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SPECTRAL CHARACTERIZATION OF IRON OXIDE AND ORGANIC MATTER INTERACTIONS IN ERODED SOILS

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ABSTRACT

Recent advances in providing spectral reflectance data of soils indicates that remote sensing techniques may be an excellent tool for delineating and monitoring soil erosion. The accurate classification of multispectral data requires that the classes of interest be spectrally, or otherwise separable. The goal of classifying soil erosion rests on our ability to define and understand the nature and degree of separability between classes of erosion. The results of previous research efforts are testimony to the extreme complexity of the interactions of many variables in determining a soil's reflectance characteristics. This complexity within soils themselves coupled with the often localized nature of soil erosion makes the accurate delineation of eroded areas with remote sensing techniques a challenging objective.

The study of eroded toposequences and simulated erosion profiles has lead to the development of an approach for examining the relationship between soil reflectance properties and erosion. The most important factors affecting the spectral response of soils in this study appear to be iron oxide and organic matter contents. The interaction of these two factors within an eroded soil has a significant effect on the shape of the overall spectral response, and thus determines the degree of separability between erosion classes.

In addition, detailed methods using the Cary spectrophotometer are being evaluated for defining the spectral properties of eroded soils. Results indicate that rapid information can be provided for spectral characterization of iron oxide and organic matter interactions in soils. The application of derivative functions in quantifying the shape of a soil's spectral response shows great promise in answering the questions of whether or not, and to what degree, eroded soils are spectrally separable. From this basic information the ultimate goal of accurately delineating and monitoring soil erosion with remote sensing techniques can be assessed.