

# Exploring the Utility of LIDAR

Laura Schmidt

North Inlet-Winyah Bay NERR

# Overview

- Basics of LIDAR
- Research Questions
- Research Progress
- Future Work



# Light Detection And Ranging

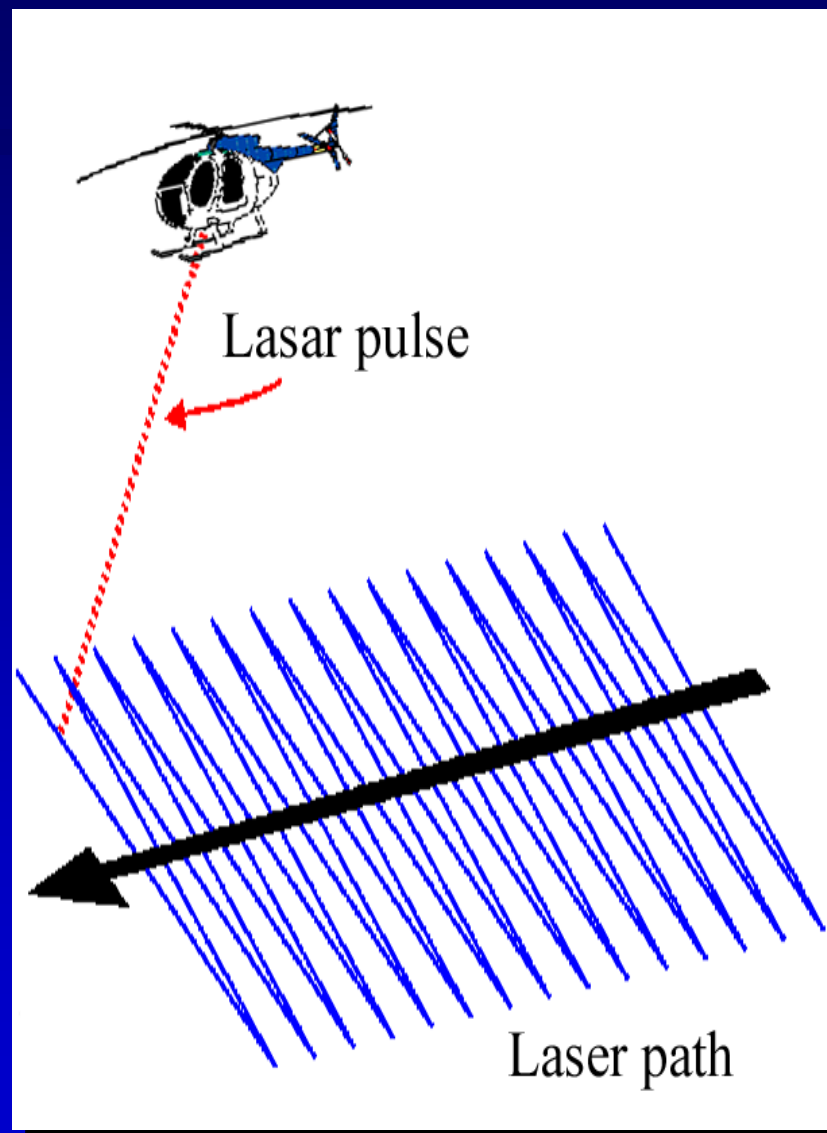
## ■ Technology

- Laser (blue-green, NIR)
- On-board GPS

## ■ Accuracy and Utility

- Day/Night operation
- Vegetation removal
- High accuracy ( $\pm 15\text{cm}$ )
- Speed (collection, processing)





sample - WordPad

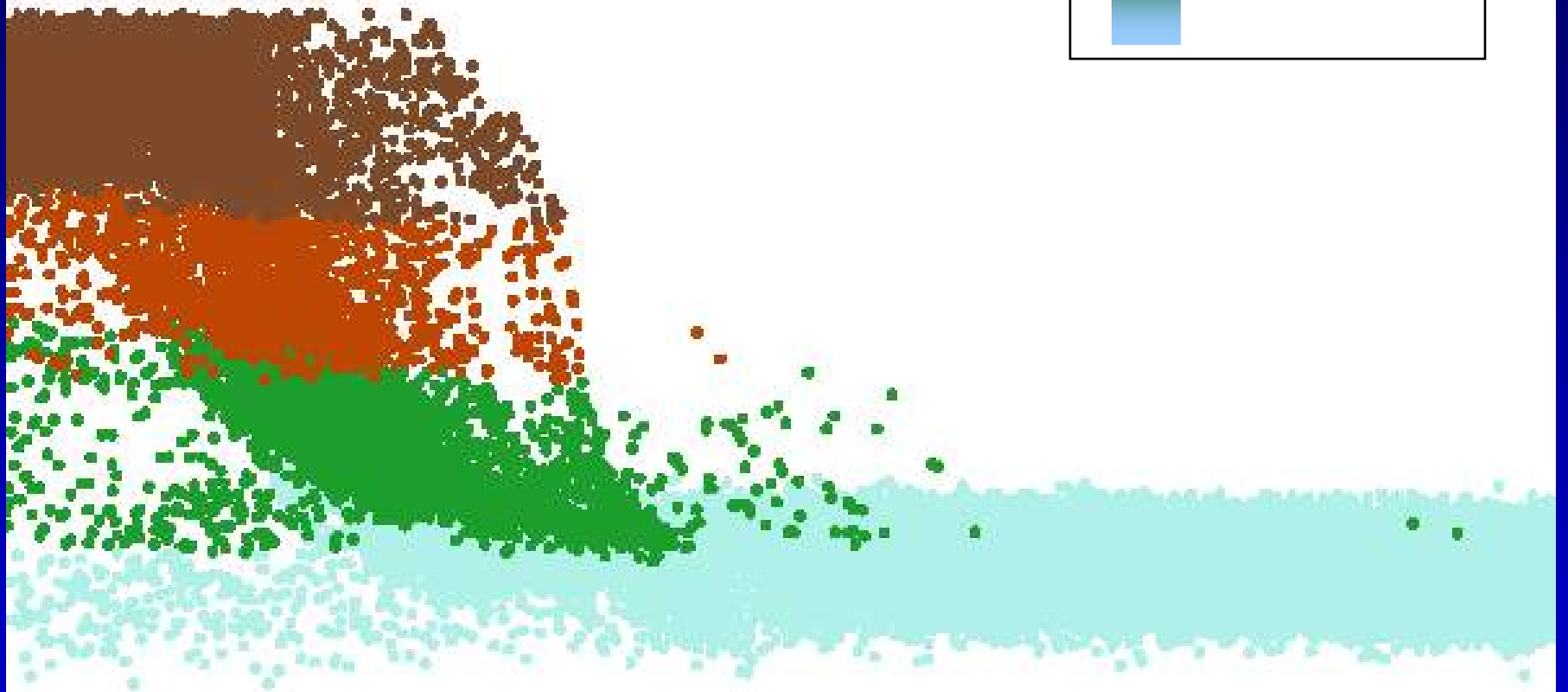
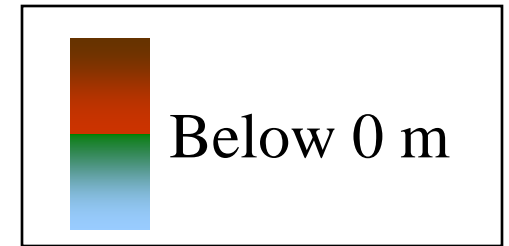
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Time	X	Y	Z	I
417250.4568	659985.980	3686151.430	-0.480	18.0
417250.5174	659969.900	3686167.880	-0.500	44.0
417250.5824	659979.100	3686169.860	-0.510	35.0
417250.6420	659945.140	3686197.340	-0.450	6.0
417250.6434	659999.080	3686165.210	-0.520	32.0
417250.7490	659995.320	3686180.270	-0.490	11.0
417250.7500	659961.820	3686200.370	-0.490	53.0
417250.7670	659941.550	3686214.590	-0.500	27.0
417250.7680	659983.040	3686189.980	-0.510	11.0
417250.7926	659924.770	3686228.010	-0.480	6.0
417250.8102	659998.070	3686186.380	-0.470	35.0
417250.8330	659978.370	3686201.000	-0.480	7.0
417250.8516	659989.070	3686197.030	-0.500	18.0
417250.9162	659999.480	3686198.380	-0.450	170.0
417250.9168	659969.470	3686216.330	-0.470	22.0
417250.9184	659907.170	3686253.570	-0.490	30.0
417250.9332	659916.620	3686249.800	-0.470	28.0
417250.9582	659984.630	3686212.370	-0.480	21.0
417250.9590	659954.580	3686230.340	-0.490	21.0
417251.0160	659887.990	3686276.110	-0.490	25.0

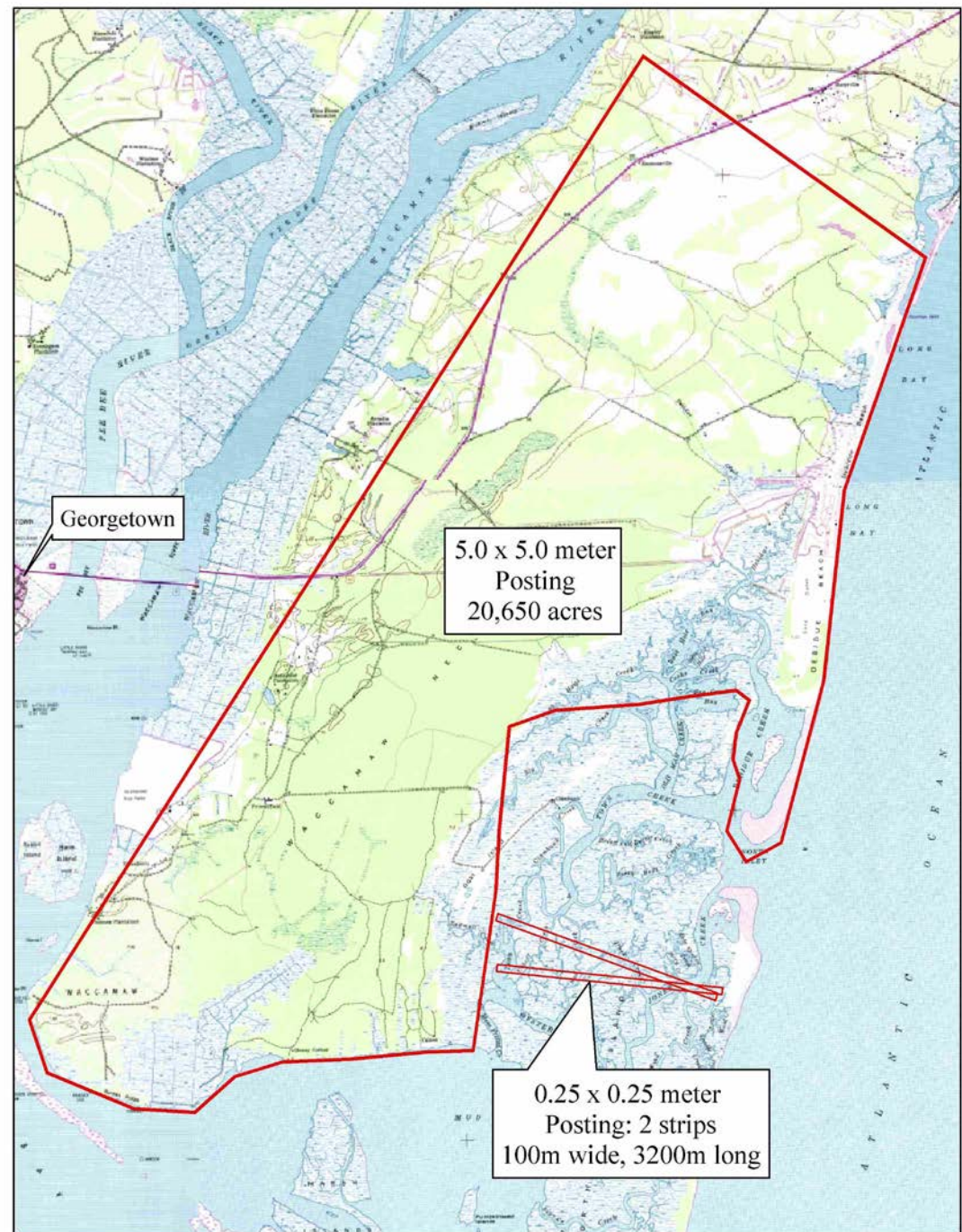








# Study Area



# Research Questions

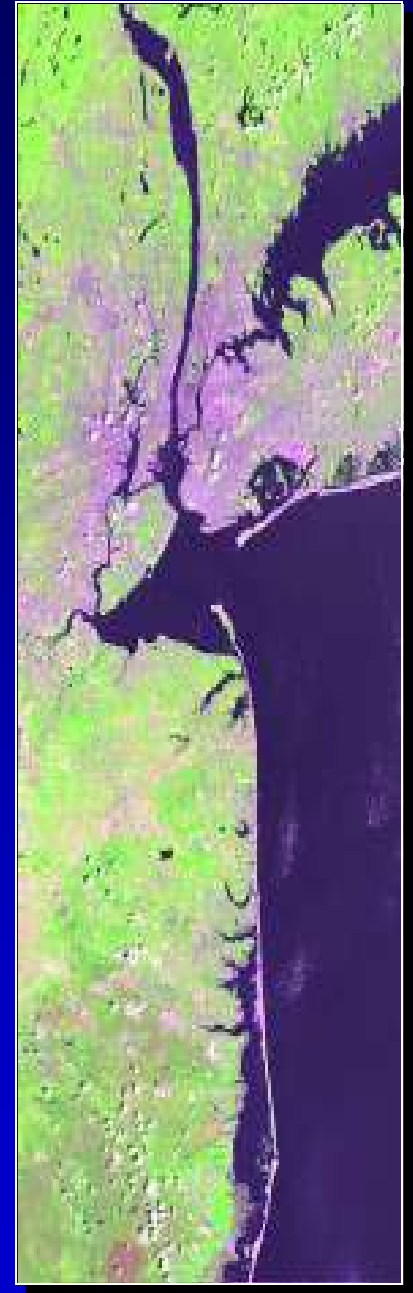
- Can oysters be identified using elevation data?
- Can intensity values be a predictor of land cover (mud, oysters, reef type)?





# Elevation Analysis

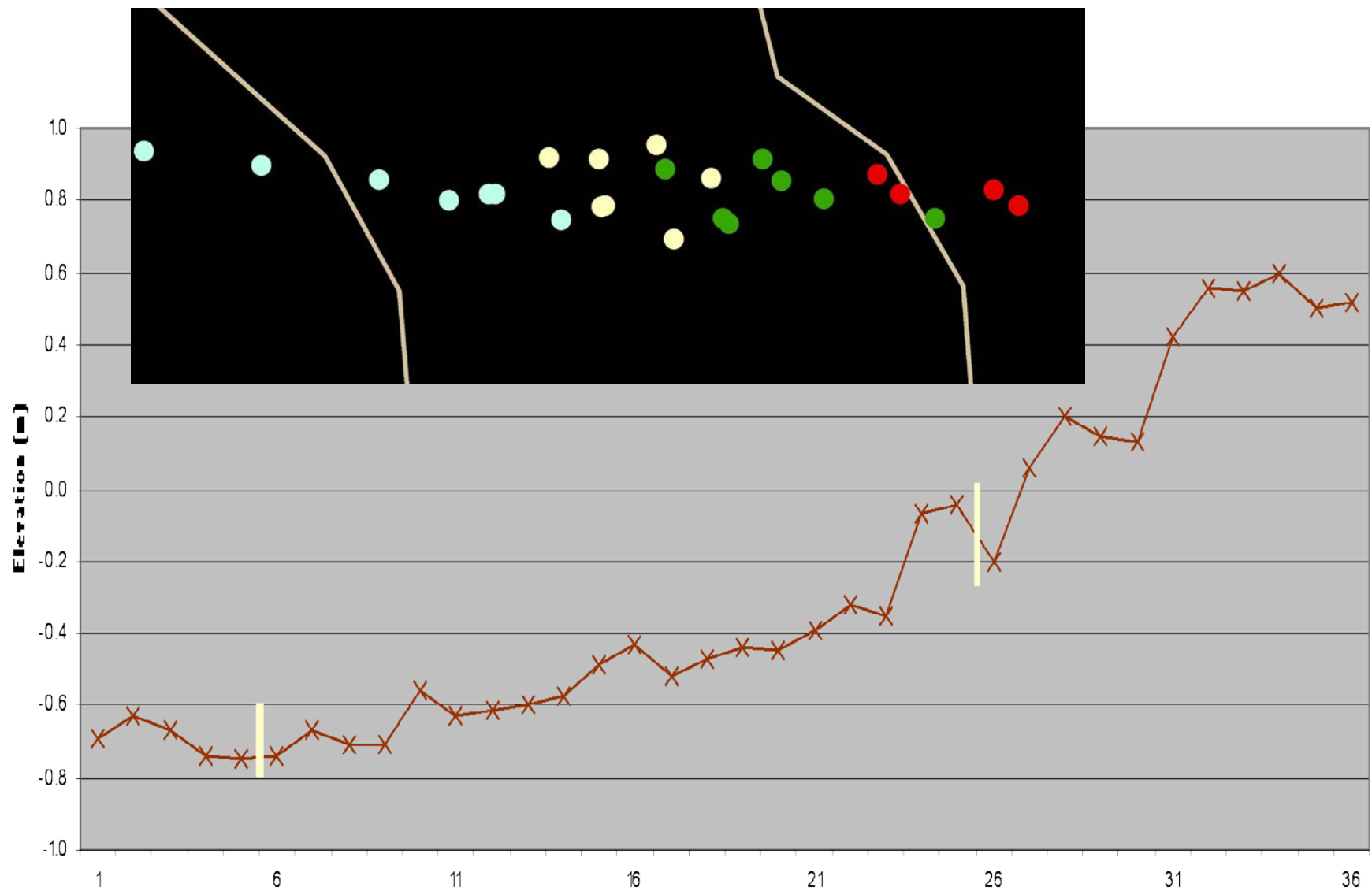
- Surface roughness
- Other textural filters?







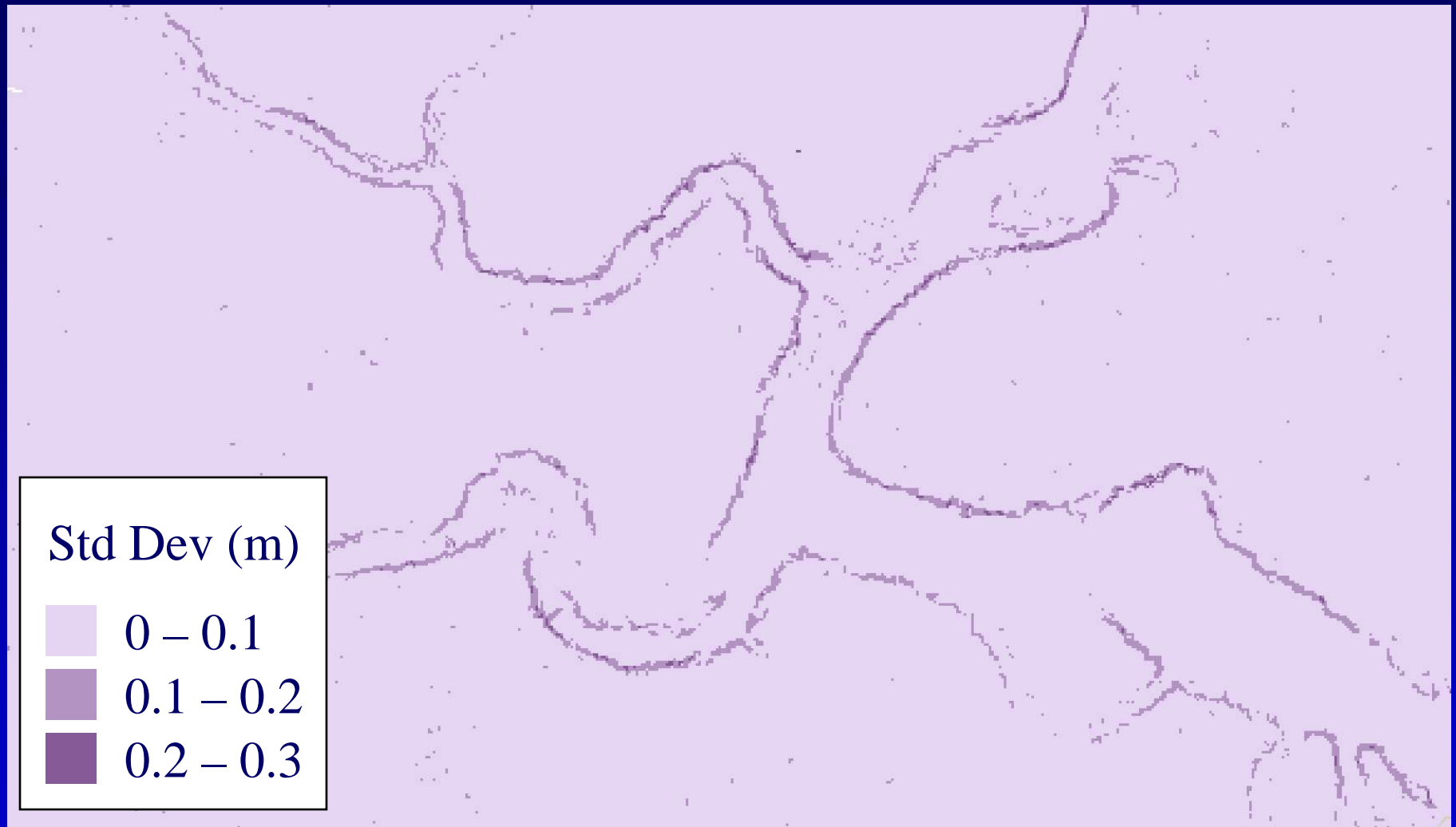






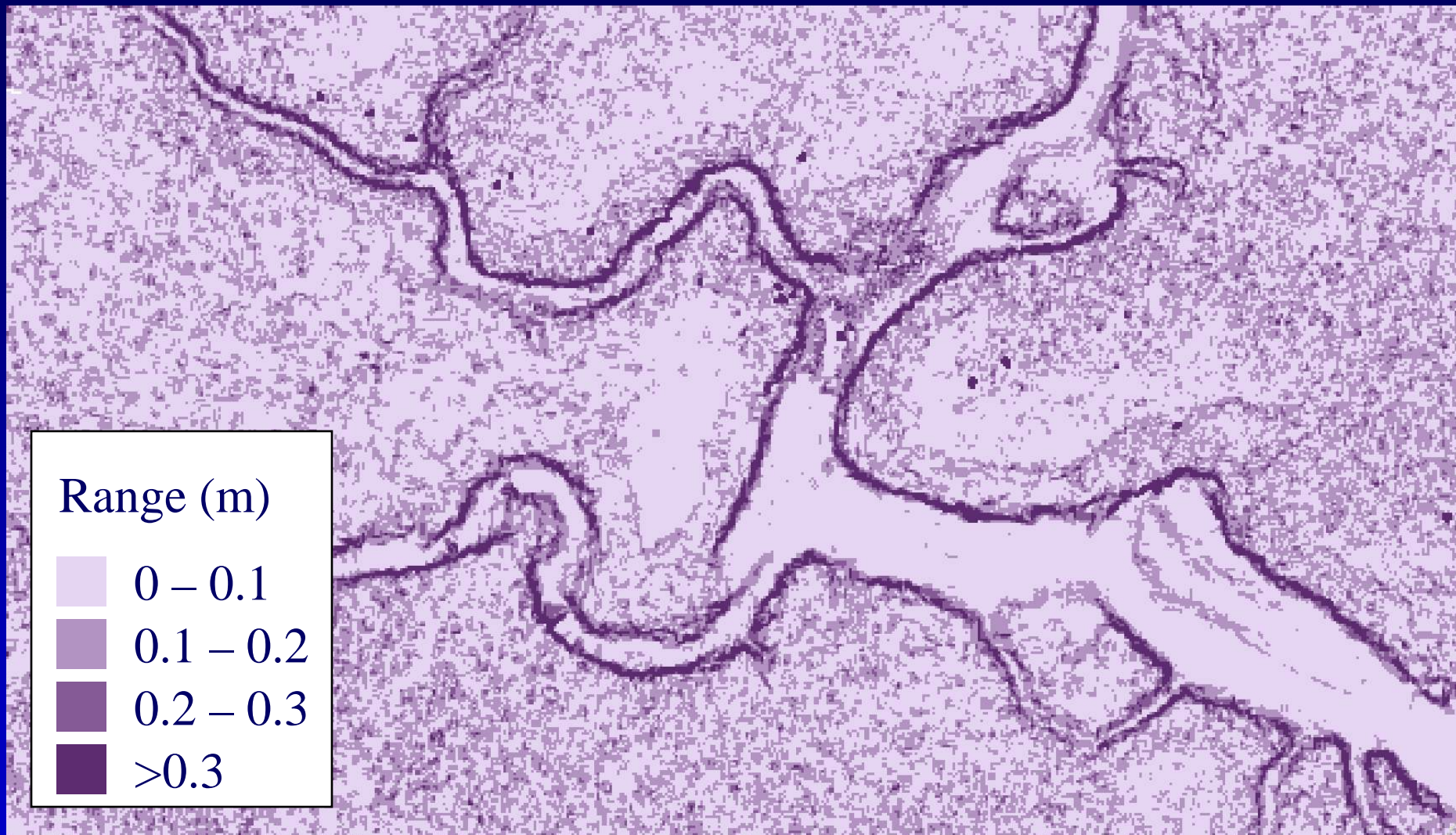


Island is obvious, but differences between oyster reefs and mud are not



Deviation from mean in a 3 x 3 meter window  
-probably highlighting creek banks, steep change





Range of elevation values in a 3 x 3 meter window



# Intensity Analysis

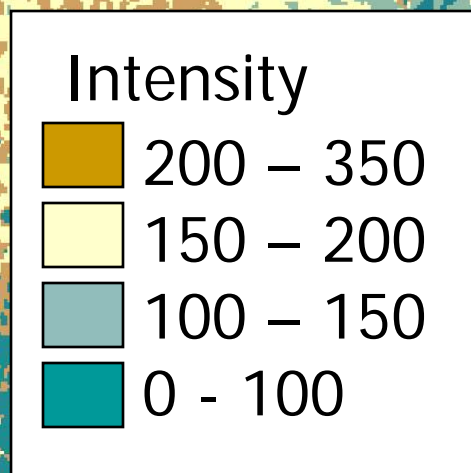
- Patterns in land cover
- Remove outliers



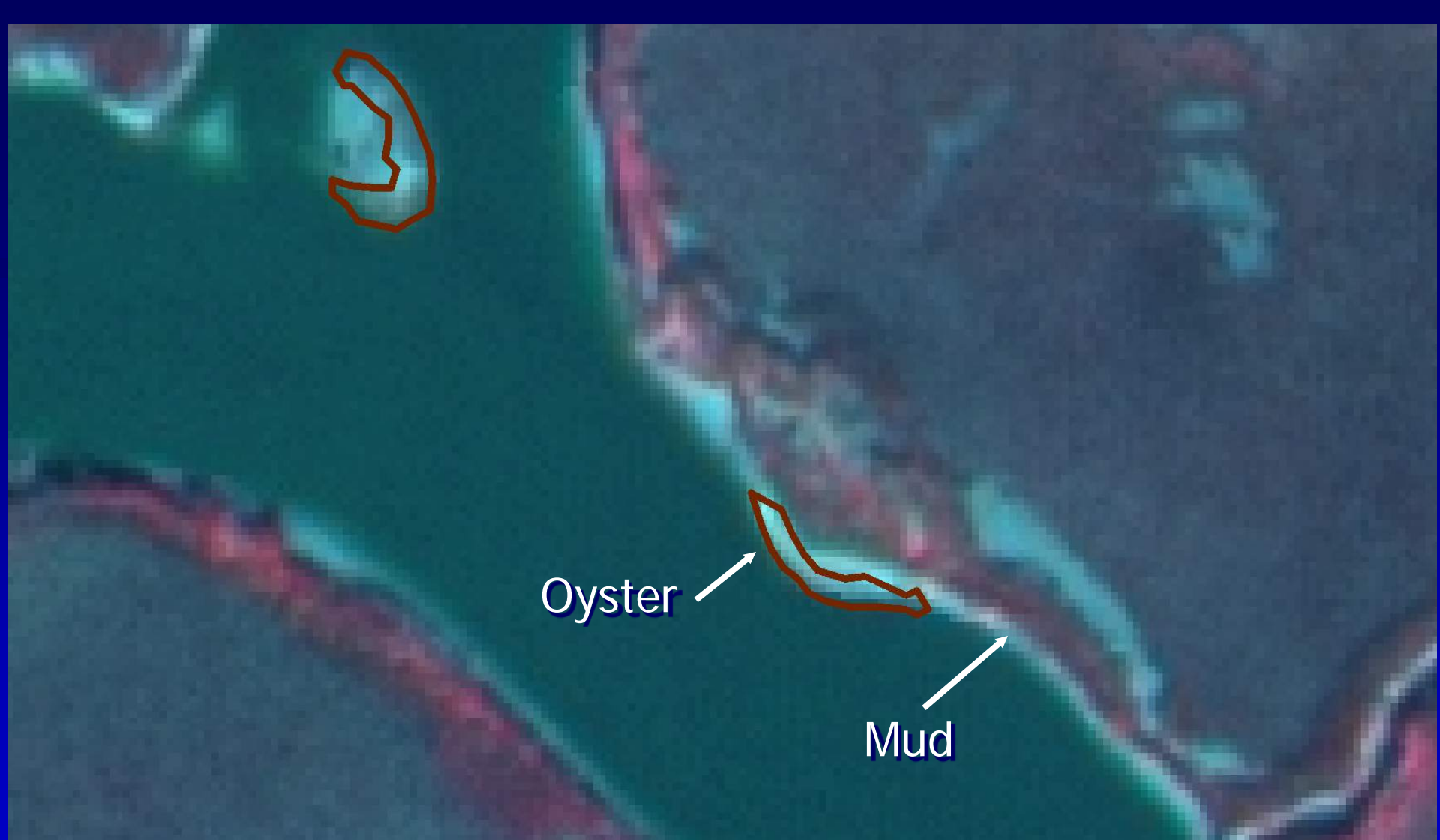
# What is Intensity?

- Measure of laser energy returned from the surface
  - Assigned unitless number
  - No calibration
  - Ex. mud = low intensity, concrete = high
- But...new sensors will take calibrated intensity readings that can be correlated to land cover types









Oyster

Mud

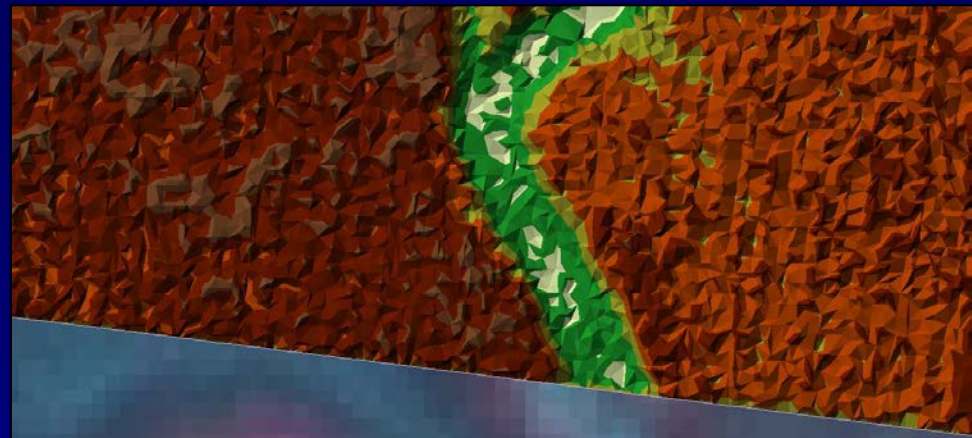
# Problems

- File size
- Georeferencing the data
- High precision
  - requires specific field effort for reference data

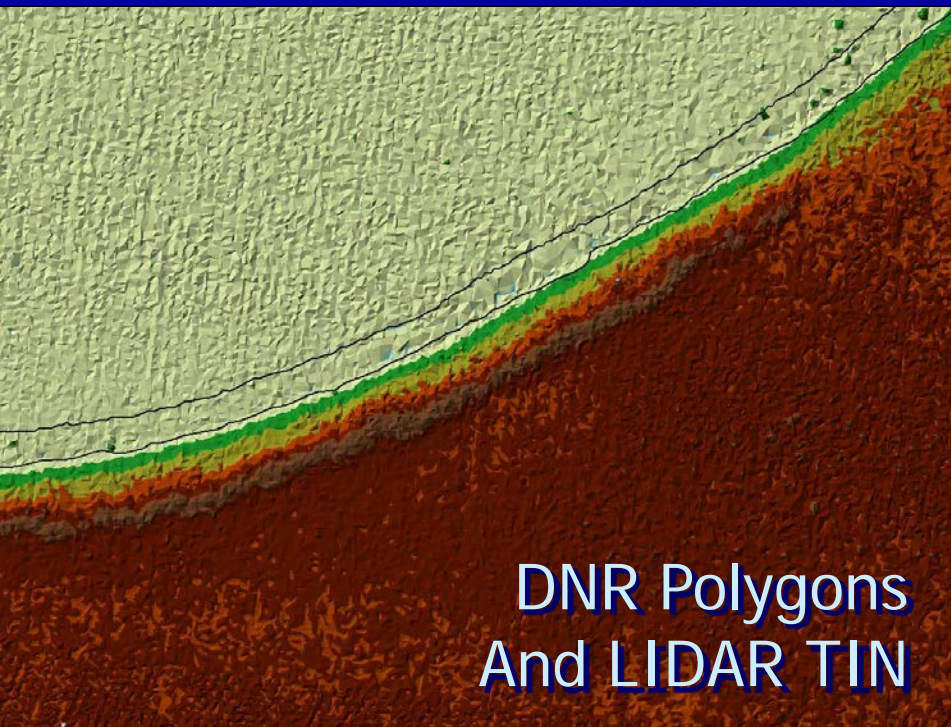




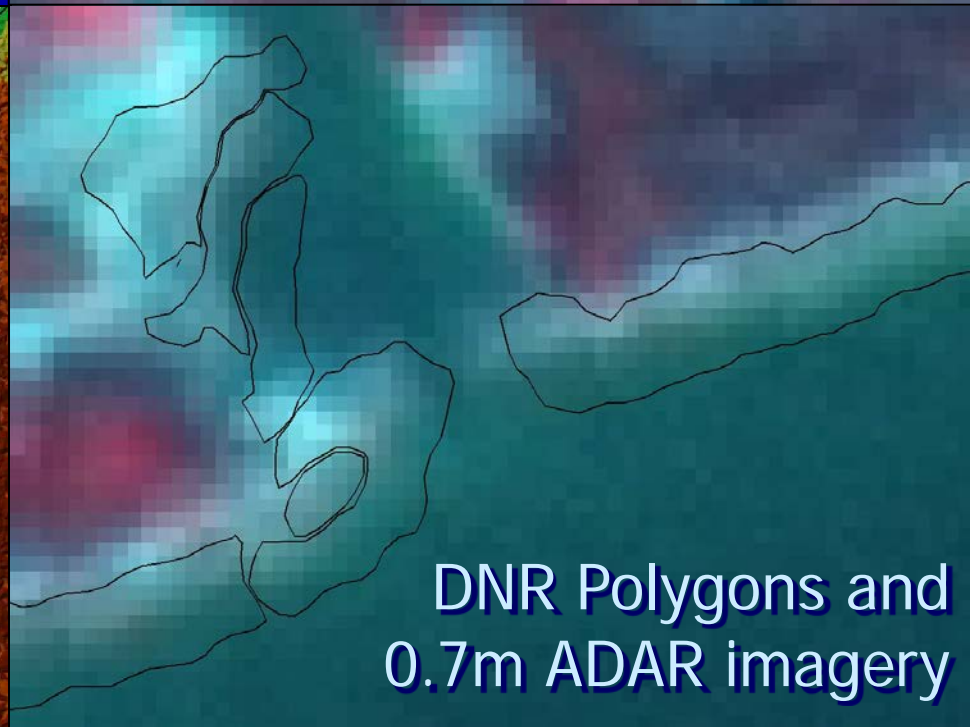
# Georeferencing the Data



LIDAR and ADAR



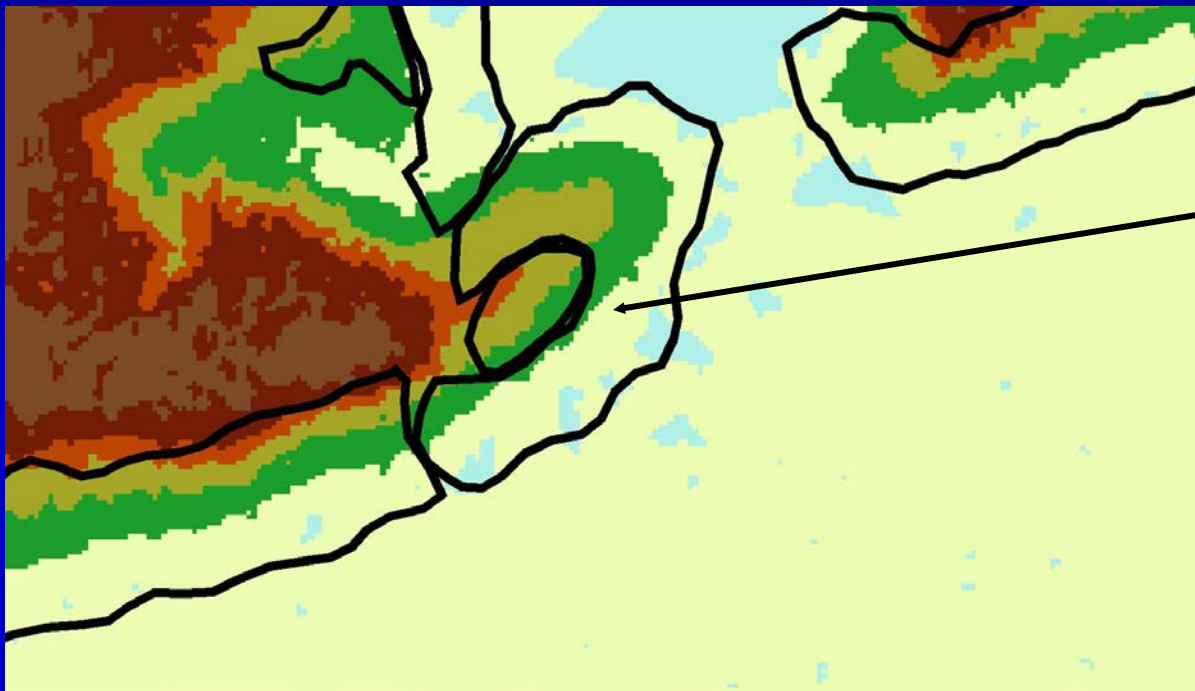
DNR Polygons  
And LIDAR TIN



DNR Polygons and  
0.7m ADAR imagery

# Field Data Precision

- Verifying accuracy of one cell, classified as mud or oyster, using large polygons of reference data



Grid cell may be classified as mud but falls within an "oyster" reference polygon



# Future Work

- More field data!
- Pursue intensity values for land cover mapping
  - Strata/reef types
  - Live/dead
- Roughness in elevation and intensity