Forging interdisciplinary collaborations in agriculture & natural resources using drone technology

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UF/IFAS Fort Lauderdale R.E.C.

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Fort Myers, FL

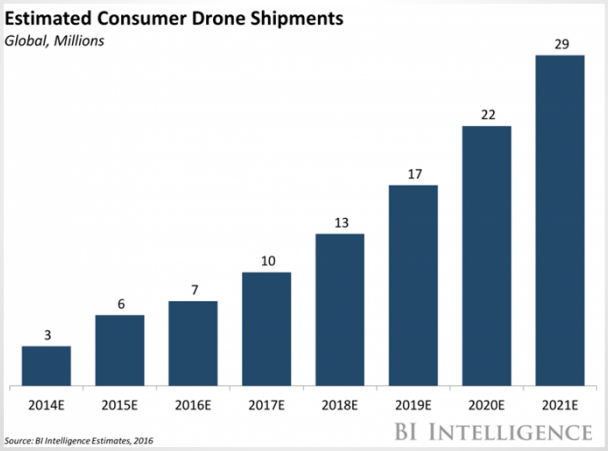
Who uses a drone commercially?

Who uses a drone as a hobbyist?

Do you know someone that does?

Interest in *drones* is driving collaboration

- **Proliferation of drones amongst all users (esp., consumers)**



Interest in *drones* is driving collaboration

- **Proliferation of drones amongst all users (esp., consumers)**

1. **Easing of regulations**

2. **Affordability of technology (e.g., procurement, maintenance)**

3. **Quality of geospatial data at lower cost**

Interest in *drones* is driving collaboration

- **Media attention keeps drone usage at forefront**


HEALTH

SCIENCE

ART & DESIGN

Drones Kill, Yes, but They Also Rescue, Research and Entertain

By WILLIAM GRIMES MAY 11, 2017

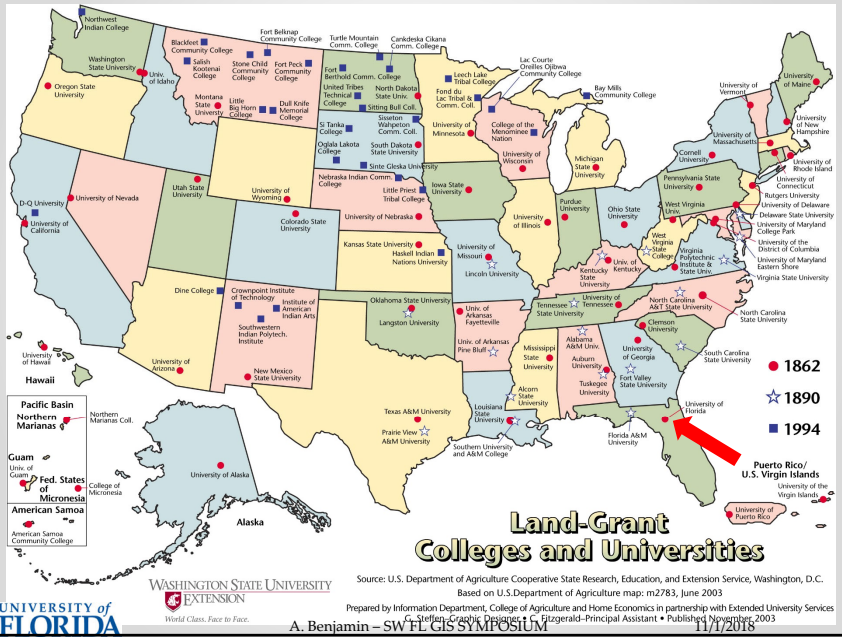
- **Domain specific researchers are interested in adopting technology and remote sensing methods (affordability)**
- **Geomatics/geospatial personnel provide domain knowledge & capabilities being sought**

UF Geomatics Organizational Structure → Increases Collaboration

- UF is a Land Grant, Sea Grant, Space Grant university
- Land Grant mission per Morrill Act of 1862
  - Focus on teaching **practical** agriculture, science, military science, & engineering

UF UNIVERSITY of FLORIDA

Organizational Structure – Land Grant



WASHINGTON STATE UNIVERSITY EXTENSION
World Class. Face to Face.

UF UNIVERSITY of FLORIDA

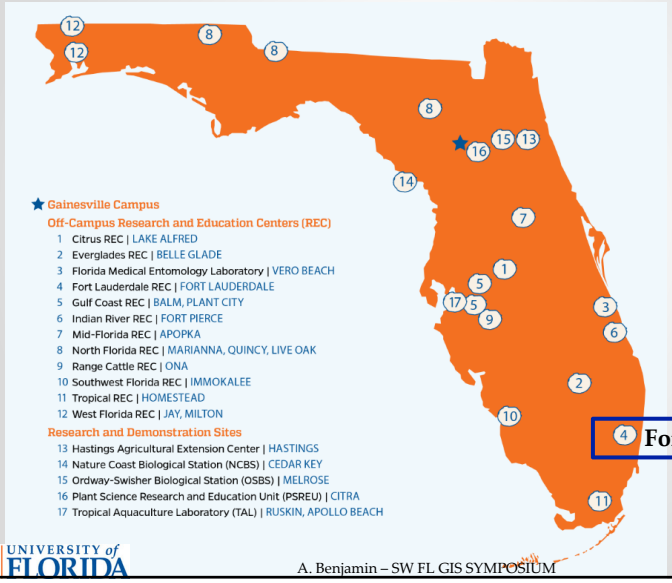
Organizational Structure – UF/IFAS

- Institute of Food and Agricultural Sciences (UF/IFAS) implements land grant mission for UF
- 3 Primary Roles:
  - Research – Florida Agricultural Experiment Station (FAES)
  - Teaching – College of Agricultural & Life Sciences (CALS)
  - Extension

UF UNIVERSITY of FLORIDA

Organizational Structure – Statewide Presence

REC – Research and Education Centers (and Extension)



4 Fort Lauderdale REC

Organizational Structure – Statewide Presence

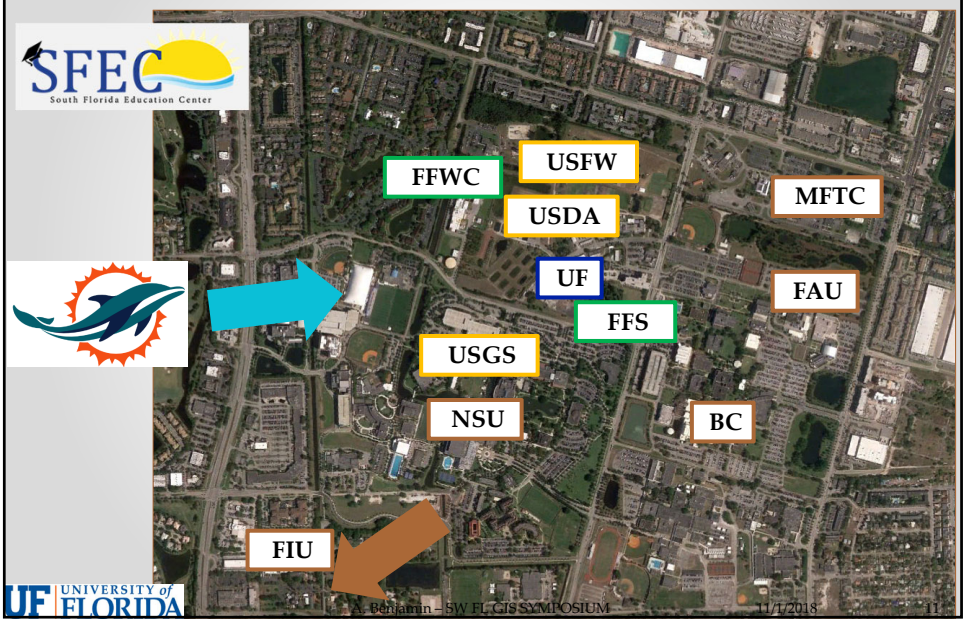
SFRC

UF | IFAS CALS UNIVERSITY of FLORIDA

Adaptation & Collaboration

5 HR DRIVE

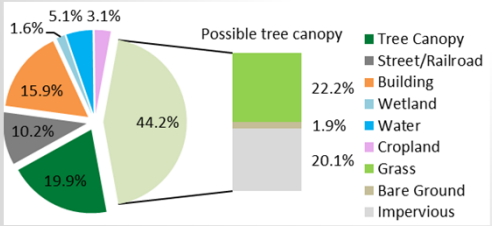
No one is isolated in South FL!

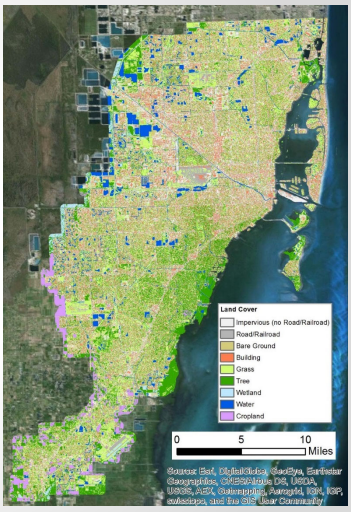


Previous non-UAS collaborations

Non-UAS external collaborations: MDC Trees

FIU FLORIDA INTERNATIONAL UNIVERSITY





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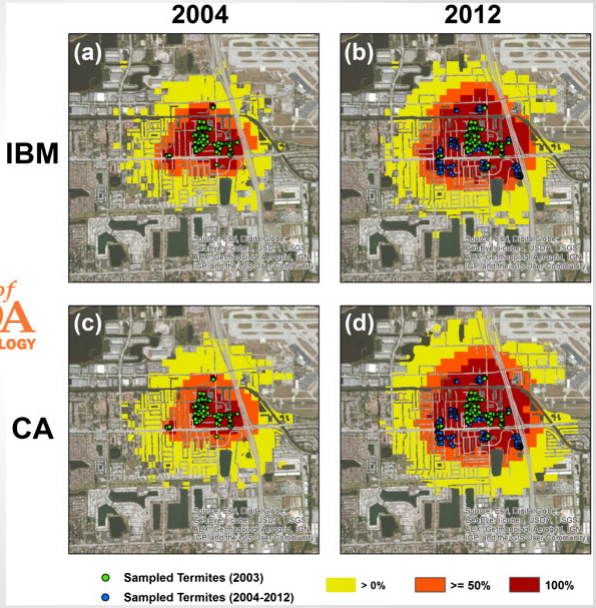
Non-UAS internal collaborations: Termite Spread



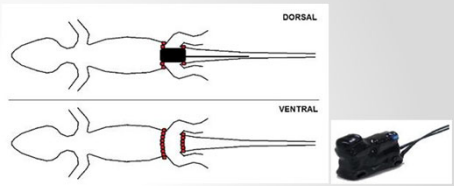
UNIVERSITY of FLORIDA ENTOMOLOGY & NEMATOLOGY

[YouTube Simulation]

UF UNIVERSITY of FLORIDA

Non-UAS internal collaborations: Tegus

Image: Flickr/Matt Baume



Establishment of UAS Mapping Program @ FLREC

- Contributing factors
  - Personal interest in UAS
  - Previous experience with UAS processing
  - Interest from others

PhotoScan
3D Modeling and Mapping
Agisoft

PIX4D

Establishment of UAS Mapping Program @ FLREC

- Hurdles encountered
  - Platform & sensors
  - Part 107

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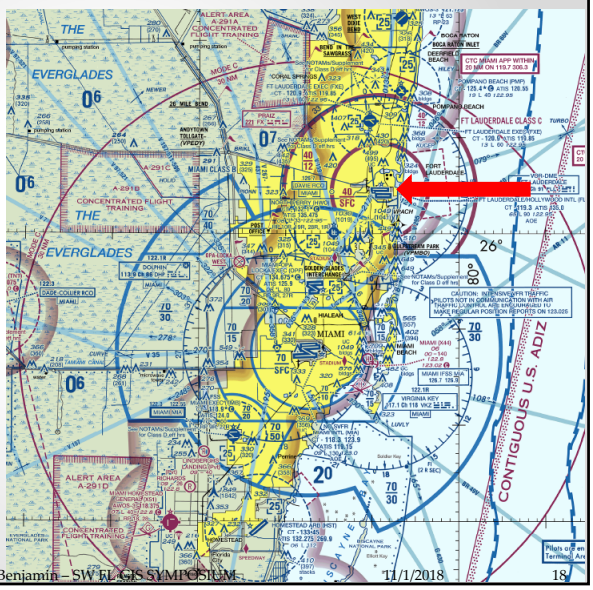

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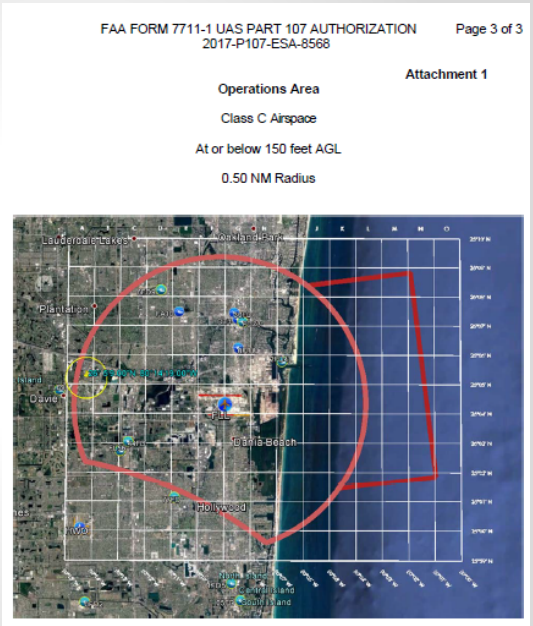
FAA FORM 7711-1 UAS PART 107 AUTHORIZATION Page 3 of 3
2017-P107-ESA-8568

Attachment 1

Operations Area

Class C Airspace

At or below 150 feet AGL

0.50 NM Radius

Establishment of UAS Mapping Program @ FLREC

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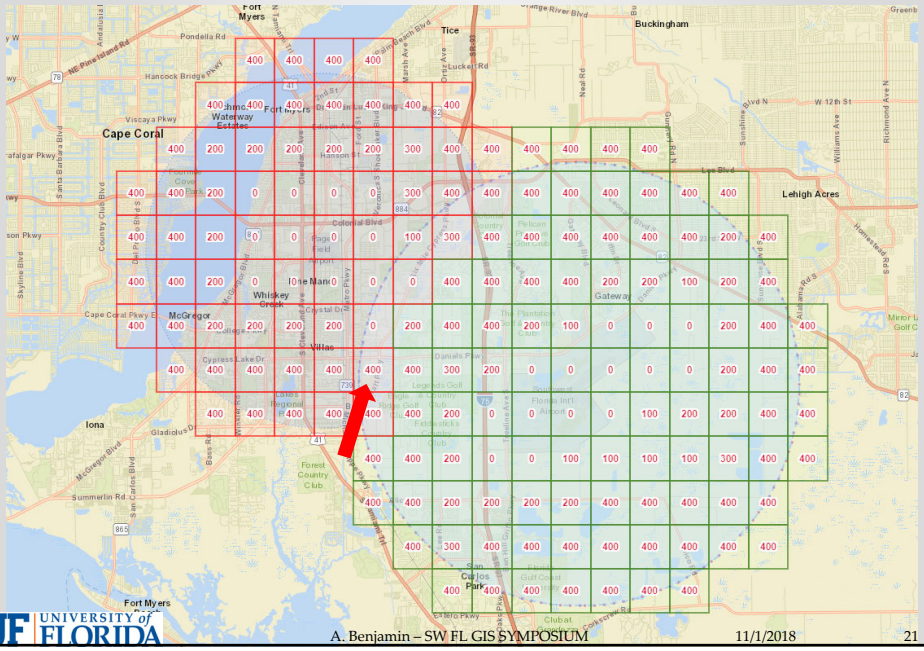
  - COA
    - LAANC

AIRMAP

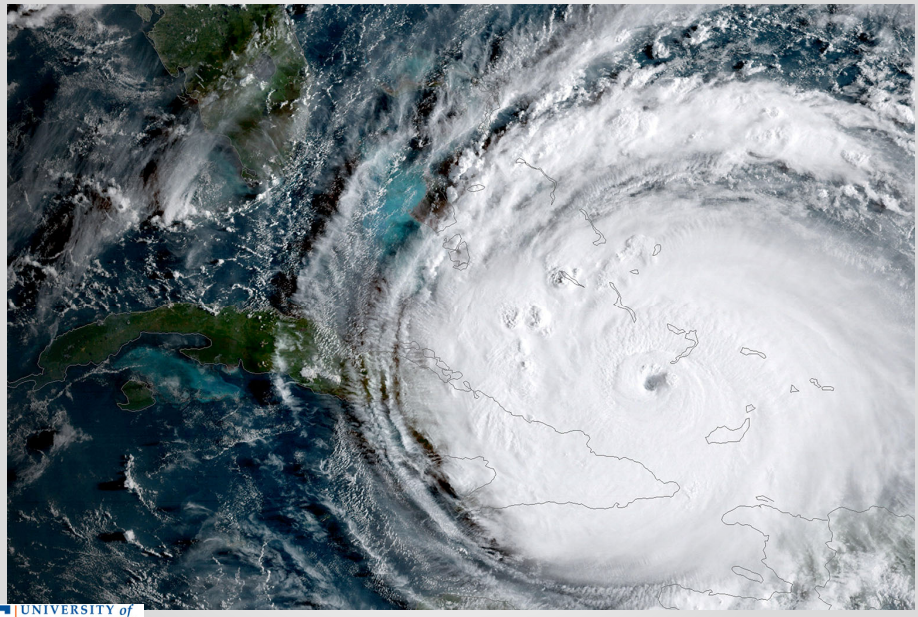
Fort Myers Airspace



Local Collaboration: New Faculty Expertise

- **Entomology**
  - Vector
  - Urban
- **Agronomy**
  - Aquatic & Wetland Plants
  - Phycology (Algae)
  - Turf Grass (vacant)
- **Ecology**
  - Movement (Wildlife)
  - Landscape (SFRC)
- **Soil & Water Science**
  - Coral Health (Sea Grant)
- **Microbiology**
  - Molecular
  - Microbial

Local Collaboration: Facilities



Local Collaboration: Facilities

- Goal: Assess roof damage @ UF Hurricane House
- Senior project
- Integration of proactive UAS monitoring into future hurricane seasons

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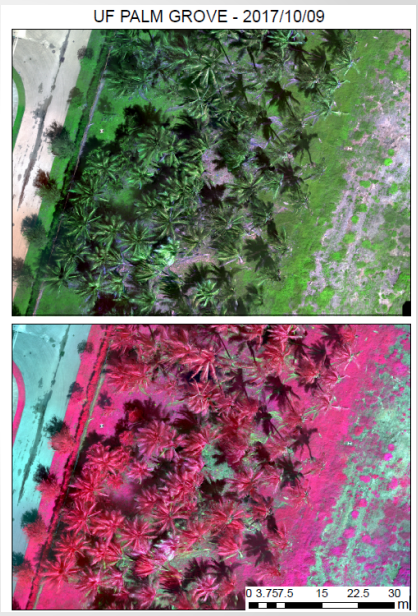
- Building Information Modeling – many lessons learned

Local Collaboration: Environmental Horticulture

- Collaboration with Env. Hort. faculty
- Initial Goal: Evaluate palm stress after Irma
- Data collection timing yielded unsatisfactory results

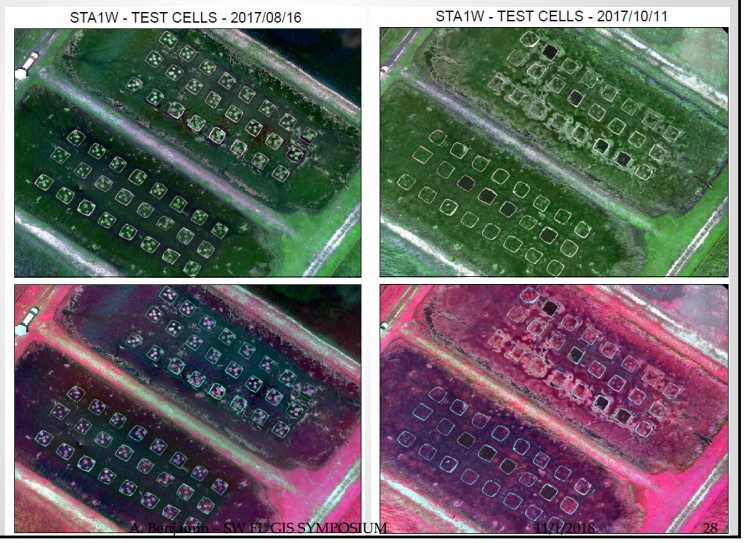


Local Collaboration: Environmental Horticulture

- Palm pathologist/vector entomologist collab. underway
- TPPD monitoring

Local Collaboration: Herbicide Efficacy

- Collaboration with Agronomy faculty
- Goal: Monitor herbicide efficacy on invasive AV



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Future Local Collaborations: Algal Blooms

- Collaboration with Phycology faculty
- Goal: Evaluate algal bloom characteristics using aerial monitoring

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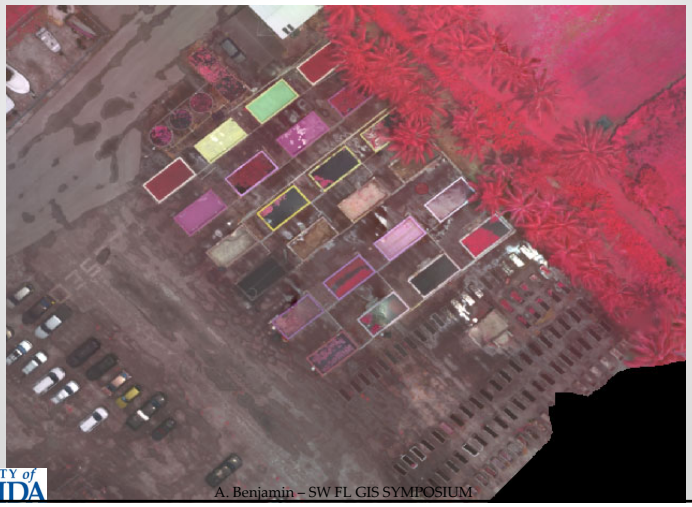
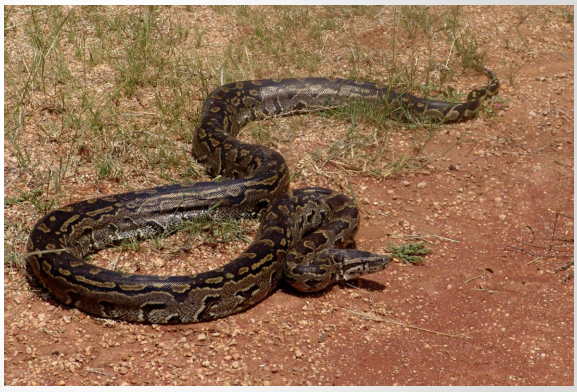


Future Local Collaborations: Wildlife

- Collaborations discussed with Wildlife faculty
- Goals:
  - Identify invasive species via aerial monitoring
  - Investigate habitat structure mapping



Future Local Collaboration: Agronomy

- Collaboration planned with Turfgrass research group
- Goal:
  - Detect nutrient deficiency and vegetation stress using MS sensor

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Conclusions

- UAS have potential to increase collaboration with interested parties
- More time needs to be spent planning tests and studies prior to implementation
- UAS are a tool – do not oversell the technology

UF GEOMATICS

THANK YOU!

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