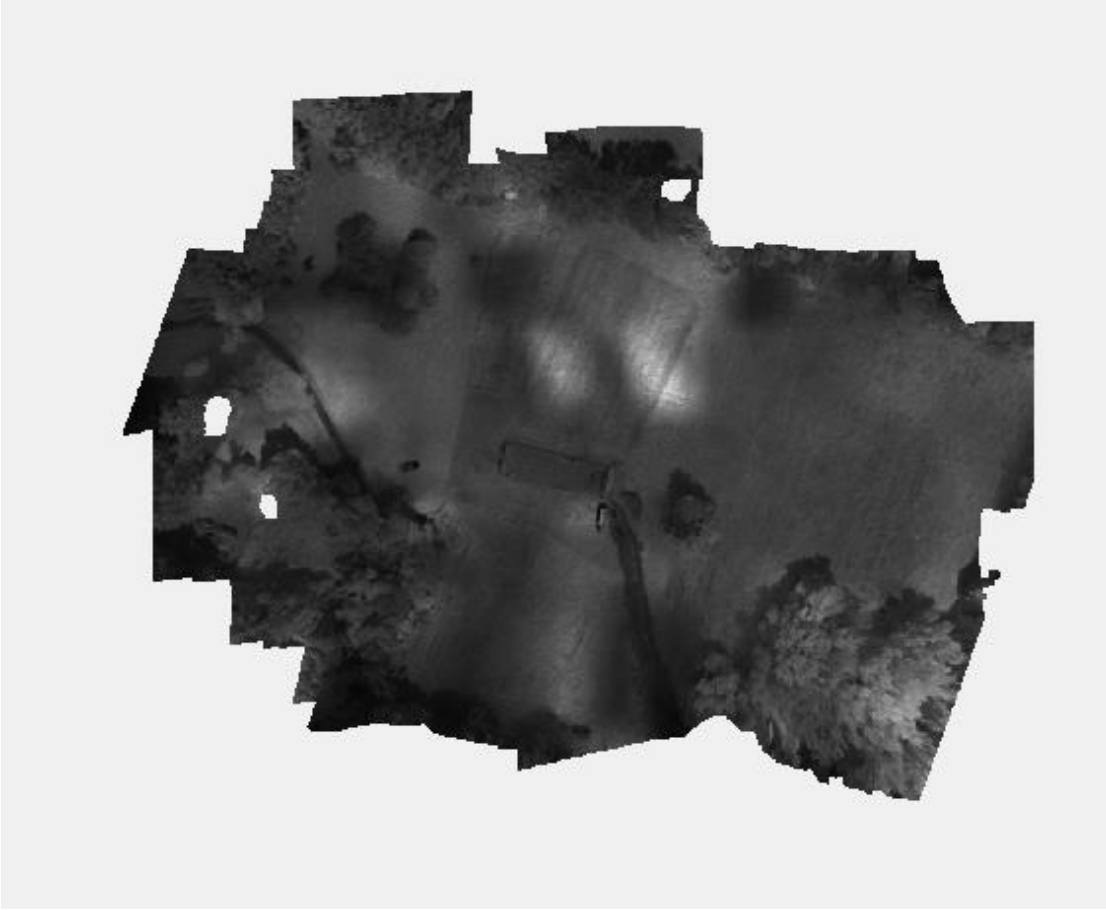
Something off?



Agisoft PhotoScan -- Orthomosaic

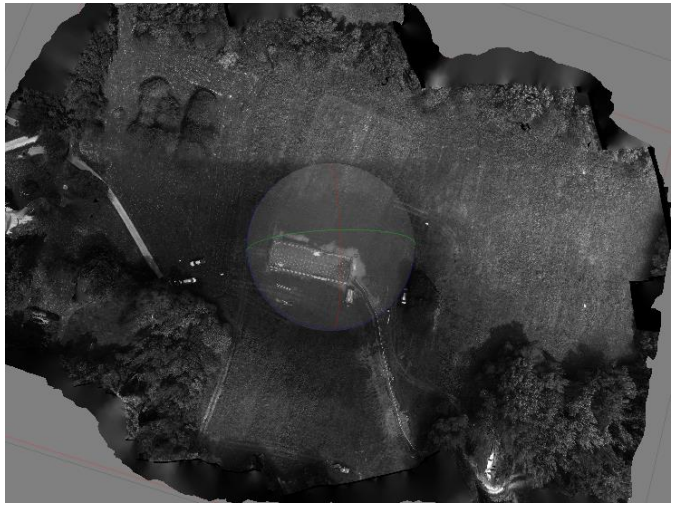
16 min
Medium

5 bands
4 cm/px

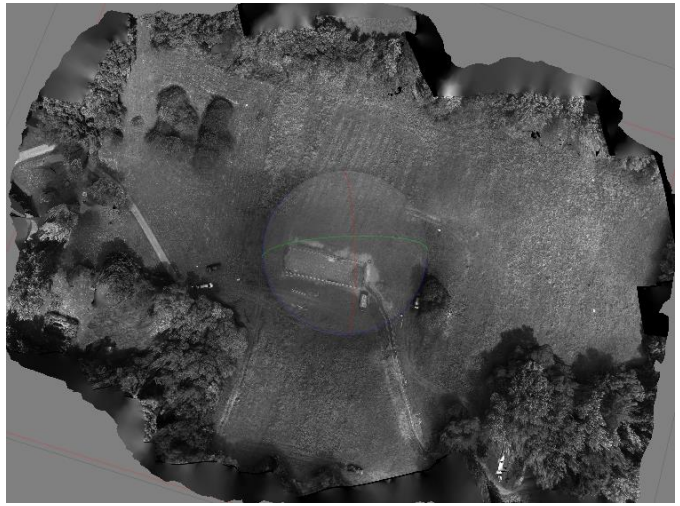


16 min
Medium

5 bands
4 cm/px

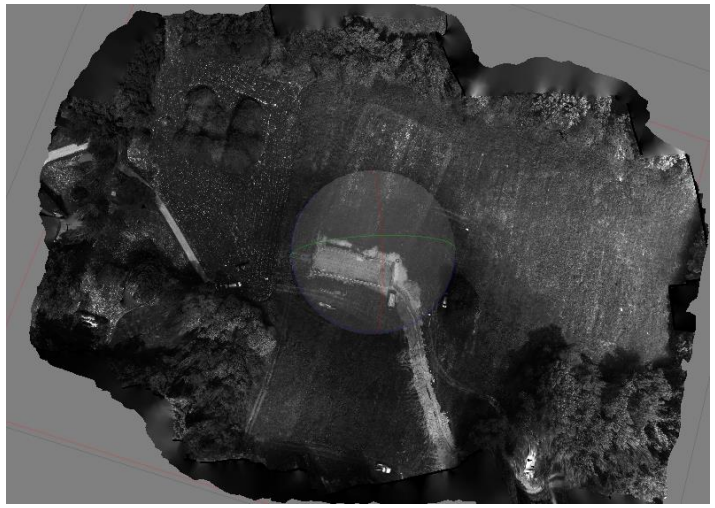


Blue

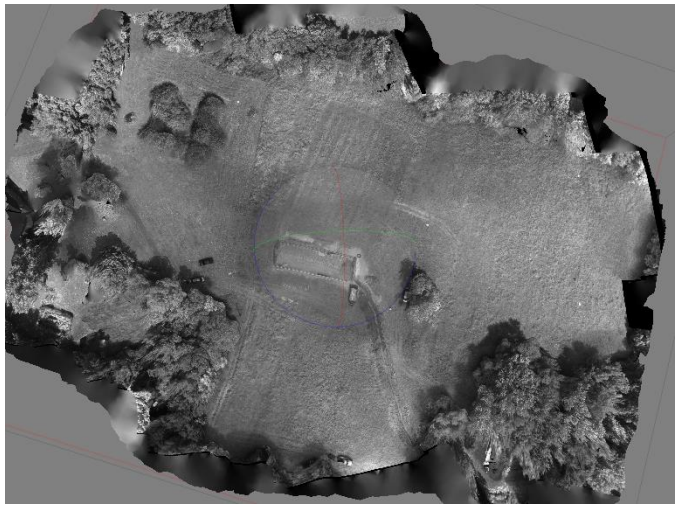


Green

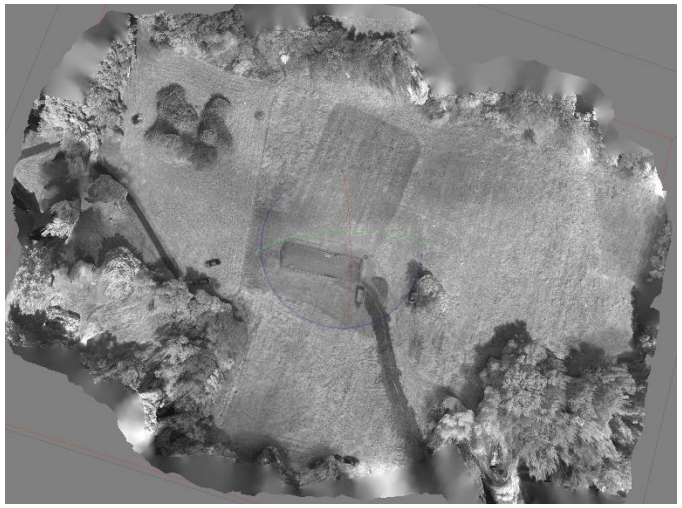
Red



Red Edge

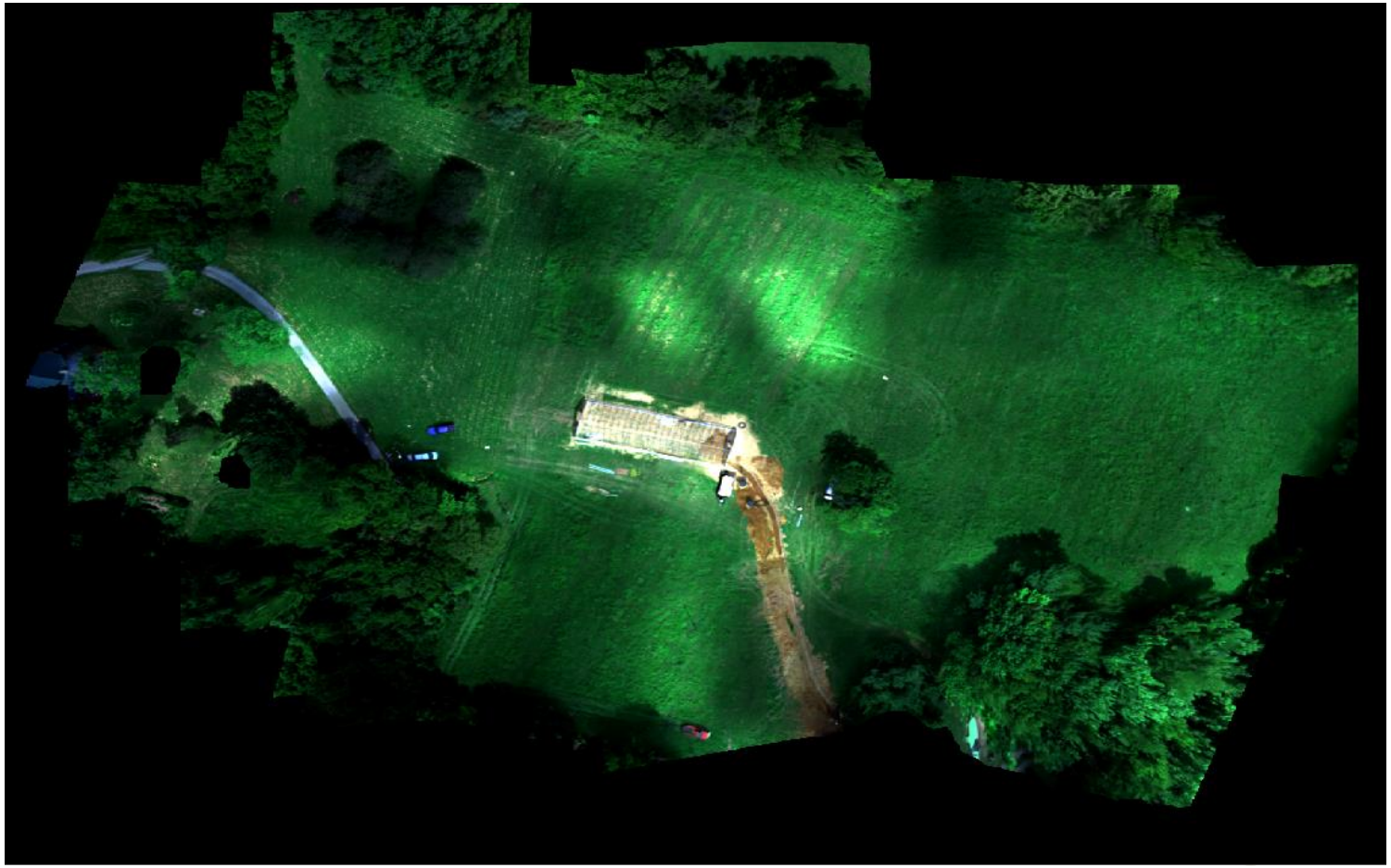


NIR



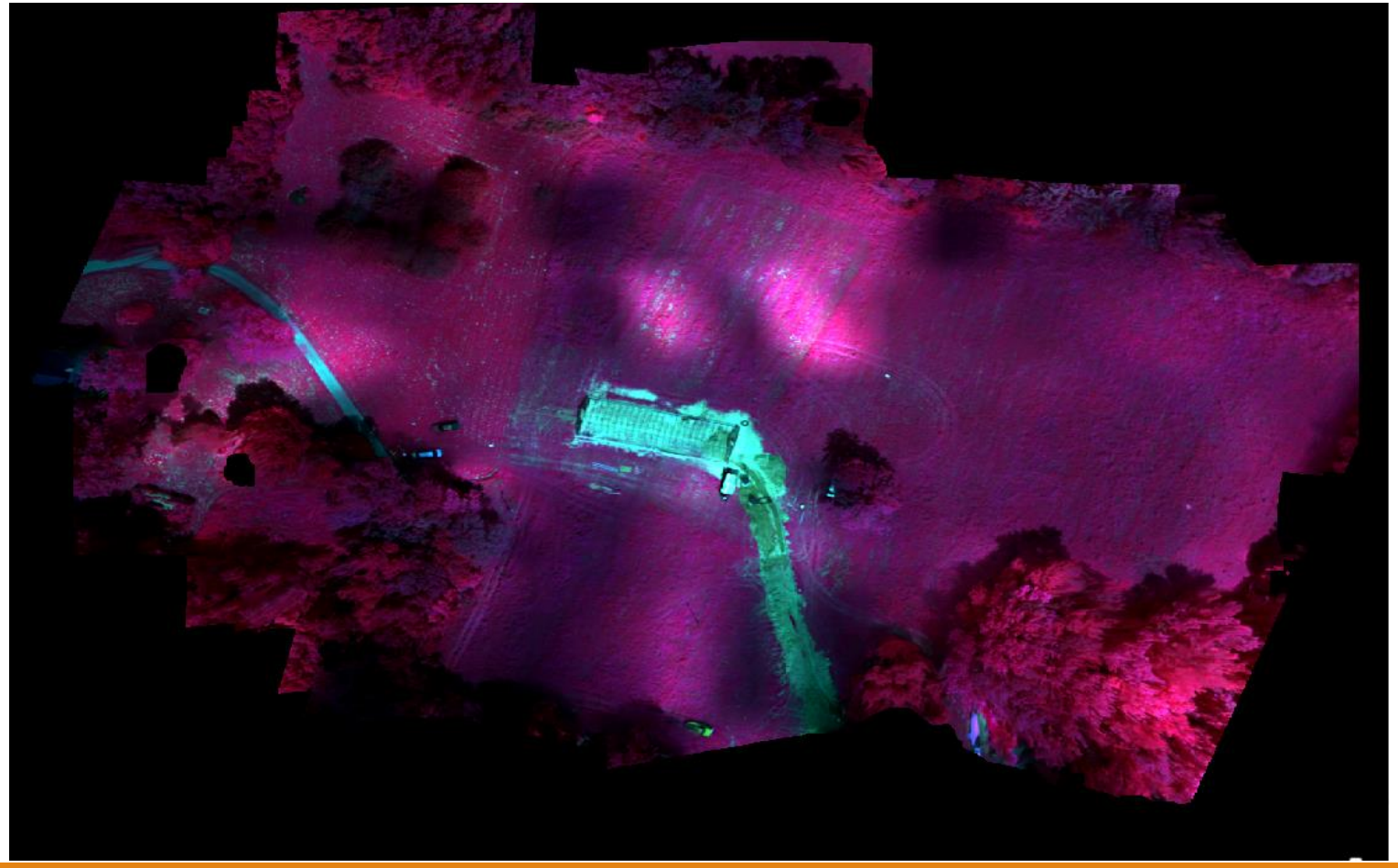
Data Analysis

Orthomosaic in ArcGIS Pro

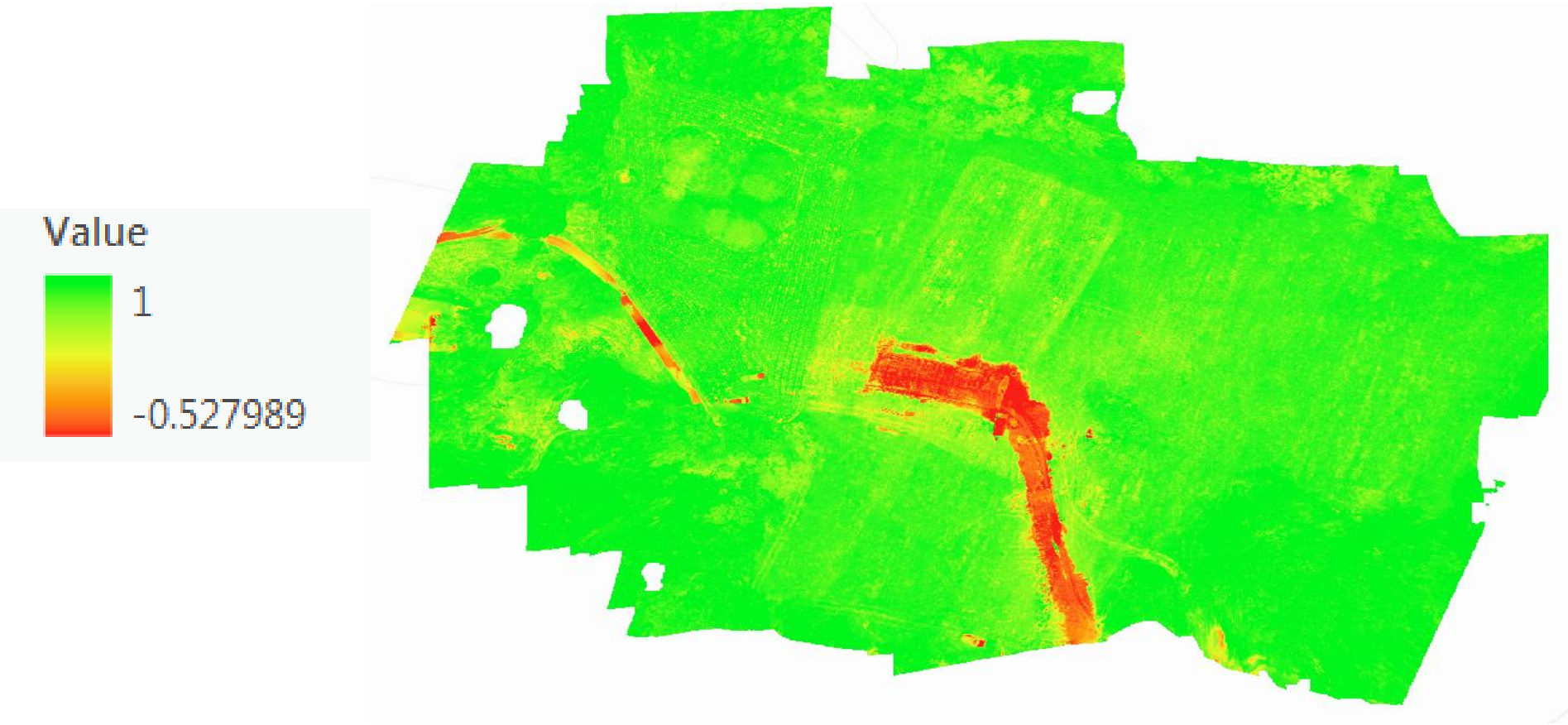


Orthomosaic in ArcGIS Pro

Orthomosaic in ArcGIS Pro



NDVI



Where to From Here

Working on linking lab computers together in order to reduce processing time

- Allow us to increase reconstruction quality

Need to verify the results of the NDVI

- Compare to LandSat?

Begin looking at other analyses that can be performed