D27 Remote Detection of Clandestine Mass Graves Using Field Spectroradiometer and Airborne Hyperspectral Data

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After attending this presentation, he attendees will gain an understanding of the fundamental concepts of remote sensing technology, and more specifically of hyperspectral data as it can be applied to forensic investigations such as the detection of clandestine graves.

This presentation will impact the forensic science community and/or humanity by demonstrating the utility of hyperspectral data with pattern recognition techniques to locate a mass grave by means of differentiating its spectral reflectance from the background in a tropical environment, going beyond simply locating “disturbance”.

Remote sensing, in the form of field spectroradiometry and airborne and satellite imagery has been relatively untested as an investigative tool in the location of mass graves. This form of remote sensing examines the reflected solar electromagnetic energy from the Earth’s surface with specialized sensors on the ground (i.e., field spectrometer), in the air (i.e., airborne imagery) or in space (i.e., satellite imagery). The unique manner in which different targets reflect the electromagnetic radiation over a series of wavelengths is referred to as a spectral signature. In this study, the focus is on examining the spectral signature of an experimental animal proxy mass grave from field and airborne hyperspectral data in a tropical moist forest environment. With over one hundred bands (narrow wavelength regions) recorded in the visible to the shortwave infrared wavelengths (i.e., 400-2,500nm) specific features in the reflectance data that may be characteristic of the spectral response of the grave in comparison to a variety of soil/ground disturbances from field data or land covers such as pasture, forest, etc. from airborne imagerycan be examined. The spectral response of the grave and a variety of soil/ground disturbances over a period of sixteen months from field spectra with a combination of standard machine learning techniques was examined. The airborne imagery, collected one month following experimental set-up was examined in *n*-dimensional space to isolate the spectral response of the grave. A clear separability between the spectra of the grave and the disturbed soils/ground throughout the sixteen month period was found. Distinct characteristics in the spectral response of the grave versus other targets in the landscape from the airborne imagery were also found. In addition, other observations show that vegetation regeneration was severely inhibited on the grave in comparison to disturbed soils. At the sixteen month period when the regeneration was sufficient to collect leaf samples, we examined in detail leaf-level spectra from grass growing on and off the grave with the same analysis techniques; the spectra were separable with minimal error and may be explained by differences in the chemical characteristics of the soil.

Remote Sensing, Cadaveric Decomposition, Spectrometry

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