

Land-Cover Models and Invasive Species Detection in the Virginia Coast Reserve from Airborne Hyperspectral Imagery

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ABSTRACT

Land-cover models derived from two airborne hyper-spectral sensors, HyMAP and PROBE2 are compared. Our primary study area is the Nature Conservancy's Virginia Coast Reserve (VCR), a chain of barrier islands on the Eastern Shore of Virginia. Our investigation focusses on a time-series of hyper-spectral imagery acquired at four times during the growing season on six of the Barrier Islands in the VCR. Results have been validated by our ground surveys using differential GPS. These surveys have also recently included the collection of in-situ field spectra with an ASD FR portable spectrometer, which has a similar spectral range to that of HyMAP and PROBE2. The land cover on these barrier islands is quite varied, ranging from beach and dune vegetation to marshes and dense upland thickets. In the present study, models with twenty categories were derived using a variety of supervised and unsupervised classification methods. Seasonal comparison of results favors the imagery acquired in October at low tide as the best time and tidal stage for discrimination of land-cover, while composite models derived by two different methods show that using multi-season data can improve classification significantly. In particular, multi-season models can be used to reduce the false alarm rate for a number of important categories treated by our models, including the invasive plant species *Phragmites australis*. Tradeoffs exist between the degree of improvement in composite algorithms and their optimization time.