Integration of Remotely-Sensed Geobotanical and Structural Methods for Hydrocarbon Exploration in West-Central West Virginia

**Quarterly Report
November 1, 1995 - January 31, 1996**

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1. Satellite Image Acquisition

The satellite image acquisition, which took much longer than anticipated, has now been completed. Image rectification is proceeding accordingly. The entire October 18 1995 image has been georeferenced, whereas for the other images only the test sites have been rectified. For the October 18 image, a second order transformation was utilized with approximately 40 ground control points, and an estimated error of less than one pixel. The cloud problems referred to in the previous report (Quarterly report August 1 - October 31, 1995) are limited to areas of little significance to this project. One disappointment is that the Landsat satellite path has apparently drifted over time, and the Equitrans storage site in Lewis County was not imaged in the October 18, 1995 image acquisition. Fortunately the Equitrans site was imaged in the September 20 1985 acquisition, and therefore we can use that data for the Lewis County analysis. The September imagery does not provide as much discrimination between different vegetation types, although it more clearly shows the vegetation anomaly referred to the previous report.

2. Lineament Analysis

The April 19, 1987 image was selected for lineament analysis. This image was acquired prior to forest leaf-out, and consequently there are few distracting variations in forest cover. However, pasture was green at this time, and this does provide some contrast with the forested areas. In order to improve the detection of lineaments, a 3 by 3 high pass filter was passed over the data. The high pass information was multiplied by 0.2 and combined with the original image data multiplied by 0.8. This combination of high pass and original data preserves the tonal features of the image and also enhances sharp discontinuities. A standard false color composite was chosen (green displayed as blue, red as green and infrared as red) for display and analysis at a scale of 1:100,000 (see attached image). Two interpreters independently mapped lineaments on the images, and the results were overlayed. Only lineaments identified by both observers were recorded on the final lineament overlay.

3. Digital Elevation Data

Graduate student Kurt Donaldson (who is supported under NRCCE-provided money) has undertaken a major effort to develop a mosaic of USGS 1:24,000 digital elevation data, which is approximately at the same resolution as the 30 m Landsat TM data. He has collated all the DEM data already owned by the Department of Geology and Geography, and obtained copies of the data owned by WV Department of Environmental Protection. Unfortunately this combined set includes little of the area of interest to this study. However, a request has been made to the WV state-wide GIS technical support center to

purchase the additional data. If this is not available soon, I purchase the data independently. Digital elevation data should be very valuable for identification of topographic site classes.

4. Digital Geology

Kurt Donaldson has been collecting subsurface information (see the previous quarterly report). In addition, he has arranged the purchase of a photographic separate of the geological boundaries shown on the 1:250,000 WV geological map. He has now arranged for that to be scanned by a digitizing company. Kurt will then convert the raster data to vectors, and assign the attribute geology.

5. Equipment purchase

An application has been made to shift funds from the proposed spectrometer to a workstation. Field spectral measurements will instead be made by a GER MK IV spectroradiometer. Although this spectrometer is fairly heavy to move in the field, it is fully portable. The proposed new workstation should speed up processing time significantly.

6. Future work

The preliminary soil gas survey will be carried out as soon as possible once the soil has dried out somewhat. It is particularly desirable to undertake the survey prior to spring leaf-out, after which movement in the forest is much slower.