Agroview: Cloud-based software to process, analyze, and visualize UAV-collected data

Precision Engineering Program

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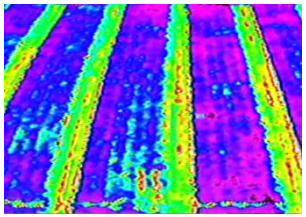
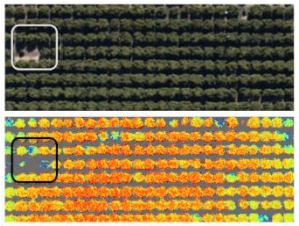
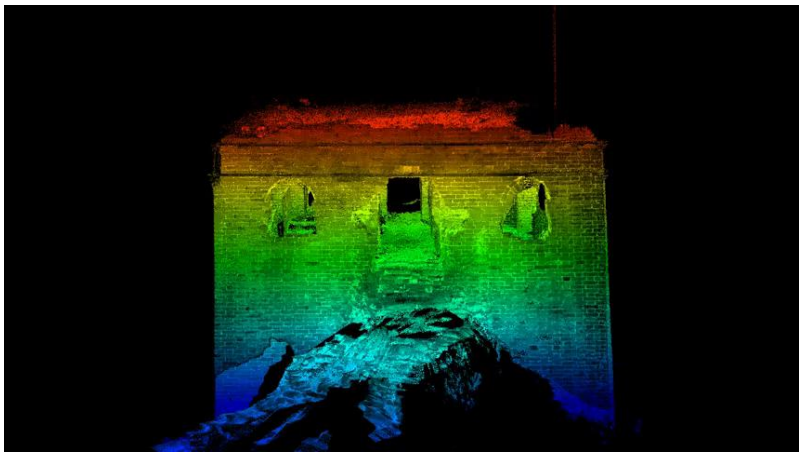
UAV Imaging

- Thermal
- Multi-Spectral
- Visual – RGB
- LiDAR







UAV-based EDIS Documentation

- Kakarla S.C., and Ampatzidis Y., 2018. ***Instructions on the Use of Unmanned Aerial Vehicles (UAVs) for Agricultural Applications***. EDIS, University of Florida, IFAS Extension.
- Kakarla S.C., De Morais L., and Ampatzidis Y., 2019. ***Pre-Flight and Flight Instructions on the Use of Unmanned Aerial Vehicles (UAVs) for Agricultural Applications***. EDIS, University of Florida, IFAS Extension.
- Kakarla S.C., and Ampatzidis Y., 2019. ***Post-Flight Data Processing Instructions on the Use of Unmanned Aerial Vehicles (UAVs) for Agricultural Applications***. EDIS, University of Florida, IFAS Extension.
- Ampatzidis Y., 2018. ***Applications of Artificial Intelligence for Precision Agriculture***. EDIS, University of Florida, IFAS Extension.

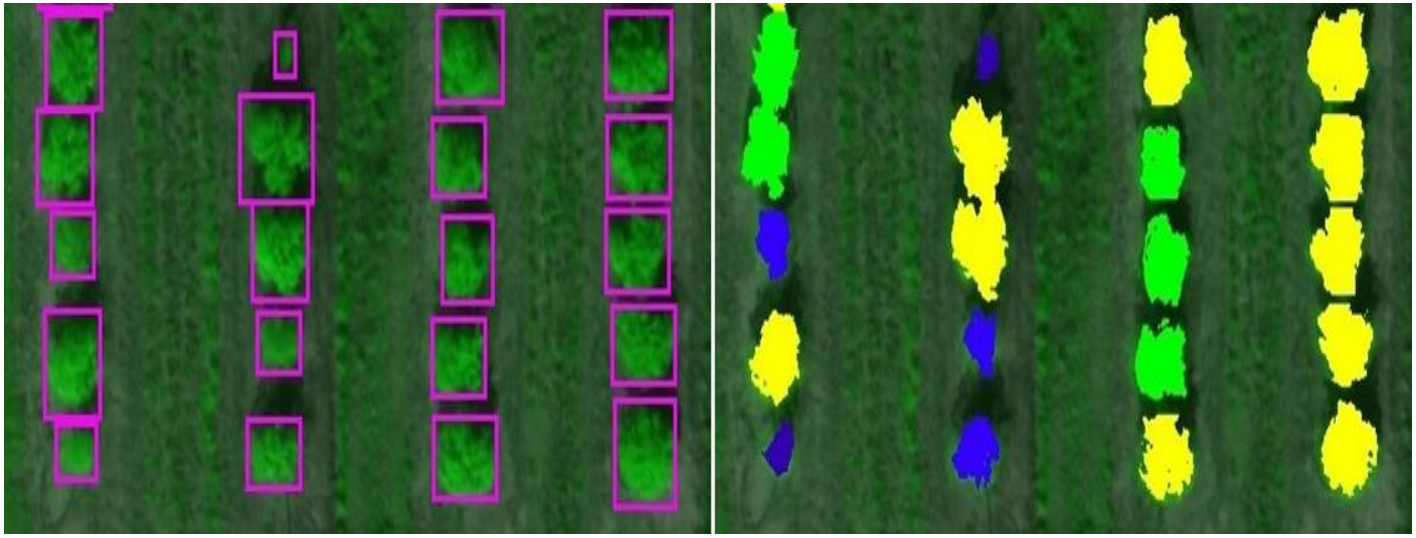
Image Detection using Artificial Intelligence (AI)

- Using AI and deep learning algorithm, we make use of an existing neural network such as alexnet, googlenet and train them to identify and detect objects according to our requirements
- We are currently using YOLO on NVIDIA Jetson TX2 board to train the neural networks such that it identifies and detects flowers, fruits, leaves and categorize them into healthy or unhealthy.
- We are also planning on incorporating the image detection process into various mechanical systems such as harvesters and weed blasters for effective extraction of fruits and removal of weeds.

Detection of trees and categorizing them based on health and size

Image Source: PrecisionMapper

Ampatzidis Y., and Partel V., 2019. UAV-based High Throughput Phenotyping in Citrus Utilizing Multispectral Imaging and Artificial Intelligence. Remote Sensing, 11(4), 410; doi: 10.3390/rs11040410.



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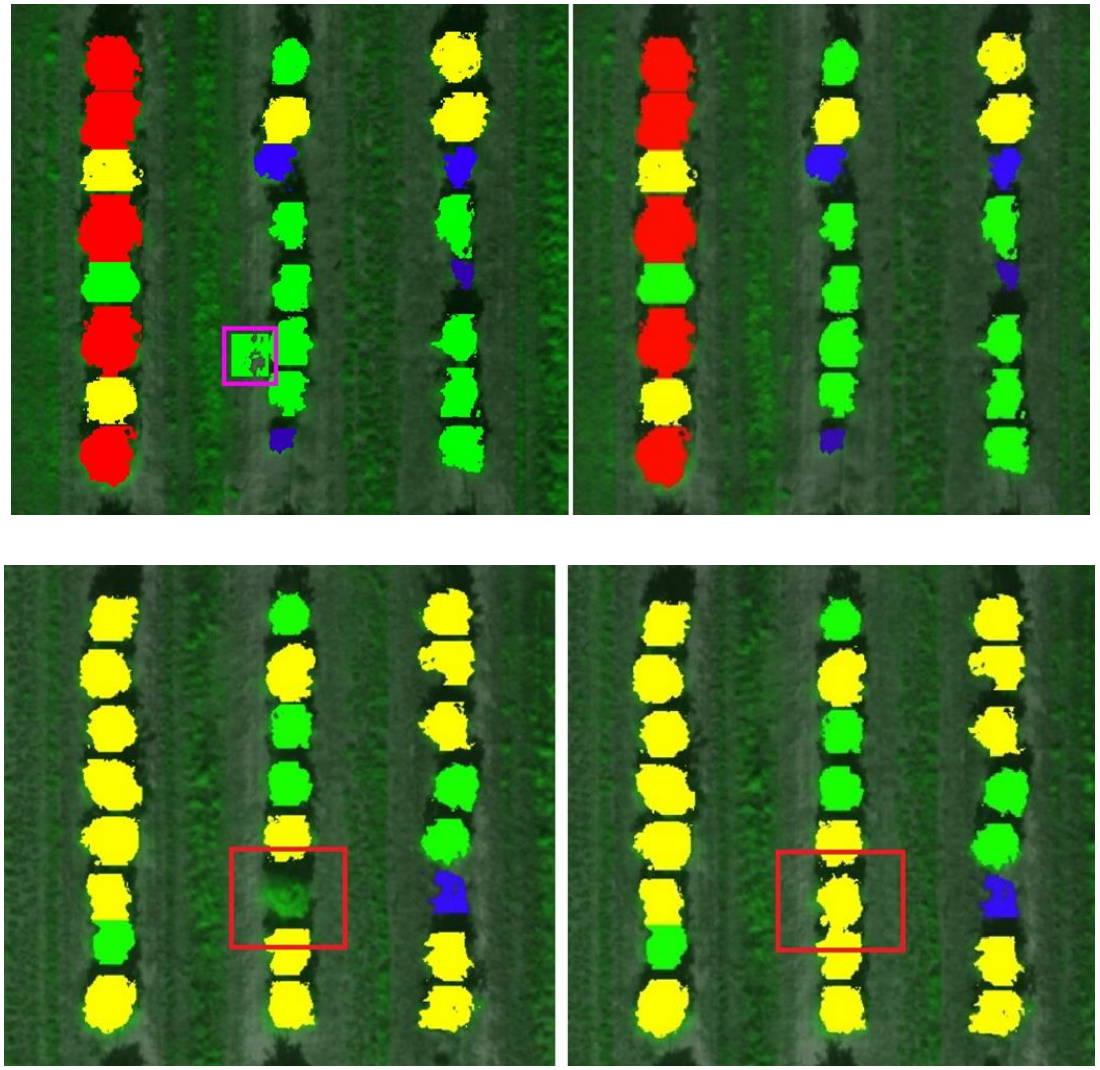
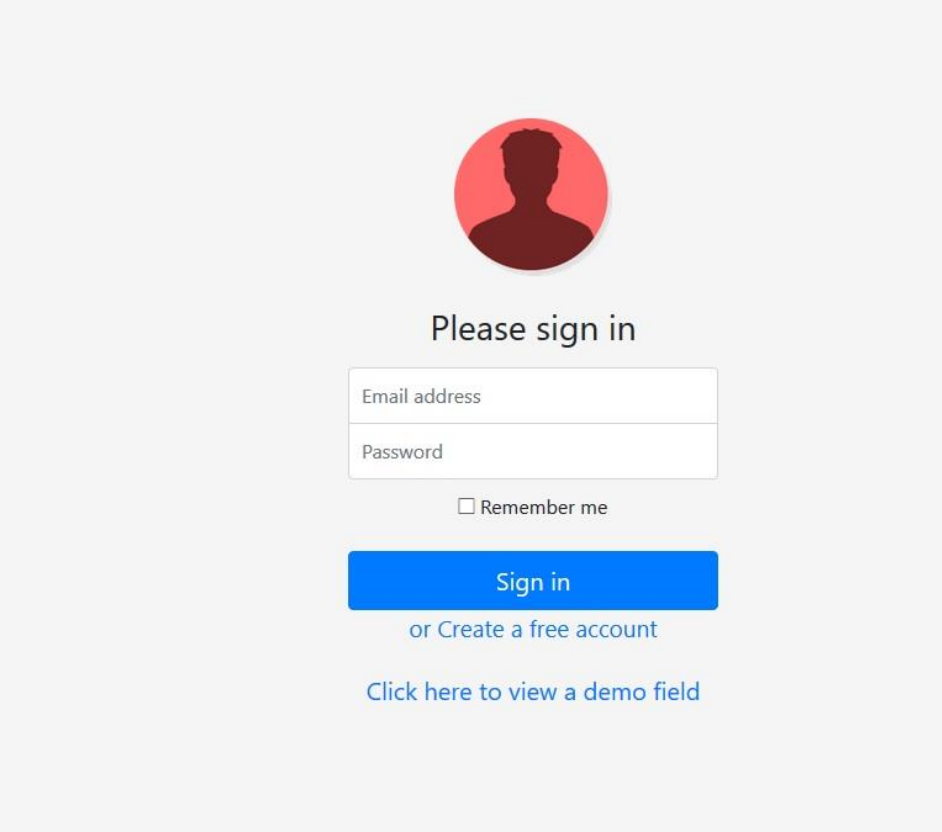
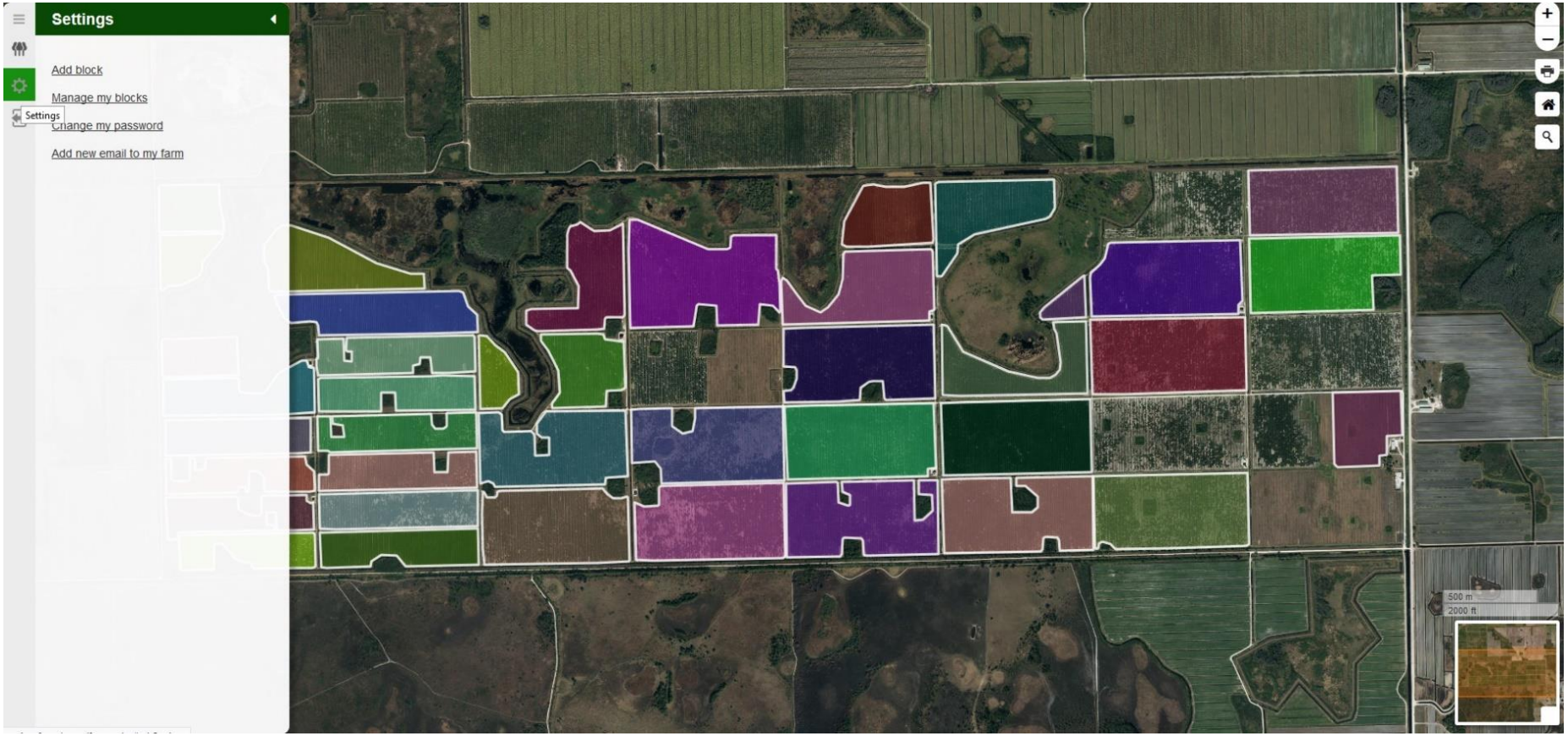


Agroview – sing in

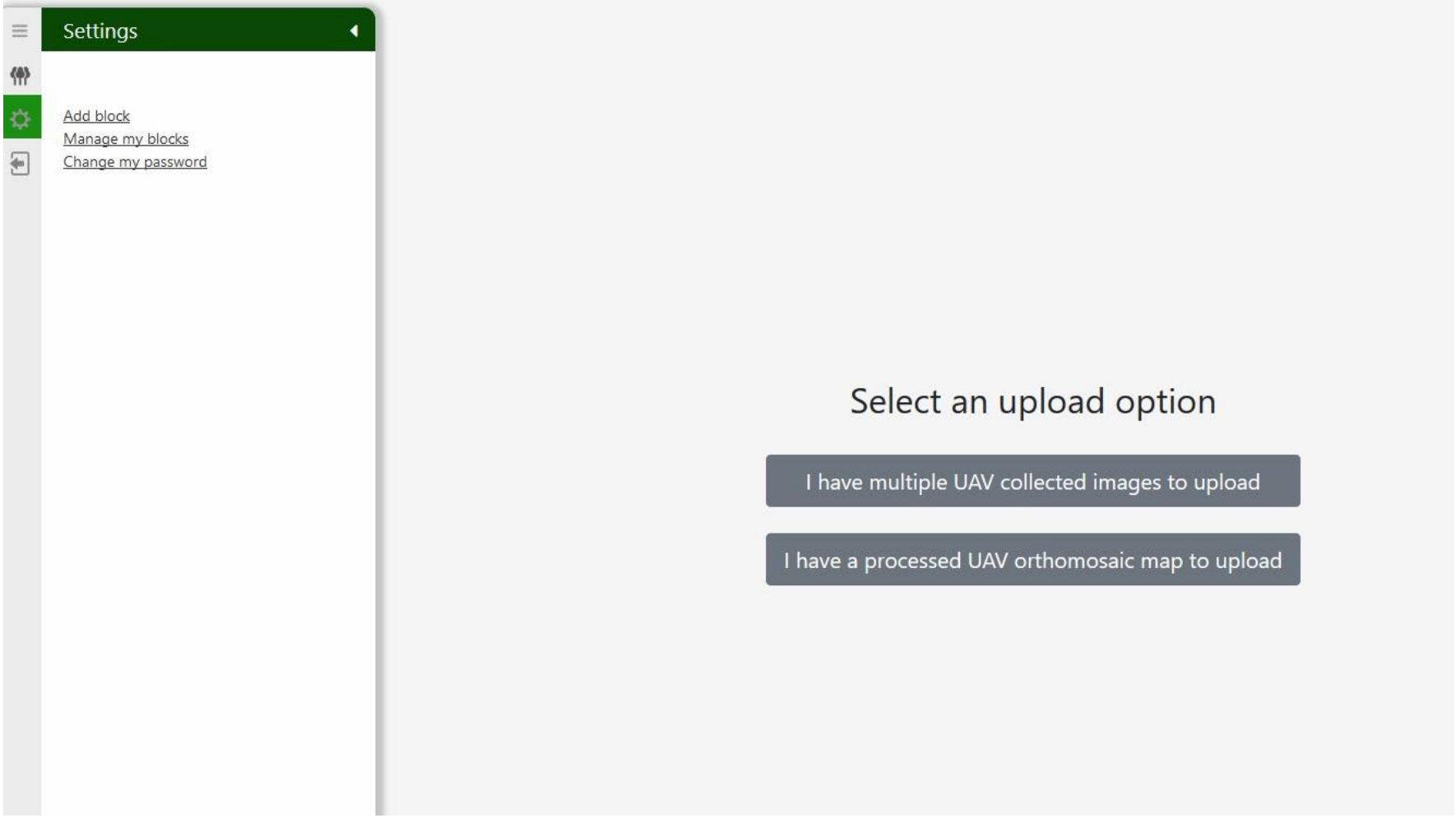


- UAV and ground-based high throughput phenotyping in citrus utilizing artificial intelligence. Huanglongbing Multi-Agency Coordination (MAC) Group. Duration: 8/1/2019 – 7/31/2021.
- UAV-based high throughput phenotyping in specialty crops utilizing artificial intelligence. Florida Specialty Crop Block Grant Program - Farm Bill (SCBGP-FB). Duration: 1/1/2020 – 8/31/2022.

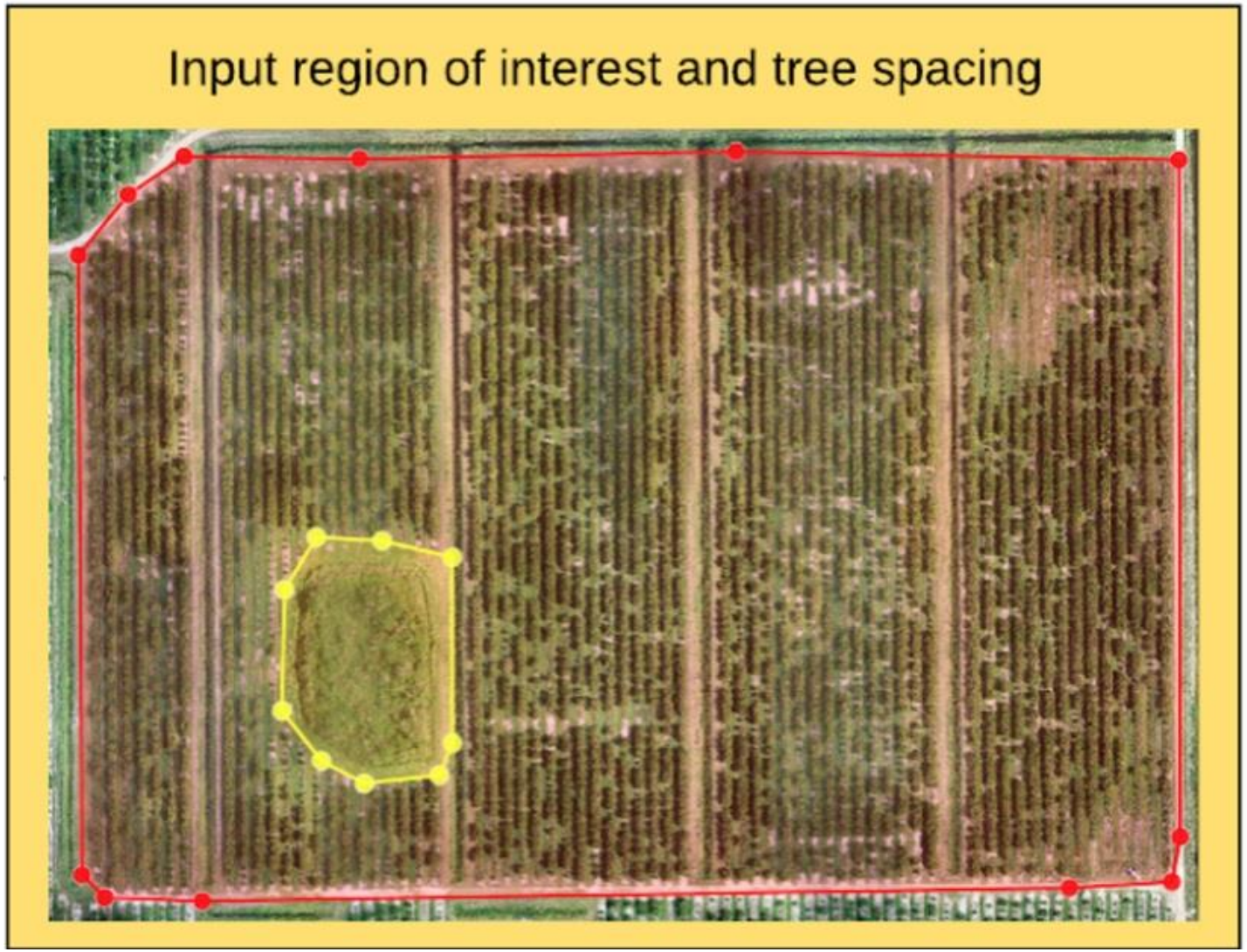
Agroview – settings



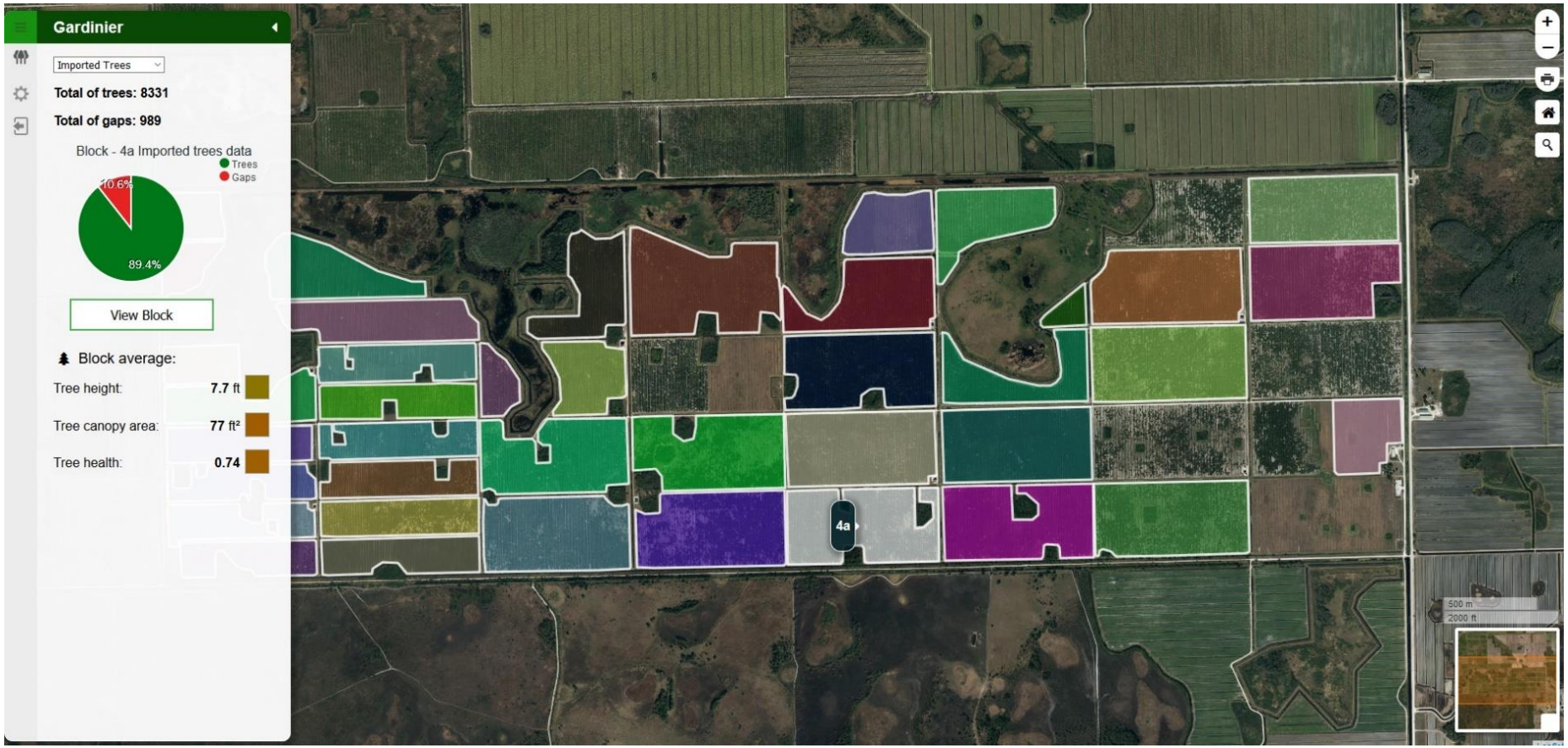
Agroview – add block



Agroview – create field boundaries



Agroview – farm analytics



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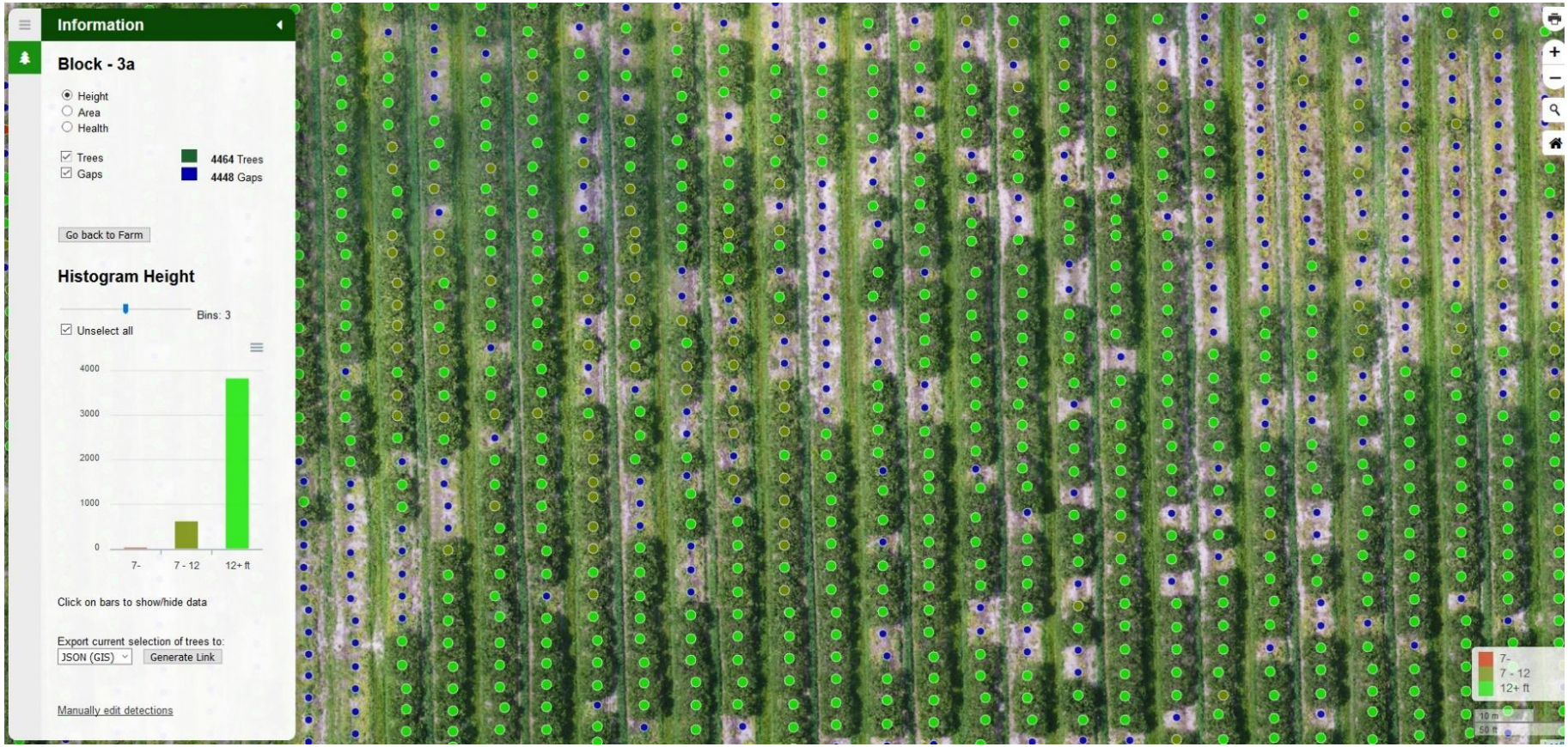
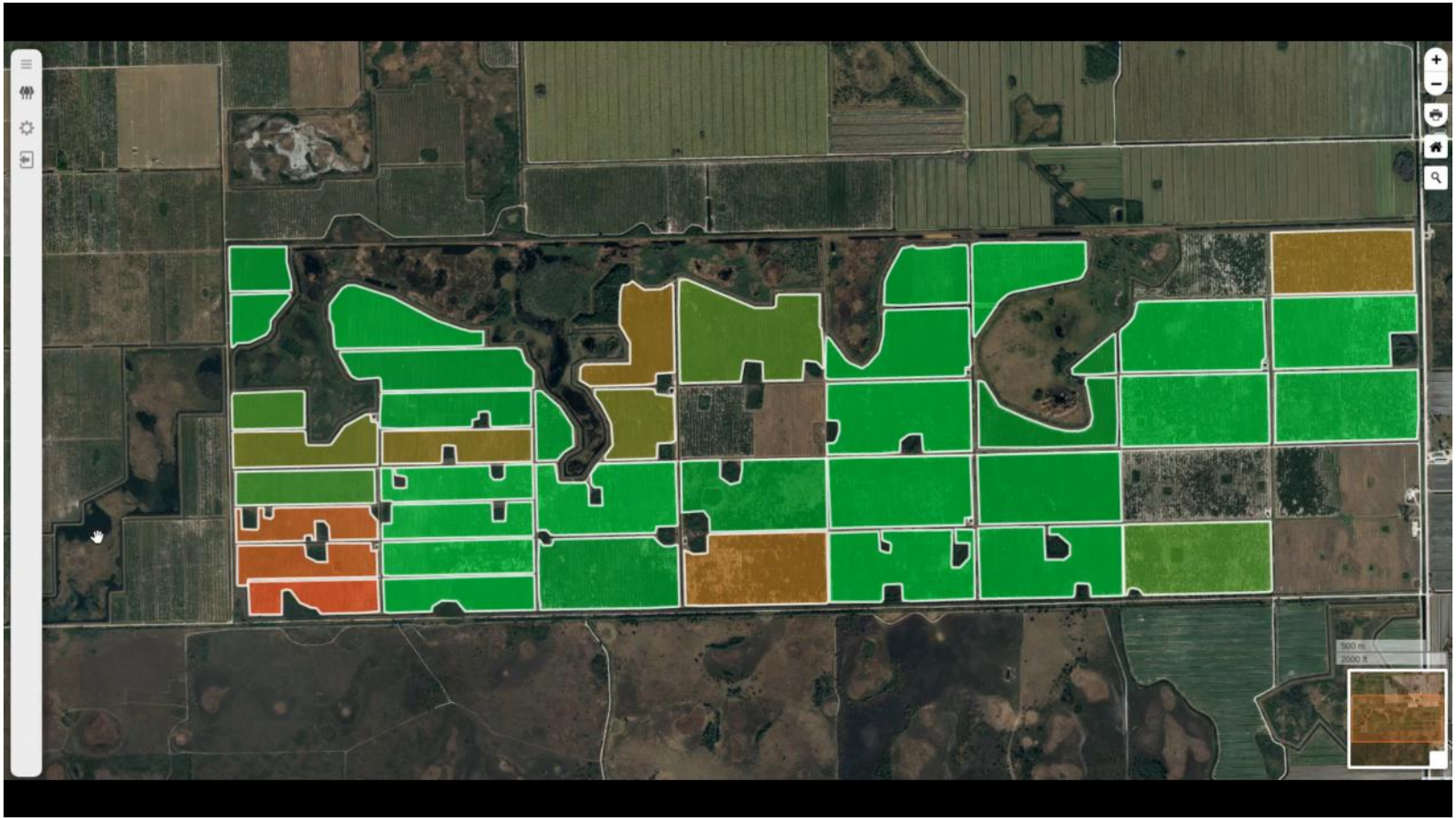
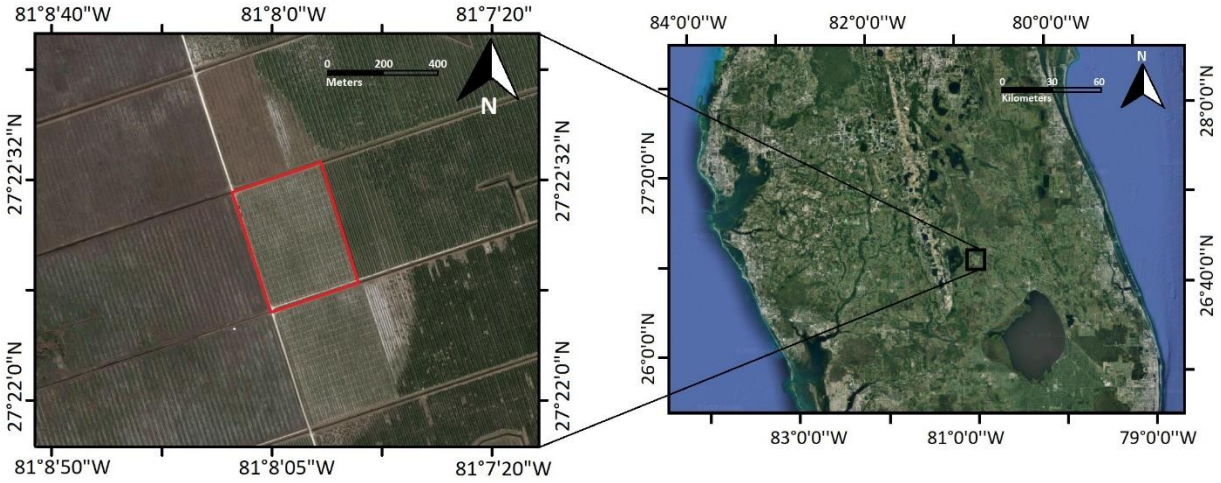


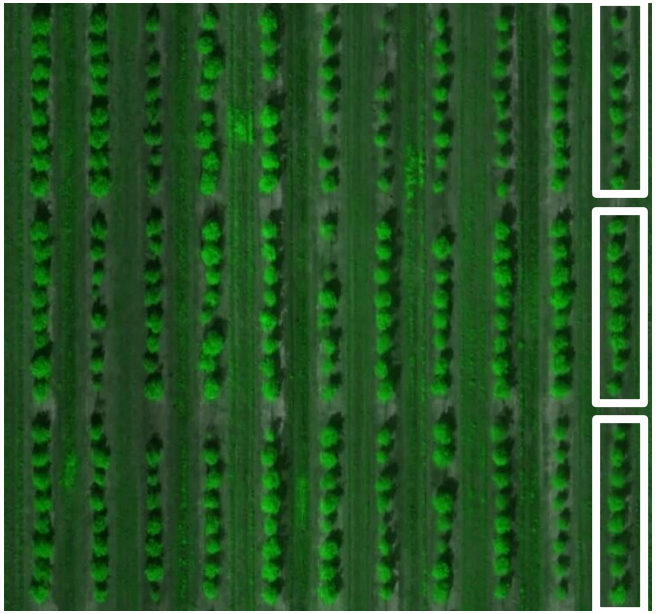
Cloud-based application to process, analyze, and to visualize UAV collected data



https://twitter.com/i/status/1202671242647490560

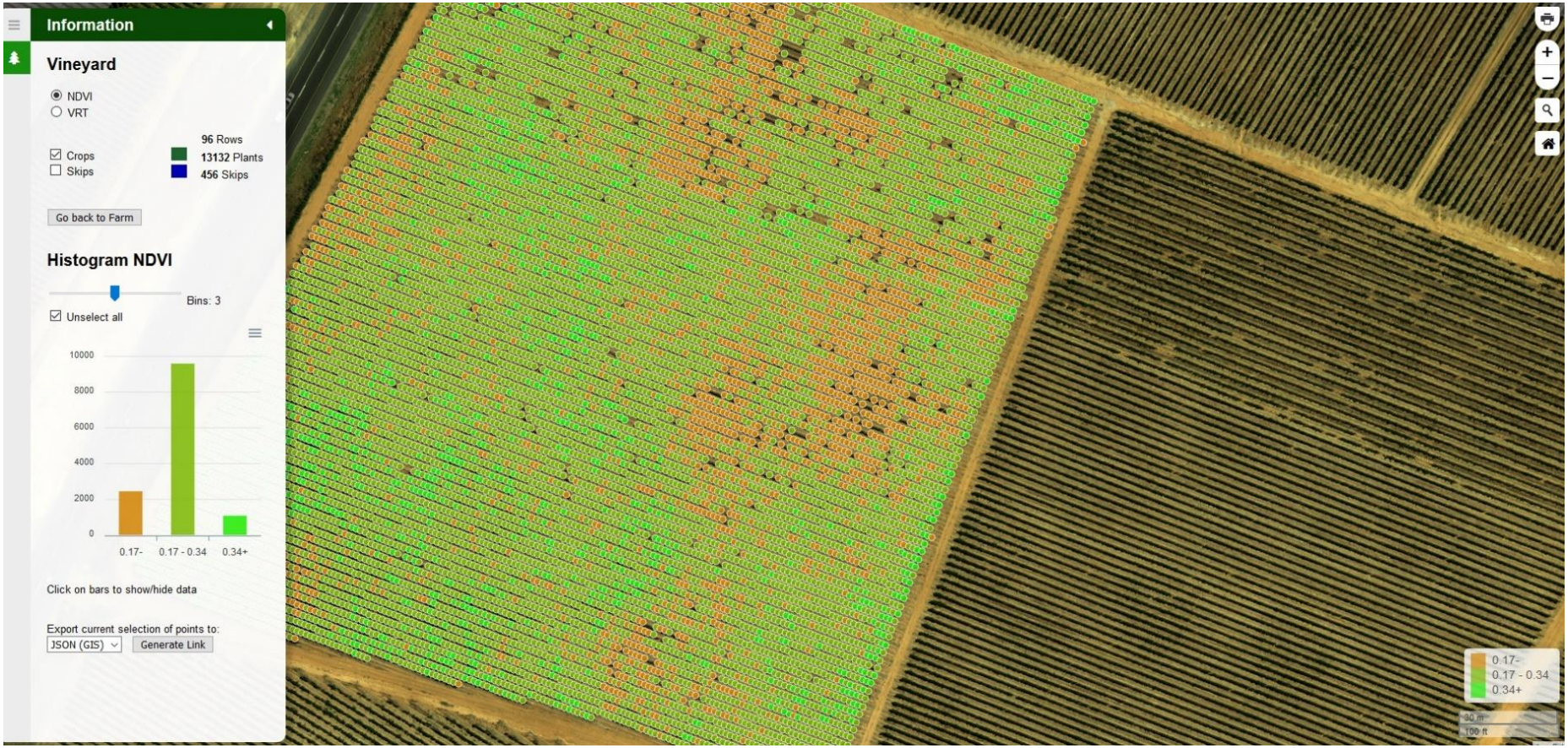
Citrus Rootstock Evaluation Utilizing UAV-based Remote Sensing and Artificial Intelligence



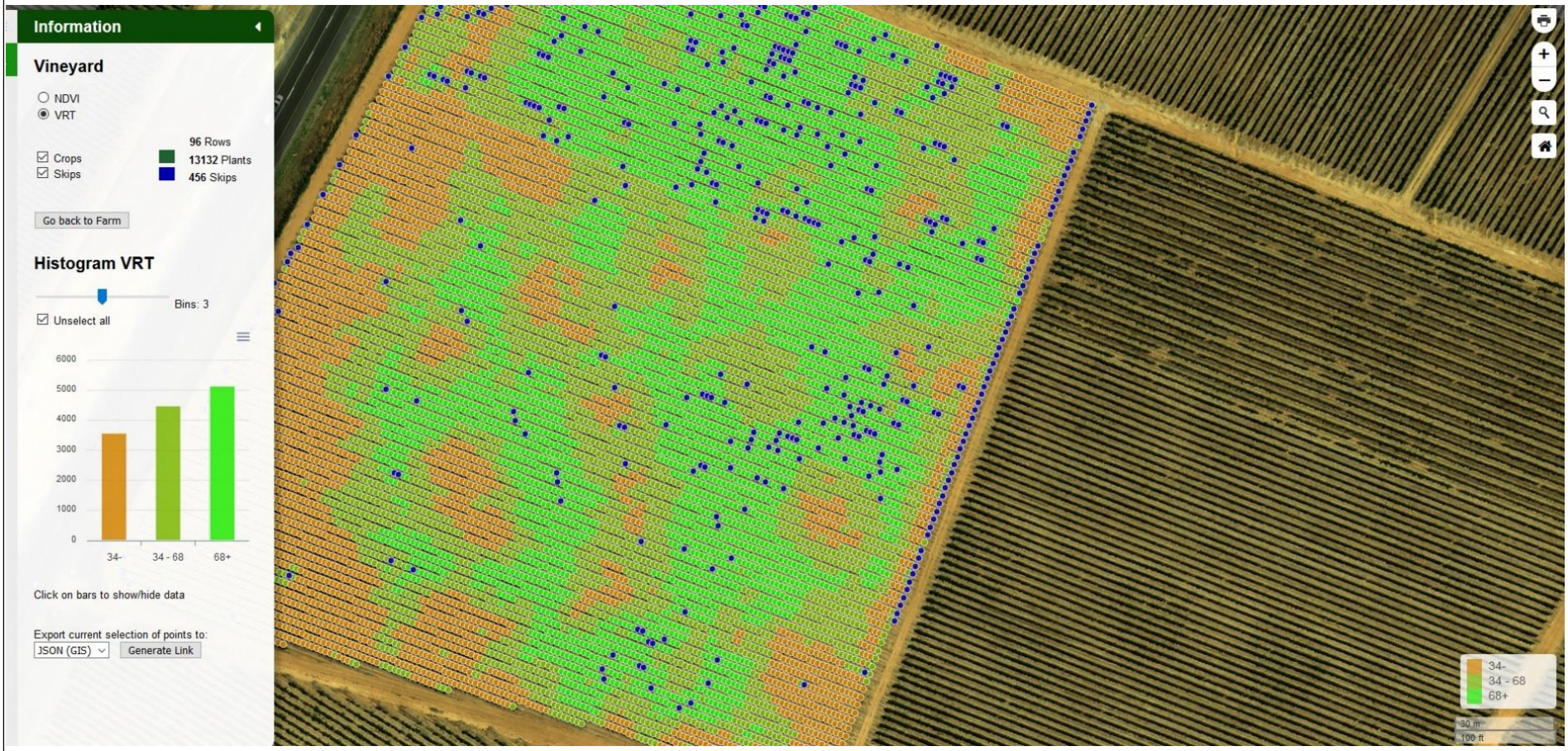


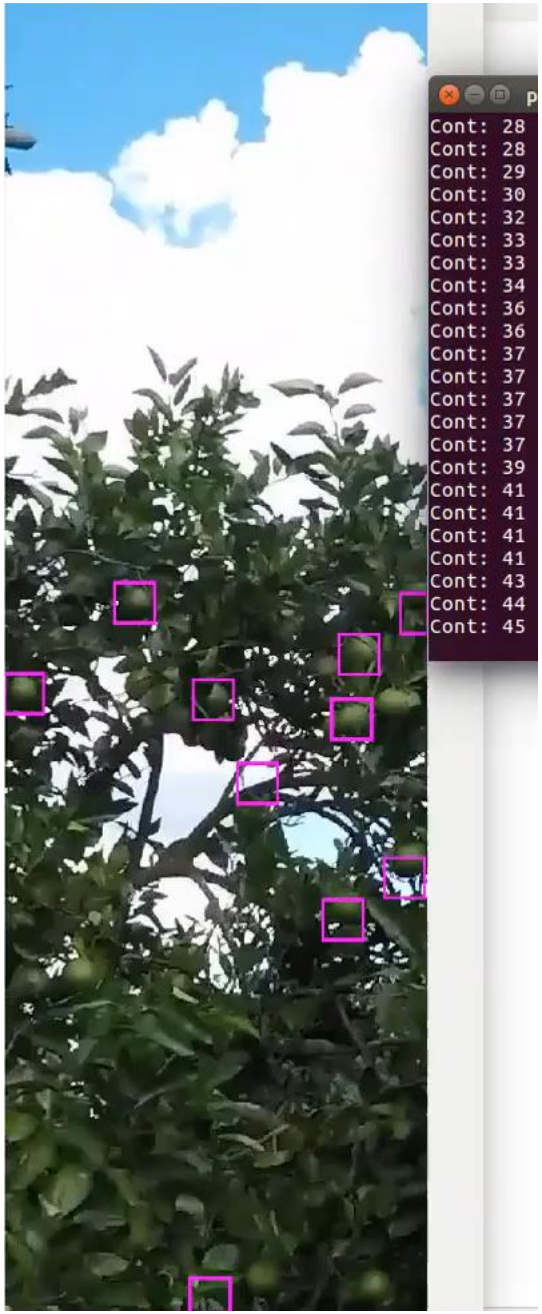
Ampatzidis Y., Partel V., Meyering B., and Albrecht U., 2019. Citrus Rootstock Evaluation Utilizing UAV-based Remote Sensing and Artificial Intelligence. *Computers and Electronics in Agriculture*, 164, 104900, doi.org/10.1016/j.compag.2019.104900.

Vineyard Map - NDVI



Vineyard Map - VRT





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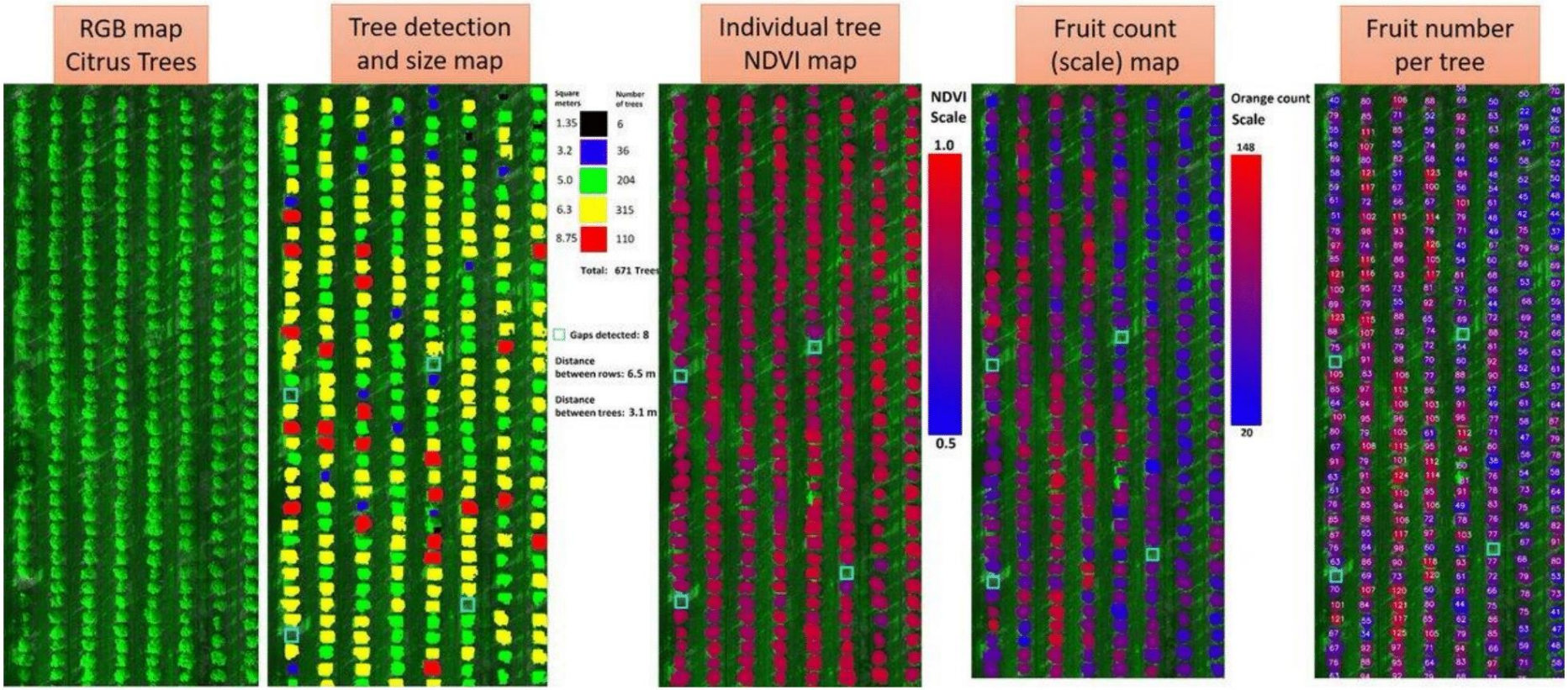
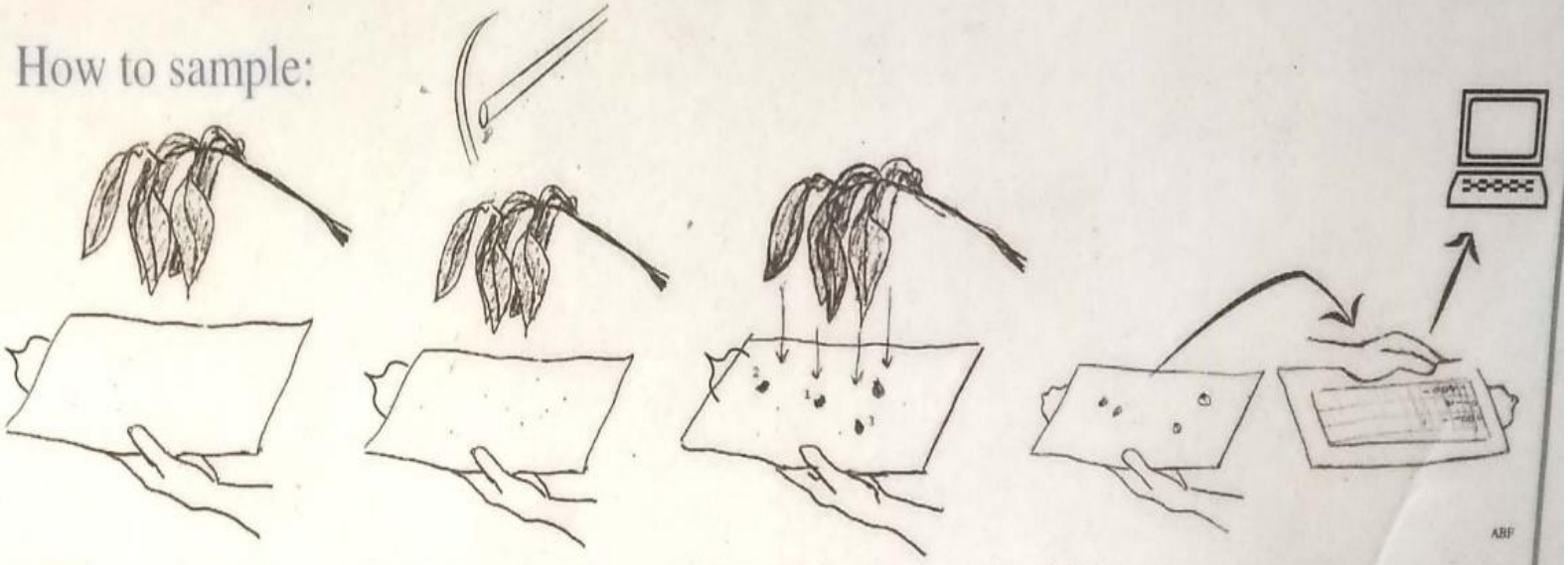
UAV- and Ground-based High Throughput Phenotyping in Citrus



Traditional (manual) ACP Monitoring Tap Sample Method

Monitoring of ACP populations is an important tool in the integrated management of citrus greening. The most efficient way to estimate field populations of this insect is by monitoring the adults. Tap sampling has proven to provide data needed to make informed decisions for managing this insect pest (Qureshi and Stansly 2007).

How to sample:



1. Place back side of this sheet 1 foot under the branch to be sampled.

2. Tap the selected branch with a PVC tube or your hand 3 times.

3. Quickly count the insects (beneficials and pests) that fall onto the paper. Pay special attention to ACP.

4. Write the number of insects from each sample on the provided datasheet for later reference and entry into a database.

Automated system and method for monitoring and mapping insects (e.g. ACP) in orchards" using AI. U.S. patent application No. 62/696,089.

https://twitter.com/i/status/1110151596770500608

Partel V., Leon Nunes, and Ampatzidis Y., 2019.Automated Vision-based System for Monitoring Asian Citrus Psyllid in Orchards Utilizing Artificial Intelligence. Computers and Electronics in Agriculture, 162, 328-336.

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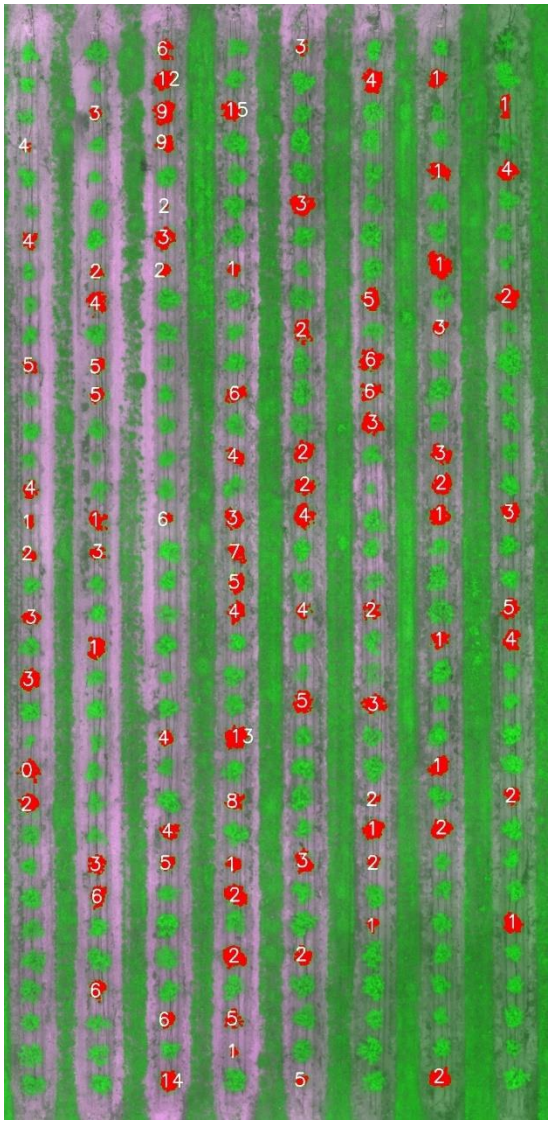

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Funding

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Questions/Comments?
Thanks for your attention!

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From Left to Right: **Daniel Escobedo** *Summer Intern*, **Jorge Escobedo** *Summer Intern*, **Dr. Jaafar Abdulridha** *Post Doctoral Associate*, **Dr. Yiannis Ampatzidis** *Program Leader*, **Dr. Xiuhua Zhang** *Visiting Scholar from China*, **Dr. Thanos Balafoutis** *Visiting Scholar from Greece*, **Magda Derival** *Research Assistant*, **Shirin Ghatresamani** *PhD Student*, **Sri Charan Kakarla** *Engineer* Not Pictured: **Victor Partel** *Research Assistant*

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