

MINERAL IDENTIFICATION IN TROPICAL SOILS BY IMAGING SPECTROSCOPY

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On August 1995, at the peak of the regional dry season, AVIRIS (Airborne Visible/InfraRed Spectrometer) data were collected in central Brazil in 224 contiguous bands (less than 10 nm in width), in the 400-2500 nm interval. The radiance data were converted into surface reflectance values through the use of a MODTRAN-based method. The study area, characterized by intense agricultural activities, was selected to evaluate the potential of Imaging Spectroscopy to identify some minerals from the groups of iron oxides (e.g., hematite and goethite) and clays (e.g., kaolinite, montmorillonite, and gibbsite) in the scene. For this purpose, the Spectral Feature Fitting (SFF), a least squares based-technique, was used in the comparison of the image reflectance spectra with the spectral response of some reference minerals provided by the Jet Propulsion Laboratory spectral library. For each mineral group, the analysis was performed at selected spectral intervals, in the VNIR (iron oxides) and SWIR (clay minerals), around the main diagnostic absorption bands. A continuum removal process was applied in order to normalize spectra from both datasets at these intervals and, thus, to highlight spectral variations associated with the absorption features. The results show that the soils in the study area are spectrally dominated by the presence of hematite and kaolinite. However, the mineral identification process in supposedly exposed soil surfaces can be affected by pixel contamination due to the presence of residues of photosynthetic or nonphotosynthetic vegetation.