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APPLICATION OF A PRINCIPAL COMPONENTS ANALYSIS ON LANDSAT MULTISPECTRAL DATA FOR STUDIES ON VEGETATION COVER UNDER DESERT CONDITIONS

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Present day available satellite remote sensing technology offers the possibility of obtaining rapid and comprehensive information about the earth's natural resource base at relatively low cost. Especially for conventional data sparse and often inaccessible remote areas these new intelligence gathering techniques are of considerable interest. The present limited spatial and spectral resolution of the Landsat multispectral scanners poses a problem to the effective recording of low coverages of vegetal growth in desert environments. The spectral response from the vegetation is generally contaminated with the reflected radiation from the abiotic background.

This paper discusses the application of a principal components transformation on Landsat multispectral data for enhancement of small areas with low coverages of ephemeral vegetation in an arid environment.

In arid areas the four Landsat spectral bands exhibit a very high degree of correlation. This characteristic, combined with the basic differences between the spectral properties of vegetation and bare surface materials, makes that a principal components transformation on Landsat multispectral data can be successfully used as an image enhancement technique. By application of a principal components transformation, very low coverages of desert vegetation can be detected by visual analysis; such vegetation coverages cannot be extracted from false colour composite imagery constructed from original 4, 5, 7 channel data.

Utilization of a principal components analysis as a data reduction technique for multispectral data of arid areas is also demonstrated.