Geophysical Research Abstracts
Vol. 14, EGU2012-6345-1, 2012
EGU General Assembly 2012

The State of Health of Nature Reserves: A Case Study using the Fusion of Hyperspectral and Lidar Data

J. Filski
George Mason University, Fairfax, Virginia, United States (filj333@gmail.com)

The primary dangers to nature reserves are from human activities such as oil spills, farming and urbanization. The relevance of fusion between high resolution hyperspectral reflectance data and Light Detection and Ranging (lidar) data to determine the state of health of nature reserves is illustrated. The study area covers 0.384 square kilometers within the Lower Suwannee National Wildlife Refuge in the Big Bend region of the State of Florida's Gulf Coast in the United States of America. Hyperspectral processing and analysis is conducted using the Environment for Visualizing Images (ENVI) 4.7 Service Pack 2. The materials with the top eight fractional abundances are investigated. Together, these bands represent over 95% of the full scene. Hyperspectral data ranging from 395 nm to 2,450 nm classifies geomorphologic features, primary vegetation types, and vegetation stress. The lidar data assists with feature identification and gauging vegetation roughness. Today's remote sensing sensors acquire ephemeris data concurrently with their image data to permit accurate georeferencing to map coordinates. Successful fusion between the hyperspectral and lidar data is achieved with the georeferencing capabilities of the ENVI software. The analysis of the fused data set reveals the main components shaping the study area's ecosystem as limestone, sea water intrusion and sunshine. The study area has three environments: a southernmost low-lying area closest to the Gulf of Mexico and therefore, frequently inundated by sea water where cordgrasses thrive; a middle transition zone that is more sea water-deprived and therefore more vulnerable to the damaging rays of the sun. It is here that the more resourceful but stressed black needlerush dominates; finally a northernmost area with higher elevations of exposed limestone that protects a robust deciduous forest. Deciduous trees also appear in the lower zones but only where there is sufficient limestone to form islands or hammocks to prevent sea water inundation. No hydrocarbon-related pollution appears to be present. Overall, the scene is a functioning tidal marsh setting. Ground truth data, collected post-analysis, corroborates these observations. The data set is therefore a good baseline to compare to future survey results that may be conducted to investigate the possibility of hydrocarbon intrusion from the Gulf of Mexico. The fusion of hyperspectral and lidar data, two vastly different digital remote sensing data types, provides a powerful technology to add to the toolbox of conservation management of land.