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UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Department of Geological Sciences, AJ-20

April 22, 1981

Dr. Joe Vitale
NASA Technical Officer
ETS 6
NASA Headquarters
Washington, D.C. 20546

Dear Joe:

This letter is our semi-annual report covering the first six months (1 October, 1980 to 31 March, 1981) of research under NAGW-85 (Geological Remote Sensing: Identification and Mapping of Rock Types for Non-renewable Resources). This, of course, has been a tooling-up period, involving hiring new people, organizing new tasks and setting up facilities. Notable accomplishments are the successful search for a computer and image-processing specialist--Milton Smith--and the acquisition and initial operation of our image-processing system. The hardware was purchased with funds from other sources, however, the current grant has made it possible to hire the personnel. We have obtained an LSI 11/23 computer-based system with a DeAnza image processor and associated hardware. Milton Smith had the system running the day it arrived, and, after six weeks, we can do a variety of sophisticated manipulations of digital images including LANDSAT tapes. The new capabilities have generated great excitement within our research group and also in the Department of Geological Sciences in general. Diane Evans and Tom Farr, both Ph.D. candidates in our group, are already using LANDSAT images produced by our new system in their research. (Previously, we have used the JPL image processing facilities.)

During the past six months we have concentrated much of our research effort on a new technique for relating laboratory spectral reflectance curves of known rocks and vegetation to LANDSAT multispectral images. The technique used in this study involves determination of the laboratory spectral signature of a material of interest and searching a stack of spatially registered multispectral images for materials with the desired spectral signature. A relatively simple atmospheric correction was employed that combined the effects of gaseous absorption, Rayeigh and anisotropic scattering. Using this correction, we found that laboratory spectral reflectance measurements of surface samples from Hawaii can be used for mapping of similar material over many square kilometers in the Hawaii LANDSAT frame and that correspondence with the known geology is excellent.

Changes in spectral reflectance caused by vegetation cover were also investigated in the Hawaii LANDSAT study. A checkerboard model was used with laboratory reflectance spectra of surface samples and vegetation as the two components.

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These preliminary investigations indicate that it is possible to account for mixtures of vegetation and rock with laboratory spectra so that some vegetation cover can be accounted for when searching for a material of interest.

In summary, the first six months have been exceptionally productive, and opened the way for a very interesting line of research where we will be searching LANDSAT multispectral images for lithologies that we have characterized in the laboratory. This is an important step in identifying rock types in remote sensing images.

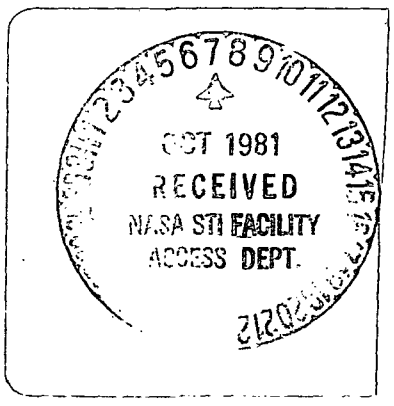
We look forward to hearing from you if you have questions.

Best regards,

John B. Adams
Professor/Chairman

JBA:SRS

Enclosure (Comparison of Laboratory Reflectance Spectra and Landsat Multispectral Images of Hawaiian Lava Flows)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