

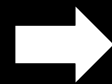
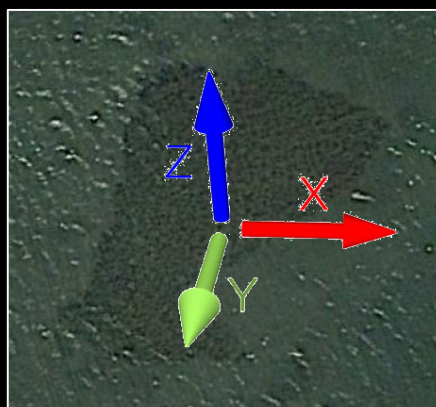
# Applications of unmanned aerial systems for oyster reef mapping in the GTM NERR

Michael Dickson, Scott Eastman

Changing Habitats



Mapping



Dilemma



Solution



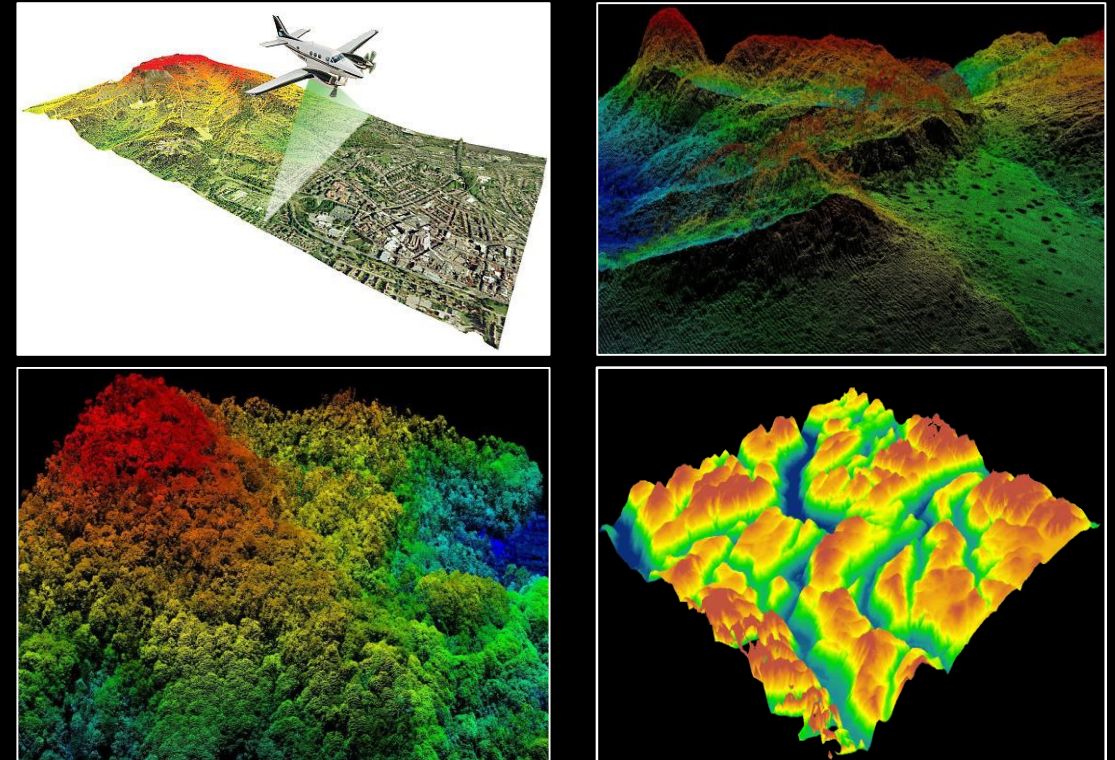
# Photogrammetry

The science of using photography to measure distances between objects



# LiDAR

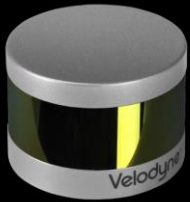
Light Detection and Ranging  
Active remote sensing technique



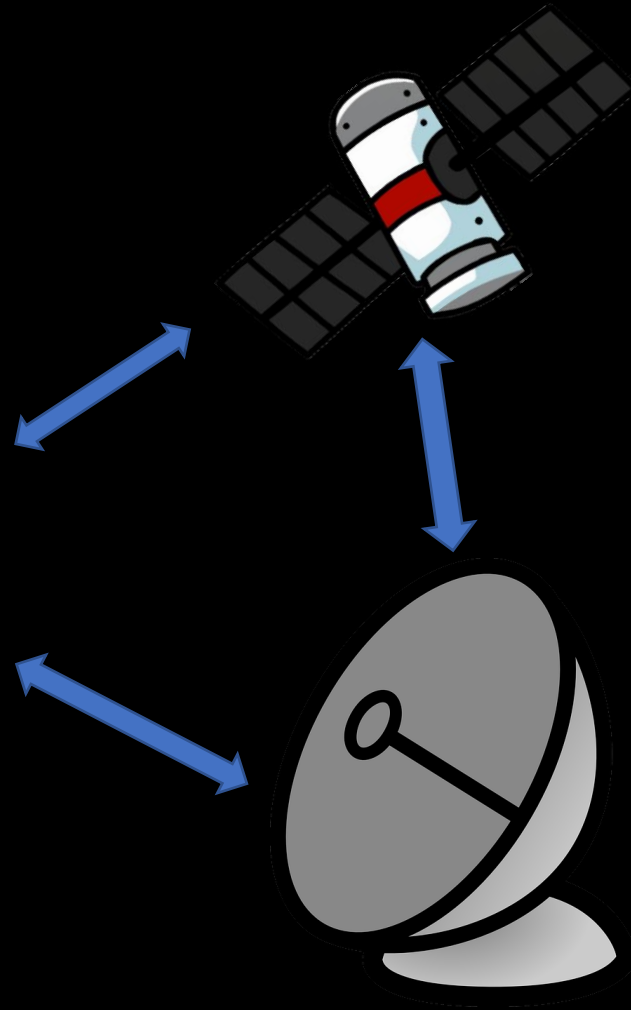


# Equipment Overview

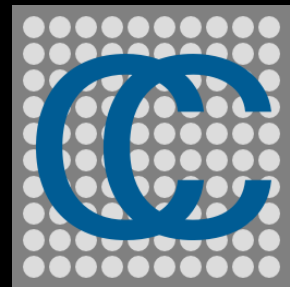
# Field Equipment



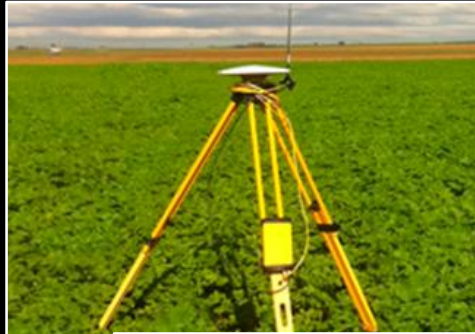
# CORS Network



# Software



# Scenario #1



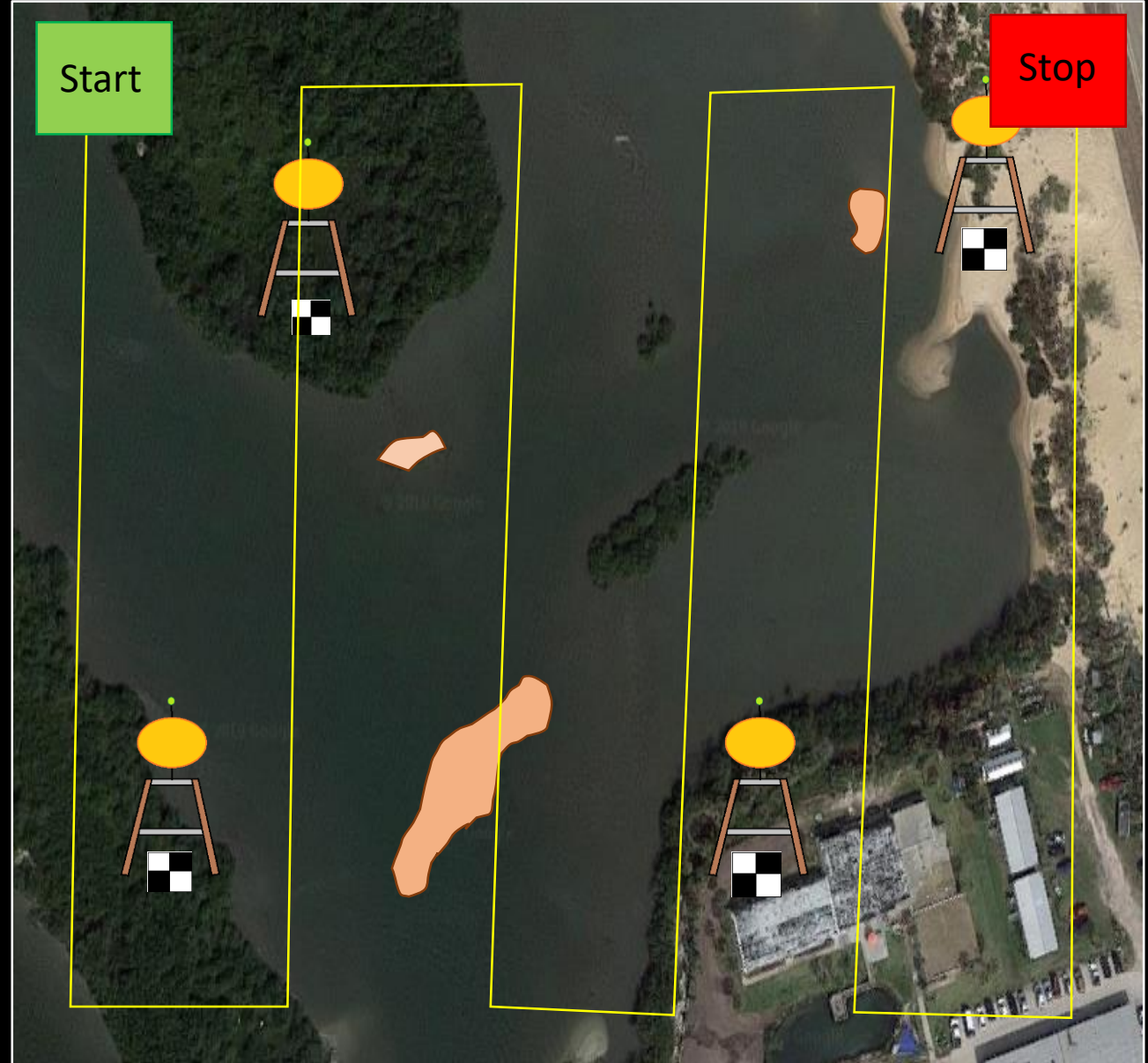
Establish well-distributed ground control sites in stationary areas



Develop an automated flight plan that is replicable



Utilize ground control in photogrammetry software to create accurate imagery products



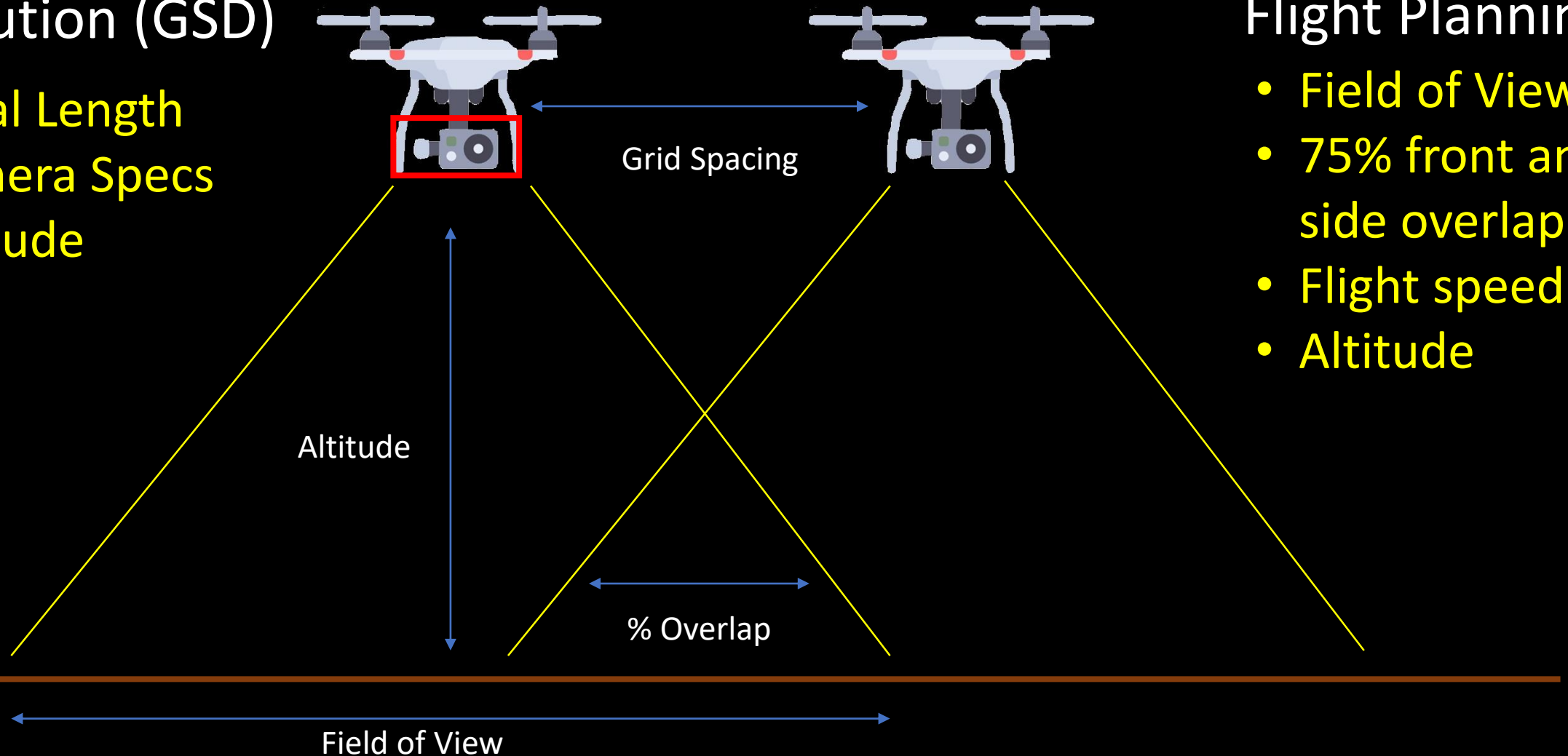
# Photogrammetry Considerations

## Resolution (GSD)

- Focal Length
- Camera Specs
- Altitude

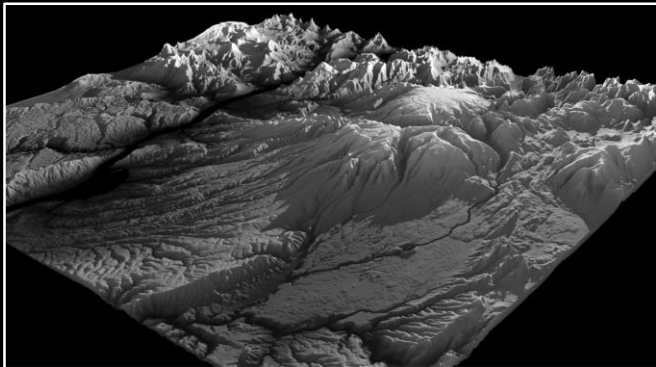
## Flight Planning

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





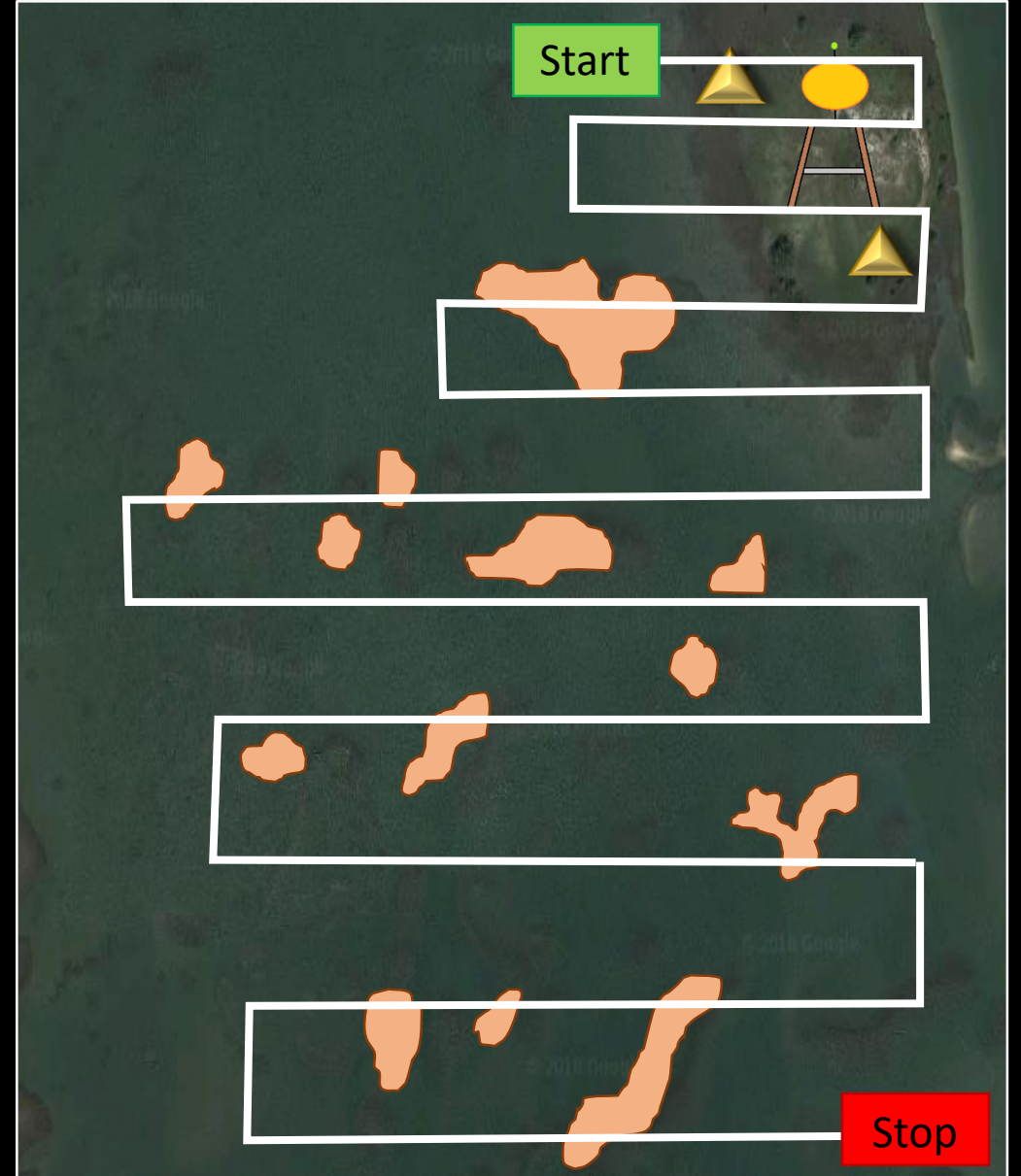
# Scenario #2



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

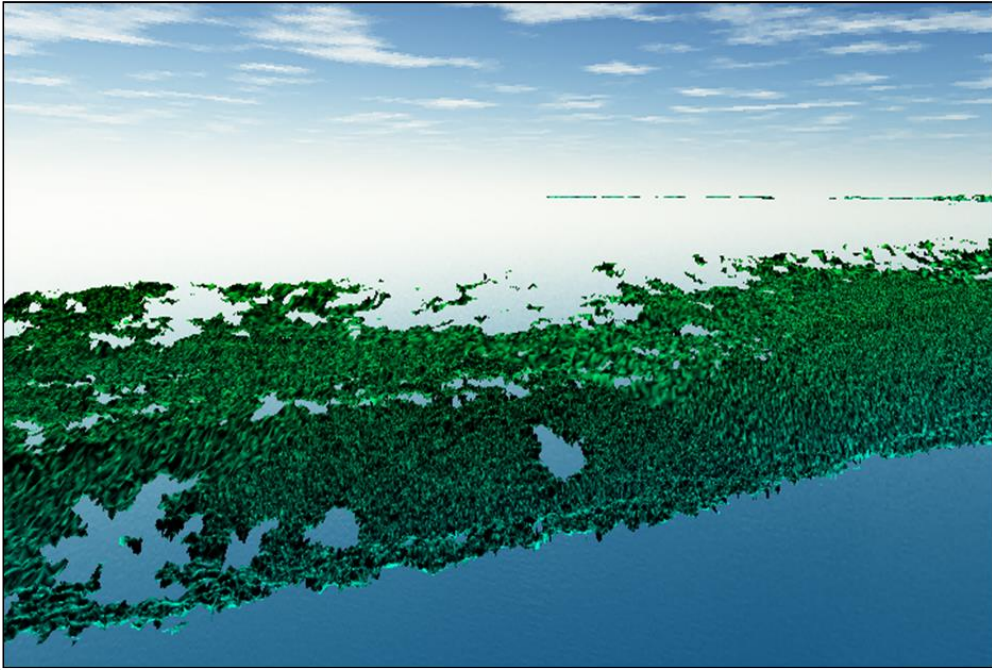
- Pulses/sec
- Angle Offset
- Speed
- Overlap

Beam Length

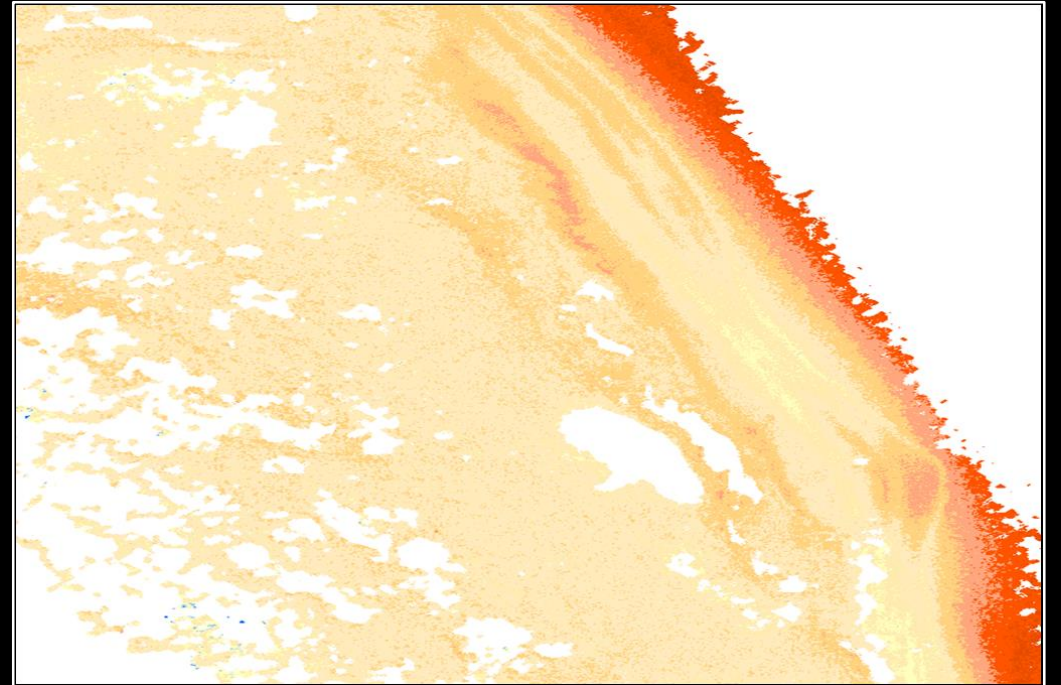
Altitude

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!



**Thank you!**



## Any Questions?

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