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Virginia Institute of Marine Science

Plans and progress for preprocessing aerial imagery to support SAV monitoring

27/June/2019

STAGES FOR IDENTIFYING SEAGRASS

Step1

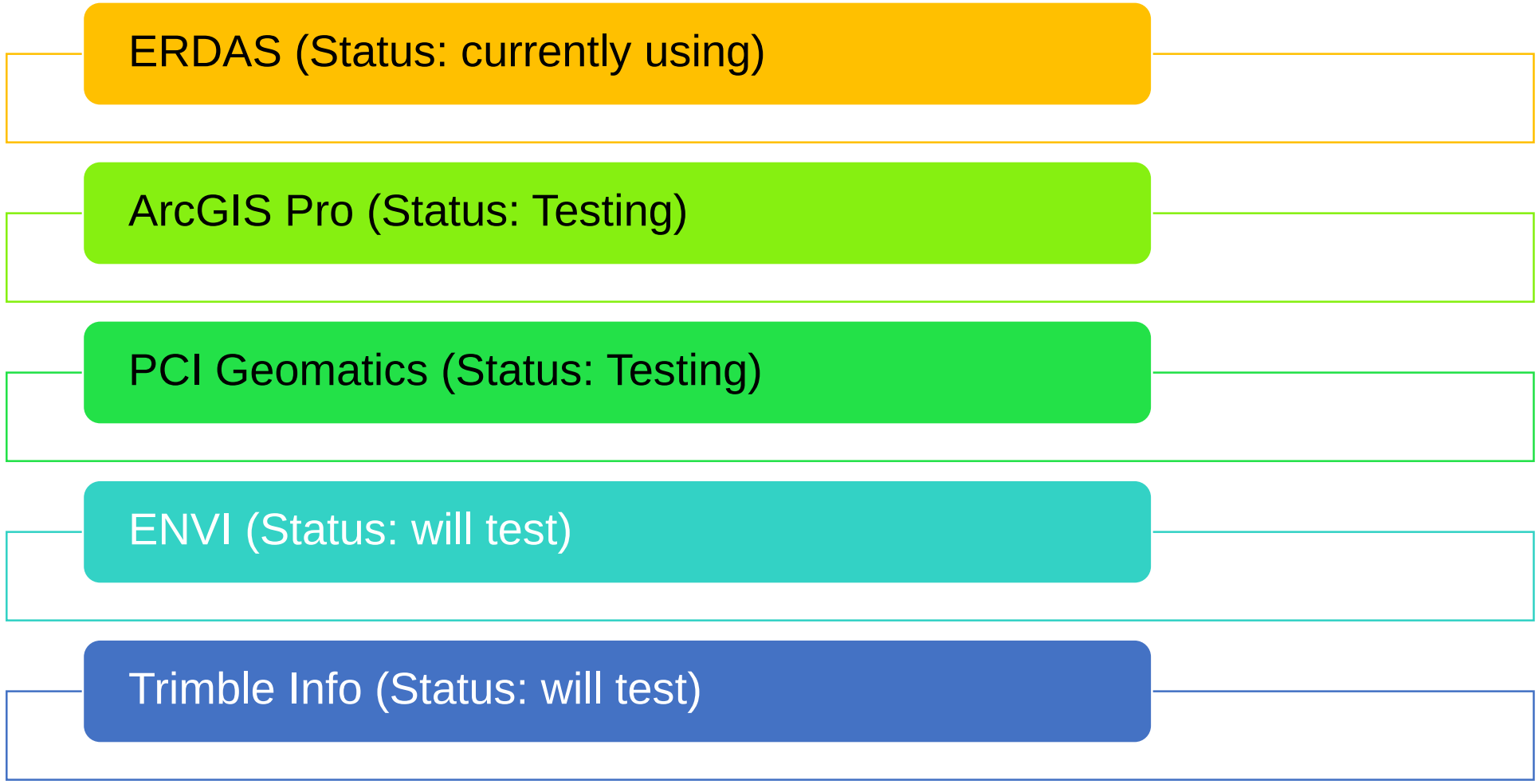
- Georectifying aerial imagery

Step 2

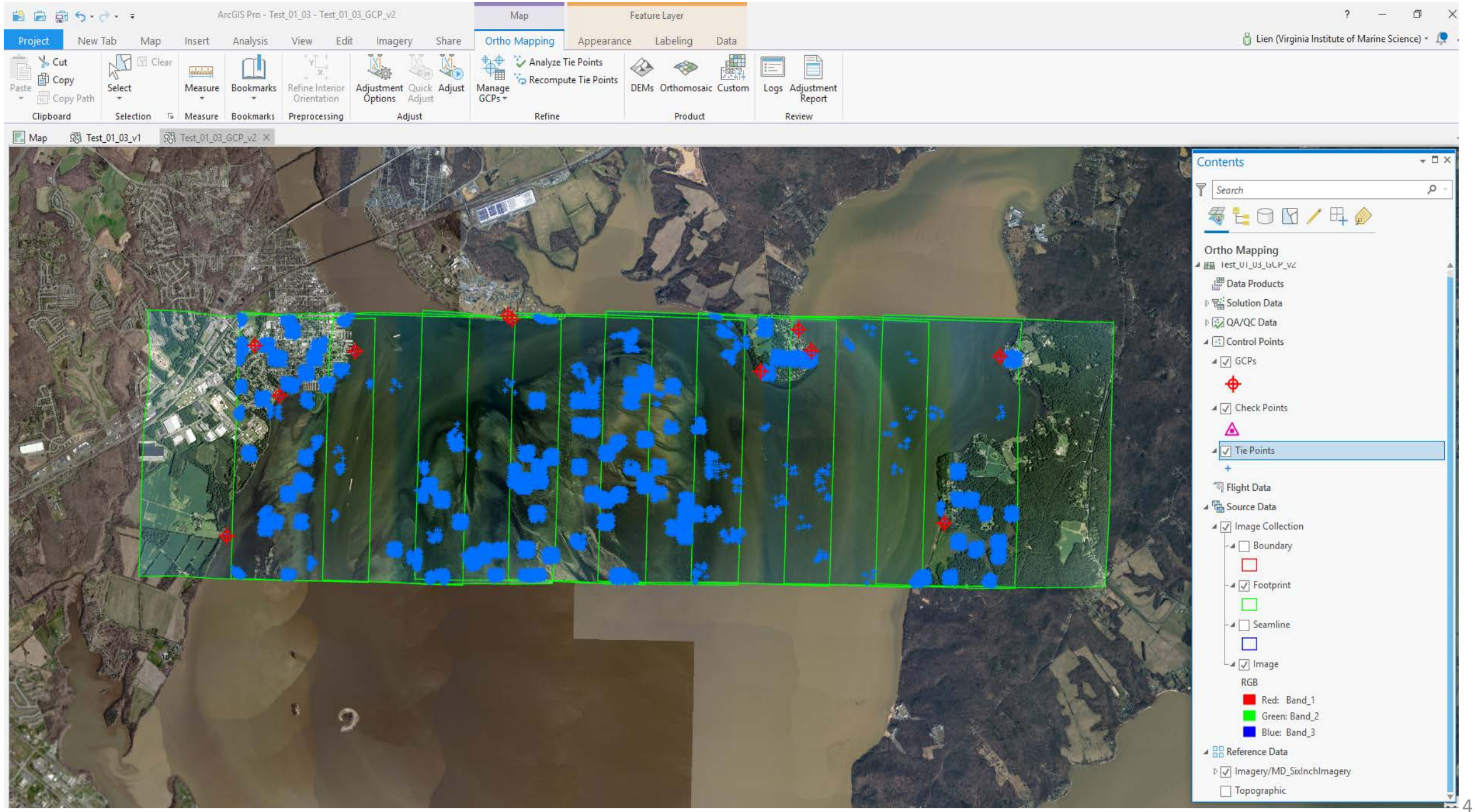
- Automatically classifying SAV

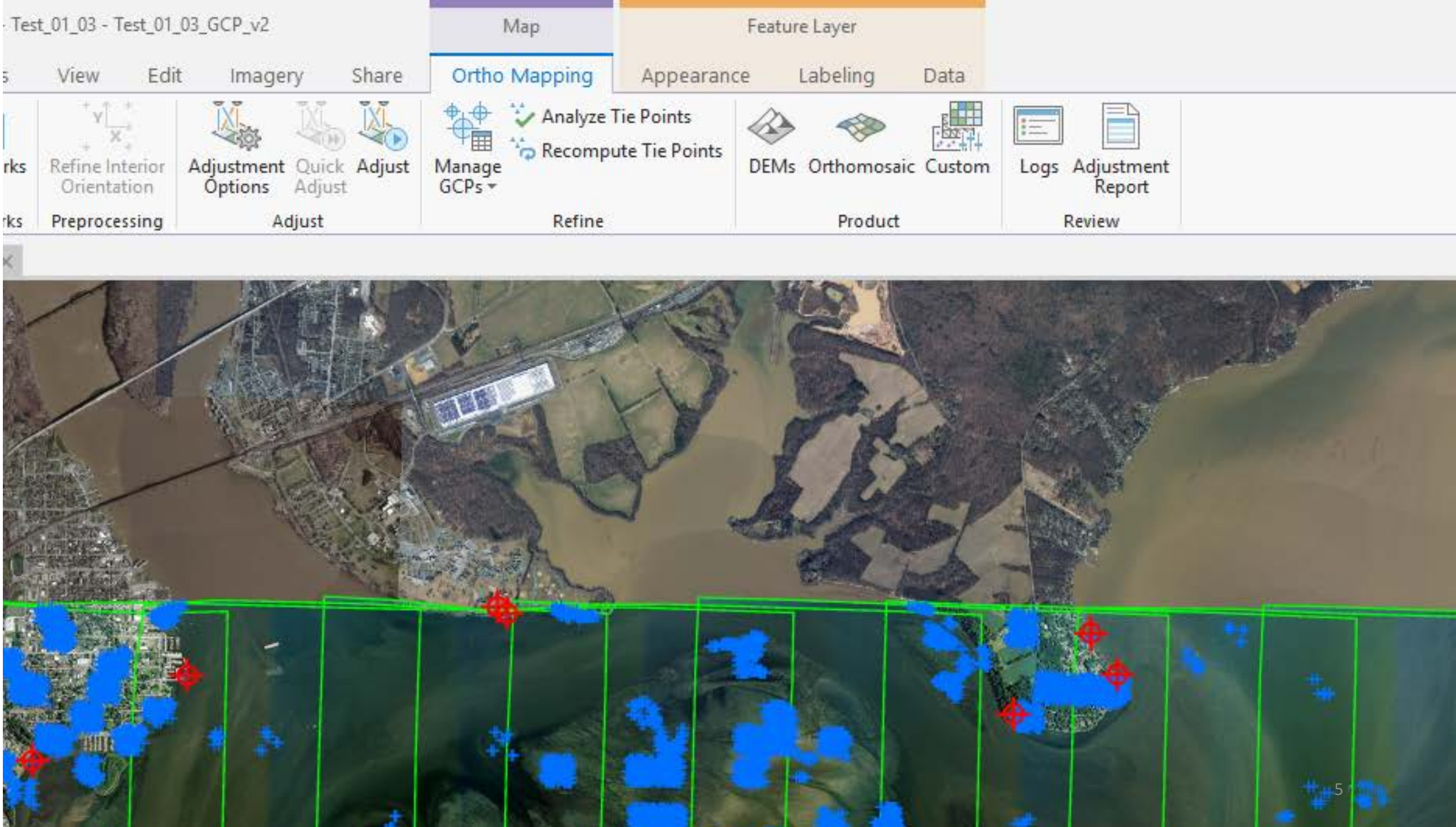
Georectifying aerial imagery

- Different packages provide block aerial triangulation tools

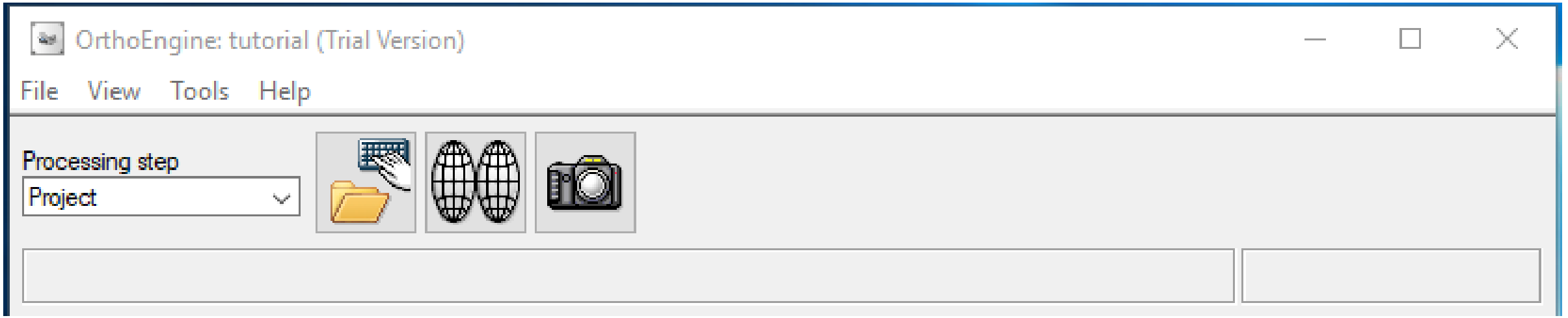


ARCGIS PRO VERSION 2.3 (Ortho Mapping)

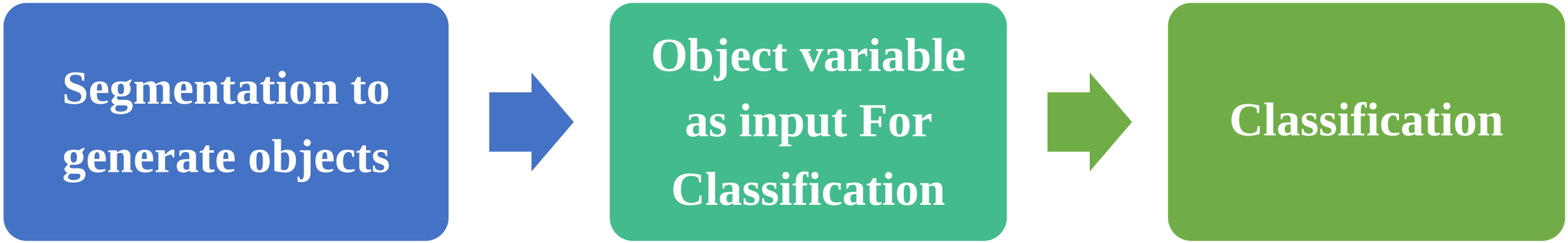



Test_01_03 - Test_01_03_GCP_v2
Map
Feature Layer
View
Edit
Imagery
Share
Ortho Mapping
Appearance
Labeling
Data
Refine Interior Orientation
Preprocessing
Adjustment Options
Quick Adjust
Adjust
Adjust
Manage GCPs
Analyze Tie Points
Recompute Tie Points
Refine
DEMs
Orthomosaic
Custom
Product
Logs
Adjustment Report
Review

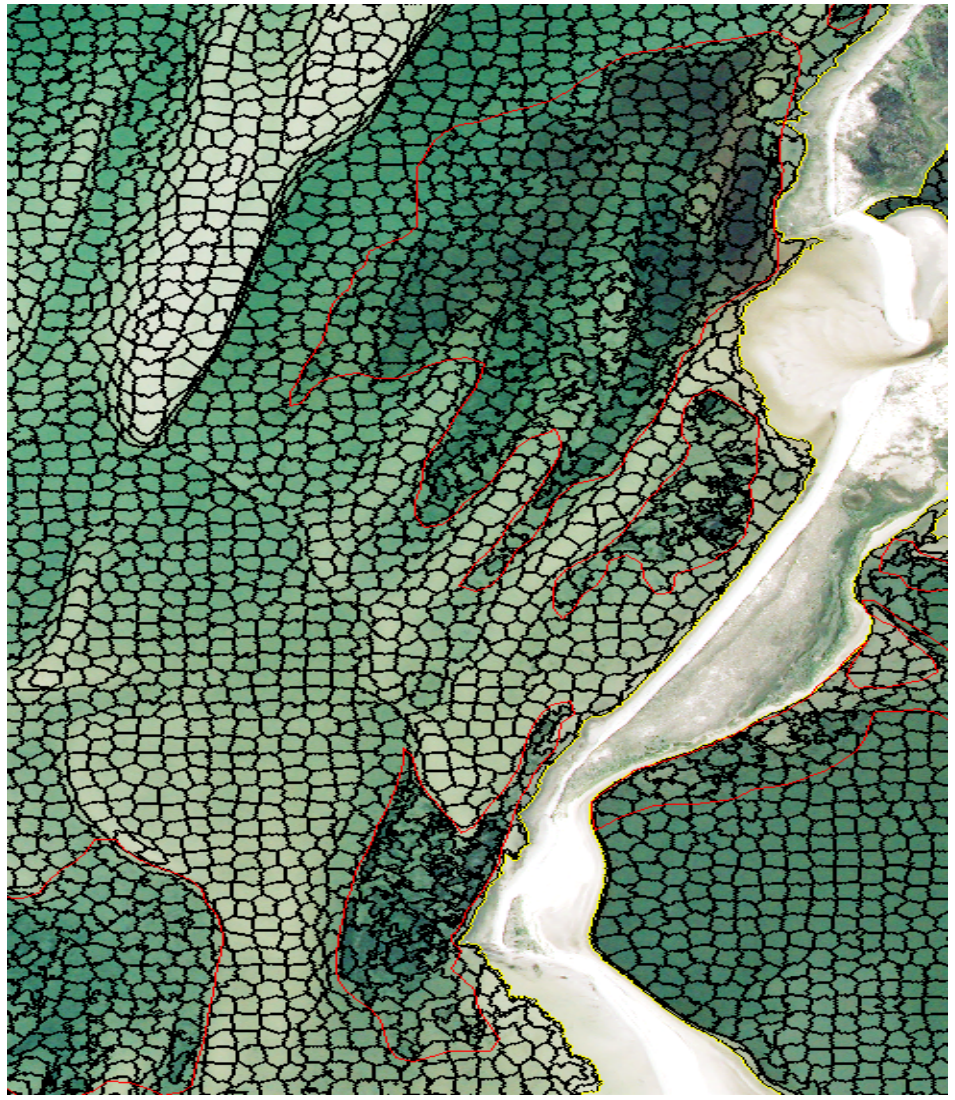
PCI GEOMATICS - OrthoEngine



Object-based image analysis

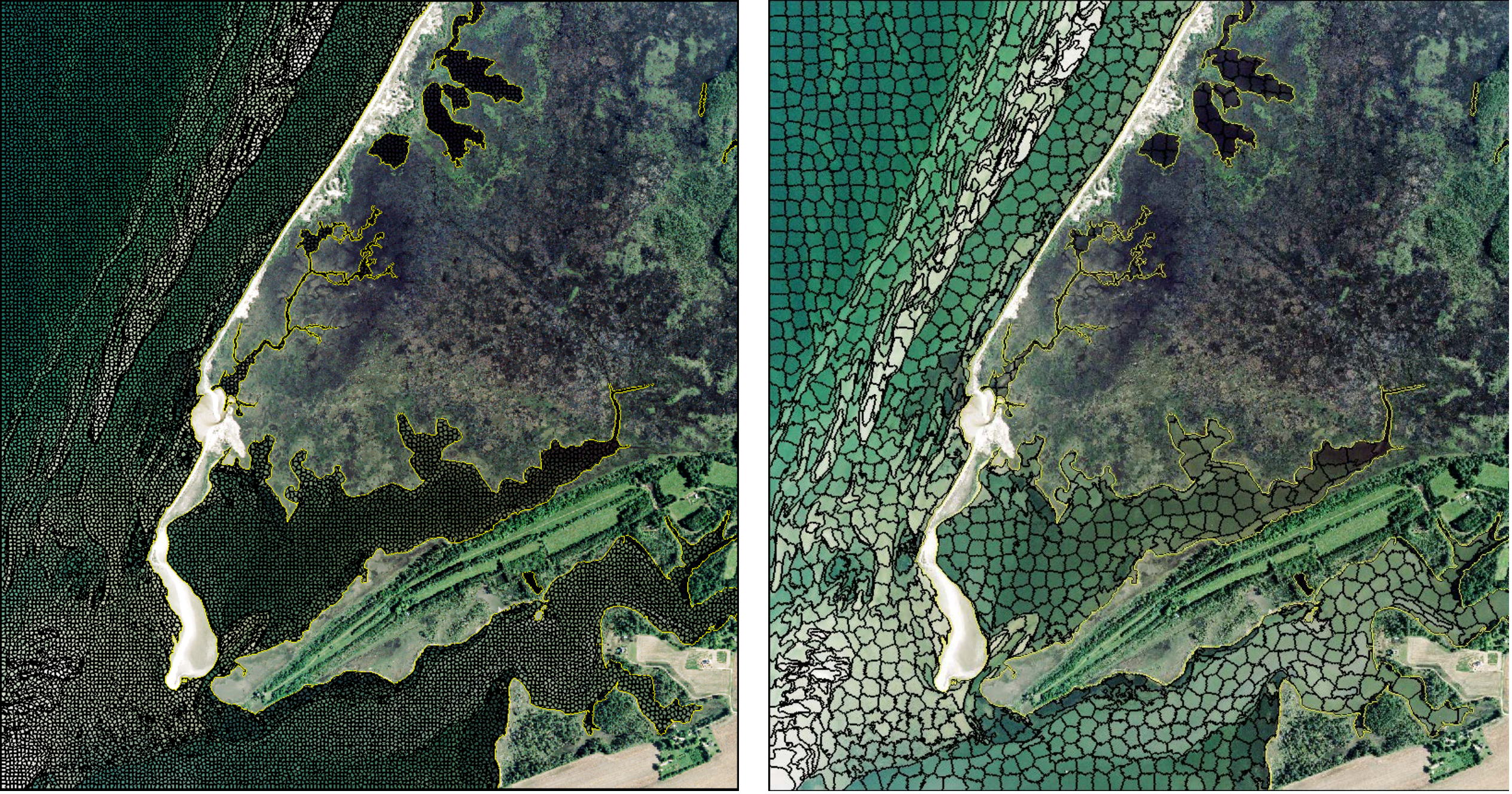


1. SEGMENTATION TO GENERATE OBJECTS



- MASKING TERRESTRIAL VEGETATION
  - 04.094 remove_vege_clip=auto threshold on NDVI
  - 09.907 creating 'New Level': unclassified <= remove_vege_clip < mask_vege on NDVI

- SEGMENTATION AND CLASSIFICATION
  - SLIC (simple linear iterative clustering)
    - 03:07.938 unclassified at New Level: superpixel segmentation SLIC on blue, green, nir, red



SLIC segmentation region size 50 - 200

2. OBJECT VARIABLE AS INPUT FOR CLASSIFICATION

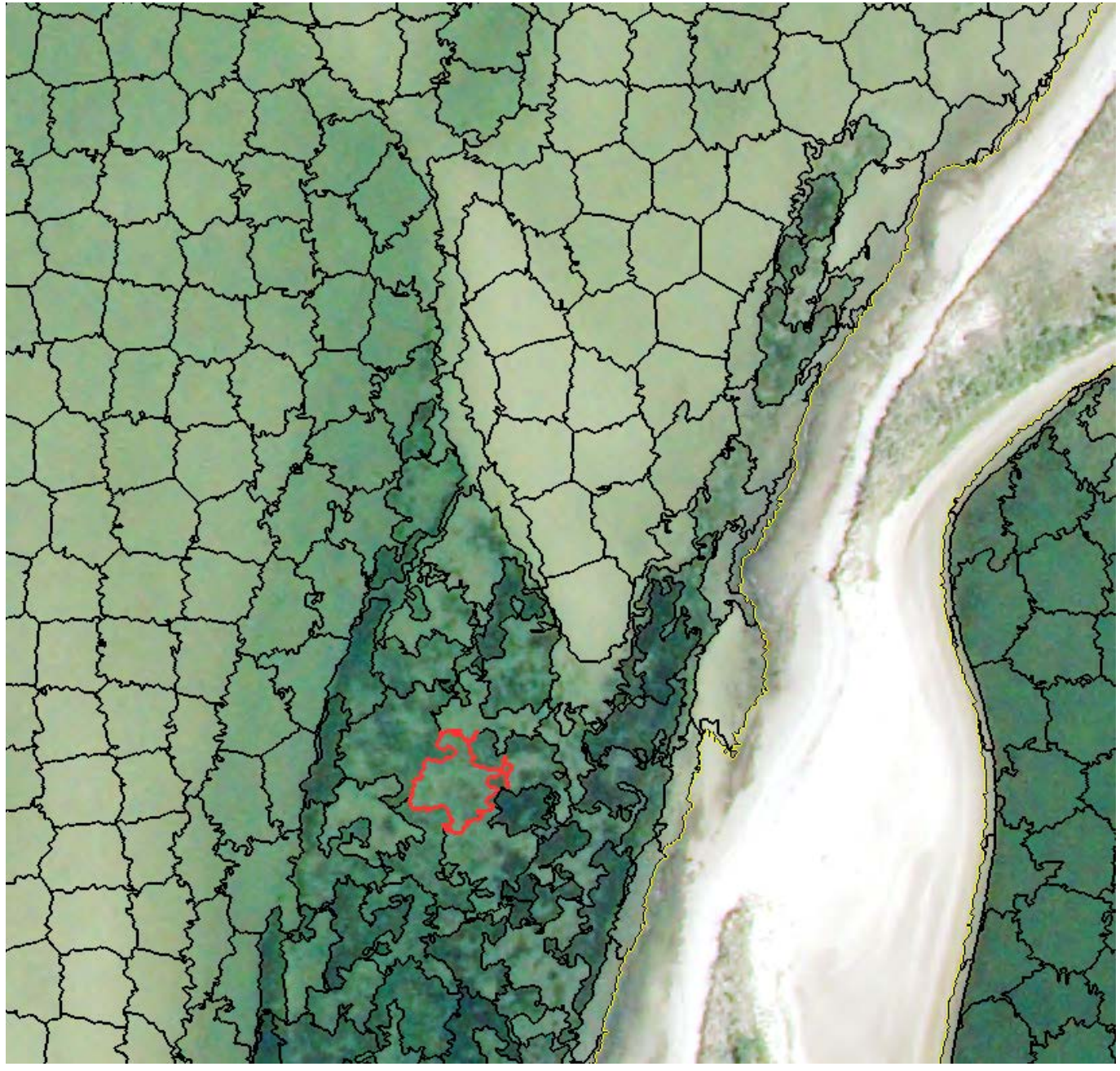
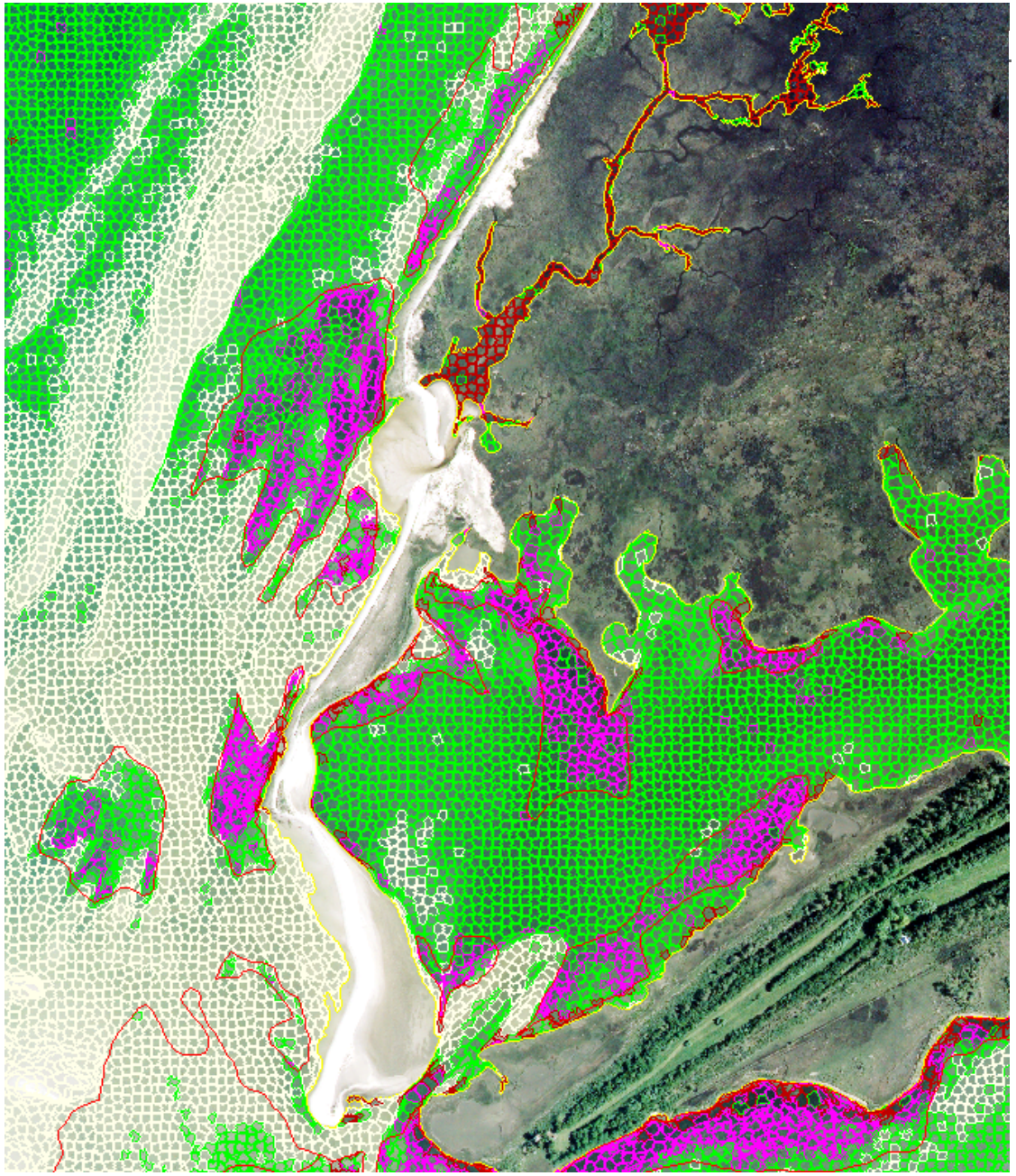


Image Object Information

Feature	Value
Image Object Related Features	
Layer values	**Mean**
blue	105.4787752
green	157.6861517
nir	10.7936674
red	134.4352818
GLCM Homogeneity	**Direction 0°**
blue	0.0837594
green	0.1023448
nir	0.7348371
red	0.0654950
GLCM Contrast	**Direction 45°**
blue	721.2111365
green	647.7102578
nir	1110.6161151
red	1024.6726046

Number of object variables: 177 variables

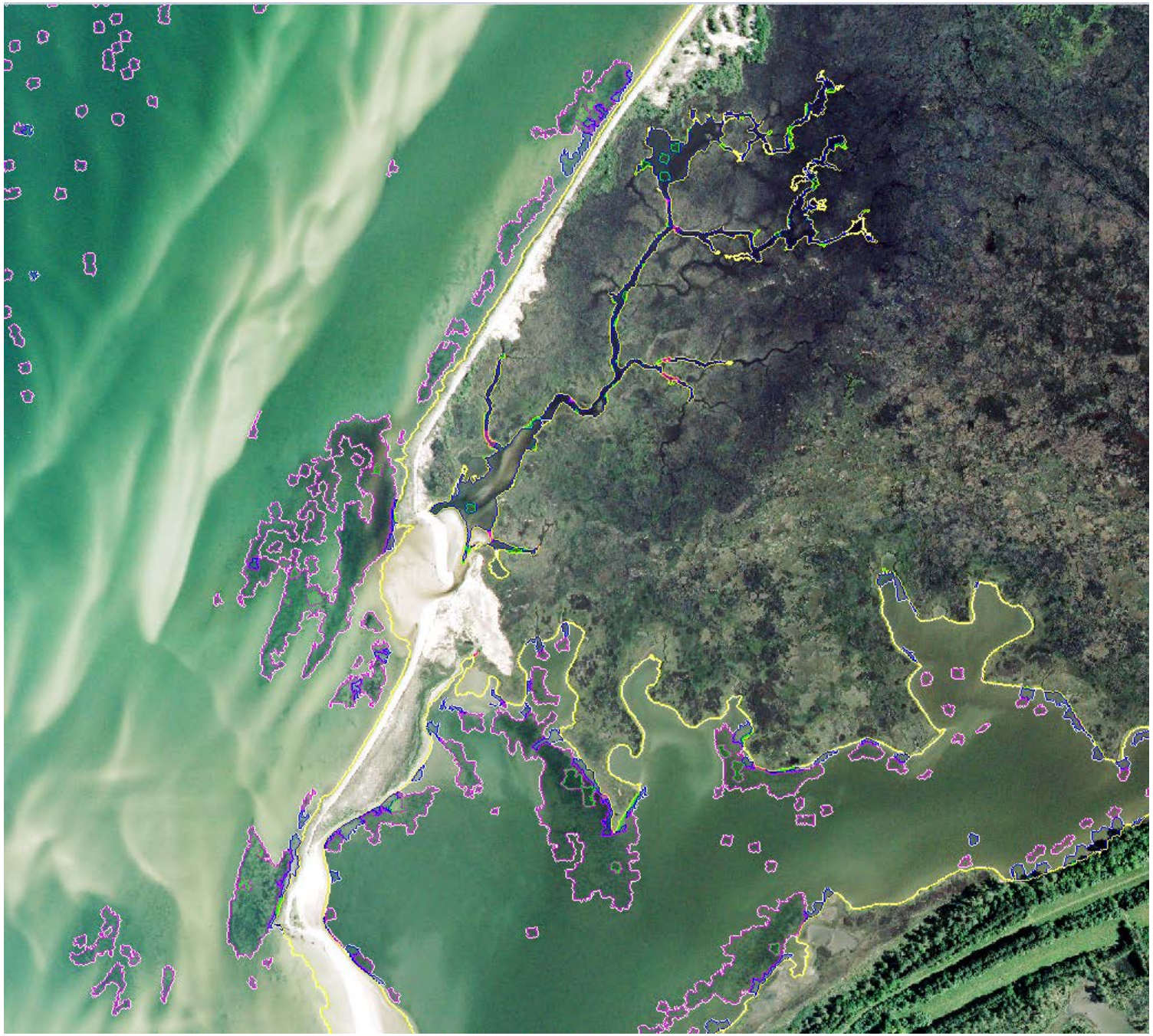
3. MACHINE LEARNING ALGORITHM FOR CLASSIFICATION



- 06.125 RANDOM FORESTS
  - 0.875 deep_water, non_sg, sand, sg at New Level: classifier: train random trees using GLD
  - 04.937 unclassified at New Level: classifier: apply
  - 0.313 classifier: query random trees

- classes
  - low_sg
  - mask_vege
  - non_sg
  - sand
  - deep_water
  - sg

Feature	Importance
GLDV Ang.2 green 0	0.049134113
GLDV Ang.2 green 45	0.042690296
GLDV Ang.2 green 90	0.040877972
GLDV Ang.2 red 0	0.040575918
GLDV Ang.2 red 90	0.034232784
GLCM Ang. 2nd green 0	0.034232784
GLDV Ang.2 green 135	0.034132101
GLDV Ang.2 red 135	0.029903343
GLDV Ang.2 red 45	0.02980266
GLCM Ang. 2nd green 45	0.029198552
GLCM Ang. 2nd green 90	0.025171164
GLCM Ang. 2nd green 135	0.024365688
GLCM Ang. 2nd red 135	0.018928716
GLDV Ang.2 nir 0	0.016814338
GLCM Ang. 2nd red 45	0.016411599
GLDV Ang.2 nir 135	0.016310915
GLDV Ang.2 nir 90	0.01469996



deep water

masked objects

seagrass