SPECTRAL IDENTIFICATION OF IMAGE ENDMEMBERS DETERMINED FROM AVIRIS DATA

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ABSTRACT

Experienced scientists can easily identify materials based on their visible/infrared reflectance spectra using field or laboratory instruments. Imaging spectrometry (hyperspectral data) also allow identification of materials using spectroscopy, however, these data typically consist of hundreds-of-thousands of spectra, so which spectra do you identify? Some researchers have taken the approach of matching every spectrum in an image to a spectral library. This works well when pure materials are present on the ground and all of the materials are contained in the library. In real-world situations, however, where materials are spatially or intimately mixed, only the strongest features are matched. In this case, it's also not possible to have all of the possible mixtures in the library, and thus the above approach will only "identify" the predominant material, if any material at all. The research described here concentrates on identifying only the purest spectra extracted from the hyperspectral data. After applying data reduction and endmember extraction methodologies, the endmember spectra are used in an automated identification procedure based on analysis of spectral features. This approach has an improved likelihood of success because; 1) the best endmember spectra have already been extracted for analysis, 2) the extracted endmembers are mean spectra and thus have improved signal-to-noise over single spectra, 3) these spectra are typically one material (no mixing), 4) not every spectrum in the image needs to be analyzed. Once the individual endmembers have been identified, then a variety of mapping methods can be used to map their spatial distributions, associations, and abundances.