Applications of unmanned aerial systems for oyster reef mapping in the GTM NERR

Michael Dickson, Scott Eastman

Changing Habitats → Mapping → Dilemma → Solution
Photogrammetry

The science of using photography to measure distances between objects

LiDAR

Light Detection and Ranging
Active remote sensing technique
Scenario #1

Establish well-distributed ground control sites in stationary areas

Develop an automated flight plan that is replicable

Utilize ground control in photogrammetry software to create accurate imagery products
Photogrammetry Considerations

**Resolution (GSD)**
- Focal Length
- Camera Specs
- Altitude

**Flight Planning**
- Field of View
- 75% front and side overlap
- Flight speed
- Altitude

Diagram:
- Altitude
- Grid Spacing
- % Overlap
- Field of View
Scenario #2

Setup may be more technical
LiDAR sensor, IMU, RTK GNSS etc. must be calibrated for accuracy
Must register point clouds among missions or for multitemporal studies using LiDAR targets

Point clouds can be triangulated to produce digital elevation models
LiDAR Considerations

Swath
- Beam Length
- Altitude

Point Density
- Pulses/sec
- Angle Offset
- Speed
- Overlap

Swath

Beam Length
Altitude

Swath
Analyses

3D view of a shoreline DEM in Global Mapper

Seahorse Key sediment change map
Pro’s and Con’s

Photogrammetry
• Lower initial cost for equipment
• Able to survey large areas easily
• Lower data storage requirements
• Less certainty on the vertical axis
• Likely lower resolution
• Ground control measures

LiDAR
• Expensive
• Often impractical to survey large areas
• High data storage requirements
• High level of accuracy
• High resolution due to dense point clouds
• Ground control measures
Thank you so much!

Any Questions?

Thank you!

Michael Dickson
Spatial Ecologist
GTM NERR
Michael.Dickson@floridadep.gov
904-461-4057