Drones in agriculture at UC Davis

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Why drones in ag?

-need for increased agricultural production

-consumer demand for responsible farm management

-farm labor concerns

-agriculture will need to rapidly evolve… and drones are a powerful, rapidly evolving tool

What can drones do in agriculture?

- Research
  - Plant breeding
  - Improving agronomic practices
- Precision agriculture
  - Eye in the sky for farmers
- Application of sprays
  - Fewer recent advances than other sectors?

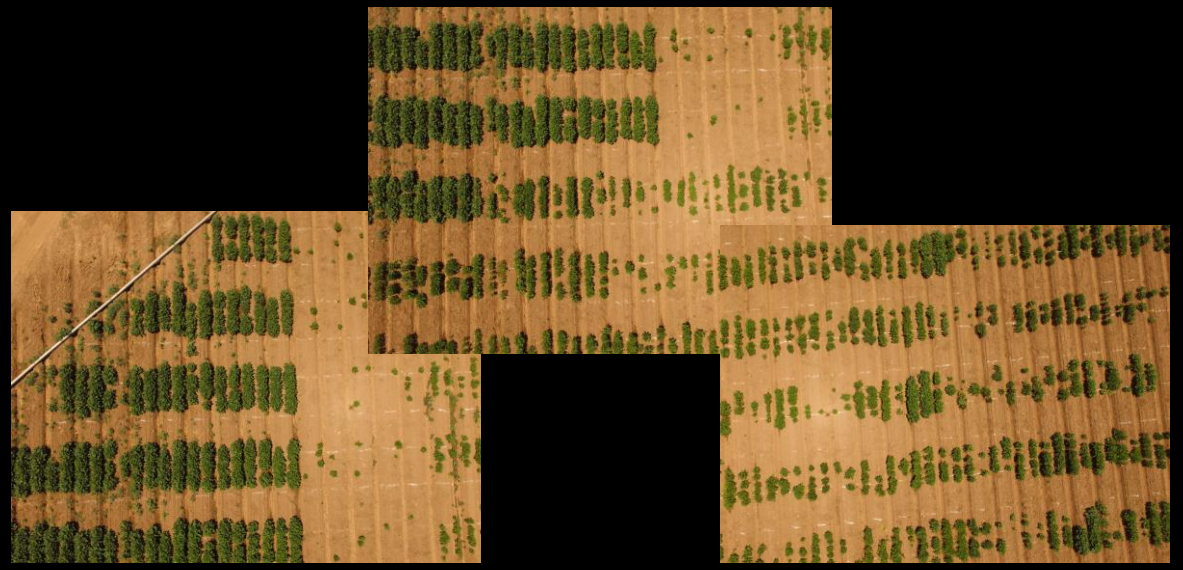
Typical UAS workflow for agricultural science:

1. Develop flight plan

Typical UAS workflow for agricultural science (cont'd):

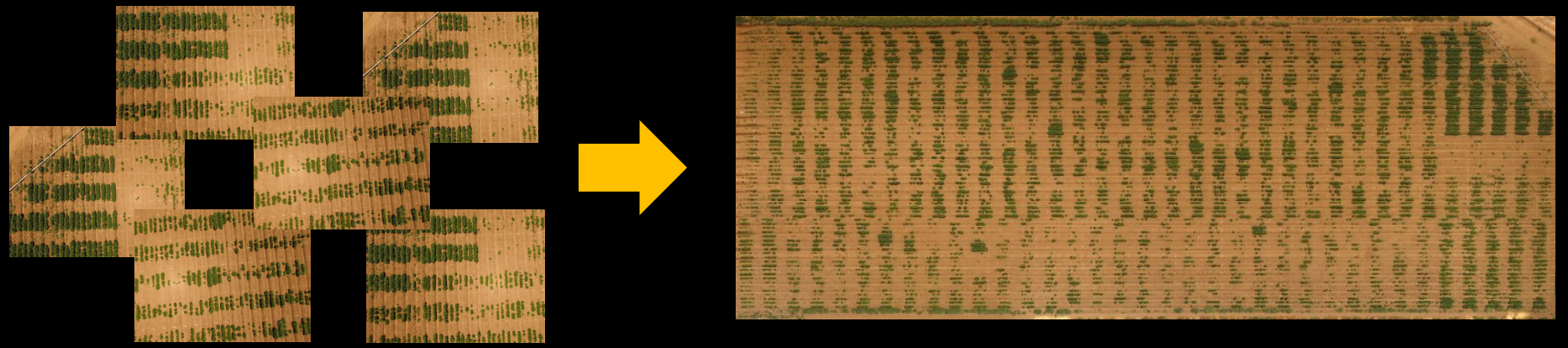
2. Collect data

3. Transfer imagery

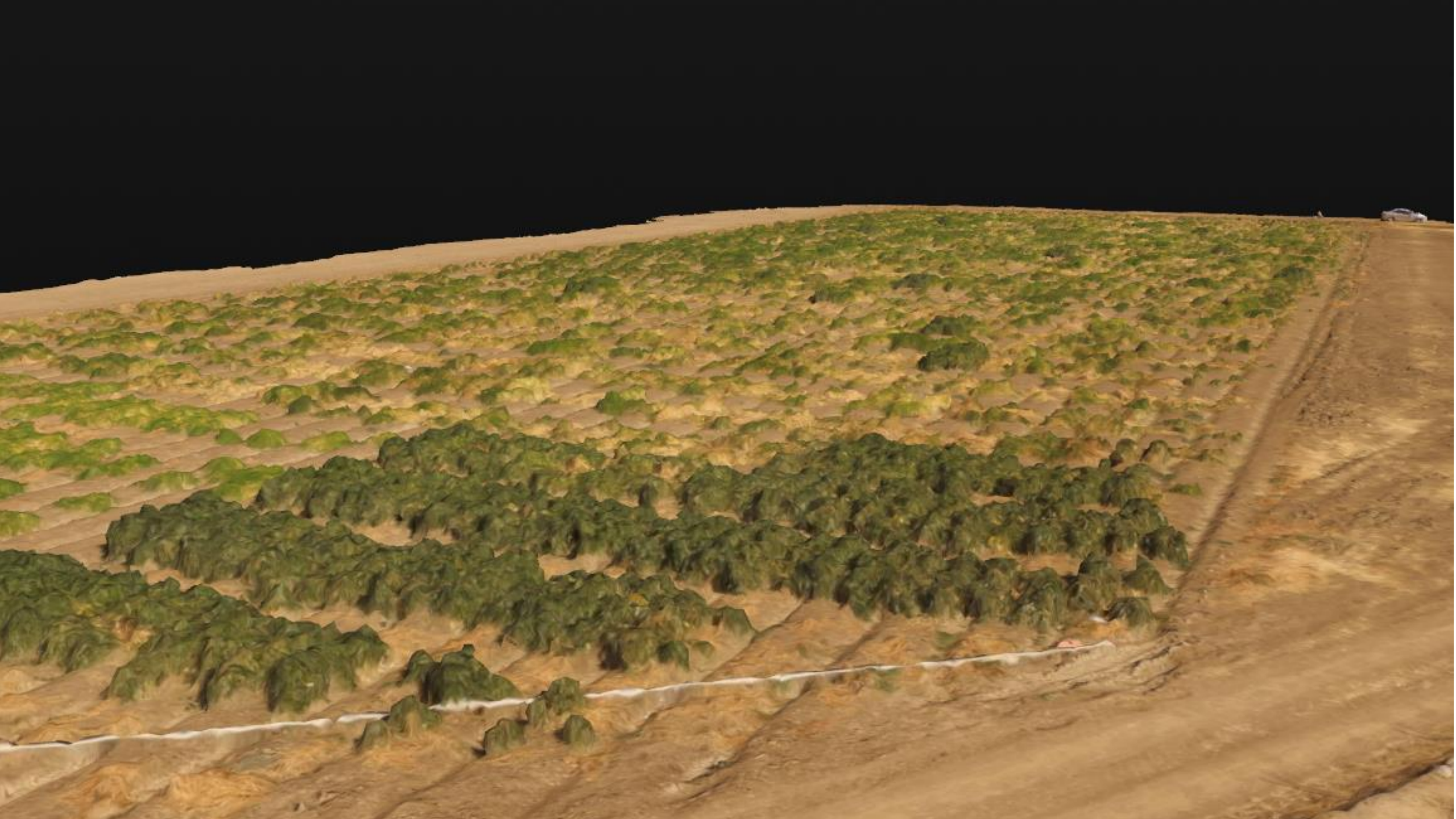


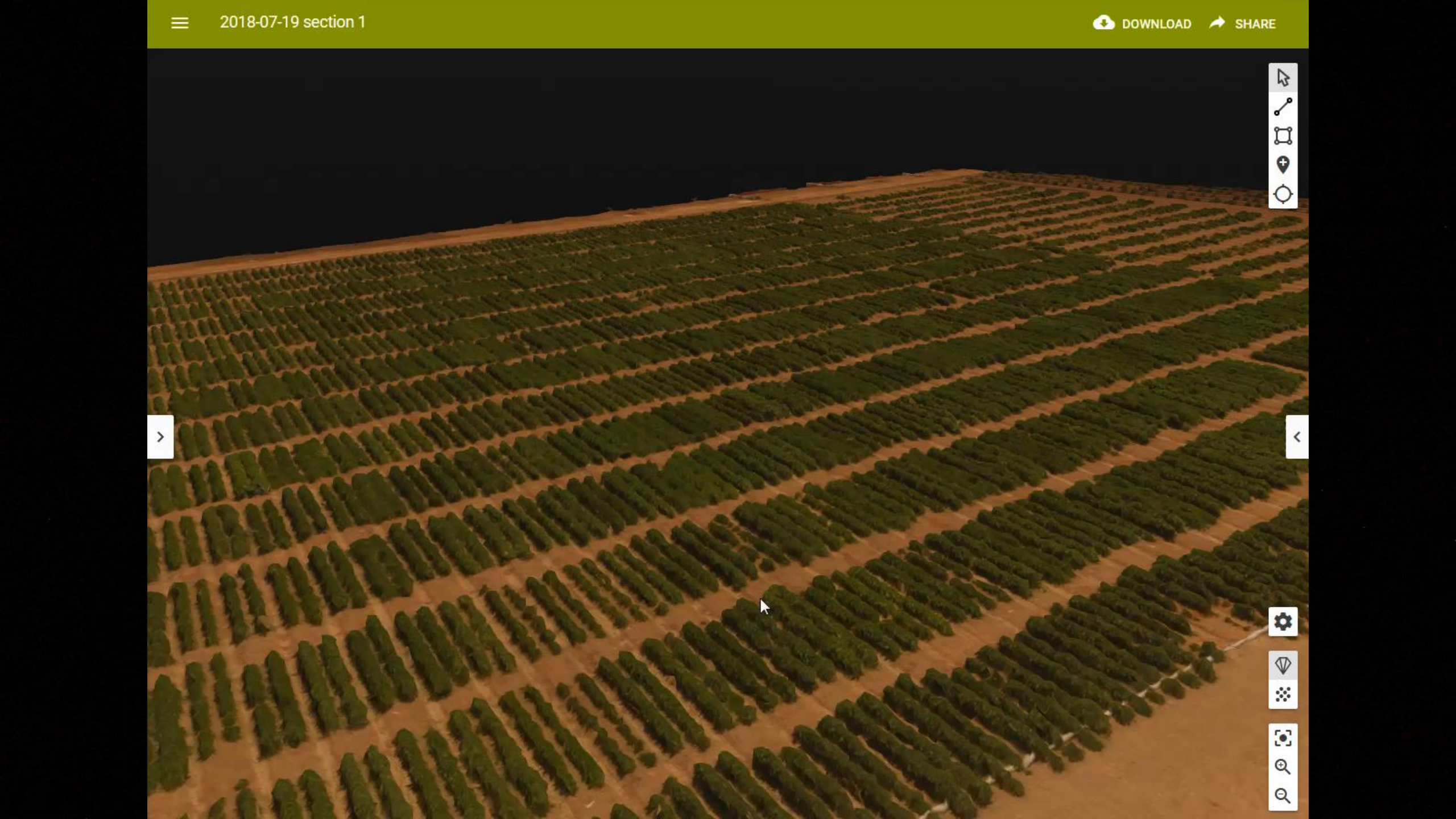
Typical UAS workflow for agricultural science (cont'd):

4. Construct models



PIX4D




2018-07-19 section 1
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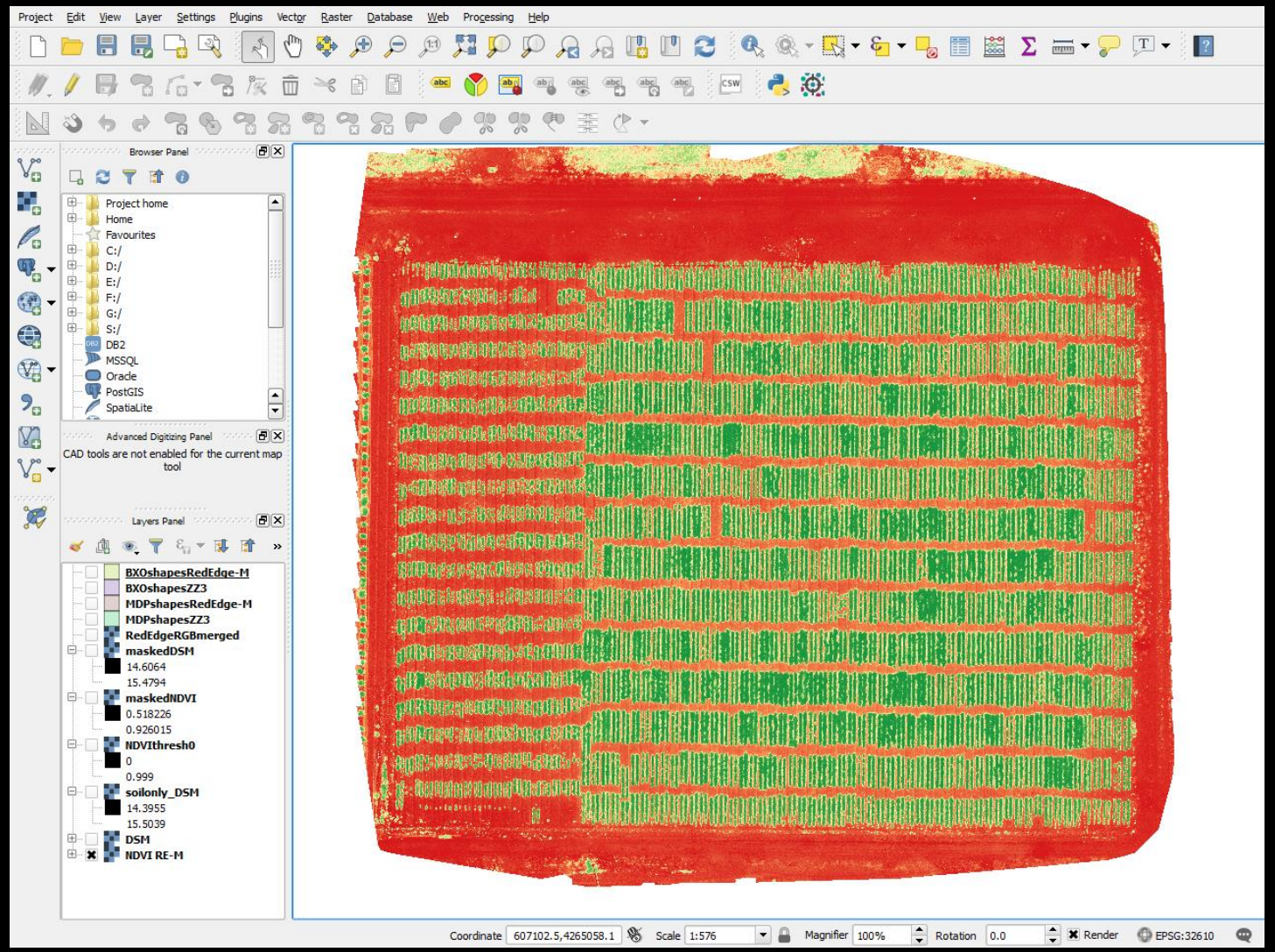
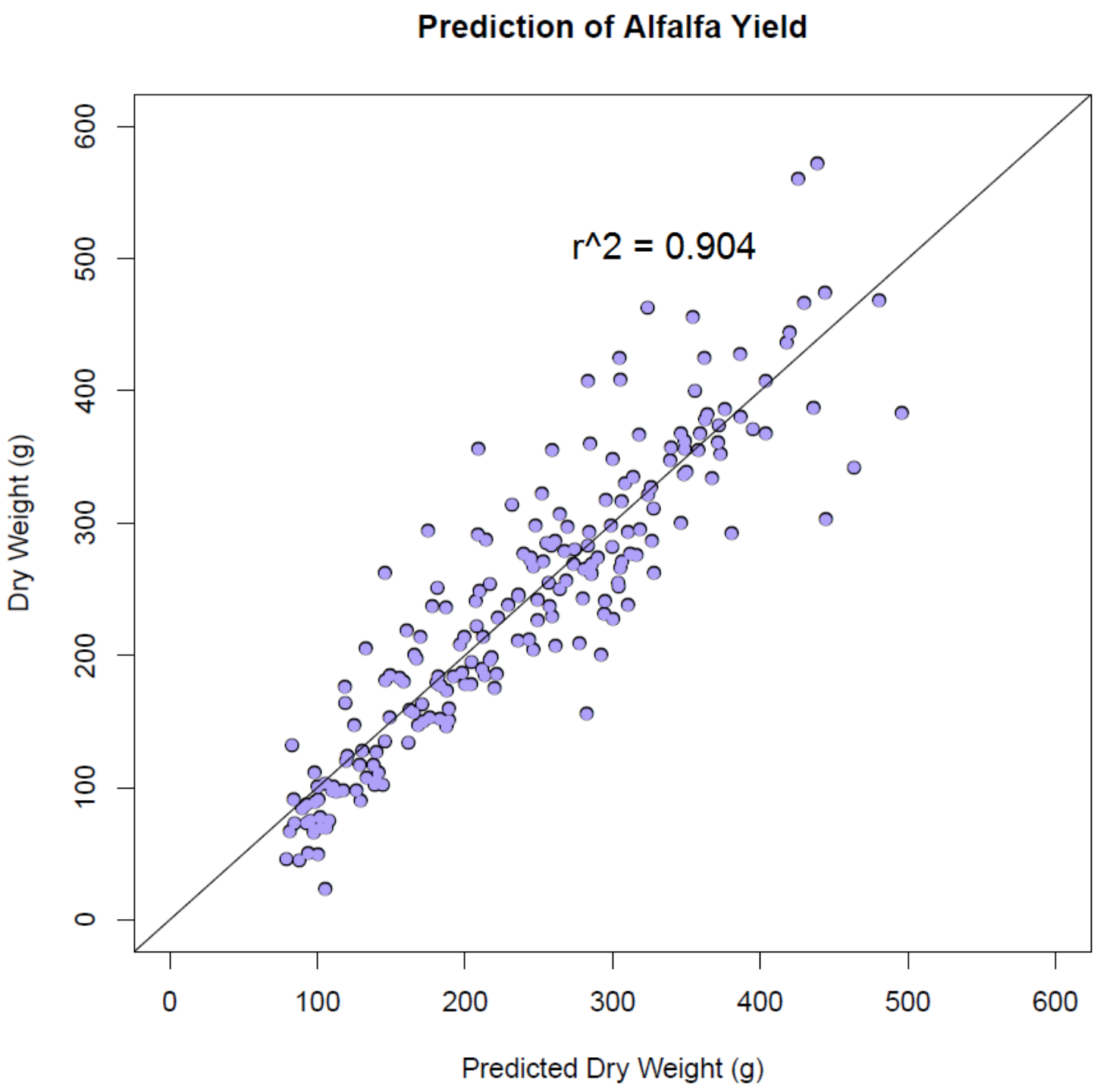
Typical UAS workflow for agricultural science (cont'd):

5. Export to other programs (e.g. QGIS)



Example: Alfalfa

- Old method: Hand-cut, dry, bag, weigh each plot individually
- New method: Fly drone, extract data from all plots simultaneously



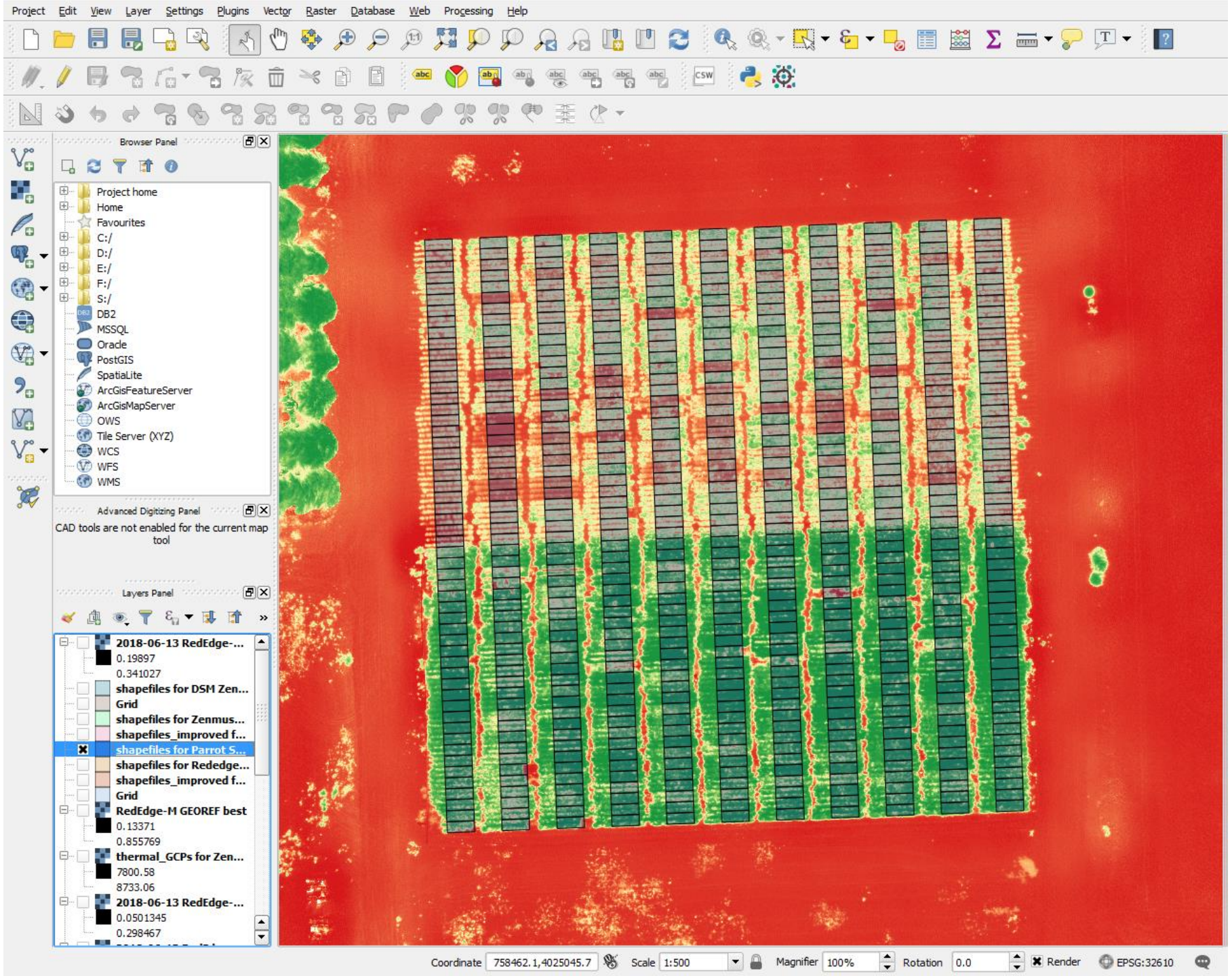
Takeaway: A few years ago, these results would have been impossible

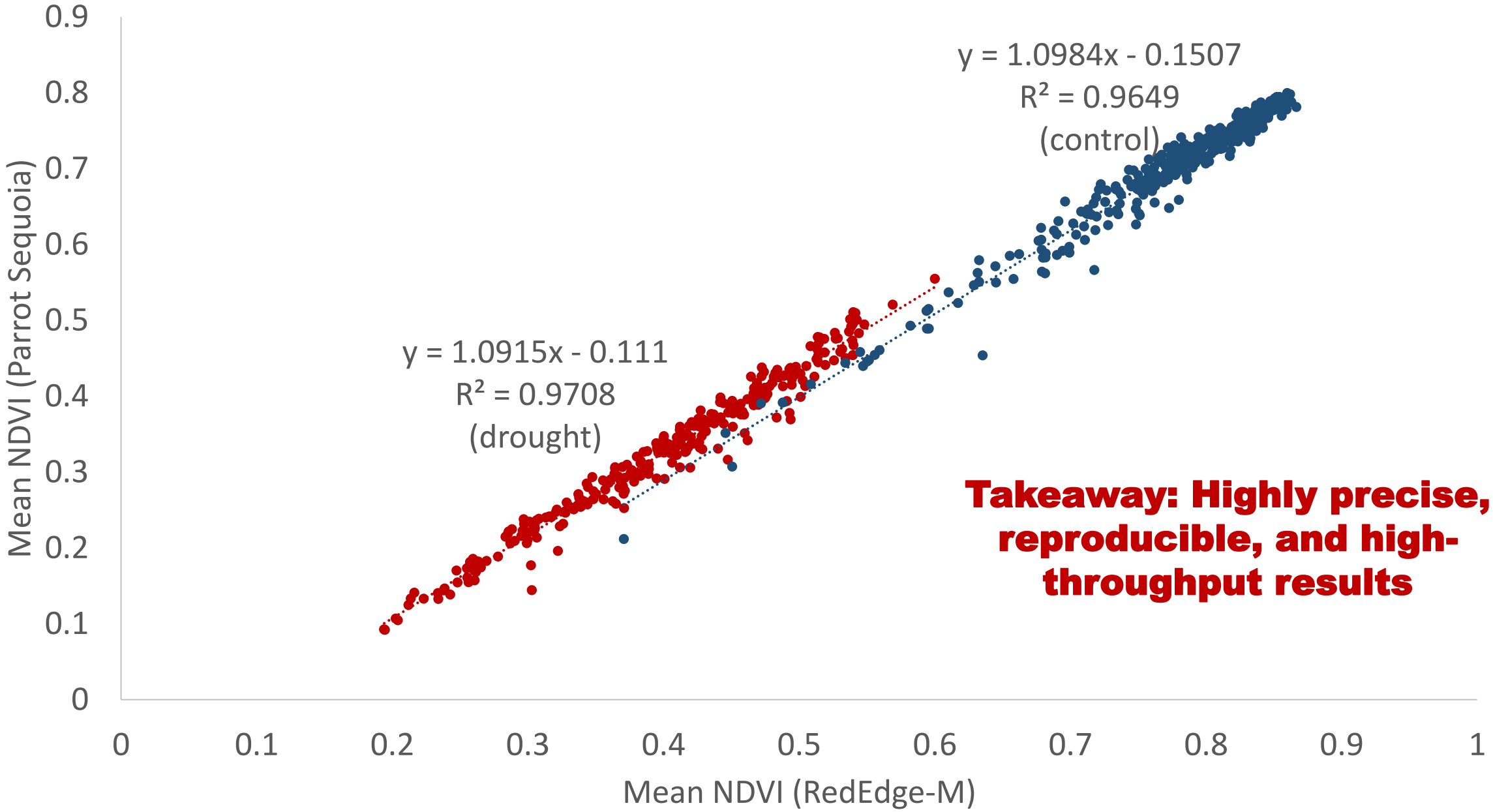
Sensors and vegetation indices

Health predicted by infrared and true color

(different camera)

+shapefiles for data extraction




y = 1.0984x - 0.1507
R² = 0.9649
(control)
y = 1.0915x - 0.111
R² = 0.9708
(drought)
Takeaway: Highly precise, reproducible, and high-throughput results
Mean NDVI (Parrot Sequoia)
Mean NDVI (RedEdge-M)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

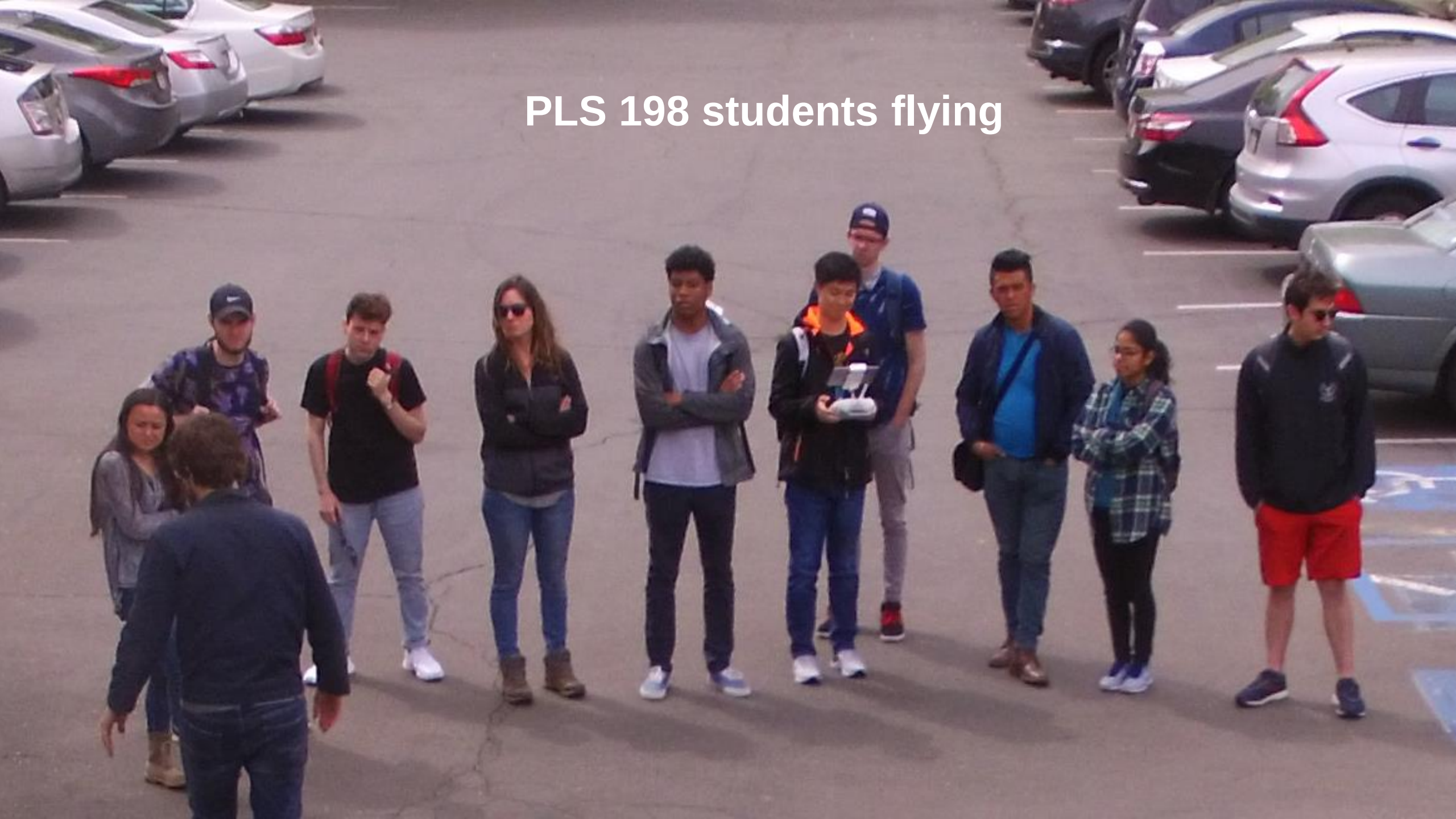
Drones as an educational tool

Drones as an educational tool

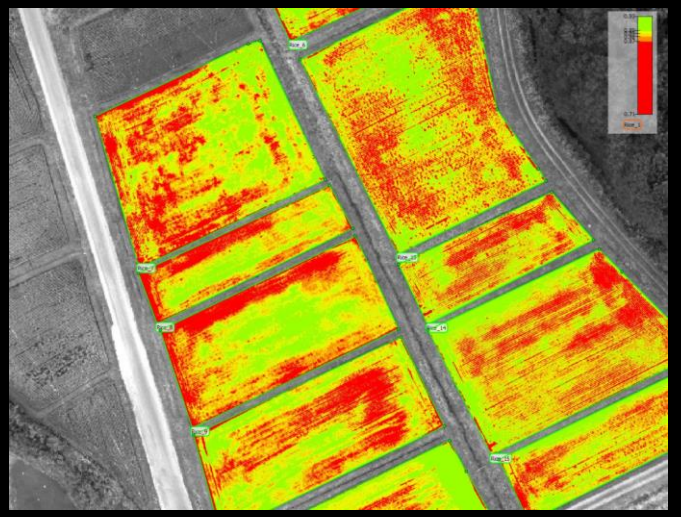
Field day demonstration flights with farmers

PLS 198 student training

PLS 198 students flying



Unmanned Aerial Vehicles (UAVs) in Agriculture



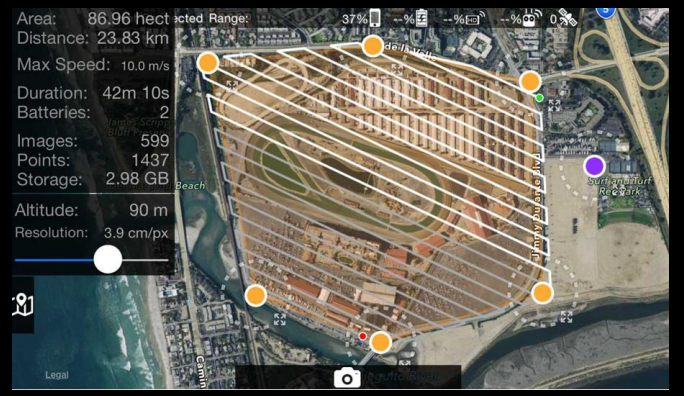
PLS 198-32, Spring 2019, 2 units
CRN: 87027

M 11am-12pm, W 1pm-4pm

Instructor: Travis Parker

trparker@ucdavis.edu

Instructor of record: Paul Gepts



Education and outreach

PLS 198 student groups

KPBS: “A Growing Passion”

Heirloom (at left) and new variety (right)

The future of farming…

Summary

- Agriculture will need major advances in coming decades
- Drones are useful for many different agricultural applications
- Drones collect highly precise, high-throughput data, which was out of reach just a few years ago
- Drones are an excellent tool for engaging the next generation of innovators

Thanks!

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