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DIGITAL IMAGE PROCESSING OF LANDSAT I MSS DATA SPECIFICALLY DESIGNED FOR LINEAR ENHANCEMENT IN SOUTHWESTERN JORDAN

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ABSTRACT

This study was designed to take LANDSAT-1 multispectral scanner digital data and use digital image processing techniques to highlight linears. Two computer processing techniques were used on the data: (1) two dimensional high-pass filtering of MSS bands 5, 6, and 7 and (2) the horizontal derivative of MSS band 6.

The primary objective of this research was to evaluate structural reconnaissance of an arid area in southwestern Jordan. Interpretive analyses indicate that the structural pattern appears to be much more detailed and complex than indicated by presently available maps. The types of lines that were identifiable as lineaments include faults, joints, fractures, topographic crests, lithologic contacts, bedding traces and flexures. A noticeable difference between published maps and maps from the high-pass filtered images is the number of long lineaments that have never been mapped as faults. High-pass filtered images displayed the largest linears in various lithologies. The horizontal derivative image proved to be an excellent data source for obtaining a perspective for the structural fabric.

LINEAR ATMOSPHERIC TRANSFORM ON LANDSAT MEASUREMENTS

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ABSTRACT

A problem exists when applying a set of ground training signatures determined under one atmospheric condition to the same area under another atmospheric condition. Sometimes the training signatures need to be adapted to the atmospheric condition of the subject area before classification. Other times the radiance measurements of an area with variable atmospheric conditions need to be adjusted to a common atmospheric condition before classification.

In order to describe the effects of the atmosphere on the ground-reflected radiance measured by the LANDSAT-1 satellite, a radiative transfer model was developed. The model is a combination of a doubling model, which describes the effects of molecular and aerosol scattering in the atmosphere, and a scaling-approximation absorption model which takes into account the gaseous absorption due to oxygen, ozone and water vapor in the LANDSAT-1 spectral region.

The model indicates that atmospheric effects can be approximtaed by linear transforms. The transform shows that the atmosphere always degredes the albedo difference but not necessarily the color difference. Signature transformations of Lambertian surfaces due to changes in the atmospheric condition can be determined.