USING UNMANNED AERIAL SYSTEMS TO CREATE A SPATIO-TEMPORAL CHARACTERIZATION OF A RESTORED BARRIER ISLAND IN TERREBONNE PARISH

Gary LaFleur, Jr.[1], Frank Yrle[1], and Balaji Ramachandran[2]
      [1]Dept of Biological Sciences, Nicholls State University, Thibodaux, LA, USA
      [2]Geomatics Program, Nicholls State University, Thibodaux, LA, USA

We have created a collaborative program to monitor the ecology and restoration of coastal Louisiana, particularly the Isle Derneieres Barrier Islands Refuge in Terrebonne Parish. Here we report results from using a lightweight fixed-wing rover to obtain over 2,000 high resolution images in true color and near infrared of a section of Trinity Island over one year. An orthomosaic was created with uniform scale and a monochrome image depicting island elevation with a Digital Surface Model. We compared images from satellite and sUAS for their ability to provide resolution of vegetative species. We also compared three different image classification techniques. Unsupervised classification was quick and efficient at extracting non-vegetation classes from the environment. Maximum likelihood and object-based techniques were then used to classify island vegetation including Black mangrove *Avicennia germinans*, Smooth cordgrass *Spartina alterniflora,* and Marshhay cordgrass *S. patens*. We found that *A. germinans* was the dominant vegetation class, accounting for 27.09% of the study area at 11.47 ha. The next most abundant vegetation class was *S. alterniflora* at 16.60% of the study area or 7.03 ha. Both species were primarily located within the leeward marsh. With a coverage of 7.98%, *S. patens* occurred at the southern dune swale portion of the study area and comprised 3.38 ha. Object-based classification resulted in the highest overall classification accuracy for the winter (75.68%, Kappa 0.70) and spring datasets (69.35%, Kappa 0.63), while maximum likelihood resulted in the highest overall classification accuracy for the fall dataset (74.32%, Kappa 0.68). We expect that sUAS will continue to increase in their effectiveness as on-demand, small-scale, high resolution monitoring tools for coastal studies. Based on our results major vegetation types can be extracted at a high resolution and an acceptable degree of accuracy. Our project was supported by the Terrebonne Parish Consolidated Government and NEI.