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SINGLE CLASS STEPWISE LINEAR DISCRIMINANT ANALYSIS OF LANDSAT-4 THEMATIC MAPPER DATA

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ABSTRACT

Technical questions have been raised as to the applicability of computer programs, algorithms, and procedures currently in use for land cover/land use multispectral classification of MSS data to Thematic Mapper (TM) data with its increased spatial and spectral resolution. A full scene, four band MSS image contains approximately forty-three million bytes of data as compared with the almost three hundred megabytes of information for a single TM scene. Computer programs, hardware architecture, operation and integration systems and procedures developed with the anticipated processing needs of unique or limited multi-dimensional data may not suffice for TM with its increased spectral bands and spatial resolution. Significant data reduction problems occur.

Past research at the Jet Propulsion Laboratory (JPL) has shown that a multiple class stepwise linear discriminant analysis is a useful technique for reducing the amount of data that needs to be processed in performing land cover/land use classification with Thematic Mapper images under a modulated set of conditions. However, using a multiple class technique to gather statistics on band orderings and band contributions lead to unacceptable inaccuracies in classified output products. Single class analysis holds promise to overcome these inaccuracies, and consequently shows the capacity to increase accuracy of multispectral classification.

A single class stepwise linear discriminant analysis has been conducted on two Landsat-4 Thematic Mapper images at the USGS level II land cover/land use classification system. Comparison of results of the analysis of images in two different climatic zones, (Hartford, CT and Miami, FL) suggest that the applicability of band orderings and band contributions to other Thematic Mapper images can be made.